EMUGE FRANKEN

Made in Germany

FRANKEN

Entgratfräser, Senker und Frässtifte
Deburring End Mills, Countersinks and Burrs

Wegweiser

Bitte beachten:
Die Eignung ist folgendermaßen gekennzeichnet:

■ = sehr gut geeignet
□ = gut geeignet

Product finder

Please note:
The suitability is indicated as follows:

■ = very suitable
□ = suitable

		Einsatzgebiete – Material Applications – material			Material-Beispiele Material examples	Material-Nummern Material numbers
P		**Stahlwerkstoffe**	**Steel materials**			
	1.1	Kaltfließpressstähle, Baustähle, Automatenstähle, u.a.	Cold-extrusion steels, Construction steels, Free-cutting steels, etc.	≤ 600 N/mm²	Cq15	1.1132
					S235JR (St37-2)	1.0037
					10SPb20	1.0722
	2.1	Baustähle, Einsatzstähle, Stahlguss, u.a.	Construction steels, Case-hardened steels, Steel castings, etc.	≤ 800 N/mm²	E360 (St70-2)	1.0070
					16MnCr5	1.7131
					GS-25CrMo4	1.7218
	3.1	Einsatzstähle, Vergütungsstähle, Kaltarbeitsstähle, u.a.	Case-hardened steels, Heat-treatable steels, Cold work steels, etc.	≤ 1000 N/mm²	20MoCr3	1.7320
					42CrMo4	1.7225
					102Cr6	1.2067
	4.1	Vergütungsstähle, Kaltarbeitsstähle, Nitrierstähle, u.a.	Heat-treatable steels, Cold work steels, Nitriding steels, etc.	≤ 1200 N/mm²	50CrMo4	1.7228
					X45NiCrMo4	1.2767
					31CrMo12	1.8515
	5.1	Hochlegierte Stähle, Kaltarbeitsstähle, Warmarbeitsstähle, u.a.	High-alloyed steels, Cold work steels, Hot work steels, etc.	≤ 1400 N/mm²	X38CrMoV5-3	1.2367
					X100CrMoV8-1-1	1.2990
					X40CrMoV5-1	1.2344
M		**Nichtrostende Stahlwerkstoffe**	**Stainless steel materials**			
	1.1	Ferritisch, martensitisch	Ferritic, martensitic	≤ 950 N/mm²	X2CrTi12	1.4512
	2.1	Austenitisch	Austenitic	≤ 950 N/mm²	X6CrNiMoTi17-12-2	1.4571
	3.1	Austenitisch-ferritisch (Duplex)	Austenitic-ferritic (Duplex)	≤ 1100 N/mm²	X2CrNiMoN22-5-3	1.4462
	4.1	Austenitisch-ferritisch hitzebeständig (Super Duplex)	Austenitic-ferritic heat-resistant (Super Duplex)	≤ 1250 N/mm²	X2CrNiMoN25-7-4	1.4410
K		**Gusswerkstoffe**	**Cast materials**			
	1.1	Gusseisen mit Lamellengrafit (GJL)	Cast iron with lamellar graphite (GJL)	100-250 N/mm²	EN-GJL-200 (GG20)	EN-JL-1030
	1.2			250-450 N/mm²	EN-GJL-300 (GG30)	EN-JL-1050
	2.1	Gusseisen mit Kugelgrafit (GJS)	Cast iron with nodular graphite (GJS)	350-500 N/mm²	EN-GJS-400-15 (GGG40)	EN-JS-1030
	2.2			500-900 N/mm²	EN-GJS-700-2 (GGG70)	EN-JS-1070
	3.1	Gusseisen mit Vermiculargrafit (GJV)	Cast iron with vermicular graphite (GJV)	300-400 N/mm²	GJV 300	
	3.2			400-500 N/mm²	GJV 450	
	4.1	Temperguss (GTMW, GTMB)	Malleable cast iron (GTMW, GTMB)	250-500 N/mm²	EN-GJMW-350-4 (GTW-35)	EN-JM-1010
	4.2			500-800 N/mm²	EN-GJMB-450-6 (GTS-45)	EN-JM-1140
N		**Nichteisenwerkstoffe**	**Non-ferrous materials**			
		Aluminium-Legierungen	**Aluminium alloys**			
	1.1	Aluminium-Knetlegierungen	Wrought aluminium alloys	≤ 200 N/mm²	EN AW-AlMn1	EN AW-3103
	1.2			≤ 350 N/mm²	EN AW-AlMgSi	EN AW-6060
	1.3			≤ 550 N/mm²	EN AW-AlZn5Mg3Cu	EN AW-7022
	1.4	Aluminium-Gusslegierungen	Aluminium cast alloys	Si ≤ 7%	EN AC-AlMg5	EN AC-51300
	1.5			7% < Si ≤ 12%	EN AC-AlSi9Cu3	EN AC-46500
	1.6			12% < Si ≤ 17%	GD-AlSi17Cu4FeMg	
		Kupfer-Legierungen	**Copper alloys**			
	2.1	Reinkupfer, niedriglegiertes Kupfer	Pure copper, low-alloyed copper	≤ 400 N/mm²	E-Cu 57	EN CW 004 A
	2.2	Kupfer-Zink-Legierungen (Messing, langspanend)	Copper-zinc alloys (brass, long-chipping)	≤ 550 N/mm²	CuZn37 (Ms63)	EN CW 508 L
	2.3	Kupfer-Zink-Legierungen (Messing, kurzspanend)	Copper-zinc alloys (brass, short-chipping)	≤ 550 N/mm²	CuZn36Pb3 (Ms58)	EN CW 603 N
	2.4	Kupfer-Aluminium-Legierungen (Alubronze, langspanend)	Copper-aluminium alloys (alu bronze, long-chipping)	≤ 800 N/mm²	CuAl10Ni5Fe4	EN CW 307 G
	2.5	Kupfer-Zinn-Legierungen (Zinnbronze, langspanend)	Copper-tin alloys (tin bronze, long-chipping)	≤ 700 N/mm²	CuSn8P	EN CW 459 K
	2.6	Kupfer-Zinn-Legierungen (Zinnbronze, kurzspanend)	Copper-tin alloys (tin bronze, short-chipping)	≤ 400 N/mm²	CuSn7ZnPb (Rg7)	2.1090
	2.7	Kupfer-Sonderlegierungen	Special copper alloys	≤ 600 N/mm²	(AMPCO® 8)	
	2.8			≤ 1400 N/mm²	(AMPCO® 45)	
		Magnesium-Legierungen	**Magnesium alloys**			
	3.1	Magnesium-Knetlegierungen	Magnesium wrought alloys	≤ 500 N/mm²	MgAl6Zn	3.5612
	3.2	Magnesium-Gusslegierungen	Magnesium cast alloys	≤ 500 N/mm²	EN-MCMgAl9Zn1	EN-MC21120
		Kunststoffe	**Synthetics**			
	4.1	Duroplaste (kurzspanend)	Duroplastics (short-chipping)		Bakelit, Pertinax	
	4.2	Thermoplaste (langspanend)	Thermoplastics (long-chipping)		PMMA, POM, PVC	
	4.3	Faserverstärkte Kunststoffe (Faseranteil ≤ 30%)	Fibre-reinforced synthetics (fibre content ≤ 30%)		GFK, CFK, AFK	
	4.4	Faserverstärkte Kunststoffe (Faseranteil > 30%)	Fibre-reinforced synthetics (fibre content > 30%)		GFK, CFK, AFK	
		Besondere Werkstoffe	**Special materials**			
	5.1	Grafit	Graphite		C 8000	
	5.2	Wolfram-Kupfer-Legierungen	Tungsten-copper alloys		W-Cu 80/20	
	5.3	Verbundwerkstoffe	Composite materials		Hylite, Alucobond	
S		**Spezialwerkstoffe**	**Special materials**			
		Titan-Legierungen	**Titanium alloys**			
	1.1	Reintitan	Pure titanium	≤ 450 N/mm²	Ti1	3.7025
	1.2	Titan-Legierungen	Titanium alloys	≤ 900 N/mm²	TiAl6V4	3.7165
	1.3			≤ 1250 N/mm²	TiAl4Mo4Sn2	3.7185
		Nickel-, Kobalt- und Eisen-Legierungen	**Nickel alloys, cobalt alloys and iron alloys**			
	2.1	Reinnickel	Pure nickel	≤ 600 N/mm²	Ni 99,6	2.4060
	2.2	Nickel-Basis-Legierungen	Nickel-base alloys	≤ 1000 N/mm²	Monel 400	2.4360
	2.3			≤ 1600 N/mm²	Inconel 718	2.4668
	2.4	Kobalt-Basis-Legierungen	Cobalt-base alloys	≤ 1000 N/mm²	Udimet 605	
	2.5			≤ 1600 N/mm²	Haynes 25	2.4964
	2.6	Eisen-Basis-Legierungen	Iron-base alloys	≤ 1500 N/mm²	Incoloy 800	1.4958
H		**Harte Werkstoffe**	**Hard materials**			
	1.1	Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	44 - 50 HRC	Weldox 1100	
	1.2			50 - 55 HRC	Hardox 550	
	1.3			55 - 60 HRC	Armox 600T	
	1.4			60 - 63 HRC	Ferro-Titanit	
	1.5			63 - 66 HRC	HSSE	

