

HARTMETALL-FRÄSSTIFTE + DRUCKLUFT GERADSCHLEIFER

Ähnlich DIN 8032

TUNGSTEN CARBIDE BURRS + PNEUMATIC STRAIGHT GRINDER

Similar DIN 8032



KONTAKT | CONTACT

KARNASCH ONLINE-WEBSHOP



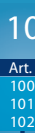
ONLINE



AUMENTO 15%

PROFESSIONAL TOOLS

Netto-Preise · Net sales prices



Art.
100
101
102

HP-3

Die am meisten verwendete Universalverzahnung ergibt:

The most widely used universal cutting style results:

Lagerartikel
Stockrange



318-331

- Hohe Zerspanleistung durch Kreuzverzahnung:
 - Ruhiger Lauf
 - Kurze Späne
- Für alle Stahlsorten wie:
 - Gusseisen
 - Stahl < 60 HRC
 - Edelstahl (INOX)
 - Nickelbasis- und Titanlegierungen
- Auch Kupfer, Messing, Bronze
- High cutting action through cross cutting style
 - smooth operation
 - short chips
- For use on all ferrous materials such as:
 - cast iron
 - steel < 60 HRC
 - stainless steel (INOX)
 - nickel basis and titanium alloy
- Also copper, brass, bronze

HP-2

Die am meisten verwendete Einfachverzahnung ergibt:

The most widely used simple cutting style results:

Lagerartikel
Stockrange



332-340

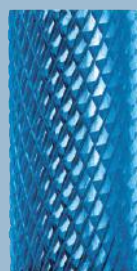
- Hohe Zerspanleistung mit guter Oberflächengüte
- Für alle Stahlsorten wie:
 - Gusseisen
 - Stahl < 60 HRC
 - Edelstahl (INOX)
 - Nickelbasis- und Titanlegierungen
- Auch Kupfer, Messing, Bronze
- High cutting action with good surface finish
- For use on all ferrous materials such as:
 - cast iron
 - steel < 60 HRC
 - stainless steel (INOX)
 - nickel basis and titanium alloy
- Also copper, brass, bronze

HP-4

Durch extra feine Kreuzverzahnung entsteht:

An extra fine cross cutting style results:

Lagerartikel
Stockrange



342-349

- Excellente Kontrolle (Auch an schwierig zugänglichen Stellen)
 - Ruhiger Lauf
 - Kurze Späne
 - Gute Oberflächengüte
- Mittlere Zerspanleistung
- Für alle Stahlsorten wie:
 - Bis zu extra harten Stählen ca. 70 HRC
 - Gusseisen
 - Edelstahl (INOX)
 - Hochwarmfeste Werkstoffe wie z.B. Nickel-Basis + Kobalt Basislegierungen
- Excellent control (also at difficult to reach positions)
 - smooth operation
 - Short chips
 - Good surface finish
- Medium cutting action
- For all kinds of steel:
 - Up to extra hard steel ca. 70 HRC
 - Cast iron
 - Stainless steel (INOX)
 - Heat-resistant substances, such as e.g. Nickel based + cobalt based alloys

HP-3

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM	WKN	KSJ	KSK
A	B	NEU NEW	C	D	E	F	G	H	L	M	N	J	K
													
320	321	323	324	325	326	327	328	329	329	330	330	331	331
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Zylinder- Radius Cylinder- Radius	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Winkel Inverted cone	Kegel 60° Countersink 60°	Kegel 90° Countersink 90°

HP-2

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM	WKN	KSJ	KSK
A	B	C	D	E	F	G	H	L	M	N	J	K
												
334	334	335	335	336	336	337	337	338	338	339	339	340
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Winkel Inverted cone	Kegel 60° Countersink 60°	Kegel 90° Countersink 90°

HP-4

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM	WKN
A	B	C	D	E	F	G	H	L	M	N
										
344	344	345	346	346	347	347	348	348	349	349
Zylinder Cylinder	Zylinder + Stirnverzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Winkel Inverted cone

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Art.
100
101
102

HP-7

Für grobe Zerspanung und höchsten Materialabtrag von:

For coarse cutting and highest material removal from:

Lagerartikel
Stockrange



350-357

- Alu-Legierungen
- Leichtmetalle
- Weiche Buntmetalle (NE-Metalle)
- Kunststoffe
- Faserverstärkte Kunststoffe GFK/CFK
- Aluminium alloy
- Light metals
- Soft copper and copper alloys (non-ferrous metals)
- Plastics
- Fibre-reinforced plastic (GFK/CFK)

HP-1

Extrem robuste Kreuzverzahnung ergibt:

Extremely robust cross cutting style results

Lagerartikel
Stockrange



358-365

- Schlagunempfindlichkeit (Zahnausbrüche, Abplatzungen, Kopfbrüche werden minimiert)
- Exzellente Kontrolle und Laufruhe
- Mittlere bis hohe Zerspanleistung
- Speziell für schwierigste Superlegierungen + Edelstähle wie: Titan, Inconel, Hastelloy, Waspaloy, Duplex, Amanox usw.
Anwendungsbeispiel: Bearbeitung von Flugzeug Turbinenschaufeln, Gasturbinen
- Impact resistance (tooth breakages, chipping, head breakages are minimised)
- Excellent control and quiet running
- Medium to high cutting action
- Especially for the most difficult super alloys + stainless steel, such as: Titanium, Inconel, Hastelloy, Waspaloy, Duplex, Amanox, etc.
Application example: Working aeroplane turbine blades, gas turbines

HP-5

Extrem feine Einfachverzahnung ergibt:

Extremely fine simple cutting style results:

Lagerartikel
Stockrange



366-372

- Exzellente Oberflächengüte
- Vorzugsweise für feines Entgraten von allen Stahlsorten wie:
 - Bis zu extra harten Stählen ca. 70 HRC
 - Gusseisen
 - Edelstahl (INOX)
 - Hochwarmfeste Werkstoffe wie z.B. Nickel-Basis + Kobalt-Basis + Kobalt-Basis Legierungen
- Excellent surface finish
- Preferred for fine deburring all ferrous materials, such as:
 - Up to extra hard steel ca. 70 HRC
 - Cast iron
 - Stainless steel (INOX)
 - Heat resistant substances, such as, e.g. Nickel based + cobalt based alloys



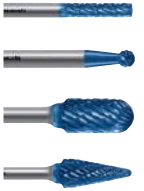
HP-7

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM	MINI-ALU
A	B	C	D	E	F	G	H	L	M	
	 									
352	352	353	353	354	354	355	355	356	356	357
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Minifrässtifte in feiner Aluverzahnung Mini-Burrs in Alu cutting style

HP-1

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM	Ø 3 + 6 mm
A	B	C	D	E	F	G	H	L	M	
	 									
360	360	361	361	362	362	363	363	364	364	365
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Ø 3+6 mm, Schaft 3mm, für Superlegierungen! Ø 3+6 mm, shank 3 mm, for super alloys!

HP-5

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM
A	B	C	D	E	F	G	H	L	M
	 								
368	368	369	369	370	370	371	371	372	372
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone

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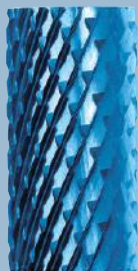
Art.
100
101
102

HP-6

Extrem grobe Kreuzverzahnung ergibt:

Extremely rough cross cutting style results:

Lagerartikel
Stockrange



374-380

- Extrem hoher Materialabtrag (Schruppen)
- Für alle Stahlsorten wie:
 - Gusseisen
 - Stahl < 60 HRC
- Auch für Kupfer, Messing, Bronze
- Für den harten Schruppeinsatz wie z.B. auf Werften, Giessereien entwickelt.
- Extremely fast metal removal (roughing)
- For all ferrous materials, such as:
 - Cast iron
 - Steel < 60 HRC
- Also for copper, brass, bronze
- Developed for use in tough roughing conditions, such as, e.g., on shipyards, foundries.

HP-9

Speziell für Edelstahl. Extrem hohe Zerspanleistung

Especially for stainless steel. Extremely high machining output.

Lagerartikel
Stockrange



382-388

- Extrem hohe Zerspanleistung und Standzeit für alle austenitischen, rost- und säurebeständigen Stähle.
- Hochwertige Oberflächengüte
- Keine Anlauffarben am Werkstück durch geringe Wärmeentwicklung
- Extremely high machining output and service life for all austenitic, rust- and acid-resilient steels.
- High-quality surface.
- No annealing colours at the workpiece due to low heat development.

HP-8

Speziell für Stahl und Stahlguss. Extrem hohe Zerspanleistung

Especially for steel and cast steel. Extremely high machining output

Lagerartikel
Stockrange



390-396

- Bis zu 60% höhere Zerspanleistung im Vergleich zu herkömmlichen Kreuzverzahnungen.
- Hohe Aggressivität erzeugt große Späne mit hervorragender Spanabfuhr.
- Keine Anlauffarben am Werkstück durch geringe Wärmeentwicklung
- Up to 60% higher machining output as compared to conventional cross cut.
- High aggressiveness produces large chips with outstanding chip removal.
- No annealing colours at the workpiece due to low heat development.



HP-6

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM
A	B	C	D	E	F	G	H	L	M
376	376	377	377	378	378	379	379	380	380
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone

HP-9

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM
A	B	C	D	E	F	G	H	L	M
384	384	385	385	386	386	387	387	388	388
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone

HP-8

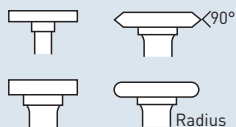
Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM
A	B	C	D	E	F	G	H	L	M
392	392	393	393	394	394	395	395	396	396
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone



Spezial-Rotierfräser · Special burrs

397-402



Scheibenform

397

RIM shape



Frässtifte für GFK/CFK

398

Fiberglass routers



Mini-Frässtifte Ø 1 + 1,5 mm

399

Mini-Burrs Ø 1 + 1,5 mm



Fräser + Bohrer für Schlüsseldienste

400-402

Burrs + drills for locksmiths

neu
new

Kombinations-Rotierfräser · Combination-burrs

403-424



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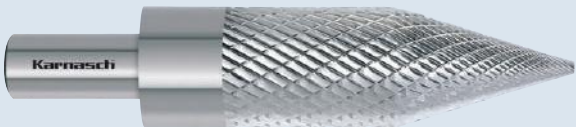


Art.
100
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Reifenreparatur · Tyre repairs

425-430



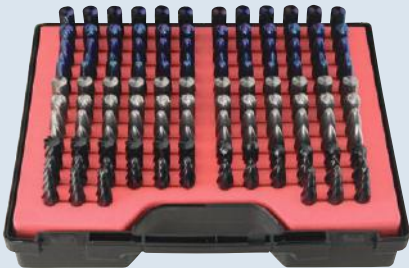
Druckluftgeradschleifer + Zubehör

431-459



Sets + Displays · Kits + Displays

460-473



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Technische Daten · Technical data

739



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Art.
100
101
102

HP-3

Die am meisten verwendete Universalverzahnung ergibt: The most widely used universal cutting style results:



- Hohe Zerspanleistung durch Kreuzverzahnung:
 - Ruhiger Lauf
 - Kurze Späne
 - Für alle Stahlsorten wie:
 - Gusseisen
 - Stahl < 60 HRC
 - Edelstahl (INOX)
 - Nickelbasis- und Titanlegierungen
 - Auch Kupfer, Messing, Bronze
- High cutting action through cross cutting style
 - smooth operation
 - short chips
 - For use on all ferrous materials such as:
 - cast iron
 - steel < 60 HRC
 - stainless steel (INOX)
 - nickel basis and titanium alloy
 - Also copper, brass, bronze

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	ZYB	WRC	KUD	TRE	RBF	SPG	–	KEL	SKM	WKN	KSJ	KSK
A	B	NEU NEW	C	D	E	F	G	H	L	M	N	J	K
320	321	323	324	325	326	327	328	329	329	330	330	331	331
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Zylinder- Radius Cylinder- Radius	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Winkel Inverted cone	Kegel 60° Countersink 60°	Kegel 90° Countersink 90°



BLUE-TEC-beschichtet
BLUE-TEC-coated



Für Frässtifte optimierte und patentierte BLUE-TEC-Beschichtung ergibt einzigartige Standzeiten und Performance in allen Stahlsorten.

Patented BLUE-TEC coating, specifically designed for burrs, gives outstanding tool life and excellent performance on all metals.

Werkstoffgruppen			Bearbeitung	Schnittgeschwindigkeit (m/min)
Stahl, Stahlguss	Ungehärtete, nicht vergütete Stähle bis 1200 N/mm ² (< 38 HRC)	Baustähle, Kohlenstoffstähle, Werkzeugstähle, unlegierte Stähle, Einsatzstähle, Stahlguss	Grobes Zerpanen mit hohem Materialabtrag	450–600
	Gehärtete, vergütete Stähle über 1200 N/mm ² (> 38 HRC)	Werkzeugstähle, Vergütungsstähle, legierte Stähle, Stahlguss		250–350
Edelstahl (INOX)	Rost- und säurebeständige Stähle	Austenitische und ferritische Edelstähle	Grobes Zerpanen mit hohem Materialabtrag	250–350
NE-Metalle	Harte NE-Metalle	Bronze, Titan/Titanlegierungen, harte Alu-Legierungen (hoher Si-Anteil)	Grobes Zerpanen mit hohem Materialabtrag	250–350
	Hochwarmfeste Werkstoffe	Nickelbasis- und Kobaltbasislegierungen (Triebwerk- und Turbinenbau)		300–450
Gusseisen	Graues Gusseisen, weißes Gusseisen	Gusseisen mit Lamellengraphit EN-GJL (GG), mit Kugelgraphit/Späroguss EN-GJS (GGG), weißer Temperguss EN-GJMW (GTW), schwarzer Temperguss EN-GJMB (GTS)	Grobes Zerpanen mit hohem Materialabtrag	450–600

Material groups			Application	Cutting speed m/min
Steel, cast steel	Non-hardened, non-heat treated steels up to 1200 N/mm ² (< 38 HRC)	Construction steels, carbon steels, tool steels, non-alloyed steels, case-hardened steels, cast steels	Coarse machining with high stock removal	450–600
	Hardened, heat-treated steels exceeding 1200 N/mm ² (> 38 HRC)	Tool steels, tempering steels, alloyed steel, cast steels		250–350
Stainless steel (INOX)	Rust and acid-resistant steels	Austenitic and ferritic stainless steels	Coarse machining with high stock removal	250–350
Non-ferrous metals	Hard-non-ferrous metals	Bronze, titanium/titanium alloys, hard alu-alloys (high Si content)	Coarse machining with high stock removal	250–350
	High-temperature resistant materials	Nickel based alloys, cobalt based alloys (aircraft engine and turbine construction)		300–450
Cast iron	Grey cast iron, white cast iron	Cast iron with flake graphite EN-GJL, with nodular graphite cast iron EN-GJS, white annealed cast iron EN-GJMW, black cast iron EN-GJMB	Coarse machining with high stock removal	450–600

Schnittgeschwindigkeit • Cutting speed (m/min)							
	250	300	350	400	450	500	600
Ø (mm)	Drehzahlen (min ⁻¹) • Rotational speed (rpm)						
2	40.000	48.000	56.000	64.000	72.000	80.000	95.000
3	27.000	32.000	37.000	42.000	48.000	53.000	64.000
4	20.000	24.000	28.000	32.000	36.000	40.000	48.000
6	13.000	16.000	19.000	21.000	24.000	27.000	32.000
8	10.000	12.000	14.000	16.000	18.000	20.000	24.000
10	8.000	10.000	11.000	13.000	14.000	16.000	19.000
12	7.000	8.000	9.000	11.000	12.000	13.000	16.000
16	5.000	6.000	7.000	8.000	9.000	10.000	12.000
20	4.000	5.000	6.000	6.000	7.000	8.000	10.000
25	3.000	4.000	4.000	5.000	6.000	6.000	8.000

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Art.

100

101

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Art. 11.5001

Art. 11.3001

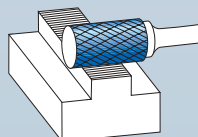


A FORM / SHAPE

ZYA

Zylinder ohne Stirnverzahnung

Cylinder without end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115001.015	• 1,5	6	3	38		✓	7,80
115001.025	• 2	11	3	38		✓	7,80
115001.027	• 2,5	11	3	38		✓	7,80
115001.030	• 3	14	3	38		✓	7,80
115001.035	• 3	14	3	50		✓	9,15
115001.040	• 3	14	3	65		✓	10,15
115001.045	• 3	14	3	75		✓	11,20
115001.050	• 3	14	3	100		✓	13,95
115001.052	• 3	12,7	6	50		✓	10,35
115001.055	• 4	14	6	50		✓	10,35
115001.057	• 5	12,7	3	38		✓	16,10
115001.058	• 5	16	6	50		✓	10,35
115001.059	• 6	5	3	37	✓		9,90
115001.060	• 6	13	3	45	✓		12,50
115001.065	• 6	18	6	50		✓	10,35
115001.067	• 6	25	6	50		✓	14,05
115001.070	• 6	18	6	100	✓		18,25
115001.075	• 6	18	6	150	✓		24,90
115001.080	• 8	20	6	65	✓		12,90
115001.085	• 8	20	6	170	✓		17,70
115001.087	• 10	13	6	58	✓		15,90
115001.090	• 10	20	6	65	✓		14,85
115001.095	• 10	20	6	172	✓		22,65
115001.100	• 10	25	6	70	✓		17,10
115001.102	• 11	25	6	70	✓		21,55
115001.103	• 12	20	6	64	✓		24,45
115001.105	• 12	25	6	70	✓		22,85
115001.107	• 12DIN	25	6	70	✓		22,35
115001.110	• 12	25	6	175	✓		33,20
115001.115	• 12	25	8	70	✓		24,85
115001.120	• 16	25	6	70	✓		27,65
115001.125	• 16	25	8	70	✓		29,70
115001.130	• 20	25	6	70	✓		40,30
115001.135	• 20	25	8	70	✓		42,35
115001.140	• 25	25	6	70	✓		54,05
115001.145	• 25	25	8	70	✓		56,05

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113001.015	• 1,5	6	3	38		✓	5,90
113001.025	• 2	11	3	38		✓	5,90
113001.027	• 2,5	11	3	38		✓	5,90
113001.030	• 3	14	3	38		✓	5,90
113001.035	• 3	14	3	50		✓	7,30
113001.040	• 3	14	3	65		✓	8,30
113001.045	• 3	14	3	75		✓	9,35
113001.050	• 3	14	3	100		✓	12,05
113001.052	• 3	12,7	6	50		✓	8,45
113001.055	• 4	14	6	50		✓	8,45
113001.057	• 5	12,7	3	38		✓	14,20
113001.058	• 5	16	6	50		✓	8,45
113001.059	• 6	5	3	37	✓		8,05
113001.060	• 6	13	3	45	✓		10,65
113001.065	• 6	18	6	50		✓	8,45
113001.067	• 6	25	6	50		✓	12,15
113001.070	• 6	18	6	100	✓		16,35
113001.075	• 6	18	6	150	✓		23,05
113001.080	• 8	20	6	65	✓		11,00
113001.085	• 8	20	6	170	✓		15,80
113001.087	• 10	13	6	58	✓		12,85
113001.090	• 10	20	6	65	✓		11,80
113001.095	• 10	20	6	172	✓		16,50
113001.100	• 10	25	6	70	✓		14,05
113001.102	• 11	25	6	70	✓		17,05
113001.103	• 12	20	6	64	✓		19,95
113001.105	• 12	25	6	70	✓		18,40
113001.107	• 12DIN	25	6	70	✓		17,85
113001.110	• 12	25	6	175	✓		25,70
113001.115	• 12	25	8	70	✓		20,35
113001.120	• 16	25	6	70	✓		23,15
113001.125	• 16	25	8	70	✓		25,25
113001.130	• 20	25	6	70	✓		34,50
113001.135	• 20	25	8	70	✓		36,50
113001.140	• 25	25	6	70	✓		48,20
113001.145	• 25	25	8	70	✓		50,25



Der revolutionäre Zylinder-Radius Frässtift siehe Seite 322/323
The revolutionary cylinder-radius burr see page 322/323



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Art.
100
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Art. **11.5011**

Art. **11.3011**

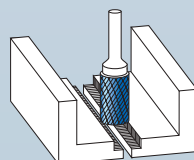


B FORM / SHAPE

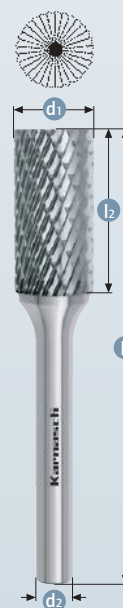
ZYB

Zylinder mit Stirnverzahnung

Cylinder with end cut



Video

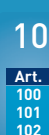
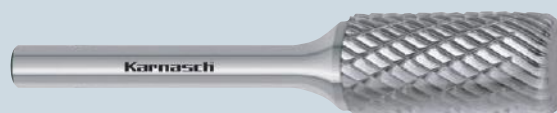


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115011.005	• 1,5	6	3	38		✓	7,80
115011.010	• 2	11	3	38		✓	8,45
115011.012	• 2,5	11	3	38		✓	7,80
115011.015	• 3	14	3	38		✓	7,70
115011.020	• 3	14	3	50		✓	9,90
115011.025	• 3	14	3	65		✓	11,00
115011.030	• 3	14	3	75		✓	12,10
115011.035	• 3	14	3	100		✓	15,15
115011.037	• 3	12,7	6	50		✓	11,05
115011.040	• 4	14	6	50		✓	11,05
115011.042	• 5	16	6	50		✓	11,05
115011.043	• 6	5	3	37	✓		11,55
115011.045	• 6	13	3	45	✓		13,60
115011.050	• 6	18	6	50		✓	11,05
115011.055	• 6	18	6	75		✓	13,75
115011.060	• 6	18	6	100	✓		19,90
115011.065	• 6	18	6	150	✓		27,25
115011.070	• 6	25	6	50		✓	15,25
115011.075	• 8	20	6	65	✓		13,95
115011.080	• 8	20	6	170	✓		19,20
115011.082	• 10	13	6	58	✓		17,20
115011.085	• 10	20	6	65	✓		16,05
115011.090	• 10	20	6	172	✓		24,75
115011.095	• 10	25	6	70	✓		18,45
115011.097	• 11	25	6	70	✓		21,95
115011.099	• 12	20	6	64	✓		26,45
115011.100	• 12	25	6	70	✓		24,70
115011.103	• 12DIN	25	6	70	✓		24,10
115011.105	• 12	25	6	175	✓		36,65
115011.110	• 12	25	8	70	✓		26,80
115011.115	• 16	25	6	70	✓		29,95
115011.120	• 16	25	8	70	✓		31,95
115011.125	• 20	25	6	70	✓		43,80
115011.130	• 20	25	8	70	✓		46,05
115011.135	• 25	25	6	70	✓		58,90
115011.140	• 25	25	8	70	✓		60,90

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113011.005	• 1,5	6	3	38		✓	5,90
113011.010	• 2	11	3	38		✓	6,55
113011.012	• 2,5	11	3	38		✓	5,90
113011.015	• 3	14	3	38		✓	5,80
113011.020	• 3	14	3	50		✓	8,00
113011.025	• 3	14	3	65		✓	9,10
113011.030	• 3	14	3	75		✓	10,20
113011.035	• 3	14	3	100		✓	13,25
113011.037	• 3	12,7	6	50		✓	9,15
113011.040	• 4	14	6	50		✓	9,15
113011.042	• 5	16	6	50		✓	9,15
113011.043	• 6	5	3	37	✓		9,65
113011.045	• 6	13	3	45	✓		11,70
113011.050	• 6	18	6	50		✓	9,15
113011.055	• 6	18	6	75		✓	11,85
113011.060	• 6	18	6	100	✓		18,00
113011.065	• 6	18	6	150	✓		25,35
113011.070	• 6	25	6	50		✓	13,35
113011.075	• 8	20	6	65	✓		12,05
113011.080	• 8	20	6	170	✓		17,35
113011.082	• 10	13	6	58	✓		14,15
113011.085	• 10	20	6	65	✓		13,00
113011.090	• 10	20	6	172	✓		18,60
113011.095	• 10	25	6	70	✓		15,40
113011.097	• 11	25	6	70	✓		18,90
113011.099	• 12	20	6	64	✓		22,00
113011.100	• 12	25	6	70	✓		20,20
113011.103	• 12DIN	25	6	70	✓		19,60
113011.105	• 12	25	6	175	✓		29,15
113011.110	• 12	25	8	70	✓		22,35
113011.115	• 16	25	6	70	✓		25,45
113011.120	• 16	25	8	70	✓		27,50
113011.125	• 20	25	6	70	✓		37,95
113011.130	• 20	25	8	70	✓		40,20
113011.135	• 25	25	6	70	✓		53,10
113011.140	• 25	25	8	70	✓		55,10



Der revolutionäre Zylinder-Radius Frässtift siehe Seite 322/323
The revolutionary cylinder-radius burr see page 322/323



Art.
100
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 neu
new


Das einzigartige **CYLINDER+RADIUS** Design verwandelt den herkömmlichen Zylinder Rotierfräser in ein Hightech Werkzeug.

Diese neue Entwicklung erfüllt die höchsten Herstellungsstandards für alle Arten der Anwendung in der Industrie, darunter speziell auch für die Luft- und Raumfahrt Industrie.

Das spezielle Radius-Design an der Spitze des Zylinders vermeidet Zahnbruch und erhöht wesentlich die Standzeit.

Durch Radiusdesign:

- kein verkanten / abrutschen in das Werkstück.
- Beschädigungen von teuren Werkzeugen werden vermieden.

Durch Kreuzverzahnung:

- exzellente Kontrolle und Führung beim Entgratvorgang.

Eigenschaften und Vorteile:

Der Radius an der Spitze des Fräasers ergibt:

- verbesserte Nutenstabilität durch verrundete Kanten.
- Der Radius ermöglicht eine bessere Kontrolle während des Schleifvorgangs.
- Die Rundung verhindert das verkanten / abrutschen in das Werkstück.
- Erzeugung eines Radius' auf dem Werkstück
- Rundung reduziert Bruch an der Schnittkante des Fräasers.

The **CYLINDER+RADIUS** unique design transforms the conventional cylinder burr into a Hightech Tool.

The new development meets the highest manufacturing standards for all kind of industries, especially the aerospace industry.

The **Radius** design at the top of the Cylinder provides an extended tool life avoiding teeth breakage.

This unique design with its **double cut** will improve operator control, reduce the size of chips and prevent damage to expensive parts.

Features and benefits:

Radius at the top of the Cylinder results:

- Offers improved flute strength at the start of the burr.
- The Radius provides better control of the burr.
- Prevents digging into work piece at the intersecting point.
- Produces a Cylinder Radius on the work piece.
- Reduces flute chipping at the intersecting point.



