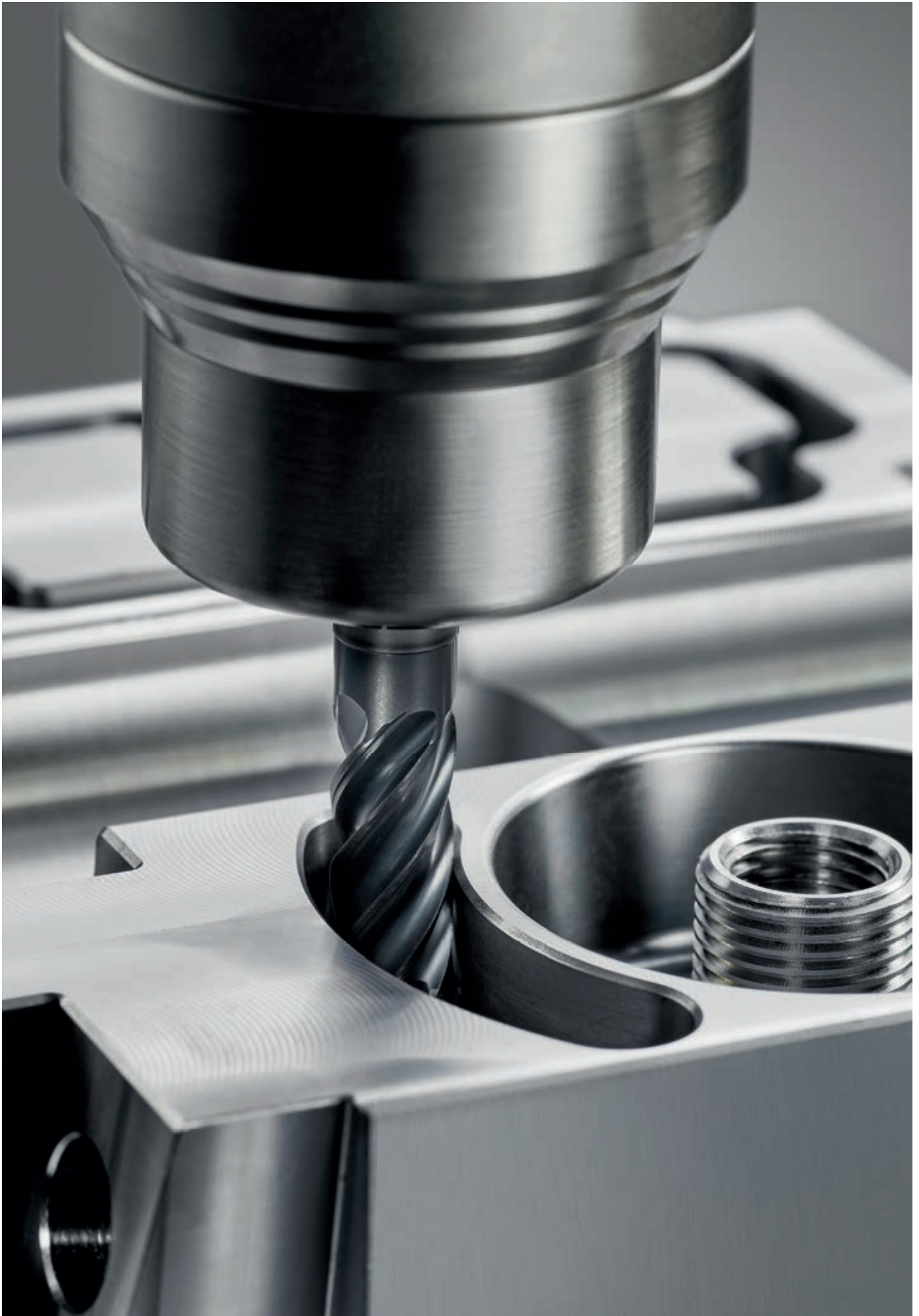




FRANKEN
TiNox-Cut

Bearbeitung von INOX und schwer zerspanbaren Materialien
Machining of Stainless Steel and Difficult to Cut Materials



Anwendungen

- Nichtrostender austenitischer, austenitisch-ferritischer Stahl und nichtrostender Stahlguss
- Hochwarmfeste Speziallegierungen auf der Basis von Eisen, Nickel und Kobalt
- Titan und Titan-Legierungen

Ausführungen

Die TiNox-Fräserreihe besteht aus folgenden Hartmetall- und HSS-Grundtypen:

- Hartmetall-Schafffräser zur Schruppschicht-Bearbeitung
- Hartmetall-Schafffräser „Base“ zum Schruppen und Schlichten
- Hartmetall-Schafffräser zum Schruppen und Schlichten
- Hartmetall-Schafffräser zum Schlichten
- Hartmetall-Schafffräser zur trochoidalen Bearbeitung
- Hartmetall-Schafffräser „N-Wave“ zum Schruppen
- HSS-Schafffräser „N-Wave“ zum Schruppen
- HSS-Schafffräser zum Schruppen
- HSS-Schafffräser zum Schlichten

Die Hartmetall-Schafffräser sind weitestgehend mit unterschiedlichen Eckenradien und innerer Kühlschmierstoff-Zufuhr mit axialem Austritt (ICA) lieferbar. Zusätzlich wird durch speziell aufgeraute Werkzeugschäfte ein „Herausziehen“ des Werkzeuges aus dem Spannfutter vermieden.

Als universelle Lösung speziell im Maschinenbau, der Chemie- und der Lebensmittelindustrie bilden die Hartmetall-Schafffräser „Base“ den Einstieg in unsere TiNox-Cut Produktlinie.

Außer der Ausführung „N-Wave“ sind alle HSS-Schafffräser mit einem Eckenradius 2 mm oder 4 mm versehen, die Schruffräser sind darüber hinaus mit innerer Kühlschmierstoff-Zufuhr mit radialem und axialem Austritt (ICRA) ausgeführt.

Um die maximale Einsatztiefe zu erreichen, sind die Schäfte nach der Schneide freigesetzt.

Applications

- Stainless steel, austenitic and austenitic-ferritic as well as stainless steel castings
- High-heat-resistant special alloys on iron, nickel and cobalt basis
- Titanium and titanium alloys

Designs

The TiNox milling cutter series consists of the following basic tools of solid carbide and HSS:


- Solid carbide end mills for semi-finishing applications
- Solid carbide end mills “Base” for roughing and finishing applications
- Solid carbide end mills for roughing and finishing applications
- Solid carbide end mills for finishing applications
- Solid carbide end mills for trochoidal machining
- Solid carbide end mills “N-Wave” for roughing applications
- HSS end mills “N-Wave” for roughing applications
- HSS end mills for roughing applications
- HSS end mills for finishing applications

The solid carbide end mills are in most cases available with different corner radii and internal coolant supply with axial exit (ICA). In addition, the specially roughened tool shanks prevent the pull out of the tool from the clamping chuck.


The solid carbide end mills “Base” are the entry level products into our TiNox-Cut product line and are designed as a universal solution especially for mechanical engineering as well as the chemical and food industries.

Except for the “N-Wave” design all HSS end mills are fitted with a corner radius 2 mm or 4 mm, the roughing end mills are additionally designed with internal coolant supply with radial and axial exit (ICRA). In order to achieve the maximum work depth, the shanks have a lateral relief after the cutting edge.


TiNox-Cut NF
Hochleistungsschruppwerkzeug für alle schwer zerspanbaren Werkstoffe
High performance roughing tool for all materials that are difficult to machine

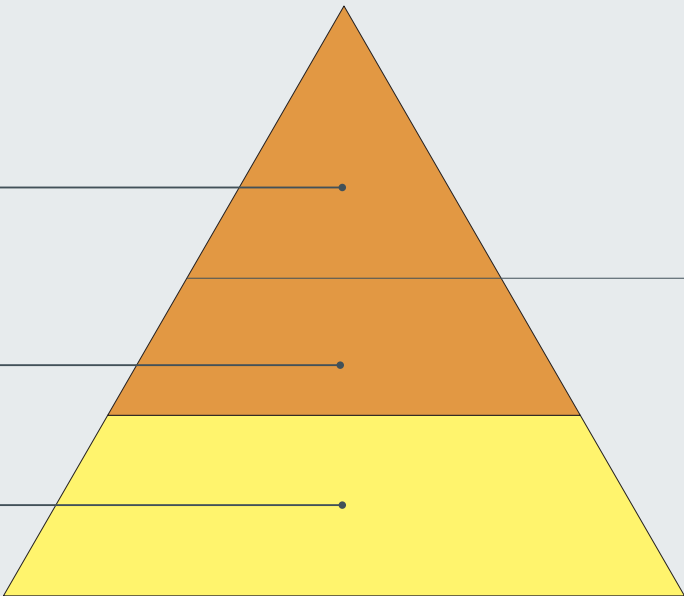


TiNox-Cut N
Hochleistungswerkzeug speziell für die Bearbeitung von Titan und Titan-Legierungen
High performance tool specially designed for machining of titanium and titanium alloys



TiNox-Cut „Base“
Universalwerkzeug für die Bearbeitung von rost- und säurebeständigen Stählen
Universal tool for machining of stainless- and acid-resistant steels





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2.5
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S 2.2
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M 3.1
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Wegweiser

Bitte beachten:

Die Eignung der Hartmetall-und HSS-Schafffräser ist folgendermaßen gekennzeichnet:

- = sehr gut geeignet
- = gut geeignet

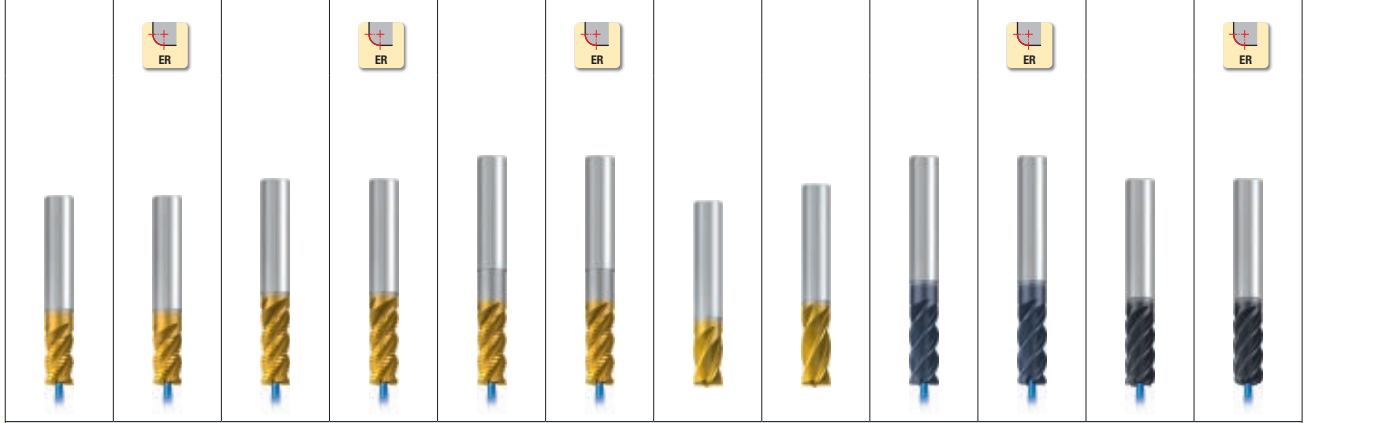
Product finder

Please note:

The suitability of the solid carbide and HSS 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.	≤ 600 N/mm ² Cq15 S235JR (St37-2) 10SPb20	1.1132 1.0037 1.0722
	2.1 Baustähle, Einsatzstähle, Stahlguss, u.a.	≤ 800 N/mm ² E360 (St70-2) 16MnCr5 GS-25CrMo4	1.0070 1.7131 1.7218
	3.1 Einsatzstähle, Vergütungsstähle, Kaltarbeitsstähle, u.a.	≤ 1000 N/mm ² 20MoCr3 42CrMo4 102Cr6	1.7320 1.7225 1.2067
	4.1 Vergütungsstähle, Kaltarbeitsstähle, Nitrierstähle, u.a.	≤ 1200 N/mm ² 50CrMo4 X45NiCrMo4 31CrMo12	1.7228 1.2767 1.8515
5.1 Hochlegierte Stähle, Kaltarbeitsstähle, Warmarbeitsstähle, u.a.	≤ 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	≤ 950 N/mm ² X2CrTi12	1.4512
	2.1 Austenitisch	≤ 950 N/mm ² X6CrNiMoTi17-12-2	1.4571
	3.1 Austenitisch-ferritisch (Duplex)	≤ 1100 N/mm ² X2CrNiMoN22-5-3	1.4462
4.1 Austenitisch-ferritisch hitzebeständig (Super Duplex)	≤ 1250 N/mm ² X2CrNiMoN25-7-4	1.4410	
K	Gusswerkstoffe Cast materials		
	1.1 Gusseisen mit Lamellengrafit (GJL)	100-250 N/mm ² EN-GJL-200 (GG20)	EN-JL-1030
	1.2 Gusseisen mit Kugelgrafit (GJS)	250-450 N/mm ² EN-GJL-300 (GG30)	EN-JL-1050
	2.1 Gusseisen mit Kugelgrafit (GJS)	350-500 N/mm ² EN-GJS-400-15 (GGG40)	EN-JS-1030
	2.2 Gusseisen mit Kugelgrafit (GJS)	500-900 N/mm ² EN-GJS-700-2 (GGG70)	EN-JS-1070
	3.1 Gusseisen mit Vermiculargrafit (GJV)	300-400 N/mm ² GJV 300	
	3.2 Gusseisen mit Vermiculargrafit (GJV)	400-500 N/mm ² GJV 450	
4.1 Temperguss (GTMW, GTMB)	250-500 N/mm ² EN-GJMW-350-4 (GTW-35)	EN-JM-1010	
4.2 Temperguss (GTMW, GTMB)	500-800 N/mm ² EN-GJMB-450-6 (GTS-45)	EN-JM-1140	
N	Nichteisenwerkstoffe Non-ferrous materials		
	1.1 Aluminium-Legierungen	Aluminium alloys	
	1.2 Aluminium-Knetlegierungen	Wrought aluminium alloys	
	1.3 Aluminium-Knetlegierungen	≤ 200 N/mm ² EN AW-AlMn1	EN AW-3103
	1.4 Aluminium-Knetlegierungen	≤ 350 N/mm ² EN AW-AlMgSi	EN AW-6060
	1.5 Aluminium-Gusslegierungen	≤ 550 N/mm ² EN AW-AlZn5Mg3Cu	EN AW-7022
	1.6 Aluminium-Gusslegierungen	Si ≤ 7% EN AC-AIS9Cu3	EN AC-51300
	2.1 Kupfer-Legierungen	7% < Si ≤ 12% EN AC-AIS17Cu4FeMg	EN AC-46500
	2.2 Reinkupfer, niedriglegiertes Kupfer	12% < Si ≤ 17% GD-AIS17Cu4FeMg	
	2.3 Kupfer-Zink-Legierungen (Messing, langspanend)	≤ 400 N/mm ² E-Cu 57	EN CW 004 A
	2.4 Kupfer-Zink-Legierungen (Messing, kurzspanend)	≤ 550 N/mm ² CuZn37 (Ms63)	EN CW 508 L
	2.5 Kupfer-Aluminium-Legierungen (Alubronze, langspanend)	≤ 550 N/mm ² CuZn36Pb3 (Ms58)	EN CW 603 N
	2.6 Kupfer-Aluminium-Legierungen (Alubronze, kurzspanend)	≤ 800 N/mm ² CuAl10Ni5Fe4	EN CW 307 G
	2.7 Kupfer-Zinn-Legierungen (Zinnbronze, langspanend)	≤ 700 N/mm ² CuSn8P	EN CW 459 K
	2.8 Kupfer-Zinn-Legierungen (Zinnbronze, kurzspanend)	≤ 400 N/mm ² CuSn7 ZnPb (Rg7)	2.1090
	3.1 Kupfer-Sonderlegierungen	≤ 600 N/mm ² (AMPCO® 8)	
3.2 Kupfer-Sonderlegierungen	≤ 1400 N/mm ² (AMPCO® 45)		
3.1 Magnesium-Legierungen	Special copper alloys		
3.2 Magnesium-Knetlegierungen	Magnesium wrought alloys		
3.3 Magnesium-Knetlegierungen	≤ 500 N/mm ² MgAl6Zn	3.5612	
3.4 Magnesium-Gusslegierungen	≤ 500 N/mm ² EN-MCMgAl9Zn1	EN-MC21120	
4.1 Kunststoffe	Synthetics		
4.2 Duroplaste (kurzspanend)	Duroplastics (short-chipping)	Bakelit, Pertinax	
4.3 Thermoplaste (langspanend)	Thermoplastics (long-chipping)	PMMA, POM, PVC	
4.4 Faserverstärkte Kunststoffe (Faseranteil ≤ 30%)	Fibre-reinforced synthetics (fibre content ≤ 30%)	GFK, CFK, AFK	
4.5 Faserverstärkte Kunststoffe (Faseranteil > 30%)	Fibre-reinforced synthetics (fibre content > 30%)	GFK, CFK, AFK	
5.1 Besondere Werkstoffe	Special materials		
5.2 Grafit	Graphite	C 8000	
5.3 Wolfram-Kupfer-Legierungen	Tungsten-copper alloys	W-Cu 80/20	
5.4 Verbundwerkstoffe	Composite materials	Hyllite, Alucobond	
5.5 Spezialwerkstoffe	Special materials		
S	Spezialwerkstoffe Special materials		
	1.1 Titan-Legierungen	Titanium alloys	
	1.2 Reintitan	Pure titanium	
	1.3 Titan-Legierungen	≤ 450 N/mm ² Ti1	3.7025
	2.1 Titan-Legierungen	≤ 900 N/mm ² TiAl6V4	3.7165
	2.2 Titan-Legierungen	≤ 1250 N/mm ² TiAl4Mo4Sn2	3.7185
	2.3 Nickel-, Kobalt- und Eisen-Legierungen	Nickel alloys, cobalt alloys and iron alloys	
	2.4 Reinnickel	Pure nickel	
	2.5 Nickel-Basis-Legierungen	≤ 600 N/mm ² Ni 99,6	2.4060
	2.6 Nickel-Basis-Legierungen	≤ 1000 N/mm ² Monel 400	2.4360
3.1 Nickel-Basis-Legierungen	≤ 1600 N/mm ² Inconel 718	2.4668	
3.2 Nickel-Basis-Legierungen	≤ 1000 N/mm ² Udimet 605		
3.3 Kobalt-Basis-Legierungen	≤ 1600 N/mm ² Haynes 25	2.4964	
3.4 Eisen-Basis-Legierungen	≤ 1500 N/mm ² Incoloy 800	1.4958	
H	Harte Werkstoffe Hard materials		
	1.1 Hochfeste Stähle, gehärtete Stähle, Hartguss	44 - 50 HRC Weldox 1100	
	1.2 Hochfeste Stähle, gehärtete Stähle, Hartguss	50 - 55 HRC Hardox 550	
	1.3 Hochfeste Stähle, gehärtete Stähle, Hartguss	55 - 60 HRC Armox 600T	
	1.4 Hochfeste Stähle, gehärtete Stähle, Hartguss	60 - 63 HRC Ferro-Titanit	
1.5 Hochfeste Stähle, gehärtete Stähle, Hartguss	63 - 66 HRC HSSE		



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<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.6	
						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					1.1	H
						<input type="checkbox"/>	<input type="checkbox"/>					1.2	
												1.3	
												1.4	
												1.5	