	NC-Entgratfräser NC deburring end mills			Gravierstichel Engraving stylus	Kegelsenker Countersinks					
	HM	HM		HM	HM		HSS			
										
	Allround									
	N	N			90°			60°		
	ø5,7 - 7,7 mm	ø4 - 12 mm 60° / 90°	ø4 - 12 mm 60° / 90°	ø3 - 8 mm 60° / 90°	ø10 - 31 mm	ø4,3 - 31 mm	ø4,3 - 31 mm	ø6,3 - 25 mm	ø6,3 - 25 mm	
	4	4	4	1	3	3	3	3	3	Z (Flutes)
	1700L	**1715**	**1715A**	**1710**	**7581**	**7560**	**7560T**	**7550**	**7550T**	
	4	6	6	8	10	11	11	11	11	Seite · Page
	5	7	7	9	12	12	12	12	12	v_c / f_z
	■	■	■	■	■	■	■	■	■	1.1 P
	■	■	■	■	■	■	■	■	■	2.1
	■	■	■	■	■	□	■	□	■	3.1
	■	□	■	□	■		□		□	4.1
	■	□	■	□	□					5.1
	■	□	■	□	□	□	□	□	□	1.1 M
	■	□	■	□	□	□	□	□	□	2.1
	■	□	■	□	□					3.1
	■		■							4.1
	■	■	■	■	■	■	■	■	■	1.1 K
	■	■	■	■	■	■	■	■	■	1.2
	■	■	■	■	■	■	■	■	■	2.1
	■	□	■	□	□	□	□	□	□	2.2
	■	□	■	□	□	□	□	□	□	3.1
	■	□	■	□	□					3.2
	■	■	■	■	■	□	□	□	□	4.1
	■	□	■	□	□	□	□	□	□	4.2
	■	□	■	□		□	□	□	□	1.1 N
	■	□	■	□	□	□	□	□	□	1.2
	■	□	■	□	□	□	□	□	□	1.3
	■	□	■	□	□	□	□	□	□	1.4
	□	□	□	□	□	□	□	□	□	1.5
	□	□	□	□	□					1.6
	■	□	■	□	□	□	□	□	□	2.1
	■	□	■	□	□	□	□	□	□	2.2
	■	□	■	□	□	□	□	□	□	2.3
	■	□	■	□	□	□	□	□	□	2.4
	■	□	■	□	□	□	□	□	□	2.5
	■	□	■	□	□	□	□	□	□	2.6
	■	□	■	□	□					2.7
	■		■							2.8
	□	□	□	□	□	□	□	□	□	3.1
	□	□	□	□	□	□	□	□	□	3.2
	□	□	□	□	□	□	□	□	□	4.1
	□	□	□	□	□	□	□	□	□	4.2
	□		□							4.3
	□		□							4.4
	■		■							5.1
	■	□	■	□	□					5.2
										5.3
	■	□	■	□	□	□	□	□	□	1.1 S
	■	□	■	□	□					1.2
	■		■							1.3
	□	□	□	□	□					2.1
	□	□	□	□	□					2.2
	□		□							2.3
	□		□							2.4
	□		□							2.5
	□		□							2.6
										1.1 H
										1.2
										1.3
										1.4
										1.5

■ = sehr gut geeignet · very suitable
□ = gut geeignet · suitable

Hartmetall-Frässtifte
Carbide burrs

ZYA	WCR
ø3 - 12 mm	ø3 - 12 mm
1721 - 1726	**1731 - 1736**
14	14

TRE	KUD
ø3 - 12 mm	ø3 - 16 mm
1741 - 1746	**1751 - 1756**
14	14

SKM	KEL
ø3 - 12 mm	ø3 - 12 mm
1761 - 1766	**1771 - 1776**
15	15

SPG	RBF
ø3 - 12 mm	ø3 - 16 mm
1781 - 1786	**1791 - 1796**
15	15

- Multifunktionales Werkzeug
- 3 unterschiedliche Einsatzlängen
- Mit 4 Schneiden
- Anfaswinkel 45°

- Multi-functional tool
- 3 different machining lengths
- With 4 flutes
- Chamfering angle 45°

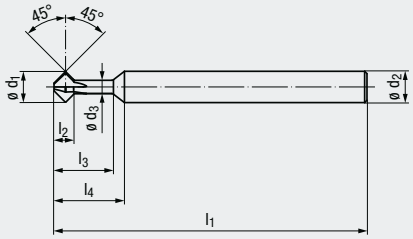
N

HM

DIN 6535 HA HB

0°

Zum vorder- und rückseitigen Anfasen von Kanten, Nuten und Bohrungen
For front and back deburring of edges, grooves and drill holes



Allround

Beschichtung · Coating

ALCR

Einsatzgebiete – Material (siehe Seite 2)

- In fast allen Werkstoffen einsetzbar
- Für Materialien mit einer Zugfestigkeit bis 1400 N/mm²

Applications – material (see page 2)

- For almost all materials
- For materials with a tensile strength of up to 1400 N/mm²