Art.
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Art. **11.6010**

Art. **11.4010**

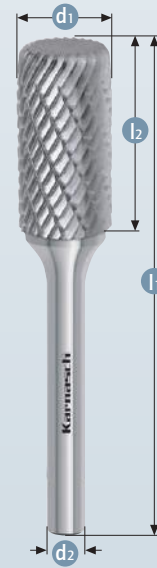
A FORM / SHAPE **HP-3** **ZYA**

Zylinder-Radius

Cylinder-Radius



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116010.005	• 3	14	3	38		✓	8,70
116010.010	• 6	18	6	50		✓	11,60
116010.015	• 8	19	6	64	✓		14,50
116010.020	• 10	19	6	64	✓		16,65
116010.025	• 12	25	8	70	✓		25,65
116010.030	• 16	25	6	70	✓		31,15

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114010.005	• 3	14	3	38		✓	6,80
114010.010	• 6	18	6	50		✓	9,70
114010.015	• 8	19	6	64	✓		12,60
114010.020	• 10	19	6	64	✓		13,60
114010.025	• 12	25	8	70	✓		21,15
114010.030	• 16	25	6	70	✓		26,65

Anwendungsbeispiele / Application examples



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Art.
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Art. 11.5021

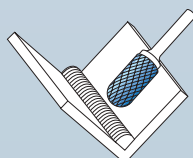
Art. 11.3021



C FORM / SHAPE

Walzenrundform

Ball nosed cylinder



Video

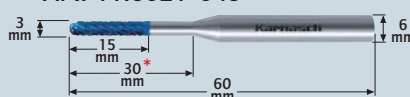


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115021.020	• 2	11	3	38		✓	7,80
115021.022	• 2,5	11	3	38		✓	7,70
115021.025	• 3	14	3	38		✓	7,80
115021.030	• 3	14	3	50		✓	10,15
115021.032	• 3	14	3	60		✓	10,65
115021.035	• 3	14	3	75		✓	11,20
115021.040	• 3	14	3	100		✓	14,00
115021.042	• 3	12,7	6	50		✓	12,10
115021.043	• 3	30*[15]	6	60		✓	22,25
115021.045	• 4	16	6	50		✓	11,65
115021.046	• 4	30*[15]	6	60		✓	22,80
115021.047	• 5	12,7	3	38		✓	16,10
115021.049	• 5	16	6	50		✓	11,65
115021.050	• 6	12,7	3	44	✓		11,55
115021.055	• 6	18	6	50		✓	11,65
115021.056	• 6	18	6	60		✓	15,55
115021.058	• 6	18	6	80		✓	18,55
115021.060	• 6	18	6	100	✓		20,90
115021.065	• 6	18	6	150	✓		28,65
115021.070	• 6	25	6	50		✓	15,25
115021.075	• 8	20	6	65	✓		13,85
115021.080	• 8	20	6	170	✓		19,10
115021.085	• 10	20	6	65	✓		16,20
115021.090	• 10	20	6	170	✓		24,50
115021.095	• 10	25	6	70	✓		18,45
115021.097	• 11	25	6	70	✓		23,30
115021.099	• 12	10	6	54	✓		26,90
115021.100	• 12	20	6	65	✓		26,50
115021.105	• 12	25	6	70	✓		25,15
115021.107	• 12DIN	25	6	70	✓		24,50
115021.110	• 12	25	6	175	✓		36,35
115021.115	• 12	25	8	70	✓		27,30
115021.120	• 16	25	6	70	✓		30,55
115021.125	• 16	25	8	70	✓		33,40
115021.130	• 20	25	6	70	✓		43,10
115021.135	• 20	25	8	70	✓		45,15

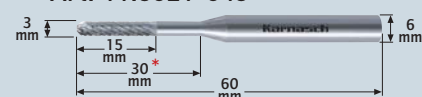
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113021.020	• 2	11	3	38		✓	5,90
113021.022	• 2,5	11	3	38		✓	5,80
113021.025	• 3	14	3	38		✓	5,90
113021.030	• 3	14	3	50		✓	8,30
113021.032	• 3	14	3	60		✓	8,80
113021.035	• 3	14	3	75		✓	9,35
113021.040	• 3	14	3	100		✓	12,10
113021.042	• 3	12,7	6	50		✓	10,20
113021.043	• 3	30*[15]	6	60		✓	20,35
113021.045	• 4	16	6	50		✓	9,75
113021.046	• 4	30*[15]	6	60		✓	20,90
113021.047	• 5	12,7	3	38		✓	14,20
113021.049	• 5	16	6	50		✓	9,75
113021.050	• 6	12,7	3	44	✓		9,65
113021.055	• 6	18	6	50		✓	9,75
113021.056	• 6	18	6	60		✓	13,65
113021.058	• 6	18	6	80		✓	16,65
113021.060	• 6	18	6	100	✓		19,00
113021.065	• 6	18	6	150	✓		26,75
113021.070	• 6	25	6	50		✓	13,35
113021.075	• 8	20	6	65	✓		11,95
113021.080	• 8	20	6	170	✓		17,20
113021.085	• 10	20	6	65	✓		13,15
113021.090	• 10	20	6	170	✓		18,35
113021.095	• 10	25	6	70	✓		15,40
113021.097	• 11	25	6	70	✓		18,80
113021.099	• 12	10	6	54	✓		22,40
113021.100	• 12	20	6	65	✓		22,00
113021.105	• 12	25	6	70	✓		20,65
113021.107	• 12DIN	25	6	70	✓		20,05
113021.110	• 12	25	6	175	✓		28,85
113021.115	• 12	25	8	70	✓		22,85
113021.120	• 16	25	6	70	✓		26,05
113021.125	• 16	25	8	70	✓		28,90
113021.130	• 20	25	6	70	✓		37,30
113021.135	• 20	25	8	70	✓		39,30

- Frässtifte speziell für Schlüsseldienste siehe Seite 400/401
Burs specially for locksmiths see page 400/401

* Art. 11.5021-043



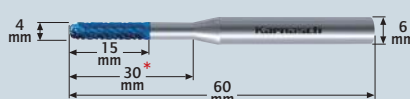
* Art. 11.3021-043



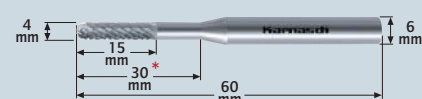
- * Von 30 mm sind 15 mm verzahnt
15 mm by 30 mm are not machined



* Art. 11.5021-046



* Art. 11.3021-046



Art. **11.5031**

Art. **11.3031**

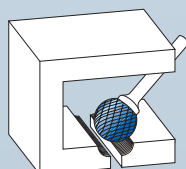


D FORM / SHAPE

KUD

Kugel

Ball



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115031.020	• 2	1,8	3	38		✓	7,80
115031.022	• 2,5	2,3	3	38		✓	7,80
115031.025	• 3	2,5	3	38		✓	7,80
115031.030	• 3	2,5	3	50		✓	9,55
115031.035	• 3	2,5	3	75		✓	10,60
115031.040	• 3	2,5	6	50		✓	10,85
115031.045	• 4	3,4	3	38		✓	16,10
115031.046	• 4	3,4	6	50		✓	11,25
115031.047	• 5	4,7	3	38		✓	16,10
115031.048	• 5	5,0	6	50		✓	10,85
115031.050	• 6	5,0	3	38	✓		11,25
115031.055	• 6	4,7	6	50		✓	10,85
115031.060	• 8	6,0	6	52	✓		11,50
115031.065	• 8	6,0	6	180	✓		15,75
115031.070	• 10	8,0	6	54	✓		13,85
115031.075	• 10	8,0	6	185	✓		21,30
115031.077	• 11	9,5	6	55	✓		16,95
115031.080	• 12	11,4	6	56	✓		19,00
115031.083	• 12DIN	11,0	6	56	✓		18,55
115031.085	• 12	11,0	8	56	✓		19,90
115031.090	• 12	11,0	6	162	✓		27,85
115031.095	• 16	14,0	6	60	✓		22,50
115031.100	• 16	14,0	8	60	✓		24,55
115031.105	• 20	16,5	6	62	✓		30,65
115031.110	• 20	16,5	8	62	✓		32,75
115031.115	• 25	22,0	6	68	✓		48,50
115031.120	• 25	22,0	8	68	✓		50,55

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113031.020	• 2	1,8	3	38		✓	5,90
113031.022	• 2,5	2,3	3	38		✓	5,90
113031.025	• 3	2,5	3	38		✓	5,90
113031.030	• 3	2,5	3	50		✓	7,65
113031.035	• 3	2,5	3	75		✓	8,70
113031.040	• 3	2,5	6	50		✓	8,95
113031.045	• 4	3,4	3	38		✓	14,20
113031.046	• 4	3,4	6	50		✓	9,40
113031.047	• 5	4,7	3	38		✓	14,20
113031.048	• 5	5,0	6	50		✓	8,95
113031.050	• 6	5,0	3	38	✓		9,40
113031.055	• 6	4,7	6	50		✓	8,95
113031.060	• 8	6,0	6	52	✓		9,60
113031.065	• 8	6,0	6	180	✓		13,85
113031.070	• 10	8,0	6	54	✓		10,80
113031.075	• 10	8,0	6	185	✓		15,15
113031.077	• 11	9,5	6	55	✓		12,45
113031.080	• 12	11,4	6	56	✓		14,50
113031.083	• 12DIN	11,0	6	56	✓		14,10
113031.085	• 12	11,0	8	56	✓		15,40
113031.090	• 12	11,0	6	162	✓		20,35
113031.095	• 16	14,0	6	60	✓		18,00
113031.100	• 16	14,0	8	60	✓		20,05
113031.105	• 20	16,5	6	62	✓		24,85
113031.110	• 20	16,5	8	62	✓		26,90
113031.115	• 25	22,0	6	68	✓		42,70
113031.120	• 25	22,0	8	68	✓		44,70



Art.
100
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Art. 11.5041

Art. 11.3041

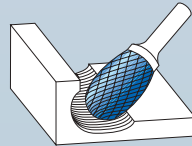


E FORM / SHAPE

TRE

Tropfen

Oval



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115041.010	• 3	6	3	38		✓	9,65
115041.005	• 3	6	3	50		✓	7,80
115041.011	• 3	6	3	75		✓	11,40
115041.012	• 5	7,1	3	38		✓	16,10
115041.015	• 6	10	3	42	✓		11,55
115041.020	• 6	10	6	50		✓	12,90
115041.025	• 8	15	6	60	✓		15,20
115041.030	• 10	16	6	60	✓		16,20
115041.032	• 10	16	6	170	✓		30,10
115041.035	• 12	22	6	67	✓		23,70
115041.037	• 12DIN	21	6	66	✓		23,15
115041.038	• 12	22	6	175	✓		37,25
115041.040	• 12	22	8	67	✓		25,70
115041.045	• 16	25	6	70	✓		31,15
115041.050	• 16	25	8	70	✓		34,20
115041.055	• 20	25	6	70	✓		41,70
115041.060	• 20	25	8	70	✓		43,75

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113041.010	• 3	6	3	38		✓	7,75
113041.005	• 3	6	3	50		✓	5,90
113041.011	• 3	6	3	75		✓	9,50
113041.012	• 5	7,1	3	38		✓	14,20
113041.015	• 6	10	3	42	✓		9,65
113041.020	• 6	10	6	50		✓	11,00
113041.025	• 8	15	6	60	✓		13,30
113041.030	• 10	16	6	60	✓		13,15
113041.032	• 10	16	6	170	✓		23,95
113041.035	• 12	22	6	67	✓		19,20
113041.037	• 12DIN	21	6	66	✓		18,65
113041.038	• 12	22	6	175	✓		29,75
113041.040	• 12	22	8	67	✓		21,25
113041.045	• 16	25	6	70	✓		26,70
113041.050	• 16	25	8	70	✓		29,70
113041.055	• 20	25	6	70	✓		35,85
113041.060	• 20	25	8	70	✓		37,90

Art. **11.5051**

Art. **11.3051**

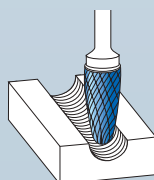


F FORM / SHAPE

RBF

Rundbogen

Ball nosed tree



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115051.007	• 3	6	3	38	✓		7,80
115051.010	• 3	8	3	38		✓	7,80
115051.015	• 3	14	3	38		✓	7,80
115051.020	• 3	14	3	50		✓	10,15
115051.021	• 3	14	3	75		✓	11,25
115051.022	• 5	12,7	3	38		✓	16,10
115051.025	• 6	12	3	44	✓		11,55
115051.030	• 6	18	6	50		✓	12,10
115051.033	• 6	18	6	168	✓		29,30
115051.035	• 8	20	6	65	✓		16,10
115051.040	• 10	20	6	65	✓		15,85
115051.045	• 10	20	6	170	✓		24,15
115051.047	• 11	25	6	70	✓		22,30
115051.048	• 12	20	6	65	✓		23,45
115051.050	• 12	25	6	70	✓		22,15
115051.053	• 12DIN	25	6	70	✓		21,60
115051.055	• 12	25	8	70	✓		22,15
115051.060	• 12	25	6	175	✓		33,95
115051.065	• 16	25	6	70	✓		30,70
115051.070	• 16	25	8	70	✓		33,15
115051.075	• 20	25	6	70	✓		40,30
115051.080	• 20	25	8	70	✓		43,45
115051.082	• 20	32	6	77	✓		49,20
115051.085	• 20	38	6	83	✓		56,80
115051.090	• 20	38	8	83	✓		61,40

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113051.007	• 3	6	3	38	✓		5,90
113051.010	• 3	8	3	38		✓	5,90
113051.015	• 3	14	3	38		✓	5,90
113051.020	• 3	14	3	50		✓	8,30
113051.021	• 3	14	3	75		✓	9,35
113051.022	• 5	12,7	3	38		✓	14,20
113051.025	• 6	12	3	44	✓		9,65
113051.030	• 6	18	6	50		✓	10,20
113051.033	• 6	18	6	168	✓		26,30
113051.035	• 8	20	6	65	✓		14,20
113051.040	• 10	20	6	65	✓		12,80
113051.045	• 10	20	6	170	✓		18,00
113051.047	• 11	25	6	70	✓		17,85
113051.048	• 12	20	6	65	✓		18,95
113051.050	• 12	25	6	70	✓		17,65
113051.053	• 12DIN	25	6	70	✓		17,15
113051.055	• 12	25	8	70	✓		17,65
113051.060	• 12	25	6	175	✓		26,50
113051.065	• 16	25	6	70	✓		26,25
113051.070	• 16	25	8	70	✓		28,65
113051.075	• 20	25	6	70	✓		34,50
113051.080	• 20	25	8	70	✓		37,65
113051.082	• 20	32	6	77	✓		43,35
113051.085	• 20	38	6	83	✓		51,00
113051.090	• 20	38	8	83	✓		55,55

1



2



3



4



5



6



7



8



9



10



Art.
100
101
102

Art. 11.5061

Art. 11.3061

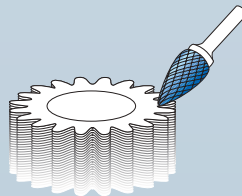


G FORM / SHAPE

SPG

Spitzbogen

Tree



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115061.010	• 3	6	3	38		✓	7,80
115061.012	• 3	10	3	38		✓	7,80
115061.015	• 3	14	3	38		✓	7,80
115061.020	• 3	14	3	50		✓	9,30
115061.025	• 3	14	3	75		✓	11,00
115061.028	• 5	12,7	3	38		✓	16,10
115061.030	• 6	12	3	44	✓		11,55
115061.035	• 6	18	6	50		✓	12,10
115061.040	• 8	20	6	65	✓		14,25
115061.045	• 10	20	6	65	✓		16,70
115061.050	• 10	20	6	170	✓		25,30
115061.055	• 12	20	6	65	✓		23,15
115061.060	• 12	25	6	70	✓		23,15
115061.063	• 12DIN	25	6	70	✓		22,55
115061.065	• 12	25	8	70	✓		24,80
115061.070	• 12	25	6	175	✓		33,65
115061.075	• 12	30	6	75	✓		26,95
115061.080	• 12	30	8	75	✓		26,95
115061.085	• 16	25	6	70	✓		30,35
115061.090	• 16	25	8	70	✓		32,40
115061.095	• 16	30	6	75	✓		39,85
115061.100	• 16	30	8	75	✓		39,85
115061.105	• 20	25	6	70	✓		40,30
115061.110	• 20	25	8	70	✓		42,35
115061.115	• 20	38	6	83	✓		56,80
115061.120	• 20	38	8	83	✓		59,10

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113061.010	• 3	6	3	38		✓	5,90
113061.012	• 3	10	3	38		✓	5,90
113061.015	• 3	14	3	38		✓	5,90
113061.020	• 3	14	3	50		✓	7,40
113061.025	• 3	14	3	75		✓	9,10
113061.028	• 5	12,7	3	38		✓	14,20
113061.030	• 6	12	3	44	✓		9,65
113061.035	• 6	18	6	50		✓	10,20
113061.040	• 8	20	6	65	✓		12,35
113061.045	• 10	20	6	65	✓		13,65
113061.050	• 10	20	6	170	✓		19,15
113061.055	• 12	20	6	65	✓		18,65
113061.060	• 12	25	6	70	✓		18,65
113061.063	• 12DIN	25	6	70	✓		18,05
113061.065	• 12	25	8	70	✓		20,30
113061.070	• 12	25	6	175	✓		26,20
113061.075	• 12	30	6	75	✓		22,45
113061.080	• 12	30	8	75	✓		22,45
113061.085	• 16	25	6	70	✓		25,85
113061.090	• 16	25	8	70	✓		27,90
113061.095	• 16	30	6	75	✓		35,35
113061.100	• 16	30	8	75	✓		35,35
113061.105	• 20	25	6	70	✓		34,50
113061.110	• 20	25	8	70	✓		36,50
113061.115	• 20	38	6	83	✓		51,00
113061.120	• 20	38	8	83	✓		53,30

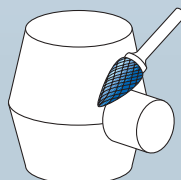
Art. **11.5071**



H FORM / SHAPE

Flamme

Flame



Video

Art. **11.3071**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115071.005	• 3	6	3	38		✓	9,65
115071.003	• 3	6	3	50		✓	7,80
115071.006	• 3	6	3	75		✓	11,40
115071.007	• 5	9,5	3	38		✓	16,10
115071.010	• 6	14	6	50		✓	15,45
115071.015	• 8	20	6	65	✓		15,35
115071.017	• 8	20	6	170	✓		25,80
115071.020	• 10	20	6	65	✓		28,05
115071.025	• 12	32	6	77	✓		33,15
115071.027	• 12DIN	30	6	75	✓		32,25
115071.028	• 12	32	6	180	✓		37,25
115071.030	• 12	32	8	77	✓		33,15
115071.035	• 16	36	6	82	✓		42,45
115071.040	• 16	36	8	82	✓		44,45
115071.045	• 20	41	6	86	✓		54,05
115071.050	• 20	41	8	86	✓		56,05

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113071.005	• 3	6	3	38		✓	7,75
113071.003	• 3	6	3	50		✓	5,90
113071.006	• 3	6	3	75		✓	9,50
113071.007	• 5	9,5	3	38		✓	14,20
113071.010	• 6	14	6	50		✓	13,55
113071.015	• 8	20	6	65	✓		13,50
113071.017	• 8	20	6	170	✓		22,80
113071.020	• 10	20	6	65	✓		25,00
113071.025	• 12	32	6	77	✓		28,65
113071.027	• 12DIN	30	6	75	✓		27,80
113071.028	• 12	32	6	180	✓		29,75
113071.030	• 12	32	8	77	✓		28,65
113071.035	• 16	36	6	82	✓		37,95
113071.040	• 16	36	8	82	✓		39,95
113071.045	• 20	41	6	86	✓		48,20
113071.050	• 20	41	8	86	✓		50,25

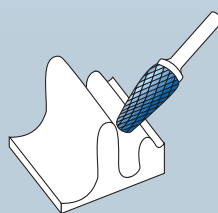
Art. **11.5081**



L FORM / SHAPE

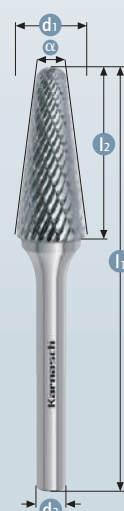
Rundkegel

Ball nosed cone



Video

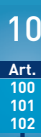
Art. **11.3081**



KEL

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115081.005	• 3	10	3	38		✓	10°	7,80
115081.010	• 3	14	3	38		✓	8°	9,65
115081.009	• 3	14	3	50	✓		8°	7,80
115081.011	• 3	14	3	75	✓		8°	11,40
115081.012	• 5	12,7	3	38	✓		14°	16,10
115081.015	• 6	16	3	48	✓		22°	12,50
115081.020	• 6	18	6	50	✓		14°	12,30
115081.025	• 8	25	6	70	✓		14°	15,50
115081.030	• 10	20	6	65	✓		14°	21,20
115081.035	• 10	30	6	75	✓		14°	19,50
115081.040	• 10	30	6	176	✓		14°	29,15
115081.045	• 12	32	6	77	✓		14°	25,45
115081.047	• 12DIN	25	6	70	✓		14°	24,80
115081.050	• 12	32	8	77	✓		14°	25,45
115081.055	• 12	32	6	182	✓		14°	37,85
115081.060	• 16	33	6	78	✓		14°	36,85
115081.065	• 16	33	8	78	✓		14°	36,85
115081.070	• 20	41	6	86	✓		14°	48,55
115081.075	• 20	41	8	86	✓		14°	48,55

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113081.005	• 3	10	3	38		✓	10°	5,90
113081.010	• 3	14	3	38		✓	8°	7,75
113081.009	• 3	14	3	50	✓		8°	5,90
113081.011	• 3	14	3	75	✓		8°	9,50
113081.012	• 5	12,7	3	38	✓		14°	14,20
113081.015	• 6	16	3	48	✓		22°	10,65
113081.020	• 6	18	6	50	✓		14°	10,40
113081.025	• 8	25	6	70	✓		14°	13,60
113081.030	• 10	20	6	65	✓		14°	18,15
113081.035	• 10	30	6	75	✓		14°	16,45
113081.040	• 10	30	6	176	✓		14°	22,95
113081.045	• 12	32	6	77	✓		14°	20,95
113081.047	• 12DIN	25	6	70	✓		14°	20,30
113081.050	• 12	32	8	77	✓		14°	20,95
113081.055	• 12	32	6	182	✓		14°	30,40
113081.060	• 16	33	6	78	✓		14°	32,35
113081.065	• 16	33	8	78	✓		14°	32,35
113081.070	• 20	41	6	86	✓		14°	42,70
113081.075	• 20	41	8	86	✓		14°	42,70



Art.
100
101
102

Art. 11.5091

Art. 11.3091

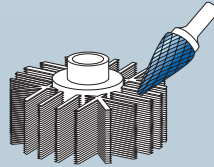


M FORM / SHAPE

SKM

Spitzkegel

Cone



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115091.010	● 3	8	3	38		✓	18°	7,80
115091.015	● 3	11	3	38		✓	14°	7,80
115091.020	● 3	15	3	38		✓	10°	7,80
115091.025	● 6	12	3	48	✓		22°	11,55
115091.027	● 6	12,7	6	50		✓	14°	11,75
115091.030	● 6	20	6	50		✓	14°	12,30
115091.032	● 6	25	6	50		✓	11°	13,05
115091.035	● 8	18	6	63	✓		13°	15,50
115091.040	● 10	20	6	65	✓		28°	19,95
115091.045	● 12	25	6	70	✓		28°	24,80
115091.047	● 12DIN	25	6	70	✓		28°	24,20
115091.050	● 12	25	8	70	✓		28°	24,80
115091.055	● 16	26	6	74	✓		33°	31,95
115091.060	● 16	26	8	74	✓		33°	34,85

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113091.010	● 3	8	3	38		✓	18°	5,90
113091.015	● 3	11	3	38		✓	14°	5,90
113091.020	● 3	15	3	38		✓	10°	5,90
113091.025	● 6	12	3	48	✓		22°	9,65
113091.027	● 6	12,7	6	50		✓	14°	9,90
113091.030	● 6	20	6	50		✓	14°	10,40
113091.032	● 6	25	6	50		✓	11°	11,15
113091.035	● 8	18	6	63	✓		13°	13,60
113091.040	● 10	20	6	65	✓		28°	16,90
113091.045	● 12	25	6	70	✓		28°	20,30
113091.047	● 12DIN	25	6	70	✓		28°	19,70
113091.050	● 12	25	8	70	✓		28°	20,30
113091.055	● 16	26	6	74	✓		33°	27,45
113091.060	● 16	26	8	74	✓		33°	30,35

Art. 11.5096

Art. 11.3096

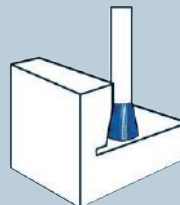


N FORM / SHAPE

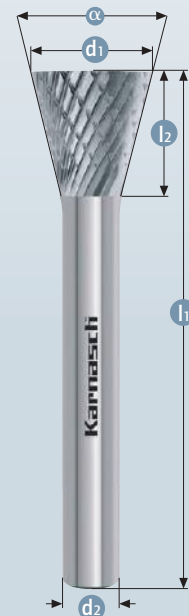
WKN

Winkel

Inverted cone



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115096.005	● 3	5	3	38		✓	10°	7,70
115096.010	● 6	7	3	39	✓		10°	11,55
115096.015	● 6	8	6	50		✓	10°	11,85
115096.020	● 10	10	6	55	✓		13°	17,55
115096.025	● 12	13	6	58	✓		30°	25,00
115096.030	● 12	13	8	58	✓		30°	27,15
115096.035	● 16	19	6	64	✓		18°	30,80
115096.040	● 16	19	8	64	✓		18°	32,85
115096.045	● 20	16	6	61	✓		30°	35,40

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113096.005	● 3	5	3	38		✓	10°	5,80
113096.010	● 6	7	3	39	✓		10°	9,65
113096.015	● 6	8	6	50		✓	10°	9,95
113096.020	● 10	10	6	55	✓		13°	14,50
113096.025	● 12	13	6	58	✓		30°	20,55
113096.030	● 12	13	8	58	✓		30°	22,65
113096.035	● 16	19	6	64	✓		18°	26,30
113096.040	● 16	19	8	64	✓		18°	28,35
113096.045	● 20	16	6	61	✓		30°	29,60

Art. **11.5101**

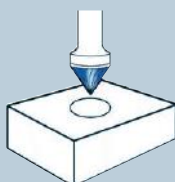


J FORM / SHAPE

KSJ

Kegel 60°

Countersink 60°



Video

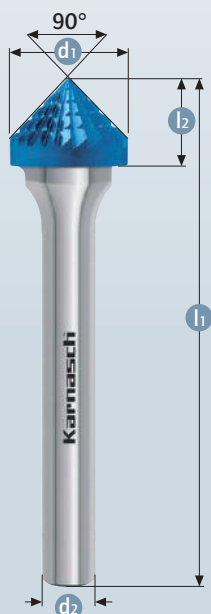
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115101.005	• 3	3	3	38		✓	7,80
115101.010	• 6	6	6	50		✓	10,85
115101.015	• 10	8	6	56	✓		14,80
115101.020	• 12	11	6	60	✓		18,75
115101.025	• 16	15	6	62	✓		23,45
115101.030	• 16	15	8	62	✓		25,45
115101.035	• 20	17	6	65	✓		30,75
115101.040	• 25	24,5	6	68	✓		45,80

Art. **11.3101**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113101.005	• 3	3	3	38		✓	5,90
113101.010	• 6	6	6	50		✓	8,95
113101.015	• 10	8	6	56	✓		11,75
113101.020	• 12	11	6	60	✓		14,25
113101.025	• 16	15	6	62	✓		18,95
113101.030	• 16	15	8	62	✓		21,00
113101.035	• 20	17	6	65	✓		24,90
113101.040	• 25	24,5	6	68	✓		39,95

Art. **11.5111**

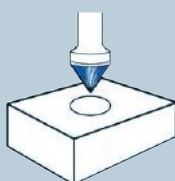


K FORM / SHAPE

KSK

Kegel 90°

Countersink 90°



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115111.005	• 3	3	3	38		✓	7,80
115111.010	• 6	6	6	50		✓	10,85
115111.015	• 10	5	6	53	✓		14,80
115111.020	• 12	7	6	55	✓		18,75
115111.025	• 12	7	8	55	✓		20,30
115111.030	• 16	8	6	57	✓		23,45
115111.035	• 16	8	8	57	✓		25,45
115111.040	• 20	12	6	60	✓		30,75
115111.045	• 25	12,7	6	60	✓		45,80

Art. **11.3111**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113111.005	• 3	3	3	38		✓	5,90
113111.010	• 6	6	6	50		✓	8,95
113111.015	• 10	5	6	53	✓		11,75
113111.020	• 12	7	6	55	✓		14,25
113111.025	• 12	7	8	55	✓		15,85
113111.030	• 16	8	6	57	✓		18,95
113111.035	• 16	8	8	57	✓		21,00
113111.040	• 20	12	6	60	✓		24,90
113111.045	• 25	12,7	6	60	✓		39,00



Art.
100
101
102

HP-2

Die am meisten verwendete Einfachverzahnung ergibt: The most widely used simple cutting style results:



- Hohe Zerspanleistung mit guter Oberflächengüte
- Für alle Stahlsorten wie:
 - Gusseisen
 - Stahl < 60 HRC
 - Edelstahl (INOX)
 - Nickelbasis- und Titanlegierungen
- Auch Kupfer, Messing, Bronze
- High cutting action with good surface finish
- For use on all ferrous materials such as:
 - cast iron
 - steel < 60 HRC
 - stainless steel (INOX)
 - nickel basis and titanium alloy
- Also copper, brass, bronze

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	–	KEL	SKM	WKN	KSJ	KSK
A	B	C	D	E	F	G	H	L	M	N	J	K
334	334	335	335	336	336	337	337	338	338	339	339	340
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Winkel Inverted cone	Kegel 60° Countersink 60°	Kegel 90° Countersink 90°



BLUE-TEC-beschichtet
BLUE-TEC-coated



Für Frässtifte optimierte und patentierte BLUE-TEC-Beschichtung ergibt einzigartige Standzeiten und Performance in allen Stahlsorten.

Patented BLUE-TEC coating, specifically designed for burrs, gives outstanding tool life and excellent performance on all metals.