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



Inox

N

NF

mittel - medium

	ø3 - 20 mm	ø12 - 20 mm	ø6 - 20 mm	ø12 - 20 mm	ø10 - 20 mm	ø6 - 20 mm	ø6 - 20 mm	ø6 - 20 mm	ø10 - 20 mm
--	------------	-------------	------------	-------------	-------------	------------	------------	------------	-------------

Z (Flutes)	4 - 5	5	4 - 5	5	5	4 - 5	4 - 5	4 - 5	4
------------	-------	---	-------	---	---	-------	-------	-------	---

	2644T	2654T	2645T	2655T	2596T				
--	-------	-------	-------	-------	-------	--	--	--	--

						2537TZ	2539TZ	2541TZ	2543TZ
--	--	--	--	--	--	--------	--------	--------	--------

Seite · Page	22	22	24	24	26	28	28	28	28
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v_c / f_z	23	23	25	25	27	29	29	29	29
-------------	----	----	----	----	----	----	----	----	----

P

1.1	■	■	■	■	■	■	■	■	■
2.1	■	■	■	■	■	■	■	■	■
3.1	■	■	■	■	■	■	■	■	■
4.1	■	■	■	■	■	□	□	□	□
5.1	■	■	■	■	■	□	□	□	□

M

1.1	■	■	■	■	■	■	■	■	■
2.1	■	■	■	■	■	■	■	■	■
3.1	■	■	■	■	■	■	■	■	■
4.1	■	■	■	■	■	■	■	■	■

K

1.1	■	■	■	■	■	□	□	□	□
1.2	■	■	■	■	■	□	□	□	□
2.1	■	■	■	■	■	□	□	□	□
2.2	■	■	■	■	■	□	□	□	□
3.1	■	■	■	■	■	□	□	□	□
3.2	■	■	■	■	■	□	□	□	□
4.1	■	■	■	■	■	□	□	□	□
4.2	■	■	■	■	■	□	□	□	□

N

1.1						■	■	■	■
1.2	□	□	□	□	□	■	■	■	■
1.3	□	□	□	□	□	■	■	■	■
1.4	□	□	□	□	□				
1.5	□	□	□	□	□				
1.6	□	□	□	□	□				

N

2.1	■	■	■	■	■	■	■	■	■
2.2	■	■	■	■	■	■	■	■	■
2.3	■	■	■	■	■	■	■	■	■
2.4	■	■	■	■	■	■	■	■	■
2.5	■	■	■	■	■	■	■	■	■
2.6	■	■	■	■	■	■	■	■	■
2.7	■	■	■	■	■	■	■	■	■
2.8	■	■	■	■	■	■	■	■	■

N

3.1									
3.2									
4.1									
4.2									
4.3									
4.4									

N

5.1									
5.2	■	■	■	■	■	■	■	■	■
5.3									

S

1.1	■	■	■	■	■	■	■	■	■
1.2	■	■	■	■	■	■	■	■	■
1.3	■	■	■	■	■	■	■	■	■
2.1	■	■	■	■	■	■	■	■	■
2.2	■	■	■	■	■	■	■	■	■
2.3	■	■	■	■	■	■	■	■	■
2.4	■	■	■	■	■	■	■	■	■
2.5	■	■	■	■	■	■	■	■	■
2.6	■	■	■	■	■	■	■	■	■

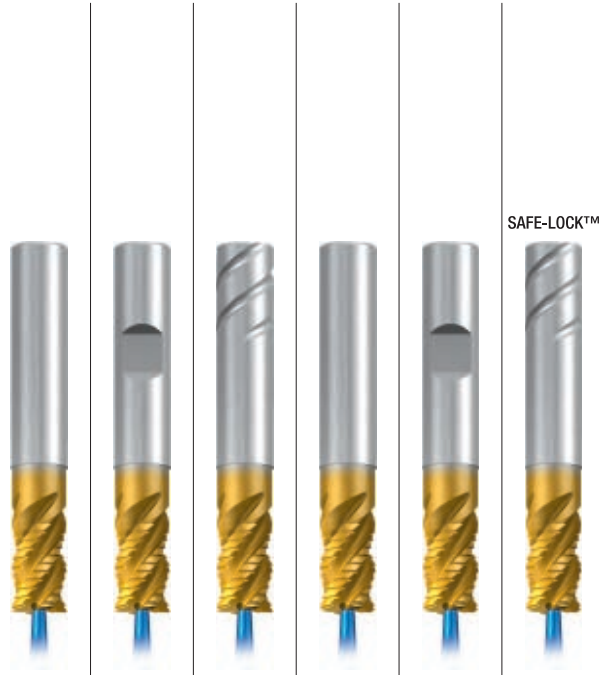
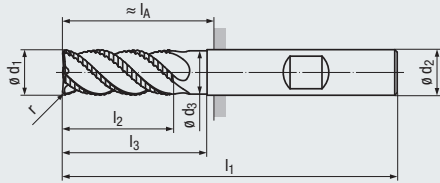
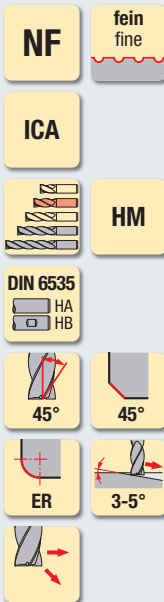
H

1.1									
1.2									
1.3									
1.4									
1.5									

ER		ER		ER		ER		ER	
Inox	Hard materials	Inox	Inox		Inox				
N	H	N	HR	asymmetr.	N	N			
Ø 12 - 20 mm	Ø 6 - 20 mm dia. 1/4 - 3/4"	Ø 12 - 25 mm	Ø 16 - 32 mm	Ø 16 - 32 mm	Ø 25 - 32 mm	Ø 25 - 32 mm			
5	6 - 20	4	4 - 6	4 - 6	8 - 10	8 - 10			Z (Flutes)
2561LZ	2887A	1391L	1395WZ	1399WZ	1365A	1390A			
30	32	34	36	36	38	38			Seite · Page
31	33	35	37	37	39	39			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

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

- Hochleistungswerkzeug
- Feine Schruppschicht-Verzahnung für zähe Werkstoffe
- Verschiedene Eckenradien pro Schneidendurchmesser
- Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)
- 3 Baulängen verfügbar
- High performance tool
- Fine semi-finishing profile for tough materials
- Several corner radii per cutting diameter
- Internal coolant supply, axial exit (ICA)
- 3 lengths available



Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- Speziell für schwer zerspanbare Werkstoffe geeignet
- In allen zähen Werkstoffen einsetzbar
- Zum HPC-Schruppen geeignet

Applications – material (see page 3)

- Especially suitable for difficult to cut materials
- For all tough materials
- Suitable for HPC roughing

TIN / TIALN

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

TIN / TIALN

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

DIN 6527 – Kurze Ausführung · Short design

Bestell-Code · Order code									2646TZ	2647TZ	2646TT				
$\varnothing d_1$ h11	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	Z (Flutes)	Dimens.- Code							
6	10	16	54	5,8	6	18	4	.006	●	●	○				
8	12	20	58	7,7	8	22	4	.008	●	●	○				
10	14	24	66	9,5	10	26	4	.010	●	●	○				
12	16	26	73	11,5	12	28	4	.012	●	●	○				
16	22	32	82	15,5	16	34	4	.016	●	●	○				
20	26	40	92	19,5	20	42	4	.020	●	●	○				

DIN 6527 – Kurze Ausführung · Short design

Eckenradius · Corner radius

Bestell-Code · Order code										2642TZ	2643TZ	2642TT				
$\varnothing d_1$ h11	r	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	Z (Flutes)	Dimens.- Code							
12	2,5	16	26	73	11,5	12	28	4	.012025	●	●	○				
12	3	16	26	73	11,5	12	28	4	.012030	●	●	○				
12	4	16	26	73	11,5	12	28	4	.012040	●	●	○				
16	2,5	22	32	82	15,5	16	34	4	.016025	●	●	○				
16	3	22	32	82	15,5	16	34	4	.016030	●	●	○				
16	4	22	32	82	15,5	16	34	4	.016040	●	●	○				
20	2,5	26	40	92	19,5	20	42	4	.020025	●	●	○				
20	3	26	40	92	19,5	20	42	4	.020030	●	●	○				
20	4	26	40	92	19,5	20	42	4	.020040	●	●	○				

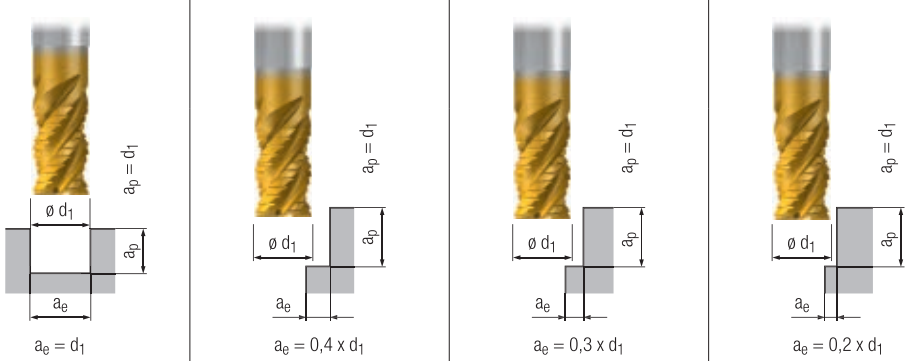
SAFE-LOCK™

Informationen zum SAFE-LOCK™-Spannsystem siehe Seite 415 im FRANKEN Katalog 250
 Information regarding SAFE-LOCK™ clamping system, see page 415 in FRANKEN Catalogue 250



Hartmetall-Schafffräser – kurze Ausführung
Solid carbide end mills – short design

