BE SMART
with
Van Hoorn Carbide

ToolOrganizer

THE VHVTR NOW PROVIDED WITH INTERNAL COOLANT
for milling stainless steel, titanium and superalloys

Simple, smart and efficient
Einfach, clever und effizient

The right amount of tools is always available at the right specified location. Inaccuracies in the stock are excluded. The endless search for tools is over!

Immer die richtige Menge an Werkzeugen am richtigen Ort. Ungenauigkeiten im Lager sind ausgeschlossen. Die endlose Suche nach Werkzeugen hat ein Ende!

READ MORE ABOUT THE TOOLORGANIZER AT PAGE 14

LESEN SIE MEHR ÜBER DEN TOOLORGANIZER AUF SEITE 14

WWW.HOORN-CARBIDE.COM

CHECK OUT OUR WEBSHOP
A VERY EASY AND FAST WAY TO ORDER

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COPERNICUSSTRAAT 2
6003 DE WEERT
THE NETHERLANDS
TEL. +31 (0)495 - 58 40 99
INFO@HOORN-CARBIDE.COM

VAN HOORN CARBIDE

2024 Van Hoorn Carbide

2024

VAN HOORN CARBIDE

NEW

Parabolic end mills, new deburring tools and end mills with internal coolant

VHVTRI

THE VHVTR NOW PROVIDED WITH INTERNAL COOLANT
for milling stainless steel, titanium and superalloys

Van Hoorn Carbide introduces the VHVTRI4+5. With these all-rounders with internal coolant you achieve even better performance!

Comparison VHVTR + VHVTRI
Workpiece Material: Stainless 316L

	VHVTR	VHVTRI
ø	6,0 mm	6,0 mm
V_c	80 m/min	120 m/min
n	4.244 rpm	6.366 rpm
F_z	0,07 mm/t	0,05 mm/t
Z	4	4
V_f	509 mm/min	1.528 mm/min
a_p	6,0 mm	6,0 mm
a_e	6,0 mm	6,0 mm
Coolant	emulsion	emulsion
Q	18,33 cm³/min	55,00 cm³/min

VHPM Material removal rate

MORE ABOUT VHVTRI AT PAGE 124

MEHR ÜBER VHVTRI AUF SEITE 124

Workpiece material / Werkstoffe

	Group / *Gruppe*	Properties / *Eigenschaften*
P	**P1.1**	**≤ 800 N/mm²**
	Very soft low-carbon steels, Purely firritic steels / *Kohlenstoffstahl, Ferritische Stähle.* Free-cutting steels / *Automatenstähle.*	
	P1.2	**≤ 1000 N/mm²**
	Steels (<0,5% C) / *Stahl (<0,5% C).* Steels (>0,5% C), low-alloy steels / *Stahl (>0,5% C), Kohlenstoffstahl.*	
	P1.3	**≤ 1400 N/mm²**
	Normal tool steel, High-alloy steels with high hardness / *Werkzeugstähle, Härtere Vergütungsstähle, Martensitische Stähle.* High-alloy steels, High strength steels, Martensitic stainless steels / *Hochgelegierte Stähle, Gehärtete Stähle.*	
H	**H2.1**	**42 > HRc < 50**
	> 42 - ≤ 50 HRC	
	H2.2	**50 > HRc < 55**
	> 50 - ≤ 55 HRC	
	H2.3	**55 > HRc < 70**
	> 55 - 70 HRC	
M	**M3.1**	**≤ 950 N/mm²**
	Stainless steel, Free-cutting stainless steel / *Rostfreie Stähle.*	
	M3.2	**≤ 1250 N/mm²**
	Difficult stainless steel, Austenitic and Duplex stainless steel / *Schwierige rostfreie Stähle, Austenit und Duplex.*	
K	**K4.1**	**≤ 800 N/mm²**
	Cast iron / *Guss.*	
N	**N5.1**	**Si < 5%**
	Aluminium Si < 5%	
	N5.2	**Si > 5%**
	Aluminium Si > 5%	
	N5.3	
	Copper, Copper alloys / *Kupfer, Kupfer legierungen.*	
	N5.4	
	Synthetics / *Kunststoffe.*	
	N5.5	
	Composites CFRP - GFRP / *Verbundwerkstoffe CFK - GFK.*	
	N5.6	
	Graphite / *Graphit.*	
S	**S6.1**	**≤ 1500 N/mm²**
	Fe-Superalloys / *Fe-Superlegierungen.*	
	S6.2	**≤ 1600 N/mm²**
	Co-Superalloys / *Co-Superlegierungen.*	
	S6.3	**≤ 1600 N/mm²**
	Ni-Superalloys / *Ni-Superlegierungen.*	
	S6.4	**≤ 1250 N/mm²**
	Titanium Superalloys / *Titanium Superlegierungen*	

webshop.hoorn-carbide.com
very easy and fast way to order

step 1 **Register your account**
Registrieren Sie Ihren Account

step 2 **We process your request**
Wir verarbeiten Ihre Anfrage

step 3 **When your request is approved, you can purchase directly**
So bald Ihr Account freigegeben ist, können Sie direkt bei uns bestellen

step 4 **Fast delivery, in-stock shipment within 24 hours**
Schnelle Auslieferung, aus Lager innerhalb von 24 Stunden

Großer Vorrat auf Lager 150.000 Premium Produkte	**Extra large stock** 150.000 premium products in stock
Technische Unterstützung von Anwendungstechniker von Ort	**Technical support** By on-site application engineers
Innovation durch F&E und hochwertiges Testzentrum	**Innovation** R&D and high-end test center
Führendes Wissen bez. Hardmetall, Geometrie und Beschichtung	**Leading technology** For each application suited solid carbide, geometry and coating
Standard schnelle Lieferung sogar schneller über Greenline innerhalb 72 Stunden	**Standard very fast delivery** Even faster by Greenline: specials within 72 hours

VAN HOORN CARBIDE

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formulas / Formeln

Spindle speed:

$$n = \frac{V_c \bullet 1000}{d \bullet \pi}$$

Feedrate:

$$V_f = F_z \bullet Z \bullet n$$

Cutting speed:

$$V_c = \frac{d \bullet \pi \bullet n}{1000}$$

Feed per tooth:

$$F_z = \frac{V_f}{Z \bullet n}$$

Material removal rate:

$$Q = \frac{a_e \bullet a_p \bullet V_f}{1000} \quad (mm^3/min)$$

Average chip thickness:

$$hm = Fz \bullet \sqrt{\frac{a_e}{d}} \quad (mm)$$

Effective diameter at ball nose end mills:

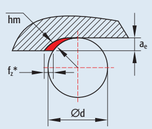
ß = 0: $d_{eff} = 2 \bullet \sqrt{d \bullet a_p - a_p^2}$

ß ≠ 0: $d_{eff} = d \bullet \sin\left[ß \pm \arccos\left(\frac{d - 2a_p}{d}\right)\right]$

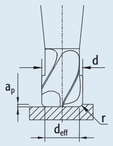
Effective diameter at torus end mills:

$$d_{eff} = d - 2r + 2 \bullet \sqrt{a_p(2r - a_p)} \quad (mm)$$

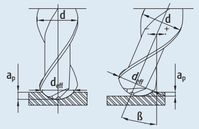
Average chip thickness



Effective diameter torus



Effective diameter ball nose

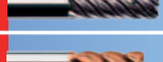
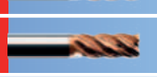


a_e :	Width of cut	mm
a_p :	Depth of cut	mm
V_c :	Cutting speed	m/min
F_z :	Feed per tooth	mm
V_f :	Feedrate	mm/min
d :	Cutting diameter	mm
Z :	Number of teeth	
hm :	Average chip thickness	mm

Index

Check our video here!
Schauen Sie sich unser Video hier an!

Product overview / Produktübersicht

		P1.1	P1.2	P1.3	H2.1	H2.2	H2.3	M3.1	M3.2	K4.1	N5.1	N5.2	N5.3	N5.4	N5.5	N5.6	S6.1	S6.2	S6.3	S6.4	Number of Flutes | Schneidenanzahl	Coating | Beschichtung	Size range | Durchmesserbereich	Page | Seite
VHPBTA											●	●	●	●	●						3	Uncoated	6,0 / 16,0	18
VHPBCA											●	●	●	●	●						3	Uncoated	6,0 / 16,0	18
VHPBTR		●	●	●	●			●	●	●							●	●	●	●	4-5	TiAlN GOLD	6,0 / 16,0	20
VHPBCR		●	●	●	●			●	●	●							●	●	●	●	4-5	TiAlN GOLD	6,0 / 16,0	20
VHAFA											●	●	●	●	●						3	Uncoated	6,0 / 16,0	24
VHAFS		●	●	●	◐			●	●	●	●						●	●	●	●	4-5	TiAlN GOLD	6,0 / 16,0	26
VHAFH				◐	◐	●	●														5	TiAlN GOLD	3,0 / 16,0	28
VHAFC		●	●	●	●			●	●	●	●	●	●	●	●		●	●	●	●	4	Uncoated	6,0 / 20,0	30
VHAFD		●	●	●	●			●	●	●	●	●	●	●	●		●	●	●	●	3-6	TiAlN+	6,0 / 12,0	32
VHPK						◐	●			◐											2	TiAlN+	0,1 / 12,0	36
VHPT						◐	●			◐											4	TiAlN+	0,2 / 12,0	40
VHPM						◐	●			◐											6-16	TiAlN+	3,0 / 20,0	46
VHPMR						◐	●			◐											6-16	TiAlN+	3,0 / 20,0	48
VHKF2		●	●	●	●	●	◐			●											2	TiAlN	1,0 / 16,0	54
VHKF4		●	●	●	●	●	◐			●											4	TiAlN	6,0 / 16,0	56
VHTF2		●	●	●	●	●	◐			●											2	TiAlN	1,0 / 16,0	58
VHTF4		●	●	●	●	●	◐			●											4	TiAlN	3,0 / 16,0	60
VHDR		●	●	●	◐					●											4	TiAlN	2,0 / 12,0	62
VHMF		●	●	●	●	●	◐			●											6-8	TiAlN GOLD	3,0 / 20,0	64
VHMFR		●	●	●	●	●	◐			●											6-8	TiAlN GOLD	3,0 / 20,0	66
VHMS		●	●	●	●	●	◐	●	●	●							●	●	●	●	2-4	TiAlN	0,1 / 3,0	68
VHMSR		●	●	●	●	●	◐	●	●	●							●	●	●	●	2-4	TiAlN	0,1 / 3,0	74
VHMSK		●	●	●	●	●	◐	●	●	●							●	●	●	●	2	TiAlN	0,1 / 3,0	80
VHRFF4		●	●	●	◐			◐	◐	●							◐	◐	◐	◐	3-4	TiAlN	6,0 / 20,0	86
VHRS4		●	●	●	◐			◐	◐	●							◐	◐	◐	◐	4	TiAlN	3,0 / 25,0	88
VHRSI4		●	●	●	◐			◐	◐	●							◐	◐	◐	◐	4	TiAlN	6,0 / 25,0	94
VHRS5		●	●	●	◐			◐	◐	●							◐	◐	◐	◐	4-7	TiAlN	3,0 / 20,0	100
VHRSI5		●	●	●	◐			◐	◐	●							◐	◐	◐	◐	4-7	TiAlN	6,0 / 20,0	106
VHTS		●	●	●	◐			◐	◐	●							◐	◐	◐	◐	4-7	TiAlN	3,0 / 20,0	112
VHTSI		●	●	●	◐			◐	◐	●							◐	◐	◐	◐	4-7	TiAlN	8,0 / 20,0	114
VHVTR4		◐	◐	◐	◐			●	●								●	●	●	●	4	TiAlN GOLD	1,0 / 25,0	120
VHVTRI4		◐	◐	◐	◐			●	●								●	●	●	●	4	TiAlN GOLD	6,0 / 25,0	126
VHVTR5		◐	◐	◐	◐			●	●								●	●	●	●	5	TiAlN GOLD	3,0 / 25,0	132
VHVTRI5		◐	◐	◐	◐			●	●								●	●	●	●	5	TiAlN GOLD	6,0 / 25,0	138

Reducing total process cost per product is our goal!

Kostenreduzierung pro Produkt ist unser Ziel!

	P1.1	P1.2	P1.3	H2.1	H2.2	H2.3	M3.1	M3.2	K4.1	N5.1	N5.2	N5.3	N5.4	N5.5	N5.6	S6.1	S6.2	S6.3	S6.4	Number of Flutes | Schneidenanzahl	Coating | Beschichtung	Size range | Durchmesserbereich	Page | Seite
VHTR	◐	◐	◐	◐			●	●								●	●	●	●	4-7	TiAlN GOLD	3,0 / 20,0	144
VHTRI	◐	◐	◐	◐			●	●								●	●	●	●	4-7	TiAlN GOLD	8,0 / 20,0	146
HAMF	◐	◐	◐	◐			●	●								●	●	●	●	6-8	TiAlN GOLD	6,0 / 20,0	148
HABM L-XL	◐	◐	◐	◐			●	●								●	●	●	●	2	TiAlN GOLD	0,4 / 12,0	150
VHDT										◐	◐	◐	◐	●	●					2	Diamond	3,0 / 12,0	154
VHDB										◐	◐	◐	◐	●	●					2	Diamond	3,0 / 12,0	156
VHCRS														●	●					8	Diamond	4,0 / 16,0	158
VHCRR														●	●					8	Diamond	4,0 / 20,0	160
VHCRL														●	●					8	Diamond	4,0 / 20,0	162
VHGR													◐	◐	●					2	Diamond	4,0 / 20,0	166
VHGT													◐	◐	●					3	Diamond	2,0 / 12,0	168
VHGTF													◐	◐	●					2-3-4	Diamond	2,0 / 12,0	170
VHGKF													◐	◐	●					2-3-4	Diamond	2,0 / 12,0	174
VHMG													◐	◐	●					2	Diamond	0,3 / 1,5	178
VHMGK													◐	◐	●					2	Diamond	0,3 / 1,5	182
VHMA										●	●	●	●	◐						2	Uncoated	0,3 / 3,0	188
VHMAK										●	●	●	●	◐						2	Uncoated	0,3 / 3,0	190
VHKE										◐	◐	◐	●	◐						1	Uncoated	1,0 / 12,0	192
VHRAW										●	●	●	●	◐						3	Uncoated	6,0 / 25,0	194
VHRAI										●	●	●	●	◐						3	Uncoated	6,0 / 25,0	196
VHLA2										●	●	●	●	◐						2	Uncoated	2,0 / 25,0	198
VHLA3										●	●	●	●	◐						3	Uncoated	4,0 / 25,0	200
VHAE										●	●	●	◐	◐						1	Uncoated	0,5 / 16,0	202
VHAD										●	●	●	●	◐						3	Uncoated	2,0 / 20,0	204
VHS	●	●	●	◐		●	●	●	◐	●	●	●	●	◐		●	●	●	●	3	TiAlN GOLD	2,0 / 20,0	210
VHXF	●	●	●	●	◐	◐	●	◐	●	●	●	●	●	◐		●	●	●	●	3	TiAlN GOLD	2,0 / 20,0	212
VHDS	●	●	●	◐			●	●	◐	●	●	●	●			●	●	●	●	2	TiAlN	1,25 / 10,25	214
VHSR	●	●	●	◐			●	●	◐							●	●	●	●	6-8	TiAlN	1,0 / 16,0	216
VHTM	●	●	●	◐			●	●	◐	●	●	●	●			●	●	●	●	3-4	TiAlN GOLD	M4 / M20	218
VHTMI	●	●	●	◐			●	●	◐	●	●	●	●			●	●	●	●	3-4	TiAlN GOLD	M4 / M20	220
VHTMM	●	●	●	◐			●	●	◐	●	●	●	●			●	●	●	●	3-4	TiAlN GOLD	M1,6 / M36	222
VHTMMI	●	●	●	◐			●	●	◐	●	●	●	●			●	●	●	●	3-4	TiAlN GOLD	M1,6 / M36	224
VHTMMH				◐	●	◐														3	TC+	M2,0 / M12	226

● Well suited / besonders geeignet

◐ Suited / geeignet

PARA Tooling

Solid carbide end mills for standard machining

Vollhartmetall Fräser für Standard Zerspanung

	P1.1	P1.2	P1.3	H2.1	H2.2	H2.3	M3.1	M3.2	K4.1	N5.1	N5.2	N5.3	N5.4	N5.5	N5.6	S6.1	S6.2	S6.3	S6.4	Number of flutes / Schneidenzahl	Coating / Beschichtung	Size range / Durchmesserbereich	Page / Seite
AS2										●	●	●	●							2	Uncoated	3,0 / 20,0	230
AS3										●	●	●	●							3	Uncoated	3,0 / 20,0	233
BT2	●	●	◐	◐			◐	◐	◐	◐	◐	◐	◐							2	TiAlN	1,0 / 20,0	234
BTL2	●	●	◐	◐			◐	◐	◐	◐	◐	◐	◐							2	TiAlN	1,0 / 12,0	235
BT4	●	●	◐	◐			◐	◐	◐			◐	◐							4	TiAlN	1,0 / 20,0	236
MS	●	●	●	◐			◐	◐	◐			◐				◐	◐	◐	◐	6-8	TiAlN	6,0 / 20,0	237
ST2	●	●	◐	◐			◐	◐	◐	◐	◐	◐								2	TiAlN	1,0 / 20,0	238
ST3	●	●	◐	◐			◐	◐	◐	◐	◐	◐								3	TiAlN	1,0 / 20,0	239
ST4	●	●	◐	◐			◐	◐	◐	◐	◐	◐								4	TiAlN	1,0 / 20,0	240
STR2	●	●	◐	◐			◐	◐	◐	◐	◐	◐								2	TiAlN	3,0 / 20,0	241
STR4	●	●	◐	◐			◐	◐	◐	◐	◐	◐								4	TiAlN	3,0 / 20,0	242
RR	●	●	●	◐			◐	◐	◐			◐								3-6	TiAlN	4,0 / 20,0	243
RS3	●	●	◐	◐			◐	◐	◐			◐				◐	◐	◐	◐	3	Silver +	2,0 / 20,0	244
RSS3	●	●	●	◐			◐	◐	●			◐				◐	◐	◐	◐	3	Silver +	2,0 / 16,0	245
RS4	●	●	◐	◐			◐	◐	◐			◐				◐	◐	◐	◐	4	Silver +	3,0 / 20,0	246
RV4	●	●	●	◐			●	●	◐			◐				◐	◐	◐	◐	4	TiAlN	4,0 / 20,0	247
RVR4	●	●	●	◐			●	●	◐			◐				◐	◐	◐	◐	4	TiAlN	3,0 / 16,0	248
RVR5	●	●	●	◐			●	●	◐			◐				◐	◐	◐	◐	5	TiAlN	3,0 / 16,0	250
RSR4	●	●	●	◐			◐	◐	◐			◐								4	Silver +	4,0 / 20,0	252
CH 60°	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	3-6	TiAlN	1,0 / 16,0	253
CH 90°	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	3-6	TiAlN	1,0 / 20,0	254
CH 120°	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	3-6	TiAlN	1,0 / 16,0	255

● Well suited / besonders geeignet

◐ Suited / geeignet

End mill designation
Fräserbezeichnung

VH	XF	3	040	064	06	40	...
1	2	3	4	5	6	7	8

1 Van Hoorn Carbide line

2 Type of end mill / Fräsetyp

AD	A aluminium D three flute L long
AE	A aluminium E single flute
AFA	A afbraam F frees A aluminium
AFC	A afbraam F frees C concave
AFD	A afbraam F frees D double
AFH	A afbraam F frees H hard
AFS	A afbraam F frees S steel
BM	B ball nose M end mill
CRS	C composite R roughing S straight
CRR	C composite R roughing R right
CRL	C composite R roughing L left
DB	D diamond B ball nose
DR	D double R radius
DT	D diamond T torus
DS	D drill S steel
GKF	G graphite K ball nose F end mill
GR	G graphite R rougher
GT	G graphite T straight
GTF	G graphite T torus F end mill
KE	K plastic E single flute
KF	K ball nose F end mill
LA	L long A aluminium
MA	M micro A aluminium
MAK	M micro A aluminium K ball nose
MF	M multiple F flute
MFR	M multiple F flute R radius
MG	M micro G graphite
MGK	M micro G graphite K ball nose
MS	M micro S steel
MSK	M micro S steel K ball nose
MSR	M micro S steel R radius
PBTA	P parabole T tangential A aluminium
PBCA	P parabole C Conical A aluminium
PBTR	P parabole T tangential R steel
PBCR	P parabole C Conical R steel
PM	P performance M multiple flute
PMR	P performance M multiple flute R radius
PK	P performance K ball nose
PT	P performance T torus
RAI	R ripper A aluminium I internal cooling
RAW	R rougher A aluminium W weldon
RFF	R rougher F end mill F chamfer
RS	R rougher S steel
RSI	R rougher S steel I internal cooling
S	S sealing
SR	S steel R reamer
TF	T torus F end mill
TM	T thread M mill
TMI	T thread M mill I internal cooling
TMM	T thread M mill M micro
TMMI	T thread M mill M micro I internal cooling
TMMH	T thread M mill M micro H hard
TR	T trochoidal R stainless/titanium
TRI	T trochoidal R stainless/titanium I internal cooling
TS	T trochoidal S steel
TSI	T trochoidal S steel I internal cooling
VTR	V variable T titanium R radius
VTRI	V variable T titanium R radius I internal cooling
XF	X extra F finish

3 Number of teeth (Z) / Anzahl Zähne (Z)

4 End mill diameter Ød (mm) / Fräserdurchmesser Ød (mm)

5 Overall length l (mm) / Gesamtlänge l (mm)

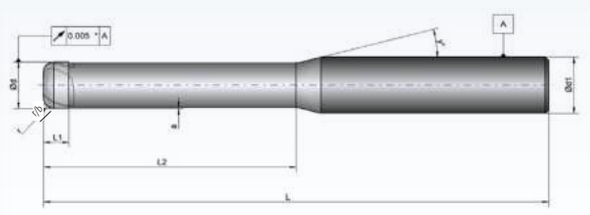
6 Shank diameter Ød1 (mm) / Schaftdurchmesser Ød1 (mm)

7 Coating / Beschichtung

02	**Diamond coating /** Diamant Beschichtung	30	**AluGold coating /** AluGold Beschichtung
03	**TiAlN coating /** TiAlN Beschichtung	40	**TiAlN Gold coating /** TiAlN Gold Beschichtung
10/15	**Uncoated /** Unbeschichtet	40	**TiAlN+ coating /** TiAlN+ Beschichtung
23	**DLC coating /** DLC Beschichtung	40	**TC+ /** TC+ Beschichtung

8 Alternative measurements / Alternative Maßen

- **usable length l2 (mm) /** Freistellungslänge l2 (mm)
- **corner radius r (mm) /** Eckenradius r (mm)



Van Hoorn Carbide

productive and precise milling tools

Van Hoorn Carbide is committed to manufacture and provide the best solid carbide end mills. We are continuously striving for leading innovations in order to improve and optimize the combination between solid carbide grades, geometries, grinding technology and coating.

Development results in new innovating milling programs for sealing surfaces and programs with ceramic end mills and thread milling cutters. Due to our in-house coating process the tool life and chip removal of our end mills have been improved impressively. Last but not least we introduce our Greenline service: specials within 72 hours delivered!

Van Hoorn Carbide bemüht sich immer die besten Hochpräzisvollhartmetalfräser zu produzieren.Kontinuierlich streben wir danach unsere Fräser zu verbessern unter Berücksichtigung des Zusammenwirkens von Hartmetallsorte, Geometrie, Schleiftechnologie und Beschichtung.

Diese Weiterentwicklung ergibt neue, innovative Fräsmethoden für konzentrische Dichtflächen, so wie auch Neuprogramme für Keramik Fräser und Gewindefräser. Die Werkzeugstandzeit und Spanabfuhr sind exponentiell verbessert worden mittels einem in-house gefahrenen Beschichtungsprozeß. Und nicht zuletzt möchten wir noch unsere Greenline Service introduzieren: Spezialfräser innerhalb von 72 Stunden geliefert!

STATE-OF-ART-PRODUCTION
MODERNSTER STAND DER FERTIGUNGSTECHNIK

Fully automated production process
Voll automatisierter Fertigungsprozess
Newest CNC grinding machines
Modernste CNC-Schleifmaschinen
24-7 production
24/7 Rund-um-die-Uhr-Produktion
Climate controlled production
Klimatisierte Produktionsräume
Knowledge about carbide, geometry (and coating)
Know-how über Hartmetall, Geometrien (und Beschichtungen)

QUALITY
QUALITÄT

Acclimatized measuring
Klimatisierte Messräume
CNC measuring equipment
CNC gesteuerte Messeinrichtungen
100% visual inspection
100% Qualitätskontrolle
Tolerances of ±0.001 mm possible
Toleranzen bis ± 0.001 mm möglich

RESEARCH & DEVELOPMENT
FORSCHUNG & ENTWICKLUNG

In-house development of cutting tools
Eigene Entwicklungsabteilung für schneidwerkzeuge
3D simulation
3D Simulationen
Manufacturing of test products
Herstellung von Testwerkzeuge
Continuous optimization of the existing programs
Permanente Optimierung von Steuerungsprogrammen

DEMONSTRATION & TEST CENTRE
MODERNSTER STAND DER FERTIGUNGSTECHNIK

Extended testing at Hermle wit 5 axes
Ausgedehnte Erprobung bei Hermle mit 5 Achsen
High speed camera, Keyence and REM microscope
Hochgeschwindigkeitskamera, Keyence und REM-Mikroskop
Shrink fit holders, collet chuck, Weldon holders
Schrumpfhalter, Spannzangenfutter, Weldon-Halter
Highly qualified application engineers testing in demo centre daily
Hochqualifizierte Anwendungstechniker testen täglich im Demozentrum

SUSTAINABLE & SOCIALLY INVOLVED
NACHHALTIG & SOZIAL ENGAGIERT

Environmentally aware and active in sustainable solutions
Umweltbewusst und aktiv in nachhaltigen Lösungen
We invest in the health of our employees
Wir investieren in die Gesundheit unserer Mitarbeiter
We encourage talent and offer good career opportunities
Wir fördern Talente und bieten gute Karrierechancen

Van Hoorn Carbide goes GREEN!

Van Hoorn Carbide wird GRÜN!

Van Hoorn Carbide invests in sustainability

Just as we lead the market in terms of innovation with our tools, we also want to contribute to sustainability. Recently we have expanded our investestment in electric driving. All of the company cars are electric now. To facilitate electric driving for our employees and our guests, we offer space for charging nine cars.

Van Hoorn Carbide investiert in Nachhaltigkeit
So wie wir mit unseren Werkzeugen in Sachen Innovation marktführend sind, wollen wir auch zur Nachhaltigkeit beitragen. Vor kurzem haben wir unsere Investitionen in das elektrische Fahren ausgeweitet. Alle Firmenwagen sind jetzt elektrisch. Um unseren Mitarbeitern und Gästen das elektrische Fahren zu erleichtern, bieten wir Platz zum Laden von neun Autos.

ECO-friendly work environment

Van Hoorn Carbide uses an ECO-friendly working process, being fully aware of the environment for the next 100 years to come. Each day we are striving for innovating our end mills, bringing customer experiences to a higher level and improving the well-being of our employees.

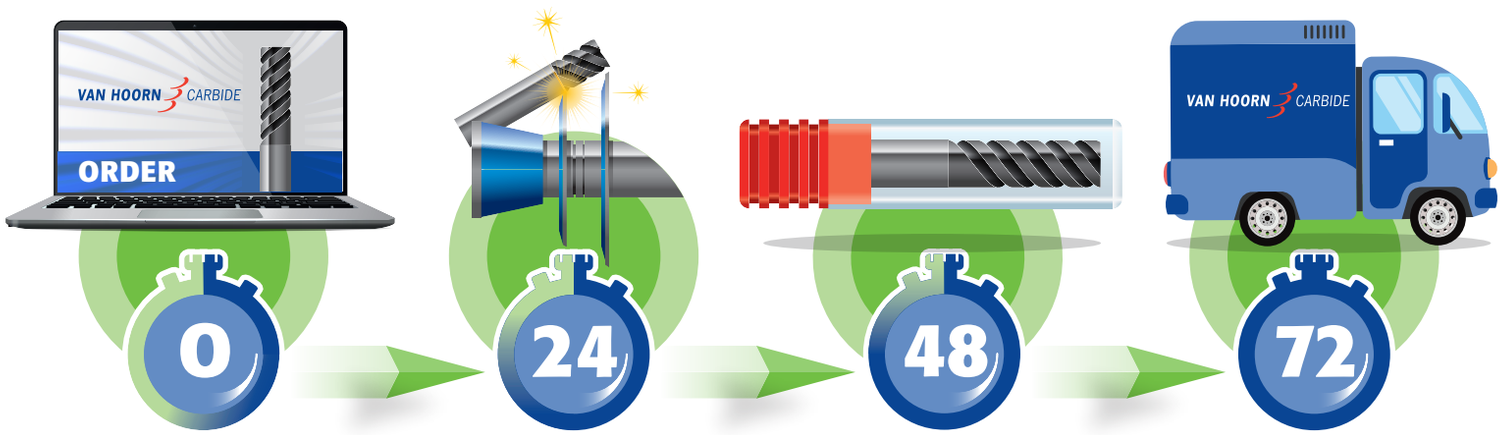
Das Herstellungsverfahren von Van Hoorn Carbide ist ECO-freundlich, Rücksicht nehmend auf unsere Umwelt für die nächsten 100 Jahre. Kontinuierlich arbeiten wir daran unsere Fräser weiter zu entwicklen, die Erfahrungen von unseren Kunden immer zu verbessern und das Wohlergehen unserer Mitarbeiter zu steigern.

- **ECO-friendly production process**
  ECO-freundliches Herstellungsverfahren
- **Air recycling and energysaving LED lighting**
  Luftrecycling und energieeffiziente LED Beleuchtung
- **Accurate handling in safe working conditions**
  Sorgfältige Handlung in einer sicheren Arbeitsumgebung
- **Our employees health and development counts**
  Die Gesundheit und Entwicklung unserer Mitarbeiter zählt

Greenline service: super short lead times

New times, new challenges, super fast delivery!

Neue Zeiten, neue Herausforderungen. Super schnelle Lieferzeiten!



We are proud to present you our Greenline service: we manufacture and ship specials within 72 hours.
Mit Stolz präsentieren wir Ihnen unseren Greenline Service: wir produzieren und liefern Spezialfräser innerhalb von 72 Stunden.

Conditions / Bedingungen

Carbide rod availability
Die Verfügbarkeit von Rohmaterial

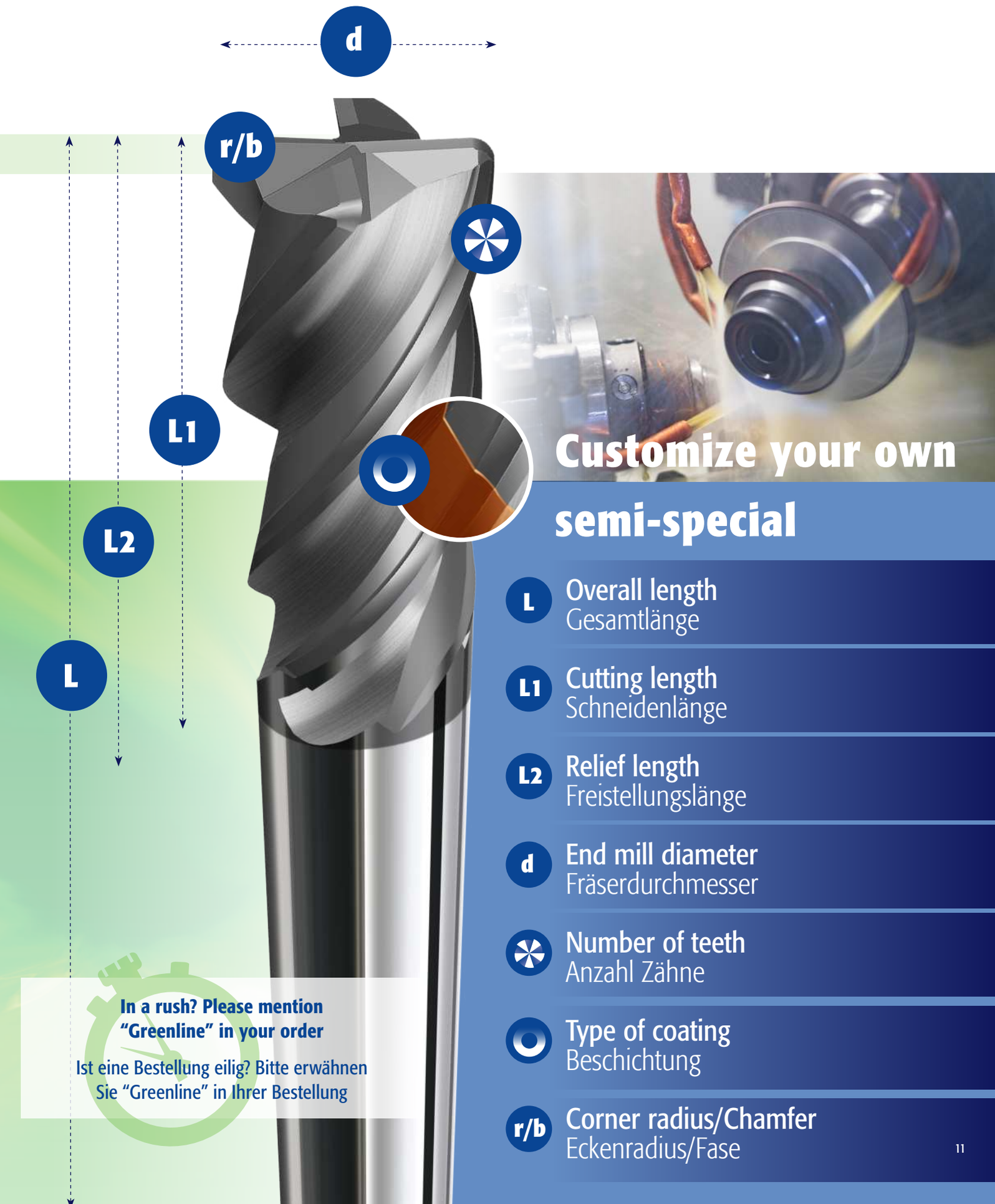
Immediate drawing approval
Umgehende Zeichnungsgenehmigung

Diamond coated tools in 7 workingdays
Diamantbeschichtete Werkzeugen innerhalb von 7 Arbeitstagen

Manufacture and **shipment** specials within **72 hours**

Semi specials, custom made

Semi-Sonderfräser, auf Maß angefertigt



Customize your own semi-special

- **L** Overall length / Gesamtlänge
- **L1** Cutting length / Schneidenlänge
- **L2** Relief length / Freistellungslänge
- **d** End mill diameter / Fräserdurchmesser
- Number of teeth / Anzahl Zähne
- Type of coating / Beschichtung
- **r/b** Corner radius/Chamfer / Eckenradius/Fase

In a rush? Please mention "Greenline" in your order

Ist eine Bestellung eilig? Bitte erwähnen Sie "Greenline" in Ihrer Bestellung

Van Hoorn Carbide regrinding service

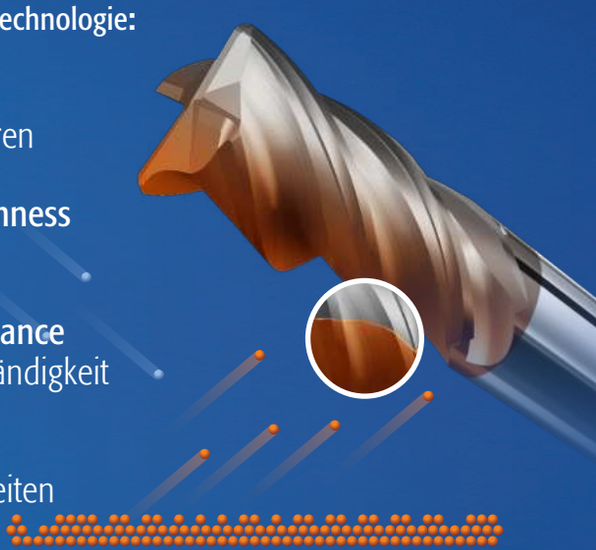
Van Hoorn Carbide Nachschleifservice

Having your milling tools regrinded to your wishes, is now part of Van Hoorn Carbide's services. We set up the specifications with you, such as a fixed size or grinding according to the original geometry. Depending on the application, it is also possible to apply a suitable coating to your tools.

Das Nachschleifen Ihrer Fräswerkzeuge nach Ihren Wünschen ist jetzt auch einer der Dienstleistungen von Van Hoorn Carbide. Wir koordinieren die Spezifikationen mit Ihnen, z.B. eine feste Größe oder das Schleifen gemäß der ursprünglichen Geometrie. Je nach Anwendung ist es auch möglich, Ihre Werkzeuge mit einer geeigneten Beschichtung zu versehen.

VHC Coating technology :
VHC Beschichtungstechnologie:

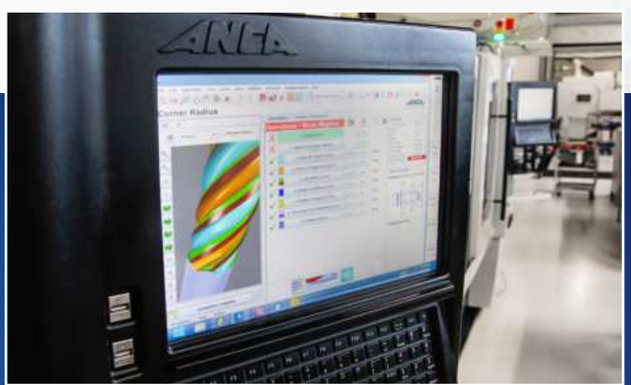
- **Own recipes**
  Eigene Rezepturen
- **Extreme smoothness**
  Extreme Glätte
- **High heat resistance**
  Hohe Hitzebeständigkeit
- **Longer tool life**
  Längere Standzeiten

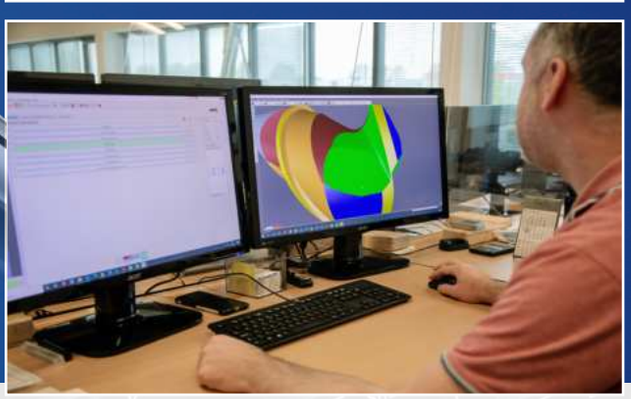


Regrinding service

Nachschleifservice

	Basic	Excellent
Sharpened in our high-tech grinding shop In unsere High-Tech-Schleiferei geschärft	✓	✓
100% visual entry and exit control 100% visuelle Eingangs- und Schlußkontrolle		✓
Collection and delivery service Abhol- und Liefermöglichkeit	✓	✓
Delivery time 2-3 weeks Lieferzeit 2-3 Wochen		✓
Greenline possible Greenline möglich		✓
Warranty Neugarantie		✓
Up to 5x regrinding possible (depending on diameter) Bis zu 5x nachschleifen möglich (je nach Durchmesser)	✓	
Original geometry Originalgeometrie		✓





Why regrind @ Van Hoorn Carbide?

Warum Nachschleifen @ Van Hoorn Carbide?

- **Original geometry** / Originalgeometrie
- **Original coating** / Originalbeschichtung
- **Original new performance** / Originalleistung
- **Quick delivery** / Schnelle Lieferung

ToolOrganizer

ToolOrganizer

The VHC ToolOrganizer, combined with Zoller Tool Management Solutions software, is the best solution for managing tools, parts and accessories. The right amount of tools is always available at the right specified location. Inaccuracies in the stock are excluded. The endless search for tools is over!

Der VHC ToolOrganizer ist in Kombination mit der Software Zoller Tool Management Solutions die beste Lösung für die Verwaltung von Werkzeugen, Teilen und Zubehör. Immer die richtige Menge an Werkzeugen am richtigen Ort. Ungenauigkeiten im Lager sind ausgeschlossen. Die endlose Suche nach Werkzeugen hat ein Ende!

Advantages of the VHC ToolOrganizer

Vorteile der VHC ToolOrganizer

- **Controlled and efficient management of your tools**
  Kontrolliertes und effizientes Management Ihrer Werkzeuge
- **Up-to-date stock situation accessible on each computer**
  Aktueller Lagerbestand zugänglich auf jedem Computer
- **Registered storage and release reports of the articles available at user level**
  Einlagerung und Entnahme der Produkten können auf Benutzerniveau registriert werden
- **Possibility of automatically ordering of tools at your supplier**
  Möglichkeit um automatisch neu zu bestellen beim Lieferanten

Simple, smart and efficient

Einfach, clever und effizient

With the unique TMS Tool Management Software it is possible to order automatically at your supplier. Registered entry and distribution reports of the articles are at user level available. Thanks to the various configuration possibilities of the ToolOrganizer, you can arrange the cabinet according to your own wishes. Simple, smart and efficient from need to delivery!

Die einzigartige TMS Tool Management Software ermöglicht es Ihnen automatisch bei Ihren Lieferanten neu zu bestellen. Einlagerung und Entnahme werden registriert und können auf Benutzerniveau verfolgt werden. Dank den verschiedenen Konfigurationsmöglichkeiten können Sie das Gehäuse nach Ihren eigenen Wünschen einrichten. EInfach, clever und effizient vom Bedarf bis zur Auslieferung.

With the TMS Tool Management Software you will:
Mit der TMS Tool Management Software haben Sie:

- **have software possibilities for regrinding management**
  Softwaremöglichkeiten für Nachschleifmanagement
- **be part of the Zoller tool database, which grants you access to each step of the production process**
  Zugang zu jeder Phase des Produktionsprozeßes mittels der Zoller Tool Datenbank
- **have the possibility to connect with the ERP system**
  die Möglichkeit eine Verbindung mit dem ERP System herzustellen

Our Innovative Products

Unsere Innovative Produkte

Innovations that matter, that really make the difference. We are proud to present our new innovative programs. Our technical engineers are ready to support you. Would you like to receive a test report or to challenge our application engineers?

Innovationen, die wichtig sind, die den Unterschied machen. Wir sind stolz darauf, unsere neuen innovativen Programme vorzustellen. Unsere Techniker unterstützen Sie gerne. Möchten Sie einen Testbericht erhalten oder unsere Anwendungstechniker herausfordern?

The perfect solution for complex forms

Die perfekte Lösung für komplexe Formen

Parabolic end mills

Parabolische Schaftfräser

No challenge is impossible for our new parabolic end mills. Optimised for the finish machining industry and freeform surfaces, our end mills are developped for tool making and mould making. Due to its unique geometry this end mill will increase wave length enourmously and decrease your process time.

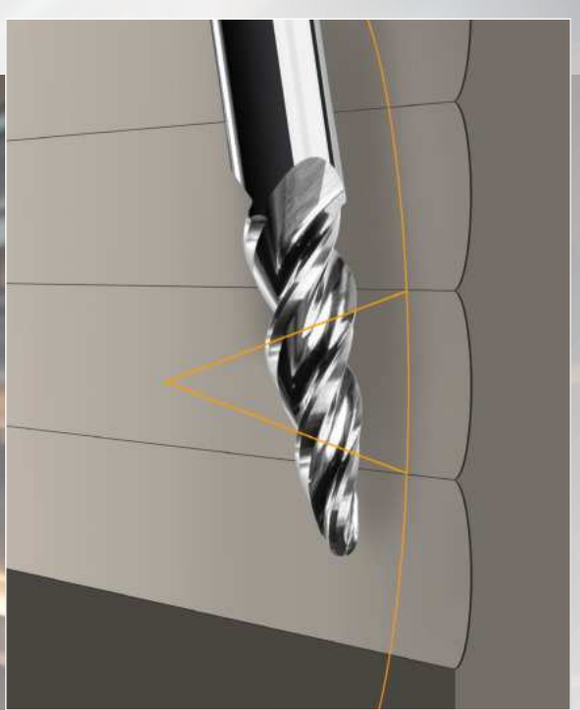
Für unsere neuen Parabol-Schaftfräser ist keine Herausforderung unmöglich. Optimiert für die Feinbearbeitungsindustrie und Freiformflächen eignen sich unsere Schaftfräser für den Werkzeug- und Formenbau. Aufgrund seiner Geometrie erhöht dieser Schaftfräser die Wellenlänge enorm und verkürzt Ihre Bearbeitungszeit.

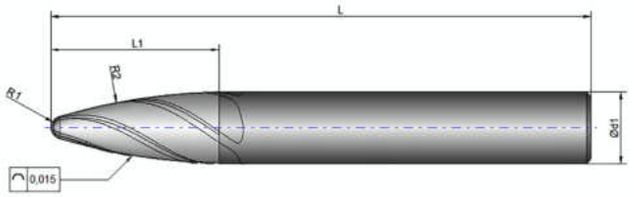
- **Larger effective radius: increasing cutting depth (Ap), less depth passes and reduction cycle time**
- Größerer effektiver Radius: Erhöhung der Schnitttiefe (Ap), der Linsentiefe und der Reduzierung der Zykluszeit

- **Access to complex forms**
  Zugang zu schwierigen Bereichen

The conical shaped VHPBCA and VHPBCR are the ideal end mill for challenging forms and larger areas. For accessing difficult areas, the tangential VHPBTA and VHPBTR are the best solution to get perfect results.

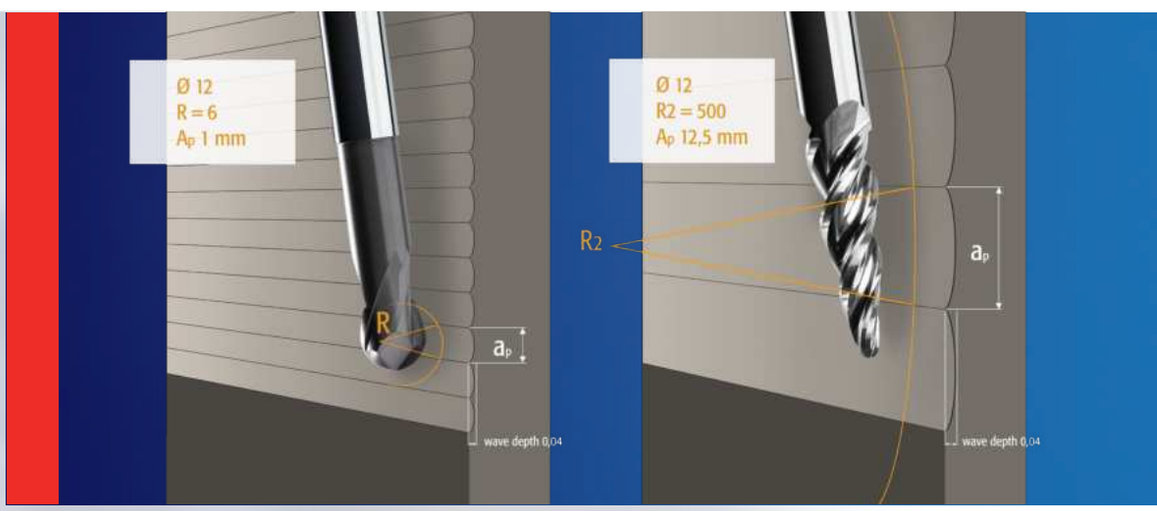
Die konisch geformten VHPBCA und VHPBCR sind die idealen Schaftfräser für anspruchsvolle Formen und größere Flächen. Für den Zugang zu schwierigen Bereichen sind die tangentialen VHPBTA und VHPBTR die beste Lösung, um einwandfreie Ergebnisse zu erzielen.





Article Number *Artikelnummer*	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	R1 (mm)	R2 (mm)	Z	γ (°)	α (°)	
VHPBTA 3 R010 070 06 10 R080	6	70	12,00	-	-	1,0	80	3	-	-	**new**
VHPBTA 3 R010 072 08 10 R080	8	72	16,00	-	-	1,0	80	3	-	-	**new**
VHPBTA 3 R020 082 10 10 R100	10	82	20,00	-	-	2,0	100	3	-	-	**new**
VHPBTA 3 R020 102 12 10 R100	12	102	24,00	-	-	2,0	100	3	-	-	**new**
VHPBTA 3 R020 116 16 10 R100	16	116	32,00	-	-	2,0	100	3	-	-	**new**
VHPBCA 3 R005 070 06 10 R300 A16	6	70	9,00	-	-	0,5	300	3	-	16°	**new**
VHPBCA 3 R030 102 12 10 R500 A9	12	102	22,00	-	-	3,0	500	3	-	9°	**new**
VHPBCA 3 R025 102 12 10 R500 A19	12	102	12,50	-	-	2,5	500	3	-	19°	**new**
VHPBCA 3 R025 116 16 10 R1000 A16	16	116	21,50	-	-	2,5	1000	3	-	16°	**new**
VHPBCA 3 R025 116 16 10 R1000 A29	16	116	12,50	-	-	2,5	1000	3	-	29°	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1			**350 - 650**	emulsion
N5.2			**200 - 500**	emulsion
N5.3			**350 - 500**	emulsion
N5.4			**400 - 1000**	emulsion
N5.5			**400 - 1000**	emulsion

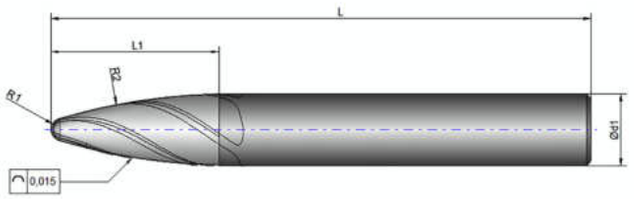


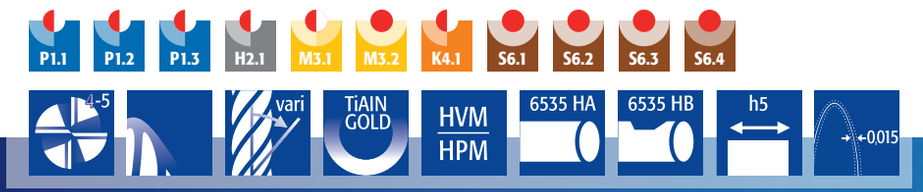
Aluminium VHPBTA

d	a_p max. (mm)	a_e max. (mm)	Fz (mm/omw)
6	11	1,80	0,040 - 0,060
8	15	2,40	0,060 - 0,100
10	18	3,00	0,080 - 0,120
12	22	3,60	0,100 - 0,140
16	30	4,80	0,140 - 0,180

Aluminium VHPBCA

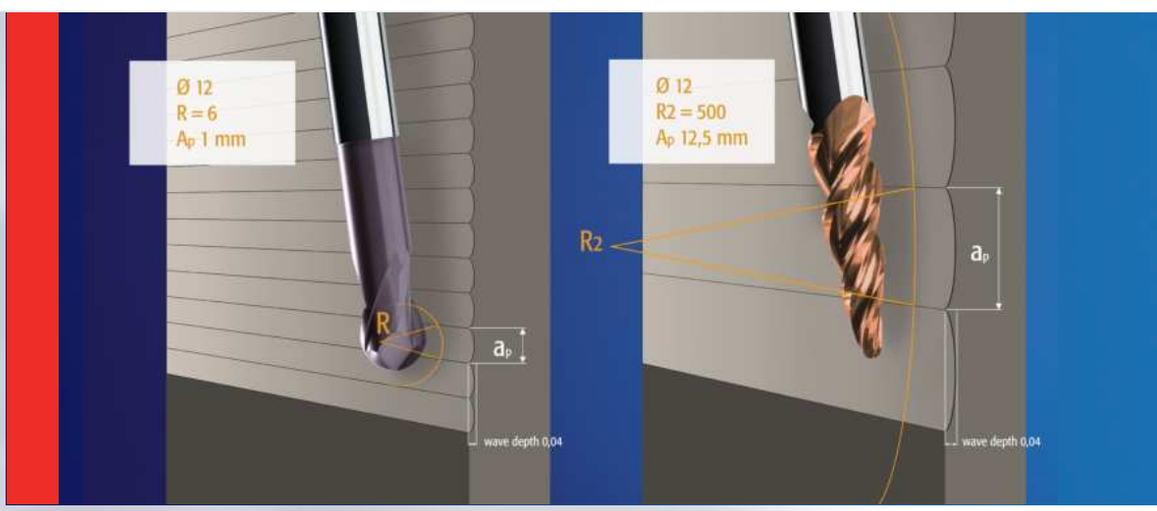
d	a_p max. (mm)	a_e max. (mm)	Fz (mm/omw)
6	11	1,80	0,080 - 0,120
12	15	3,60	0,100 - 0,140
12	18	3,60	0,100 - 0,140
16	22	4,80	0,140 - 0,180
16	30	4,80	0,140 - 0,180





Article Number *Artikelnummer*	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	R1 (mm)	R2 (mm)	Z	γ (°)	α (°)	
VHPBTR 4 R010 070 06 40 R080	6	70	12,00	-	-	1,0	80	4	-	-	**new**
VHPBTR 4 R010 072 08 40 R080	8	72	16,00	-	-	1,0	80	4	-	-	**new**
VHPBTR 5 R020 082 10 40 R100	10	82	20,00	-	-	2,0	100	5	-	-	**new**
VHPBTR 5 R020 102 12 40 R100	12	102	24,00	-	-	2,0	100	5	-	-	**new**
VHPBTR 5 R020 116 16 40 R100	16	116	32,00	-	-	2,0	100	5	-	-	**new**
VHPBCR 4 R005 070 06 40 R300 A16	6	70	9,00	-	-	0,5	300	4	-	16°	**new**
VHPBCR 5 R030 102 12 40 R500 A9	12	102	22,00	-	-	3,0	500	5	-	9°	**new**
VHPBCR 5 R025 102 12 40 R500 A19	12	102	12,50	-	-	2,5	500	5	-	19°	**new**
VHPBCR 5 R025 116 16 40 R1000 A16	16	116	21,50	-	-	2,5	1000	5	-	16°	**new**
VHPBCR 5 R025 116 16 40 R1000 A29	16	116	12,50	-	-	2,5	1000	5	-	29°	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 800	< 250	**200 - 300**	emulsion
P1.2	< 1000	< 300	**150 - 250**	emulsion
P1.3	< 1400	< 400	**100 - 200**	emulsion
H2.1		42-50 HRc	**100 - 200**	emulsion
M3.1	< 950		**150 -250**	emulsion
M3.2	< 1250		**100 - 200**	emulsion
K4.1	< 800		**150 - 250**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion



RVS VHPBTR

d	a_p max. (mm)	a_e max. (mm)	Fz (mm/omw)
6	11	0,90	0,040 - 0,060
8	15	1,20	0,060 - 0,100
10	18	1,50	0,080 - 0,120
12	22	1,80	0,100 - 0,140
16	30	2,40	0,140 - 0,180

RVS VHPBCR

d	a_p max. (mm)	a_e max. (mm)	Fz (mm/omw)
6	11	0,90	0,040 - 0,060
8	15	1,80	0,100 - 0,140
10	18	1,80	0,100 - 0,140
12	22	2,40	0,140 - 0,180
16	30	2,40	0,140 - 0,180

Deburring & chamfering

Entgratfräser & Fase fräsen

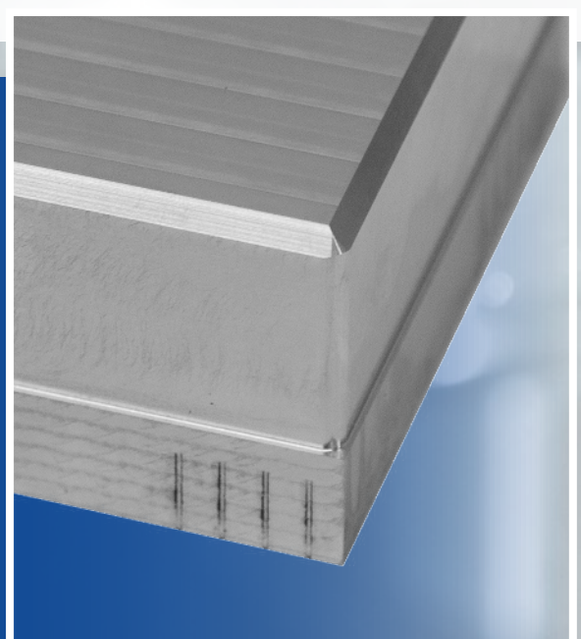
Van Hoorn Carbide presents an innovation with regard to deburring and chamfering. A new range of deburring end mills, manufactured with a helix and special geometry, offers even easier and smoother deburring.

Van Hoorn Carbide präsentiert eine Innovation für Entgraten und Fase fräsen. Eine neue Serie Entgrater, versehen mit Drall und spezieller Geometrie, bietet noch einfacher und glatter Entgraten.

VHAFA - VHAFS

Is the deburring not offering enough result? These end mills are also suited for larger chamfers. We provide types for aluminium, as well as an all-purpose type for steel grades and stainless steel, which is also applicable for the super alloys.

Ist das Entgraten nich zureichend? Diese Fräser sind auch geeignet für größere Fasen. Es gibt eine Ausführung für Aluminium, so wie auch eine Universalausführung für Stahlsorten und RVS, welche auch geeignet ist für Superlegierungen.



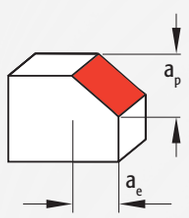
Advantages - Vorteile

- **Van Hoorn Carbide offers a suitable deburring end mill for every material**
  Van Hoorn Carbide bietet für jedes Material den passenden Entgrater
- **The double deburring end mill is available for places that are hard to reach**
  Für schwer zugängliche Stellen ist der Doppel Entgrater erhältlich

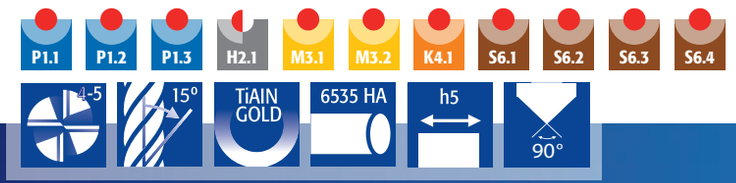
Article Number *Artikelnummer*	Ød (mm)	ß (°)	Ød1 (mm)	Ød1a (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
VHAFA 3 030 051 03 10 090	3,0	90	3	1	51	1,00	-	-	3	-	**new**
VHAFA 3 040 051 04 10 090	4,0	90	4	1	51	1,50	-	-	3	-	**new**
VHAFA 3 060 057 06 10 090	6,0	90	6	1	57	2,50	-	-	3	-	**new**
VHAFA 3 080 063 08 10 090	8,0	90	8	1	63	3,50	-	-	3	-	**new**
VHAFA 3 100 072 10 10 090	10,0	90	10	1	72	4,50	-	-	3	-	**new**
VHAFA 3 100 090 10 10 090	10,0	90	10	1	90	4,50	-	-	3	-	**new**
VHAFA 3 120 083 12 10 090	12,0	90	12	1	83	5,50	-	-	3	-	**new**
VHAFA 3 120 100 12 10 090	12,0	90	12	1	100	5,50	-	-	3	-	**new**
VHAFA 3 160 092 16 10 090	16,0	90	16	1	92	7,50	-	-	3	-	**new**
VHAFA 3 160 120 16 10 090	16,0	90	16	1	120	7,50	-	-	3	-	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1	<500	<150	**350 - 650**	Emulsion
N5.2	<400	<120	**200 - 500**	Emulsion
N5.3	<350	<100	**350 - 500**	Emulsion
N5.4			**400 - 1000**	Emulsion
N5.5			**400 - 1000**	Emulsion

Helix for achieving less cutting force
Mit Drall ausgeführt für geringeren Schneiddruck



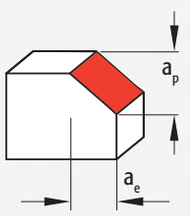
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 1,0	< 1,0	0,020 - 0,050
4,0	< 1,5	< 1,5	0,040 - 0,080
6,0	< 2,5	< 2,5	0,060 - 0,150
8,0	< 3,5	< 3,5	0,080 - 0,180
10,0	< 4,5	< 4,5	0,100 - 0,200
12,0	< 5,5	< 5,5	0,120 - 0,220
16,0	< 7,5	< 7,5	0,160 - 0,260



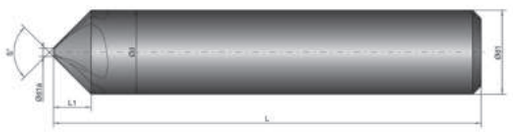
Article Number *Artikelnummer*	Ød (mm)	ß (°)	Ød1 (mm)	Ød1a (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
VHAFS 4 030 051 03 40 090	3,0	90	3	1	51	1,00	-	-	4	-	**new**
VHAFS 4 040 051 04 40 090	4,0	90	4	1	51	1,50	-	-	4	-	**new**
VHAFS 4 060 057 06 40 090	6,0	90	6	1	57	2,50	-	-	4	-	**new**
VHAFS 4 080 063 08 40 090	8,0	90	8	1	63	3,50	-	-	4	-	**new**
VHAFS 4 100 072 10 40 090	10,0	90	10	1	72	4,50	-	-	4	-	**new**
VHAFS 4 100 090 10 40 090	10,0	90	10	1	90	4,50	-	-	4	-	**new**
VHAFS 4 120 083 12 40 090	12,0	90	12	1	83	5,50	-	-	4	-	**new**
VHAFS 4 120 100 12 40 090	12,0	90	12	1	100	5,50	-	-	4	-	**new**
VHAFS 4 160 092 16 40 090	16,0	90	16	1	92	7,50	-	-	4	-	**new**
VHAFS 4 160 120 16 40 090	16,0	90	16	1	120	7,50	-	-	4	-	**new**
VHAFS 5 100 072 10 40 090	10,0	90	10	1	72	4,50	-	-	5	-	**new**
VHAFS 5 100 090 10 40 090	10,0	90	10	1	90	4,50	-	-	5	-	**new**
VHAFS 5 120 083 12 40 090	12,0	90	12	1	83	5,50	-	-	5	-	**new**
VHAFS 5 120 100 12 40 090	12,0	90	12	1	100	5,50	-	-	5	-	**new**
VHAFS 5 160 092 16 40 090	16,0	90	16	1	92	7,50	-	-	5	-	**new**
VHAFS 5 160 120 16 40 090	16,0	90	16	1	120	7,50	-	-	5	-	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	<750	<250	**180 - 300**	emulsion
P1.2	<1000	<300	**140 - 260**	emulsion
P1.3	<1400	<400	**100 - 200**	emulsion
H2.1		42-50 HRc	**110 - 170**	emulsion
M3.1	<950		**140 - 200**	emulsion
M3.1	<1250		**80 - 140**	emulsion
K4.1	< 800		**100 - 200**	emulsion
S6.1	<1500		**50 - 70**	emulsion
S6.2	<1600		**55 - 80**	emulsion
S6.3	<1600		**40 - 60**	emulsion
S6.4	<1250		**70 - 100**	emulsion

- **Super smoothly deburring**
  Super glatt entgraten
- **Also applicable for larger chamfers**
  Auch einsetzbar für größere Fasen



Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 1,0	< 1,0	0,010 - 0,030
4,0	< 1,5	< 1,5	0,015 - 0,050
6,0	< 2,5	< 2,5	0,025 - 0,070
8,0	< 3,5	< 3,5	0,030 - 0,080
10,0	< 4,5	< 4,5	0,040 - 0,090
12,0	< 5,5	< 5,5	0,050 - 0,100
16,0	< 7,5	< 7,5	0,060 - 0,120

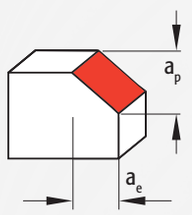


Article Number *Artikelnummer*	Ød (mm)	ß (°)	Ød1 (mm)	Ød1a (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
VHAFH 5 030 051 03 40 090	3,0	90	3	1	51	1,00	-	-	5	-	**new**
VHAFH 5 040 051 04 40 090	4,0	90	4	1	51	1,50	-	-	5	-	**new**
VHAFH 5 060 057 06 40 090	6,0	90	6	1	57	2,50	-	-	5	-	**new**
VHAFH 5 080 063 08 40 090	8,0	90	8	1	63	3,50	-	-	5	-	**new**
VHAFH 5 100 072 10 40 090	10,0	90	10	1	72	4,50	-	-	5	-	**new**
VHAFH 5 100 090 10 40 090	10,0	90	10	1	90	4,50	-	-	5	-	**new**
VHAFH 5 120 083 12 40 090	12,0	90	12	1	83	5,50	-	-	5	-	**new**
VHAFH 5 120 100 12 40 090	12,0	90	12	1	100	5,50	-	-	5	-	**new**
VHAFH 5 160 092 16 40 090	16,0	90	16	1	92	7,50	-	-	5	-	**new**
VHAFH 5 160 120 16 40 090	16,0	90	16	1	120	7,50	-	-	5	-	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.3	< 1400	< 400	**100 - 200**	emulsion
H2.1		42-50 HRc	**110 - 170**	emulsion
H2.2		50-55 HRc	**90 - 140**	emulsion
H2.3		55-70 HRc	**70 - 120**	emulsion

Geometry specially suited for cutting hardened steel 42-70 HRc

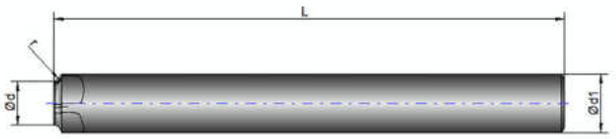
Geometrie spezial geeignet für Bearbeitung gehärteter Werkstoffen 42-70 HRc



Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 0,07	< 0,07	0,010 - 0,030
4,0	< 0,10	< 0,10	0,015 - 0,050
6,0	< 0,20	< 0,20	0,025 - 0,070
8,0	< 0,40	< 0,40	0,030 - 0,080
10,0	< 0,60	< 0,60	0,040 - 0,090
12,0	< 0,80	< 0,80	0,050 - 0,100
16,0	< 1,00	< 1,00	0,060 - 0,120

Ap and Ae are calculated for material group H2.2.
Use below factor to calculate Ap and Ae for other suitable material groups.

P1.3 = factor 3
H2.1 = factor 2
H2.3 = factor 0,5

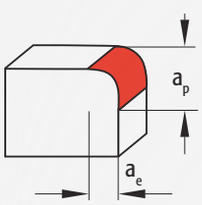


Article Number *Artikelnummer*	Ød (mm)	r (°)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Uncoated / Unbeschichtet										
VHAFC 4 056 051 06 10 R002	5,6	0,20	6,0	51	-	-	-	4	-	**new**
VHAFC 4 054 051 06 10 R003	5,4	0,30	6,0	51	-	-	-	4	-	**new**
VHAFC 4 052 051 06 10 R004	5,2	0,40	6,0	51	-	-	-	4	-	**new**
VHAFC 4 070 070 08 10 R005	7,0	0,50	8,0	70	-	-	-	4	-	**new**
VHAFC 4 068 070 08 10 R006	6,8	0,60	8,0	70	-	-	-	4	-	**new**
VHAFC 4 064 070 08 10 R008	6,4	0,80	8,0	70	-	-	-	4	-	**new**
VHAFC 4 060 070 08 10 R010	6,0	1,00	8,0	70	-	-	-	4	-	**new**
VHAFC 4 070 075 10 10 R015	7,0	1,50	10,0	75	-	-	-	4	-	**new**
VHAFC 4 060 075 10 10 R020	6,0	2,00	10,0	75	-	-	-	4	-	**new**
VHAFC 4 070 078 12 10 R025	7,0	2,50	12,0	78	-	-	-	4	-	**new**
VHAFC 4 060 078 12 10 R030	6,0	3,00	12,0	78	-	-	-	4	-	**new**
VHAFC 4 090 089 16 10 R035	9,0	3,50	16,0	80	-	-	-	4	-	**new**
VHAFC 4 080 089 16 10 R040	8,0	4,00	16,0	89	-	-	-	4	-	**new**
VHAFC 4 070 089 16 10 R045	7,0	4,50	16,0	89	-	-	-	4	-	**new**
VHAFC 4 100 102 20 10 R050	10,0	5,00	20,0	102	-	-	-	4	-	**new**
VHAFC 4 080 102 20 10 R060	8,0	6,00	20,0	102	-	-	-	4	-	**new**
Coated / Beschichtet										
VHAFC 4 056 051 06 40 R002	5,6	0,20	6,0	51	-	-	-	4	-	**new**
VHAFC 4 054 051 06 40 R003	5,4	0,30	6,0	51	-	-	-	4	-	**new**
VHAFC 4 052 051 06 40 R004	5,2	0,40	6,0	51	-	-	-	4	-	**new**
VHAFC 4 070 070 08 40 R005	7,0	0,50	8,0	70	-	-	-	4	-	**new**
VHAFC 4 068 070 08 40 R006	6,8	0,60	8,0	70	-	-	-	4	-	**new**
VHAFC 4 064 070 08 40 R008	6,4	0,80	8,0	70	-	-	-	4	-	**new**
VHAFC 4 060 070 08 40 R010	6,0	1,00	8,0	70	-	-	-	4	-	**new**
VHAFC 4 070 075 10 40 R015	7,0	1,50	10,0	75	-	-	-	4	-	**new**
VHAFC 4 060 075 10 40 R020	6,0	2,00	10,0	75	-	-	-	4	-	**new**
VHAFC 4 070 078 12 40 R025	7,0	2,50	12,0	78	-	-	-	4	-	**new**
VHAFC 4 060 078 12 40 R030	6,0	3,00	12,0	78	-	-	-	4	-	**new**
VHAFC 4 090 089 16 40 R035	9,0	3,50	16,0	80	-	-	-	4	-	**new**
VHAFC 4 080 089 16 40 R040	8,0	4,00	16,0	89	-	-	-	4	-	**new**
VHAFC 4 070 089 16 40 R045	7,0	4,50	16,0	89	-	-	-	4	-	**new**
VHAFC 4 100 102 20 40 R050	10,0	5,00	20,0	102	-	-	-	4	-	**new**
VHAFC 4 080 102 20 40 R060	8,0	6,00	20,0	102	-	-	-	4	-	**new**

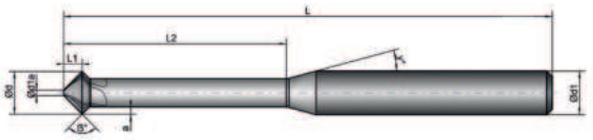
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 800	< 250	**180 - 300**	emulsion
P1.2	< 1000	< 300	**140 - 260**	emulsion
P1.3	< 1400	< 400	**100 - 200**	emulsion
H2.1		42-50 HRc	**110 - 170**	emulsion
M3.1	< 950		**140 - 200**	emulsion
M3.2	< 1250		**80 - 140**	emulsion
K4.1	< 800		**100 - 200**	emulsion
N5.1	< 500	< 150	**350 - 650**	emulsion
N5.2	< 400	< 120	**200 - 500**	emulsion
N5.3	< 350	< 100	**350 - 500**	emulsion
N5.4			**400 - 1000**	emulsion
N5.5			**400 - 1000**	emulsion
S6.1	< 1500		**50 -70**	emulsion
S6.2	< 1600		**55 - 80**	emulsion
S6.3	< 1600		**40 - 60**	emulsion
S6.4	< 1250		**70 -100**	emulsion

Ideal for radius profil

Ideal für Radiusprofile



r (mm)	a_p max. (mm)	a_e max. (mm)	F_n (mm/omw)
0,20	< 0,20	< 0,20	0,025 - 0,070
0,30	< 0,30	< 0,30	0,025 - 0,070
0,40	< 0,40	< 0,40	0,025 - 0,070
0,50	< 0,50	< 0,50	0,030 - 0,080
0,60	< 0,60	< 0,60	0,030 - 0,080
0,80	< 0,80	< 0,80	0,030 - 0,080
1,00	< 1,00	< 1,00	0,030 - 0,080
1,50	< 1,50	< 1,50	0,040 - 0,090
2,00	< 2,00	< 2,00	0,040 - 0,090
2,50	< 2,50	< 2,50	0,050 - 0,100
3,00	< 3,00	< 3,00	0,050 - 0,100
3,50	< 3,50	< 3,50	0,060 - 0,120
4,00	< 4,00	< 4,00	0,060 - 0,120
4,50	< 4,50	< 4,50	0,060 - 0,120
5,00	< 5,00	< 5,00	0,080 - 0,0160
6,00	< 5,50	< 5,50	0,080 - 0,0160

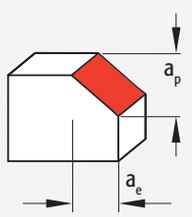


Article Number *Artikelnummer*	Ød (mm)	ß (°)	Ød1 (mm)	Ød1a (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Uncoated / Unbeschichtet											
VHAFD 3 018 060 06 10	1,8	90	6	1	60	0,60	9,0	0,200	3	15	**new**
VHAFD 3 028 060 06 10	2,8	90	6	1	60	1,20	14,0	0,300	3	15	**new**
VHAFD 4 038 064 06 10	3,8	90	6	1	64	1,80	19,0	0,400	3	15	**new**
VHAFD 4 048 070 06 10	4,8	90	6	1	70	2,40	24,0	0,500	3	15	**new**
VHAFD 4 058 080 06 10	5,8	90	6	1	80	3,70	29,0	1,300	4	15	**new**
VHAFD 4 078 090 08 10	7,8	90	8	1	90	4,70	39,0	1,300	4	15	**new**
VHAFD 5 098 100 10 10	9,8	90	10	1	100	5,70	49,0	1,300	5	15	**new**
VHAFD 5 118 120 12 10	11,8	90	12	1	120	6,70	59,0	1,300	5	15	**new**
Coated / Beschichtet											
VHAFD 4 018 060 06 40	1,8	90	6	1	60	0,60	9,0	0,200	4	15	**new**
VHAFD 4 028 060 06 40	2,8	90	6	1	60	1,20	14,0	0,300	4	15	**new**
VHAFD 4 038 064 06 40	3,8	90	6	1	64	1,80	19,0	0,400	4	15	**new**
VHAFD 4 048 070 06 40	4,8	90	6	1	70	2,40	24,0	0,500	4	15	**new**
VHAFD 4 058 080 06 40	5,8	90	6	1	80	3,70	29,0	1,300	4	15	**new**
VHAFD 5 078 090 08 40	7,8	90	8	1	90	4,70	39,0	1,300	5	15	**new**
VHAFD 6 098 100 10 40	9,8	90	10	1	100	5,70	49,0	1,300	6	15	**new**
VHAFD 6 118 120 12 40	11,8	90	12	1	120	6,70	59,0	1,300	6	15	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**180 - 300**	emulsion
P1.2	< 1000	< 300	**140 - 260**	emulsion
P1.3	< 1400	< 400	**100 - 200**	emulsion
H2.1		42-50 HRc	**110 - 170**	emulsion
M3.1	< 950		**140 - 200**	emulsion
M3.2	< 1250		**80 - 140**	emulsion
K4.1	< 750		**100 - 200**	emulsion
N5.1	Si < 5%		**350 - 650**	emulsion
N5.2	Si < 5%		**200 - 500**	emulsion
N5.3			**350 - 500**	emulsion
N5.4			**400 - 1000**	emulsion
N5.5			**400 - 1000**	emulsion
S6.1	< 1500		**50 - 70**	emulsion
S6.2	< 1600		**55 - 80**	emulsion
S6.3	< 1600		**40 - 60**	emulsion
S6.4	< 1250		**70 -100**	emulsion

The double deburring end mill is available for places that are hard to reach

Für schwer zugängliche Stellen ist der Doppel Entgrater erhältlich



d (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/omw)
1,8	< 0,20	< 0,20	0,005 - 0,020
2,8	< 0,30	< 0,30	0,010 - 0,025
3,8	< 0,40	< 0,40	0,015 - 0,030
4,8	< 0,50	< 0,50	0,020 - 0,040
5,8	< 1,30	< 1,30	0,020 - 0,050
7,8	< 1,30	< 1,30	0,030 - 0,060
9,8	< 1,30	< 1,30	0,040 - 0,080
11,8	< 1,30	< 1,30	0,050 - 0,100

Milling hardened steels from 55-70 HRc with VHC technology

Fräsen in gehärteten Stählen 55-70 HRc mit VHC Technologie

No EDM is required (milling is much faster)
Kein Erodieren benötigt (Fräsen deutlich zeitsparender)

Polishing can be minimized
Nacharbeiten kann minimiert werden

One single clamping, for more accurate results
Nur eine Aufspannung - erleichtert das Erreichen von Zielvorgaben

Depending on the workpiece different strategies can be chosen. Chip removal and coolant in such applications are crucial.

Abhängig vom Werkstück können unterschiedliche Strategien eingesetzt werden. Spanabfuhr und Kühlung spielen bei diesen Anwendungen die entscheidende Rolle.

HPM (High Perfomance Machining)
Hochleistungsbearbeitung

- **High cutting speed (V_c)**
  Hohe Schnittgeschwindigkeit (V_c)
- **Large cutting depth (a_p)**
  Große Schnitttiefe (a_p)
- **Small cutting width (a_e)**
  Geringe Schnittbreite (a_e)
- **Medium feed per tooth (F_z) / table feed (V_f)**
  Mittlerer Zahnvorschub (F_z) / Vorschubgeschwindigkeit (V_f)

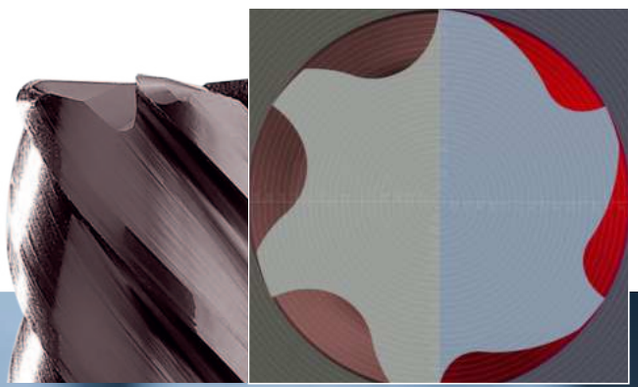
HSM (High Speed Machining)
Hochgeschwindigkeitsbearbeitung

- **High cutting speed (V_c)**
  Hohe Schnittgeschwindigkeit (V_c)
- **Small cutting depth (a_p)**
  Geringe Schnitttiefe (a_p)
- **Small cutting width (a_e)**
  Geringe Schnittbreite (a_e)
- **High feed per tooth (F_z) / table feed (V_f)**
  Hoher Zahnvorschub (F_z) / Vorschubgeschwindigkeit (V_f)

Leading technology for hardened materials (55-70 HRc)

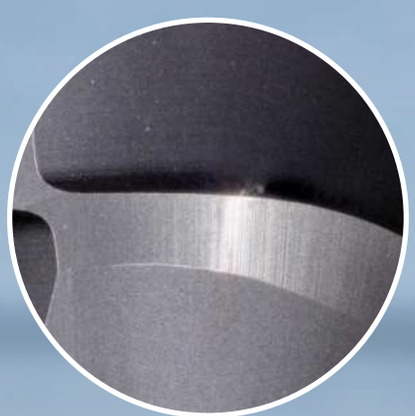
Führende Technologie für gehärtete Werkstoffe (55-70 HRc)

- 2-Flute ball nose geometry VHPK
  2-Schneiden Kugelfräser VHPK
- 4-Flute torus geometry VHPT
  4-Schneiden Torusfräser VHPT
- Micro program shank 4 mm
  Mikroprogramm Schaft 4 mm
- Micro program shank 6 mm
  Mikroprogramm Schaft 6 mm
- Multiple flute VHPM
  Mehrschneidenfräser VHPM
- Multiple flute with corner radius VHPMR
  Mehrschneidenfräser mit Eckenradius VHPMR

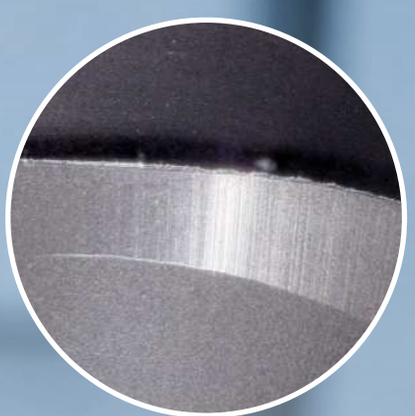


± 0,005 mm radius tolerance / Radiustoleranz
± 0,005 mm corner radius tolerance / Eckenradiustoleranz

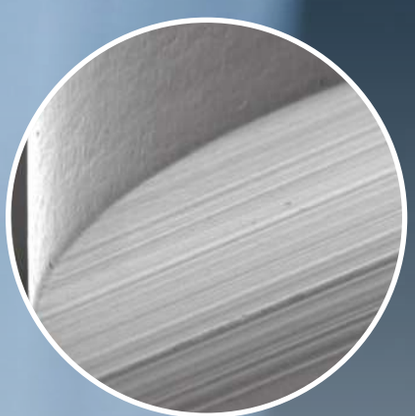
old / *alte*
new geometry / *neue Geometrie*



Optimized center
Optimiertes Zentrum



Wear
Verschleiß

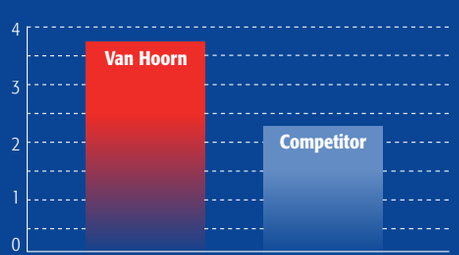


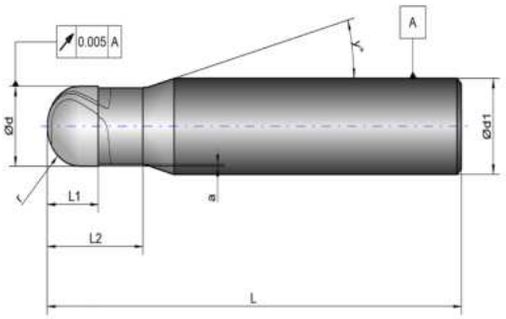
Edge Preparation
Kantenverrundung

VHPM 6 080 078 08 40
Workpiece Material: 1.2379
Hardness: 62HRc

	Van Hoorn	Competitor
ø	8,0 mm	8,0 mm
V_c	140 m/min	120 m/min
n	5.570 rpm	4.775 rpm
F_z	0,07 mm/t	0,05 mm/t
Z	6	6
V_f	2.340 mm/min	1.432mm/min
a_p	8,0 mm	8,0 mm
a_e	0,2 mm	0,2 mm
Coolant	air	air
Q	**3,7 cm³/min**	**2,3 cm³/min**

VHPM Material removal rate





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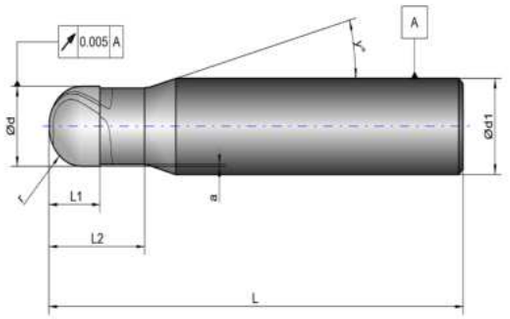
Radius profile accuracy
± 0,005 mm
Radiusprofil
Präzision
± 0,005 mm

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
Shank ø4													
VHPK 2 001 051 04 L015	0,1	0,05	4	51	0,15	-	-	2	15	0,684	0,706	0,755	0,812
VHPK 2 001 051 04 L020	0,1	0,05	4	51	0,15	2,0	0,005	2	15	2,357	2,437	2,616	2,825
VHPK 2 002 051 04 L003	0,2	0,10	4	51	0,30	-	-	2	15	0,786	0,810	0,863	0,925
VHPK 2 002 051 04 L020	0,2	0,10	4	51	0,30	2,0	0,005	2	15	2,355	2,434	2,609	2,812
VHPK 2 002 051 04 L040	0,2	0,10	4	51	0,30	4,0	0,005	2	15	4,423	4,573	4,909	5,299
VHPK 2 003 051 04 L012	0,3	0,15	4	51	0,40	1,2	0,010	2	15	1,682	1,736	1,854	1,993
VHPK 2 003 051 04 L015	0,3	0,15	4	51	0,40	1,5	0,010	2	15	1,992	2,056	2,199	2,366
VHPK 2 004 051 04 L005	0,4	0,20	4	51	0,50	-	-	2	15	1,299	1,337	1,423	1,522
VHPK 2 004 051 04 L020	0,4	0,20	4	51	0,50	2,0	0,010	2	15	2,371	2,447	2,615	2,811
VHPK 2 004 051 04 L040	0,4	0,20	4	51	0,50	4,0	0,010	2	15	4,439	4,586	4,915	5,298
VHPK 2 004 051 04 L060	0,4	0,20	4	51	0,50	6,0	0,010	2	15	6,506	6,726	7,215	7,784
VHPK 2 004 051 04 L080	0,4	0,20	4	51	0,50	8,0	0,010	2	15	8,573	8,865	9,515	10,270
VHPK 2 005 051 04 L007	0,5	0,25	4	51	0,70	-	-	2	15	1,504	1,548	1,645	1,758
VHPK 2 005 051 04 L020	0,5	0,25	4	51	0,70	2,0	0,020	2	15	2,408	2,483	2,651	2,846
VHPK 2 005 051 04 L040	0,5	0,25	4	51	0,70	4,0	0,020	2	15	4,476	4,623	4,951	5,332
VHPK 2 005 051 04 L060	0,5	0,25	4	51	0,70	6,0	0,020	2	15	6,543	6,762	7,250	7,818
VHPK 2 005 051 04 L080	0,5	0,25	4	51	0,70	8,0	0,020	2	15	8,610	8,902	9,550	10,304
VHPK 2 006 051 04 L008	0,6	0,30	4	51	0,80	-	-	2	15	2,259	2,327	2,479	2,656
VHPK 2 006 051 04 L020	0,6	0,30	4	51	0,80	2,0	0,020	2	15	2,543	2,621	2,795	2,997
VHPK 2 008 051 04 L010	0,8	0,40	4	51	1,00	-	-	2	15	2,462	2,534	2,694	2,880
VHPK 2 010 051 04 L012	1,0	0,50	4	51	1,20	-	-	2	15	2,665	2,741	2,909	3,104
VHPK 2 010 051 04 L022	1,0	0,50	4	51	1,20	2,2	0,020	2	15	2,743	2,821	2,995	3,197
VHPK 2 010 051 04 L040	1,0	0,50	4	51	1,20	4,0	0,020	2	15	4,603	4,746	5,064	5,435
VHPK 2 010 051 04 L060	1,0	0,50	4	51	1,20	6,0	0,020	2	15	6,671	6,886	7,364	7,921
VHPK 2 010 051 04 L080	1,0	0,50	4	51	1,20	8,0	0,020	2	15	8,738	9,025	9,664	10,407
VHPK 2 010 051 04 L100	1,0	0,50	4	51	1,20	10,0	0,020	2	15	10,805	11,164	11,964	12,894
VHPK 2 015 051 04 L018	1,5	0,75	4	51	1,80	-	-	2	15	4,066	4,182	4,439	4,738
VHPK 2 015 051 04 L033	1,5	0,75	4	51	1,80	3,3	0,025	2	15	4,163	4,282	4,546	4,854
VHPK 2 015 051 04 L040	1,5	0,75	4	51	1,80	4,0	0,025	2	15	4,886	5,030	5,351	5,725
VHPK 2 015 051 04 L060	1,5	0,75	4	51	1,80	6,0	0,025	2	15	6,954	7,170	7,651	8,211
VHPK 2 015 051 04 L080	1,5	0,75	4	51	1,80	8,0	0,025	2	15	9,021	9,309	9,951	10,697
VHPK 2 015 051 04 L100	1,5	0,75	4	51	1,80	10,0	0,025	2	15	11,088	11,448	12,250	13,183
VHPK 2 020 051 04 L025	2,0	1,00	4	51	2,50	-	-	2	15	4,781	4,913	5,206	5,548
VHPK 2 020 051 04 L040	2,0	1,00	4	51	2,50	4,0	0,050	2	15	4,974	5,113	5,421	5,780
VHPK 2 020 051 04 L060	2,0	1,00	4	51	2,50	6,0	0,050	2	15	7,042	7,252	7,721	8,266
VHPK 2 020 051 04 L080	2,0	1,00	4	51	2,50	8,0	0,050	2	15	9,109	9,392	10,020	10,752
VHPK 2 020 051 04 L100	2,0	1,00	4	51	2,50	10,0	0,050	2	15	11,176	11,531	12,320	13,239



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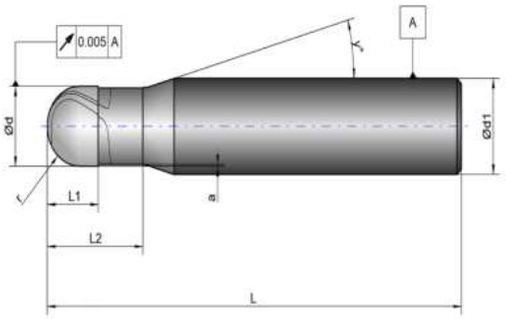
For an extra charge we offer an inspection report of the tool geometry.

Auf Wunsch erhalten Sie zu jedem Werkzeug ein separates Prüfprotokoll (aufpreispflichtig).

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	 1°	 2°	 3°
VHPK 2 025 051 04 L030	2,5	1,25	4	51	3,00	-	-	2	15	5,290	5,431	5,744	6,109
VHPK 2 025 051 04 L045	2,5	1,25	4	51	3,00	4,5	0,050	2	15	5,483	5,630	5,959	6,341
VHPK 2 025 051 04 L060	2,5	1,25	4	51	3,00	6,0	0,050	2	15	7,033	7,235	7,683	8,205
VHPK 2 025 051 04 L080	2,5	1,25	4	51	3,00	8,0	0,050	2	15	9,101	9,374	9,983	10,692
VHPK 2 025 051 04 L100	2,5	1,25	4	51	3,00	10,0	0,050	2	15	11,168	11,513	12,283	13,178
VHPK 2 030 051 04 L035	3,0	1,50	4	51	3,50	-	-	2	15	5,798	5,948	6,281	6,669
VHPK 2 030 051 04 L050	3,0	1,50	4	51	3,50	5,0	0,050	2	15	5,991	6,148	6,496	6,901
VHPK 2 030 051 04 L060	3,0	1,50	4	51	3,50	6,0	0,050	2	15	7,025	7,217	7,646	8,144
VHPK 2 030 051 04 L070	3,0	1,50	4	51	3,50	7,0	0,050	2	15	8,058	8,287	8,796	9,388
VHPK 2 030 051 04 L080	3,0	1,50	4	51	3,50	8,0	0,050	2	15	9,092	9,357	9,946	10,631
VHPK 2 030 051 04 L100	3,0	1,50	4	51	3,50	10,0	0,050	2	15	11,159	11,496	12,245	∞
Shank ø6													
VHPK 2 001 064 06 L015	0,1	0,05	6	64	0,15	-	-	2	15	0,684	0,706	0,755	0,812
VHPK 2 001 064 06 L020	0,1	0,05	6	64	0,15	2,0	0,005	2	15	2,357	2,437	2,616	2,825
VHPK 2 002 064 06 L003	0,2	0,10	6	64	0,30	-	-	2	15	0,786	0,810	0,863	0,925
VHPK 2 002 064 06 L020	0,2	0,10	6	64	0,30	2,0	0,005	2	15	2,355	2,434	2,609	2,812
VHPK 2 002 064 06 L040	0,2	0,10	6	64	0,30	4,0	0,005	2	15	4,423	4,573	4,909	5,299
VHPK 2 003 064 06 L012	0,3	0,15	6	64	0,40	1,2	0,010	2	15	1,682	1,736	1,854	1,993
VHPK 2 003 064 06 L015	0,3	0,15	6	64	0,40	1,5	0,010	2	15	1,992	2,056	2,199	2,366
VHPK 2 004 064 06 L005	0,4	0,20	6	64	0,50	-	-	2	15	1,299	1,337	1,423	1,522
VHPK 2 004 064 06 L020	0,4	0,20	6	64	0,50	2,0	0,010	2	15	2,371	2,447	2,615	2,811
VHPK 2 004 064 06 L040	0,4	0,20	6	64	0,50	4,0	0,010	2	15	4,439	4,586	4,915	5,298
VHPK 2 004 064 06 L060	0,4	0,20	6	64	0,50	6,0	0,010	2	15	6,506	6,726	7,215	7,784
VHPK 2 004 064 06 L080	0,4	0,20	6	64	0,50	8,0	0,010	2	15	8,573	8,865	9,515	10,270
VHPK 2 005 064 06 L007	0,5	0,25	6	64	0,70	-	-	2	15	1,504	1,548	1,645	1,758
VHPK 2 005 064 06 L020	0,5	0,25	6	64	0,70	2,0	0,020	2	15	2,408	2,483	2,651	2,846
VHPK 2 005 064 06 L040	0,5	0,25	6	64	0,70	4,0	0,020	2	15	4,476	4,623	4,951	5,332
VHPK 2 005 064 06 L060	0,5	0,25	6	64	0,70	6,0	0,020	2	15	6,543	6,762	7,250	7,818
VHPK 2 005 064 06 L080	0,5	0,25	6	64	0,70	8,0	0,020	2	15	8,610	8,902	9,550	10,304
VHPK 2 006 064 06 L008	0,6	0,30	6	64	0,80	-	-	2	15	2,259	2,327	2,479	2,656
VHPK 2 006 064 06 L020	0,6	0,30	6	64	0,80	2,0	0,020	2	15	2,543	2,621	2,795	2,997
VHPK 2 008 064 06 L010	0,8	0,40	6	64	1,00	-	-	2	15	2,462	2,534	2,694	2,880
VHPK 2 010 064 06 L012	1,0	0,50	6	64	1,20	-	-	2	15	2,665	2,741	2,909	3,104
VHPK 2 010 064 06 L022	1,0	0,50	6	64	1,20	2,2	0,020	2	15	2,743	2,821	2,995	3,197
VHPK 2 010 064 06 L040	1,0	0,50	6	64	1,20	4,0	0,020	2	15	4,603	4,746	5,064	5,435
VHPK 2 010 064 06 L060	1,0	0,50	6	64	1,20	6,0	0,020	2	15	6,671	6,886	7,364	7,921
VHPK 2 010 064 06 L080	1,0	0,50	6	64	1,20	8,0	0,020	2	15	8,738	9,025	9,664	10,407
VHPK 2 010 064 06 L100	1,0	0,50	6	64	1,20	10,0	0,020	2	15	10,805	11,164	11,964	12,894



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Remark ∞ = infinity,
no collision in projection length area.

Bemerkung ∞ = unendlich, keine Kollision in Länge Projektionsfläche.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	 1°	 2°	 3°
VHPK 2 015 064 06 L018	1,5	0,75	6	64	1,80	-	-	2	15	4,066	4,182	4,439	4,738
VHPK 2 015 064 06 L033	1,5	0,75	6	64	1,80	3,3	0,025	2	15	4,163	4,282	4,546	4,854
VHPK 2 015 064 06 L040	1,5	0,75	6	64	1,80	4,0	0,025	2	15	4,886	5,030	5,351	5,725
VHPK 2 015 064 06 L060	1,5	0,75	6	64	1,80	6,0	0,025	2	15	6,954	7,170	7,651	8,211
VHPK 2 015 064 06 L080	1,5	0,75	6	64	1,80	8,0	0,025	2	15	9,021	9,309	9,951	10,697
VHPK 2 015 064 06 L100	1,5	0,75	6	64	1,80	10,0	0,025	2	15	11,088	11,448	12,250	13,183
VHPK 2 020 064 06 L025	2,0	1,00	6	64	2,50	-	-	2	15	4,781	4,913	5,206	5,548
VHPK 2 020 064 06 L040	2,0	1,00	6	64	2,50	4,0	0,050	2	15	4,974	5,113	5,421	5,780
VHPK 2 020 064 06 L060	2,0	1,00	6	64	2,50	6,0	0,050	2	15	7,042	7,252	7,721	8,266
VHPK 2 020 064 06 L080	2,0	1,00	6	64	2,50	8,0	0,050	2	15	9,109	9,392	10,020	10,752
VHPK 2 020 064 06 L100	2,0	1,00	6	64	2,50	10,0	0,050	2	15	11,176	11,531	12,320	13,239
VHPK 2 025 064 06 L030	2,5	1,25	6	64	3,00	-	-	2	15	5,290	5,431	5,744	6,109
VHPK 2 025 064 06 L045	2,5	1,25	6	64	3,00	4,5	0,050	2	15	5,483	5,630	5,959	6,341
VHPK 2 025 064 06 L060	2,5	1,25	6	64	3,00	6,0	0,050	2	15	7,033	7,235	7,683	8,205
VHPK 2 025 064 06 L080	2,5	1,25	6	64	3,00	8,0	0,050	2	15	9,101	9,374	9,983	10,692
VHPK 2 025 064 06 L100	2,5	1,25	6	64	3,00	10,0	0,050	2	15	11,168	11,513	12,283	13,178
VHPK 2 030 064 06 L035	3,0	1,50	6	64	3,50	-	-	2	15	5,798	5,948	6,281	6,669
VHPK 2 030 064 06 L050	3,0	1,50	6	64	3,50	5,0	0,050	2	15	5,991	6,148	6,496	6,901
VHPK 2 030 064 06 L060	3,0	1,50	6	64	3,50	6,0	0,050	2	15	7,025	7,217	7,646	8,144
VHPK 2 030 064 06 L070	3,0	1,50	6	64	3,50	7,0	0,050	2	15	8,058	8,287	8,796	9,388
VHPK 2 030 064 06 L080	3,0	1,50	6	64	3,50	8,0	0,050	2	15	9,092	9,357	9,946	10,631
VHPK 2 030 064 06 L100	3,0	1,50	6	64	3,50	10,0	0,050	2	15	11,159	11,496	12,245	13,117
VHPK 2 040 064 06 L045	4,0	2,00	6	64	4,50	-	-	2	15	6,815	6,983	7,356	7,791
VHPK 2 040 064 06 L080	4,0	2,00	6	64	4,50	8,0	0,100	2	15	9,268	9,521	10,085	10,741
VHPK 2 050 064 06 L060	5,0	2,50	6	64	6,00	-	-	2	15	8,349	8,553	9,006	9,534
VHPK 2 050 064 06 L100	5,0	2,50	6	64	6,00	10,0	0,150	2	15	11,512	11,826	12,525	∞
VHPK 2 060 064 06 L070	6,0	3,00	6	64	7,00	-	-	2	-	∞	∞	∞	∞
VHPK 2 060 064 06 L120	6,0	3,00	6	64	7,00	12,0	0,150	2	-	∞	∞	∞	∞
VHPK 2 060 064 06 L250	6,0	3,00	6	64	7,00	25,0	0,150	2	-	∞	∞	∞	∞
VHPK 2 080 064 08 L090	8,0	4,00	8	64	9,00	-	-	2	-	∞	∞	∞	∞
VHPK 2 080 064 08 L160	8,0	4,00	8	64	9,00	16,0	0,200	2	-	∞	∞	∞	∞
VHPK 2 080 064 08 L250	8,0	4,00	8	64	9,00	25,0	0,200	2	-	∞	∞	∞	∞
VHPK 2 100 078 10 L120	10,0	5,00	10	78	12,00	-	-	2	-	∞	∞	∞	∞
VHPK 2 100 078 10 L200	10,0	5,00	10	78	12,00	20,0	0,200	2	-	∞	∞	∞	∞
VHPK 2 120 078 12 L150	12,0	6,00	12	78	15,00	-	-	2	-	∞	∞	∞	∞

Material group	TSR (N/mm²)	Hardness	Cutting speed V_c m/min	Coolant
H2.2		50-55 HRc	**150 - 220**	min.lub.
H2.3		55-70 HRc	**200 - 250**	min.lub.
K4.1			**160 - 240**	emulsion

Milling up to 70 HRc with 0,1 mm end mill!

Fräsen bis 70 HRc mit 0,1 mm Fräser!

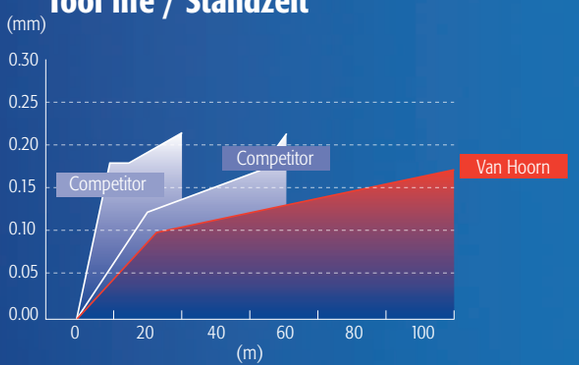
For an extra charge we offer an inspection report of the tool geometry

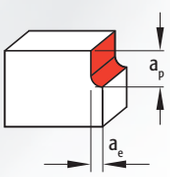
Auf Wunsch erhalten Sie zu jedem Werkzeug ein separates Prüfprotokoll (aufpreispflichtig).

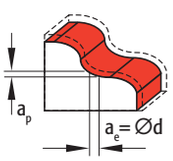
VHPK 2 060 064 06 L070
Workpiece Material: 1.2379
Hardness: 60 HRc

	Van Hoorn	Competitor
ø	6,0 mm	6,0 mm
V_c	220 m/min	170 m/min
n	8.753 rpm	6.764rpm
F_z	0,06 mm/t	0,06 mm/t
Z	2	2
V_f	1.050 mm/min	812mm/min
a_p	0,2 mm	0,2 mm
a_e	0,2 mm	0,2 mm
Coolant	min. lubrication	min. lubrication
Q	**0,42 mm³/min**	**0,32 mm³/min**
Lifetime	**1.400 mtr**	**600 mtr**

Tool life / Standzeit

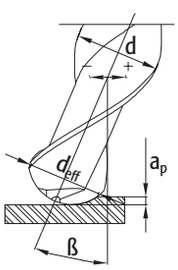






Profiling / Profilierung

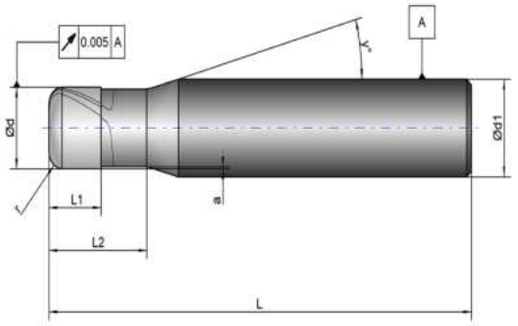
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,1	< 0,02	< 0,003	0,002 - 0,007
0,2	< 0,04	< 0,006	0,004 - 0,010
0,4	< 0,08	< 0,012	0,006 - 0,013
0,5	< 0,10	< 0,015	0,007 - 0,015
0,6	< 0,12	< 0,018	0,009 - 0,018
0,8	< 0,16	< 0,024	0,012 - 0,021
1,0	< 0,20	< 0,030	0,015 - 0,025
1,5	< 0,30	< 0,045	0,020 - 0,035
2,0	< 0,40	< 0,060	0,030 - 0,050
2,5	< 0,50	< 0,075	0,035 - 0,055
3,0	< 0,60	< 0,090	0,040 - 0,060
4,0	< 0,80	< 0,120	0,050 - 0,080
5,0	< 1,00	< 0,150	0,060 - 0,110
6,0	< 1,20	< 0,180	0,065 - 0,125
8,0	< 1,60	< 0,240	0,080 - 0,130
10,0	< 2,00	< 0,300	0,085 - 0,135
12,0	< 2,40	< 0,360	0,100 - 0,140



- For the cutting speed V_c calculation the effective cutting diameter d_{eff} has to be taken into account. See formula.