Werkstoffgruppen			Bearbeitung	Schnittgeschwindigkeit (m/min)
Stahl, Stahlguss	Ungehärtete, nicht vergütete Stähle bis 1200 N/mm ² (< 38 HRC)	Baustähle, Kohlenstoffstähle, Werkzeugstähle, unlegierte Stähle, Einsatzstähle, Stahlguss	Grobes Zerpanen mit hohem Materialabtrag	450–600
	Gehärtete, vergütete Stähle über 1200 N/mm ² (> 38 HRC)	Werkzeugstähle, Vergütungsstähle, legierte Stähle, Stahlguss		250–350
Edelstahl (INOX)	Rost- und säurebeständige Stähle	Austenitische und ferritische Edelstähle	Grobes Zerpanen mit hohem Materialabtrag	250–350
NE-Metalle	Harte NE-Metalle	Bronze, Titan/Titanlegierungen, harte Alu-Legierungen (hoher Si-Anteil)	Grobes Zerpanen mit hohem Materialabtrag	250–350
	Hochwarmfeste Werkstoffe	Nickelbasis- und Kobaltbasislegierungen (Triebwerk- und Turbinenbau)		300–450
Gusseisen	Graues Gusseisen, weißes Gusseisen	Gusseisen mit Lamellengraphit EN-GJL (GG), mit Kugelgraphit/Späroguss EN-GJS (GGG), weißer Temperguss EN-GJMW (GTW), schwarzer Temperguss EN-GJMB (GTS)	Grobes Zerpanen mit hohem Materialabtrag	450–600

Material groups			Application	Cutting speed m/min
Steel, cast steel	Non-hardened, non-heat treated steels up to 1200 N/mm ² (< 38 HRC)	Construction steels, carbon steels, tool steels, non-alloyed steels, case-hardened steels, cast steels	Coarse machining with high stock removal	450–600
	Hardened, heat-treated steels exceeding 1200 N/mm ² (> 38 HRC)	Tool steels, tempering steels, alloyed steel, cast steels		250–350
Stainless steel (INOX)	Rust and acid-resistant steels	Austenitic and ferritic stainless steels	Coarse machining with high stock removal	250–350
Non-ferrous metals	Hard-non-ferrous metals	Bronze, titanium/titanium alloys, hard alu-alloys (high Si content)	Coarse machining with high stock removal	250–350
	High-temperature resistant materials	Nickel based alloys, cobalt based alloys (aircraft engine and turbine construction)		300–450
Cast iron	Grey cast iron, white cast iron	Cast iron with flake graphite EN-GJL, with nodular graphite cast iron EN-GJS, white annealed cast iron EN-GJMW, black cast iron EN-GJMB	Coarse machining with high stock removal	450–600

Schnittgeschwindigkeit • Cutting speed (m/min)							
	250	300	350	400	450	500	600
Ø (mm)	Drehzahlen (min ⁻¹) • Rotational speed (rpm)						
2	40.000	48.000	56.000	64.000	72.000	80.000	95.000
3	27.000	32.000	37.000	42.000	48.000	53.000	64.000
4	20.000	24.000	28.000	32.000	36.000	40.000	48.000
6	13.000	16.000	19.000	21.000	24.000	27.000	32.000
8	10.000	12.000	14.000	16.000	18.000	20.000	24.000
10	8.000	10.000	11.000	13.000	14.000	16.000	19.000
12	7.000	8.000	9.000	11.000	12.000	13.000	16.000
16	5.000	6.000	7.000	8.000	9.000	10.000	12.000
20	4.000	5.000	6.000	6.000	7.000	8.000	10.000
25	3.000	4.000	4.000	5.000	6.000	6.000	8.000

1



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3



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5



6



7



8



9



10



Art. 100 101 102

Art. 11.5000

Art. 11.3000

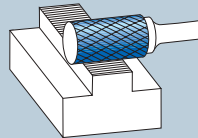


A FORM / SHAPE

ZYA

Zylinder ohne Stirnverzahnung

Cylindrical without end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115000.030	• 3	14	3	38		✓	7,70
115000.060	• 6	13	3	45	✓		12,20
115000.065	• 6	18	6	50		✓	10,35
115000.080	• 8	20	6	65	✓		12,70
115000.090	• 10	20	6	65	✓		14,85
115000.105	• 12	25	6	70	✓		22,85

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113000.030	• 3	14	3	38		✓	5,80
113000.060	• 6	13	3	45	✓		10,35
113000.065	• 6	18	6	50		✓	8,45
113000.080	• 8	20	6	65	✓		10,80
113000.090	• 10	20	6	65	✓		11,80
113000.105	• 12	25	6	70	✓		18,40

Art. 11.5010

Art. 11.3010

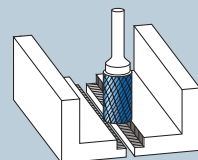


B FORM / SHAPE

ZYB

Zylinder mit Stirnverzahnung

Cylindrical with end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115010.015	• 3	14	3	38		✓	7,80
115010.045	• 6	13	3	45	✓		13,25
115010.050	• 6	18	6	50		✓	11,05
115010.070	• 6	25	6	50		✓	15,10
115010.075	• 8	20	6	65	✓		13,95
115010.085	• 10	20	6	65	✓		16,05
115010.100	• 12	25	6	70	✓		23,85

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113010.015	• 3	14	3	38		✓	5,90
113010.045	• 6	13	3	45	✓		11,40
113010.050	• 6	18	6	50		✓	9,15
113010.070	• 6	25	6	50		✓	13,25
113010.075	• 8	20	6	65	✓		12,05
113010.085	• 10	20	6	65	✓		13,00
113010.100	• 12	25	6	70	✓		19,35

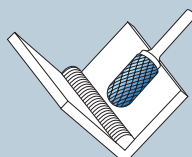
Art. **11.5020**



C FORM / SHAPE

WRC

Walzenrundform
Ball nosed cylinder



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115020.022	• 2,5	11	3	38		✓	7,70
115020.025	• 3	14	3	38		✓	7,70
115020.050	• 6	12,7	3	44	✓		11,55
115020.055	• 6	18	6	50		✓	11,65
115020.075	• 8	20	6	65	✓		13,85
115020.085	• 10	20	6	65	✓		16,05
115020.105	• 12	25	6	70	✓		24,90

Art. **11.3020**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113020.022	• 2,5	11	3	38		✓	5,80
113020.025	• 3	14	3	38		✓	5,80
113020.050	• 6	12,7	3	44	✓		9,65
113020.055	• 6	18	6	50		✓	9,75
113020.075	• 8	20	6	65	✓		11,95
113020.085	• 10	20	6	65	✓		13,00
113020.105	• 12	25	6	70	✓		20,45

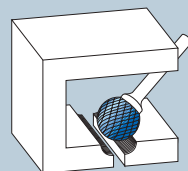
Art. **11.5030**



D FORM / SHAPE

KUD

Kugel
Ball



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115030.025	• 3	2,5	3	38		✓	7,70
115030.045	• 4	3,4	3	38		✓	16,10
115030.046	• 4	3,0	6	50		✓	11,25
115030.047	• 5	4,7	3	38		✓	15,90
115030.048	• 5	4,0	6	50		✓	10,75
115030.050	• 6	5,0	3	38	✓		10,55
115030.055	• 6	4,7	6	50		✓	10,85
115030.060	• 8	6,0	6	52	✓		11,50
115030.070	• 10	8,0	6	54	✓		13,85
115030.080	• 12	11,0	6	56	✓		19,00

Art. **11.3030**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113030.025	• 3	2,5	3	38		✓	5,80
113030.045	• 4	3,4	3	38		✓	14,20
113030.046	• 4	3,0	6	50		✓	9,40
113030.047	• 5	4,7	3	38		✓	14,05
113030.048	• 5	4,0	6	50		✓	8,85
113030.050	• 6	5,0	3	38	✓		8,65
113030.055	• 6	4,7	6	50		✓	8,95
113030.060	• 8	6,0	6	52	✓		9,60
113030.070	• 10	8,0	6	54	✓		10,80
113030.080	• 12	11,0	6	56	✓		14,50



Art.
100
101
102

Art. 11.5040

Art. 11.3040

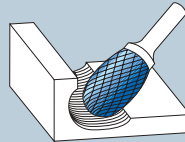


E FORM / SHAPE

TRE

Tropfen

Oval



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115040.010	• 3	6	3	38		✓	7,70
115040.015	• 6	10	3	42	✓		11,55
115040.020	• 6	10	6	50		✓	12,90
115040.025	• 8	15	6	60	✓		14,75
115040.030	• 10	16	6	60	✓		16,20
115040.035	• 12	22	6	67	✓		23,70

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113040.010	• 3	6	3	38		✓	5,80
113040.015	• 6	10	3	42	✓		9,65
113040.020	• 6	10	6	50		✓	11,00
113040.025	• 8	15	6	60	✓		12,85
113040.030	• 10	16	6	60	✓		13,15
113040.035	• 12	22	6	67	✓		19,20

Art. 11.5050

Art. 11.3050

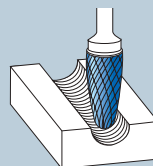


F FORM / SHAPE

RBF

Rundbogen

Ball nosed tree



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115050.015	• 3	8	3	38		✓	7,70
115050.025	• 6	12	3	44	✓		11,40
115050.030	• 6	18	6	50		✓	12,10
115050.035	• 8	20	6	65	✓		15,65
115050.040	• 10	20	6	65	✓		15,85
115050.050	• 12	25	6	70	✓		23,45

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113050.015	• 3	8	3	38		✓	4,85
113050.025	• 6	12	3	44	✓		9,50
113050.030	• 6	18	6	50		✓	10,20
113050.035	• 8	20	6	65	✓		13,80
113050.040	• 10	20	6	65	✓		12,80
113050.050	• 12	25	6	70	✓		18,95

Art. **11.5060**

Art. **11.3060**

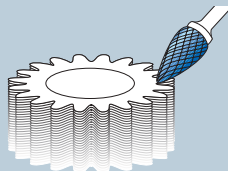


G FORM / SHAPE

SPG

Spitzbogen

Tree



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115060.012	• 3	10	3	38		✓	7,70
115060.015	• 3	14	3	38		✓	7,70
115060.030	• 6	12	3	44	✓		11,40
115060.035	• 6	18	6	50		✓	12,10
115060.040	• 8	20	6	65	✓		14,10
115060.045	• 10	20	6	65	✓		16,55
115060.060	• 12	25	6	70	✓		22,90

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113060.012	• 3	10	3	38		✓	5,80
113060.015	• 3	14	3	38		✓	5,80
113060.030	• 6	12	3	44	✓		9,50
113060.035	• 6	18	6	50		✓	10,20
113060.040	• 8	20	6	65	✓		12,25
113060.045	• 10	20	6	65	✓		13,50
113060.060	• 12	25	6	70	✓		18,45

Art. **11.5070**

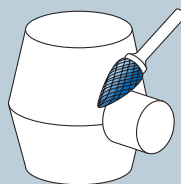
Art. **11.3070**



H FORM / SHAPE

Flamme

Flame



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115070.005	• 3	6	3	38		✓	7,75
115070.015	• 8	20	6	65	✓		15,35
115070.020	• 10	20	6	65	✓		27,30
115070.025	• 12	32	6	77	✓		32,25

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113070.005	• 3	6	3	38		✓	5,85
113070.015	• 8	20	6	65	✓		13,50
113070.020	• 10	20	6	65	✓		24,25
113070.025	• 12	32	6	77	✓		27,75

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Art.
100
101
102

Art. 11.5080

Art. 11.3080

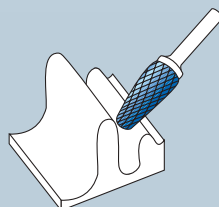


L FORM / SHAPE

KEL

Rundkegel

Ball nosed cone



Video

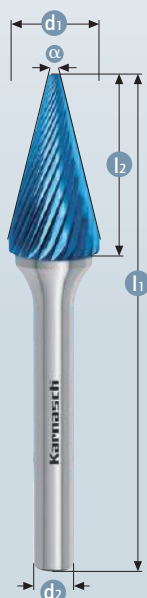


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115080.010	• 3	14	3	38		✓	8°	7,70
115080.015	• 6	16	3	48	✓		22°	12,20
115080.020	• 6	18	6	50		✓	14°	12,20
115080.025	• 8	25	6	70	✓		14°	15,50
115080.030	• 10	20	6	65	✓		14°	21,00
115080.045	• 12	32	6	77	✓		14°	24,80

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113080.010	• 3	14	3	38		✓	8°	5,80
113080.015	• 6	16	3	48	✓		22°	10,35
113080.020	• 6	18	6	50		✓	14°	10,30
113080.025	• 8	25	6	70	✓		14°	13,60
113080.030	• 10	20	6	65	✓		14°	17,95
113080.045	• 12	32	6	77	✓		14°	20,30

Art. 11.5090

Art. 11.3090

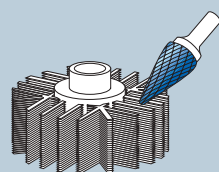


M FORM / SHAPE

SKM

Spitzkegel

Cone



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115090.015	• 3	11	3	38		✓	14°	7,70
115090.025	• 6	12	3	48	✓		22°	11,55
115090.030	• 6	20	6	50		✓	14°	12,20
115090.040	• 10	20	6	65	✓		28°	19,45
115090.045	• 12	25	6	70	✓		28°	24,20

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113090.015	• 3	11	3	38		✓	14°	5,80
113090.025	• 6	12	3	48	✓		22°	9,65
113090.030	• 6	20	6	50		✓	14°	10,30
113090.040	• 10	20	6	65	✓		28°	16,40
113090.045	• 12	25	6	70	✓		28°	19,70

Art. **11.5099**

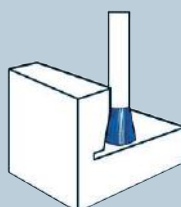


N FORM / SHAPE

WKN

Winkel

Inverted cone



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115099.005	• 3	5	3	38		✓	10°	7,80
115099.010	• 6	7	3	39	✓		10°	11,55
115099.015	• 6	8	6	50		✓	10°	11,85
115099.020	• 10	10	6	55	✓		13°	17,40
115099.025	• 12	13	6	58	✓		30°	25,00

Art. **11.3099**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113099.005	• 3	5	3	38		✓	10°	5,90
113099.010	• 6	7	3	39	✓		10°	9,65
113099.015	• 6	8	6	50		✓	10°	9,95
113099.020	• 10	10	6	55	✓		13°	14,35
113099.025	• 12	13	6	58	✓		30°	20,55

Art. **11.5100**

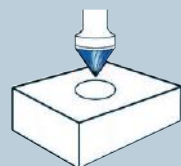


J FORM / SHAPE

KSJ

Kegel 60°

Countersink 60°



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115100.005	• 3	3	3	38		✓	7,70
115100.010	• 6	6	6	50		✓	10,75
115100.015	• 10	8	6	56	✓		14,80
115100.020	• 12	11	6	60	✓		18,75

Art. **11.3100**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113100.005	• 3	3	3	38		✓	5,80
113100.010	• 6	6	6	50		✓	8,85
113100.015	• 10	8	6	56	✓		11,75
113100.020	• 12	11	6	60	✓		14,25



Art.
100
101
102

Art. 11.5110

Art. 11.3110

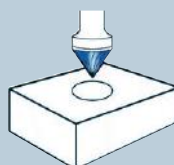


K FORM / SHAPE

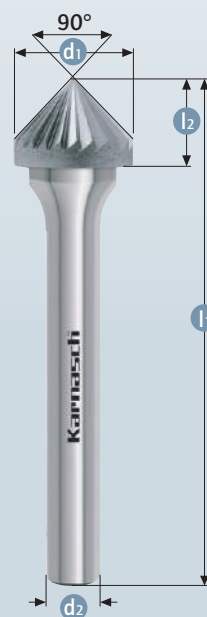
KSK

Kegel 90°

Countersink 90°



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115110.005	• 3	3	3	38		✓	7,70
115110.010	• 6	6	6	50		✓	10,75
115110.015	• 10	8	6	56	✓		14,80
115110.020	• 12	11	6	60	✓		18,75

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113110.005	• 3	3	3	38		✓	5,80
113110.010	• 6	6	6	50		✓	8,85
113110.015	• 10	8	6	56	✓		11,75
113110.020	• 12	11	6	60	✓		14,25

Karnasch®
PROFESSIONAL TOOLS

IHR PARTNER FÜR:

Metallindustrie

Automobilindustrie

Flugzeugindustrie

Schiffbau

Schienenbau

Formenbau

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Schienenbau

Formenbau

Forschung und Entwicklung

Eine große Vision braucht einen zuverlässigen Partner.

KARNASCH – Made for Professionals

1



2



3



4



5



6



7



8



9



10



Art.
100
101
102

HP-4

Durch extra feine Kreuzverzähung entsteht: Through extra fine cross cutting style arise:



- Exzellente Kontrolle (Auch an schwierig zugänglichen Stellen)
 - Ruhiger Lauf
 - Kurze Späne
 - Gute Oberflächengüte
- Mittlere Zerspanleistung
- Für alle Stahlsorten wie:
 - Bis zu extra harten Stählen ca. 70 HRC
 - Gusseisen
 - Edelstahl (INOX)
 - Hochwarmfeste Werkstoffe wie z.B. Nickel-Basis + Kobalt Basislegierungen
- Excellent control (also at difficult to reach positions)
 - smooth operation
 - Short chips
 - Good surface finish
- Medium cutting action
- For all kinds of steel:
 - Up to extra hard steel ca. 70 HRC
 - Cast iron
 - Stainless steel (INOX)
 - Heat-resistant substances, such as e.g. Nickel based + cobalt based alloys

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	–	KEL	SKM	WKN
A	B	C	D	E	F	G	H	L	M	N
344	344	345	346	346	347	347	348	348	349	349
Zylinder Cylinder	Zylinder + Stirnverzähung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Winkel Inverted cone



BLUE-TEC-beschichtet
BLUE-TEC-coated



Für Frässtifte optimierte und patentierte BLUE-TEC-Beschichtung ergibt einzigartige Standzeiten und Performance in allen Stahlsorten.

Patented BLUE-TEC coating, specifically designed for burrs, gives outstanding tool life and excellent performance on all metals.

Werkstoffgruppen			Bearbeitung	Schnittgeschwindigkeit (m/min)
Stahl, Stahlguss	Ungehärtete, nicht vergütete Stähle bis 1200 N/mm ² (< 38 HRC)	Baustähle, Kohlenstoffstähle, Werkzeugstähle, unlegierte Stähle, Einsatzstähle, Stahlguss	Feines Zerspanen = mittlerer Materialabtrag	650-750
	Gehärtete, vergütete Stähle über 1200 N/mm ² (> 38 HRC)	Werkzeugstähle, Vergütungsstähle, legierte Stähle, Stahlguss		450-600
Edelstahl (INOX)	Rost- und säurebeständige Stähle	Austenitische und ferritische Edelstähle	Feines Zerspanen = mittlerer Materialabtrag	450-600
NE-Metalle	Harte NE-Metalle	Bronze, Titan/Titanlegierungen, harte Alu-Legierungen (hoher Si-Anteil)	Feines Zerspanen = mittlerer Materialabtrag	450-600
	Hochwarmfeste Werkstoffe	Nickelbasis- und Kobaltbasislegierungen (Triebwerk- und Turbinenbau)		
Gusseisen	Graues Gusseisen, weißes Gusseisen	Gusseisen mit Lamellengraphit EN-GJL (GG), mit Kugelgraphit/Späroguss EN-GJS (GGG), weißer Temperguss EN-GJMW (GTW), schwarzer Temperguss EN-GJMB (GTS)	Feines Zerspanen = mittlerer Materialabtrag	650-750

Material groups			Application	Cutting speed m/min
Steel, cast steel	Non-hardened, non-heat treated steels up to 1200 N/mm ² (< 38 HRC)	Construction steels, carbon steels, tool steels, non-alloyed steels, case-hardened steels, cast steels	Fine machining = medium stock removal	650-750
	Hardened, heat-treated steels exceeding 1200 N/mm ² (> 38 HRC)	Tool steels, tempering steels, alloyed steel, cast steels		450-600
Stainless steel (INOX)	Rust and acid-resistant steels	Austenitic and ferritic stainless steels	Fine machining = medium stock removal	450-600
Non-ferrous metals	Hard-non-ferrous metals	Bronze, titanium/titanium alloys, hard alu-alloys (high Si content)	Fine machining = medium stock removal	450-600
	High-temperature resistant materials	Nickel based alloys, cobalt based alloys (aircraft engine and turbine construction)		
Cast iron	Grey cast iron, white cast iron	Cast iron with flake graphite EN-GJL, with nodular graphite cast iron EN-GJS, white annealed cast iron EN-GJMW, black cast iron EN-GJMB	Fine machining = medium stock removal	650-750

Schnittgeschwindigkeit • Cutting speed (m/min)				
	450	600	650	750
Ø (mm)	Drehzahlen (min ⁻¹) • Rotational speed (rpm)			
2	72.000	95.000	104.000	120.000
3	48.000	64.000	68.000	80.000
4	36.000	48.000	52.000	60.000
6	24.000	32.000	34.000	40.000
8	18.000	24.000	26.000	30.000
10	14.000	19.000	21.000	24.000
12	12.000	16.000	18.000	21.000
16	9.000	12.000	14.000	17.000



Art. 11.5002

Art. 11.3002

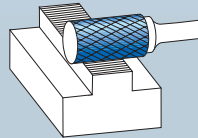


A FORM / SHAPE

ZYA

Zylinder ohne Stirnverzahnung

Cylinder without end cut



Video

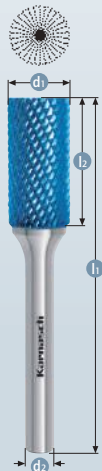


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115002.015	1,5	6	3	38		✓	8,30
115002.025	2	11	3	38		✓	8,30
115002.030	3	14	3	38		✓	8,30
115002.035	3	14	3	50		✓	9,65
115002.040	3	14	3	65		✓	10,75
115002.045	3	14	3	75		✓	11,80
115002.050	3	14	3	100		✓	14,05
115002.055	4	14	6	50		✓	12,00
115002.060	6	13	3	45	✓		13,25
115002.065	6	18	6	50		✓	12,00
115002.070	6	18	6	100	✓		21,50
115002.080	8	20	6	65	✓		14,85
115002.090	10	20	6	65	✓		16,85
115002.095	10	20	6	172	✓		25,95
115002.100	10	25	6	70	✓		17,10
115002.105	12	25	6	70	✓		26,20
115002.110	12	25	6	175	✓		40,50
115002.115	12	25	8	70	✓		26,30
115002.120	16	25	6	70	✓		32,25
115002.125	16	25	8	70	✓		34,75

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113002.015	1,5	6	3	38		✓	6,40
113002.025	2	11	3	38		✓	6,40
113002.030	3	14	3	38		✓	6,40
113002.035	3	14	3	50		✓	7,80
113002.040	3	14	3	65		✓	9,90
113002.045	3	14	3	75		✓	9,90
113002.050	3	14	3	100		✓	12,20
113002.055	4	14	6	50		✓	10,10
113002.060	6	13	3	45	✓		11,40
113002.065	6	18	6	50		✓	10,10
113002.070	6	18	6	100	✓		19,60
113002.080	8	20	6	65	✓		13,00
113002.090	10	20	6	65	✓		13,80
113002.095	10	20	6	172	✓		19,80
113002.100	10	25	6	70	✓		14,05
113002.105	12	25	6	70	✓		21,70
113002.110	12	25	6	175	✓		33,00
113002.115	12	25	8	70	✓		21,80
113002.120	16	25	6	70	✓		27,80
113002.125	16	25	8	70	✓		30,25

Art. 11.5012

Art. 11.3012

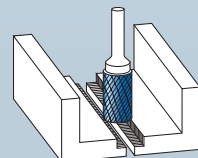


B FORM / SHAPE

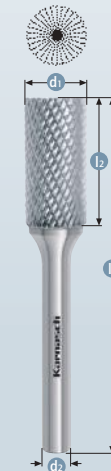
ZYB

Zylinder mit Stirnverzahnung

Cylinder with end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115012.005	1,5	6	3	38		✓	8,85
115012.010	2	1	3	38		✓	8,85
115012.015	3	14	3	38		✓	8,85
115012.020	3	14	3	50		✓	10,45
115012.025	3	14	3	65		✓	11,60
115012.030	3	14	3	75		✓	12,80
115012.035	3	14	3	100		✓	15,65
115012.040	4	14	6	50		✓	12,80
115012.045	6	13	3	45	✓		14,45
115012.050	6	18	6	50		✓	12,80
115012.060	6	18	6	100	✓		23,50
115012.075	8	20	6	65	✓		16,15
115012.080	8	20	6	170	✓		22,75
115012.085	10	20	6	65	✓		18,35
115012.090	10	20	6	172	✓		28,50
115012.100	12	25	6	70	✓		28,40
115012.105	12	25	6	175	✓		42,40
115012.110	12	25	8	70	✓		28,40
115012.115	16	25	6	70	✓		35,05
115012.120	16	25	8	70	✓		37,45

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113012.005	1,5	6	3	38		✓	7,00
113012.010	2	1	3	38		✓	7,00
113012.015	3	14	3	38		✓	7,00
113012.020	3	14	3	50		✓	8,60
113012.025	3	14	3	65		✓	9,70
113012.030	3	14	3	75		✓	10,90
113012.035	3	14	3	100		✓	13,75
113012.040	4	14	6	50		✓	10,95
113012.045	6	13	3	45	✓		12,55
113012.050	6	18	6	50		✓	10,95
113012.060	6	18	6	100	✓		21,60
113012.075	8	20	6	65	✓		14,25
113012.080	8	20	6	170	✓		20,85
113012.085	10	20	6	65	✓		15,30
113012.090	10	20	6	172	✓		22,35
113012.100	12	25	6	70	✓		23,90
113012.105	12	25	6	175	✓		34,95
113012.110	12	25	8	70	✓		23,90
113012.115	16	25	6	70	✓		30,55
113012.120	16	25	8	70	✓		33,00

Art. **11.5022**

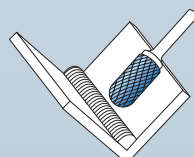
Art. **11.3022**



C FORM / SHAPE

WRC

Walzenrundform
Ball nosed cylinder



Video

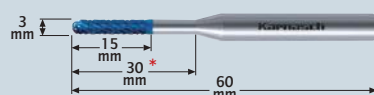


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115022.020	2	11	3	38		✓	8,30
115022.025	3	14	3	38		✓	8,30
115022.030	3	14	3	50		✓	10,80
115022.032	3	14	3	60		✓	11,30
115022.035	3	14	3	75		✓	11,80
115022.040	3	14	3	100		✓	14,85
115022.043	3	30*(15)	6	60		✓	24,40
115022.045	4	16	6	50		✓	13,55
115022.046	4	30*(15)	6	60		✓	24,95
115022.050	6	12,7	3	44	✓		13,25
115022.055	6	18	6	50		✓	13,55
115022.056	6	18	6	60		✓	16,90
115022.058	6	18	6	80		✓	20,20
115022.060	6	18	6	100	✓		24,65
115022.065	6	18	6	150	✓		33,95
115022.070	6	25	6	50		✓	16,95
115022.075	8	20	6	65	✓		16,00
115022.080	8	20	6	170	✓		20,30
115022.085	10	20	6	65	✓		18,60
115022.090	10	20	6	170	✓		28,20
115022.095	10	25	6	70	✓		21,55
115022.100	12	20	6	65	✓		28,00
115022.105	12	25	6	70	✓		28,75
115022.110	12	25	6	175	✓		42,10
115022.115	12	25	8	70	✓		28,90
115022.120	16	25	6	70	✓		35,50
115022.125	16	25	8	70	✓		35,50

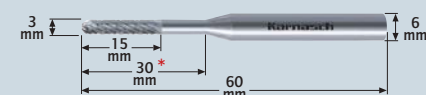
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113022.020	2	11	3	38		✓	6,40
113022.025	3	14	3	38		✓	6,40
113022.030	3	14	3	50		✓	8,90
113022.032	3	14	3	60		✓	9,40
113022.035	3	14	3	75		✓	9,90
113022.040	3	14	3	100		✓	13,00
113022.043	3	30*(15)	6	60		✓	22,50
113022.045	4	16	6	50		✓	11,65
113022.046	4	30*(15)	6	60		✓	23,05
113022.050	6	12,7	3	44	✓		11,40
113022.055	6	18	6	50		✓	11,65
113022.056	6	18	6	60		✓	15,05
113022.058	6	18	6	80		✓	18,30
113022.060	6	18	6	100	✓		22,80
113022.065	6	18	6	150	✓		32,10
113022.070	6	25	6	50		✓	15,05
113022.075	8	20	6	65	✓		14,10
113022.080	8	20	6	170	✓		18,40
113022.085	10	20	6	65	✓		15,55
113022.090	10	20	6	170	✓		22,05
113022.095	10	25	6	70	✓		18,50
113022.100	12	20	6	65	✓		23,50
113022.105	12	25	6	70	✓		24,25
113022.110	12	25	6	175	✓		34,60
113022.115	12	25	8	70	✓		24,40
113022.120	16	25	6	70	✓		31,00
113022.125	16	25	8	70	✓		31,00

• Frässtifte speziell für Schlüsseldienste siehe Seite 400/401
Burs specially for locksmiths see page 400/401

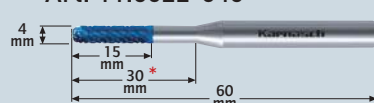
* Art. 11.5022-043



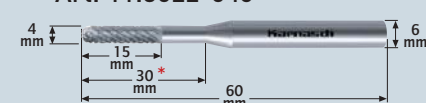
* Art. 11.3022-043



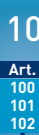
* Art. 11.5022-046



* Art. 11.3022-046



* Von 30 mm sind 15 mm verzahnt
15 mm by 30 mm are not machined



Art.
100
101
102

Art. 11.5032

Art. 11.3032

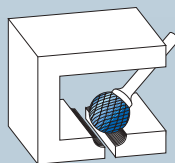


D FORM / SHAPE

KUD

Kugel

Ball



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115032.020	• 2	1,8	3	38		✓	8,30
115032.025	• 3	2,5	3	38		✓	8,30
115032.030	• 3	2,5	3	50		✓	10,10
115032.035	• 3	2,5	3	75		✓	11,20
115032.040	• 3	2,5	6	50		✓	12,60
115032.045	• 4	3,4	3	38		✓	18,65
115032.050	• 6	5,0	3	38	✓		11,40
115032.055	• 6	4,7	6	50		✓	12,60
115032.060	• 8	6,0	6	52	✓		13,25
115032.065	• 8	6,0	6	180	✓		18,50
115032.070	• 10	8,0	6	54	✓		15,30
115032.075	• 10	8,0	6	185	✓		24,30
115032.080	• 12	11,0	6	56	✓		21,00
115032.085	• 12	11,0	8	56	✓		21,00
115032.090	• 12	11,0	6	162	✓		31,95
115032.095	• 16	14,0	6	60	✓		26,05
115032.100	• 16	14,0	8	60	✓		27,95

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113032.020	• 2	1,8	3	38		✓	6,40
113032.025	• 3	2,5	3	38		✓	6,40
113032.030	• 3	2,5	3	50		✓	8,20
113032.035	• 3	2,5	3	75		✓	9,35
113032.040	• 3	2,5	6	50		✓	10,70
113032.045	• 4	3,4	3	38		✓	16,75
113032.050	• 6	5,0	3	38	✓		9,50
113032.055	• 6	4,7	6	50		✓	10,70
113032.060	• 8	6,0	6	52	✓		11,40
113032.065	• 8	6,0	6	180	✓		16,60
113032.070	• 10	8,0	6	54	✓		12,25
113032.075	• 10	8,0	6	185	✓		18,15
113032.080	• 12	11,0	6	56	✓		16,50
113032.085	• 12	11,0	8	56	✓		16,50
113032.090	• 12	11,0	6	162	✓		24,50
113032.095	• 16	14,0	6	60	✓		21,60
113032.100	• 16	14,0	8	60	✓		23,45

Art. 11.5042

Art. 11.3042

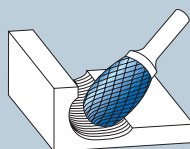


E FORM / SHAPE

TRE

Tropfen

Oval



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115042.010	• 3	6	3	38		✓	8,30
115042.015	• 6	10	3	42	✓		13,25
115042.020	• 6	10	6	50		✓	15,05
115042.025	• 8	15	6	60	✓		16,10
115042.030	• 10	16	6	60	✓		18,60
115042.035	• 12	22	6	67	✓		27,20
115042.040	• 12	22	8	67	✓		27,20
115042.045	• 16	25	6	70	✓		36,25
115042.050	• 16	25	8	70	✓		36,25

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113042.010	• 3	6	3	38		✓	6,40
113042.015	• 6	10	3	42	✓		11,40
113042.020	• 6	10	6	50		✓	13,15
113042.025	• 8	15	6	60	✓		14,20
113042.030	• 10	16	6	60	✓		15,55
113042.035	• 12	22	6	67	✓		22,70
113042.040	• 12	22	8	67	✓		22,70
113042.045	• 16	25	6	70	✓		31,75
113042.050	• 16	25	8	70	✓		31,75

