



■ Made
■ in
■ Germany



FRANKEN
TOP-Cut

Universalfräser für den Werkzeug- und Formenbau
Universal End Mills for the Die and Mould Industry



100 Jahre Präzision und Innovation. 100 years of precision and innovation.

FRANKEN als Teil der EMUGE-FRANKEN Unternehmensgruppe beschäftigt sich seit seiner Gründung mit der Entwicklung und Produktion von Fräswerkzeugen. Präzision und Innovation prägen das breite Angebot von Fräsern aus Hartmetall und HSS sowie PKD-, CBN- oder wendepplattenbestückten Fräskörpern.

Die Fertigung am deutschen Produktionsstandort in Rückersdorf reicht von Standard-Schaft- und Bohrungsfräsern bis hin zu hochgenauen Form- und Profil-Sonderfräsern. Mit seiner Typen- und Schneidstoffvielfalt, dem hohen Standard und der kompromisslosen Präzision entspricht das Fräserprogramm den höchsten Qualitätsanforderungen.

Als Ergänzung zu den Fräswerkzeugen führt FRANKEN ein durchgängiges Programm an Fräsespannmitteln und Zubehör für die verschiedensten Adaptierungsmöglichkeiten.

Ever since its foundation FRANKEN as part of the EMUGE-FRANKEN company association has been developing and manufacturing milling tools. The wide range of end mills of solid carbide and HSS as well as PCD and CBN inserts or milling cutters with indexable inserts is characterised by precision and innovation.

The production in our German manufacturing plant in Rückersdorf includes standard end mills and bore cutters as well as highly precise special form and profile milling tools. With its large variety of tool types and cutting materials, the consistently high standards and uncompromising precision, our product range of milling cutters meets even the highest quality requirements.

In addition to our selection of milling tools, we also offer a comprehensive range of clamping systems, tool holders and accessories.





In dieser Broschüre wird eine Auswahl der wichtigsten FRANKEN TOP-Cut Hartmetall-Kugel- und -Torusfräser dargestellt. Diese sind speziell auf den Werkzeug- und Formenbau abgestimmt. Dank einer universellen Werkzeuggeometrie können verschiedenste Materialien im Bereich der Schrupp- und Schlichtbearbeitung zerspant werden. Der Einsatz auf modernen Zerspanungszentren mit 5-Achs-Technologie ist ebenfalls möglich.

Zu jedem Werkzeug werden – in Abhängigkeit zur jeweiligen Werkstoffgruppe – sichere Startbedingungen für die Schnittgeschwindigkeit v_c und den Vorschub pro Zahn f_z , sowie Hinweise zu empfohlenen Kühlschmierstoffen angegeben.

Besonderheiten:

- Universelle Schneidengeometrie
- Verschiedene Baulängen
- Unterschiedliche, hochgenaue Eckenradien
- Moderner Schneidstoff
- Hochleistungs-Beschichtung

Hauptmerkmal:

- In fast allen Werkstoffen einsetzbar
- Zum Schruppen, Schlichten sowie zum HSC-Schlichten geeignet

Im FRANKEN Katalog 250 finden Sie weitere Werkzeuge für den Einsatz im Werkzeug- und Formenbau.

This brochure presents a selection of the most important FRANKEN TOP-Cut carbide ball nose and torus end mills. These are specially designed for the die and mould industry. Thanks to a universal tool geometry different materials can be machined in roughing and finishing operations. The use of these tools on modern machining centres with 5-axis technology is also possible.

Machining recommendations are provided for each tool taking the respective material group into account, including safe starting conditions for the cutting speed v_c and feed per tooth f_z as well as advice on recommended coolant-lubricants.

Characteristics:

- Universal flute geometry
- Different lengths
- Different, highly accurate corner radii
- Modern cutting material
- High performance coating

Main feature:

- For almost all materials
- Suitable for roughing, finishing and HSC finishing

Additional tools for the application in die and mould making can be found in the FRANKEN catalogue 250.

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Wegweiser

Bitte beachten:

Die Eignung der Hartmetall-Kugel- und Torusfräser ist folgendermaßen gekennzeichnet:

- = sehr gut geeignet
- = gut geeignet

Product finder

Please note:

The suitability of the solid carbide ball nose and torus end mills is indicated as follows:

- = very suitable
- = suitable

		Einsatzgebiete – Material Applications – material		Material-Beispiele Material examples	Material-Nummern Material numbers	
P	Stahlwerkstoffe	Steel materials				
	1.1	Kaltfließpressstähle, Baustähle, Automatenstähle, u.a.	Cold-extrusion steels, Construction steels, Free-cutting steels, etc.	≤ 600 N/mm ²	Cq15 S235JR (St37-2) 10SPb20	1.1132 1.0037 1.0722
	2.1	Baustähle, Einsatzstähle, Stahlguss, u.a.	Construction steels, Case-hardened steels, Steel castings, etc.	≤ 800 N/mm ²	E360 (St70-2) 16MnCr5 GS-25CrMo4	1.0070 1.7131 1.7218
	3.1	Einsatzstähle, Vergütungsstähle, Kaltarbeitsstähle, u.a.	Case-hardened steels, Heat-treatable steels, Cold work steels, etc.	≤ 1000 N/mm ²	20MoCr3 42CrMo4 102Cr6	1.7320 1.7225 1.2067
	4.1	Vergütungsstähle, Kaltarbeitsstähle, Nitrierstähle, u.a.	Heat-treatable steels, Cold work steels, Nitriding steels, etc.	≤ 1200 N/mm ²	50CrMo4 X45NiCrMo4 31CrMo12	1.7228 1.2767 1.8515
5.1	Hochlegierte Stähle, Kaltarbeitsstähle, Warmarbeitsstähle, u.a.	High-alloyed steels, Cold work steels, Hot work steels, etc.	≤ 1400 N/mm ²	X38CrMoV5-3 X100CrMoV8-1-1 X40CrMoV5-1	1.2367 1.2990 1.2344	
M	Nichtrostende Stahlwerkstoffe	Stainless steel materials				
	1.1	Ferritisch, martensitisch	Ferritic, martensitic	≤ 950 N/mm ²	X2CrTi12	1.4512
	2.1	Austenitisch	Austenitic	≤ 950 N/mm ²	X6CrNiMoTi17-12-2	1.4571
	3.1	Austenitisch-ferritisch (Duplex)	Austenitic-ferritic (Duplex)	≤ 1100 N/mm ²	X2CrNiMoN22-5-3	1.4462
4.1	Austenitisch-ferritisch hitzebeständig (Super Duplex)	Austenitic-ferritic heat-resistant (Super Duplex)	≤ 1250 N/mm ²	X2CrNiMoN25-7-4	1.4410	
K	Gusswerkstoffe	Cast materials				
	1.1	Gusseisen mit Lamellengrafit (GJL)	Cast iron with lamellar graphite (GJL)	100-250 N/mm ²	EN-GJL-200 (GG20)	EN-JL-1030
	1.2	Gusseisen mit Kugelgrafit (GJS)	Cast iron with nodular graphite (GJS)	250-450 N/mm ²	EN-GJL-300 (GG30)	EN-JL-1050
	2.1	Gusseisen mit Kugelgrafit (GJS)	Cast iron with nodular graphite (GJS)	350-500 N/mm ²	EN-GJS-400-15 (GGG40)	EN-JS-1030
	2.2	Gusseisen mit Kugelgrafit (GJS)	Cast iron with nodular graphite (GJS)	500-900 N/mm ²	EN-GJS-700-2 (GGG70)	EN-JS-1070
	3.1	Gusseisen mit Vermiculargrafit (GJV)	Cast iron with vermicular graphite (GJV)	300-400 N/mm ²	GJV 300	
	3.2	Gusseisen mit Vermiculargrafit (GJV)	Cast iron with vermicular graphite (GJV)	400-500 N/mm ²	GJV 450	
4.1	Temperguss (GTMW, GTMB)	Malleable cast iron (GTMW, GTMB)	250-500 N/mm ²	EN-GJMW-350-4 (GTW-35)	EN-JM-1010	
4.2	Temperguss (GTMW, GTMB)	Malleable cast iron (GTMW, GTMB)	500-800 N/mm ²	EN-GJMB-450-6 (GTS-45)	EN-JM-1140	
N	Nichteisenwerkstoffe	Non-ferrous materials				
	Aluminium-Legierungen		Aluminium alloys			
	1.1	Aluminium-Knetlegierungen	Wrought aluminium alloys	≤ 200 N/mm ²	EN AW-AIMn1	EN AW-3103
	1.2	Aluminium-Knetlegierungen	Wrought aluminium alloys	≤ 350 N/mm ²	EN AW-AIMgSi	EN AW-6060
	1.3	Aluminium-Knetlegierungen	Wrought aluminium alloys	≤ 550 N/mm ²	EN AW-AlZn5Mg3Cu	EN AW-7022
	1.4	Aluminium-Knetlegierungen	Wrought aluminium alloys	Si ≤ 7%	EN AC-AIMg5	EN AC-51300
	1.5	Aluminium-Gusslegierungen	Aluminium cast alloys	7% < Si ≤ 12%	EN AC-AISi9Cu3	EN AC-46500
	1.6	Aluminium-Gusslegierungen	Aluminium cast alloys	12% < Si ≤ 17%	GD-AISi17Cu4FeMg	
	Kupfer-Legierungen		Copper alloys			
	2.1	Reinkupfer, niedriglegiertes Kupfer	Pure copper, low-alloyed copper	≤ 400 N/mm ²	E-Cu 57	EN CW 004 A
	2.2	Kupfer-Zink-Legierungen (Messing, langspanend)	Copper-zinc alloys (brass, long-chipping)	≤ 550 N/mm ²	CuZn37 (Ms63)	EN CW 508 L
	2.3	Kupfer-Zink-Legierungen (Messing, kurzspanend)	Copper-zinc alloys (brass, short-chipping)	≤ 550 N/mm ²	CuZn36Pb3 (Ms58)	EN CW 603 N
	2.4	Kupfer-Aluminium-Legierungen (Alubronze, langspanend)	Copper-aluminium alloys (alu bronze, long-chipping)	≤ 800 N/mm ²	CuAl10Ni5Fe4	EN CW 307 G
	2.5	Kupfer-Zinn-Legierungen (Zinnbronze, langspanend)	Copper-tin alloys (tin bronze, long-chipping)	≤ 700 N/mm ²	CuSn8P	EN CW 459 K
	2.6	Kupfer-Zinn-Legierungen (Zinnbronze, kurzspanend)	Copper-tin alloys (tin bronze, short-chipping)	≤ 400 N/mm ²	CuSn7 ZnPb (Rg7)	2.1090
	2.7	Kupfer-Sonderlegierungen	Special copper alloys	≤ 600 N/mm ²	(AMPCO® 8)	
2.8	Kupfer-Sonderlegierungen	Special copper alloys	≤ 1400 N/mm ²	(AMPCO® 45)		
Magnesium-Legierungen		Magnesium alloys				
3.1	Magnesium-Knetlegierungen	Magnesium wrought alloys	≤ 500 N/mm ²	MgAl6Zn	3.5612	
3.2	Magnesium-Gusslegierungen	Magnesium cast alloys	≤ 500 N/mm ²	EN-MCMgAl9Zn1	EN-MC21120	
Kunststoffe		Synthetics				
4.1	Duroplaste (kurzspanend)	Duroplastics (short-chipping)		Bakelit, Pertinax		
4.2	Thermoplaste (langspanend)	Thermoplastics (long-chipping)		PMMA, POM, PVC		
4.3	Faserverstärkte Kunststoffe (Faseranteil ≤ 30%)	Fibre-reinforced synthetics (fibre content ≤ 30%)		GFK, CFK, AFK		
4.4	Faserverstärkte Kunststoffe (Faseranteil > 30%)	Fibre-reinforced synthetics (fibre content > 30%)		GFK, CFK, AFK		
Besondere Werkstoffe		Special materials				
5.1	Grafit	Graphite		C 8000		
5.2	Wolfram-Kupfer-Legierungen	Tungsten-copper alloys		W-Cu 80/20		
5.3	Verbundwerkstoffe	Composite materials		Hyllite, Alucobond		
S	Spezialwerkstoffe	Special materials				
	Titan-Legierungen		Titanium alloys			
	1.1	Reintitan	Pure titanium	≤ 450 N/mm ²	Ti1	3.7025
	1.2	Titan-Legierungen	Titanium alloys	≤ 900 N/mm ²	TiAl6V4	3.7165
	1.3	Titan-Legierungen	Titanium alloys	≤ 1250 N/mm ²	TiAl4Mo4Sn2	3.7185
	Nickel-, Kobalt- und Eisen-Legierungen		Nickel alloys, cobalt alloys and iron alloys			
	2.1	Reinnickel	Pure nickel	≤ 600 N/mm ²	Ni 99.6	2.4060
	2.2	Nickel-Basis-Legierungen	Nickel-base alloys	≤ 1000 N/mm ²	Monel 400	2.4360
	2.3	Nickel-Basis-Legierungen	Nickel-base alloys	≤ 1600 N/mm ²	Inconel 718	2.4668
	2.4	Nickel-Basis-Legierungen	Nickel-base alloys	≤ 1000 N/mm ²	Udimet 605	
2.5	Kobalt-Basis-Legierungen	Cobalt-base alloys	≤ 1600 N/mm ²	Haynes 25	2.4964	
2.6	Eisen-Basis-Legierungen	Iron-base alloys	≤ 1500 N/mm ²	Incoloy 800	1.4958	
H	Harte Werkstoffe	Hard materials				
	1.1	Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	44 - 50 HRC	Weldox 1100	
	1.2	Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	50 - 55 HRC	Hardox 550	
	1.3	Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	55 - 60 HRC	ArmoX 600T	
	1.4	Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	60 - 63 HRC	Ferro-Titanit	
	1.5	Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	63 - 66 HRC	HSSE	