  Für die Berechnung der Schnittgeschwindigkeit muss der effektive Durchmesser d_{eff} berücksichtigt werden (siehe Formel).

$$ß \neq 0: \quad d_{eff} = d \bullet \sin\left[ß \pm \arccos\left(\frac{d - 2a_p}{d}\right)\right]$$



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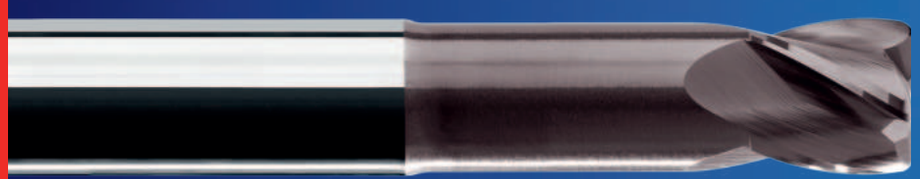
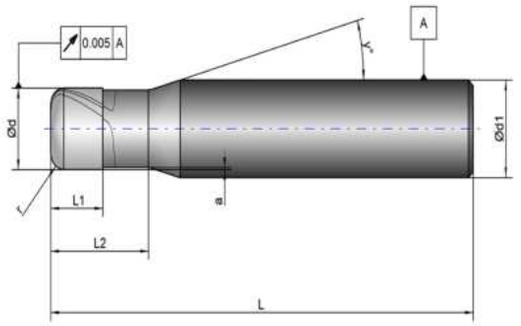


Shank 4 mm
Schaft 4 mm

Remark ∞ = infinity,
no collision in projection length area.

Bemerkung ∞ = unendlich, keine Kollision in Länge Projektionsfläche.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHPT 4 002 051 04 40 L002	0,2	0,01	4	51	0,20	-	-	4	15	0,685	0,709	0,761	0,822
VHPT 4 002 051 04 40 L004	0,2	0,01	4	51	0,20	0,4	0,010	4	15	0,724	0,749	0,804	0,869
VHPT 4 004 051 04 40 L004	0,4	0,01	4	51	0,40	-	-	4	15	1,202	1,244	1,336	1,444
VHPT 4 004 051 04 40 L009	0,4	0,01	4	51	0,40	0,9	0,010	4	15	1,241	1,284	1,379	1,490
VHPT 4 004 051 04 40 L016	0,4	0,01	4	51	0,40	1,6	0,010	4	15	1,964	2,032	2,184	2,360
VHPT 4 005 051 04 40 L005	0,5	0,03	4	51	0,50	-	-	4	15	1,305	1,349	1,448	1,563
VHPT 4 005 051 04 40 L010	0,5	0,03	4	51	0,50	1,0	0,010	4	15	1,343	1,389	1,491	1,610
VHPT 4 005 051 04 40 L020	0,5	0,03	4	51	0,50	2,0	0,010	4	15	2,377	2,459	2,641	2,853
VHPT 4 006 051 04 40 L006	0,6	0,05	4	51	0,60	-	-	4	15	2,060	2,130	2,286	2,468
VHPT 4 006 051 04 40 L016	0,6	0,05	4	51	0,60	1,6	0,020	4	15	2,138	2,210	2,372	2,561
VHPT 4 006 051 04 40 L024	0,6	0,05	4	51	0,60	2,4	0,020	4	15	2,965	3,066	3,292	3,555
VHPT 4 008 051 04 40 L008	0,8	0,05	4	51	0,80	-	-	4	15	2,267	2,344	2,516	2,716
VHPT 4 008 051 04 40 L018	0,8	0,05	4	51	0,80	1,8	0,020	4	15	2,344	2,424	2,602	2,809
VHPT 4 008 051 04 40 L032	0,8	0,05	4	51	0,80	3,2	0,020	4	15	3,791	3,922	4,212	4,550
VHPT 4 010 051 04 40 L001	1,0	0,05	4	51	1,00	-	-	4	15	2,474	2,558	2,746	2,965
VHPT 4 010 051 04 40 L020	1,0	0,05	4	51	1,00	2,0	0,020	4	15	2,551	2,638	2,832	3,058
VHPT 4 010 051 04 40 L040	1,0	0,05	4	51	1,00	4,0	0,020	4	15	4,618	4,778	5,132	5,544
VHPT 4 010 051 04 40 L060	1,0	0,05	4	51	1,00	6,0	0,020	4	15	6,686	6,917	7,432	8,030
VHPT 4 01A 051 04 40 L010	1,0	0,10	4	51	1,00	-	-	4	15	2,472	2,555	2,739	2,953
VHPT 4 01A 051 04 40 L020	1,0	0,10	4	51	1,00	2,0	0,020	4	15	2,549	2,635	2,825	3,046
VHPT 4 01A 051 04 40 L040	1,0	0,10	4	51	1,00	4,0	0,020	4	15	4,617	4,774	5,124	5,532
VHPT 4 01A 051 04 40 L060	1,0	0,10	4	51	1,00	6,0	0,020	4	15	6,684	6,913	7,424	8,018
VHPT 4 015 051 04 40 L015	1,5	0,10	4	51	1,50	-	-	4	15	3,778	3,906	4,191	4,523
VHPT 4 015 051 04 40 L030	1,5	0,10	4	51	1,50	3,0	0,025	4	15	3,874	4,006	4,299	4,639
VHPT 4 015 051 04 40 L060	1,5	0,10	4	51	1,50	6,0	0,025	4	15	6,975	7,215	7,748	8,369
VHPT 4 015 051 04 40 L090	1,5	0,10	4	51	1,50	9,0	0,025	4	15	10,076	10,424	11,198	12,098
VHPT 4 015 B51 04 40 L015	1,5	0,20	4	51	1,50	-	-	4	15	3,775	3,899	4,177	4,499
VHPT 4 015 B51 04 40 L030	1,5	0,20	4	51	1,50	3,0	0,025	4	15	3,871	3,999	4,284	4,615
VHPT 4 015 B51 04 40 L060	1,5	0,20	4	51	1,50	6,0	0,025	4	15	6,972	7,208	7,733	8,345
VHPT 4 015 B51 04 40 L090	1,5	0,20	4	51	1,50	9,0	0,025	4	15	10,073	10,417	11,183	12,074



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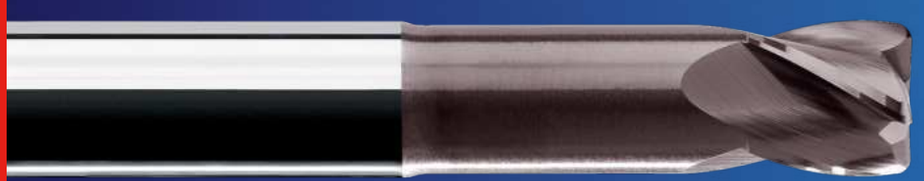
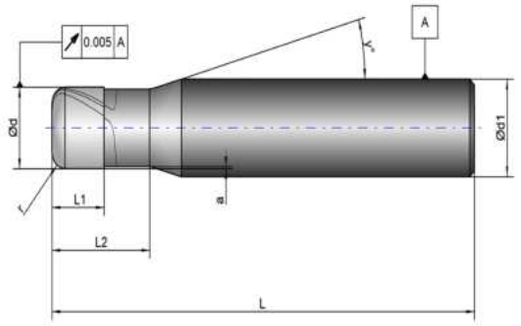
Shank 4 mm
Schaft 4 mm

For an extra charge we offer an inspection report of the tool geometry.

Auf Wunsch erhalten Sie zu jedem Werkzeug ein separates Prüfprotokoll (aufpreispflichtig).



Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	 1°	 2°	 3°
VHPT 4 020 051 04 40 L020	2,0	0,10	4	51	2,00	-	-	4	15	4,295	4,441	4,766	5,145
VHPT 4 020 051 04 40 L040	2,0	0,10	4	51	2,00	4,0	0,050	4	15	5,005	5,175	5,556	5,999
VHPT 4 020 051 04 40 L080	2,0	0,10	4	51	2,00	8,0	0,050	4	15	9,139	9,454	10,155	10,971
VHPT 4 020 051 04 40 L120	2,0	0,10	4	51	2,00	12,0	0,050	4	15	13,274	13,733	14,755	15,944
VHPT 4 02A 051 04 40 L020	2,0	0,30	4	51	2,00	-	-	4	15	4,288	4,427	4,736	5,096
VHPT 4 02A 051 04 40 L040	2,0	0,30	4	51	2,00	4,0	0,050	4	15	4,998	5,162	5,526	5,950
VHPT 4 02A 051 04 40 L080	2,0	0,30	4	51	2,00	8,0	0,050	4	15	9,133	9,440	10,125	10,923
VHPT 4 02A 051 04 40 L120	2,0	0,30	4	51	2,00	12,0	0,050	4	15	13,267	13,719	14,725	15,895
VHPT 4 025 051 04 40 L025	2,5	0,10	4	51	2,50	-	-	4	15	4,812	4,976	5,341	5,767
VHPT 4 025 051 04 40 L050	2,5	0,10	4	51	2,50	5,0	0,050	4	15	6,038	6,245	6,706	7,242
VHPT 4 025 051 04 40 L100	2,5	0,10	4	51	2,50	10,0	0,050	4	15	11,207	11,594	12,455	13,457
VHPT 4 025 051 04 40 L150	2,5	0,10	4	51	2,50	15,0	0,050	4	15	16,375	16,942	18,204	∞
VHPT 4 025 B51 04 40 L025	2,5	0,30	4	51	2,50	-	-	4	15	4,805	4,962	5,311	5,718
VHPT 4 025 B51 04 40 L050	2,5	0,30	4	51	2,50	5,0	0,050	4	15	6,032	6,231	6,676	7,193
VHPT 4 025 B51 04 40 L100	2,5	0,30	4	51	2,50	10,0	0,050	4	15	11,200	11,580	12,425	13,409
VHPT 4 025 B51 04 40 L150	2,5	0,30	4	51	2,50	15,0	0,050	4	15	16,368	16,928	18,174	∞
VHPT 4 030 051 04 40 L030	3,0	0,20	4	51	3,00	-	-	4	15	5,325	5,504	5,901	6,364
VHPT 4 030 051 04 40 L060	3,0	0,20	4	51	3,00	6,0	0,050	4	15	7,069	7,308	7,841	8,461
VHPT 4 030 051 04 40 L120	3,0	0,20	4	51	3,00	12,0	0,050	4	15	13,271	13,726	14,740	∞
VHPT 4 030 051 04 40 L180	3,0	0,20	4	51	3,00	18,0	0,050	4	15	19,473	20,144	∞	∞
VHPT 4 03B 051 04 40 L030	3,0	0,50	4	51	3,00	-	-	4	15	5,325	5,504	5,901	6,364
VHPT 4 03B 051 04 40 L060	3,0	0,50	4	51	3,00	6,0	0,050	4	15	7,058	7,287	7,796	8,388
VHPT 4 03B 051 04 40 L120	3,0	0,50	4	51	3,00	12,0	0,050	4	15	13,260	13,705	14,695	∞
VHPT 4 03B 051 04 40 L180	3,0	0,50	4	51	3,00	18,0	0,050	4	15	19,462	20,123	∞	∞



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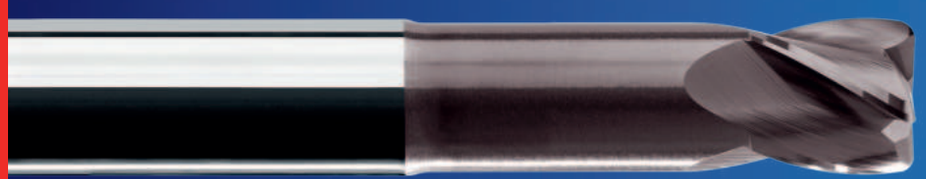
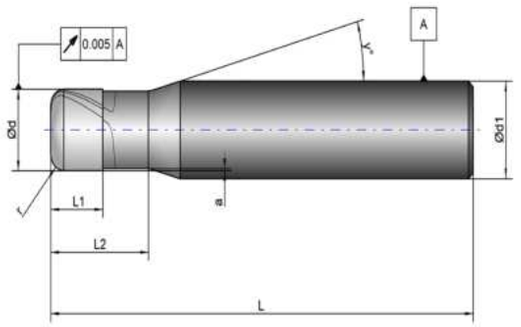


Shank 6 mm
Schaft 6 mm

Remark ∞ = infinity,
no collision in projection length area.

Bemerkung ∞ = unendlich, keine Kollision in Länge Projektionsfläche.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHPT 4 002 064 06 40 L002	0,2	0,01	6	64	0,20	-	-	4	15	0,685	0,709	0,761	0,822
VHPT 4 002 064 06 40 L004	0,2	0,01	6	64	0,20	0,4	0,010	4	15	0,724	0,749	0,804	0,869
VHPT 4 004 064 06 40 L004	0,4	0,01	6	64	0,40	-	-	4	15	1,202	1,244	1,336	1,444
VHPT 4 004 064 06 40 L009	0,4	0,01	6	64	0,40	0,9	0,010	4	15	1,241	1,284	1,379	1,490
VHPT 4 004 064 06 40 L016	0,4	0,01	6	64	0,40	1,6	0,010	4	15	1,964	2,032	2,184	2,360
VHPT 4 005 064 06 40 L005	0,5	0,03	6	64	0,50	-	-	4	15	1,305	1,349	1,448	1,563
VHPT 4 005 064 06 40 L010	0,5	0,03	6	64	0,50	1,0	0,010	4	15	1,343	1,389	1,491	1,610
VHPT 4 005 064 06 40 L020	0,5	0,03	6	64	0,50	2,0	0,010	4	15	2,377	2,459	2,641	2,853
VHPT 4 006 064 06 40 L006	0,6	0,05	6	64	0,60	-	-	4	15	2,060	2,130	2,286	2,468
VHPT 4 006 064 06 40 L016	0,6	0,05	6	64	0,60	1,6	0,020	4	15	2,138	2,210	2,372	2,561
VHPT 4 006 064 06 40 L024	0,6	0,05	6	64	0,60	2,4	0,020	4	15	2,965	3,066	3,292	3,555
VHPT 4 008 064 06 40 L008	0,8	0,05	6	64	0,80	-	-	4	15	2,267	2,344	2,516	2,716
VHPT 4 008 064 06 40 L018	0,8	0,05	6	64	0,80	1,8	0,020	4	15	2,344	2,424	2,602	2,809
VHPT 4 008 064 06 40 L032	0,8	0,05	6	64	0,80	3,2	0,020	4	15	3,791	3,922	4,212	4,550
VHPT 4 010 064 06 40 L001	1,0	0,05	6	64	1,00	-	-	4	15	2,474	2,558	2,746	2,965
VHPT 4 010 064 06 40 L020	1,0	0,05	6	64	1,00	2,0	0,020	4	15	2,551	2,638	2,832	3,058
VHPT 4 010 064 06 40 L040	1,0	0,05	6	64	1,00	4,0	0,020	4	15	4,618	4,778	5,132	5,544
VHPT 4 010 064 06 40 L060	1,0	0,05	6	64	1,00	6,0	0,020	4	15	6,686	6,917	7,432	8,030
VHPT 4 01A 064 06 40 L001	1,0	0,10	6	64	1,00	-	-	4	15	2,472	2,555	2,739	2,953
VHPT 4 01A 064 06 40 L020	1,0	0,10	6	64	1,00	2,0	0,020	4	15	2,549	2,635	2,825	3,046
VHPT 4 01A 064 06 40 L040	1,0	0,10	6	64	1,00	4,0	0,020	4	15	4,617	4,774	5,124	5,532
VHPT 4 01A 064 06 40 L060	1,0	0,10	6	64	1,00	6,0	0,020	4	15	6,684	6,913	7,424	8,018
VHPT 4 015 064 06 40 L015	1,5	0,10	6	64	1,50	-	-	4	15	3,778	3,906	4,191	4,523
VHPT 4 015 064 06 40 L030	1,5	0,10	6	64	1,50	3,0	0,025	4	15	3,874	4,006	4,299	4,639
VHPT 4 015 064 06 40 L060	1,5	0,10	6	64	1,50	6,0	0,025	4	15	6,975	7,215	7,748	8,369
VHPT 4 015 064 06 40 L090	1,5	0,10	6	64	1,50	9,0	0,025	4	15	10,076	10,424	11,198	12,098
VHPT 4 015 B64 06 40 L015	1,5	0,20	6	64	1,50	-	-	4	15	3,775	3,899	4,177	4,499
VHPT 4 015 B64 06 40 L030	1,5	0,20	6	64	1,50	3,0	0,025	4	15	3,871	3,999	4,284	4,615
VHPT 4 015 B64 06 40 L060	1,5	0,20	6	64	1,50	6,0	0,025	4	15	6,972	7,208	7,733	8,345
VHPT 4 015 B64 06 40 L090	1,5	0,20	6	64	1,50	9,0	0,025	4	15	10,073	10,417	11,183	12,074
VHPT 4 020 064 06 40 L002	2,0	0,10	6	64	2,00	-	-	4	15	4,295	4,441	4,766	5,145
VHPT 4 020 064 06 40 L040	2,0	0,10	6	64	2,00	4,0	0,050	4	15	5,005	5,175	5,556	5,999
VHPT 4 020 064 06 40 L080	2,0	0,10	6	64	2,00	8,0	0,050	4	15	9,139	9,454	10,155	10,971
VHPT 4 020 064 06 40 L120	2,0	0,10	6	64	2,00	12,0	0,050	4	15	13,274	13,733	14,755	15,944
VHPT 4 02A 064 06 40 L002	2,0	0,30	6	64	2,00	-	-	4	15	4,288	4,427	4,736	5,096
VHPT 4 02A 064 06 40 L040	2,0	0,30	6	64	2,00	4,0	0,050	4	15	4,998	5,162	5,526	5,950
VHPT 4 02A 064 06 40 L080	2,0	0,30	6	64	2,00	8,0	0,050	4	15	9,133	9,440	10,125	10,923
VHPT 4 02A 064 06 40 L120	2,0	0,30	6	64	2,00	12,0	0,050	4	15	13,267	13,719	14,725	15,895



PAGE 44

Shank 6 mm
Schaft 6 mm

For an extra charge we offer an inspection report of the tool geometry.

Auf Wunsch erhalten Sie zu jedem Werkzeug ein separates Prüfprotokoll (aufpreispflichtig).

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	 1°	 2°	 3°
VHPT 4 025 064 06 40 L025	2,5	0,10	6	64	2,50	-	-	4	15	4,812	4,976	5,341	5,767
VHPT 4 025 064 06 40 L050	2,5	0,10	6	64	2,50	5,0	0,050	4	15	6,038	6,245	6,706	7,242
VHPT 4 025 064 06 40 L100	2,5	0,10	6	64	2,50	10,0	0,050	4	15	11,207	11,594	12,455	13,457
VHPT 4 025 064 06 40 L150	2,5	0,10	6	64	2,50	15,0	0,050	4	15	16,375	16,942	18,204	19,673
VHPT 4 025 B64 06 40 L025	2,5	0,30	6	64	2,50	-	-	4	15	4,805	4,962	5,311	5,718
VHPT 4 025 B64 06 40 L050	2,5	0,30	6	64	2,50	5,0	0,050	4	15	6,032	6,231	6,676	7,193
VHPT 4 025 B64 06 40 L100	2,5	0,30	6	64	2,50	10,0	0,050	4	15	11,200	11,580	12,425	13,409
VHPT 4 025 B64 06 40 L150	2,5	0,30	6	64	2,50	15,0	0,050	4	15	16,368	16,928	18,174	19,625
VHPT 4 030 064 06 40 L003	3,0	0,20	6	64	3,00	-	-	4	15	5,325	5,504	5,901	6,364
VHPT 4 030 064 06 40 L060	3,0	0,20	6	64	3,00	6,0	0,050	4	15	7,069	7,308	7,841	8,461
VHPT 4 030 064 06 40 L120	3,0	0,20	6	64	3,00	12,0	0,050	4	15	13,271	13,726	14,740	15,919
VHPT 4 030 064 06 40 L180	3,0	0,20	6	64	3,00	18,0	0,050	4	15	19,473	20,144	21,639	23,378
VHPT 4 03B 064 06 40 L003	3,0	0,50	6	64	3,00	-	-	4	15	5,325	5,504	5,901	6,364
VHPT 4 03B 064 06 40 L060	3,0	0,50	6	64	3,00	6,0	0,050	4	15	7,058	7,287	7,796	8,388
VHPT 4 03B 064 06 40 L120	3,0	0,50	6	64	3,00	12,0	0,050	4	15	13,260	13,705	14,695	15,846
VHPT 4 03B 064 06 40 L180	3,0	0,50	6	64	3,00	18,0	0,050	4	15	19,462	20,123	21,594	23,305
VHPT 4 040 064 06 40 L080	4,0	0,20	6	64	4,00	8,0	0,100	4	15	9,329	9,647	10,355	11,179
VHPT 4 040 064 06 40 L160	4,0	0,20	6	64	4,00	16,0	0,100	4	15	17,598	18,204	19,554	∞
VHPT 4 040 064 06 40 L240	4,0	0,20	6	64	4,00	24,0	0,100	4	15	25,867	26,762	28,753	∞
VHPT 4 04B 064 06 40 L080	4,0	0,50	6	64	4,00	8,0	0,100	4	15	9,319	9,626	10,310	11,106
VHPT 4 04B 064 06 40 L160	4,0	0,50	6	64	4,00	16,0	0,100	4	15	17,588	18,183	19,509	∞
VHPT 4 04B 064 06 40 L240	4,0	0,50	6	64	4,00	24,0	0,100	4	15	25,857	26,741	28,708	∞
VHPT 4 06B 064 06 40 L120	6,0	0,50	6	64	6,00	12,0	0,150	4	-	-	-	-	-
VHPT 4 06B 064 06 40 L240	6,0	0,50	6	64	6,00	24,0	0,150	4	-	-	-	-	-
VHPT 4 06C 064 06 40 L120	6,0	1,00	6	64	6,00	12,0	0,150	4	-	-	-	-	-
VHPT 4 06C 064 06 40 L240	6,0	1,00	6	64	6,00	24,0	0,150	4	-	-	-	-	-
VHPT 4 08B 078 08 40 L160	8,0	0,50	8	78	8,00	16,0	0,200	4	-	-	-	-	-
VHPT 4 08B 078 08 40 L320	8,0	0,50	8	78	8,00	32,0	0,200	4	-	-	-	-	-
VHPT 4 08C 078 08 40 L160	8,0	1,00	8	78	8,00	16,0	0,200	4	-	-	-	-	-
VHPT 4 08C 078 08 40 L320	8,0	1,00	8	78	8,00	32,0	0,200	4	-	-	-	-	-
VHPT 4 10B 100 10 40 L200	10,0	0,50	10	100	10,00	20,0	0,200	4	-	-	-	-	-
VHPT 4 10B 100 10 40 L400	10,0	0,50	10	100	10,00	40,0	0,200	4	-	-	-	-	-
VHPT 4 10C 100 10 40 L200	10,0	1,00	10	100	10,00	20,0	0,200	4	-	-	-	-	-
VHPT 4 10C 100 10 40 L400	10,0	1,00	10	100	10,00	40,0	0,200	4	-	-	-	-	-
VHPT 4 12B 100 12 40 L240	12,0	0,50	12	100	12,00	24,0	0,200	4	-	-	-	-	-
VHPT 4 12B 100 12 40 L480	12,0	0,50	12	100	12,00	48,0	0,200	4	-	-	-	-	-
VHPT 4 12C 100 12 40 L240	12,0	1,00	12	100	12,00	24,0	0,200	4	-	-	-	-	-
VHPT 4 12C 100 12 40 L480	12,0	1,00	12	100	12,00	48,0	0,200	4	-	-	-	-	-

Material group	TSR (N/mm²)	Hardness	Cutting speed V_c m/min	Coolant
H2.2		50-55 HRc	**150 - 220**	min.lub.
H2.3		55-70 HRc	**200 - 250**	min.lub.
K4.1			**160 - 240**	emulsion

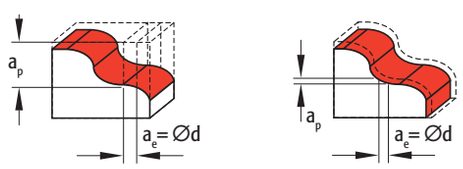
VHPT408B0780840L160
Workpiece Material: 1.2162
Hardness: 60 HRc

	Van Hoorn	Competitor
V_c	200 m/min	25 m/min
n	7.958 rpm	995 rpm
F_z	0,079 mm/t	0,038 mm/t
V_f	2.500 mm/min	150 mm/min
a_p	3,0 mm	3,0 mm
a_e	0,1 mm	0,25 mm
Coolant	air	air
Q	**0,75 mm³/min**	**0,11 mm³/min**

Finishing application / Schlichtbearbeitung
6 times faster than Competitor! / 6-Mal schneller als der Wettbewerb!

VHC Technology for hardened materials (55-70 HRc)
VHC Technologie für gehärtete Materialen (55-70 HRc)

- Consistency of cutting Speeds.
- Gleichbleibende Schnittgeschwindigkeit.
- Optimized performance.
- Optimierte Leistung.
- Significant production time reductions.
- Deutlich verkürzte Fertigungszeiten.

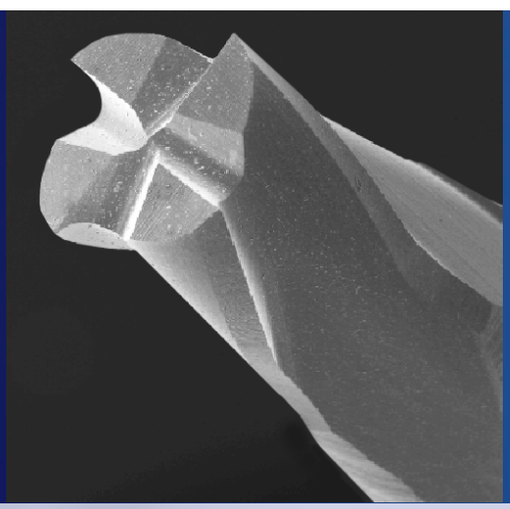


Shoulder milling / Stirnfräsen

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,2	< 0,15	< 0,005	0,004 - 0,010
0,4	< 0,30	< 0,010	0,006 - 0,013
0,5	< 0,38	< 0,013	0,007 - 0,015
0,6	< 0,45	< 0,015	0,009 - 0,018
0,8	< 0,60	< 0,020	0,012 - 0,021
1,0	< 0,75	< 0,025	0,015 - 0,025
1,5	< 1,13	< 0,038	0,020 - 0,035
2,0	< 1,50	< 0,050	0,030 - 0,050
2,5	< 1,88	< 0,063	0,035 - 0,055
3,0	< 2,25	< 0,075	0,040 - 0,060
4,0	< 3,00	< 0,100	0,050 - 0,080
5,0	< 3,75	< 0,125	0,060 - 0,110
6,0	< 4,50	< 0,150	0,065 - 0,125
8,0	< 6,00	< 0,200	0,080 - 0,130
10,0	< 7,50	< 0,250	0,085 - 0,135
12,0	< 9,00	< 0,300	0,100 - 0,140

Materials from 55 until 70 HRc
Materiale von 55 bis 70 HRc

- From 0,1 mm until 3,0 mm micro milling
  Ab 0,1 mm bis zum 3,0 mm Mikro Fräsen
- Shaft 4 and 6 mm
  Schaft 4 und 6 mm
- 2 Flute and 4 flute
  2 Schneiden und 4 Schneiden
- Ball nose
  Kugel
- Torus
  Torus
- Multiple flute
  Mehrschneiderfräsen

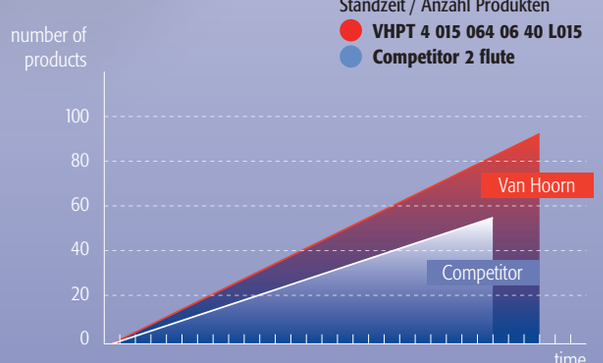


- **Micro 4 flute (0,2 mm)**
  Mikro 4 Schneiden (0,2 mm)
- **Ideal chipflow geometry**
  Ideale Spanabfluß Geometrie
- **Optimized for hardened steels**
  Optimiert für gehärtete Stählen

Micro 4 flute
42% higher material removal rate!

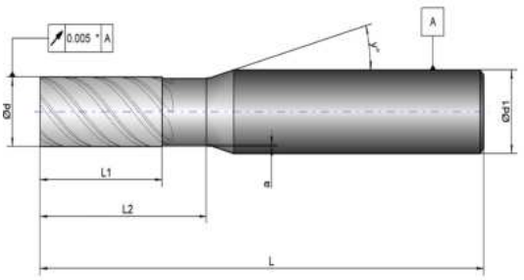
Mikro 4 Schneiden
42% höheres Zeitspanvolumen

Tool life / number of products
Standzeit / Anzahl Produkten
VHPT 4 015 064 06 40 L015
Competitor 2 flute

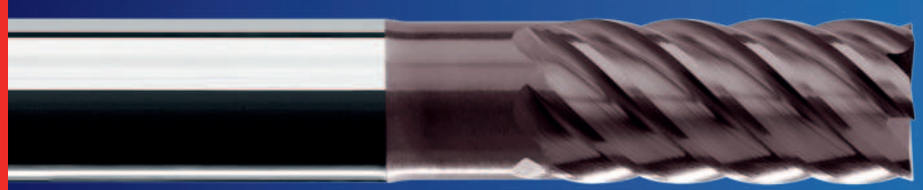


VHPT 4 flute / 4 Schneiden
Workpiece Material: Elmax Hardened
Hardness: 62 HRc

	Van Hoorn	Competitor
ø	1,5 mm	1,5 mm
V_c	85 m/min	85 m/min
n	18.000 rpm	18.000 rpm
V_f	1.440 mm/min	828 mm/min
Z	4	2
F_z	0,02 mm/t	0,023 mm/t
a_p	0,65 mm	0,65 mm
a_e	0,04 mm	0,04 mm
Coolant	MMS	MMS
Q	**37,44 mm³/min**	**21,52 mm³/min**



* For end mills / für Schaftfräser L < 100 mm.



Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHPM 6 030 064 06 40	3,0	-	6	64	8,00	15,0	0,050	6	15
VHPM 6 040 064 06 40	4,0	-	6	64	10,00	16,0	0,100	6	15
VHPM 6 050 064 06 40	5,0	-	6	64	12,00	18,0	0,150	6	15
VHPM 6 060 064 06 40	6,0	-	6	64	14,00	20,0	0,200	6	-
VHPM 6 080 078 08 40	8,0	-	8	78	18,00	25,0	0,200	6	-
VHPM 6 100 078 10 40	10,0	-	10	78	22,00	30,0	0,300	6	-
VHPM 6 120 089 12 40	12,0	-	12	89	26,00	35,0	0,300	6	-
VHPM 6 160 089 16 40	16,0	-	16	89	34,00	40,0	0,300	6	-
VHPM 8 200 102 20 40	20,0	-	20	102	42,00	48,0	0,300	8	-

Also available with extra teeth for higher productivity

Auch lieferbar mit größere Anzahl Zähne für Produktivitätssteigerung.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHPM 8 080 078 08 40	8,0	-	8	78	18,00	25,00	0,200	8	-
VHPM 10 100 078 10 40	10,0	-	10	78	22,00	30,00	0,300	10	-
VHPM 12 120 089 12 40	12,0	-	12	89	26,00	35,00	0,300	12	-
VHPM 16 160 089 16 40	16,0	-	16	89	34,00	40,00	0,300	16	-

Material group	TSR (N/mm²)	Hardness	Cutting speed V_c m/min	Coolant
H2.2		50-55 HRc	**110 - 170**	min.lub.
H2.3		55-70 HRc	**80 - 140**	min.lub.
K4.1			**140 - 200**	emulsion

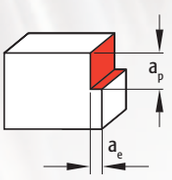
For an extra charge we offer an inspection report of the tool geometry.

Auf Wunsch erhalten Sie zu jedem Werkzeug ein separates Prüfprotokoll (aufpreispflichtig).

Negative rake angle
Negativer Spanwinkel

VHPM 6 080 078 08 40
Workpiece Material: 1.2379
Hardness: 61 HRc

	Van Hoorn	Competitor
ø	8,0 mm	8,0 mm
V_c	140 m/min	120 m/min
n	5.570 rpm	4.775 rpm
F_z	0,07 mm/t	0,05 mm/t
Z	6	4
V_f	2.340 mm/min	1.432 mm/min
a_p	8,0 mm	8,0 mm
a_e	0,2 mm	0,2 mm
Coolant	air	air
Q	**3,7 cm³/min**	**2,3 cm³/min**

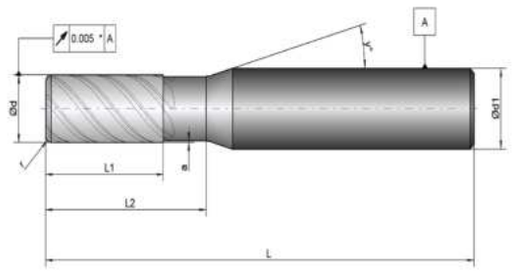


Hardened material
Gehärtete Werkstoffe

a_p up to 2,00 x d
a_e up to 0,02 x d

Shoulder milling / Eckfräsen

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 3,0	< 0,03	0,020 - 0,035
4,0	< 6,0	< 0,05	0,030 - 0,045
5,0	< 7,5	< 0,07	0,035 - 0,055
6,0	< 12,0	< 0,10	0,045 - 0,065
8,0	< 16,0	< 0,13	0,060 - 0,080
10,0	< 20,0	< 0,17	0,070 - 0,095
12,0	< 24,0	< 0,21	0,085 - 0,110
16,0	< 32,0	< 0,28	0,095 - 0,125
20,0	< 40,0	< 0,35	0,105 - 0,140



Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHPMR 6 030 064 06 40 030	3,0	0,30	6	64	8,00	15,0	0,050	6	15
VHPMR 6 040 064 06 40 030	4,0	0,30	6	64	10,00	16,0	0,100	6	15
VHPMR 6 050 064 06 40 030	5,0	0,30	6	64	12,00	18,0	0,150	6	15
VHPMR 6 050 064 06 40 050	5,0	0,50	6	64	12,00	18,0	0,150	6	15
VHPMR 6 060 064 06 40 050	6,0	0,50	6	64	14,00	20,0	0,200	6	-
VHPMR 6 060 064 06 40 100	6,0	1,00	6	64	14,00	20,0	0,200	6	-
VHPMR 6 080 070 08 40 050	8,0	0,50	8	70	18,00	25,0	0,200	6	-
VHPMR 6 080 070 08 40 100	8,0	1,00	8	70	18,00	25,0	0,200	6	-
VHPMR 6 100 078 10 40 050	10,0	0,50	10	78	22,00	30,0	0,300	6	-
VHPMR 6 100 078 10 40 100	10,0	1,00	10	78	22,00	30,0	0,300	6	-
VHPMR 6 100 078 10 40 150	10,0	1,50	10	78	22,00	30,0	0,300	6	-
VHPMR 6 120 078 12 40 050	12,0	0,50	12	78	26,00	35,0	0,300	6	-
VHPMR 6 120 078 12 40 100	12,0	1,00	12	78	26,00	35,0	0,300	6	-
VHPMR 6 120 078 12 40 200	12,0	2,00	12	78	26,00	35,0	0,300	6	-
VHPMR 6 160 089 16 40 100	16,0	1,00	16	89	34,00	40,0	0,300	6	-
VHPMR 6 160 089 16 40 200	16,0	2,00	16	89	34,00	40,0	0,300	6	-
VHPMR 8 200 102 20 40 100	20,0	1,00	20	102	42,00	48,0	0,300	8	-
VHPMR 8 200 102 20 40 200	20,0	2,00	20	102	42,00	48,0	0,300	8	-

Also available with extra teeth for higher productivity

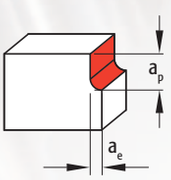
Auch lieferbar mit größere Anzahl Zähne für Produktivitätssteigerung.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHPMR 8 080 078 08 40 050	8,0	0,50	8	78	18,00	25,00	0,200	8	-
VHPMR 10 100 078 10 40 050	10,0	0,50	10	78	22,00	30,00	0,300	10	-
VHPMR 12 120 089 12 40 050	12,0	0,50	12	89	26,00	35,00	0,300	12	-
VHPMR 16 160 089 16 40 050	16,0	0,50	16	89	34,00	40,00	0,300	16	-

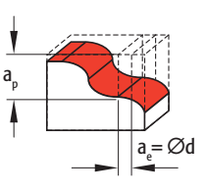
Material group	TSR (N/mm²)	Hardness	Cutting speed V_c m/min	Coolant
H2.2		50-55 HRc	**110 - 170**	min.lub.
H2.3		55-70 HRc	**80 - 140**	min.lub.
K4.1			**140 - 200**	emulsion

For an extra charge we offer an inspection report of the tool geometry.

Auf Wunsch erhalten Sie zu jedem Werkzeug ein separates Prüfprotokoll (aufpreispflichtig).



Hardened material
Gehärtete Werkstoffe
a_p up to 2,00 x d
a_e up to 0,02 x d



Hardened material
Gehärtete Werkstoffe
a_p up to 2,00 x d
a_e up to 0,02 x d

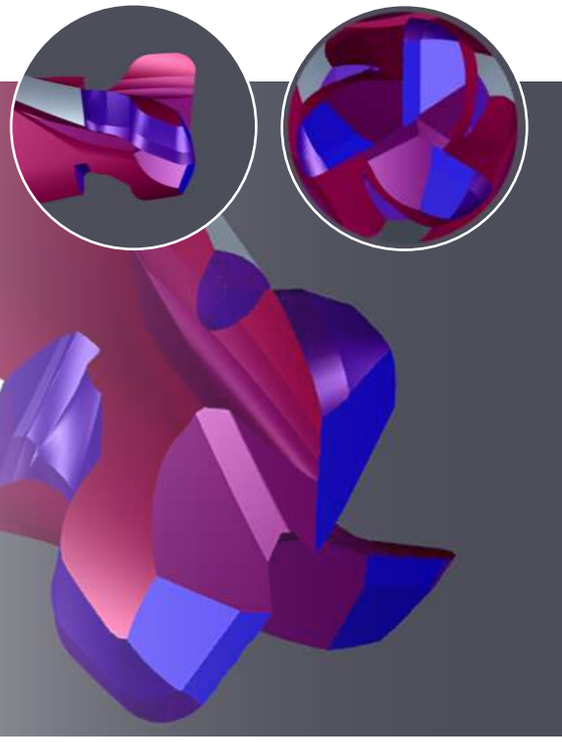
Shoulder milling / Eckfräsen

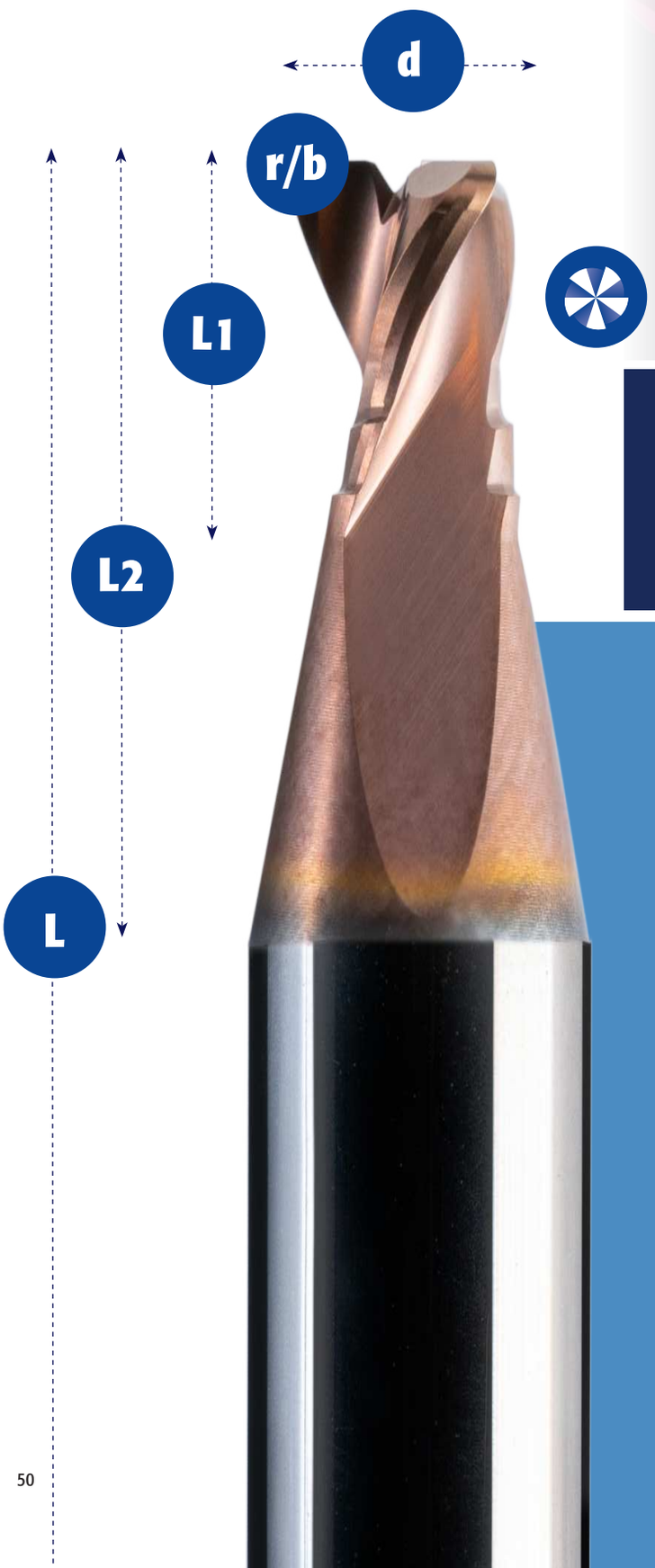
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 3,0	< 0,03	0,020 - 0,035
4,0	< 6,0	< 0,05	0,030 - 0,045
5,0	< 7,5	< 0,07	0,035 - 0,055
6,0	< 12,0	< 0,10	0,045 - 0,065
8,0	< 16,0	< 0,13	0,060 - 0,080
10,0	< 20,0	< 0,17	0,070 - 0,095
12,0	< 24,0	< 0,21	0,085 - 0,110
16,0	< 32,0	< 0,28	0,095 - 0,125
20,0	< 40,0	< 0,35	0,105 - 0,140

Specials, custom made

Sonderfräser, auf Maß angefertigt

If our extensive standard programs do not have the required size, profile or form for your application, we can offer you custom made tools.
Wenn Sie die gewünschte Ausführung in unseren umfangreichen Standardprogrammen nicht finden, können wir Ihnen Sonderfräser, nach Kundenwunsch, anbieten.





Adjustment possibilities for the required geometry & coating
Änderungsmöglichkeiten für die gewünschte Geometrie & Beschichtung

Customize your own special:

- **L** Overall length / Gesamtlänge
- **L1** Cutting length / Schneidenlänge
- **L2** Relief length / Freistellungslänge
- **d** End mill diameter / Fräserdurchmesser
- Number of teeth / Anzahl Zähne
- **r/b** Corner radius/Chamfer / Eckenradius/Fase

"We strongly recommend Van Hoorn Carbide, as a technical sparring partner."

Jens Säckel
CNC Programmer
WTL Formenbau (Germany)

The WTL Group is an association of 4 individual companies and exists since 2005. Our field of activity is toolmaking for injection moulding, maintenance and repair of third-party tools, as well as order-related contract manufacturing. Short decision-making processes, combined with our modern equipment and innovative tools, result in short lead times to help and serve our customers quickly.

Many hardened steels and exotic materials have high demands on the tools. As we are active in the manufacturing of single-ordered parts, we must be able to rely on the quality of the tools and we also need dependable processes to manufacture economically. Also for materials which are difficult to machine, these working conditions are granted by using modern equipment combined with Van Hoorn Carbide tools. The process reliability during machining and the performance for the modern HSC equipment are decisive for our cooperation with Van Hoorn Carbide.

- Well structured product portfolio, especially for machining of hardened steels (55 HRc and more)
- Technical support is very fast and competent, in particular for special materials as well as for custom made geometries, deviating from the standard programme
- Cutting conditions are proven to be reliable during processing
- Innovative

We strongly recommend Van Hoorn Carbide, as a technical sparring partner as well as in discussions with our partners.

Die WTL Group ist ein Zusammenschluß von 4 Einzelunternehmen und besteht seit 2005.Zu unserem Tätigkeitsfelt gehören der Werkzeugbau für Spritzgießwerkzeuge, die Wartung und Instandhaltung von Fremdwerkzeugen sowie die auftragsbezogene Lohnfertigung. Besonders die kurze Reaktionszeit und kurze Entscheidungswege helfen, unsere Kunden schnell zu bedienen. Wir setzen dafür auf einen modernen Maschinenpark und innovative Werkzeuge. Durch das Zusammenspiel von diesen Faktoren, wird die Umsetzung der Wünsche unserer Kunden gewährleistet.

Viele gehärtete Werkzeugstähle und exotische Materialien setzen hohe Anforderungen an die Werkzeuge. Da wir uns in der Einzelteilfertigung bewegen, müssen wir uns auf die Qualität der Werkzeuge verlassen und zuverlässige Prozesse haben, um wirtschaftlich fertigen zu können. Diese Voraussetzung ist mit modernen Maschinen im Zusammenspiel mit Van Hoorn Carbide Werkzeugen, auch bei schwer zu zerspanenden Materialien gegeben.

Die Prozeßsicherheit bei der Zerspanung und die Performance für die modernen HSC Maschinen geben den Zuschlag für Van Hoorn Carbide Werkzeuge; auch der gute technische Support und die Bereitschaft sich mit Problemen auseinander zu setzen sind vorbildlich.
- Gut strukturiertes Produktportfolio, besonders für die Hartbearbeitung über 55 HRc
- Technischer Support; z.B. bei Sondermaterialien, sehr schnelle und kompetente Hilfe
- Erprobte Schnittwertempfehlungen die prozeßsicher auf der Maschine funktionieren
- Innovativ

Sehr gerne empfehlen wir die Firma Van Hoorn Carbide weiter, z.B. sowohl in Fachgesprächen als auch bei Gesprächen mit unseren Partnern.

4-Flute ball nose, higher productivity

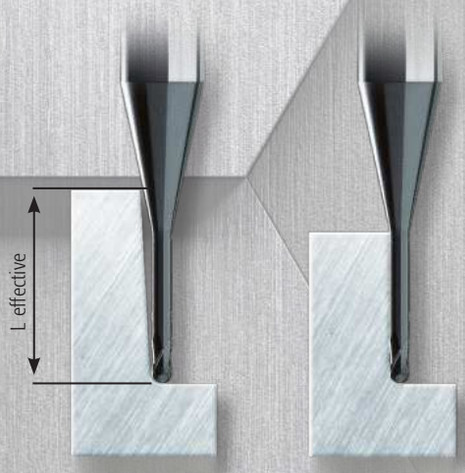
4-Schneider Vollradius, höhere Produktivität

An optimized combination between geometry, coating and tolerances results in an excellent surface finish and extended tool life.

Eine optimierte Kombination von Schneidengeometrie, Beschichtung und Toleranzen gewährleistet ausgezeichnete Oberflächen und verlängerte Standzeiten.

Ball nose geometries
Vollradius Geometrien

- Special designed center
  Spezial entwickeltes Zentrum
- Smooth surface finish
  Glatte Oberflächen
- Optimized coating for tool life improvement
  Optimierte Beschichtung für Standzeitverbesserung



Micro end mills
Mikrofräser

- Also standard in shank 4
  Auch Standard in Schaft 4
- Radial runout determines tool life
  Rundlaufgenauigkeit beeinflußt Standzeit
- Micro 4 flutes
  Mikro 4 Schneiden
- New designed ideal clearance
  Neuer idealer Freilauf

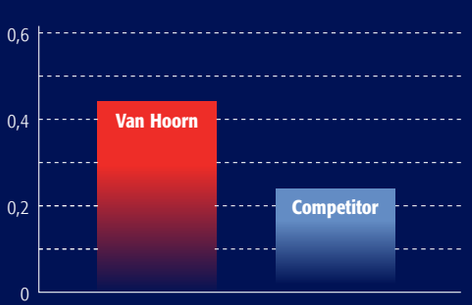
A complete range of high end solutions for typical Mould & Die applications

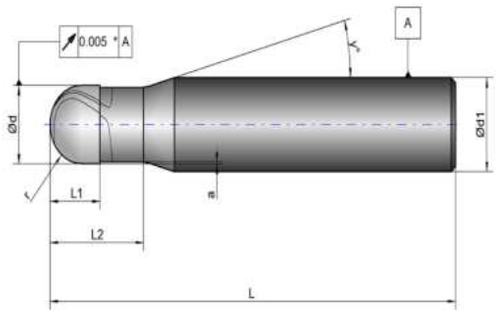
Ein vollständiges Sortiment an hochwertigen Produkten für den Werkzeug- und Formenbau.

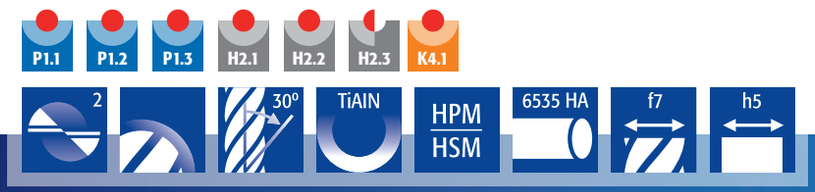
VHMFR 6 080 064 08 03 050
Workpiece Material: 1.2343 (S136)
Hardness: 52 HRc

	Van Hoorn	Competitor
ø	8,0 mm	8,0 mm
V_c	140 m/min	140 m/min
n	5.570 rpm	5.5710 rpm
F_z	0,07 mm/t	0,029 mm/t
Z	6	4
V_f	2.340 mm/min	800 mm/min
a_p	8,0 mm	0,1 mm
a_e	0,2 mm	3,0 mm
Coolant	emulsion	emulsion
Q	**0,45 cm³/min**	**0,24 cm³/min**
Lifetime	**680 mtr**	**240 mtr**

VHMFR Material removal rate

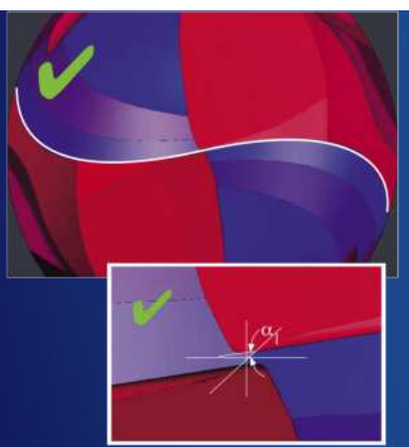






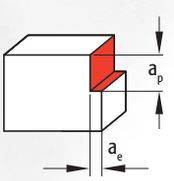
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHKF 2 010 064 06 03	1,0	0,50	6	64	2,00	4,00	0,050	2	7
VHKF 2 010 078 06 03	1,0	0,50	6	78	2,00	4,00	0,050	2	4
VHKF 2 015 064 06 03	1,5	0,75	6	64	2,00	4,00	0,050	2	6
VHKF 2 015 078 06 03	1,5	0,75	6	78	2,00	4,00	0,050	2	4
VHKF 2 020 064 06 03	2,0	1,00	6	64	3,00	5,00	0,050	2	6
VHKF 2 020 064 06 03 L080	2,0	1,00	6	64	3,00	8,00	0,050	2	9
VHKF 2 020 078 06 03 L080	2,0	1,00	6	78	3,00	8,00	0,050	2	4
VHKF 2 020 078 06 03	2,0	1,00	6	78	3,00	15,00	0,050	2	5
VHKF 2 030 064 06 03	3,0	1,50	6	64	4,00	7,00	0,050	2	5
VHKF 2 030 078 06 03 L080	3,0	1,50	6	78	4,00	8,00	0,050	2	3
VHKF 2 030 078 06 03	3,0	1,50	6	78	4,00	15,00	0,050	2	4
VHKF 2 030 100 06 03	3,0	1,50	6	100	4,00	7,00	0,050	2	2
VHKF 2 040 064 06 03	4,0	2,00	6	64	5,00	8,00	0,100	2	4
VHKF 2 040 064 06 03 L120	4,0	2,00	6	64	5,00	12,00	0,100	2	5
VHKF 2 040 064 06 03 L160	4,0	2,00	6	64	5,00	16,00	0,100	2	6
VHKF 2 040 064 06 03 L200	4,0	2,00	6	64	5,00	20,00	0,100	2	10
VHKF 2 040 078 06 03	4,0	2,00	6	78	5,00	15,00	0,100	2	3
VHKF 2 040 100 06 03	4,0	2,00	6	100	5,00	8,00	0,100	2	1
VHKF 2 050 064 06 03	5,0	2,50	6	64	5,00	10,00	0,150	2	2
VHKF 2 050 078 06 03	5,0	2,50	6	78	5,00	20,00	0,150	2	2
VHKF 2 060 064 06 03	6,0	3,00	6	64	6,00	25,00	0,200	2	-
VHKF 2 060 078 06 03	6,0	3,00	6	78	6,00	35,00	0,200	2	-
VHKF 2 060 100 08 03	6,0	3,00	8	100	6,00	25,00	0,200	2	2
VHKF 2 080 064 08 03	8,0	4,00	8	64	8,00	25,00	0,300	2	-
VHKF 2 080 078 08 03	8,0	4,00	8	78	8,00	35,00	0,300	2	-
VHKF 2 080 100 08 03	8,0	4,00	8	100	8,00	50,00	0,300	2	-
VHKF 2 080 120 10 03	8,0	4,00	10	120	8,00	30,00	0,300	2	2
VHKF 2 100 078 10 03	10,0	5,00	10	78	10,00	35,00	0,300	2	-
VHKF 2 100 100 10 03	10,0	5,00	10	100	10,00	55,00	0,300	2	-
VHKF 2 100 120 12 03	10,0	5,00	12	120	10,00	30,00	0,300	2	2
VHKF 2 120 078 12 03	12,0	6,00	12	78	12,00	35,00	0,300	2	-
VHKF 2 120 100 12 03	12,0	6,00	12	100	12,00	55,00	0,300	2	-
VHKF 2 120 120 16 03	12,0	6,00	16	120	12,00	40,00	0,300	2	5
VHKF 2 160 100 16 03	16,0	8,00	16	100	20,00	50,00	0,300	2	-
VHKF 2 160 150 16 03	16,0	8,00	16	150	20,00	100,00	0,300	2	-

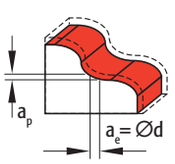
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**150 - 250**	emulsion
P1.2	< 1000	< 300	**120 - 200**	emulsion
P1.3	< 1400	< 400	**100 - 160**	emulsion
H2.1		42-50 HRc	**120 - 180**	min.lub.
H2.2		50-55 HRc	**150 - 200**	min.lub.
H2.3		55-70 HRc	**200 - 250**	min.lub.
K4.1			**100 - 200**	emulsion



Special/ideal ball nose geometry

Spezieller/idealer Kugelgeometrie





- For the cutting speed V_c calculation the effective cutting diameter d_{eff} has to be taken into account. See formula.

  Für die Berechnung der Schnittgeschwindigkeit muss der effektive Durchmesser d_{eff} berücksichtigt werden (siehe Formel).

ß ≠ 0: $d_{eff} = d \bullet \sin\left[ß \pm \arccos\left(\frac{d - 2a_p}{d}\right)\right]$

Roughing / Schruppfräsen

	P1.1 / P1.2 / P1.3		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
1,0	< 1,0	< 0,30	0,015 - 0,025
1,5	< 1,5	< 0,45	0,020 - 0,030
2,0	< 2,0	< 0,60	0,025 - 0,035
3,0	< 3,0	< 0,90	0,028 - 0,040
4,0	< 4,0	< 1,20	0,030 - 0,045
5,0	< 5,0	< 1,50	0,035 - 0,050
6,0	< 6,0	< 1,80	0,040 - 0,055
8,0	< 8,0	< 2,40	0,050 - 0,065
10,0	< 10,0	< 3,00	0,055 - 0,080
12,0	< 12,0	< 3,60	0,065 - 0,090
16,0	< 16,0	< 4,80	0,075 - 0,110

Finishing / Schlichtfräsen

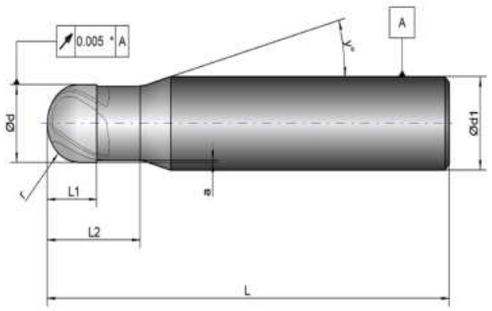
	P1.1 / P1.2 / P1.3		
	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
	< 1,0	< 0,10	0,020 - 0,030
	< 1,5	< 0,15	0,025 - 0,040
	< 2,0	< 0,20	0,030 - 0,050
	< 3,0	< 0,30	0,040 - 0,060
	< 4,0	< 0,40	0,050 - 0,080
	< 5,0	< 0,50	0,060 - 0,110
	< 6,0	< 0,60	0,065 - 0,125
	< 8,0	< 0,80	0,080 - 0,130
	< 10,0	< 1,00	0,085 - 0,135
	< 12,0	< 1,20	0,100 - 0,140
	< 16,0	< 1,60	0,120 - 0,160

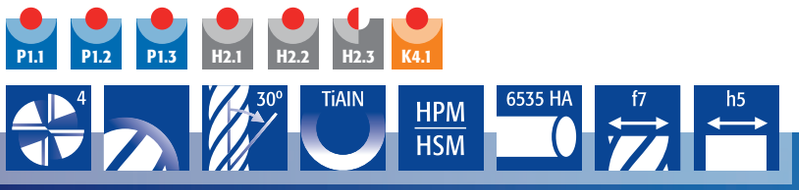
Roughing / Schruppfräsen

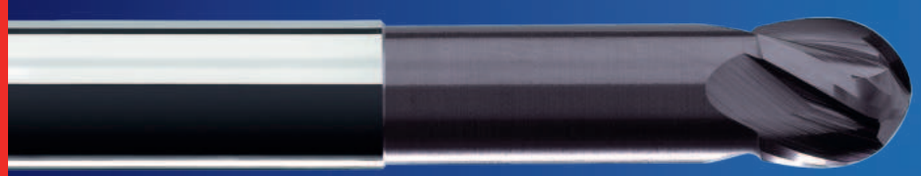
	H2.1 / H2.2 / H2.3		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
1,0	< 0,5	< 0,05	0,015 - 0,025
1,5	< 0,75	< 0,08	0,020 - 0,030
2,0	< 1,0	< 0,10	0,025 - 0,035
3,0	< 1,5	< 0,15	0,028 - 0,040
4,0	< 2,0	< 0,20	0,030 - 0,045
5,0	< 2,5	< 0,25	0,035 - 0,050
6,0	< 3,0	< 0,30	0,040 - 0,055
8,0	< 4,0	< 0,40	0,050 - 0,065
10,0	< 5,0	< 0,50	0,055 - 0,080
12,0	< 6,0	< 0,60	0,065 - 0,090
16,0	< 8,0	< 0,80	0,075 - 0,110

Finishing / Schlichtfräsen

	H2.1 / H2.2 / H2.3		
	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
	< 0,5	< 0,02	0,020 - 0,030
	< 0,75	< 0,03	0,025 - 0,040
	< 1,0	< 0,04	0,030 - 0,050
	< 1,5	< 0,06	0,040 - 0,060
	< 2,0	< 0,08	0,050 - 0,080
	< 2,5	< 0,10	0,060 - 0,110
	< 3,0	< 0,12	0,065 - 0,125
	< 4,0	< 0,16	0,080 - 0,130
	< 5,0	< 0,20	0,085 - 0,135
	< 6,0	< 0,24	0,100 - 0,140
	< 8,0	< 0,32	0,120 - 0,160





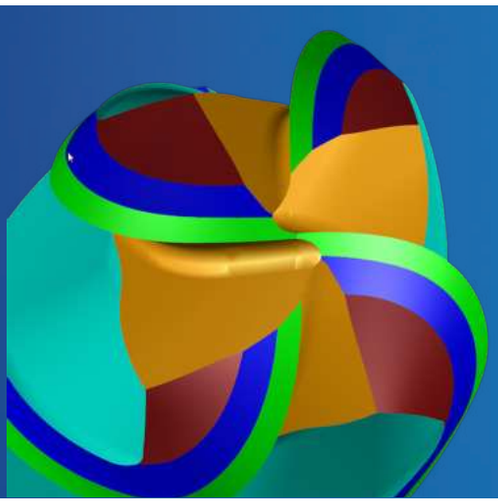


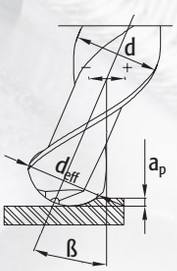
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHKF 4 060 064 06 03	6,0	3,00	6	64	6,00	25,0	0,200	4	-
VHKF 4 060 078 06 03	6,0	3,00	6	78	6,00	35,0	0,200	4	-
VHKF 4 060 100 08 03	6,0	3,00	8	100	6,00	25,0	0,200	4	2
VHKF 4 080 064 08 03	8,0	4,00	8	64	8,00	25,0	0,300	4	-
VHKF 4 080 078 08 03	8,0	4,00	8	78	8,00	35,0	0,300	4	-
VHKF 4 080 100 08 03	8,0	4,00	8	100	8,00	50,0	0,300	4	-
VHKF 4 080 120 10 03	8,0	4,00	10	120	8,00	30,0	0,300	4	2
VHKF 4 100 078 10 03	10,0	5,00	10	78	10,00	35,0	0,300	4	-
VHKF 4 100 100 10 03	10,0	5,00	10	100	10,00	55,0	0,300	4	-
VHKF 4 100 120 12 03	10,0	5,00	12	120	10,00	30,0	0,300	4	2
VHKF 4 120 078 12 03	12,0	6,00	12	78	12,00	35,0	0,300	4	-
VHKF 4 120 100 12 03	12,0	6,00	12	100	12,00	55,0	0,300	4	-
VHKF 4 120 120 16 03	12,0	6,00	16	120	12,00	40,0	0,300	4	5
VHKF 4 160 100 16 03	16,0	8,00	16	100	20,00	50,0	0,300	4	-
VHKF 4 160 150 16 03	16,0	8,00	16	150	20,00	100,0	0,300	4	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**150 - 250**	emulsion
P1.2	< 1000	< 300	**120 - 200**	emulsion
P1.3	< 1400	< 400	**100 - 160**	emulsion
H2.1		42-50 HRc	**120 - 180**	min.lub.
H2.2		50-55 HRc	**150 - 200**	min.lub.
H2.3		55-70 HRc	**200 - 250**	min.lub.
K4.1			**100 - 200**	emulsion

Recommendations: Empfehlungen:

- **Down-milling**
  Gleich lauf fräsen
- **Inclination angle max. 15 degrees**
  Neigungswinkel max. 15°
- **Use the effective diameter d_{eff} to calculate cutting speed**
  Effektive Durchmesser d_{eff} muß berücksichtigt werden bei der Schnittgeschwindigkeitsberechnung

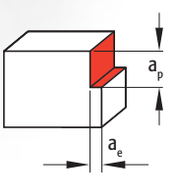




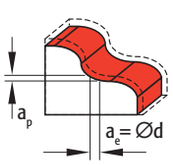
- For the cutting speed V_c calculation the effective cutting diameter d_{eff} has to be taken into account. See formula.

  Für die Berechnung der Schnittgeschwindigkeit muß der effektive Durchmesser d_{eff} berücksichtigt werden (siehe Formel).

ß ≠ 0: $d_{eff} = d \bullet \sin\left[ß \pm \arccos\left(\frac{d - 2a_p}{d}\right)\right]$



Roughing
Schruppen



Finishing
Schlichten

Roughing / Schruppfräsen

	P1.1 / P1.2 / P1.3		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
6,0	< 6,0	< 1,80	0,040 - 0,055
8,0	< 8,0	< 2,40	0,050 - 0,065
10,0	< 10,0	< 3,00	0,055 - 0,080
12,0	< 12,0	< 3,60	0,065 - 0,090
16,0	< 16,0	< 4,80	0,075 - 0,110

Finishing / Schlichtfräsen

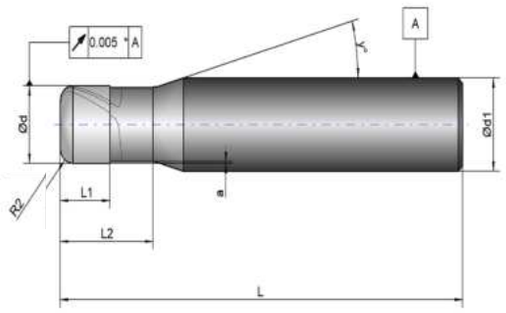
	P1.1 / P1.2 / P1.3		
	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
	< 6,0	< 0,60	0,065 - 0,125
	< 8,0	< 0,80	0,080 - 0,130
	< 10,0	< 1,00	0,085 - 0,135
	< 12,0	< 1,20	0,100 - 0,140
	< 16,0	< 1,60	0,120 - 0,160

Roughing / Schruppfräsen

	H2.1 / H2.2 / H2.3		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
6,0	< 3,0	< 0,30	0,040 - 0,055
8,0	< 4,0	< 0,40	0,050 - 0,065
10,0	< 5,0	< 0,50	0,055 - 0,080
12,0	< 6,0	< 0,60	0,065 - 0,090
16,0	< 8,0	< 0,80	0,075 - 0,110

Finishing / Schlichtfräsen

	H2.1 / H2.2 / H2.3		
	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
	< 3,0	< 0,12	0,065 - 0,125
	< 4,0	< 0,16	0,080 - 0,130
	< 5,0	< 0,20	0,085 - 0,135
	< 6,0	< 0,24	0,100 - 0,140
	< 8,0	< 0,32	0,120 - 0,160

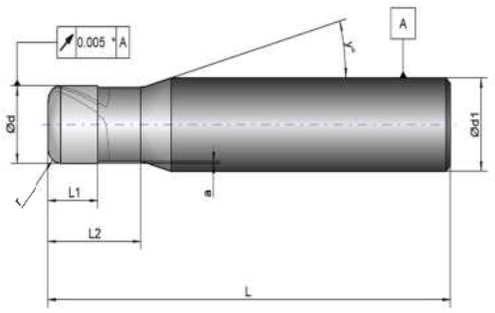


P1.1 P1.2 P1.3 H2.1 H2.2 H2.3 K4.1

2 | 30° | TiAlN | HPM / HSM | 6535 HA | f7 | h5

PAGE 61

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHTF 2 010 078 06 03 L040	1,0	0,10	6	78	2,00	4,0	0,050	2	-
VHTF 2 015 064 06 03 L050	1,5	0,30	6	64	2,00	5,0	0,050	2	7
VHTF 2 015 064 06 03 L100	1,5	0,30	6	64	2,00	10,0	0,050	2	9
VHTF 2 015 078 06 03 L080	1,5	0,30	6	78	2,00	4,0	0,050	2	9
VHTF 2 020 064 06 03	2,0	0,50	6	64	3,00	5,0	0,050	2	6
VHTF 2 020 064 06 03 L080	2,0	0,50	6	64	3,00	8,0	0,050	2	7
VHTF 2 020 064 06 03 L100	2,0	0,50	6	64	3,00	10,0	0,050	2	8
VHTF 2 020 078 06 03	2,0	0,50	6	78	3,00	15,0	0,050	2	5
VHTF 2 030 064 06 03	3,0	0,50	6	64	4,00	7,0	0,050	2	5
VHTF 2 020 078 06 03 L080	2,0	0,50	6	78	3,00	8,0	0,050	2	4
VHTF 2 030 064 06 03 L120	3,0	0,50	6	64	4,00	12,0	0,050	2	5
VHTF 2 030 064 06 03 L160	3,0	0,50	6	64	4,00	16,0	0,050	2	5
VHTF 2 030 078 06 03 L080	3,0	0,50	6	78	4,00	8,0	0,050	2	5
VHTF 2 030 078 06 03	3,0	0,50	6	78	4,00	15,0	0,050	2	4
VHTF 2 03D 078 06 03	3,0	1,00	6	78	4,00	15,0	0,050	2	4
VHTF 2 040 064 06 03	4,0	0,50	6	64	5,00	8,0	0,100	2	4
VHTF 2 040 064 06 03 L120	4,0	0,50	6	64	5,00	12,0	0,100	2	4
VHTF 2 040 064 06 03 L160	4,0	0,50	6	64	5,00	16,0	0,100	2	4
VHTF 2 040 064 06 03 L200	4,0	0,50	6	64	5,00	20,0	0,100	2	4
VHTF 2 04D 064 06 03	4,0	1,00	6	64	5,00	8,0	0,100	2	4
VHTF 2 04B 078 06 03	4,0	0,50	6	78	5,00	15,0	0,100	2	3
VHTF 2 040 078 06 03	4,0	1,00	6	78	5,00	15,0	0,100	2	3
VHTF 2 050 064 06 03	5,0	0,50	6	64	5,00	10,0	0,150	2	3
VHTF 2 05D 064 06 03	5,0	1,00	6	64	5,00	10,0	0,150	2	3
VHTF 2 05B 078 06 03	5,0	0,50	6	78	5,00	20,0	0,150	2	3
VHTF 2 050 078 06 03	5,0	1,00	6	78	5,00	20,0	0,150	2	2
VHTF 2 060 064 06 03	6,0	0,50	6	64	6,00	25,0	0,200	2	-
VHTF 2 06D 064 06 03	6,0	1,00	6	64	6,00	25,0	0,200	2	-
VHTF 2 06F 064 06 03	6,0	1,50	6	64	6,00	25,0	0,200	2	-
VHTF 2 06B 078 06 03	6,0	0,50	6	78	6,00	35,0	0,200	2	-
VHTF 2 06D 078 06 03	6,0	1,00	6	78	6,00	35,0	0,200	2	-
VHTF 2 060 078 06 03	6,0	1,50	6	78	6,00	35,0	0,200	2	-

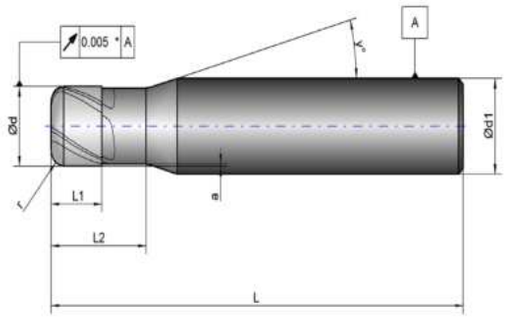


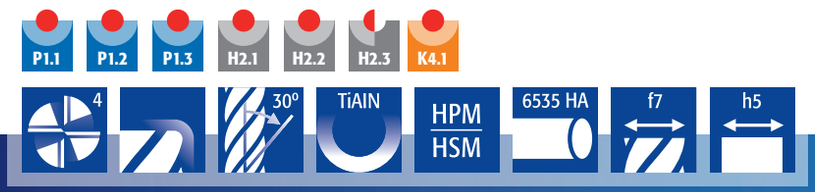
P1.1 P1.2 P1.3 H2.1 H2.2 H2.3 K4.1

2 | 30° | TiAlN | HPM HSM | 6535 HA | f7 | h5

PAGE 61

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHTF 2 06B 100 06 03 L550	6,0	0,50	6	100	6,00	55,0	0,200	2	2
VHTF 2 06B 100 08 03	6,0	0,50	8	100	6,00	25,0	0,200	2	2
VHTF 2 06D 100 08 03	6,0	1,00	8	100	6,00	25,0	0,200	2	2
VHTF 2 060 100 08 03	6,0	1,50	8	100	6,00	25,0	0,200	2	2
VHTF 2 08B 064 08 03	8,0	0,50	8	64	8,00	25,0	0,300	2	-
VHTF 2 080 064 08 03	8,0	1,00	8	64	8,00	25,0	0,300	2	-
VHTF 2 08H 064 08 03	8,0	2,00	8	64	8,00	25,0	0,300	2	-
VHTF 2 08B 078 08 03	8,0	0,50	8	78	8,00	25,0	0,300	2	-
VHTF 2 08D 078 08 03	8,0	1,00	8	78	8,00	35,0	0,300	2	-
VHTF 2 080 078 08 03	8,0	2,00	8	78	8,00	35,0	0,300	2	-
VHTF 2 08B 100 08 03	8,0	0,50	8	100	8,00	50,0	0,300	2	-
VHTF 2 08D 100 08 03	8,0	1,00	8	100	8,00	50,0	0,300	2	-
VHTF 2 080 100 08 03	8,0	2,00	8	100	8,00	50,0	0,300	2	-
VHTF 2 08D 125 08 03	8,0	1,00	8	125	8,00	55,0	0,300	2	2
VHTF 2 08D 120 10 03	8,0	1,00	10	120	8,00	30,0	0,300	2	2
VHTF 2 080 120 10 03	8,0	2,00	10	120	8,00	30,0	0,300	2	2
VHTF 2 100 078 10 03	10,0	0,50	10	78	10,00	35,0	0,300	2	-
VHTF 2 10D 078 10 03	10,0	1,00	10	78	10,00	35,0	0,300	2	-
VHTF 2 10H 078 10 03	10,0	2,00	10	78	10,00	35,0	0,300	2	-
VHTF 2 100 100 10 03	10,0	1,00	10	100	10,00	55,0	0,300	2	-
VHTF 2 10H 100 10 03	10,0	2,00	10	100	10,00	55,0	0,300	2	-
VHTF 2 10M 100 10 03	10,0	3,00	10	100	10,00	55,0	0,300	2	-
VHTF 2 10D 125 10 03	10,0	1,00	10	125	10,00	55,0	0,300	2	-
VHTF 2 10M 125 10 03	10,0	3,00	10	125	10,00	55,0	0,300	2	-
VHTF 2 100 120 12 03	10,0	2,00	12	120	10,00	30,0	0,300	2	2
VHTF 2 120 078 12 03	12,0	0,50	12	78	12,00	35,0	0,300	2	-
VHTF 2 12H 078 12 03	12,0	2,00	12	78	12,00	35,0	0,300	2	-
VHTF 2 120 100 12 03	12,0	1,00	12	100	12,00	55,0	0,300	2	-
VHTF 2 12H 100 12 03	12,0	2,00	12	100	12,00	55,0	0,300	2	-
VHTF 2 12D 125 12 03	12,0	1,00	12	125	12,00	55,0	0,300	2	-
VHTF 2 120 120 16 03	12,0	2,00	16	120	12,00	40,0	0,300	2	5
VHTF 2 160 100 16 03	16,0	3,50	16	100	20,00	50,0	0,300	2	-
VHTF 2 160 150 16 03	16,0	3,50	16	150	20,00	100,0	0,300	2	-





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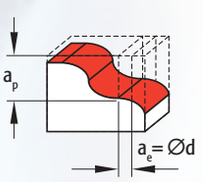
Article Number Artikelnummer	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHTF 4 030 064 06 03 050	3,0	0,50	6	64	4,00	7,0	0,050	4	5
VHTF 4 030 078 06 03 050	3,0	0,50	6	78	4,00	15,0	0,050	4	4
VHTF 4 040 064 06 03 050	4,0	0,50	6	64	5,00	8,0	0,100	4	4
VHTF 4 040 064 06 03 100	4,0	1,00	6	64	5,00	8,0	0,100	4	4
VHTF 4 040 078 06 03 050	4,0	0,50	6	78	5,00	15,0	0,100	4	3
VHTF 4 040 078 06 03 100	4,0	1,00	6	78	5,00	15,0	0,100	4	3
VHTF 4 050 064 06 03 050	5,0	0,50	6	64	5,00	10,0	0,150	4	2
VHTF 4 050 064 06 03 100	5,0	1,00	6	64	5,00	10,0	0,150	4	2
VHTF 4 050 078 06 03 050	5,0	0,50	6	78	5,00	20,0	0,150	4	2
VHTF 4 050 078 06 03 100	5,0	1,00	6	78	5,00	20,0	0,150	4	2
VHTF 4 060 064 06 03 050	6,0	0,50	6	64	6,00	25,0	0,200	4	-
VHTF 4 060 064 06 03 100	6,0	1,00	6	64	6,00	25,0	0,200	4	-
VHTF 4 060 064 06 03 150	6,0	1,50	6	64	6,00	25,0	0,200	4	-
VHTF 4 060 078 06 03 050	6,0	0,50	6	78	6,00	35,0	0,200	4	-
VHTF 4 060 078 06 03 150	6,0	1,50	6	78	6,00	35,0	0,200	4	-
VHTF 4 060 100 08 03 050	6,0	0,50	8	100	6,00	25,0	0,200	4	2
VHTF 4 060 100 08 03 150	6,0	1,50	8	100	6,00	25,0	0,200	4	2
VHTF 4 080 064 08 03 050	8,0	0,50	8	64	8,00	25,0	0,300	4	-
VHTF 4 080 064 08 03 100	8,0	1,00	8	64	8,00	25,0	0,300	4	-
VHTF 4 080 064 08 03 200	8,0	2,00	8	64	8,00	25,0	0,300	4	-
VHTF 4 080 078 08 03 050	8,0	0,50	8	78	8,00	25,0	0,300	4	-
VHTF 4 080 078 08 03 100	8,0	1,00	8	78	8,00	35,0	0,300	4	-
VHTF 4 080 078 08 03 200	8,0	2,00	8	78	8,00	35,0	0,300	4	-
VHTF 4 080 100 08 03 050	8,0	0,50	8	100	8,00	50,0	0,300	4	-
VHTF 4 080 100 08 03 100	8,0	1,00	8	100	8,00	50,0	0,300	4	-
VHTF 4 080 100 08 03 200	8,0	2,00	8	100	8,00	50,0	0,300	4	-
VHTF 4 080 120 10 03 100	8,0	1,00	10	120	8,00	30,0	0,300	4	-
VHTF 4 080 120 10 03 200	8,0	2,00	10	120	8,00	30,0	0,300	4	2
VHTF 4 100 078 10 03 050	10,0	0,50	10	78	10,00	35,0	0,300	4	2
VHTF 4 100 078 10 03 200	10,0	2,00	10	78	10,00	35,0	0,300	4	-
VHTF 4 100 100 10 03 100	10,0	1,00	10	100	10,00	55,0	0,300	4	-
VHTF 4 100 100 10 03 200	10,0	2,00	10	100	10,00	55,0	0,300	4	-
VHTF 4 100 120 12 03 200	10,0	2,00	12	120	10,00	30,0	0,300	4	-
VHTF 4 120 078 12 03 050	12,0	0,50	12	78	12,00	35,0	0,300	4	2
VHTF 4 120 078 12 03 200	12,0	2,00	12	78	12,00	35,0	0,300	4	-
VHTF 4 120 100 12 03 100	12,0	1,00	12	100	12,00	55,0	0,300	4	-
VHTF 4 120 100 12 03 200	12,0	2,00	12	100	12,00	55,0	0,300	4	-
VHTF 4 120 120 16 03 200	12,0	2,00	16	120	12,00	40,0	0,300	4	-
VHTF 4 160 100 16 03 350	16,0	3,50	16	100	20,00	50,0	0,300	4	5
VHTF 4 160 150 16 03 350	16,0	3,50	16	150	20,00	100,0	0,300	4	-

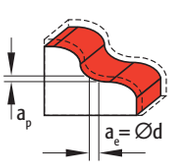
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**150 - 250**	emulsion
P1.2	< 1000	< 300	**120 - 200**	emulsion
P1.3	< 1400	< 400	**100 - 160**	emulsion
H2.1		42-50 HRc	**120 - 180**	min.lub.
H2.2		50-55 HRc	**150 - 200**	min.lub.
H2.3		55-70 HRc	**200 - 250**	min.lub.
K4.1			**100 - 200**	emulsion

Torus end mills:
Torusfräser:

- High effective cutting speed
  Hohe Schnittgeschwindigkeit
- Optimized surface finish
  Optimale Oberflächenqualität
- 2 Flute and 4 flute
  2 Schneiden und 4 Schneiden
- Finishing, Semi finishing and roughing
  Schlicht-, semi-Schlicht und
  Schruppbearbeitung

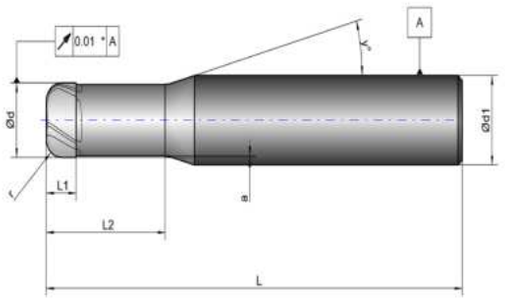


Roughing
Schruppen



Finishing
Schlichten

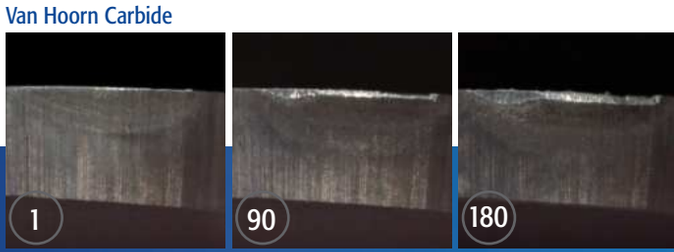
	Shoulder milling / Eckfräsen			Shoulder milling / Eckfräsen		
	P1.1 / P1.2 / P1.3			H2.1 / H2.2 / H2.3		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
1,5	< 1,5	< 0,15	0,025 - 0,040	< 0,7	< 0,03	0,025 - 0,040
2	< 2,0	< 0,2	0,030 - 0,050	< 1,0	< 0,04	0,030 - 0,050
3,0	< 3,0	< 0,30	0,040 - 0,060	< 1,5	< 0,06	0,040 - 0,060
4,0	< 4,0	< 0,40	0,050 - 0,080	< 2,0	< 0,10	0,050 - 0,080
5,0	< 5,0	< 0,50	0,060 - 0,110	< 2,5	< 0,13	0,060 - 0,110
6,0	< 6,0	< 0,60	0,065 - 0,125	< 3,0	< 0,18	0,065 - 0,125
8,0	< 8,0	< 0,80	0,080 - 0,130	< 4,0	< 0,24	0,080 - 0,130
10,0	< 10,0	< 1,00	0,085 - 0,135	< 5,0	< 0,30	0,085 - 0,135
12,0	< 12,0	< 1,20	0,100 - 0,140	< 6,0	< 0,36	0,100 - 0,140
16,0	< 16,0	< 1,60	0,100 - 0,150	< 8,0	< 0,50	0,100 - 0,150



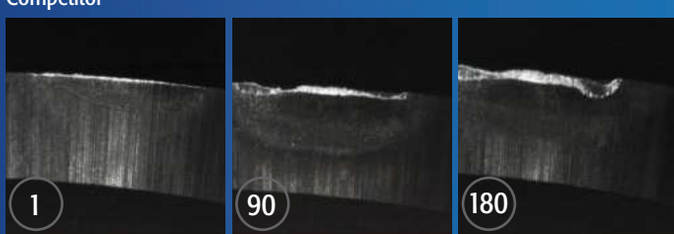
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHDR 4 020 060 06 03 L04	2,0	0,50	6	60	1,00	4,0	0,100	4	15
VHDR 4 020 060 06 03 L08	2,0	0,50	6	60	1,00	8,0	0,100	4	15
VHDR 4 030 060 06 03 L06	3,0	0,75	6	60	1,50	6,0	0,150	4	15
VHDR 4 030 060 06 03 L12	3,0	0,75	6	60	1,50	12,0	0,150	4	15
VHDR 4 040 060 06 03 L08	4,0	1,00	6	60	2,00	8,0	0,200	4	15
VHDR 4 040 060 06 03 L16	4,0	1,00	6	60	2,00	16,0	0,200	4	15
VHDR 4 060 080 06 03 L12	6,0	1,50	6	80	3,00	12,0	0,250	4	-
VHDR 4 060 080 06 03 L24	6,0	1,50	6	80	3,00	24,0	0,250	4	-
VHDR 4 080 090 08 03 L16	8,0	2,00	8	90	4,00	16,0	0,300	4	-
VHDR 4 080 090 08 03 L32	8,0	2,00	8	90	4,00	32,0	0,300	4	-
VHDR 4 100 100 10 03 L20	10,0	2,50	10	100	5,00	20,0	0,400	4	-
VHDR 4 100 100 10 03 L40	10,0	2,50	10	100	5,00	40,0	0,400	4	-
VHDR 4 120 110 12 03 L24	12,0	3,00	12	110	6,00	24,0	0,500	4	-
VHDR 4 120 110 12 03 L48	12,0	3,00	12	110	6,00	48,0	0,500	4	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**230 - 330**	min.lub.
P1.2	< 1000	< 300	**200 - 250**	min.lub.
P1.3	< 1400	< 400	**140 - 180**	min.lub.
H2.1		42-50 HRc	**80 - 120**	min.lub.
K4.1		< 260	**100 - 200**	min.lub.

Van Hoorn Carbide



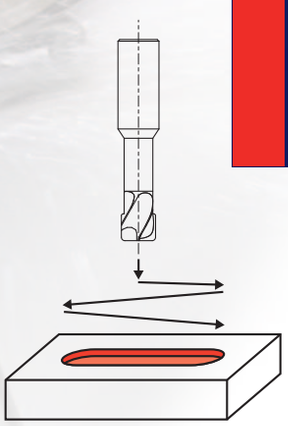
Competitor

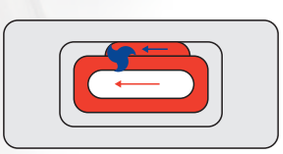


Wear after 1, 90 and 180 metres
Verschleiß nach 1, 90 und 180 Meter

VHDR 4 080 090 08 03 L16
Workpiece material: 1.2311

ø	**8,0 mm**
V_c	150 m/min
n	6.000 rpm
F_z	4
z	0,70 mm/t
V_f	16.800 mm/min
a_p	0,5 mm
a_e	8,0 mm
Coolant	emulsion
Q	**67,2 cm³/min**



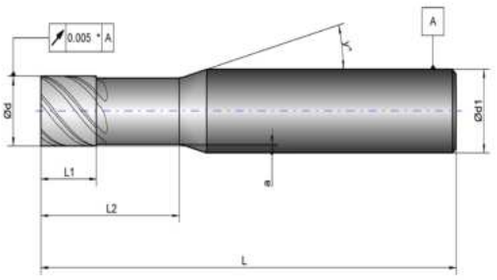


This end mill can be used for pocket milling; for strategy see drawings above. Always mill from inside to outside. If possible use helicoidal down-milling, otherwise ramping down.

Dieser Fräser kann zum Taschenfräsen eingesetzt werden; entsprechende Frässtrategie entnehmen Sie von obenstehenden Zeichnungen. Fräsen Sie stets von Innen nach Außen. Wenn möglich zirkular Abwärtsfräsen oder Schrägeintauchen.

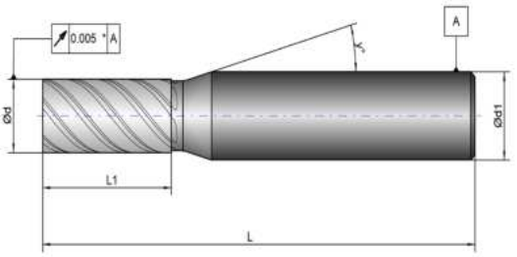
	Shoulder milling / Eckfräsen			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
2,0	< 0,10	< 1,2	0,10 - 0,14	< 0,10	2,0	0,07 - 0,10
3,0	< 0,16	< 1,8	0,15 - 0,22	< 0,16	3,0	0,12 - 0,19
4,0	< 0,20	< 2,4	0,22 - 0,30	< 0,20	4,0	0,18 - 0,25
6,0	< 0,30	< 4,0	0,34 - 0,50	< 0,30	6,0	0,28 - 0,40
8,0	< 0,38	< 5,5	0,45 - 0,60	< 0,38	8,0	0,40 - 0,55
10,0	< 0,43	< 7,0	0,56 - 0,75	< 0,42	10,0	0,50 - 0,70
12,0	< 0,46	< 8,4	0,67 - 0,84	< 0,46	12,0	0,60 - 0,80

short



* For end mills / für Schaftfräser L < 100 mm.

standard



* For end mills / für Schaftfräser L < 100 mm.

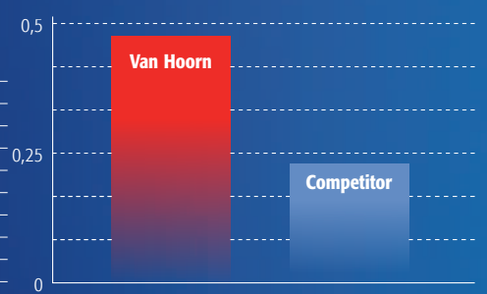
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Short / Kurze Ausführung									
VHMF 6 030 064 06 03 S	3,0	-	6	64	3,00	10,0	0,050	6	15
VHMF 6 040 064 06 03 S	4,0	-	6	64	4,00	10,0	0,100	6	15
VHMF 6 050 064 06 03 S	5,0	-	6	64	5,00	15,0	0,150	6	15
VHMF 6 060 064 06 03 S	6,0	-	6	64	6,00	20,0	0,200	6	-
VHMF 6 080 064 08 03 S	8,0	-	8	64	8,00	20,0	0,300	6	-
VHMF 6 100 070 10 03 S	10,0	-	10	70	10,00	25,0	0,300	6	-
VHMF 6 120 078 12 03 S	12,0	-	12	78	12,00	25,0	0,300	6	-
VHMF 6 160 089 16 03 S	16,0	-	16	89	16,00	35,0	0,300	6	-
VHMF 8 200 102 20 03 S	20,0	-	20	102	20,00	40,0	0,300	8	-
Standard / Standard Ausführung									
VHMF 6 030 064 06 03	3,0	-	6	64	10,00	-	-	6	15
VHMF 6 040 064 06 03	4,0	-	6	64	10,00	-	-	6	15
VHMF 6 050 064 06 03	5,0	-	6	64	15,00	-	-	6	15
VHMF 6 060 064 06 03	6,0	-	6	64	20,00	-	-	6	15
VHMF 6 080 064 08 03	8,0	-	8	64	20,00	-	-	6	-
VHMF 6 100 070 10 03	10,0	-	10	70	25,00	-	-	6	-
VHMF 6 120 078 12 03	12,0	-	12	78	25,00	-	-	6	-
VHMF 6 160 089 16 03	16,0	-	16	89	35,00	-	-	6	-
VHMF 8 200 102 20 03	20,0	-	20	102	40,00	-	-	8	-

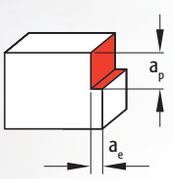
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**130 - 180**	emulsion
P1.2	< 1000	< 300	**100 - 160**	emulsion
P1.3	< 1400	< 400	**90 - 140**	emulsion
H2.1		42-50 HRc	**150 - 200**	min.lub.
H2.2		50-55 HRc	**120 - 180**	min.lub.
H2.3		55-70 HRc	**80 - 150**	min.lub.
K4.1			**100 - 200**	emulsion

VHMF 6 060 064 06 03
Workpiece Material: 1.2343
Hardness: 52 HRc

	Van Hoorn	Competitor
ø	6,0 mm	6,0 mm
V_c	132 m/min	132 m/min
n	7.000 rpm	7.000 rpm
F_z	0,036 mm/t	0,029 mm/t
Z	6	4
V_f	1.500 mm/min	800 mm/min
a_p	0,1 mm	0,1 mm
a_e	3,0 mm	3,0 mm
Coolant	min. lubrication	min. lubrication
Q	**0,45 mm³/min**	**0,24 mm³/min**

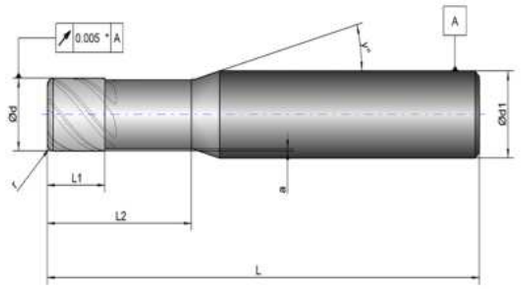
Material removal rate
Zerspanungsleistung





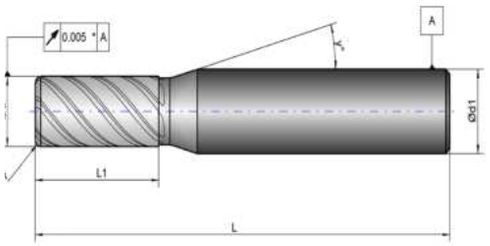
Ød (mm)	Shoulder milling / Eckfräsen P1.1 / P1.2 / P1.3 a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Shoulder milling / Eckfräsen H2.1 / H2.2 / H2.3 a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 6,0	< 0,30	0,020 - 0,035	< 6,0	< 0,06	0,020 - 0,035
4,0	< 8,0	< 0,40	0,030 - 0,045	< 8,0	< 0,10	0,030 - 0,045
5,0	< 10,0	< 0,50	0,035 - 0,055	< 10,0	< 0,12	0,035 - 0,055
6,0	< 12,0	< 0,60	0,045 - 0,065	< 12,0	< 0,18	0,045 - 0,065
8,0	< 16,0	< 0,80	0,060 - 0,080	< 16,0	< 0,24	0,060 - 0,080
10,0	< 20,0	< 1,00	0,070 - 0,095	< 20,0	< 0,30	0,070 - 0,095
12,0	< 24,0	< 1,20	0,085 - 0,110	< 24,0	< 0,36	0,085 - 0,110
16,0	< 32,0	< 1,60	0,095 - 0,125	< 32,0	< 0,48	0,095 - 0,125
20,0	< 40,0	< 2,00	0,105 - 0,140	< 40,0	< 0,60	0,105 - 0,140

short



* For end mills / für Schaftfräser L < 100 mm.

standard



* For end mills / für Schaftfräser L < 100 mm.

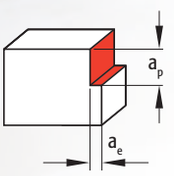
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Short / Kurze Ausführung									
VHMFR 6 030 064 06 03 030 S	3,0	0,30	6	64	3,00	10,0	0,050	6	15
VHMFR 6 040 064 06 03 030 S	4,0	0,30	6	64	4,00	10,0	0,100	6	15
VHMFR 6 050 064 06 03 030 S	5,0	0,30	6	64	5,00	15,0	0,150	6	15
VHMFR 6 050 064 06 03 050 S	5,0	0,50	6	64	5,00	15,0	0,150	6	15
VHMFR 6 060 064 06 03 050 S	6,0	0,50	6	64	6,00	20,0	0,200	6	-
VHMFR 6 060 064 06 03 100 S	6,0	1,00	6	64	6,00	20,0	0,200	6	-
VHMFR 6 080 064 08 03 050 S	8,0	0,50	8	64	8,00	20,0	0,300	6	-
VHMFR 6 080 064 08 03 100 S	8,0	1,00	8	64	8,00	20,0	0,300	6	-
VHMFR 6 100 070 10 03 050 S	10,0	0,50	10	70	10,00	25,0	0,300	6	-
VHMFR 6 100 070 10 03 100 S	10,0	1,00	10	70	10,00	25,0	0,300	6	-
VHMFR 6 100 070 10 03 150 S	10,0	1,50	10	70	10,00	25,0	0,300	6	-
VHMFR 6 120 078 12 03 050 S	12,0	0,50	12	78	12,00	25,0	0,300	6	-
VHMFR 6 120 078 12 03 100 S	12,0	1,00	12	78	12,00	25,0	0,300	6	-
VHMFR 6 120 078 12 03 200 S	12,0	2,00	12	78	12,00	25,0	0,300	6	-
VHMFR 6 160 089 16 03 100 S	16,0	1,00	16	89	16,00	35,0	0,300	6	-
VHMFR 6 160 089 16 03 200 S	16,0	2,00	16	89	16,00	35,0	0,300	6	-
VHMFR 8 200 102 20 03 100 S	20,0	1,00	20	102	20,00	40,0	0,300	8	-
VHMFR 8 200 102 20 03 200 S	20,0	2,00	20	102	20,00	40,0	0,300	8	-
Standard / Standard Ausführung									
VHMFR 6 030 064 06 03 030	3,0	0,30	6	64	10,00	-	-	6	15
VHMFR 6 040 064 06 03 030	4,0	0,30	6	64	10,00	-	-	6	15
VHMFR 6 050 064 06 03 030	5,0	0,30	6	64	15,00	-	-	6	15
VHMFR 6 050 064 06 03 050	5,0	0,50	6	64	15,00	-	-	6	15
VHMFR 6 060 064 06 03 050	6,0	0,50	6	64	20,00	-	-	6	-
VHMFR 6 060 064 06 03 100	6,0	1,00	6	64	20,00	-	-	6	-
VHMFR 6 080 064 08 03 050	8,0	0,50	8	64	20,00	-	-	6	-
VHMFR 6 080 064 08 03 100	8,0	1,00	8	64	20,00	-	-	6	-
VHMFR 6 100 070 10 03 050	10,0	0,50	10	70	25,00	-	-	6	-
VHMFR 6 100 070 10 03 100	10,0	1,00	10	70	25,00	-	-	6	-
VHMFR 6 100 070 10 03 150	10,0	1,50	10	70	25,00	-	-	6	-
VHMFR 6 120 078 12 03 050	12,0	0,50	12	78	25,00	-	-	6	-
VHMFR 6 120 078 12 03 100	12,0	1,00	12	78	25,00	-	-	6	-
VHMFR 6 120 078 12 03 200	12,0	2,00	12	78	25,00	-	-	6	-
VHMFR 6 160 089 16 03 100	16,0	1,00	16	89	35,00	-	-	6	-
VHMFR 6 160 089 16 03 200	16,0	2,00	16	89	35,00	-	-	6	-
VHMFR 8 200 102 20 03 100	20,0	1,00	20	102	40,00	-	-	8	-
VHMFR 8 200 102 20 03 200	20,0	2,00	20	102	40,00	-	-	8	-

Cutting conditions / Schnittwertempfehlungen VHMFR

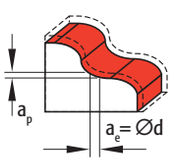
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**130 - 180**	emulsion
P1.2	< 1000	< 300	**100 - 160**	emulsion
P1.3	< 1400	< 400	**90 - 140**	emulsion
H2.1		42-50 HRc	**150 - 200**	min.lub.
H2.2		50-55 HRc	**120 - 180**	min.lub.
H2.3		55-70 HRc	**80 - 150**	min.lub.
K4.1			**100 - 200**	emulsion

VHMF
Recommended for Side milling.
Empfohlen für Stirnfräsen.

VHMFR
Recommended for Shoulder milling.
Empfohlen für Eckfräsen.

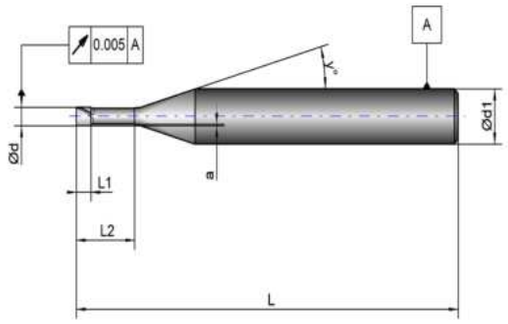


Roughing
Schruppen



Finishing
Schlichten

Ød (mm)	Shoulder milling / Eckfräsen P1.1 / P1.2 / P1.3 a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Shoulder milling / Eckfräsen H2.1 / H2.2 / H2.3 a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 6,0	< 0,30	0,020 - 0,035	< 6,0	< 0,06	0,020 - 0,035
4,0	< 8,0	< 0,40	0,030 - 0,045	< 8,0	< 0,10	0,030 - 0,045
5,0	< 10,0	< 0,50	0,035 - 0,055	< 10,0	< 0,12	0,035 - 0,055
6,0	< 12,0	< 0,60	0,045 - 0,065	< 12,0	< 0,18	0,045 - 0,065
8,0	< 16,0	< 0,80	0,060 - 0,080	< 16,0	< 0,24	0,060 - 0,080
10,0	< 20,0	< 1,00	0,070 - 0,095	< 20,0	< 0,30	0,070 - 0,095
12,0	< 24,0	< 1,20	0,085 - 0,110	< 24,0	< 0,36	0,085 - 0,110
16,0	< 32,0	< 1,60	0,095 - 0,125	< 32,0	< 0,48	0,095 - 0,125
20,0	< 40,0	< 2,00	0,105 - 0,140	< 40,0	< 0,60	0,105 - 0,140



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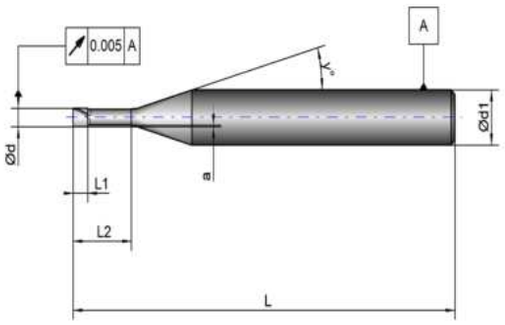
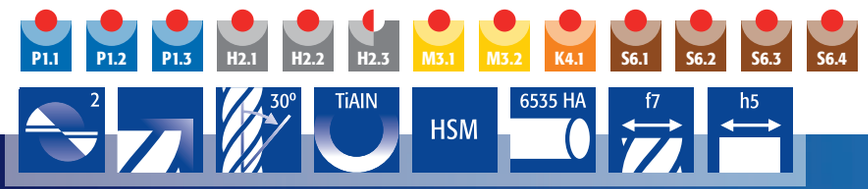
Shank 4 mm
Schaft 4 mm
2-Flute
2-Schneiden

Remark ∞ = infinity, no collision in projection length area.