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.1-1.4	1.5-1.6
N	2.1-2.8, 5.1-5.2	
N		3.1-4.4
S	1.1-1.3	2.1-2.6

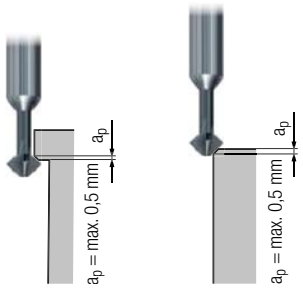
Lange Ausführung · Long design

Bestell-Code · Order code — **1700L**

ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h6	Z (Flutes)	Dimens.-Code	
5,7	3,3	10	68	2,8	12	6	**4**	**.05710A**	●
5,7	3,3	20	68	2,8	22	6	**4**	**.05720A**	●
5,7	3,3	30	68	2,8	32	6	**4**	**.05730A**	●
7,7	5	15	80	3,4	18	8	**4**	**.07715A**	●
7,7	5	25	80	3,4	28	8	**4**	**.07725A**	●
7,7	5	35	80	3,4	38	8	**4**	**.07735A**	●

Hartmetall-NC-Entgratfräser – lange Ausführung
Solid carbide NC deburring end mills – long design

N



Gültig für · Valid for
1700L

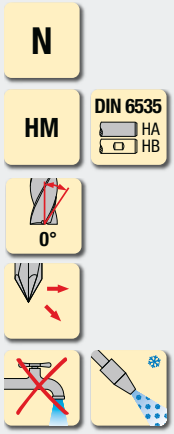
		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]			MMS MQL	
P	**1.1**	80	0,004 x d_1	72	0,004 x d_1	64	0,004 x d_1	□	■	□	■
	2.1	70	0,004 x d_1	63	0,004 x d_1	56	0,004 x d_1	□	■	□	■
	3.1	60	0,003 x d_1	54	0,003 x d_1	48	0,003 x d_1	□	■	□	■
	4.1	50	0,003 x d_1	45	0,003 x d_1	40	0,003 x d_1	□	■		
	5.1	40	0,002 x d_1	36	0,002 x d_1	32	0,002 x d_1	□	■		
M	**1.1**	60	0,002 x d_1	54	0,002 x d_1	48	0,002 x d_1			□	■
	2.1	50	0,002 x d_1	45	0,002 x d_1	40	0,002 x d_1			□	■
	3.1	40	0,002 x d_1	36	0,002 x d_1	32	0,002 x d_1			□	■
	4.1	30	0,002 x d_1	27	0,002 x d_1	24	0,002 x d_1			□	■
K	**1.1**	70	0,004 x d_1	63	0,004 x d_1	56	0,004 x d_1	□	■		
	1.2	70	0,004 x d_1	63	0,004 x d_1	56	0,004 x d_1	□	■		
	2.1	60	0,003 x d_1	54	0,003 x d_1	48	0,003 x d_1	□	■		
	2.2	60	0,003 x d_1	54	0,003 x d_1	48	0,003 x d_1	□	■		
	3.1	50	0,002 x d_1	45	0,002 x d_1	40	0,002 x d_1	□	■		
	3.2	50	0,002 x d_1	45	0,002 x d_1	40	0,002 x d_1	□	■		
	4.1	40	0,002 x d_1	36	0,002 x d_1	32	0,002 x d_1	□	■		
	4.2	30	0,002 x d_1	27	0,002 x d_1	24	0,002 x d_1	□	■		
N	**1.1**	120	0,005 x d_1	108	0,005 x d_1	96	0,005 x d_1			□	■
	1.2	120	0,005 x d_1	108	0,005 x d_1	96	0,005 x d_1			□	■
	1.3	120	0,005 x d_1	108	0,005 x d_1	96	0,005 x d_1			□	■
	1.4	80	0,004 x d_1	72	0,004 x d_1	64	0,004 x d_1			□	■
	1.5	70	0,004 x d_1	63	0,004 x d_1	56	0,004 x d_1			□	■
	1.6	60	0,004 x d_1	54	0,004 x d_1	48	0,004 x d_1			□	■
	2.1	70	0,004 x d_1	63	0,004 x d_1	56	0,004 x d_1			□	■
	2.2	60	0,004 x d_1	54	0,004 x d_1	48	0,004 x d_1			□	■
	2.3	70	0,004 x d_1	63	0,004 x d_1	56	0,004 x d_1		□	□	■
	2.4	60	0,004 x d_1	54	0,004 x d_1	48	0,004 x d_1			□	■
	2.5	60	0,004 x d_1	54	0,004 x d_1	48	0,004 x d_1			□	■
	2.6	70	0,004 x d_1	63	0,004 x d_1	56	0,004 x d_1		□	□	■
	2.7	50	0,003 x d_1	45	0,003 x d_1	40	0,003 x d_1			□	■
	2.8	40	0,003 x d_1	36	0,003 x d_1	32	0,003 x d_1			□	■
	3.1	120	0,004 x d_1	108	0,004 x d_1	96	0,004 x d_1			□	■
	3.2	80	0,003 x d_1	72	0,003 x d_1	64	0,003 x d_1			□	■
	4.1	150	0,004 x d_1	135	0,004 x d_1	120	0,004 x d_1		□	□	■
	4.2	100	0,004 x d_1	90	0,004 x d_1	80	0,004 x d_1			□	■
	4.3	80	0,004 x d_1	72	0,004 x d_1	64	0,004 x d_1	■	■		□
	4.4	60	0,004 x d_1	54	0,004 x d_1	48	0,004 x d_1	■	■		□
	5.1	120	0,005 x d_1	108	0,005 x d_1	96	0,005 x d_1	□	□		■
	5.2	60	0,003 x d_1	54	0,003 x d_1	48	0,003 x d_1			□	■
	5.3										
S	**1.1**	50	0,003 x d_1	45	0,003 x d_1	40	0,003 x d_1				■
	1.2	40	0,002 x d_1	36	0,002 x d_1	32	0,002 x d_1				■
	1.3	30	0,002 x d_1	27	0,002 x d_1	24	0,002 x d_1				■
	2.1	50	0,003 x d_1	45	0,003 x d_1	40	0,003 x d_1				■
	2.2	30	0,002 x d_1	27	0,002 x d_1	24	0,002 x d_1				■
	2.3	20	0,002 x d_1	18	0,002 x d_1	16	0,002 x d_1				■
	2.4	30	0,002 x d_1	27	0,002 x d_1	24	0,002 x d_1				■
	2.5	20	0,002 x d_1	18	0,002 x d_1	16	0,002 x d_1				■
	2.6	30	0,002 x d_1	27	0,002 x d_1	24	0,002 x d_1				■
H	**1.1**										
	1.2										
	1.3										
	1.4										
	1.5										

■ = sehr gut geeignet · very suitable
□ = gut geeignet · suitable

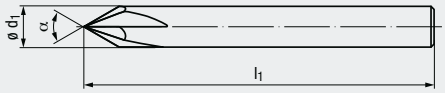
v_c = Schnittgeschwindigkeit · Cutting speed
f_z = Vorschub pro Zahn · Feed per tooth