Hartmetall-Kugelfräser
Solid carbide ball nose end mills

Hartmetall-Torusfräser
Solid carbide torus end mills



Allround				Allround				
N				N				
ø0,5-12mm	ø1-12mm	ø2-16mm	ø6-16mm	ø0,5-12mm	ø1-12mm	ø3-12mm	ø3-12mm	Z (Flutes)
2550A	2551A	2502A	2504A	2552A	2553A	2554A	2555A	
6	8	10	10	12	14	16	18	Seite · Page
7	9	11	11	13	15	17	19	V_c / f_z
■	■	■	■	■	■	■	■	1.1
■	■	■	■	■	■	■	■	2.1
■	■	■	■	■	■	■	■	3.1
■	■	■	■	■	■	■	■	4.1
■	■	■	■	■	■	■	■	5.1
■	■	■	■	■	■	■	■	1.1
■	■	■	■	■	■	■	■	2.1
■	■	□	□	■	■	■	■	3.1
■	■	□	□	■	■	■	■	4.1
■	■	■	■	■	■	■	■	1.1
■	■	■	■	■	■	■	■	1.2
■	■	■	■	■	■	■	■	2.1
■	■	■	■	■	■	■	■	2.2
■	■	□	□	■	■	■	■	3.1
■	■	□	□	■	■	■	■	3.2
■	■	□	□	■	■	■	■	4.1
■	■	□	□	■	■	■	■	4.2
□	□			□	□			1.1
□	□			□	□			1.2
□	□			□	□			1.3
								1.4
								1.5
								1.6
■	■	■	■	■	■	□	□	2.1
■	■	■	■	■	■	■	■	2.2
■	■	■	■	■	■	■	■	2.3
■	■	■	■	■	■	■	■	2.4
■	■	■	■	■	■	■	■	2.5
■	■	■	■	■	■	■	■	2.6
■	■	■	■	■	■	■	■	2.7
■	■	■	■	■	■	■	■	2.8
								3.1
								3.2
		■	■					4.1
		■	■					4.2
								4.3
								4.4
■	■	■	■	■	■	■	■	5.1
		■	■					5.2
								5.3
		□	□			■	■	1.1
		□	□			■	■	1.2
		□	□			■	■	1.3
■	■	□	□	■	■	■	■	2.1
■	■	□	□	■	■	■	■	2.2
■	■	□	□	■	■	■	■	2.3
□	□	□	□	□	□	■	■	2.4
□	□	□	□	□	□	■	■	2.5
□	□	□	□	□	□	■	■	2.6
■	■			■	■	■	■	1.1
■	■			■	■	■	■	1.2
								1.3
								1.4
								1.5

- Multifunktionales Hochleistungswerkzeug
- Patentierte Querschneide
- 2 Baulängen verfügbar

- Multi-functional, high performance tool
- Patented chisel edge
- 2 lengths available

N

HM

DIN 6535
HA
HB

30° **Kugel**

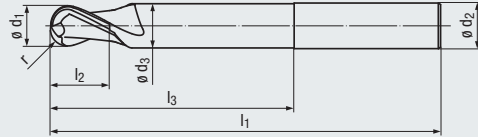
v_c / f_z
7

Optional

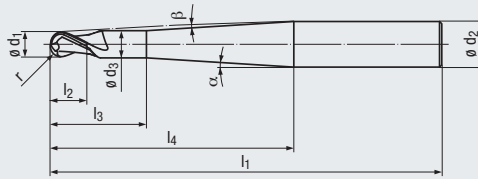
≤ 55 HRC



Allround



Design I₄:



Beschichtung · Coating

TIALN

Einsatzgebiete – Material (siehe Seite 4)

- In fast allen Werkstoffen einsetzbar
- Zum Schrappen, Schlichten sowie zum HSC-Schlichten geeignet

Applications – material (see page 4)

- For almost all materials
- Suitable for roughing, finishing and HSC finishing

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	2.1-2.8, 5.2 1.2-1.4
S	2.1-2.3 2.4-2.6
H	1.1-1.2

Kurze Ausführung · Short design

Bestell-Code · Order code

2550A

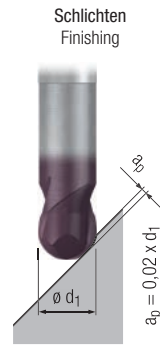
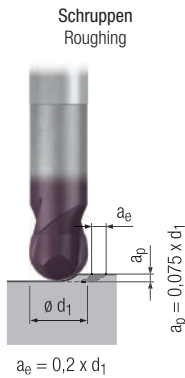
$\varnothing d_1$ ±0,01	r ±0,005	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h5	α	β	Z (Flutes)	Dimens.- Code				
0,5	0,25	1	2	57	0,45	20	6	10°	8,5°	2	.0005	●			
1	0,5	2	4	57	0,95	20	6	10°	8°	2	.001	●			
1,5	0,75	2,5	7,5	57	1,4	20	6	12,5°	7°	2	.0015	●			
2	1	3	8	57	1,8	20	6	12°	6,5°	2	.002	●			
3	1,5	3,5	10	57	2,8	20	6	11,5°	5°	2	.003	●			
4	2	4	12	57	3,8	20	6	11°	3,5°	2	.004	●			
5	2,5	5	14	57	4,7	20	6	10°	2°	2	.005	●			
6	3	6	20	57	5,6	–	6	–	–	2	.006	●			
8	4	7	25	63	7,6	–	8	–	–	2	.008	●			
10	5	8	30	72	9,6	–	10	–	–	2	.010	●			
12	6	10	35	83	11,5	–	12	–	–	2	.012	●			