Bemerkung ∞ = unendlich, keine Kollision in Länge Projektionsfläche.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMS 2 001 051 04 03 L0015	0,1	-	4	51	0,15	-	-	2	15	0,634	0,656	0,705	0,762
VHMS 2 002 051 04 03 L0025	0,2	-	4	51	0,25	-	-	2	15	0,737	0,763	0,820	0,887
VHMS 2 003 051 04 03 L003	0,3	-	4	51	0,30	-	-	2	15	1,099	1,137	1,223	1,322
VHMS 2 003 051 04 03 L015	0,3	-	4	51	0,30	1,5	0,010	2	15	1,861	1,926	2,070	2,238
VHMS 2 003 051 04 03 L030	0,3	-	4	51	0,30	3,0	0,010	2	15	3,412	3,531	3,795	4,103
VHMS 2 004 051 04 03 L004	0,4	-	4	51	0,40	-	-	2	15	1,202	1,244	1,338	1,446
VHMS 2 004 051 04 03 L020	0,4	-	4	51	0,40	2,0	0,010	2	15	2,378	2,461	2,645	2,860
VHMS 2 004 051 04 03 L040	0,4	-	4	51	0,40	4,0	0,010	2	15	4,445	4,600	4,945	5,346
VHMS 2 005 051 04 03 L005	0,5	-	4	51	0,50	-	-	2	15	1,306	1,351	1,453	1,570
VHMS 2 005 051 04 03 L030	0,5	-	4	51	0,50	3,0	0,015	2	15	3,431	3,551	3,817	4,126
VHMS 2 005 051 04 03 L060	0,5	-	4	51	0,50	6,0	0,015	2	15	6,532	6,760	7,266	7,856
VHMS 2 005 051 04 03 L080	0,5	-	4	51	0,50	8,0	0,015	2	15	8,599	8,899	9,566	10,342
VHMS 2 005 051 04 03 L100	0,5	-	4	51	0,50	10,0	0,015	2	15	10,667	11,038	11,866	12,828
VHMS 2 006 051 04 03 L006	0,6	-	4	51	0,60	-	-	2	15	2,062	2,134	2,294	2,480
VHMS 2 006 051 04 03 L020	0,6	-	4	51	0,60	2,0	0,025	2	15	2,572	2,662	2,861	3,093
VHMS 2 006 051 04 03 L040	0,6	-	4	51	0,60	4,0	0,025	2	15	4,639	4,801	5,161	5,580
VHMS 2 006 051 04 03 L060	0,6	-	4	51	0,60	6,0	0,025	2	15	6,707	6,940	7,461	8,066
VHMS 2 006 051 04 03 L080	0,6	-	4	51	0,60	8,0	0,025	2	15	8,774	9,080	9,760	10,552
VHMS 2 006 051 04 03 L100	0,6	-	4	51	0,60	10,0	0,025	2	15	10,841	11,219	12,060	13,038
VHMS 2 008 051 04 03 L008	0,8	-	4	51	0,80	-	-	2	15	2,269	2,348	2,524	2,729
VHMS 2 008 051 04 03 L025	0,8	-	4	51	0,80	2,5	0,025	2	15	3,089	3,196	3,436	3,715
VHMS 2 008 051 04 03 L050	0,8	-	4	51	0,80	5,0	0,025	2	15	5,673	5,871	6,311	6,823
VHMS 2 008 051 04 03 L080	0,8	-	4	51	0,80	8,0	0,025	2	15	8,774	9,080	9,760	10,552
VHMS 2 008 051 04 03 L100	0,8	-	4	51	0,80	10,0	0,025	2	15	10,841	11,219	12,060	13,038
VHMS 2 010 051 04 03 L010	1,0	-	4	51	1,00	-	-	2	15	2,476	2,562	2,754	2,977
VHMS 2 010 051 04 03 L040	1,0	-	4	51	1,00	4,0	0,025	2	15	4,639	4,801	5,161	5,580
VHMS 2 010 051 04 03 L060	1,0	-	4	51	1,00	6,0	0,025	2	15	6,707	6,940	7,461	8,066
VHMS 2 010 051 04 03 L080	1,0	-	4	51	1,00	8,0	0,025	2	15	8,774	9,080	9,760	10,552
VHMS 2 010 051 04 03 L100	1,0	-	4	51	1,00	10,0	0,025	2	15	10,841	11,219	12,060	13,038
VHMS 2 010 051 04 03 L120	1,0	-	4	51	1,00	12,0	0,025	2	15	12,909	13,358	14,360	15,525
VHMS 2 010 051 04 03 L150	1,0	-	4	51	1,00	15,0	0,025	2	15	16,010	16,568	17,809	19,254
VHMS 2 010 060 04 03 L200	1,0	-	4	60	1,00	20,0	0,025	2	15	21,178	21,916	23,559	25,470
VHMS 2 010 060 04 03 L250	1,0	-	4	60	1,00	25,0	0,025	2	15	26,346	27,264	29,308	∞
VHMS 2 012 051 04 03 L012	1,2	-	4	51	1,20	-	-	2	15	3,471	3,592	3,862	4,175
VHMS 2 012 051 04 03 L040	1,2	-	4	51	1,20	4,0	0,025	2	15	4,912	5,083	5,464	5,907
VHMS 2 012 051 04 03 L060	1,2	-	4	51	1,20	6,0	0,025	2	15	6,979	7,222	7,763	8,393
VHMS 2 012 051 04 03 L080	1,2	-	4	51	1,20	8,0	0,025	2	15	9,046	9,361	10,063	10,879
VHMS 2 012 051 04 03 L120	1,2	-	4	51	1,20	12,0	0,025	2	15	13,181	13,640	14,662	15,852
VHMS 2 012 051 04 03 L160	1,2	-	4	51	1,20	16,0	0,025	2	15	17,316	17,919	19,262	20,825





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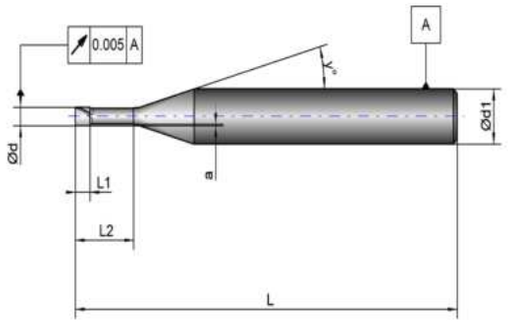
Shank 4 mm
Schaft 4 mm
2-Flute
2-Schneiden

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	 1°	 2°	 3°
VHMS 2 015 051 04 03 L015	1,5	-	4	51	1,50	-	-	2	15	3,781	3,913	4,206	4,548
VHMS 2 015 051 04 03 L040	1,5	-	4	51	1,50	4,0	0,025	2	15	4,912	5,083	5,464	5,907
VHMS 2 015 051 04 03 L060	1,5	-	4	51	1,50	6,0	0,025	2	15	6,979	7,222	7,763	8,393
VHMS 2 015 051 04 03 L080	1,5	-	4	51	1,50	8,0	0,025	2	15	9,046	9,361	10,063	10,879
VHMS 2 015 051 04 03 L100	1,5	-	4	51	1,50	10,0	0,025	2	15	11,114	11,501	12,363	13,366
VHMS 2 015 051 04 03 L120	1,5	-	4	51	1,50	12,0	0,025	2	15	13,181	13,640	14,662	15,852
VHMS 2 015 051 04 03 L150	1,5	-	4	51	1,50	15,0	0,025	2	15	16,282	16,849	18,112	19,581
VHMS 2 015 060 04 03 L200	1,5	-	4	60	1,50	20,0	0,025	2	15	21,450	22,198	23,861	∞
VHMS 2 015 060 04 03 L250	1,5	-	4	60	1,50	25,0	0,025	2	15	26,619	27,546	29,611	∞
VHMS 2 020 051 04 03 L020	2,0	-	4	51	2,00	-	-	2	15	4,298	4,448	4,781	5,169
VHMS 2 020 051 04 03 L060	2,0	-	4	51	2,00	6,0	0,050	2	15	7,075	7,322	7,871	8,509
VHMS 2 020 051 04 03 L080	2,0	-	4	51	2,00	8,0	0,050	2	15	9,143	9,461	10,170	10,995
VHMS 2 020 051 04 03 L100	2,0	-	4	51	2,00	10,0	0,050	2	15	11,210	11,601	12,470	13,482
VHMS 2 020 051 04 03 L120	2,0	-	4	51	2,00	12,0	0,050	2	15	13,277	13,740	14,770	15,968
VHMS 2 020 051 04 03 L160	2,0	-	4	51	2,00	16,0	0,050	2	15	17,412	18,019	19,369	∞
VHMS 2 020 060 04 03 L200	2,0	-	4	60	2,00	20,0	0,050	2	15	21,547	22,297	23,969	∞
VHMS 2 020 060 04 03 L250	2,0	-	4	60	2,00	25,0	0,050	2	15	26,715	27,646	∞	∞
VHMS 2 020 064 04 03 L300	2,0	-	4	64	2,00	30,0	0,050	2	15	31,883	32,994	∞	∞
VHMS 2 025 051 04 03 L025	2,5	-	4	51	2,50	-	-	2	15	4,815	4,983	5,356	5,791
VHMS 2 025 051 04 03 L060	2,5	-	4	51	2,50	6,0	0,050	2	15	7,075	7,322	7,871	8,509
VHMS 2 025 051 04 03 L080	2,5	-	4	51	2,50	8,0	0,050	2	15	9,143	9,461	10,170	10,995
VHMS 2 025 051 04 03 L100	2,5	-	4	51	2,50	10,0	0,050	2	15	11,210	11,601	12,470	13,482
VHMS 2 025 051 04 03 L120	2,5	-	4	51	2,50	12,0	0,050	2	15	13,277	13,740	14,770	∞
VHMS 2 025 051 04 03 L160	2,5	-	4	51	2,50	16,0	0,050	2	15	17,412	18,019	19,369	∞
VHMS 2 025 060 04 03 L200	2,5	-	4	60	2,50	20,0	0,050	2	15	21,547	22,297	∞	∞
VHMS 2 025 060 04 03 L250	2,5	-	4	60	2,50	25,0	0,050	2	15	26,715	27,646	∞	∞
VHMS 2 025 064 04 03 L300	2,5	-	4	64	2,50	30,0	0,050	2	15	31,883	32,994	∞	∞
VHMS 2 030 051 04 03 L030	3,0	-	4	51	3,00	-	-	2	15	5,332	5,518	5,931	6,412
VHMS 2 030 051 04 03 L060	3,0	-	4	51	3,00	6,0	0,050	2	15	7,075	7,322	7,871	8,509
VHMS 2 030 051 04 03 L080	3,0	-	4	51	3,00	8,0	0,050	2	15	9,143	9,461	10,170	∞
VHMS 2 030 051 04 03 L100	3,0	-	4	51	3,00	10,0	0,050	2	15	11,210	11,601	12,470	∞
VHMS 2 030 051 04 03 L120	3,0	-	4	51	3,00	12,0	0,050	2	15	13,277	13,740	∞	∞
VHMS 2 030 051 04 03 L160	3,0	-	4	51	3,00	16,0	0,050	2	15	17,412	18,019	∞	∞
VHMS 2 030 060 04 03 L200	3,0	-	4	60	3,00	20,0	0,050	2	15	21,547	22,297	∞	∞
VHMS 2 030 060 04 03 L250	3,0	-	4	60	3,00	25,0	0,050	2	15	26,715	27,646	∞	∞
VHMS 2 030 064 04 03 L300	3,0	-	4	64	3,00	30,0	0,050	2	15	31,883	-	∞	∞



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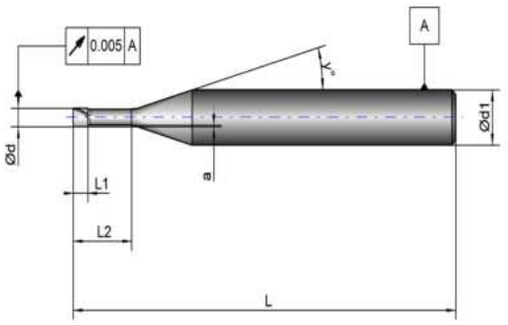
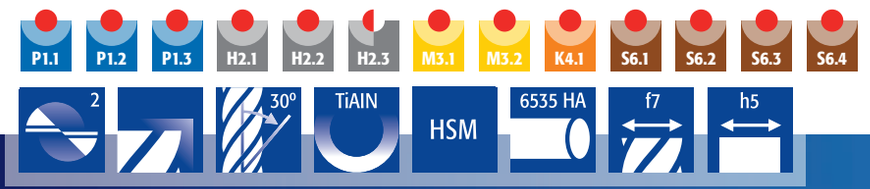
Shank 6 mm
Schaft 6 mm
2-Flute
2-Schneiden

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMS 2 001 064 06 03 L0015	0,1	-	6	64	0,15	-	-	2	10	0,552	0,583	0,655	0,747
VHMS 2 002 064 06 03 L003	0,2	-	6	64	0,30	-	-	2	10	0,710	0,749	0,842	0,960
VHMS 2 003 064 06 03 L005	0,3	-	6	64	0,50	-	-	2	10	1,236	1,304	1,465	1,672
VHMS 2 003 064 06 03 L015	0,3	-	6	64	0,50	1,5	0,010	2	11	1,826	1,916	2,126	2,388
VHMS 2 003 064 06 03 L030	0,3	-	6	64	0,50	3,0	0,010	2	12	3,397	3,549	3,898	4,323
VHMS 2 004 064 06 03 L006	0,4	-	6	64	0,60	-	-	2	10	1,341	1,415	1,590	1,814
VHMS 2 004 064 06 03 L020	0,4	-	6	64	0,60	2,0	0,010	2	11	2,350	2,465	2,735	3,072
VHMS 2 004 064 06 03 L040	0,4	-	6	64	0,60	4,0	0,010	2	13	4,439	4,621	5,032	5,525
VHMS 2 005 064 06 03 L008	0,5	-	6	64	0,80	-	-	2	10	1,552	1,637	1,839	2,099
VHMS 2 005 064 06 03 L030	0,5	-	6	64	0,80	3,0	0,015	2	12	3,421	3,574	3,926	4,354
VHMS 2 005 064 06 03 L060	0,5	-	6	64	0,80	6,0	0,015	2	15	6,532	6,760	7,266	7,856
VHMS 2 005 064 06 03 L080	0,5	-	6	64	0,80	8,0	0,015	2	15	8,599	8,899	9,566	10,342
VHMS 2 005 064 06 03 L100	0,5	-	6	64	0,80	10,0	0,015	2	15	10,667	11,038	11,866	12,828
VHMS 2 006 064 06 03 L009	0,6	-	6	64	0,90	-	-	2	10	1,749	1,845	2,073	2,366
VHMS 2 006 064 06 03 L020	0,6	-	6	64	0,90	2,0	0,025	2	11	2,531	2,656	2,947	3,310
VHMS 2 006 064 06 03 L040	0,6	-	6	64	0,90	4,0	0,025	2	12	4,623	4,830	5,304	5,884
VHMS 2 006 064 06 03 L060	0,6	-	6	64	0,90	6,0	0,025	2	15	6,707	6,940	7,461	8,066
VHMS 2 006 064 06 03 L080	0,6	-	6	64	0,90	8,0	0,025	2	15	8,774	9,080	9,760	10,552
VHMS 2 006 064 06 03 L100	0,6	-	6	64	0,90	10,0	0,025	2	15	10,841	11,219	12,060	13,038
VHMS 2 008 064 06 03 L012	0,8	-	6	64	1,20	-	-	2	10	2,591	2,733	3,071	3,504
VHMS 2 008 064 06 03 L025	0,8	-	6	64	1,20	2,5	0,025	2	11	3,055	3,205	3,556	3,994
VHMS 2 008 064 06 03 L050	0,8	-	6	64	1,20	5,0	0,025	2	13	5,664	5,896	6,421	7,051
VHMS 2 008 064 06 03 L080	0,8	-	6	64	1,20	8,0	0,025	2	15	8,774	9,080	9,760	10,552
VHMS 2 008 064 06 03 L100	0,8	-	6	64	1,20	10,0	0,025	2	15	10,841	11,219	12,060	13,038
VHMS 2 010 064 06 03 L015	1,0	-	6	64	1,50	-	-	2	10	2,906	3,066	3,445	3,931
VHMS 2 010 064 06 03 L040	1,0	-	6	64	1,50	4,0	0,025	2	11	4,625	4,853	5,385	6,048
VHMS 2 010 064 06 03 L060	1,0	-	6	64	1,50	6,0	0,025	2	14	6,703	6,956	7,522	8,190
VHMS 2 010 064 06 03 L080	1,0	-	6	64	1,50	8,0	0,025	2	15	8,774	9,080	9,760	10,552
VHMS 2 010 064 06 03 L100	1,0	-	6	64	1,50	10,0	0,025	2	15	10,841	11,219	12,060	13,038
VHMS 2 010 064 06 03 L120	1,0	-	6	64	1,50	12,0	0,025	2	15	12,909	13,358	14,360	15,525
VHMS 2 010 064 06 03 L150	1,0	-	6	64	1,50	15,0	0,025	2	15	16,010	16,568	17,809	19,254
VHMS 2 010 064 06 03 L200	1,0	-	6	64	1,50	20,0	0,025	2	15	21,178	21,916	23,559	25,470
VHMS 2 010 064 06 03 L250	1,0	-	6	64	1,50	25,0	0,025	2	15	26,346	27,264	29,308	31,686
VHMS 2 012 064 06 03 L018	1,2	-	6	64	1,80	-	-	2	10	3,932	4,148	4,660	5,318
VHMS 2 012 064 06 03 L040	1,2	-	6	64	1,80	4,0	0,025	2	11	4,827	5,065	5,620	6,312
VHMS 2 012 064 06 03 L060	1,2	-	6	64	1,80	6,0	0,025	2	13	6,940	7,224	7,868	8,639
VHMS 2 012 064 06 03 L080	1,2	-	6	64	1,80	8,0	0,025	2	15	9,046	9,361	10,063	10,879
VHMS 2 012 064 06 03 L120	1,2	-	6	64	1,80	12,0	0,025	2	15	13,181	13,640	14,662	15,852
VHMS 2 012 064 06 03 L160	1,2	-	6	64	1,80	16,0	0,025	2	15	17,316	17,919	19,262	20,825





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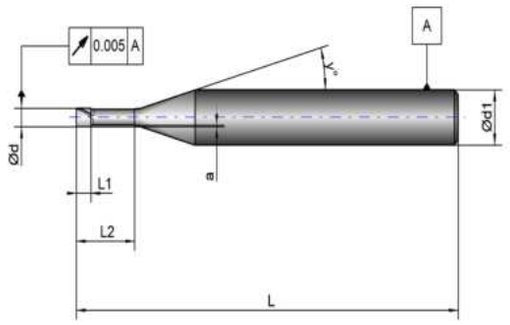
Shank 6 mm
Schaft 6 mm
2-Flute
2-Schneiden

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	 1°	 2°	 3°
VHMS 2 015 064 06 03 L023	1,5	-	6	64	2,30	-	-	2	9	4,438	4,713	5,380	6,267
VHMS 2 015 064 06 03 L040	1,5	-	6	64	2,30	4,0	0,025	2	10	4,818	5,082	5,710	6,516
VHMS 2 015 064 06 03 L060	1,5	-	6	64	2,30	6,0	0,025	2	12	6,928	7,237	7,949	8,817
VHMS 2 015 064 06 03 L080	1,5	-	6	64	2,30	8,0	0,025	2	15	9,046	9,361	10,063	10,879
VHMS 2 015 064 06 03 L100	1,5	-	6	64	2,30	10,0	0,025	2	15	11,114	11,501	12,363	13,366
VHMS 2 015 064 06 03 L120	1,5	-	6	64	2,30	12,0	0,025	2	15	13,181	13,640	14,662	15,852
VHMS 2 015 064 06 03 L150	1,5	-	6	64	2,30	15,0	0,025	2	15	16,282	16,849	18,112	19,581
VHMS 2 015 064 06 03 L200	1,5	-	6	64	2,30	20,0	0,025	2	15	21,450	22,198	23,861	25,797
VHMS 2 015 064 06 03 L250	1,5	-	6	64	2,30	25,0	0,025	2	15	26,619	27,546	29,611	32,013
VHMS 2 020 064 06 03 L030	2,0	-	6	64	3,00	-	-	2	8	5,171	5,537	6,453	7,733
VHMS 2 020 064 06 03 L060	2,0	-	6	64	3,00	6,0	0,050	2	11	7,055	7,403	8,214	9,226
VHMS 2 020 064 06 03 L080	2,0	-	6	64	3,00	8,0	0,050	2	14	9,134	9,478	10,250	11,160
VHMS 2 020 064 06 03 L100	2,0	-	6	64	3,00	10,0	0,050	2	15	11,210	11,601	12,470	13,482
VHMS 2 020 064 06 03 L120	2,0	-	6	64	3,00	12,0	0,050	2	15	13,277	13,740	14,770	15,968
VHMS 2 020 064 06 03 L160	2,0	-	6	64	3,00	16,0	0,050	2	15	17,412	18,019	19,369	20,941
VHMS 2 020 064 06 03 L200	2,0	-	6	64	3,00	20,0	0,050	2	15	21,547	22,297	23,969	25,913
VHMS 2 020 064 06 03 L250	2,0	-	6	64	3,00	25,0	0,050	2	15	26,715	27,646	29,718	32,129
VHMS 2 020 064 06 03 L300	2,0	-	6	64	3,00	30,0	0,050	2	15	31,883	32,994	35,467	38,345
VHMS 2 025 064 06 03 L030	2,5	-	6	64	3,00	-	-	2	8	5,171	5,537	6,453	7,733
VHMS 2 025 064 06 03 L060	2,5	-	6	64	3,00	6,0	0,050	2	10	7,071	7,459	8,381	9,563
VHMS 2 025 064 06 03 L080	2,5	-	6	64	3,00	8,0	0,050	2	12	9,136	9,545	10,483	11,628
VHMS 2 025 064 06 03 L100	2,5	-	6	64	3,00	10,0	0,050	2	15	11,210	11,601	12,470	13,482
VHMS 2 025 064 06 03 L120	2,5	-	6	64	3,00	12,0	0,050	2	15	13,277	13,740	14,770	15,968
VHMS 2 025 064 06 03 L160	2,5	-	6	64	3,00	16,0	0,050	2	15	17,412	18,019	19,369	20,941
VHMS 2 025 064 06 03 L200	2,5	-	6	64	3,00	20,0	0,050	2	15	21,547	22,297	23,969	25,913
VHMS 2 025 064 06 03 L250	2,5	-	6	64	3,00	25,0	0,050	2	15	26,715	27,646	29,718	32,129
VHMS 2 025 064 06 03 L300	2,5	-	6	64	3,00	30,0	0,050	2	15	31,883	32,994	35,467	38,345
VHMS 2 030 064 06 03 L030	3,0	-	6	64	3,00	-	-	2	7	5,174	5,602	6,716	8,385
VHMS 2 030 064 06 03 L060	3,0	-	6	64	3,00	6,0	0,050	2	8	7,149	7,656	8,922	10,693
VHMS 2 030 064 06 03 L080	3,0	-	6	64	3,00	8,0	0,050	2	10	9,175	9,679	10,875	12,409
VHMS 2 030 064 06 03 L100	3,0	-	6	64	3,00	10,0	0,050	2	13	11,210	11,668	12,709	13,954
VHMS 2 030 064 06 03 L120	3,0	-	6	64	3,00	12,0	0,050	2	15	13,277	13,740	14,770	15,968
VHMS 2 030 064 06 03 L160	3,0	-	6	64	3,00	16,0	0,050	2	15	17,412	18,019	19,369	20,941
VHMS 2 030 064 06 03 L200	3,0	-	6	64	3,00	20,0	0,050	2	15	21,547	22,297	23,969	25,913
VHMS 2 030 064 06 03 L250	3,0	-	6	64	3,00	25,0	0,050	2	15	26,715	27,646	29,718	∞
VHMS 2 030 064 06 03 L300	3,0	-	6	64	3,00	30,0	0,050	2	15	31,883	32,994	35,467	∞



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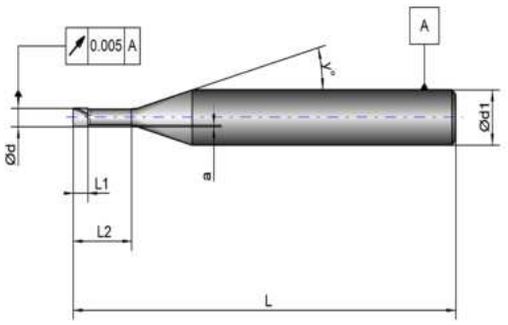
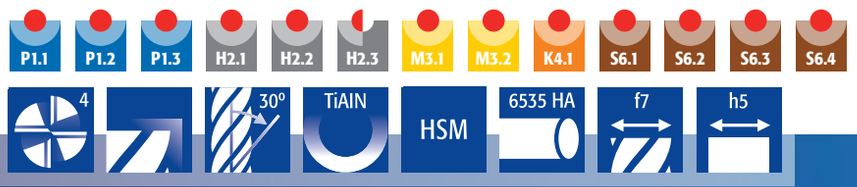
Shank 4 mm
Schaft 4 mm
4-Flute
4-Schneiden

Remark ∞ = infinity, no collision in projection length area.

Bemerkung ∞ = unendlich, keine Kollision in Länge Projektionsfläche.

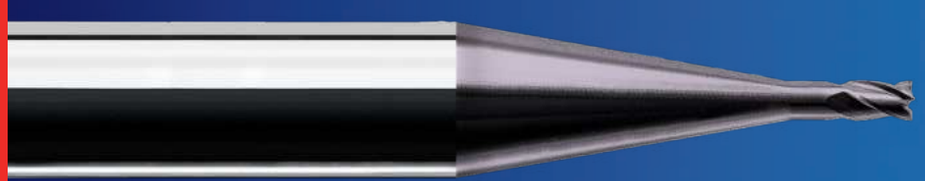
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMS 4 002 051 04 03 L020	0,2	-	4	51	0,25	2,0	0,010	4	15	2,378	2,461	2,645	2,860
VHMS 4 002 051 04 03 L040	0,2	-	4	51	0,25	4,0	0,010	4	15	4,445	4,600	4,945	5,346
VHMS 4 004 051 04 03 L020	0,4	-	4	51	0,40	2,0	0,010	4	15	2,378	2,461	2,645	2,860
VHMS 4 004 051 04 03 L040	0,4	-	4	51	0,40	4,0	0,010	4	15	4,445	4,600	4,945	5,346
VHMS 4 004 051 04 03 L060	0,4	-	4	51	0,40	6,0	0,010	4	15	6,513	6,740	7,245	7,833
VHMS 4 004 051 04 03 L080	0,4	-	4	51	0,40	8,0	0,010	4	15	8,580	8,879	9,545	10,319
VHMS 4 004 051 04 03 L100	0,4	-	4	51	0,40	10,0	0,010	4	15	10,647	11,018	11,844	12,805
VHMS 4 005 051 04 03 L020	0,5	-	4	51	0,50	2,0	0,015	4	15	2,397	2,481	2,667	2,883
VHMS 4 005 051 04 03 L040	0,5	-	4	51	0,50	4,0	0,015	4	15	4,465	4,620	4,967	5,369
VHMS 4 005 051 04 03 L060	0,5	-	4	51	0,50	6,0	0,015	4	15	6,532	6,760	7,266	7,856
VHMS 4 005 051 04 03 L080	0,5	-	4	51	0,50	8,0	0,015	4	15	8,599	8,899	9,566	10,342
VHMS 4 005 051 04 03 L100	0,5	-	4	51	0,50	10,0	0,015	4	15	10,667	11,038	11,866	12,828
VHMS 4 010 051 04 03 L020	1,0	-	4	51	1,00	2,0	0,025	4	15	2,572	2,662	2,861	3,093
VHMS 4 010 051 04 03 L040	1,0	-	4	51	1,00	4,0	0,025	4	15	4,639	4,801	5,161	5,580
VHMS 4 010 051 04 03 L060	1,0	-	4	51	1,00	6,0	0,025	4	15	6,707	6,940	7,461	8,066
VHMS 4 010 051 04 03 L080	1,0	-	4	51	1,00	8,0	0,025	4	15	8,774	9,080	9,760	10,552
VHMS 4 010 051 04 03 L100	1,0	-	4	51	1,00	10,0	0,025	4	15	10,841	11,219	12,060	13,038
VHMS 4 015 051 04 03 L015	1,5	-	4	51	1,50	-	-	4	15	3,781	3,913	4,206	4,548
VHMS 4 015 051 04 03 L040	1,5	-	4	51	1,50	4,0	0,025	4	15	4,912	5,083	5,464	5,907
VHMS 4 015 051 04 03 L060	1,5	-	4	51	1,50	6,0	0,025	4	15	6,979	7,222	7,763	8,393
VHMS 4 015 051 04 03 L080	1,5	-	4	51	1,50	8,0	0,025	4	15	9,046	9,361	10,063	10,879
VHMS 4 015 051 04 03 L100	1,5	-	4	51	1,50	10,0	0,025	4	15	11,114	11,501	12,363	13,366
VHMS 4 020 051 04 03 L020	2,0	-	4	51	2,00	-	-	4	15	4,298	4,448	4,781	5,169
VHMS 4 020 051 04 03 L040	2,0	-	4	51	2,00	4,0	0,050	4	15	5,008	5,182	5,571	6,023
VHMS 4 020 051 04 03 L060	2,0	-	4	51	2,00	6,0	0,050	4	15	7,075	7,322	7,871	8,509
VHMS 4 020 051 04 03 L080	2,0	-	4	51	2,00	8,0	0,050	4	15	9,143	9,461	10,170	10,995
VHMS 4 020 051 04 03 L100	2,0	-	4	51	2,00	10,0	0,050	4	15	11,210	11,601	12,470	13,482
VHMS 4 025 051 04 03 L025	2,5	-	4	51	2,50	-	-	4	15	4,815	4,983	5,356	5,791
VHMS 4 025 051 04 03 L040	2,5	-	4	51	2,50	4,0	0,050	4	15	5,008	5,182	5,571	6,023
VHMS 4 025 051 04 03 L060	2,5	-	4	51	2,50	6,0	0,050	4	15	7,075	7,322	7,871	8,509
VHMS 4 025 051 04 03 L080	2,5	-	4	51	2,50	8,0	0,050	4	15	9,143	9,461	10,170	10,995
VHMS 4 025 051 04 03 L100	2,5	-	4	51	2,50	10,0	0,050	4	15	11,210	11,601	12,470	13,482
VHMS 4 030 051 04 03 L030	3,0	-	4	51	3,00	-	-	4	15	5,332	5,518	5,931	6,412
VHMS 4 030 051 04 03 L045	3,0	-	4	51	3,00	4,5	0,050	4	15	5,525	5,717	6,146	6,644
VHMS 4 030 051 04 03 L060	3,0	-	4	51	3,00	6,0	0,050	4	15	7,075	7,322	7,871	8,509
VHMS 4 030 051 04 03 L080	3,0	-	4	51	3,00	8,0	0,050	4	15	9,143	9,461	10,170	∞
VHMS 4 030 051 04 03 L100	3,0	-	4	51	3,00	10,0	0,050	4	15	11,210	11,601	12,470	∞



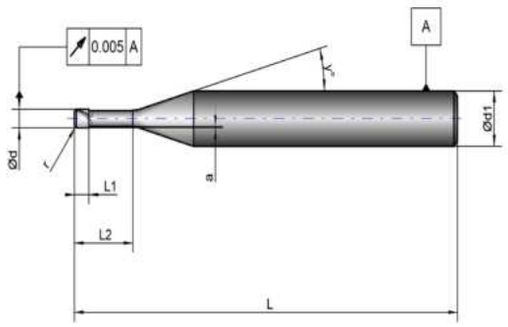


PAGE 84

Shank 6 mm
Schaft 6 mm
4-Flute
4-Schneiden



Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMS 4 002 064 06 03 L020	0,2	-	6	64	0,30	2,0	0,010	4	11	2,350	2,465	2,735	3,072
VHMS 4 002 064 06 03 L040	0,2	-	6	64	0,30	4,0	0,010	4	13	4,439	4,621	5,032	5,525
VHMS 4 004 064 06 03 L020	0,4	-	6	64	0,60	2,0	0,010	4	11	2,350	2,465	2,735	3,072
VHMS 4 004 064 06 03 L040	0,4	-	6	64	0,60	4,0	0,010	4	13	4,439	4,621	5,032	5,525
VHMS 4 004 064 06 03 L060	0,4	-	6	64	0,60	6,0	0,010	4	15	6,513	6,740	7,245	7,833
VHMS 4 004 064 06 03 L080	0,4	-	6	64	0,60	8,0	0,010	4	15	8,580	8,879	9,545	10,319
VHMS 4 004 064 06 03 L100	0,4	-	6	64	0,60	10,0	0,010	4	15	10,647	11,018	11,844	12,805
VHMS 4 005 064 06 03 L020	0,5	-	6	64	0,80	2,0	0,015	4	11	2,376	2,494	2,767	3,108
VHMS 4 005 064 06 03 L040	0,5	-	6	64	0,80	4,0	0,015	4	12	4,464	4,664	5,122	5,682
VHMS 4 005 064 06 03 L060	0,5	-	6	64	0,80	6,0	0,015	4	15	6,532	6,760	7,266	7,856
VHMS 4 005 064 06 03 L080	0,5	-	6	64	0,80	8,0	0,015	4	15	8,599	8,899	9,566	10,342
VHMS 4 005 064 06 03 L100	0,5	-	6	64	0,80	10,0	0,015	4	15	10,667	11,038	11,866	12,828
VHMS 4 010 064 06 03 L015	1,0	-	6	64	1,50	-	-	4	10	3,055	3,223	3,621	4,133
VHMS 4 010 064 06 03 L040	1,0	-	6	64	1,50	4,0	0,025	4	11	4,625	4,853	5,385	6,048
VHMS 4 010 064 06 03 L060	1,0	-	6	64	1,50	6,0	0,025	4	14	6,703	6,956	7,522	8,190
VHMS 4 010 064 06 03 L080	1,0	-	6	64	1,50	8,0	0,025	4	15	8,774	9,080	9,760	10,552
VHMS 4 010 064 06 03 L100	1,0	-	6	64	1,50	10,0	0,025	4	15	10,841	11,219	12,060	13,038
VHMS 4 015 064 06 03 L023	1,5	-	6	64	2,30	-	-	4	9	4,438	4,713	5,380	6,267
VHMS 4 015 064 06 03 L040	1,5	-	6	64	2,30	4,0	0,025	4	10	4,818	5,082	5,710	6,516
VHMS 4 015 064 06 03 L060	1,5	-	6	64	2,30	6,0	0,025	4	12	6,928	7,237	7,949	8,817
VHMS 4 015 064 06 03 L080	1,5	-	6	64	2,30	8,0	0,025	4	15	9,046	9,361	10,063	10,879
VHMS 4 015 064 06 03 L100	1,5	-	6	64	2,30	10,0	0,025	4	15	11,114	11,501	12,363	13,366
VHMS 4 020 064 06 03 L030	2,0	-	6	64	3,00	-	-	4	8	5,171	5,537	6,453	7,733
VHMS 4 020 064 06 03 L045	2,0	-	6	64	3,00	4,5	0,050	4	9	5,513	5,854	6,683	7,785
VHMS 4 020 064 06 03 L060	2,0	-	6	64	3,00	6,0	0,050	4	11	7,055	7,403	8,214	9,226
VHMS 4 020 064 06 03 L080	2,0	-	6	64	3,00	8,0	0,050	4	14	9,134	9,478	10,250	11,160
VHMS 4 020 064 06 03 L100	2,0	-	6	64	3,00	10,0	0,050	4	15	11,210	11,601	12,470	13,482
VHMS 4 025 064 06 03 L030	2,5	-	6	64	3,00	-	-	4	8	5,171	5,537	6,453	7,733
VHMS 4 025 064 06 03 L045	2,5	-	6	64	3,00	4,5	0,050	4	9	5,513	5,854	6,683	7,785
VHMS 4 025 064 06 03 L060	2,5	-	6	64	3,00	6,0	0,050	4	11	7,055	7,403	8,214	9,226
VHMS 4 025 064 06 03 L080	2,5	-	6	64	3,00	8,0	0,050	4	14	9,134	9,478	10,250	11,160
VHMS 4 025 064 06 03 L100	2,5	-	6	64	3,00	10,0	0,050	4	15	11,210	11,601	12,470	13,482
VHMS 4 030 064 06 03 L030	3,0	-	6	64	3,00	-	-	4	6	5,193	5,710	7,131	9,498
VHMS 4 030 064 06 03 L045	3,0	-	6	64	3,00	4,5	0,050	4	7	5,612	6,077	7,285	9,095
VHMS 4 030 064 06 03 L060	3,0	-	6	64	3,00	6,0	0,050	4	8	7,149	7,656	8,922	10,693
VHMS 4 030 064 06 03 L080	3,0	-	6	64	3,00	8,0	0,050	4	10	9,175	9,679	10,875	12,409
VHMS 4 030 064 06 03 L100	3,0	-	6	64	3,00	10,0	0,050	4	13	11,210	11,668	12,709	13,954



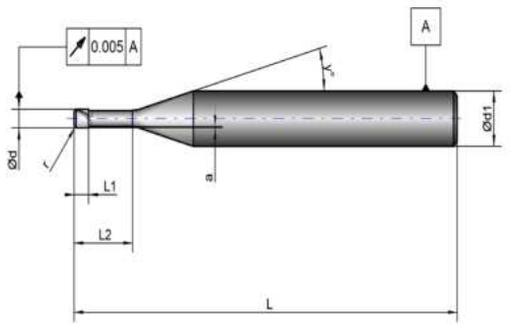
PAGE 84

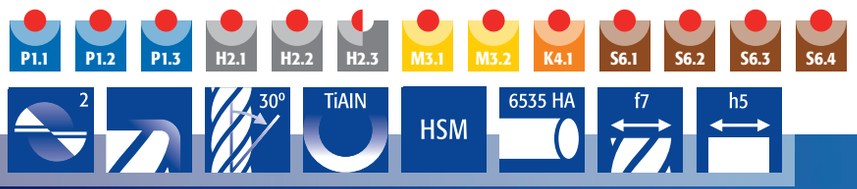
Shank 4 mm
Schaft 4 mm
2-Flute
2-Schneiden

Remark ∞ = infinity, no collision in projection length area.

Bemerkung ∞ = unendlich, keine Kollision in Länge Projektionsfläche.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMSR 2 001 051 04 03 L0015	0,1	0,03	4	51	0,15	-	-	2	15	0,633	0,654	0,701	0,755
VHMSR 2 001 051 04 03 L002	0,1	0,03	4	51	0,20	-	-	2	7	0,560	0,604	0,718	0,889
VHMSR 2 002 051 04 03 L0025	0,2	0,03	4	51	0,25	-	-	2	15	0,736	0,761	0,816	0,879
VHMSR 2 003 051 04 03 L003	0,3	0,05	4	51	0,30	-	-	2	15	1,097	1,134	1,215	1,310
VHMSR 2 003 051 04 03 L015	0,3	0,05	4	51	0,30	1,5	0,010	2	15	1,860	1,923	2,063	2,226
VHMSR 2 003 051 04 03 L030	0,3	0,05	4	51	0,30	3,0	0,010	2	15	3,410	3,527	3,788	4,091
VHMSR 2 004 051 04 03 L004	0,4	0,05	4	51	0,40	-	-	2	15	1,201	1,241	1,330	1,434
VHMSR 2 004 051 04 03 L020	0,4	0,05	4	51	0,40	2,0	0,010	2	15	2,376	2,457	2,638	2,848
VHMSR 2 004 051 04 03 L040	0,4	0,05	4	51	0,40	4,0	0,010	2	15	4,444	4,597	4,938	5,334
VHMSR 2 005 051 04 03 L005	0,5	0,05	4	51	0,50	-	-	2	15	1,304	1,348	1,445	1,558
VHMSR 2 005 051 04 03 L010	0,5	0,05	4	51	0,50	1,0	0,015	2	15	1,362	1,408	1,509	1,628
VHMSR 2 005 051 04 03 L030	0,5	0,05	4	51	0,50	3,0	0,015	2	15	3,429	3,547	3,809	4,114
VHMSR 2 005 051 04 03 L060	0,5	0,05	4	51	0,50	6,0	0,015	2	15	6,530	6,756	7,259	7,844
VHMSR 2 005 051 04 03 L080	0,5	0,05	4	51	0,50	8,0	0,015	2	15	8,598	8,896	9,558	10,330
VHMSR 2 005 051 04 03 L100	0,5	0,05	4	51	0,50	10,0	0,015	2	15	10,665	11,035	11,858	12,816
VHMSR 2 006 051 04 03 L006	0,6	0,05	4	51	0,60	-	-	2	15	2,060	2,130	2,286	2,468
VHMSR 2 006 051 04 03 L020	0,6	0,05	4	51	0,60	2,0	0,025	2	15	2,570	2,658	2,854	3,081
VHMSR 2 006 051 04 03 L040	0,6	0,05	4	51	0,60	4,0	0,025	2	15	4,638	4,798	5,153	5,567
VHMSR 2 006 051 04 03 L060	0,6	0,05	4	51	0,60	6,0	0,025	2	15	6,705	6,937	7,453	8,054
VHMSR 2 006 051 04 03 L080	0,6	0,05	4	51	0,60	8,0	0,025	2	15	8,772	9,076	9,753	10,540
VHMSR 2 006 051 04 03 L100	0,6	0,05	4	51	0,60	10,00	0,025	2	15	10,840	11,216	12,052	13,026
VHMSR 2 008 051 04 03 L008	0,8	0,05	4	51	0,80	-	-	2	15	2,267	2,344	2,516	2,716
VHMSR 2 008 051 04 03 L025	0,8	0,05	4	51	0,80	2,5	0,025	2	15	3,087	3,193	3,429	3,703
VHMSR 2 008 051 04 03 L050	0,8	0,05	4	51	0,80	5,0	0,025	2	15	5,671	5,867	6,303	6,811
VHMSR 2 008 051 04 03 L080	0,8	0,05	4	51	0,80	8,0	0,025	2	15	8,772	9,076	9,753	10,540
VHMSR 2 008 051 04 03 L100	0,8	0,05	4	51	0,80	10,0	0,025	2	15	10,840	11,216	12,052	13,026
VHMSR 2 010 051 04 03 L010	1,0	0,10	4	51	1,00	-	-	2	15	2,472	2,555	2,739	2,953
VHMSR 2 010 051 04 03 L020	1,0	0,10	4	51	1,00	2,0	0,025	2	15	2,569	2,655	2,846	3,069
VHMSR 2 010 051 04 03 L040	1,0	0,10	4	51	1,00	4,0	0,025	2	15	4,636	4,794	5,146	5,555
VHMSR 2 010 051 04 03 L060	1,0	0,10	4	51	1,00	6,0	0,025	2	15	6,703	6,933	7,446	8,042
VHMSR 2 010 051 04 03 L080	1,0	0,10	4	51	1,00	8,0	0,025	2	15	8,771	9,073	9,745	10,528
VHMSR 2 010 051 04 03 L100	1,0	0,10	4	51	1,00	10,0	0,025	2	15	10,838	11,212	12,045	13,014
VHMSR 2 010 051 04 03 L120	1,0	0,10	4	51	1,00	12,0	0,025	2	15	12,905	13,352	14,345	15,500
VHMSR 2 010 051 04 03 L150	1,0	0,10	4	51	1,00	15,0	0,025	2	15	16,006	16,561	17,794	19,230
VHMSR 2 010 060 04 03 L200	1,0	0,10	4	60	1,00	20,0	0,025	2	15	21,175	21,909	23,544	25,446
VHMSR 2 010 060 04 03 L250	1,0	0,10	4	60	1,00	25,0	0,025	2	15	26,343	27,257	29,293	∞
VHMSR 2 012 051 04 03 L012	1,2	0,10	4	51	1,20	-	-	2	15	3,468	3,585	3,847	4,150
VHMSR 2 012 051 04 03 L040	1,2	0,10	4	51	1,20	4,0	0,025	2	15	4,908	5,076	5,449	5,883
VHMSR 2 012 051 04 03 L060	1,2	0,10	4	51	1,20	6,0	0,025	2	15	6,975	7,215	7,748	8,369
VHMSR 2 012 051 04 03 L080	1,2	0,10	4	51	1,20	8,0	0,025	2	15	9,043	9,354	10,048	10,855
VHMSR 2 012 051 04 03 L120	1,2	0,10	4	51	1,20	12,0	0,025	2	15	13,177	13,633	14,647	15,828
VHMSR 2 012 051 04 03 L160	1,2	0,10	4	51	1,20	16,0	0,025	2	15	17,312	17,912	19,247	20,800

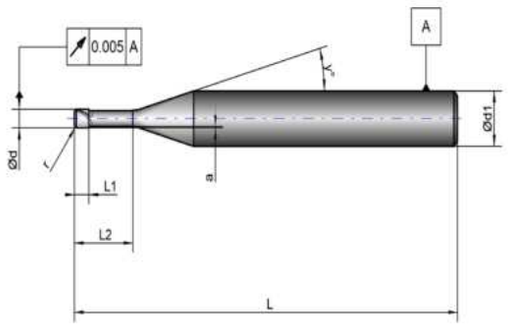




PAGE 84

Shank 4 mm
Schaft 4 mm
2-Flute
2-Schneiden

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMSR 2 015 051 04 03 L015	1,5	0,15	4	51	1,50	-	-	2	15	3,776	3,903	4,184	4,511
VHMSR 2 015 051 04 03 L030	1,5	0,15	4	51	1,50	3,0	0,025	2	15	3,873	4,003	4,291	4,627
VHMSR 2 015 051 04 03 L040	1,5	0,15	4	51	1,50	4,0	0,025	2	15	4,906	5,072	5,441	5,870
VHMSR 2 015 051 04 03 L060	1,5	0,15	4	51	1,50	6,0	0,025	2	15	6,974	7,212	7,741	8,357
VHMSR 2 015 051 04 03 L080	1,5	0,15	4	51	1,50	8,0	0,025	2	15	9,041	9,351	10,041	10,843
VHMSR 2 015 051 04 03 L100	1,5	0,15	4	51	1,50	10,0	0,025	2	15	11,108	11,490	12,340	13,329
VHMSR 2 015 051 04 03 L120	1,5	0,15	4	51	1,50	12,0	0,025	2	15	13,176	13,630	14,640	15,816
VHMSR 2 015 051 04 03 L150	1,5	0,15	4	51	1,50	15,0	0,025	2	15	16,277	16,839	18,090	19,545
VHMSR 2 015 060 04 03 L200	1,5	0,15	4	60	1,50	20,0	0,025	2	15	21,445	22,187	23,839	∞
VHMSR 2 015 060 04 03 L250	1,5	0,15	4	60	1,50	25,0	0,025	2	15	26,613	27,536	29,588	∞
VHMSR 2 020 051 04 03 L020	2,0	0,20	4	51	2,00	-	-	2	15	4,292	4,434	4,751	5,121
VHMSR 2 020 051 04 03 L040	2,0	0,20	4	51	2,00	4,0	0,050	2	15	5,001	5,169	5,541	5,974
VHMSR 2 020 051 04 03 L060	2,0	0,20	4	51	2,00	6,0	0,050	2	15	7,069	7,308	7,841	8,461
VHMSR 2 020 051 04 03 L080	2,0	0,20	4	51	2,00	8,0	0,050	2	15	9,136	9,447	10,140	10,947
VHMSR 2 020 051 04 03 L100	2,0	0,20	4	51	2,00	10,0	0,050	2	15	11,203	11,587	12,440	13,433
VHMSR 2 020 051 04 03 L120	2,0	0,20	4	51	2,00	12,0	0,050	2	15	13,271	13,726	14,740	15,919
VHMSR 2 020 051 04 03 L160	2,0	0,20	4	51	2,00	16,0	0,050	2	15	17,405	18,005	19,339	∞
VHMSR 2 020 060 04 03 L200	2,0	0,20	4	60	2,00	20,0	0,050	2	15	21,540	22,283	23,939	∞
VHMSR 2 020 060 04 03 L250	2,0	0,20	4	60	2,00	25,0	0,050	2	15	26,708	27,632	∞	∞
VHMSR 2 020 064 04 03 L300	2,0	0,20	4	64	2,00	30,0	0,050	2	15	31,877	32,980	∞	∞
VHMSR 2 025 051 04 03 L025	2,5	0,20	4	51	2,50	-	-	2	15	4,808	4,969	5,326	5,742
VHMSR 2 025 051 04 03 L040	2,5	0,20	4	51	2,50	4,0	0,050	2	15	5,001	5,169	5,541	5,974
VHMSR 2 025 051 04 03 L060	2,5	0,20	4	51	2,50	6,0	0,050	2	15	7,069	7,308	7,841	8,461
VHMSR 2 025 051 04 03 L080	2,5	0,20	4	51	2,50	8,0	0,050	2	15	9,136	9,447	10,140	10,947
VHMSR 2 025 051 04 03 L100	2,5	0,20	4	51	2,50	10,0	0,050	2	15	11,203	11,587	12,440	13,433
VHMSR 2 025 051 04 03 L120	2,5	0,20	4	51	2,50	12,0	0,050	2	15	13,271	13,726	14,740	∞
VHMSR 2 025 051 04 03 L160	2,5	0,20	4	51	2,50	16,0	0,050	2	15	17,405	18,005	19,339	∞
VHMSR 2 025 060 04 03 L200	2,5	0,20	4	60	2,50	20,0	0,050	2	15	21,540	22,283	∞	∞
VHMSR 2 025 060 04 03 L250	2,5	0,20	4	60	2,50	25,0	0,050	2	15	26,708	27,632	∞	∞
VHMSR 2 025 064 04 03 L300	2,5	0,20	4	64	2,50	30,0	0,050	2	15	31,877	32,980	∞	∞
VHMSR 2 030 051 04 03 L030	3,0	0,30	4	51	3,00	-	-	2	15	5,322	5,497	5,886	6,340
VHMSR 2 030 051 04 03 L060	3,0	0,30	4	51	3,00	6,0	0,050	2	15	7,065	7,301	7,826	∞
VHMSR 2 030 051 04 03 L080	3,0	0,30	4	51	3,00	8,0	0,050	2	15	9,133	9,440	10,125	∞
VHMSR 2 030 051 04 03 L100	3,0	0,30	4	51	3,00	10,0	0,050	2	15	11,200	11,580	12,425	∞
VHMSR 2 030 051 04 03 L120	3,0	0,30	4	51	3,00	12,0	0,050	2	15	13,267	13,719	14,725	∞
VHMSR 2 030 051 04 03 L160	3,0	0,30	4	51	3,00	16,0	0,050	2	15	17,402	17,998	∞	∞
VHMSR 2 030 060 04 03 L200	3,0	0,30	4	60	3,00	20,0	0,050	2	15	21,537	22,276	∞	∞
VHMSR 2 030 060 04 03 L250	3,0	0,30	4	60	3,00	25,0	0,050	2	15	26,705	27,625	∞	∞
VHMSR 2 030 064 04 03 L300	3,0	0,30	4	64	3,00	30,0	0,050	2	15	31,873	∞	∞	∞



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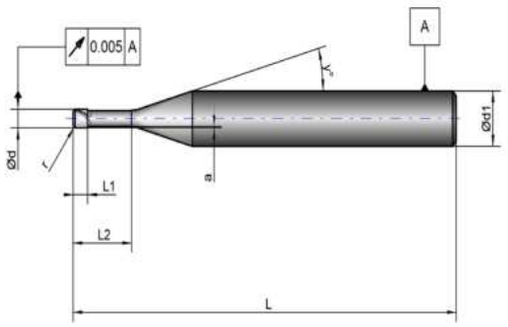
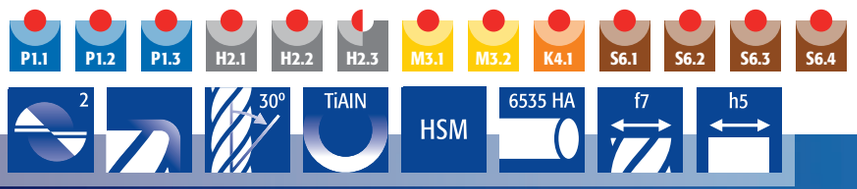
Shank 6 mm
Schaft 6 mm
2-Flute
2-Schneiden

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMSR 2 002 Z64 06 03 L003	0,2	0,03	6	64	0,30	-	-	2	10	0,709	0,746	0,834	0,948
VHMSR 2 003 Z64 06 03 L005	0,3	0,05	6	64	0,50	-	-	2	10	1,234	1,299	1,453	1,651
VHMSR 2 003 Z64 06 03 L015	0,3	0,05	6	64	0,50	1,5	0,010	2	11	1,824	1,911	2,115	2,369
VHMSR 2 003 Z64 06 03 L030	0,3	0,05	6	64	0,50	3,0	0,010	2	12	3,395	3,544	3,888	4,307
VHMSR 2 004 Z64 06 03 L006	0,4	0,05	6	64	0,60	-	-	2	10	1,339	1,410	1,577	1,793
VHMSR 2 004 Z64 06 03 L020	0,4	0,05	6	64	0,60	2,0	0,010	2	11	2,347	2,460	2,725	3,054
VHMSR 2 004 Z64 06 03 L040	0,4	0,05	6	64	0,60	4,0	0,010	2	13	4,437	4,616	5,023	5,511
VHMSR 2 005 Z64 06 03 L008	0,5	0,05	6	64	0,80	-	-	2	10	1,549	1,632	1,827	2,078
VHMSR 2 005 Z64 06 03 L030	0,5	0,05	6	64	0,80	3,0	0,015	2	12	3,419	3,570	3,916	4,338
VHMSR 2 005 Z64 06 03 L060	0,5	0,05	6	64	0,80	6,0	0,015	2	15	6,530	6,756	7,259	7,844
VHMSR 2 005 Z64 06 03 L080	0,5	0,05	6	64	0,80	8,0	0,015	2	15	8,598	8,896	9,558	10,330
VHMSR 2 005 Z64 06 03 L100	0,5	0,05	6	64	0,80	10,0	0,015	2	15	10,665	11,035	11,858	12,816
VHMSR 2 006 Z64 06 03 L009	0,6	0,05	6	64	0,90	-	-	2	10	2,272	2,395	2,684	3,056
VHMSR 2 006 Z64 06 03 L020	0,6	0,05	6	64	0,90	2,0	0,025	2	11	2,529	2,651	2,936	3,291
VHMSR 2 006 Z64 06 03 L040	0,6	0,05	6	64	0,90	4,0	0,025	2	12	4,621	4,825	5,295	5,867
VHMSR 2 006 Z64 06 03 L060	0,6	0,05	6	64	0,90	6,0	0,025	2	15	6,705	6,937	7,453	8,054
VHMSR 2 006 Z64 06 03 L080	0,6	0,05	6	64	0,90	8,0	0,025	2	15	8,772	9,076	9,753	10,540
VHMSR 2 006 Z64 06 03 L100	0,6	0,05	6	64	0,90	10,0	0,025	2	15	10,840	11,216	12,052	13,026
VHMSR 2 008 Z64 06 03 L012	0,8	0,05	6	64	1,20	-	-	2	10	2,588	2,728	3,058	3,483
VHMSR 2 008 Z64 06 03 L025	0,8	0,05	6	64	1,20	2,5	0,025	2	11	3,052	3,200	3,545	3,976
VHMSR 2 008 Z64 06 03 L050	0,8	0,05	6	64	1,20	5,0	0,025	2	13	5,662	5,892	6,412	7,036
VHMSR 2 008 Z64 06 03 L080	0,8	0,05	6	64	1,20	8,0	0,025	2	15	8,772	9,076	9,753	10,540
VHMSR 2 008 Z64 06 03 L100	0,8	0,05	6	64	1,20	10,0	0,025	2	15	10,840	11,216	12,052	13,026
VHMSR 2 010 Y64 06 03 L015	1,0	0,10	6	64	1,50	-	-	2	9	2,890	3,063	3,482	4,040
VHMSR 2 010 Y64 06 03 L040	1,0	0,10	6	64	1,50	4,0	0,025	2	11	4,620	4,843	5,363	6,011
VHMSR 2 010 Y64 06 03 L060	1,0	0,10	6	64	1,50	6,0	0,025	2	14	6,700	6,948	7,506	8,164
VHMSR 2 010 Y64 06 03 L080	1,0	0,10	6	64	1,50	8,0	0,025	2	15	8,771	9,073	9,745	10,528
VHMSR 2 010 Y64 06 03 L100	1,0	0,10	6	64	1,50	10,0	0,025	2	15	10,838	11,212	12,045	13,014
VHMSR 2 010 Y64 06 03 L120	1,0	0,10	6	64	1,50	12,0	0,025	2	15	12,905	13,352	14,345	15,500
VHMSR 2 010 Y64 06 03 L150	1,0	0,10	6	64	1,50	15,0	0,025	2	15	16,006	16,561	17,794	19,230
VHMSR 2 010 Y64 06 03 L200	1,0	0,10	6	64	1,50	20,0	0,025	2	15	21,175	21,909	23,544	25,446
VHMSR 2 010 Y64 06 03 L250	1,0	0,10	6	64	1,50	25,0	0,025	2	15	26,343	27,257	29,293	31,661
VHMSR 2 012 Y64 06 03 L018	1,2	0,10	6	64	1,80	-	-	2	9	3,903	4,139	4,710	5,471
VHMSR 2 012 Y64 06 03 L040	1,2	0,10	6	64	1,80	4,0	0,025	2	11	4,822	5,055	5,598	6,275
VHMSR 2 012 Y64 06 03 L060	1,2	0,10	6	64	1,80	6,0	0,025	2	13	6,936	7,216	7,850	8,610
VHMSR 2 012 Y64 06 03 L080	1,2	0,10	6	64	1,80	8,0	0,025	2	15	9,043	9,354	10,048	10,855
VHMSR 2 012 Y64 06 03 L120	1,2	0,10	6	64	1,80	12,0	0,025	2	15	13,177	13,633	14,647	15,828
VHMSR 2 012 Y64 06 03 L160	1,2	0,10	6	64	1,80	16,0	0,025	2	15	17,312	17,912	19,247	20,800





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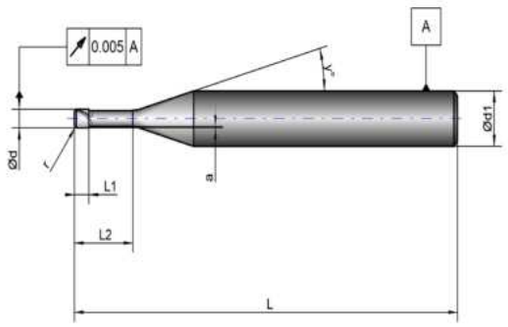
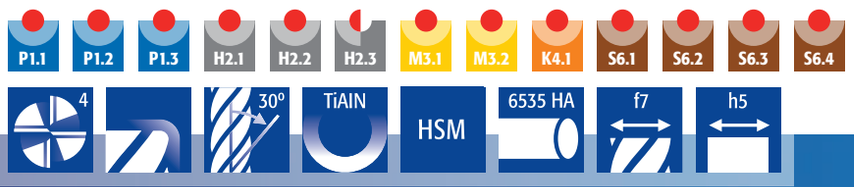
Shank 6 mm
Schaft 6 mm
2-Flute
2-Schneiden

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMSR 2 015 X64 06 03 L023	1,5	0,15	6	64	2,30	-	-	2	9	4,429	4,694	5,337	6,193
VHMSR 2 015 X64 06 03 L040	1,5	0,15	6	64	2,30	4,0	0,025	2	10	4,810	5,066	5,673	6,452
VHMSR 2 015 X64 06 03 L060	1,5	0,15	6	64	2,30	6,0	0,025	2	12	6,921	7,224	7,920	8,768
VHMSR 2 015 X64 06 03 L080	1,5	0,15	6	64	2,30	8,0	0,025	2	15	9,041	9,351	10,041	10,843
VHMSR 2 015 X64 06 03 L100	1,5	0,15	6	64	2,30	10,0	0,025	2	15	11,108	11,490	12,340	13,329
VHMSR 2 015 X64 06 03 L120	1,5	0,15	6	64	2,30	12,0	0,025	2	15	13,176	13,630	14,640	15,816
VHMSR 2 015 X64 06 03 L150	1,5	0,15	6	64	2,30	15,0	0,025	2	15	16,277	16,839	18,090	19,545
VHMSR 2 015 X64 06 03 L200	1,5	0,15	6	64	2,30	20,0	0,025	2	15	21,445	22,187	23,839	25,761
VHMSR 2 015 X64 06 03 L250	1,5	0,15	6	64	2,30	25,0	0,025	2	15	26,613	27,536	29,588	31,976
VHMSR 2 020 W64 06 03 L030	2,0	0,20	6	64	3,00	-	-	2	8	5,157	5,509	6,387	7,615
VHMSR 2 020 W64 06 03 L040	2,0	0,20	6	64	3,00	4,0	0,050	2	9	4,972	5,268	5,985	6,939
VHMSR 2 020 W64 06 03 L060	2,0	0,20	6	64	3,00	6,0	0,050	2	11	7,046	7,384	8,171	9,152
VHMSR 2 020 W64 06 03 L080	2,0	0,20	6	64	3,00	8,0	0,050	2	14	9,127	9,463	10,218	11,107
VHMSR 2 020 W64 06 03 L100	2,0	0,20	6	64	3,00	10,0	0,050	2	15	11,203	11,587	12,440	13,433
VHMSR 2 020 W64 06 03 L120	2,0	0,20	6	64	3,00	12,0	0,050	2	15	13,271	13,726	14,740	15,919
VHMSR 2 020 W64 06 03 L160	2,0	0,20	6	64	3,00	16,0	0,050	2	15	17,405	18,005	19,339	20,892
VHMSR 2 020 W64 06 03 L200	2,0	0,20	6	64	3,00	20,0	0,050	2	15	21,540	22,283	23,939	25,865
VHMSR 2 020 W64 06 03 L250	2,0	0,20	6	64	3,00	25,0	0,050	2	15	26,708	27,632	29,688	32,080
VHMSR 2 020 W64 06 03 L300	2,0	0,20	6	64	3,00	30,0	0,050	2	15	31,877	32,980	35,437	38,296
VHMSR 2 025 W64 06 03 L030	2,5	0,20	6	64	3,00	-	-	2	7	5,158	5,569	6,636	8,236
VHMSR 2 025 W64 06 03 L060	2,5	0,20	6	64	3,00	6,0	0,050	2	10	7,061	7,437	8,331	9,479
VHMSR 2 025 W64 06 03 L080	2,5	0,20	6	64	3,00	8,0	0,050	2	12	9,127	9,527	10,444	11,562
VHMSR 2 025 W64 06 03 L100	2,5	0,20	6	64	3,00	10,0	0,050	2	15	11,203	11,587	12,440	13,433
VHMSR 2 025 W64 06 03 L120	2,5	0,20	6	64	3,00	12,0	0,050	2	15	13,271	13,726	14,740	15,919
VHMSR 2 025 W64 06 03 L160	2,5	0,20	6	64	3,00	16,0	0,050	2	15	17,405	18,005	19,339	20,892
VHMSR 2 025 W64 06 03 L200	2,5	0,20	6	64	3,00	20,0	0,050	2	15	21,540	22,283	23,939	25,865
VHMSR 2 025 W64 06 03 L250	2,5	0,20	6	64	3,00	25,0	0,050	2	15	26,708	27,632	29,688	32,080
VHMSR 2 025 W64 06 03 L300	2,5	0,20	6	64	3,00	30,0	0,050	2	15	31,877	32,980	35,437	38,296
VHMSR 2 030 U64 06 03 L030	3,0	0,30	6	64	3,00	-	-	2	6	5,166	5,651	6,982	9,200
VHMSR 2 030 U64 06 03 L060	3,0	0,30	6	64	3,00	6,0	0,050	2	8	7,129	7,614	8,823	10,514
VHMSR 2 030 U64 06 03 L080	3,0	0,30	6	64	3,00	8,0	0,050	2	10	9,159	9,646	10,801	12,282
VHMSR 2 030 U64 06 03 L100	3,0	0,30	6	64	3,00	10,0	0,050	2	13	11,198	11,644	12,655	13,866
VHMSR 2 030 U64 06 03 L120	3,0	0,30	6	64	3,00	12,0	0,050	2	15	13,267	13,719	14,725	15,895
VHMSR 2 030 U64 06 03 L160	3,0	0,30	6	64	3,00	16,0	0,050	2	15	17,402	17,998	19,324	20,868
VHMSR 2 030 U64 06 03 L200	3,0	0,30	6	64	3,00	20,0	0,050	2	15	21,537	22,276	23,924	25,840
VHMSR 2 030 U64 06 03 L250	3,0	0,30	6	64	3,00	25,0	0,050	2	15	26,705	27,625	29,673	32,056
VHMSR 2 030 U64 06 03 L300	3,0	0,30	6	64	3,00	30,0	0,050	2	15	31,873	32,973	35,422	38,272





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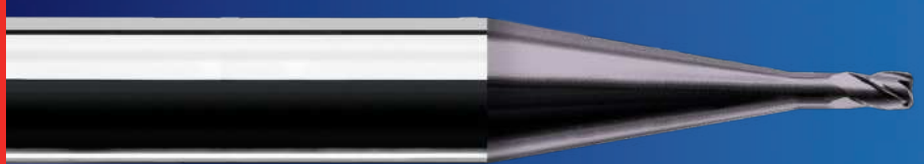
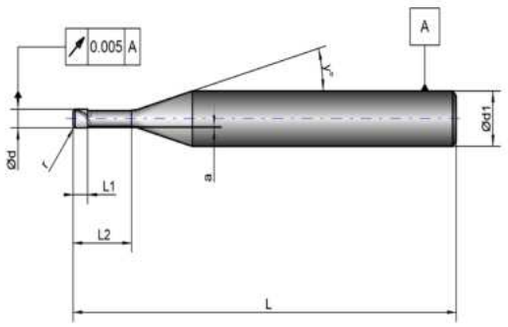


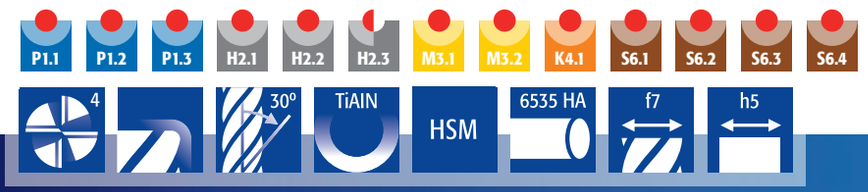
Shank 4 mm
Schaft 4 mm
4-Flute
4-Schneiden

Remark ∞ = infinity, no collision in projection length area.

Bemerkung ∞ = unendlich, keine Kollision in Länge Projektionsfläche.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMSR 4 002 051 04 03 L020	0,2	0,03	4	51	0,25	2,0	0,010	4	15	2,377	2,459	2,641	2,853
VHMSR 4 002 051 04 03 L040	0,2	0,03	4	51	0,25	4,0	0,010	4	15	4,444	4,598	4,941	5,339
VHMSR 4 004 051 04 03 L020	0,4	0,05	4	51	0,40	2,0	0,010	4	15	2,376	2,457	2,638	2,848
VHMSR 4 004 051 04 03 L040	0,4	0,05	4	51	0,40	4,0	0,010	4	15	4,444	4,597	4,938	5,334
VHMSR 4 004 051 04 03 L060	0,4	0,05	4	51	0,40	6,0	0,010	4	15	6,511	6,736	7,237	7,820
VHMSR 4 004 051 04 03 L080	0,4	0,05	4	51	0,40	8,0	0,010	4	15	8,578	8,876	9,537	10,307
VHMSR 4 004 051 04 03 L100	0,4	0,05	4	51	0,40	10,0	0,010	4	15	10,646	11,015	11,837	12,793
VHMSR 4 005 051 04 03 L020	0,5	0,05	4	51	0,50	2,0	0,015	4	15	2,396	2,477	2,659	2,871
VHMSR 4 005 051 04 03 L040	0,5	0,05	4	51	0,50	4,0	0,015	4	15	4,463	4,617	4,959	5,357
VHMSR 4 005 051 04 03 L060	0,5	0,05	4	51	0,50	6,0	0,015	4	15	6,530	6,756	7,259	7,844
VHMSR 4 005 051 04 03 L080	0,5	0,05	4	51	0,50	8,0	0,015	4	15	8,598	8,896	9,558	10,330
VHMSR 4 005 051 04 03 L100	0,5	0,05	4	51	0,50	10,0	0,015	4	15	10,665	11,035	11,858	12,816
VHMSR 4 010 051 04 03 L020	1,0	0,10	4	51	1,00	2,0	0,025	4	15	2,569	2,655	2,846	3,069
VHMSR 4 010 051 04 03 L040	1,0	0,10	4	51	1,00	4,0	0,025	4	15	4,636	4,794	5,146	5,555
VHMSR 4 010 051 04 03 L060	1,0	0,10	4	51	1,00	6,0	0,025	4	15	6,703	6,933	7,446	8,042
VHMSR 4 010 051 04 03 L080	1,0	0,10	4	51	1,00	8,0	0,025	4	15	8,771	9,073	9,745	10,528
VHMSR 4 010 051 04 03 L100	1,0	0,10	4	51	1,00	10,0	0,025	4	15	10,838	11,212	12,045	13,014
VHMSR 4 015 051 04 03 L015	1,5	0,15	4	51	1,50	-	-	4	15	3,776	3,903	4,184	4,511
VHMSR 4 015 051 04 03 L040	1,5	0,15	4	51	1,50	4,0	0,025	4	15	4,906	5,072	5,441	5,870
VHMSR 4 015 051 04 03 L060	1,5	0,15	4	51	1,50	6,0	0,025	4	15	6,974	7,212	7,741	8,357
VHMSR 4 015 051 04 03 L080	1,5	0,15	4	51	1,50	8,0	0,025	4	15	9,041	9,351	10,041	10,843
VHMSR 4 015 051 04 03 L100	1,5	0,15	4	51	1,50	10,0	0,025	4	15	11,108	11,490	12,340	13,329
VHMSR 4 020 051 04 03 L020	2,0	0,20	4	51	2,00	-	-	4	15	4,292	4,434	4,751	5,121
VHMSR 4 020 051 04 03 L040	2,0	0,20	4	51	2,00	4,0	0,050	4	15	5,001	5,169	5,541	5,974
VHMSR 4 020 051 04 03 L060	2,0	0,20	4	51	2,00	6,0	0,050	4	15	7,069	7,308	7,841	8,461
VHMSR 4 020 051 04 03 L080	2,0	0,20	4	51	2,00	8,0	0,050	4	15	9,136	9,447	10,140	10,947
VHMSR 4 020 051 04 03 L100	2,0	0,20	4	51	2,00	10,0	0,050	4	15	11,203	11,587	12,440	13,433
VHMSR 4 025 051 04 03 L025	2,5	0,20	4	51	2,50	-	-	4	15	4,808	4,969	5,326	5,742
VHMSR 4 025 051 04 03 L040	2,5	0,20	4	51	2,50	4,0	0,050	4	15	5,001	5,169	5,541	5,974
VHMSR 4 025 051 04 03 L060	2,5	0,20	4	51	2,50	6,0	0,050	4	15	7,069	7,308	7,841	8,461
VHMSR 4 025 051 04 03 L080	2,5	0,20	4	51	2,50	8,0	0,050	4	15	9,136	9,447	10,140	10,947
VHMSR 4 025 051 04 03 L100	2,5	0,20	4	51	2,50	10,0	0,050	4	15	11,203	11,587	12,440	13,433
VHMSR 4 030 051 04 03 L030	3,0	0,30	4	51	3,00	-	-	4	15	5,322	5,497	5,886	6,340
VHMSR 4 030 051 04 03 L040	3,0	0,30	4	51	3,00	4,0	0,050	4	15	4,998	5,162	5,526	5,950
VHMSR 4 030 051 04 03 L060	3,0	0,30	4	51	3,00	6,0	0,050	4	15	7,065	7,301	7,826	8,436
VHMSR 4 030 051 04 03 L080	3,0	0,30	4	51	3,00	8,0	0,050	4	15	9,133	9,440	10,125	∞
VHMSR 4 030 051 04 03 L100	3,0	0,30	4	51	3,00	10,0	0,050	4	15	11,200	11,580	12,425	∞

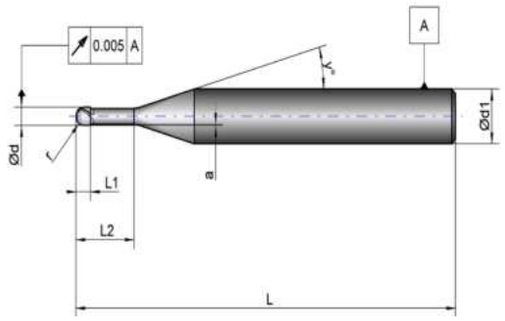




PAGE 84

Shank 6 mm
Schaft 6 mm
4-Flute
4-Schneiden

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	 1°	 2°	 3°
VHMSR 4 002 064 06 03 L020	0,2	0,03	6	64	0,30	2,0	0,010	4	11	2,348	2,462	2,729	3,061
VHMSR 4 002 064 06 03 L040	0,2	0,03	6	64	0,30	4,0	0,010	4	13	4,438	4,618	5,027	5,517
VHMSR 4 004 064 06 03 L020	0,4	0,05	6	64	0,60	2,0	0,010	4	11	2,347	2,460	2,725	3,054
VHMSR 4 004 064 06 03 L040	0,4	0,05	6	64	0,60	4,0	0,010	4	13	4,437	4,616	5,023	5,511
VHMSR 4 004 064 06 03 L060	0,4	0,05	6	64	0,60	6,0	0,010	4	15	6,511	6,736	7,237	7,820
VHMSR 4 004 064 06 03 L080	0,4	0,05	6	64	0,60	8,0	0,010	4	15	8,578	8,876	9,537	10,307
VHMSR 4 004 064 06 03 L100	0,4	0,05	6	64	0,60	10,0	0,010	4	15	10,646	11,015	11,837	12,793
VHMSR 4 005 064 06 03 L020	0,5	0,05	6	64	0,80	2,0	0,015	4	11	2,374	2,489	2,756	3,089
VHMSR 4 005 064 06 03 L040	0,5	0,05	6	64	0,80	4,0	0,015	4	12	4,462	4,659	5,112	5,665
VHMSR 4 005 064 06 03 L060	0,5	0,05	6	64	0,80	6,0	0,015	4	15	6,530	6,756	7,259	7,844
VHMSR 4 005 064 06 03 L080	0,5	0,05	6	64	0,80	8,0	0,015	4	15	8,598	8,896	9,558	10,330
VHMSR 4 005 064 06 03 L100	0,5	0,05	6	64	0,80	10,0	0,015	4	15	10,665	11,035	11,858	12,816
VHMSR 4 010 064 06 03 L015	1,0	0,10	6	64	1,50	-	-	4	10	3,050	3,212	3,597	4,090
VHMSR 4 010 064 06 03 L040	1,0	0,10	6	64	1,50	4,0	0,025	4	11	4,620	4,843	5,363	6,011
VHMSR 4 010 064 06 03 L060	1,0	0,10	6	64	1,50	6,0	0,025	4	14	6,700	6,948	7,506	8,164
VHMSR 4 010 064 06 03 L080	1,0	0,10	6	64	1,50	8,0	0,025	4	15	8,771	9,073	9,745	10,528
VHMSR 4 010 064 06 03 L100	1,0	0,10	6	64	1,50	10,0	0,025	4	15	10,838	11,212	12,045	13,014
VHMSR 4 015 064 06 03 L023	1,5	0,15	6	64	2,30	-	-	4	9	4,429	4,694	5,337	6,193
VHMSR 4 015 064 06 03 L040	1,5	0,15	6	64	2,30	4,0	0,025	4	10	4,810	5,066	5,673	6,452
VHMSR 4 015 064 06 03 L060	1,5	0,15	6	64	2,30	6,0	0,025	4	12	6,921	7,224	7,920	8,768
VHMSR 4 015 064 06 03 L080	1,5	0,15	6	64	2,30	8,0	0,025	4	15	9,041	9,351	10,041	10,843
VHMSR 4 015 064 06 03 L100	1,5	0,15	6	64	2,30	10,0	0,025	4	15	11,108	11,490	12,340	13,329
VHMSR 4 020 064 06 03 L030	2,0	0,20	6	64	3,00	-	-	4	8	5,157	5,509	6,387	7,615
VHMSR 4 020 064 06 03 L045	2,0	0,20	6	64	3,00	4,5	0,050	4	9	5,501	5,830	6,626	7,686
VHMSR 4 020 064 06 03 L060	2,0	0,20	6	64	3,00	6,0	0,050	4	11	7,046	7,384	8,171	9,152
VHMSR 4 020 064 06 03 L080	2,0	0,20	6	64	3,00	8,0	0,050	4	14	9,127	9,463	10,218	11,107
VHMSR 4 020 064 06 03 L100	2,0	0,20	6	64	3,00	10,0	0,050	4	15	11,203	11,587	12,440	13,433
VHMSR 4 025 064 06 03 L030	2,5	0,20	6	64	3,00	-	-	4	8	5,157	5,509	6,387	7,615
VHMSR 4 025 064 06 03 L045	2,5	0,20	6	64	3,00	4,5	0,050	4	9	5,501	5,830	6,626	7,686
VHMSR 4 025 064 06 03 L060	2,5	0,20	6	64	3,00	6,0	0,050	4	11	7,046	7,384	8,171	9,152
VHMSR 4 025 064 06 03 L080	2,5	0,20	6	64	3,00	8,0	0,050	4	14	9,127	9,463	10,218	11,107
VHMSR 4 025 064 06 03 L100	2,5	0,20	6	64	3,00	10,0	0,050	4	15	11,203	11,587	12,440	13,433
VHMSR 4 030 064 06 03 L030	3,0	0,30	6	64	3,00	-	-	4	6	5,166	5,651	6,982	9,200
VHMSR 4 030 064 06 03 L045	3,0	0,30	6	64	3,00	4,5	0,050	4	7	5,589	6,027	7,166	8,872
VHMSR 4 030 064 06 03 L060	3,0	0,30	6	64	3,00	6,0	0,050	4	8	7,129	7,614	8,823	10,514
VHMSR 4 030 064 06 03 L080	3,0	0,30	6	64	3,00	8,0	0,050	4	10	9,159	9,646	10,801	12,282
VHMSR 4 030 064 06 03 L100	3,0	0,30	6	64	3,00	10,0	0,050	4	13	11,198	11,644	12,655	13,866



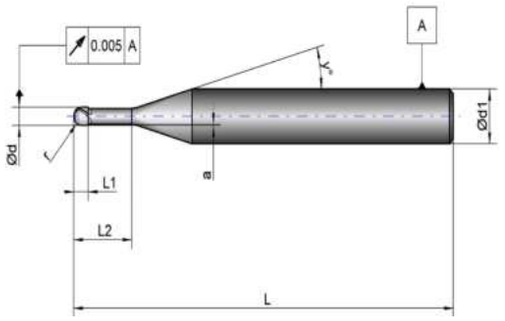
PAGE 84

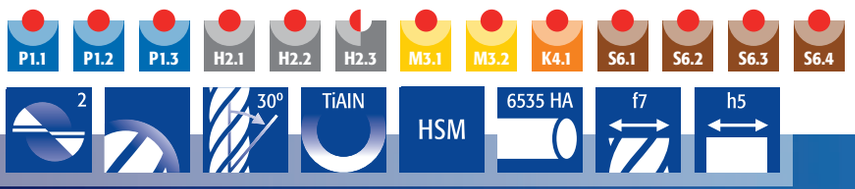
Shank 4 mm
Schaft 4 mm
2-Flute
2-Schneiden

Remark ∞ = infinity, no collision in projection length area.

Bemerkung ∞ = unendlich, keine Kollision in Länge Projektionsfläche.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMSK 2 001 051 04 03 L002	0,1	0,05	4	51	0,20	-	-	2	15	0,684	0,706	0,755	0,812
VHMSK 2 001 060 04 03 L002	0,1	0,05	4	60	0,20	-	-	2	10	0,602	0,633	0,705	0,797
VHMSK 2 002 051 04 03 L003	0,2	0,10	4	51	0,30	-	-	2	15	0,786	0,810	0,863	0,925
VHMSK 2 003 051 04 03 L004	0,3	0,15	4	51	0,40	-	-	2	15	1,197	1,234	1,315	1,410
VHMSK 2 003 051 04 03 L015	0,3	0,15	4	51	0,40	1,5	0,010	2	15	1,856	1,916	2,048	2,202
VHMSK 2 003 051 04 03 L030	0,3	0,15	4	51	0,40	3,0	0,010	2	15	3,407	3,520	3,773	4,067
VHMSK 2 004 051 04 03 L005	0,4	0,20	4	51	0,50	-	-	2	15	1,299	1,337	1,423	1,522
VHMSK 2 004 051 04 03 L020	0,4	0,20	4	51	0,50	2,0	0,010	2	15	2,371	2,447	2,615	2,811
VHMSK 2 004 051 04 03 L040	0,4	0,20	4	51	0,50	4,0	0,010	2	15	4,439	4,586	4,915	5,298
VHMSK 2 005 051 04 03 L007	0,5	0,25	4	51	0,70	-	-	2	15	1,504	1,548	1,645	1,758
VHMSK 2 005 051 04 03 L030	0,5	0,25	4	51	0,70	3,0	0,015	2	15	3,423	3,533	3,779	4,066
VHMSK 2 005 051 04 03 L060	0,5	0,25	4	51	0,70	6,0	0,015	2	15	6,524	6,742	7,229	7,795
VHMSK 2 005 051 04 03 L080	0,5	0,25	4	51	0,70	8,0	0,015	2	15	8,591	8,882	9,529	10,281
VHMSK 2 005 051 04 03 L100	0,5	0,25	4	51	0,70	10,0	0,015	2	15	10,658	11,021	11,828	12,768
VHMSK 2 006 051 04 03 L008	0,6	0,30	4	51	0,80	-	-	2	15	2,259	2,327	2,479	2,656
VHMSK 2 006 051 04 03 L020	0,6	0,30	4	51	0,80	2,0	0,025	2	15	2,562	2,641	2,816	3,020
VHMSK 2 006 051 04 03 L040	0,6	0,30	4	51	0,80	4,0	0,025	2	15	4,629	4,780	5,116	5,507
VHMSK 2 006 051 04 03 L060	0,6	0,30	4	51	0,80	6,0	0,025	2	15	6,697	6,919	7,416	7,993
VHMSK 2 006 051 04 03 L080	0,6	0,30	4	51	0,80	8,0	0,025	2	15	8,764	9,059	9,715	10,479
VHMSK 2 006 051 04 03 L100	0,6	0,30	4	51	0,80	10,0	0,025	2	15	10,831	11,198	12,015	12,965
VHMSK 2 008 051 04 03 L010	0,8	0,40	4	51	1,00	-	-	2	15	2,462	2,534	2,694	2,880
VHMSK 2 008 051 04 03 L025	0,8	0,40	4	51	1,00	2,5	0,025	2	15	3,075	3,169	3,376	3,618
VHMSK 2 008 051 04 03 L050	0,8	0,40	4	51	1,00	5,0	0,025	2	15	5,660	5,843	6,251	6,725
VHMSK 2 008 051 04 03 L080	0,8	0,40	4	51	1,00	8,0	0,025	2	15	8,761	9,052	9,700	10,455
VHMSK 2 008 051 04 03 L100	0,8	0,40	4	51	1,00	10,0	0,025	2	15	10,828	11,191	12,000	12,941
VHMSK 2 010 051 04 03 L012	1,0	0,50	4	51	1,20	-	-	2	15	2,665	2,741	2,909	3,104
VHMSK 2 010 051 04 03 L040	1,0	0,50	4	51	1,20	4,0	0,025	2	15	4,623	4,766	5,086	5,458
VHMSK 2 010 051 04 03 L060	1,0	0,50	4	51	1,20	6,0	0,025	2	15	6,690	6,906	7,386	7,944
VHMSK 2 010 051 04 03 L080	1,0	0,50	4	51	1,20	8,0	0,025	2	15	8,757	9,045	9,685	10,431
VHMSK 2 010 051 04 03 L100	1,0	0,50	4	51	1,20	10,0	0,025	2	15	10,825	11,184	11,985	12,917
VHMSK 2 010 051 04 03 L120	1,0	0,50	4	51	1,20	12,0	0,025	2	15	12,892	13,324	14,285	15,403
VHMSK 2 010 051 04 03 L150	1,0	0,50	4	51	1,20	15,0	0,025	2	15	15,993	16,533	17,734	19,133
VHMSK 2 010 060 04 03 L200	1,0	0,50	4	60	1,20	20,0	0,025	2	15	21,161	21,881	23,484	25,348
VHMSK 2 010 060 04 03 L250	1,0	0,50	4	60	1,20	25,0	0,025	2	15	26,330	27,230	29,233	∞
VHMSK 2 012 051 04 03 L014	1,2	0,60	4	51	1,40	-	-	2	15	3,658	3,764	4,002	4,278
VHMSK 2 012 051 04 03 L040	1,2	0,60	4	51	1,40	4,0	0,025	2	15	4,891	5,041	5,374	5,761
VHMSK 2 012 051 04 03 L060	1,2	0,60	4	51	1,40	6,0	0,025	2	15	6,959	7,180	7,673	8,247
VHMSK 2 012 051 04 03 L080	1,2	0,60	4	51	1,40	8,0	0,025	2	15	9,026	9,320	9,973	10,734
VHMSK 2 012 051 04 03 L120	1,2	0,60	4	51	1,40	12,0	0,025	2	15	13,161	13,598	14,573	15,706
VHMSK 2 012 051 04 03 L160	1,2	0,60	4	51	1,40	16,0	0,025	2	15	17,295	17,877	19,172	20,679

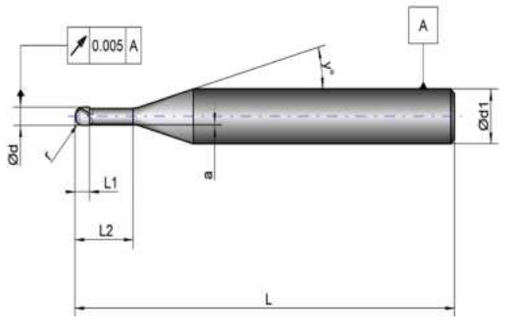


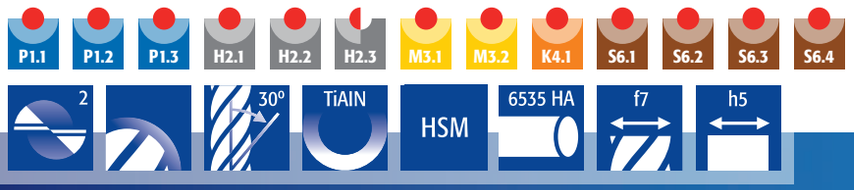


PAGE 84

Shank 4 mm
Schaft 4 mm
2-Flute
2-Schneiden

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMSK 2 015 051 04 03 L018	1,5	0,75	4	51	1,80	-	-	2	15	4,066	4,182	4,439	4,738
VHMSK 2 015 051 04 03 L040	1,5	0,75	4	51	1,80	4,0	0,020	2	15	4,867	5,010	5,330	5,701
VHMSK 2 015 051 04 03 L060	1,5	0,75	4	51	1,80	6,0	0,025	2	15	6,954	7,170	7,651	8,211
VHMSK 2 015 051 04 03 L080	1,5	0,75	4	51	1,80	8,0	0,025	2	15	9,021	9,309	9,951	10,697
VHMSK 2 015 051 04 03 L100	1,5	0,75	4	51	1,80	10,0	0,025	2	15	11,088	11,448	12,250	13,183
VHMSK 2 015 051 04 03 L120	1,5	0,75	4	51	1,80	12,0	0,025	2	15	13,156	13,588	14,550	15,670
VHMSK 2 015 051 04 03 L150	1,5	0,75	4	51	1,80	15,0	0,025	2	15	16,257	16,797	18,000	19,399
VHMSK 2 015 060 04 03 L200	1,5	0,75	4	60	1,80	20,0	0,025	2	15	21,425	22,145	23,749	∞
VHMSK 2 015 060 04 03 L250	1,5	0,75	4	60	1,80	25,0	0,025	2	15	26,593	27,494	29,498	∞
VHMSK 2 020 051 04 03 L025	2,0	1,00	4	51	2,50	-	-	2	15	4,781	4,913	5,206	5,548
VHMSK 2 020 051 04 03 L040	2,0	1,00	4	51	2,50	4,0	0,050	2	15	4,974	5,113	5,421	5,780
VHMSK 2 020 051 04 03 L060	2,0	1,00	4	51	2,50	6,0	0,050	2	15	7,042	7,252	7,721	8,266
VHMSK 2 020 051 04 03 L080	2,0	1,00	4	51	2,50	8,0	0,050	2	15	9,109	9,392	10,020	10,752
VHMSK 2 020 051 04 03 L100	2,0	1,00	4	51	2,50	10,0	0,050	2	15	11,176	11,531	12,320	13,239
VHMSK 2 020 051 04 03 L120	2,0	1,00	4	51	2,50	12,0	0,050	2	15	13,244	13,670	14,620	15,725
VHMSK 2 020 051 04 03 L160	2,0	1,00	4	51	2,50	16,0	0,050	2	15	17,378	17,949	19,219	∞
VHMSK 2 020 060 04 03 L200	2,0	1,00	4	60	2,50	20,0	0,050	2	15	21,513	22,228	23,819	∞
VHMSK 2 020 060 04 03 L250	2,0	1,00	4	60	2,50	25,0	0,050	2	15	26,681	27,576	29,568	∞
VHMSK 2 020 064 04 03 L300	2,0	1,00	4	64	2,50	30,0	0,050	2	15	31,850	32,925	∞	∞
VHMSK 2 025 051 04 03 L035	2,5	1,25	4	51	3,50	-	-	2	15	5,807	5,965	6,319	6,730
VHMSK 2 025 051 04 03 L060	2,5	1,25	4	51	3,50	6,0	0,050	2	15	7,033	7,235	7,683	8,205
VHMSK 2 025 051 04 03 L080	2,5	1,25	4	51	3,50	8,0	0,050	2	15	9,101	9,374	9,983	10,692
VHMSK 2 025 051 04 03 L100	2,5	1,25	4	51	3,50	10,00	0,050	2	15	11,168	11,513	12,283	13,178
VHMSK 2 025 051 04 03 L120	2,5	1,25	4	51	3,50	12,0	0,050	2	15	13,235	13,653	14,582	15,664
VHMSK 2 025 051 04 03 L160	2,5	1,25	4	51	3,50	16,0	0,050	2	15	17,370	17,932	19,182	∞
VHMSK 2 025 060 04 03 L200	2,5	1,25	4	60	3,50	20,0	0,050	2	15	21,505	22,210	∞	∞
VHMSK 2 025 060 04 03 L250	2,5	1,25	4	60	3,50	25,0	0,050	2	15	26,673	27,559	∞	∞
VHMSK 2 025 064 04 03 L300	2,5	1,25	4	64	3,50	30,0	0,050	2	15	31,841	32,907	∞	∞
VHMSK 2 030 051 04 03 L035	3,0	1,50	4	51	3,50	-	-	2	15	5,798	5,948	6,281	6,669
VHMSK 2 030 051 04 03 L060	3,0	1,50	4	51	3,50	6,0	0,050	2	15	7,025	7,217	7,646	8,144
VHMSK 2 030 051 04 03 L080	3,0	1,50	4	51	3,50	8,0	0,050	2	15	9,092	9,357	9,946	10,631
VHMSK 2 030 051 04 03 L100	3,0	1,50	4	51	3,50	10,0	0,050	2	15	11,159	11,496	12,245	∞
VHMSK 2 030 051 04 03 L120	3,0	1,50	4	51	3,50	12,0	0,050	2	15	13,227	13,635	14,545	∞
VHMSK 2 030 051 04 03 L160	3,0	1,50	4	51	3,50	16,0	0,050	2	15	17,361	17,914	∞	∞
VHMSK 2 030 060 04 03 L200	3,0	1,50	4	60	3,50	20,0	0,050	2	15	21,496	22,193	∞	∞
VHMSK 2 030 060 04 03 L250	3,0	1,50	4	60	3,50	25,0	0,050	2	15	26,664	27,541	∞	∞
VHMSK 2 030 064 04 03 L300	3,0	1,50	4	64	3,50	30,0	0,050	2	15	31,833	∞	∞	∞





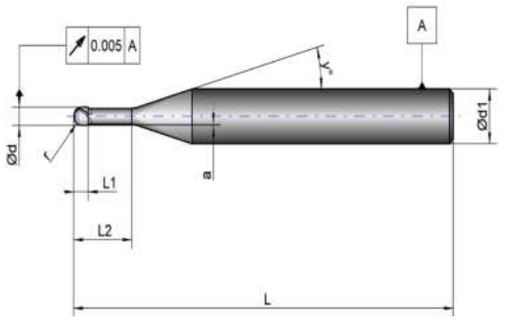
PAGE 84

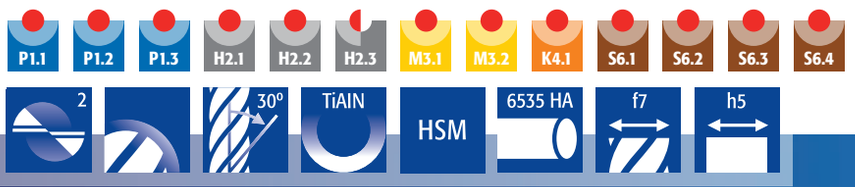
Shank 6 mm
Schaft 6 mm
2-Flute
2-Schneiden

Remark ∞ = infinity, no collision in projection length area.

Bemerkung ∞ = unendlich, keine Kollision in Länge Projektionsfläche.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	 1°	 2°	 3°
VHMSK 2 002 064 06 03 L003	0,2	0,10	6	64	0,30	-	-	2	10	0,705	0,738	0,817	0,918
VHMSK 2 003 064 06 03 L005	0,3	0,15	6	64	0,50	-	-	2	10	1,228	1,288	1,428	1,608
VHMSK 2 003 064 06 03 L015	0,3	0,15	6	64	0,50	1,5	0,010	2	11	1,819	1,901	2,093	2,332
VHMSK 2 003 064 06 03 L030	0,3	0,15	6	64	0,50	3,0	0,010	2	12	3,390	3,535	3,868	4,274
VHMSK 2 004 064 06 03 L006	0,4	0,20	6	64	0,60	-	-	2	10	1,331	1,393	1,540	1,730
VHMSK 2 004 064 06 03 L020	0,4	0,20	6	64	0,60	2,0	0,010	2	11	2,340	2,446	2,692	2,999
VHMSK 2 004 064 06 03 L040	0,4	0,20	6	64	0,60	4,0	0,010	2	13	4,431	4,604	4,997	5,467
VHMSK 2 005 064 06 03 L008	0,5	0,25	6	64	0,80	-	-	2	10	1,539	1,610	1,777	1,993
VHMSK 2 005 064 06 03 L030	0,5	0,25	6	64	0,80	3,0	0,015	2	12	3,411	3,552	3,877	4,273
VHMSK 2 005 064 06 03 L060	0,5	0,25	6	64	0,80	6,0	0,015	2	15	6,524	6,742	7,229	7,795
VHMSK 2 005 064 06 03 L080	0,5	0,25	6	64	0,80	8,0	0,015	2	15	8,591	8,882	9,529	10,281
VHMSK 2 005 064 06 03 L100	0,5	0,25	6	64	0,80	10,0	0,015	2	15	10,658	11,021	11,828	12,768
VHMSK 2 006 064 06 03 L009	0,6	0,30	6	64	0,90	-	-	2	10	2,259	2,367	2,622	2,950
VHMSK 2 006 064 06 03 L020	0,6	0,30	6	64	0,90	2,0	0,025	2	11	2,517	2,626	2,881	3,199
VHMSK 2 006 064 06 03 L040	0,6	0,30	6	64	0,90	4,0	0,025	2	12	4,610	4,803	5,245	5,785
VHMSK 2 006 064 06 03 L060	0,6	0,30	6	64	0,90	6,0	0,025	2	15	6,697	6,919	7,416	7,993
VHMSK 2 006 064 06 03 L080	0,6	0,30	6	64	0,90	8,0	0,025	2	15	8,764	9,059	9,715	10,479
VHMSK 2 006 064 06 03 L100	0,6	0,30	6	64	0,90	10,0	0,025	2	15	10,831	11,198	12,015	12,965
VHMSK 2 008 064 06 03 L012	0,8	0,40	6	64	1,20	-	-	2	10	2,570	2,689	2,972	3,335
VHMSK 2 008 064 06 03 L025	0,8	0,40	6	64	1,20	2,5	0,025	2	11	3,036	3,166	3,469	3,847
VHMSK 2 008 064 06 03 L050	0,8	0,40	6	64	1,20	5,0	0,025	2	13	5,648	5,863	6,350	6,933
VHMSK 2 008 064 06 03 L080	0,8	0,40	6	64	1,20	8,0	0,025	2	15	8,761	9,052	9,700	10,455
VHMSK 2 008 064 06 03 L100	0,8	0,40	6	64	1,20	10,0	0,025	2	15	10,828	11,191	12,000	12,941
VHMSK 2 010 064 06 03 L015	1,0	0,50	6	64	1,50	-	-	2	9	2,866	3,013	3,369	3,842
VHMSK 2 010 064 06 03 L040	1,0	0,50	6	64	1,50	4,0	0,025	2	11	4,602	4,804	5,275	5,864
VHMSK 2 010 064 06 03 L060	1,0	0,50	6	64	1,50	6,0	0,025	2	14	6,685	6,918	7,441	8,057
VHMSK 2 010 064 06 03 L080	1,0	0,50	6	64	1,50	8,0	0,025	2	15	8,757	9,045	9,685	10,431
VHMSK 2 010 064 06 03 L100	1,0	0,50	6	64	1,50	10,0	0,025	2	15	10,825	11,184	11,985	12,917
VHMSK 2 010 064 06 03 L120	1,0	0,50	6	64	1,50	12,0	0,025	2	15	12,892	13,324	14,285	15,403
VHMSK 2 010 064 06 03 L150	1,0	0,50	6	64	1,50	15,0	0,025	2	15	15,993	16,533	17,734	19,133
VHMSK 2 010 064 06 03 L200	1,0	0,50	6	64	1,50	20,0	0,025	2	15	21,161	21,881	23,484	25,348
VHMSK 2 010 064 06 03 L250	1,0	0,50	6	64	1,50	25,0	0,025	2	15	26,330	27,230	29,233	31,564
VHMSK 2 012 064 06 03 L018	1,2	0,60	6	64	1,80	-	-	2	9	3,874	4,077	4,568	5,223
VHMSK 2 012 064 06 03 L040	1,2	0,60	6	64	1,80	4,0	0,025	2	11	4,799	5,006	5,488	6,090
VHMSK 2 012 064 06 03 L060	1,2	0,60	6	64	1,80	6,0	0,025	2	13	6,917	7,175	7,761	8,463
VHMSK 2 012 064 06 03 L080	1,2	0,60	6	64	1,80	8,0	0,025	2	15	9,026	9,320	9,973	10,734
VHMSK 2 012 064 06 03 L120	1,2	0,60	6	64	1,80	12,0	0,025	2	15	13,161	13,598	14,573	15,706
VHMSK 2 012 064 06 03 L160	1,2	0,60	6	64	1,80	16,0	0,025	2	15	17,295	17,877	19,172	20,679





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Shank 6 mm
Schaft 6 mm
2-Flute
2-Schneiden

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMSK 2 015 064 06 03 L023	1,5	0,75	6	64	2,30	-	-	2	9	4,394	4,620	5,167	5,896
VHMSK 2 015 064 06 03 L040	1,5	0,75	6	64	2,30	4,0	0,020	2	10	4,749	4,968	5,490	6,158
VHMSK 2 015 064 06 03 L060	1,5	0,75	6	64	2,30	6,0	0,025	2	12	6,895	7,170	7,802	8,572
VHMSK 2 015 064 06 03 L080	1,5	0,75	6	64	2,30	8,0	0,025	2	15	9,021	9,309	9,951	10,697
VHMSK 2 015 064 06 03 L100	1,5	0,75	6	64	2,30	10,0	0,025	2	15	11,088	11,448	12,250	13,183
VHMSK 2 015 064 06 03 L120	1,5	0,75	6	64	2,30	12,0	0,025	2	15	13,156	13,588	14,550	15,670
VHMSK 2 015 064 06 03 L150	1,5	0,75	6	64	2,30	15,0	0,025	2	15	16,257	16,797	18,000	19,399
VHMSK 2 015 064 06 03 L200	1,5	0,75	6	64	2,30	20,0	0,025	2	15	21,425	22,145	23,749	25,615
VHMSK 2 015 064 06 03 L250	1,5	0,75	6	64	2,30	25,0	0,025	2	15	26,593	27,494	29,498	31,831
VHMSK 2 020 064 06 03 L030	2,0	1,00	6	64	3,00	-	-	2	8	5,105	5,396	6,122	7,139
VHMSK 2 020 064 06 03 L045	2,0	1,00	6	64	3,00	4,5	0,050	2	9	5,455	5,731	6,400	7,291
VHMSK 2 020 064 06 03 L060	2,0	1,00	6	64	3,00	6,0	0,050	2	11	7,008	7,305	7,995	8,857
VHMSK 2 020 064 06 03 L080	2,0	1,00	6	64	3,00	8,0	0,050	2	14	9,098	9,403	10,087	10,894
VHMSK 2 020 064 06 03 L100	2,0	1,00	6	64	3,00	10,0	0,050	2	15	11,176	11,531	12,320	13,239
VHMSK 2 020 064 06 03 L120	2,0	1,00	6	64	3,00	12,0	0,050	2	15	13,244	13,670	14,620	15,725
VHMSK 2 020 064 06 03 L160	2,0	1,00	6	64	3,00	16,0	0,050	2	15	17,378	17,949	19,219	20,697
VHMSK 2 020 064 06 03 L200	2,0	1,00	6	64	3,00	20,0	0,050	2	15	21,513	22,228	23,819	25,670
VHMSK 2 020 064 06 03 L250	2,0	1,00	6	64	3,00	25,0	0,050	2	15	26,681	27,576	29,568	31,886
VHMSK 2 020 064 06 03 L300	2,0	1,00	6	64	3,00	30,0	0,050	2	15	31,850	32,925	35,317	38,101
VHMSK 2 025 064 06 03 L030	2,5	1,25	6	64	3,00	-	-	2	7	5,078	5,395	6,219	7,454
VHMSK 2 025 064 06 03 L060	2,5	1,25	6	64	3,00	6,0	0,050	2	10	7,006	7,322	8,072	9,035
VHMSK 2 025 064 06 03 L080	2,5	1,25	6	64	3,00	8,0	0,050	2	12	9,082	9,433	10,237	11,219
VHMSK 2 025 064 06 03 L100	2,5	1,25	6	64	3,00	10,0	0,050	2	15	11,168	11,513	12,283	13,178
VHMSK 2 025 064 06 03 L120	2,5	1,25	6	64	3,00	12,0	0,050	2	15	13,235	13,653	14,582	15,664
VHMSK 2 025 064 06 03 L160	2,5	1,25	6	64	3,00	16,0	0,050	2	15	17,370	17,932	19,182	20,637
VHMSK 2 025 064 06 03 L200	2,5	1,25	6	64	3,00	20,0	0,050	2	15	21,505	22,210	23,781	25,609
VHMSK 2 025 064 06 03 L250	2,5	1,25	6	64	3,00	25,0	0,050	2	15	26,673	27,559	29,531	31,825
VHMSK 2 025 064 06 03 L300	2,5	1,25	6	64	3,00	30,0	0,050	2	15	31,841	32,907	35,280	∞
VHMSK 2 030 064 06 03 L030	3,0	1,50	6	64	3,00	-	-	2	6	5,057	5,412	6,385	8,006
VHMSK 2 030 064 06 03 L060	3,0	1,50	6	64	3,00	6,0	0,050	2	8	7,050	7,444	8,426	9,801
VHMSK 2 030 064 06 03 L080	3,0	1,50	6	64	3,00	8,0	0,050	2	10	9,097	9,514	10,504	11,775
VHMSK 2 030 064 06 03 L100	3,0	1,50	6	64	3,00	10,0	0,050	2	13	11,151	11,546	12,441	13,513
VHMSK 2 030 064 06 03 L120	3,0	1,50	6	64	3,00	12,0	0,050	2	15	13,227	13,635	14,545	15,603
VHMSK 2 030 064 06 03 L160	3,0	1,50	6	64	3,00	16,0	0,050	2	15	17,361	17,914	19,144	20,576
VHMSK 2 030 064 06 03 L200	3,0	1,50	6	64	3,00	20,0	0,050	2	15	21,496	22,193	23,744	25,548
VHMSK 2 030 064 06 03 L250	3,0	1,50	6	64	3,00	25,0	0,050	2	15	26,664	27,541	29,493	∞
VHMSK 2 030 064 06 03 L300	3,0	1,50	6	64	3,00	30,0	0,050	2	15	31,833	32,890	35,242	∞

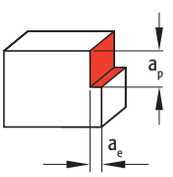
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**150 - 220**	emulsion
P1.2	< 1000	< 300	**120 - 180**	emulsion
P1.3	< 1400	< 400	**100 - 150**	emulsion
H2.1		42-50 HRc	**150 - 190**	min.lub.
H2.2		50-55 HRc	**100 - 140**	min.lub.
H2.3		55-70 HRc	**70 - 90**	min.lub.
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
K4.1	< 800		**100 - 160**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

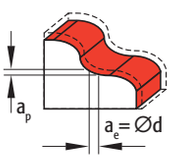
VHMSR 2 015 051 04 03 L015

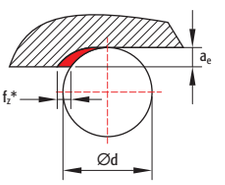
Material 1.2343 (52 HRc)

ø	1,5 mm
V_c	92 m/min
n	19.500rpm
F_z	0,013 mm/t
Z	2
Vf	508 mm/min
a_p	0,75 mm
a_e	0,04 mm
Coolant	min. lubrication
Lifetime	100 mtr

- Finishing application.
  Schlichtbearbeitung.
- Excellent surface finish.
  Ausgezeichnete Oberflächenqualität.
- Save a polishing operation.
  Erspart Nachpolieren.







$$f_z^* = f_z \sqrt{\frac{d}{a_e}}$$

Shoulder milling / Eckfräsen

	P		M	S	H2.1 / H2.2 / H2.3		
Ød (mm)	a_p max. (mm)		a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,1	<0,06		<0,004	0,001 - 0,003	< 0,05	< 0,004	0,001 - 0,003
0,2	<0,12		<0,008	0,002 - 0,004	< 0,09	< 0,008	0,002 - 0,004
0,3	<0,18		<0,012	0,003 - 0,006	< 0,14	< 0,012	0,003 - 0,006
0,4	<0,24		<0,016	0,004 - 0,008	< 0,18	< 0,016	0,004 - 0,008
0,5	<0,30		<0,020	0,005 - 0,009	< 0,23	< 0,020	0,005 - 0,009
0,6	<0,36		<0,024	0,006 - 0,010	< 0,27	< 0,024	0,006 - 0,010
0,8	<0,48		<0,032	0,007 - 0,012	< 0,36	< 0,032	0,007 - 0,012
1,0	<0,60		<0,040	0,008 - 0,015	< 0,45	< 0,040	0,008 - 0,015
1,2	<0,72		<0,048	0,010 - 0,016	< 0,54	< 0,048	0,010 - 0,016
1,5	<0,90		<0,060	0,012 - 0,018	< 0,68	< 0,060	0,012 - 0,018
2,0	<1,20		<0,080	0,016 - 0,022	< 0,90	< 0,080	0,016 - 0,022
2,5	<1,50		<0,100	0,018 - 0,025	< 1,13	< 0,100	0,018 - 0,025
3,0	<1,80		<0,120	0,020 - 0,028	< 1,35	< 0,120	0,020 - 0,028

Slot milling / Nutfräsen

	P		M	S	H2.1 / H2.2 / H2.3		
Ød (mm)	a_p max. (mm)		a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,1	<0,03		0,100	0,001 - 0,002	<0,02	0,100	0,001 - 0,002
0,2	<0,06		0,200	0,002 - 0,003	<0,04	0,200	0,002 - 0,003
0,3	<0,09		0,300	0,003 - 0,005	<0,06	0,300	0,003 - 0,005
0,4	<0,12		0,400	0,004 - 0,006	<0,08	0,400	0,004 - 0,006
0,5	<0,15		0,500	0,005 - 0,008	<0,10	0,500	0,005 - 0,008
0,6	<0,18		0,600	0,006 - 0,010	<0,12	0,600	0,006 - 0,010
0,8	<0,24		0,800	0,008 - 0,012	<0,16	0,800	0,008 - 0,012
1,0	<0,30		1,000	0,009 - 0,014	<0,20	1,000	0,009 - 0,014
1,2	<0,36		1,200	0,010 - 0,016	<0,24	1,200	0,010 - 0,016
1,5	<0,45		1,500	0,012 - 0,018	<0,30	1,500	0,012 - 0,018
2,0	<0,60		2,000	0,016 - 0,022	<0,40	2,000	0,016 - 0,022
2,5	<0,75		2,500	0,018 - 0,025	<0,50	2,500	0,018 - 0,025
3,0	<0,90		3,000	0,020 - 0,028	<0,60	3,000	0,020 - 0,028

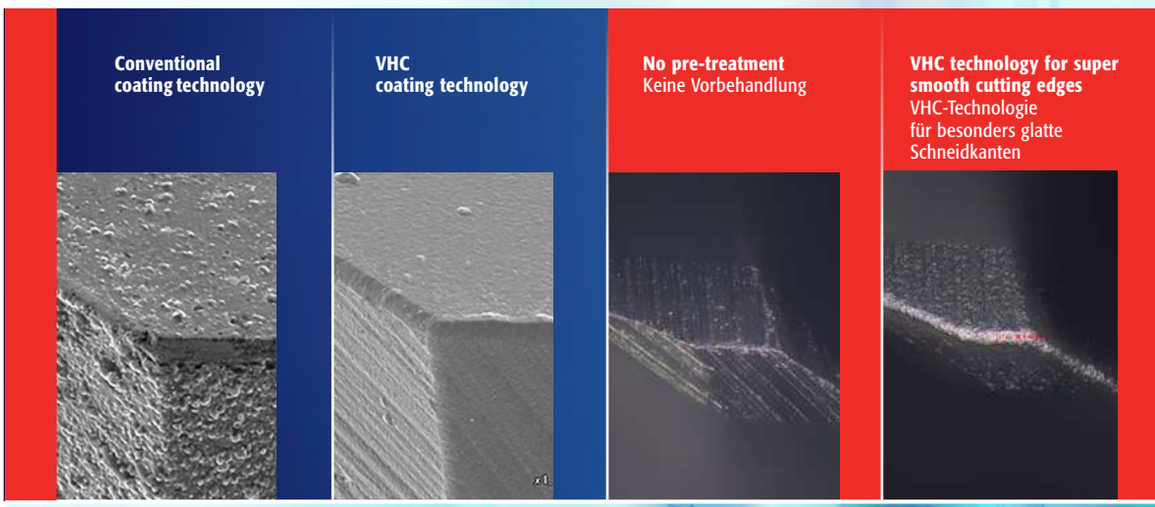
- At shoulder milling, feed per tooth F_z* for lower a_e values should be converted according formula.
  Beim Eckfräsen ist der Vorschub F_z* von der Schnittbreite a_e abhängig.
- Given conditions are based on VHMS, VHMSR and VHMSK end mills.
  Angegebene Schnittwerte sind bezogen auf Schaftfräser VHMS, VHMSR und VHMSK.
- Without corner radius.
  Ohne Eckenradius.
- For shoulder milling cutting speed V_c may be increased up to 30%.
  Beim Eckfräsen kann die Schnittgeschwindigkeit V_c um 30% erhöht werden.