NF



Gültig für · Valid for

- 2642TT
- 2642TZ
- 2643TZ
- 2646TT
- 2646TZ
- 2647TZ

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

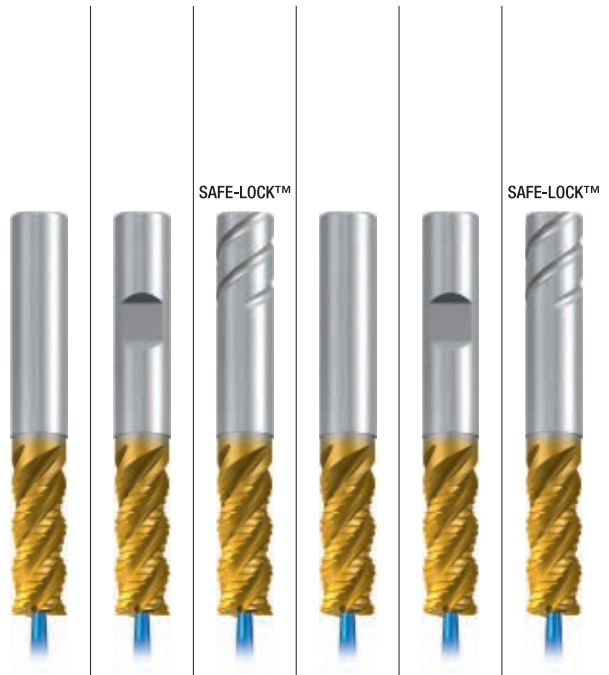
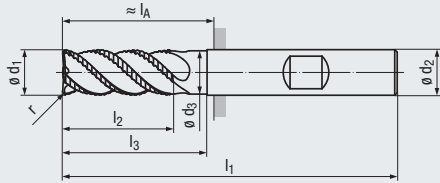
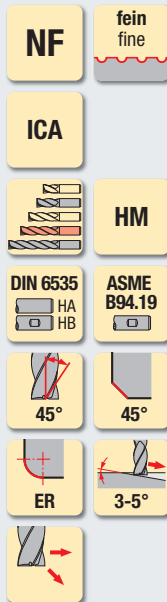
All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

	Vc [m/min]	fz [mm]	Vc [m/min]	fz [mm]	Vc [m/min]	fz [mm]	Vc [m/min]	fz [mm]	MMS MQL				
P	1.1	120	0,005 x d ₁	140	0,006 x d ₁	170	0,007 x d ₁	190	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	110	0,004 x d ₁	130	0,005 x d ₁	150	0,006 x d ₁	180	0,007 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	90	0,004 x d ₁	110	0,005 x d ₁	130	0,005 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	70	0,003 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	60	0,003 x d ₁	70	0,003 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
M	1.1	100	0,004 x d ₁	120	0,004 x d ₁	140	0,005 x d ₁	160	0,006 x d ₁				<input checked="" type="checkbox"/>
	2.1	80	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁	130	0,006 x d ₁				<input checked="" type="checkbox"/>
	3.1	50	0,003 x d ₁	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁				<input checked="" type="checkbox"/>
	4.1	40	0,003 x d ₁	50	0,003 x d ₁	60	0,004 x d ₁	60	0,004 x d ₁				<input checked="" type="checkbox"/>
K	1.1	120	0,005 x d ₁	140	0,006 x d ₁	170	0,007 x d ₁	190	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	120	0,005 x d ₁	140	0,006 x d ₁	170	0,007 x d ₁	190	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	110	0,004 x d ₁	130	0,005 x d ₁	150	0,006 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	110	0,004 x d ₁	130	0,005 x d ₁	150	0,006 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	90	0,004 x d ₁	110	0,005 x d ₁	130	0,006 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	90	0,004 x d ₁	110	0,005 x d ₁	130	0,006 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	70	0,003 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4.2	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
N	1.1												
	1.2												
	1.3												
	1.4												
	1.5												
	1.6												
	2.1	110	0,005 x d ₁	130	0,006 x d ₁	150	0,007 x d ₁	180	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	110	0,005 x d ₁	130	0,006 x d ₁	150	0,007 x d ₁	180	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	110	0,005 x d ₁	130	0,006 x d ₁	150	0,007 x d ₁	180	0,008 x d ₁	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	100	0,004 x d ₁	120	0,005 x d ₁	140	0,006 x d ₁	160	0,006 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	100	0,004 x d ₁	120	0,005 x d ₁	140	0,006 x d ₁	160	0,006 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	100	0,004 x d ₁	120	0,005 x d ₁	140	0,006 x d ₁	160	0,006 x d ₁	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 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	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁				<input checked="" type="checkbox"/>	
5.3													
S	1.1	70	0,005 x d ₁	80	0,005 x d ₁	100	0,006 x d ₁	110	0,007 x d ₁				<input checked="" type="checkbox"/>
	1.2	60	0,004 x d ₁	70	0,004 x d ₁	80	0,005 x d ₁	100	0,006 x d ₁				<input checked="" type="checkbox"/>
	1.3	30	0,003 x d ₁	40	0,003 x d ₁	40	0,004 x d ₁	50	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.1	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁	110	0,006 x d ₁				<input checked="" type="checkbox"/>
	2.2	20	0,003 x d ₁	20	0,004 x d ₁	25	0,004 x d ₁	30	0,005 x d ₁				<input checked="" type="checkbox"/>
	2.3	10	0,002 x d ₁	15	0,002 x d ₁	15	0,003 x d ₁	20	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.4	20	0,003 x d ₁	25	0,003 x d ₁	35	0,004 x d ₁	30	0,004 x d ₁				<input checked="" type="checkbox"/>
2.5	10	0,002 x d ₁	10	0,002 x d ₁	10	0,003 x d ₁	20	0,003 x d ₁				<input checked="" type="checkbox"/>	
2.6	10	0,003 x d ₁	10	0,003 x d ₁	10	0,004 x d ₁	20	0,004 x d ₁				<input checked="" type="checkbox"/>	
H	1.1												
	1.2												
	1.3												
	1.4												
	1.5												

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

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

- Hochleistungswerkzeug
- Feine Schruppschicht-Verzahnung für zähe Werkstoffe
- Verschiedene Eckenradien pro Schneidendurchmesser
- Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)
- 3 Baulängen verfügbar
- High performance tool
- Fine semi-finishing profile for tough materials
- Several corner radii per cutting diameter
- Internal coolant supply, axial exit (ICA)
- 3 lengths available



Inox

Inox

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- Speziell für schwer zerspanbare Werkstoffe geeignet
- In allen zähen Werkstoffen einsetzbar
- Zum HPC-Schruppen geeignet

Applications – material (see page 3)

- Especially suitable for difficult to cut materials
- For all tough materials
- Suitable for HPC roughing

TIN / TIALN

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

TIN / TIALN

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

DIN 6527 – Lange Ausführung · Long design

Bestell-Code · Order code										2648TZ	2649TZ	2648TT				
	∅ d ₁ h11	l ₂	l ₃	l ₁	∅ d ₃	∅ d ₂ h6	l _A	Z (Flutes)	Dimens.- Code							
[mm]	6	13	20	57	5,8	6	21	4	.006	●	●	○				
	8	19	25	63	7,7	8	27	4	.008	●	●	○				
	10	22	30	72	9,5	10	32	4	.010	●	●	○				
	12	26	35	83	11,5	12	38	4	.012	●	●	○				
	16	32	40	92	15,5	16	44	4	.016	●	●	○				
20	38	50	104	19,5	20	54	4	.020	●	●	○					
[inch]	1/4	17/32	3/4	2 1/2	0.236	1/4	1 1/8	4	.A250	●	●	○				
	5/16	3/4	1	2 1/2	0.295	5/16	1 1/8	4	.A3125	●	●	○				
	3/8	7/8	1 1/8	2 3/4	0.358	3/8	1 3/16	4	.0375	●	●	○				
	1/2	1 1/8	1 3/8	3 1/4	0.480	1/2	1 15/32	4	.0500	●	●	○				
	5/8	1 1/4	1 1/2	3 1/2	0.605	5/8	1 19/32	4	.0625	●	●	○				
	3/4	1 1/2	1 7/8	4	0.730	3/4	1 31/32	4	.0750	●	●	○				
	1	1 3/4	2 5/8	5	0.969	1	2 23/32	5	.1000	●	●	○				

DIN 6527 – Lange Ausführung · Long design

Bestell-Code · Order code										Eckenradius · Corner radius			
	∅ d ₁ h11	r	l ₂	l ₃	l ₁	∅ d ₃	∅ d ₂ h6	l _A	Z (Flutes)	Dimens.- Code	2670TZ	2671TZ	2670TT
[mm]	12	2,5	26	35	83	11,5	12	38	4	.012025	●	●	○
	12	3	26	35	83	11,5	12	38	4	.012030	●	●	○
	12	4	26	35	83	11,5	12	38	4	.012040	●	●	○
	16	2,5	32	40	92	15,5	16	44	4	.016025	●	●	○
	16	3	32	40	92	15,5	16	44	4	.016030	●	●	○
	16	4	32	40	92	15,5	16	44	4	.016040	●	●	○
	20	2,5	38	50	104	19,5	20	54	4	.020025	●	●	○
	20	3	38	50	104	19,5	20	54	4	.020030	●	●	○
	20	4	38	50	104	19,5	20	54	4	.020040	●	●	○

SAFE-LOCK™

Informationen zum SAFE-LOCK™-Spannsystem siehe Seite 415 im FRANKEN Katalog 250
 Information regarding SAFE-LOCK™ clamping system, see page 415 in FRANKEN Catalogue 250