- Multifunktionales Werkzeug
- Mit 4 Schneiden
- Konuswinkel 60° und 90°

- Multi-functional tool
- With 4 flutes
- Taper angle 60° or 90°



Zum Anfasen von Kanten und Nuten
For chamfering edges and slots



Allround

Allround

Beschichtung · Coating

TIALN

Einsatzgebiete – Material (siehe Seite 2)

- In fast allen Werkstoffen einsetzbar
- Für Materialien mit einer Zugfestigkeit bis 1400 N/mm²

Applications – material (see page 2)

- For almost all materials
- For materials with a tensile strength of up to 1400 N/mm²

	1715	1715A
P	1.1-3.1, 4.1-5.1	1.1-5.1
M	1.1-3.1	1.1-4.1
K	1.1-2.1, 2.2-3.2	1.1-4.2
K	4.1, 4.2	
N	1.1-2.7	1.1-1.4, 1.5-1.6
N	3.1-4.2, 5.2	2.1-2.8, 5.1-5.2
N		3.1-4.4
S	1.1-1.2, 2.1-2.2	1.1-1.3, 2.1-2.6

Bestell-Code · Order code					1715		1715A	
α	ø d_1 h6	l_1	Z (Flutes)	**Dimens.-Code**				
60°	**4**	54	**4**	**.06004**	●		●	
	6	54	**4**	**.06006**	●		●	
	8	58	**4**	**.06008**	●		●	
	10	66	**4**	**.06010**	●		●	
	12	73	**4**	**.06012**	●		●	
90°	**4**	54	**4**	**.09004**	●		●	
	6	54	**4**	**.09006**	●		●	
	8	58	**4**	**.09008**	●		●	
	10	66	**4**	**.09010**	●		●	
	12	73	**4**	**.09012**	●		●	

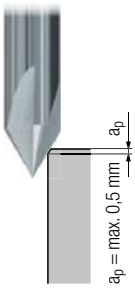
● = Lagerwerkzeug, siehe Preisliste · Stock tool, see price list

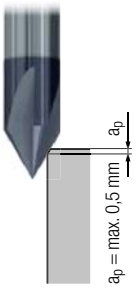
Bestell-Beispiel · Ordering example: **1715.06004**

Hartmetall-NC-Entgratfräser
Solid carbide NC deburring end mills

N

Gültig für · Valid for
1715
1715A





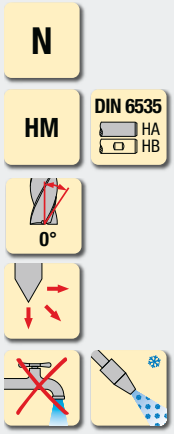
		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]			MMS MQL	
P	**1.1**	160	0,004 x d_1	240	0,004 x d_1	□	■	□	■
	2.1	140	0,004 x d_1	210	0,004 x d_1	□	■	□	■
	3.1	120	0,003 x d_1	180	0,003 x d_1	□	■	□	■
	4.1	100	0,003 x d_1	150	0,003 x d_1	□	■		
	5.1	80	0,002 x d_1	120	0,002 x d_1	□	■		
M	**1.1**	120	0,002 x d_1	180	0,002 x d_1			□	■
	2.1	100	0,002 x d_1	150	0,002 x d_1			□	■
	3.1	80	0,002 x d_1	120	0,002 x d_1			□	■
	4.1			90	0,002 x d_1			□	■
K	**1.1**	140	0,004 x d_1	210	0,004 x d_1	□	■		
	1.2	140	0,004 x d_1	210	0,004 x d_1	□	■		
	2.1	120	0,003 x d_1	180	0,003 x d_1	□	■		
	2.2	120	0,003 x d_1	180	0,003 x d_1	□	■		
	3.1	100	0,002 x d_1	150	0,002 x d_1	□	■		
	3.2	100	0,002 x d_1	150	0,002 x d_1	□	■		
	4.1	80	0,002 x d_1	120	0,002 x d_1	□	■		
	4.2	60	0,002 x d_1	90	0,002 x d_1	□	■		
N	**1.1**	240	0,005 x d_1	360	0,005 x d_1			□	■
	1.2	240	0,005 x d_1	360	0,005 x d_1			□	■
	1.3	240	0,005 x d_1	360	0,005 x d_1			□	■
	1.4	160	0,004 x d_1	240	0,004 x d_1			□	■
	1.5	140	0,004 x d_1	210	0,004 x d_1			□	■
	1.6	120	0,004 x d_1	180	0,004 x d_1			□	■
	2.1	140	0,004 x d_1	210	0,004 x d_1			□	■
	2.2	120	0,004 x d_1	180	0,004 x d_1			□	■
	2.3	140	0,004 x d_1	210	0,004 x d_1		□	□	■
	2.4	120	0,004 x d_1	180	0,004 x d_1			□	■
	2.5	120	0,004 x d_1	180	0,004 x d_1			□	■
	2.6	140	0,004 x d_1	210	0,004 x d_1		□	□	■
	2.7	100	0,003 x d_1	150	0,003 x d_1			□	■
	2.8			120	0,003 x d_1			□	■
	3.1	240	0,004 x d_1	360	0,004 x d_1			□	■
	3.2	160	0,003 x d_1	240	0,003 x d_1			□	■
	4.1	300	0,004 x d_1	450	0,004 x d_1		□	□	■
	4.2	200	0,004 x d_1	300	0,004 x d_1			□	■
	4.3			240	0,004 x d_1	■	■		□
	4.4			180	0,004 x d_1	■	■		□
	5.1			360	0,005 x d_1	□	□		■
	5.2	120	0,003 x d_1	180	0,003 x d_1			□	■
	5.3								
S	**1.1**	100	0,003 x d_1	150	0,003 x d_1				■
	1.2	80	0,002 x d_1	120	0,002 x d_1				■
	1.3			90	0,002 x d_1				■
	2.1	100	0,003 x d_1	150	0,003 x d_1				■
	2.2	60	0,002 x d_1	90	0,002 x d_1				■
	2.3			60	0,002 x d_1				■
	2.4			90	0,002 x d_1				■
	2.5			60	0,002 x d_1				■
	2.6			90	0,002 x d_1				■
H	**1.1**								
	1.2								
	1.3								
	1.4								
	1.5								

■ = sehr gut geeignet · very suitable
□ = gut geeignet · suitable

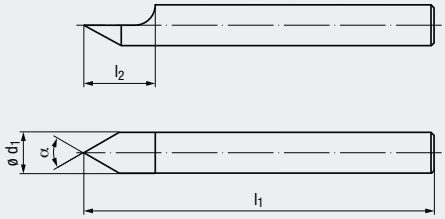
v_c = Schnittgeschwindigkeit · Cutting speed
f_z = Vorschub pro Zahn · Feed per tooth

- Multifunktionales Werkzeug
- Mit 1 Schneide
- Konuswinkel 60° und 90°

- Multi-functional tool
- With 1 effective cutting edge
- Taper angle 60° or 90°



Zum Gravieren von Schriftzügen
For engraving letter markings



Allround

Einsatzgebiete – Material (siehe Seite 2)

- In fast allen Werkstoffen einsetzbar
- Für Materialien mit einer Zugfestigkeit bis 1400 N/mm²