Hartmetall-Kugelfräser – kurze Ausführung
Solid carbide ball nose end mills – short design

N

Gültig für · Valid for
2550A



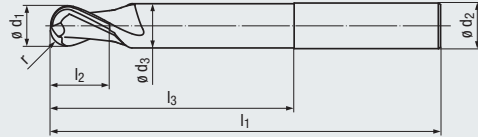
	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]			MMS MQL		
P	1.1	220	0,014 x d_1	300	0,010 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	190	0,013 x d_1	260	0,009 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	160	0,011 x d_1	220	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1	130	0,010 x d_1	180	0,007 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1	110	0,008 x d_1	150	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	1.1	110	0,008 x d_1	150	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	90	0,008 x d_1	120	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	70	0,006 x d_1	90	0,005 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	50	0,006 x d_1	70	0,005 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
K	1.1	220	0,014 x d_1	300	0,010 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	1.2	220	0,014 x d_1	300	0,010 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.1	200	0,011 x d_1	260	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.2	200	0,011 x d_1	260	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.1	160	0,011 x d_1	220	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.2	160	0,011 x d_1	220	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	4.1	130	0,008 x d_1	180	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	4.2	110	0,008 x d_1	150	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
N	1.1								
	1.2	900	0,020 x d_1	1200	0,014 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	900	0,017 x d_1	1200	0,012 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	600	0,020 x d_1	800	0,014 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5								
	1.6								
	2.1	200	0,014 x d_1	260	0,010 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	200	0,014 x d_1	260	0,010 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	200	0,014 x d_1	260	0,010 x d_1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	160	0,011 x d_1	220	0,008 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	160	0,011 x d_1	220	0,008 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	160	0,011 x d_1	220	0,008 x d_1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	100	0,008 x d_1	130	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	100	0,008 x d_1	130	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1								
	3.2								
4.1									
4.2									
4.3									
4.4									
5.1									
5.2	110	0,008 x d_1	150	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.3									
S	1.1								
	1.2								
	1.3								
	2.1	80	0,008 x d_1	110	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	30	0,006 x d_1	50	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	30	0,006 x d_1	40	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	30	0,006 x d_1	40	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.5	20	0,006 x d_1	30	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2.6	30	0,006 x d_1	40	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H	1.1			150	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2			130	0,005 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.3								
	1.4								
	1.5								

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

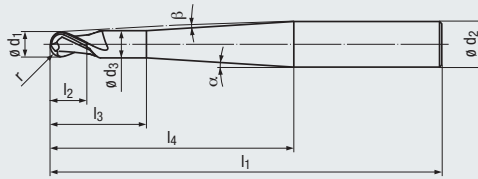
■ = sehr gut geeignet · very suitable
□ = gut geeignet · suitable

- Multifunktionales Hochleistungswerkzeug
- Patentierte Querschnitte
- 2 Baulängen verfügbar

- Multi-functional, high performance tool
- Patented chisel edge
- 2 lengths available



Design I₄:



- N**
- HM**
- DIN 6535**
HA
HB
- 30°**
- Kugel**
- v_c / f_z
9
- Optional**
- ≤ 55
HRC



Allround

Beschichtung · Coating

TIALN

Einsatzgebiete – Material (siehe Seite 4)

- In fast allen Werkstoffen einsetzbar
- Zum Schrappen, Schichten sowie zum HSC-Schlichten geeignet

Applications – material (see page 4)

- For almost all materials
- Suitable for roughing, finishing and HSC finishing

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	2.1-2.8, 5.2 1.2-1.4
S	2.1-2.3 2.4-2.6
H	1.1-1.2

Extra lange Ausführung · Extra long design

Bestell-Code · Order code

2551A

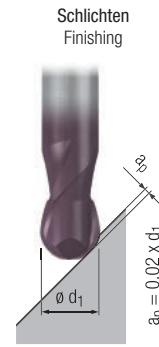
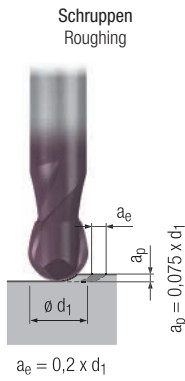
$\varnothing d_1$ $\pm 0,01$	r $\pm 0,005$	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h5	α	β	Z (Flutes)	Dimens.- Code				
1	0,5	2	4	80	0,95	40	6	4,5°	4°	2	.001	●			
1,5	0,75	2,5	7,5	80	1,4	40	6	4,5°	3,5°	2	.0015	●			
2	1	3	8	80	1,8	40	6	4°	3°	2	.002	●			
3	1,5	3,5	12	80	2,8	40	6	3,5°	2,5°	2	.003	●			
4	2	4	20	80	3,8	40	6	4°	1,5°	2	.004	●			
5	2,5	5	25	80	4,7	40	6	3°	1°	2	.005	●			
6	3	6	40	80	5,6	—	6	—	—	2	.006	●			
8	4	7	60	100	7,6	—	8	—	—	2	.008	●			
10	5	8	50	100	9,6	—	10	—	—	2	.110	●			
10	5	8	75	120	9,6	—	10	—	—	2	.010	●			
12	6	10	70	120	11,5	—	12	—	—	2	.112	●			
12	6	10	70	160	11,5	—	12	—	—	2	.012	●			



Hartmetall-Kugelfräser – extra lange Ausführung
Solid carbide ball nose end mills – extra long design

N

Gültig für · Valid for
2551A



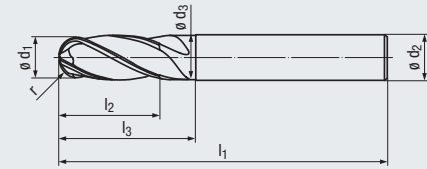
	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]			MMS MQL		
P	1.1	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	190	$0,013 \times d_1$	260	$0,009 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1	130	$0,010 \times d_1$	180	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1	110	$0,008 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	1.1	110	$0,008 \times d_1$	150	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	90	$0,008 \times d_1$	120	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	70	$0,006 \times d_1$	90	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	50	$0,006 \times d_1$	70	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
K	1.1	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	1.2	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.1	200	$0,011 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.2	200	$0,011 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.1	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.2	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	4.1	130	$0,008 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	4.2	110	$0,008 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
N	1.1								
	1.2	900	$0,020 \times d_1$	1200	$0,014 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	900	$0,017 \times d_1$	1200	$0,012 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	600	$0,020 \times d_1$	800	$0,014 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5								
	1.6								
	2.1	200	$0,014 \times d_1$	260	$0,010 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	200	$0,014 \times d_1$	260	$0,010 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	200	$0,014 \times d_1$	260	$0,010 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	160	$0,011 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	160	$0,011 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	100	$0,008 \times d_1$	130	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	100	$0,008 \times d_1$	130	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1								
	3.2								
4.1									
4.2									
4.3									
4.4									
5.1									
5.2	110	$0,008 \times d_1$	150	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.3									
S	1.1								
	1.2								
	1.3								
	2.1	80	$0,008 \times d_1$	110	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	30	$0,006 \times d_1$	50	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.5	20	$0,006 \times d_1$	30	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2.6	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H	1.1			150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2			130	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.3								
	1.4								
	1.5								

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

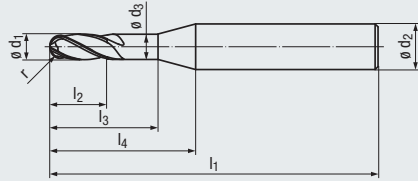
■ = sehr gut geeignet · very suitable
□ = gut geeignet · suitable

- Multifunktionales Hochleistungswerkzeug
- 2 Schneiden zur Mitte
- 2 Baulängen verfügbar

- Multi-functional, high performance tool
- 2 centre cutting edges
- 2 lengths available



Design I₄:



N

HM

DIN 6535
HA
HB

35-38° **Kugel**

3-5°

V_c / f_z
11

Optional



Allround

Allround

Beschichtung · Coating

TIALN

TIALN

Einsatzgebiete – Material (siehe Seite 4)

Applications – material (see page 4)

- In fast allen Werkstoffen einsetzbar
- Zum HSC-Schlichten geeignet

- For almost all materials
- Suitable for HSC finishing

P	1.1-5.1		P	1.1-5.1	
M	1.1-2.1	3.1-4.1	M	1.1-2.1	3.1-4.1
K	1.1-2.2	3.1-4.2	K	1.1-2.2	3.1-4.2
N	2.1-2.8, 4.1-4.2		N	2.1-2.8, 4.1-4.2	
N	5.2-5.3		N	5.2-5.3	
S		1.1-2.6	S		1.1-2.6

Lange Ausführung · Long design

Bestell-Code · Order code

2502A

$\varnothing d_1$ h10	r	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	Z (Flutes)	Dimens.- Code				
2	1	6	10	57	1,9	20	6	3	.002	●			
3	1,5	8	14	57	2,9	20	6	3	.003	●			
4	2	11	18	57	3,8	20	6	3	.004	●			
5	2,5	13	19	57	4,8	20	6	3	.005	●			
6	3	13	20	57	5,8	–	6	4	.006	●			
8	4	19	25	63	7,7	–	8	4	.008	●			
10	5	22	30	72	9,5	–	10	4	.010	●			
12	6	26	35	83	11,5	–	12	4	.012	●			
16	8	32	40	92	15,5	–	16	4	.016	●			