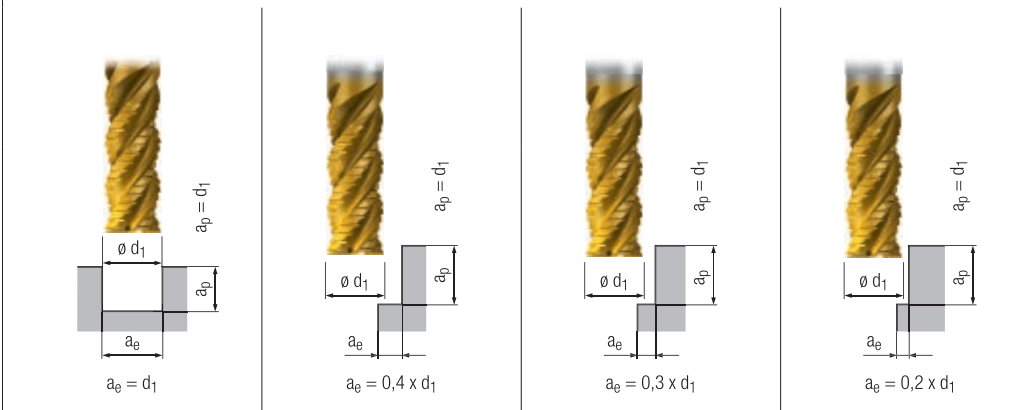


Hartmetall-Schafffräser – lange Ausführung
Solid carbide end mills – long design

NF

Gültig für · Valid for

- 2648TT
- 2648TZ
- 2649TZ
- 2670TT
- 2670TZ
- 2671TZ



Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

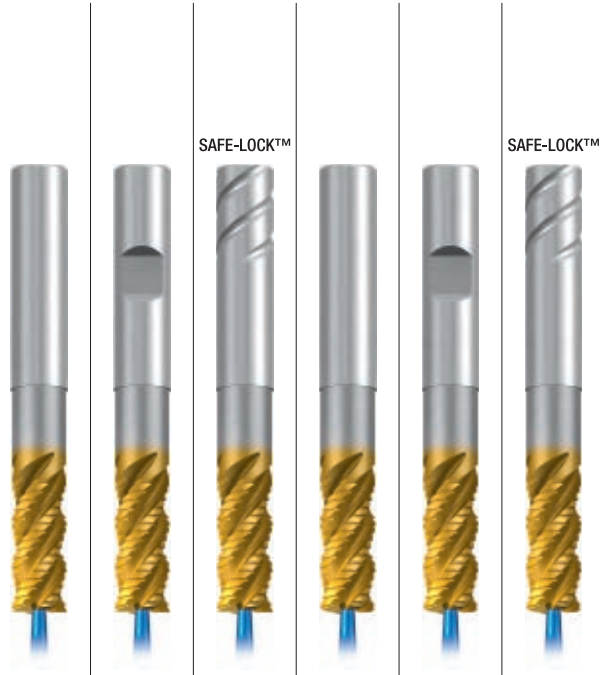
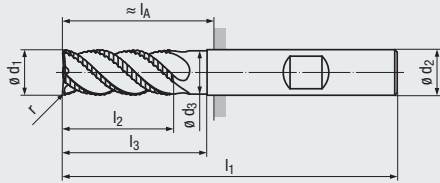
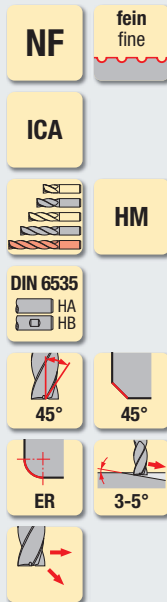
	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	MMS MQL				
P	1.1	120	$0,005 \times d_1$	140	$0,006 \times d_1$	170	$0,007 \times d_1$	190	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	180	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	90	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,005 \times d_1$	140	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
M	1.1	100	$0,004 \times d_1$	120	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$				<input checked="" type="checkbox"/>
	2.1	80	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,006 \times d_1$				<input checked="" type="checkbox"/>
	3.1	50	$0,003 \times d_1$	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	4.1	40	$0,003 \times d_1$	50	$0,003 \times d_1$	60	$0,004 \times d_1$	60	$0,004 \times d_1$				<input checked="" type="checkbox"/>
K	1.1	120	$0,005 \times d_1$	140	$0,006 \times d_1$	170	$0,007 \times d_1$	190	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	120	$0,005 \times d_1$	140	$0,006 \times d_1$	170	$0,007 \times d_1$	190	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	90	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,006 \times d_1$	140	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	90	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,006 \times d_1$	140	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4.2	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
N	1.1												
	1.2												
	1.3												
	1.4												
	1.5												
	1.6												
	2.1	110	$0,005 \times d_1$	130	$0,006 \times d_1$	150	$0,007 \times d_1$	180	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	110	$0,005 \times d_1$	130	$0,006 \times d_1$	150	$0,007 \times d_1$	180	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	110	$0,005 \times d_1$	130	$0,006 \times d_1$	150	$0,007 \times d_1$	180	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1												
	3.2												
4.1													
4.2													
4.3													
4.4													
5.1													
5.2	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$				<input checked="" type="checkbox"/>	
5.3													
S	1.1	70	$0,005 \times d_1$	80	$0,005 \times d_1$	100	$0,006 \times d_1$	110	$0,007 \times d_1$				<input checked="" type="checkbox"/>
	1.2	60	$0,004 \times d_1$	70	$0,004 \times d_1$	80	$0,005 \times d_1$	100	$0,006 \times d_1$				<input checked="" type="checkbox"/>
	1.3	30	$0,003 \times d_1$	40	$0,003 \times d_1$	40	$0,004 \times d_1$	50	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	2.1	70	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$	110	$0,006 \times d_1$				<input checked="" type="checkbox"/>
	2.2	20	$0,003 \times d_1$	20	$0,004 \times d_1$	25	$0,004 \times d_1$	30	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	2.3	10	$0,002 \times d_1$	15	$0,002 \times d_1$	15	$0,003 \times d_1$	20	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.4	20	$0,003 \times d_1$	25	$0,003 \times d_1$	35	$0,004 \times d_1$	30	$0,004 \times d_1$				<input checked="" type="checkbox"/>
2.5	10	$0,002 \times d_1$	10	$0,002 \times d_1$	10	$0,003 \times d_1$	20	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
2.6	10	$0,003 \times d_1$	10	$0,003 \times d_1$	10	$0,004 \times d_1$	20	$0,004 \times d_1$				<input checked="" type="checkbox"/>	
H	1.1												
	1.2												
	1.3												
	1.4												
	1.5												

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

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

- Hochleistungswerkzeug
- Feine Schruppschicht-Verzahnung für zähe Werkstoffe
- Verschiedene Eckenradien pro Schneidendurchmesser
- Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)
- Extra lange Ausführung mit langer Schneidlänge
- 3 Baulängen verfügbar

- High performance tool
- Fine semi-finishing profile for tough materials
- Several corner radii per cutting diameter
- Internal coolant supply, axial exit (ICA)
- Extra long design with long flute length
- 3 lengths available



Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- Speziell für schwer zerspanbare Werkstoffe geeignet
- In allen zähen Werkstoffen einsetzbar
- Zum HPC-Schruppen geeignet

Applications – material (see page 3)

- Especially suitable for difficult to cut materials
- For all tough materials
- Suitable for HPC roughing

TIN / TIALN

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

TIN / TIALN

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

Extra lange Ausführung · Extra long design

Bestell-Code · Order code									2656TZ	2657TZ	2656TT				
∅ d ₁ h11	l ₂	l ₃	l ₁	∅ d ₃	∅ d ₂ h6	l _A	Z (Flutes)	Dimens.- Code							
6	13	25	62	5,8	6	26	4	.006	●	●	○				
8	19	30	68	7,7	8	32	4	.008	●	●	○				
10	22	35	80	9,5	10	40	4	.010	●	●	○				
12	26	45	93	11,5	12	48	4	.012	●	●	○				
16	32	55	108	15,5	16	60	4	.016	●	●	○				
20	38	70	126	19,5	20	76	4	.020	●	●	○				

Extra lange Ausführung · Extra long design

Eckenradius · Corner radius

Bestell-Code · Order code										2658TZ	2659TZ	2658TT				
∅ d ₁ h11	r	l ₂	l ₃	l ₁	∅ d ₃	∅ d ₂ h6	l _A	Z (Flutes)	Dimens.- Code							
6	0,5	13	25	62	5,8	6	26	4	.006005	●	●	○				
6	1	13	25	62	5,8	6	26	4	.006010	●	●	○				
8	1	19	30	68	7,7	8	32	4	.008010	●	●	○				
8	2	19	30	68	7,7	8	32	4	.008020	●	●	○				
10	2	22	35	80	9,5	10	40	4	.010020	●	●	○				
10	2,5	22	35	80	9,5	10	40	4	.010025	●	●	○				
12	2	26	45	93	11,5	12	48	4	.012020	●	●	○				
12	2,5	26	45	93	11,5	12	48	4	.012025	●	●	○				
12	3	26	45	93	11,5	12	48	4	.012030	●	●	○				
12	4	26	45	93	11,5	12	48	4	.012040	●	●	○				
16	2	32	55	108	15,5	16	60	4	.016020	●	●	○				
16	2,5	32	55	108	15,5	16	60	4	.016025	●	●	○				
16	3	32	55	108	15,5	16	60	4	.016030	●	●	○				
16	4	32	55	108	15,5	16	60	4	.016040	●	●	○				
20	2	38	70	126	19,5	20	76	4	.020020	●	●	○				
20	2,5	38	70	126	19,5	20	76	4	.020025	●	●	○				
20	3	38	70	126	19,5	20	76	4	.020030	●	●	○				
20	4	38	70	126	19,5	20	76	4	.020040	●	●	○				

Andere Eckenradien auf Anfrage lieferbar
Other corner radii available on request

SAFE-LOCK™

Informationen zum SAFE-LOCK™-Spannsystem siehe Seite 415 im FRANKEN Katalog 250
Information regarding SAFE-LOCK™ clamping system, see page 415 in FRANKEN Catalogue 250



Hartmetall-Schaftfräser – extra lange Ausführung
Solid carbide end mills – extra long design