Applications – material (see page 2)

- For almost all materials
- For materials with a tensile strength of up to 1400 N/mm²

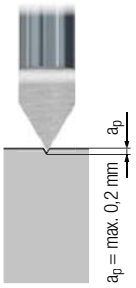
P	**1.1-3.1**	4.1-5.1
M		1.1-3.1
K	**1.1-2.1**	2.2-3.2
K	**4.1**	4.2
N		1.1-2.7
N		3.1-4.2, 5.2
S		1.1-1.2, 2.1-2.2

Bestell-Code · Order code

α	ø d_1 h6	l_2	l_1	Z (Flutes)	Dimens.-Code	**1710**			
60°	**3**	4	50	**1**	**.06003**	●			
	4	5	55	**1**	**.06004**	●			
	5	6	62	**1**	**.06005**	●			
	6	7	66	**1**	**.06006**	●			
	8	9	79	**1**	**.06008**	●			
90°	**3**	4	50	**1**	**.09003**	●			
	4	5	55	**1**	**.09004**	●			
	5	6	62	**1**	**.09005**	●			
	6	7	66	**1**	**.09006**	●			
	8	9	79	**1**	**.09008**	●			

Hartmetall-Gravierstichel
Solid carbide engraving stylus

N



Gültig für · Valid for
1710

		v_c [m/min]	f_z [mm]			MMS MQL	
P	**1.1**	200	0,004 x d_1	□	■	□	■
	2.1	175	0,004 x d_1	□	■	□	■
	3.1	150	0,003 x d_1	□	■	□	■
	4.1	125	0,003 x d_1	□	■		
	5.1	100	0,002 x d_1	□	■		
M	**1.1**	150	0,002 x d_1			□	■
	2.1	125	0,002 x d_1			□	■
	3.1	100	0,002 x d_1			□	■
	4.1						
K	**1.1**	175	0,004 x d_1	□	■		
	1.2	175	0,004 x d_1	□	■		
	2.1	150	0,003 x d_1	□	■		
	2.2	150	0,003 x d_1	□	■		
	3.1	125	0,002 x d_1	□	■		
	3.2	125	0,002 x d_1	□	■		
	4.1	100	0,002 x d_1	□	■		
	4.2	75	0,002 x d_1	□	■		
N	**1.1**	300	0,005 x d_1			□	■
	1.2	300	0,005 x d_1			□	■
	1.3	300	0,005 x d_1			□	■
	1.4	280	0,004 x d_1			□	■
	1.5	175	0,004 x d_1			□	■
	1.6	150	0,004 x d_1			□	■
	2.1	175	0,004 x d_1			□	■
	2.2	150	0,004 x d_1			□	■
	2.3	175	0,004 x d_1		□	□	■
	2.4	150	0,004 x d_1			□	■
	2.5	150	0,004 x d_1			□	■
	2.6	175	0,004 x d_1		□	□	■
	2.7	125	0,003 x d_1			□	■
	2.8						
	3.1	300	0,004 x d_1			□	■
	3.2	200	0,003 x d_1			□	■
	4.1	375	0,004 x d_1		□	□	■
	4.2	250	0,004 x d_1			□	■
	4.3						
	4.4						
	5.1						
	5.2	150	0,003 x d_1				■
	5.3						
S	**1.1**	125	0,003 x d_1				■
	1.2	100	0,002 x d_1				■
	1.3						
	2.1	125	0,003 x d_1				■
	2.2	75	0,002 x d_1				■
	2.3						
	2.4						
	2.5						
	2.6						
H	**1.1**						
	1.2						
	1.3						
	1.4						
	1.5						

■ = sehr gut geeignet · very suitable
□ = gut geeignet · suitable

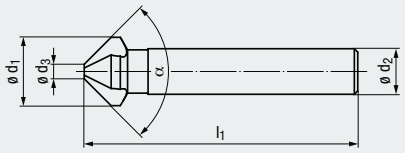
v_c = Schnittgeschwindigkeit · Cutting speed
f_z = Vorschub pro Zahn · Feed per tooth

- Mit angelötetem Hartmetall-Kopf
- Am Umfang radial und axial hinterschliffen
- Komplett geschliffene Nuten

- With brazed carbide head
- Circumference radially and axially relieved
- Fully ground flutes

90° | **HM** | v_c/f 12

Zum Entgraten und Ansenken von Bohrungen und Kernlöchern
For deburring and counterboring drilled holes and tap holes



Allround

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 2)

- In fast allen Werkstoffen einsetzbar
- Für Materialien mit einer Zugfestigkeit bis 1400 N/mm²
- Senkungen für Schraubenköpfe

Applications – material (see page 2)

- For almost all materials
- For materials with a tensile strength of up to 1400 N/mm²
- Countersink for screw heads

P	**1.1-4.1**	5.1
M		1.1-3.1
K	**1.1-2.1**	2.2-3.2
K	**4.1**	4.2
N		1.2-2.7
N		3.1-4.2, 5.2
S		1.1-1.2, 2.1-2.2

≈ DIN 335 C

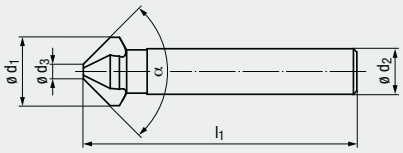
Bestell-Code · Order code							**7581**			
α	ø d_1	ø d_3	l_1	ø d_2 h9	Z (Flutes)	**Dimens.-Code**				
90°	10	2,5	46	8	**3**	**.09010**	●			
	10,4	2,5	46	8	**3**	**.090104**	●			
	11,5	2,8	56	8	**3**	**.090115**	●			
	12,4	2,8	56	8	**3**	**.090124**	●			
	15	3,2	60	10	**3**	**.09015**	●			
	16,5	3,2	60	10	**3**	**.090165**	●			
	20,5	3,5	63	10	**3**	**.090205**	●			
	25	3,8	67	10	**3**	**.09025**	●			
	31	4,2	71	12	**3**	**.09031**	●			

- Am Umfang radial und axial hinterschliffen
- Komplett geschliffene Nuten

- Circumference radially and axially relieved
- Fully ground flutes

90° 60° HSS v_c/f 12

Zum Entgraten und Ansenken von Bohrungen und Kernlöchern
For deburring and counterboring drilled holes and tap holes



Allround | **Allround**

Beschichtung · Coating | TIN

Einsatzgebiete – Material (siehe Seite 2)

- In fast allen Werkstoffen einsetzbar
- Für Materialien mit einer Zugfestigkeit bis 1000 N/mm², mit TIN-Beschichtung bis 1200 N/mm²
- Senkungen für Schraubenköpfe

Applications – material (see page 2)

- For almost all materials
- For materials with a tensile strength of up to 1000 N/mm², with TIN coating of up to 1200 N/mm²
- Countersink for screw heads

	7560	TIN 7560T
P	1.1-2.1 / 3.1	1.1-3.1 / 4.1
M	1.1-2.1	1.1-2.1
K	1.1-2.1 / 2.2-3.1	1.1-2.1 / 2.2-3.1
K	4.1-4.2	4.1-4.2
N	1.1-1.5, 2.1-2.6	1.1-1.5, 2.1-2.6
N	3.1-4.2	3.1-4.2
S	1.1	1.1