Extra lange Ausführung · Extra long design

Bestell-Code · Order code

2504A

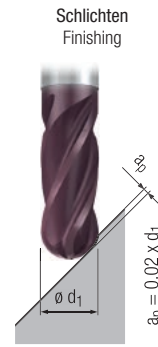
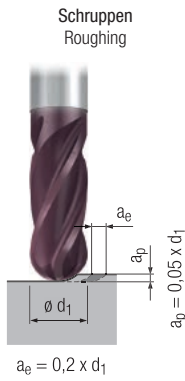
$\varnothing d_1$ h10	r	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	Z (Flutes)	Dimens.- Code				
6	3	40	60	100	5,8	–	6	4	.006			●	
8	4	40	60	100	7,7	–	8	4	.008			●	
10	5	40	55	100	9,5	–	10	4	.010			●	
12	6	45	50	100	11,5	–	12	4	.012			●	
16	8	65	90	150	15,5	–	16	4	.016			●	



Hartmetall-Kugelfräser – lange und extra lange Ausführung
Solid carbide ball nose end mills – long and extra long design

N

Gültig für · Valid for
2502A
2504A



	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]			MMS MQL		
P	1.1	200	0,014 x d_1	270	0,010 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	170	0,013 x d_1	230	0,009 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	140	0,011 x d_1	200	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1	110	0,010 x d_1	160	0,007 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1	100	0,008 x d_1	130	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	1.1	100	0,008 x d_1	130	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	80	0,008 x d_1	110	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	60	0,006 x d_1	80	0,005 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	40	0,006 x d_1	60	0,005 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
K	1.1	200	0,014 x d_1	270	0,010 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	1.2	200	0,014 x d_1	270	0,010 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.1	180	0,011 x d_1	230	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.2	180	0,011 x d_1	230	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.1	140	0,011 x d_1	200	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.2	140	0,011 x d_1	200	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	4.1	110	0,008 x d_1	160	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	4.2	100	0,008 x d_1	130	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
N	1.1								
	1.2								
	1.3								
	1.4								
	1.5								
	1.6								
	2.1	180	0,014 x d_1	230	0,010 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	180	0,014 x d_1	230	0,010 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	180	0,014 x d_1	230	0,010 x d_1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	140	0,011 x d_1	200	0,008 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	140	0,011 x d_1	200	0,008 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	140	0,011 x d_1	200	0,008 x d_1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	90	0,008 x d_1	120	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	90	0,008 x d_1	120	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1								
	3.2								
4.1	290	0,020 x d_1	400	0,015 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.2	430	0,020 x d_1	580	0,015 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.3									
4.4									
5.1									
5.2	100	0,008 x d_1	130	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.3	180	0,017 x d_1	270	0,012 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
S	1.1	100	0,010 x d_1	130	0,007 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	80	0,008 x d_1	110	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	40	0,007 x d_1	60	0,005 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	70	0,008 x d_1	100	0,006 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	25	0,006 x d_1	40	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	25	0,006 x d_1	30	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	25	0,006 x d_1	30	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.5	15	0,006 x d_1	25	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2.6	25	0,006 x d_1	30	0,004 x d_1			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

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

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

- Multifunktionales Hochleistungswerkzeug
- Hochgenauer Eckenradius
- 2 Baulängen verfügbar

- Multi-functional, high performance tool
- High-precision corner radius
- 2 lengths available

N

HM

DIN 6535
HA
HB

30°
Torus

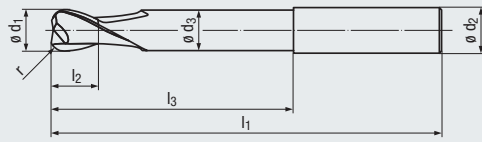
V_c/f_z
13

Optional

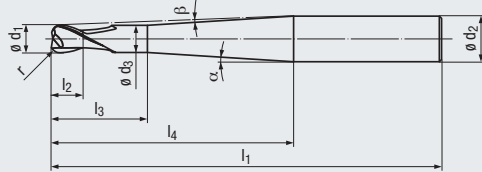
≤ 55
HRC



Allround



Design I₄:



Beschichtung · Coating

TIALN

Einsatzgebiete – Material (siehe Seite 4)

Applications – material (see page 4)

- In fast allen Werkstoffen einsetzbar
- Zum Schruppen, Schlichten sowie zum HSC-Schlichten geeignet

- For almost all materials
- Suitable for roughing, finishing and HSC finishing

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	2.1-2.8, 5.2 1.2-1.4
S	2.1-2.3 2.4-2.6
H	1.1-1.2

Kurze Ausführung · Short design

Bestell-Code · Order code

2552A

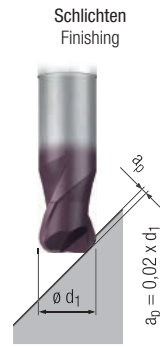
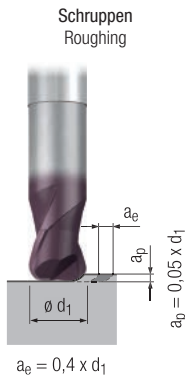
ϕd_1 ±0,01	r ±0,005	l_2	l_3	l_1	ϕd_3	l_4	ϕd_2 h5	α	β	Z (Flutes)	Dimens.- Code			
0,5	0,1	1	2	57	0,45	20	6	10°	8,5°	2	.0005	●		
1	0,2	2	4	57	0,95	20	6	10°	8°	2	.101	●		
1	0,25	2	4	57	0,95	20	6	10°	8°	2	.001	●		
1,5	0,2	2,5	7,5	57	1,4	20	6	12,5°	7°	2	.1015	●		
1,5	0,3	2,5	7,5	57	1,4	20	6	12,5°	7°	2	.0015	●		
2	0,2	3	8	57	1,8	20	6	12°	6,5°	2	.102	●		
2	0,5	3	8	57	1,8	20	6	12°	6,5°	2	.002	●		
3	0,2	3,5	10	57	2,8	20	6	11,5°	5°	2	.103	●		
3	0,5	3,5	10	57	2,8	20	6	11,5°	5°	2	.003	●		
4	0,3	4	12	57	3,8	20	6	11°	3,5°	2	.204	●		
4	0,5	4	12	57	3,8	20	6	11°	3,5°	2	.104	●		
4	1	4	12	57	3,8	20	6	11°	3,5°	2	.004	●		
5	0,3	5	14	57	4,7	20	6	10°	2°	2	.305	●		
5	0,5	5	14	57	4,7	20	6	10°	2°	2	.205	●		
5	1	5	14	57	4,7	20	6	10°	2°	2	.105	●		
5	1,5	5	14	57	4,7	20	6	10°	2°	2	.005	●		
6	0,3	6	20	57	5,6	-	6	-	-	2	.306	●		
6	0,5	6	20	57	5,6	-	6	-	-	2	.206	●		
6	1	6	20	57	5,6	-	6	-	-	2	.106	●		
6	2	6	20	57	5,6	-	6	-	-	2	.006	●		
8	0,3	7	25	63	7,6	-	8	-	-	2	.408	●		
8	0,5	7	25	63	7,6	-	8	-	-	2	.308	●		
8	1	7	25	63	7,6	-	8	-	-	2	.208	●		
8	2	7	25	63	7,6	-	8	-	-	2	.008	●		
10	0,5	8	30	72	9,6	-	10	-	-	2	.710	●		
10	1	8	30	72	9,6	-	10	-	-	2	.610	●		
10	1,5	8	30	72	9,6	-	10	-	-	2	.210	●		
10	2	8	30	72	9,6	-	10	-	-	2	.410	●		
10	3	8	30	72	9,6	-	10	-	-	2	.010	●		
12	0,5	10	35	83	11,5	-	12	-	-	2	.612	●		
12	1	10	35	83	11,5	-	12	-	-	2	.512	●		
12	1,5	10	35	83	11,5	-	12	-	-	2	.112	●		
12	2	10	35	83	11,5	-	12	-	-	2	.312	●		
12	4	10	35	83	11,5	-	12	-	-	2	.012	●		



Hartmetall-Torusfräser – kurze Ausführung
Solid carbide torus end mills – short design

N

Gültig für · Valid for
2552A



	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]			MMS MQL		
P	1.1	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	190	$0,013 \times d_1$	260	$0,009 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1	130	$0,010 \times d_1$	180	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1	110	$0,008 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	1.1	110	$0,008 \times d_1$	150	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	90	$0,008 \times d_1$	120	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	70	$0,006 \times d_1$	90	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	50	$0,006 \times d_1$	70	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
K	1.1	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	1.2	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.1	200	$0,011 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.2	200	$0,011 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.1	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.2	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	4.1	130	$0,008 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	4.2	110	$0,008 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
N	1.1								
	1.2	1000	$0,020 \times d_1$	1350	$0,014 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	1000	$0,017 \times d_1$	1350	$0,012 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	600	$0,020 \times d_1$	800	$0,014 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5								
	1.6								
	2.1	200	$0,014 \times d_1$	260	$0,010 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	200	$0,014 \times d_1$	260	$0,010 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	200	$0,014 \times d_1$	260	$0,010 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	160	$0,011 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	160	$0,011 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	100	$0,008 \times d_1$	130	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	100	$0,008 \times d_1$	130	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1								
	3.2								
4.1									
4.2									
4.3									
4.4									
5.1									
5.2	110	$0,008 \times d_1$	150	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.3									
S	1.1								
	1.2								
	1.3								
	2.1	80	$0,008 \times d_1$	110	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	30	$0,006 \times d_1$	50	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.5	20	$0,006 \times d_1$	30	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2.6	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H	1.1			150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2			130	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.3								
	1.4								
	1.5								