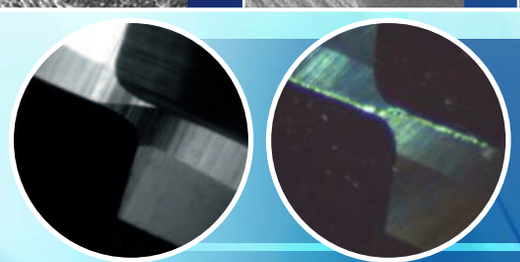
a_e	F_z*=
0,10 x d	F_z x 3
0,25 x d	F_z x 2
0,50 x d	F_z x 1

VHC coating technology: high-quality coatings with ultra-high wear resistance

VHC Beschichtungstechnologie: hochwertige Beschichtungen mit extrem hoher Verschleißfestigkeit

For each application Van Hoorn Carbide designs their own ultra modern coating recipe. Leading technology with our own twist results in powerful and wear resistant coatings, smooth processes and ultra homogenous coatings.
Für jede Anwendung entwickeln wir unsere eigene ultramoderne Rezeptur. Wir haben die führende Technologie mit unseren eigenen Erfahrungen erweitert. Das Ergebnis ist versleißfeste Beschichtungen, reibungslose Prozesse und ultra homogene Beschichtungen.





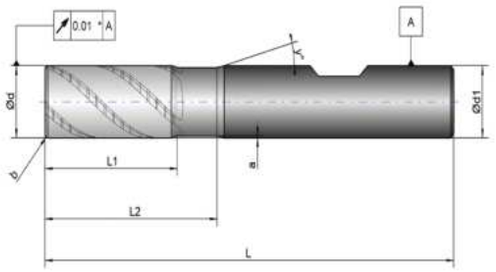
Wear / *Verschleiß*

VHKF
Current 650 mtr **New 1100 mtr**

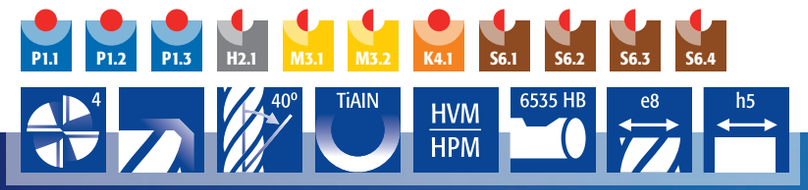
VHMFR
Current 120 mtr **New 320 mtr**

Optimized geometry, cutting edge treatment, coating recipe and layer build up
Optimierte Geometrie, Schneidkantenbehandlung, Beschichtungsrezeptur und Schichtaufbau

150% better tool life, lower internal tension and better chip removal
150% längere Standzeit, geringere Innenspannung und bessere Spanabfuhr



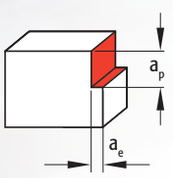
* For end mills / für Schaftfräser L < 100 mm.

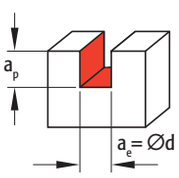


Article Number *Artikelnummer*	Ød (mm)	b (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z
VHRFF 4 060 064 06 03 L180	6,0	0,25	6	64	14,00	18,0	0,200	4
VHRFF 4 080 064 08 03 L240	8,0	0,50	8	64	18,00	24,0	0,300	4
VHRFF 4 100 070 10 03 L300	10,0	0,50	10	70	22,00	30,0	0,300	4
VHRFF 4 120 083 12 03 L360	12,0	0,50	12	83	26,00	36,0	0,300	4
VHRFF 4 160 102 16 03 L480	16,0	1,00	16	102	34,00	48,0	0,400	4
VHRFF 4 200 125 20 03 L600	20,0	1,00	20	125	42,00	60,0	0,400	4

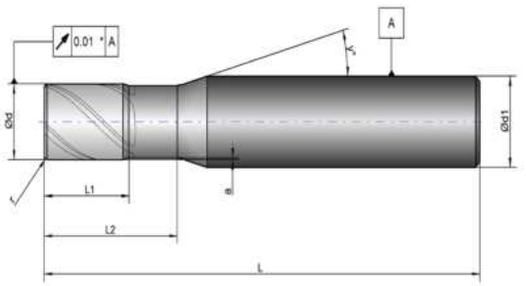
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
K4.1	< 800		**100 - 160**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

- **Very high removal rate (due to the specially designed geometry)**
  Hohe Zerspanungsleistung (durch speziell entwickelte Geometrie)
- **Low cutting forces**
  Geringe Schnittkräfte
- **Easy chip removal (no problem with the conveyor belt)**
  Bessere Spahnabfuhr (Kein Problem mit dem Förderband)

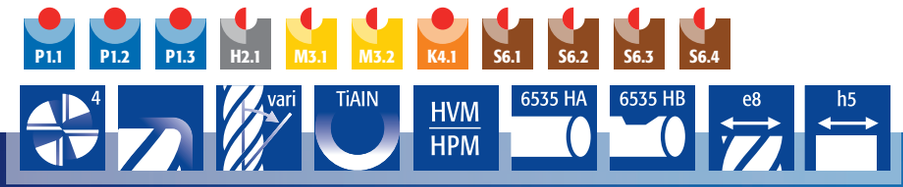




Ød (mm)	Shoulder milling / Eckfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Slot milling / Nutfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
6,0	< 12,0	< 2,7	0,025 - 0,050	< 6,0	6,0	0,015 - 0,035
8,0	< 16,0	< 3,6	0,030 - 0,060	< 8,0	8,0	0,025 - 0,045
10,0	< 20,0	< 4,5	0,040 - 0,070	< 10,0	10,0	0,030 - 0,050
12,0	< 24,0	< 5,4	0,050 - 0,080	< 12,0	12,0	0,035 - 0,060
14,0	< 28,0	< 6,3	0,055 - 0,090	< 14,0	14,0	0,060 - 0,070
16,0	< 32,0	< 7,2	0,060 - 0,100	< 16,0	16,0	0,050 - 0,080
20,0	< 40,0	< 9,0	0,080 - 0,120	< 20,0	20,0	0,060 - 0,100



* For end mills / für Schaftfräser L < 100 mm.



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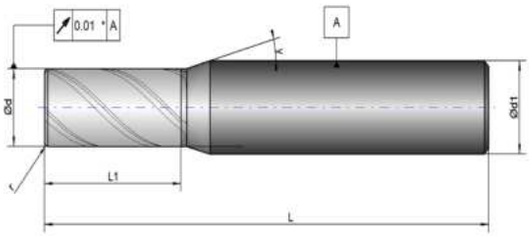
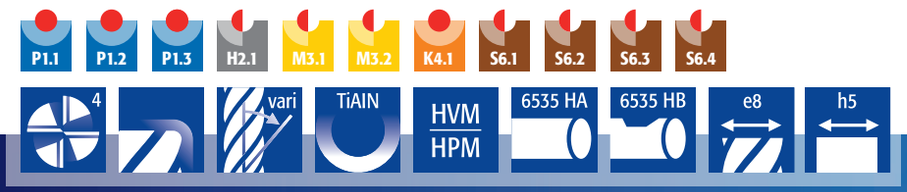
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Short / Kurze Ausführung									
VHRS 4 010 051 06 03 S	1,0	0,10	6	51	1,50	2,5	0,005	4	15
VHRS 4 020 051 06 03 S	2,0	0,10	6	51	3,00	5,0	0,005	4	15
VHRS 4 030 051 06 03 S	3,0	0,20	6	51	5,00	7,0	0,100	4	15
VHRS 4 040 051 06 03 S	4,0	0,20	6	51	6,00	9,0	0,100	4	15
VHRS 4 050 051 06 03 S	5,0	0,20	6	51	7,00	11,0	0,200	4	15
VHRS 4 060 064 06 03 010 S	6,0	0,10	6	64	8,00	13,0	0,200	4	-
VHRS 4 060 064 06 03 030 S	6,0	0,10	6	64	8,00	13,0	0,200	4	-
VHRS 4 060 064 06 03 050 S	6,0	0,50	6	64	8,00	13,0	0,200	4	-
VHRS 4 060 064 06 03 100 S	6,0	1,00	6	64	8,00	13,0	0,200	4	-
VHRS 4 080 064 08 03 010 S	8,0	0,10	8	64	11,00	18,0	0,300	4	-
VHRS 4 080 064 08 03 030 S	8,0	0,30	8	64	11,00	18,0	0,300	4	-
VHRS 4 080 064 08 03 050 S	8,0	0,50	8	64	11,00	18,0	0,300	4	-
VHRS 4 080 064 08 03 100 S	8,0	1,00	8	64	11,00	18,0	0,300	4	-
VHRS 4 100 070 10 03 010 S	10,0	0,10	10	70	13,00	22,0	0,300	4	-
VHRS 4 100 070 10 03 030 S	10,0	0,30	10	70	13,00	22,0	0,300	4	-
VHRS 4 100 070 10 03 050 S	10,0	0,50	10	70	13,00	22,0	0,300	4	-
VHRS 4 100 070 10 03 100 S	10,0	1,00	10	70	13,00	22,0	0,300	4	-
VHRS 4 120 078 12 03 010 S	12,0	0,10	12	78	15,00	25,0	0,300	4	-
VHRS 4 120 078 12 03 030 S	12,0	0,30	12	78	15,00	25,0	0,300	4	-
VHRS 4 120 078 12 03 050 S	12,0	0,50	12	78	15,00	25,0	0,300	4	-
VHRS 4 120 078 12 03 100 S	12,0	1,00	12	78	15,00	25,0	0,300	4	-
VHRS 4 140 089 14 03 050 S	14,0	0,50	14	89	17,00	30,0	0,300	4	-
VHRS 4 140 089 14 03 100 S	14,0	1,00	14	89	17,00	30,0	0,300	4	-
VHRS 4 160 089 16 03 010 S	16,0	0,10	16	89	19,00	35,0	0,300	4	-
VHRS 4 160 089 16 03 050 S	16,0	0,50	16	89	19,00	35,0	0,300	4	-
VHRS 4 160 089 16 03 100 S	16,0	1,00	16	89	19,00	35,0	0,300	4	-
VHRS 4 200 102 20 03 050 S	20,0	0,50	20	102	23,00	42,0	0,400	4	-
VHRS 4 200 102 20 03 100 S	20,0	1,00	20	102	23,00	42,0	0,400	4	-
VHRS 4 250 120 25 03 050 S	25,0	0,50	25	120	28,00	45,0	0,400	4	-
VHRS 4 250 120 25 03 100 S	25,0	1,00	25	120	28,00	45,0	0,400	4	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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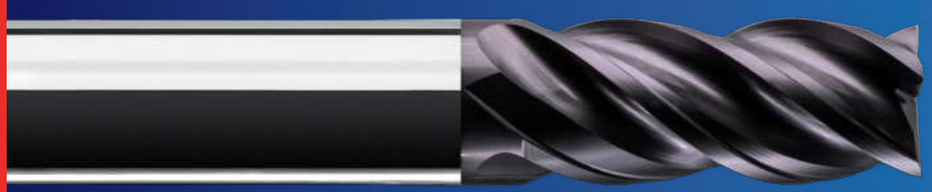
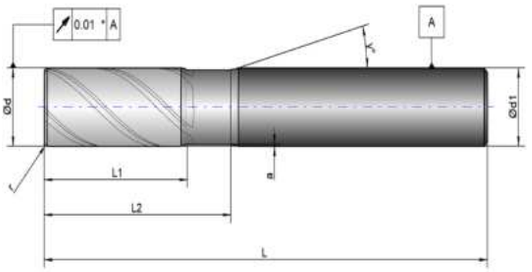


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard									
VHRS 4 010 051 06 03	1,0	0,10	6	51	2,50	-	-	4	15
VHRS 4 020 051 06 03	2,0	0,10	6	51	5,00	-	-	4	15
VHRS 4 030 051 06 03	3,0	0,20	6	51	7,00	-	-	4	15
VHRS 4 040 051 06 03	4,0	0,20	6	51	9,00	-	-	4	15
VHRS 4 050 051 06 03	5,0	0,20	6	51	11,00	-	-	4	15
VHRS 4 060 064 06 03 010	6,0	0,10	6	64	13,00	-	-	4	-
VHRS 4 060 064 06 03 030	6,0	0,30	6	64	13,00	-	-	4	-
VHRS 4 060 064 06 03 050	6,0	0,50	6	64	13,00	-	-	4	-
VHRS 4 060 064 06 03 100	6,0	1,00	6	64	13,00	-	-	4	-
VHRS 4 080 064 08 03 010	8,0	0,10	8	64	18,00	-	-	4	-
VHRS 4 080 064 08 03 030	8,0	0,30	8	64	18,00	-	-	4	-
VHRS 4 080 064 08 03 050	8,0	0,50	8	64	18,00	-	-	4	-
VHRS 4 080 064 08 03 100	8,0	1,00	8	64	18,00	-	-	4	-
VHRS 4 100 070 10 03 010	10,0	0,10	10	70	22,00	-	-	4	-
VHRS 4 100 070 10 03 030	10,0	0,30	10	70	22,00	-	-	4	-
VHRS 4 100 070 10 03 050	10,0	0,50	10	70	22,00	-	-	4	-
VHRS 4 100 070 10 03 100	10,0	1,00	10	70	22,00	-	-	4	-
VHRS 4 120 078 12 03 010	12,0	0,10	12	78	25,00	-	-	4	-
VHRS 4 120 078 12 03 030	12,0	0,30	12	78	25,00	-	-	4	-
VHRS 4 120 078 12 03 050	12,0	0,50	12	78	25,00	-	-	4	-
VHRS 4 120 078 12 03 100	12,0	1,00	12	78	25,00	-	-	4	-
VHRS 4 140 092 14 03 050	14,0	0,50	14	92	30,00	-	-	4	-
VHRS 4 140 092 14 03 100	14,0	1,00	14	92	30,00	-	-	4	-
VHRS 4 160 092 16 03 010	16,0	0,10	16	92	35,00	-	-	4	-
VHRS 4 160 092 16 03 050	16,0	0,50	16	92	35,00	-	-	4	-
VHRS 4 160 092 16 03 100	16,0	1,00	16	92	35,00	-	-	4	-
VHRS 4 200 102 20 03 050	20,0	0,50	20	102	42,00	-	-	4	-
VHRS 4 200 102 20 03 100	20,0	1,00	20	102	42,00	-	-	4	-
VHRS 4 250 120 25 03 050	25,0	0,50	25	120	45,00	-	-	4	-
VHRS 4 250 120 25 03 100	25,0	1,00	25	120	45,00	-	-	4	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.

P1.1 P1.2 P1.3 H2.1 M3.1 M3.2 K4.1 S6.1 S6.2 S6.3 S6.4

4 | vari | TiAlN | HVM HPM | 6535 HA | 6535 HB | e8 | h5

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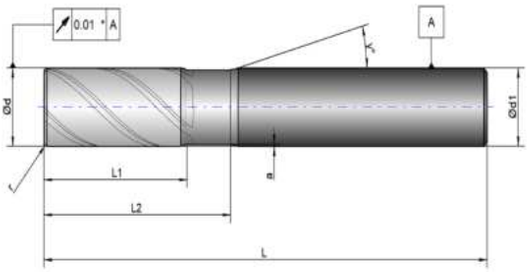
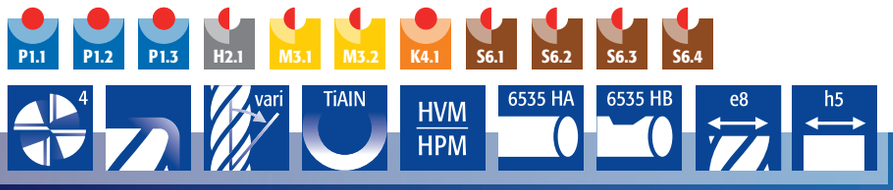
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 3xD									
VHRS 4 010 055 06 03 L	1,0	0,10	6	55	2,50	4,0	0,05	4	15
VHRS 4 020 055 06 03 L	2,0	0,10	6	55	5,00	7,0	0,05	4	15
VHRS 4 030 055 06 03 L	3,0	0,20	6	55	7,00	10,0	0,100	4	15
VHRS 4 040 055 06 03 L	4,0	0,20	6	55	9,00	13,0	0,100	4	15
VHRS 4 050 057 06 03 L	5,0	0,20	6	57	11,00	16,0	0,200	4	15
VHRS 4 060 064 06 03 010 L	6,0	0,10	6	64	13,00	19,0	0,200	4	-
VHRS 4 060 064 06 03 030 L	6,0	0,30	6	64	13,00	19,0	0,200	4	-
VHRS 4 060 064 06 03 050 L	6,0	0,50	6	64	13,00	19,0	0,200	4	-
VHRS 4 060 064 06 03 100 L	6,0	1,00	6	64	13,00	19,0	0,200	4	-
VHRS 4 080 064 08 03 010 L	8,0	0,10	8	64	18,00	25,0	0,300	4	-
VHRS 4 080 064 08 03 030 L	8,0	0,30	8	64	18,00	25,0	0,300	4	-
VHRS 4 080 064 08 03 050 L	8,0	0,50	8	64	18,00	25,0	0,300	4	-
VHRS 4 080 064 08 03 100 L	8,0	1,00	8	64	18,00	25,0	0,300	4	-
VHRS 4 100 075 10 03 010 L	10,0	0,10	10	75	22,00	32,0	0,300	4	-
VHRS 4 100 075 10 03 030 L	10,0	0,30	10	75	22,00	32,0	0,300	4	-
VHRS 4 100 075 10 03 050 L	10,0	0,50	10	75	22,00	32,0	0,300	4	-
VHRS 4 100 075 10 03 100 L	10,0	1,00	10	75	22,00	32,0	0,300	4	-
VHRS 4 120 086 12 03 010 L	12,0	0,10	12	86	25,00	38,0	0,300	4	-
VHRS 4 120 086 12 03 030 L	12,0	0,30	12	86	25,00	38,0	0,300	4	-
VHRS 4 120 086 12 03 050 L	12,0	0,50	12	86	25,00	38,0	0,300	4	-
VHRS 4 120 086 12 03 100 L	12,0	1,00	12	86	25,00	38,0	0,300	4	-
VHRS 4 120 102 12 03 010 L	12,0	0,10	12	102	25,00	38,0	0,300	4	-
VHRS 4 120 102 12 03 030 L	12,0	0,30	12	102	25,00	38,0	0,300	4	-
VHRS 4 120 102 12 03 050 L	12,0	0,50	12	102	25,00	38,0	0,300	4	-
VHRS 4 120 102 12 03 100 L	12,0	1,00	12	102	25,00	38,0	0,300	4	-
VHRS 4 140 102 14 03 050 L	14,0	0,50	14	102	30,00	44,0	0,300	4	-
VHRS 4 140 102 14 03 100 L	14,0	1,00	14	102	30,00	44,0	0,300	4	-
VHRS 4 160 102 16 03 010 L	16,0	0,10	16	102	35,00	50,0	0,300	4	-
VHRS 4 160 102 16 03 050 L	16,0	0,50	16	102	35,00	50,0	0,300	4	-
VHRS 4 160 102 16 03 100 L	16,0	1,00	16	102	35,00	50,0	0,300	4	-
VHRS 4 200 125 20 03 050 L	20,0	0,50	20	125	42,00	62,0	0,300	4	-
VHRS 4 200 125 20 03 100 L	20,0	1,00	20	125	42,00	62,0	0,300	4	-
VHRS 4 250 135 25 03 050 L	25,0	0,50	25	135	45,00	77,0	0,400	4	-
VHRS 4 250 135 25 03 100 L	25,0	1,00	25	135	45,00	77,0	0,400	4	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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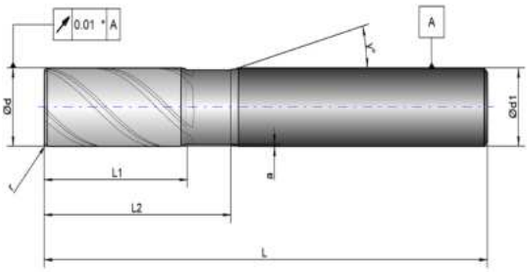
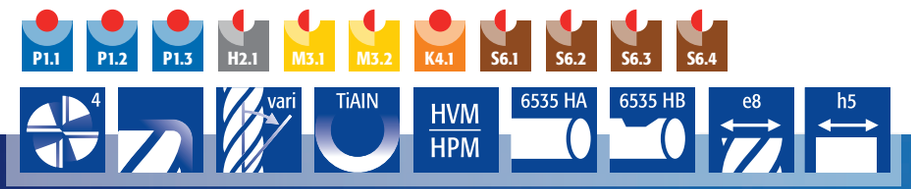
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 4xD									
VHRS 4 010 055 06 03 L005	1,0	0,10	6	55	2,50	5,0	0,050	4	15
VHRS 4 020 057 06 03 L009	2,0	0,10	6	57	5,00	9,0	0,050	4	15
VHRS 4 030 057 06 03 L013	3,0	0,20	6	57	7,00	13,0	0,100	4	15
VHRS 4 040 060 06 03 L017	4,0	0,20	6	60	9,00	17,0	0,100	4	15
VHRS 4 050 064 06 03 L021	5,0	0,20	6	64	11,00	21,0	0,200	4	15
VHRS 4 060 064 06 03 010 L025	6,0	0,10	6	64	13,00	25,0	0,200	4	-
VHRS 4 060 064 06 03 030 L025	6,0	0,30	6	64	13,00	25,0	0,200	4	-
VHRS 4 060 064 06 03 050 L025	6,0	0,50	6	64	13,00	25,0	0,200	4	-
VHRS 4 060 064 06 03 100 L025	6,0	1,00	6	64	13,00	25,0	0,200	4	-
VHRS 4 080 072 08 03 010 L033	8,0	0,10	8	72	18,00	33,0	0,300	4	-
VHRS 4 080 072 08 03 030 L033	8,0	0,30	8	72	18,00	33,0	0,300	4	-
VHRS 4 080 072 08 03 050 L033	8,0	0,50	8	72	18,00	33,0	0,300	4	-
VHRS 4 080 072 08 03 100 L033	8,0	1,00	8	72	18,00	33,0	0,300	4	-
VHRS 4 100 084 10 03 010 L042	10,0	0,10	10	84	22,00	42,0	0,300	4	-
VHRS 4 100 084 10 03 030 L042	10,0	0,30	10	84	22,00	42,0	0,300	4	-
VHRS 4 100 084 10 03 050 L042	10,0	0,50	10	84	22,00	42,0	0,300	4	-
VHRS 4 100 084 10 03 100 L042	10,0	1,00	10	84	22,00	42,0	0,300	4	-
VHRS 4 120 098 12 03 010 L050	12,0	0,10	12	98	25,00	50,0	0,300	4	-
VHRS 4 120 098 12 03 030 L050	12,0	0,30	12	98	25,00	50,0	0,300	4	-
VHRS 4 120 098 12 03 050 L050	12,0	0,50	12	98	25,00	50,0	0,300	4	-
VHRS 4 120 098 12 03 100 L050	12,0	1,00	12	98	25,00	50,0	0,300	4	-
VHRS 4 160 116 16 03 010 L066	16,0	0,10	16	116	35,00	66,0	0,300	4	-
VHRS 4 160 116 16 03 050 L066	16,0	0,50	16	116	35,00	66,0	0,300	4	-
VHRS 4 160 116 16 03 100 L066	16,0	1,00	16	116	35,00	66,0	0,300	4	-
VHRS 4 200 135 20 03 050 L082	20,0	0,50	20	135	42,00	82,0	0,300	4	-
VHRS 4 200 135 20 03 100 L082	20,0	1,00	20	135	42,00	82,0	0,300	4	-
VHRS 4 250 160 25 03 050 L102	25,0	0,50	25	160	45,00	102,0	0,400	4	-
VHRS 4 250 160 25 03 100 L102	25,0	1,00	25	160	45,00	102,0	0,400	4	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 5xD									
VHRS 4 010 057 06 03 L006	1	0,10	6	57	2,50	6,0	0,050	4	15
VHRS 4 020 057 06 03 L011	2	0,10	6	57	5,00	11,0	0,050	4	15
VHRS 4 030 060 06 03 L016	3	0,20	6	60	7,00	16,0	0,100	4	15
VHRS 4 040 064 06 03 L021	4	0,20	6	64	9,00	21,0	0,100	4	15
VHRS 4 050 070 06 03 L026	5	0,20	6	70	11,00	26,0	0,200	4	15
VHRS 4 060 070 06 03 010 L031	6	0,10	6	70	13,00	31,0	0,200	4	-
VHRS 4 060 070 06 03 030 L031	6	0,30	6	70	13,00	31,0	0,200	4	-
VHRS 4 060 070 06 03 050 L031	6	0,50	6	70	13,00	31,0	0,200	4	-
VHRS 4 060 070 06 03 100 L031	6	1,00	6	70	13,00	31,0	0,200	4	-
VHRS 4 080 080 08 03 010 L041	8	0,10	8	80	18,00	41,0	0,300	4	-
VHRS 4 080 080 08 03 030 L041	8	0,30	8	80	18,00	41,0	0,300	4	-
VHRS 4 080 080 08 03 050 L041	8	0,50	8	80	18,00	41,0	0,300	4	-
VHRS 4 080 080 08 03 100 L041	8	1,00	8	80	18,00	41,0	0,300	4	-
VHRS 4 100 094 10 03 010 L052	10	0,10	10	94	22,00	52,0	0,300	4	-
VHRS 4 100 094 10 03 030 L052	10	0,30	10	94	22,00	52,0	0,300	4	-
VHRS 4 100 094 10 03 050 L052	10	0,50	10	94	22,00	52,0	0,300	4	-
VHRS 4 100 094 10 03 100 L052	10	1,00	10	94	22,00	52,0	0,300	4	-
VHRS 4 120 110 12 03 010 L062	12	0,10	12	110	25,00	62,0	0,300	4	-
VHRS 4 120 110 12 03 030 L062	12	0,30	12	110	25,00	62,0	0,300	4	-
VHRS 4 120 110 12 03 050 L062	12	0,50	12	110	25,00	62,0	0,300	4	-
VHRS 4 120 110 12 03 100 L062	12	1,00	12	110	25,00	62,0	0,300	4	-
VHRS 4 160 132 16 03 010 L082	16	0,10	16	132	35,00	82,0	0,300	4	-
VHRS 4 160 132 16 03 050 L082	16	0,50	16	132	35,00	82,0	0,300	4	-
VHRS 4 160 132 16 03 100 L082	16	1,00	16	132	35,00	82,0	0,300	4	-
VHRS 4 200 154 20 03 050 L102	20	0,50	20	154	42,00	102,0	0,300	4	-
VHRS 4 200 154 20 03 100 L102	20	1,00	20	154	42,00	102,0	0,300	4	-

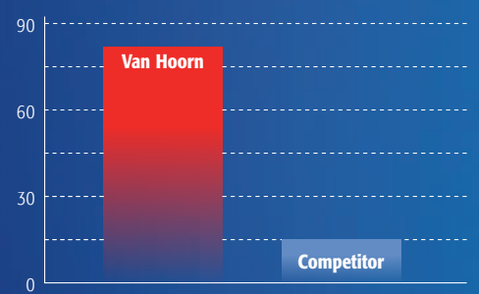
EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 4 060…

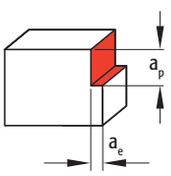
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
K4.1	< 800		**100 - 160**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

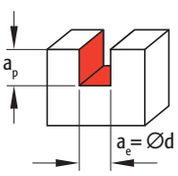
VHRS 4 120 078 12 03
Workpiece Material: 1.0503
Hardness: - HB

	Van Hoorn	Competitor
ø	12,0 mm	16,0 mm
V_c	180 m/min	130 m/min
n	4.775 rpm	2.586 rpm
F_z	0,08 mm/t	0,06 mm/t
Z	4	4
a_p	18,0 mm	12,0 mm
a_e	3,0 mm	2,0 mm
Coolant	emulsion	emulsion
Q	**82 mm³/min**	**15 mm³/min**

Material removal rate
Zerspanungsleistung







Shoulder milling / Eckfräsen (1xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	< 1,4	0,010 - 0,020
< 4,0	< 1,8	0,015 - 0,030
< 5,0	< 2,3	0,020 - 0,040
< 6,0	< 2,7	0,025 - 0,050
< 8,0	< 3,6	0,030 - 0,060
< 10,0	< 4,5	0,040 - 0,070
< 12,0	< 5,4	0,050 - 0,080
< 14,0	< 6,3	0,055 - 0,090
< 16,0	< 7,2	0,060 - 0,100
< 20,0	< 9,0	0,080 - 0,120
< 25,0	< 11,3	0,100 - 0,150

Shoulder milling / Eckfräsen (2xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 6,0	< 0,75	0,010 - 0,030
< 8,0	< 1,00	0,020 - 0,040
< 10,0	< 1,25	0,025 - 0,055
< 12,0	< 1,50	0,035 - 0,065
< 16,0	< 2,00	0,045 - 0,075
< 20,0	< 2,50	0,055 - 0,085
< 24,0	< 3,00	0,070 - 0,100
< 28,0	< 3,50	0,080 - 0,120
< 32,0	< 4,00	0,090 - 0,130
< 40,0	< 5,00	0,110 - 0,150
< 50,0	< 6,25	0,135 - 0,185

Slot milling / Nutfräsen

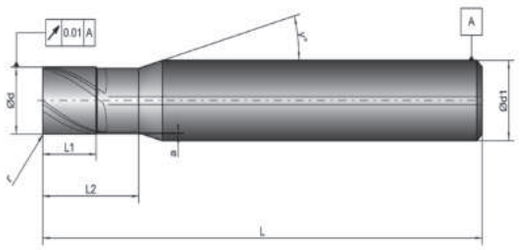
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	3,0	0,005 - 0,015
< 4,0	4,0	0,008 - 0,025
< 5,0	5,0	0,010 - 0,030
< 6,0	6,0	0,015 - 0,035
< 8,0	8,0	0,025 - 0,045
< 10,0	10,0	0,030 - 0,050
< 12,0	12,0	0,035 - 0,060
< 14,0	14,0	0,040 - 0,070
< 16,0	16,0	0,050 - 0,080
< 20,0	20,0	0,060 - 0,100
< 25,0	25,0	0,080 - 0,130

Cutting conditions 3xD - 4xD - 5xD Neck relief

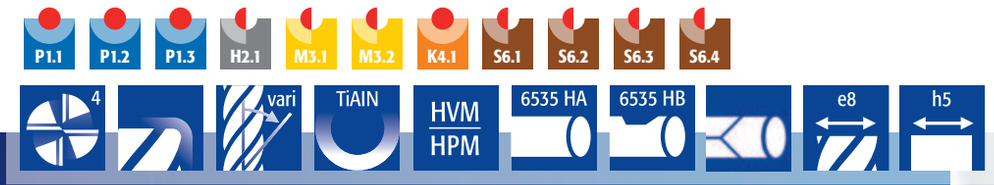
STD	Ap	Ae	Fz
3xD Neck relief	100% STD	100% STD	100% STD
4xD Neck relief	75% STD	50% STD	100% STD
5xD Neck relief	50% STD	25% STD	100% STD

Cutting speed 3xD - 4xD - 5xD Neck relief

STD	Vc m/min
3xD Neck relief	100% STD
4xD Neck relief	90% STD
5xD Neck relief	75% STD



* For end mills / für Schaftfräser L < 100 mm.



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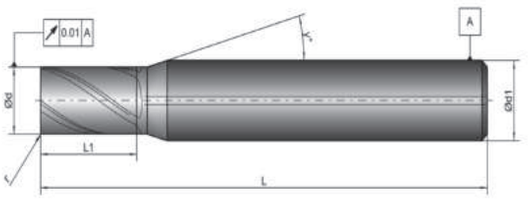
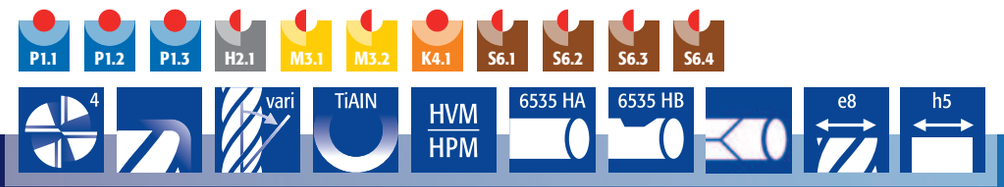
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Short / Kurze Ausführung										
VHRSI 4 060 064 06 03 010 S	6,0	0,10	6	64	8,00	13,0	0,200	4	-	new
VHRSI 4 060 064 06 03 030 S	6,0	0,10	6	64	8,00	13,0	0,200	4	-	new
VHRSI 4 060 064 06 03 050 S	6,0	0,50	6	64	8,00	13,0	0,200	4	-	new
VHRSI 4 060 064 06 03 100 S	6,0	1,00	6	64	8,00	13,0	0,200	4	-	new
VHRSI 4 080 064 08 03 010 S	8,0	0,10	8	64	11,00	18,0	0,300	4	-	new
VHRSI 4 080 064 08 03 030 S	8,0	0,30	8	64	11,00	18,0	0,300	4	-	new
VHRSI 4 080 064 08 03 050 S	8,0	0,50	8	64	11,00	18,0	0,300	4	-	new
VHRSI 4 080 064 08 03 100 S	8,0	1,00	8	64	11,00	18,0	0,300	4	-	new
VHRSI 4 100 070 10 03 010 S	10,0	0,10	10	70	13,00	22,0	0,300	4	-	new
VHRSI 4 100 070 10 03 030 S	10,0	0,30	10	70	13,00	22,0	0,300	4	-	new
VHRSI 4 100 070 10 03 050 S	10,0	0,50	10	70	13,00	22,0	0,300	4	-	new
VHRSI 4 100 070 10 03 100 S	10,0	1,00	10	70	13,00	22,0	0,300	4	-	new
VHRSI 4 120 078 12 03 010 S	12,0	0,10	12	78	15,00	25,0	0,300	4	-	new
VHRSI 4 120 078 12 03 030 S	12,0	0,30	12	78	15,00	25,0	0,300	4	-	new
VHRSI 4 120 078 12 03 050 S	12,0	0,50	12	78	15,00	25,0	0,300	4	-	new
VHRSI 4 120 078 12 03 100 S	12,0	1,00	12	78	15,00	25,0	0,300	4	-	new
VHRSI 4 140 089 14 03 050 S	14,0	0,50	14	89	17,00	30,0	0,300	4	-	new
VHRSI 4 140 089 14 03 100 S	14,0	1,00	14	89	17,00	30,0	0,300	4	-	new
VHRSI 4 160 089 16 03 010 S	16,0	0,10	16	89	19,00	35,0	0,300	4	-	new
VHRSI 4 160 089 16 03 050 S	16,0	0,50	16	89	19,00	35,0	0,300	4	-	new
VHRSI 4 160 089 16 03 100 S	16,0	1,00	16	89	19,00	35,0	0,300	4	-	new
VHRSI 4 200 102 20 03 050 S	20,0	0,50	20	102	23,00	42,0	0,400	4	-	new
VHRSI 4 200 102 20 03 100 S	20,0	1,00	20	102	23,00	42,0	0,400	4	-	new
VHRSI 4 250 120 25 03 050 S	25,0	0,50	25	120	28,00	45,0	0,400	4	-	new
VHRSI 4 250 120 25 03 100 S	25,0	1,00	25	120	28,00	45,0	0,400	4	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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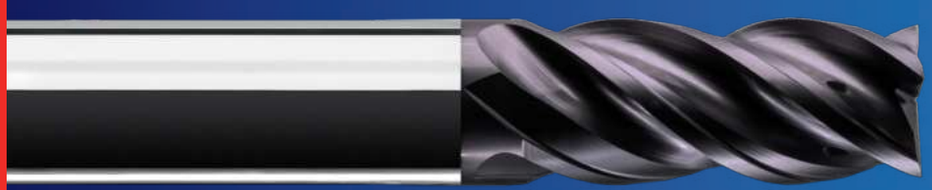
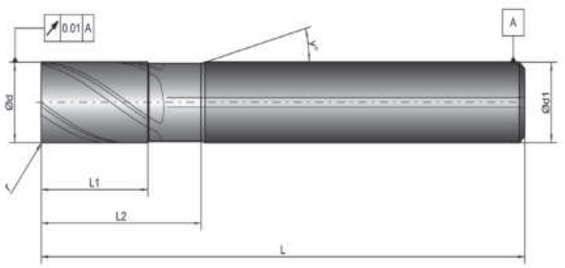
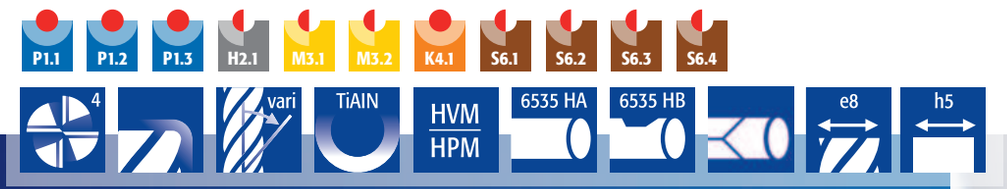


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Standard										
VHRSI 4 060 064 06 03 010	6,0	0,10	6	64	13,00	-	-	4	-	new
VHRSI 4 060 064 06 03 030	6,0	0,30	6	64	13,00	-	-	4	-	new
VHRSI 4 060 064 06 03 050	6,0	0,50	6	64	13,00	-	-	4	-	new
VHRSI 4 060 064 06 03 100	6,0	1,00	6	64	13,00	-	-	4	-	new
VHRSI 4 080 064 08 03 010	8,0	0,10	8	64	18,00	-	-	4	-	new
VHRSI 4 080 064 08 03 030	8,0	0,30	8	64	18,00	-	-	4	-	new
VHRSI 4 080 064 08 03 050	8,0	0,50	8	64	18,00	-	-	4	-	new
VHRSI 4 080 064 08 03 100	8,0	1,00	8	64	18,00	-	-	4	-	new
VHRSI 4 100 070 10 03 010	10,0	0,10	10	70	22,00	-	-	4	-	new
VHRSI 4 100 070 10 03 030	10,0	0,30	10	70	22,00	-	-	4	-	new
VHRSI 4 100 070 10 03 050	10,0	0,50	10	70	22,00	-	-	4	-	new
VHRSI 4 100 070 10 03 100	10,0	1,00	10	70	22,00	-	-	4	-	new
VHRSI 4 120 078 12 03 010	12,0	0,10	12	78	25,00	-	-	4	-	new
VHRSI 4 120 078 12 03 030	12,0	0,30	12	78	25,00	-	-	4	-	new
VHRSI 4 120 078 12 03 050	12,0	0,50	12	78	25,00	-	-	4	-	new
VHRSI 4 120 078 12 03 100	12,0	1,00	12	78	25,00	-	-	4	-	new
VHRSI 4 140 092 14 03 050	14,0	0,50	14	92	30,00	-	-	4	-	new
VHRSI 4 140 092 14 03 100	14,0	1,00	14	92	30,00	-	-	4	-	new
VHRSI 4 160 092 16 03 010	16,0	0,10	16	92	35,00	-	-	4	-	new
VHRSI 4 160 092 16 03 050	16,0	0,50	16	92	35,00	-	-	4	-	new
VHRSI 4 160 092 16 03 100	16,0	1,00	16	92	35,00	-	-	4	-	new
VHRSI 4 200 102 20 03 050	20,0	0,50	20	102	42,00	-	-	4	-	new
VHRSI 4 200 102 20 03 100	20,0	1,00	20	102	42,00	-	-	4	-	new
VHRSI 4 250 120 25 03 050	25,0	0,50	25	120	45,00	-	-	4	-	new
VHRSI 4 250 120 25 03 100	25,0	1,00	25	120	45,00	-	-	4	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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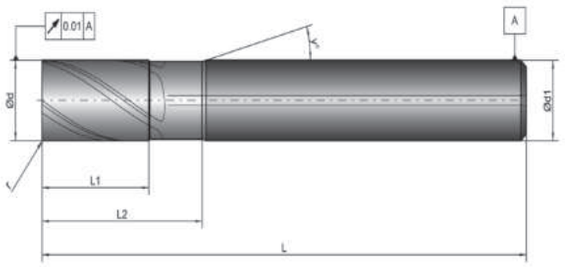
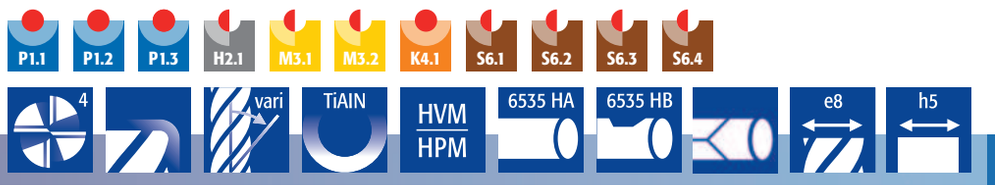
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 3xD										
VHRSI 4 060 064 06 03 010 L	6,0	0,10	6	64	13,00	19,0	0,200	4	-	new
VHRSI 4 060 064 06 03 030 L	6,0	0,30	6	64	13,00	19,0	0,200	4	-	new
VHRSI 4 060 064 06 03 050 L	6,0	0,50	6	64	13,00	19,0	0,200	4	-	new
VHRSI 4 060 064 06 03 100 L	6,0	1,00	6	64	13,00	19,0	0,200	4	-	new
VHRSI 4 080 064 08 03 010 L	8,0	0,10	8	64	18,00	25,0	0,300	4	-	new
VHRSI 4 080 064 08 03 030 L	8,0	0,30	8	64	18,00	25,0	0,300	4	-	new
VHRSI 4 080 064 08 03 050 L	8,0	0,50	8	64	18,00	25,0	0,300	4	-	new
VHRSI 4 080 064 08 03 100 L	8,0	1,00	8	64	18,00	25,0	0,300	4	-	new
VHRSI 4 100 075 10 03 010 L	10,0	0,10	10	75	22,00	32,0	0,300	4	-	new
VHRSI 4 100 075 10 03 030 L	10,0	0,30	10	75	22,00	32,0	0,300	4	-	new
VHRSI 4 100 075 10 03 050 L	10,0	0,50	10	75	22,00	32,0	0,300	4	-	new
VHRSI 4 100 075 10 03 100 L	10,0	1,00	10	75	22,00	32,0	0,300	4	-	new
VHRSI 4 120 086 12 03 010 L	12,0	0,10	12	86	25,00	38,0	0,300	4	-	new
VHRSI 4 120 086 12 03 030 L	12,0	0,30	12	86	25,00	38,0	0,300	4	-	new
VHRSI 4 120 086 12 03 050 L	12,0	0,50	12	86	25,00	38,0	0,300	4	-	new
VHRSI 4 120 086 12 03 100 L	12,0	1,00	12	86	25,00	38,0	0,300	4	-	new
VHRSI 4 120 102 12 03 010 L	12,0	0,10	12	102	25,00	38,0	0,300	4	-	new
VHRSI 4 120 102 12 03 030 L	12,0	0,30	12	102	25,00	38,0	0,300	4	-	new
VHRSI 4 120 102 12 03 050 L	12,0	0,50	12	102	25,00	38,0	0,300	4	-	new
VHRSI 4 120 102 12 03 100 L	12,0	1,00	12	102	25,00	38,0	0,300	4	-	new
VHRSI 4 140 102 14 03 050 L	14,0	0,50	14	102	30,00	44,0	0,300	4	-	new
VHRSI 4 140 102 14 03 100 L	14,0	1,00	14	102	30,00	44,0	0,300	4	-	new
VHRSI 4 160 102 16 03 010 L	16,0	0,10	16	102	35,00	50,0	0,300	4	-	new
VHRSI 4 160 102 16 03 050 L	16,0	0,50	16	102	35,00	50,0	0,300	4	-	new
VHRSI 4 160 102 16 03 100 L	16,0	1,00	16	102	35,00	50,0	0,300	4	-	new
VHRSI 4 200 125 20 03 050 L	20,0	0,50	20	125	42,00	62,0	0,300	4	-	new
VHRSI 4 200 125 20 03 100 L	20,0	1,00	20	125	42,00	62,0	0,300	4	-	new
VHRSI 4 250 135 25 03 050 L	25,0	0,50	25	135	45,00	77,0	0,400	4	-	new
VHRSI 4 250 135 25 03 100 L	25,0	1,00	25	135	45,00	77,0	0,400	4	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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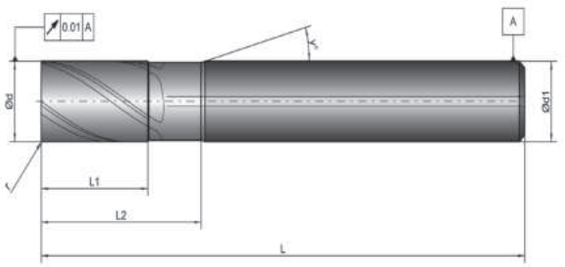
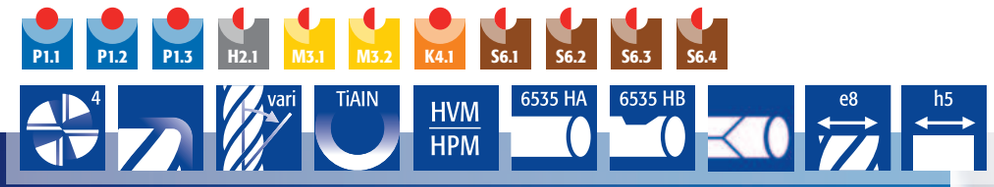
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 4xD										
VHRSI 4 060 064 06 03 010 L025	6,0	0,10	6	64	13,00	25,0	0,200	4	-	**new**
VHRSI 4 060 064 06 03 030 L025	6,0	0,30	6	64	13,00	25,0	0,200	4	-	**new**
VHRSI 4 060 064 06 03 050 L025	6,0	0,50	6	64	13,00	25,0	0,200	4	-	**new**
VHRSI 4 060 064 06 03 100 L025	6,0	1,00	6	64	13,00	25,0	0,200	4	-	**new**
VHRSI 4 080 072 08 03 010 L033	8,0	0,10	8	72	18,00	33,0	0,300	4	-	**new**
VHRSI 4 080 072 08 03 030 L033	8,0	0,30	8	72	18,00	33,0	0,300	4	-	**new**
VHRSI 4 080 072 08 03 050 L033	8,0	0,50	8	72	18,00	33,0	0,300	4	-	**new**
VHRSI 4 080 072 08 03 100 L033	8,0	1,00	8	72	18,00	33,0	0,300	4	-	**new**
VHRSI 4 100 084 10 03 010 L042	10,0	0,10	10	84	22,00	42,0	0,300	4	-	**new**
VHRSI 4 100 084 10 03 030 L042	10,0	0,30	10	84	22,00	42,0	0,300	4	-	**new**
VHRSI 4 100 084 10 03 050 L042	10,0	0,50	10	84	22,00	42,0	0,300	4	-	**new**
VHRSI 4 100 084 10 03 100 L042	10,0	1,00	10	84	22,00	42,0	0,300	4	-	**new**
VHRSI 4 120 098 12 03 010 L050	12,0	0,10	12	98	25,00	50,0	0,300	4	-	**new**
VHRSI 4 120 098 12 03 030 L050	12,0	0,30	12	98	25,00	50,0	0,300	4	-	**new**
VHRSI 4 120 098 12 03 050 L050	12,0	0,50	12	98	25,00	50,0	0,300	4	-	**new**
VHRSI 4 120 098 12 03 100 L050	12,0	1,00	12	98	25,00	50,0	0,300	4	-	**new**
VHRSI 4 160 116 16 03 010 L066	16,0	0,10	16	116	35,00	66,0	0,300	4	-	**new**
VHRSI 4 160 116 16 03 050 L066	16,0	0,50	16	116	35,00	66,0	0,300	4	-	**new**
VHRSI 4 160 116 16 03 100 L066	16,0	1,00	16	116	35,00	66,0	0,300	4	-	**new**
VHRSI 4 200 135 20 03 050 L082	20,0	0,50	20	135	42,00	82,0	0,300	4	-	**new**
VHRSI 4 200 135 20 03 100 L082	20,0	1,00	20	135	42,00	82,0	0,300	4	-	**new**
VHRSI 4 250 160 25 03 050 L102	25,0	0,50	25	160	45,00	102,0	0,400	4	-	**new**
VHRSI 4 250 160 25 03 100 L102	25,0	1,00	25	160	45,00	102,0	0,400	4	-	**new**

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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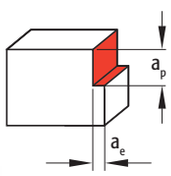
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 5xD										
VHRSI 4 060 070 06 03 010 L031	6	0,10	6	70	13,00	31,0	0,200	4	-	new
VHRSI 4 060 070 06 03 030 L031	6	0,30	6	70	13,00	31,0	0,200	4	-	new
VHRSI 4 060 070 06 03 050 L031	6	0,50	6	70	13,00	31,0	0,200	4	-	new
VHRSI 4 060 070 06 03 100 L031	6	1,00	6	70	13,00	31,0	0,200	4	-	new
VHRSI 4 080 080 08 03 010 L041	8	0,10	8	80	18,00	41,0	0,300	4	-	new
VHRSI 4 080 080 08 03 030 L041	8	0,30	8	80	18,00	41,0	0,300	4	-	new
VHRSI 4 080 080 08 03 050 L041	8	0,50	8	80	18,00	41,0	0,300	4	-	new
VHRSI 4 080 080 08 03 100 L041	8	1,00	8	80	18,00	41,0	0,300	4	-	new
VHRSI 4 100 094 10 03 010 L052	10	0,10	10	94	22,00	52,0	0,300	4	-	new
VHRSI 4 100 094 10 03 030 L052	10	0,30	10	94	22,00	52,0	0,300	4	-	new
VHRSI 4 100 094 10 03 050 L052	10	0,50	10	94	22,00	52,0	0,300	4	-	new
VHRSI 4 100 094 10 03 100 L052	10	1,00	10	94	22,00	52,0	0,300	4	-	new
VHRSI 4 120 110 12 03 010 L062	12	0,10	12	110	25,00	62,0	0,300	4	-	new
VHRSI 4 120 110 12 03 030 L062	12	0,30	12	110	25,00	62,0	0,300	4	-	new
VHRSI 4 120 110 12 03 050 L062	12	0,50	12	110	25,00	62,0	0,300	4	-	new
VHRSI 4 120 110 12 03 100 L062	12	1,00	12	110	25,00	62,0	0,300	4	-	new
VHRSI 4 160 132 16 03 010 L082	16	0,10	16	132	35,00	82,0	0,300	4	-	new
VHRSI 4 160 132 16 03 050 L082	16	0,50	16	132	35,00	82,0	0,300	4	-	new
VHRSI 4 160 132 16 03 100 L082	16	1,00	16	132	35,00	82,0	0,300	4	-	new
VHRSI 4 200 154 20 03 050 L102	20	0,50	20	154	42,00	102,0	0,300	4	-	new
VHRSI 4 200 154 20 03 100 L102	20	1,00	20	154	42,00	102,0	0,300	4	-	new

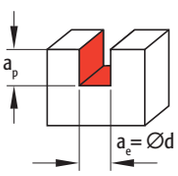
EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 4 060…

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
K4.1	< 800		**100 - 160**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

The internal cooling allows an even more all-purpose usage, a.o for mechanical engineering

Die Innenkühlung ermöglicht eine noch umfassendere Universalverwendung, u.A. im Maschinenbau





Shoulder milling / Eckfräsen (1xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	< 1,4	0,010 - 0,020
< 4,0	< 1,8	0,015 - 0,030
< 5,0	< 2,3	0,020 - 0,040
< 6,0	< 2,7	0,025 - 0,050
< 8,0	< 3,6	0,030 - 0,060
< 10,0	< 4,5	0,040 - 0,070
< 12,0	< 5,4	0,050 - 0,080
< 14,0	< 6,3	0,055 - 0,090
< 16,0	< 7,2	0,060 - 0,100
< 20,0	< 9,0	0,080 - 0,120
< 25,0	< 11,3	0,100 - 0,150

Shoulder milling / Eckfräsen (2xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 6,0	< 0,75	0,010 - 0,030
< 8,0	< 1,00	0,020 - 0,040
< 10,0	< 1,25	0,025 - 0,055
< 12,0	< 1,50	0,035 - 0,065
< 16,0	< 2,00	0,045 - 0,075
< 20,0	< 2,50	0,055 - 0,085
< 24,0	< 3,00	0,070 - 0,100
< 28,0	< 3,50	0,080 - 0,120
< 32,0	< 4,00	0,090 - 0,130
< 40,0	< 5,00	0,110 - 0,150
< 50,0	< 6,25	0,135 - 0,185

Slot milling / Nutfräsen

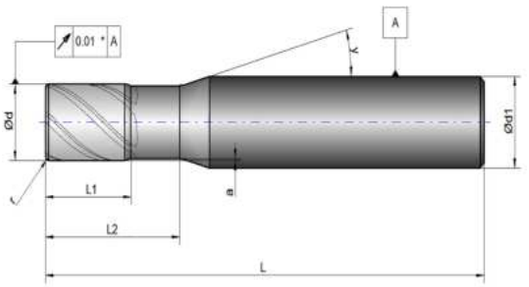
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	3,0	0,005 - 0,015
< 4,0	4,0	0,008 - 0,025
< 5,0	5,0	0,010 - 0,030
< 6,0	6,0	0,015 - 0,035
< 8,0	8,0	0,025 - 0,045
< 10,0	10,0	0,030 - 0,050
< 12,0	12,0	0,035 - 0,060
< 14,0	14,0	0,040 - 0,070
< 16,0	16,0	0,050 - 0,080
< 20,0	20,0	0,060 - 0,100
< 25,0	25,0	0,080 - 0,130

Cutting conditions 3xD - 4xD - 5xD Neck relief

STD	Ap	Ae	Fz
3xD Neck relief	100% STD	100% STD	100% STD
4xD Neck relief	75% STD	50% STD	100% STD
5xD Neck relief	50% STD	25% STD	100% STD

Cutting speed 3xD - 4xD - 5xD Neck relief

STD	Vc m/min
3xD Neck relief	100% STD
4xD Neck relief	90% STD
5xD Neck relief	75% STD



* For end mills / für Schaftfräser L < 100 mm.

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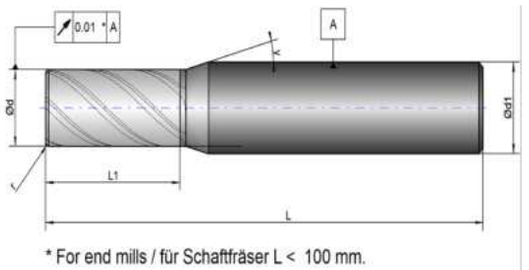
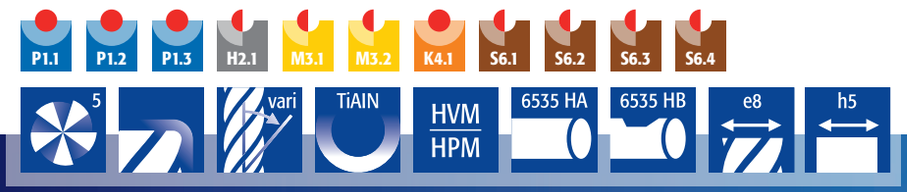
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Short / Kurze Ausführung									
VHRS 5 030 051 06 03 S	3,0	0,20	6	51	5,00	7,0	0,100	5	15
VHRS 5 040 051 06 03 S	4,0	0,20	6	51	6,00	9,0	0,100	5	15
VHRS 5 050 051 06 03 S	5,0	0,20	6	51	7,00	11,0	0,200	5	15
VHRS 5 060 064 06 03 010 S	6,0	0,10	6	64	8,00	13,0	0,200	5	-
VHRS 5 060 064 06 03 030 S	6,0	0,30	6	64	8,00	13,0	0,200	5	-
VHRS 5 060 064 06 03 050 S	6,0	0,50	6	64	8,00	13,0	0,200	5	-
VHRS 5 060 064 06 03 100 S	6,0	1,00	6	64	8,00	13,0	0,200	5	-
VHRS 5 080 064 08 03 010 S	8,0	0,10	8	64	11,00	18,0	0,300	5	-
VHRS 5 080 064 08 03 030 S	8,0	0,30	8	64	11,00	18,0	0,300	5	-
VHRS 5 080 064 08 03 050 S	8,0	0,50	8	64	11,00	18,0	0,300	5	-
VHRS 5 080 064 08 03 100 S	8,0	1,00	8	64	11,00	18,0	0,300	5	-
VHRS 5 100 070 10 03 010 S	10,0	0,10	10	70	13,00	22,0	0,300	5	-
VHRS 5 100 070 10 03 030 S	10,0	0,30	10	70	13,00	22,0	0,300	5	-
VHRS 5 100 070 10 03 050 S	10,0	0,50	10	70	13,00	22,0	0,300	5	-
VHRS 5 100 070 10 03 100 S	10,0	1,00	10	70	13,00	22,0	0,300	5	-
VHRS 5 120 078 12 03 010 S	12,0	0,10	12	78	15,00	25,0	0,300	5	-
VHRS 5 120 078 12 03 030 S	12,0	0,30	12	78	15,00	25,0	0,300	5	-
VHRS 5 120 078 12 03 050 S	12,0	0,50	12	78	15,00	25,0	0,300	5	-
VHRS 5 120 078 12 03 100 S	12,0	1,00	12	78	15,00	25,0	0,300	5	-
VHRS 5 140 089 14 03 050 S	14,0	0,50	14	89	17,00	30,0	0,300	5	-
VHRS 5 140 089 14 03 100 S	14,0	1,00	14	89	17,00	30,0	0,300	5	-
VHRS 5 160 089 16 03 010 S	16,0	0,10	16	89	19,00	35,0	0,300	5	-
VHRS 5 160 089 16 03 050 S	16,0	0,50	16	89	19,00	35,0	0,300	5	-
VHRS 5 160 089 16 03 100 S	16,0	1,00	16	89	19,00	35,0	0,300	5	-
VHRS 5 200 102 20 03 050 S	20,0	0,50	20	102	23,00	42,0	0,400	5	-
VHRS 5 200 102 20 03 100 S	20,0	1,00	20	102	23,00	42,0	0,400	5	-
VHRS 5 250 120 25 03 050 S	25,0	0,50	25	120	28,00	45,0	0,400	5	-
VHRS 5 250 120 25 03 100 S	25,0	1,00	25	120	28,00	45,0	0,400	5	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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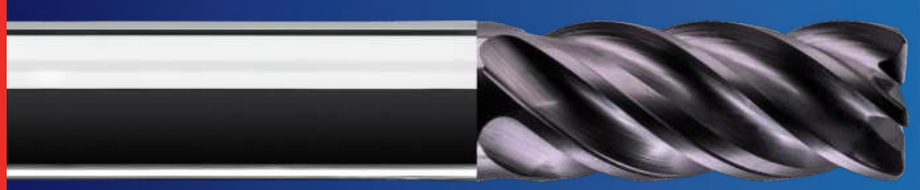
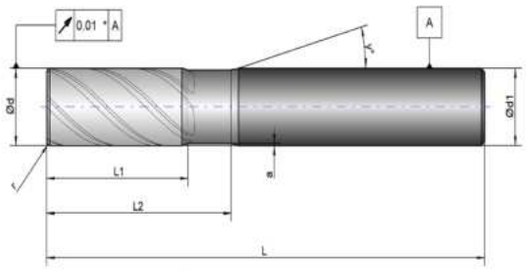
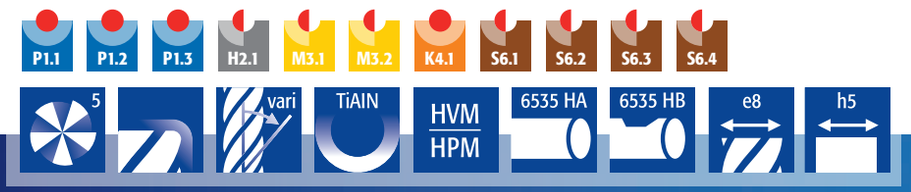


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard									
VHRS 5 030 051 06 03	3,0	0,20	6	51	7,00	-	-	5	15
VHRS 5 040 051 06 03	4,0	0,20	6	51	9,00	-	-	5	15
VHRS 5 050 051 06 03	5,0	0,20	6	51	11,00	-	-	5	15
VHRS 5 060 064 06 03 010	6,0	0,10	6	64	13,00	-	-	5	-
VHRS 5 060 064 06 03 030	6,0	0,30	6	64	13,00	-	-	5	-
VHRS 5 060 064 06 03 050	6,0	0,50	6	64	13,00	-	-	5	-
VHRS 5 060 064 06 03 100	6,0	1,00	6	64	13,00	-	-	5	-
VHRS 5 080 064 08 03 010	8,0	0,10	8	64	18,00	-	-	5	-
VHRS 5 080 064 08 03 030	8,0	0,30	8	64	18,00	-	-	5	-
VHRS 5 080 064 08 03 050	8,0	0,50	8	64	18,00	-	-	5	-
VHRS 5 080 064 08 03 100	8,0	1,00	8	64	18,00	-	-	5	-
VHRS 5 100 070 10 03 010	10,0	0,10	10	70	22,00	-	-	5	-
VHRS 5 100 070 10 03 030	10,0	0,30	10	70	22,00	-	-	5	-
VHRS 5 100 070 10 03 050	10,0	0,50	10	70	22,00	-	-	5	-
VHRS 5 100 070 10 03 100	10,0	1,00	10	70	22,00	-	-	5	-
VHRS 5 120 078 12 03 010	12,0	0,10	12	78	25,00	-	-	5	-
VHRS 5 120 078 12 03 030	12,0	0,30	12	78	25,00	-	-	5	-
VHRS 5 120 078 12 03 050	12,0	0,50	12	78	25,00	-	-	5	-
VHRS 5 120 078 12 03 100	12,0	1,00	12	78	25,00	-	-	5	-
VHRS 5 140 092 14 03 050	14,0	0,50	14	92	30,00	-	-	5	-
VHRS 5 140 092 14 03 100	14,0	1,00	14	92	30,00	-	-	5	-
VHRS 5 160 092 16 03 010	16,0	0,10	16	92	35,00	-	-	5	-
VHRS 5 160 092 16 03 050	16,0	0,50	16	92	35,00	-	-	5	-
VHRS 5 160 092 16 03 100	16,0	1,00	16	92	35,00	-	-	5	-
VHRS 5 200 102 20 03 050	20,0	0,50	20	102	42,00	-	-	5	-
VHRS 5 200 102 20 03 100	20,0	1,00	20	102	42,00	-	-	5	-
VHRS 5 250 120 25 03 050	25,0	0,50	25	120	45,00	-	-	5	-
VHRS 5 250 120 25 03 100	25,0	1,00	25	120	45,00	-	-	5	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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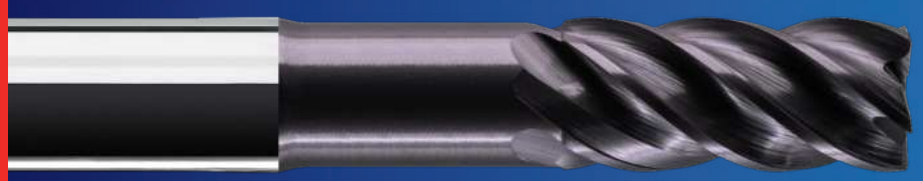
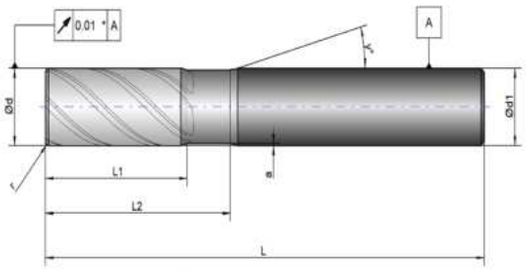
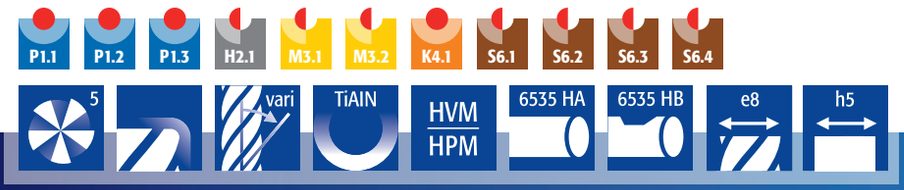


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 3xD									
VHRS 5 030 055 06 03 020 L	3,0	0,20	6	55	8,00	10,0	0,100	5	15
VHRS 5 040 055 06 03 020 L	4,0	0,20	6	55	10,00	13,0	0,100	5	15
VHRS 5 050 057 06 03 020 L	5,0	0,20	6	57	12,00	16,0	0,200	5	15
VHRS 5 060 064 06 03 010 L	6,0	0,10	6	64	13,00	19,0	0,200	5	-
VHRS 5 060 064 06 03 030 L	6,0	0,30	6	64	14,00	19,0	0,200	5	-
VHRS 5 060 064 06 03 050 L	6,0	0,50	6	64	14,00	19,0	0,200	5	-
VHRS 5 060 064 06 03 100 L	6,0	1,00	6	64	14,00	19,0	0,200	5	-
VHRS 5 080 064 08 03 010 L	8,0	0,10	8	64	18,00	25,0	0,300	5	-
VHRS 5 080 064 08 03 030 L	8,0	0,30	8	64	18,00	25,0	0,300	5	-
VHRS 5 080 064 08 03 050 L	8,0	0,50	8	64	18,00	25,0	0,300	5	-
VHRS 5 080 064 08 03 100 L	8,0	1,00	8	64	18,00	25,0	0,300	5	-
VHRS 5 100 075 10 03 010 L	10,0	0,10	10	75	22,00	32,0	0,300	5	-
VHRS 5 100 075 10 03 030 L	10,0	0,30	10	75	22,00	32,0	0,300	5	-
VHRS 5 100 075 10 03 050 L	10,0	0,50	10	75	22,00	32,0	0,300	5	-
VHRS 5 100 075 10 03 100 L	10,0	1,00	10	75	22,00	32,0	0,300	5	-
VHRS 5 120 086 12 03 010 L	12,0	0,10	12	86	25,00	38,0	0,300	5	-
VHRS 5 120 086 12 03 030 L	12,0	0,30	12	86	25,00	38,0	0,300	5	-
VHRS 5 120 086 12 03 050 L	12,0	0,50	12	86	25,00	38,0	0,300	5	-
VHRS 5 120 086 12 03 100 L	12,0	1,00	12	86	25,00	38,0	0,300	5	-
VHRS 5 120 102 12 03 010 L	12,0	0,10	12	102	25,00	38,0	0,300	5	-
VHRS 5 120 102 12 03 030 L	12,0	0,30	12	102	25,00	38,0	0,300	5	-
VHRS 5 120 102 12 03 050 L	12,0	0,50	12	102	25,00	38,0	0,300	5	-
VHRS 5 120 102 12 03 100 L	12,0	1,00	12	102	25,00	38,0	0,300	5	-
VHRS 5 140 102 14 03 050 L	14,0	0,50	14	102	30,00	44,0	0,300	5	-
VHRS 5 140 102 14 03 100 L	14,0	1,00	14	102	30,00	44,0	0,300	5	-
VHRS 5 160 102 16 03 010 L	16,0	0,10	16	102	35,00	50,0	0,300	5	-
VHRS 5 160 102 16 03 050 L	16,0	0,50	16	102	35,00	50,0	0,300	5	-
VHRS 5 160 102 16 03 100 L	16,0	1,00	16	102	35,00	50,0	0,300	5	-
VHRS 5 200 125 20 03 050 L	20,0	0,50	20	125	42,00	62,0	0,400	5	-
VHRS 5 200 125 20 03 100 L	20,0	1,00	20	125	42,00	62,0	0,400	5	-
VHRS 5 250 135 25 03 050 L	25,0	0,50	25	135	45,00	77,0	0,400	5	-
VHRS 5 250 135 25 03 100 L	25,0	1,00	25	135	45,00	77,0	0,400	5	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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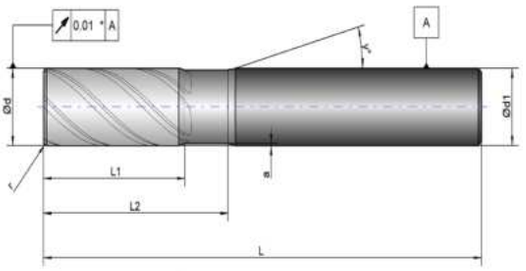
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 4xD									
VHRS 5 030 057 06 03 020 L013	3,0	0,20	6	57	8,00	13,0	0,100	5	15
VHRS 5 040 060 06 03 020 L017	4,0	0,20	6	60	10,00	17,0	0,100	5	15
VHRS 5 050 064 06 03 020 L021	5,0	0,20	6	64	12,00	21,0	0,200	5	15
VHRS 5 060 064 06 03 010 L025	6,0	0,10	6	64	13,00	25,0	0,200	5	-
VHRS 5 060 064 06 03 030 L025	6,0	0,30	6	64	14,00	25,0	0,200	5	-
VHRS 5 060 064 06 03 050 L025	6,0	0,50	6	64	14,00	25,0	0,200	5	-
VHRS 5 060 064 06 03 100 L025	6,0	1,00	6	64	14,00	25,0	0,200	5	-
VHRS 5 080 072 08 03 010 L033	8,0	0,10	8	72	18,00	33,0	0,300	5	-
VHRS 5 080 072 08 03 030 L033	8,0	0,30	8	72	18,00	33,0	0,300	5	-
VHRS 5 080 072 08 03 050 L033	8,0	0,50	8	72	18,00	33,0	0,300	5	-
VHRS 5 080 072 08 03 100 L033	8,0	1,00	8	72	18,00	33,0	0,300	5	-
VHRS 5 100 084 10 03 010 L042	10,0	0,10	10	84	22,00	42,0	0,300	5	-
VHRS 5 100 084 10 03 030 L042	10,0	0,30	10	84	22,00	42,0	0,300	5	-
VHRS 5 100 084 10 03 050 L042	10,0	0,50	10	84	22,00	42,0	0,300	5	-
VHRS 5 100 084 10 03 100 L042	10,0	1,00	10	84	22,00	42,0	0,300	5	-
VHRS 5 120 098 12 03 010 L050	12,0	0,10	12	98	25,00	50,0	0,300	5	-
VHRS 5 120 098 12 03 030 L050	12,0	0,30	12	98	25,00	50,0	0,300	5	-
VHRS 5 120 098 12 03 050 L050	12,0	0,50	12	98	25,00	50,0	0,300	5	-
VHRS 5 120 098 12 03 100 L050	12,0	1,00	12	98	25,00	50,0	0,300	5	-
VHRS 5 160 116 16 03 010 L066	16,0	0,10	16	116	35,00	66,0	0,300	5	-
VHRS 5 160 116 16 03 050 L066	16,0	0,50	16	116	35,00	66,0	0,300	5	-
VHRS 5 160 116 16 03 100 L066	16,0	1,00	16	116	35,00	66,0	0,300	5	-
VHRS 5 200 135 20 03 050 L082	20,0	0,50	20	135	42,00	82,0	0,400	5	-
VHRS 5 200 135 20 03 100 L082	20,0	1,00	20	135	42,00	82,0	0,400	5	-
VHRS 5 250 160 25 03 050 L102	25,0	0,50	25	160	45,00	102,0	0,400	5	-
VHRS 5 250 160 25 03 100 L102	25,0	1,00	25	160	45,00	102,0	0,400	5	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.

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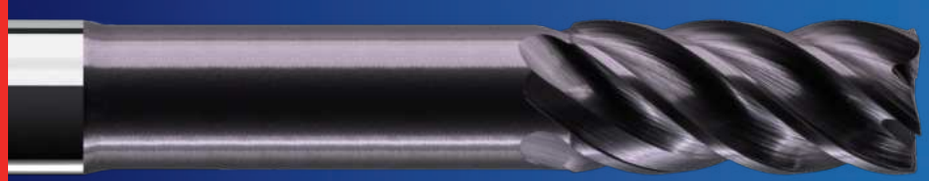
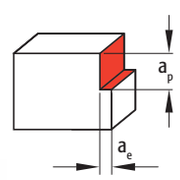


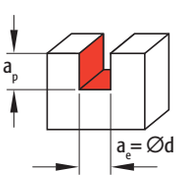
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 5xD									
VHRS 5 030 057 06 03 020 L016	3,0	0,20	6	57	8,00	16,0	0,100	5	15
VHRS 5 040 064 06 03 020 L021	4,0	0,20	6	64	10,00	21,0	0,100	5	15
VHRS 5 050 070 06 03 020 L026	5,0	0,20	6	70	12,00	26,0	0,200	5	15
VHRS 5 060 070 06 03 010 L031	6,0	0,10	6	70	13,00	31,0	0,200	5	-
VHRS 5 060 070 06 03 030 L031	6,0	0,30	6	70	14,00	31,0	0,200	5	-
VHRS 5 060 070 06 03 050 L031	6,0	0,50	6	70	14,00	31,0	0,200	5	-
VHRS 5 060 070 06 03 100 L031	6,0	1,00	6	70	14,00	31,0	0,200	5	-
VHRS 5 080 080 08 03 010 L041	8,0	0,10	8	80	18,00	41,0	0,300	5	-
VHRS 5 080 080 08 03 030 L041	8,0	0,30	8	80	18,00	41,0	0,300	5	-
VHRS 5 080 080 08 03 050 L041	8,0	0,50	8	80	18,00	41,0	0,300	5	-
VHRS 5 080 080 08 03 100 L041	8,0	1,00	8	80	18,00	41,0	0,300	5	-
VHRS 5 100 094 10 03 010 L052	10,0	0,10	10	94	22,00	52,0	0,300	5	-
VHRS 5 100 094 10 03 030 L052	10,0	0,30	10	94	22,00	52,0	0,300	5	-
VHRS 5 100 094 10 03 050 L052	10,0	0,50	10	94	22,00	52,0	0,300	5	-
VHRS 5 100 094 10 03 100 L052	10,0	1,00	10	94	22,00	52,0	0,300	5	-
VHRS 5 120 110 12 03 010 L062	12,0	0,10	12	110	25,00	62,0	0,300	5	-
VHRS 5 120 110 12 03 030 L062	12,0	0,30	12	110	25,00	62,0	0,300	5	-
VHRS 5 120 110 12 03 050 L062	12,0	0,50	12	110	25,00	62,0	0,300	5	-
VHRS 5 120 110 12 03 100 L062	12,0	1,00	12	110	25,00	62,0	0,300	5	-
VHRS 5 160 132 16 03 010 L082	16,0	0,10	16	132	35,00	82,0	0,300	5	-
VHRS 5 160 132 16 03 050 L082	16,0	0,50	16	132	35,00	82,0	0,300	5	-
VHRS 5 160 132 16 03 100 L082	16,0	1,00	16	132	35,00	82,0	0,300	5	-
VHRS 5 200 154 20 03 050 L102	20,0	0,50	20	154	42,00	102,0	0,400	5	-
VHRS 5 200 154 20 03 100 L102	20,0	1,00	20	154	42,00	102,0	0,400	5	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRS**W** 5 060…

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
K4.1	< 800		**100 - 160**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

- **Special designed geometry for machining materials P1.1, 1.2, 1.3, K4.1**
  Spezielle Geometrie für Zerspanung Materialien P1.1, 1.2, 1.3, K4.1
- **5 Flute for new machining strategies**
  5 Schneiden für Zerspanung mit neuen Strategien
- **High material removal rate!**
  Maximales Zerspanungsvolumen!





Shoulder milling / Eckfräsen (1xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	< 1,4	0,010 - 0,020
< 4,0	< 1,8	0,015 - 0,030
< 5,0	< 2,3	0,020 - 0,040
< 6,0	< 2,7	0,025 - 0,050
< 8,0	< 3,6	0,030 - 0,060
< 10,0	< 4,5	0,040 - 0,070
< 12,0	< 5,4	0,050 - 0,080
< 14,0	< 6,3	0,055 - 0,090
< 16,0	< 7,2	0,060 - 0,100
< 20,0	< 9,0	0,080 - 0,120
< 25,0	< 11,3	0,100 - 0,150

Shoulder milling / Eckfräsen (2xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 6,0	< 0,75	0,010 - 0,030
< 8,0	< 1,00	0,020 - 0,040
< 10,0	< 1,25	0,025 - 0,055
< 12,0	< 1,50	0,035 - 0,065
< 16,0	< 2,00	0,045 - 0,075
< 20,0	< 2,50	0,055 - 0,085
< 24,0	< 3,00	0,070 - 0,100
< 28,0	< 3,50	0,080 - 0,120
< 32,0	< 4,00	0,090 - 0,130
< 40,0	< 5,00	0,110 - 0,150
< 50,0	< 6,25	0,135 - 0,185

Slot milling / Nutfräsen

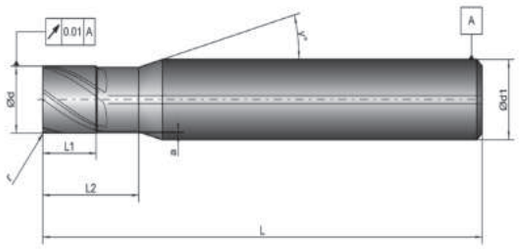
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	3,0	0,005 - 0,015
< 4,0	4,0	0,008 - 0,025
< 5,0	5,0	0,010 - 0,030
< 6,0	6,0	0,015 - 0,035
< 8,0	8,0	0,025 - 0,045
< 10,0	10,0	0,030 - 0,050
< 12,0	12,0	0,035 - 0,060
< 14,0	14,0	0,040 - 0,070
< 16,0	16,0	0,050 - 0,080
< 20,0	20,0	0,060 - 0,100
< 25,0	25,0	0,080 - 0,130

Cutting conditions 3xD - 4xD - 5xD Neck relief

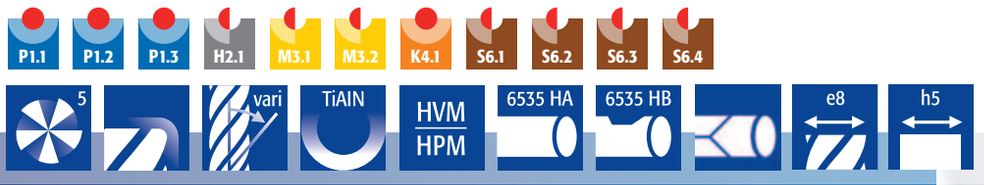
STD	Ap	Ae	Fz
3xD Neck relief	100% STD	100% STD	100% STD
4xD Neck relief	75% STD	50% STD	100% STD
5xD Neck relief	50% STD	25% STD	100% STD

Cutting speed 3xD - 4xD - 5xD Neck relief

STD	Vc m/min
3xD Neck relief	100% STD
4xD Neck relief	90% STD
5xD Neck relief	75% STD



* For end mills / für Schaftfräser L < 100 mm.



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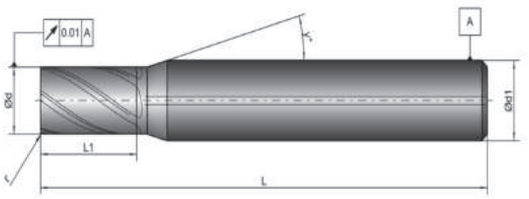
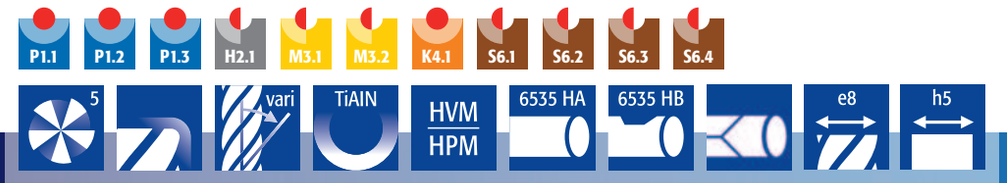
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Short / Kurze Ausführung										
VHRSI 5 060 064 06 03 010 S	6,0	0,10	6	64	8,00	13,0	0,200	5	-	new
VHRSI 5 060 064 06 03 030 S	6,0	0,30	6	64	8,00	13,0	0,200	5	-	new
VHRSI 5 060 064 06 03 050 S	6,0	0,50	6	64	8,00	13,0	0,200	5	-	new
VHRSI 5 060 064 06 03 100 S	6,0	1,00	6	64	8,00	13,0	0,200	5	-	new
VHRSI 5 080 064 08 03 010 S	8,0	0,10	8	64	11,00	18,0	0,300	5	-	new
VHRSI 5 080 064 08 03 030 S	8,0	0,30	8	64	11,00	18,0	0,300	5	-	new
VHRSI 5 080 064 08 03 050 S	8,0	0,50	8	64	11,00	18,0	0,300	5	-	new
VHRSI 5 080 064 08 03 100 S	8,0	1,00	8	64	11,00	18,0	0,300	5	-	new
VHRSI 5 100 070 10 03 010 S	10,0	0,10	10	70	13,00	22,0	0,300	5	-	new
VHRSI 5 100 070 10 03 030 S	10,0	0,30	10	70	13,00	22,0	0,300	5	-	new
VHRSI 5 100 070 10 03 050 S	10,0	0,50	10	70	13,00	22,0	0,300	5	-	new
VHRSI 5 100 070 10 03 100 S	10,0	1,00	10	70	13,00	22,0	0,300	5	-	new
VHRSI 5 120 078 12 03 010 S	12,0	0,10	12	78	15,00	25,0	0,300	5	-	new
VHRSI 5 120 078 12 03 030 S	12,0	0,30	12	78	15,00	25,0	0,300	5	-	new
VHRSI 5 120 078 12 03 050 S	12,0	0,50	12	78	15,00	25,0	0,300	5	-	new
VHRSI 5 120 078 12 03 100 S	12,0	1,00	12	78	15,00	25,0	0,300	5	-	new
VHRSI 5 140 089 14 03 050 S	14,0	0,50	14	89	17,00	30,0	0,300	5	-	new
VHRSI 5 140 089 14 03 100 S	14,0	1,00	14	89	17,00	30,0	0,300	5	-	new
VHRSI 5 160 089 16 03 010 S	16,0	0,10	16	89	19,00	35,0	0,300	5	-	new
VHRSI 5 160 089 16 03 050 S	16,0	0,50	16	89	19,00	35,0	0,300	5	-	new
VHRSI 5 160 089 16 03 100 S	16,0	1,00	16	89	19,00	35,0	0,300	5	-	new
VHRSI 5 200 102 20 03 050 S	20,0	0,50	20	102	23,00	42,0	0,400	5	-	new
VHRSI 5 200 102 20 03 100 S	20,0	1,00	20	102	23,00	42,0	0,400	5	-	new
VHRSI 5 250 120 25 03 050 S	25,0	0,50	25	120	28,00	45,0	0,400	5	-	new
VHRSI 5 250 120 25 03 100 S	25,0	1,00	25	120	28,00	45,0	0,400	5	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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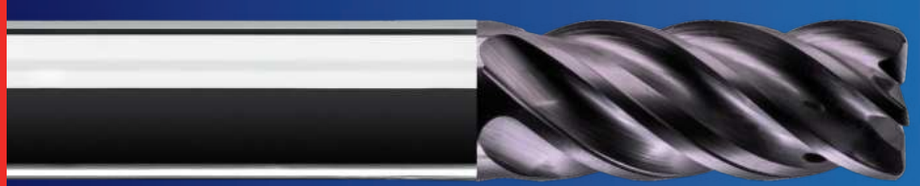
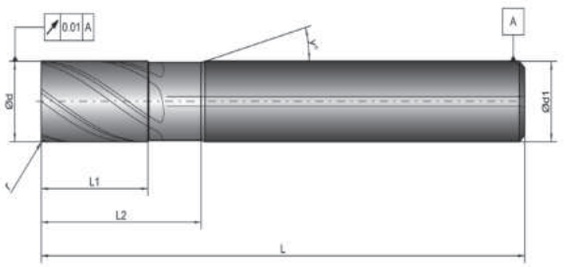
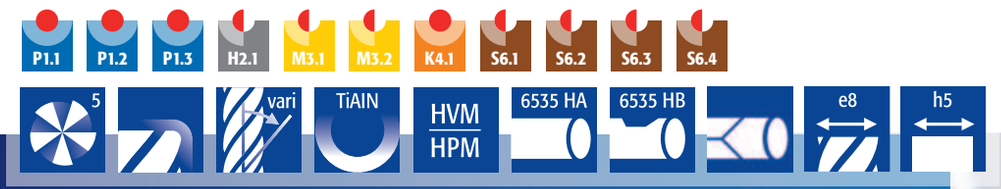


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Standard										
VHRSI 5 060 064 06 03 010	6,0	0,10	6	64	13,00	-	-	5	-	new
VHRSI 5 060 064 06 03 030	6,0	0,30	6	64	13,00	-	-	5	-	new
VHRSI 5 060 064 06 03 050	6,0	0,50	6	64	13,00	-	-	5	-	new
VHRSI 5 060 064 06 03 100	6,0	1,00	6	64	13,00	-	-	5	-	new
VHRSI 5 080 064 08 03 010	8,0	0,10	8	64	18,00	-	-	5	-	new
VHRSI 5 080 064 08 03 030	8,0	0,30	8	64	18,00	-	-	5	-	new
VHRSI 5 080 064 08 03 050	8,0	0,50	8	64	18,00	-	-	5	-	new
VHRSI 5 080 064 08 03 100	8,0	1,00	8	64	18,00	-	-	5	-	new
VHRSI 5 100 070 10 03 010	10,0	0,10	10	70	22,00	-	-	5	-	new
VHRSI 5 100 070 10 03 030	10,0	0,30	10	70	22,00	-	-	5	-	new
VHRSI 5 100 070 10 03 050	10,0	0,50	10	70	22,00	-	-	5	-	new
VHRSI 5 100 070 10 03 100	10,0	1,00	10	70	22,00	-	-	5	-	new
VHRSI 5 120 078 12 03 010	12,0	0,10	12	78	25,00	-	-	5	-	new
VHRSI 5 120 078 12 03 030	12,0	0,30	12	78	25,00	-	-	5	-	new
VHRSI 5 120 078 12 03 050	12,0	0,50	12	78	25,00	-	-	5	-	new
VHRSI 5 120 078 12 03 100	12,0	1,00	12	78	25,00	-	-	5	-	new
VHRSI 5 140 092 14 03 050	14,0	0,50	14	92	30,00	-	-	5	-	new
VHRSI 5 140 092 14 03 100	14,0	1,00	14	92	30,00	-	-	5	-	new
VHRSI 5 160 092 16 03 010	16,0	0,10	16	92	35,00	-	-	5	-	new
VHRSI 5 160 092 16 03 050	16,0	0,50	16	92	35,00	-	-	5	-	new
VHRSI 5 160 092 16 03 100	16,0	1,00	16	92	35,00	-	-	5	-	new
VHRSI 5 200 102 20 03 050	20,0	0,50	20	102	42,00	-	-	5	-	new
VHRSI 5 200 102 20 03 100	20,0	1,00	20	102	42,00	-	-	5	-	new
VHRSI 5 250 120 25 03 050	25,0	0,50	25	120	45,00	-	-	5	-	new
VHRSI 5 250 120 25 03 100	25,0	1,00	25	120	45,00	-	-	5	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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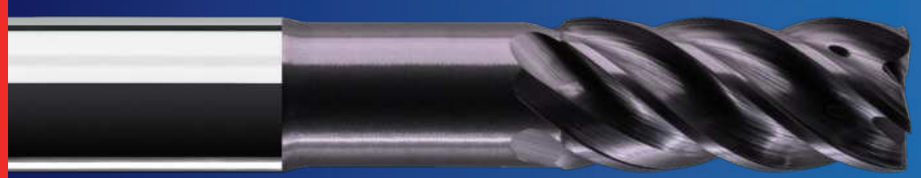
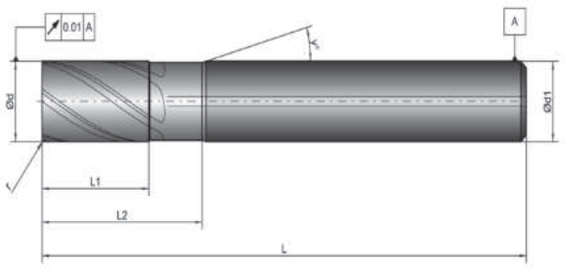
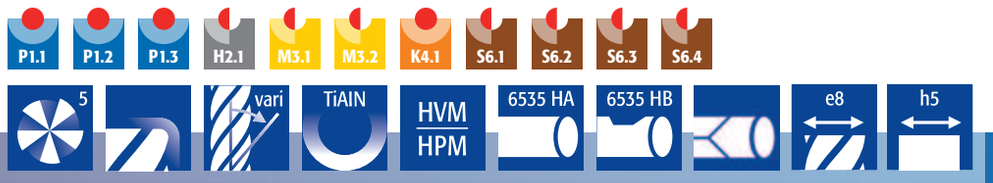


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 3xD										
VHRSI 5 060 064 06 03 010 L	6,0	0,10	6	64	13,00	19,0	0,200	5	-	new
VHRSI 5 060 064 06 03 030 L	6,0	0,30	6	64	14,00	19,0	0,200	5	-	new
VHRSI 5 060 064 06 03 050 L	6,0	0,50	6	64	14,00	19,0	0,200	5	-	new
VHRSI 5 060 064 06 03 100 L	6,0	1,00	6	64	14,00	19,0	0,200	5	-	new
VHRSI 5 080 064 08 03 010 L	8,0	0,10	8	64	18,00	25,0	0,300	5	-	new
VHRSI 5 080 064 08 03 030 L	8,0	0,30	8	64	18,00	25,0	0,300	5	-	new
VHRSI 5 080 064 08 03 050 L	8,0	0,50	8	64	18,00	25,0	0,300	5	-	new
VHRSI 5 080 064 08 03 100 L	8,0	1,00	8	64	18,00	25,0	0,300	5	-	new
VHRSI 5 100 075 10 03 010 L	10,0	0,10	10	75	22,00	32,0	0,300	5	-	new
VHRSI 5 100 075 10 03 030 L	10,0	0,30	10	75	22,00	32,0	0,300	5	-	new
VHRSI 5 100 075 10 03 050 L	10,0	0,50	10	75	22,00	32,0	0,300	5	-	new
VHRSI 5 100 075 10 03 100 L	10,0	1,00	10	75	22,00	32,0	0,300	5	-	new
VHRSI 5 120 086 12 03 010 L	12,0	0,10	12	86	25,00	38,0	0,300	5	-	new
VHRSI 5 120 086 12 03 030 L	12,0	0,30	12	86	25,00	38,0	0,300	5	-	new
VHRSI 5 120 086 12 03 050 L	12,0	0,50	12	86	25,00	38,0	0,300	5	-	new
VHRSI 5 120 086 12 03 100 L	12,0	1,00	12	86	25,00	38,0	0,300	5	-	new
VHRSI 5 120 102 12 03 010 L	12,0	0,10	12	102	25,00	38,0	0,300	5	-	new
VHRSI 5 120 102 12 03 030 L	12,0	0,30	12	102	25,00	38,0	0,300	5	-	new
VHRSI 5 120 102 12 03 050 L	12,0	0,50	12	102	25,00	38,0	0,300	5	-	new
VHRSI 5 120 102 12 03 100 L	12,0	1,00	12	102	25,00	38,0	0,300	5	-	new
VHRSI 5 140 102 14 03 050 L	14,0	0,50	14	102	30,00	44,0	0,300	5	-	new
VHRSI 5 140 102 14 03 100 L	14,0	1,00	14	102	30,00	44,0	0,300	5	-	new
VHRSI 5 160 102 16 03 010 L	16,0	0,10	16	102	35,00	50,0	0,300	5	-	new
VHRSI 5 160 102 16 03 050 L	16,0	0,50	16	102	35,00	50,0	0,300	5	-	new
VHRSI 5 160 102 16 03 100 L	16,0	1,00	16	102	35,00	50,0	0,300	5	-	new
VHRSI 5 200 125 20 03 050 L	20,0	0,50	20	125	42,00	62,0	0,400	5	-	new
VHRSI 5 200 125 20 03 100 L	20,0	1,00	20	125	42,00	62,0	0,400	5	-	new
VHRSI 5 250 135 25 03 050 L	25,0	0,50	25	135	45,00	77,0	0,400	5	-	new
VHRSI 5 250 135 25 03 100 L	25,0	1,00	25	135	45,00	77,0	0,400	5	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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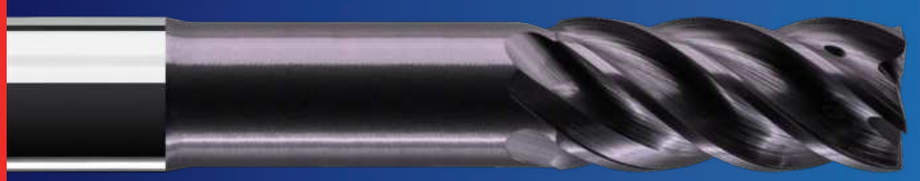
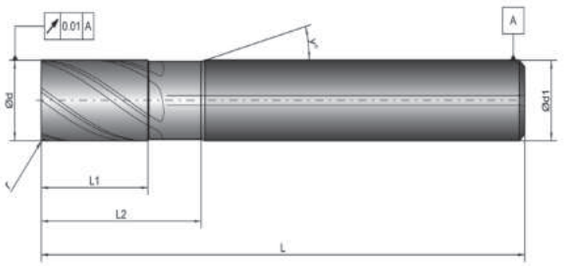
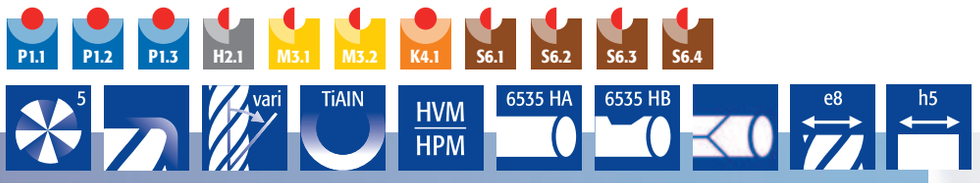


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 4xD										
VHRSI 5 060 064 06 03 010 L025	6,0	0,10	6	64	13,00	25,0	0,200	5	-	**new**
VHRSI 5 060 064 06 03 030 L025	6,0	0,30	6	64	14,00	25,0	0,200	5	-	**new**
VHRSI 5 060 064 06 03 050 L025	6,0	0,50	6	64	14,00	25,0	0,200	5	-	**new**
VHRSI 5 060 064 06 03 100 L025	6,0	1,00	6	64	14,00	25,0	0,200	5	-	**new**
VHRSI 5 080 072 08 03 010 L033	8,0	0,10	8	72	18,00	33,0	0,300	5	-	**new**
VHRSI 5 080 072 08 03 030 L033	8,0	0,30	8	72	18,00	33,0	0,300	5	-	**new**
VHRSI 5 080 072 08 03 050 L033	8,0	0,50	8	72	18,00	33,0	0,300	5	-	**new**
VHRSI 5 080 072 08 03 100 L033	8,0	1,00	8	72	18,00	33,0	0,300	5	-	**new**
VHRSI 5 100 084 10 03 010 L042	10,0	0,10	10	84	22,00	42,0	0,300	5	-	**new**
VHRSI 5 100 084 10 03 030 L042	10,0	0,30	10	84	22,00	42,0	0,300	5	-	**new**
VHRSI 5 100 084 10 03 050 L042	10,0	0,50	10	84	22,00	42,0	0,300	5	-	**new**
VHRSI 5 100 084 10 03 100 L042	10,0	1,00	10	84	22,00	42,0	0,300	5	-	**new**
VHRSI 5 120 098 12 03 010 L050	12,0	0,10	12	98	25,00	50,0	0,300	5	-	**new**
VHRSI 5 120 098 12 03 030 L050	12,0	0,30	12	98	25,00	50,0	0,300	5	-	**new**
VHRSI 5 120 098 12 03 050 L050	12,0	0,50	12	98	25,00	50,0	0,300	5	-	**new**
VHRSI 5 120 098 12 03 100 L050	12,0	1,00	12	98	25,00	50,0	0,300	5	-	**new**
VHRSI 5 160 116 16 03 010 L066	16,0	0,10	16	116	35,00	66,0	0,300	5	-	**new**
VHRSI 5 160 116 16 03 050 L066	16,0	0,50	16	116	35,00	66,0	0,300	5	-	**new**
VHRSI 5 160 116 16 03 100 L066	16,0	1,00	16	116	35,00	66,0	0,300	5	-	**new**
VHRSI 5 200 135 20 03 050 L082	20,0	0,50	20	135	42,00	82,0	0,400	5	-	**new**
VHRSI 5 200 135 20 03 100 L082	20,0	1,00	20	135	42,00	82,0	0,400	5	-	**new**
VHRSI 5 250 160 25 03 050 L102	25,0	0,50	25	160	45,00	102,0	0,400	5	-	**new**
VHRSI 5 250 160 25 03 100 L102	25,0	1,00	25	160	45,00	102,0	0,400	5	-	**new**

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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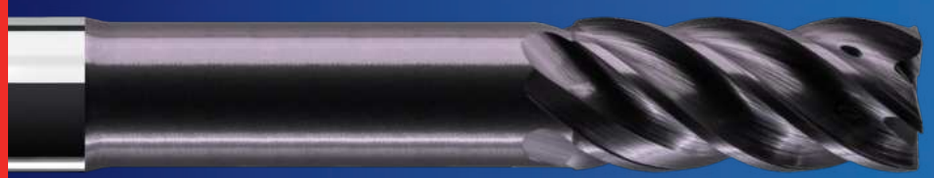


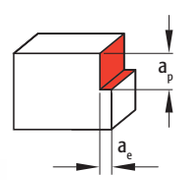
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 5xD										
VHRSI 5 060 070 06 03 010 L031	6,0	0,10	6	70	13,00	31,0	0,200	5	-	**new**
VHRSI 5 060 070 06 03 030 L031	6,0	0,30	6	70	14,00	31,0	0,200	5	-	**new**
VHRSI 5 060 070 06 03 050 L031	6,0	0,50	6	70	14,00	31,0	0,200	5	-	**new**
VHRSI 5 060 070 06 03 100 L031	6,0	1,00	6	70	14,00	31,0	0,200	5	-	**new**
VHRSI 5 080 080 08 03 010 L041	8,0	0,10	8	80	18,00	41,0	0,300	5	-	**new**
VHRSI 5 080 080 08 03 030 L041	8,0	0,30	8	80	18,00	41,0	0,300	5	-	**new**
VHRSI 5 080 080 08 03 050 L041	8,0	0,50	8	80	18,00	41,0	0,300	5	-	**new**
VHRSI 5 080 080 08 03 100 L041	8,0	1,00	8	80	18,00	41,0	0,300	5	-	**new**
VHRSI 5 100 094 10 03 010 L052	10,0	0,10	10	94	22,00	52,0	0,300	5	-	**new**
VHRSI 5 100 094 10 03 030 L052	10,0	0,30	10	94	22,00	52,0	0,300	5	-	**new**
VHRSI 5 100 094 10 03 050 L052	10,0	0,50	10	94	22,00	52,0	0,300	5	-	**new**
VHRSI 5 100 094 10 03 100 L052	10,0	1,00	10	94	22,00	52,0	0,300	5	-	**new**
VHRSI 5 120 110 12 03 010 L062	12,0	0,10	12	110	25,00	62,0	0,300	5	-	**new**
VHRSI 5 120 110 12 03 030 L062	12,0	0,30	12	110	25,00	62,0	0,300	5	-	**new**
VHRSI 5 120 110 12 03 050 L062	12,0	0,50	12	110	25,00	62,0	0,300	5	-	**new**
VHRSI 5 120 110 12 03 100 L062	12,0	1,00	12	110	25,00	62,0	0,300	5	-	**new**
VHRSI 5 160 132 16 03 010 L082	16,0	0,10	16	132	35,00	82,0	0,300	5	-	**new**
VHRSI 5 160 132 16 03 050 L082	16,0	0,50	16	132	35,00	82,0	0,300	5	-	**new**
VHRSI 5 160 132 16 03 100 L082	16,0	1,00	16	132	35,00	82,0	0,300	5	-	**new**
VHRSI 5 200 154 20 03 050 L102	20,0	0,50	20	154	42,00	102,0	0,400	5	-	**new**
VHRSI 5 200 154 20 03 100 L102	20,0	1,00	20	154	42,00	102,0	0,400	5	-	**new**

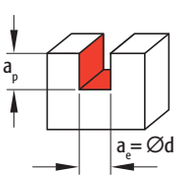
EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. VHRSI**W** 5 060…

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
K4.1	< 800		**100 - 160**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

The perfect tool for rough-milling as well as for finish-milling, granting an even longer toollife due to the internal cooling

Das perfekte Werkzeug für das schruppfräsen, so wie auch für das schlichten, wobei die Innenkühlung eine längere Standzeit bietet





Shoulder milling / Eckfräsen (1xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	< 1,4	0,010 - 0,020
< 4,0	< 1,8	0,015 - 0,030
< 5,0	< 2,3	0,020 - 0,040
< 6,0	< 2,7	0,025 - 0,050
< 8,0	< 3,6	0,030 - 0,060
< 10,0	< 4,5	0,040 - 0,070
< 12,0	< 5,4	0,050 - 0,080
< 14,0	< 6,3	0,055 - 0,090
< 16,0	< 7,2	0,060 - 0,100
< 20,0	< 9,0	0,080 - 0,120
< 25,0	< 11,3	0,100 - 0,150

Shoulder milling / Eckfräsen (2xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 6,0	< 0,75	0,010 - 0,030
< 8,0	< 1,00	0,020 - 0,040
< 10,0	< 1,25	0,025 - 0,055
< 12,0	< 1,50	0,035 - 0,065
< 16,0	< 2,00	0,045 - 0,075
< 20,0	< 2,50	0,055 - 0,085
< 24,0	< 3,00	0,070 - 0,100
< 28,0	< 3,50	0,080 - 0,120
< 32,0	< 4,00	0,090 - 0,130
< 40,0	< 5,00	0,110 - 0,150
< 50,0	< 6,25	0,135 - 0,185

Slot milling / Nutfräsen

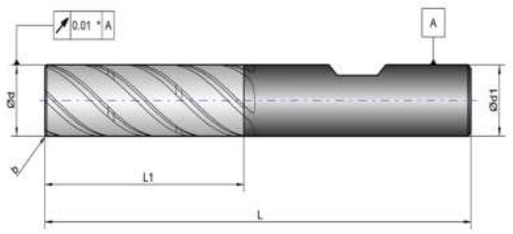
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	3,0	0,005 - 0,015
< 4,0	4,0	0,008 - 0,025
< 5,0	5,0	0,010 - 0,030
< 6,0	6,0	0,015 - 0,035
< 8,0	8,0	0,025 - 0,045
< 10,0	10,0	0,030 - 0,050
< 12,0	12,0	0,035 - 0,060
< 14,0	14,0	0,040 - 0,070
< 16,0	16,0	0,050 - 0,080
< 20,0	20,0	0,060 - 0,100
< 25,0	25,0	0,080 - 0,130

Cutting conditions 3xD - 4xD - 5xD Neck relief

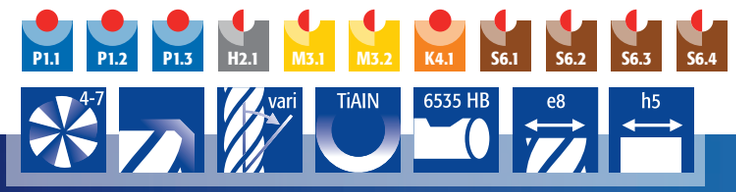
STD	Ap	Ae	Fz
3xD Neck relief	100% STD	100% STD	100% STD
4xD Neck relief	75% STD	50% STD	100% STD
5xD Neck relief	50% STD	25% STD	100% STD

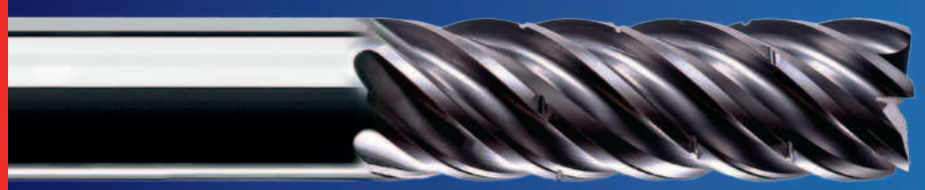
Cutting speed 3xD - 4xD - 5xD Neck relief

STD	Vc m/min
3xD Neck relief	100% STD
4xD Neck relief	90% STD
5xD Neck relief	75% STD



* For end mills / für Schaftfräser L < 100 mm.