DIN 335 C

Bestell-Code · Order code							7560		7560T	
α	ø d_1	ø d_3	l_1	ø d_2 h9	Z (Flutes)	Dimens.-Code				
90°	4,3	1,3	40	4	3	.090043	●		●	
	5	1,5	40	4	3	.09005	●		●	
	5,3	1,5	40	4	3	.090053	●		●	
	5,8	1,5	45	5	3	.090058	●		●	
	6	1,5	45	5	3	.09006	●		●	
	6,3	1,5	45	5	3	.090063	●		●	
	7	1,8	50	6	3	.09007	●		●	
	7,3	1,8	50	6	3	.090073	●		●	
	8	2	50	6	3	.09008	●		●	
	8,3	2	50	6	3	.090083	●		●	
	9,4	2,2	50	6	3	.090094	●		●	
	10	2,5	50	6	3	.09010	●		●	
	10,4	2,5	50	6	3	.090104	●		●	
	11,5	2,8	56	8	3	.090115	●		●	
	12,4	2,8	56	8	3	.090124	●		●	
	13,4	2,9	56	8	3	.090134	●		●	
	15	3,2	60	10	3	.09015	●		●	
	16,5	3,2	60	10	3	.090165	●		●	
	19	3,5	63	10	3	.09019	●		●	
	20,5	3,5	63	10	3	.090205	●		●	
	23	3,8	67	10	3	.09023	●		●	
	25	3,8	67	10	3	.09025	●		●	
	28	4	71	12	3	.09028	●		●	
	31	4,2	71	12	3	.09031	●		●	

DIN 334 C

Bestell-Code · Order code								7550		7550T
α	ø d_1	ø d_3	l_1	ø d_2 h9	Z (Flutes)	Dimens.-Code				
60°	6,3	1,6	45	5	3	.060063		●		●
	8	2	50	6	3	.06008		●		●
	12,5	3,2	56	8	3	.060125		●		●
	16	4	63	10	3	.06016		●		●
	20	5	67	10	3	.06020		●		●
	25	6,3	71	10	3	.06025		●		●

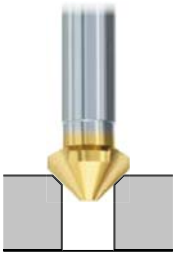
● = Lagerwerkzeug, siehe Preisliste · Stock tool, see price list

Kegelsenker 60° und 90°
Countersinks 60° and 90°

Gültig für · Valid for
7550 7560 7581
7550T 7560T

HM

HSS



		v_c [m/min] Unbeschichtet Uncoated	f [mm] 90°	v_c [m/min] Unbeschichtet Uncoated	v_c [m/min] TIN	f [mm] 60°, 90°	HM HSS-TIN		MMS MQL	HSS Unbesch. Uncoated
P	1.1	35	0,060	15	25	0,050	□	□	□	■
	2.1	25	0,060	12	15	0,050		□	□	■
	3.1	18	0,036	10	12	0,030			□	■
	4.1	12	0,036		8	0,030				■
	5.1	10	0,024							■
M	1.1	9	0,036	6	8	0,030				■
	2.1	8	0,036	4	6	0,030				■
	3.1	7	0,024							■
	4.1									
K	1.1	40	0,096	20	30	0,080	□	■	□	■
	1.2	30	0,096	15	20	0,080	□	■	□	■
	2.1	28	0,096	11	14	0,080		□	□	■
	2.2	20	0,096	10	12	0,080		□	□	■
	3.1	15	0,084	8	10	0,070			□	■
	3.2	12	0,084							■
	4.1	20	0,096	8	10	0,080		□	□	■
	4.2	18	0,096	7	9	0,080		□	□	■
N	1.1			40	50	0,060			□	■
	1.2	60	0,072	30	40	0,060			□	■
	1.3	50	0,072	25	30	0,060			□	■
	1.4	45	0,072	20	25	0,060			□	■
	1.5	30	0,072	15	20	0,060			□	■
	1.6	10	0,065							■
	2.1	45	0,096	25	30	0,080			□	■
	2.2	60	0,096	30	40	0,080			□	■
	2.3	80	0,096	35	55	0,080			□	■
	2.4	30	0,084	15	20	0,070			□	■
	2.5	45	0,084	20	30	0,070			□	■
	2.6	30	0,096	15	20	0,080			□	■
	2.7	15	0,078						□	■
	2.8									
	3.1	85	0,120	50	60	0,100	□	■		□
	3.2	75	0,120	45	50	0,100	□	■		□
	4.1	90	0,060	55	65	0,050	□	□	□	■
	4.2	100	0,060	60	70	0,050	□	□	□	■
	4.3									
	4.4									
	5.1									
	5.2	15	0,070							■
	5.3									
S	1.1	15	0,048	6	8	0,040				■
	1.2	10	0,048							■
	1.3									
	2.1	6	0,038							■
	2.2	5	0,033							■
	2.3									
	2.4									
	2.5									
	2.6									
H	1.1									
	1.2									
	1.3									
	1.4									
	1.5									

v_c = Schnittgeschwindigkeit · Cutting speed
f = Vorschub pro Umdrehung · Feed per revolution

Frässtifte der heutigen Fertigung sind Präzisionswerkzeuge. Diese sind in unserer modernen Industrie unentbehrlich und haben einen weit gezogenen Anwendungsbereich. Die zu bearbeitenden Materialien reichen von Aluminium über Bronze, Stahl, Guss bis zu gehärteten Stählen.

Wählen Sie bitte aus unserem Sortiment die für Ihre Bearbeitung optimale Ausführung.

Burrs as produced these days are precision tools: as such they are indispensable in our modern industry and ca be used for a wide range of applications. The materials to be machined cover everything from aluminium, bronze, steel and cast materials to hardened steels.

Please select the appropriate type for your application from our product range.

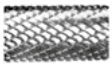
Ab Lager lieferbar:

Zahnung 3

Standard-Teilung

Besonders zur Bearbeitung von Stahl, Stahlguss und ähnlichen metallischen Werkstoffen geeignet. Bei optimaler Schnittleistung werden gute Oberflächen erreicht.

Zahnung 6



Kreuzverzahnt

Universal für alle metallischen Werkstoffe einzusetzen. Die spezielle Verzahnung sorgt für eine gute Spanunterbrechung, reduziert Vibrationen und erleichtert dadurch gezielten Handeinsatz.

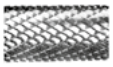
Available ex stock:

Toothing 3

Standard spacing

Suitable for machining steel, cast steel and similar metallic materials. Combines excellent cutting performance with good surface quality.

Toothing 6



Staggered teeth

For universal use with all metallic materials. The special toothing ensures good chip breaking, reduces vibrations and makes precise hand operation easier.

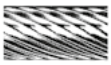
Auf Anfrage, mit kurzer Lieferzeit:

Zahnung 1

Besonders grobe Teilung

Geeignet, um Aluminium, Magnesium und Hartgummi zu bearbeiten. Große Spankammern verhindern, dass diese sich zusetzen.