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

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

- Multifunktionales Hochleistungswerkzeug
- Hochgenauer Eckenradius
- 2 Baulängen verfügbar

- Multi-functional, high performance tool
- High-precision corner radius
- 2 lengths available

N

HM

DIN 6535
HA
HB

30°
Torus

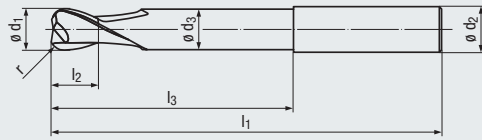
v_c / f_z
15

Optional

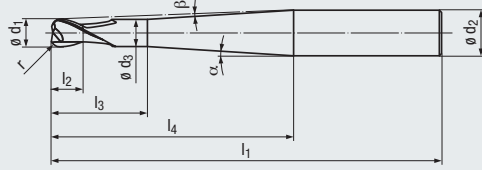
≤ 55 HRC



Allround



Design l_4 :



Beschichtung · Coating

TIALN

Einsatzgebiete – Material (siehe Seite 4)

Applications – material (see page 4)

- In fast allen Werkstoffen einsetzbar
- Zum Schruppen, Schlichten sowie zum HSC-Schlichten geeignet

- For almost all materials
- Suitable for roughing, finishing and HSC finishing

P 1.1-5.1

M 1.1-4.1

K 1.1-4.2

N 2.1-2.8, 5.2 1.2-1.4

S 2.1-2.3 2.4-2.6

H 1.1-1.2

Extra lange Ausführung · Extra long design

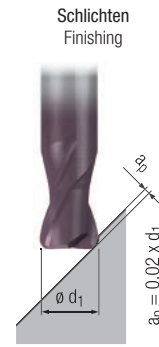
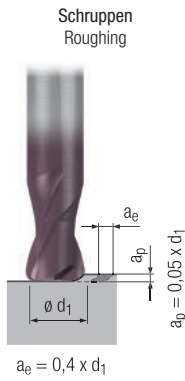
Bestell-Code · Order code												2553A			
$\varnothing d_1$ ±0,01	r ±0,005	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h5	α	β	Z (Flutes)	Dimens.- Code				
1	0,2	2	4	80	0,95	40	6	4,5°	4°	2	.101	●			
1	0,25	2	4	80	0,95	40	6	4,5°	4°	2	.001	●			
1,5	0,2	2,5	7,5	80	1,4	40	6	4,5°	3,5°	2	.1015	●			
1,5	0,3	2,5	7,5	80	1,4	40	6	4,5°	3,5°	2	.0015	●			
2	0,2	3	8	80	1,8	40	6	4°	3°	2	.102	●			
2	0,5	3	8	80	1,8	40	6	4°	3°	2	.002	●			
3	0,2	3,5	12	80	2,8	40	6	3,5°	2,5°	2	.103	●			
3	0,5	3,5	12	80	2,8	40	6	3,5°	2,5°	2	.003	●			
4	0,3	4	20	80	3,8	40	6	4°	1,5°	2	.204	●			
4	0,5	4	20	80	3,8	40	6	4°	1,5°	2	.104	●			
4	1	4	20	80	3,8	40	6	4°	1,5°	2	.004	●			
5	0,3	5	25	80	4,7	40	6	3°	1°	2	.305	●			
5	0,5	5	25	80	4,7	40	6	3°	1°	2	.205	●			
5	1	5	25	80	4,7	40	6	3°	1°	2	.105	●			
5	1,5	5	25	80	4,7	40	6	3°	1°	2	.005	●			
6	0,3	6	40	80	5,6	-	6	-	-	2	.306	●			
6	0,5	6	40	80	5,6	-	6	-	-	2	.206	●			
6	1	6	40	80	5,6	-	6	-	-	2	.106	●			
6	2	6	40	80	5,6	-	6	-	-	2	.006	●			
8	0,3	7	60	100	7,6	-	8	-	-	2	.408	●			
8	0,5	7	60	100	7,6	-	8	-	-	2	.308	●			
8	1	7	60	100	7,6	-	8	-	-	2	.208	●			
8	2	7	60	100	7,6	-	8	-	-	2	.008	●			
8	2,5	7	60	100	7,6	-	8	-	-	2	.108	●			
10	0,5	8	50	100	9,6	-	10	-	-	2	.710	●			
10	1	8	50	100	9,6	-	10	-	-	2	.610	●			
10	1,5	8	50	100	9,6	-	10	-	-	2	.510	●			
10	1,5	8	75	120	9,6	-	10	-	-	2	.210	●			
10	2	8	50	100	9,6	-	10	-	-	2	.410	●			
10	2,5	8	75	120	9,6	-	10	-	-	2	.110	●			
10	3	8	50	100	9,6	-	10	-	-	2	.310	●			
10	3	8	75	120	9,6	-	10	-	-	2	.010	●			
12	0,5	10	70	120	11,5	-	12	-	-	2	.612	●			
12	1	10	70	120	11,5	-	12	-	-	2	.512	●			
12	1,5	10	70	120	11,5	-	12	-	-	2	.412	●			
12	1,5	10	70	160	11,5	-	12	-	-	2	.112	●			
12	2	10	70	120	11,5	-	12	-	-	2	.312	●			
12	4	8	70	120	11,5	-	12	-	-	2	.212	●			
12	4	10	70	160	11,5	-	12	-	-	2	.012	●			

Hartmetall-Torusfräser – extra lang Ausführung
Solid carbide torus end mills – extra long design

Gültig für · Valid for
2553A



N



	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]				
P	1.1	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2.1	190	$0,013 \times d_1$	260	$0,009 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3.1	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4.1	130	$0,010 \times d_1$	180	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	5.1	110	$0,008 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
M	1.1	110	$0,008 \times d_1$	150	$0,006 \times d_1$			<input type="checkbox"/>
	2.1	90	$0,008 \times d_1$	120	$0,006 \times d_1$			<input type="checkbox"/>
	3.1	70	$0,006 \times d_1$	90	$0,005 \times d_1$			<input type="checkbox"/>
	4.1	50	$0,006 \times d_1$	70	$0,005 \times d_1$			<input type="checkbox"/>
K	1.1	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	1.2	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2.1	200	$0,011 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2.2	200	$0,011 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3.1	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3.2	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4.1	130	$0,008 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4.2	110	$0,008 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
N	1.1							
	1.2	1000	$0,020 \times d_1$	1350	$0,014 \times d_1$			<input type="checkbox"/>
	1.3	1000	$0,017 \times d_1$	1350	$0,012 \times d_1$			<input type="checkbox"/>
	1.4	600	$0,020 \times d_1$	800	$0,014 \times d_1$			<input type="checkbox"/>
	1.5							
	1.6							
	2.1	200	$0,014 \times d_1$	260	$0,010 \times d_1$			<input type="checkbox"/>
	2.2	200	$0,014 \times d_1$	260	$0,010 \times d_1$			<input type="checkbox"/>
	2.3	200	$0,014 \times d_1$	260	$0,010 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.4	160	$0,011 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>
	2.5	160	$0,011 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>
	2.6	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.7	100	$0,008 \times d_1$	130	$0,006 \times d_1$			<input type="checkbox"/>
	2.8	100	$0,008 \times d_1$	130	$0,006 \times d_1$			<input type="checkbox"/>
	3.1							
	3.2							
4.1								
4.2								
4.3								
4.4								
5.1								
5.2	110	$0,008 \times d_1$	150	$0,006 \times d_1$			<input type="checkbox"/>	
5.3								
S	1.1							
	1.2							
	1.3							
	2.1	80	$0,008 \times d_1$	110	$0,006 \times d_1$			<input type="checkbox"/>
	2.2	30	$0,006 \times d_1$	50	$0,004 \times d_1$			<input type="checkbox"/>
	2.3	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>
	2.4	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>
2.5	20	$0,006 \times d_1$	30	$0,004 \times d_1$			<input type="checkbox"/>	
2.6	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>	
H	1.1			150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.2			130	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.3							
	1.4							
	1.5							

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

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

- Multifunktionales Hochleistungswerkzeug
- Hochgenauer Eckenradius
- 2 Baulängen verfügbar

- Multi-functional, high performance tool
- High-precision corner radius
- 2 lengths available

N

HM

DIN 6535
HA
HB

30°

Torus

1-2°

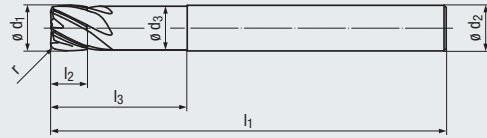
V_c / f_z
17

Optional

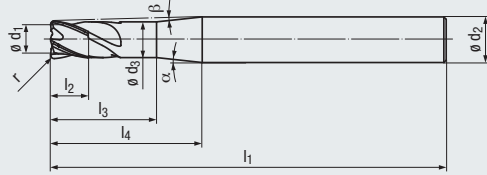
≤ 55 HRC



Allround



Design I₄:



Beschichtung · Coating

TIALN

Einsatzgebiete – Material (siehe Seite 4)

Applications – material (see page 4)

- In schwer zerspanbaren Materialien einsetzbar
- Zum Schruppen, Schlichten sowie zum HSC-Schlichten geeignet

- For difficult to cut materials
- Suitable for roughing, finishing and HSC finishing