Article Number *Artikelnummer*	Ød (mm)	b (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
3xD									
VHTS 4 030 060 06 03	3,0	0,10	6	60	10,00	-	-	4	15
VHTS 4 040 060 06 03	4,0	0,10	6	60	13,00	-	-	4	15
VHTS 4 050 060 06 03	5,0	0,10	6	60	16,00	-	-	4	15
VHTS 5 060 060 06 03	6,0	0,10	6	60	19,00	-	-	5	-
VHTS 5 080 065 08 03	8,0	0,15	8	65	25,00	-	-	5	-
VHTS 5 100 078 10 03	10,0	0,20	10	78	32,00	-	-	5	-
VHTS 6 120 090 12 03	12,0	0,20	12	90	38,00	-	-	6	-
VHTS 6 160 108 16 03	16,0	0,30	16	108	50,00	-	-	6	-
VHTS 7 200 130 20 03	20,0	0,40	20	130	62,00	-	-	7	-
4xD									
VHTS 4 030 064 06 03 L	3,0	0,10	6	64	13,00	-	-	4	15
VHTS 4 040 064 06 03 L	4,0	0,10	6	64	17,00	-	-	4	15
VHTS 4 050 064 06 03 L	5,0	0,10	6	64	21,00	-	-	4	15
VHTS 5 060 064 06 03 L	6,0	0,10	6	64	25,00	-	-	5	-
VHTS 5 080 078 08 03 L	8,0	0,15	8	78	33,00	-	-	5	-
VHTS 5 100 089 10 03 L	10,0	0,15	10	89	42,00	-	-	5	-
VHTS 5 120 102 12 03 L	12,0	0,15	12	102	50,00	-	-	5	-
VHTS 5 160 125 16 03 L	16,0	0,20	16	125	66,00	-	-	5	-

End mills suitable for trochoidal milling.

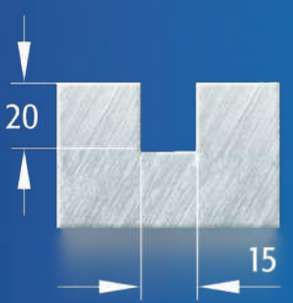
Schaftfräser für trochoidales Fräsen geeignet.

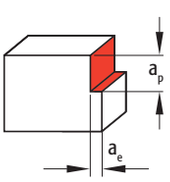
Cutting conditions / Schnittwertempfehlungen VHTS

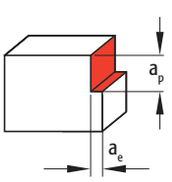
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**240 - 300**	emulsion
P1.2	< 1000	< 300	**160 - 240**	emulsion
P1.3	< 1400	< 400	**130 - 200**	emulsion
H2.1		< 50 HRc	**100 - 150**	emulsion
M3.1	< 950		**140 - 200**	emulsion
M3.2	< 1250		**110 - 150**	emulsion
K4.1	< 800		**125 - 225**	emulsion
S6.1	< 1500		**45 - 65**	emulsion
S6.2	< 1600		**50 - 80**	emulsion
S6.3	< 1600		**35 - 55**	emulsion
S6.4	< 1250		**70 - 105**	emulsion

VHTS 5 100 072 06 03
Workpiece Material: 1.0038

	VHTS 5 100 072 06 03	Competitor
ø	10,0 mm	10,0 mm
V_c	250 mtr/min	180 mtr/min
n	7.957 rpm	5.730 rpm
F_z	0,12 mm/t	0,04 mm/t
Z	5	4
V_f	4.774 mm/min	912 mm/min
a_p max	20,0 mm	10,0 mm
a_e	1,0 mm (programmed)	10,0 mm / 5,0 mm
Production time	24 s	37 s





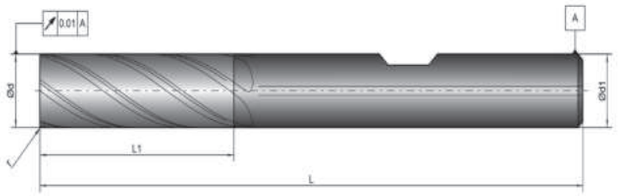


Shoulder milling 3xD/Eckfräsen 3xD

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 9,00	< 0,600	0,015 - 0,035
4,0	< 12,00	< 0,800	0,025 - 0,050
5,0	< 15,00	< 1,000	0,030 - 0,060
6,0	< 18,00	< 1,200	0,040 - 0,070
8,0	< 24,00	< 1,600	0,050 - 0,085
10,0	< 30,00	< 2,000	0,060 - 0,100
12,0	< 36,00	< 2,400	0,085 - 0,120
16,0	< 40,00	<3,200	0,100 - 0,145
20,0	< 50,00	< 4,000	0,125 - 0,175

Shoulder milling 4xD/Eckfräsen 4xD

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 9,00	< 0,280	0,015 - 0,035
4,0	< 12,00	< 0,370	0,025 - 0,050
5,0	< 15,00	< 0,470	0,030 - 0,060
6,0	< 18,00	< 0,560	0,040 - 0,070
8,0	< 24,00	< 0,750	0,050 - 0,085
10,0	< 30,00	< 0,930	0,060 - 0,100
12,0	< 36,00	< 1,120	0,085 - 0,120
16,0	< 40,00	<1,490	0,100 - 0,145
20,0	< 50,00	< 1,870	0,125 - 0,175



* For end mills / für Schaftfräser L < 100 mm.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
3xD										
VHTSI 5 080 065 08 03	8,0	0,15	8	65	25,00	-	-	5	-	**new**
VHTSI 5 100 078 10 03	10,0	0,20	10	78	32,00	-	-	5	-	**new**
VHTSI 6 120 090 12 03	12,0	0,20	12	90	38,00	-	-	6	-	**new**
VHTSI 6 160 108 16 03	16,0	0,30	16	108	50,00	-	-	6	-	**new**
VHTSI 7 200 130 20 03	20,0	0,40	20	130	62,00	-	-	7	-	**new**

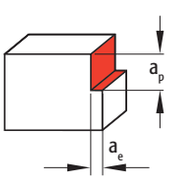
End mills suitable for trochoidal milling.

Schaftfräser für trochoidales Fräsen geeignet.

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**240 - 300**	emulsion
P1.2	< 1000	< 300	**160 - 240**	emulsion
P1.3	< 1400	< 400	**130 - 200**	emulsion
H2.1		< 50 HRc	**100 - 150**	emulsion
M3.1	< 950		**140 - 250**	emulsion
M3.2	< 1250		**110 - 180**	emulsion
K4.1	< 800		**125 - 225**	emulsion
S6.1	< 1500		**45 - 65**	emulsion
S6.2	< 1600		**50 - 80**	emulsion
S6.3	< 1600		**35 - 55**	emulsion
S6.4	< 1250		**70 - 105**	emulsion

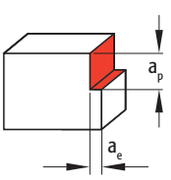
Due to the internal coolant, this volume end mill provides the perfect solution for large volume production requiring a constant quality

Durch die Innenkühlung ist dieses Volumenwerkzeug die perfekte Lösung für Großvolumenproduktion mit einer konstanten Qualität



Shoulder milling 3xD/Eckfräsen 4xD

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 9,00	< 0,600	0,015 - 0,035
4,0	< 12,00	< 0,800	0,025 - 0,050
5,0	< 15,00	< 1,000	0,030 - 0,060
6,0	< 18,00	< 1,200	0,040 - 0,070
8,0	< 24,00	< 1,600	0,050 - 0,085
10,0	< 30,00	< 2,000	0,060 - 0,100
12,0	< 36,00	< 2,400	0,085 - 0,120
16,0	< 40,00	<3,200	0,100 - 0,145
20,0	< 50,00	< 4,000	0,125 - 0,175



Shoulder milling 4xD/Eckfräsen 4xD

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 9,00	< 0,280	0,015 - 0,035
4,0	< 12,00	< 0,370	0,025 - 0,050
5,0	< 15,00	< 0,470	0,030 - 0,060
6,0	< 18,00	< 0,560	0,040 - 0,070
8,0	< 24,00	< 0,750	0,050 - 0,085
10,0	< 30,00	< 0,930	0,060 - 0,100
12,0	< 36,00	< 1,120	0,085 - 0,120
16,0	< 40,00	<1,490	0,100 - 0,145
20,0	< 50,00	< 1,870	0,125 - 0,175

New generation end mills for machining stainless steels and exotic materials

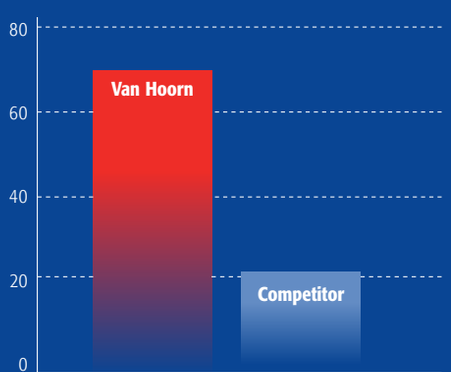
Neue Generation Schaftfräser für die Bearbeitung VA-Stähle und exotischer Werkstoffen

- **VHVTR: 4- and 5-flute for roughing / semi finishing**
  VHVTR: 4 und 5 Schneiden für Schrupp- / semi-Schrupp Bearbeitung
- **HAMF (L-XL): Multiple flute finishing**
  HAMF (L-XL): Mehrschneidenfräser Bearbeitung
- **HABM: Ball nose for finishing / semi finishing**
  HABM: Vollradius für Schlicht- / semi-Schlicht Bearbeitung

VHVTR 4 160 089 16 03S
Workpiece Material: 3.7165

	Van Hoorn	Competitor
ø	16,0 mm	16,0 mm
V_c	85 m/min	30 m/min
n	1.691 rpm	600 rpm
F_z	0,080 mm/t	0,033 mm/t
Z	4	4
V_f	540 mm/min	80 mm/min
a_p	8,0 mm	16,0 mm
a_e	16,0 mm	16,0 mm
Coolant	emulsion	emulsion
Q	**69,12 cm³/min**	**20,48 cm³/min**

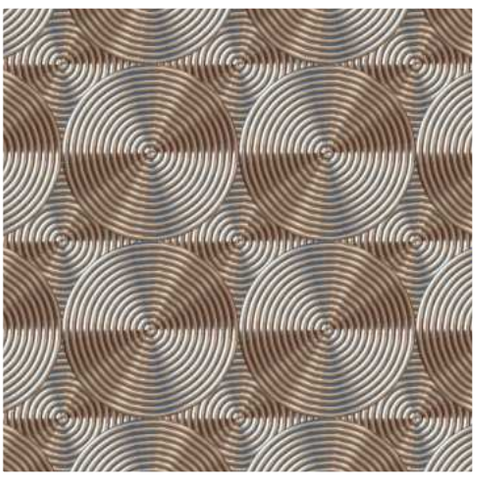
VHVTR Material removal rate



Milling exotic materials
Fräsen exotischer Werkstoffe

Most common problems to face / Häufig auftretende Probleme:

- Abrasiveness of the material.
  Abrasivität des Materials.
- Resonance of the machine and/or workpiece.
  Maschinen- und/oder Werkstückschwingungen.
- Vibrations of the workpiece and/or tool.
  Werkstück- und/oder Werkzeugvibrationen.

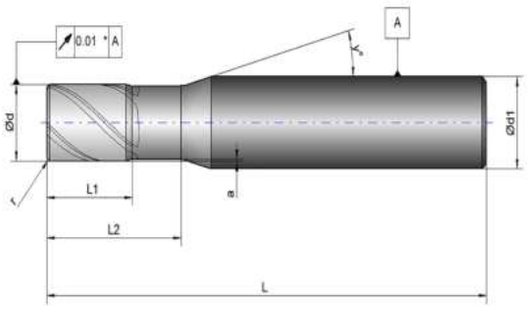


High performance

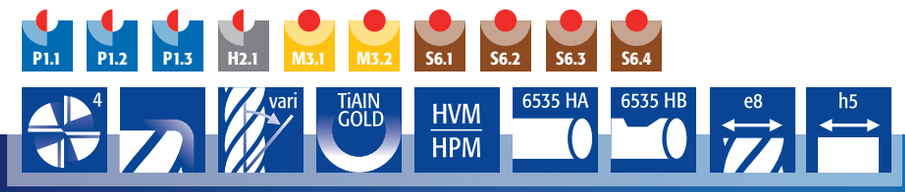
VHTR + VHTRI

Trochoidal Strategy / Trochoidal Strategie

Trochoidal end mill with chipbreaker
and chamfer for stainless steels and super alloys.
Trochoidalräser mit Spanbrecher und Kantenschütz-Fase
für rostfreie Stahlsorten und Sonderlegierungen.



* For end mills / für Schaftfräser L < 100 mm.



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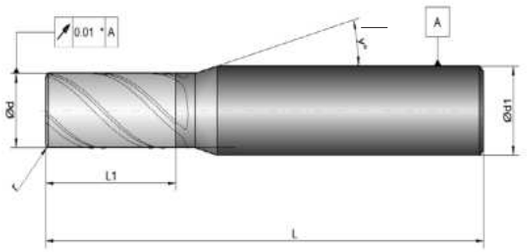
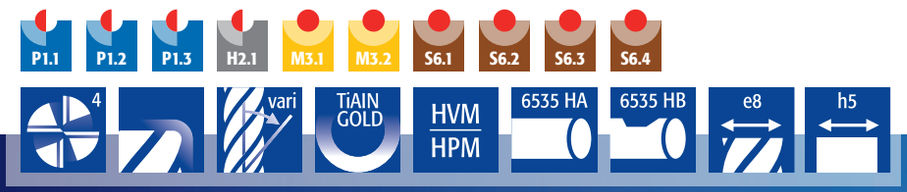
The new standard in milling super alloys!
Der neue Standard in Fräsen von Sonderlegierungen!

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Short / Kurze Ausführung									
VHVTR 4 010 051 06 03 S	1,0	0,10	6	51	1,50	2,5	0,050	4	15
VHVTR 4 020 051 06 03 S	2,0	0,10	6	51	3,00	5,0	0,050	4	15
VHVTR 4 030 051 06 03 S	3,0	0,20	6	51	5,00	7,0	0,100	4	15
VHVTR 4 040 051 06 03 S	4,0	0,20	6	51	6,00	9,0	0,100	4	15
VHVTR 4 050 051 06 03 S	5,0	0,20	6	51	7,00	11,0	0,200	4	15
VHVTR 4 060 064 06 03 010 S	6,0	0,10	6	64	8,00	13,0	0,200	4	-
VHVTR 4 060 064 06 03 030 S	6,0	0,30	6	64	8,00	13,0	0,200	4	-
VHVTR 4 060 064 06 03 050 S	6,0	0,50	6	64	8,00	13,0	0,200	4	-
VHVTR 4 060 064 06 03 100 S	6,0	1,00	6	64	8,00	13,0	0,200	4	-
VHVTR 4 080 064 08 03 010 S	8,0	0,10	8	64	11,00	18,0	0,300	4	-
VHVTR 4 080 064 08 03 030 S	8,0	0,30	8	64	11,00	18,0	0,300	4	-
VHVTR 4 080 064 08 03 050 S	8,0	0,50	8	64	11,00	18,0	0,300	4	-
VHVTR 4 080 064 08 03 100 S	8,0	1,00	8	64	11,00	18,0	0,300	4	-
VHVTR 4 100 070 10 03 010 S	10,0	0,10	10	70	13,00	22,0	0,300	4	-
VHVTR 4 100 070 10 03 030 S	10,0	0,30	10	70	13,00	22,0	0,300	4	-
VHVTR 4 100 070 10 03 050 S	10,0	0,50	10	70	13,00	22,0	0,300	4	-
VHVTR 4 100 070 10 03 100 S	10,0	1,00	10	70	13,00	22,0	0,300	4	-
VHVTR 4 120 078 12 03 010 S	12,0	0,10	12	78	15,00	25,0	0,300	4	-
VHVTR 4 120 078 12 03 030 S	12,0	0,30	12	78	15,00	25,0	0,300	4	-
VHVTR 4 120 078 12 03 050 S	12,0	0,50	12	78	15,00	25,0	0,300	4	-
VHVTR 4 120 078 12 03 100 S	12,0	1,00	12	78	15,00	25,0	0,300	4	-
VHVTR 4 140 089 14 03 050 S	14,0	0,50	14	89	17,00	30,0	0,300	4	-
VHVTR 4 140 089 14 03 100 S	14,0	1,00	14	89	17,00	30,0	0,300	4	-
VHVTR 4 160 089 16 03 010 S	16,0	0,10	16	89	19,00	35,0	0,300	4	-
VHVTR 4 160 089 16 03 050 S	16,0	0,50	16	89	19,00	35,0	0,300	4	-
VHVTR 4 160 089 16 03 100 S	16,0	1,00	16	89	19,00	35,0	0,300	4	-
VHVTR 4 200 102 20 03 050 S	20,0	0,50	20	102	23,00	42,0	0,400	4	-
VHVTR 4 200 102 20 03 100 S	20,0	1,00	20	102	23,00	42,0	0,400	4	-
VHVTR 4 250 120 25 03 050 S	25,0	0,50	25	120	28,00	45,0	0,400	4	-
VHVTR 4 250 120 25 03 100 S	25,0	1,00	25	120	28,00	45,0	0,400	4	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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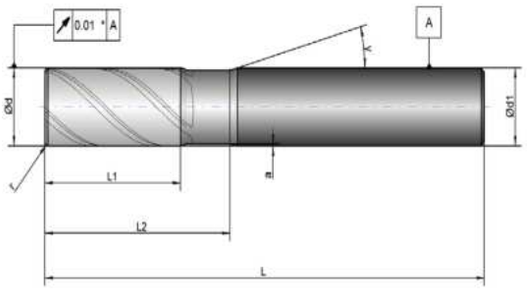
One tool for roughing and finishing!

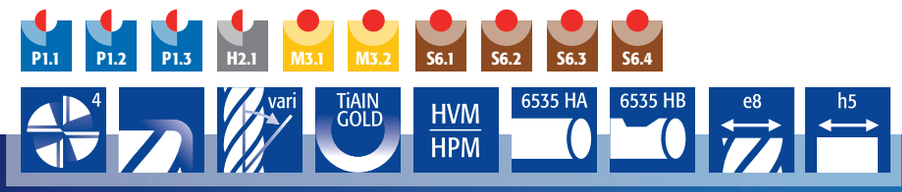
Ein Fräser für Schruppen und Schlichten!

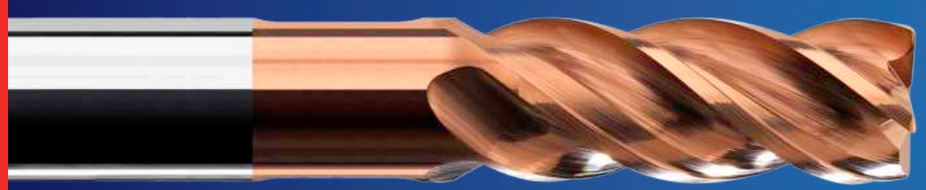
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard									
VHVTR 4 010 051 06 03	1,0	0,10	6	51	2,50	-	-	4	15
VHVTR 4 020 051 06 03	2,0	0,10	6	51	5,00	-	-	4	15
VHVTR 4 030 051 06 03	3,0	0,20	6	51	7,00	-	-	4	15
VHVTR 4 040 051 06 03	4,0	0,20	6	51	9,00	-	-	4	15
VHVTR 4 050 051 06 03	5,0	0,20	6	51	11,00	-	-	4	15
VHVTR 4 060 064 06 03 010	6,0	0,10	6	64	13,00	-	-	4	-
VHVTR 4 060 064 06 03 030	6,0	0,30	6	64	13,00	-	-	4	-
VHVTR 4 060 064 06 03 050	6,0	0,50	6	64	13,00	-	-	4	-
VHVTR 4 060 064 06 03 100	6,0	1,00	6	64	13,00	-	-	4	-
VHVTR 4 080 064 08 03 010	8,0	0,10	8	64	18,00	-	-	4	-
VHVTR 4 080 064 08 03 030	8,0	0,30	8	64	18,00	-	-	4	-
VHVTR 4 080 064 08 03 050	8,0	0,50	8	64	18,00	-	-	4	-
VHVTR 4 080 064 08 03 100	8,0	1,00	8	64	18,00	-	-	4	-
VHVTR 4 100 070 10 03 010	10,0	0,10	10	70	22,00	-	-	4	-
VHVTR 4 100 070 10 03 030	10,0	0,30	10	70	22,00	-	-	4	-
VHVTR 4 100 070 10 03 050	10,0	0,50	10	70	22,00	-	-	4	-
VHVTR 4 100 070 10 03 100	10,0	1,00	10	70	22,00	-	-	4	-
VHVTR 4 120 078 12 03 010	12,0	0,10	12	78	25,00	-	-	4	-
VHVTR 4 120 078 12 03 030	12,0	0,30	12	78	25,00	-	-	4	-
VHVTR 4 120 078 12 03 050	12,0	0,50	12	78	25,00	-	-	4	-
VHVTR 4 120 078 12 03 100	12,0	1,00	12	78	25,00	-	-	4	-
VHVTR 4 140 092 14 03 050	14,0	0,50	14	92	30,00	-	-	4	-
VHVTR 4 140 092 14 03 100	14,0	1,00	14	92	30,00	-	-	4	-
VHVTR 4 160 092 16 03 010	16,0	0,10	16	92	35,00	-	-	4	-
VHVTR 4 160 092 16 03 050	16,0	0,50	16	92	35,00	-	-	4	-
VHVTR 4 160 092 16 03 100	16,0	1,00	16	92	35,00	-	-	4	-
VHVTR 4 200 102 20 03 050	20,0	0,50	20	102	42,00	-	-	4	-
VHVTR 4 200 102 20 03 100	20,0	1,00	20	102	42,00	-	-	4	-
VHVTR 4 250 120 25 03 050	25,0	0,50	25	120	45,00	-	-	4	-
VHVTR 4 250 120 25 03 100	25,0	1,00	25	120	45,00	-	-	4	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.





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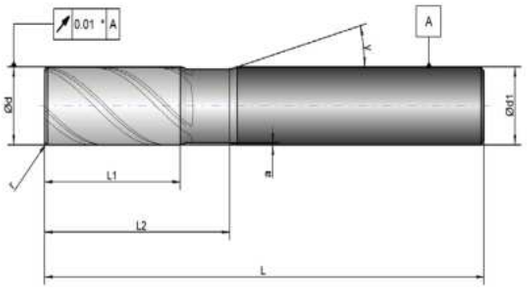
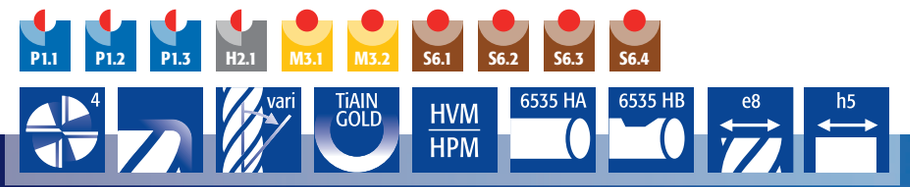
Wide range of standard lengths!
Umfangreiches Programm mit Standardmaßen!

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 3xD									
VHVTR 4 010 055 06 03 010 L	1,0	0,10	6	55	2,50	4,0	0,05	4	15
VHVTR 4 020 055 06 03 010 L	2,0	0,10	6	55	5,00	7,0	0,05	4	15
VHVTR 4 030 055 06 03 020 L	3,0	0,20	6	55	7,00	10,0	0,10	4	15
VHVTR 4 040 055 06 03 020 L	4,0	0,20	6	55	9,00	13,0	0,10	4	15
VHVTR 4 050 057 06 03 020 L	5,0	0,20	6	57	11,00	16,0	0,20	4	15
VHVTR 4 060 064 06 03 010 L	6,0	0,10	6	64	13,00	19,0	0,20	4	-
VHVTR 4 060 064 06 03 030 L	6,0	0,30	6	64	13,00	19,0	0,20	4	-
VHVTR 4 060 064 06 03 050 L	6,0	0,50	6	64	13,00	19,0	0,20	4	-
VHVTR 4 060 064 06 03 100 L	6,0	1,00	6	64	13,00	19,0	0,20	4	-
VHVTR 4 080 064 08 03 010 L	8,0	0,10	8	64	18,00	25,0	0,30	4	-
VHVTR 4 080 064 08 03 030 L	8,0	0,30	8	64	18,00	25,0	0,30	4	-
VHVTR 4 080 064 08 03 050 L	8,0	0,50	8	64	18,00	25,0	0,30	4	-
VHVTR 4 080 064 08 03 100 L	8,0	1,00	8	64	18,00	25,0	0,30	4	-
VHVTR 4 100 075 10 03 010 L	10,0	0,10	10	75	22,00	32,0	0,30	4	-
VHVTR 4 100 075 10 03 030 L	10,0	0,30	10	75	22,00	32,0	0,30	4	-
VHVTR 4 100 075 10 03 050 L	10,0	0,50	10	75	22,00	32,0	0,30	4	-
VHVTR 4 100 075 10 03 100 L	10,0	1,00	10	75	22,00	32,0	0,30	4	-
VHVTR 4 120 086 12 03 010 L	12,0	0,10	12	86	25,00	38,0	0,30	4	-
VHVTR 4 120 086 12 03 030 L	12,0	0,30	12	86	25,00	38,0	0,30	4	-
VHVTR 4 120 086 12 03 050 L	12,0	0,50	12	86	25,00	38,0	0,30	4	-
VHVTR 4 120 086 12 03 100 L	12,0	1,00	12	86	25,00	38,0	0,30	4	-
VHVTR 4 120 102 12 03 010 L	12,0	0,10	12	102	25,00	38,0	0,30	4	-
VHVTR 4 120 102 12 03 030 L	12,0	0,30	12	102	25,00	38,0	0,30	4	-
VHVTR 4 120 102 12 03 050 L	12,0	0,50	12	102	25,00	38,0	0,30	4	-
VHVTR 4 120 102 12 03 100 L	12,0	1,00	12	102	25,00	38,0	0,30	4	-
VHVTR 4 140 102 14 03 050 L	14,0	0,50	14	102	30,00	44,0	0,30	4	-
VHVTR 4 140 102 14 03 100 L	14,0	1,00	14	102	30,00	44,0	0,30	4	-
VHVTR 4 160 102 16 03 010 L	16,0	0,10	16	102	35,00	50,0	0,30	4	-
VHVTR 4 160 102 16 03 050 L	16,0	0,50	16	102	35,00	50,0	0,30	4	-
VHVTR 4 160 102 16 03 100 L	16,0	1,00	16	102	35,00	50,0	0,30	4	-
VHVTR 4 200 125 20 03 050 L	20,0	0,50	20	125	42,00	62,0	0,40	4	-
VHVTR 4 200 125 20 03 100 L	20,0	1,00	20	125	42,00	62,0	0,40	4	-
VHVTR 4 250 135 25 03 050 L	25,0	0,50	25	135	45,00	77,0	0,40	4	-
VHVTR 4 250 135 25 03 100 L	25,0	1,00	25	135	45,00	77,0	0,40	4	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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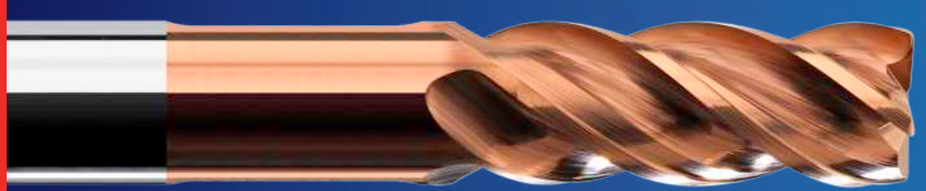
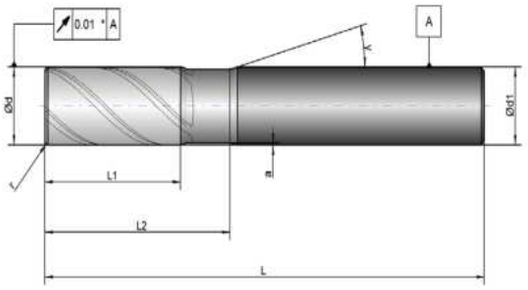
VHVTR the best you can get!
VHVTR das Beste im Markt!

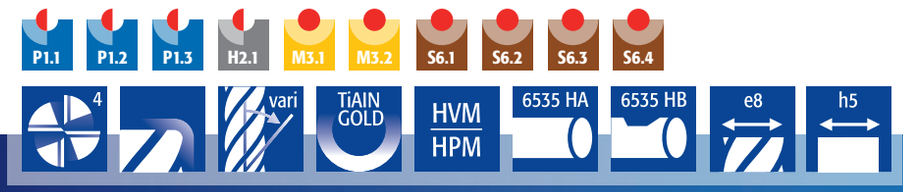


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 4xD									
VHVTR 4 010 055 06 03 010 L005	1,0	0,10	6	55	2,50	5,0	0,050	4	15
VHVTR 4 020 057 06 03 010 L009	2,0	0,10	6	57	5,00	9,0	0,050	4	15
VHVTR 4 030 057 06 03 020 L013	3,0	0,20	6	57	7,00	13,0	0,100	4	15
VHVTR 4 040 060 06 03 020 L017	4,0	0,20	6	60	9,00	17,0	0,100	4	15
VHVTR 4 050 064 06 03 020 L021	5,0	0,20	6	64	11,00	21,0	0,200	4	15
VHVTR 4 060 064 06 03 010 L025	6,0	0,10	6	64	13,00	25,0	0,200	4	-
VHVTR 4 060 064 06 03 030 L025	6,0	0,30	6	64	13,00	25,0	0,200	4	-
VHVTR 4 060 064 06 03 050 L025	6,0	0,50	6	64	13,00	25,0	0,200	4	-
VHVTR 4 060 064 06 03 100 L025	6,0	1,00	6	64	13,00	25,0	0,200	4	-
VHVTR 4 080 072 08 03 010 L033	8,0	0,10	8	72	18,00	33,0	0,300	4	-
VHVTR 4 080 072 08 03 030 L033	8,0	0,30	8	72	18,00	33,0	0,300	4	-
VHVTR 4 080 072 08 03 050 L033	8,0	0,50	8	72	18,00	33,0	0,300	4	-
VHVTR 4 080 072 08 03 100 L033	8,0	1,00	8	72	18,00	33,0	0,300	4	-
VHVTR 4 100 084 10 03 010 L042	10,0	0,10	10	84	22,00	42,0	0,300	4	-
VHVTR 4 100 084 10 03 030 L042	10,0	0,30	10	84	22,00	42,0	0,300	4	-
VHVTR 4 100 084 10 03 050 L042	10,0	0,50	10	84	22,00	42,0	0,300	4	-
VHVTR 4 100 084 10 03 100 L042	10,0	1,00	10	84	22,00	42,0	0,300	4	-
VHVTR 4 120 098 12 03 010 L050	12,0	0,10	12	98	25,00	50,0	0,300	4	-
VHVTR 4 120 098 12 03 030 L050	12,0	0,30	12	98	25,00	50,0	0,300	4	-
VHVTR 4 120 098 12 03 050 L050	12,0	0,50	12	98	25,00	50,0	0,300	4	-
VHVTR 4 120 098 12 03 100 L050	12,0	1,00	12	98	25,00	50,0	0,300	4	-
VHVTR 4 160 116 16 03 010 L066	16,0	0,10	16	116	35,00	66,0	0,300	4	-
VHVTR 4 160 116 16 03 050 L066	16,0	0,50	16	116	35,00	66,0	0,300	4	-
VHVTR 4 160 116 16 03 100 L066	16,0	1,00	16	116	35,00	66,0	0,300	4	-
VHVTR 4 200 135 20 03 050 L082	20,0	0,50	20	135	42,00	82,0	0,400	4	-
VHVTR 4 200 135 20 03 100 L082	20,0	1,00	20	135	42,00	82,0	0,400	4	-
VHVTR 4 250 160 25 03 050 L102	25,0	0,50	25	160	45,00	102,0	0,400	4	-
VHVTR 4 250 160 25 03 100 L102	25,0	1,00	25	160	45,00	102,0	0,400	4	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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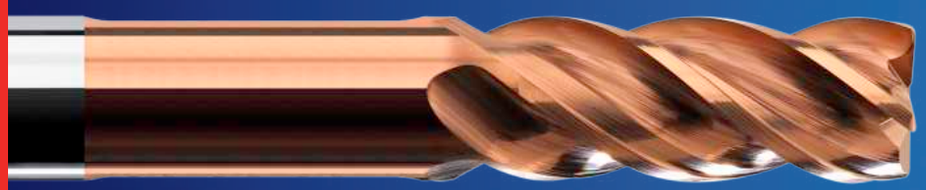
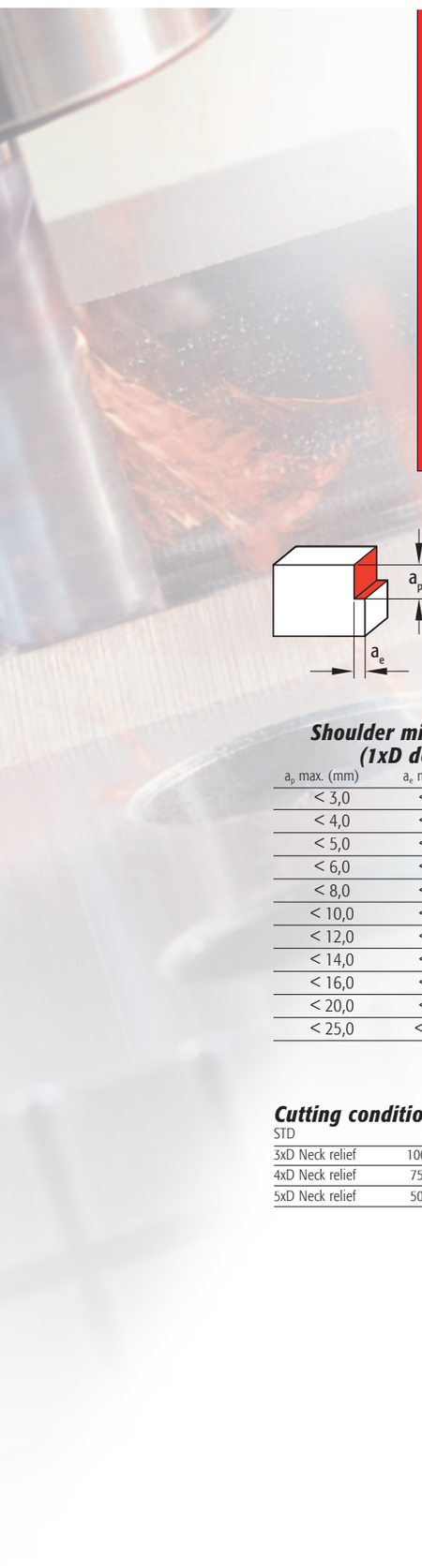


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 5xD									
VHVTR 4 010 057 06 03 010 L006	1,0	0,10	6	57	2,50	6,0	0,050	4	15
VHVTR 4 020 057 06 03 010 L011	2,0	0,10	6	57	5,00	11,0	0,050	4	15
VHVTR 4 030 060 06 03 020 L016	3,0	0,20	6	60	7,00	16,0	0,100	4	15
VHVTR 4 040 064 06 03 020 L021	4,0	0,20	6	64	9,00	21,0	0,100	4	15
VHVTR 4 050 070 06 03 020 L026	5,0	0,20	6	70	11,00	26,0	0,200	4	15
VHVTR 4 060 070 06 03 010 L031	6,0	0,10	6	70	13,00	31,0	0,200	4	-
VHVTR 4 060 070 06 03 030 L031	6,0	0,30	6	70	13,00	31,0	0,200	4	-
VHVTR 4 060 070 06 03 050 L031	6,0	0,50	6	70	13,00	31,0	0,200	4	-
VHVTR 4 060 070 06 03 100 L031	6,0	1,00	6	70	13,00	31,0	0,200	4	-
VHVTR 4 080 080 08 03 010 L041	8,0	0,10	8	80	18,00	41,0	0,300	4	-
VHVTR 4 080 080 08 03 030 L041	8,0	0,30	8	80	18,00	41,0	0,300	4	-
VHVTR 4 080 080 08 03 050 L041	8,0	0,50	8	80	18,00	41,0	0,300	4	-
VHVTR 4 080 080 08 03 100 L041	8,0	1,00	8	80	18,00	41,0	0,300	4	-
VHVTR 4 100 094 10 03 010 L052	10,0	0,10	10	94	22,00	52,0	0,300	4	-
VHVTR 4 100 094 10 03 030 L052	10,0	0,30	10	94	22,00	52,0	0,300	4	-
VHVTR 4 100 094 10 03 050 L052	10,0	0,50	10	94	22,00	52,0	0,300	4	-
VHVTR 4 100 094 10 03 100 L052	10,0	1,00	10	94	22,00	52,0	0,300	4	-
VHVTR 4 120 110 12 03 010 L062	12,0	0,10	12	110	25,00	62,0	0,300	4	-
VHVTR 4 120 110 12 03 030 L062	12,0	0,30	12	110	25,00	62,0	0,300	4	-
VHVTR 4 120 110 12 03 050 L062	12,0	0,50	12	110	25,00	62,0	0,300	4	-
VHVTR 4 120 110 12 03 100 L062	12,0	1,00	12	110	25,00	62,0	0,300	4	-
VHVTR 4 160 132 16 03 010 L082	16,0	0,10	16	132	35,00	82,0	0,300	4	-
VHVTR 4 160 132 16 03 050 L082	16,0	0,50	16	132	35,00	82,0	0,300	4	-
VHVTR 4 160 132 16 03 100 L082	16,0	1,00	16	132	35,00	82,0	0,300	4	-
VHVTR 4 200 154 20 03 050 L102	20,0	0,50	20	154	42,00	102,0	0,400	4	-
VHVTR 4 200 154 20 03 100 L102	20,0	1,00	20	154	42,00	102,0	0,400	4	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 4 060…

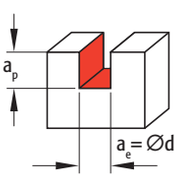
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion



High performance!

- **Productivity**
  Produktivität
- **Tool life**
  Standzeit
- **Surface finish**
- Oberfläche Qualität

a_p up to 2,00 x d
a_e up to 0,45 x d



a_p up to 1,00 x d

Shoulder milling / Eckfräsen (1xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	< 1,4	0,010 - 0,020
< 4,0	< 1,8	0,015 - 0,030
< 5,0	< 2,3	0,020 -0,040
< 6,0	< 2,7	0,025 - 0,050
< 8,0	< 3,6	0,030 - 0,060
< 10,0	< 4,5	0,040 - 0,070
< 12,0	< 5,4	0,050 - 0,080
< 14,0	< 6,3	0,055 - 0,090
< 16,0	< 7,2	0,060 - 0,100
< 20,0	< 9,0	0,080 - 0,120
< 25,0	< 11,3	0,100 - 0,150

Shoulder milling / Eckfräsen (2xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 6,0	< 0,75	0,010 - 0,030
< 8,0	< 1,00	0,020 - 0,040
< 10,0	< 1,25	0,025 - 0,055
< 12,0	< 1,50	0,035 - 0,065
< 16,0	< 2,00	0,045 - 0,075
< 20,0	< 2,50	0,055 - 0,085
< 24,0	< 3,00	0,070 - 0,100
< 28,0	< 3,50	0,080 - 0,120
< 32,0	< 4,00	0,090 - 0,130
< 40,0	< 5,00	0,110 - 0,150
< 50,0	< 6,25	0,135 - 0,185

Slot milling / Nutfräsen

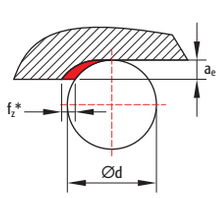
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	3,0	0,005 - 0,015
< 4,0	4,0	0,008 - 0,025
< 5,0	5,0	0,010 -0,030
< 6,0	6,0	0,015 - 0,035
< 8,0	8,0	0,025 - 0,045
< 10,0	10,0	0,030 - 0,050
< 12,0	12,0	0,035 - 0,060
< 14,0	14,0	0,040 - 0,070
< 16,0	16,0	0,050 - 0,080
< 20,0	20,0	0,060 - 0,100
< 25,0	25,0	0,080 - 0,130

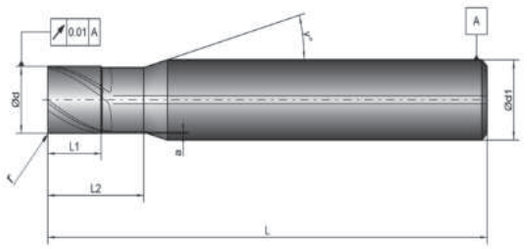
Cutting conditions 3xD - 4xD - 5xD Neck relief

STD	Ap	Ae	Fz
3xD Neck relief	100% STD	100% STD	100% STD
4xD Neck relief	75% STD	50% STD	100% STD
5xD Neck relief	50% STD	25% STD	100% STD

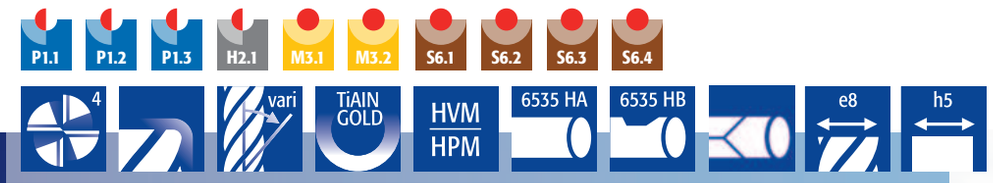
Cutting speed 3xD - 4xD - 5xD Neck relief

STD	Vc m/min
3xD Neck relief	100% STD
4xD Neck relief	90% STD
5xD Neck relief	75% STD





* For end mills / für Schaftfräser L < 100 mm.



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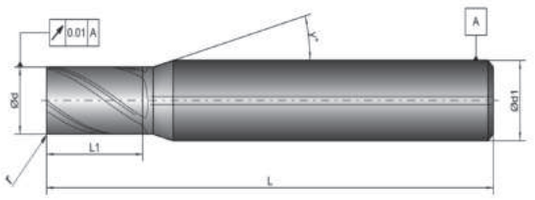
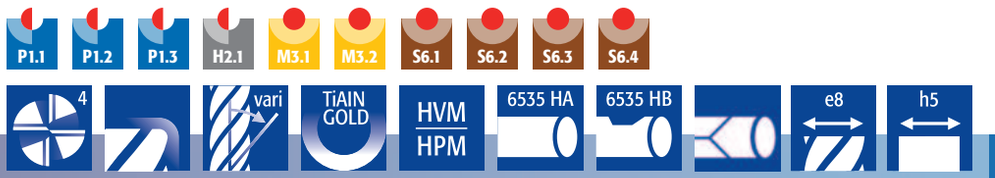
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Short / Kurze Ausführung										
VHVTRI 4 060 064 06 03 010 S	6,0	0,10	6	64	8,00	13,0	0,2	4	-	new
VHVTRI 4 060 064 06 03 030 S	6,0	0,30	6	64	8,00	13,0	0,2	4	-	new
VHVTRI 4 060 064 06 03 050 S	6,0	0,50	6	64	8,00	13,0	0,2	4	-	new
VHVTRI 4 060 064 06 03 100 S	6,0	1,00	6	64	8,00	13,0	0,2	4	-	new
VHVTRI 4 080 064 08 03 010 S	8,0	0,10	8	64	11,00	18,0	0,3	4	-	new
VHVTRI 4 080 064 08 03 030 S	8,0	0,30	8	64	11,00	18,0	0,3	4	-	new
VHVTRI 4 080 064 08 03 050 S	8,0	0,50	8	64	11,00	18,0	0,3	4	-	new
VHVTRI 4 080 064 08 03 100 S	8,0	1,00	8	64	11,00	18,0	0,3	4	-	new
VHVTRI 4 100 070 10 03 010 S	10,0	0,10	10	70	13,00	22,0	0,3	4	-	new
VHVTRI 4 100 070 10 03 030 S	10,0	0,30	10	70	13,00	22,0	0,3	4	-	new
VHVTRI 4 100 070 10 03 050 S	10,0	0,50	10	70	13,00	22,0	0,3	4	-	new
VHVTRI 4 100 070 10 03 100 S	10,0	1,00	10	70	13,00	22,0	0,3	4	-	new
VHVTRI 4 120 078 12 03 010 S	12,0	0,10	12	78	15,00	25,0	0,3	4	-	new
VHVTRI 4 120 078 12 03 030 S	12,0	0,30	12	78	15,00	25,0	0,3	4	-	new
VHVTRI 4 120 078 12 03 050 S	12,0	0,50	12	78	15,00	25,0	0,3	4	-	new
VHVTRI 4 120 078 12 03 100 S	12,0	1,00	12	78	15,00	25,0	0,3	4	-	new
VHVTRI 4 140 089 14 03 050 S	14,0	0,50	14	89	17,00	30,0	0,3	4	-	new
VHVTRI 4 140 089 14 03 100 S	14,0	1,00	14	89	17,00	30,0	0,3	4	-	new
VHVTRI 4 160 089 16 03 010 S	16,0	0,10	16	89	19,00	35,0	0,3	4	-	new
VHVTRI 4 160 089 16 03 050 S	16,0	0,50	16	89	19,00	35,0	0,3	4	-	new
VHVTRI 4 160 089 16 03 100 S	16,0	1,00	16	89	19,00	35,0	0,3	4	-	new
VHVTRI 4 200 102 20 03 050 S	20,0	0,50	20	102	23,00	42,0	0,4	4	-	new
VHVTRI 4 200 102 20 03 100 S	20,0	1,00	20	102	23,00	42,0	0,4	4	-	new
VHVTRI 4 250 120 25 03 050 S	25,0	0,50	25	120	28,00	45,0	0,4	4	-	new
VHVTRI 4 250 120 25 03 100 S	25,0	1,00	25	120	28,00	45,0	0,4	4	-	new

ø1 and 2 cooling channels exit in y-measure.
From ø3, cooling channels exit in the chip chamber.

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.



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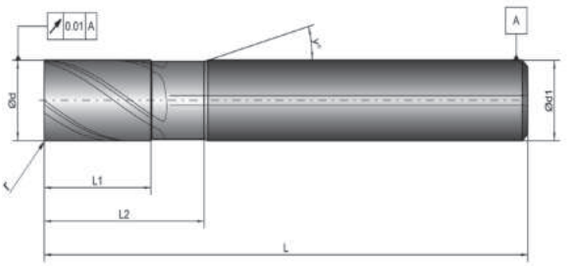
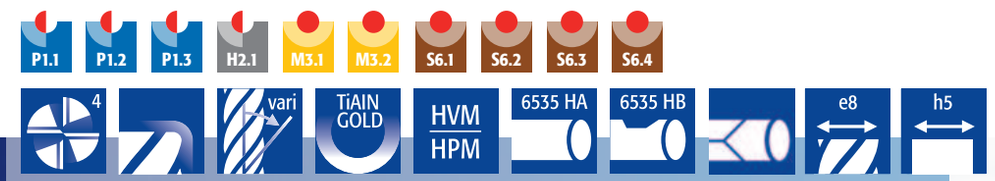
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Standard										
VHVTRI 4 060 064 06 03 010	6,0	0,10	6	64	13,00	-	-	4	-	new
VHVTRI 4 060 064 06 03 030	6,0	0,30	6	64	13,00	-	-	4	-	new
VHVTRI 4 060 064 06 03 050	6,0	0,50	6	64	13,00	-	-	4	-	new
VHVTRI 4 060 064 06 03 100	6,0	1,00	6	64	13,00	-	-	4	-	new
VHVTRI 4 080 064 08 03 010	8,0	0,10	8	64	18,00	-	-	4	-	new
VHVTRI 4 080 064 08 03 030	8,0	0,30	8	64	18,00	-	-	4	-	new
VHVTRI 4 080 064 08 03 050	8,0	0,50	8	64	18,00	-	-	4	-	new
VHVTRI 4 080 064 08 03 100	8,0	1,00	8	64	18,00	-	-	4	-	new
VHVTRI 4 100 070 10 03 010	10,0	0,10	10	70	22,00	-	-	4	-	new
VHVTRI 4 100 070 10 03 030	10,0	0,30	10	70	22,00	-	-	4	-	new
VHVTRI 4 100 070 10 03 050	10,0	0,50	10	70	22,00	-	-	4	-	new
VHVTRI 4 100 070 10 03 100	10,0	1,00	10	70	22,00	-	-	4	-	new
VHVTRI 4 120 078 12 03 010	12,0	0,10	12	78	25,00	-	-	4	-	new
VHVTRI 4 120 078 12 03 030	12,0	0,30	12	78	25,00	-	-	4	-	new
VHVTRI 4 120 078 12 03 050	12,0	0,50	12	78	25,00	-	-	4	-	new
VHVTRI 4 120 078 12 03 100	12,0	1,00	12	78	25,00	-	-	4	-	new
VHVTRI 4 140 092 14 03 050	14,0	0,50	14	92	30,00	-	-	4	-	new
VHVTRI 4 140 092 14 03 100	14,0	1,00	14	92	30,00	-	-	4	-	new
VHVTRI 4 160 092 16 03 010	16,0	0,10	16	92	35,00	-	-	4	-	new
VHVTRI 4 160 092 16 03 050	16,0	0,50	16	92	35,00	-	-	4	-	new
VHVTRI 4 160 092 16 03 100	16,0	1,00	16	92	35,00	-	-	4	-	new
VHVTRI 4 200 102 20 03 050	20,0	0,50	20	102	42,00	-	-	4	-	new
VHVTRI 4 200 102 20 03 100	20,0	1,00	20	102	42,00	-	-	4	-	new
VHVTRI 4 250 120 25 03 050	25,0	0,50	25	120	45,00	-	-	4	-	new
VHVTRI 4 250 120 25 03 100	25,0	1,00	25	120	45,00	-	-	4	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 4 060…

ø1 and 2 cooling channels exit in y-measure.
From ø3, cooling channels exit in the chip chamber.



* For end mills / für Schaftfräser L < 100 mm.



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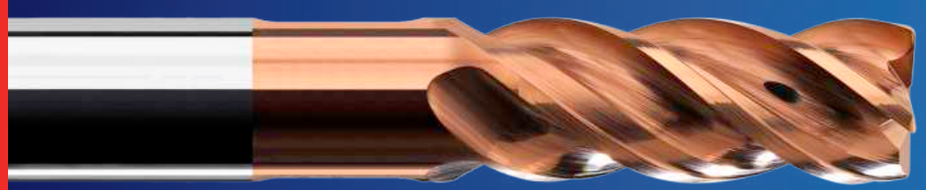
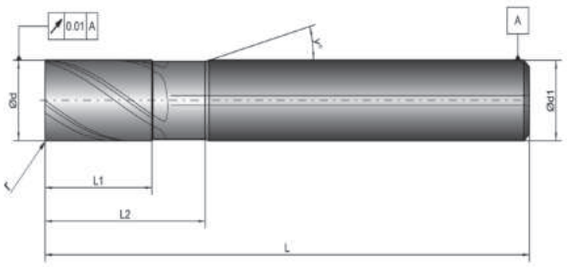


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 3xD										
VHVTRI 4 060 064 06 03 010 L	6,0	0,10	6	64	13,00	19,0	0,20	4	-	new
VHVTRI 4 060 064 06 03 030 L	6,0	0,30	6	64	13,00	19,0	0,20	4	-	new
VHVTRI 4 060 064 06 03 050 L	6,0	0,50	6	64	13,00	19,0	0,20	4	-	new
VHVTRI 4 060 064 06 03 100 L	6,0	1,00	6	64	13,00	19,0	0,20	4	-	new
VHVTRI 4 080 064 08 03 010 L	8,0	0,10	8	64	18,00	25,0	0,30	4	-	new
VHVTRI 4 080 064 08 03 030 L	8,0	0,30	8	64	18,00	25,0	0,30	4	-	new
VHVTRI 4 080 064 08 03 050 L	8,0	0,50	8	64	18,00	25,0	0,30	4	-	new
VHVTRI 4 080 064 08 03 100 L	8,0	1,00	8	64	18,00	25,0	0,30	4	-	new
VHVTRI 4 100 075 10 03 010 L	10,0	0,10	10	75	22,00	32,0	0,30	4	-	new
VHVTRI 4 100 075 10 03 030 L	10,0	0,30	10	75	22,00	32,0	0,30	4	-	new
VHVTRI 4 100 075 10 03 050 L	10,0	0,50	10	75	22,00	32,0	0,30	4	-	new
VHVTRI 4 100 075 10 03 100 L	10,0	1,00	10	75	22,00	32,0	0,30	4	-	new
VHVTRI 4 120 086 12 03 010 L	12,0	0,10	12	86	25,00	38,0	0,30	4	-	new
VHVTRI 4 120 086 12 03 030 L	12,0	0,30	12	86	25,00	38,0	0,30	4	-	new
VHVTRI 4 120 086 12 03 050 L	12,0	0,50	12	86	25,00	38,0	0,30	4	-	new
VHVTRI 4 120 086 12 03 100 L	12,0	1,00	12	86	25,00	38,0	0,30	4	-	new
VHVTRI 4 120 102 12 03 010 L	12,0	0,10	12	102	25,00	38,0	0,30	4	-	new
VHVTRI 4 120 102 12 03 030 L	12,0	0,30	12	102	25,00	38,0	0,30	4	-	new
VHVTRI 4 120 102 12 03 050 L	12,0	0,50	12	102	25,00	38,0	0,30	4	-	new
VHVTRI 4 120 102 12 03 100 L	12,0	1,00	12	102	25,00	38,0	0,30	4	-	new
VHVTRI 4 140 102 14 03 050 L	14,0	0,50	14	102	30,00	44,0	0,30	4	-	new
VHVTRI 4 140 102 14 03 100 L	14,0	1,00	14	102	30,00	44,0	0,30	4	-	new
VHVTRI 4 160 102 16 03 010 L	16,0	0,10	16	102	35,00	50,0	0,30	4	-	new
VHVTRI 4 160 102 16 03 050 L	16,0	0,50	16	102	35,00	50,0	0,30	4	-	new
VHVTRI 4 160 102 16 03 100 L	16,0	1,00	16	102	35,00	50,0	0,30	4	-	new
VHVTRI 4 200 125 20 03 050 L	20,0	0,50	20	125	42,00	62,0	0,40	4	-	new
VHVTRI 4 200 125 20 03 100 L	20,0	1,00	20	125	42,00	62,0	0,40	4	-	new
VHVTRI 4 250 135 25 03 050 L	25,0	0,50	25	135	45,00	77,0	0,40	4	-	new
VHVTRI 4 250 135 25 03 100 L	25,0	1,00	25	135	45,00	77,0	0,40	4	-	new

ø1 and 2 cooling channels exit in y-measure.
From ø3, cooling channels exit in the chip chamber.

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 4 060…



* For end mills / für Schaftfräser L < 100 mm.

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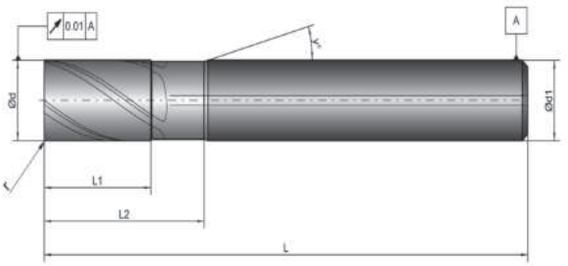
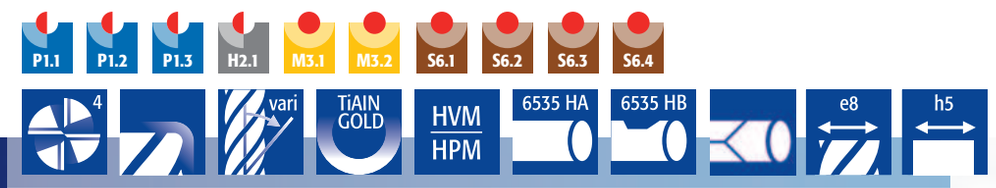
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 4xD										
VHVTRI 4 060 064 06 03 010 L025	6,0	0,10	6	64	13,00	25,0	0,200	4	-	new
VHVTRI 4 060 064 06 03 030 L025	6,0	0,30	6	64	13,00	25,0	0,200	4	-	new
VHVTRI 4 060 064 06 03 050 L025	6,0	0,50	6	64	13,00	25,0	0,200	4	-	new
VHVTRI 4 060 064 06 03 100 L025	6,0	1,00	6	64	13,00	25,0	0,200	4	-	new
VHVTRI 4 080 072 08 03 010 L033	8,0	0,10	8	72	18,00	33,0	0,300	4	-	new
VHVTRI 4 080 072 08 03 030 L033	8,0	0,30	8	72	18,00	33,0	0,300	4	-	new
VHVTRI 4 080 072 08 03 050 L033	8,0	0,50	8	72	18,00	33,0	0,300	4	-	new
VHVTRI 4 080 072 08 03 100 L033	8,0	1,00	8	72	18,00	33,0	0,300	4	-	new
VHVTRI 4 100 084 10 03 010 L042	10,0	0,10	10	84	22,00	42,0	0,300	4	-	new
VHVTRI 4 100 084 10 03 030 L042	10,0	0,30	10	84	22,00	42,0	0,300	4	-	new
VHVTRI 4 100 084 10 03 050 L042	10,0	0,50	10	84	22,00	42,0	0,300	4	-	new
VHVTRI 4 100 084 10 03 100 L042	10,0	1,00	10	84	22,00	42,0	0,300	4	-	new
VHVTRI 4 120 098 12 03 010 L050	12,0	0,10	12	98	25,00	50,0	0,300	4	-	new
VHVTRI 4 120 098 12 03 030 L050	12,0	0,30	12	98	25,00	50,0	0,300	4	-	new
VHVTRI 4 120 098 12 03 050 L050	12,0	0,50	12	98	25,00	50,0	0,300	4	-	new
VHVTRI 4 120 098 12 03 100 L050	12,0	1,00	12	98	25,00	50,0	0,300	4	-	new
VHVTRI 4 160 116 16 03 010 L066	16,0	0,10	16	116	35,00	66,0	0,300	4	-	new
VHVTRI 4 160 116 16 03 050 L066	16,0	0,50	16	116	35,00	66,0	0,300	4	-	new
VHVTRI 4 160 116 16 03 100 L066	16,0	1,00	16	116	35,00	66,0	0,300	4	-	new
VHVTRI 4 200 135 20 03 050 L082	20,0	0,50	20	135	42,00	82,0	0,400	4	-	new
VHVTRI 4 200 135 20 03 100 L082	20,0	1,00	20	135	42,00	82,0	0,400	4	-	new
VHVTRI 4 250 160 25 03 050 L102	25,0	0,50	25	160	45,00	102,0	0,400	4	-	new
VHVTRI 4 250 160 25 03 100 L102	25,0	1,00	25	160	45,00	102,0	0,400	4	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 4 060…

ø1 and 2 cooling channels exit in y-measure.
From ø3, cooling channels exit in the chip chamber.



* For end mills / für Schaftfräser L < 100 mm.



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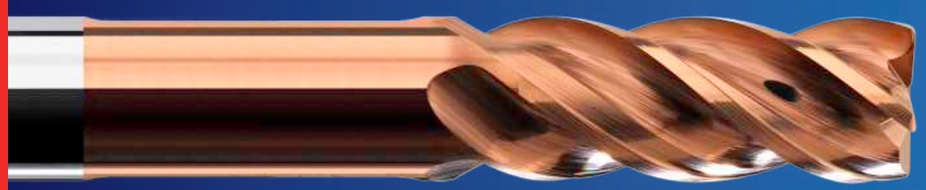


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 5xD										
VHVTRI 4 060 070 06 03 010 L031	6,0	0,10	6	70	13,00	31,0	0,200	4	-	**new**
VHVTRI 4 060 070 06 03 030 L031	6,0	0,30	6	70	13,00	31,0	0,200	4	-	**new**
VHVTRI 4 060 070 06 03 050 L031	6,0	0,50	6	70	13,00	31,0	0,200	4	-	**new**
VHVTRI 4 060 070 06 03 100 L031	6,0	1,00	6	70	13,00	31,0	0,200	4	-	**new**
VHVTRI 4 080 080 08 03 010 L041	8,0	0,10	8	80	18,00	41,0	0,300	4	-	**new**
VHVTRI 4 080 080 08 03 030 L041	8,0	0,30	8	80	18,00	41,0	0,300	4	-	**new**
VHVTRI 4 080 080 08 03 050 L041	8,0	0,50	8	80	18,00	41,0	0,300	4	-	**new**
VHVTRI 4 080 080 08 03 100 L041	8,0	1,00	8	80	18,00	41,0	0,300	4	-	**new**
VHVTRI 4 100 094 10 03 010 L052	10,0	0,10	10	94	22,00	52,0	0,300	4	-	**new**
VHVTRI 4 100 094 10 03 030 L052	10,0	0,30	10	94	22,00	52,0	0,300	4	-	**new**
VHVTRI 4 100 094 10 03 050 L052	10,0	0,50	10	94	22,00	52,0	0,300	4	-	**new**
VHVTRI 4 100 094 10 03 100 L052	10,0	1,00	10	94	22,00	52,0	0,300	4	-	**new**
VHVTRI 4 120 110 12 03 010 L062	12,0	0,10	12	110	25,00	62,0	0,300	4	-	**new**
VHVTRI 4 120 110 12 03 030 L062	12,0	0,30	12	110	25,00	62,0	0,300	4	-	**new**
VHVTRI 4 120 110 12 03 050 L062	12,0	0,50	12	110	25,00	62,0	0,300	4	-	**new**
VHVTRI 4 120 110 12 03 100 L062	12,0	1,00	12	110	25,00	62,0	0,300	4	-	**new**
VHVTRI 4 160 132 16 03 010 L082	16,0	0,10	16	132	35,00	82,0	0,300	4	-	**new**
VHVTRI 4 160 132 16 03 050 L082	16,0	0,50	16	132	35,00	82,0	0,300	4	-	**new**
VHVTRI 4 160 132 16 03 100 L082	16,0	1,00	16	132	35,00	82,0	0,300	4	-	**new**
VHVTRI 4 200 154 20 03 050 L102	20,0	0,50	20	154	42,00	102,0	0,400	4	-	**new**
VHVTRI 4 200 154 20 03 100 L102	20,0	1,00	20	154	42,00	102,0	0,400	4	-	**new**

ø1 and 2 cooling channels exit in y-measure.
From ø3, cooling channels exit in the chip chamber.

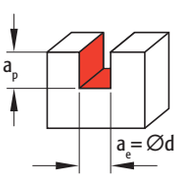
EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 4 060…

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

For stainless steel and titanium, due to the internal cooling even more all-purpose usage in a large application range

Für RVS und Titan, wobei die Innenkühlung eine noch umfassendere Universalverwendung gewährleistet in einem großen Anwendungsbereich

a_p up to 2,00 x d
a_e up to 0,45 x d



a_p up to 1,00 x d

Shoulder milling / Eckfräsen (1xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	< 1,4	0,010 - 0,020
< 4,0	< 1,8	0,015 - 0,030
< 5,0	< 2,3	0,020 -0,040
< 6,0	< 2,7	0,025 - 0,050
< 8,0	< 3,6	0,030 - 0,060
< 10,0	< 4,5	0,040 - 0,070
< 12,0	< 5,4	0,050 - 0,080
< 14,0	< 6,3	0,055 - 0,090
< 16,0	< 7,2	0,060 - 0,100
< 20,0	< 9,0	0,080 - 0,120
< 25,0	< 11,3	0,100 - 0,150

Shoulder milling / Eckfräsen (2xD depth of cut)

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 6,0	< 0,75	0,010 - 0,030
< 8,0	< 1,00	0,020 - 0,040
< 10,0	< 1,25	0,025 - 0,055
< 12,0	< 1,50	0,035 - 0,065
< 16,0	< 2,00	0,045 - 0,075
< 20,0	< 2,50	0,055 - 0,085
< 24,0	< 3,00	0,070 - 0,100
< 28,0	< 3,50	0,080 - 0,120
< 32,0	< 4,00	0,090 - 0,130
< 40,0	< 5,00	0,110 - 0,150
< 50,0	< 6,25	0,135 - 0,185

Slot milling / Nutfräsen

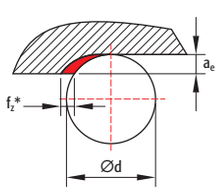
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 3,0	3,0	0,005 - 0,015
< 4,0	4,0	0,008 - 0,025
< 5,0	5,0	0,010 -0,030
< 6,0	6,0	0,015 - 0,035
< 8,0	8,0	0,025 - 0,045
< 10,0	10,0	0,030 - 0,050
< 12,0	12,0	0,035 - 0,060
< 14,0	14,0	0,040 - 0,070
< 16,0	16,0	0,050 - 0,080
< 20,0	20,0	0,060 - 0,100
< 25,0	25,0	0,080 - 0,130

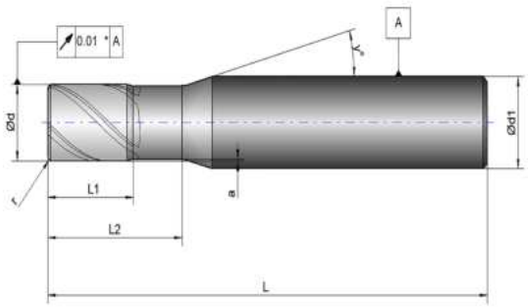
Cutting conditions 3xD - 4xD - 5xD Neck relief

STD	Ap	Ae	Fz
3xD Neck relief	100% STD	100% STD	100% STD
4xD Neck relief	75% STD	50% STD	100% STD
5xD Neck relief	50% STD	25% STD	100% STD

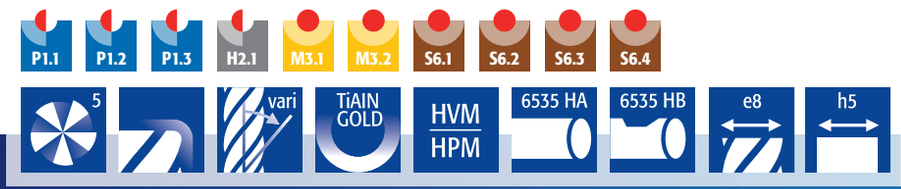
Cutting speed 3xD - 4xD - 5xD Neck relief

STD	Vc m/min
3xD Neck relief	100% STD
4xD Neck relief	90% STD
5xD Neck relief	75% STD





* For end mills / für Schaftfräser L < 100 mm.



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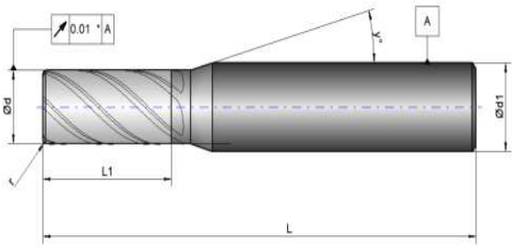
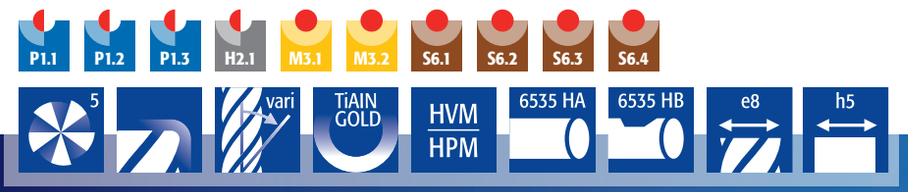
Ideal tool for trochoidal milling super alloys!
Idealer Fräser für trochoidales Fräsen von Sonderlegierungen!

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Short / Kurze Ausführung									
VHVTR 5 030 051 06 03 S	3,0	0,20	6	51	5,00	7,0	0,1	5	15
VHVTR 5 040 051 06 03 S	4,0	0,20	6	51	6,00	9,0	0,1	5	15
VHVTR 5 050 051 06 03 S	5,0	0,20	6	51	7,00	11,0	0,2	5	15
VHVTR 5 060 064 06 03 010 S	6,0	0,10	6	64	8,00	13,0	0,2	5	-
VHVTR 5 060 064 06 03 030 S	6,0	0,30	6	64	8,00	13,0	0,2	5	-
VHVTR 5 060 064 06 03 050 S	6,0	0,50	6	64	8,00	13,0	0,2	5	-
VHVTR 5 060 064 06 03 100 S	6,0	1,00	6	64	8,00	13,0	0,2	5	-
VHVTR 5 080 064 08 03 010 S	8,0	0,10	8	64	11,00	18,0	0,3	5	-
VHVTR 5 080 064 08 03 030 S	8,0	0,30	8	64	11,00	18,0	0,3	5	-
VHVTR 5 080 064 08 03 050 S	8,0	0,50	8	64	11,00	18,0	0,3	5	-
VHVTR 5 080 064 08 03 100 S	8,0	1,00	8	64	11,00	18,0	0,3	5	-
VHVTR 5 100 070 10 03 010 S	10,0	0,10	10	70	13,00	22,0	0,3	5	-
VHVTR 5 100 070 10 03 030 S	10,0	0,30	10	70	13,00	22,0	0,3	5	-
VHVTR 5 100 070 10 03 050 S	10,0	0,50	10	70	13,00	22,0	0,3	5	-
VHVTR 5 100 070 10 03 100 S	10,0	1,00	10	70	13,00	22,0	0,3	5	-
VHVTR 5 120 078 12 03 010 S	12,0	0,10	12	78	15,00	25,0	0,3	5	-
VHVTR 5 120 078 12 03 030 S	12,0	0,30	12	78	15,00	25,0	0,3	5	-
VHVTR 5 120 078 12 03 050 S	12,0	0,50	12	78	15,00	25,0	0,3	5	-
VHVTR 5 120 078 12 03 100 S	12,0	1,00	12	78	15,00	25,0	0,3	5	-
VHVTR 5 140 089 14 03 050 S	14,0	0,50	14	89	17,00	30,0	0,3	5	-
VHVTR 5 140 089 14 03 100 S	14,0	1,00	14	89	17,00	30,0	0,3	5	-
VHVTR 5 160 089 16 03 010 S	16,0	0,10	16	89	19,00	35,0	0,3	5	-
VHVTR 5 160 089 16 03 050 S	16,0	0,50	16	89	19,00	35,0	0,3	5	-
VHVTR 5 160 089 16 03 100 S	16,0	1,00	16	89	19,00	35,0	0,3	5	-
VHVTR 5 200 102 20 03 050 S	20,0	0,50	20	102	23,00	42,0	0,4	5	-
VHVTR 5 200 102 20 03 100 S	20,0	1,00	20	102	23,00	42,0	0,4	5	-
VHVTR 5 250 120 25 03 050 S	25,0	0,50	25	120	28,00	45,0	0,4	5	-
VHVTR 5 250 120 25 03 100 S	25,0	1,00	25	120	28,00	45,0	0,4	5	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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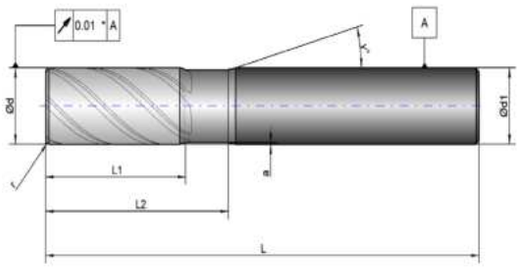
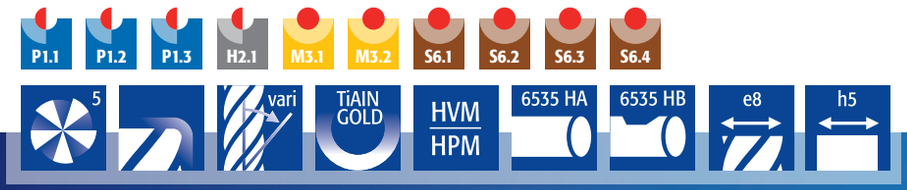
Save money by improving your production!
Geld sparen durch Produktionsverbesserung!

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard									
VHVTR 5 030 051 06 03	3,0	0,20	6	51	7,00	-	-	5	15
VHVTR 5 040 051 06 03	4,0	0,20	6	51	9,00	-	-	5	15
VHVTR 5 050 051 06 03	5,0	0,20	6	51	11,00	-	-	5	15
VHVTR 5 060 064 06 03 010	6,0	0,10	6	64	13,00	-	-	5	-
VHVTR 5 060 064 06 03 030	6,0	0,30	6	64	13,00	-	-	5	-
VHVTR 5 060 064 06 03 050	6,0	0,50	6	64	13,00	-	-	5	-
VHVTR 5 060 064 06 03 100	6,0	1,00	6	64	13,00	-	-	5	-
VHVTR 5 080 064 08 03 010	8,0	0,10	8	64	18,00	-	-	5	-
VHVTR 5 080 064 08 03 030	8,0	0,30	8	64	18,00	-	-	5	-
VHVTR 5 080 064 08 03 050	8,0	0,50	8	64	18,00	-	-	5	-
VHVTR 5 080 064 08 03 100	8,0	1,00	8	64	18,00	-	-	5	-
VHVTR 5 100 070 10 03 010	10,0	0,10	10	70	22,00	-	-	5	-
VHVTR 5 100 070 10 03 030	10,0	0,30	10	70	22,00	-	-	5	-
VHVTR 5 100 070 10 03 050	10,0	0,50	10	70	22,00	-	-	5	-
VHVTR 5 100 070 10 03 100	10,0	1,00	10	70	22,00	-	-	5	-
VHVTR 5 120 078 12 03 010	12,0	0,10	12	78	25,00	-	-	5	-
VHVTR 5 120 078 12 03 030	12,0	0,30	12	78	25,00	-	-	5	-
VHVTR 5 120 078 12 03 050	12,0	0,50	12	78	25,00	-	-	5	-
VHVTR 5 120 078 12 03 100	12,0	1,00	12	78	25,00	-	-	5	-
VHVTR 5 140 092 14 03 050	14,0	0,50	14	92	30,00	-	-	5	-
VHVTR 5 140 092 14 03 100	14,0	1,00	14	92	30,00	-	-	5	-
VHVTR 5 160 092 16 03 010	16,0	0,10	16	92	35,00	-	-	5	-
VHVTR 5 160 092 16 03 050	16,0	0,50	16	92	35,00	-	-	5	-
VHVTR 5 160 092 16 03 100	16,0	1,00	16	92	35,00	-	-	5	-
VHVTR 5 200 102 20 03 050	20,0	0,50	20	102	42,00	-	-	5	-
VHVTR 5 200 102 20 03 100	20,0	1,00	20	102	42,00	-	-	5	-
VHVTR 5 250 120 25 03 050	25,0	0,50	25	120	45,00	-	-	5	-
VHVTR 5 250 120 25 03 100	25,0	1,00	25	120	45,00	-	-	5	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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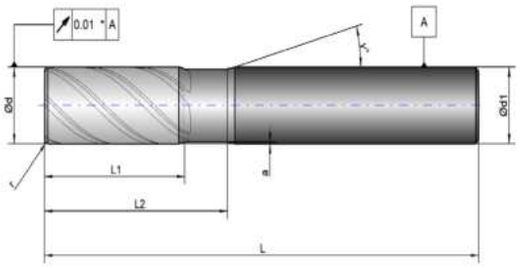
High performance!

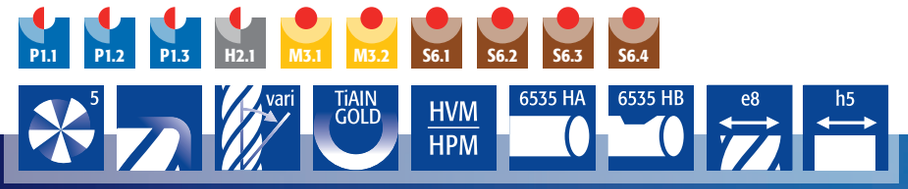
- **Productivity**
  Produktivität
- **Tool life**
  Standzeit
- **Surface finish**
- Oberfläche Qualität

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 3xD									
VHVTR 5 030 055 06 03 020 L	3,0	0,20	6	55	8,00	10,0	0,10	5	15
VHVTR 5 040 055 06 03 020 L	4,0	0,20	6	55	9,00	13,0	0,10	5	15
VHVTR 5 050 057 06 03 020 L	5,0	0,20	6	57	11,00	16,0	0,20	5	15
VHVTR 5 060 064 06 03 010 L	6,0	0,10	6	64	13,00	19,0	0,20	5	-
VHVTR 5 060 064 06 03 030 L	6,0	0,30	6	64	13,00	19,0	0,20	5	-
VHVTR 5 060 064 06 03 050 L	6,0	0,50	6	64	13,00	19,0	0,20	5	-
VHVTR 5 060 064 06 03 100 L	6,0	1,00	6	64	13,00	19,0	0,20	5	-
VHVTR 5 080 064 08 03 010 L	8,0	0,10	8	64	18,00	25,0	0,30	5	-
VHVTR 5 080 064 08 03 030 L	8,0	0,30	8	64	18,00	25,0	0,30	5	-
VHVTR 5 080 064 08 03 050 L	8,0	0,50	8	64	18,00	25,0	0,30	5	-
VHVTR 5 080 064 08 03 100 L	8,0	1,00	8	64	18,00	25,0	0,30	5	-
VHVTR 5 100 075 10 03 010 L	10,0	0,10	10	75	22,00	32,0	0,30	5	-
VHVTR 5 100 075 10 03 030 L	10,0	0,30	10	75	22,00	32,0	0,30	5	-
VHVTR 5 100 075 10 03 050 L	10,0	0,50	10	75	22,00	32,0	0,30	5	-
VHVTR 5 100 075 10 03 100 L	10,0	1,00	10	75	22,00	32,0	0,30	5	-
VHVTR 5 120 086 12 03 010 L	12,0	0,10	12	86	25,00	38,0	0,30	5	-
VHVTR 5 120 086 12 03 030 L	12,0	0,30	12	86	25,00	38,0	0,30	5	-
VHVTR 5 120 086 12 03 050 L	12,0	0,50	12	86	25,00	38,0	0,30	5	-
VHVTR 5 120 086 12 03 100 L	12,0	1,00	12	86	25,00	38,0	0,30	5	-
VHVTR 5 120 102 12 03 010 L	12,0	0,10	12	102	25,00	38,0	0,30	5	-
VHVTR 5 120 102 12 03 030 L	12,0	0,30	12	102	25,00	38,0	0,30	5	-
VHVTR 5 120 102 12 03 050 L	12,0	0,50	12	102	25,00	38,0	0,30	5	-
VHVTR 5 120 102 12 03 100 L	12,0	1,00	12	102	25,00	38,0	0,30	5	-
VHVTR 5 140 102 14 03 050 L	14,0	0,50	14	102	30,00	44,0	0,30	5	-
VHVTR 5 140 102 14 03 100 L	14,0	1,00	14	102	30,00	44,0	0,30	5	-
VHVTR 5 160 102 16 03 010 L	16,0	0,10	16	102	35,00	50,0	0,30	5	-
VHVTR 5 160 102 16 03 050 L	16,0	0,50	16	102	35,00	50,0	0,30	5	-
VHVTR 5 160 102 16 03 100 L	16,0	1,00	16	102	35,00	50,0	0,30	5	-
VHVTR 5 200 125 20 03 050 L	20,0	0,50	20	125	42,00	62,0	0,40	5	-
VHVTR 5 200 125 20 03 100 L	20,0	1,00	20	125	42,00	62,0	0,40	5	-
VHVTR 5 250 135 25 03 050 L	25,0	0,50	25	135	45,00	77,0	0,40	5	-
VHVTR 5 250 135 25 03 100 L	25,0	1,00	25	135	45,00	77,0	0,40	5	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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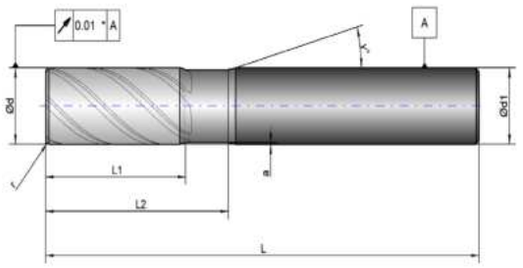
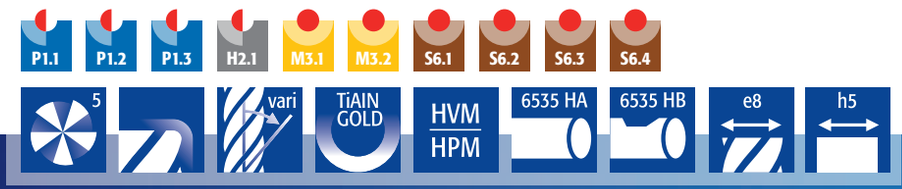
VHVTR the best you can get!
VHVTR das Beste im Markt!

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 4xD									
VHVTR 5 030 057 06 03 020 L013	3,0	0,20	6	57	8,00	13,0	0,100	5	15
VHVTR 5 040 060 06 03 020 L017	4,0	0,20	6	60	9,00	17,0	0,100	5	15
VHVTR 5 050 064 06 03 020 L021	5,0	0,20	6	64	11,00	21,0	0,200	5	15
VHVTR 5 060 064 06 03 010 L025	6,0	0,10	6	64	13,00	25,0	0,200	5	-
VHVTR 5 060 064 06 03 030 L025	6,0	0,30	6	64	13,00	25,0	0,200	5	-
VHVTR 5 060 064 06 03 050 L025	6,0	0,50	6	64	13,00	25,0	0,200	5	-
VHVTR 5 060 064 06 03 100 L025	6,0	1,00	6	64	13,00	25,0	0,200	5	-
VHVTR 5 080 072 08 03 010 L033	8,0	0,10	8	72	18,00	33,0	0,300	5	-
VHVTR 5 080 072 08 03 030 L033	8,0	0,30	8	72	18,00	33,0	0,300	5	-
VHVTR 5 080 072 08 03 050 L033	8,0	0,50	8	72	18,00	33,0	0,300	5	-
VHVTR 5 080 072 08 03 100 L033	8,0	1,00	8	72	18,00	33,0	0,300	5	-
VHVTR 5 100 084 10 03 010 L042	10,0	0,10	10	84	22,00	42,0	0,300	5	-
VHVTR 5 100 084 10 03 030 L042	10,0	0,30	10	84	22,00	42,0	0,300	5	-
VHVTR 5 100 084 10 03 050 L042	10,0	0,50	10	84	22,00	42,0	0,300	5	-
VHVTR 5 100 084 10 03 100 L042	10,0	1,00	10	84	22,00	42,0	0,300	5	-
VHVTR 5 120 098 12 03 010 L 050	12,0	0,10	12	98	25,00	50,0	0,300	5	-
VHVTR 5 120 098 12 03 030 L050	12,0	0,30	12	98	25,00	50,0	0,300	5	-
VHVTR 5 120 098 12 03 050 L050	12,0	0,50	12	98	25,00	50,0	0,300	5	-
VHVTR 5 120 098 12 03 100 L050	12,0	1,00	12	98	25,00	50,0	0,300	5	-
VHVTR 5 160 116 16 03 010 L066	16,0	0,10	16	116	35,00	66,0	0,300	5	-
VHVTR 5 160 116 16 03 050 L066	16,0	0,50	16	116	35,00	66,0	0,300	5	-
VHVTR 5 160 116 16 03 100 L066	16,0	1,00	16	116	35,00	66,0	0,300	5	-
VHVTR 5 200 135 20 03 050 L082	20,0	0,50	20	135	42,00	82,0	0,400	5	-
VHVTR 5 200 135 20 03 100 L082	20,0	1,00	20	135	42,00	82,0	0,400	5	-
VHVTR 5 250 160 25 03 050 L102	25,0	0,50	25	160	45,00	102,0	0,400	5	-
VHVTR 5 250 160 25 03 100 L102	25,0	1,00	25	160	45,00	102,0	0,400	5	-

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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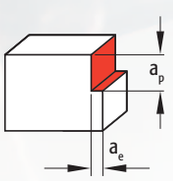
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 5XD									
VHVTR 5 030 060 06 03 020 L016	3,0	0,20	6	60	8,00	16,0	0,100	5	15
VHVTR 5 040 064 06 03 020 L021	4,0	0,20	6	64	9,00	21,0	0,100	5	15
VHVTR 5 050 070 06 03 020 L026	5,0	0,20	6	70	11,00	26,0	0,200	5	15
VHVTR 5 060 070 06 03 010 L031	6,0	0,10	6	70	13,00	31,0	0,200	5	-
VHVTR 5 060 070 06 03 030 L031	6,0	0,30	6	70	13,00	31,0	0,200	5	-
VHVTR 5 060 070 06 03 050 L031	6,0	0,50	6	70	13,00	31,0	0,200	5	-
VHVTR 5 060 070 06 03 100 L031	6,0	1,00	6	70	13,00	31,0	0,200	5	-
VHVTR 5 080 080 08 03 010 L041	8,0	0,10	8	80	18,00	41,0	0,300	5	-
VHVTR 5 080 080 08 03 030 L041	8,0	0,30	8	80	18,00	41,0	0,300	5	-
VHVTR 5 080 080 08 03 050 L041	8,0	0,50	8	80	18,00	41,0	0,300	5	-
VHVTR 5 080 080 08 03 100 L041	8,0	1,00	8	80	18,00	41,0	0,300	5	-
VHVTR 5 100 094 10 03 010 L052	10,0	0,10	10	94	22,00	52,0	0,300	5	-
VHVTR 5 100 094 10 03 030 L052	10,0	0,30	10	94	22,00	52,0	0,300	5	-
VHVTR 5 100 094 10 03 050 L052	10,0	0,50	10	94	22,00	52,0	0,300	5	-
VHVTR 5 100 094 10 03 100 L052	10,0	1,00	10	94	22,00	52,0	0,300	5	-
VHVTR 5 120 110 12 03 010 L062	12,0	0,10	12	110	25,00	62,0	0,300	5	-
VHVTR 5 120 110 12 03 030 L062	12,0	0,30	12	110	25,00	62,0	0,300	5	-
VHVTR 5 120 110 12 03 050 L062	12,0	0,50	12	110	25,00	62,0	0,300	5	-
VHVTR 5 120 110 12 03 100 L062	12,0	1,00	12	110	25,00	62,0	0,300	5	-
VHVTR 5 160 132 16 03 010 L082	16,0	0,10	16	132	35,00	82,0	0,300	5	-
VHVTR 5 160 132 16 03 050 L082	16,0	0,50	16	132	35,00	82,0	0,300	5	-
VHVTR 5 160 132 16 03 100 L082	16,0	1,00	16	132	35,00	82,0	0,300	5	-
VHVTR 5 200 154 20 03 050 L102	20,0	0,50	20	154	42,00	102,0	0,400	5	-
VHVTR 5 200 154 20 03 100 L102	20,0	1,00	20	154	42,00	102,0	0,400	5	-

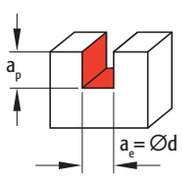
EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTR**W** 5 060…

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

All-purpose usage for rough-milling, as well as for finish-milling

Universalverwendung
für schruppfräsen, so wie auch für schlichten





Shoulder milling / Eckfräsen (1xD depth of cut)

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 3,0	< 1,4	0,010 - 0,020
4,0	< 4,0	< 1,8	0,015 - 0,030
5,0	< 5,0	< 2,3	0,020 -0,040
6,0	< 6,0	< 2,7	0,025 - 0,050
8,0	< 8,0	< 3,6	0,030 - 0,060
10,0	< 10,0	< 4,5	0,040 - 0,070
12,0	< 12,0	< 5,4	0,050 - 0,080
14,0	< 14,0	< 6,3	0,055 - 0,090
16,0	< 16,0	< 7,2	0,060 - 0,100
20,0	< 20,0	< 9,0	0,080 - 0,120
25,0	< 25,0	< 11,3	0,100 - 0,150

Shoulder milling / Eckfräsen (2xD depth of cut)

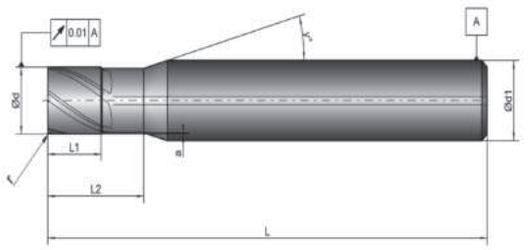
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 6,0	< 0,75	0,010 - 0,030
< 8,0	< 1,00	0,020 - 0,040
< 10,0	< 1,25	0,025 - 0,055
< 12,0	< 1,50	0,035 - 0,065
< 16,0	< 2,00	0,045 - 0,075
< 20,0	< 2,50	0,055 - 0,085
< 24,0	< 3,00	0,070 - 0,100
< 28,0	< 3,50	0,080 - 0,120
< 32,0	< 4,00	0,090 - 0,130
< 40,0	< 5,00	0,110 - 0,150
< 50,0	< 6,25	0,135 - 0,185

Cutting conditions 3xD - 4xD - 5xD Neck relief

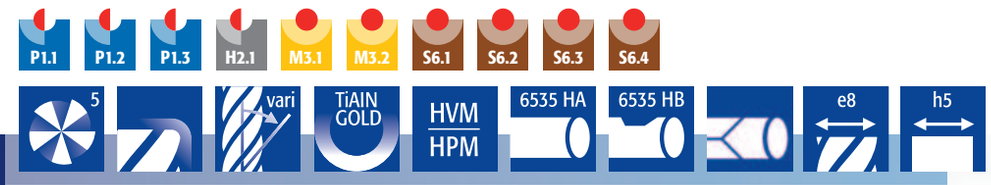
STD	Ap	Ae	Fz
3xD Neck relief	100% STD	100% STD	100% STD
4xD Neck relief	75% STD	50% STD	100% STD
5xD Neck relief	50% STD	25% STD	100% STD

Cutting speed 3xD - 4xD - 5xD Neck relief

STD	Vc m/min
3xD Neck relief	100% STD
4xD Neck relief	90% STD
5xD Neck relief	75% STD



* For end mills / für Schaftfräser L < 100 mm.