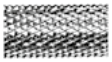
Zahnung 2



Grobe Teilung

Zur Bearbeitung von Bronze, Messing, Zink, Kupfer usw. geeignet.

Zahnung 4



Diamant-Verzahnung

Wird zur Bearbeitung von hochlegierten Stählen, Inox, Grauguss usw. eingesetzt. Die Verzahnung verhindert die Bildung von langen Spänen.

Zahnung 5

Feine Teilung

Eignet sich zur Bearbeitung von gehärteten Werkstoffen mit einer Härte bis ca. 65 HRC.

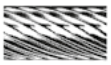
Upon request, with short delivery time:

Toothing 1

Extra coarse spacing

Suitable for machining aluminium, magnesium and hard rubber; large chip spaces prevent loading and clogging.

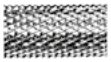
Toothing 2



Coarse spacing

Suitable for machining bronze, brass, zinc, copper etc.

Toothing 4



Diamond teeth

Suitable for machining high-alloyed steels, Inox, cast iron etc. The toothing prevents the formation of long chips.

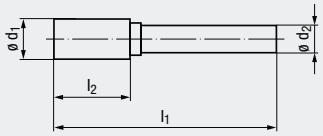
Toothing 5

Fine spacing

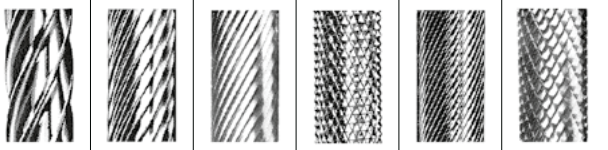
Suitable for machining hardened materials with a hardness of up to approximately 65 HRC.

- Zylinder-Form
- Ohne Stirnverzahnung [1)]
- Baumaße ≈ DIN 8033

- Cylindrical form
- Without cutting face [1)]
- Dimensions ≈ DIN 8033



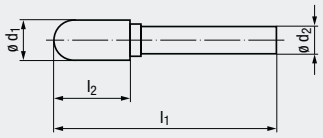
ZYA **HM**



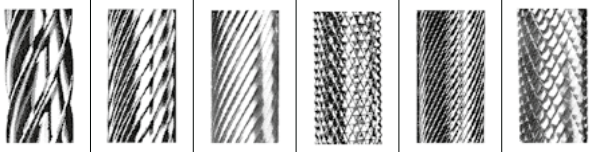
Zahnung · Toothing					1	2	3	4	5	6
Bestell-Code · Order code					**1721**	**1722**	**1723**	**1724**	**1725**	**1726**
ø d_1	l_2	l_1	ø d_2	**Dimens.-Code**						
3	14	40	3	**.003**	○	○	●	○	○	●
6	14	49	3	**.00603**	○	○	●	○	○	●
6	18	50	6	**.006**	○	○	●	○	○	●
8	18	63	6	**.008**	○	○	●	○	○	●
10	20	65	6	**.010**	○	○	●	○	○	●
12	25	70	6	**.012**	○	○	●	○	○	●

- Walzenrund-Form
- Baumaße ≈ DIN 8033

- Round nose form
- Dimensions ≈ DIN 8033



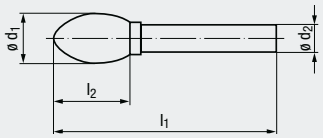
WRC **HM**



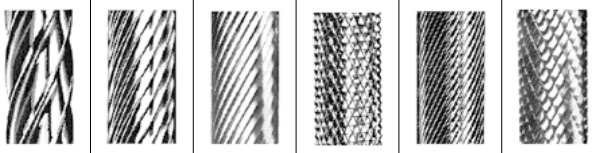
Zahnung · Toothing					1	2	3	4	5	6
Bestell-Code · Order code					**1731**	**1732**	**1733**	**1734**	**1735**	**1736**
ø d_1	l_2	l_1	ø d_2	**Dimens.-Code**						
3	14	40	3	**.003**	○	○	●	○	○	●
6	14	49	3	**.00603**	○	○	●	○	○	●
6	18	50	6	**.006**	○	○	●	○	○	●
8	18	63	6	**.008**	○	○	●	○	○	●
10	20	65	6	**.010**	○	○	●	○	○	●
12	25	70	6	**.012**	○	○	●	○	○	●

- Tropfen-Form
- Baumaße ≈ DIN 8033

- Oval form
- Dimensions ≈ DIN 8033



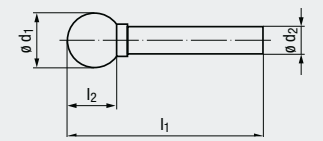
TRE **HM**



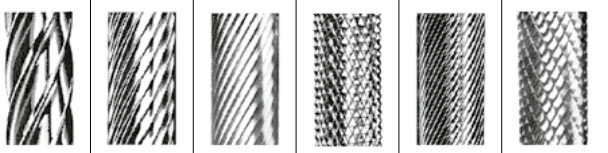
Zahnung · Toothing					1	2	3	4	5	6
Bestell-Code · Order code					**1741**	**1742**	**1743**	**1744**	**1745**	**1746**
ø d_1	l_2	l_1	ø d_2	**Dimens.-Code**						
3	5	40	3	**.003**	○	○	●	○	○	●
6	9	44	3	**.00603**	○	○	●	○	○	●
6	9	50	6	**.006**	○	○	●	○	○	●
8	14	59	6	**.008**	○	○	●	○	○	●
10	16	61	6	**.010**	○	○	●	○	○	●
12	21	66	6	**.012**	○	○	●	○	○	●

- Kugel-Form
- Baumaße ≈ DIN 8033

- Spherical form
- Dimensions ≈ DIN 8033



KUD **HM**



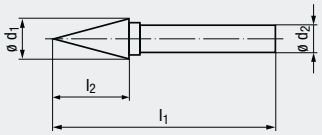
Zahnung · Toothing					1	2	3	4	5	6
Bestell-Code · Order code					**1751**	**1752**	**1753**	**1754**	**1755**	**1756**
ø d_1	l_2	l_1	ø d_2	**Dimens.-Code**						
3	2,5	40	3	**.003**	○	○	●	○	○	●
6	5	40	3	**.00603**	○	○	●	○	○	●
6	5	50	6	**.006**	○	○	●	○	○	●
10	9	54	6	**.010**	○	○	●	○	○	●
12	11	56	6	**.012**	○	○	●	○	○	●
16	15	60	6	**.016**	○	○	●	○	○	●

[1)] Mit Stirnverzahnung auf Anfrage lieferbar
With cutting face on request

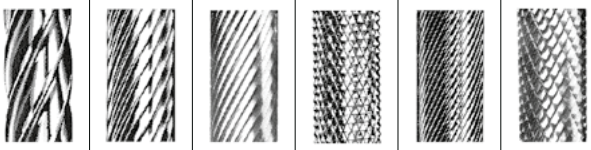
Bestell-Beispiel · Ordering example: **1723.003**