Art. **11.5052**

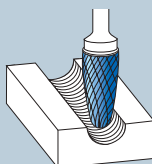


F FORM / SHAPE

RBF

Rundbogen

Ball nosed tree



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115052.010	• 3	8	3	38		✓	8,30
115052.015	• 3	14	3	38		✓	8,30
115052.020	• 3	14	3	50		✓	10,80
115052.025	• 6	12	3	44	✓		13,25
115052.030	• 6	18	6	50		✓	14,10
115052.035	• 8	20	6	65	✓		17,10
115052.040	• 10	20	6	65	✓		18,90
115052.045	• 10	20	6	170	✓		27,75
115052.050	• 12	25	6	70	✓		26,60
115052.055	• 12	25	8	70	✓		26,60
115052.060	• 12	25	6	175	✓		39,20
115052.065	• 16	25	6	70	✓		35,10
115052.070	• 16	25	8	80	✓		35,10

Art. **11.3052**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113052.010	• 3	8	3	38		✓	6,40
113052.015	• 3	14	3	38		✓	6,40
113052.020	• 3	14	3	50		✓	8,90
113052.025	• 6	12	3	44	✓		11,40
113052.030	• 6	18	6	50		✓	12,25
113052.035	• 8	20	6	65	✓		15,20
113052.040	• 10	20	6	65	✓		15,85
113052.045	• 10	20	6	170	✓		21,60
113052.050	• 12	25	6	70	✓		22,10
113052.055	• 12	25	8	70	✓		22,10
113052.060	• 12	25	6	175	✓		31,75
113052.065	• 16	25	6	70	✓		30,65
113052.070	• 16	25	8	80	✓		30,65

Art. **11.5062**

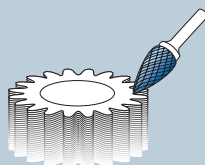


F FORM / SHAPE

SPG

Spitzbogen

Tree



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115062.010	• 3	6	3	38		✓	8,30
115062.015	• 3	14	3	38		✓	8,30
115062.020	• 3	14	3	50		✓	9,85
115062.025	• 3	14	3	75		✓	11,65
115062.030	• 6	12	3	44	✓		13,25
115062.035	• 6	18	6	50		✓	14,10
115062.040	• 8	20	6	65	✓		16,50
115062.045	• 10	20	6	65	✓		19,25
115062.050	• 10	20	6	170	✓		29,10
115062.055	• 12	20	6	65	✓		26,20
115062.060	• 12	25	6	70	✓		26,20
115062.065	• 12	25	8	70	✓		26,20
115062.070	• 12	25	6	175	✓		38,85
115062.075	• 12	30	6	75	✓		28,50
115062.080	• 12	30	8	75	✓		28,50
115062.085	• 16	25	6	70	✓		35,50
115062.090	• 16	25	8	70	✓		38,15

Art. **11.3062**



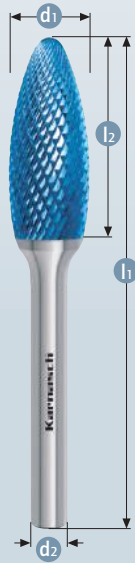
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113062.010	• 3	6	3	38		✓	6,40
113062.015	• 3	14	3	38		✓	6,40
113062.020	• 3	14	3	50		✓	7,95
113062.025	• 3	14	3	75		✓	9,75
113062.030	• 6	12	3	44	✓		11,40
113062.035	• 6	18	6	50		✓	12,25
113062.040	• 8	20	6	65	✓		14,60
113062.045	• 10	20	6	65	✓		16,20
113062.050	• 10	20	6	170	✓		22,95
113062.055	• 12	20	6	65	✓		21,75
113062.060	• 12	25	6	70	✓		21,75
113062.065	• 12	25	8	70	✓		21,75
113062.070	• 12	25	6	175	✓		31,40
113062.075	• 12	30	6	75	✓		24,00
113062.080	• 12	30	8	75	✓		24,00
113062.085	• 16	25	6	70	✓		31,05
113062.090	• 16	25	8	70	✓		33,65



Art.
100
101
102

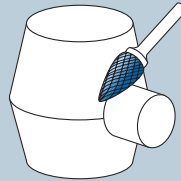
Art. 11.5072

Art. 11.3072

**H** FORM / SHAPE

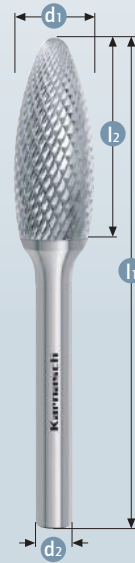
Flamme

Flame



Video

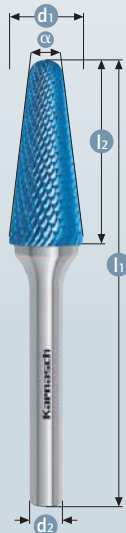
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115072.005	• 3	6	3	38		✓	8,30
115072.010	• 6	14	6	60		✓	16,35
115072.015	• 8	20	6	65	✓		17,70
115072.020	• 10	20	6	65	✓		29,85
115072.025	• 12	32	6	77	✓		35,10
115072.030	• 12	32	8	77	✓		35,10
115072.035	• 16	36	6	82	✓		50,00
115072.040	• 16	36	8	82	✓		53,90



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113072.005	• 3	6	3	38		✓	6,40
113072.010	• 6	14	6	60		✓	14,50
113072.015	• 8	20	6	65	✓		15,85
113072.020	• 10	20	6	65	✓		26,80
113072.025	• 12	32	6	77	✓		30,65
113072.030	• 12	32	8	77	✓		30,65
113072.035	• 16	36	6	82	✓		45,55
113072.040	• 16	36	8	82	✓		49,40

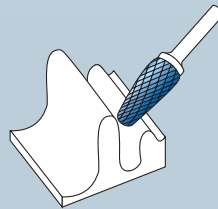
Art. 11.5082

Art. 11.3082

**L** FORM / SHAPE

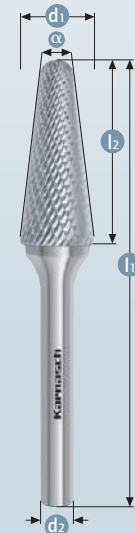
Rundkegel

Ball nosed cone



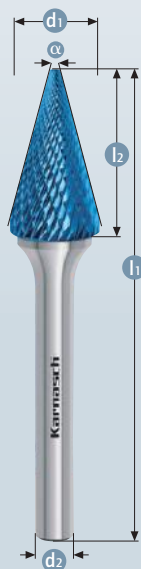
Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115082.005	• 3	10	3	38		✓	10°	8,30
115082.010	• 3	14	3	38		✓	8°	8,30
115082.015	• 6	16	3	48	✓		22°	13,25
115082.020	• 6	18	6	50		✓	14°	14,40
115082.025	• 8	25	6	70	✓		14°	18,10
115082.030	• 10	20	6	65	✓		14°	22,45
115082.035	• 10	30	6	75	✓		14°	22,45
115082.040	• 10	30	6	176	✓		14°	33,70
115082.045	• 12	32	6	77	✓		14°	26,95
115082.050	• 12	32	8	77	✓		14°	26,95
115082.055	• 12	32	6	182	✓		14°	44,30
115082.060	• 16	33	6	78	✓		14°	39,10
115082.065	• 16	33	8	78	✓		14°	39,10



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113082.005	• 3	10	3	38		✓	10°	6,40
113082.010	• 3	14	3	38		✓	8°	6,40
113082.015	• 6	16	3	48	✓		22°	11,40
113082.020	• 6	18	6	50		✓	14°	12,50
113082.025	• 8	25	6	70	✓		14°	16,20
113082.030	• 10	20	6	65	✓		14°	19,35
113082.035	• 10	30	6	75	✓		14°	19,35
113082.040	• 10	30	6	176	✓		14°	27,55
113082.045	• 12	32	6	77	✓		14°	22,45
113082.050	• 12	32	8	77	✓		14°	22,45
113082.055	• 12	32	6	182	✓		14°	36,80
113082.060	• 16	33	6	78	✓		14°	34,60
113082.065	• 16	33	8	78	✓		14°	34,60

Art. **11.5092**

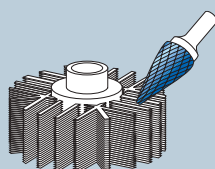


M FORM / SHAPE

SKM

Spitzkegel

Cone



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115092.010	• 3	8	3	38		✓	18°	8,30
115092.015	• 3	11	3	38		✓	14°	8,30
115092.020	• 3	15	3	38		✓	10°	8,30
115092.025	• 6	12	3	48	✓		22°	13,25
115092.030	• 6	20	6	50		✓	14°	14,40
115092.035	• 8	18	6	63	✓		13°	16,50
115092.040	• 10	20	6	65	✓		28°	21,15
115092.045	• 12	25	6	70	✓		28°	26,20
115092.050	• 12	25	8	70	✓		28°	26,20
115092.055	• 16	26	6	74	✓		33°	37,05
115092.060	• 16	26	8	74	✓		33°	37,05

Art. **11.3092**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113092.010	• 3	8	3	38		✓	18°	6,40
113092.015	• 3	11	3	38		✓	14°	6,40
113092.020	• 3	15	3	38		✓	10°	6,40
113092.025	• 6	12	3	48	✓		22°	11,40
113092.030	• 6	20	6	50		✓	14°	12,50
113092.035	• 8	18	6	63	✓		13°	14,60
113092.040	• 10	20	6	65	✓		28°	18,05
113092.045	• 12	25	6	70	✓		28°	21,75
113092.050	• 12	25	8	70	✓		28°	21,75
113092.055	• 16	26	6	74	✓		33°	32,55
113092.060	• 16	26	8	74	✓		33°	32,55

Art. **11.5098**

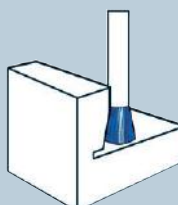


N FORM / SHAPE

WKN

Winkel

Inverted cone



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115098.015	• 6	8	6	50		✓	10°	15,35
115098.020	• 10	10	6	55	✓		13°	19,05
115098.025	• 12	13	6	58	✓		30°	28,70

Art. **11.3098**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113098.015	• 6	8	6	50		✓	10°	13,45
113098.020	• 10	10	6	55	✓		13°	16,00
113098.025	• 12	13	6	58	✓		30°	24,20



Art.
100
101
102

HP-7

Für grobe Zerspanung und höchsten Materialabtrag von:
For coarse cutting and highest material removal from:

- Alu-Legierungen
- Leichtmetalle
- Weiche Buntmetalle (NE-Metalle)
- Kunststoffe
- Faserverstärkte Kunststoffe GFK/CFK
- Aluminium alloy
- Light metals
- Soft copper and copper alloys (non-ferrous metals)
- Plastics
- Fibre-reinforced plastics (GFK/CFK)

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM	MINI-ALU
A	B	C	D	E	F	G	H	L	M	
										
352	352	353	353	354	354	355	355	356	356	357
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Minifrässtifte in feiner Aluverzahnung Mini-Burrs in Alu cutting style



BLACK-TEC-beschichtet
BLACK-TEC-coated



Karnasch BLACK-TEC-Beschichtung wurde speziell für NE-Metalle entwickelt (Verzahnung HP-7) hervorragende Reib- und Gleiteigenschaften verringern die Bildung von Aufbauschneiden.

Karnasch BLACK-TEC coating is specifically designed for non-ferrous materials (Cut HP-7). Low friction and excellent chip clearance characteristics reduce clogging of the flutes.

Werkstoffgruppen			Bearbeitung	Schnittgeschwindigkeit (m/min)
NE-Metalle	Weiche NE- Metalle	Alu Legierungen, Messing, Kupfer, Zink	Grobes Zerspanen = Hoher Materialabtrag	600 - 1100
			Feines Zerspanen = Geringer Materialabtrag	900 - 1100
	Harte NE- Metalle	Bronze, Titan, harte Alu- Legierungen (hoher Si-Anteil)	Grobes Zerspanen = Hoher Materialabtrag	600 - 1100
			Feines Zerspanen = Geringer Materialabtrag	900 - 1100
Kunststoff, andere Werkstoffe	Faserverstärkte Kunststoffe (GFK/CFK) thermoplastische Kunststoffe, Hartgummi		Grobes Zerspanen = Hoher Materialabtrag	500 - 1100
			Feines Zerspanen = Geringer Materialabtrag	500 - 1100

Material groups			Application	Cutting speed m/min
Non-ferrous metals	Soft non-ferrous metals	Alu alloys, brass copper, zinc	Coarse machining = high stock removal	600 - 1100
			Fine machining = low stock removal	900 - 1100
	Hard non-ferrous metals	Bronze, titanium, hard aluminium alloys, (high Si content)	Coarse machining = high stock removal	600 - 1100
			Fine machining = low stock removal	900 - 1100
Plastics, other materials	Fibre-reinforced plastic (GFK/CFK) thermoplastics, hard rubber		Coarse machining = high stock removal	500 - 1100
			Fine machining = low stock removal	500 - 1100



Schnittgeschwindigkeit • Cutting speed (m/min)				
	500	600	900	1100
Ø (mm)	Drehzahlen (min ⁻¹) • Rotational speed (rpm)			
2	80000	95000	143000	175000
3	53000	64000	95000	116000
4	40000	48000	72000	88000
6	27000	32000	48000	59000
8	20000	24000	36000	44000
10	16000	19000	29000	35000
12	13000	16000	24000	30000
16	10000	12000	18000	22000
20	8000	10000	14000	17000
25	6000	8000	11000	13500

1



2



3



4



5



6



7



8



9



10



Art. 100 101 102

Art. 11.5005

Art. 11.3005

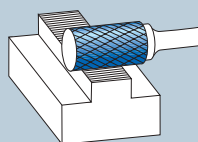


A FORM / SHAPE

ZYA

Zylinder ohne Stirnverzahnung

Cylinder without end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115005.030	• 3	14	3	38		✓	11,10
115005.060	• 6	13	3	45	✓		18,50
115005.065	• 6	18	6	50		✓	15,70
115005.080	• 8	20	6	65	✓		19,50
115005.090	• 10	20	6	65	✓		22,85
115005.105	• 12	25	6	70	✓		32,45
115005.120	• 16	25	6	70	✓		37,80
115005.125	• 16	25	8	70	✓		40,10
115005.130	• 20	25	6	70	✓		54,45
115005.135	• 20	25	8	70	✓		56,45
115005.140	• 25	25	6	70	✓		91,70

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113005.030	• 3	14	3	38		✓	7,90
113005.060	• 6	13	3	45	✓		14,20
113005.065	• 6	18	6	50		✓	11,40
113005.080	• 8	20	6	65	✓		15,15
113005.090	• 10	20	6	65	✓		17,05
113005.105	• 12	25	6	70	✓		25,30
113005.120	• 16	25	6	70	✓		30,65
113005.125	• 16	25	8	70	✓		33,00
113005.130	• 20	25	6	70	✓		42,10
113005.135	• 20	25	8	70	✓		44,10
113005.140	• 25	25	6	70	✓		79,35

Art. 11.5015

Art. 11.3015

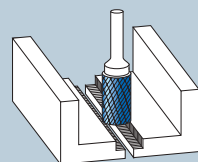


B FORM / SHAPE

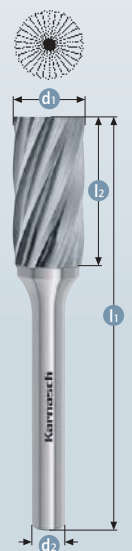
ZYB

Zylinder mit Stirnverzahnung

Cylinder with end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115015.015	• 3	14	3	38		✓	11,90
115015.045	• 6	13	3	45	✓		20,70
115015.050	• 6	18	6	50		✓	16,90
115015.075	• 8	20	6	65	✓		21,00
115015.085	• 10	20	6	65	✓		24,60
115015.100	• 12	25	6	70	✓		34,60
115015.110	• 12	25	8	70	✓		36,65
115015.115	• 16	25	6	70	✓		40,85
115015.120	• 16	25	8	70	✓		43,20
115015.125	• 20	25	6	70	✓		58,65
115015.130	• 20	25	8	70	✓		60,75
115015.135	• 25	25	6	70	✓		103,20

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113015.015	• 3	14	3	38		✓	8,70
113015.045	• 6	13	3	45	✓		16,40
113015.050	• 6	18	6	50		✓	12,60
113015.075	• 8	20	6	65	✓		16,70
113015.085	• 10	20	6	65	✓		18,80
113015.100	• 12	25	6	70	✓		27,50
113015.110	• 12	25	8	70	✓		29,55
113015.115	• 16	25	6	70	✓		33,70
113015.120	• 16	25	8	70	✓		36,05
113015.125	• 20	25	6	70	✓		46,30
113015.130	• 20	25	8	70	✓		48,40
113015.135	• 25	25	6	70	✓		90,85

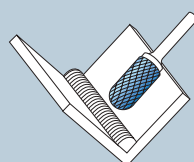
Art. **11.5025**



C FORM / SHAPE

WRC

Walzenrundform
Ball nosed cylinder



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115025.020	• 2	11	3	38		✓	11,10
115025.025	• 3	14	3	38		✓	11,10
115025.050	• 6	12,7	3	44	✓		19,05
115025.055	• 6	18	6	50		✓	17,05
115025.075	• 8	20	6	65	✓		23,80
115025.085	• 10	20	6	65	✓		22,85
115025.100	• 12	20	6	65	✓		36,30
115025.105	• 12	25	6	70	✓		32,10
115025.115	• 12	25	8	70	✓		34,60
115025.120	• 16	25	6	70	✓		48,45
115025.125	• 16	25	8	70	✓		48,45
115025.130	• 20	25	6	70	✓		64,30
115025.135	• 20	25	8	70	✓		64,30

Art. **11.3025**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113025.020	• 2	11	3	38		✓	7,90
113025.025	• 3	14	3	38		✓	7,90
113025.050	• 6	12,7	3	44	✓		14,75
113025.055	• 6	18	6	50		✓	12,75
113025.075	• 8	20	6	65	✓		19,45
113025.085	• 10	20	6	65	✓		17,05
113025.100	• 12	20	6	65	✓		29,15
113025.105	• 12	25	6	70	✓		24,95
113025.115	• 12	25	8	70	✓		27,50
113025.120	• 16	25	6	70	✓		41,30
113025.125	• 16	25	8	70	✓		41,30
113025.130	• 20	25	6	70	✓		51,95
113025.135	• 20	25	8	70	✓		51,95

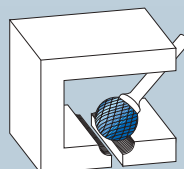
Art. **11.5035**



D FORM / SHAPE

KUD

Kugel
Ball



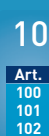
Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115035.020	• 2	1,8	3	38		✓	11,10
115035.025	• 3	2,7	3	38		✓	11,10
115035.045	• 4	3,4	3	38		✓	24,05
115035.050	• 6	5,0	3	38	✓		16,80
115035.055	• 6	4,7	6	50		✓	16,90
115035.060	• 8	6,0	6	52	✓		21,55
115035.070	• 10	8,0	6	54	✓		19,85
115035.080	• 12	11,0	6	56	✓		32,10
115035.085	• 12	11,0	8	56	✓		33,50
115035.095	• 16	11,0	6	60	✓		39,65
115035.100	• 16	11,0	8	60	✓		39,65
115035.105	• 20	16,5	6	62	✓		54,60
115035.110	• 20	16,5	8	62	✓		54,60
115035.115	• 25	22,0	6	68	✓		79,75
115035.120	• 25	22,0	8	68	✓		79,75

Art. **11.3035**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113035.020	• 2	1,8	3	38		✓	7,90
113035.025	• 3	2,7	3	38		✓	7,90
113035.045	• 4	3,4	3	38		✓	20,85
113035.050	• 6	5,0	3	38	✓		12,45
113035.055	• 6	4,7	6	50		✓	12,60
113035.060	• 8	6,0	6	52	✓		17,20
113035.070	• 10	8,0	6	54	✓		14,05
113035.080	• 12	11,0	6	56	✓		24,95
113035.085	• 12	11,0	8	56	✓		26,40
113035.095	• 16	11,0	6	60	✓		32,50
113035.100	• 16	11,0	8	60	✓		32,50
113035.105	• 20	16,5	6	62	✓		42,25
113035.110	• 20	16,5	8	62	✓		42,25
113035.115	• 25	22,0	6	68	✓		67,40
113035.120	• 25	22,0	8	68	✓		67,40



Art.
100
101
102

Art. 11.5045

Art. 11.3045

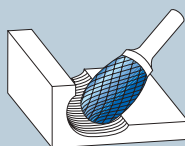


E FORM / SHAPE

TRE

Tropfen

Oval



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115045.010	• 3	6	3	38		✓	11,10
115045.015	• 6	10	3	42	✓		19,20
115045.020	• 6	10	6	50		✓	23,30
115045.025	• 8	15	6	60	✓		21,60
115045.030	• 10	16	6	60	✓		23,95
115045.035	• 12	22	6	67	✓		29,95
115045.045	• 16	25	6	70	✓		44,25
115045.050	• 16	25	8	70	✓		44,25
115045.055	• 20	25	6	70	✓		62,15
115045.060	• 20	25	8	70	✓		62,15

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113045.010	• 3	6	3	38		✓	7,90
113045.015	• 6	10	3	42	✓		14,90
113045.020	• 6	10	6	50		✓	18,95
113045.025	• 8	15	6	60	✓		17,25
113045.030	• 10	16	6	60	✓		18,15
113045.035	• 12	22	6	67	✓		22,80
113045.045	• 16	25	6	70	✓		37,10
113045.050	• 16	25	8	70	✓		37,10
113045.055	• 20	25	6	70	✓		49,80
113045.060	• 20	25	8	70	✓		49,80

Art. 11.5055

Art. 11.3055

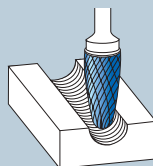


F FORM / SHAPE

RBF

Rundbogen

Ball nosed tree



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115055.015	• 3	14	3	38		✓	11,10
115055.025	• 6	12	3	44	✓		19,20
115055.030	• 6	18	6	50		✓	17,05
115055.035	• 8	20	6	65	✓		22,75
115055.040	• 10	20	6	65	✓		23,90
115055.050	• 12	25	6	70	✓		33,70
115055.055	• 12	25	8	70	✓		33,70
115055.065	• 16	25	6	70	✓		39,65
115055.070	• 16	25	8	70	✓		39,65
115055.075	• 20	25	6	70	✓		59,40
115055.080	• 20	25	8	70	✓		59,40

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113055.015	• 3	14	3	38		✓	7,90
113055.025	• 6	12	3	44	✓		14,90
113055.030	• 6	18	6	50		✓	12,75
113055.035	• 8	20	6	65	✓		18,45
113055.040	• 10	20	6	65	✓		18,05
113055.050	• 12	25	6	70	✓		26,55
113055.055	• 12	25	8	70	✓		26,55
113055.065	• 16	25	6	70	✓		32,50
113055.070	• 16	25	8	70	✓		32,50
113055.075	• 20	25	6	70	✓		47,00
113055.080	• 20	25	8	70	✓		47,00

Art. **11.5065**

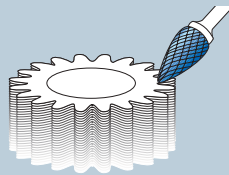


G FORM / SHAPE

SPG

Spitzbogen

Tree

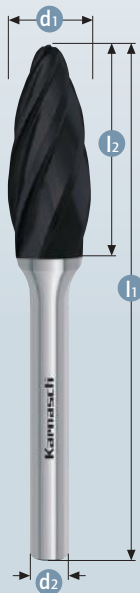


Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115065.015	• 3	14	3	38		✓	11,10
115065.030	• 6	12	3	44	✓		19,20
115065.035	• 6	18	6	50		✓	21,90
115065.040	• 8	20	6	65	✓		22,10
115065.045	• 10	20	6	65	✓		25,50
115065.060	• 12	25	6	70	✓		33,55
115065.085	• 16	25	6	70	✓		48,05

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113065.015	• 3	14	3	38		✓	7,90
113065.030	• 6	12	3	44	✓		14,90
113065.035	• 6	18	6	50		✓	17,60
113065.040	• 8	20	6	65	✓		17,75
113065.045	• 10	20	6	65	✓		19,70
113065.060	• 12	25	6	70	✓		26,45
113065.085	• 16	25	6	70	✓		40,90

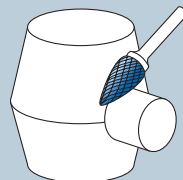
Art. **11.5075**



H FORM / SHAPE

Flamme

Flame



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115075.015	• 8	20	6	65	✓		23,50
115075.020	• 10	20	6	65	✓		40,85
115075.025	• 12	32	6	77	✓		44,35
115075.035	• 16	36	6	82	✓		67,10

Art. **11.3075**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113075.015	• 8	20	6	65	✓		19,20
113075.020	• 10	20	6	65	✓		35,05
113075.025	• 12	32	6	77	✓		37,25
113075.035	• 16	36	6	82	✓		59,95

1



2



3



4



5



6



7



8



9



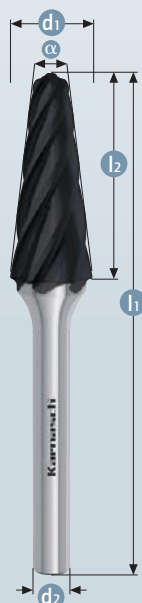
10



Art.
100
101
102

Art. 11.5085

Art. 11.3085

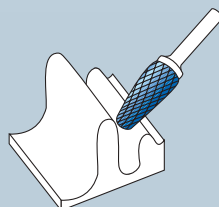


L FORM / SHAPE

KEL

Rundkegel

Ball nosed cone



Video

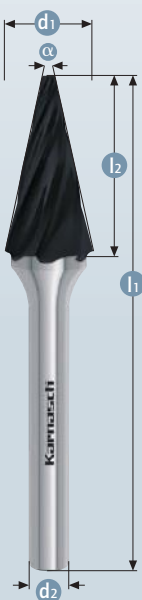


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115085.010	● 3	14	3	38		✓	8°	11,10
115085.015	● 6	16	3	48	✓		22°	19,20
115085.020	● 6	18	6	50		✓	14°	23,00
115085.025	● 8	25	6	70	✓		14°	23,95
115085.035	● 10	30	6	75	✓		14°	28,95
115085.045	● 12	32	6	77	✓		14°	36,10
115085.050	● 12	32	8	77	✓		14°	36,10
115085.055	● 12	32	8	182	✓		14°	55,00
115085.060	● 16	33	6	78	✓		14°	48,45
115085.065	● 16	33	8	78	✓		14°	48,45

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113085.010	● 3	14	3	38		✓	8°	7,90
113085.015	● 6	16	3	48	✓		22°	14,90
113085.020	● 6	18	6	50		✓	14°	18,65
113085.025	● 8	25	6	70	✓		14°	19,65
113085.035	● 10	30	6	75	✓		14°	23,15
113085.045	● 12	32	6	77	✓		14°	28,95
113085.050	● 12	32	8	77	✓		14°	28,95
113085.055	● 12	32	8	182	✓		14°	42,95
113085.060	● 16	33	6	78	✓		14°	41,30
113085.065	● 16	33	8	78	✓		14°	41,30

Art. 11.5095

Art. 11.3095

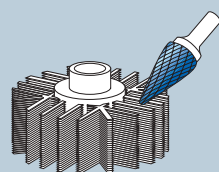


M FORM / SHAPE

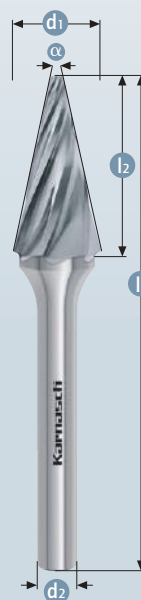
SKM

Spitzkegel

Cone



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115095.015	● 3	11	3	38		✓	8°	11,10
115095.025	● 6	12	3	44	✓		22°	18,50
115095.030	● 6	20	6	50		✓	14°	21,20
115095.040	● 10	20	6	65	✓		14°	26,70
115095.045	● 12	25	6	70	✓		14°	32,30

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113095.015	● 3	11	3	38		✓	8°	7,90
113095.025	● 6	12	3	44	✓		22°	14,20
113095.030	● 6	20	6	50		✓	14°	16,90
113095.040	● 10	20	6	65	✓		14°	20,90
113095.045	● 12	25	6	70	✓		14°	25,20

Einsatzgebiete:

Zu bearbeitende Werkstoffe:

Drehzahlempfehlung:

Feinmechanik, Werkzeugbau

Alulegierungen, Leichtmetalle, Buntmetalle, Kunststoffe

ca. 70.000 U/min

Applications:

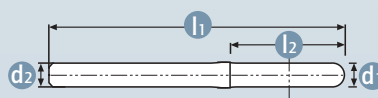
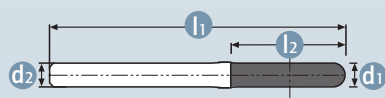
For use on:

Recommended operating speed:

Precision engineering, tool manufacture

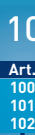
Aluminium alloys, light metals, copper and copper alloys, Plastics

ca. 70,000 RPM



Art.	d1	l2	d2	l1	Form Shape	DIN 8033		€
115005.030	• 3	14	3	38	A	ZYA		11,10
115015.015	• 3	14	3	38	B	ZYB		11,90
115025.020	• 2	11	3	38	C	WRC		11,10
115025.025	• 3	14	3	38	C	WRC		11,10
115035.020	• 2	1,75	3	38	D	KUD		11,10
115035.025	• 3	2,7	3	38	D	KUD		11,10
115045.010	• 3	6	3	38	E	TRE		11,10
115055.015	• 3	14	3	38	F	RBF		11,10
115065.015	• 3	14	3	38	G	SPG		11,10
115085.010	• 3	14	3	38	L	KEL		11,10
115095.015	• 3	11	3	38	M	SKM		11,10

Art.	d1	l2	d2	l1	Form Shape	DIN 8033		€
113005.030	• 3	14	3	38	A	ZYA		7,90
113015.015	• 3	14	3	38	B	ZYB		8,70
113025.020	• 2	11	3	38	C	WRC		7,90
113025.025	• 3	14	3	38	C	WRC		7,90
113035.020	• 2	1,75	3	38	D	KUD		7,90
113035.025	• 3	2,7	3	38	D	KUD		7,90
113045.010	• 3	6	3	38	E	TRE		7,90
113055.015	• 3	14	3	38	F	RBF		7,90
113065.015	• 3	14	3	38	G	SPG		7,90
113085.010	• 3	14	3	38	L	KEL		7,90
113095.015	• 3	11	3	38	M	SKM		7,90



Art.
100
101
102

HP-1

Extrem robuste Kreuzverzahnung ergibt:

Extremely robust cross cutting style results:



- Schlagunempfindlichkeit (Zahnausbrüche, Abplatzungen, Kopfbrüche werden minimiert)
- Exzellente Kontrolle und Laufruhe
- Mittlere bis hohe Zerspanleistung
- Speziell für schwierigste Superlegierungen + Edelstähle wie: Titan, Inconel, Hastelloy, Waspaloy, Duplex, Amanox usw.
Anwendungsbeispiel: Bearbeitung von Flugzeug Turbinenschaufeln, Gasturbinen
- Impact resistance (tooth breakages, chipping, head breakages are minimised)
- Excellent control and quiet running
- Medium to high cutting action
- Especially for the most difficult super alloys + stainless steel, such as: Titanium, Inconel, Hastelloy, Waspaloy, Duplex, Amanox, etc.
Application example: Working aeroplane turbine blades, gas turbines

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM	Ø 3 + 6 mm
A	B	C	D	E	F	G	H	L	M	
360	360	361	361	362	362	363	363	364	364	365
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone	Ø 3+6 mm, Schaft 3mm, für Superlegierungen! Ø 3+6 mm, shank 3 mm, for super alloys!