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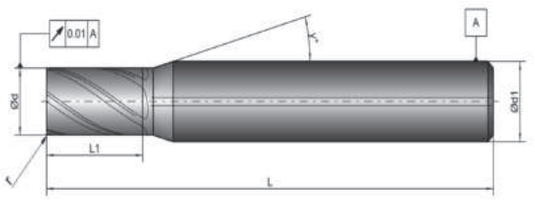
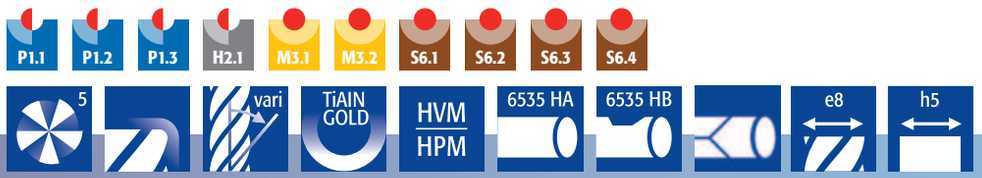
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Short / Kurze Ausführung										
VHVTRI 5 060 064 06 03 010 S	6,0	0,10	6	64	8,00	13,0	0,2	5	-	new
VHVTRI 5 060 064 06 03 030 S	6,0	0,30	6	64	8,00	13,0	0,2	5	-	new
VHVTRI 5 060 064 06 03 050 S	6,0	0,50	6	64	8,00	13,0	0,2	5	-	new
VHVTRI 5 060 064 06 03 100 S	6,0	1,00	6	64	8,00	13,0	0,2	5	-	new
VHVTRI 5 080 064 08 03 010 S	8,0	0,10	8	64	11,00	18,0	0,3	5	-	new
VHVTRI 5 080 064 08 03 030 S	8,0	0,30	8	64	11,00	18,0	0,3	5	-	new
VHVTRI 5 080 064 08 03 050 S	8,0	0,50	8	64	11,00	18,0	0,3	5	-	new
VHVTRI 5 080 064 08 03 100 S	8,0	1,00	8	64	11,00	18,0	0,3	5	-	new
VHVTRI 5 100 070 10 03 010 S	10,0	0,10	10	70	13,00	22,0	0,3	5	-	new
VHVTRI 5 100 070 10 03 030 S	10,0	0,30	10	70	13,00	22,0	0,3	5	-	new
VHVTRI 5 100 070 10 03 050 S	10,0	0,50	10	70	13,00	22,0	0,3	5	-	new
VHVTRI 5 100 070 10 03 100 S	10,0	1,00	10	70	13,00	22,0	0,3	5	-	new
VHVTRI 5 120 078 12 03 010 S	12,0	0,10	12	78	15,00	25,0	0,3	5	-	new
VHVTRI 5 120 078 12 03 030 S	12,0	0,30	12	78	15,00	25,0	0,3	5	-	new
VHVTRI 5 120 078 12 03 050 S	12,0	0,50	12	78	15,00	25,0	0,3	5	-	new
VHVTRI 5 120 078 12 03 100 S	12,0	1,00	12	78	15,00	25,0	0,3	5	-	new
VHVTRI 5 140 089 14 03 050 S	14,0	0,50	14	89	17,00	30,0	0,3	5	-	new
VHVTRI 5 140 089 14 03 100 S	14,0	1,00	14	89	17,00	30,0	0,3	5	-	new
VHVTRI 5 160 089 16 03 010 S	16,0	0,10	16	89	19,00	35,0	0,3	5	-	new
VHVTRI 5 160 089 16 03 050 S	16,0	0,50	16	89	19,00	35,0	0,3	5	-	new
VHVTRI 5 160 089 16 03 100 S	16,0	1,00	16	89	19,00	35,0	0,3	5	-	new
VHVTRI 5 200 102 20 03 050 S	20,0	0,50	20	102	23,00	42,0	0,4	5	-	new
VHVTRI 5 200 102 20 03 100 S	20,0	1,00	20	102	23,00	42,0	0,4	5	-	new
VHVTRI 5 250 120 25 03 050 S	25,0	0,50	25	120	28,00	45,0	0,4	5	-	new
VHVTRI 5 250 120 25 03 100 S	25,0	1,00	25	120	28,00	45,0	0,4	5	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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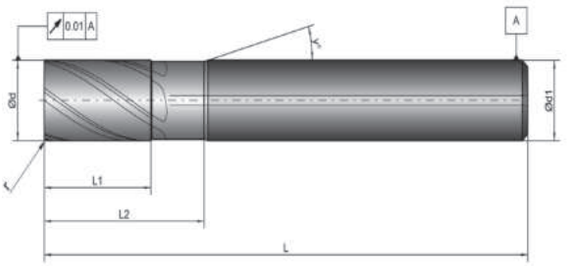
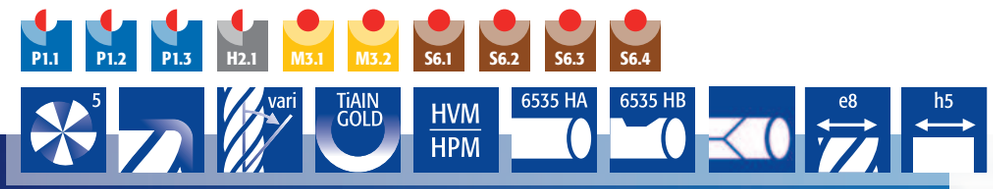
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
Standard										
VHVTRI 5 060 064 06 03 010	6,0	0,10	6	64	13,00	-	-	5	-	new
VHVTRI 5 060 064 06 03 030	6,0	0,30	6	64	13,00	-	-	5	-	new
VHVTRI 5 060 064 06 03 050	6,0	0,50	6	64	13,00	-	-	5	-	new
VHVTRI 5 060 064 06 03 100	6,0	1,00	6	64	13,00	-	-	5	-	new
VHVTRI 5 080 064 08 03 010	8,0	0,10	8	64	18,00	-	-	5	-	new
VHVTRI 5 080 064 08 03 030	8,0	0,30	8	64	18,00	-	-	5	-	new
VHVTRI 5 080 064 08 03 050	8,0	0,50	8	64	18,00	-	-	5	-	new
VHVTRI 5 080 064 08 03 100	8,0	1,00	8	64	18,00	-	-	5	-	new
VHVTRI 5 100 070 10 03 010	10,0	0,10	10	70	22,00	-	-	5	-	new
VHVTRI 5 100 070 10 03 030	10,0	0,30	10	70	22,00	-	-	5	-	new
VHVTRI 5 100 070 10 03 050	10,0	0,50	10	70	22,00	-	-	5	-	new
VHVTRI 5 100 070 10 03 100	10,0	1,00	10	70	22,00	-	-	5	-	new
VHVTRI 5 120 078 12 03 010	12,0	0,10	12	78	25,00	-	-	5	-	new
VHVTRI 5 120 078 12 03 030	12,0	0,30	12	78	25,00	-	-	5	-	new
VHVTRI 5 120 078 12 03 050	12,0	0,50	12	78	25,00	-	-	5	-	new
VHVTRI 5 120 078 12 03 100	12,0	1,00	12	78	25,00	-	-	5	-	new
VHVTRI 5 140 092 14 03 050	14,0	0,50	14	92	30,00	-	-	5	-	new
VHVTRI 5 140 092 14 03 100	14,0	1,00	14	92	30,00	-	-	5	-	new
VHVTRI 5 160 092 16 03 010	16,0	0,10	16	92	35,00	-	-	5	-	new
VHVTRI 5 160 092 16 03 050	16,0	0,50	16	92	35,00	-	-	5	-	new
VHVTRI 5 160 092 16 03 100	16,0	1,00	16	92	35,00	-	-	5	-	new
VHVTRI 5 200 102 20 03 050	20,0	0,50	20	102	42,00	-	-	5	-	new
VHVTRI 5 200 102 20 03 100	20,0	1,00	20	102	42,00	-	-	5	-	new
VHVTRI 5 250 120 25 03 050	25,0	0,50	25	120	45,00	-	-	5	-	new
VHVTRI 5 250 120 25 03 100	25,0	1,00	25	120	45,00	-	-	5	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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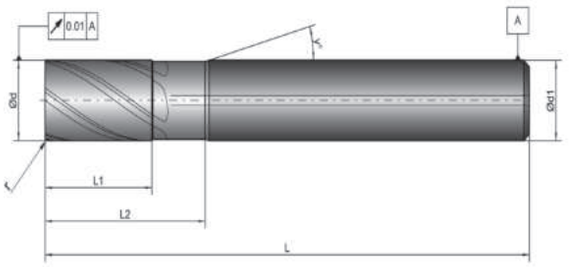
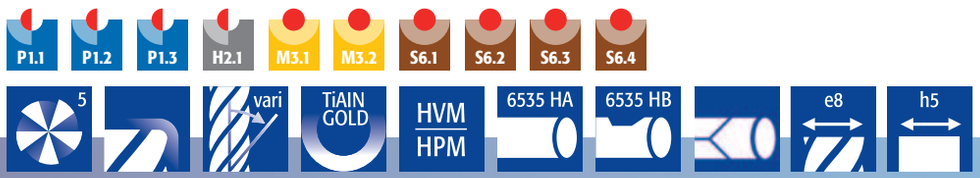
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 3xD										
VHVTRI 5 060 064 06 03 010 L	6,0	0,10	6	64	13,00	19,0	0,20	5	-	new
VHVTRI 5 060 064 06 03 030 L	6,0	0,30	6	64	13,00	19,0	0,20	5	-	new
VHVTRI 5 060 064 06 03 050 L	6,0	0,50	6	64	13,00	19,0	0,20	5	-	new
VHVTRI 5 060 064 06 03 100 L	6,0	1,00	6	64	13,00	19,0	0,20	5	-	new
VHVTRI 5 080 064 08 03 010 L	8,0	0,10	8	64	18,00	25,0	0,30	5	-	new
VHVTRI 5 080 064 08 03 030 L	8,0	0,30	8	64	18,00	25,0	0,30	5	-	new
VHVTRI 5 080 064 08 03 050 L	8,0	0,50	8	64	18,00	25,0	0,30	5	-	new
VHVTRI 5 080 064 08 03 100 L	8,0	1,00	8	64	18,00	25,0	0,30	5	-	new
VHVTRI 5 100 075 10 03 010 L	10,0	0,10	10	75	22,00	32,0	0,30	5	-	new
VHVTRI 5 100 075 10 03 030 L	10,0	0,30	10	75	22,00	32,0	0,30	5	-	new
VHVTRI 5 100 075 10 03 050 L	10,0	0,50	10	75	22,00	32,0	0,30	5	-	new
VHVTRI 5 100 075 10 03 100 L	10,0	1,00	10	75	22,00	32,0	0,30	5	-	new
VHVTRI 5 120 086 12 03 010 L	12,0	0,10	12	86	25,00	38,0	0,30	5	-	new
VHVTRI 5 120 086 12 03 030 L	12,0	0,30	12	86	25,00	38,0	0,30	5	-	new
VHVTRI 5 120 086 12 03 050 L	12,0	0,50	12	86	25,00	38,0	0,30	5	-	new
VHVTRI 5 120 086 12 03 100 L	12,0	1,00	12	86	25,00	38,0	0,30	5	-	new
VHVTRI 5 120 102 12 03 010 L	12,0	0,10	12	102	25,00	38,0	0,30	5	-	new
VHVTRI 5 120 102 12 03 030 L	12,0	0,30	12	102	25,00	38,0	0,30	5	-	new
VHVTRI 5 120 102 12 03 050 L	12,0	0,50	12	102	25,00	38,0	0,30	5	-	new
VHVTRI 5 120 102 12 03 100 L	12,0	1,00	12	102	25,00	38,0	0,30	5	-	new
VHVTRI 5 140 102 14 03 050 L	14,0	0,50	14	102	30,00	44,0	0,30	5	-	new
VHVTRI 5 140 102 14 03 100 L	14,0	1,00	14	102	30,00	44,0	0,30	5	-	new
VHVTRI 5 160 102 16 03 010 L	16,0	0,10	16	102	35,00	50,0	0,30	5	-	new
VHVTRI 5 160 102 16 03 050 L	16,0	0,50	16	102	35,00	50,0	0,30	5	-	new
VHVTRI 5 160 102 16 03 100 L	16,0	1,00	16	102	35,00	50,0	0,30	5	-	new
VHVTRI 5 200 125 20 03 050 L	20,0	0,50	20	125	42,00	62,0	0,40	5	-	new
VHVTRI 5 200 125 20 03 100 L	20,0	1,00	20	125	42,00	62,0	0,40	5	-	new
VHVTRI 5 250 135 25 03 050 L	25,0	0,50	25	135	45,00	77,0	0,40	5	-	new
VHVTRI 5 250 135 25 03 100 L	25,0	1,00	25	135	45,00	77,0	0,40	5	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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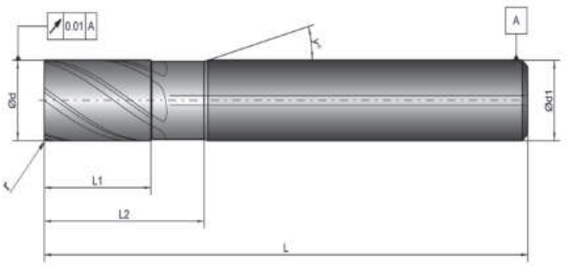
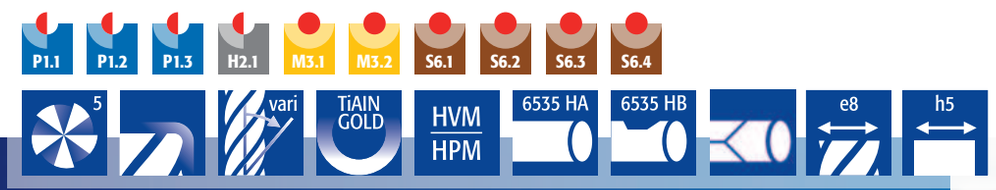
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 4xD										
VHVTRI 5 060 064 06 03 010 L025	6,0	0,10	6	64	13,00	25,0	0,200	5	-	new
VHVTRI 5 060 064 06 03 030 L025	6,0	0,30	6	64	13,00	25,0	0,200	5	-	new
VHVTRI 5 060 064 06 03 050 L025	6,0	0,50	6	64	13,00	25,0	0,200	5	-	new
VHVTRI 5 060 064 06 03 100 L025	6,0	1,00	6	64	13,00	25,0	0,200	5	-	new
VHVTRI 5 080 072 08 03 010 L033	8,0	0,10	8	72	18,00	33,0	0,300	5	-	new
VHVTRI 5 080 072 08 03 030 L033	8,0	0,30	8	72	18,00	33,0	0,300	5	-	new
VHVTRI 5 080 072 08 03 050 L033	8,0	0,50	8	72	18,00	33,0	0,300	5	-	new
VHVTRI 5 080 072 08 03 100 L033	8,0	1,00	8	72	18,00	33,0	0,300	5	-	new
VHVTRI 5 100 084 10 03 010 L042	10,0	0,10	10	84	22,00	42,0	0,300	5	-	new
VHVTRI 5 100 084 10 03 030 L042	10,0	0,30	10	84	22,00	42,0	0,300	5	-	new
VHVTRI 5 100 084 10 03 050 L042	10,0	0,50	10	84	22,00	42,0	0,300	5	-	new
VHVTRI 5 100 084 10 03 100 L042	10,0	1,00	10	84	22,00	42,0	0,300	5	-	new
VHVTRI 5 120 098 12 03 010 L 050	12,0	0,10	12	98	25,00	50,0	0,300	5	-	new
VHVTRI 5 120 098 12 03 030 L050	12,0	0,30	12	98	25,00	50,0	0,300	5	-	new
VHVTRI 5 120 098 12 03 050 L050	12,0	0,50	12	98	25,00	50,0	0,300	5	-	new
VHVTRI 5 120 098 12 03 100 L050	12,0	1,00	12	98	25,00	50,0	0,300	5	-	new
VHVTRI 5 160 116 16 03 010 L066	16,0	0,10	16	116	35,00	66,0	0,300	5	-	new
VHVTRI 5 160 116 16 03 050 L066	16,0	0,50	16	116	35,00	66,0	0,300	5	-	new
VHVTRI 5 160 116 16 03 100 L066	16,0	1,00	16	116	35,00	66,0	0,300	5	-	new
VHVTRI 5 200 135 20 03 050 L082	20,0	0,50	20	135	42,00	82,0	0,400	5	-	new
VHVTRI 5 200 135 20 03 100 L082	20,0	1,00	20	135	42,00	82,0	0,400	5	-	new
VHVTRI 5 250 160 25 03 050 L102	25,0	0,50	25	160	45,00	102,0	0,400	5	-	new
VHVTRI 5 250 160 250 03 100 L102	25,0	1,00	25	160	45,00	102,0	0,400	5	-	new

EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 5 060…



* For end mills / für Schaftfräser L < 100 mm.



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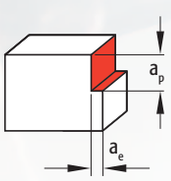
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
With neck relief 5XD										
VHVTRI 5 060 070 06 03 010 L031	6,0	0,10	6	70	13,00	31,0	0,200	5	-	new
VHVTRI 5 060 070 06 03 030 L031	6,0	0,30	6	70	13,00	31,0	0,200	5	-	new
VHVTRI 5 060 070 06 03 050 L031	6,0	0,50	6	70	13,00	31,0	0,200	5	-	new
VHVTRI 5 060 070 06 03 100 L031	6,0	1,00	6	70	13,00	31,0	0,200	5	-	new
VHVTRI 5 080 080 08 03 010 L041	8,0	0,10	8	80	18,00	41,0	0,300	5	-	new
VHVTRI 5 080 080 08 03 030 L041	8,0	0,30	8	80	18,00	41,0	0,300	5	-	new
VHVTR 5 080 080 08 03 050 L041	8,0	0,50	8	80	18,00	41,0	0,300	5	-	new
VHVTRI 5 080 080 08 03 100 L041	8,0	1,00	8	80	18,00	41,0	0,300	5	-	new
VHVTRI 5 100 094 10 03 010 L052	10,0	0,10	10	94	22,00	52,0	0,300	5	-	new
VHVTRI 5 100 094 10 03 030 L052	10,0	0,30	10	94	22,00	52,0	0,300	5	-	new
VHVTRI 5 100 094 10 03 050 L052	10,0	0,50	10	94	22,00	52,0	0,300	5	-	new
VHVTRI 5 100 094 10 03 100 L052	10,0	1,00	10	94	22,00	52,0	0,300	5	-	new
VHVTRI 5 120 110 12 03 010 L062	12,0	0,10	12	110	25,00	62,0	0,300	5	-	new
VHVTRI 5 120 110 12 03 030 L062	12,0	0,30	12	110	25,00	62,0	0,300	5	-	new
VHVTRI 5 120 110 12 03 050 L062	12,0	0,50	12	110	25,00	62,0	0,300	5	-	new
VHVTRI 5 120 110 12 03 100 L062	12,0	1,00	12	110	25,00	62,0	0,300	5	-	new
VHVTRI 5 160 132 16 03 010 L082	16,0	0,10	16	132	35,00	82,0	0,300	5	-	new
VHVTRI 5 160 132 16 03 050 L082	16,0	0,50	16	132	35,00	82,0	0,300	5	-	new
VHVTRI 5 160 132 16 03 100 L082	16,0	1,00	16	132	35,00	82,0	0,300	5	-	new
VHVTRI 5 200 154 20 03 050 L102	20,0	0,50	20	154	42,00	102,0	0,400	5	-	new
VHVTRI 5 200 154 20 03 100 L102	20,0	1,00	20	154	42,00	102,0	0,400	5	-	new

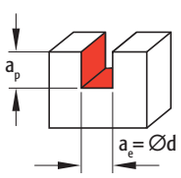
EVEN SHANK DIAMETERS STARTING FROM Ø6 MM ARE AVAILABLE WITH WELDON, ADD "W" TO THE ARTICLE CODE. E.G. VHVTRI**W** 5 060…

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

Due to the internal cooling, the perfect tool for rough-milling as well as for finish-milling, granting an even longer toollife

Durch die Innenkühlung, das perfekte Werkzeug für das Aufrauhfräsen, so wie auch für das Fertigfräsen, mit einer längeren Standzeit





Shoulder milling / Eckfräsen (1xD depth of cut)

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 3,0	< 1,4	0,010 - 0,020
4,0	< 4,0	< 1,8	0,015 - 0,030
5,0	< 5,0	< 2,3	0,020 -0,040
6,0	< 6,0	< 2,7	0,025 - 0,050
8,0	< 8,0	< 3,6	0,030 - 0,060
10,0	< 10,0	< 4,5	0,040 - 0,070
12,0	< 12,0	< 5,4	0,050 - 0,080
14,0	< 14,0	< 6,3	0,055 - 0,090
16,0	< 16,0	< 7,2	0,060 - 0,100
20,0	< 20,0	< 9,0	0,080 - 0,120
25,0	< 25,0	< 11,3	0,100 - 0,150

Shoulder milling / Eckfräsen (2xD depth of cut)

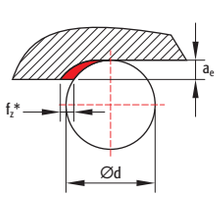
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 6,0	< 0,75	0,010 - 0,030
< 8,0	< 1,00	0,020 - 0,040
< 10,0	< 1,25	0,025 - 0,055
< 12,0	< 1,50	0,035 - 0,065
< 16,0	< 2,00	0,045 - 0,075
< 20,0	< 2,50	0,055 - 0,085
< 24,0	< 3,00	0,070 - 0,100
< 28,0	< 3,50	0,080 - 0,120
< 32,0	< 4,00	0,090 - 0,130
< 40,0	< 5,00	0,110 - 0,150
< 50,0	< 6,25	0,135 - 0,185

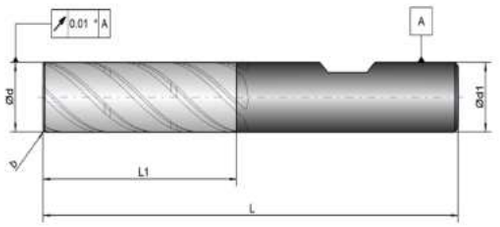
Cutting conditions 3xD - 4xD - 5xD Neck relief

STD	Ap	Ae	Fz
3xD Neck relief	100% STD	100% STD	100% STD
4xD Neck relief	75% STD	50% STD	100% STD
5xD Neck relief	50% STD	25% STD	100% STD

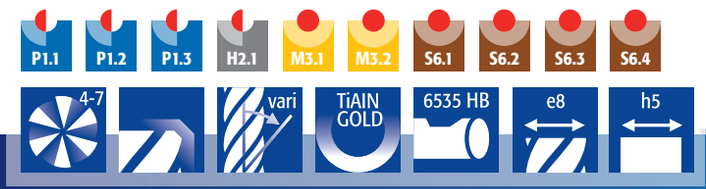
Cutting speed 3xD - 4xD - 5xD Neck relief

STD	Vc m/min
3xD Neck relief	100% STD
4xD Neck relief	90% STD
5xD Neck relief	75% STD





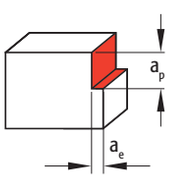
* For end mills / für Schaftfräser L < 100 mm.

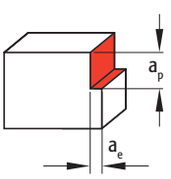


Article Number *Artikelnummer*	Ød (mm)	b (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
3xD									
VHTR 4 030 060 06 03	3,0	0,10	6	60	10,00	-	-	4	15
VHTR 4 040 060 06 03	4,0	0,10	6	60	13,00	-	-	4	15
VHTR 4 050 060 06 03	5,0	0,10	6	60	16,00	-	-	4	15
VHTR 5 060 060 06 03	6,0	0,10	6	60	19,00	-	-	5	-
VHTR 5 080 065 08 03	8,0	0,15	8	65	25,00	-	-	5	-
VHTR 5 100 078 10 03	10,0	0,20	10	78	32,00	-	-	5	-
VHTR 6 120 090 12 03	12,0	0,20	12	90	38,00	-	-	6	-
VHTR 6 160 108 16 03	16,0	0,30	16	108	50,00	-	-	6	-
VHTR 7 200 130 20 03	20,0	0,40	20	130	62,00	-	-	7	-
4xD									
VHTR 4 030 064 06 03 L	3,0	0,10	6	64	13,00	-	-	4	15
VHTR 4 040 064 06 03 L	4,0	0,10	6	64	17,00	-	-	4	15
VHTR 4 050 064 06 03 L	5,0	0,10	6	64	21,00	-	-	4	15
VHTR 5 060 064 06 03 L	6,0	0,10	6	64	25,00	-	-	5	-
VHTR 5 080 078 08 03 L	8,0	0,15	8	78	33,00	-	-	5	-
VHTR 5 100 089 10 03 L	10,0	0,15	10	89	42,00	-	-	5	-
VHTR 5 120 102 12 03 L	12,0	0,15	12	102	50,00	-	-	5	-
VHTR 5 160 125 16 03 L	16,0	0,20	16	125	66,00	-	-	5	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**220 - 280**	emulsion
P1.2	< 1000	< 300	**145 - 225**	emulsion
P1.3	< 1400	< 400	**100 - 180**	emulsion
H2.1		< 50 HRc	**100 - 150**	emulsion
M3.1	< 950		**140 - 200**	emulsion
M3.2	< 1250		**110 - 150**	emulsion
S6.1	< 1500		**55 - 75**	emulsion
S6.2	< 1600		**60 - 90**	emulsion
S6.3	< 1600		**45 - 65**	emulsion
S6.4	< 1250		**80 - 120**	emulsion

- High MRR (Material Removal Rate)
  Großes Spanvolumen erreichen
- Constant cutting force
  Konstante Schnittkraft
  - Better for machine
    Besser für die Maschine
  - Better for end mill
    Besser für Schaftfräser
  - Increased lifetime
    Erhöhte Lebensdauer



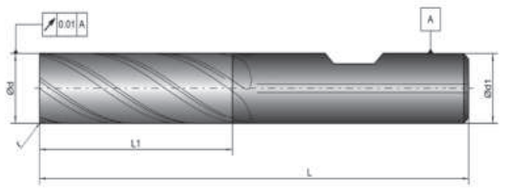


Shoulder milling 3xD/Eckfräsen 3xD

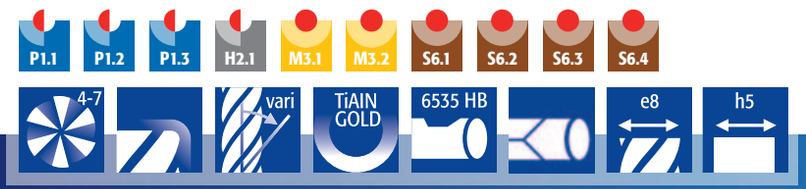
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 9,00	< 0,450	0,015 - 0,035
4,0	< 12,00	< 0,600	0,025 - 0,050
5,0	< 15,00	< 0,750	0,030 - 0,060
6,0	< 18,00	< 0,900	0,040 - 0,070
8,0	< 24,00	< 1,200	0,050 - 0,085
10,0	< 30,00	< 1,500	0,060 - 0,100
12,0	< 36,00	< 1,800	0,085 - 0,120
16,0	< 40,00	< 2,400	0,100 - 0,145
20,0	< 50,00	< 3,000	0,125 - 0,175

Shoulder milling 4xD/Eckräsen 4xD

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 12,00	< 0,210	0,015 - 0,035
4,0	< 16,00	< 0,280	0,025 - 0,050
5,0	< 20,00	< 0,350	0,030 - 0,060
6,0	< 24,00	< 0,420	0,040 - 0,070
8,0	< 32,00	< 0,560	0,050 - 0,085
10,0	< 40,00	< 0,700	0,060 - 0,100
12,0	< 48,00	< 0,840	0,085 - 0,120
16,0	< 64,00	< 1,120	0,100 - 0,145
20,0	< 83,00	< 1,400	0,125 - 0,175



* For end mills / für Schaftfräser L < 100 mm.

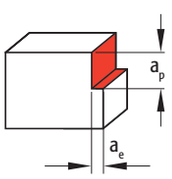


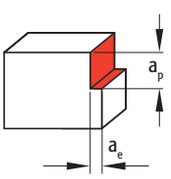
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
3xD										
VHTRI 5 080 065 08 03	8,0	0,15	8	65	25,00	-	-	5	-	**new**
VHTRI 5 100 078 10 03	10,0	0,20	10	78	32,00	-	-	5	-	**new**
VHTRI 6 120 090 12 03	12,0	0,20	12	90	38,00	-	-	6	-	**new**
VHTRI 6 160 108 16 03	16,0	0,30	16	108	50,00	-	-	6	-	**new**
VHTRI 7 200 130 20 03	20,0	0,40	20	130	62,00	-	-	7	-	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**220 - 280**	emulsion
P1.2	< 1000	< 300	**145 - 225**	emulsion
P1.3	< 1400	< 400	**100 - 180**	emulsion
H2.1		< 50 HRc	**100 - 150**	emulsion
M3.1	< 950		**140 - 250**	emulsion
M3.2	< 1250		**110 - 180**	emulsion
S6.1	< 1500		**55 - 75**	emulsion
S6.2	< 1600		**60 - 90**	emulsion
S6.3	< 1600		**45 - 65**	emulsion
S6.4	< 1250		**80 - 120**	emulsion

Optimized cutting conditions to application area

Optimierte Schnittwertebedingungen auf Anwendungsgebiet



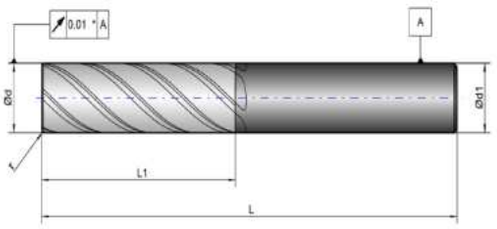


Shoulder milling 3xD/Eckfräsen 3xD

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 9,00	< 0,450	0,015 - 0,035
4,0	< 12,00	< 0,600	0,025 - 0,050
5,0	< 15,00	< 0,750	0,030 - 0,060
6,0	< 18,00	< 0,900	0,040 - 0,070
8,0	< 24,00	< 1,200	0,050 - 0,085
10,0	< 30,00	< 1,500	0,060 - 0,100
12,0	< 36,00	< 1,800	0,085 - 0,120
16,0	< 40,00	< 2,400	0,100 - 0,145
20,0	< 50,00	< 3,000	0,125 - 0,175

Shoulder milling 4xD/Eckfräsen 4xD

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 12,00	< 0,210	0,015 - 0,035
4,0	< 16,00	< 0,280	0,025 - 0,050
5,0	< 20,00	< 0,350	0,030 - 0,060
6,0	< 24,00	< 0,420	0,040 - 0,070
8,0	< 32,00	< 0,560	0,050 - 0,085
10,0	< 40,00	< 0,700	0,060 - 0,100
12,0	< 48,00	< 0,840	0,085 - 0,120
16,0	< 64,00	< 1,120	0,100 - 0,145
20,0	< 83,00	< 1,400	0,125 - 0,175



* For end mills / für Schaftfräser L < 100 mm.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard / Long / Extra long									
HAMF 6 030 057 06 03 010	3,0	0,10	6	57	7,00	-	-	6	15
HAMF 6 040 057 06 03 010	4,0	0,10	6	57	9,00	-	-	6	15
HAMF 6 050 057 06 03 010	5,0	0,10	6	57	11,00	-	-	6	15
HAMF 6 060 057 06 03 010	6,0	0,10	6	57	15,00	-	-	6	-
HAMF 6 060 057 06 03 030	6,0	0,30	6	57	15,00	-	-	6	-
HAMF 6 080 064 08 03 010	8,0	0,10	8	64	20,00	-	-	6	-
HAMF 6 080 064 08 03 050	8,0	0,50	8	64	20,00	-	-	6	-
HAMF 6 100 078 10 03 010	10,0	0,10	10	78	22,00	-	-	6	-
HAMF 6 100 078 10 03 050	10,0	0,50	10	78	22,00	-	-	6	-
HAMF 6 120 078 12 03 010	12,0	0,10	12	78	28,00	-	-	6	-
HAMF 6 120 078 12 03 050	12,0	0,50	12	78	28,00	-	-	6	-
HAMF 6 160 089 16 03 015	16,0	0,15	16	89	34,00	-	-	6	-
HAMF 6 160 089 16 03 050	16,0	0,50	16	89	34,00	-	-	6	-
HAMF 8 200 102 20 03 015	20,0	0,15	20	102	42,00	-	-	8	-
HAMF 8 200 102 20 03 050	20,0	0,50	20	102	42,00	-	-	8	-
HAMFL 6 030 064 06 03 010	3,0	0,10	6	64	10,00	-	-	6	15
HAMFL 6 040 064 06 03 010	4,0	0,10	6	64	13,00	-	-	6	15
HAMFL 6 050 064 06 03 010	5,0	0,10	6	64	16,00	-	-	6	15
HAMFL 6 060 064 06 03 010	6,0	0,10	6	64	20,00	-	-	6	-
HAMFL 6 060 064 06 03 030	6,0	0,30	6	64	20,00	-	-	6	-
HAMFL 6 080 078 08 03 010	8,0	0,10	8	78	30,00	-	-	6	-
HAMFL 6 080 078 08 03 050	8,0	0,50	8	78	30,00	-	-	6	-
HAMFL 6 100 089 10 03 010	10,0	0,10	10	89	35,00	-	-	6	-
HAMFL 6 100 089 10 03 050	10,0	0,50	10	89	35,00	-	-	6	-
HAMFL 6 120 102 12 03 010	12,0	0,10	12	102	40,00	-	-	6	-
HAMFL 6 120 102 12 03 050	12,0	0,50	12	102	40,00	-	-	6	-
HAMFL 6 160 102 16 03 015	16,0	0,15	16	102	50,00	-	-	6	-
HAMFL 6 160 102 16 03 050	16,0	0,50	16	102	50,00	-	-	6	-
HAMFL 8 200 125 20 03 015	20,0	0,15	20	125	60,00	-	-	8	-
HAMFL 8 200 125 20 03 050	20,0	0,50	20	125	60,00	-	-	8	-
HAMFXL 6 060 070 06 03 010	6,0	0,10	6	70	30,00	-	-	6	-
HAMFXL 6 080 102 08 03 010	8,0	0,10	8	102	40,00	-	-	6	-
HAMFXL 6 080 102 08 03 050	8,0	0,50	8	102	40,00	-	-	6	-
HAMFXL 6 100 125 10 03 010	10,0	0,10	10	125	60,00	-	-	6	-
HAMFXL 6 100 125 10 03 050	10,0	0,50	10	125	60,00	-	-	6	-
HAMFXL 6 120 150 12 03 010	12,0	0,10	12	150	65,00	-	-	6	-
HAMFXL 6 120 150 12 03 050	12,0	0,50	12	150	65,00	-	-	6	-
HAMFXL 6 160 150 16 03 015	16,0	0,15	16	150	75,00	-	-	6	-
HAMFXL 6 160 150 16 03 050	16,0	0,50	16	150	75,00	-	-	6	-
HAMFXL 8 200 150 20 03 015	20,0	0,15	20	150	80,00	-	-	8	-
HAMFXL 8 200 150 20 03 050	20,0	0,50	20	150	80,00	-	-	8	-

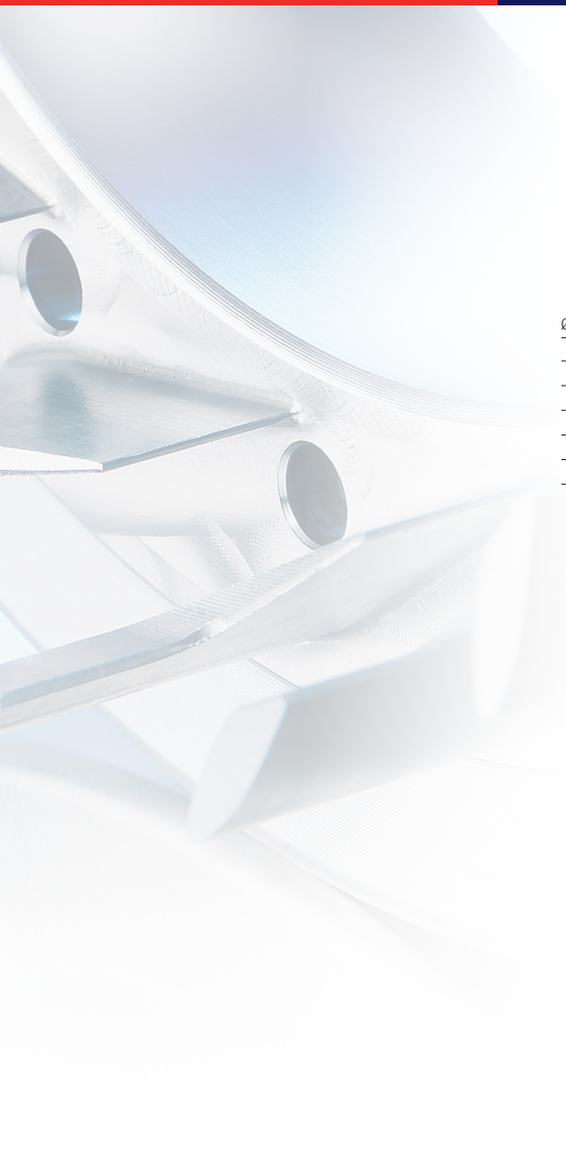
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

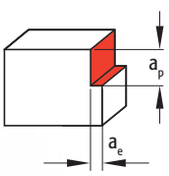
Super smooth surface finish
Super glatte Oberflächenqualität

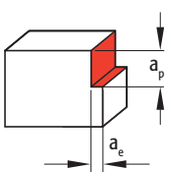
HAMFL 8 200 125 20 03 050
Workpiece material: 1.4401 stainless 316

Ø	20,0 mm
V_c	100 m/min
n	3.979 rpm
F_z	0,03 mm/t
Z	8
V_f	950 mm/min
a_p	40,0 mm
a_e	0,2 mm
Coolant	emulsion
Q	**7,6 cm³/min**

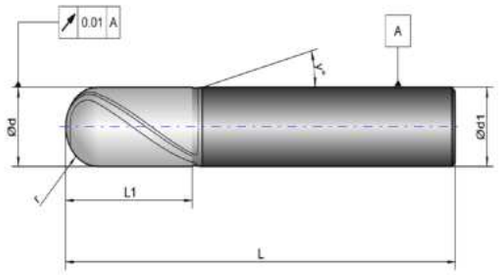
- Superior surface finish!
  Hervorragende Oberflächenqualität!
- Excellent straightness tolerances.
  Ausgezeichnete Plantoleranzen.
- Cutting length up to 6 x D.
  Schnitttiefen bis 6 x D.







Ød (mm)	Roughing / Schruppfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Finishing / Schlichtfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
6,0	< 20,0	< 0,48	0,035 - 0,055	< 20,0	< 0,12	0,020 - 0,040
8,0	< 40,0	< 0,64	0,045 - 0,075	< 40,0	< 0,16	0,030 - 0,050
10,0	< 60,0	< 0,80	0,070 - 0,090	< 60,0	< 0,20	0,040 - 0,060
12,0	< 65,0	< 0,96	0,080 - 0,110	< 65,0	< 0,24	0,050 - 0,080
16,0	< 75,0	< 1,28	0,100 - 0,140	< 75,0	< 0,32	0,070 - 0,100
20,0	< 80,0	< 1,60	0,120 - 0,180	< 80,0	< 0,40	0,085 - 0,120



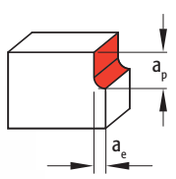
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
HABM 2 004 051 04 03	0,4	0,20	4	51	0,60	-	-	2	10
HABM 2 005 051 04 03	0,5	0,25	4	51	0,90	-	-	2	10
HABM 2 006 051 04 03	0,6	0,30	4	51	1,20	-	-	2	10
HABM 2 008 051 04 03	0,8	0,40	4	51	1,50	-	-	2	10
HABM 2 010 051 04 03	1,0	0,50	4	51	2,00	-	-	2	15
HABM 2 015 051 04 03	1,5	0,75	4	51	3,00	-	-	2	15
HABM 2 020 051 04 03	2,0	1,00	4	51	4,00	-	-	2	15
HABM 2 030 051 04 03	3,0	1,50	4	51	6,00	-	-	2	15
HABM 2 040 057 06 03	4,0	2,00	6	57	8,00	-	-	2	15
HABM 2 050 057 06 03	5,0	2,50	6	57	10,00	-	-	2	15
HABM 2 060 057 06 03	6,0	3,00	6	57	12,00	-	-	2	-
HABM 2 080 063 08 03	8,0	4,00	8	63	16,00	-	-	2	-
HABM 2 100 072 10 03	10,0	5,00	10	72	20,00	-	-	2	-
HABM 2 120 083 12 03	12,0	6,00	12	83	24,00	-	-	2	-

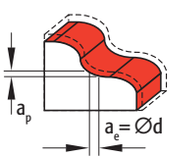
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion

HABM 2 080 100 08 03
Material: 1.4462 Duplex

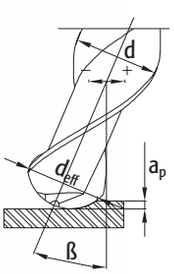
Ø	8,0 mm
V_c	120 m/min
n	4.775 rpm
F_z	0,04 mm/t
Z	2
V_f	385 mm/min
a_p	0,1 mm
a_e	0,1 mm
Coolant	emulsion
Tool life	**2,5 Hours**

- Improved tool life
  Erhöhte Standzeit
- Better surface finish
  Bessere Oberflächenqualität





Ød (mm)	Roughing / Schruppfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Finishing / Schlichtfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,4	< 0,60	< 0,12	0,004 - 0,008	< 0,60	< 0,04	0,007 - 0,015
0,5	<0,75	< 0,15	0,005 - 0,009	< 0,75	< 0,05	0,010 - 0,020
0,6	<0,90	< 0,18	0,006 - 0,010	< 0,90	< 0,06	0,012 - 0,021
0,8	<1,20	< 0,24	0,007 - 0,012	< 1,20	< 0,08	0,014 - 0,023
1,0	< 1,50	< 0,30	0,008 - 0,015	< 1,50	< 0,10	0,015 - 0,025
1,5	< 2,25	< 0,45	0,012 - 0,018	< 2,25	< 0,15	0,020 - 0,030
2,0	< 3,00	< 0,60	0,016 - 0,022	< 3,00	< 0,20	0,025 - 0,035
3,0	< 4,50	< 0,90	0,018 - 0,025	< 4,50	< 0,30	0,028 - 0,040
4,0	< 6,00	< 1,20	0,020 - 0,028	< 6,00	< 0,40	0,030 - 0,045
5,0	< 7,50	< 1,50	0,025 - 0,035	< 7,50	< 0,50	0,035 - 0,050
6,0	< 9,00	< 1,80	0,028 - 0,042	< 9,00	< 0,60	0,040 - 0,055
8,0	< 12,00	< 2,40	0,030 - 0,050	< 12,00	< 0,80	0,050 - 0,065
10,0	< 15,00	< 3,00	0,040 - 0,070	< 15,00	<1,00	0,055 - 0,080
12,0	< 18,00	< 3,60	0,050 - 0,080	< 18,00	< 1,20	0,065 - 0,090



- For the cutting speed V_c calculation the effective cutting diameter d_{eff} has to be taken into account. See formula.
- Für die Berechnung der Schnittgeschwindigkeit muss der effektive Durchmesser d_{eff} berücksichtigt werden (siehe Formel).

ß ≠ 0: $d_{eff} = d \bullet \sin\left[ß \pm \arccos\left(\frac{d - 2a_p}{d}\right)\right]$

Solutions for synthetics and composite materials

Lösungen für die Bearbeitung von Kunst- und Verbundwerkstoffen

Years of experience and numerous tests in aerospace applications, provided the details required to develop an integral end mill high-end program for glass- and carbon fibre reinforced materials.

Jahrelange Erfahrung und zahlreiche Teste in der Luft- und Raumfahrtindustrie ermöglichten die Entwicklung eines umfassenden High-End-Fräserprogramms für glas- und kohlefaserverstärkte Werkstoffe.

STOCK SELLOUT
Lagerausverkauf
-40%

Due to Stock sell out, we offer the VHDT and VHDB at a reduced price.

Da der Lagerbestand ausverkauft wird, bieten wir VHDT und VHDB zu einem reduzierten Preis an.

Mills can be ordered as special after stock sellout.
Fräser können nach Lagerausverkauf als Sonderfräser bestellt werden.

High accurate manufacturing by laser

Hohe Präzisionsproduktion mit Lasern

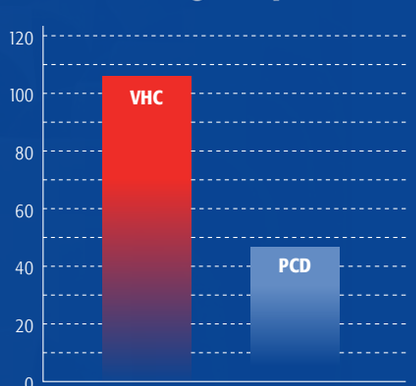
Workpiece Material: Aerospace Composite T800/M21
End mill: VHDT 2 060 078 R05
Operation / Bearbeitung: Shoulder Milling / Eckfräsen

Ø	6,0 mm
V_c	285 m/min
N	15.120 rpm
D_c	6,0 mm
F_z	0,12 mm/t
Z	2
V_f	3.000 mm/min
a_p	4,0 mm
a_e	2,5 mm
Coolant	air / external

Result / Ergebnis **PCD**	47,0 cm^3/min
Result / Ergebnis **VHC**	107,0 cm^3/min

Improvement Verbesserung	**2,3 time higher tool life** 2,3 fache Standzeit

Practicle example
Bearbeitungsbeispiele

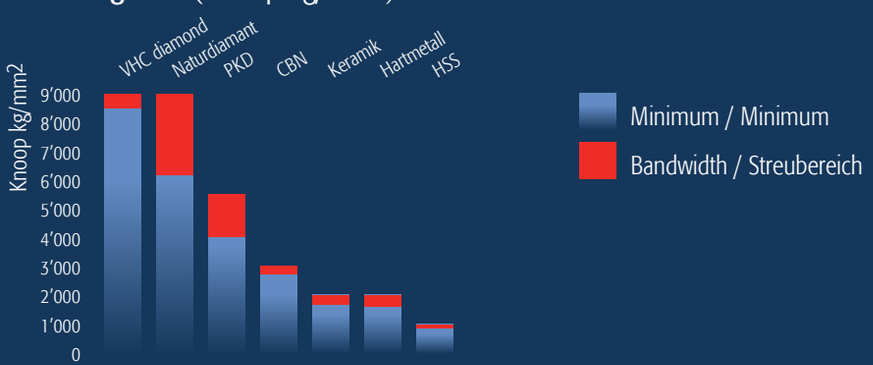


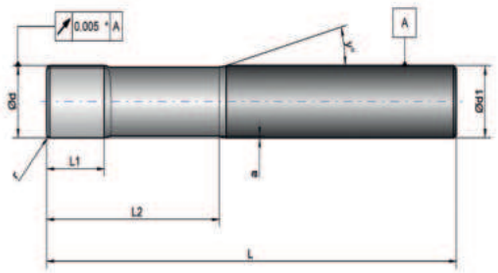
CVD vs PCD

CVD vs PCD

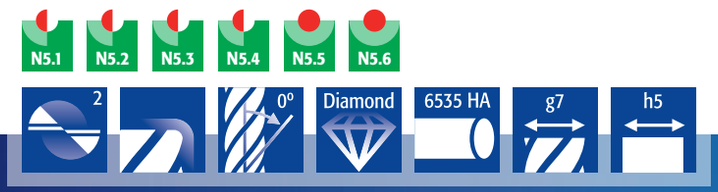
- **2 To 5 times longer tool life**
  2 Bis 5-fache Standzeit
- **More accuracy & a better surface finish**
  Höhere Genauigkeit und bessere Oberflächenqualität
- **Higher machine efficiency**
  Höhere Maschineneffizienz

Hardness Comparison (Knoop kg/mm²)
Härtevergleich (Knoop kg/mm²)





* For end mills / für Schaftfräser L < 100 mm.



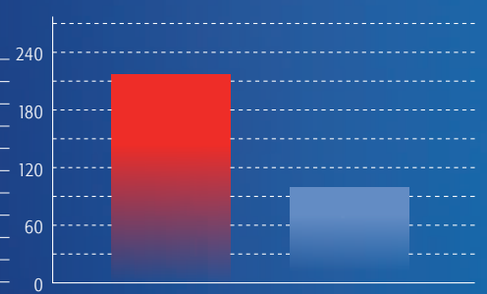
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHDT 2 030 078 030 L09	3,0	0,30	6	78	2,50	9,0	0,250	2	25
VHDT 2 030 078 030 L15	3,0	0,30	6	78	2,50	15,0	0,250	2	25
VHDT 2 030 078 R03	3,0	0,30	6	78	3,00	9,0	0,100	2	15
VHDT 2 030 078 050 L09	3,0	0,50	6	78	2,50	9,0	0,250	2	25
VHDT 2 030 078 050 L15	3,0	0,50	6	78	2,50	15,0	0,250	2	25
VHDT 2 030 078 R05	3,0	0,50	6	78	3,00	9,0	0,100	2	15
VHDT 2 040 078 030 L12	4,0	0,30	6	78	2,50	12,0	0,250	2	25
VHDT 2 040 078 030 L20	4,0	0,30	6	78	2,50	20,0	0,250	2	25
VHDT 2 040 078 R03	4,0	0,30	6	78	4,00	12,0	0,100	2	15
VHDT 2 040 078 050 L12	4,0	0,50	6	78	2,50	12,0	0,250	2	25
VHDT 2 040 078 050 L20	4,0	0,50	6	78	2,50	20,0	0,250	2	25
VHDT 2 040 078 R05	4,0	0,50	6	78	4,00	12,0	0,100	2	15
VHDT 2 050 078 030 L15	5,0	0,30	6	78	3,00	15,0	0,300	2	25
VHDT 2 050 078 030 L25	5,0	0,30	6	78	3,00	25,0	0,300	2	25
VHDT 2 050 078 050 L15	5,0	0,50	6	78	3,00	15,0	0,300	2	25
VHDT 2 050 078 050 L25	5,0	0,50	6	78	3,00	25,0	0,300	2	25
VHDT 2 050 078 R05	5,0	0,50	6	78	5,00	15,0	0,100	2	15
VHDT 2 050 078 R10	5,0	1,00	6	78	5,00	15,0	0,100	2	15
VHDT 2 060 078 R05	6,0	0,50	6	78	6,00	18,0	0,100	2	-
VHDT 2 060 078 R10	6,0	1,00	6	78	6,00	18,0	0,100	2	-
VHDT 2 060 102 030 L18	6,0	0,30	6	102	6,00	18,0	0,300	2	-
VHDT 2 060 102 030 L30	6,0	0,30	6	102	6,00	30,0	0,300	2	-
VHDT 2 060 102 050 L18	6,0	0,50	6	102	6,00	18,0	0,300	2	-
VHDT 2 060 102 050 L30	6,0	0,50	6	102	6,00	30,0	0,300	2	-
VHDT 2 060 102 100 L18	6,0	1,00	6	102	6,00	18,0	0,300	2	-
VHDT 2 060 102 100 L30	6,0	1,00	6	102	6,00	30,0	0,300	2	-
VHDT 2 080 078 R05	8,0	0,50	8	78	8,00	24,0	0,100	2	-
VHDT 2 080 078 R10	8,0	1,00	8	78	8,00	24,0	0,100	2	-
VHDT 2 080 102 030 L24	8,0	0,30	8	102	7,00	24,0	0,400	2	-
VHDT 2 080 102 050 L24	8,0	0,50	8	102	7,00	24,0	0,400	2	-
VHDT 2 080 102 100 L24	8,0	1,00	8	102	7,00	24,0	0,400	2	-
VHDT 2 100 078 R10	10,0	1,00	10	78	10,00	30,0	0,100	2	-
VHDT 2 100 102 050 L30	10,0	0,50	10	102	8,00	30,0	0,500	2	-
VHDT 2 100 102 100 L30	10,0	1,00	10	102	8,00	30,0	0,500	2	-
VHDT 2 120 078 R10	12,0	1,00	12	78	12,00	30,0	0,100	2	-
VHDT 2 120 107 050 L36	12,0	0,50	12	107	9,00	36,0	0,500	2	-
VHDT 2 120 107 100 L36	12,0	1,00	12	107	9,00	36,0	0,500	2	-

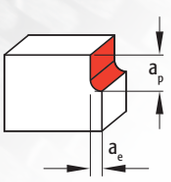
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air
N5.6			**< 700**	emulsion / air

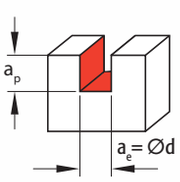
VHDT 2 060 078 R05
Workpiece Material: T800 M21
Hardness: Aerospace Material

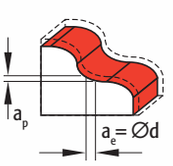
	Van Hoorn	Competitor
Ø	**6,0 mm**	**6,0 mm**
V_c	283 m/min	283 m/min
n	15.000 rpm	15.000 rpm
F_z	0,10 mm/t	0,10 mm/t
Z	2	2
V_f	3.000 mm/min	3.000 mm/min
a_p	4,0 mm	4,0 mm
a_e	6,0 mm	6,0 mm
Coolant	emulsion	emulsion
Q	**72,0 mm³/min**	**72,0 mm³/min**
Tool life	**214 min**	**94 min**

Tool life
Standzeit









Shoulder milling / Eckfräsen

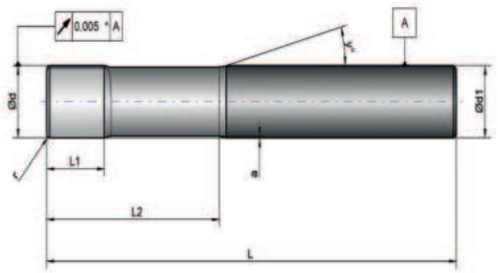
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 1,95	< 1,20	0,020 - 0,030
4,0	< 2,60	< 1,60	0,030 - 0,045
5,0	< 3,25	< 2,00	0,040 - 0,060
6,0	< 3,90	< 2,40	0,050 - 0,070
8,0	< 5,20	< 3,20	0,060 - 0,080
10,0	< 6,50	< 4,00	0,070 - 0,100
12,0	< 7,80	< 4,80	0,090 - 0,120

Slot milling / Nutfräsen

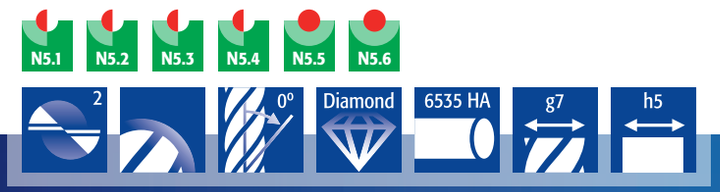
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 0,60	< 3,0	0,010 - 0,020
< 0,80	< 4,0	0,020 - 0,040
< 1,00	< 5,0	0,030 - 0,045
< 1,20	< 6,0	0,040 - 0,060
< 1,60	< 8,0	0,050 - 0,070
< 2,00	< 10,0	0,060 - 0,080
< 2,40	< 12,0	0,080 - 0,100

Profile milling / Profilfräsen

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 0,60	< 0,30	0,020 - 0,030
< 0,80	< 0,40	0,030 - 0,045
< 1,00	< 0,50	0,040 - 0,060
< 1,20	< 0,60	0,050 - 0,070
< 1,60	< 0,80	0,060 - 0,080
< 2,00	< 1,00	0,070 - 0,100
< 2,40	< 12,0	0,080 - 0,120



* For end mills / für Schaftfräser L < 100 mm.



Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHDB 2 030 078 L09	3,0	1,50	6	78	2,50	9,0	0,250	2	25
VHDB 2 030 078 L15	3,0	1,50	6	78	2,50	15,0	0,250	2	25
VHDB 2 030 078	3,0	1,50	6	78	3,00	9,0	0,100	2	15
VHDB 2 040 078 L12	4,0	2,00	6	78	2,50	12,0	0,250	2	25
VHDB 2 040 078 L20	4,0	2,00	6	78	2,50	20,0	0,250	2	25
VHDB 2 040 078	4,0	2,00	6	78	4,00	12,0	0,100	2	15
VHDB 2 050 078 L15	5,0	2,50	6	78	3,00	15,0	0,300	2	25
VHDB 2 050 078 L25	5,0	2,50	6	78	3,00	25,0	0,300	2	25
VHDB 2 050 078	5,0	2,50	6	78	5,00	15,0	0,100	2	15
VHDB 2 060 078	6,0	3,00	6	78	6,00	18,0	0,100	2	-
VHDB 2 060 102 L18	6,0	3,00	6	102	6,00	18,0	0,300	2	-
VHDB 2 060 102 L30	6,0	3,00	6	102	6,00	30,0	0,300	2	-
VHDB 2 080 078	8,0	4,00	8	78	8,00	24,0	0,100	2	-
VHDB 2 080 102 L24	8,0	4,00	8	102	7,00	24,0	0,400	2	-
VHDB 2 080 102 L40	8,0	4,00	8	102	7,00	40,0	0,400	2	-
VHDB 2 100 078	10,0	5,00	10	78	10,00	30,0	0,100	2	-
VHDB 2 100 102 L30	10,0	5,00	10	102	8,00	30,0	0,500	2	-
VHDB 2 100 102 L50	10,0	5,00	10	102	8,00	50,0	0,500	2	-
VHDB 2 120 078	12,0	6,00	12	78	12,00	30,0	0,100	2	-
VHDB 2 120 107 L36	12,0	6,00	12	107	9,00	36,0	0,500	2	-
VHDB 2 120 107 L60	12,0	6,00	12	107	9,00	60,0	0,500	2	-

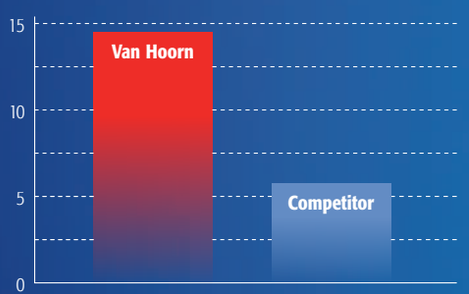
Available in special dimensions on request.
Sondermaße auf Anfrage lieferbar.

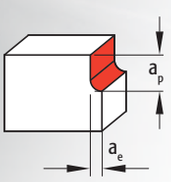
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air
N5.6			**< 700**	emulsion / air

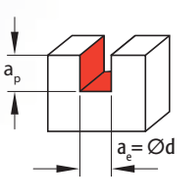
VHDB 2 100 078
Workpiece Material: Hextool
Hardness: Aerospace Material

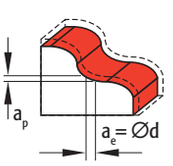
	Van Hoorn	Competitor
Ø	**10,0 mm**	**12,0 mm**
V_c	314 m/min	377 m/min
n	10.000 rpm	10.000 rpm
F_z	0,15 mm/t	0,13 mm/t
Z	**2**	**2**
V_f	3.000 mm/min	2.600 mm/min
a_p	0,35 mm	0,35 mm
a_e	0,35 mm	0,35 mm
Coolant	dry	dry
Q	**0,37 mm³/min**	**0,32 mm³/min**
Tool life	**14 h 10 min**	**5 h 33 min**

Tool life
Standzeit









Shoulder milling / Stirnfräsen

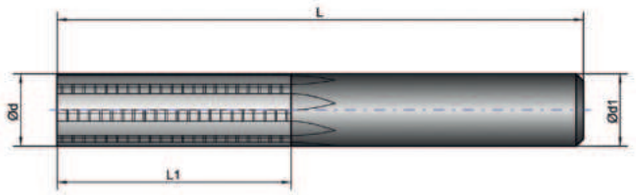
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
3,0	< 1,95	< 1,2	0,020 - 0,030
4,0	< 2,60	< 1,6	0,030 - 0,045
5,0	< 3,25	< 2,0	0,040 - 0,060
6,0	< 3,90	< 2,4	0,050 - 0,070
8,0	< 5,20	< 3,2	0,060 - 0,080
10,0	< 6,50	< 4,0	0,070 - 0,100
12,0	< 7,80	< 4,8	0,090 - 0,120

Slot milling / Nutfräsen

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 0,6	3,0	0,010 - 0,020
< 0,8	4,0	0,020 - 0,040
< 1,0	5,0	0,030 - 0,045
< 1,2	6,0	0,040 - 0,060
< 1,6	8,0	0,050 - 0,070
< 2,0	10,0	0,060 - 0,080
< 2,4	12,0	0,080 - 0,100

Profile milling / Profilfräsen

a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 0,6	< 0,3	0,020 - 0,030
< 0,8	< 0,4	0,030 - 0,045
< 1,0	< 0,5	0,040 - 0,060
< 1,2	< 0,6	0,050 - 0,070
< 1,6	< 0,8	0,060 - 0,080
< 2,0	< 1,0	0,070 - 0,100
< 2,4	< 1,2	0,080 - 0,120



N5.5 N5.6

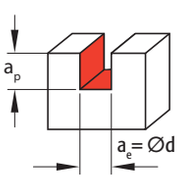
8 | 0° | Diamond | 6535 HA | h5

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
VHCRS 8 040 060 06 02	4,0	-	6	60	16,00	-	-	8	-	**new**
VHCRS 8 050 060 06 02	5,0	-	6	60	18,00	-	-	8	-	**new**
VHCRS 8 060 060 06 02	6,0	-	6	60	20,00	-	-	8	-	**new**
VHCRS 8 060 064 06 02	6,0	-	6	64	25,00	-	-	8	-	**new**
VHCRS 8 060 075 06 02	6,0	-	6	75	30,00	-	-	8	-	**new**
VHCRS 8 060 100 06 02	6,0	-	6	100	50,00	-	-	8	-	**new**
VHCRS 8 080 064 08 02	8,0	-	8	64	22,00	-	-	8	-	**new**
VHCRS 8 080 075 08 02	8,0	-	8	75	32,00	-	-	8	-	**new**
VHCRS 8 080 100 08 02	8,0	-	8	100	50,00	-	-	8	-	**new**
VHCRS 8 100 072 10 02	10,0	-	10	72	32,00	-	-	8	-	**new**
VHCRS 8 100 120 10 02	10,0	-	10	120	60,00	-	-	8	-	**new**
VHCRS 8 120 083 12 02	12,0	-	12	83	32,00	-	-	8	-	**new**
VHCRS 8 120 120 12 02	12,0	-	12	120	70,00	-	-	8	-	**new**

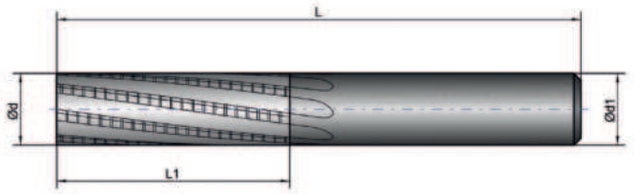
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.5			**150 - 350**	air
N5.6			**200 - 500**	air

Increasing the helix angle improves the removal rate

Durch Erhöhen des Spiralwinkels wird die Abtragsleistung verbessert



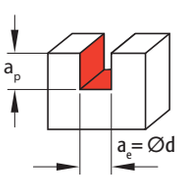
		Side milling		Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
4,0	L1	< 1,80	0,035 - 0,055	< 4,0	4,0	0,015 - 0,035
5,0	L1	< 2,25	0,045 - 0,065	< 5,0	5,0	0,020 - 0,040
6,0	L1	< 2,70	0,055- 0,075	< 6,0	6,0	0,025 - 0,045
8,0	L1	< 3,60	0,070 - 0,090	< 8,0	8,0	0,040 - 0,060
10,0	L1	< 4,50	0,090 - 0,110	< 10,0	10,0	0,050 - 0,070
12,0	L1	< 5,40	0,110 - 0,130	< 12,0	12,0	0,060 - 0,080



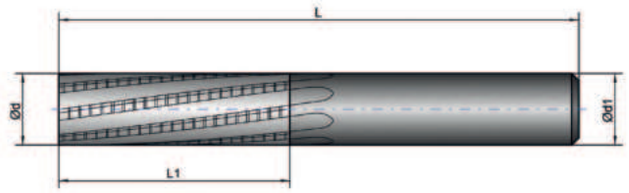
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
VHCRR 8 040 060 06 02	4,0	-	6	60	16,00	-	-	8	-	**new**
VHCRR 8 050 060 06 02	5,0	-	6	60	18,00	-	-	8	-	**new**
VHCRR 8 060 060 06 02	6,0	-	6	60	20,00	-	-	8	-	**new**
VHCRR 8 060 064 06 02	6,0	-	6	64	25,00	-	-	8	-	**new**
VHCRR 8 060 075 06 02	6,0	-	6	75	30,00	-	-	8	-	**new**
VHCRR 8 060 100 06 02	6,0	-	6	100	50,00	-	-	8	-	**new**
VHCRR 8 080 064 08 02	8,0	-	8	64	22,00	-	-	8	-	**new**
VHCRR 8 080 075 08 02	8,0	-	8	75	32,00	-	-	8	-	**new**
VHCRR 8 080 100 08 02	8,0	-	8	100	50,00	-	-	8	-	**new**
VHCRR 8 100 072 10 02	10,0	-	10	72	32,00	-	-	8	-	**new**
VHCRR 8 100 120 10 02	10,0	-	10	120	60,00	-	-	8	-	**new**
VHCRR 8 120 083 12 02	12,0	-	12	83	32,00	-	-	8	-	**new**
VHCRR 8 120 120 12 02	12,0	-	12	120	70,00	-	-	8	-	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.5			**150 - 350**	air
N5.6			**300 - 500**	air

Perfect surface finish and higher tool life due to the flute structure



	Side milling			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
4,0	L1	< 1,80	0,035 - 0,055	< 4,0	4,0	0,015 - 0,035
5,0	L1	< 2,25	0,045 - 0,065	< 5,0	5,0	0,020 - 0,040
6,0	L1	< 2,70	0,055- 0,075	< 6,0	6,0	0,025 - 0,045
8,0	L1	< 3,60	0,070 - 0,090	< 8,0	8,0	0,040 - 0,060
10,0	L1	< 4,50	0,090 - 0,110	< 10,0	10,0	0,050 - 0,070
12,0	L1	< 5,40	0,110 - 0,130	< 12,0	12,0	0,060 - 0,080

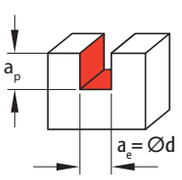


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
VHCRL 8 040 060 06 02	4,0	-	6	60	16,00	-	-	8	-	**new**
VHCRL 8 050 060 06 02	5,0	-	6	60	18,00	-	-	8	-	**new**
VHCRL 8 060 060 06 02	6,0	-	6	60	20,00	-	-	8	-	**new**
VHCRL 8 060 064 06 02	6,0	-	6	64	25,00	-	-	8	-	**new**
VHCRL 8 060 075 06 02	6,0	-	6	75	30,00	-	-	8	-	**new**
VHCRL 8 060 100 06 02	6,0	-	6	100	50,00	-	-	8	-	**new**
VHCRL 8 080 064 08 02	8,0	-	8	64	22,00	-	-	8	-	**new**
VHCRL 8 080 075 08 02	8,0	-	8	75	32,00	-	-	8	-	**new**
VHCRL 8 080 100 08 02	8,0	-	8	100	50,00	-	-	8	-	**new**
VHCRL 8 100 072 10 02	10,0	-	10	72	32,00	-	-	8	-	**new**
VHCRL 8 100 120 10 02	10,0	-	10	120	60,00	-	-	8	-	**new**
VHCRL 8 120 083 12 02	12,0	-	12	83	32,00	-	-	8	-	**new**
VHCRL 8 120 120 12 02	12,0	-	12	120	70,00	-	-	8	-	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.5			**150 - 350**	air
N5.6			**300 - 500**	air

Perfect for machining at increased speeds and feeds

Perfekt für die Bearbeitung mit erhöhten Geschwindigkeiten und Vorschüben



	Side milling			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
4,0	L1	< 1,80	0,035 - 0,055	< 4,0	4,0	0,015 - 0,035
5,0	L1	< 2,25	0,045 - 0,065	< 5,0	5,0	0,020 - 0,040
6,0	L1	< 2,70	0,055- 0,075	< 6,0	6,0	0,025 - 0,045
8,0	L1	< 3,60	0,070 - 0,090	< 8,0	8,0	0,040 - 0,060
10,0	L1	< 4,50	0,090 - 0,110	< 10,0	10,0	0,050 - 0,070
12,0	L1	< 5,40	0,110 - 0,130	< 12,0	12,0	0,060 - 0,080

End mills for processing graphite

Schaftfräser für die Graphitbearbeitung

The leading technology of Van Hoorn Carbide diamond coated end mills
Die führendeTechnologie von Van Hoorn Carbide mit diamantbeschichteten Schaftfräsern

Our technology / Unsere Technologie:

Technology to minimize droplets
Technologie zur minimierung Droplets

Superior accuracy and tolerances
Überragende Genauigkeit und Toleranzen

Improved performance and tool life
Leistungsverbesserung und Standzeitverlängerung

Excellent surface finish
Hervorragende Oberflächenqualität

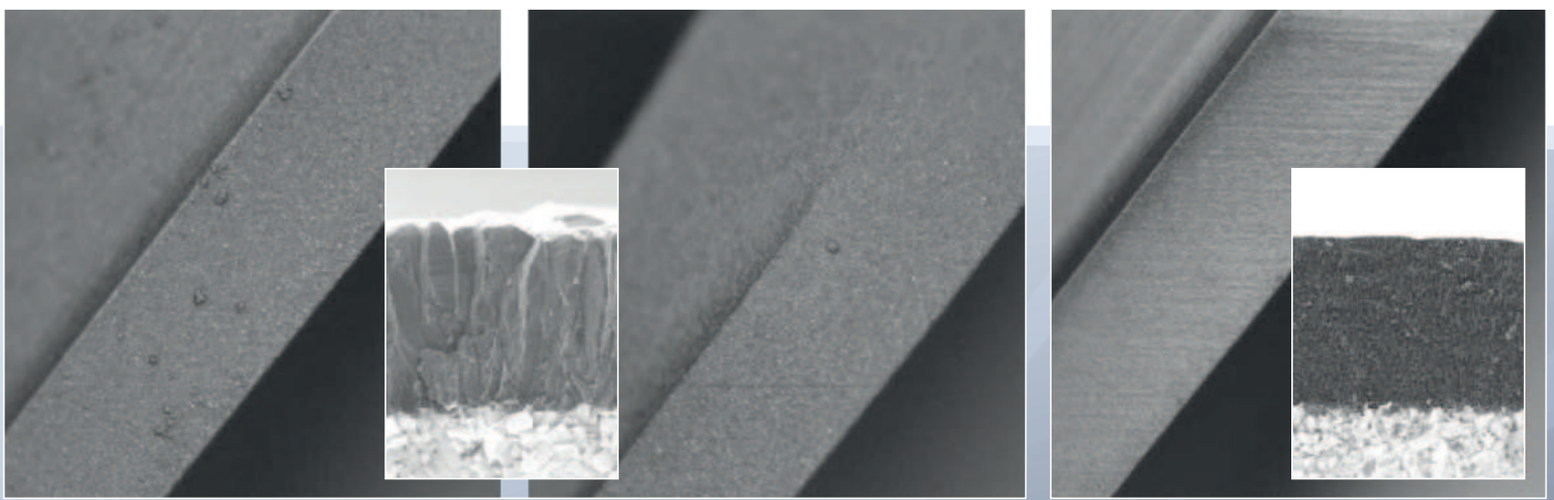
Productivity test
Produktivitätstest

Workpiece Material: SGL Graphite
End Mill: VHGR 2 080 078 08 02
Hardness: R8500

	Van Hoorn Carbide	Competitor
Ø	8,0 mm	8,0 mm
V_c	503 m/min	302 m/min
n	20.000 rpm	8.000 rpm
F_z	0,113 mm/t	0,167 mm/t
Z	2	2
V_f	4.500 mm/min	400 mm/min
a_p	8,0 mm	1,5 mm
a_e	8,0 mm	12,0 mm
Coolant	air	air
Q	288 cm^3/min	72 cm^3/min

Diamond coated end mills for applications in graphite

Diamantbeschichtete Schaftfräser für die Graphitbearbeitung



VHGR: Roughing geometry
VHGR: Schruppgeometrie

VHGT: 40° helix sharp geometry
VHGT: 40° Spiralwinkel scharfer Schneidengeometrie

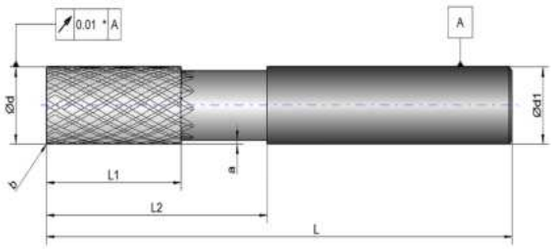
VHGTF: 40° helix geometry with corner radius
VHGTF: 40° Spiralwinkel mit Eckenradius

VHGKF: 40° helix ball nose geometry
VHGKF: 40° Spiralwinkel Radiusfräser

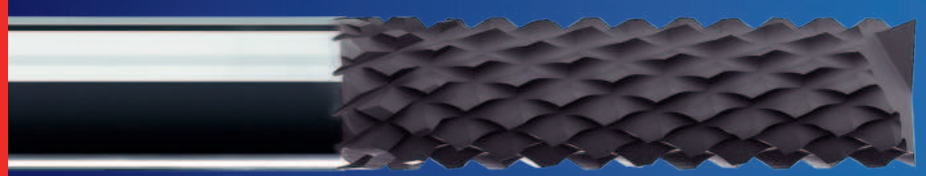
VHMG: Micro end mill with corner radius
VHMG: Mikro-Schaftfräser scharfer Eckenradius

VHMGK: Micro ball nose geometry
VHMGK: Mikro-Radiusfräser

Now available in shank 4 mm
Jetzt auch in Schaft 4 mm erhältlich

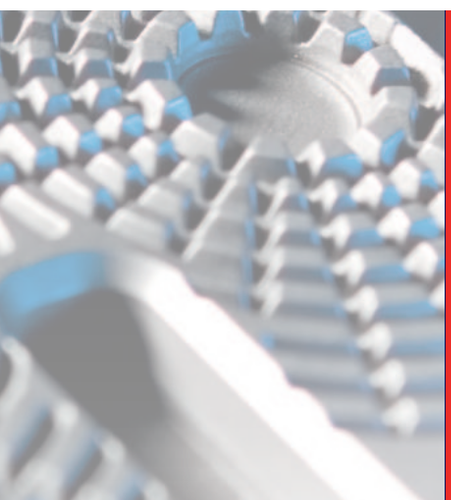


* For end mills / für Schaftfräser L < 100 mm.



Article Number *Artikelnummer*	Ød (mm)	b (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z
VHGR 2 040 060 04 02	4,0	0,25	4	60	12,00	-	-	2
VHGR 2 060 078 06 02	6,0	0,30	6	78	18,00	-	-	2
VHGR 2 080 078 08 02	8,0	0,35	8	78	24,00	-	-	2
VHGR 2 100 078 10 02	10,0	0,40	10	78	30,00	-	-	2
VHGR 2 120 089 12 02	12,0	0,50	12	89	36,00	-	-	2
VHGR 2 120 150 12 02	12,0	0,50	12	150	36,00	50,0	0,300	2
VHGR 2 160 150 16 02	16,0	0,50	16	150	36,00	70,0	0,400	2

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.4			**< 600**	air
N5.5			**< 600**	air
N5.6			**350 - 500**	air

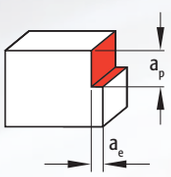


VHGR 2 080 078 08 02
Workpiece Material: Graphite

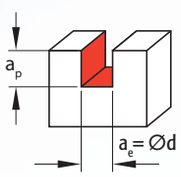
	Van Hoorn	Competitor
Ø	8,0 mm	16,0 mm
V_c	452m/min	754 m/min
n	18.000 rpm	15.000 rpm
F_z	* mm/t	0,111 mm/t
Z	3	2
V_f	4.000 mm/min	5.000 mm/min
a_p	7,0 mm	0,2 mm
a_e	2,5 mm	3,0 mm
Coolant	air	air
Q	**70 mm³/min**	**3 mm³/min**

VHGR for roughing applications on graphite:
VHGR für Schruppbearbeitung in Graphit:

- High material removal rate
  Hohe Zerspanungsleistung
- Special roughing pitch
  Spezielle Schruppverzahnung
- Designed for high feeds on graphite applications
  Entwickelt für hohe Vorschübe in der Graphit-Bearbeitung

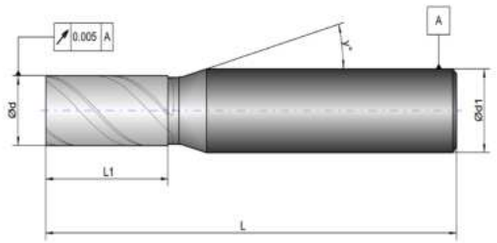


a_p up to 2,50 x d
a_e up to 0,50 x d



a_p up to 1,00 x d

	Shoulder milling / Eckfräsen			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	V_f (mm/min)	a_p max. (mm)	a_e max. (mm)	V_f (mm/min)
4,0	< 10,0	< 2,0	< 5000	< 4,0	4,0	< 3750
6,0	< 15,0	< 3,0	< 6000	< 6,0	6,0	< 4500
8,0	< 20,0	< 4,0	< 8000	< 8,0	8,0	< 6000
10,0	< 25,0	< 5,0	< 10000	< 10,0	10,0	< 7500
12,0	< 30,0	< 6,0	< 12000	< 12,0	12,0	< 9000
16,0	< 35,0	< 8,0	< 15000	< 16,0	16,0	< 11250



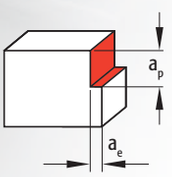
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHGT 3 020 050 03 02	2,0	-	3	50	10,00	-	-	3	15
VHGT 3 030 050 03 02	3,0	-	3	50	10,00	-	-	3	-
VHGT 3 040 060 04 02	4,0	-	4	60	15,00	-	-	3	-
VHGT 3 050 060 05 02	5,0	-	5	60	20,00	-	-	3	-
VHGT 3 060 078 06 02	6,0	-	6	78	30,00	-	-	3	-
VHGT 3 080 078 08 02	8,0	-	8	78	30,00	-	-	3	-
VHGT 3 100 078 10 02	10,0	-	10	78	30,00	-	-	3	-
VHGT 3 120 089 12 02	12,0	-	12	89	30,00	-	-	3	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.4			**< 600**	air
N5.5			**< 600**	air
N5.6			**350 - 500**	air

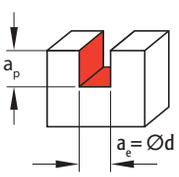
VHGT 3 060 078 06 02
Workpiece Material: Graphite

	Van Hoorn	Competitor
Ø	6,0 mm	6,0 mm
V_c	547 m/min	547 m/min
n	29.000 rpm	29.000 rpm
F_z	0,023 mm/t	0,005 mm/t
Z	3	3
V_f	2.000 mm/min	580 mm/min
a_p	3,0 mm	3,0 mm
a_e	0,5 mm	0,5 mm
Coolant	air	air
Q	**3,00 mm³/min**	**0,87 mm³/min**
Tool life	**7 h 14 min**	**2 h 37 min**

- More accuracy
  Höhere Genauigkeit
- Smooth surface on the workpiece
  Glatte Werkstückoberflächen
- Better tool life
  Längere Standzeit

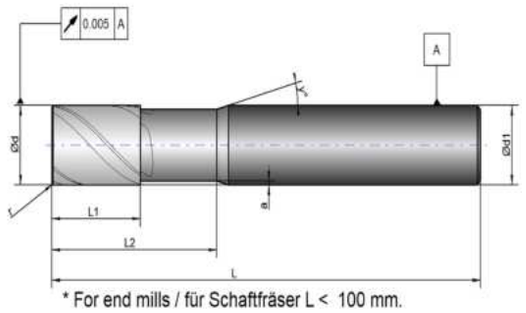


a_p up to 2,0 x d
a_e up to 0,2 x d



a_p up to 1,00 x d

	Shoulder milling / Eckfräsen			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
2,0	< 4,0	< 0,4	0,012 - 0,036	< 2,0	2,0	0,010 - 0,030
3,0	< 6,0	< 0,6	0,018 - 0,048	< 3,0	3,0	0,015 - 0,040
4,0	< 8,0	< 0,8	0,030 - 0,060	< 4,0	4,0	0,025 - 0,050
5,0	< 10,0	< 1,0	0,042 - 0,072	< 5,0	5,0	0,035 - 0,060
6,0	< 12,0	< 1,2	0,054 - 0,096	< 6,0	6,0	0,045 - 0,080
8,0	< 16,0	< 1,6	0,066 - 0,120	< 8,0	8,0	0,055 - 0,100
10,0	< 20,0	< 2,0	0,090 - 0,144	< 10,0	10,0	0,075 - 0,120
12,0	< 24,0	< 2,4	0,108 - 0,168	< 12,0	12,0	0,090 - 0,140



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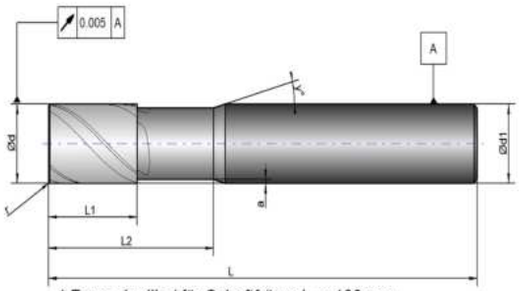
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Short / Kurze Ausführung									
VHGTF 2 020 050 03 02 S	2,0	0,10	3	50	3,00	10,0	0,100	2	15
VHGTF 2 030 051 06 02 S	3,0	0,10	6	51	4,00	10,0	0,100	2	15
VHGTF 4 040 051 06 02 S	4,0	0,20	6	51	4,00	10,0	0,100	4	15
VHGTF 4 050 051 06 02 S	5,0	0,20	6	51	5,00	10,0	0,150	4	15
VHGTF 4 060 051 06 02 S	6,0	0,30	6	51	6,00	10,0	0,200	4	-
VHGTF 4 080 064 08 02 S	8,0	0,30	8	64	8,00	15,0	0,300	4	-
VHGTF 4 100 078 10 02 S	10,0	0,30	10	78	10,00	20,0	0,300	4	-
VHGTF 4 120 078 12 02 S	12,0	0,30	12	78	10,00	20,0	0,300	4	-



N5.4 N5.5 N5.6

2-3-4 | 40° | Diamond | HPM / HSM | 6535 HA | VHC | h5

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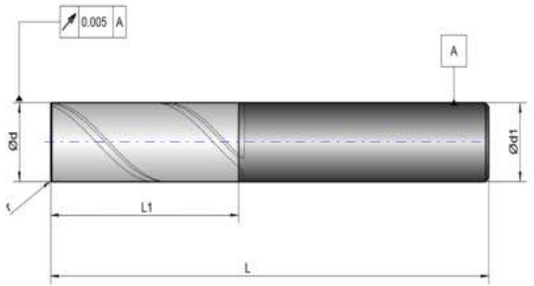
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard 3-flute / 3-Schneiden									
VHGTF 3 020 050 02 02	2,0	0,10	2	50	10,00	-	-	3	-
VHGTF 3 020 050 03 02	2,0	0,10	3	50	10,00	-	-	3	15
VHGTF 3 020 050 03 02 L150	2,0	0,10	3	50	10,00	15,0	0,100	3	10
VHGTF 3 020 050 03 02 L200	2,0	0,10	3	50	10,00	20,0	0,100	3	15
VHGTF 3 020 065 03 02 L300	2,0	0,10	3	65	10,00	30,0	0,100	3	15
VHGTF 3 020 080 03 02 L300	2,0	0,10	3	80	10,00	30,0	0,100	3	15
VHGTF 3 020 050 04 02	2,0	0,10	4	50	10,00	12,0	-	3	-
VHGTF 3 020 050 04 02 L200	2,0	0,20	4	50	10,00	20,0	0,100	3	15
VHGTF 3 020 060 04 02 L160	2,0	0,20	4	60	10,00	16,0	0,100	3	15
VHGTF 3 020 060 04 02 L200	2,0	0,20	4	60	10,00	20,0	0,100	3	15
VHGTF 3 020 064 04 02 L300	2,0	0,20	4	64	10,00	30,0	0,100	3	15
VHGTF 3 020 075 04 02 L200	2,0	0,20	4	75	10,00	20,0	0,050	3	15
VHGTF 3 030 050 03 02	3,0	0,10	3	50	10,00	-	-	3	-
VHGTF 3 030 065 03 02 L200	3,0	0,10	3	65	10,00	20,0	0,100	3	-
VHGTF 3 030 065 03 02 L300	3,0	0,10	3	65	10,00	30,0	0,100	3	-
VHGTF 3 030 080 03 02 L300	3,0	0,10	3	80	10,00	30,0	0,100	3	-
VHGTF 3 030 075 04 02 L300	3,0	0,30	4	75	10,00	30,0	0,100	3	15
VHGTF 3 030 075 06 02 L300	3,0	0,10	6	75	10,00	30,0	0,100	3	15
VHGTF 3 040 060 04 02	4,0	0,20	4	60	15,00	-	-	3	-
VHGTF 3 040 075 04 02 L250	4,0	0,30	4	75	8,00	25,0	0,100	3	15
VHGTF 3 040 100 04 02 L450	4,0	0,30	4	100	8,00	45,0	0,100	3	-
VHGTF 3 040 075 06 02 L300	4,0	0,50	6	75	10,00	30,0	0,100	3	15
VHGTF 3 040 085 06 02 L400	4,0	0,50	6	85	10,00	40,0	0,100	3	15
VHGTF 3 050 060 05 02	5,0	0,20	5	60	20,00	-	-	3	-
VHGTF 3 060 078 06 02	6,0	0,30	6	78	30,00	-	-	3	-
VHGTF 3 060 080 06 02 L440	6,0	0,30	6	80	10,00	44,0	0,200	3	-
VHGTF 3 060 090 06 02 L440	6,0	0,50	6	90	13,00	44,0	0,250	3	-
VHGTF 3 060 105 06 02 L650	6,0	0,30	6	105	10,00	65,0	0,100	3	-
VHGTF 3 080 078 08 02	8,0	0,30	8	78	30,00	-	-	3	-
VHGTF 3 080 090 08 02 L440	8,0	0,30	8	90	10,00	44,0	0,100	3	15
VHGTF 3 080 120 08 02 L800	8,0	0,30	8	120	10,00	80,0	0,100	3	15
VHGTF 3 100 078 10 02	10,0	0,30	10	78	30,00	-	-	3	-
VHGTF 3 120 089 12 02	12,0	0,30	12	89	30,00	-	-	3	-



* For end mills / für Schaftfräser L < 100 mm.

N5.4 N5.5 N5.6

2 | 40° | Diamond | HPM / HSM | 6535 HA | VHC | h5

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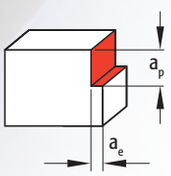
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard 4-flute / 4-Schneiden									
VHGTF 4 040 060 04 02 L150	4,0	0,50	4	60	8,00	15,0	0,100	4	-
VHGTF 4 040 060 04 02 L200	4,0	0,50	4	60	8,00	20,0	0,100	4	-
VHGTF 4 040 064 04 02 L300	4,0	0,50	4	64	8,00	30,0	0,100	4	-
VHGTF 4 040 080 04 02 L400	4,0	0,50	4	80	8,00	40,0	0,100	4	-
VHGTF 4 040 100 04 02 L500	4,0	0,50	4	100	8,00	50,0	0,100	4	-
VHGTF 4 060 070 06 02 L300	6,0	0,50	6	70	10,00	30,0	0,200	4	-
VHGTF 4 060 080 06 02 L400	6,0	0,50	6	80	10,00	40,0	0,200	4	-
VHGTF 4 060 100 06 02 L600	6,0	0,50	6	100	10,00	60,0	0,200	4	-
VHGTF 4 060 120 06 02 L700	6,0	0,50	6	120	10,00	70,0	0,200	4	-
VHGTF 4 080 080 08 02 L400	8,0	0,50	8	80	15,00	40,0	0,300	4	-
VHGTF 4 080 100 08 02 L600	8,0	0,50	8	100	15,00	60,0	0,300	4	-
VHGTF 4 080 120 08 02 L800	8,0	0,50	8	120	15,00	80,0	0,300	4	-
VHGTF 4 100 080 10 02 L400	10,0	0,50	10	80	18,00	40,0	0,300	4	-
VHGTF 4 100 100 10 02 L600	10,0	0,50	10	100	18,00	60,0	0,300	4	-
Long / Lange Ausführung									
VHGTF 2 030 102 03 02 L650	3,0	0,10	3	102	10,00	65,0	0,100	2	-
VHGTF 2 040 080 04 02	4,0	0,20	4	80	10,00	-	-	2	-
VHGTF 2 040 090 04 02 L400	4,0	0,30	4	90	10,00	40,0	0,100	2	-
VHGTF 2 040 102 04 02	4,0	0,30	4	102	10,00	-	-	2	-
VHGTF 2 050 102 05 02	5,0	0,50	5	102	13,00	-	-	2	-
VHGTF 2 060 100 06 02 L600	6,0	0,50	6	100	10,00	60,0	0,100	2	15
VHGTF 2 060 102 06 02	6,0	0,50	6	102	42,00	-	-	2	-
VHGTF 2 060 150 06 02	6,0	0,50	6	150	26,00	-	-	2	-
VHGTF 2 080 100 08 02 L600	8,0	0,50	8	100	10,00	60,0	0,100	2	-
VHGTF 2 080 102 08 02	8,0	0,50	8	102	42,00	-	-	2	-
VHGTF 2 080 150 08 02	8,0	0,50	8	150	41,00	-	-	2	-
VHGTF 2 100 120 10 02 L700	10,0	0,50	10	120	10,00	70,0	-	2	-
VHGTF 2 100 150 10 02	10,0	0,50	10	150	42,00	-	-	2	-
VHGTF 2 120 120 12 02 L700	12,0	0,50	12	120	18,00	70,0	0,150	2	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.4			**< 600**	air
N5.5			**< 600**	air
N5.6			**350 - 500**	air

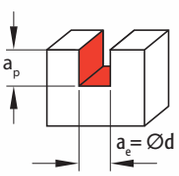
VHGTF 3 040 060 04 02
Workpiece material: EDM-3 Graphite

Ø	4,0 mm
V_c	440 m/min
n	35.000 rpm
F_Z	0,049 mm/t
Z	3
V_f	5.145 mm/min
a_p	0,8 mm
a_e	1,6 mm
Coolant	air
Q	**6,60 cm³/min**

- More accuracy
  Höhere Genauigkeit
- Smooth surface on the workpiece
  Glatte Werkstückoberflächen
- Longer tool life
  Längere Standzeit

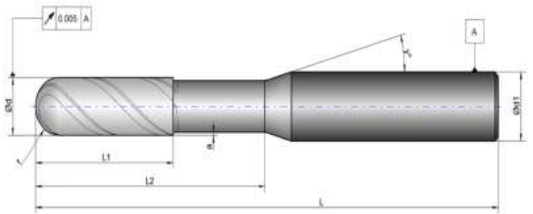


a_p up to 2,0 x d
a_e up to 0,2 x d



a_p up to 1,00 x d

	Shoulder milling / Eckfräsen			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
2,0	< 4,0	< 0,4	0,012 - 0,036	< 2,0	2,0	0,010 - 0,030
3,0	< 6,0	< 0,6	0,018 - 0,048	< 3,0	3,0	0,015 - 0,040
4,0	< 8,0	< 0,8	0,030 - 0,060	< 4,0	4,0	0,025 - 0,050
5,0	< 10,0	< 1,0	0,042 - 0,072	< 5,0	5,0	0,035 - 0,060
6,0	< 12,0	< 1,2	0,054 - 0,096	< 6,0	6,0	0,045 - 0,080
8,0	< 16,0	< 1,6	0,066 - 0,120	< 8,0	8,0	0,055 - 0,100
10,0	< 20,0	< 2,0	0,090 - 0,144	< 10,0	10,0	0,075 - 0,120
12,0	< 24,0	< 2,4	0,108 - 0,168	< 12,0	12,0	0,090 - 0,140



* For end mills / für Schaftfräser L < 100 mm.

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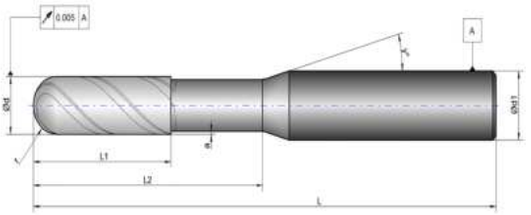
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Short / Kurze Ausführung									
VHGKF 2 020 050 03 02 S	2,0	1,00	3	50	3,00	10,0	0,100	2	15
VHGKF 2 030 051 06 02 S	3,0	1,50	6	51	4,00	10,0	0,100	2	15
VHGKF 4 040 051 06 02 S	4,0	2,00	6	51	4,00	10,0	0,100	4	15
VHGKF 4 050 051 06 02 S	5,0	2,50	6	51	5,00	10,0	0,150	4	15
VHGKF 4 060 051 06 02 S	6,0	3,00	6	51	6,00	10,0	0,200	4	-
VHGKF 4 080 064 08 02 S	8,0	4,00	8	64	8,00	15,0	0,300	4	-
VHGKF 4 100 078 10 02 S	10,0	5,00	10	78	10,00	20,0	0,300	4	-
VHGKF 4 120 078 12 02 S	12,0	6,00	12	78	10,00	20,0	0,300	4	-



* For end mills / für Schaftfräser L < 100 mm.

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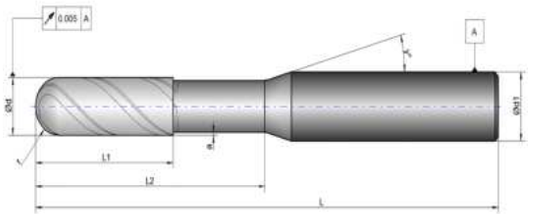
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard 3-flute / 3-Schneiden									
VHGKF 3 020 050 02 02	2,0	1,00	2	50	10,00	-	-	3	-
VHGKF 3 020 050 03 02	2,0	1,00	3	50	10,00	-	-	3	15
VHGKF 3 020 050 03 02 L150	2,0	1,00	3	50	10,00	15,0	0,100	3	15
VHGKF 3 020 050 03 02 L200	2,0	1,00	3	50	10,00	20,0	0,100	3	15
VHGKF 3 020 065 03 02 L300	2,0	1,00	3	65	10,00	30,0	0,100	3	15
VHGKF 3 020 050 04 02	2,0	1,00	4	50	10,00	-	-	3	15
VHGKF 3 020 050 04 02 L200	2,0	1,00	4	50	10,00	20,0	0,100	3	30
VHGKF 3 020 070 04 02 L200	2,0	1,00	4	70	10,00	20,0	0,100	3	15
VHGKF 3 020 070 04 02 L300	2,0	1,00	4	70	13,00	30,0	0,100	3	15
VHGKF 3 020 075 06 02 L300	2,0	1,00	6	75	10,00	30,0	0,100	3	15
VHGKF 3 030 050 03 02	3,0	1,50	3	50	10,00	-	-	3	-
VHGKF 3 030 050 03 02 L150	3,0	1,50	3	50	10,00	15,0	0,100	3	-
VHGKF 3 030 050 03 02 L200	3,0	1,50	3	50	10,00	20,0	0,100	3	-
VHGKF 3 030 065 03 02 L300	3,0	1,50	3	65	10,00	30,0	0,100	3	-
VHGKF 3 030 060 04 02 L300	3,0	1,50	4	60	10,00	30,0	0,100	3	17
VHGKF 3 030 075 06 02 L300	3,0	1,50	6	75	10,00	30,0	0,100	3	15
VHGKF 3 040 060 04 02	4,0	2,00	4	60	15,00	-	-	3	-
VHGKF 3 040 060 04 02 L300	4,0	2,00	4	60	15,00	30,0	0,100	3	-
VHGKF 3 040 090 04 02 L400	4,0	2,00	4	90	8,00	40,0	0,100	3	-
VHGKF 3 050 060 05 02	5,0	2,50	5	60	20,00	-	-	3	-
VHGKF 3 060 078 06 02	6,0	3,00	6	78	30,00	-	-	3	-
VHGKF 3 060 078 06 02 L400	6,0	3,00	6	78	30,00	40,0	0,100	3	-
VHGKF 3 080 078 08 02	8,0	4,00	8	78	30,00	-	-	3	-
VHGKF 3 100 078 10 02	10,0	5,00	10	78	30,00	-	-	3	-
VHGKF 3 120 089 12 02	12,0	6,00	12	89	30,00	-	-	3	-



* For end mills / für Schaftfräser L < 100 mm.