P 1.1-5.1

M 1.1-2.1

K 1.1-4.2

N 2.2-2.8, 5.2 2.1

S 1.1-2.6

H 1.1-1.2

Kurze Ausführung · Short design

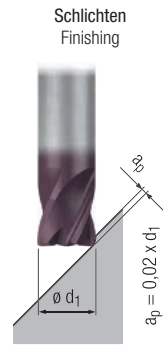
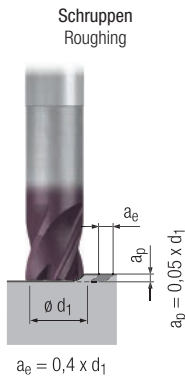
Bestell-Code · Order code												2554A			
$\varnothing d_1$ $\pm 0,01$	r $\pm 0,005$	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h5	α	β	Z (Flutes)	Dimens.- Code				
3	0,2	3,5	10	57	2,8	20	6	11,5°	5°	4	.103	●			
3	0,5	3,5	10	57	2,8	20	6	11,5°	5°	4	.003	●			
4	0,3	4	12	57	3,8	20	6	11°	3,5°	4	.104	●			
4	0,5	4	12	57	3,8	20	6	11°	3,5°	4	.004	●			
4	1	4	12	57	3,8	20	6	11°	3,5°	4	.204	●			
5	0,3	5	14	57	4,7	20	6	10°	1,5°	4	.105	●			
5	0,5	5	14	57	4,7	20	6	10°	1,5°	4	.005	●			
5	1	5	14	57	4,7	20	6	10°	1,5°	4	.205	●			
6	0,3	6	20	57	5,6	-	6	-	-	4	.406	●			
6	0,5	6	20	57	5,6	-	6	-	-	4	.506	●			
6	0,8	6	20	57	5,6	-	6	-	-	4	.006004	●			
6	1	6	20	57	5,6	-	6	-	-	4	.606	●			
8	0,3	7	25	63	7,6	-	8	-	-	4	.408	●			
8	0,5	7	25	63	7,6	-	8	-	-	4	.508	●			
8	1	7	25	63	7,6	-	8	-	-	4	.008004	●			
10	0,5	8	30	72	9,6	-	10	-	-	4	.410	●			
10	1	8	30	72	9,6	-	10	-	-	4	.010004	●			
10	1,5	8	30	72	9,6	-	10	-	-	4	.510	●			
10	2	8	30	72	9,6	-	10	-	-	4	.610	●			
12	0,5	10	35	83	11,5	-	12	-	-	4	.312	●			
12	1	10	35	83	11,5	-	12	-	-	4	.412	●			
12	1,5	10	35	83	11,5	-	12	-	-	4	.012004	●			
12	2	10	35	83	11,5	-	12	-	-	4	.512	●			



Hartmetall-Torusfräser – kurze Ausführung
Solid carbide torus end mills – short design

N

Gültig für · Valid for
2554A



	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]			MMS MQL	
P	1.1	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2.1	190	$0,013 \times d_1$	260	$0,009 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3.1	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4.1	130	$0,010 \times d_1$	180	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	5.1	110	$0,008 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
M	1.1	110	$0,008 \times d_1$	150	$0,006 \times d_1$			<input type="checkbox"/>
	2.1	90	$0,008 \times d_1$	120	$0,006 \times d_1$			<input type="checkbox"/>
	3.1							
	4.1							
K	1.1	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	1.2	220	$0,014 \times d_1$	300	$0,010 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2.1	200	$0,011 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2.2	200	$0,011 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3.1	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3.2	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4.1	130	$0,008 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4.2	110	$0,008 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
N	1.1							
	1.2							
	1.3							
	1.4							
	1.5							
	1.6							
	2.1	200	$0,014 \times d_1$	260	$0,010 \times d_1$			<input type="checkbox"/>
	2.2	200	$0,014 \times d_1$	260	$0,010 \times d_1$			<input type="checkbox"/>
	2.3	200	$0,014 \times d_1$	260	$0,010 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.4	160	$0,011 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>
	2.5	160	$0,011 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>
	2.6	160	$0,011 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.7	100	$0,008 \times d_1$	130	$0,006 \times d_1$			<input type="checkbox"/>
	2.8	100	$0,008 \times d_1$	130	$0,006 \times d_1$			<input type="checkbox"/>
	3.1							
	3.2							
4.1								
4.2								
4.3								
4.4								
5.1								
5.2	110	$0,008 \times d_1$	150	$0,006 \times d_1$			<input type="checkbox"/>	
5.3								
S	1.1	110	$0,010 \times d_1$	150	$0,007 \times d_1$			<input type="checkbox"/>
	1.2	90	$0,008 \times d_1$	120	$0,006 \times d_1$			<input type="checkbox"/>
	1.3	50	$0,007 \times d_1$	70	$0,005 \times d_1$			<input type="checkbox"/>
	2.1	80	$0,008 \times d_1$	110	$0,006 \times d_1$			<input type="checkbox"/>
	2.2	30	$0,006 \times d_1$	50	$0,004 \times d_1$			<input type="checkbox"/>
	2.3	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>
	2.4	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>
2.5	20	$0,006 \times d_1$	30	$0,004 \times d_1$			<input type="checkbox"/>	
2.6	30	$0,006 \times d_1$	40	$0,004 \times d_1$			<input type="checkbox"/>	
H	1.1			150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.2			130	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.3							
	1.4							
	1.5							

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

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

- Multifunktionales Hochleistungswerkzeug
- Hochgenauer Eckenradius
- 2 Baulängen verfügbar

- Multi-functional, high performance tool
- High-precision corner radius
- 2 lengths available

N

HM

DIN 6535
HA
HB

30°

Torus

1-2°

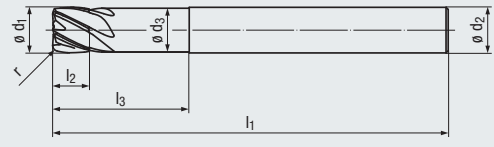
V_c / f_z
19

Optional

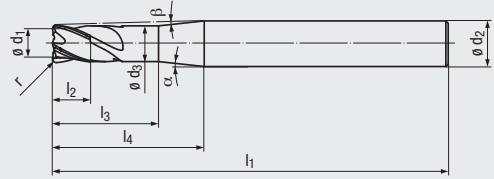
≤ 55 HRC



Allround



Design I₄:



Beschichtung · Coating

TIALN

Einsatzgebiete – Material (siehe Seite 4)

Applications – material (see page 4)

- In schwer zerspanbaren Materialien einsetzbar
- Zum Schruppen, Schlichten sowie zum HSC-Schlichten geeignet

- For difficult to cut materials
- Suitable for roughing, finishing and HSC finishing

P 1.1-5.1

M 1.1-2.1

K 1.1-4.2

N 2.2-2.8, 5.2 2.1

S 1.1-2.6

H 1.1-1.2

Extra lange Ausführung · Extra long design

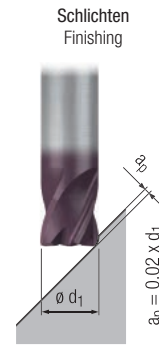
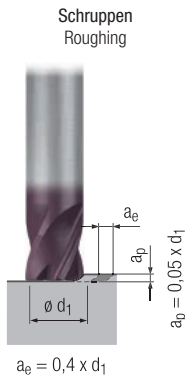
Bestell-Code · Order code												2555A			
$\varnothing d_1$ ±0,01	r ±0,005	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h5	α	β	Z (Flutes)	Dimens.- Code				
3	0,2	3,5	12	80	2,8	40	6	3,5°	2,5°	4	.103	●			
3	0,5	3,5	12	80	2,8	40	6	3,5°	2,5°	4	.003	●			
4	0,3	4	20	80	3,8	40	6	4°	3,5°	4	.104	●			
4	0,5	4	20	80	3,8	40	6	4°	3,5°	4	.004	●			
4	1	4	20	80	3,8	40	6	4°	3,5°	4	.204	●			
5	0,3	5	25	80	4,7	40	6	3°	1°	4	.105	●			
5	0,5	5	25	80	4,7	40	6	3°	1°	4	.005	●			
5	1	5	25	80	4,7	40	6	3°	1°	4	.205	●			
6	0,3	6	40	80	5,6	–	6	–	–	4	.406	●			
6	0,5	6	40	80	5,6	–	6	–	–	4	.506	●			
6	0,8	6	40	80	5,6	–	6	–	–	4	.006	●			
6	1	6	40	80	5,6	–	6	–	–	4	.606	●			
8	0,3	7	40	80	7,6	–	8	–	–	4	.408	●			
8	0,5	7	40	80	7,6	–	8	–	–	4	.508	●			
8	1	7	40	80	7,6	–	8	–	–	4	.008	●			
10	0,5	8	55	100	9,6	–	10	–	–	4	.410	●			
10	1	8	55	100	9,6	–	10	–	–	4	.010	●			
10	1,5	8	55	100	9,6	–	10	–	–	4	.510	●			
10	2	8	55	100	9,6	–	10	–	–	4	.610	●			
12	0,5	10	70	120	11,5	–	12	–	–	4	.312	●			
12	1	10	70	120	11,5	–	12	–	–	4	.412	●			
12	1,5	10	70	120	11,5	–	12	–	–	4	.012	●			
12	2	10	70	120	11,5	–	12	–	–	4	.512	●			



Hartmetall-Torusfräser – extra lang Ausführung
Solid carbide torus end mills – extra long design