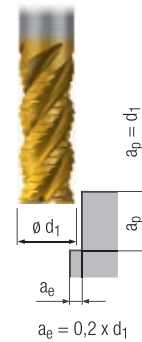
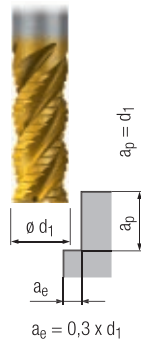
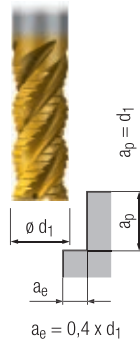
NF

Gültig für · Valid for

- 2656TT
- 2656TZ
- 2657TZ
- 2658TT
- 2658TZ
- 2659TZ

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary



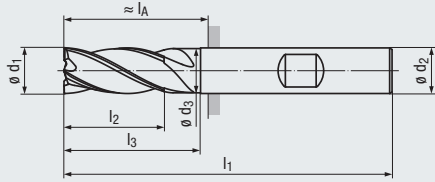
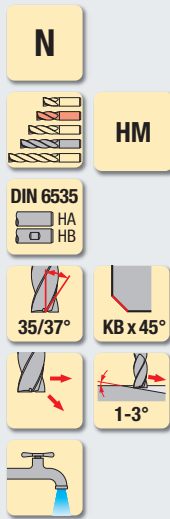
	V _c [m/min]	f _z [mm]	V _c [m/min]	f _z [mm]	V _c [m/min]	f _z [mm]	V _c [m/min]	f _z [mm]	MMS MQL				
P	1.1	120	0,005 x d ₁	140	0,006 x d ₁	170	0,007 x d ₁	190	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	110	0,004 x d ₁	130	0,005 x d ₁	150	0,006 x d ₁	180	0,007 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	90	0,004 x d ₁	110	0,005 x d ₁	130	0,005 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	70	0,003 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	60	0,003 x d ₁	70	0,003 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
M	1.1	100	0,004 x d ₁	120	0,004 x d ₁	140	0,005 x d ₁	160	0,006 x d ₁				<input checked="" type="checkbox"/>
	2.1	80	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁	130	0,006 x d ₁				<input checked="" type="checkbox"/>
	3.1	50	0,003 x d ₁	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁				<input checked="" type="checkbox"/>
	4.1	40	0,003 x d ₁	50	0,003 x d ₁	60	0,004 x d ₁	60	0,004 x d ₁				<input checked="" type="checkbox"/>
K	1.1	120	0,005 x d ₁	140	0,006 x d ₁	170	0,007 x d ₁	190	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	120	0,005 x d ₁	140	0,006 x d ₁	170	0,007 x d ₁	190	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	110	0,004 x d ₁	130	0,005 x d ₁	150	0,006 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	110	0,004 x d ₁	130	0,005 x d ₁	150	0,006 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	90	0,004 x d ₁	110	0,005 x d ₁	130	0,006 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	90	0,004 x d ₁	110	0,005 x d ₁	130	0,006 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	70	0,003 x d ₁	80	0,004 x d ₁	100	0,004 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4.2	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
N	1.1												
	1.2												
	1.3												
	1.4												
	1.5												
	1.6												
	2.1	110	0,005 x d ₁	130	0,006 x d ₁	150	0,007 x d ₁	180	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	110	0,005 x d ₁	130	0,006 x d ₁	150	0,007 x d ₁	180	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	110	0,005 x d ₁	130	0,006 x d ₁	150	0,007 x d ₁	180	0,008 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	100	0,004 x d ₁	120	0,005 x d ₁	140	0,006 x d ₁	160	0,006 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	100	0,004 x d ₁	120	0,005 x d ₁	140	0,006 x d ₁	160	0,006 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	100	0,004 x d ₁	120	0,005 x d ₁	140	0,006 x d ₁	160	0,006 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 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	60	0,003 x d ₁	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁				<input checked="" type="checkbox"/>	
5.3													
S	1.1	70	0,005 x d ₁	80	0,005 x d ₁	100	0,006 x d ₁	110	0,007 x d ₁				<input checked="" type="checkbox"/>
	1.2	60	0,004 x d ₁	70	0,004 x d ₁	80	0,005 x d ₁	100	0,006 x d ₁				<input checked="" type="checkbox"/>
	1.3	30	0,003 x d ₁	40	0,003 x d ₁	40	0,004 x d ₁	50	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.1	70	0,004 x d ₁	80	0,004 x d ₁	100	0,005 x d ₁	110	0,006 x d ₁				<input checked="" type="checkbox"/>
	2.2	20	0,003 x d ₁	20	0,004 x d ₁	25	0,004 x d ₁	30	0,005 x d ₁				<input checked="" type="checkbox"/>
	2.3	10	0,002 x d ₁	15	0,002 x d ₁	15	0,003 x d ₁	20	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.4	20	0,003 x d ₁	25	0,003 x d ₁	35	0,004 x d ₁	30	0,004 x d ₁				<input checked="" type="checkbox"/>
2.5	10	0,002 x d ₁	10	0,002 x d ₁	10	0,003 x d ₁	20	0,003 x d ₁				<input checked="" type="checkbox"/>	
2.6	10	0,003 x d ₁	10	0,003 x d ₁	10	0,004 x d ₁	20	0,004 x d ₁				<input checked="" type="checkbox"/>	
H	1.1												
	1.2												
	1.3												
	1.4												
	1.5												

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

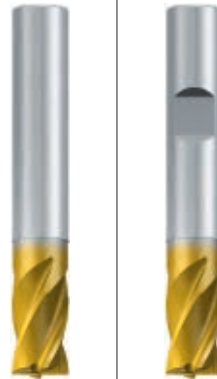
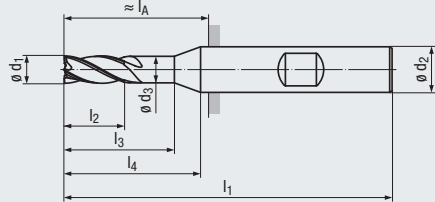
v_c = Schnittgeschwindigkeit · Cutting speed
f_z = Vorschub pro Zahn · Feed per tooth

- Hochleistungswerkzeug
- Schlicht-Verzahnung für zähe Werkstoffe
- Keine Vibrationen durch spezielle Geometrie
- Ungleiche Teilung

- High performance tool
- Finishing end mill for tough materials
- Special geometry prevents vibration
- Variable spacing



Design I₄:



Inox

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- Speziell für rost- und säurebeständige Stähle geeignet
- Zum HPC-Schruppen und zum Schlichten geeignet

Applications – material (see page 3)

- Especially suitable for stainless steel materials
- Suitable for HPC roughing and finishing

TIN/TIALN

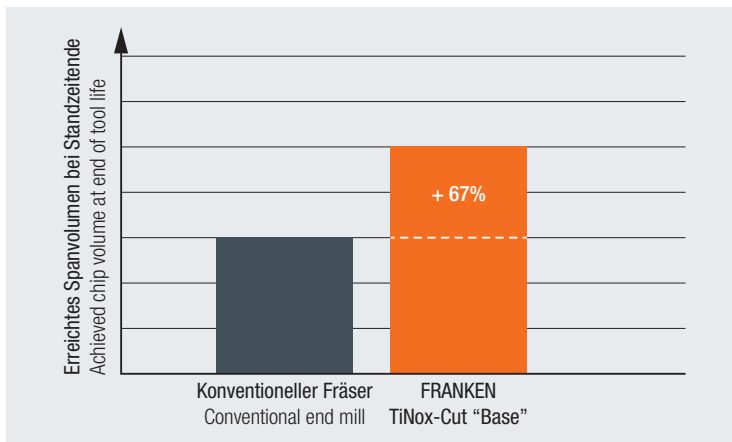
P	1.1-3.1	4.1-5.1
M	1.1-4.1	
K	1.1-2.2	3.1-4.2
N	1.1-1.3	
N	2.1-2.8	5.2
S	1.1	1.2-1.3
S	2.1	2.2-2.6
H	1.1	1.2

DIN 6527 – kurze Ausführung · Short design

Bestell-Code · Order code

$\varnothing d_1$ h10	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	l_A	KB	Z (Flutes)	Dimens.- Code	2566T	2567T
3	5	9	50	2,9	14	6	14	0,07	4	.003	●	●
4	8	12	54	3,8	18	6	18	0,07	4	.004	●	●
5	9	16	54	4,8	18	6	18	0,12	4	.005	●	●
6	10	16	54	5,8	–	6	18	0,12	4	.006	●	●
8	12	20	58	7,7	–	8	22	0,12	4	.008	●	●
10	15	24	66	9,5	–	10	26	0,2	4	.010	●	●
12	18	26	73	11,5	–	12	28	0,2	4	.012	●	●
16	24	32	82	15,5	–	16	34	0,2	4	.016	●	●
20	30	40	92	19,5	–	20	42	0,3	4	.020	●	●

Bearbeitungsbeispiel – 1.4404, Nassbearbeitung
Machining example – 1.4404, with coolant



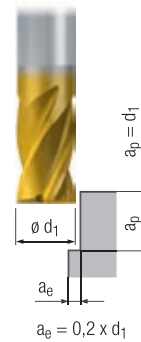
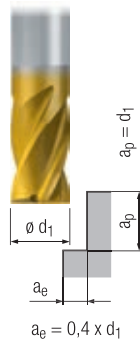
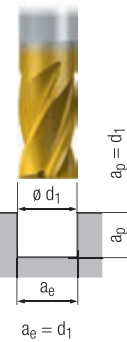
Artikel-Nr.: Article no.:	2569T.012	
Werkzeugdurchmesser: Tool diameter:	[d ₁]	12 mm
Schnittgeschwindigkeit: Cutting speed:	[v _c]	170 m/min
Vorschub pro Zahn: Feed per tooth:	[f _z]	0,066 mm
Axiale Zustellung: Axial depth of cut:	[a _p]	25 mm
Radiale Zustellung: Radial depth of cut:	[a _e]	2 mm
Drehzahl: Speed:	[n]	4 500 min ⁻¹
Vorschubgeschwindigkeit: Feed speed:	[v _f]	1 200 mm/min