BLUE-TEC-beschichtet
BLUE-TEC-coated



Für Frässtifte optimierte und patentierte BLUE-TEC-Beschichtung ergibt einzigartige Standzeiten und Performance in allen Stahlsorten.

Patented BLUE-TEC coating, specifically designed for burrs, gives outstanding tool life and excellent performance on all metals.

Werkstoffgruppen			Bearbeitung	Schnittgeschwindigkeit (m/min)
Schwierigste Legierungen Superlegierungen	Titan, Inconel, Hastelloy, Waspaloy, Duplex, Amanox Udimet, Nicrofer, Conicro, René	Motoren-, Turbinen- und Triebwerksbau Energietechnik, Luft- und Raumfahrt Öl- und Gasindustrie, Gasturbinen	grobes Zerspanen = hoher bis mittlerer Materialabtrag	250-350
Edelstahl (INOX)	Rost- und säurebeständige Stähle	Austenitische und ferritische Edelstähle	grobes Zerspanen = hoher bis mittlerer Materialabtrag	250-350
Stahl, Stahlguss	Ungehärtet, nicht vergütete Stähle bis 1200 N/mm ² (<38HRC)	Baustähle, Kohlenstoffstähle, Werkzeugstähle, unlegierte Stähle, Einsatzstähle, Stahlguss	grobes Zerspanen = hoher bis mittlerer Materialabtrag	450-600
	Gehärtete, vergütete Stähle über 1200 N/mm ² (<38HRC)	Werkzeugstähle, Vergütungsstähle, legierte Stähle, Stahlguss		250-350
Gusseisen	Graues Gusseisen, weißes Gusseisen	Gusseisen mit Lamellengraphit EN-GJL (GG), mit Kugelgraphit/ Sphäroguss EN-GJS (GGG), weißer Temperguss EN-GJMW (GTW), schwarzer Temperguss EN-GJMB (GTS)	grobes Zerspanen = hoher bis mittlerer Materialabtrag	450-600

Material groups			Application	Cutting speed m/min
difficult alloys superalloys	Titan, Inconel, Hastelloy, Waspaloy, Duplex, Amanox Udimet, Nicrofer, Conicro, René	Engines, aircraft engine and turbine construction, Energy technology, aerospace Oil and gas industry, gas turbines	Coarse machining = high to medium stock removal	250-350
Stainless steel (INOX)	Rust and acid-resistant steels	Austenitic and ferritic stainless steels	Coarse machining = high to medium stock removal	250-350
Steel cast steel	Non-hardened, non-heat treated steels up to 1200 N/mm ² (<38HRC)	Construction steels, carbon steels, tool steels, non-alloyed steels, case-hardened steels, cast steels	Coarse machining = high to medium stock removal	450-600
	Hardened, heat treated steels exceeding 1200 N/mm ² (<38HRC)	tool steels, tempering steels, alloyed steels, cast steels		250-350
Cast iron	Grey cast iron, white cast iron	Cast-iron with flake graphite EN-GJL (GG), with nodular graphite cast iron EN-GJS (GGG), white annealed cast iron EN-GJMW (GTW), black cast iron EN-GJMB (GTS)	Coarse machining = high to medium stock removal	450-600



Schnittgeschwindigkeit • Cutting speed (m/min)							
	250	300	350	400	450	500	600
Ø (mm)	Drehzahlen (min ⁻¹) • Rotational speed (rpm)						
3	27000	32000	37000	42000	48000	53000	64000
6	13000	16000	19000	21000	24000	27000	32000
8	10000	12000	14000	16000	18000	20000	24000
10	8000	10000	11000	13000	14000	16000	19000
12	7000	8000	9000	11000	12000	13000	16000
16	5000	6000	7000	8000	9000	10000	12000



Art. 11.5007

Art. 11.3007

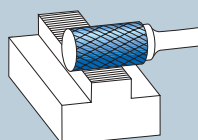


A FORM / SHAPE

ZYA

Zylinder ohne Stirnverzahnung

Cylinder without end cut



Video

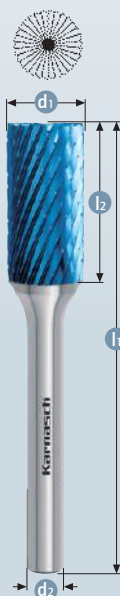


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115007.030	• 3	14	3	38		✓	6,95
115007.060	• 6	13	3	45	✓		10,20
115007.065	• 6	18	6	50		✓	13,65
115007.080	• 8	20	6	65	✓		13,65
115007.090	• 10	20	6	65	✓		15,70
115007.100	• 10	25	6	70	✓		18,10
115007.107	• 12DIN	25	6	70	✓		22,45
115007.120	• 16	25	6	70	✓		29,30

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113007.030	• 3	14	3	38		✓	5,05
113007.060	• 6	13	3	45	✓		8,35
113007.065	• 6	18	6	50		✓	11,75
113007.080	• 8	20	6	65	✓		11,75
113007.090	• 10	20	6	65	✓		12,65
113007.100	• 10	25	6	70	✓		15,05
113007.107	• 12DIN	25	6	70	✓		18,00
113007.120	• 16	25	6	70	✓		24,80

Art. 11.5017

Art. 11.3017

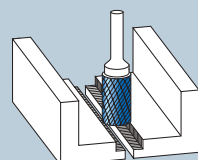


B FORM / SHAPE

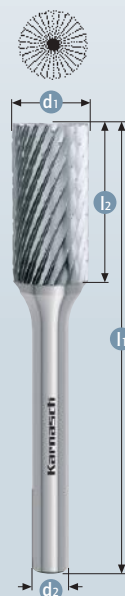
ZYB

Zylinder mit Stirnverzahnung

Cylinder with end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115017.015	• 3	14	3	38		✓	7,50
115017.045	• 6	13	3	45	✓		11,05
115017.050	• 6	18	6	50		✓	11,65
115017.075	• 8	20	6	65	✓		14,80
115017.085	• 10	20	6	65	✓		16,90
115017.103	• 12DIN	25	6	70	✓		24,45
115017.115	• 16	25	6	70	✓		31,75

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113017.015	• 3	14	3	38		✓	5,60
113017.045	• 6	13	3	45	✓		9,15
113017.050	• 6	18	6	50		✓	9,75
113017.075	• 8	20	6	65	✓		12,90
113017.085	• 10	20	6	65	✓		13,85
113017.103	• 12DIN	25	6	70	✓		19,95
113017.115	• 16	25	6	70	✓		27,25

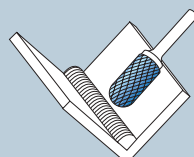
Art. **11.5027**



C FORM / SHAPE

WRC

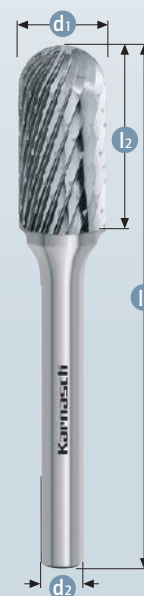
Walzenrundform
Ball nosed cylinder



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115027.025	• 3	14	3	38		✓	6,95
115027.050	• 6	12,7	3	44	✓		10,20
115027.055	• 6	18	6	50		✓	12,30
115027.075	• 8	20	6	65	✓		14,65
115027.085	• 10	20	6	65	✓		17,15
115027.107	• 12DIN	25	6	70	✓		24,90
115027.120	• 16	25	6	70	✓		32,35

Art. **11.3027**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113027.025	• 3	14	3	38		✓	5,05
113027.050	• 6	12,7	3	44	✓		8,35
113027.055	• 6	18	6	50		✓	10,40
113027.075	• 8	20	6	65	✓		12,75
113027.085	• 10	20	6	65	✓		14,10
113027.107	• 12DIN	25	6	70	✓		20,40
113027.120	• 16	25	6	70	✓		27,85

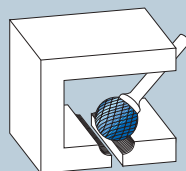
Art. **11.5037**



D FORM / SHAPE

KUD

Kugel
Ball



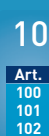
Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115037.025	• 3	2,5	3	38		✓	6,95
115037.050	• 6	5,0	3	38	✓		10,20
115037.055	• 6	5,4	6	50		✓	11,45
115037.060	• 8	6,0	6	52	✓		12,20
115037.070	• 10	8,0	6	54	✓		14,60
115037.083	• 12DIN	11,0	6	56	✓		18,30
115037.095	• 16	14,0	6	60	✓		23,70

Art. **11.3037**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113037.025	• 3	2,5	3	38		✓	5,05
113037.050	• 6	5,0	3	38	✓		8,35
113037.055	• 6	5,4	6	50		✓	9,60
113037.060	• 8	6,0	6	52	✓		10,30
113037.070	• 10	8,0	6	54	✓		11,55
113037.083	• 12DIN	11,0	6	56	✓		13,85
113037.095	• 16	14,0	6	60	✓		19,25



Art.
100
101
102

Art. 11.5047

Art. 11.3047

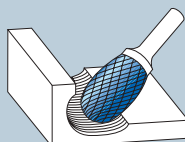


E FORM / SHAPE

TRE

Tropfen

Oval



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115047.010	• 3	6	3	38		✓	6,95
115047.015	• 6	10	3	42	✓		10,20
115047.020	• 6	10	6	50		✓	13,65
115047.025	• 8	15	6	60	✓		16,10
115047.030	• 10	16	6	60	✓		17,15
115047.037	• 12DIN	21	6	66	✓		23,35
115047.045	• 16	25	6	70	✓		33,05

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113047.010	• 3	6	3	38		✓	5,05
113047.015	• 6	10	3	42	✓		8,35
113047.020	• 6	10	6	50		✓	11,75
113047.025	• 8	15	6	60	✓		14,25
113047.030	• 10	16	6	60	✓		14,10
113047.037	• 12DIN	21	6	66	✓		18,90
113047.045	• 16	25	6	70	✓		28,60

Art. 11.5057

Art. 11.3057

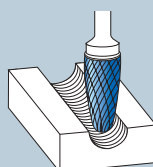


F FORM / SHAPE

RBF

Rundbogen

Ball nosed tree



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115057.015	• 3	14	3	38		✓	6,95
115057.025	• 6	12	3	44	✓		10,20
115057.030	• 6	18	6	50		✓	12,80
115057.035	• 8	20	6	65	✓		17,05
115057.040	• 10	20	6	65	✓		16,70
115057.053	• 12DIN	25	6	70	✓		21,65
115057.065	• 16	25	6	70	✓		32,55

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113057.015	• 3	14	3	38		✓	5,05
113057.025	• 6	12	3	44	✓		8,35
113057.030	• 6	18	6	50		✓	10,90
113057.035	• 8	20	6	65	✓		15,15
113057.040	• 10	20	6	65	✓		13,65
113057.053	• 12DIN	25	6	70	✓		17,20
113057.065	• 16	25	6	70	✓		28,10

Art. **11.5067**

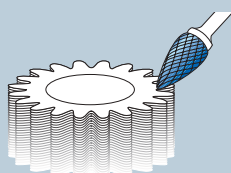


G FORM / SHAPE

SPG

Spitzbogen

Tree



Video

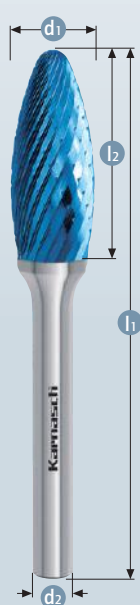
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115067.015	• 3	14	3	38		✓	6,95
115067.030	• 6	12	3	44	✓		10,20
115067.035	• 6	18	6	50		✓	12,80
115067.040	• 8	20	6	65	✓		15,10
115067.045	• 10	20	6	65	✓		17,65
115067.063	• 12DIN	25	6	70	✓		22,70
115067.085	• 16	25	6	70	✓		32,20

Art. **11.3067**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113067.015	• 3	14	3	38		✓	5,05
113067.030	• 6	12	3	44	✓		8,35
113067.035	• 6	18	6	50		✓	10,90
113067.040	• 8	20	6	65	✓		13,25
113067.045	• 10	20	6	65	✓		14,60
113067.063	• 12DIN	25	6	70	✓		18,25
113067.085	• 16	25	6	70	✓		27,70

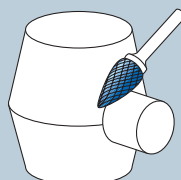
Art. **11.5077**



H FORM / SHAPE

Flamme

Flame



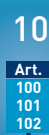
Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115077.005	• 3	6	3	38		✓	6,95
115077.009	• 6	10	3	43		✓	10,20
115077.010	• 6	14	6	50		✓	16,35
115077.015	• 8	20	6	65	✓		16,30
115077.020	• 10	20	6	65	✓		29,85
115077.027	• 12DIN	30	6	75	✓		33,40
115077.035	• 16	36	6	82	✓		45,10

Art. **11.3077**



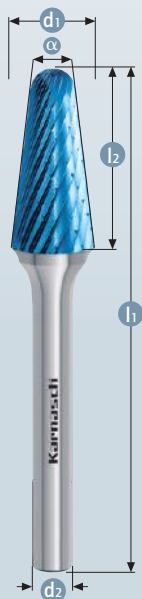
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113077.005	• 3	6	3	38		✓	5,05
113077.009	• 6	10	3	43		✓	8,35
113077.010	• 6	14	6	50		✓	14,50
113077.015	• 8	20	6	65	✓		14,40
113077.020	• 10	20	6	65	✓		26,80
113077.027	• 12DIN	30	6	75	✓		28,90
113077.035	• 16	36	6	82	✓		40,60



Art.
100
101
102

Art. 11.5087

Art. 11.3087

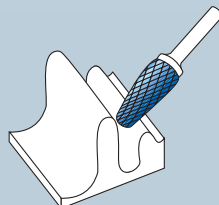


L FORM / SHAPE

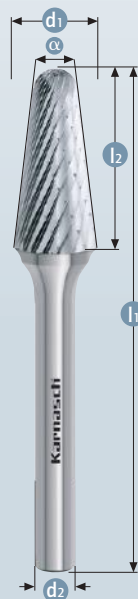
KEL

Rundkegel

Ball nosed cone



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115087.010	• 3	14	3	38		✓	8°	6,95
115087.015	• 6	16	3	48	✓		22°	10,20
115087.020	• 6	18	6	50		✓	14°	13,05
115087.025	• 8	25	6	70	✓		14°	16,50
115087.030	• 10	20	6	65	✓		14°	20,65
115087.047	• 12DIN	25	6	70	✓		14°	25,20
115087.060	• 16	33	6	78	✓		14°	39,10

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113087.010	• 3	14	3	38		✓	8°	5,05
113087.015	• 6	16	3	48	✓		22°	8,35
113087.020	• 6	18	6	50		✓	14°	11,15
113087.025	• 8	25	6	70	✓		14°	14,60
113087.030	• 10	20	6	65	✓		14°	17,60
113087.047	• 12DIN	25	6	70	✓		14°	20,75
113087.060	• 16	33	6	78	✓		14°	34,60

Art. 11.5097

Art. 11.3097

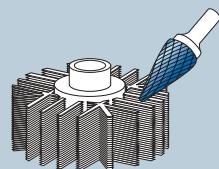


M FORM / SHAPE

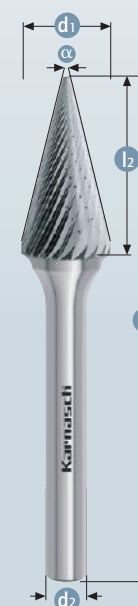
SKM

Spitzkegel

Cone



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115097.015	• 3	11	3	38		✓	14°	6,95
115097.025	• 6	12	3	48	✓		22°	10,20
115097.030	• 6	20	6	50		✓	14°	13,05
115097.040	• 10	20	6	65	✓		28°	21,15
115097.047	• 12DIN	25	6	70	✓		28°	24,50
115097.055	• 16	26	6	74	✓		33°	33,90

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113097.015	• 3	11	3	38		✓	14°	5,05
113097.025	• 6	12	3	48	✓		22°	8,35
113097.030	• 6	20	6	50		✓	14°	11,15
113097.040	• 10	20	6	65	✓		28°	18,05
113097.047	• 12DIN	25	6	70	✓		28°	20,05
113097.055	• 16	26	6	74	✓		33°	29,47

Extrem robuste Kreuzverzahnung ergibt:

- Schlagunempfindlichkeit (Zahnausbrüche, Abplatzungen, Kopfbrüche werden minimiert)
- Excellente Kontrolle und Laufruhe
- Mittlere bis hohe Zerspanleistung
- Speziell für schwierigste Superlegierungen + Edelstähle wie: Titan, Inconel, Hastelloy, Waspaloy, Duplex, Amanox usw.
Anwendungsbeispiel: Bearbeitung von Flugzeug, Turbinenschaufeln, Gasturbinen

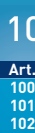
Extremely robust cross cutting style gives:

- Impact resistance (tooth breakages, chipping, head breakages are minimised)
- Excellent control and quiet running
- Medium to high cutting action
- Especially for the most difficult super alloys + stainless steel, such as: Titanium, Inconel, Hastelloy, Waspaloy, Duplex, Amanox, etc.
Application example: Working aeroplane turbine loops, gas turbines



Art.	d1	l2	d2	l1	Form Shape	DIN 8033		€
115007.030	• 3	14	3	38	A	ZYA		6,95
115007.060	• 6	12	3	44				10,20
115017.015	• 3	14	3	38	B	ZYB		7,50
115017.045	• 6	12	3	44				11,05
115027.025	• 3	14	3	38	C	WRC		6,95
115027.050	• 6	12	3	44				10,20
115037.025	• 3	2,7	3	38	D	KUD		6,95
115037.050	• 6	5,7	3	38				10,20
115047.010	• 3	6,0	3	38	E	TRE		6,95
115047.015	• 6	10	3	42				10,20
115057.015	• 3	14	3	38	F	RBF		6,95
115057.025	• 6	12	3	44				10,20
115067.015	• 3	14	3	38	G	SPG		6,95
115067.030	• 6	12	3	44				10,20
115077.005	• 3	6	3	38	H	-		6,95
115077.009	• 6	10	3	43				10,20
115087.010	• 3	14	3	38	L	KEL		6,95
115087.015	• 6	16	3	48				10,20
115097.015	• 3	11	3	38	M	SKM		6,95
115097.025	• 6	12	3	48				10,20

Art.	d1	l2	d2	l1	Form Shape	DIN 8033		€
113007.030	• 3	14	3	38	A	ZYA		5,05
113007.060	• 6	12	3	44				8,35
113017.015	• 3	14	3	38	B	ZYB		5,60
113017.045	• 6	12	3	44				9,15
113027.025	• 3	14	3	38	C	WRC		5,05
113027.050	• 6	12	3	44				8,35
113037.025	• 3	2,7	3	38	D	KUD		5,05
113037.050	• 6	5,7	3	38				8,35
113047.010	• 3	6,0	3	38	E	TRE		5,05
113047.015	• 6	10	3	42				8,35
113057.015	• 3	14	3	38	F	RBF		5,05
113057.025	• 6	12	3	44				8,35
113067.015	• 3	14	3	38	G	SPG		5,05
113067.030	• 6	12	3	44				8,35
113077.005	• 3	6	3	38	H	-		5,05
113077.009	• 6	10	3	43				8,35
113087.010	• 3	14	3	38	L	KEL		5,05
113087.015	• 6	16	3	48				8,35
113097.015	• 3	11	3	38	M	SKM		5,05
113097.025	• 6	12	3	48				8,35



HP-5

Extrem feine Einfachverzahnung ergibt:

Extremely fine simple cutting style results:



- Excellente Oberflächengüte
- Vorzugsweise für feines Entgraten von allen Stahlsorten wie:
 - Bis zu extra harten Stählen ca. 70 HRC
 - Gusseisen
 - Edelstahl (INOX)
 - Hochwarmfeste Werkstoffe wie z.B. Nickel-Basis + Kobalt-Basis + Kobalt-Basis Legierungen
- Excellent surface finish
- Preferred for fine deburring all ferrous materials, such as:
 - Up to extra hard steel ca. 70 HRC
 - Cast iron
 - Stainless steel (INOX)
 - Heat resistant substances, such as, e.g. Nickel based + cobalt based alloys

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	–	KEL	SKM
A	B	C	D	E	F	G	H	L	M
368	368	369	369	370	370	371	371	372	372
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone



BLUE-TEC-beschichtet
BLUE-TEC-coated



Für Frässtifte optimierte und patentierte BLUE-TEC-Beschichtung ergibt einzigartige Standzeiten und Performance in allen Stahlsorten.

Patented BLUE-TEC coating, specifically designed for burrs, gives outstanding tool life and excellent performance on all metals.

Werkstoffgruppen			Bearbeitung	Schnittgeschwindigkeit (m/min)
Stahl, Stahlguss	Ungehärtete, nicht vergütete Stähle bis 1200 N/mm ² (< 38 HRC)	Baustähle, Kohlenstoffstähle, Werkzeugstähle, unlegierte Stähle, Einsatzstähle, Stahlguss	Feines Zerspanen = mittlerer Materialabtrag	650-750
	Gehärtete, vergütete Stähle über 1200 N/mm ² (> 38 HRC)	Werkzeugstähle, Vergütungsstähle, legierte Stähle, Stahlguss		450-600
Edelstahl (INOX)	Rost- und säurebeständige Stähle	Austenitische und ferritische Edelstähle	Feines Zerspanen = mittlerer Materialabtrag	450-600
NE-Metalle	Harte NE-Metalle	Bronze, Titan/Titanlegierungen, harte Alu-Legierungen (hoher Si-Anteil)	Feines Zerspanen = mittlerer Materialabtrag	450-600
	Hochwarmfeste Werkstoffe	Nickelbasis- und Kobaltbasislegierungen (Triebwerk- und Turbinenbau)		
Gusseisen	Graues Gusseisen, weißes Gusseisen	Gusseisen mit Lamellengraphit EN-GJL (GG), mit Kugelgraphit/Späroguss EN-GJS (GGG), weißer Temperguss EN-GJMW (GTW), schwarzer Temperguss EN-GJMB (GTS)	Feines Zerspanen = mittlerer Materialabtrag	650-750

Material groups			Application	Cutting speed m/min
Steel, cast steel	Non-hardened, non-heat treated steels up to 1200 N/mm ² (< 38 HRC)	Construction steels, carbon steels, tool steels, non-alloyed steels, case-hardened steels, cast steels	Fine machining = medium stock removal	650-750
	Hardened, heat-treated steels exceeding 1200 N/mm ² (> 38 HRC)	Tool steels, tempering steels, alloyed steel, cast steels		450-600
Stainless steel (INOX)	Rust and acid-resistant steels	Austenitic and ferritic stainless steels	Fine machining = medium stock removal	450-600
Non-ferrous metals	Hard-non-ferrous metals	Bronze, titanium/titanium alloys, hard alu-alloys (high Si content)	Fine machining = medium stock removal	450-600
	High-temperature resistant materials	Nickel based alloys, cobalt based alloys (aircraft engine and turbine construction)		
Cast iron	Grey cast iron, white cast iron	Cast iron with flake graphite EN-GJL, with nodular graphite cast iron EN-GJS, white annealed cast iron EN-GJMW, black cast iron EN-GJMB	Fine machining = medium stock removal	650-750



Schnittgeschwindigkeit • Cutting speed (m/min)				
	450	600	650	750
Ø (mm)	Drehzahlen (min ⁻¹) • Rotational speed (rpm)			
2	72.000	95.000	104.000	120.000
3	48.000	64.000	68.000	80.000
4	36.000	48.000	52.000	60.000
6	24.000	32.000	34.000	40.000
8	18.000	24.000	26.000	30.000
10	14.000	19.000	21.000	24.000
12	12.000	16.000	18.000	21.000
16	9.000	12.000	14.000	17.000

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Art.

100

101

102

Art. 11.5003

Art. 11.3003

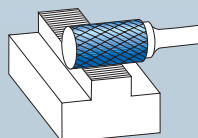


A FORM / SHAPE

ZYA

Zylinder ohne Stirnverzahnung

Cylinder without end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115003.015	• 1,5	6	3	38		✓	8,30
115003.025	• 2	11	3	38		✓	7,95
115003.030	• 3	14	3	38		✓	8,30
115003.035	• 3	14	3	50		✓	9,65
115003.040	• 3	14	3	65		✓	11,00
115003.045	• 3	14	3	75		✓	11,80
115003.050	• 3	14	3	100		✓	15,15
115003.055	• 4	14	6	50		✓	11,15
115003.060	• 6	13	3	45	✓		13,25
115003.065	• 6	18	6	50		✓	11,15
115003.070	• 6	18	6	100	✓		19,90
115003.080	• 8	20	6	65	✓		13,95
115003.090	• 10	20	6	65	✓		16,05
115003.095	• 10	20	6	172	✓		24,30
115003.100	• 10	25	6	70	✓		18,50
115003.105	• 12	25	6	70	✓		24,70
115003.110	• 12	25	6	175	✓		35,75
115003.115	• 12	25	8	70	✓		26,25
115003.120	• 16	25	6	70	✓		29,95
115003.125	• 16	25	8	70	✓		32,20

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113003.015	• 1,5	6	3	38		✓	6,40
113003.025	• 2	11	3	38		✓	6,05
113003.030	• 3	14	3	38		✓	6,40
113003.035	• 3	14	3	50		✓	7,80
113003.040	• 3	14	3	65		✓	9,10
113003.045	• 3	14	3	75		✓	9,90
113003.050	• 3	14	3	100		✓	13,25
113003.055	• 4	14	6	50		✓	9,25
113003.060	• 6	13	3	45	✓		11,40
113003.065	• 6	18	6	50		✓	9,25
113003.070	• 6	18	6	100	✓		18,00
113003.080	• 8	20	6	65	✓		12,05
113003.090	• 10	20	6	65	✓		13,00
113003.095	• 10	20	6	172	✓		18,15
113003.100	• 10	25	6	70	✓		15,45
113003.105	• 12	25	6	70	✓		20,20
113003.110	• 12	25	6	175	✓		28,30
113003.115	• 12	25	8	70	✓		21,80
113003.120	• 16	25	6	70	✓		25,45
113003.125	• 16	25	8	70	✓		27,70

Art. 11.5013

Art. 11.3013

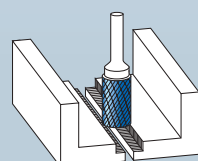


B FORM / SHAPE

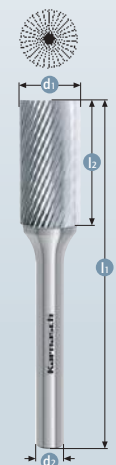
ZYB

Zylinder mit Stirnverzahnung

Cylinder with end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115013.005	• 1,5	6	3	38		✓	7,80
115013.010	• 2	11	3	38		✓	8,85
115013.015	• 3	14	3	38		✓	8,40
115013.020	• 3	14	3	50		✓	10,45
115013.025	• 3	14	3	65		✓	11,30
115013.030	• 3	14	3	75		✓	12,80
115013.035	• 3	14	3	100		✓	18,30
115013.040	• 4	12	6	50		✓	11,95
115013.045	• 6	13	3	45	✓		14,45
115013.050	• 6	18	6	50		✓	11,95
115013.060	• 6	18	6	100	✓		21,70
115013.075	• 8	20	6	65	✓		15,20
115013.080	• 8	20	6	170	✓		21,00
115013.085	• 10	20	6	65	✓		17,35
115013.090	• 10	20	6	172	✓		35,65
115013.100	• 12	25	6	70	✓		26,70
115013.105	• 12	25	6	175	✓		39,50
115013.110	• 12	25	8	70	✓		28,40
115013.115	• 16	25	6	70	✓		32,45
115013.120	• 16	25	8	70	✓		34,75

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113013.005	• 1,5	6	3	38		✓	5,90
113013.010	• 2	11	3	38		✓	7,00
113013.015	• 3	14	3	38		✓	6,55
113013.020	• 3	14	3	50		✓	8,60
113013.025	• 3	14	3	65		✓	9,40
113013.030	• 3	14	3	75		✓	10,90
113013.035	• 3	14	3	100		✓	16,40
113013.040	• 4	12	6	50		✓	10,10
113013.045	• 6	13	3	45	✓		12,55
113013.050	• 6	18	6	50		✓	10,10
113013.060	• 6	18	6	100	✓		19,80
113013.075	• 8	20	6	65	✓		13,30
113013.080	• 8	20	6	170	✓		19,15
113013.085	• 10	20	6	65	✓		14,30
113013.090	• 10	20	6	172	✓		29,50
113013.100	• 12	25	6	70	✓		22,25
113013.105	• 12	25	6	175	✓		32,00
113013.110	• 12	25	8	70	✓		23,90
113013.115	• 16	25	6	70	✓		28,00
113013.120	• 16	25	8	70	✓		30,25