N

Gültig für · Valid for
2555A



	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]				
P	1.1	220	0,014 x d_1	300	0,010 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2.1	190	0,013 x d_1	260	0,009 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3.1	160	0,011 x d_1	220	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4.1	130	0,010 x d_1	180	0,007 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	5.1	110	0,008 x d_1	150	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
M	1.1	110	0,008 x d_1	150	0,006 x d_1			<input type="checkbox"/>
	2.1	90	0,008 x d_1	120	0,006 x d_1			<input type="checkbox"/>
	3.1							
	4.1							
K	1.1	220	0,014 x d_1	300	0,010 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	1.2	220	0,014 x d_1	300	0,010 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2.1	200	0,011 x d_1	260	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2.2	200	0,011 x d_1	260	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3.1	160	0,011 x d_1	220	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3.2	160	0,011 x d_1	220	0,008 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4.1	130	0,008 x d_1	180	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4.2	110	0,008 x d_1	150	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
N	1.1							
	1.2							
	1.3							
	1.4							
	1.5							
	1.6							
	2.1	200	0,014 x d_1	260	0,010 x d_1			<input type="checkbox"/>
	2.2	200	0,014 x d_1	260	0,010 x d_1			<input type="checkbox"/>
	2.3	200	0,014 x d_1	260	0,010 x d_1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.4	160	0,011 x d_1	220	0,008 x d_1			<input type="checkbox"/>
	2.5	160	0,011 x d_1	220	0,008 x d_1			<input type="checkbox"/>
	2.6	160	0,011 x d_1	220	0,008 x d_1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.7	100	0,008 x d_1	130	0,006 x d_1			<input type="checkbox"/>
	2.8	100	0,008 x d_1	130	0,006 x d_1			<input type="checkbox"/>
	3.1							
	3.2							
4.1								
4.2								
4.3								
4.4								
5.1								
5.2	110	0,008 x d_1	150	0,006 x d_1			<input type="checkbox"/>	
5.3								
S	1.1	110	0,010 x d_1	150	0,007 x d_1			<input type="checkbox"/>
	1.2	90	0,008 x d_1	120	0,006 x d_1			<input type="checkbox"/>
	1.3	50	0,007 x d_1	70	0,005 x d_1			<input type="checkbox"/>
	2.1	80	0,008 x d_1	110	0,006 x d_1			<input type="checkbox"/>
	2.2	30	0,006 x d_1	50	0,004 x d_1			<input type="checkbox"/>
	2.3	30	0,006 x d_1	40	0,004 x d_1			<input type="checkbox"/>
	2.4	30	0,006 x d_1	40	0,004 x d_1			<input type="checkbox"/>
2.5	20	0,006 x d_1	30	0,004 x d_1			<input type="checkbox"/>	
2.6	30	0,006 x d_1	40	0,004 x d_1			<input type="checkbox"/>	
H	1.1			150	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.2			130	0,005 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.3							
	1.4							
	1.5							

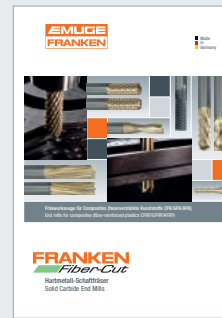
v_c = Schnittgeschwindigkeit · Cutting speed
 f_z = Vorschub pro Zahn · Feed per tooth

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

	P	M	K	N	S	H
Werkzeugtyp Tool type	Hochleistungsfräser-Programm High performance end mill programme					
NR	Multi-Cut	Multi-Cut	Multi-Cut			
NF	Jet-Cut	TiNox-Cut	Jet-Cut		TiNox-Cut	
N	Jet-Cut	TiNox-Cut	Jet-Cut		TiNox-Cut	
W				Alu-Cut		
W				Fiber-Cut		
WR				Alu-Cut		
H						Hard-Cut
Werkzeugtyp Tool type	Hochleistungs-Universalfräser-Programm High performance universal end mill programme					
N	TOP-Cut	TOP-Cut	TOP-Cut	TOP-Cut	TOP-Cut	TOP-Cut

Druckerzeugnisse für Hochleistungswerkzeuge

Sales literature for high performance end mills



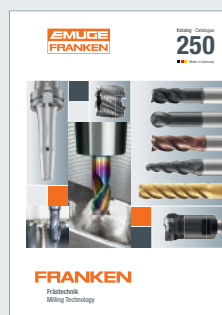
Druckerzeugnisse für Fräswerkzeuge mit besonderen Eigenschaften

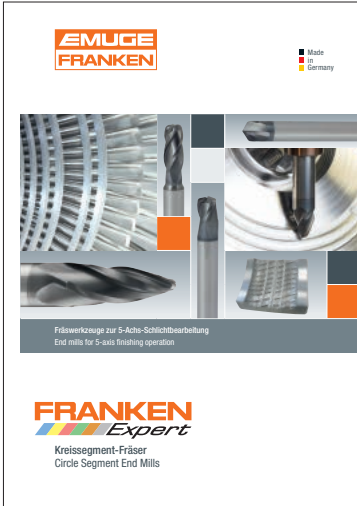
Sales literature for milling tools with special characteristics



Hauptkatalog

Main catalogue





Mit den Kreissegment-Fräsern wurde eine Werkzeugfamilie geschaffen, welche einen höheren Bahnabstand bei der Vorschlicht- und Schlichtbearbeitung erlaubt. Diese Werkzeuge kommen vorwiegend im Formenbau sowie bei der Herstellung von Reifenformen, Turbinenschaukeln, Impellerblättern oder Blisks zum Einsatz.

Die technische Besonderheit dieser Fräser liegt bei den großen Radien im schneidenden Bereich der jeweiligen Ausführung, welche ganz neue Möglichkeiten in der Zerspanung bieten. Der große Radius simuliert einen Kugelfräser mit einem Schneidendurchmesser von 12 bis 3000 mm, auf Anfrage sogar größer.

Eine wichtige Rolle spielt hierbei das CAM-System, welches die Geometrie der Kreissegment-Fräser unterstützen und verrechnen muss. Somit können Bearbeitungszeiten drastisch reduziert und im Gegenzug die Oberflächenqualität der Bauteile erhöht werden.

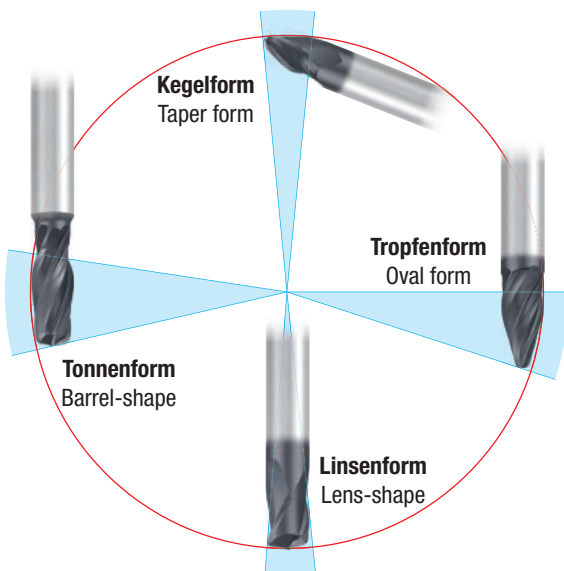
The circle segment end mills constitute a new tool class which enable machining with a larger tool path distance during prefinishing and finishing operations. These tools are primarily used in mould-making as well as in the production of tyre moulds, turbine blades, impeller blades or blisks.

The technical specialty of these end mills are the large radii in the cutting area of the respective tool which offer entirely new possibilities in machining. The large radius simulates a ball-nose end mill with a cutting diameter of 12 to 3000 mm and even larger on request.

The CAM system which has to support and compute the geometry of the circle segment end mill, plays an important role here. As a consequence, machining times can be reduced significantly and at the same time the surface quality of the components is increased.

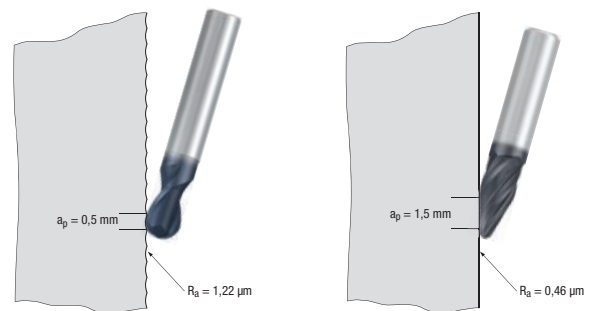
Übersicht der Kreissegment-Fräser

Overview of circle segment end mills



Vergleichsbeispiel: Kugelfräser – Kreissegment-Fräser mit Tropfenform

Comparison example: Ball nose end mill – circle segment end mill with oval form



Ergebnis: Kreissegment-Fräser ermöglichen eine höhere axiale Zustellung (a_p) bei wesentlich besseren Oberflächengüten.

Result: Circle segment end mills enable a larger axial depth of cut (a_p) and a considerably better surface finish.