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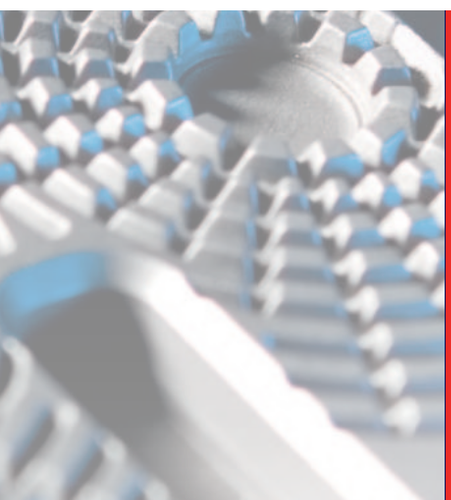
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Long / Lange Ausführung									
VHGKF 2 020 102 03 02	2,0	1,00	3	102	6,00	-	-	2	15
VHGKF 2 030 102 03 02	3,0	1,50	3	102	16,00	-	-	2	-
VHGKF 2 040 080 04 02	4,0	2,00	4	80	10,00	-	-	2	-
VHGKF 2 040 102 04 02	4,0	2,00	4	102	16,00	-	-	2	-
VHGKF 2 060 102 06 02	6,0	3,00	6	102	42,00	-	-	2	-
VHGKF 2 060 150 06 02	6,0	3,00	6	150	42,00	-	-	2	-
VHGKF 2 080 102 08 02	8,0	4,00	8	102	42,00	-	-	2	-
VHGKF 2 080 150 08 02	8,0	4,00	8	150	42,00	-	-	2	-
VHGKF 2 100 150 10 02	10,0	5,00	10	150	45,00	-	-	2	-
VHGKF 2 120 150 12 02	12,0	6,00	12	150	65,00	-	-	2	-

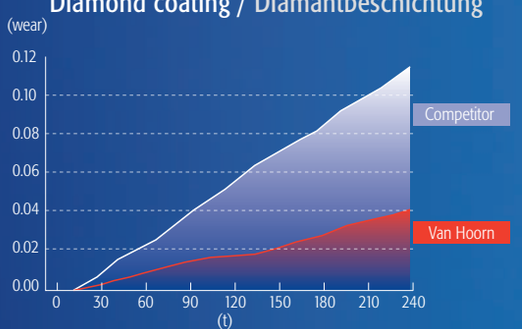
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.4			**< 600**	air
N5.5			**< 600**	air
N5.6			**350 - 500**	air

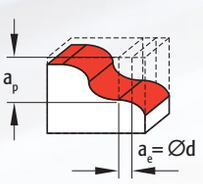


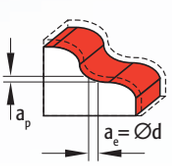
VHGKF 3 040 060 04 02
Workpiece material: ISO 63

Ø	4,0 mm
V_c	276 m/min
n	22.000 rpm
F_z	0,121 mm/t
Z	3
V_f	8.000 mm/min
a_p	5,0 mm
a_e	0,1 mm
Coolant	air
Q	**4,0 cm³/min**

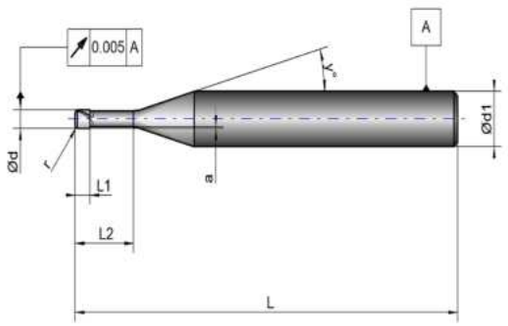
Wear / Verschleiß
Diamond coating / Diamantbeschichtung







Ød (mm)	Roughing / Schruppfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Finishing / Schlichtfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
2,0	< 4,0	< 0,4	0,012 - 0,036	< 0,4	0,2	0,012 - 0,036
3,0	< 6,0	< 0,6	0,018 - 0,048	< 0,6	0,3	0,018 - 0,048
4,0	< 8,0	< 0,8	0,030 - 0,060	< 0,8	0,4	0,030 - 0,060
5,0	< 10,0	< 1,0	0,042 - 0,072	< 1,0	0,5	0,042 - 0,072
6,0	< 12,0	< 1,2	0,054 - 0,096	< 1,2	0,6	0,054 - 0,096
8,0	< 16,0	< 1,6	0,066 - 0,120	< 1,6	0,8	0,066 - 0,120
10,0	< 20,0	< 2,0	0,090 - 0,144	< 2,0	1,0	0,090 - 0,144
12,0	< 24,0	< 2,4	0,108 - 0,168	< 2,4	1,2	0,108 - 0,168



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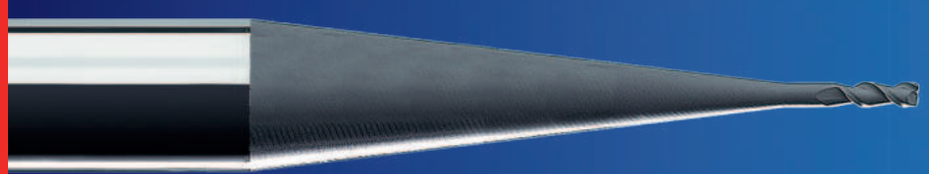
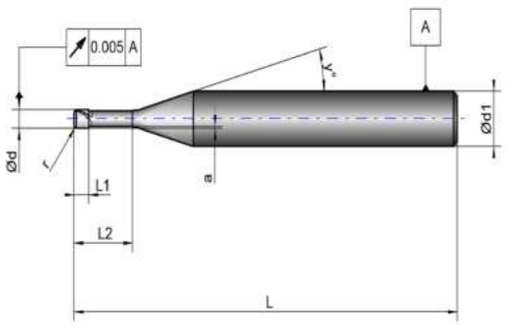


Shank 4 mm
Schaft 4 mm

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMG 2 003 055 04 02	0,3	0,05	4	55	1,00	-	-	2	5	1,105	1,237	1,631	2,419
VHMG 2 003 055 04 02 L025	0,3	0,05	4	55	1,50	2,5	0,010	2	5	2,898	3,253	4,318	6,445
VHMG 2 003 055 04 02 L030	0,3	0,05	4	55	1,50	3,0	0,010	2	5	3,454	3,878	5,150	7,692
VHMG 2 003 055 04 02 L050	0,3	0,05	4	55	1,50	5,0	0,010	2	6	5,552	6,100	7,605	10,113
VHMG 2 004 055 04 02	0,4	0,05	4	55	1,50	-	-	2	5	1,661	1,861	2,463	3,666
VHMG 2 004 055 04 02 L025	0,4	0,05	4	55	1,50	2,5	0,010	2	5	2,898	3,253	4,318	6,445
VHMG 2 004 055 04 02 L040	0,4	0,05	4	55	1,50	4,0	0,010	2	5	4,565	5,127	6,814	10,186
VHMG 2 004 055 04 02 L050	0,4	0,05	4	55	1,50	5,0	0,010	2	6	5,552	6,100	7,605	10,113
VHMG 2 004 055 04 02 L060	0,4	0,05	4	55	1,50	6,0	0,010	2	6	6,643	7,299	9,103	12,107
VHMG 2 005 055 04 02	0,5	0,05	4	55	1,50	-	-	2	5	1,661	1,861	2,463	3,666
VHMG 2 005 055 04 02 L035	0,5	0,05	4	55	1,50	3,5	0,010	2	5	4,009	4,503	5,982	8,939
VHMG 2 005 055 04 02 L050	0,5	0,05	4	55	1,50	5,0	0,010	2	6	5,552	6,100	7,605	10,113
VHMG 2 005 055 04 02 L070	0,5	0,05	4	55	1,50	7,0	0,010	2	6	7,733	8,498	10,601	14,102
VHMG 2 005 055 04 02 L080	0,5	0,05	4	55	1,50	8,0	0,010	2	6	8,824	9,697	12,098	16,096
VHMG 2 005 055 04 02 L100	0,5	0,05	4	55	1,50	10,0	0,010	2	7	10,849	11,744	14,068	17,552
VHMG 2 006 055 04 02	0,6	0,05	4	55	1,50	-	-	2	5	1,661	1,861	2,463	3,666
VHMG 2 006 055 04 02 L035	0,6	0,05	4	55	2,00	3,5	0,025	2	5	4,200	4,717	6,267	9,367
VHMG 2 006 055 04 02 L050	0,6	0,05	4	55	2,00	5,0	0,025	2	5	5,866	6,591	8,764	13,108
VHMG 2 006 055 04 02 L070	0,6	0,05	4	55	2,00	7,0	0,025	2	6	7,889	8,669	10,814	14,386
VHMG 2 006 055 04 02 L080	0,6	0,05	4	55	2,00	8,0	0,025	2	6	8,979	9,868	12,312	16,381
VHMG 2 006 055 04 02 L100	0,6	0,05	4	55	2,00	10,0	0,025	2	7	10,980	11,886	14,239	17,765
VHMG 2 008 055 04 02	0,8	0,05	4	55	2,00	-	-	2	4	2,278	2,649	3,945	7,833
VHMG 2 008 055 04 02 L050	0,8	0,05	4	55	2,00	5,0	0,025	2	5	5,866	6,591	8,764	13,108
VHMG 2 008 055 04 02 L075	0,8	0,05	4	55	2,00	7,5	0,025	2	6	8,434	9,269	11,563	15,384
VHMG 2 008 055 04 02 L080	0,8	0,05	4	55	2,00	8,0	0,025	2	6	8,979	9,868	12,312	16,381
VHMG 2 008 055 04 02 L010	0,8	0,05	4	55	2,00	10,0	0,025	2	7	10,980	11,886	14,239	17,765
VHMG 2 008 055 04 02 L150	0,8	0,05	4	55	2,00	15,0	0,025	2	10	15,928	16,800	18,869	21,524



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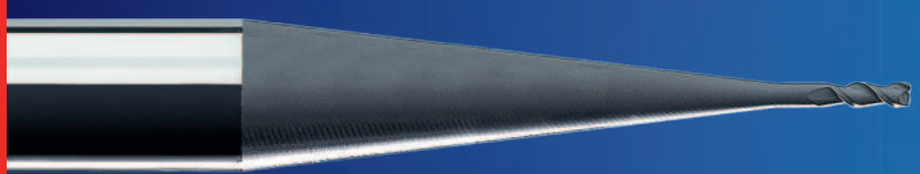
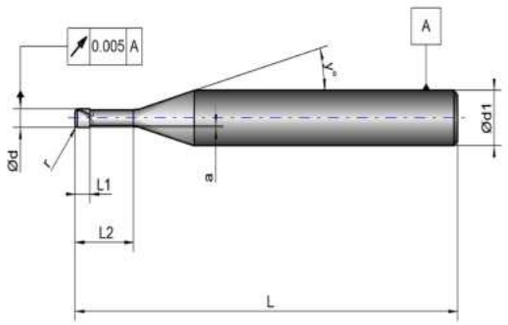
Shank 4 mm
Schaft 4 mm



Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMG 2 010 055 04 02	1,0	0,05	4	55	2,50	-	-	2	4	2,849	3,315	4,944	9,829
VHMG 2 010 055 04 02 L050	1,0	0,05	4	55	3,00	5,0	0,025	2	5	5,866	6,591	8,764	13,108
VHMG 2 010 055 04 02 L075	1,0	0,05	4	55	3,00	7,5	0,025	2	5	8,643	9,714	12,925	19,342
VHMG 2 010 055 04 02 L100	1,0	0,05	4	55	3,00	10,0	0,025	2	9	10,747	11,409	13,017	15,156
VHMG 2 010 055 04 02 L150	1,0	0,05	4	55	3,00	15,0	0,025	2	13	15,700	16,340	17,792	19,530
VHMG 2 010 055 04 02 L200	1,0	0,05	4	55	3,00	20,0	0,025	2	18	20,620	21,214	22,489	23,928
VHMG 2 010 055 04 02 L250	1,0	0,05	4	55	3,00	25,0	0,025	2	18	25,768	26,498	28,091	29,890
VHMG 2 010 060 04 02 L300	1,0	0,05	4	60	3,00	30,0	0,025	2	15	31,201	32,287	34,703	37,514
VHMG 2 012 055 04 02 L050	1,2	0,05	4	55	3,00	5,0	0,025	2	5	5,866	6,591	8,764	13,108
VHMG 2 012 055 04 02 L100	1,2	0,05	4	55	3,00	10,0	0,025	2	6	11,160	12,267	15,307	20,370
VHMG 2 015 055 04 02 L050	1,5	0,05	4	55	3,00	5,0	0,025	2	4	6,114	7,123	10,652	21,235
VHMG 2 015 055 04 02 L075	1,5	0,05	4	55	3,00	7,5	0,025	2	5	8,643	9,714	12,925	19,342
VHMG 2 015 055 04 02 L100	1,5	0,05	4	55	3,00	10,0	0,025	2	5	11,420	12,837	17,085	25,577
VHMG 2 015 055 04 02 L150	1,5	0,05	4	55	3,00	15,0	0,025	2	8	16,179	17,323	20,180	24,174
VHMG 2 015 055 04 02 L200	1,5	0,05	4	55	3,00	20,0	0,025	2	15	20,768	21,490	23,097	24,967



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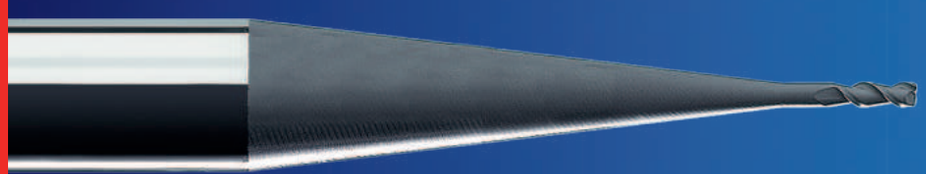


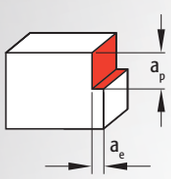
Shank 6 mm
Schaft mm

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	 1°	 2°	 3°
VHMG 2 003 064 06 02 L010	0,3	0,05	6	64	1,00	-	-	2	7	1,743	1,896	2,304	2,944
VHMG 2 003 064 06 02 L025	0,3	0,05	6	64	1,50	2,5	0,010	2	7	2,908	3,148	3,771	4,710
VHMG 2 003 064 06 02	0,3	0,05	6	64	1,50	5,0	0,010	2	8	5,562	5,967	6,988	8,436
VHMG 2 004 064 06 02 L010	0,4	0,05	6	64	1,50	-	-	2	6	2,286	2,492	3,046	3,925
VHMG 2 004 064 06 02 L025	0,4	0,05	6	64	1,50	2,5	0,010	2	7	2,912	3,156	3,797	4,773
VHMG 2 004 064 06 02	0,4	0,05	6	64	1,50	5,0	0,010	2	8	5,568	5,982	7,029	8,529
VHMG 2 005 064 06 02 L015	0,5	0,05	6	64	1,50	-	-	2	6	2,286	2,492	3,043	3,918
VHMG 2 005 064 06 02 L035	0,5	0,05	6	64	1,50	3,5	0,010	2	7	3,984	4,310	5,158	6,429
VHMG 2 005 064 06 02	0,5	0,05	6	64	1,50	7,0	0,010	2	8	7,671	8,192	9,480	11,256
VHMG 2 005 064 06 02 L100	0,5	0,05	6	64	1,50	10,0	0,010	2	10	10,772	11,375	12,813	14,671
VHMG 2 006 064 06 02 L015	0,6	0,05	6	64	1,50	-	-	2	6	2,890	3,157	3,878	5,036
VHMG 2 006 064 06 02 L035	0,6	0,05	6	64	2,00	3,5	0,025	2	7	4,185	4,534	5,442	6,815
VHMG 2 006 064 06 02	0,6	0,05	6	64	2,00	7,0	0,025	2	8	7,864	8,405	9,750	11,614
VHMG 2 006 064 06 02 L100	0,6	0,05	6	64	2,00	10,0	0,025	2	10	10,959	11,582	13,070	15,001
VHMG 2 008 064 06 02 L020	0,8	0,05	6	64	2,00	-	-	2	6	3,435	3,760	4,642	6,078
VHMG 2 008 064 06 02 L050	0,8	0,05	6	64	2,00	5,0	0,025	2	7	5,787	6,253	7,456	9,240
VHMG 2 008 064 06 02 L075	0,8	0,05	6	64	2,00	7,5	0,025	2	8	8,402	8,987	10,447	12,478
VHMG 2 008 064 06 02	0,8	0,05	6	64	2,00	10,0	0,025	2	9	10,978	11,629	13,195	15,253
VHMG 2 008 064 06 02 L150	0,8	0,05	6	64	2,00	15,0	0,025	2	13	16,043	16,674	18,099	19,794
VHMG 2 010 064 06 02 L025	1,0	0,05	6	64	2,50	-	-	2	6	3,982	4,368	5,423	7,163
VHMG 2 010 064 06 02 L050	1,0	0,05	6	64	3,00	5,0	0,025	2	7	5,805	6,294	7,572	9,512
VHMG 2 010 064 06 02 L075	1,0	0,05	6	64	3,00	7,5	0,025	2	8	8,422	9,036	10,581	12,772
VHMG 2 010 064 06 02	1,0	0,05	6	64	3,00	10,0	0,025	2	9	10,999	11,680	13,333	15,537
VHMG 2 010 064 06 02 L150	1,0	0,05	6	64	3,00	15,0	0,025	2	13	16,057	16,716	18,212	20,005
VHMG 2 010 064 06 02 L200	1,0	0,05	6	64	3,00	20,0	0,025	2	18	21,124	21,741	23,091	24,621
VHMG 2 010 064 06 02 L250	1,0	0,05	6	64	3,00	25,0	0,025	2	18	26,266	27,034	28,713	30,617
VHMG 2 010 064 06 02 L300	1,0	0,05	6	64	3,00	30,0	0,025	2	18	31,408	32,326	34,335	36,612
VHMG 2 012 064 06 02 L050	1,2	0,05	6	64	3,00	5,0	0,025	2	7	5,950	6,475	7,869	10,037
VHMG 2 012 064 06 02	1,2	0,05	6	64	3,00	10,0	0,025	2	9	11,183	11,907	13,683	16,087
VHMG 2 015 064 06 02 L050	1,5	0,05	6	64	3,00	5,0	0,025	2	6	5,978	6,548	8,094	10,609
VHMG 2 015 064 06 02 L075	1,5	0,05	6	64	3,00	7,5	0,025	2	7	8,618	9,326	11,166	13,921
VHMG 2 015 064 06 02	1,5	0,05	6	64	3,00	10,0	0,025	2	8	11,215	11,996	13,941	16,647
VHMG 2 015 064 06 02 L150	1,5	0,05	6	64	3,00	15,0	0,025	2	12	16,319	17,069	18,798	20,921
VHMG 2 015 064 06 02 L200	1,5	0,05	6	64	3,00	20,0	0,025	2	15	21,448	22,194	23,854	25,785

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.4			< 600	air
N5.5			< 600	air
N5.6			350 - 500	air

VHC Diamond coated end mills:
VHC Diamant beschichtete Schaftfräser:

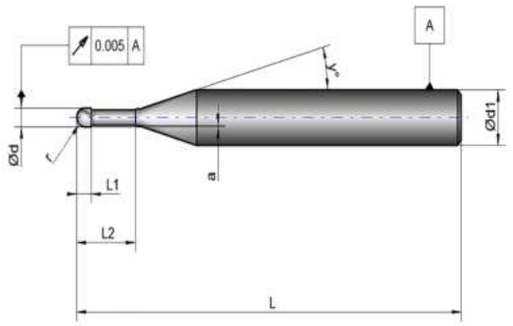
- Excellent accuracy and tolerances
  Ausgezeichnete Genauigkeiten und Toleranzen
- Optimized surface finish on workpiece
  Optimierte Werkstückoberflächen
- Leading diamond coating technology
  Führende Diamant-Beschichtungstechnologie
- Superior tool life
  Hervorragende Standzeiten



	Shoulder milling / Eckfräsen			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,3	< 0,6	< 0,03	0,007 - 0,014	< 0,15	0,3	0,006 - 0,012
0,4	< 0,8	< 0,04	0,010 - 0,018	< 0,20	0,4	0,008 - 0,015
0,5	< 1,0	< 0,05	0,012 - 0,024	< 0,25	0,5	0,010 - 0,020
0,6	< 1,2	< 0,06	0,014 - 0,026	< 0,30	0,6	0,012 - 0,022
0,8	< 1,6	< 0,08	0,018 - 0,030	< 0,40	0,8	0,015 - 0,025
1,0	< 2,0	< 0,10	0,022 - 0,036	< 0,50	1,0	0,018 - 0,030
1,2	< 2,4	< 0,12	0,024 - 0,042	< 0,60	1,2	0,020 - 0,035
1,5	< 3,0	< 0,15	0,030 - 0,048	< 0,75	1,5	0,025 - 0,040

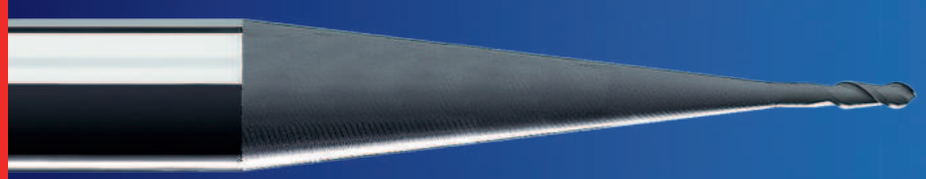
- Cutting speed V_c is based on max. 40.000 rpm.
  Schnittgeschwindigkeit V_c bezogen auf max. 40.000 U/min.
- Given conditions are based on VHMGK short length end mills; when using end mills with longer L2-length, reduce F_z according table.
  Die angegebenen Schnittwerte beziehen sich auf die kurze VHMGK Ausführung; beim Einsatz von Schaftfräsern mit größerem L2-Maß, Vorschub F_z gemäß Tabellenangaben reduzieren.

L2-Length	Reduction
1-5 x d	0%
5-10 x d	30%
10 ~	50%



N5.4 N5.5 N5.6

2 | 30° | Diamond | HPM / HSM | 6535 HA | VHC | h5



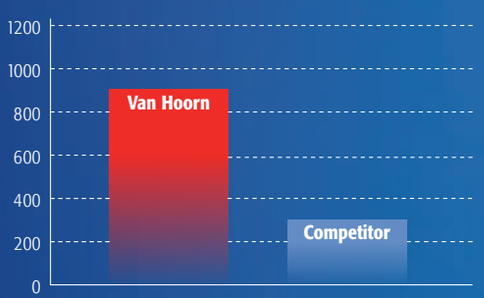
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMGK 2 003 064 06 02 L010	0,3	0,15	6	64	1,00	-	-	2	6	1,736	1,886	2,292	2,946
VHMGK 2 003 064 06 02 L025	0,3	0,15	6	64	1,50	2,5	0,010	2	7	2,901	3,131	3,731	4,635
VHMGK 2 003 064 06 02	0,3	0,15	6	64	1,50	5,0	0,010	2	8	5,555	5,953	6,953	8,373
VHMGK 2 004 064 06 02 L010	0,4	0,20	6	64	1,50	-	-	2	6	2,276	2,476	3,023	3,916
VHMGK 2 004 064 06 02 L025	0,4	0,20	6	64	1,50	2,5	0,010	2	7	2,900	3,131	3,735	4,656
VHMGK 2 004 064 06 02	0,4	0,20	6	64	1,50	5,0	0,010	2	8	5,557	5,959	6,976	8,432
VHMGK 2 005 064 06 02 L015	0,5	0,25	6	64	1,50	-	-	2	6	2,272	2,472	3,020	3,928
VHMGK 2 005 064 06 02 L035	0,5	0,25	6	64	1,50	3,5	0,010	2	7	3,968	4,277	5,078	6,280
VHMGK 2 005 064 06 02	0,5	0,25	6	64	1,50	7,0	0,010	2	8	7,658	8,164	9,417	11,143
VHMGK 2 005 064 06 02 L100	0,5	0,25	6	64	1,50	10,0	0,010	2	10	10,761	11,353	12,762	14,584
VHMGK 2 006 064 06 02 L015	0,6	0,30	6	64	1,50	-	-	2	6	2,871	3,131	3,849	5,055
VHMGK 2 006 064 06 02 L035	0,6	0,30	6	64	2,00	3,5	0,025	2	7	4,166	4,492	5,341	6,624
VHMGK 2 006 064 06 02	0,6	0,30	6	64	2,00	7,0	0,025	2	8	7,848	8,371	9,670	11,470
VHMGK 2 006 064 06 02 L100	0,6	0,30	6	64	2,00	10,0	0,025	2	10	10,946	11,554	13,006	14,890
VHMGK 2 008 055 04 02 L050	0,8	0,40	4	55	2,00	5,0	0,025	2	5	8,440	8,728	9,369	10,116
VHMGK 2 008 064 06 02 L020	0,8	0,40	6	64	2,00	-	-	2	6	3,413	3,731	4,625	6,177
VHMGK 2 008 064 06 02 L050	0,8	0,40	6	64	2,00	5,0	0,025	2	7	5,761	6,196	7,320	8,987
VHMGK 2 008 064 06 02 L075	0,8	0,40	6	64	2,00	7,5	0,025	2	8	8,379	8,938	10,332	12,273
VHMGK 2 008 064 06 02	0,8	0,40	6	64	2,00	10,0	0,025	2	9	10,958	11,587	13,100	15,089
VHMGK 2 008 064 06 02 L150	0,8	0,40	6	64	2,00	15,0	0,025	2	13	16,029	16,646	18,039	19,695
VHMGK 2 010 055 04 02 L100	1,0	0,50	4	55	3,00	10,0	0,025	2	5	11,333	12,641	16,512	24,019
VHMGK 2 010 055 04 02 L150	1,0	0,50	4	55	3,00	15,0	0,025	2	8	16,280	17,537	20,765	25,511
VHMGK 2 010 055 04 02 L200	1,0	0,50	4	55	3,00	20,0	0,025	2	13	20,933	21,823	23,859	26,328
VHMGK 2 010 060 04 02 L100	1,0	0,50	4	60	3,00	10,0	0,025	2	5	10,417	10,417	10,417	10,417
VHMGK 2 010 060 04 02 L300	1,0	0,50	4	60	3,00	30,0	0,025	2	15	31,151	32,281	34,813	37,787
VHMGK 2 010 064 06 02 L025	1,0	0,50	6	64	2,50	-	-	2	5	3,958	4,341	5,437	7,410
VHMGK 2 010 064 06 02 L050	1,0	0,50	6	64	3,00	5,0	0,025	2	7	5,770	6,218	7,388	9,164
VHMGK 2 010 064 06 02 L075	1,0	0,50	6	64	3,00	7,5	0,025	2	8	8,392	8,970	10,427	12,491
VHMGK 2 010 064 06 02	1,0	0,50	6	64	3,00	10,0	0,025	2	9	10,973	11,624	13,205	15,313
VHMGK 2 010 064 06 02 L150	1,0	0,50	6	64	3,00	15,0	0,025	2	13	16,040	16,679	18,131	19,872
VHMGK 2 010 064 06 02 L200	1,0	0,50	6	64	3,00	20,0	0,025	2	18	21,111	21,715	23,035	24,532
VHMGK 2 010 064 06 02 L250	1,0	0,05	6	64	3,00	25,0	0,025	2	18	26,266	27,034	28,713	30,617
VHMGK 2 010 064 06 02 L300	1,0	0,05	6	64	3,00	30,0	0,025	2	18	31,408	32,326	34,335	36,612
VHMGK 2 012 064 06 02 L050	1,2	0,60	6	64	3,00	5,0	0,025	2	7	5,905	6,378	7,630	9,579
VHMGK 2 012 064 06 02	1,2	0,60	6	64	3,00	10,0	0,025	2	9	11,149	11,836	13,518	15,796
VHMGK 2 015 064 06 02 L050	1,5	0,75	6	64	3,00	5,0	0,025	2	6	5,917	6,413	7,761	9,953
VHMGK 2 015 064 06 02 L075	1,5	0,75	6	64	3,00	7,5	0,025	2	7	8,564	9,210	10,889	13,401
VHMGK 2 015 064 04 02 L100	1,5	0,75	4	64	3,00	10,0	0,025	2	8	10,528	10,528	10,528	10,528
VHMGK 2 015 064 04 02 L150	1,5	0,75	4	64	3,00	15,0	0,025	2	12	15,643	15,643	15,643	15,643
VHMGK 2 015 064 06 02	1,5	0,75	6	64	3,00	10,0	0,025	2	8	11,169	11,898	13,713	16,238
VHMGK 2 015 064 06 02 L150	1,5	0,75	6	64	3,00	15,0	0,025	2	12	16,288	17,004	18,656	20,684
VHMGK 2 015 064 06 02 L200	1,5	0,75	6	64	3,00	20,0	0,025	2	15	21,425	22,145	23,749	25,615

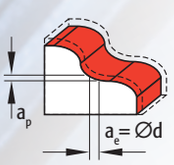
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.4			**< 600**	air
N5.5			**< 600**	air
N5.6			**350 - 500**	air

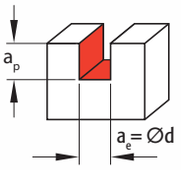
VHMGK 2 010 064 06 02
Workpiece Material: Poco Graphite
Hardness: 1700

	Van Hoorn	Competitor
Ø	10,0 mm	10,0 mm
V_c	126 m/min	126 m/min
n	40.000 rpm	40.000 rpm
F_z	0,013 mm/t	0,010 mm/t
Z	2	2
V_f	1.000 mm/min	800 mm/min
a_p	0,05 mm	0,05 mm
a_e	0,10 mm	0,10 mm
Coolant	air	air
Lifetime	**900 min**	**300 min**

Finishing application



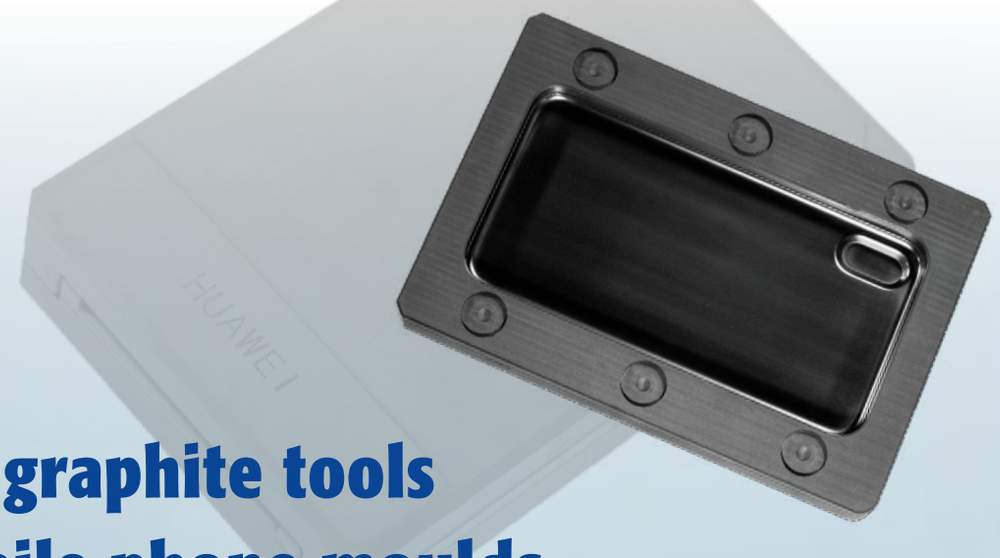




Ød (mm)	Shoulder milling / Eckfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Profiling / Kopierfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,3	< 0,3	<0,03	0,007 - 0,014	< 0,03	0,03	0,007 - 0,014
0,4	< 0,4	<0,04	0,010 - 0,018	< 0,04	0,04	0,010 - 0,018
0,5	< 0,5	<0,05	0,012 - 0,024	< 0,05	0,05	0,012 - 0,024
0,6	< 0,6	<0,06	0,014 - 0,026	< 0,06	0,06	0,014 - 0,026
0,8	< 0,8	<0,08	0,018 - 0,030	< 0,08	0,08	0,018 - 0,030
1,0	< 1,0	<0,10	0,022 - 0,036	< 0,10	0,10	0,022 - 0,036
1,2	< 1,2	<0,12	0,024 - 0,042	< 0,12	0,12	0,024 - 0,042
1,5	< 1,5	<0,15	0,030 - 0,048	< 0,15	0,15	0,030 - 0,048

- Cutting speed V_c is based on max. 40.000 rpm.
  Schnittgeschwindigkeit V_c bezogen auf max. 40.000 U/min.
- Given conditions are based on VHMGK short length end mills; when using end mills with longer L2-length, reduce F_z according table.
  Die angegebenen Schnittwerte beziehen sich auf die kurze VHMGK Ausführung; beim Einsatz von Schaftfräsern mit größerem L2-Maß, Vorschub F_z gemäß Tabellenangaben reduzieren.

L2-Length	Reduction
1-5 x d	0%
5-10 x d	30%
10 ~	50%



Special graphite tools for mobile phone moulds

Spezielle Graphitwerkzeuge für handy Formen

Our end mills program for applications on graphite is perfectly suited for the production of dies and moulds. These tools are most efficient due to the optimized geometry and special diamond coating.

Unsere Schaftfräser für die Graphit-Bearbeitung sind besonders geeignet für die Produktion von Stempeln und Matrizen. Die optimalisierte Geometrie und spezielle Diamantbeschichtung garantieren eine sehr hohe Nutzleistung.

Diamond coating:
More accuracy
Höhere Genauigkeit
Smooth surface on the workpiece
Glatte Werkstückoberflächen
Longer tool life
Längere Standzeit

"With our great range of optimized products we are distinctive from our competitors."

Carlos Dias
Owner
CMFD (Portugal)

CMFD's headquarter is located in Portugal and we are specialized in the mould industry for synthetics. With our wide range of optimized products we are distinctive from our competitors. In Portugal we have a large potential market for graphite tools. Van Hoorn Carbide provides us with a most complete program of end mills for this market, which makes us very competitive.

Most important is our relationship with Van Hoorn Carbide. This great personal and professional relation was established through years of technical support and innovation. CMFD is competitive with big brands worldwide because Van Hoorn Carbide have very fast lead times to produce specials.

Year by year Van Hoorn Carbide is innovating and this is positively noticeable for customers like us. We would recommend Van Hoorn Carbide because they still grow year by year and have a great program for moulds.

Der Hauptsitz von CMFD befindet sich in Portugal. CMFD ist spezialisiert in Forme für die Plastikindustrie. Durch unsere große Produktpalette von optimierten Produkten unterscheiden wir uns vom Wettbewerb. In Portugal haben wir einen großen potentiellen Markt für Werkzeuge für die Bearbeitung von Graphite. Van Hoorn Carbide bietet uns ein umfangreiches Programm von Schaftfräsern wodurch wir sehr wettbewerbsfähig sind.

Sehr wichtig ist unsere Beziehung zu Van Hoorn Carbide. Diese gute personelle und geschäftliche Beziehung mittels technische Unterstützung und Innovation entwickelte sich durch die Jahren. CMFD ist wettbewerbsfähig mit den großen Weltmarken, weil Van Hoorn Carbide schnelle Vorlaufzeiten hat um Specials zu produzieren.

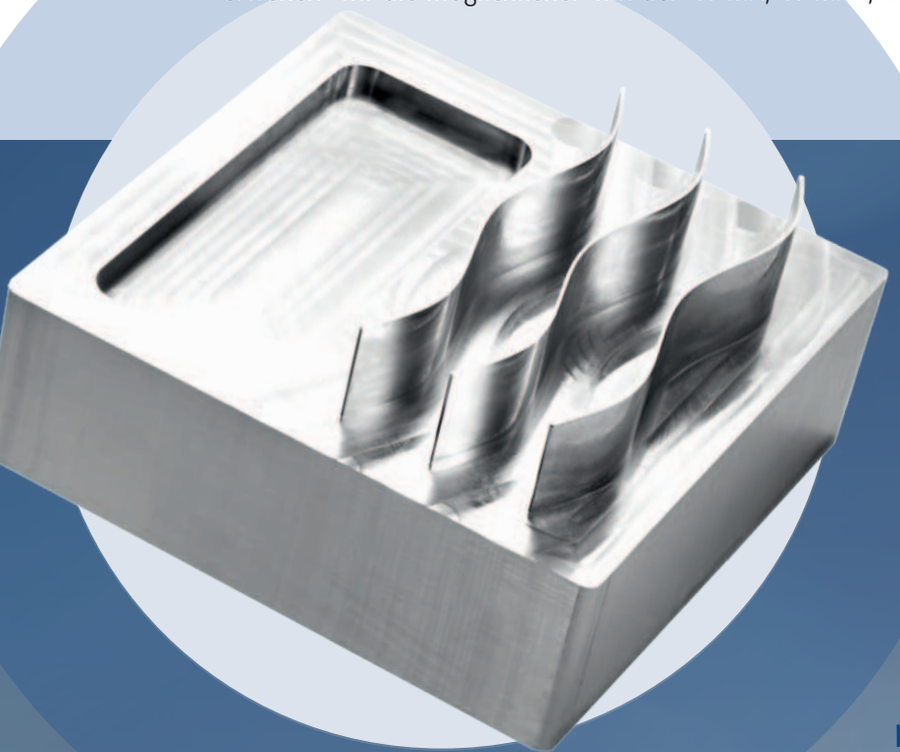
Jahr nach Jahr ist Van Hoorn Carbide innovativ und das ist positiv bemerkbar für Kunden wie wir. Wir würden Van Hoorn Carbide empfehlen, weil sie jedes Jahr wachsen und Van Hoorn Carbide ein umfangreiches Programm für den Formenbau hat.

Milling of non ferrous materials; our strength!

Fräsen von Nichteisen - Werkstoffe (NE); unsere Stärke!

With a large number of superior end mills for applications on non ferrous materials, we prove our strength every day. Now we expand the possibilities with the VHMA, VHMAK, VHKE, VHAD and VHRAI.

Mit einer großen Zahl an Top-Fräsern für die NE-Metall beweisen wir täglich unsere Stärke. Jetzt erweitern wir die Möglichkeiten mit den VHMA, VHMAK, VHKE, VHAD und VHRAI.



High performance machining non Ferrous!

Hohe Leistung bei der Bearbeitung NE-Materialien!

Non ferrous materials / NE-Materialien:

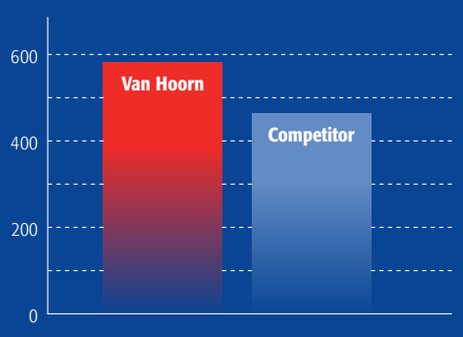
- Aluminium / Aluminium
- Copper / Kupfer
- Bronze / Bronze
- Lead / Blei
- Brass / Messing
- Zinc / Zink
- Plastics / Kunststoff

micro

VHAD 3 100 072 10 10
Workpiece Material: 3.2315
Hardness: Aluminium 51ST

	Van Hoorn	Competitor
Ø	10,0 mm	10,0 mm
vc	500 m/min	600 m/min
n	15.915 rpm	23.870 rpm
Fz	0,25 mm/t	0,15 mm/t
Z	3	2
vf	2.387 mm/min	7.161 mm/min
ap	10,0 mm	8,0 mm
ae	10,0 mm	8,0 mm
Coolant	emulsion	emulsion
Q	**1193,7 cm³/min**	**458,3 cm³/min**

VHAD Material removal rate



Application demands on aluminium

Anwendungsanforderingen bei der Bearbeitung von Aluminium

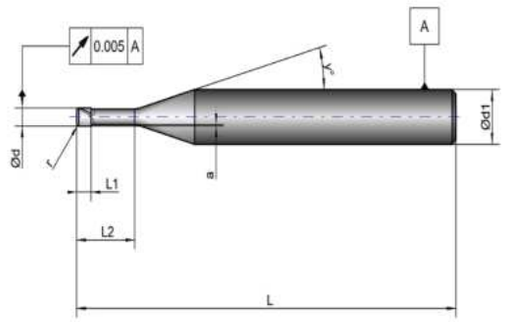
- **Large chipping volumes: VHRAW / VHRAI**
  Großes Zeitspanungsvolumen: VHRAW / VHRAI
- **Burr-free or thin wall applications: VHLA2 and VHLA3**
  Gratfreie oder Bearbeitung dünnwändigere Werkstücke VHLA
- **Operation flexibility: VHAE**
  Flexible Anwendung: VHAE
- **Multiple demands: VHRAI**
  Wechselnde Einsatzbedingungen: VHRAI

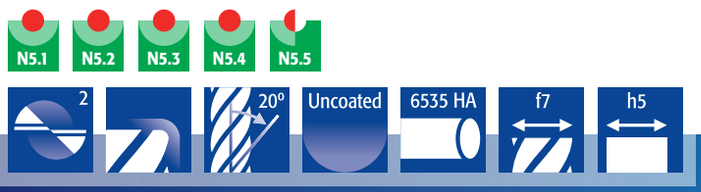
Micro milling
Mikrofräsen

- **Straight - VHMA**
  Gerade - VHMA
- **Ball nose - VHMAK**
  Kugel - VHMAK

Advantages / Vorteile VHAD

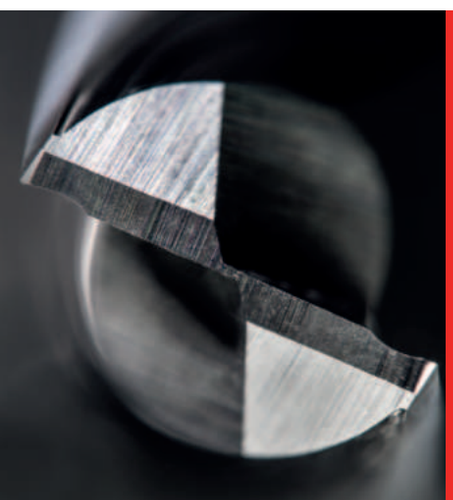
- **Perfect allround end mill**
  Perfekte allround-Schaftfräser
- **High material removal rates & a smooth surface finish**
  Hohe Zerspanungsleistung und glatte Oberflächen
- **Polished flutes for optimized chip evacuation**
  Polierte Spannkammer für optimale Spanabfuhr
- **Excellent chip flow: high material removal rates**
  Hervorragende Spanabfuhr: hohe Zerspanungsleistung





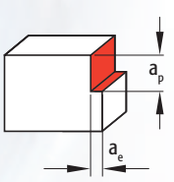
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMA 2 003 064 06 10 L010	0,3	0,05	6	64	0,60	1,0	0,025	2	10	1,383	1,456	1,630	1,852
VHMA 2 003 064 06 10 L025	0,3	0,05	6	64	0,60	2,5	0,025	2	10	2,961	3,121	3,500	3,987
VHMA 2 004 064 06 10 L015	0,4	0,05	6	64	0,80	1,5	0,050	2	10	2,058	2,168	2,430	2,766
VHMA 2 004 064 06 10 L032	0,4	0,05	6	64	0,80	3,2	0,050	2	10	3,846	4,055	4,550	5,185
VHMA 2 005 064 06 10 L015	0,5	0,05	6	64	1,00	1,5	0,100	2	10	2,356	2,483	2,783	3,169
VHMA 2 005 064 06 10 L040	0,5	0,05	6	64	1,00	4,0	0,100	2	10	4,986	5,258	5,901	6,726
VHMA 2 006 064 06 10 L020	0,6	0,05	6	64	1,20	2,0	0,100	2	12	2,903	3,031	3,324	3,681
VHMA 2 006 064 06 10 L050	0,6	0,05	6	64	1,20	5,0	0,100	2	12	6,031	6,299	6,913	7,663
VHMA 2 008 064 06 10 L040	0,8	0,05	6	64	1,60	4,0	0,100	2	12	4,989	5,209	5,717	6,336
VHMA 2 010 064 06 10 L050	1,0	0,05	6	64	2,00	5,0	0,100	2	12	6,031	6,299	6,913	7,663
VHMA 2 012 064 06 10 L060	1,2	0,05	6	64	2,40	6,0	0,100	2	12	7,293	7,617	8,361	9,269
VHMA 2 015 064 06 10 L080	1,5	0,05	6	64	3,00	8,0	0,100	2	12	9,379	9,796	10,755	11,924
VHMA 2 020 064 06 10 L100	2,0	0,05	6	64	3,00	10,0	0,100	2	12	11,465	11,975	13,148	14,578
VHMA 2 025 064 06 10 L120	2,5	0,05	6	64	3,00	12,0	0,100	2	12	13,550	14,154	15,541	17,232
VHMA 2 030 064 06 10 L120	3,0	0,05	6	64	3,00	12,0	0,100	2	12	13,550	14,154	15,541	17,232

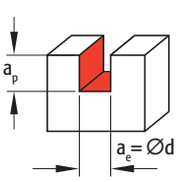
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air



Micro milling of non Ferrous
Mikro Fräsen von Nichteisen - Werkstoffe

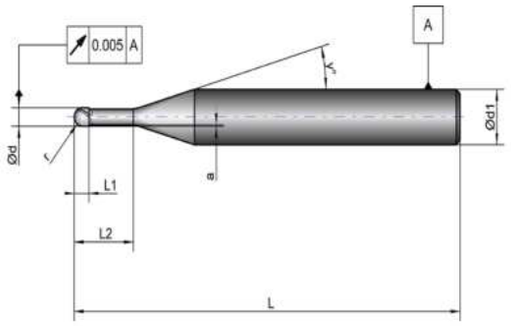
- **High accuracy**
  Hohe Genauigkeit
- **Optimized chip evacuation**
  Optimale Spanabfuhr
- **Smooth surface finish**
  Glatte Oberflächen

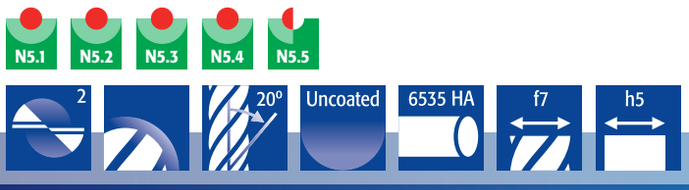




Ød (mm)	Shoulder milling / Eckfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Slot milling / Nutfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,3	< 0,3	<0,03	0,005 - 0,009	< 0,12	0,3	0,003 - 0,006
0,4	< 0,4	<0,04	0,007 - 0,012	< 0,16	0,4	0,005 - 0,009
0,5	< 0,5	<0,05	0,009 - 0,015	< 0,20	0,5	0,007 - 0,012
0,6	< 0,6	<0,06	0,011 - 0,018	< 0,24	0,6	0,009 - 0,014
0,8	< 0,8	<0,08	0,013 - 0,021	< 0,32	0,8	0,010 - 0,016
1,0	< 1,0	<0,10	0,016 - 0,025	< 0,40	1,0	0,012 - 0,019
1,2	< 1,2	<0,12	0,020 - 0,030	< 0,48	1,2	0,015 - 0,023
1,5	< 1,5	<0,15	0,030 - 0,040	< 0,60	1,5	0,023 - 0,030
2,0	< 2,0	<0,20	0,035 - 0,050	< 0,80	2,0	0,026 - 0,038
2,5	< 2,5	<0,25	0,040 - 0,060	< 1,00	2,5	0,030 - 0,045
3,0	< 3,0	<0,30	0,050 - 0,075	< 1,20	3,0	0,038 - 0,056

- Cutting speed V_c is based on max. 50.000 rpm.
  Schnittgeschwindigkeit V_c bezogen auf max. 50.000 U/min.
- End mills can be used also for drilling with reduced cutting conditions.
  Mit verringerten Schnittwerten können die Fräser auch für Herstellung von Bohrungen verwendet werden.





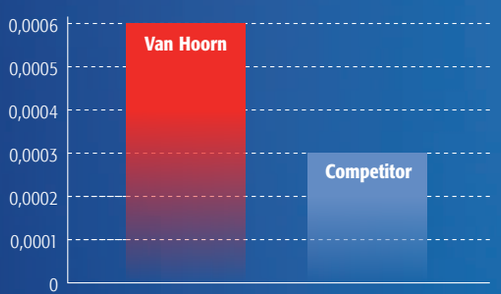
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	Effective length compared with Inclined Angle 0,5°	1°	2°	3°
VHMAK 2 003 064 06 10 L010	0,3	0,15	6	64	0,60	1,0	0,025	2	10	1,378	1,445	1,605	1,810
VHMAK 2 003 064 06 10 L025	0,3	0,15	6	64	0,60	2,5	0,025	2	10	2,956	3,110	3,475	3,945
VHMAK 2 004 064 06 10 L015	0,4	0,20	6	64	0,80	1,5	0,050	2	10	2,050	2,152	2,393	2,702
VHMAK 2 004 064 06 10 L032	0,4	0,20	6	64	0,80	3,2	0,050	2	10	3,839	4,039	4,513	5,121
VHMAK 2 005 064 06 10 L015	0,5	0,25	6	64	1,00	1,5	0,100	2	10	2,346	2,461	2,734	3,085
VHMAK 2 005 064 06 10 L040	0,5	0,25	6	64	1,00	4,0	0,100	2	10	4,976	5,236	5,851	6,642
VHMAK 2 006 064 06 10 L020	0,6	0,30	6	64	1,20	2,0	0,100	2	12	2,892	3,008	3,274	3,599
VHMAK 2 006 064 06 10 L050	0,6	0,30	6	64	1,20	5,0	0,100	2	12	6,021	6,277	6,864	7,581
VHMAK 2 008 064 06 10 L040	0,8	0,40	6	64	1,60	4,0	0,100	2	12	4,974	5,178	5,648	6,221
VHMAK 2 010 064 06 10 L050	1,0	0,50	6	64	2,00	5,0	0,100	2	12	6,012	6,259	6,825	7,516
VHMAK 2 012 064 06 10 L060	1,2	0,60	6	64	2,40	6,0	0,100	2	12	7,270	7,568	8,253	9,089
VHMAK 2 015 064 06 10 L080	1,5	0,75	6	64	3,00	8,0	0,100	2	12	9,349	9,734	10,617	11,694
VHMAK 2 020 064 06 10 L100	2,0	1,00	6	64	3,00	10,0	0,100	2	12	11,424	11,890	12,961	14,267
VHMAK 2 025 064 06 10 L120	2,5	1,25	6	64	3,00	12,0	0,100	2	12	13,499	14,047	15,305	16,840
VHMAK 2 030 064 06 10 L120	3,0	1,50	6	64	3,00	12,0	0,100	2	12	13,488	14,024	15,256	16,758

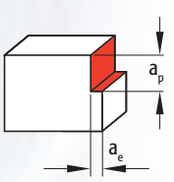
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air

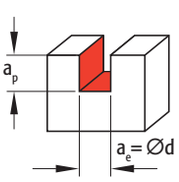
VHMAK 2 015 064 06 10 L080
Workpiece Material: Tungsten Copper

	Van Hoorn	Competitor
Ø	1,5 mm	1,5 mm
V_c	180 m/min	120 m/min
n	38.200 rpm	25.500 rpm
F_z	0,021	0,015
Z	2	2
V_f	1500	750
a_p	0,02 mm	0,02 mm
a_e	0,02 mm	0,02 mm
Coolant	emulsion	emulsion
Q	**0,0006**	**0,0003**

Material removal rate
Zerspanungsleistung

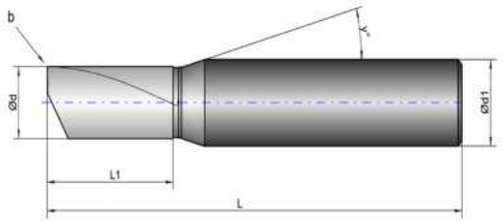


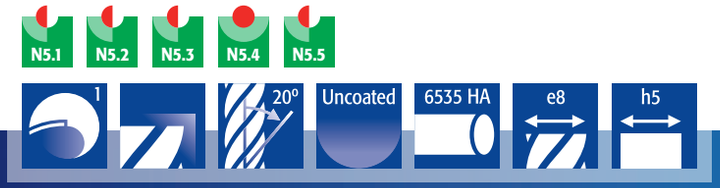


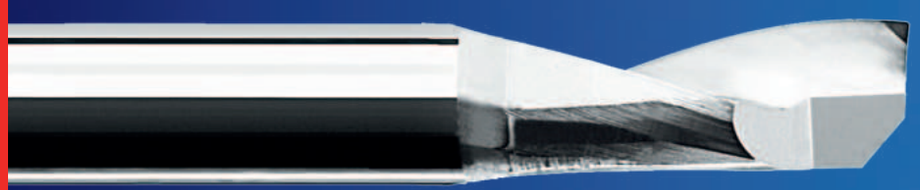


Ød (mm)	Shoulder milling / Eckfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Slot milling / Nutfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,3	< 0,3	< 0,03	0,005 - 0,009	< 0,03	< 0,03	0,005 - 0,009
0,4	< 0,4	< 0,04	0,007 - 0,012	< 0,04	< 0,04	0,007 - 0,012
0,5	< 0,5	< 0,05	0,009 - 0,015	< 0,05	< 0,05	0,009 - 0,015
0,6	< 0,6	< 0,06	0,011 - 0,018	< 0,06	< 0,06	0,011 - 0,018
0,8	< 0,8	< 0,08	0,013 - 0,021	< 0,08	< 0,08	0,013 - 0,021
1,0	< 1,0	< 0,10	0,016 - 0,025	< 0,10	< 0,10	0,016 - 0,025
1,2	< 1,2	< 0,12	0,020 - 0,030	< 0,12	< 0,12	0,020 - 0,030
1,5	< 1,5	< 0,15	0,030 - 0,040	< 0,15	< 0,15	0,030 - 0,040
2,0	< 2,0	< 0,20	0,035 - 0,050	< 0,20	< 0,20	0,035 - 0,050
2,5	< 2,5	< 0,25	0,040 - 0,060	< 0,25	< 0,25	0,040 - 0,060
3,0	< 3,0	< 0,30	0,050 - 0,075	< 0,30	< 0,30	0,050 - 0,075

- Cutting speed V_c is based on max. 50.000 rpm.
  Schnittgeschwindigkeit V_c bezogen auf max. 50.000 U/min.
- End mills can be used also for drilling with reduced cutting conditions.
  Mit verringerten Schnittwerten können die Fräser auch für Herstellung von Bohrungen verwendet werden.







Ideal tools for signing industry
Ideale Werkzeuge für die Werbe Industrie

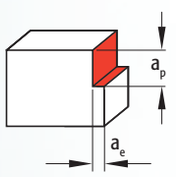
Article Number *Artikelnummer*	Ød (mm)	b (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard									
VHKE 1 010 039 03 10 L 020	1,0	-	3	39	2,00	-	-	1	15
VHKE 1 010 039 03 10 L 040	1,0	-	3	39	4,00	-	-	1	15
VHKE 1 015 039 03 10 L 025	1,5	-	3	39	2,50	-	-	1	15
VHKE 1 015 039 03 10 L 050	1,5	-	3	39	5,00	-	-	1	15
VHKE 1 020 039 03 10 L 030	2,0	-	3	39	3,00	-	-	1	15
VHKE 1 020 039 03 10 L 060	2,0	-	3	39	6,00	-	-	1	15
VHKE 1 025 039 03 10 L 040	2,5	-	3	39	4,00	-	-	1	15
VHKE 1 025 039 03 10 L 060	2,5	-	3	39	6,00	-	-	1	15
VHKE 1 030 051 06 10 L 040	3,0	0,05	6	51	4,00	-	-	1	15
VHKE 1 030 051 06 10 L 060	3,0	0,05	6	51	6,00	-	-	1	15
VHKE 1 030 051 06 10 L 080	3,0	0,05	6	51	8,00	-	-	1	15
VHKE 1 030 051 06 10 L 120	3,0	0,05	6	51	12,00	-	-	1	15
VHKE 1 040 051 06 10 L 050	4,0	0,05	6	51	5,00	-	-	1	15
VHKE 1 040 051 06 10 L 080	4,0	0,05	6	51	8,00	-	-	1	15
VHKE 1 040 051 06 10 L 100	4,0	0,05	6	51	10,00	-	-	1	15
VHKE 1 040 051 06 10 L 140	4,0	0,05	6	51	14,00	-	-	1	15
VHKE 1 050 051 06 10 L 060	5,0	0,08	6	51	6,00	-	-	1	15
VHKE 1 050 051 06 10 L 100	5,0	0,08	6	51	10,00	-	-	1	15
VHKE 1 050 051 06 10 L 120	5,0	0,08	6	51	12,00	-	-	1	15
VHKE 1 060 051 06 10 L 080	6,0	0,10	6	51	8,00	-	-	1	-
VHKE 1 060 051 06 10 L 120	6,0	0,10	6	51	12,00	-	-	1	-
VHKE 1 060 051 06 10 L 140	6,0	0,10	6	51	14,00	-	-	1	-
VHKE 1 080 060 08 10 L 100	8,0	0,12	8	60	10,00	-	-	1	-
VHKE 1 080 060 08 10 L 160	8,0	0,12	8	60	16,00	-	-	1	-
VHKE 1 100 070 10 10 L 120	10,0	0,15	10	70	12,00	-	-	1	-
VHKE 1 100 070 10 10 L 220	10,0	0,15	10	70	22,00	-	-	1	-
VHKE 1 120 078 12 10 L 150	12,0	0,20	12	78	15,00	-	-	1	-
Long / Lange Ausführung									
VHKE 1 030 060 06 10 L 220	3,0	-	6	60	22,00	-	-	1	15
VHKE 1 040 060 06 10 L 220	4,0	-	6	60	22,00	-	-	1	15
VHKE 1 060 064 06 10 L 250	6,0	-	6	64	25,00	-	-	1	-
VHKE 1 060 070 06 10 L 320	6,0	-	6	70	32,00	-	-	1	-
VHKE 1 080 078 08 10 L 420	8,0	-	8	78	42,00	-	-	1	-

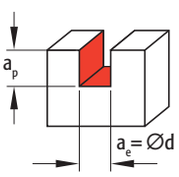
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air

VHKE 1 040 051 06 10 L050

Ø	4,0 mm
V_c	503 m/min
n	40.000 rpm
F_z	0,150 mm/t
Z	1
V_f	6.000 mm/min
a_p	3,2 mm
a_e	4,0 mm
Coolant	air
Q	**76,8 cm³/min**

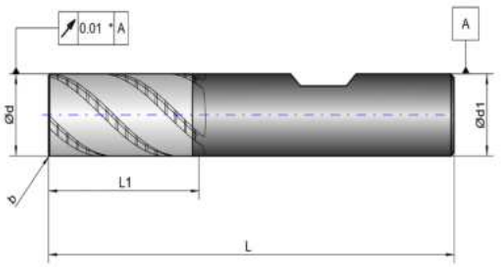
- Burr free milling!
  Gratfrei fräsen!
- Excellent chip evacuation!
  Ausgezeichnete Spanabfuhr!



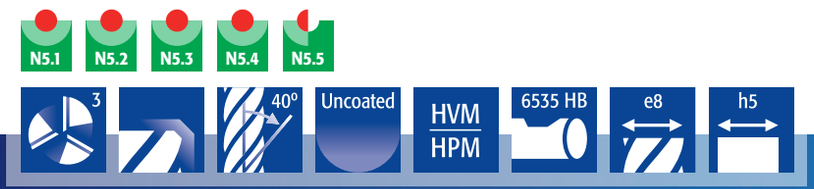


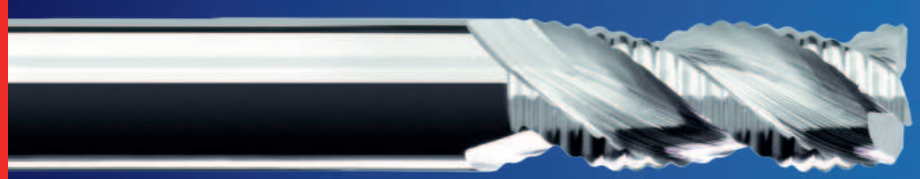
	Shoulder milling / Eckfräsen			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
1,0	< 2,0	< 0,4	0,020 - 0,030	< 1,0	1,0	0,015 - 0,022
1,5	< 3,0	< 0,6	0,030 - 0,050	< 1,5	1,5	0,022 - 0,037
2,0	< 4,0	< 0,8	0,045 - 0,065	< 2,0	2,0	0,034 - 0,048
2,5	< 5,0	< 1,0	0,060 - 0,080	< 2,5	2,5	0,045 - 0,060
3,0	< 6,0	< 1,2	0,070 -0,100	< 3,0	3,0	0,053 -0,075
4,0	< 8,0	< 1,6	0,085 - 0,115	< 4,0	4,0	0,064 - 0,086
5,0	< 10,0	< 2,0	0,100 - 0,140	< 5,0	5,0	0,075 - 0,105
6,0	< 12,0	< 2,4	0,125 - 0,175	< 6,0	6,0	0,094 - 0,131
8,0	< 16,0	< 3,2	0,140 - 0,220	< 8,0	8,0	0,105 - 0,165
10,0	< 20,0	< 4,0	0,180 - 0,270	< 10,0	10,0	0,135 - 0,200
12,0	< 15,0	< 4,8	0,220 - 0,300	< 12,0	12,0	0,165 - 0,225

- Cutting speed V_c is based on max. 50.000 rpm.
  Schnittgeschwindigkeit V_c bezogen auf max. 50.000 U/min.
- End mills can be used also for drilling with reduced cutting conditions.
  Mit verringerten Schnittwerten können die Fräser auch für Herstellung von Bohrungen verwendet werden.



* For end mills / für Schaftfräser L < 100 mm.



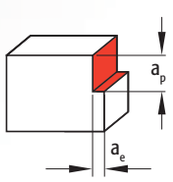


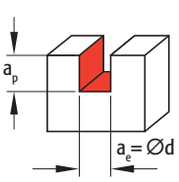
Article Number *Artikelnummer*	Ød (mm)	b (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHRAW 3 060 064 06 15	6,0	0,25	6	64	16,00	-	-	3	-
VHRAW 3 080 064 08 15	8,0	0,50	8	64	20,00	-	-	3	-
VHRAW 3 100 070 10 15	10,0	0,50	10	70	22,00	-	-	3	-
VHRAW 3 120 078 12 15	12,0	0,50	12	78	25,00	-	-	3	-
VHRAW 3 160 089 16 15	16,0	1,00	16	89	35,00	-	-	3	-
VHRAW 3 200 102 20 15	20,0	1,00	20	102	40,00	-	-	3	-
VHRAW 3 250 120 25 15	25,0	1,00	25	120	50,00	-	-	3	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air

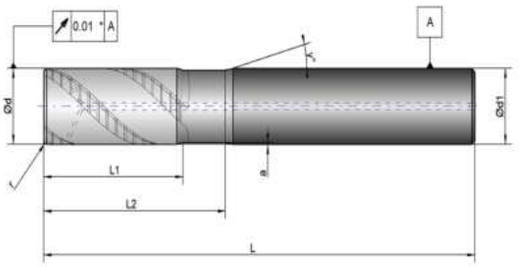
Ripper formed for optimized chip flow

Kordelprofil für optimale Spanabfuhr

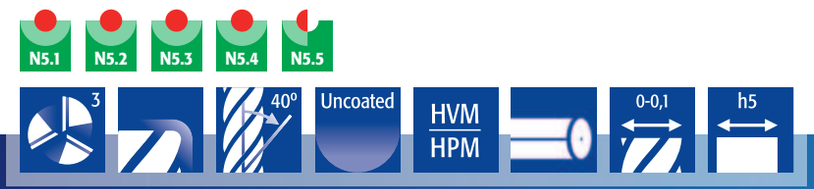




	Shoulder milling / Eckfräsen			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
6,0	< 12,0	< 2,70	0,040 - 0,080	< 6,00	6,00	0,032 - 0,064
8,0	< 16,0	< 3,60	0,060 - 0,100	< 8,00	8,00	0,048 - 0,080
10,0	< 20,0	< 4,50	0,080 - 0,120	< 10,00	10,00	0,064 - 0,096
12,0	< 24,0	< 5,40	0,090 - 0,150	< 12,00	12,00	0,072 - 0,120
16,0	< 32,0	< 7,20	0,120 - 0,180	< 16,00	16,00	0,096 - 0,144
20,0	< 40,0	< 9,00	0,150 - 0,230	< 20,00	20,00	0,120 - 0,184
25,0	< 50,0	< 11,25	0,180 - 0,280	< 25,00	25,00	0,144 - 0,224



* For end mills / für Schaftfräser L < 100 mm.



New geometry with internal coolant
Neue Geometrie mit interner Kühlung

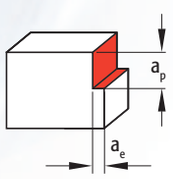
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
With neck relief 3xD									
VHRAI 3 060 057 06 10 020 L180	6,0	0,20	6	57	14,00	18,0	0,100	3	30
VHRAI 3 080 063 08 10 020 L240	8,0	0,20	8	63	18,00	24,0	0,200	3	30
VHRAI 3 100 072 10 10 020 L300	10,0	0,20	10	72	22,00	30,0	0,300	3	30
VHRAI 3 120 083 12 10 050 L360	12,0	0,50	12	83	26,00	36,0	0,350	3	30
VHRAI 3 120 083 12 10 200 L360	12,0	2,00	12	83	26,00	36,0	0,350	3	30
VHRAI 3 120 083 12 10 400 L360	12,0	4,00	12	83	26,00	36,0	0,350	3	30
VHRAI 3 160 098 16 10 050 L480	16,0	0,50	16	98	34,00	48,0	0,400	3	30
VHRAI 3 160 098 16 10 400 L480	16,0	4,00	16	98	34,00	48,0	0,400	3	30
VHRAI 3 200 112 20 10 050 L600	20,0	0,50	20	112	42,00	60,0	0,500	3	30
VHRAI 3 250 132 25 10 050 L750	25,0	0,50	25	132	52,00	75,0	0,750	3	30
VHRAI 3 250 132 25 10 400 L750	25,0	4,00	25	132	52,00	75,0	0,750	3	30
With neck relief 4xD									
VHRAI 3 060 064 06 10 020 L240	6,0	0,20	6	64	14,00	24,0	0,100	3	30
VHRAI 3 080 072 08 10 020 L320	8,0	0,20	8	72	18,00	32,0	0,200	3	30
VHRAI 3 100 084 10 10 020 L400	10,0	0,20	10	84	22,00	40,0	0,300	3	30
VHRAI 3 120 095 12 10 050 L480	12,0	0,50	12	95	26,00	48,0	0,350	3	30
VHRAI 3 120 095 12 10 200 L480	12,0	2,00	12	95	26,00	48,0	0,350	3	30
VHRAI 3 120 095 12 10 400 L480	12,0	4,00	12	95	26,00	48,0	0,350	3	30
VHRAI 3 160 114 16 10 050 L640	16,0	0,50	16	114	34,00	64,0	0,400	3	30
VHRAI 3 160 114 16 10 400 L640	16,0	4,00	16	114	34,00	64,0	0,400	3	30
VHRAI 3 200 132 20 10 050 L800	20,0	0,50	20	132	42,00	80,0	0,500	3	30
VHRAI 3 250 157 25 10 050 L1000	25,0	0,50	25	157	52,00	100,0	0,750	3	30
With neck relief 5xD									
VHRAI 3 060 072 06 10 020 L300	6,0	0,20	6	72	14,00	30,0	0,100	3	30
VHRAI 3 080 078 08 10 020 L400	8,0	0,20	8	78	18,00	40,0	0,200	3	30
VHRAI 3 100 092 10 10 020 L500	10,0	0,20	10	92	22,00	50,0	0,300	3	30
VHRAI 3 120 107 12 10 050 L600	12,0	0,50	12	107	26,00	60,0	0,350	3	30
VHRAI 3 120 107 12 10 200 L600	12,0	2,00	12	107	26,00	60,0	0,350	3	30
VHRAI 3 120 107 12 10 400 L600	12,0	4,00	12	107	26,00	60,0	0,350	3	30
VHRAI 3 160 130 16 10 050 L800	16,0	0,50	16	130	34,00	80,0	0,400	3	30
VHRAI 3 160 130 16 10 400 L800	16,0	4,00	16	130	34,00	80,0	0,400	3	30
VHRAI 3 200 152 20 10 050 L1000	20,0	0,50	20	152	42,00	100,0	0,500	3	30
VHRAI 3 250 182 25 10 050 L1250	25,0	0,50	25	182	52,00	125,0	0,750	3	30

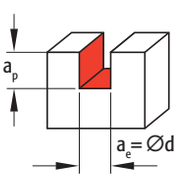
Material group	TSR (N/mm²)	Hardness HB	Cutting speed Vc m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air

Extreme productivity
Extreme Produktivität

VHRAI 3 120 078 12 15
Workpiece material: 51ST Aluminium

Ø	12,0 mm
V_c	829 m/min
n	22.000 rpm
F_z	0,067 mm/t
Z	3
V_f	4.400 mm/min
a_p	12,0 mm
a_e	5,5 mm
Coolant	emulsion
Q	**290,4 cm³/min**





Shoulder milling / Eckfräsen

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
6,0	< 12,0	< 2,4	0,048 - 0,096
8,0	< 16,0	< 3,2	0,072 - 0,120
10,0	< 20,0	< 4,0	0,096 - 0,144
12,0	< 24,0	< 4,8	0,108 - 0,180
16,0	< 32,0	< 6,4	0,144 - 0,216
20,0	< 40,0	< 8,0	0,180 - 0,276
25,0	< 50,0	< 10,0	0,240 - 0,360

Slot milling / Nutfräsen

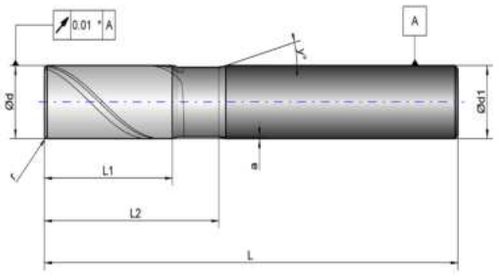
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 9,00	6,00	0,040 - 0,080
< 12,00	8,00	0,060 - 0,100
< 15,00	10,00	0,080 - 0,120
< 18,00	12,00	0,090 - 0,150
< 24,00	16,00	0,120 - 0,180
< 30,00	20,00	0,150 - 0,230
< 37,50	25,00	0,200 - 0,300

Cutting conditions 4xD - 5xD Neck relief

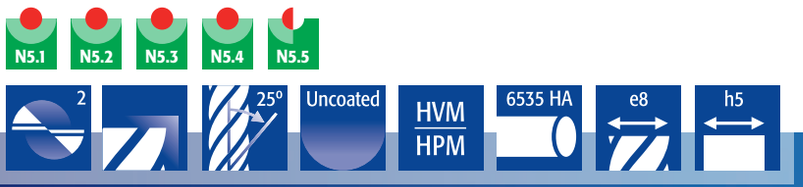
Ø x D	a_p %	a_e %	Fz %
4 x D	60	100	85
5 x D	40	100	60

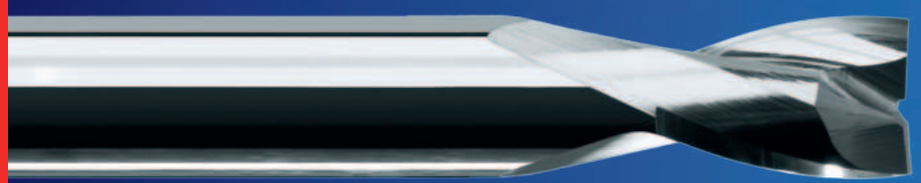
Cutting conditions 4xD - 5xD Neck relief

a_p %	a_e %	Fz %
60	100	85
40	100	60



* For end mills / für Schaftfräser L < 100 mm.





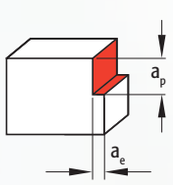
2 flute
2 Schneiden

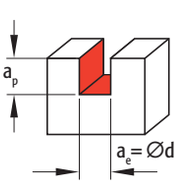
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHLA 2 020 039 03 15	2,0	0,10	3	39	3,00	6,0	0,050	2	15
VHLA 2 030 064 03 15	3,0	0,10	3	64	4,00	9,0	0,050	2	-
VHLA 2 040 064 04 15	4,0	0,10	4	64	5,00	12,0	0,100	2	-
VHLA 2 040 064 06 15	4,0	-	6	64	11,00	-	-	2	15
VHLA 2 050 064 05 15	5,0	0,10	5	64	8,00	15,0	0,100	2	-
VHLA 2 050 064 06 15	5,0	-	6	64	13,00	-	-	2	15
VHLA 2 060 064 06 15	6,0	0,10	6	64	8,00	18,0	0,100	2	-
VHLA 2 060 102 06 15	6,0	0,10	6	102	8,00	24,0	0,100	2	-
VHLA 2 080 070 08 15	8,0	0,10	8	70	10,00	24,0	0,100	2	-
VHLA 2 080 102 08 15	8,0	0,10	8	102	10,00	32,0	0,100	2	-
VHLA 2 100 070 10 15	10,0	0,10	10	70	14,00	26,0	0,150	2	-
VHLA 2 100 102 10 15	10,0	0,10	10	102	14,00	30,0	0,150	2	-
VHLA 2 120 089 12 15	12,0	0,10	12	89	16,00	36,0	0,150	2	-
VHLA 2 120 125 12 15	12,0	0,10	12	125	16,00	48,0	0,150	2	-
VHLA 2 160 089 16 15	16,0	0,10	16	89	20,00	40,0	0,250	2	-
VHLA 2 200 102 20 15	20,0	0,10	20	102	25,00	50,0	0,250	2	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed Vc m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air

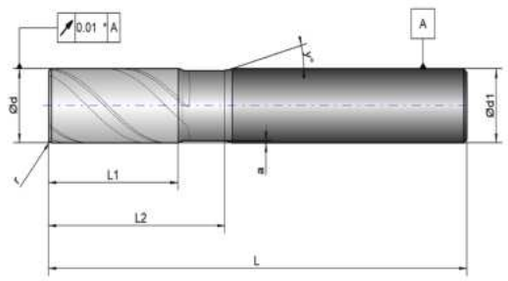
VHLA 2 100 070 10 15
Workpiece material: PEEK 30

	Van Hoorn	Competitor
Ø	10,0 mm	10,0 mm
V_c	157 m/min	125 m/min
n	5.000 rpm	4.000 rpm
F_z	0.,08 mm/t	0,08 mm/t
Z	2	2
V_f	800 mm/min	640 mm/min
a_p	10,0 mm	6,0 mm
a_e	4,0 mm	3,0 mm
Coolant	emulsion	emulsion
Q	**32 mm³/min**	**11,5 mm³/min**

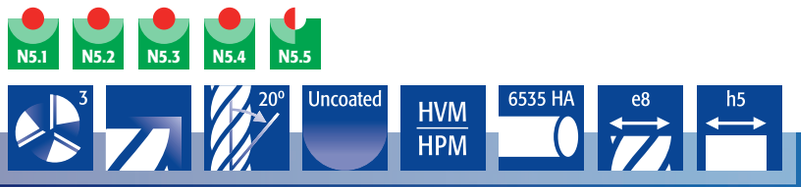


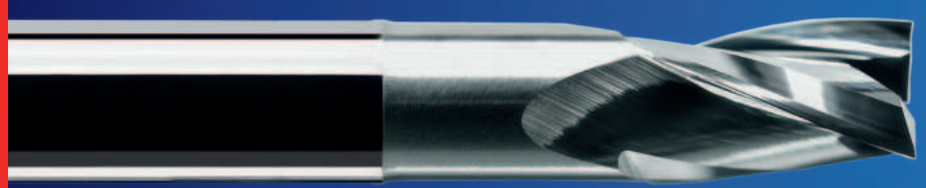


Ød (mm)	Shoulder milling / Eckfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	Slot milling / Nutfräsen a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
4,0	< 4,0	< 1,80	0,025 - 0,050	< 4,00	4,00	0,020 - 0,040
5,0	< 5,0	< 2,25	0,030 - 0,060	< 5,00	5,00	0,024 - 0,048
6,0	< 6,0	< 2,70	0,040 - 0,080	< 6,00	6,00	0,032 - 0,064
8,0	< 8,0	< 3,60	0,060 - 0,100	< 8,00	8,00	0,048 - 0,080
10,0	< 10,0	< 4,50	0,080 - 0,120	< 10,00	10,00	0,064 - 0,096
12,0	< 12,0	< 5,40	0,090 - 0,150	< 12,00	12,00	0,072 - 0,120
16,0	< 16,0	< 7,20	0,120 - 0,180	< 16,00	16,00	0,096 - 0,144
20,0	< 20,0	< 9,00	0,150 - 0,230	< 20,00	20,00	0,120 - 0,184
25,0	< 25,0	< 11,25	0,200 - 0,300	< 25,00	25,00	0,160 - 0,240



* For end mills / für Schaftfräser L < 100 mm.





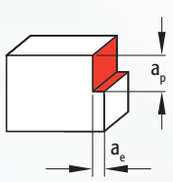
3 flute
3 Schneiden

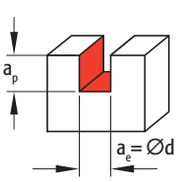
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard									
VHLA 3 040 064 06 15	4,0	-	6	64	11,00	-	-	3	15
VHLA 3 050 064 06 15	5,0	-	6	64	13,00	-	-	3	15
VHLA 3 060 064 06 15	6,0	-	6	64	13,00	-	-	3	-
VHLA 3 080 064 08 15	8,0	-	8	64	19,00	-	-	3	-
VHLA 3 100 070 10 15	10,0	-	10	70	22,00	-	-	3	-
VHLA 3 120 078 12 15	12,0	-	12	78	26,00	-	-	3	-
VHLA 3 160 089 16 15	16,0	-	16	89	32,00	-	-	3	-
VHLA 3 200 102 20 15	20,0	-	20	102	38,00	-	-	3	-
VHLA 3 250 120 25 15	25,0	-	25	120	45,00	-	-	3	-
With neck relief 3xD									
VHLA 3 040 064 06 15 L012	4,0	-	6	64	6,00	12,0	0,100	3	15
VHLA 3 050 064 06 15 L015	5,0	-	6	64	7,00	15,0	0,100	3	15
VHLA 3 060 064 06 15 L018	6,0	-	6	64	9,00	18,0	0,100	3	-
VHLA 3 080 064 08 15 L024	8,0	-	8	64	12,00	24,0	0,100	3	-
VHLA 3 100 072 10 15 L030	10,0	-	10	72	15,00	30,0	0,150	3	-
VHLA 3 120 083 12 15 L036	12,0	-	12	83	18,00	36,0	0,150	3	-
VHLA 3 160 100 16 15 L048	16,0	-	16	100	24,00	48,0	0,200	3	-
VHLA 3 200 110 20 15 L060	20,0	-	20	110	30,00	60,0	0,250	3	-
With neck relief 5xD									
VHLA 3 040 064 06 15 L020	4,0	-	6	64	6,00	20,0	0,100	3	15
VHLA 3 050 064 06 15 L025	5,0	-	6	64	7,00	25,0	0,100	3	15
VHLA 3 060 072 06 15 L030	6,0	-	6	72	9,00	30,0	0,100	3	-
VHLA 3 080 078 08 15 L040	8,0	-	8	78	12,00	40,0	0,100	3	-
VHLA 3 100 092 10 15 L050	10,0	-	10	92	15,00	50,0	0,150	3	-
VHLA 3 120 100 12 15 L060	12,0	-	12	100	18,00	60,0	0,150	3	-
VHLA 3 160 130 16 15 L080	16,0	-	16	130	24,00	80,0	0,200	3	-
VHLA 3 200 150 20 15 L100	20,0	-	20	150	30,00	100,0	0,250	3	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air

Van Hoorn 1: VHAD 3 080 063 08 10
Van Hoorn 2: VHLA 3 080 064 08 15

	VH	Van Hoorn
Ø	8,0 mm	8,0 mm
V_c	500 m/min	500 m/min
n	19.849 rpm	19.849 rpm
F_z	0,100 mm/t	0,060 mm/t
Z	3	3
V_f	5.968 mm/min	3.581 mm/min
a_p	16,0 mm	16,0 mm
a_e	3,6 mm	0,05 mm
Coolant	emulsion	emulsion
Q	**343,76 mm³/min**	**28,65 mm³/min**





Shoulder milling / Eckfräsen

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
4,0	< 8,0	< 1,80	0,025 - 0,050
5,0	< 10,0	< 2,25	0,030 - 0,060
6,0	< 12,0	< 2,70	0,040 - 0,080
8,0	< 16,0	< 3,60	0,060 - 0,100
10,0	< 20,0	< 4,50	0,080 - 0,120
12,0	< 24,0	< 5,40	0,090 - 0,150
16,0	< 32,0	< 7,20	0,120 - 0,180
20,0	< 36,0	< 9,00	0,150 - 0,230
25,0	< 43,0	< 11,25	0,200 - 0,300

Slot milling / Nutfräsen

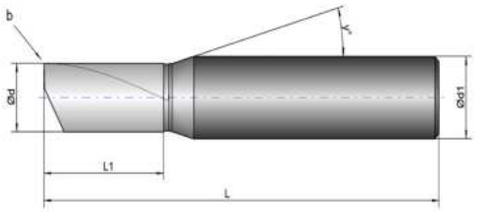
a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
< 4,00	4,00	0,020 - 0,040
< 5,00	5,00	0,024 - 0,048
< 6,00	6,00	0,032 - 0,064
< 8,00	8,00	0,048 - 0,080
< 10,00	10,00	0,064 - 0,096
< 12,00	12,00	0,072 - 0,120
< 16,00	16,00	0,096 - 0,144
< 20,00	20,00	0,120 - 0,184
< 25,00	25,00	0,160 - 0,240

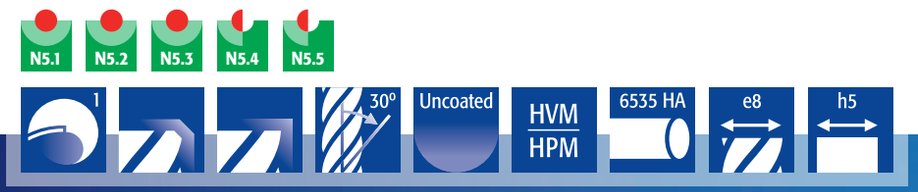
Cutting conditions 3xD - 5xD Neck relief

Ø x D	a_p %	a_e %	Fz %
3 x D	150	50	85
5 x D	150	25	60

Cutting conditions 3xD - 5xD Neck relief

a_p %	a_e %	Fz %
60	100	85
40	100	60



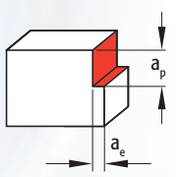


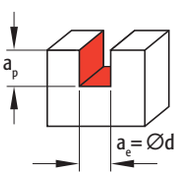
Article Number *Artikelnummer*	Ød (mm)	b (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHAE 1 005 038 03 10	0,5	-	3	38	2,50	-	-	1	15
VHAE 1 006 038 03 10	0,6	-	3	38	3,00	-	-	1	15
VHAE 1 008 038 03 10	0,8	-	3	38	4,00	-	-	1	15
VHAE 1 010 038 03 10	1,0	-	3	38	5,00	-	-	1	15
VHAE 1 012 038 03 10	1,2	-	3	38	5,00	-	-	1	15
VHAE 1 015 038 03 10	1,5	-	3	38	5,00	-	-	1	15
VHAE 1 016 038 03 10	1,6	-	3	38	6,00	-	-	1	15
VHAE 1 018 038 03 10	1,8	-	3	38	7,00	-	-	1	15
VHAE 1 020 038 03 10	2,0	-	3	38	8,00	-	-	1	15
VHAE 1 025 038 03 10	2,5	-	3	38	9,00	-	-	1	15
VHAE 1 030 038 03 10	3,0	0,10	3	38	12,00	-	-	1	-
VHAE 1 040 050 04 10	4,0	0,10	4	50	12,00	-	-	1	-
VHAE 1 050 050 05 10	5,0	0,15	5	50	15,00	-	-	1	-
VHAE 1 060 050 06 10	6,0	0,20	6	50	16,00	-	-	1	-
VHAE 1 070 060 07 10	7,0	0,20	7	60	20,00	-	-	1	-
VHAE 1 080 060 08 10	8,0	0,25	8	60	20,00	-	-	1	-
VHAE 1 100 070 10 10	10,0	0,30	10	70	22,00	-	-	1	-
VHAE 1 120 075 12 10	12,0	0,35	12	75	25,00	-	-	1	-
VHAE 1 160 081 16 10	16,0	0,40	16	81	33,00	-	-	1	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air

VHAE 1 060 050 06 10
Workpiece material: Aluminium

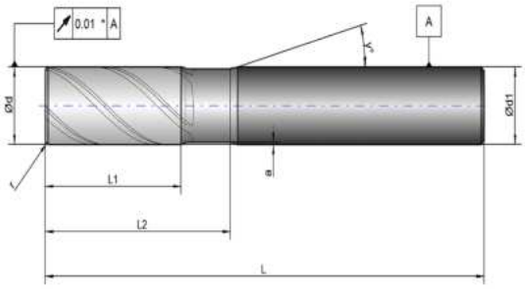
Ø	6,0 mm
V_c	716 m/min
n	38.000 rpm
F_Z	0,150 mm/t
Z	1
V_f	5.700 mm/min
a_p	6,0 mm
a_e	4,0 mm
Coolant	emulsion
Q	**136,8 cm³/min**



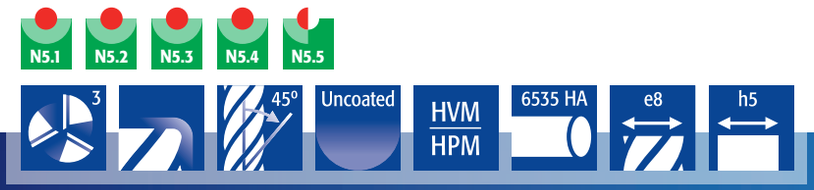


	Shoulder milling / Eckfräsen			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
0,5	< 1,0	< 0,15	0,010 - 0,018	< 0,5	0,5	0,007 - 0,012
0,6	< 1,2	< 0,18	0,012 - 0,020	< 0,6	0,6	0,009 - 0,015
0,8	< 1,6	< 0,24	0,016 - 0,024	< 0,8	0,8	0,012 - 0,018
1,0	< 2,0	< 0,30	0,020 - 0,030	< 1,0	1,0	0,015 - 0,022
1,2	< 2,4	< 0,36	0,025 - 0,040	< 1,2	1,2	0,019 - 0,030
1,5	< 3,0	< 0,45	0,030 - 0,050	< 1,5	1,5	0,022 - 0,037
1,6	< 3,2	< 0,48	0,035 - 0,055	< 1,6	1,6	0,026 - 0,041
1,8	< 3,6	< 0,54	0,040 - 0,060	< 1,8	1,8	0,030 - 0,045
2,0	< 4,0	< 0,60	0,045 - 0,065	< 2,0	2,0	0,034 - 0,048
2,5	< 5,0	< 0,75	0,060 - 0,080	< 2,5	2,5	0,045 - 0,060
3,0	< 6,0	< 0,90	0,070 -0,100	< 3,0	3,0	0,053 -0,075
4,0	< 8,0	< 1,20	0,085 - 0,115	< 4,0	4,0	0,064 - 0,086
5,0	< 10,0	< 1,50	0,100 - 0,140	< 5,0	5,0	0,075 - 0,105
6,0	< 12,0	< 1,80	0,125 - 0,175	< 6,0	6,0	0,094 - 0,131
7,0	< 14,0	< 2,10	0,132 - 0,200	< 7,0	7,0	0,100 - 0,150
8,0	< 16,0	< 2,40	0,140 - 0,220	< 8,0	8,0	0,105 - 0,165
10,0	< 20,0	< 3,00	0,180 - 0,270	< 10,0	10,0	0,135 - 0,200
12,0	< 15,0	< 3,60	0,220 - 0,300	< 12,0	12,0	0,165 - 0,225
16,0	< 16,0	< 4,80	0,250 - 0,350	< 16,0	16,0	0,180 - 0,250

- Cutting speed V_c is based on max. 20.000 rpm.
  Schnittgeschwindigkeit V_c bezogen auf max. 20.000 U/min.
- Conditions are based on pure aluminium for < 5% Si reduce feed per tooth F_z up to 10% and for > 5% Si reduce F_z up to 20%.
  Schnittwerte sind auf die Bearbeitung von Rein-Aluminum ausgelegt. Für Aluminium < 5% Si den Zahnvorschub F_z um 10%, für Aluminium > 5% Si um 20% reduzieren.
- End mills can be used also for drilling with the same cutting conditions.
  Die Schaftfräser können mit gleichen Schnittwerten auch für die Herstellung von Bohrungen verwendet werden.



* For end mills / für Schaftfräser L < 100 mm.



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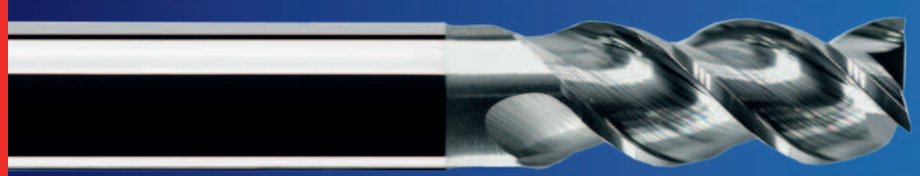
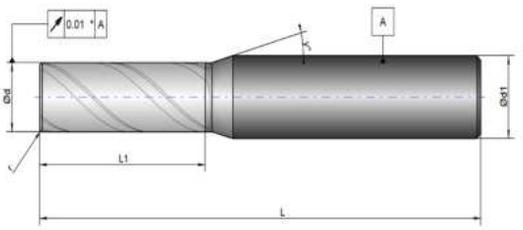


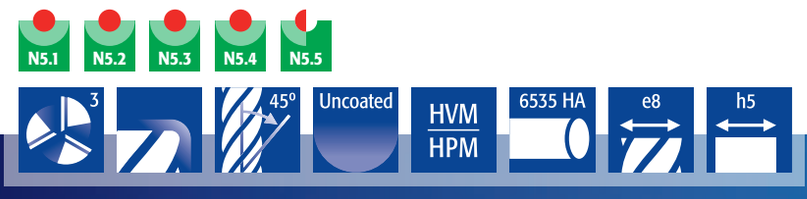
Complete program for all your demands!

Komplettes Programm für alle Ihre Wünschen!

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Standard									
VHAD 3 020 057 06 10	2,0	0,05	6	57	5,00	-	-	3	15
VHAD 3 030 057 06 10	3,0	0,10	6	57	8,00	-	-	3	15
VHAD 3 040 057 06 10	4,0	0,10	6	57	11,00	-	-	3	15
VHAD 3 050 057 06 10	5,0	0,20	6	57	13,00	-	-	3	15
VHAD 3 060 057 06 10	6,0	0,20	6	57	16,00	-	-	3	-
VHAD 3 080 063 08 10	8,0	0,20	8	63	19,00	-	-	3	-
VHAD 3 100 072 10 10	10,0	0,20	10	72	22,00	-	-	3	-
VHAD 3 120 083 12 10	12,0	0,20	12	83	26,00	-	-	3	-
VHAD 3 160 092 16 10	16,0	0,20	16	92	32,00	-	-	3	-
VHAD 3 200 104 20 10	20,0	0,20	20	104	40,00	-	-	3	-
With neck relief 3xD									
VHAD 3 020 057 06 10 L060	2,0	0,05	6	57	5,00	6,0	0,050	3	15
VHAD 3 030 057 06 10 L090	3,0	0,10	6	57	8,00	9,0	0,050	3	15
VHAD 3 040 057 06 10 L120	4,0	0,10	6	57	11,00	12,0	0,100	3	15
VHAD 3 050 057 06 10 L150	5,0	0,20	6	57	13,00	15,0	0,100	3	15
VHAD 3 060 057 06 10 L200	6,0	0,20	6	57	16,00	20,0	0,100	3	15
VHAD 3 080 063 08 10 L250	8,0	0,20	8	63	19,00	25,0	0,100	3	15
VHAD 3 100 072 10 10 L300	10,0	0,20	10	72	22,00	30,0	0,150	3	15
VHAD 3 120 083 12 10 L360	12,0	0,20	12	83	26,00	36,0	0,150	3	15
VHAD 3 160 100 16 10 L480	16,0	0,20	16	100	32,00	48,0	0,200	3	15
VHAD 3 200 110 20 10 L600	20,0	0,20	20	110	40,00	60,0	0,250	3	15
With neck relief 5xD									
VHAD 3 020 063 06 10 L100	2,0	0,05	6	63	5,00	10,0	0,050	3	15
VHAD 3 030 063 06 10 L150	3,0	0,10	6	63	8,00	15,0	0,050	3	15
VHAD 3 040 063 06 10 L200	4,0	0,10	6	63	11,00	20,0	0,100	3	15
VHAD 3 050 063 06 10 L250	5,0	0,20	6	63	13,00	25,0	0,100	3	15
VHAD 3 060 072 06 10 L300	6,0	0,20	6	72	16,00	30,0	0,100	3	15
VHAD 3 080 078 08 10 L400	8,0	0,20	8	78	19,00	40,0	0,100	3	15
VHAD 3 100 092 10 10 L500	10,0	0,20	10	92	22,00	50,0	0,150	3	15
VHAD 3 120 100 12 10 L600	12,0	0,20	12	100	26,00	60,0	0,150	3	15
VHAD 3 160 130 16 10 L800	16,0	0,20	16	130	32,00	80,0	0,200	3	15
VHAD 3 200 150 20 10 L100	20,0	0,20	20	150	40,00	100,0	0,250	3	15



* For end mills / für Schaftfräser L < 100 mm.



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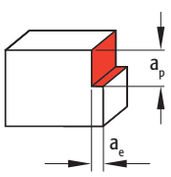
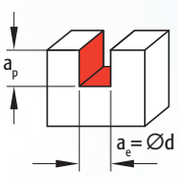
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Long									
VHADL 3 020 057 06 10	2,0	0,05	6	57	6,00	-	-	3	15
VHADL 3 030 057 06 10	3,0	0,10	6	57	11,00	-	-	3	15
VHADL 3 040 057 06 10	4,0	0,10	6	57	14,00	-	-	3	15
VHADL 3 050 057 06 10	5,0	0,20	6	57	18,00	-	-	3	15
VHADL 3 060 057 06 10	6,0	0,20	6	57	20,00	-	-	3	-
VHADL 3 080 063 08 10	8,0	0,20	8	63	25,00	-	-	3	-
VHADL 3 100 072 10 10	10,0	0,20	10	72	30,00	-	-	3	-
VHADL 3 120 083 12 10	12,0	0,20	12	83	36,00	-	-	3	-
VHADL 3 160 100 16 10	16,0	0,20	16	100	48,00	-	-	3	-
VHADL 3 200 110 20 10	20,0	0,20	20	110	60,00	-	-	3	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed Vc m/min	Coolant
N5.1	< 500	< 150	**350 - 650**	emulsion / air
N5.2	< 400	< 120	**200 - 500**	emulsion / air
N5.3	< 350	< 100	**350 - 500**	emulsion / air
N5.4			**400 - 1000**	emulsion / air
N5.5			**400 - 1000**	emulsion / air

VHAD 3 100 072 10 10
Workpiece material: Aluminium 7075

Ø	10,0 mm
V_c	800 m/min
n	25.465 rpm
F_z	0,250 mm/t
Z	3
V_f	19.099 mm/min
a_p	10,0 mm
a_e	5,0 mm
Coolant	emulsion
Q	**954,95 cm³/min**





	Shoulder milling / Eckfräsen			Slot milling / Nutfräsen		
Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)
2,0	< 4,0	< 0,90	0,015 - 0,030	< 2,00	2,00	0,012 - 0,024
3,0	< 6,0	< 1,35	0,020 - 0,040	< 3,00	3,00	0,016 - 0,032
4,0	< 8,0	< 1,80	0,025 - 0,050	< 4,00	4,00	0,020 - 0,040
5,0	< 10,0	< 2,25	0,030 - 0,060	< 5,00	5,00	0,024 - 0,048
6,0	< 12,0	< 2,70	0,040 - 0,080	< 6,00	6,00	0,032 - 0,064
8,0	< 16,0	< 3,60	0,060 - 0,100	< 8,00	8,00	0,048 - 0,080
10,0	< 20,0	< 4,50	0,080 - 0,120	< 10,00	10,00	0,064 - 0,096
12,0	< 24,0	< 5,40	0,090 - 0,150	< 12,00	12,00	0,072 - 0,120
16,0	< 32,0	< 7,20	0,120 - 0,180	< 16,00	16,00	0,096 - 0,144
20,0	< 38,0	< 9,00	0,150 - 0,230	< 20,00	20,00	0,120 - 0,184

	Cutting conditions 3xD - 5xD Neck relief			Cutting conditions 3xD - 5xD Neck relief		
Ø x D	a_p %	a_e %	Fz %	a_p %	a_e %	Fz %
3 x D	150	50	85	60	100	85
5 x D	150	25	60	40	100	60

"Our challenge is to optimize the combination of the most efficient tools and cutting conditions for the best result."

Bas de Kok
Owner
Cosign (The Netherlands)

COSIGN
CNC CUTTING MACHINES

Cosign is since 25 years specialized in producing, installing and maintaining large-format CNC-flatbed milling machines. These CNC-flatbed milling machines are mainly used for machining large sizes of aluminium, plastic, acrylic and other materials.

Important niche in this industry is Aluminium Composites, which is a combination of aluminium and synthetics. Secondary challenge is the milling of different materials with one type of end mill, which is normally very difficult because Aluminium and PE both have their own cutting conditions. Van Hoorn Carbide and their application engineers have beaten this challenge and have designed the perfect end mill for this specific application.

Our collaboration with Van Hoorn Carbide started several years ago. In good cooperation we mutually developed a quality line of single flute end mills. Cosign presents an own range of end mills, specially for this industry with a variety of diameters and various cutting edge lengths.
We have experienced years of consistent quality, competitive pricing and excellent tool life results, and we therefore recommend Van Hoorn Carbide, also because of the good after-sales and service.

Cosign ist seit 25 Jahren spezialisiert in das Produzieren, das Installieren und die Wartung von Großformaten CNC-flatbed-Fräsmaschinen. Diese CNC-flatbed-Fräsmaschinen werden hauptsächlich verwendet für die große Abmessungen von Aluminium, Kunststoff, Acryl und andere Materialien.

Die wichtigste Nische in dieser Industrie ist Aluminium-Verbundwerkstoffen, d.h. eine Kombination von Aluminium und Kunststoffe. Eine 2e Herausforderung ist das Bearbeiten unterschiedlicher Materialien mit einem einziger Fräsertyp. Dies ist normalerweise sehr schwierig, da Aluminium und PE beide ihre eigene Schnittwertempfehlungen haben. Van Hoorn Carbide und Ihre Anwendugstechniker haben diese Herausforderung bewältigt indem sie einen perfekten Fräser für diese spezielle Anwendung entwickelt haben.

Unsere Kooperation mit Van Hoorn Carbide hat vor Jahren angefangen. In guter Zusammenarbeit haben wir gemeinsam eine Qualitätslinie von Einzahnfräsern entwickelt. Cosign präsentiert eine eigene Auswahl von Fräsern mit einer Vielfalt von Diametern und verschiedenen Schneidelängen, speziell für diese Industrie. Nachdem wir jahrenlang gleichbleibende Qualität, wettbewerbsfähige Preisen und ausgezeichnete Standzeitergebnisse erfahren dürften, empfehlen wir Van Hoorn Carbide, auch wegen der guten Kundenbetreuung und Service.

Special process mills

Spezielle prozess fräser

For special applications such as hole machining and sealing surfaces, we have a selection of unique tools, like circular surface end mills, drills, reamers and precision fit end mills. Can we support you with the right tool selection? Our application engineers are ready for you.

Für spezielle Anwendungen wie die Bearbeitung von Löchern und das Versiegeln von Oberflächen verfügen wir über eine Auswahl einzigartiger Werkzeuge, wie Dichtflächfräser, Bohrer, Reibahlen und Präzisions-Schaftfräser. Können wir Sie bei der richtigen Werkzeugauswahl unterstützen? Unsere Anwendungstechniker stehen für Sie bereit.

Precision Fit End Mills

Präzisions-Schaftfräser

- One tool is suitable for many different fittings
  Ein Fräser ist geeignet für mehrere, verschiedene Passungen

- Up to 5xD depth
  Bis zu 5xD Tiefe

Circular Surface End Mills

Dichtflächfräser

Sealing surface end mills fits for a great range of materials: aluminium, stainless steel, PMMA, titanium, peek and many more. The milling tool to machine sealing surfaces! Traditional sealing surface applications will be finished manually. Our innovation results in time efficiency and personel cost reduction.

Fräser für konzentrische Dichtflächen sind verwendbar für eine große Auswahl von Materialien: Aluminium, rostfreier Stahl, PMMA, Titanium, Peek und viele andere. Der meist geeichnete Fräser für das Zerspanen von Dichtflächen! Traditionelle konzentrische Dichtflächenanwendungen müssen manuel nachgearbeitet werden. Unsere Innovation führt zur Zeiteffizienz und Personalkostenreduzierung.

Pilot drills

Pilotbohrer

Our program has been extended by pilot drills, as pre-treatment for the treaded holes which can be applied with our VHTM range of thread mills. With this supplementation we have completed our package of tools for the purpose of hole machining in a wide range of materials.

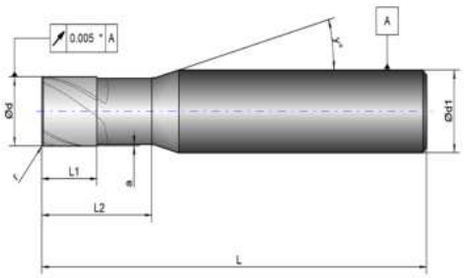
Neu in unserem Programm sind die Pilotbohrer, als Vorbehandlung für die Gewindebohrungen welche mit unseren VHTM Programm Gewindefräsern gefertigt werden. Diese Ergänzung komplementiert unser Werkzeugprogramm für die Lochbearbeitungen in einem großem Materialbereich.

Reamers

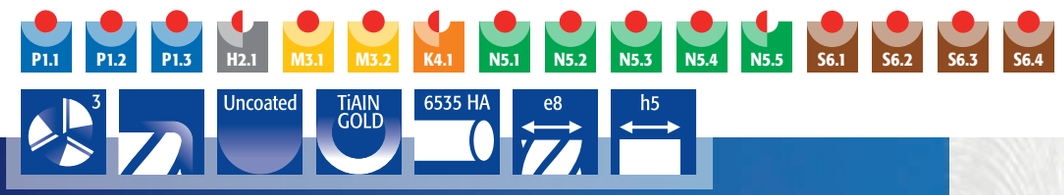
Reibahle

The Van Hoorn Carbide program has been extended with the VHM-reamers with helix for hole tolerance H7. The TiAlN coating of our reamers guarantees high cutting performances and long tool life when machining various materials up to 55 Hrc.

Neu in unserem Van Hoorn Carbide Programm sind die VHM-Reibahle mit Drall für Lochtoleranz H7. Die TiAlN Beschichtung unserer Reibahle garantiert hohe Schnittleistungen und Standzeiten in verschiedenen Materialsorten bis 55 Hrc.



* For end mills / für Schaftfräser L < 100 mm.



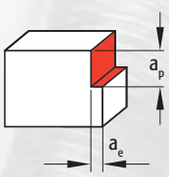
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
Uncoated									
VHS 3 020 051 06 10	2,0	0,02	6	51	1,00	3,0	0,050	3	15
VHS 3 030 051 06 10	3,0	0,02	6	51	1,00	4,0	0,050	3	15
VHS 3 040 051 06 10	4,0	0,05	6	51	2,00	4,0	0,050	3	15
VHS 3 050 051 06 10	5,0	0,05	6	51	2,00	4,0	0,050	3	15
VHS 3 060 051 06 10	6,0	0,10	6	51	4,00	-	-	3	-
VHS 3 080 064 08 10	8,0	0,10	8	64	6,00	-	-	3	-
VHS 3 100 064 10 10	10,0	0,15	10	64	7,00	-	-	3	-
VHS 3 120 073 12 10	12,0	0,15	12	73	9,00	-	-	3	-
VHS 3 160 089 16 10	16,0	0,15	16	89	12,00	-	-	3	-
VHS 3 200 102 20 10	20,0	0,20	20	102	15,00	-	-	3	-
Coated									
VHS 3 020 051 06 40	2,0	0,02	6	51	1,00	3,0	0,050	3	15
VHS 3 030 051 06 40	3,0	0,02	6	51	1,00	4,0	0,050	3	15
VHS 3 040 051 06 40	4,0	0,05	6	51	2,00	4,0	0,050	3	15
VHS 3 050 051 06 40	5,0	0,05	6	51	2,00	4,0	0,050	3	15
VHS 3 060 051 06 40	6,0	0,10	6	51	4,00	-	-	3	-
VHS 3 080 064 08 40	8,0	0,10	8	64	6,00	-	-	3	-
VHS 3 100 064 10 40	10,0	0,15	10	64	7,00	-	-	3	-
VHS 3 120 073 12 40	12,0	0,15	12	73	9,00	-	-	3	-
VHS 3 160 089 16 40	16,0	0,15	16	89	12,00	-	-	3	-
VHS 3 200 102 20 40	20,0	0,20	20	102	15,00	-	-	3	-

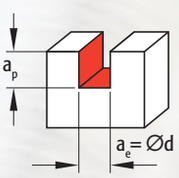
Material group	TSR (N/mm²)	Hardness HB	RPM	Coolant
P1.1		< 250	2000 - 3000	emulsion
P1.2		< 300	2000 - 3000	emulsion
P1.3		< 400	2000 - 3000	emulsion
H2.1		42-50 HRc	2000 - 3000	emulsion
M3.1			2000 - 3000	emulsion
M3.2			2000 - 3000	emulsion
K4.1			2000 - 3000	emulsion
N5.1		< 150	2000 - 3000	emulsion
N5.2		< 120	2000 - 3000	emulsion
N5.3		< 100	2000 - 3000	emulsion
N5.4			2000 - 3000	emulsion
N5.5			2000 - 3000	emulsion
S6.1	< 1500		2000 - 3000	emulsion
S6.2	< 1600		2000 - 3000	emulsion
S6.3	< 1600		2000 - 3000	emulsion
S6.4	< 1250		2000 - 3000	emulsion

Application area: Producing circular surfaces for high-end products

Anwendung: Herstellung konzentrische Dichtflächen für hochwertige Produkte

- **No reworking needed**
  Keine Nacharbeit benötigt
- **Only concentric milling lines**
  Nur konzentrische Fräslinien
- **Smooth surface**
  Glatte Oberfläche



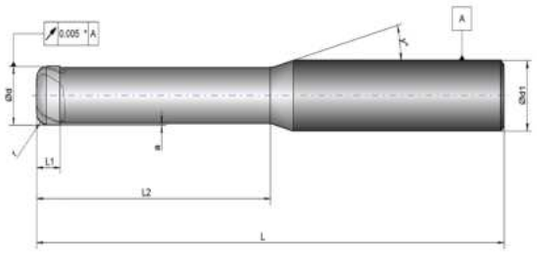


Shoulder milling / Eckfräsen

Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/min)
4,0	< 0,05	< 4,0	< 0,005
5,0	< 0,05	< 5,0	< 0,007
6,0	< 0,05	< 6,0	< 0,010
8,0	< 0,05	< 8,0	< 0,015
10,0	< 0,05	< 10,0	< 0,020
12,0	< 0,05	< 12,0	< 0,030
16,0	< 0,05	< 16,0	< 0,030
20,0	< 0,05	< 20,0	< 0,035

Slot milling / Nutfräsen

a_p max. (mm)	a_e max. (mm)	F_z (mm/min)
< 0,05	< 4,0	< 0,005
< 0,05	< 5,0	< 0,007
< 0,05	< 6,0	< 0,010
< 0,05	< 8,0	< 0,015
< 0,05	< 10,0	< 0,020
< 0,05	< 12,0	< 0,030
< 0,05	< 16,0	< 0,030
< 0,05	< 20,0	< 0,035

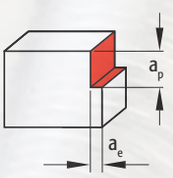


* For end mills / für Schaftfräser L < 100 mm.