Art. **11.5023**

Art. **11.3023**

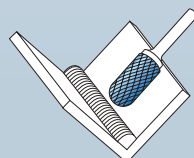


C FORM / SHAPE

WRC

Walzenrundform

Ball nosed cylinder



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115023.020	2	11	3	38		✓	8,30
115023.025	3	14	3	38		✓	8,30
115023.030	3	14	3	50		✓	10,80
115023.035	3	14	3	75		✓	11,80
115023.040	3	14	3	100		✓	14,10
115023.045	4	16	6	50		✓	12,55
115023.050	6	12,7	3	44	✓		12,50
115023.055	6	18	6	50		✓	12,55
115023.060	6	18	6	100	✓		22,80
115023.065	6	18	6	150	✓		31,30
115023.070	6	25	6	50		✓	16,95
115023.075	8	20	6	65	✓		15,05
115023.080	8	20	6	170	✓		20,80
115023.085	10	20	6	65	✓		17,50
115023.090	10	20	6	170	✓		26,35
115023.095	10	25	6	70	✓		20,00
115023.100	12	20	6	65	✓		28,00
115023.105	12	25	6	70	✓		27,20
115023.110	12	25	6	175	✓		39,20
115023.115	12	25	8	70	✓		28,90
115023.120	16	25	6	70	✓		33,00
115023.125	16	25	8	70	✓		35,50

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113023.020	2	11	3	38		✓	6,40
113023.025	3	14	3	38		✓	6,40
113023.030	3	14	3	50		✓	8,90
113023.035	3	14	3	75		✓	9,90
113023.040	3	14	3	100		✓	12,25
113023.045	4	16	6	50		✓	10,70
113023.050	6	12,7	3	44	✓		10,65
113023.055	6	18	6	50		✓	10,70
113023.060	6	18	6	100	✓		20,90
113023.065	6	18	6	150	✓		29,40
113023.070	6	25	6	50		✓	15,05
113023.075	8	20	6	65	✓		13,15
113023.080	8	20	6	170	✓		18,90
113023.085	10	20	6	65	✓		14,45
113023.090	10	20	6	170	✓		20,20
113023.095	10	25	6	70	✓		16,95
113023.100	12	20	6	65	✓		23,50
113023.105	12	25	6	70	✓		22,70
113023.110	12	25	6	175	✓		31,75
113023.115	12	25	8	70	✓		24,40
113023.120	16	25	6	70	✓		28,50
113023.125	16	25	8	70	✓		31,00

Art. **11.5033**

Art. **11.3033**

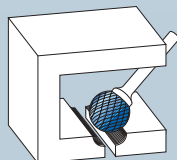


D FORM / SHAPE

KUD

Kugel

Ball



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115033.020	2	1,8	3	38		✓	8,30
115033.025	3	2,5	3	38		✓	8,30
115033.030	3	2,5	3	50		✓	10,10
115033.035	3	2,5	3	75		✓	11,20
115033.040	3	2,5	6	50		✓	11,75
115033.045	4	3,0	3	38		✓	17,45
115033.050	6	5,0	3	38	✓		11,40
115033.055	6	4,7	6	50		✓	11,75
115033.060	8	6,0	6	52	✓		12,50
115033.065	8	6,0	6	180	✓		17,10
115033.070	10	8,0	6	54	✓		15,30
115033.075	10	8,0	6	185	✓		22,80
115033.080	12	11,0	6	56	✓		21,00
115033.085	12	11,0	8	56	✓		21,00
115033.090	12	11,0	6	162	✓		29,90
115033.095	16	14,0	6	60	✓		24,30
115033.100	16	14,0	8	60	✓		26,55

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113033.020	2	1,8	3	38		✓	6,40
113033.025	3	2,5	3	38		✓	6,40
113033.030	3	2,5	3	50		✓	8,20
113033.035	3	2,5	3	75		✓	9,35
113033.040	3	2,5	6	50		✓	9,85
113033.045	4	3,0	3	38		✓	15,60
113033.050	6	5,0	3	38	✓		9,50
113033.055	6	4,7	6	50		✓	9,85
113033.060	8	6,0	6	52	✓		10,60
113033.065	8	6,0	6	180	✓		15,20
113033.070	10	8,0	6	54	✓		12,25
113033.075	10	8,0	6	185	✓		16,65
113033.080	12	11,0	6	56	✓		16,50
113033.085	12	11,0	8	56	✓		16,50
113033.090	12	11,0	6	162	✓		22,40
113033.095	16	14,0	6	60	✓		19,80
113033.100	16	14,0	8	60	✓		22,10

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Art.
100
101
102

Art. 11.5043

Art. 11.3043

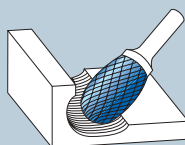


E FORM / SHAPE

TRE

Tropfen

Oval



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115043.010	• 3	6	3	38		✓	8,30
115043.015	• 6	10	3	42	✓		12,50
115043.020	• 6	10	6	50		✓	13,95
115043.025	• 8	15	6	60	✓		16,10
115043.030	• 10	16	6	60	✓		17,50
115043.035	• 12	22	6	67	✓		25,60
115043.040	• 12	22	8	67	✓		27,20
115043.045	• 16	25	6	70	✓		33,90
115043.050	• 16	25	8	70	✓		36,25



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113043.010	• 3	6	3	38		✓	6,40
113043.015	• 6	10	3	42	✓		10,65
113043.020	• 6	10	6	50		✓	12,05
113043.025	• 8	15	6	60	✓		14,20
113043.030	• 10	16	6	60	✓		14,45
113043.035	• 12	22	6	67	✓		21,10
113043.040	• 12	22	8	67	✓		22,70
113043.045	• 16	25	6	70	✓		29,40
113043.050	• 16	25	8	70	✓		31,75

Art. 11.5053

Art. 11.3053

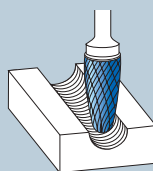


F FORM / SHAPE

RBF

Rundbogen

Ball nosed tree



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115053.010	• 3	8	3	38		✓	8,30
115053.015	• 3	14	3	38		✓	8,30
115053.020	• 3	14	3	50		✓	10,80
115053.025	• 6	12	3	44	✓		12,50
115053.030	• 6	18	6	50		✓	13,10
115053.035	• 8	20	6	65	✓		17,10
115053.040	• 10	20	6	65	✓		17,15
115053.045	• 10	20	6	170	✓		25,95
115053.050	• 12	25	6	70	✓		25,35
115053.055	• 12	25	8	70	✓		26,60
115053.060	• 12	25	6	175	✓		36,55
115053.065	• 16	25	6	70	✓		33,30
115053.070	• 16	25	8	80	✓		35,10



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113053.010	• 3	8	3	38		✓	6,40
113053.015	• 3	14	3	38		✓	6,40
113053.020	• 3	14	3	50		✓	8,90
113053.025	• 6	12	3	44	✓		10,65
113053.030	• 6	18	6	50		✓	11,20
113053.035	• 8	20	6	65	✓		15,20
113053.040	• 10	20	6	65	✓		14,10
113053.045	• 10	20	6	170	✓		19,80
113053.050	• 12	25	6	70	✓		20,85
113053.055	• 12	25	8	70	✓		22,10
113053.060	• 12	25	6	175	✓		29,10
113053.065	• 16	25	6	70	✓		28,80
113053.070	• 16	25	8	80	✓		30,65

Art. **11.5063**

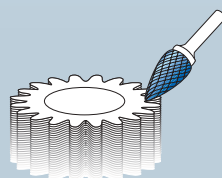


G FORM / SHAPE

SPG

Spitzbogen

Tree



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115063.010	• 3	6	3	38		✓	8,30
115063.015	• 3	14	3	38		✓	8,30
115063.020	• 3	14	3	50		✓	9,85
115063.025	• 3	14	3	75		✓	11,65
115063.030	• 6	12	3	44	✓		12,50
115063.035	• 6	18	6	50		✓	13,10
115063.040	• 8	20	6	65	✓		15,50
115063.045	• 10	20	6	65	✓		18,10
115063.050	• 10	20	6	170	✓		27,15
115063.055	• 12	20	6	65	✓		25,00
115063.060	• 12	25	6	70	✓		25,00
115063.065	• 12	25	8	70	✓		26,20
115063.070	• 12	25	6	175	✓		36,25
115063.075	• 12	30	6	75	✓		28,50
115063.080	• 12	30	8	75	✓		27,80
115063.085	• 16	25	6	70	✓		32,95
115063.090	• 16	25	8	70	✓		35,15

Art. **11.3063**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113063.010	• 3	6	3	38		✓	6,40
113063.015	• 3	14	3	38		✓	6,40
113063.020	• 3	14	3	50		✓	7,95
113063.025	• 3	14	3	75		✓	9,75
113063.030	• 6	12	3	44	✓		10,65
113063.035	• 6	18	6	50		✓	11,20
113063.040	• 8	20	6	65	✓		13,60
113063.045	• 10	20	6	65	✓		15,05
113063.050	• 10	20	6	170	✓		21,00
113063.055	• 12	20	6	65	✓		20,55
113063.060	• 12	25	6	70	✓		20,55
113063.065	• 12	25	8	70	✓		21,75
113063.070	• 12	25	6	175	✓		28,75
113063.075	• 12	30	6	75	✓		24,00
113063.080	• 12	30	8	75	✓		23,30
113063.085	• 16	25	6	70	✓		28,45
113063.090	• 16	25	8	70	✓		30,65

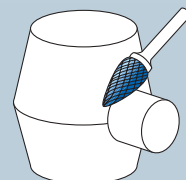
Art. **11.5073**



H FORM / SHAPE

Flamme

Flame



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115073.005	• 3	6	3	38		✓	8,30
115073.010	• 6	14	6	60		✓	16,35
115073.015	• 8	20	6	65	✓		16,75
115073.020	• 10	20	6	65	✓		29,85
115073.025	• 12	32	6	77	✓		35,10
115073.030	• 12	32	8	77	✓		35,10
115073.035	• 16	36	6	82	✓		46,20
115073.040	• 16	36	8	82	✓		48,40

Art. **11.3073**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113073.005	• 3	6	3	38		✓	6,40
113073.010	• 6	14	6	60		✓	14,50
113073.015	• 8	20	6	65	✓		14,85
113073.020	• 10	20	6	65	✓		26,80
113073.025	• 12	32	6	77	✓		30,65
113073.030	• 12	32	8	77	✓		30,65
113073.035	• 16	36	6	82	✓		41,70
113073.040	• 16	36	8	82	✓		43,90



Art.
100
101
102

Art. 11.5083

Art. 11.3083

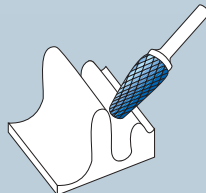


L FORM / SHAPE

KEL

Rundkegel

Ball nosed cone



Video

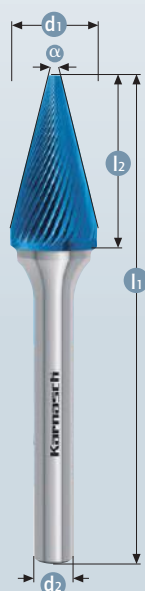


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115083.005	• 3	10	3	38		✓	10°	8,30
115083.010	• 3	14	3	38		✓	8°	8,30
115083.015	• 6	16	3	48	✓		22°	13,25
115083.020	• 6	18	6	50		✓	14°	13,30
115083.025	• 8	25	6	70	✓		14°	16,90
115083.030	• 10	20	6	65	✓		14°	21,20
115083.035	• 10	30	6	75	✓		14°	21,15
115083.040	• 10	30	6	176	✓		14°	31,50
115083.045	• 12	32	6	77	✓		14°	26,95
115083.050	• 12	32	8	77	✓		14°	26,95
115083.055	• 12	32	6	182	✓		14°	40,95
115083.060	• 16	33	6	78	✓		14°	39,10
115083.065	• 16	33	8	78	✓		14°	39,10

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113083.005	• 3	10	3	38		✓	10°	6,40
113083.010	• 3	14	3	38		✓	8°	6,40
113083.015	• 6	16	3	48	✓		22°	11,40
113083.020	• 6	18	6	50		✓	14°	11,45
113083.025	• 8	25	6	70	✓		14°	15,05
113083.030	• 10	20	6	65	✓		14°	19,35
113083.035	• 10	30	6	75	✓		14°	18,05
113083.040	• 10	30	6	176	✓		14°	25,30
113083.045	• 12	32	6	77	✓		14°	22,45
113083.050	• 12	32	8	77	✓		14°	22,45
113083.055	• 12	32	6	182	✓		14°	33,45
113083.060	• 16	33	6	78	✓		14°	34,60
113083.065	• 16	33	8	78	✓		14°	34,60

Art. 11.5093

Art. 11.3093

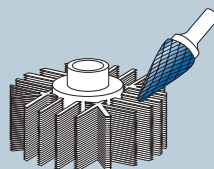


M FORM / SHAPE

SKM

Spitzkegel

Cone



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115093.010	• 3	8	3	38		✓	18°	8,30
115093.015	• 3	11	3	38		✓	14°	8,30
115093.020	• 3	15	3	38		✓	10°	8,30
115093.025	• 6	12	3	48	✓		22°	12,50
115093.030	• 6	20	6	50		✓	14°	13,30
115093.035	• 8	18	6	63	✓		13°	16,50
115093.040	• 10	20	6	65	✓		28°	21,15
115093.045	• 12	25	6	70	✓		28°	26,20
115093.050	• 12	25	8	70	✓		28°	26,20
115093.055	• 16	26	6	74	✓		33°	34,70
115093.060	• 16	26	8	74	✓		33°	37,05

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113093.010	• 3	8	3	38		✓	18°	6,40
113093.015	• 3	11	3	38		✓	14°	6,40
113093.020	• 3	15	3	38		✓	10°	6,40
113093.025	• 6	12	3	48	✓		22°	10,65
113093.030	• 6	20	6	50		✓	14°	11,45
113093.035	• 8	18	6	63	✓		13°	14,60
113093.040	• 10	20	6	65	✓		28°	18,05
113093.045	• 12	25	6	70	✓		28°	21,75
113093.050	• 12	25	8	70	✓		28°	21,75
113093.055	• 16	26	6	74	✓		33°	30,20
113093.060	• 16	26	8	74	✓		33°	32,55

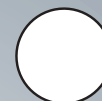
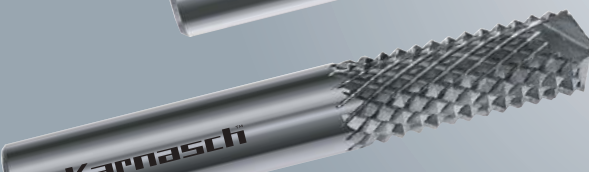
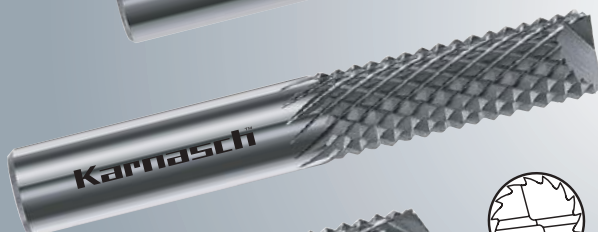
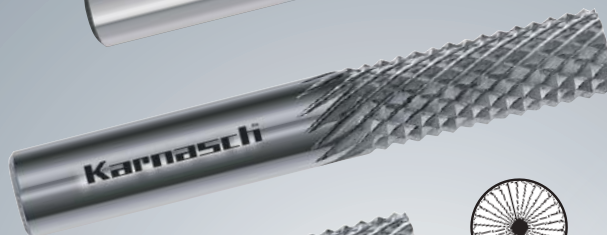
Rotierfräser speziell für abrasive Werkstoffe wie GFK und CFK, AL > 30% SI/
Magnesium siehe HP-7 Verzahnung Seite 350-357 sowie unsere Art. 11.6001,
11.6002, 11.6003, 11.6004 siehe Seite 398

Rotary burrs specially designed for abrasive materials such as GRP and
CFRP and AL > 30% SI/Magnesium see HP-7 cut on page 350-357 and our
Art. 11.6001, 11.6002, 11.6003, 11.6004 see Page 398

→ Automobilindustrie
→ Automotive

→ Luftfahrtindustrie
→ Aerospace industry

→ Raumfahrtindustrie
→ Outer space industry



1



2



3



4



5



6



7



8



9



10


Art.
100
101
102
↓

HP-6

Extrem grobe Kreuzverzahnung ergibt: Extremely rough cross cutting style results:



- Extrem hoher Materialabtrag (Schruppen)
- Für alle Stahlsorten wie:
 - Gusseisen
 - Stahl < 60 HRC
- Auch für Kupfer, Messing, Bronze
- Für den harten Schruppeinsatz wie z.B. auf Werften, Giessereien entwickelt.
- Extremely fast metal removal (roughing)
- For all ferrous materials, such as:
 - Cast iron
 - Steel < 60 HRC
- Also for copper, brass, bronze
- Developed for use in tough roughing conditions, such as, e.g., on shipyards, foundries.

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	–	KEL	SKM
A	B	C	D	E	F	G	H	L	M
376	376	377	377	378	378	379	379	380	380
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone



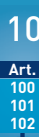
Für Frässtifte optimierte und patentierte BLUE-TEC-Beschichtung ergibt einzigartige Standzeiten und Performance in allen Stahlsorten.

Patented BLUE-TEC coating, specifically designed for burrs, gives outstanding tool life and excellent performance on all metals.

Werkstoffgruppen			Bearbeitung	Schnittgeschwindigkeit (m/min)
Stahl, Stahlguss	Ungehärtete, nicht vergütete Stähle bis 1200 N/mm ² (< 38 HRC)	Baustähle, Kohlenstoffstähle, Werkzeugstähle, unlegierte Stähle, Einsatzstähle, Stahlguss	Grobes Zerspanen = hoher Materialabtrag mit Schlagbelastung	250 - 600
	Gehärtete, vergütete Stähle über 1200 N/mm ² (> 38 HRC)	Werkzeugstähle, Vergütungsstähle, legierte Stähle, Stahlguss		250 - 350
NE-Metalle	Hochwarmfeste Werkstoffe	Nickelbasis- und Kobaltbasislegierungen, (Triebwerk- und Turbinenbau)	Grobes Zerspanen = hoher Materialabtrag mit Schlagbelastung	250 - 450
Gusseisen	Graues Gusseisen, weißes Gusseisen	Gusseisen mit Lamellengraphit EN-GJL (GG), mit Kugelgraphit/ Sphäroguss EN-GJS (GGG), weißer Temperguss EN-GJMW (GTW), schwarzer Temperguss EN-GJMB (GTS)	Grobes Zerspanen = hoher Materialabtrag mit Schlagbelastung	250 - 600

Material groups			Application	Cutting speed m/min
Steel cast steel	Non-hardened, non-heat treated steels up to 1200 N/mm ² (< 38HRC)	Construction steels, carbon steels, tool steels, non-alloyed steels, case-hardened steels, cast steels	Coarse machining = high stock removal with impact load	250 - 600
	Hardened, heat treated steels exceeding 1200 N/mm ² (>38HRC)	tool steels, tempering steels, alloyed steels, cast steels		250 - 350
Non-Ferrous metals	High-temperature resistant materials	Nickel based alloys cobalt based alloys (aircraft engine and turbine construction)	Coarse machining = high stock removal with impact load	250 - 450
Cast iron	Grey cast iron, white cast iron	Cast-iron with flake graphite EN-GJL (GG), with nodular graphite cast iron EN-GJS (GGG), white annealed cast iron EN-GJMW (GTW), black cast iron EN-GJMB (GTS)	Coarse machining = high stock removal with impact load	250 - 600

Schnittgeschwindigkeit • Cutting speed (m/min)				
	250	500	600	900
Ø (mm)	Drehzahlen (min ⁻¹) • Rotational speed (rpm)			
6	13000	27000	32000	48000
8	10000	20000	24000	36000
10	8000	16000	19000	29000
12	7000	13000	16000	24000
16	5000	10000	12000	18000



Art. 11.5004

Art. 11.3004

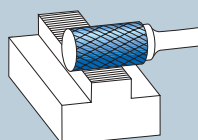


A FORM / SHAPE

ZYA

Zylinder ohne Stirnverzahnung

Cylinder without end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115004.065	• 6	18	6	50		✓	11,15
115004.080	• 8	20	6	65	✓		13,95
115004.090	• 10	20	6	65	✓		16,60
115004.100	• 10	25	6	70	✓		18,50
115004.105	• 12	25	6	70	✓		24,70
115004.115	• 12	25	8	70	✓		25,90
115004.120	• 16	25	6	70	✓		29,95
115004.125	• 16	25	8	70	✓		32,20

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113004.065	• 6	18	6	50		✓	9,25
113004.080	• 8	20	6	65	✓		12,05
113004.090	• 10	20	6	65	✓		13,55
113004.100	• 10	25	6	70	✓		15,45
113004.105	• 12	25	6	70	✓		20,20
113004.115	• 12	25	8	70	✓		21,40
113004.120	• 16	25	6	70	✓		25,45
113004.125	• 16	25	8	70	✓		27,70

Art. 11.5014

Art. 11.3014

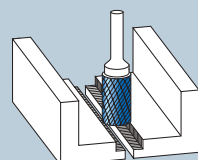


B FORM / SHAPE

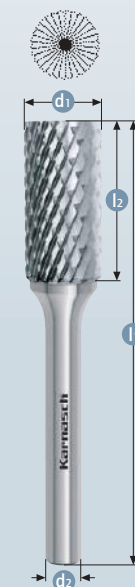
ZYB

Zylinder mit Stirnverzahnung

Cylinder with end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115014.050	• 6	18	6	50		✓	11,95
115014.075	• 8	20	6	65	✓		15,20
115014.085	• 10	20	6	65	✓		17,35
115014.100	• 12	25	6	70	✓		26,70
115014.110	• 12	25	8	70	✓		27,95
115014.115	• 16	25	6	70	✓		32,45
115014.120	• 16	25	8	70	✓		34,75

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113014.050	• 6	18	6	50		✓	10,10
113014.075	• 8	20	6	65	✓		13,30
113014.085	• 10	20	6	65	✓		14,30
113014.100	• 12	25	6	70	✓		22,25
113014.110	• 12	25	8	70	✓		23,45
113014.115	• 16	25	6	70	✓		28,00
113014.120	• 16	25	8	70	✓		30,25

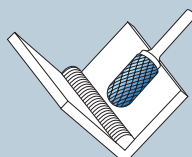
Art. **11.5024**



C FORM / SHAPE

WRC

Walzenrundform
Ball nosed cylinder



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115024.055	• 6	18	6	50		✓	12,55
115024.075	• 8	20	6	65	✓		15,05
115024.085	• 10	20	6	65	✓		17,50
115024.105	• 12	25	6	70	✓		27,20
115024.115	• 12	25	8	70	✓		28,45
115024.120	• 16	25	6	70	✓		33,00
115024.125	• 16	25	8	70	✓		34,85

Art. **11.3024**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113024.055	• 6	18	6	50		✓	10,70
113024.075	• 8	20	6	65	✓		13,15
113024.085	• 10	20	6	65	✓		14,45
113024.105	• 12	25	6	70	✓		22,70
113024.115	• 12	25	8	70	✓		23,95
113024.120	• 16	25	6	70	✓		28,50
113024.125	• 16	25	8	70	✓		30,35

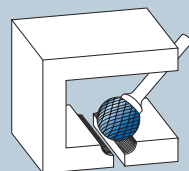
Art. **11.5034**



D FORM / SHAPE

KUD

Kugel
Ball



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115034.055	• 6	4,7	6	50		✓	11,75
115034.060	• 8	6,0	6	52	✓		12,50
115034.070	• 10	8,0	6	54	✓		15,05
115034.080	• 12	11,0	6	56	✓		20,65
115034.085	• 12	11,0	8	56	✓		20,65
115034.095	• 16	14,0	6	60	✓		24,30
115034.100	• 16	14,0	8	60	✓		27,50

Art. **11.3034**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113034.055	• 6	4,7	6	50		✓	9,85
113034.060	• 8	6,0	6	52	✓		10,60
113034.070	• 10	8,0	6	54	✓		12,00
113034.080	• 12	11,0	6	56	✓		16,20
113034.085	• 12	11,0	8	56	✓		16,20
113034.095	• 16	14,0	6	60	✓		19,80
113034.100	• 16	14,0	8	60	✓		23,00



Art.
100
101
102

Art. 11.5044

Art. 11.3044

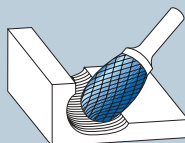


E FORM / SHAPE

TRE

Tropfen

Oval



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115044.020	• 6	10	6	50		✓	13,95
115044.025	• 8	15	6	60	✓		15,80
115044.030	• 10	16	6	60	✓		17,50
115044.035	• 12	22	6	67	✓		25,60
115044.040	• 12	22	8	67	✓		26,75
115044.045	• 16	25	6	70	✓		33,90
115044.050	• 16	25	8	70	✓		35,65

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113044.020	• 6	10	6	50		✓	12,05
113044.025	• 8	15	6	60	✓		13,90
113044.030	• 10	16	6	60	✓		14,45
113044.035	• 12	22	6	67	✓		21,10
113044.040	• 12	22	8	67	✓		22,25
113044.045	• 16	25	6	70	✓		29,40
113044.050	• 16	25	8	70	✓		31,20

Art. 11.5054

Art. 11.3054

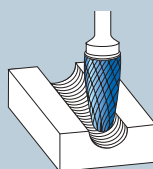


F FORM / SHAPE

RBF

Rundbogen

Ball nosed tree



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115054.030	• 6	18	6	50		✓	13,10
115054.035	• 8	20	6	65	✓		16,80
115054.040	• 10	20	6	65	✓		17,15
115054.050	• 12	25	6	70	✓		26,20
115054.055	• 12	25	8	70	✓		26,20
115054.065	• 16	25	6	70	✓		34,60
115065.070	• 16	25	8	70	✓		34,60

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113054.030	• 6	18	6	50		✓	11,20
113054.035	• 8	20	6	65	✓		14,90
113054.040	• 10	20	6	65	✓		14,10
113054.050	• 12	25	6	70	✓		21,70
113054.055	• 12	25	8	70	✓		21,70
113054.065	• 16	25	6	70	✓		30,10
113065.070	• 16	25	8	70	✓		30,10

Art. **11.5064**

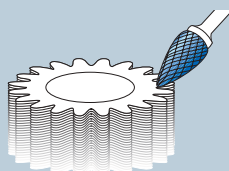


G FORM / SHAPE

SPG

Spitzbogen

Tree



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115064.035	• 6	18	6	50		✓	13,10
115064.040	• 8	20	6	65	✓		15,50
115064.045	• 10	20	6	65	✓		18,10
115064.060	• 12	25	6	70	✓		25,80
115064.065	• 12	25	8	70	✓		25,80
115064.085	• 16	25	6	70	✓		32,95
115064.090	• 16	25	8	70	✓		35,15

Art. **11.3064**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113064.035	• 6	18	6	50		✓	11,20
113064.040	• 8	20	6	65	✓		13,60
113064.045	• 10	20	6	65	✓		15,05
113064.060	• 12	25	6	70	✓		21,35
113064.065	• 12	25	8	70	✓		21,35
113064.085	• 16	25	6	70	✓		28,45
113064.090	• 16	25	8	70	✓		30,65

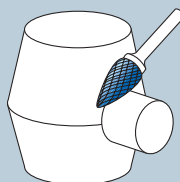
Art. **11.5074**



H FORM / SHAPE

Flamme

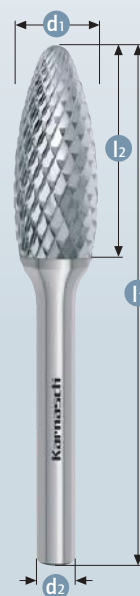
Flame



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
115074.010	• 6	14	6	50		✓	16,10
115074.015	• 8	20	6	65	✓		17,35
115074.020	• 10	20	6	65	✓		29,35
115074.025	• 12	32	6	77	✓		34,60
115074.030	• 12	32	8	77	✓		34,60
115074.035	• 16	36	6	82	✓		46,20
115074.040	• 16	36	8	82	✓		48,40

Art. **11.3074**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
113074.010	• 6	14	6	50		✓	14,25
113074.015	• 8	20	6	65	✓		15,45
113074.020	• 10	20	6	65	✓		26,30
113074.025	• 12	32	6	77	✓		30,10
113074.030	• 12	32	8	77	✓		30,10
113074.035	• 16	36	6	82	✓		41,70
113074.040	• 16	36	8	82	✓		43,90



Art.
100
101
102

Art. 11.5084

Art. 11.3084

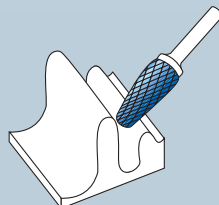


L FORM / SHAPE

KEL

Rundkegel

Ball nosed cone



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115084.020	• 6	18	6	50		✓	14°	13,30
115084.025	• 8	25	6	70	✓		14°	16,90
115084.035	• 10	30	6	75	✓		14°	21,15
115084.045	• 12	32	6	77	✓		14°	26,50
115084.050	• 12	32	8	77	✓		14°	26,50
115084.060	• 16	33	6	78	✓		14°	38,50
115084.065	• 16	33	8	78	✓		14°	38,50

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113084.020	• 6	18	6	50		✓	14°	11,45
113084.025	• 8	25	6	70	✓		14°	15,05
113084.035	• 10	30	6	75	✓		14°	18,05
113084.045	• 12	32	6	77	✓		14°	22,05
113084.050	• 12	32	8	77	✓		14°	22,05
113084.060	• 16	33	6	78	✓		14°	34,00
113084.065	• 16	33	8	78	✓		14°	34,00

Art. 11.5094

Art. 11.3094

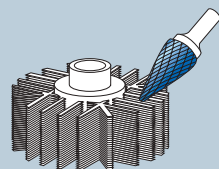


M FORM / SHAPE

SKM

Spitzkegel

Cone



Video

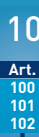
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
115094.030	• 6	20	6	50		✓	14°	13,30
115094.040	• 10	20	6	65	✓		13°	20,75
115094.045	• 12	25	6	70	✓		28°	25,80
115094.050	• 12	25	8	70	✓		28°	25,80
115094.055	• 16	26	6	74	✓		33°	34,70
115094.060	• 16	26	8	74	✓		33°	36,40

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
113094.030	• 6	20	6	50		✓	14°	11,45
113094.040	• 10	20	6	65	✓		13°	17,70
113094.045	• 12	25	6	70	✓		28°	21,35
113094.050	• 12	25	8	70	✓		28°	21,35
113094.055	• 16	26	6	74	✓		33°	30,20
113094.060	• 16	26	8	74	✓		33°	31,95



POWER.
PRECISION.
PERFORMANCE.