Hartmetall-Schafffräser „Base“ – kurze Ausführung
Solid carbide end mills “Base” – short design

N

Gültig für · Valid for
2566T
2567T



Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

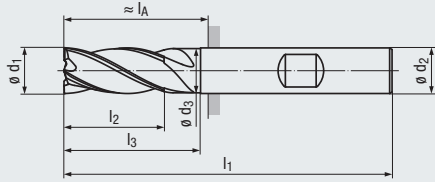
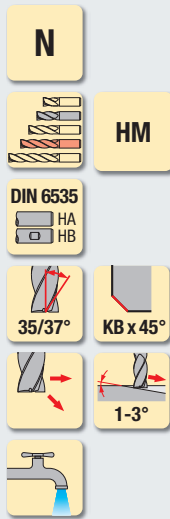
	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]					
											MMS MQL		
P	1.1	170	$0,005 \times d_1$	190	$0,006 \times d_1$	200	$0,007 \times d_1$	240	$0,007 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	150	$0,004 \times d_1$	170	$0,005 \times d_1$	180	$0,006 \times d_1$	210	$0,006 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	130	$0,004 \times d_1$	140	$0,004 \times d_1$	160	$0,005 \times d_1$	180	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	120	$0,003 \times d_1$	130	$0,004 \times d_1$	140	$0,004 \times d_1$	170	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
M	1.1	90	$0,004 \times d_1$	110	$0,005 \times d_1$	120	$0,005 \times d_1$	130	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	80	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,005 \times d_1$	110	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	70	$0,003 \times d_1$	80	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	60	$0,002 \times d_1$	70	$0,002 \times d_1$	80	$0,003 \times d_1$	90	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
K	1.1	150	$0,005 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	1.2	150	$0,005 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.1	140	$0,004 \times d_1$	150	$0,005 \times d_1$	170	$0,005 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	2.2	140	$0,004 \times d_1$	150	$0,005 \times d_1$	170	$0,005 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.1	120	$0,004 \times d_1$	130	$0,005 \times d_1$	140	$0,005 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	3.2	120	$0,004 \times d_1$	130	$0,005 \times d_1$	140	$0,005 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
	4.1	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>
4.2	80	$0,003 \times d_1$	90	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
N	1.1	220	$0,009 \times d_1$	250	$0,010 \times d_1$	280	$0,011 \times d_1$	300	$0,008 \times d_1$				<input checked="" type="checkbox"/>
	1.2	220	$0,008 \times d_1$	250	$0,009 \times d_1$	280	$0,010 \times d_1$	300	$0,008 \times d_1$				<input checked="" type="checkbox"/>
	1.3	220	$0,007 \times d_1$	250	$0,008 \times d_1$	280	$0,009 \times d_1$	300	$0,007 \times d_1$				<input checked="" type="checkbox"/>
	1.4												
	1.5												
	1.6												
	2.1	170	$0,007 \times d_1$	180	$0,007 \times d_1$	200	$0,008 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	170	$0,007 \times d_1$	180	$0,007 \times d_1$	200	$0,008 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	170	$0,007 \times d_1$	180	$0,007 \times d_1$	200	$0,008 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	160	$0,006 \times d_1$	170	$0,006 \times d_1$	180	$0,007 \times d_1$	200	$0,007 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	160	$0,006 \times d_1$	170	$0,006 \times d_1$	180	$0,007 \times d_1$	200	$0,007 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	160	$0,006 \times d_1$	170	$0,006 \times d_1$	180	$0,007 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	120	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1												
	3.2												
4.1													
4.2													
4.3													
4.4													
5.1													
5.2	70	$0,003 \times d_1$	80	$0,004 \times d_1$	80	$0,005 \times d_1$	100	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.3													
S	1.1	70	$0,005 \times d_1$	90	$0,005 \times d_1$	100	$0,006 \times d_1$	100	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	1.2	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	1.3	50	$0,002 \times d_1$	60	$0,002 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	2.2	20	$0,002 \times d_1$	25	$0,002 \times d_1$	30	$0,003 \times d_1$	35	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.3	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.4	20	$0,002 \times d_1$	25	$0,002 \times d_1$	30	$0,003 \times d_1$	35	$0,003 \times d_1$				<input checked="" type="checkbox"/>
2.5	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
2.6	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
H	1.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,003 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	70	$0,002 \times d_1$	80	$0,003 \times d_1$	90	$0,003 \times d_1$	110	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.3												
	1.4												
	1.5												

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

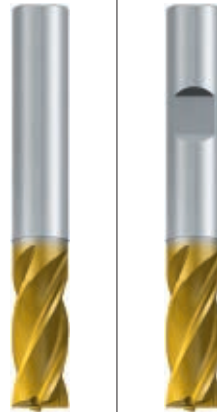
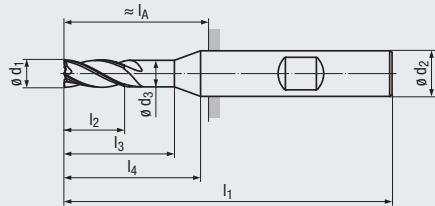
v_c = Schnittgeschwindigkeit · Cutting speed
 f_z = Vorschub pro Zahn · Feed per tooth

- Hochleistungswerkzeug
- Schlicht-Verzahnung für zähe Werkstoffe
- Keine Vibrationen durch spezielle Geometrie
- Ungleiche Teilung

- High performance tool
- Finishing end mill for tough materials
- Special geometry prevents vibration
- Variable spacing



Design I₄:



Inox

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- Speziell für rost- und säurebeständige Stähle geeignet
- Zum HPC-Schruppen und zum Schlichten geeignet

Applications – material (see page 3)

- Especially suitable for stainless steel materials
- Suitable for HPC roughing and finishing

TIN/TIALN

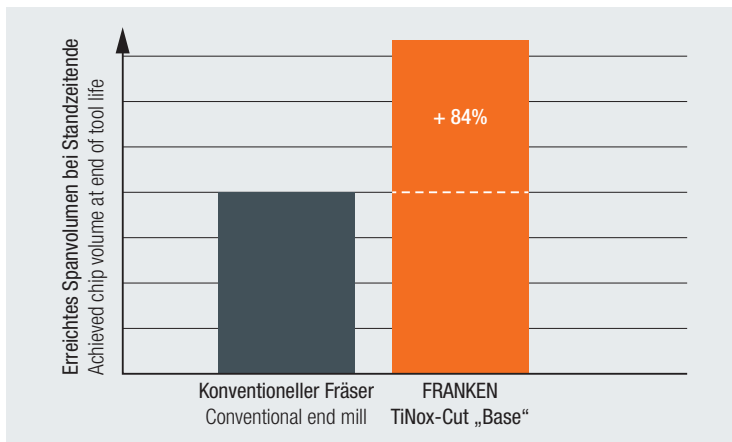
P	1.1-3.1	4.1-5.1
M	1.1-4.1	
K	1.1-2.2	3.1-4.2
N	1.1-1.3	
N	2.1-2.8	5.2
S	1.1	1.2-1.3
S	2.1	2.2-2.6
H	1.1	1.2

Lange Ausführung · Long design

Bestell-Code · Order code

$\varnothing d_1$ h10	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	l_A	KB	Z (Flutes)	Dimens.- Code	2568T	2569T
3	8	14	57	2,9	20	6	21	0,07	4	.003	●	●
4	11	18	57	3,8	20	6	21	0,07	4	.004	●	●
5	13	19	57	4,8	20	6	21	0,12	4	.005	●	●
6	13	20	57	5,8	—	6	21	0,12	4	.006	●	●
8	21	25	63	7,7	—	8	27	0,12	4	.008	●	●
10	22	30	72	9,5	—	10	32	0,2	4	.010	●	●
12	26	35	83	11,5	—	12	38	0,2	4	.012	●	●
14	26	35	83	13,5	—	16	38	0,2	4	.014	●	●
16	36	42	92	15,5	—	16	44	0,2	4	.016	●	●
20	41	52	104	19,5	—	20	54	0,3	4	.020	●	●

Bearbeitungsbeispiel – 1.4301, Trockenbearbeitung
Machining example – 1.4301, dry machining



Artikel-Nr.: Article no.:	2569T.020	
Werkzeugdurchmesser: Tool diameter:	[d ₁]	20 mm
Schnittgeschwindigkeit: Cutting speed:	[v _c]	80 m/min
Vorschub pro Zahn: Feed per tooth:	[f _z]	0,075 mm
Axiale Zustellung: Axial depth of cut:	[a _p]	24 mm
Radiale Zustellung: Radial depth of cut:	[a _e]	2-18 mm
Drehzahl: Speed:	[n]	1273 min ⁻¹
Vorschubgeschwindigkeit: Feed speed:	[v _f]	382 mm/min

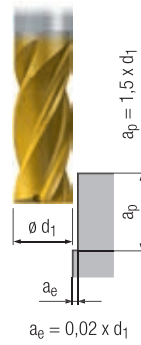
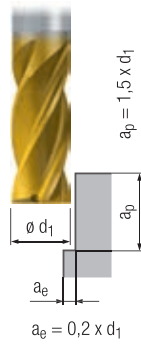
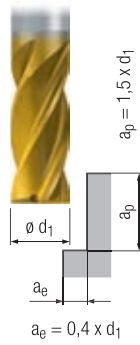
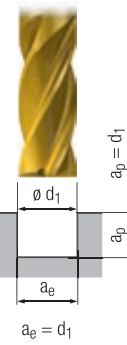


Hartmetall-Schafffräser „Base“ – lange Ausführung
Solid carbide end mills “Base” – long design