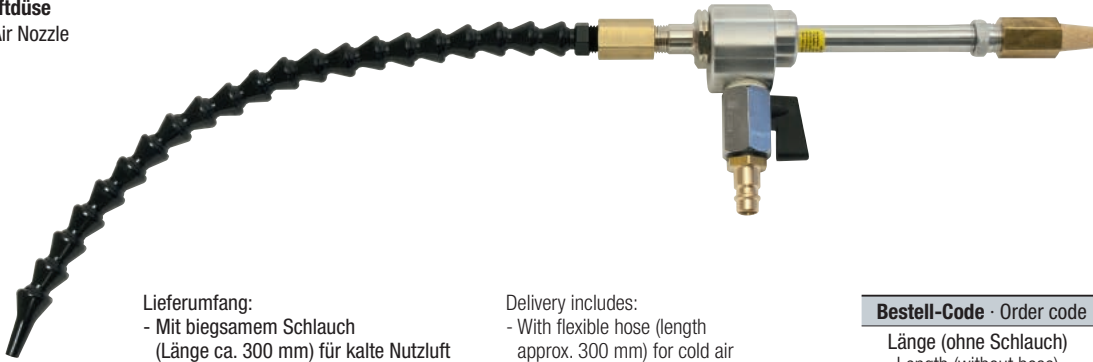
Wirtschaftlichkeitsberechnung für Kreissegment-Fräser

Economical calculation for circle segment end mills

www.frankenexpert.com



Kaltluftdüse
Cold-Air Nozzle



Lieferumfang:
- Mit biegsamem Schlauch
(Länge ca. 300 mm) für kalte Nutzluft
- Schalldämpfer (SN14) für heiße Abluft
- Kugelhahn mit Anschlussstück (ST 1/4)
für Zuluftschlauch (NW6)
mit Schnellwechselkupplung (NW7.2)

Delivery includes:
- With flexible hose (length
approx. 300 mm) for cold air
- Silencer (SN14) for hot exhaust air
- Ball-valve with fitting (1/4") for inlet
hose (6 mm) with quick-change
attachment (7.2 mm)

Bestell-Code · Order code		6910
Länge (ohne Schlauch) Length (without hose)	Dimens.- Code	
225 mm	.15	●

Ersatzschlauch
Spare Hose



Bestell-Code · Order code		6910
Länge Length	Dimens.- Code	
≈ 300 mm	.20	●
≈ 400 mm	.22	●
≈ 500 mm	.21	●

Halterungen für die Kaltluftdüse
Holders for the Cold-Air Nozzle



Klemmarm mit Grundhalter
Socket with basic holder



Klemmarm mit Magnethalter
Socket with magnetic shoe



Klemmarm
Socket



Grundhalter für Klemmarm
Basic holder for socket



Magnethalter für Klemmarm
Magnetic shoe for socket



Bestell-Code · Order code		6910				
Abmaße Dimensions	Dimens.- Code					
ø 45 x 68 mm	.24	●				
ø 80 x 80 mm	.25		●			
ø 80 x 17 mm	.26					●
ø 32 x 63 mm	.27			●		
ø 45 x 20 mm	.32				●	

Kaltluftdüsen-Anbausset
Cold-Air Nozzle Attachment Set

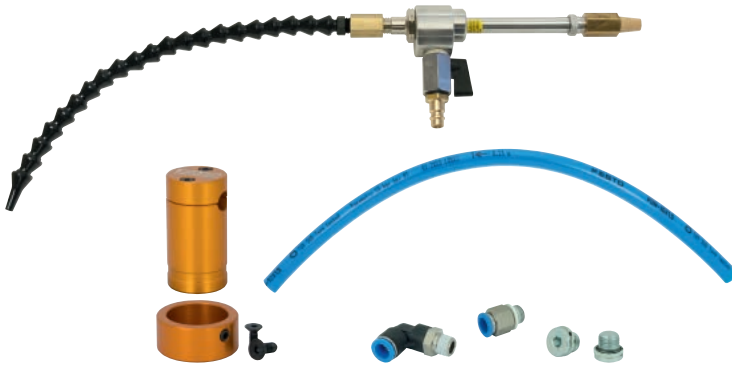


Bestell-Code · Order code		6910
	Dimens.-Code	
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- Lieferumfang:
- 1 x Klemmarm mit Grundhalter (Art.-Nr.: 6910.24)
 - 1 x Anschluss Schlauch 300 mm
 - 1 x Winkel-Verschraubung G 1/4
 - 1 x Verschraubung G 1/4
 - 2 x Blindstopfen G 1/4

- Delivery includes:
- 1 x Socket with basic holder (art. No. 6910.24)
 - 1 x Connecting hose 300 mm
 - 1 x Elbow coupling G 1/4
 - 1 x Screw G 1/4
 - 2 x Sealing plugs G 1/4

Kaltluftdüsen-Montageset 1
Cold-Air Nozzle Assembly Set 1

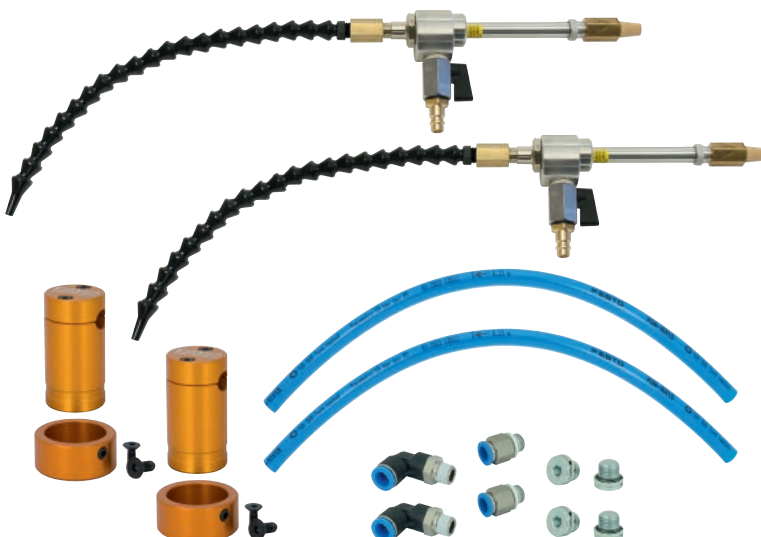


Bestehend aus 1 Kaltluftdüse (Art.-Nr.: 6910.15) und 1 Kaltluftdüsen-Anbausset (Art.-Nr.: 6910.12)
Consists of 1 cold-air nozzle (art. no. 6910.15) and 1 cold-air nozzle attachment set (art. no. 6910.12)

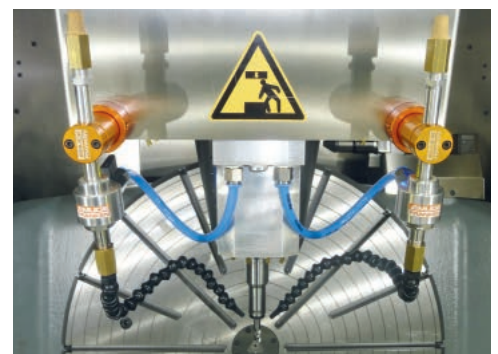


Bestell-Code · Order code		6910
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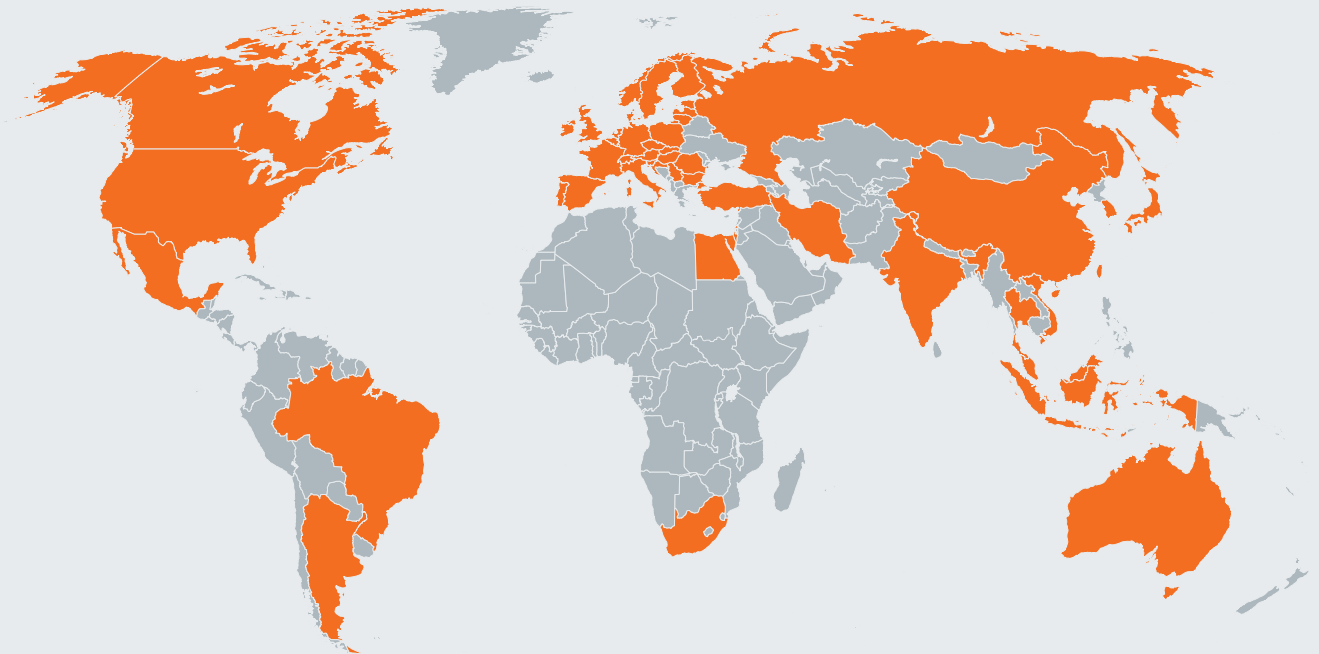
Kaltluftdüsen-Montageset 2
Cold-Air Nozzle Assembly Set 2



Bestehend aus 2 Kaltluftdüsen (Art.-Nr.: 6910.15) und 2 Kaltluftdüsen-Anbausets (Art.-Nr.: 6910.12)
Consists of 2 cold-air nozzles (art. no. 6910.15) and 2 cold-air nozzle attachment sets (art. no. 6910.12)



Bestell-Code · Order code		6910
	Dimens.-Code	
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