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PROFESSIONAL TOOLS



Art.
100
101
102

HP-9

Speziell für Edelstahl. Extrem hohe Zerspanleistung

Especially for stainless steel. Extremely high machining output.

neu
new



• Extrem hohe Zerspanleistung und Standzeit für alle austenitischen, rost- und säurebeständigen Stähle.

• Hochwertige Oberflächengüte

• Keine Anlauffarben am Werkstück durch geringe Wärmeentwicklung

• Extremely high machining output and service life for all austenitic, rust- and acid-resilient steels.

• High-quality surface.

• No annealing colours at the workpiece due to low heat development.

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM
A	B	C	D	E	F	G	H	L	M
384	384	385	385	386	386	387	387	388	388
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone



Für Frässtifte optimierte und patentierte BLUE-TEC-Beschichtung ergibt einzigartige Standzeiten und Performance in allen Stahlsorten.

Patented BLUE-TEC coating, specifically designed for burrs, gives outstanding tool life and excellent performance on all metals.

Werkstoffgruppen			Bearbeitung	Schnittgeschwindigkeit (m/min)
Edelstahl (INOX)	Rost- und säurebeständige Stähle	Austenitische und ferritische Edelstähle	Grobes Zerspanen = Hoher Materialabtrag	450 - 600
			Feines Zerspanen = Geringer Materialabtrag	

Material groups			Application	Cutting speed m/min
Stainless steel INOX	Rust and acid-resistant steels	Austenitic and ferritic stainless steels	Coarse machining = high stock removal	450 - 600
			Fine machining = low stock removal	

Schnittgeschwindigkeit • Cutting speed (m/min)		
	450	600
Ø (mm)	Drehzahlen (min ⁻¹) • Rotational speed (rpm)	
3	48000	64000
6	24000	32000
8	18000	24000
10	14000	19000
12	12000	16000
16	9000	12000

1



2



3



4



5



6



7



8



9



10

Art.
100
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Art. 11.6031

Art. 11.4031

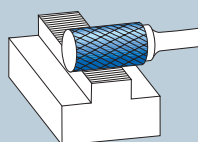


A FORM / SHAPE

ZYA

Zylinder ohne Stirnverzahnung

Cylinder without end cut



Video

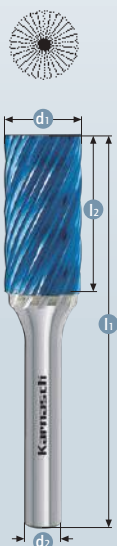


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116031.005	• 3	14	3	38		✓	9,90
116031.007	• 6,3	12,7	3	45		✓	16,20
116031.010	• 6	18	6	50		✓	12,00
116031.015	• 8	20	6	65	✓		15,05
116031.020	• 10	20	6	65	✓		17,20
116031.025	• 12	25	6	70	✓		26,50
116031.030	○ 16	25	6	70	✓		-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114031.005	• 3	14	3	38		✓	8,00
114031.007	• 6,3	12,7	3	45		✓	14,35
114031.010	• 6	18	6	50		✓	10,15
114031.015	• 8	20	6	65	✓		13,20
114031.020	• 10	20	6	65	✓		14,15
114031.025	• 12	25	6	70	✓		22,00
114031.030	○ 16	25	6	70	✓		-

Art. 11.6032

Art. 11.4032

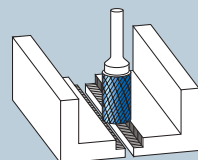


B FORM / SHAPE

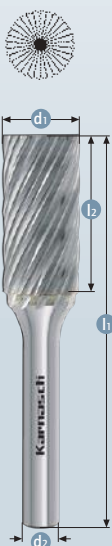
ZYB

Zylinder mit Stirnverzahnung

Cylinder with end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116032.005	○ 3	14	3	38		✓	-
116032.010	○ 6	18	6	50		✓	-
116032.015	○ 8	20	6	65	✓		-
116032.020	○ 10	20	6	65	✓		-
116032.025	○ 12	25	6	70	✓		-
116032.030	○ 16	25	6	70	✓		-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114032.005	○ 3	14	3	38		✓	-
114032.010	○ 6	18	6	50		✓	-
114032.015	○ 8	20	6	65	✓		-
114032.020	○ 10	20	6	65	✓		-
114032.025	○ 12	25	6	70	✓		-
114032.030	○ 16	25	6	70	✓		-

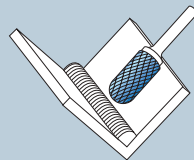
Art. **11.6033**



C FORM / SHAPE

WRC

Walzenrundform
Ball nosed cylinder



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116033.005	• 3	14	3	38		✓	9,90
116033.007	• 6,3	12,7	3	45		✓	14,95
116033.010	• 6	18	6	50		✓	13,55
116033.015	• 8	20	6	65	✓		16,25
116033.020	• 10	20	6	65	✓		18,85
116033.025	• 12	25	6	70	✓		29,25
116033.030	○ 16	25	6	70	✓		-

Art. **11.4033**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114033.005	• 3	14	3	38		✓	8,00
114033.007	• 6,3	12,7	3	45		✓	13,05
114033.010	• 6	18	6	50		✓	11,70
114033.015	• 8	20	6	65	✓		14,35
114033.020	• 10	20	6	65	✓		15,80
114033.025	• 12	25	6	70	✓		24,75
114033.030	○ 16	25	6	70	✓		-

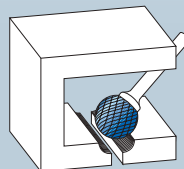
Art. **11.6034**



D FORM / SHAPE

KUD

Kugel
Ball



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116034.005	• 3	2,5	3	38		✓	9,90
116034.007	• 6,3	5,0	3	38		✓	14,55
116034.010	• 6	4,7	6	50		✓	12,60
116034.015	• 8	6,0	6	52	✓		13,40
116034.020	• 10	8,0	6	54	✓		16,00
116034.025	• 12	11,0	6	56	✓		21,90
116034.030	○ 16	11,0	6	60	✓		-

Art. **11.4034**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114034.005	• 3	2,5	3	38		✓	8,00
114034.007	• 6,3	5,0	3	38		✓	12,65
114034.010	• 6	4,7	6	50		✓	10,70
114034.015	• 8	6,0	6	52	✓		11,50
114034.020	• 10	8,0	6	54	✓		12,95
114034.025	• 12	11,0	6	56	✓		17,40
114034.030	○ 16	11,0	6	60	✓		-



Art.
100
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Art. 11.6035

Art. 11.4035

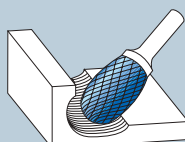


E FORM / SHAPE

TRE

Tropfen

Oval



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116035.005	○ 3	6	3	38		✓	-
116035.010	○ 6	10	6	50		✓	-
116035.015	● 8	15	6	60	✓		17,85
116035.020	● 10	16	6	60	✓		18,85
116035.025	● 12	22	6	67	✓		27,55
116035.030	○ 16	25	6	70	✓		-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114035.005	○ 3	6	3	38		✓	-
114035.010	○ 6	10	6	50		✓	-
114035.015	● 8	15	6	60	✓		15,95
114035.020	● 10	16	6	60	✓		15,80
114035.025	● 12	22	6	67	✓		23,05
114035.030	○ 16	25	6	70	✓		-

Art. 11.6036

Art. 11.4036

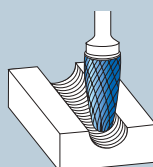


F FORM / SHAPE

RBF

Rundbogen

Ball nosed tree



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116036.005	● 3	14	3	38		✓	9,90
116036.007	● 6,3	12,7	3	45		✓	14,95
116036.010	● 6	18	6	50		✓	14,15
116036.015	● 8	20	6	65	✓		18,90
116036.020	● 10	20	6	65	✓		18,40
116036.025	● 12	25	6	70	✓		25,65
116036.030	○ 16	25	6	70	✓		-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114036.005	● 3	14	3	38		✓	8,00
114036.007	● 6,3	12,7	3	45		✓	13,05
114036.010	● 6	18	6	50		✓	12,25
114036.015	● 8	20	6	65	✓		17,00
114036.020	● 10	20	6	65	✓		15,35
114036.025	● 12	25	6	70	✓		21,15
114036.030	○ 16	25	6	70	✓		-

Art. **11.6037**

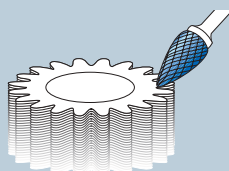


G FORM / SHAPE

SPG

Spitzbogen

Tree



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116037.005	○ 3	14	3	38		✓	-
116037.010	● 6	18	6	50		✓	14,10
116037.015	● 8	20	6	65	✓		16,70
116037.020	● 10	20	6	65	✓		19,40
116037.025	● 12	25	6	70	✓		26,85
116037.030	○ 16	25	6	70	✓		-

Art. **11.4037**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114037.005	○ 3	14	3	38		✓	-
114037.010	● 6	18	6	50		✓	12,25
114037.015	● 8	20	6	65	✓		14,80
114037.020	● 10	20	6	65	✓		16,35
114037.025	● 12	25	6	70	✓		22,40
114037.030	○ 16	25	6	70	✓		-

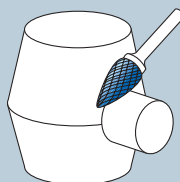
Art. **11.6038**



H FORM / SHAPE

Flamme

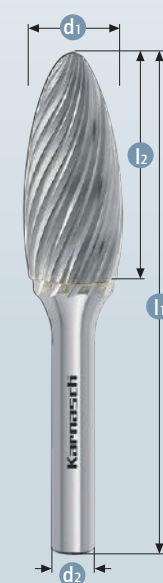
Flame



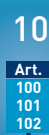
Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116038.015	● 8	20	6	65	✓		18,05
116038.020	● 10	20	6	65	✓		33,05
116038.025	● 12	32	6	77	✓		38,85
116038.030	○ 16	36	6	82	✓		-

Art. **11.4038**



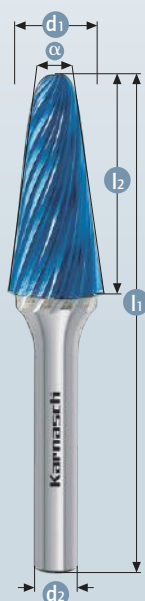
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114038.015	● 8	20	6	65	✓		16,15
114038.020	● 10	20	6	65	✓		30,00
114038.025	● 12	32	6	77	✓		34,35
114038.030	○ 16	36	6	82	✓		-



Art.
100
101
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Art. 11.6039

Art. 11.4039

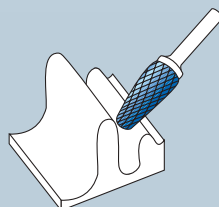


L FORM / SHAPE

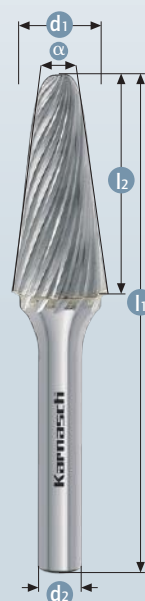
KEL

Rundkegel

Ball nosed cone



Video

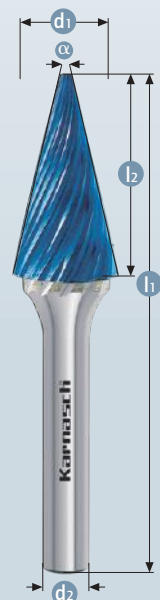


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
116039.005	3	14	3	38		✓	8°	-
116039.010	6	18	6	50		✓	14°	-
116039.015	8	25	6	70	✓		14°	18,20
116039.020	10	30	6	75	✓		14°	24,80
116039.025	12	32	6	77	✓		14°	29,60
116039.030	16	33	6	78	✓		14°	-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
114039.005	3	14	3	38		✓	8°	-
114039.010	6	18	6	50		✓	14°	-
114039.015	8	25	6	70	✓		14°	16,35
114039.020	10	30	6	75	✓		14°	21,75
114039.025	12	32	6	77	✓		14°	25,15
114039.030	16	33	6	78	✓		14°	-

Art. 11.6040

Art. 11.4040

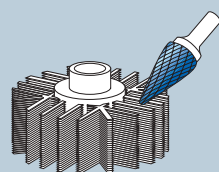


M FORM / SHAPE

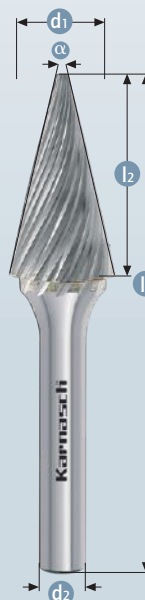
SKM

Spitzkegel

Cone

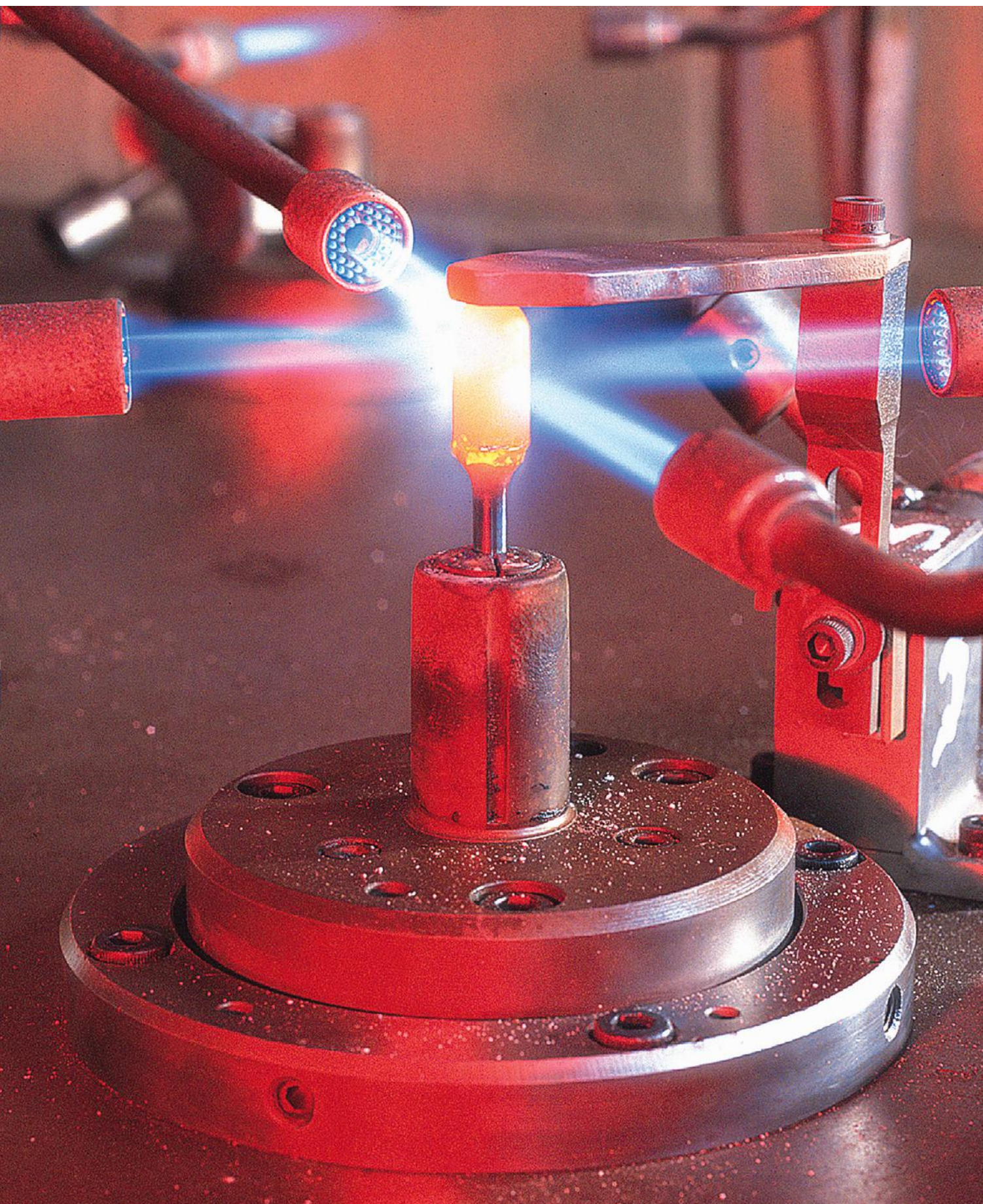


Video



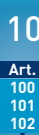
Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
116040.005	3	11	3	38		✓	8°	-
116040.010	6	20	6	50		✓	14°	-
116040.020	10	20	6	65	✓		14°	-
116040.025	12	25	6	70	✓		14°	-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
114040.005	3	11	3	38		✓	8°	-
114040.010	6	20	6	50		✓	14°	-
114040.020	10	20	6	65	✓		14°	-
114040.025	12	25	6	70	✓		14°	-



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Art.
100
101
102

HP-8

Speziell für Stahl und Stahlguss. Extrem hohe Zerspanleistung Especially for steel and cast steel. Extremely high machining output

neu
new



- Bis zu 60% höhere Zerspanleistung im Vergleich zu herkömmlichen Kreuzverzahnungen.
- Hohe Aggressivität erzeugt große Späne mit hervorragender Spanabfuhr.
- Keine Anlauffarben im Material durch geringe Wärmeentwicklung

- Up to 60% higher machining output as compared to conventional cross cut.
- High aggressiveness produces large chips with outstanding chip removal.
- No annealing colours at the workpiece due to low heat development.

Lagerprogramm + Katalogseiten • Stockrange + catalogue pages

ZYA	ZYB	WRC	KUD	TRE	RBF	SPG	-	KEL	SKM
A	B	C	D	E	F	G	H	L	M
392	392	393	393	394	394	395	395	396	396
Zylinder Cylinder	Zylinder + Stirn- verzahnung Cylinder + end cut	Walzenrund- form Ball nosed cylinder	Kugel Ball	Tropfen Oval	Rundbogen Ball nosed tree	Spitzbogen Tree	Flamme Flame	Rundkegel Ball nosed cone	Spitzkegel Cone



BLUE-TEC-beschichtet
BLUE-TEC-coated



Für Frässtifte optimierte und patentierte BLUE-TEC-Beschichtung ergibt einzigartige Standzeiten und Performance in allen Stahlsorten.

Patented BLUE-TEC coating, specifically designed for burrs, gives outstanding tool life and excellent performance on all metals.



Werkstoffgruppen			Bearbeitung	Schnittgeschwindigkeit (m/min)
Stahl, Stahlguss	Ungehärtete, nicht vergütete Stähle bis 1200 N/mm ² (< 38 HRC)	Baustähle, Kohlenstoffstähle, Werkzeugstähle, unlegierte Stähle, Einsatzstähle, Stahlguss	Grobes Zerspanen = hoher Materialabtrag mit Schlagbelastung	450 - 750
	Gehärtete, vergütete Stähle über 1200 N/mm ² (< 38 HRC)	Werkzeugstähle, Vergütungsstähle, legierte Stähle, Stahlguss		

Material groups			Application	Cutting speed m/min
Steel cast steel	Non-hardened, non-heat treated steels up to 1200 N/mm ² (< 38HRC)	Construction steels, carbon steels, tool steels, non-alloyed steels, case-hardened steels, cast steels	Coarse machining = high stock removal with impact load	450 - 750
	Hardened, heat treated steels exceeding 1200 N/mm ² (<38HRC)	tool steels, tempering steels, alloyed steels, cast steels		



Schnittgeschwindigkeit • Cutting speed (m/min)		
	450	750
Ø (mm)	Drehzahlen (min ⁻¹) • Rotational speed (rpm)	
3	48000	80000
6	24000	40000
8	18000	30000
10	14000	24000
12	12000	20000
16	9000	17000



Art.
100
101
102

Art. 11.6041

Art. 11.4041

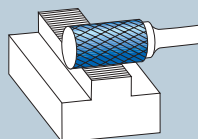


A FORM / SHAPE

ZYA

Zylinder ohne Stirnverzahnung

Cylinder without end cut



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116041.005	○ 3	14	3	38		✓	-
116041.010	● 6	18	6	50		✓	11,20
116041.015	● 8	20	6	65	✓		14,00
116041.020	● 10	20	6	65	✓		16,05
116041.025	● 12	25	6	70	✓		24,70
116041.030	○ 16	25	6	70	✓		-



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114041.005	○ 3	14	3	38		✓	-
114041.010	● 6	18	6	50		✓	9,30
114041.015	● 8	20	6	65	✓		12,10
114041.020	● 10	20	6	65	✓		13,00
114041.025	● 12	25	6	70	✓		20,20
114041.030	○ 16	25	6	70	✓		-

Art. 11.6042

Art. 11.4042

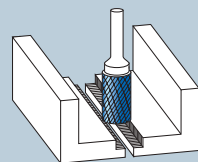


B FORM / SHAPE

ZYB

Zylinder mit Stirnverzahnung

Cylinder with end cut



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116042.005	○ 3	14	3	38		✓	-
116042.010	● 6	18	6	50		✓	11,95
116042.015	● 8	20	6	65	✓		15,15
116042.020	● 10	20	6	65	✓		17,35
116042.025	● 12	25	6	70	✓		26,70
116042.030	○ 16	25	6	70	✓		-



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114042.005	○ 3	14	3	38		✓	-
114042.010	● 6	18	6	50		✓	10,05
114042.015	● 8	20	6	65	✓		13,25
114042.020	● 10	20	6	65	✓		14,30
114042.025	● 12	25	6	70	✓		22,25
114042.030	○ 16	25	6	70	✓		-

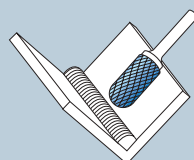
Art. **11.6043**



C FORM / SHAPE

WRC

Walzenrundform
Ball nosed cylinder



Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116043.005	○ 3	14	3	38		✓	-
116043.010	● 6	18	6	50		✓	12,60
116043.015	● 8	20	6	65	✓		15,05
116043.020	● 10	20	6	65	✓		17,50
116043.025	● 12	25	6	70	✓		27,20
116043.030	○ 16	25	6	70	✓		-

Art. **11.4043**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114043.005	○ 3	14	3	38		✓	-
114043.010	● 6	18	6	50		✓	10,70
114043.015	● 8	20	6	65	✓		13,15
114043.020	● 10	20	6	65	✓		14,45
114043.025	● 12	25	6	70	✓		22,70
114043.030	○ 16	25	6	70	✓		-

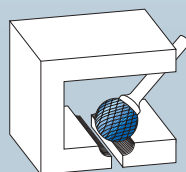
Art. **11.6044**



D FORM / SHAPE

KUD

Kugel
Ball



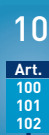
Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116044.005	○ 3	2,5	3	38		✓	-
116044.010	● 6	4,7	6	50		✓	11,70
116044.015	● 8	6,0	6	52	✓		12,45
116044.020	● 10	8,0	6	54	✓		14,95
116044.025	● 12	11,0	6	56	✓		20,45
116044.030	○ 16	11,0	6	60	✓		-

Art. **11.4044**



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114044.005	○ 3	2,5	3	38		✓	-
114044.010	● 6	4,7	6	50		✓	9,85
114044.015	● 8	6,0	6	52	✓		10,55
114044.020	● 10	8,0	6	54	✓		11,85
114044.025	● 12	11,0	6	56	✓		15,95
114044.030	○ 16	11,0	6	60	✓		-



Art.
100
101
102

Art. 11.6045

Art. 11.4045

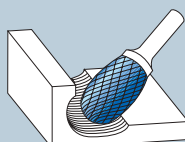


E FORM / SHAPE

TRE

Tropfen

Oval



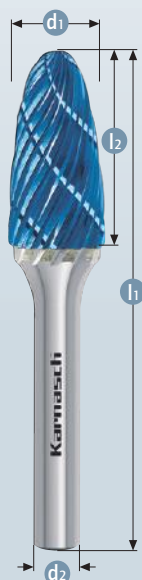
Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116045.005	○ 3	6	3	38		✓	-
116045.010	○ 6	10	6	50		✓	-
116045.015	○ 8	15	6	60	✓		-
116045.020	○ 10	16	6	60	✓		-
116045.025	● 12	22	6	67	✓		25,60
116045.030	○ 16	25	6	70	✓		-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114045.005	○ 3	6	3	38		✓	-
114045.010	○ 6	10	6	50		✓	-
114045.015	○ 8	15	6	60	✓		-
114045.020	○ 10	16	6	60	✓		-
114045.025	● 12	22	6	67	✓		21,10
114045.030	○ 16	25	6	70	✓		-

Art. 11.6046

Art. 11.4046

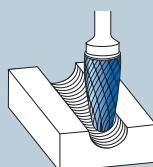


F FORM / SHAPE

RBF

Rundbogen

Ball nosed tree

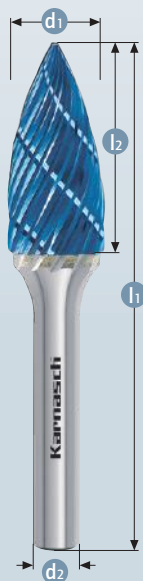


Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116046.005	○ 3	14	3	38		✓	-
116046.010	● 6	18	6	50		✓	13,15
116046.015	● 8	20	6	65	✓		17,50
116046.020	● 10	20	6	65	✓		17,10
116046.025	● 12	25	6	70	✓		23,90
116046.030	○ 16	25	6	70	✓		-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114046.005	○ 3	14	3	38		✓	-
114046.010	● 6	18	6	50		✓	11,25
114046.015	● 8	20	6	65	✓		15,60
114046.020	● 10	20	6	65	✓		14,05
114046.025	● 12	25	6	70	✓		19,45
114046.030	○ 16	25	6	70	✓		-

Art. **11.6047**

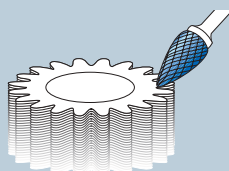


G FORM / SHAPE

SPG

Spitzbogen

Tree

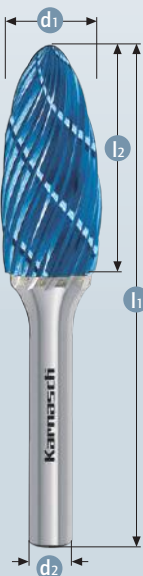


Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116047.005	○ 3	14	3	38		✓	-
116047.010	● 6	18	6	50		✓	13,15
116047.015	● 8	20	6	65	✓		15,50
116047.020	● 10	20	6	65	✓		18,05
116047.025	● 12	25	6	70	✓		25,00
116047.030	○ 16	25	6	70	✓		-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114047.005	○ 3	14	3	38		✓	-
114047.010	● 6	18	6	50		✓	11,25
114047.015	● 8	20	6	65	✓		13,60
114047.020	● 10	20	6	65	✓		15,00
114047.025	● 12	25	6	70	✓		20,50
114047.030	○ 16	25	6	70	✓		-

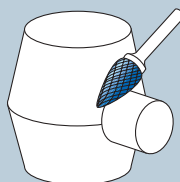
Art. **11.6048**



H FORM / SHAPE

Flamme

Flame

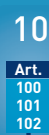
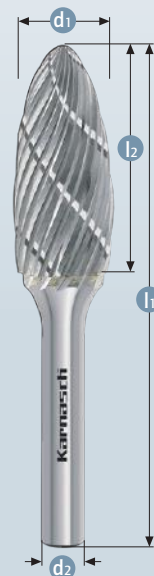


Video

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116048.015	● 8	20	6	65	✓		16,75
116048.020	○ 10	20	6	65	✓		-
116048.025	● 12	32	6	77	✓		36,00
116048.030	○ 16	36	6	82	✓		-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114048.015	● 8	20	6	65	✓		14,85
114048.020	○ 10	20	6	65	✓		-
114048.025	● 12	32	6	77	✓		31,50
114048.030	○ 16	36	6	82	✓		-

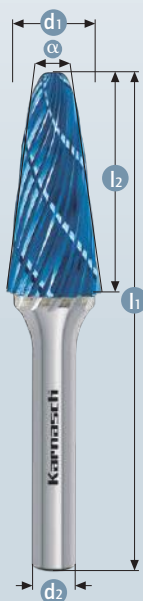
Art. **11.4048**



Art.
100
101
102

Art. 11.6049

Art. 11.4049

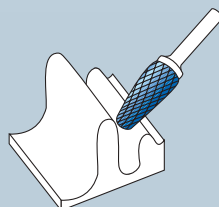


L FORM / SHAPE

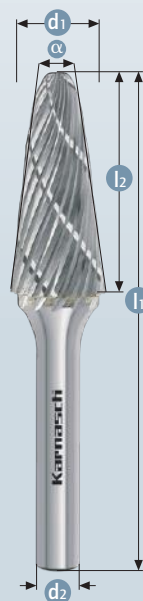
KEL

Rundkegel

Ball nosed cone



Video

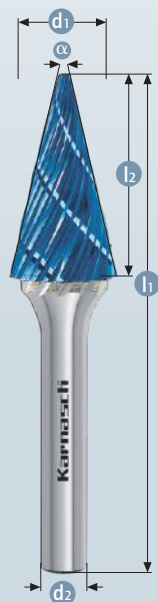


Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
116049.005	3	14	3	38		✓	8°	-
116049.010	6	18	6	50		✓	14°	-
116049.015	8	25	6	70	✓		14°	-
116049.017	10	20	6	65	✓		14°	23,00
116049.020	10	30	6	75	✓		14°	23,00
116049.025	12	32	6	77	✓		14°	27,50
116049.030	16	33	6	78	✓		14°	-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
114049.005	3	14	3	38		✓	8°	-
114049.010	6	18	6	50		✓	14°	-
114049.015	8	25	6	70	✓		14°	-
114049.017	10	20	6	65	✓		14°	19,90
114049.020	10	30	6	75	✓		14°	19,95
114049.025	12	32	6	77	✓		14°	23,05
114049.030	16	33	6	78	✓		14°	-

Art. 11.6050

Art. 11.4050

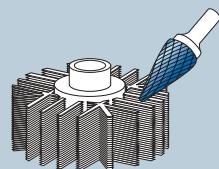


M FORM / SHAPE

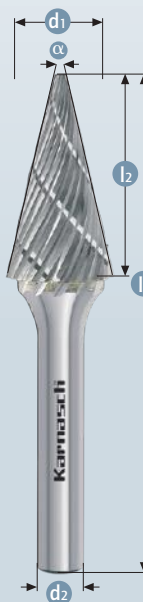
SKM

Spitzkegel

Cone



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
116050.005	3	11	3	38		✓	8°	-
116050.010	6	20	6	50		✓	14°	-
116050.020	10	20	6	65	✓		14°	-
116050.025	12	25	6	70	✓		14°	-

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	α°	€
114050.005	3	11	3	38		✓	8°	-
114050.010	6	20	6	50		✓	14°	-
114050.020	10	20	6	65	✓		14°	-
114050.025	12	25	6	70	✓		14°	-



Frässtifte für GFK/CFK

398

Fiberglass routers



Mini-Frässtifte Ø 1 + 1,5 mm

399

Mini-Burrs Ø 1 + 1,5 mm



Fräser + Bohrer für Schlüsseldienste

400-402

Burrs + drills for locksmiths

Art. 11.6011

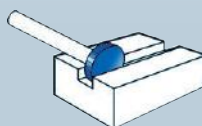
HP-2 VERZÄHNUNG · CUT

Art. 11.4011

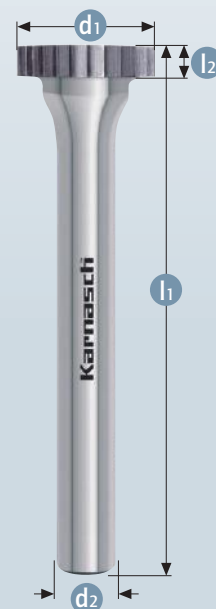


Scheibenform

RIM shape



Video



Art.	d1	l2	d2	l1	gelötet brazed	Form Shape	€
116011.005	• 10	1,6	3	34	✓		15,25
116011.010	• 12	2,6	6	48	✓		37,15
116011.015	• 25	5,2	8	50	✓		87,75
116011.020	• 25	6,3	8	51	✓		91,05

Art.	d1	l2	d2	l1	gelötet brazed	Form Shape	€
114011.005	• 10	1,6	3	34	✓		12,20
114011.010	• 12	2,6	6	48	✓		32,70
114011.015	• 25	5,2	8	50	✓		81,90
114011.020	• 25	6,3	8	51	✓		85,20

Art. **11.6001** Art. **11.6002** Art. **11.6003** Art. **11.6004**

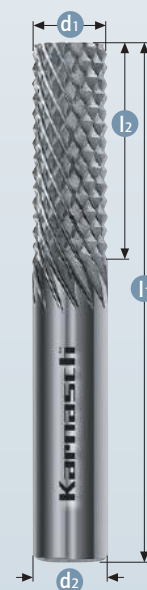
GFK, CFK

Für Kunststoffe, GFK, CFK, MMC

Routers for fiberglass, GFK, CFK



Video



Toleranzen
Tolerances

d_1
Ø 1.6 mm, 2.4 mm
= +0,00/-0,10

Ø 3-12 mm
= +0,00/-0,13

Diese Frässtifte sind geeignet zum Umrissfräsen, Besäumen, Nuten und Bohren der großen Bandbreite von Faserverstärkten Kunststoffen (Fiberglas, GFK CFK). Weiterhin für MMC (Metal Matrix Composites = schwer zerspanbare abrasive Verbundstoffe wie z.B. Leiterplatten, Verbindungen wie Keramik mit Glasfaser, Graphit, Carbon.