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
3xD										
VHXF 3 010 057 06 40	1,0	0,05	6	57	0,20	4,0	0,050	3	15	**new**
VHXF 3 020 057 06 40	2,0	0,05	6	57	0,40	7,0	0,050	3	15	**new**
VHXF 3 030 057 06 40	3,0	0,05	6	57	0,60	10,0	0,050	3	15	**new**
VHXF 3 040 057 06 40	4,0	0,05	6	57	0,80	13,0	0,050	3	15	**new**
VHXF 3 050 057 06 40	5,0	0,05	6	57	1,00	16,0	0,075	3	15	**new**
VHXF 3 060 060 06 40	6,0	0,05	6	60	1,20	19,0	0,075	3	-	**new**
VHXF 3 080 064 08 40	8,0	0,05	8	64	1,60	25,0	0,100	3	-	**new**
VHXF 3 100 075 10 40	10,0	0,05	10	75	2,00	31,0	0,100	3	-	**new**
VHXF 3 120 085 12 40	12,0	0,10	12	85	2,40	37,0	0,150	3	-	**new**
VHXF 3 160 102 16 40	16,0	0,10	16	102	3,20	49,0	0,150	3	-	**new**
VHXF 3 200 120 20 40	20,0	0,10	20	120	4,00	61,0	0,200	3	-	**new**
5xD										
VHXF 3 010 064 06 40	1,0	0,05	6	64	0,20	6,0	0,050	3	15	
VHXF 3 020 064 06 40	2,0	0,05	6	64	0,40	11,0	0,050	3	15	
VHXF 3 030 064 06 40	3,0	0,05	6	64	0,60	16,0	0,050	3	15	
VHXF 3 040 064 06 40	4,0	0,05	6	64	0,80	21,0	0,050	3	15	
VHXF 3 050 070 06 40	5,0	0,05	6	70	1,00	26,0	0,075	3	15	
VHXF 3 060 070 06 40	6,0	0,05	6	70	1,20	31,0	0,075	3	-	
VHXF 3 080 078 08 40	8,0	0,05	8	78	1,60	41,0	0,100	3	-	
VHXF 3 100 092 10 40	10,0	0,05	10	92	2,00	51,0	0,100	3	-	
VHXF 3 120 108 12 40	12,0	0,10	12	108	2,40	61,0	0,150	3	-	
VHXF 3 160 130 16 40	16,0	0,10	16	130	3,20	81,0	0,150	3	-	
VHXF 3 200 163 20 40	20,0	0,10	20	163	4,00	101,0	0,200	3	-	

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**200 - 300**	emulsion
P1.2	< 1000	< 300	**180 - 250**	emulsion
P1.3	< 1400	< 400	**150 - 220**	emulsion
H2.1		42-50 HRc	**120 - 180**	min. lub
K4.1	< 750		**180 - 250**	emulsion
M3.1	< 950		**180 - 250**	emulsion
M3.2	< 1250		**140 - 200**	emulsion
N5.1	Si < 5%		**350 - 650**	emulsion/air
N5.2	Si < 5%		**200 - 500**	emulsion/air
N5.3			**350 - 500**	emulsion/air
N5.4			**400 - 1000**	emulsion/air
N5.5			**400 - 1000**	emulsion/air
S6.1	< 1500		**50 - 70**	emulsion
S6.2	< 1600		**60 - 80**	emulsion
S6.3	< 1600		**40 - 60**	emulsion
S6.4	< 1250		**70 - 100**	emulsion

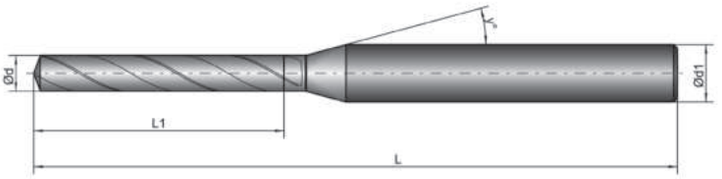
Designed for helicoidal strategy
Entwickelt für helicoidal Strategie

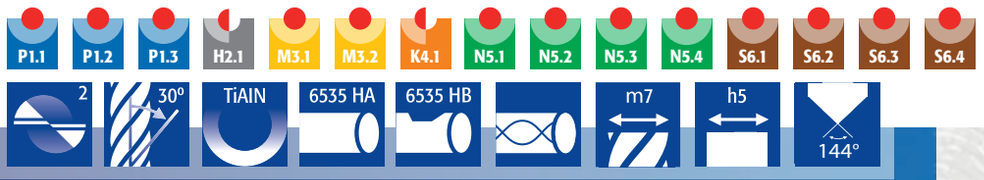


Ød (mm)	a_p max. (mm)	a_e max. (mm)	F_z (mm/tooth)	min. hole Ø (mm)
1,0	< 0,18	< 0,03	0,008-0,015	1,5
2,0	< 0,36	< 0,03	0,016-0,022	3,0
3,0	< 0,54	< 0,04	0,020-0,028	4,5
4,0	< 0,72	< 0,04	0,024-0,030	6,0
5,0	< 0,90	< 0,05	0,028-0,040	7,5
6,0	< 1,08	< 0,05	0,032-0,050	9,0
8,0	< 1,44	< 0,10	0,036-0,060	12,0
10,0	< 1,80	< 0,10	0,040-0,070	15,0
12,0	< 2,16	< 0,10	0,050-0,090	18,0
16,0	< 2,88	< 0,20	0,060-0,110	24,0
20,0	< 3,60	< 0,20	0,075-0,150	30,0

Feedrate based on centerline programming
Vorschub basiert auf Werkzeugmittelpunkt Programmierung

Vf = (D0-Dc)*N*Z*Fz/D0
D0 diameter hole / Durchmesser Loch
Dc diameter mill / Durchmesser Fräser

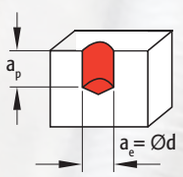




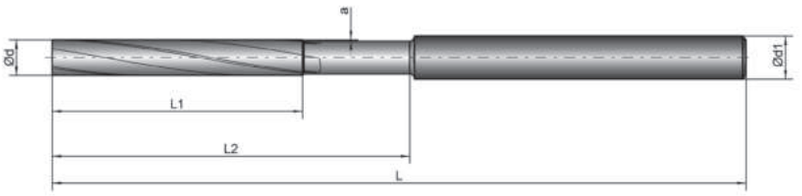
Article Number *Artikelnummer*	Ød (mm)	ß (°)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHDS 2 0125 043 03 03	1,25	144	3	43	10,00	-	-	2	15
VHDS 2 0145 043 03 03	1,45	144	3	43	10,00	-	-	2	15
VHDS 2 0160 051 04 03	1,60	144	4	51	12,00	-	-	2	15
VHDS 2 0205 051 04 03	2,05	144	4	51	15,00	-	-	2	15
VHDS 2 0250 051 04 03	2,50	144	4	51	18,00	-	-	2	15
VHDS 2 0330 068 06 03	3,30	144	6	68	25,00	-	-	2	15
VHDS 2 0420 072 06 03	4,20	144	6	72	30,00	-	-	2	15
VHDS 2 0500 078 06 03	5,00	144	6	78	35,00	-	-	2	15
VHDS 2 0680 096 08 03	6,80	144	8	96	50,00	-	-	2	15
VHDS 2 0850 110 10 03	8,50	144	10	110	60,00	-	-	2	15
VHDS 2 1025 130 12 03	10,25	144	12	130	70,00	-	-	2	15

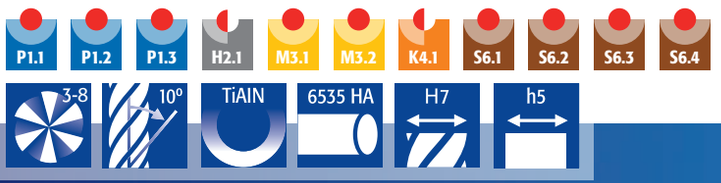
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 800		**140 - 180**	emulsion
P1.2	< 1000		**100 - 120**	emulsion
P1.3	< 1400		**50 - 70**	emulsion
H2.1		42 - 50 Hrc	**40 - 60**	emulsion
M3.1	< 950		**55 - 75**	emulsion
M3.2	< 1250		**45 - 55**	emulsion
K4.1	< 800		**160 - 180**	emulsion
N5.1			**300 - 350**	emulsion
N5.2			**250 - 300**	emulsion
N5.3			**100 - 150**	emulsion
N5.4			**80 - 140**	emulsion
S6.1	< 1500		**30 - 40**	emulsion
S6.2	< 1600		**20 - 30**	emulsion
S6.3	< 1600		**30 - 40**	emulsion
S6.4	< 1250		**35 - 45**	emulsion

- **Available for each type of VHC thread mill**
  Verfügbar für jeden Typ VHC Gewindefräser
- **Manufactured from our best solid carbide material and coated with TiAlN**
  Gefertigt aus unserem besten Hochpräzisvollhartmetal und beschichtet mit TiAlN



Ød (mm)	a_p max. (mm)	Fu (mm/rotation)
1,25	10	0.02 - 0.03
1,45	10	0.03 - 0.04
1,60	12	0.03 - 0.04
2,05	15	0.04 - 0.05
2,50	18	0.05 - 0.06
3,30	25	0.08 - 0.10
4,20	30	0.12 - 0.17
5,00	35	0.15 - 0.19
6,80	50	0.16 - 0.20
8,50	60	0.20 - 0.25
10,25	70	0.20 - 0.25

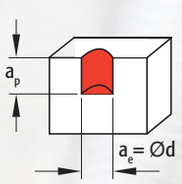




Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)
VHSR 3 010 050 06 03 H7	1,0	-	6	50	4,00	10,0	-	3	-
VHSR 3 015 050 06 03 H7	1,5	-	6	50	5,00	15,0	-	3	-
VHSR 4 020 050 06 03 H7	2,0	-	6	50	7,00	20,0	-	4	-
VHSR 4 025 057 06 03 H7	2,5	-	6	57	9,00	25,0	-	4	-
VHSR 6 030 060 06 03 H7	3,0	-	6	60	11,00	30,0	-	6	-
VHSR 6 040 068 06 03 H7	4,0	-	6	68	14,00	40,0	-	6	-
VHSR 6 050 086 06 03 H7	5,0	-	6	86	18,00	50,0	-	6	-
VHSR 6 060 096 08 03 H7	6,0	-	8	96	21,00	60,0	-	6	-
VHSR 6 070 106 08 03 H7	7,0	-	8	106	25,00	70,0	-	6	-
VHSR 6 080 120 10 03 H7	8,0	-	10	120	28,00	80,0	-	6	-
VHSR 6 090 130 10 03 H7	9,0	-	10	130	32,00	90,0	-	6	-
VHSR 6 100 145 12 03 H7	10,0	-	12	145	35,00	100,0	-	6	-
VHSR 6 110 155 12 03 H7	11,0	-	12	155	39,00	110,0	-	6	-
VHSR 6 120 165 14 03 H7	12,0	-	14	165	42,00	120,0	-	6	-
VHSR 8 160 208 18 03 H7	16,0	-	18	208	56,00	160,0	-	8	-

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 800		**10 - 16**	emulsion
P1.2	<1000		**8 - 14**	emulsion
P1.3	<1400		**6 - 1**	emulsion
H2.1		42 - 50 Hrc	**6 - 8**	
M3.1	<950		**8 - 11**	emulsion
M3.2	<1250		**8 - 11**	emulsion
K4.1	<800		**12 - 16**	emulsion
S6.1	<1500		**5 - 10**	emulsion
S6.2	<1600		**5 - 10**	emulsion
S6.3	<1600		**5 - 10**	emulsion
S6.3	<1250		**5 - 10**	emulsion

- **Suited for through-going, as well as for blind holes**
  Geeignet für sowohl durchgehende Löcher als auch für Grundlöcher
- **Special reamers at customer's request**
  Spezialreibahle auf Kundenangabe



Ød (mm)	a_p max. (mm)	Fu (mm/rotation)
1	10	0.05 - 0.11
1,5	15	0.05 - 0.11
2	20	0.05 - 0.11
2,5	25	0.05 - 0.11
3	30	0.05 - 0.11
4	40	0.15 - 0.23
5	50	0.15 - 0.23
6	60	0.15 - 0.23
7	70	0.15 - 0.23
8	80	0.15 - 0.23
9	90	0.12 - 0.28
10	100	0.12 - 0.28
11	110	0.12 - 0.28
12	120	0.12 - 0.28
16	160	0.12 - 0.28

Thread mills

Gewindefräser

Thread milling is a way to create a thread. A single mill can be used to make a wide range of holes with the same pitch. This lowers the cost of your tools and reduces the tool change time. Our thread mills can be used to make both internal and external threads.

Gewindefräsen ist eine Möglichkeit, ein Gewinde zu erstellen. Ein einziger Fräser kann verwendet werden, um eine Vielzahl von Löchern mit der gleichen Steigung herzustellen. Das senkt die Kosten Ihrer Werkzeuge und verkürzt die Werkzeugwechselzeit. Mit unseren Gewindefräsern können sowohl Innen- als auch Außengewinde hergestellt werden.

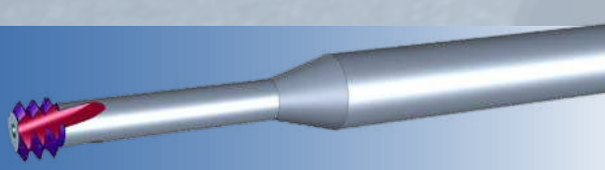
By developing and producing high-quality carbide end mills in our own production center, Van Hoorn Carbide offers you the best quality thread milling. We guarantee you a very accurate and stable process with excellent results!

Durch die Entwicklung und Produktion hochwertiger Hartmetall-Schaftfräser in unserem eigenen Produktionszentrum bietet Van Hoorn Carbide Ihnen Gewindefräsen in bester Qualität. Wir garantieren Ihnen einen sehr genauen und stabilen Prozess mit hervorragenden Ergebnissen!

- **Generates a very accurate and stable process**
  Das Herstellungsverfahren ist sehr präzise und konstant
- **Easy to adjust thread fit**
  Gewindemaß einfach zu optimieren
- **Inside- but also outside thread possible**
  Sowohl Innengewinde wie auch Außengewinde möglich

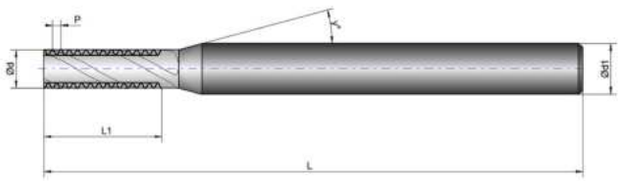
Available with internal coolant

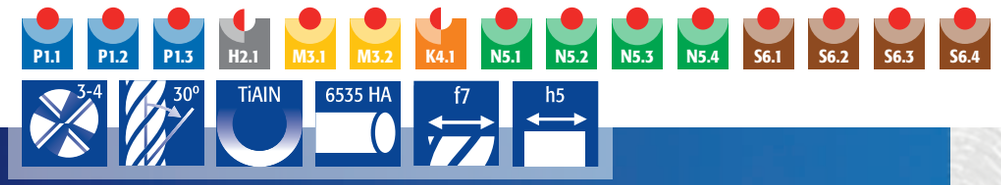
Erhältlich mit Innenkühlung



Both the VHTM and VHTMM are available with internal coolant. The coolant lubricates, removes chips and reduces heat. This results in higher tool life and more productivity.

Sowohl VHTM als auch VHTMM sind mit interner Kühlung erhältlich. Das Kühlmittel schmiert, entfernt Späne und reduziert die Hitze. Daraus resultieren höhere Standzeiten und mehr Produktivität.





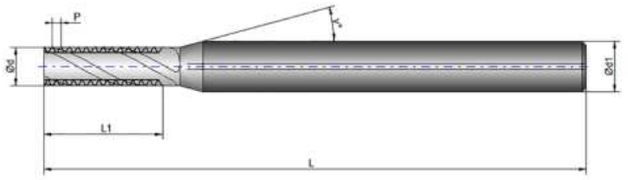
Article Number *Artikelnummer*	Thread	Ød (mm)	p (mm)	Ød1 (mm)	L (mm)	L1 (mm)	Z (mm)	γ (°)
VHTM 3 M040 064 06 40	M4	3,1	0,70	6	64	9,00	3	15
VHTM 3 M050 064 06 40	M5	4,0	0,80	6	64	11,00	3	15
VHTM 3 M060 064 06 40	M6	4,5	1,00	6	64	13,50	3	15
VHTM 3 M080 064 06 40	M8	6,0	1,25	6	64	18,00	3	15
VHTM 3 M100 064 08 40	M10	7,5	1,50	8	64	22,00	3	15
VHTM 4 M120 070 10 40	M12	9,5	1,75	10	70	26,00	4	15
VHTM 4 M140 070 10 40	M14	10,0	2,00	10	70	30,00	4	15
VHTM 4 M160 083 12 40	M16	12,0	2,00	12	83	34,00	4	15
VHTM 4 M200 100 16 40	M20	16,0	2,50	16	100	42,00	4	15

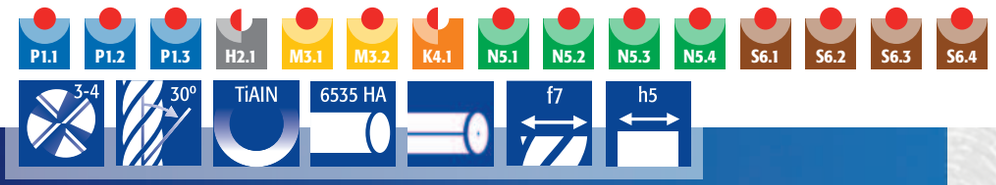
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**50 - 75**	emulsion
P1.2	< 1000	< 300	**50 - 75**	emulsion
P1.3	< 1400	< 400	**40 - 70**	emulsion
H2.1		42-50 HRc	**15 - 30**	emulsion
M3.1		< 950	**20 - 40**	emulsion
M3.2		< 1250	**20 - 40**	emulsion
K4.1		< 800	**50 - 100**	emulsion
N5.1	< 500		**50 - 100**	emulsion
N5.2	< 400		**60 - 130**	emulsion
N5.3	< 350		**50 - 100**	emulsion
N5.4			**50 - 100**	emulsion
S6.1			**30 - 50**	emulsion
S6.2			**30 - 50**	emulsion
S6.3	< 1600		**15 - 30**	emulsion
S6.4	< 1250		**30 - 60**	emulsion

VHTM 3 M080 064 06 40
Material: RVS 304

Ø	6,0 mm
V_c	35 m/min
n	1.850 rpm
F_z	0,040 mm/t
Z	3
V_f	223 mm/min
a_p	10,0 mm
a_e	0,625 mm
Coolant	emulsion

Ød (mm)	F_z (mm/tooth)
M4	0,02 - 0,04
M5	0,02 - 0,04
M6	0,03 - 0,05
M8	0,03 - 0,05
M10	0,03 - 0,05
M12	0,03 - 0,05
M16	0,03 - 0,05
M20	0,05 - 0,10



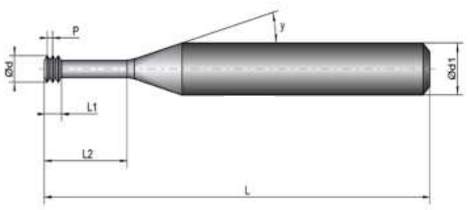


Article Number *Artikelnummer*	Thread	Ød (mm)	p (mm)	Ød1 (mm)	L (mm)	L1 (mm)	Z (mm)	γ (°)
VHTMI 3 M040 064 06 40	M4	3,1	0,70	6	64	9,00	3	15
VHTMI 3 M050 064 06 40	M5	4,0	0,80	6	64	11,00	3	15
VHTMI 3 M060 064 06 40	M6	4,5	1,00	6	64	13,50	3	15
VHTMI 3 M080 064 06 40	M8	6,0	1,25	6	64	18,00	3	15
VHTMI 3 M100 064 08 40	M10	7,5	1,50	8	64	22,00	3	15
VHTMI 4 M120 070 10 40	M12	9,5	1,75	10	70	26,00	4	15
VHTMI 4 M140 070 10 40	M14	10,0	2,00	10	70	30,00	4	15
VHTMI 4 M160 083 12 40	M16	12,0	2,00	12	83	34,00	4	15
VHTMI 4 M200 100 16 40	M20	16,0	2,50	16	100	42,00	4	15

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**50 - 75**	emulsion
P1.2	< 1000	< 300	**50 - 75**	emulsion
P1.3	< 1400	< 400	**40 - 70**	emulsion
H2.1		42-50 HRc	**15 - 30**	emulsion
M3.1		< 950	**20 - 40**	emulsion
M3.2		< 1250	**20 - 40**	emulsion
K4.1		< 800	**50 - 100**	emulsion
N5.1	< 500		**50 - 100**	emulsion
N5.2	< 400		**60 - 130**	emulsion
N5.3	< 350		**50 - 100**	emulsion
N5.4			**50 - 100**	emulsion
S6.1			**30 - 50**	emulsion
S6.2			**30 - 50**	emulsion
S6.3	< 1600		**15 - 30**	emulsion
S6.4	< 1250		**30 - 60**	emulsion

- **Short cycle time**
  Kurze Zykluszeit
- **Extra long cutting edge**
  Extra lange Schneidkante

Ød (mm)	F_z (mm/tooth)
M4	0,02 - 0,04
M5	0,02 - 0,04
M6	0,03 - 0,05
M8	0,03 - 0,05
M10	0,03 - 0,05
M12	0,03 - 0,05
M16	0,03 - 0,05
M20	0,05 - 0,10



P1.1 P1.2 P1.3 H2.1 M3.1 M3.2 K4.1 N5.1 N5.2 N5.3 N5.4 S6.1 S6.2 S6.3 S6.4

3-4 | 15° | TiAlN | 6535 HA | f7 | h5

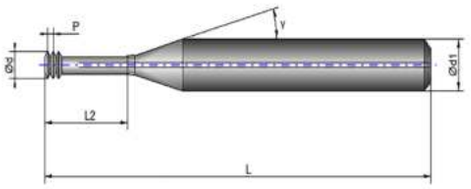
Article Number *Artikelnummer*	Thread (mm)	Ød (mm)	p (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z (mm)	γ (°)
VHTMM 3 M016 064 06 40	M1,6	1,2	0,35	6	64	1,10	4,8	0,23	3	15
VHTMM 3 M016 064 06 40 L064	M1,6	1,2	0,35	6	64	1,10	6,4	0,23	3	15
VHTMM 3 M016 064 06 40 L080	M1,6	1,2	0,35	6	64	1,10	8,0	0,23	3	15
VHTMM 3 M018 064 06 40	M1,8	1,4	0,35	6	64	1,10	5,4	0,23	3	15
VHTMM 3 M018 064 06 40 L072	M1,8	1,4	0,35	6	64	1,10	7,2	0,23	3	15
VHTMM 3 M018 064 06 40 L090	M1,8	1,4	0,35	6	64	1,10	9,0	0,23	3	15
VHTMM 3 M020 064 06 40	M2	1,5	0,40	6	64	1,20	6,0	0,26	3	15
VHTMM 3 M020 064 06 40 L080	M2	1,5	0,40	6	64	1,20	8,0	0,26	3	15
VHTMM 3 M020 064 06 40 L100	M2	1,5	0,40	6	64	1,20	10,0	0,26	3	15
VHTMM 3 M025 064 06 40	M2,5	1,9	0,45	6	64	1,40	7,5	0,29	3	15
VHTMM 3 M025 064 06 40 L100	M2,5	1,9	0,45	6	64	1,40	10,0	0,29	3	15
VHTMM 3 M025 064 06 40 L125	M2,5	1,9	0,45	6	64	1,40	12,5	0,29	3	15
VHTMM 3 M030 064 06 40	M3	2,4	0,50	6	64	1,50	9,5	0,32	3	15
VHTMM 3 M030 064 06 40 L120	M3	2,4	0,50	6	64	1,50	12,0	0,32	3	15
VHTMM 3 M030 064 06 40 L150	M3	2,4	0,50	6	64	1,50	15,0	0,32	3	15
VHTMM 3 M040 064 06 40	M4	3,1	0,70	6	64	2,10	12,5	0,45	3	15
VHTMM 3 M040 064 06 40 L160	M4	3,1	0,70	6	64	2,10	16,0	0,45	3	15
VHTMM 3 M040 064 06 40 L200	M4	3,1	0,70	6	64	2,10	20,0	0,45	3	15
VHTMM 3 M050 064 06 40	M5	4,0	0,80	6	64	2,40	16,0	0,52	3	15
VHTMM 3 M050 064 06 40 L200	M5	4,0	0,80	6	64	2,40	20,0	0,52	3	15
VHTMM 3 M050 064 06 40 L250	M5	4,0	0,80	6	64	2,40	25,0	0,52	3	15
VHTMM 3 M060 064 06 40	M6	4,5	1,00	6	64	3,00	20,0	0,65	3	15
VHTMM 3 M060 070 06 40 L240	M6	4,5	1,00	6	70	3,00	24,0	0,65	3	15
VHTMM 3 M060 070 06 40 L300	M6	4,5	1,00	6	70	3,00	30,0	0,65	3	15
VHTMM 4 M080 064 06 40	M8	6,0	1,25	6	64	3,80	24,0	0,81	4	15
VHTMM 4 M080 078 06 40 L320	M8	6,0	1,25	6	78	3,80	32,0	0,81	4	15
VHTMM 4 M080 078 06 40 L400	M8	6,0	1,25	6	78	3,80	40,0	0,81	4	15
VHTMM 4 M100 078 08 40	M10	7,5	1,50	8	78	4,50	33,0	0,97	4	15
VHTMM 4 M100 089 08 40 L400	M10	7,5	1,50	8	89	4,50	40,0	0,97	4	15
VHTMM 4 M100 089 08 40 L500	M10	7,5	1,50	8	89	4,50	50,0	0,97	4	15
VHTMM 4 M120 089 10 40	M12	9,5	1,75	10	89	5,30	38,0	1,14	4	15
VHTMM 4 M120 110 10 40 L480	M12	9,5	1,75	10	110	5,30	48,0	1,14	4	15
VHTMM 4 M120 110 10 40 L600	M12	9,5	1,75	10	110	5,30	60,0	1,14	4	15
VHTMM 4 M160 100 12 40	M16	12,0	2,00	12	100	6,00	50,0	1,30	4	15
VHTMM 4 M160 130 12 40 L640	M16	12,0	2,00	12	130	6,00	64,0	1,30	4	15
VHTMM 4 M160 130 12 40 L800	M16	12,0	2,00	12	130	6,00	80,0	1,30	4	15
VHTMM 4 M200 102 16 40	M20	16,0	2,50	16	102	7,10	50,0	1,62	4	15
VHTMM 4 M240 102 18 40	M24	18,0	3,00	18	102	8,60	50,0	1,95	4	15
VHTMM 4 M300 120 20 40	M30	20,0	3,50	20	120	10,50	60,0	2,27	4	15
VHTMM 4 M360 120 20 40	M36	20,0	4,00	20	120	11,00	60,0	2,60	4	15

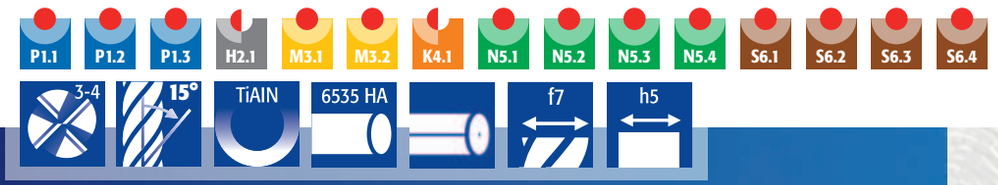
Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**50 - 75**	emulsion
P1.2	< 1000	< 300	**50 - 75**	emulsion
P1.3	< 1400	< 400	**50 - 80**	emulsion
H2.1		42-50 HRc	**15 - 30**	emulsion
M3.1		< 950	**40 - 60**	emulsion
M3.2		< 1250	**35 - 50**	emulsion
K4.1		< 800	**50 - 100**	emulsion
N5.1	< 500		**50 - 100**	emulsion
N5.2	< 400		**60 - 130**	emulsion
N5.3	< 350		**50 - 100**	emulsion
N5.4			**50 - 100**	emulsion
S6.1			**30 - 50**	emulsion
S6.2			**30 - 50**	emulsion
S6.3	< 1600		**15 - 30**	emulsion
S6.4	< 1250		**30 - 60**	emulsion

VHTMM 3 M020 064 06 40
Material: 42CrMo4V

Ø	1,5 mm
V_c	70 m/min
n	14.854 rpm
F_z	0,009 mm/t
Z	3
V_f	401 mm/min
a_p	1,2 mm
a_e	0,2 mm
Coolant	emulsion

Ød (mm)	F_z (mm/tooth)
M1,6	0,01 - 0,04
M1,8	0,01 - 0,04
M2	0,01 - 0,04
M2,5	0,01 - 0,04
M3	0,02 - 0,05
M4	0,02 - 0,05
M5	0,02 - 0,05
M6	0,03 - 0,06
M8	0,03 - 0,07
M10	0,03 - 0,07
M12	0,03 - 0,07
M16	0,03 - 0,07
M20	0,05 - 0,10
M24	0,05 - 0,10
M30	0,05 - 0,10
M36	0,05 - 0,10



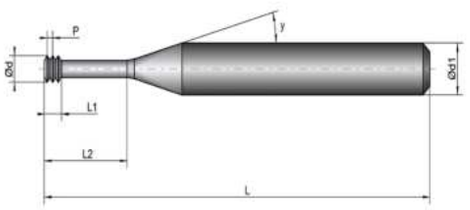


Article Number *Artikelnummer*	Thread (mm)	Ød (mm)	p (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z (mm)	γ (°)
VHTMMI 3 M030 064 06 40	M3	2,40	0,50	6	64	1,50	9,5	0,32	3	15
VHTMMI 3 M030 064 06 40 L120	M3	2,40	0,50	6	64	1,50	12,0	0,32	3	15
VHTMMI 3 M030 064 06 40 L150	M3	2,40	0,50	6	64	1,50	15,0	0,32	3	15
VHTMMI 3 M040 064 06 40	M4	3,10	0,70	6	64	2,10	12,5	0,45	3	15
VHTMMI 3 M040 064 06 40 L160	M4	3,10	0,70	6	64	2,10	16,0	0,45	3	15
VHTMMI 3 M040 064 06 40 L200	M4	3,10	0,70	6	64	2,10	20,0	0,45	3	15
VHTMMI 3 M050 064 06 40	M5	4,00	0,80	6	64	2,40	16,0	0,52	3	15
VHTMMI 3 M050 064 06 40 L200	M5	4,00	0,80	6	64	2,40	20,0	0,52	3	15
VHTMMI 3 M050 064 06 40 L250	M5	4,00	0,80	6	64	2,40	25,0	0,52	3	15
VHTMMI 3 M060 064 06 40	M6	4,50	1,00	6	64	3,00	20,0	0,65	3	15
VHTMMI 3 M060 070 06 40 L240	M6	4,50	1,00	6	70	3,00	24,0	0,65	3	15
VHTMMI 3 M060 070 06 40 L300	M6	4,50	1,00	6	70	3,00	30,0	0,65	3	15
VHTMMI 4 M080 064 06 40	M8	6,00	1,25	6	64	3,80	24,0	0,81	4	15
VHTMMI 4 M080 078 06 40 L320	M8	6,00	1,25	6	78	3,80	32,0	0,81	4	15
VHTMMI 4 M080 078 06 40 L400	M8	6,00	1,25	6	78	3,80	40,0	0,81	4	15
VHTMMI 4 M100 078 08 40	M10	7,50	1,50	8	78	4,50	33,0	0,97	4	15
VHTMMI 4 M100 089 08 40 L400	M10	7,50	1,50	8	89	4,50	40,0	0,97	4	15
VHTMMI 4 M100 089 08 40 L500	M10	7,50	1,50	8	89	4,50	50,0	0,97	4	15
VHTMMI 4 M120 089 10 40	M12	9,50	1,75	10	89	5,30	38,0	1,14	4	15
VHTMMI 4 M120 110 10 40 L480	M12	9,50	1,75	10	110	5,30	48,0	1,14	4	15
VHTMMI 4 M120 110 10 40 L600	M12	9,50	1,75	10	110	5,30	60,0	1,14	4	15
VHTMMI 4 M160 100 12 40	M16	12,00	2,00	12	100	6,00	50,0	1,30	4	15
VHTMMI 4 M160 130 12 40 L640	M16	12,00	2,00	12	130	6,00	64,0	1,30	4	15
VHTMMI 4 M160 130 12 40 L800	M16	12,00	2,00	12	130	6,00	80,0	1,30	4	15
VHTMMI 4 M200 102 16 40	M20	14,95	2,50	16	102	7,10	50,0	1,62	4	15
VHTMMI 4 M240 102 18 40	M24	17,95	3,00	18	102	8,60	50,0	1,95	4	15
VHTMMI 4 M300 120 20 40	M30	19,95	3,50	20	120	10,50	60,0	2,27	4	15
VHTMMI 4 M360 120 20 40	M36	19,95	4,00	20	120	11,00	60,0	2,60	4	15

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**50 - 75**	emulsion
P1.2	< 1000	< 300	**50 - 75**	emulsion
P1.3	< 1400	< 400	**50 - 80**	emulsion
H2.1		42-50 HRc	**15 - 30**	emulsion
M3.1		< 950	**40 - 60**	emulsion
M3.2		< 1250	**35 - 50**	emulsion
K4.1		< 800	**50 - 100**	emulsion
N5.1	< 500		**50 - 100**	emulsion
N5.2	< 400		**60 - 130**	emulsion
N5.3	< 350		**50 - 100**	emulsion
N5.4			**50 - 100**	emulsion
S6.1			**30 - 50**	emulsion
S6.2			**30 - 50**	emulsion
S6.3	< 1600		**15 - 30**	emulsion
S6.4	< 1250		**30 - 60**	emulsion

- **Suitable for blind holes**
  Geeignet für Sacklöcher
- **Better chip removal**
  Bessere Spanabfuhr

Ød (mm)	F_z (mm/tooth)
M1,6	0,01 - 0,04
M1,8	0,01 - 0,04
M2	0,01 - 0,04
M2,5	0,01 - 0,04
M3	0,02 - 0,05
M4	0,02 - 0,05
M5	0,02 - 0,05
M6	0,03 - 0,06
M8	0,03 - 0,07
M10	0,03 - 0,07
M12	0,03 - 0,07
M16	0,03 - 0,07
M20	0,05 - 0,10
M24	0,05 - 0,10
M30	0,05 - 0,10
M36	0,05 - 0,10



Article Number *Artikelnummer*	Thread (mm)	Ød (mm)	p (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	a (mm)	Z	γ (°)	
VHTMMH3M0200640640	M2,0	1,50	0,40	6	64	1,20	6,00	0,100	3	15	**new**
VHTMMH3M0250640640	M2,5	1,90	0,45	6	64	1,40	7,50	0,100	3	15	**new**
VHTMMH3M0300640640	M3	2,40	0,50	6	64	1,50	9,00	0,100	3	15	**new**
VHTMMH3M0400640640	M4	3,10	0,70	6	64	2,10	12,00	0,100	3	15	**new**
VHTMMH3M0500640640	M5	4,00	0,80	6	64	2,40	15,00	0,100	3	15	**new**
VHTMMH4M0600640640	M6	4,80	1,00	6	64	3,00	18,00	0,100	4	15	**new**
VHTMMH4M0800640840	M8	6,60	1,25	8	64	3,80	24,00	0,100	4	15	**new**
VHTMMH4M1000781040	M10	8,30	1,50	10	78	4,50	30,00	0,100	4	15	**new**
VHTMMH4M1200891040	M12	10,00	1,75	10	89	5,30	36,00	0,100	4	15	**new**

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
H2.1		42-50 HRc	**50 - 70**	emulsion
H2.2		50-55 HRc	**40 - 60**	emulsion
H2.3		55-70 HRc	**30 - 50**	emulsion

- **NO pre-drilling allowed; drilling + thread tapping in one single operation**
  NICHT Vorbohren; Bohren und Gewinde schneiden in einem Arbeitsgang
- **Ideal for retroactive corrective actions**
  Ideal für nachträgliche Korrekturarbeit
- **Axial cutting geometry**
  Axiale Kopfgeometrie

Ød (mm)	a_p max. (mm per helix)	a_e max. (mm)	H2.1 F_z (mm/tooth)	H2.2 F_z (mm/tooth)	H2.3 F_z (mm/tooth)
2,0	*p*	< 2,00	0,003 - 0,007	0,002 - 0,005	0,001 - 0,004
2,50	*p*	< 2,50	0,004 - 0,008	0,003 - 0,006	0,002 - 0,005
3,0	*p*	< 3,00	0,004 - 0,010	0,003 - 0,008	0,002 - 0,007
4,0	*p*	< 4,00	0,005 - 0,012	0,004 - 0,009	0,003 - 0,008
5,0	*p*	< 5,00	0,008 - 0,016	0,006 - 0,012	0,004 - 0,010
6,0	*p*	< 6,00	0,010 - 0,020	0,008 - 0,015	0,005 - 0,012
8,0	*p*	< 8,00	0,020 - 0,039	0,015 - 0,030	0,010 - 0,025
10,0	*p*	< 10,00	0,033 - 0,059	0,025 - 0,045	0,020 - 0,040
12,0	*p*	< 12,00	0,039 - 0,065	0,030 - 0,050	0,030 - 0,050

PARA Tooling

Solid carbide end mills for standard machining

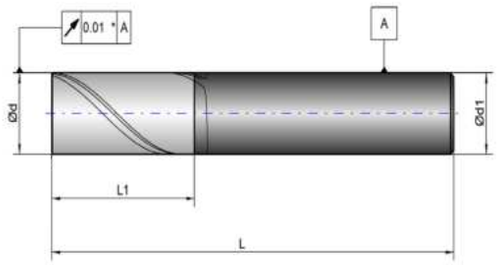
Vollhartmetall Fräser für Standardzerspanung

These carbide end mills are also produced in our high-tech production facility at our headquarters in Weert. These tools are manufactured from standard carbides and then provided with standard coatings. Their geometries have derived from the older generation Van Hoorn Carbide end mills and therefore are very useful for general applications! These end mills are inspected visually by sampling. Because the costs of developing PARA Tooling end mills are lower and the production quantities are larger, we can offer you these at very competitive prices. Perfect for smaller production environments and general applications.

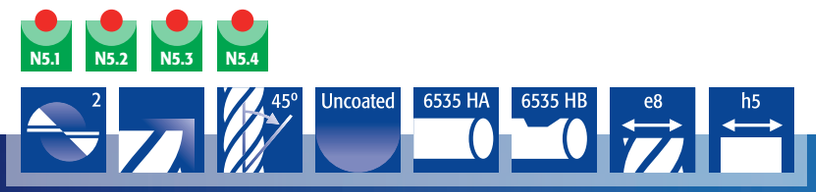
Auch diese Hartmetallfräser werden in unserer Hightech-Produktionsstätte in unserem Hauptsitz in Weert produziert. Sie werden aus Standardhartmetall gefertigt und versehen mit Standardbeschichtungen. Die Geometrien stammen aus der älteren Generation von Van Hoorn Carbide Fräsern und sind daher sehr gut geeignet für allgemeine Anwendungen. Die Fräser werden stichprobenweise visuell kontrolliert. Bei diesen Fräsern sind die Entwicklungskosten niedriger und die Produktionszahlen höher, dadurch können wir PARA Tooling Fräser zu einem sehr wettbewerbsfähigen Preis anbieten. Perfekt für die kleinere Produktionsumgebung und allgemeine Anwendungen.

Produced at the same high tech machines for general applications!

Produziert auf den gleichen high tech Maschinen für algemeine Anwendungen!



* For end mills / für Schaftfräser L < 100 mm.



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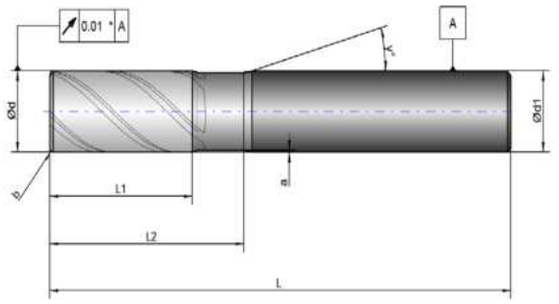
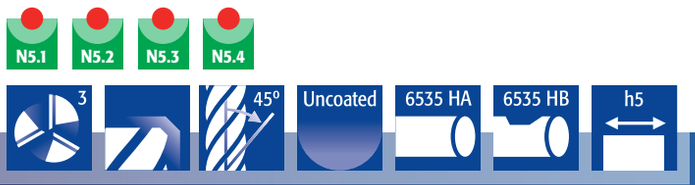
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
AS2 3.0x57	3,0	-	6	57	8,00	-	-	-	2	15
AS2 4.0x57	4,0	-	6	57	11,00	-	-	-	2	15
AS2 5.0x57	5,0	-	6	57	13,00	-	-	-	2	15
AS2 6.0x57	6,0	-	6	57	13,00	-	-	-	2	-
AS2 8.0x63	8,0	-	8	63	19,00	-	-	-	2	-
AS2 10.0x72	10,0	-	10	72	22,00	-	-	-	2	-
AS2 12.0x83	12,0	-	12	83	26,00	-	-	-	2	-
AS2 16.0x92	16,0	-	16	92	32,00	-	-	-	2	-
AS2 20.0x104	20,0	-	20	104	38,00	-	-	-	2	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.



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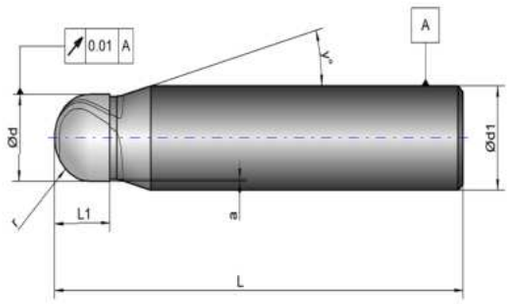
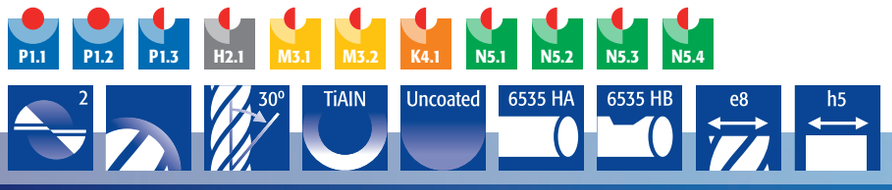
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
AS3 3,0x57	3,0	-	6	57	6,00	-	0,10	-	3	15
AS3 4,0x57	4,0	-	6	57	8,00	-	0,10	-	3	15
AS3 5,0x57	5,0	-	6	57	10,00	-	0,15	-	3	15
AS3 6,0x57	6,0	-	6	57	12,00	-	0,15	-	3	-
AS3 8,0x63	8,0	-	8	63	16,00	-	0,20	-	3	-
AS3 10,0x72	10,0	-	10	72	20,00	-	0,20	-	3	-
AS3 12,0x83	12,0	-	12	83	24,00	-	0,25	-	3	-
AS3 16,0x92	16,0	-	16	92	32,00	-	0,25	-	3	-
AS3 20,0x104	20,0	-	20	104	40,00	-	0,25	-	3	-
AS3 3,0x57 L009	3,0	-	6	57	6,00	9,0	0,10	0,050	3	15
AS3 4,0x57 L012	4,0	-	6	57	8,00	12,0	0,10	0,100	3	15
AS3 5,0x57 L015	5,0	-	6	57	10,00	15,0	0,15	0,100	3	15
AS3 6,0x57 L018	6,0	-	6	57	12,00	18,0	0,15	0,100	3	-
AS3 8,0x63 L024	8,0	-	8	63	16,00	24,0	0,20	0,100	3	-
AS3 10,0x72 L030	10,0	-	10	72	20,00	30,0	0,20	0,150	3	-
AS3 12,0x83 L036	12,0	-	12	83	24,00	36,0	0,25	0,150	3	-
AS3 16,0x100 L048	16,0	-	16	100	32,00	48,0	0,25	0,200	3	-
AS3 20,0x110 L060	20,0	-	20	110	40,00	60,0	0,25	0,250	3	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.





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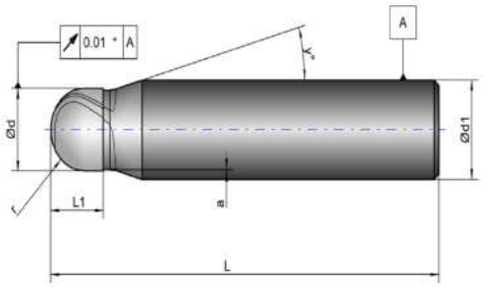
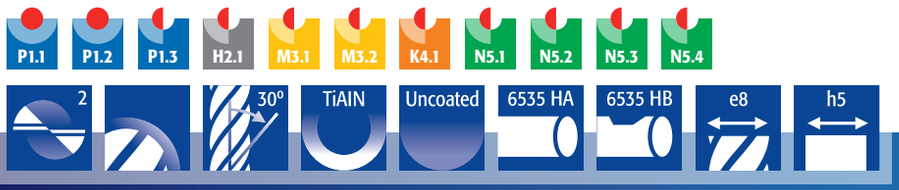
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
BT2 1.0x40	1,0	0,50	3	40	3,00	-	-	-	2	15
BT2 1.5x40	1,5	0,75	3	40	5,00	-	-	-	2	15
BT2 2.0x40	2,0	1,00	3	40	7,00	-	-	-	2	15
BT2 2.5x40	2,5	1,25	3	40	7,00	-	-	-	2	15
BT2 3.0x40	3,0	1,50	3	40	10,00	-	-	-	2	-
BT2 3.5x50	3,5	1,75	4	50	12,00	-	-	-	2	15
BT2 4.0x50	4,0	2,00	4	50	15,00	-	-	-	2	-
BT2 4.5x50	4,5	2,25	5	50	15,00	-	-	-	2	15
BT2 5.0x50	5,0	2,50	5	50	15,00	-	-	-	2	-
BT2 6.0x65	6,0	3,00	6	65	20,00	-	-	-	2	-
BT2 7.0x65	7,0	3,50	8	65	20,00	-	-	-	2	15
BT2 8.0x65	8,0	4,00	8	65	20,00	-	-	-	2	-
BT2 9.0x70	9,0	4,50	10	70	22,00	-	-	-	2	15
BT2 10.0x70	10,0	5,00	10	70	22,00	-	-	-	2	-
BT2 11.0x70	11,0	5,50	11	70	25,00	-	-	-	2	-
BT2 12.0x80	12,0	6,00	12	80	25,00	-	-	-	2	-
BT2 14.0x90	14,0	7,00	14	90	30,00	-	-	-	2	-
BT2 16.0x90	16,0	8,00	16	90	32,00	-	-	-	2	-
BT2 18.0x100	18,0	9,00	18	100	35,00	-	-	-	2	-
BT2 20.0x100	20,0	10,00	20	100	38,00	-	-	-	2	-

Only even shanks starting from Ø6 mm available with Weldon shank.
All items are available uncoated for the same price.

Nur gerade Schäfte ab Ø6 mm verfügbar mit Weldonfläche.
Alle Positionen auch Unbeschichtet lieferbar für den Beschichteten Preis.



* For end mills / für Schaftfräser L < 100 mm.



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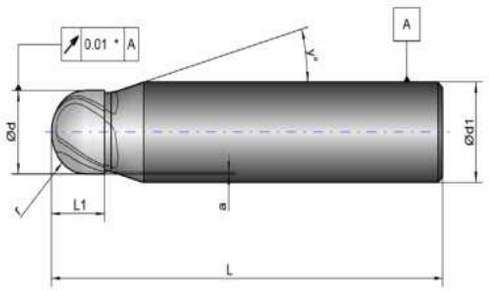
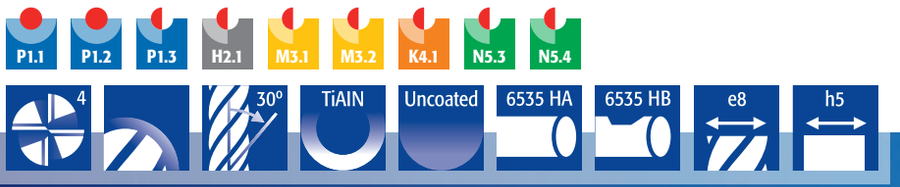
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
BTL2 1.0x50	1,0	0,50	4	50	2,50	-	-	-	2	15
BTL2 1.5x50	1,5	0,75	4	50	4,00	-	-	-	2	15
BTL2 2.0x50	2,0	1,00	6	50	5,00	-	-	-	2	15
BTL2 3.0x60	3,0	1,50	6	60	8,00	-	-	-	2	15
BTL2 4.0x70	4,0	2,00	6	70	8,00	-	-	-	2	15
BTL2 5.0x80	5,0	2,50	6	80	10,00	-	-	-	2	15
BTL2 6.0x90	6,0	3,00	6	90	12,00	-	-	-	2	-
BTL2 8.0x100	8,0	4,00	8	100	14,00	-	-	-	2	-
BTL2 10.0x100	10,0	5,00	10	100	18,00	-	-	-	2	-
BTL2 12.0x110	12,0	6,00	12	110	22,00	-	-	-	2	-
Long / Lange länge										
BTXL2 2.0x80	2,0	1,00	3	80	6,00	-	-	-	2	15
BTXL2 3.0x100	3,0	1,50	3	100	8,00	-	-	-	2	15
BTXL2 4.0x100	4,0	2,00	4	100	8,00	-	-	-	2	15
BTXL2 5.0x120	5,0	2,50	6	120	10,00	-	-	-	2	15
BTXL2 6.0x120	6,0	3,00	6	120	10,00	-	-	-	2	-
BTXL2 8.0x140	8,0	4,00	8	140	14,00	-	-	-	2	-
BTXL2 10.0x180	10,0	5,00	10	180	18,00	-	-	-	2	-
BTXL2 12.0x200	12,0	6,00	12	200	22,00	-	-	-	2	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.



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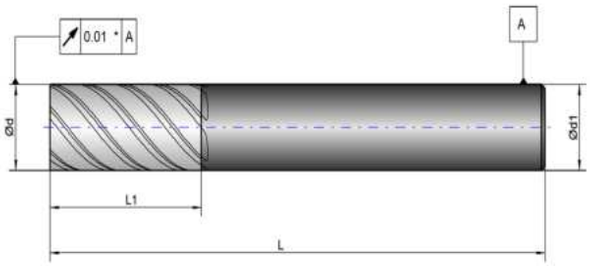
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
BT4 1.0x40	1,0	0,50	3	40	3,00	-	-	-	4	15
BT4 1.5x40	1,5	0,75	3	40	5,00	-	-	-	4	15
BT4 2.0x40	2,0	1,00	3	40	7,00	-	-	-	4	15
BT4 2.5x40	2,5	1,25	3	40	7,00	-	-	-	4	15
BT4 3.0x40	3,0	1,50	3	40	10,00	-	-	-	4	-
BT4 3.5x50	3,5	1,75	4	50	12,00	-	-	-	4	15
BT4 4.0x50	4,0	2,00	4	50	15,00	-	-	-	4	-
BT4 4.5x50	4,5	2,25	5	50	15,00	-	-	-	4	15
BT4 5.0x50	5,0	2,50	5	50	15,00	-	-	-	4	-
BT4 6.0x65	6,0	3,00	6	65	20,00	-	-	-	4	-
BT4 7.0x65	7,0	3,50	8	65	20,00	-	-	-	4	15
BT4 8.0x65	8,0	4,00	8	65	20,00	-	-	-	4	-
BT4 9.0x70	9,0	4,50	10	70	22,00	-	-	-	4	15
BT4 10.0x70	10,0	5,00	10	70	22,00	-	-	-	4	-
BT4 11.0x70	11,0	5,50	11	70	25,00	-	-	-	4	-
BT4 12.0x80	12,0	6,00	12	80	25,00	-	-	-	4	-
BT4 14.0x90	14,0	7,00	14	90	30,00	-	-	-	4	-
BT4 16.0x90	16,0	8,00	16	90	32,00	-	-	-	4	-
BT4 18.0x100	18,0	9,00	18	100	35,00	-	-	-	4	-
BT4 20.0x100	20,0	10,00	20	100	38,00	-	-	-	4	-

Only even shanks starting from Ø6 mm available with Weldon shank.
All items are available uncoated for the same price.

Nur gerade Schäfte ab Ø6 mm verfügbar mit Weldonfläche.
Alle Positionen auch Unbeschichtet lieferbar für den Beschichteten Preis.



* For end mills / für Schaftfräser L < 100 mm.

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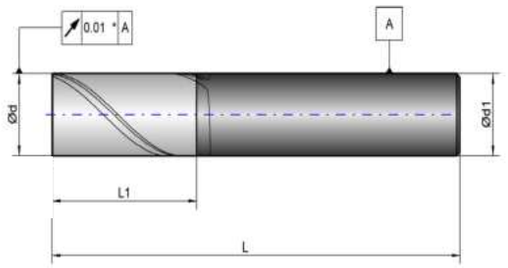
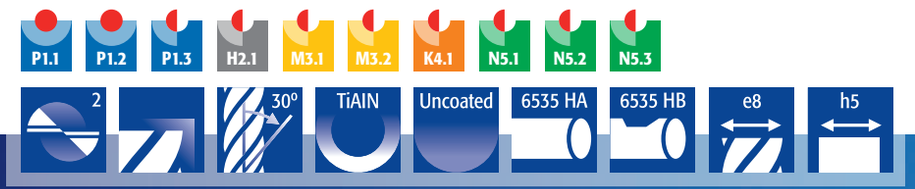
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
MS 6.0x58	6,0	-	6	58	13,00	-	-	-	6	-
MS 8.0x65	8,0	-	8	65	19,00	-	-	-	6	-
MS 10.0x72	10,0	-	10	72	22,00	-	-	-	6	-
MS 12.0x83	12,0	-	12	83	26,00	-	-	-	6	-
MS 16.0x92	16,0	-	16	92	32,00	-	-	-	6	-
MS 18.0x92	18,0	-	20	92	32,00	-	-	-	8	15
MS 20.0x103	20,0	-	20	103	38,00	-	-	-	8	-
MSL 6.0x70	6,0	-	6	70	26,00	-	-	-	6	-
MSL 8.0x90	8,0	-	8	90	36,00	-	-	-	6	-
MSL 10.0x100	10,0	-	10	100	46,00	-	-	-	6	-
MSL 12.0x110	12,0	-	12	110	56,00	-	-	-	6	-
MSL 16.0x130	16,0	-	16	130	66,00	-	-	-	6	-
MSL 20.0x140	20,0	-	20	140	76,00	-	-	-	6	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.



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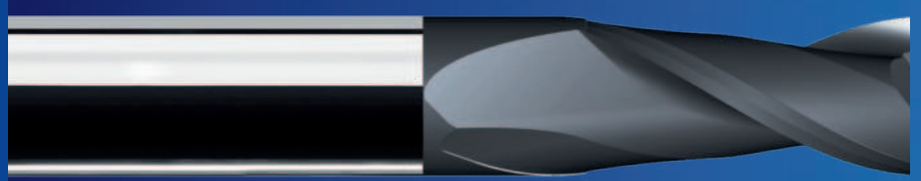
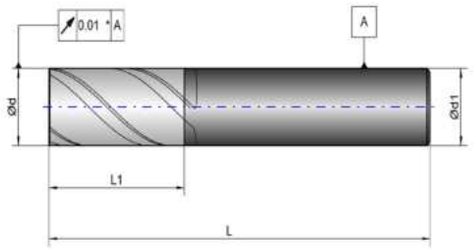


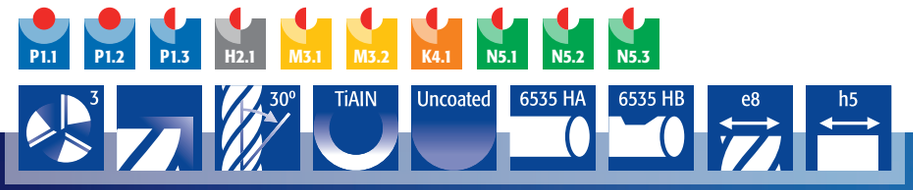
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
ST2 1.0x40	1,0	-	3	40	3,00	-	-	-	2	15
ST2 1.5x40	1,5	-	3	40	5,00	-	-	-	2	15
ST2 2.0x40	2,0	-	3	40	7,00	-	-	-	2	15
ST2 2.5x40	2,5	-	3	40	7,00	-	-	-	2	15
ST2 3.0x40	3,0	-	3	40	10,00	-	-	-	2	-
ST2 3.5x50	3,5	-	4	50	12,00	-	-	-	2	15
ST2 4.0x50	4,0	-	4	50	15,00	-	-	-	2	-
ST2 4.5x50	4,5	-	5	50	15,00	-	-	-	2	15
ST2 5.0x50	5,0	-	5	50	15,00	-	-	-	2	-
ST2 5.5x65	5,5	-	6	65	18,00	-	-	-	2	15
ST2 6.0x65	6,0	-	6	65	20,00	-	-	-	2	-
ST2 7.0x65	7,0	-	8	65	20,00	-	-	-	2	15
ST2 8.0x65	8,0	-	8	65	20,00	-	-	-	2	-
ST2 9.0x70	9,0	-	10	70	22,00	-	-	-	2	15
ST2 10.0x70	10,0	-	10	70	22,00	-	-	-	2	-
ST2 11.0x70	11,0	-	11	70	25,00	-	-	-	2	-
ST2 12.0x80	12,0	-	12	80	25,00	-	-	-	2	-
ST2 14.0x90	14,0	-	14	90	30,00	-	-	-	2	-
ST2 16.0x90	16,0	-	16	90	32,00	-	-	-	2	-
ST2 18.0x100	18,0	-	18	100	35,00	-	-	-	2	-
ST2 20.0x100	20,0	-	20	100	38,00	-	-	-	2	-

Only even shanks starting from Ø6 mm available with Weldon shank.
All items are available uncoated for the same price.

Nur gerade Schäfte ab Ø6 mm verfügbar mit Weldonfläche.
Alle Positionen auch Unbeschichtet lieferbar für den Beschichteten Preis.



* For end mills / für Schaftfräser L < 100 mm.



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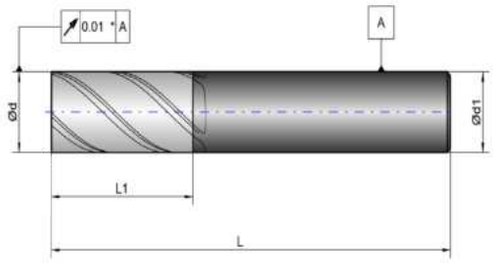
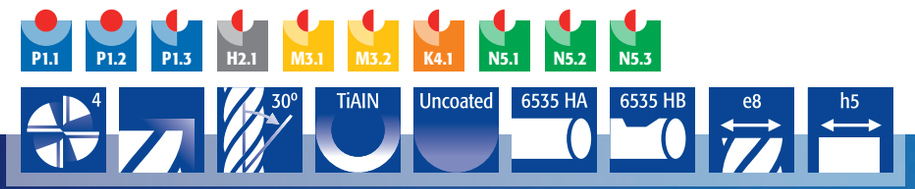
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
ST3 1.0x40	1,0	-	3	40	3,00	-	-	-	3	15
ST3 1.5x40	1,5	-	3	40	5,00	-	-	-	3	15
ST3 2.0x40	2,0	-	3	40	7,00	-	-	-	3	15
ST3 2.5x40	2,5	-	3	40	7,00	-	-	-	3	15
ST3 3.0x40	3,0	-	3	40	10,00	-	-	-	3	-
ST3 3.5x50	3,5	-	4	50	12,00	-	-	-	3	15
ST3 4.0x50	4,0	-	4	50	15,00	-	-	-	3	-
ST3 4.5x50	4,5	-	5	50	15,00	-	-	-	3	15
ST3 5.0x50	5,0	-	5	50	15,00	-	-	-	3	-
ST3 6.0x65	6,0	-	6	65	20,00	-	-	-	3	-
ST3 7.0x65	7,0	-	8	65	20,00	-	-	-	3	15
ST3 8.0x65	8,0	-	8	65	20,00	-	-	-	3	-
ST3 9.0x70	9,0	-	10	70	22,00	-	-	-	3	15
ST3 10.0x70	10,0	-	10	70	22,00	-	-	-	3	-
ST3 11.0x70	11,0	-	11	70	25,00	-	-	-	3	-
ST3 12.0x80	12,0	-	12	80	25,00	-	-	-	3	-
ST3 14.0x90	14,0	-	14	90	30,00	-	-	-	3	-
ST3 16.0x90	16,0	-	16	90	32,00	-	-	-	3	-
ST3 18.0x100	18,0	-	18	100	35,00	-	-	-	3	-
ST2 20.0x100	20,0	-	20	100	38,00	-	-	-	3	-

Only even shanks starting from Ø6 mm available with Weldon shank.
All items are available uncoated for the same price.

Nur gerade Schäfte ab Ø6 mm verfügbar mit Weldonfläche.
Alle Positionen auch Unbeschichtet lieferbar für den Beschichteten Preis.



* For end mills / für Schaftfräser L < 100 mm.



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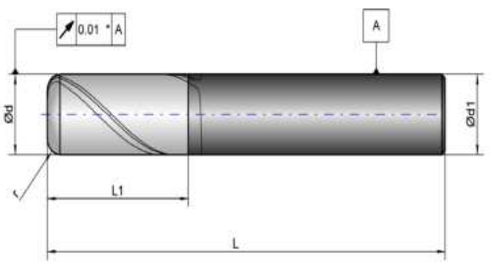
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
ST4 1.0x40	1,0	-	3	40	3,00	-	-	-	4	15
ST4 1.5x40	1,5	-	3	40	5,00	-	-	-	4	15
ST4 2.0x40	2,0	-	3	40	7,00	-	-	-	4	15
ST4 2.5x40	2,5	-	3	40	7,00	-	-	-	4	15
ST4 3.0x40	3,0	-	3	40	10,00	-	-	-	4	-
ST4 3.5x50	3,5	-	4	50	12,00	-	-	-	4	15
ST4 4.0x50	4,0	-	4	50	15,00	-	-	-	4	-
ST4 4.5x50	4,5	-	5	50	15,00	-	-	-	4	15
ST4 5.0x50	5,0	-	5	50	15,00	-	-	-	4	-
ST4 6.0x65	6,0	-	6	65	20,00	-	-	-	4	-
ST4 7.0x65	7,0	-	8	65	20,00	-	-	-	4	15
ST4 8.0x65	8,0	-	8	65	20,00	-	-	-	4	-
ST4 9.0x70	9,0	-	10	70	22,00	-	-	-	4	15
ST4 10.0x70	10,0	-	10	70	22,00	-	-	-	4	-
ST4 11.0x70	11,0	-	11	70	25,00	-	-	-	4	-
ST4 12.0x80	12,0	-	12	80	25,00	-	-	-	4	-
ST4 14.0x90	14,0	-	14	90	30,00	-	-	-	4	-
ST4 16.0x90	16,0	-	16	90	32,00	-	-	-	4	-
ST4 18.0x100	18,0	-	18	100	35,00	-	-	-	4	-
ST4 20.0x100	20,0	-	20	100	38,00	-	-	-	4	-

Only even shanks starting from Ø6 mm available with Weldon shank.
All items are available uncoated for the same price.

Nur gerade Schäfte ab Ø6 mm verfügbar mit Weldonfläche.
Alle Positionen auch Unbeschichtet lieferbar für den Beschichteten Preis.



* For end mills / für Schaftfräser L < 100 mm.

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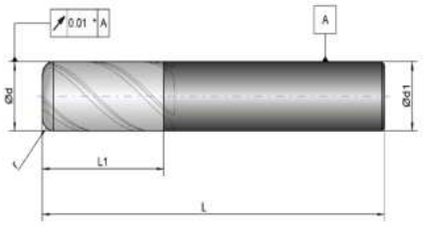
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
STR2 3.0x50 R=0.3	3,0	0,30	6	50	12,00	-	-	-	2	15
STR2 4.0x50 R=0.3	4,0	0,30	6	50	15,00	-	-	-	2	15
STR2 4.0x50 R=0.5	4,0	0,50	6	50	15,00	-	-	-	2	15
STR2 5.0x60 R=0.3	5,0	0,30	6	60	20,00	-	-	-	2	15
STR2 5.0x60 R=0.5	5,0	0,50	6	60	20,00	-	-	-	2	15
STR2 6.0x60 R=0.3	6,0	0,30	6	60	20,00	-	-	-	2	-
STR2 6.0x60 R=0.5	6,0	0,50	6	60	20,00	-	-	-	2	-
STR2 6.0x60 R=1.0	6,0	1,00	6	60	20,00	-	-	-	2	-
STR2 8.0x70 R=0.3	8,0	0,30	8	70	25,00	-	-	-	2	-
STR2 8.0x70 R=0.5	8,0	0,50	8	70	25,00	-	-	-	2	-
STR2 8.0x70 R=1.0	8,0	1,00	8	70	25,00	-	-	-	2	-
STR2 8.0x70 R=1.5	8,0	1,50	8	70	25,00	-	-	-	2	-
STR2 8.0x70 R=2.0	8,0	2,00	8	70	25,00	-	-	-	2	-
STR2 10.0x90 R=0.3	10,0	0,30	10	90	30,00	-	-	-	2	-
STR2 10.0x90 R=0.5	10,0	0,50	10	90	30,00	-	-	-	2	-
STR2 10.0x90 R=1.0	10,0	1,00	10	90	30,00	-	-	-	2	-
STR2 10.0x90 R=1.5	10,0	1,50	10	90	30,00	-	-	-	2	-
STR2 10.0x90 R=2.0	10,0	2,00	10	90	30,00	-	-	-	2	-
STR2 12.0x90 R=0.5	12,0	0,50	12	90	30,00	-	-	-	2	-
STR2 12.0x90 R=1.0	12,0	1,00	12	90	30,00	-	-	-	2	-
STR2 12.0x90 R=1.5	12,0	1,50	12	90	30,00	-	-	-	2	-
STR2 12.0x90 R=2.0	12,0	2,00	12	90	30,00	-	-	-	2	-
STR2 16.0x110 R=0.5	16,0	0,50	16	110	50,00	-	-	-	2	-
STR2 16.0x110 R=1.0	16,0	1,00	16	110	50,00	-	-	-	2	-
STR2 16.0x110 R=1.5	16,0	1,50	16	110	50,00	-	-	-	2	-
STR2 16.0x110 R=2.0	16,0	2,00	16	110	50,00	-	-	-	2	-
STR2 20.0x110 R=0.5	20,0	0,50	20	110	50,00	-	-	-	2	-
STR2 20.0x110 R=1.0	20,0	1,00	20	110	50,00	-	-	-	2	-
STR2 20.0x110 R=1.5	20,0	1,50	20	110	50,00	-	-	-	2	-
STR2 20.0x110 R=2.0	20,0	2,00	20	110	50,00	-	-	-	2	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.

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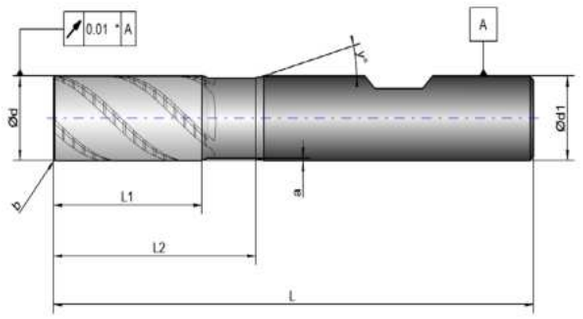
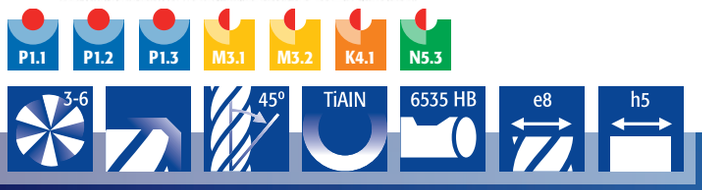
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
STR4 3.0x50 R=0.3	3,0	0,30	6	50	12,00	-	-	-	4	15
STR4 4.0x50 R=0.3	4,0	0,30	6	50	15,00	-	-	-	4	15
STR4 4.0x50 R=0.5	4,0	0,50	6	50	15,00	-	-	-	4	15
STR4 5.0x60 R=0.3	5,0	0,30	6	60	20,00	-	-	-	4	15
STR4 5.0x60 R=0.5	5,0	0,50	6	60	20,00	-	-	-	4	15
STR4 6.0x60 R=0.3	6,0	0,30	6	60	20,00	-	-	-	4	-
STR4 6.0x60 R=0.5	6,0	0,50	6	60	20,00	-	-	-	4	-
STR4 6.0x60 R=1.0	6,0	1,00	6	60	20,00	-	-	-	4	-
STR4 8.0x70 R=0.3	8,0	0,30	8	70	25,00	-	-	-	4	-
STR4 8.0x70 R=0.5	8,0	0,50	8	70	25,00	-	-	-	4	-
STR4 8.0x70 R=0.75	8,0	0,75	8	70	25,00	-	-	-	4	-
STR4 8.0x70 R=1.0	8,0	1,00	8	70	25,00	-	-	-	4	-
STR4 8.0x70 R=1.5	8,0	1,50	8	70	25,00	-	-	-	4	-
STR4 8.0x70 R=2.0	8,0	2,00	8	70	25,00	-	-	-	4	-
STR4 10.0x90 R=0.3	10,0	0,30	10	90	30,00	-	-	-	4	-
STR4 10.0x90 R=0.5	10,0	0,50	10	90	30,00	-	-	-	4	-
STR4 10.0x90 R=1.0	10,0	1,00	10	90	30,00	-	-	-	4	-
STR4 10.0x90 R=1.5	10,0	1,50	10	90	30,00	-	-	-	4	-
STR4 10.0x90 R=2.0	10,0	2,00	10	90	30,00	-	-	-	4	-
STR4 12.0x90 R=0.5	12,0	0,50	12	90	30,00	-	-	-	4	-
STR4 12.0x90 R=1.0	12,0	1,00	12	90	30,00	-	-	-	4	-
STR4 12.0x90 R=1.5	12,0	1,50	12	90	30,00	-	-	-	4	-
STR4 12.0x90 R=2.0	12,0	2,00	12	90	30,00	-	-	-	4	-
STR4 16.0x110 R=0.5	16,0	0,50	16	110	50,00	-	-	-	4	-
STR4 16.0x110 R=1.0	16,0	1,00	16	110	50,00	-	-	-	4	-
STR4 16.0x110 R=1.5	16,0	1,50	16	110	50,00	-	-	-	4	-
STR4 16.0x110 R=2.0	16,0	2,00	16	110	50,00	-	-	-	4	-
STR4 20.0x110 R=0.5	20,0	0,50	20	110	50,00	-	-	-	4	-
STR4 20.0x110 R=1.0	20,0	1,00	20	110	50,00	-	-	-	4	-
STR4 20.0x110 R=1.5	20,0	1,50	20	110	50,00	-	-	-	4	-
STR4 20.0x110 R=2.0	20,0	2,00	20	110	50,00	-	-	-	4	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.



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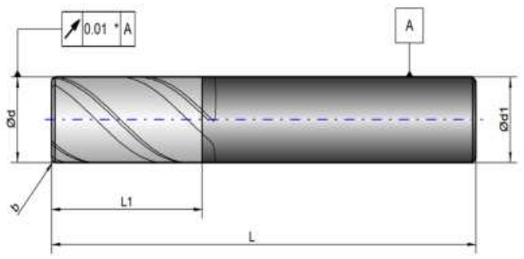
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RR 4,0x57	4,0	-	6	57	11,00	-	0,25	-	3	15
RR 5,0x57	5,0	-	6	57	13,00	-	0,25	-	4	15
RR 6,0x57	6,0	-	6	57	13,00	-	0,25	-	4	-
RR 8,0x63	8,0	-	8	63	19,00	-	0,25	-	4	-
RR 10,0x72	10,0	-	10	72	22,00	-	0,25	-	4	-
RR 12,0x83	12,0	-	12	83	26,00	-	0,25	-	4	-
RR 16,0x92	16,0	-	16	92	32,00	-	0,25	-	5	-
RR 20,0x104	20,0	-	20	104	38,00	-	0,40	-	6	-
RR 6,0x57 L021	6,0	-	6	57	13,00	21,0	0,25	0,250	4	-
RR 8,0x63 L027	8,0	-	8	63	19,00	27,0	0,25	0,250	4	-
RR 10,0x72 L032	10,0	-	10	72	22,00	32,0	0,25	0,300	4	-
RR 12,0x83 L038	12,0	-	12	83	26,00	38,0	0,25	0,300	4	-
RR 16,0x92 L044	16,0	-	16	92	32,00	44,0	0,25	0,300	5	-
RR 20,0x104 L054	20,0	-	20	104	38,00	54,0	0,40	0,300	6	-

Standard with Weldon shank.

Standard mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.

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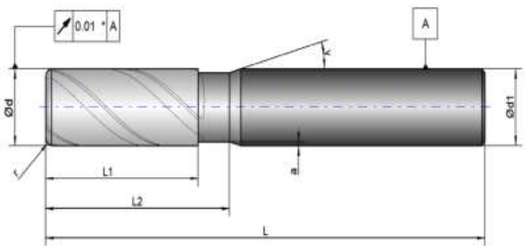
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RS3 2,0x40	2,0	-	3	40	8,00	-	0,10	-	3	15
RS3 3,0x40	3,0	-	3	40	10,00	-	0,10	-	3	
RS3 4,0x50	4,0	-	4	50	12,00	-	0,10	-	3	-
RS3 5,0x50	5,0	-	5	50	15,00	-	0,15	-	3	-
RS3 6,0x65	6,0	-	6	65	15,00	-	0,15	-	3	-
RS3 8,0x65	8,0	-	8	65	20,00	-	0,20	-	3	-
RS3 10,0x70	10,0	-	10	70	22,00	-	0,20	-	3	-
RS3 12,0x80	12,0	-	12	80	25,00	-	0,25	-	3	-
RS3 16,0x90	16,0	-	16	90	35,00	-	0,25	-	3	-
RS3 20,0x102	20,0	-	20	102	40,00	-	0,25	-	3	-
RS3 2,0x39 L008	2,0	-	3	39	4,00	8,0	-	0,050	3	15
RS3 3,0x39 L010	3,0	-	3	39	5,00	10,0	-	0,050	3	15
RS3 4,0x51 L012	4,0	-	4	51	6,00	12,0	-	0,100	3	15
RS3 5,0x51 L014	5,0	-	5	51	7,00	14,0	-	0,150	3	15
RS3 6,0x64 L016	6,0	-	6	64	8,00	16,0	-	0,200	3	15
RS3 8,0x64 L020	8,0	-	8	64	11,00	20,0	-	0,300	3	15
RS3 10,0x70 L022	10,0	-	10	70	13,00	22,0	-	0,300	3	15
RS3 12,0x78 L025	12,0	-	12	78	15,00	25,0	-	0,300	3	15
RS3 16,0x89 L035	16,0	-	16	89	19,00	35,0	-	0,300	3	15

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.

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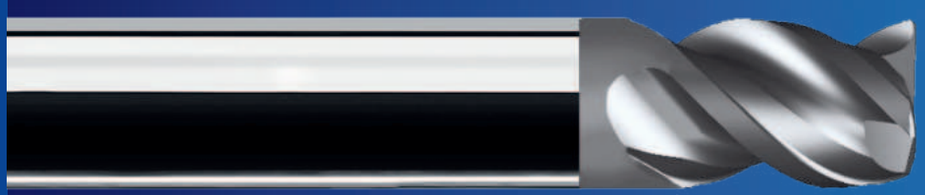
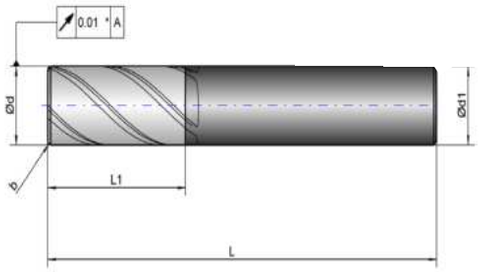


Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RSS3 2,0x39 L010 R=0,20	2,0	0,200	3	39	3,00	10,0	-	0,050	3	15
RSS3 3,0x39 L010 R=0,20	3,0	0,200	3	39	4,00	10,0	-	0,050	3	15
RSS3 4,0x51 L012 R=0,20	4,0	0,200	6	51	5,00	12,0	-	0,100	3	15
RSS3 4,0x64 L012 R=0,20	4,0	0,200	6	64	5,00	12,0	-	0,100	3	15
RSS3 5,0x51 L014 R=0,20	5,0	0,200	6	51	6,00	14,0	-	0,150	3	15
RSS3 5,0x64 L014 R=0,20	5,0	0,200	6	64	6,00	14,0	-	0,150	3	15
RSS3 6,0x64 L016 R=0,30	6,0	0,300	6	64	7,00	16,0	-	0,200	3	15
RSS3 8,0x64 L020 R=0,50	8,0	0,500	8	64	9,00	20,0	-	0,300	3	15
RSS3 10,0x70 L025 R=0,50	10,0	0,500	10	70	12,00	25,0	-	0,300	3	15
RSS3 12,0x78 L030 R=0,50	12,0	0,500	12	78	15,00	30,0	-	0,300	3	15
RSS3 16,0x89 L038 R=0,50	16,0	0,500	16	89	18,00	38,0	-	0,300	3	15

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



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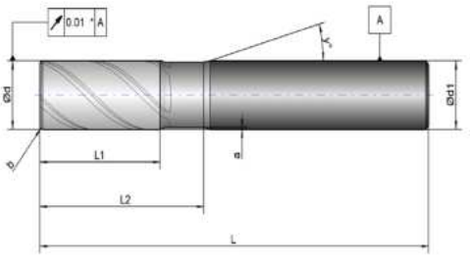
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RS4 3,0x40	3,0	-	3	40	10,00	-	0,10	-	4	-
RS4 4,0x50	4,0	-	4	50	12,00	-	0,10	-	4	-
RS4 5,0x50	5,0	-	5	50	15,00	-	0,15	-	4	-
RS4 6,0x65	6,0	-	6	65	15,00	-	0,15	-	4	-
RS4 8,0x65	8,0	-	8	65	20,00	-	0,20	-	4	-
RS4 10,0x70	10,0	-	10	70	22,00	-	0,20	-	4	-
RS4 12,0x80	12,0	-	12	80	25,00	-	0,25	-	4	-
RS4 16,0x90	16,0	-	16	90	35,00	-	0,25	-	4	-
RS4 20,0x102	20,0	-	20	102	40,00	-	0,25	-	4	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.

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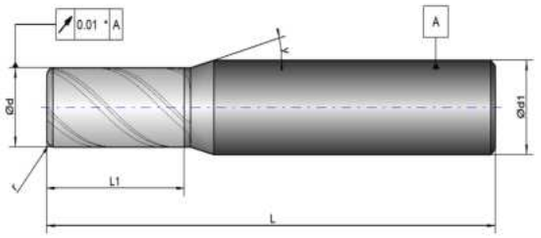
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RV 4.0x57	4,0	-	6	57	11,00	-	0,25	-	4	15
RV 5.0x57	5,0	-	6	57	13,00	-	0,25	-	4	15
RV 6.0x57	6,0	-	6	57	13,00	-	0,25	-	4	-
RV 8.0x63	8,0	-	8	63	19,00	-	0,25	-	4	-
RV 10.0x72	10,0	-	10	72	22,00	-	0,25	-	4	-
RV 12.0x83	12,0	-	12	83	26,00	-	0,25	-	4	-
RV 16.0x92	16,0	-	16	92	32,00	-	0,25	-	4	-
RV 20.0x104	20,0	-	20	104	38,00	-	0,40	-	4	-
RV 4.0x57 L021	4,0	-	6	57	11,00	21,0	0,25	0,150	4	15
RV 5.0x57 L021	5,0	-	6	57	13,00	21,0	0,25	0,200	4	15
RV 6,0x57 L021	6,0	-	6	57	13,00	21,0	0,25	0,250	4	-
RV 8.0x63 L028	8,0	-	8	63	19,00	28,0	0,25	0,250	4	-
RV 10.0x72 L032	10,0	-	10	72	22,00	32,0	0,25	0,300	4	-
RV 12.0x83 L038	12,0	-	12	83	26,00	38,0	0,25	0,300	4	-
RV 16.0x92 L044	16,0	-	16	92	32,00	44,0	0,25	0,300	4	-
RV 20,0x104 L054	20,0	-	20	104	38,00	54,0	0,40	0,300	4	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.

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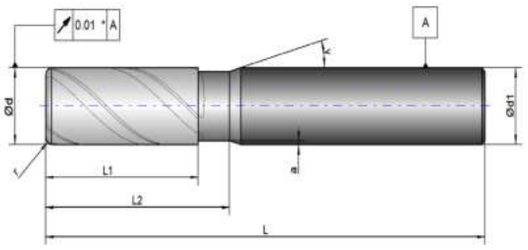
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RVR 3,0x57 R=0,25	3,0	0,25	6	57	11,0	-	-	-	4	15
RVR 3,0x57 R=0,50	3,0	0,50	6	57	13,0	-	-	-	4	15
RVR 4,0x57 R=0,50	4,0	0,50	6	57	13,0	-	-	-	4	15
RVR 5,0x57 R=0,50	5,0	0,50	6	57	13,0	-	-	-	4	15
RVR 6,0x57 R=0,50	6,0	0,50	6	57	13,0	-	-	-	4	-
RVR 6,0x57 R=1,00	6,0	1,00	6	57	13,0	-	-	-	4	-
RVR 6,0x57 R=1,50	6,0	1,50	6	57	13,0	-	-	-	4	-
RVR 8,0x63 R=0,50	8,0	0,50	8	63	19,0	-	-	-	4	-
RVR 8,0x63 R=1,00	8,0	1,00	8	63	19,0	-	-	-	4	-
RVR 8,0x63 R=1,50	8,0	1,50	8	63	19,0	-	-	-	4	-
RVR 10,0x72 R=0,50	10,0	0,50	10	72	22,0	-	-	-	4	-
RVR 10,0x72 R=1,00	10,0	1,00	10	72	22,0	-	-	-	4	-
RVR 10,0x72 R=1,50	10,0	1,50	10	72	22,0	-	-	-	4	-
RVR 12,0x83 R=0,50	12,0	0,50	12	83	26,0	-	-	-	4	-
RVR 12,0x83 R=1,50	12,0	1,50	12	83	26,0	-	-	-	4	-
RVR 16,0x92 R=0,50	16,0	0,50	16	92	32,0	-	-	-	4	-
RVR 16,0x92 R=1,50	16,0	1,50	16	92	32,0	-	-	-	4	-
RVR 16,0x92 R=3,00	16,0	3,00	16	92	32,0	-	-	-	4	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.

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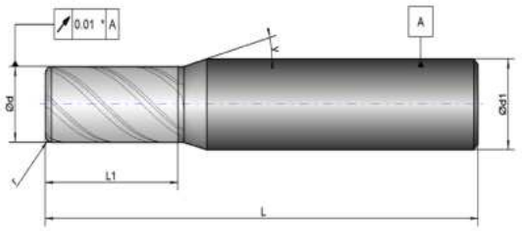
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RVR 3,0x57 L021 R=0,25	3,0	0,25	6	57	11,00	21,0	-	0,100	4	15
RVR 3,0x57 L021 R=0,50	3,0	0,50	6	57	13,00	21,0	-	0,100	4	15
RVR 4,0x57 L021 R=0,50	4,0	0,50	6	57	13,00	21,0	-	0,150	4	15
RVR 5,0x57 L021 R=0,50	5,0	0,50	6	57	13,00	21,0	-	0,200	4	15
RVR 6,0x57 L021 R=0,50	6,0	0,50	6	57	13,00	21,0	-	0,250	4	-
RVR 6,0x57 L021 R=1,00	6,0	1,00	6	57	13,00	21,0	-	0,250	4	-
RVR 6,0x57 L021 R=1,50	6,0	1,50	6	57	13,00	21,0	-	0,250	4	-
RVR 6,0x63 L026 R=0,50	6,0	0,50	6	63	13,00	26,0	-	0,250	4	-
RVR 8,0x63 L028 R=0,50	8,0	0,50	8	63	19,00	28,0	-	0,250	4	-
RVR 8,0x63 L028 R=1,00	8,0	1,00	8	63	19,00	28,0	-	0,250	4	-
RVR 8,0x63 L028 R=1,50	8,0	1,50	8	63	19,00	28,0	-	0,250	4	-
RVR 8,0x72 L034 R=0,50	8,0	0,50	8	72	19,00	34,0	-	0,250	4	-
RVR 10,0x72 L032 R=0,50	10,0	0,50	10	72	22,00	32,0	-	0,300	4	-
RVR 10,0x72 L032 R=1,00	10,0	1,00	10	72	22,00	32,0	-	0,300	4	-
RVR 10,0x72 L032 R=1,50	10,0	1,50	10	72	22,00	32,0	-	0,300	4	-
RVR 10,0x83 L042 R=0,50	10,0	0,50	10	83	22,00	42,0	-	0,300	4	-
RVR 12,0x83 L038 R=0,50	12,0	0,50	12	83	26,00	38,0	-	0,300	4	-
RVR 12,0x83 L038 R=1,50	12,0	1,50	12	83	26,00	38,0	-	0,300	4	-
RVR 12,0x100 L050 R=0,50	12,0	0,50	12	100	26,00	50,0	-	0,300	4	-
RVR 16,0x92 L044 R=0,50	16,0	0,50	16	92	32,00	44,0	-	0,300	4	-
RVR 16,0x92 L044 R=1,50	16,0	1,50	16	92	32,00	44,0	-	0,300	4	-
RVR 16,0x92 L044 R=2,50	16,0	2,50	16	92	32,00	44,0	-	0,300	4	-
RVR 16,0x92 L044 R=3,00	16,0	3,00	16	92	32,00	44,0	-	0,300	4	-
RVR 16,0x120 L066 R=1,50	16,0	1,50	16	120	32,00	66,0	-	0,300	4	-
RVR 6,0x57 L026 R=0,50	6,0	0,50	6	57	13,00	26,0	-	0,300	4	-
RVR 8,0x63 L034 R=0,50	8,0	0,50	8	63	19,00	34,0	-	0,300	4	-
RVR 10,0x72 L042 R=0,50	10,0	0,50	10	72	22,00	42,0	-	0,300	4	-
RVR 12,0x83 L050 R=0,50	12,0	0,50	12	83	26,00	50,0	-	0,300	4	-
RVR 16,0x92 L066 R=1,50	16,0	1,50	16	92	32,00	66,0	-	0,300	4	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.

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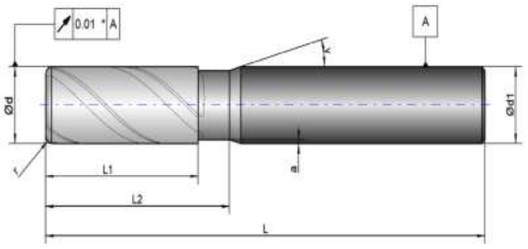
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RVR5 3,0x57 R=0,25	3,0	0,25	6	57	11,00	-	-	-	5	15
RVR5 3,0x57 R0,50	3,0	0,50	6	57	13,00	-	-	-	5	15
RVR5 4,0x57 R=0,50	4,0	0,50	6	57	13,00	-	-	-	5	15
RVR5 5,0x57 R=0,50	5,0	0,50	6	57	13,00	-	-	-	5	15
RVR5 6,0x57 R=0,50	6,0	0,50	6	57	13,00	-	-	-	5	-
RVR5 6,0x57 R=1,00	6,0	1,00	6	57	13,00	-	-	-	5	-
RVR5 6,0x57 R=1,50	6,0	1,50	6	57	13,00	-	-	-	5	-
RVR5 8,0x63 R=0,50	8,0	0,50	8	63	19,00	-	-	-	5	-
RVR5 8,0x63 R=1,00	8,0	1,00	8	63	19,00	-	-	-	5	-
RVR5 8,0x63 R=1,50	8,0	1,50	8	63	19,00	-	-	-	5	-
RVR5 10,0x72 R=0,50	10,0	0,50	10	72	22,00	-	-	-	5	-
RVR5 10,0x72 R=1,00	10,0	1,00	10	72	22,00	-	-	-	5	-
RVR5 10,0x72 R=1,50	10,0	1,50	10	72	22,00	-	-	-	5	-
RVR5 12,0x83 R=0,50	12,0	0,50	12	83	26,00	-	-	-	5	-
RVR5 12,0x83 R=1,50	12,0	1,50	12	83	26,00	-	-	-	5	-
RVR5 16,0x92 R=0,50	16,0	0,50	16	92	32,00	-	-	-	5	-
RVR5 16,0x92 R=1,50	16,0	1,50	16	92	32,00	-	-	-	5	-
RVR5 16,0x92 R=3,00	16,0	3,00	16	92	32,00	-	-	-	5	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.

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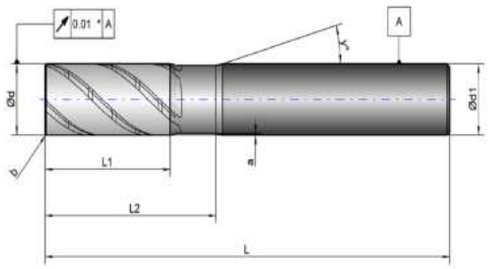
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RVR5 3,0x57 L021 R=0,25	3,0	0,25	6	57	11,00	21,0	-	0,100	5	15
RVR5 3,0x57 L021 R=0,50	3,0	0,50	6	57	13,00	21,0	-	0,100	5	15
RVR5 4,0x57 L021 R=0,50	4,0	0,50	6	57	13,00	21,0	-	0,150	5	15
RVR5 5,0x57 L021 R=0,50	5,0	0,50	6	57	13,00	21,0	-	0,200	5	15
RVR5 6,0x57 L021 R=0,50	6,0	0,50	6	57	13,00	21,0	-	0,250	5	-
RVR5 6,0x57 L021 R=1,00	6,0	1,00	6	57	13,00	21,0	-	0,250	5	-
RVR5 6,0x57 L021 R=1,50	6,0	1,50	6	57	13,00	21,0	-	0,250	5	-
RVR5 6,0x63 L026 R=0,50	6,0	0,50	6	63	13,00	26,0	-	0,250	5	-
RVR5 8,0x63 L028 R=0,50	8,0	0,50	8	63	19,00	28,0	-	0,250	5	-
RVR5 8,0x63 L028 R=1,00	8,0	1,00	8	63	19,00	28,0	-	0,250	5	-
RVR5 8,0x63 L028 R=1,50	8,0	1,50	8	63	19,00	28,0	-	0,250	5	-
RVR5 8,0x72 L034 R=0,50	8,0	0,50	8	72	19,00	34,0	-	0,250	5	-
RVR5 10,0x72 L032 R=0,50	10,0	0,50	10	72	22,00	32,0	-	0,300	5	-
RVR5 10,0x72 L032 R=1,00	10,0	1,00	10	72	22,00	32,0	-	0,300	5	-
RVR5 10,0x72 L032 R=1,50	10,0	1,50	10	72	22,00	32,0	-	0,300	5	-
RVR5 10,0x83 L042 R=0,50	10,0	0,50	10	83	22,00	42,0	-	0,300	5	-
RVR5 12,0x83 L038 R=0,50	12,0	0,50	12	83	26,00	38,0	-	0,300	5	-
RVR5 12,0x83 L038 R=1,50	12,0	1,50	12	83	26,00	38,0	-	0,300	5	-
RVR5 12,0x100 L050 R=0,50	12,0	0,50	12	100	26,00	50,0	-	0,300	5	-
RVR5 16,0x92 L044 R=0,50	16,0	0,50	16	92	32,00	44,0	-	0,300	5	-
RVR5 16,0x92 L044 R=1,50	16,0	1,50	16	92	32,00	44,0	-	0,300	5	-
RVR5 16,0x92 L044 R=3,00	16,0	3,00	16	92	32,00	44,0	-	0,300	5	-
RVR5 16,0x120 L066 R=1,50	16,0	1,50	16	120	32,00	66,0	-	0,300	5	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



* For end mills / für Schaftfräser L < 100 mm.

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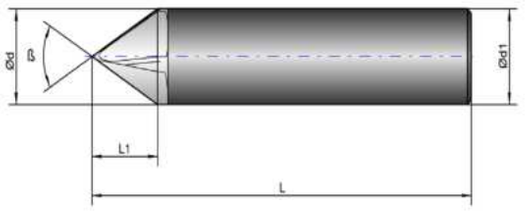
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
RSR4 4,0x57	4,0	-	6	57	11,00	-	0,10	-	4	15
RSR4 5,0x57	5,0	-	6	57	13,00	-	0,10	-	4	15
RSR4 6,0x57	6,0	-	6	57	13,00	-	0,25	-	4	-
RSR4 8,0x63	8,0	-	8	63	19,00	-	0,25	-	4	-
RSR4 10,0x72	10,0	-	10	72	22,00	-	0,25	-	4	-
RSR4 12,0x83	12,0	-	12	83	26,00	-	0,25	-	4	-
RSR4 16,0x92	16,0	-	16	92	32,00	-	0,25	-	4	-
RSR4 20,0x104	20,0	-	20	104	38,00	-	0,40	-	4	-
RSR4 6,0x57 L021	6,0	-	6	57	13,00	21,0	0,13	0,250	4	-
RSR4 8,0x63 L027	8,0	-	8	63	19,00	27,0	0,25	0,250	4	-
RSR4 10,0x72 L032	10,0	-	10	72	22,00	32,0	0,25	0,300	4	-
RSR4 12,0x83 L038	12,0	-	12	83	26,00	38,0	0,25	0,300	4	-
RSR4 16,0x92 L044	16,0	-	16	92	32,00	44,0	0,25	0,300	4	-
RSR4 20,0x104 L054	20,0	-	20	104	38,00	54,0	0,40	0,300	4	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



P1.1 P1.2 P1.3 H2.1 H2.2 H2.3 M3.1 M3.2 K4.1 N5.1 N5.2 N5.3 N5.4 N5.5 N5.6 S6.1 S6.2 S6.3 S6.4

3-6 | 0° | TiAlN | Uncoated | 6535 HA | 6535 HB | e8 | h5 | 60°

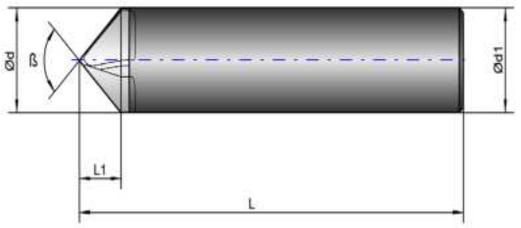
PAGE 254

Deburring 60° / Entgrater 60°

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
CH3 1,0x39 60°	1,0	-	3	39	0,80	-	-	-	3	45
CH3 2,0x39 60°	2,0	-	3	39	1,70	-	-	-	3	45
CH3 3,0x39 60°	3,0	-	3	39	2,60	-	-	-	3	-
CH4 4,0x51 60°	4,0	-	4	51	3,46	-	-	-	4	-
CH4 6,0x64 60°	6,0	-	6	64	5,20	-	-	-	4	-
CH5 6,0x64 60°	6,0	-	6	64	5,20	-	-	-	5	-
CH4 8,0x64 60°	8,0	-	8	64	6,93	-	-	-	4	-
CH5 8,0x64 60°	8,0	-	8	64	6,90	-	-	-	5	-
CH4 10,0x70 60°	10,0	-	10	70	8,66	-	-	-	4	-
CH6 10,0x70 60°	10,0	-	10	70	8,70	-	-	-	6	-
CH4 12,0x78 60°	12,0	-	12	78	10,40	-	-	-	4	-
CH6 12,0x78 60°	12,0	-	12	78	10,40	-	-	-	6	-
CH6 16,0x89 60°	16,0	-	16	89	13,80	-	-	-	6	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



P1.1 P1.2 P1.3 H2.1 H2.2 H2.3 M3.1 M3.2 K4.1 N5.1 N5.2 N5.3 N5.4 N5.5 N5.6 S6.1 S6.2 S6.3 S6.4

3-6 | 0° | TiAlN | Uncoated | 6535 HA | 6535 HB | e8 | h5 | 90°

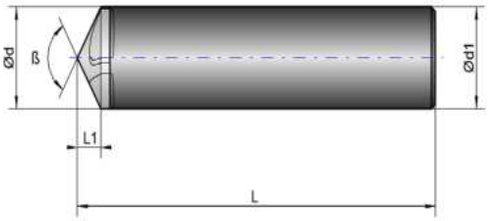
PAGE 254

Deburring 90° / Entgrater 90°

Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
CH3 1,0x39 90°	1,0	-	3	39	0,50	-	-	-	3	45
CH3 2,0x39 90°	2,0	-	3	39	1,00	-	-	-	3	45
CH3 3,0x39 90°	3,0	-	3	39	1,50	-	-	-	3	-
CH4 4,0x51 90°	4,0	-	4	51	2,00	-	-	-	4	-
CH4 6,0x64 90°	6,0	-	6	64	3,00	-	-	-	4	-
CH5 6,0x64 90°	6,0	-	6	64	3,00	-	-	-	5	-
CH4 8,0x64 90°	8,0	-	8	64	4,00	-	-	-	4	-
CH5 8,0x64 90°	8,0	-	8	64	4,00	-	-	-	5	-
CH4 10,0x70 90°	10,0	-	10	70	5,00	-	-	-	4	-
CH6 10,0x70 90°	10,0	-	10	70	5,00	-	-	-	6	-
CH4 12,0x78 90°	12,0	-	12	78	6,00	-	-	-	4	-
CH6 12,0x78 90°	12,0	-	12	78	6,00	-	-	-	6	-
CH6 16,0x89 90°	16,0	-	16	89	8,00	-	-	-	6	-
CH6 20,0x104 90°	20,0	-	20	104	10,00	-	-	-	6	-

Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.



P1.1 P1.2 P1.3 H2.1 H2.2 H2.3 M3.1 M3.2 K4.1 N5.1 N5.2 N5.3 N5.4 N5.5 N5.6 S6.1 S6.2 S6.3 S6.4

3-6 | 0° | TiAlN | Uncoated | 6535 HA | 6535 HB | e8 | h5 | 120°

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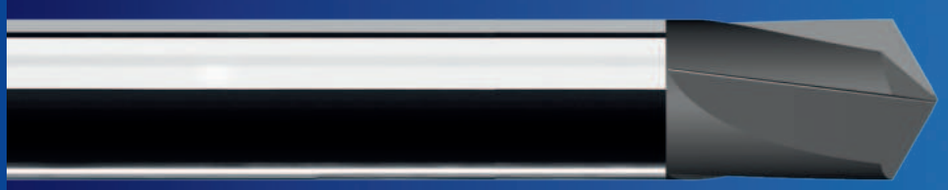


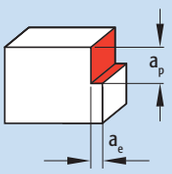
Deburring 120° / Entgrater 120°

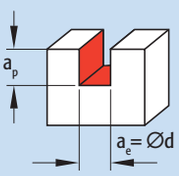
Article Number *Artikelnummer*	Ød (mm)	r (mm)	Ød1 (mm)	L (mm)	L1 (mm)	L2 (mm)	b (mm)	a (mm)	Z	γ (°)
CH3 1,0x39 120°	1,0	-	3	39	0,20	-	-	-	3	45
CH3 2,0x39 120°	2,0	-	3	39	0,50	-	-	-	3	45
CH3 3,0x39 120°	3,0	-	3	39	0,80	-	-	-	3	-
CH4 4,0x51 120°	4,0	-	4	51	1,10	-	-	-	4	-
CH4 6,0x64 120°	6,0	-	6	64	1,70	-	-	-	4	-
CH5 6,0x64 120°	6,0	-	6	64	1,70	-	-	-	5	-
CH4 8,0x64 120°	8,0	-	8	64	2,30	-	-	-	4	-
CH5 8,0x64 120°	8,0	-	8	64	2,30	-	-	-	5	-
CH4 10,0x70 120°	10,0	-	10	70	2,80	-	-	-	4	-
CH6 10,0x70 120°	10,0	-	10	70	2,80	-	-	-	6	-
CH4 12,0x78 120°	12,0	-	12	78	3,40	-	-	-	4	-
CH6 12,0x78 120°	12,0	-	12	78	3,40	-	-	-	6	-
CH6 16,0x89 120°	16,0	-	16	89	4,60	-	-	-	6	-

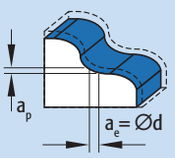
Starting from shank Ø6 mm available with Weldon shank.

Ab Schaft Ø6 mm verfügbar mit Weldonfläche.

Material group	TSR (N/mm²)	Hardness HB	Cutting speed V_c m/min	Coolant
P1.1	< 750	< 250	**140 - 220**	emulsion
P1.2	< 1000	< 300	**100 - 180**	emulsion
P1.3	< 1400	< 400	**70 - 160**	emulsion
H2.1		42-50 HRc	**80 - 140**	emulsion
H2.2		50-55 HRc	**100 - 160**	emulsion
H2.3		55-70 HRc	**120 - 180**	emulsion
M3.1	< 950		**80 - 130**	emulsion
M3.2	< 1250		**60 - 100**	emulsion
K4.1	< 800		**100 - 160**	emulsion
N5.1			**200 - 500**	emulsion
N5.2			**150 - 400**	emulsion
N5.3			**200 - 400**	emulsion
N5.4			**300 - 700**	emulsion
N5.5			**150 - 700**	emulsion
N5.6			**< 350**	emulsion
S6.1	< 1500		**40 - 60**	emulsion
S6.2	< 1600		**45 - 70**	emulsion
S6.3	< 1600		**30 - 50**	emulsion
S6.4	< 1250		**60 - 90**	emulsion





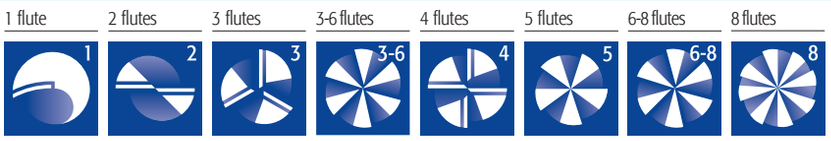


Roughing	Semi finishing	Finishing	0,5xD	1,0xD	Semi finishing	Finishing
a_p up to 1,25 x d	a_p up to 1,50 x d	a_p up to 2,0 x d	a_p up to 0,5 x d	a_p up to 1,0 x d	a_p up to 0,10 x d	a_p up to 0,05 x d
a_e up to 0,40 x d	a_e up to 0,20 x d	a_e up to 0,05 x d	a_e up to 1,0 x d	a_e up to 1,0 x d	a_e up to 0,40 x d	a_e up to 0,20 x d

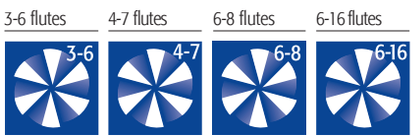
	Contouring / Konturierung			Slot milling / Nutfräsen		Profile milling / Profilfräsen	
Ød (mm)	Rouching / Eckfräsen F_z	Semi finishing / Halbbearbeitung F_z	Finishing / Weiterverarbeitung F_z	0,5xD F_z	1,0xD F_z	Semi finishing / Halbbearbeitung F_z	Finishing / Weiterverarbeitung F_z
1	0,005	0,007	0,009	0,008	0,005	0,020	0,040
2	0,008	0,009	0,011	0,010	0,008	0,030	0,050
3	0,015	0,025	0,035	0,020	0,010	0,040	0,060
4	0,020	0,030	0,045	0,025	0,013	0,050	0,080
5	0,025	0,035	0,055	0,030	0,015	0,060	0,100
6	0,030	0,040	0,065	0,035	0,020	0,070	0,120
8	0,035	0,045	0,075	0,045	0,030	0,080	0,140
10	0,040	0,055	0,085	0,055	0,040	0,100	0,180
12	0,050	0,065	0,095	0,065	0,050	0,120	0,200
16	0,070	0,090	0,115	0,075	0,060	0,140	0,220
20	0,090	0,110	0,130	0,085	0,075	0,160	0,250

Symbols / Piktogramme

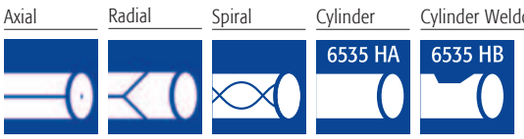
Number of Flutes
Schneidenzahl
Centre cutting
Zentrum schneidend



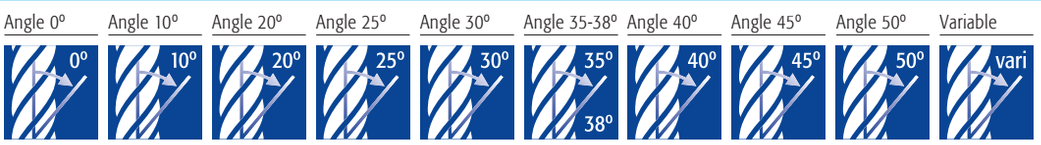
Non centre cutting
Nicht Zentrum schneidend



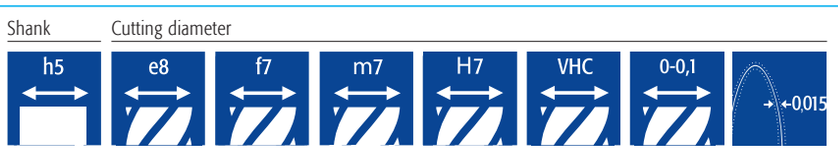
Shank
Schaftausführung



Helix angle
Spiralwinkel



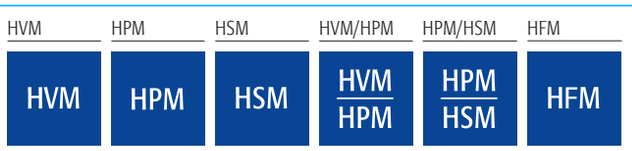
Diameter Tolerance
Durchmessertoleranz



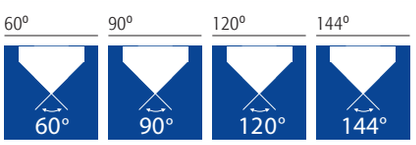
Version
Ausführung

Coating
Beschichtung

Strategy
Strategie



Top angle
Spitzenwinkel



Tolerances / Toleranzen

Diameter Range	Shank Ød1-h5	Cutting diameter Ød-e8	Cutting diameter Ød-f7	Cutting diameter Ød-m7	Cutting diameter Ød-H7	Cutting diameter VHC	Cutting diameter G7
d ≤ 3	0 -0,004	-0,014 -0,028	-0,006 -0,016	+0,002 +0,012	0 +0,010	0 -0,015	0,008 -0,012
3 > d ≤ 6	0 -0,005	-0,020 -0,038	-0,010 -0,022	+0,004 +0,016	0 +0,012	0 -0,017	-0,004 -0,016
6 > d ≤ 10	0 -0,006	-0,025 -0,047	-0,013 -0,028	+0,006 +0,021	0 +0,015	0 -0,020	-0,005 -0,020
10 > d ≤ 18	0 -0,008	-0,032 -0,059	-0,016 -0,034	+0,007 +0,021	0 +0,018	0 -0,024	-0,006 -0,024
18 > d ≤ 30	0 -0,009	-0,040 -0,073	-0,020 -0,041	+0,008 +0,029	0 +0,021	0 -0,028	-0,007 -0,028