- Spitzkegel-Form
- Baumaße ≈ DIN 8033

- Conical pointed nose form
- Dimensions ≈ DIN 8033



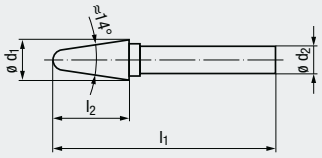
SKM HM



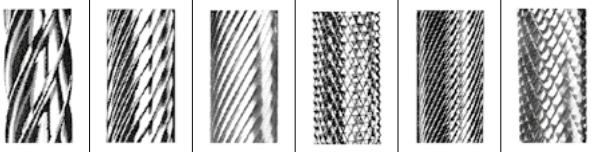
Zahnung · Toothing					1	2	3	4	5	6
Bestell-Code · Order code					**1761**	**1762**	**1763**	**1764**	**1765**	**1766**
ø d_1	l_2	l_1	ø d_2	**Dimens.-Code**						
3	14	40	3	**.003**	○	○	●	○	○	●
6	14	49	3	**.00603**	○	○	●	○	○	●
6	18	50	6	**.006**	○	○	●	○	○	●
12	20	65	6	**.012**	○	○	●	○	○	●

- Rundkegel-Form
- Baumaße ≈ DIN 8033

- Conical round nose form
- Dimensions ≈ DIN 8033



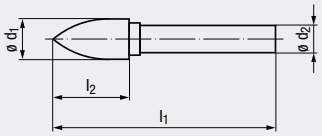
KEL HM



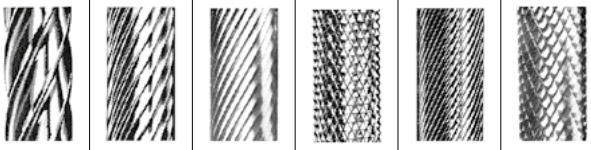
Zahnung · Toothing					1	2	3	4	5	6
Bestell-Code · Order code					**1771**	**1772**	**1773**	**1774**	**1775**	**1776**
ø d_1	l_2	l_1	ø d_2	**Dimens.-Code**						
3	14	40	3	**.003**	○	○	●	○	○	●
6	20	50	6	**.006**	○	○	●	○	○	●
8	24	69	6	**.008**	○	○	●	○	○	●
10	28	73	6	**.010**	○	○	●	○	○	●
12	30	75	6	**.012**	○	○	●	○	○	●

- Spitzbogen-Form
- Baumaße ≈ DIN 8033

- Arch pointed nose form
- Dimensions ≈ DIN 8033



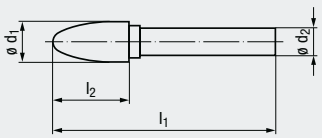
SPG HM



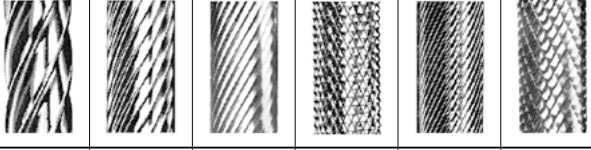
Zahnung · Toothing					1	2	3	4	5	6
Bestell-Code · Order code					**1781**	**1782**	**1783**	**1784**	**1785**	**1786**
ø d_1	l_2	l_1	ø d_2	**Dimens.-Code**						
3	14	40	3	**.003**	○	○	●	○	○	●
6	14	49	3	**.00603**	○	○	●	○	○	●
6	18	50	6	**.006**	○	○	●	○	○	●
8	16	61	6	**.008**	○	○	●	○	○	●
10	20	65	6	**.010**	○	○	●	○	○	●
12	25	70	6	**.012**	○	○	●	○	○	●

- Rundbogen-Form
- Baumaße ≈ DIN 8033

- Arch round nose form
- Dimensions ≈ DIN 8033

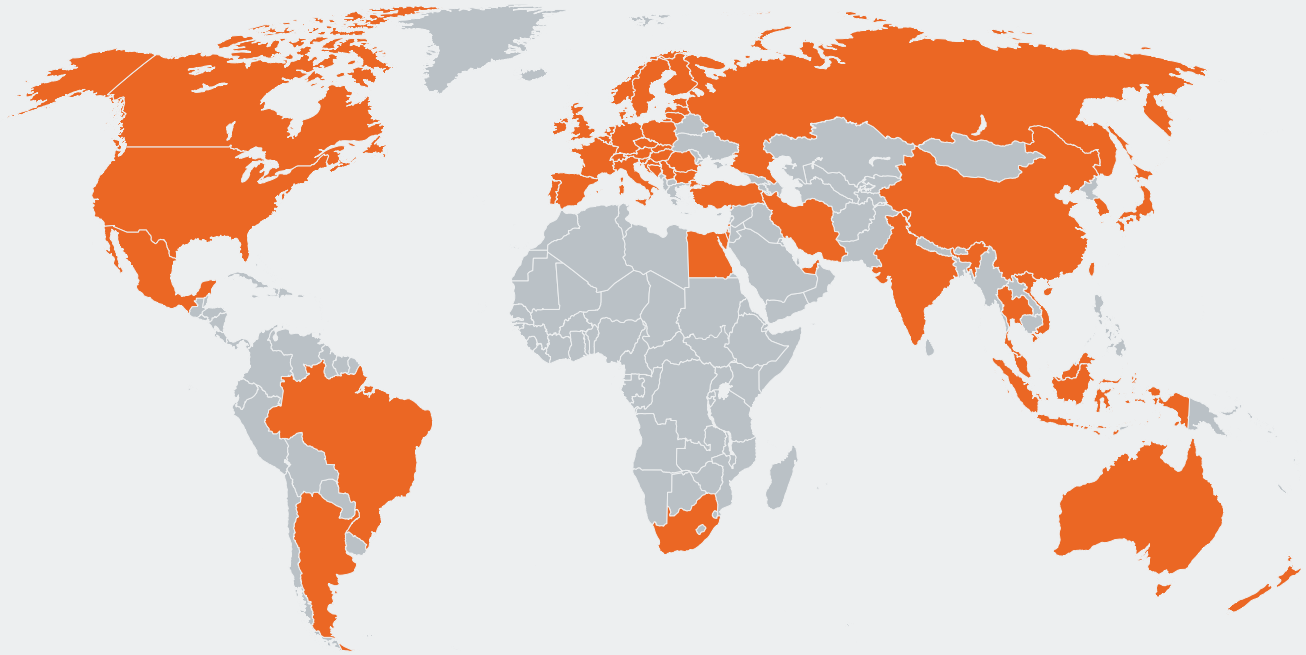


RBF HM



Zahnung · Toothing					1	2	3	4	5	6
Bestell-Code · Order code					**1791**	**1792**	**1793**	**1794**	**1795**	**1796**
ø d_1	l_2	l_1	ø d_2	**Dimens.-Code**						
3	14	40	3	**.003**	○	○	●	○	○	●
6	14	49	3	**.00603**	○	○	●	○	○	●
6	18	50	6	**.006**	○	○	●	○	○	●
8	16	61	6	**.008**	○	○	●	○	○	●
10	20	65	6	**.010**	○	○	●	○	○	●
12	25	70	6	**.012**	○	○	●	○	○	●
16	28	73	6	**.016**	○	○	●	○	○	●

● = Lagerwerkzeug, siehe Preisliste · Stock tool, see price list
○ = Kurzfristig lieferbar, Preis auf Anfrage · Available at short notice, price on request



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