Sollten höchste Standzeiten erwünscht sein empfehlen wir eine Diamantbeschichtung. Fragen Sie uns an.

These routers are for contouring, grooving, drilling of a wide range of GFK, CFK, fiberglass reinforced plastics, as well as MMC (Metal Matrix Composites). MMC material such as printed circuit boards, composites such as ceramic with glass fiber, graphite, carbon etc.

If highest lifetime is required do we recommend a diamond coating. On request.



Ohne Stirnverzahnung
No end cut



Mehrschneiden
Stirnverzahnung
Burr end cut



Zweischneiden
Stirnverzahnung
2-flute end mill cut



Bohrspitze 135°
Drill point 135°

d1	l2	d2	l1	VHM solid	116001		116002		116003		116004	
					Art.	€	Art.	€	Art.	€	Art.	€
• 1,6	5	3	38	✓	116001.001	8,50	116002.001	10,05	116003.001	10,15	116004.001	10,75
• 2,4	9,5	3	38	✓	116001.003	9,00	116002.003	10,05	116003.003	10,95	116004.003	11,55
• 3	12	3	38	✓	116001.005	9,55	116002.005	10,20	116003.005	11,95	116004.005	11,95
• 4	16	4	50	✓	116001.010	13,65	116002.010	14,35	116003.010	16,00	116004.010	16,00
• 4	16	6	50	✓	116001.012	15,35	116002.012	17,15	116003.012	18,30	116004.012	19,05
• 6	19	6	50	✓	116001.013	15,35	116002.013	17,15	116003.013	18,30	116004.013	19,05
• 6	19	6	63	✓	116001.015	21,80	116002.015	24,00	116003.015	25,50	116004.015	25,50
• 6	25	6	75	✓	116001.017	19,05	116002.017	20,70	116003.017	21,70	116004.017	22,40
• 8	25	8	63	✓	116001.020	31,60	116002.020	33,35	116003.020	34,80	116004.020	34,80
▲ 10	25	10	63	✓	116001.025	37,75	116002.025	41,10	116003.025	42,75	116004.025	44,40
• 10	25	10	75	✓	116001.027	39,70	116002.027	43,15	116003.027	44,80	116004.027	46,55
• 12	25	12	75	✓	116001.029	54,50	116002.029	59,95	116003.029	62,90	116004.029	65,80
▲ 12	30	12	75	✓	116001.030	54,20	116002.030	59,50	116003.030	62,35	116004.030	65,20

Schnittgeschwindigkeit • Cutting speed (m/min)

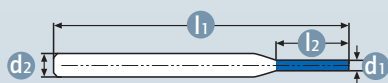
Ø (mm)	450	900
	Drehzahlen (min ⁻¹) • Rotational speed (rpm)	
2	72000	143000
3	48000	95000
4	36000	72000
6	24000	48000
8	17000	36000
10	14000	29000
12	12000	24000

Einsatzgebiete:
Zu bearbeitende Werkstoffe:
Drehzahlempfehlung:

Feinmechanik, Schmuckindustrie, Turbinenbau, Werkzeugbau
Edelstähle, Buntmetalle, Zinkdruckguss, weiche Keramiken, Titanlegierungen
ca. 70.000 U/min

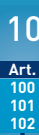
Applications:
For use on:
Recommended operating speed:

Precision engineering, jewellery industry, turbine manufacture, tool manufacture
stainless steel, copper and copper alloys, zinc pressure die castings soft ceramics, titanium alloys
+/- 70,000 RPM



Art.	d1	l2	d2	l1	Form Shape	DIN 8033		€
115006.005	• 1	4	3	38	A	ZYA		11,40
115006.010	• 1,5	4	3	38	A	ZYA		11,40
115006.020	• 2	4	3	38	A	ZYA		11,40
115026.005	• 1	4	3	38	C	WRC		11,40
115026.010	• 1,5	4	3	38	C	WRC		11,40
115026.015	• 2	4	3	38	C	WRC		11,40
115036.005	• 1	1	3	38	D	KUD		11,40
115036.010	• 1,5	1	3	38	D	KUD		11,40
115036.015	• 2	2	3	38	D	KUD		11,40
115046.005	• 1,5	4	3	38	E	TRE		11,40
115056.005	• 1,5	4	3	38	F	RBF		11,40
115066.005	• 1,5	4	3	38	G	SPG		11,40
115196.005	• 1,5	4	3	38	M	SKM		11,40

Art.	d1	l2	d2	l1	Form Shape	DIN 8033		€
113006.005	• 1	4	3	38	A	ZYA		9,50
113006.010	• 1,5	4	3	38	A	ZYA		9,50
113006.020	• 2	4	3	38	A	ZYA		9,50
113026.005	• 1	4	3	38	C	WRC		9,50
113026.010	• 1,5	4	3	38	C	WRC		9,50
113026.015	• 2	4	3	38	C	WRC		9,50
113036.005	• 1	1	3	38	D	KUD		9,50
113036.010	• 1,5	1	3	38	D	KUD		9,50
113036.015	• 2	2	3	38	D	KUD		9,50
113046.005	• 1,5	4	3	38	E	TRE		9,50
113056.005	• 1,5	4	3	38	F	RBF		9,50
113066.005	• 1,5	4	3	38	G	SPG		9,50
113196.005	• 1,5	4	3	38	M	SKM		9,50



Art. **11.5021** Art. **11.5022** Art. **11.5025**

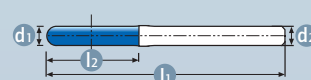


C FORM / SHAPE

WRC

Walzenrundform

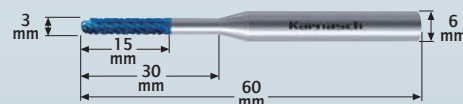
Ball nosed cylinder



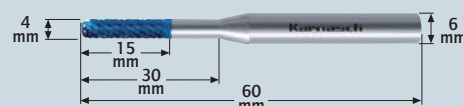
Video

Art.	d1	l2	d2	l1	Zahnung	€
115021.030	• 3,0	14	3	50	 HP-3 Die am meisten verwendete Universalverzahnung Stahl bis < 60 HRC The most widely used universal cutting style < 60 HRC	10,15
115021.032	• 3,0	14	3	60		10,65
115021.035	• 3,0	14	3	75		11,20
115021.040	• 3,0	14	3	100		14,00
115021.043	• 3,0	30*	6	60		22,25
115021.046	• 4,0	30*	6	60		22,80
115021.055	• 6,0	18	6	50		11,65
115021.056	• 6,0	18	6	60		15,55
115021.058	• 6,0	18	6	80		18,55
115021.060	• 6,0	18	6	100		20,90
115021.065	• 6,0	18	6	150		28,65
115022.030	• 3,0	14	3	50	 HP-4 Extra feine Kreuz- verzahnung für Stähle bis ca. 70 HRC Extra fine cross cutting style up to extra hard steel 70 HRC	10,80
115022.032	• 3,0	14	3	60		11,30
115022.035	• 3,0	14	3	75		11,80
115022.040	• 3,0	14	3	100		14,85
115022.043	• 3,0	30*	6	60		24,40
115022.046	• 4,0	30*	6	60		24,95
115022.055	• 6,0	18	6	50		13,55
115022.056	• 6,0	18	6	60		16,90
115022.058	• 6,0	18	6	80		20,20
115022.060	• 6,0	18	6	100		24,65
115022.065	• 6,0	18	6	150		33,95
115025.055	• 6,0	18	6	50	 HP-7 Grobe Zerspanung und höchsten Materialabtrag von Alu- Legierungen For coarse cutting and highest material removal of aluminium alloys	17,05

* Art. 11.5021-043 / 11.5022-043



* Art. 11.5021-046 / 11.5022-046



* Davon 15 mm verzahnt | Of which 15 mm teathed

- * Durch Verjüngung eines Ø 6 mm Frässtiftes auf Ø 3 mm oder Ø 4 mm wird die Arbeitszeit um ca. die Hälfte reduziert, da weniger Material zerspannt werden muss.
- Durch Ø 6 mm Schaft wesentlich bruchunempfindlicher als durchgehend Ø 3 mm oder Ø 4 mm Schaft
- Bei Ø 3 mm, 4 mm, 6 mm kann mit der gleichen Ø 6 mm Spannzange gearbeitet werden.
- Die Kernziehschutzblende muss in der Regel wegen des geringen Fräskopf-Durchmessers nicht zuerstört werden.

- * By tapering of a 6 mm burr to Ø 3 mm or Ø 4 mm working time is reduced by about half, because less material needs to be machined.
- Because of its 6 mm shank, significantly less susceptible to breakage than continuous Ø 3 mm or Ø 4 mm shank
- At Ø 3 mm, Ø 4 mm the same collet can be used for Ø 6 mm
- Because of the limited diameter of the burr head, the core drawing tray may not be disturbed

Art. 11.3021 Art. 11.3022 Art. 11.3025

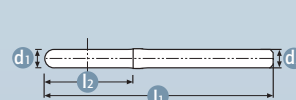


C FORM / SHAPE

WRC

Walzenrundform

Ball nosed cylinder



Video

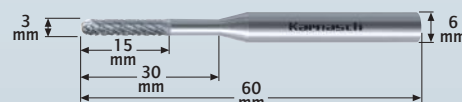
Art.	d1	l2	d2	l1	Zahnung	€
113021.030	• 3,0	14	3	50	 HP-3 Die am meisten verwendete Universalverzahnung Stahl bis < 60 HRC The most widely used universal cutting style < 60 HRC	8,30
113021.032	• 3,0	14	3	60		8,80
113021.035	• 3,0	14	3	75		9,35
113021.040	• 3,0	14	3	100		12,10
113021.043	• 3,0	30*	6	60		20,35
113021.046	• 4,0	30*	6	60		20,90
113021.055	• 6,0	18	6	50		9,75
113021.056	• 6,0	18	6	60		13,65
113021.058	• 6,0	18	6	80	 HP-4 Extra feine Kreuz- verzahnung für Stähle bis ca. 70 HRC Extra fine cross cutting style up to extra hard steel 70 HRC	16,65
113021.060	• 6,0	18	6	100		19,00
113021.065	• 6,0	18	6	150		26,75
113022.030	• 3,0	14	3	50		8,90
113022.032	• 3,0	14	3	60		9,40
113022.035	• 3,0	14	3	75		9,90
113022.040	• 3,0	14	3	100		13,00
113022.043	• 3,0	30*	6	60		22,50
113022.046	• 4,0	30*	6	60	 HP-7 Grobe Zerspanung und höchsten Materialabtrag von Alu- Legierungen For coarse cutting and highest material removal of aluminium alloys	23,05
113022.055	• 6,0	18	6	50		11,65
113022.056	• 6,0	18	6	60		15,05
113022.058	• 6,0	18	6	80		18,30
113022.060	• 6,0	18	6	100		22,80
113022.065	• 6,0	18	6	150		32,10
113025.055	• 6,0	18	6	50		12,75

* Davon 15 mm verzahnt | Of which 15 mm teathed

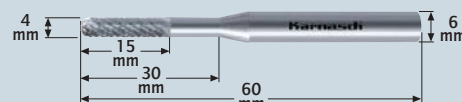
- * Durch Verjüngung eines Ø 6 mm Frässtiftes auf Ø 3 mm oder Ø 4 mm wird die Arbeitszeit um ca. die Hälfte reduziert, da weniger Material zerspannt werden muss.
- Durch Ø 6 mm Schaft wesentlich bruchunempfindlicher als durchgehend Ø 3 mm oder Ø 4 mm Schaft
- Bei Ø 3 mm, 4 mm, 6 mm kann mit der gleichen Ø 6 mm Spannzange gearbeitet werden.
- Die Kernziehschutzblende muss in der Regel wegen des geringen Fräskopf-Durchmessers nicht zuerstört werden.

- * By tapering of a 6 mm burr to Ø 3 mm or Ø 4 mm working time is reduced by about half, because less material needs to be machined.
- Because of its 6 mm shank, significantly less susceptible to breakage than continuous Ø 3 mm or Ø 4 mm shank
- At Ø 3 mm, Ø 4 mm, the same collet can be used for Ø 6 mm
- Because of the limited diameter of the burr head, the core drawing tray may usually not be disturbed

* Art. 11.3021-043 / 11.3022-043



* Art. 11.3021-046 / 11.3022-046



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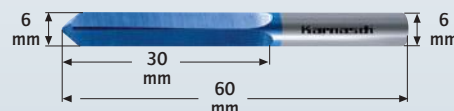
10



Art.
100
101
102

Art. **11.4701**

€ 26,45



Vollhartmetall-Bohrfräser der neuesten Generation. Öffnet Schließzylinder in Rekordzeit. Beste Ergebnisse werden mit Geradschleifer erzielt (siehe Seite 432/433). Aufbohrungen auch mit Bohrmaschine/Akku-Bohrmaschinen möglich.

In Verbindung mit Frässtiften (Seite 400/401) ergibt sich die ideale Werkzeugkombination.

Mit dem Bohrfräser wird der Zylinder in kürzester Zeit geradlinig aufgebohrt. In der Regel sollte der Schließzylinder nun bereits zu schließen sein. Falls nicht, z.B. bei besonderen Bohrschutzsicherungen, wird die Bohrung mit einem Frässtift (siehe Seite 400/401) seitlich erweitert.

Solid carbide drill of the newest generation. Opens locking cylinders in record time. Best results are achieved with straight grinders (see page 432/433). Also drilling with drilling/battery drills. Together with burrs (page 400/401), the ideal tool combination is achieved. With the drill, the cylinder is drilled in a straight line in the shortest possible time. Usually, the locking cylinder can already be closed now. If not, e.g., in case of special drill prevention, the borehole is sideways expanded with a burr (see page 400/401).

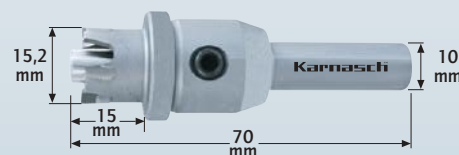


Video

Art. **11.4702**

€ 16,95

HM-LOCHSÄGE FÜR ABLOY PROTEC-SCHLIESSZYLINDER T.C.T. HOLESAWS FOR ABLOY PROTEC LOCKING CYLINDERS



Zu verwenden mit einer Bohrmaschine/starke Akku-Bohrmaschine. Mit dieser Lochsäge ist es möglich, die vor dem Kern liegende, gehärtete Stirnplatte dieses speziellen Hochsicherheitszylinders zu durchdringen um anschließend den Kern herausziehen zu können.

Werkzeugmerkmale:

- 4 x HM-Zähne Ø 15,2
- Gefederte Stifführung (6,8 mm) zur Zentrierung im Schließkanal
- Tiefenanschlag

To be used with a drilling machine/strong battery drill. With this holesaw it is possible to penetrate the hardened front plate of this special high security locking cylinder that sits in front of the core and then to retrieve the core.

Properties of the tool:

- 4 x T.C.T. teeth Ø 15.2
- Sprung pin guide (6.8 mm) for centring in the locking channel
- Depth stop



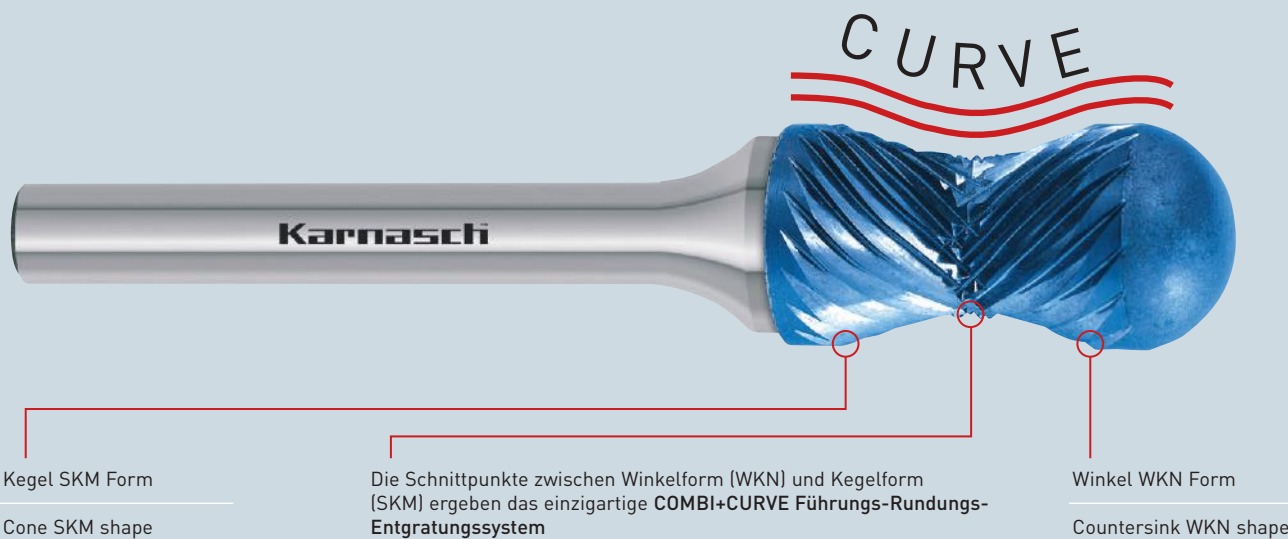
Video



COMBI →

CURVE →

ZYA	ZYB	WRC	WRC	RBF	SKM	KEL	KSJ	KSK
406	407	408	409	410	411	412	413	414



Kegel SKM Form
Cone SKM shape

Die Schnittpunkte zwischen Winkelform (WKN) und Kegelform (SKM) ergeben das einzigartige COMBI+CURVE Führungs-Rundungs-Entgratungssystem

The intersecting points of the countersink (WKN) and cone shapes (SKM) form the unique COMBI+CURVE guiding-rounding-deburring system

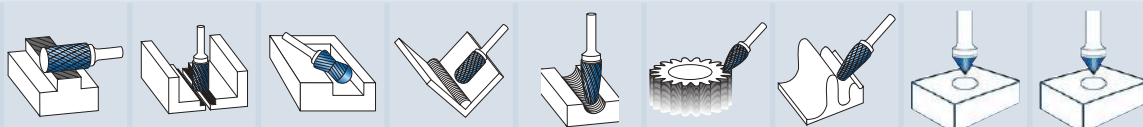
Winkel WKN Form
Countersink WKN shape

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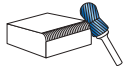
Art.
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new

COMBI →



CURVE →



406

407

408

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410

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412

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414

Die Kombination aus den gängigsten Kopfformen wie Zylinder ZYA + ZYB, Walzenrund WRC, Rundbogen RBF, Spitzbogen SPG, Rundkegel KEL, Winkel KSJ + KSK mit dem einzigartigen **COMBI+CURVE** Führungs-Rundungs-Entgratungssystem ergeben folgende Vorteile:

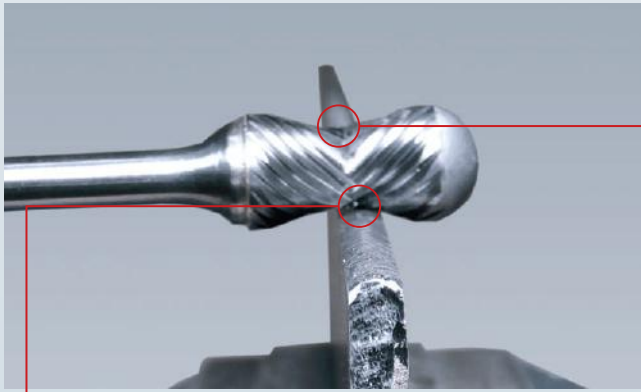
- ideal zum schnellen Kantenverrunden.
- Die Kanten werden nicht einfach flach abgeschrägt, sondern erhalten durch das einzigartige **Führungs-Rundungs-Entgratungssystem** eine saubere Rundung.
- Der **COMBI+CURVE** zentriert sich selbst, immer mittig zur Kante.
- Durch die einzigartige Selbstzentrierung ist ein Abgleiten oder Verutschen an scharfen Kanten nahezu unmöglich.
- Somit besteht eine deutlich bessere Kontrolle und garantiert einen einfachen und schnellen Materialabtrag.

Anwendbar in den verschiedensten Materialien wie: Gusseisen, Stahl < 60 HRC, Edelstahl (INOX), Nickelbasis- und Titanlegierungen, sowie Kupfer, Messing und Bronze

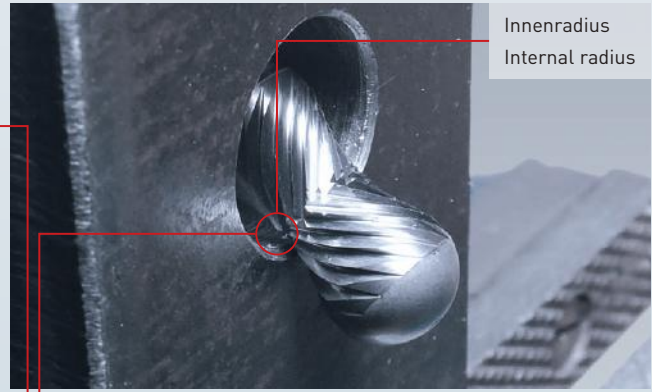
The combination of the most used head shapes as Cylinder ZYA + ZYB, Ball nosed cylinder WRC, Ball nosed three RBF, Tree SPG, Ball nosed cone KEL, Countersink KSJ + KSK with the unique **COMBI+CURVE** guiding-rounding-deburring system result the following advantages:

- The Ideal tool for extremely fast chamfering. The edges are not simply bevelled, but by the unique guiding-rounding-deburring system smoothly rounded.
- **COMBI+CURVE** guiding-rounding-deburring system always centres itself on the centre of the edge.
- Slipping off the edge is almost impossible. This gives best control and guarantees faster and easier removal of material.

Can be used on a wide variety of material e.g. Cast iron, Steel < 60 HRC, stainless steel (INOX), nickel-based and Titanium alloys, copper, brass and bronze.

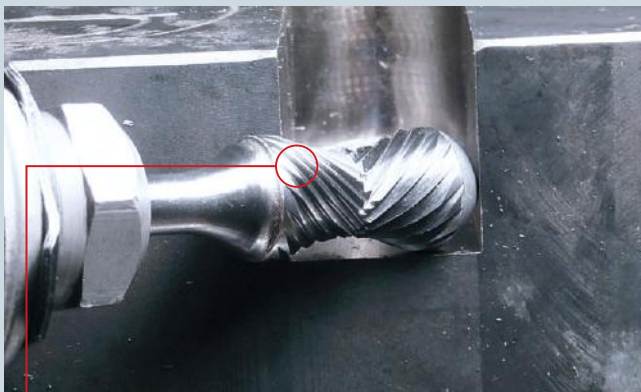


Außenradius
External radius



Die Schnittpunkte zwischen Winkelform (WKN) und Kegelform (SKM) ergeben das einzigartige COMBI+CURVE Führungs-Rundungs-Entgratungssystem

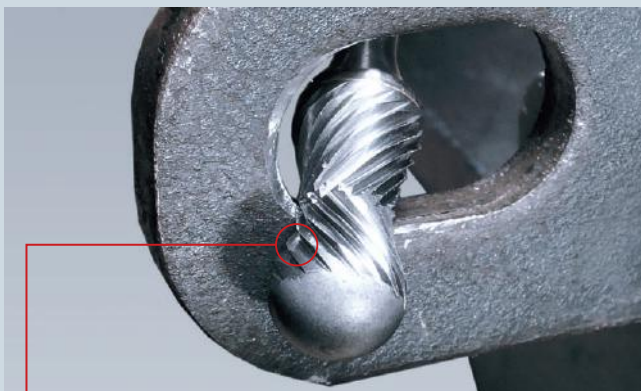
The intersecting points of the countersink (WKN) and cone shapes (SKM) form the unique COMBI+CURVE guiding-rounding-deburring system



Interne Fase in SKM Form
Internal chamfer with SKM shape



Außenfase in SKM Form
External chamfer with SKM shape



Interne Fase in WKN Form
Internal chamfer with WKN shape



Außenfase in WKN Form
External chamfer with WKN shape

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Art.
100
101
102

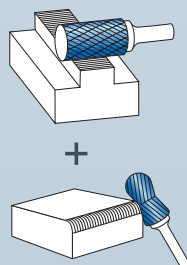
Art. **11.6019**

Art. **11.4019**

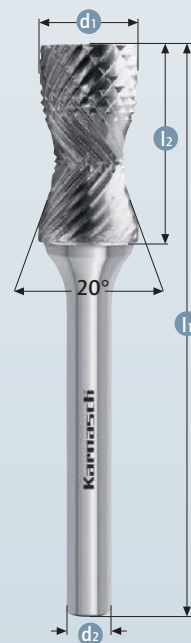


Curve + Zylinder

Curve + Cylinder



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116019.100	• 12	25	6	70	✓	–	40,35

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114019.100	• 12	25	6	70	✓	–	35,85

Anwendungsbeispiele / Application examples

COMBI →

+

CURVE



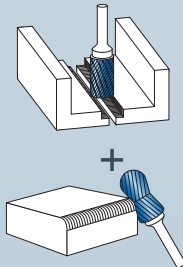
Art. 11.6020

Art. 11.4020



Curve + Zylinder mit Stirnverzahnung

Curve + Cylinder with end cut



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116020.100	• 12	25	6	70	✓	–	50,90

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114020.100	• 12	25	6	70	✓	–	46,40

Anwendungsbeispiele / Application examples

COMBI →

+

CURVE



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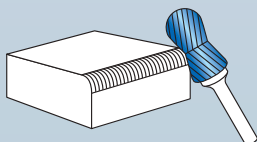
Art.
100
101
102

Art. 11.6021

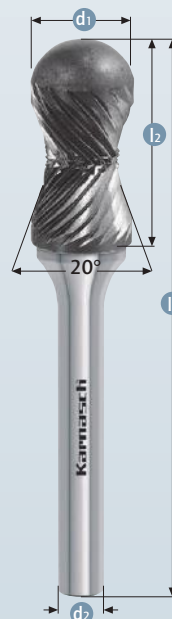
Art. 11.4021



Curve + Walzenrundform
Curve + Ball nosed cylinder



Video



Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
116021.100	• 12	25	6	70	✓	–	44,70

Art.	d1	l2	d2	l1	gelötet brazed	VHM solid	€
114021.100	• 12	25	6	70	✓	–	40,25

Anwendungsbeispiele / Application examples

COMBI →

+

CURVE
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Der Radius an der Spitze des Rotierfräasers dient als Führung und Abstützung. Beschädigungen am Werkstück werden vermieden.

The radius at the front of the burr serves as a guide and a support. Damage to the workpiece can thus be avoided.