N

Gültig für · Valid for

2568T
2569T



Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]					
P	1.1	140	$0,005 \times d_1$	150	$0,006 \times d_1$	170	$0,007 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	110	$0,004 \times d_1$	120	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	100	$0,003 \times d_1$	110	$0,004 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	1.1	80	$0,004 \times d_1$	100	$0,005 \times d_1$	110	$0,005 \times d_1$	120	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,005 \times d_1$	100	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	50	$0,002 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
K	1.1	140	$0,005 \times d_1$	150	$0,006 \times d_1$	170	$0,006 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2	140	$0,005 \times d_1$	150	$0,006 \times d_1$	170	$0,006 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.1	110	$0,004 \times d_1$	120	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.2	110	$0,004 \times d_1$	120	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
N	1.1	220	$0,009 \times d_1$	250	$0,010 \times d_1$	280	$0,011 \times d_1$	300	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	220	$0,008 \times d_1$	250	$0,009 \times d_1$	280	$0,010 \times d_1$	300	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	220	$0,007 \times d_1$	250	$0,008 \times d_1$	280	$0,009 \times d_1$	300	$0,007 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.6									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	170	$0,007 \times d_1$	180	$0,007 \times d_1$	200	$0,008 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	170	$0,007 \times d_1$	180	$0,007 \times d_1$	200	$0,008 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	170	$0,007 \times d_1$	180	$0,007 \times d_1$	200	$0,008 \times d_1$	220	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	160	$0,006 \times d_1$	170	$0,006 \times d_1$	180	$0,007 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	160	$0,006 \times d_1$	170	$0,006 \times d_1$	180	$0,007 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	160	$0,006 \times d_1$	170	$0,006 \times d_1$	180	$0,007 \times d_1$	200	$0,007 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	120	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.2									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.1									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.2									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.3									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.4									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.1									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.2	70	$0,003 \times d_1$	80	$0,004 \times d_1$	80	$0,005 \times d_1$	100	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.3									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
S	1.1	70	$0,005 \times d_1$	90	$0,005 \times d_1$	100	$0,006 \times d_1$	100	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	50	$0,002 \times d_1$	60	$0,002 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	20	$0,002 \times d_1$	25	$0,002 \times d_1$	30	$0,003 \times d_1$	35	$0,003 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	20	$0,002 \times d_1$	25	$0,002 \times d_1$	30	$0,003 \times d_1$	35	$0,003 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.5	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2.6	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
H	1.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,003 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2	70	$0,002 \times d_1$	80	$0,003 \times d_1$	90	$0,003 \times d_1$	110	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.3									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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

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

- Hochleistungswerkzeug
- Schlicht-Verzahnung für zähe Werkstoffe
- Keine Vibrationen durch spezielle Geometrie
- Verschiedene Eckenradien pro Schneidendurchmesser
- Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)
- Lange Schneidenlänge
- High performance tool
- Finishing end mill for tough materials
- Special geometry prevents vibration
- Several corner radii per cutting diameter
- Internal coolant supply, axial exit (ICA)
- Long flute length

N

ICA

HM

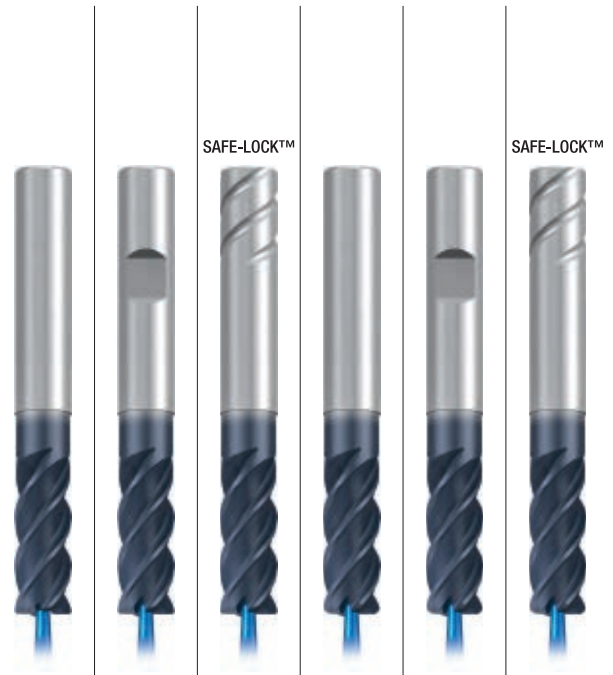
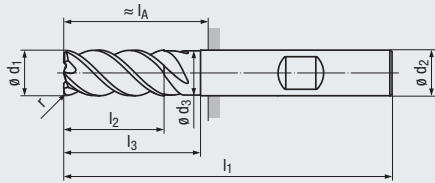
DIN 6535
HA
HB

38-40°

KB x 45°

ER

3-5°



Inox

Inox

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- Speziell für schwer zerspanbare Werkstoffe geeignet
- In allen zähen Werkstoffen einsetzbar
- Zum HPC-Schruppen und HSC-Schlichten geeignet

Applications – material (see page 3)

- Especially suitable for difficult to cut materials
- For all tough materials
- Suitable for HPC roughing and HSC finishing

TIALN

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.5-2.8, 5.2 1.4
S	1.1-2.6

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.5-2.8, 5.2 1.4
S	1.1-2.6

Extra lange Ausführung · Extra long design

Bestell-Code · Order code										2650AZ	2651AZ	2650AT				
$\varnothing d_1$ h10	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	KB	Z (Flutes)	Dimens.- Code							
6	13	25	62	5,8	6	26	0,12	4	.006	●	●	○				
8	19	30	68	7,7	8	32	0,12	4	.008	●	●	○				
10	22	35	80	9,5	10	40	0,2	4	.010	●	●	○				
12	26	45	93	11,5	12	48	0,2	4	.012	●	●	○				
16	32	55	108	15,5	16	60	0,2	4	.016	●	●	○				
20	38	70	126	19,5	20	76	0,3	4	.020	●	●	○				

Extra lange Ausführung · Extra long design

Eckenradius · Corner radius

Bestell-Code · Order code												2652AZ	2653AZ	2652AT	
$\varnothing d_1$ h10	r	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	Z (Flutes)	Dimens.- Code						
6	0,5	13	25	62	5,8	6	26	4	.006005			●	●	○	
6	1	13	25	62	5,8	6	26	4	.006010			●	●	○	
8	1	19	30	68	7,7	8	32	4	.008010			●	●	○	
8	2	19	30	68	7,7	8	32	4	.008020			●	●	○	
10	2	22	35	80	9,5	10	40	4	.010020			●	●	○	
10	2,5	22	35	80	9,5	10	40	4	.010025			●	●	○	
12	2	26	45	93	11,5	12	48	4	.012020			●	●	○	
12	2,5	26	45	93	11,5	12	48	4	.012025			●	●	○	
12	3	26	45	93	11,5	12	48	4	.012030			●	●	○	
12	4	26	45	93	11,5	12	48	4	.012040			●	●	○	
16	2	32	55	108	15,5	16	60	4	.016020			●	●	○	
16	2,5	32	55	108	15,5	16	60	4	.016025			●	●	○	
16	3	32	55	108	15,5	16	60	4	.016030			●	●	○	
16	4	32	55	108	15,5	16	60	4	.016040			●	●	○	
20	2	38	70	126	19,5	20	76	4	.020020			●	●	○	
20	2,5	38	70	126	19,5	20	76	4	.020025			●	●	○	
20	3	38	70	126	19,5	20	76	4	.020030			●	●	○	
20	4	38	70	126	19,5	20	76	4	.020040			●	●	○	

Andere Eckenradien auf Anfrage lieferbar
Other corner radii available on request

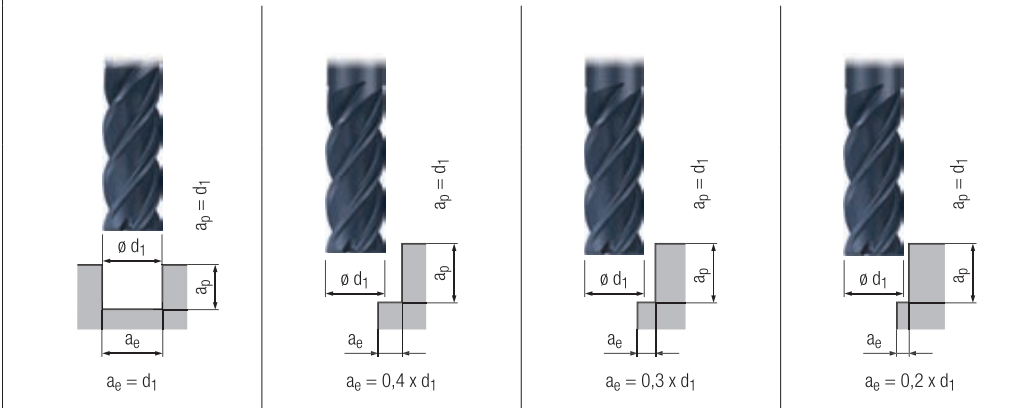
SAFE-LOCK™

Informationen zum SAFE-LOCK™-Spannsystem siehe Seite 415 im FRANKEN Katalog 250
Information regarding SAFE-LOCK™ clamping system, see page 415 in FRANKEN Catalogue 250



Hartmetall-Schaftfräser – extra lange Ausführung
Solid carbide end mills – extra long design

N



Gültig für · Valid for

- 2650AT
- 2650AZ
- 2651AZ
- 2652AT
- 2652AZ
- 2653AZ

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	MMS MQL				
P	1.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	100	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	80	$0,003 \times d_1$	100	$0,004 \times d_1$	110	$0,004 \times d_1$	130	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	50	$0,003 \times d_1$	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
M	1.1	90	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	2.1	80	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	3.1	40	$0,003 \times d_1$	50	$0,003 \times d_1$	60	$0,004 \times d_1$	60	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	4.1	30	$0,002 \times d_1$	40	$0,003 \times d_1$	40	$0,003 \times d_1$	50	$0,004 \times d_1$				<input checked="" type="checkbox"/>
K	1.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,006 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	100	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	160	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	100	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	160	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	80	$0,003 \times d_1$	100	$0,004 \times d_1$	110	$0,004 \times d_1$	130	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	80	$0,003 \times d_1$	100	$0,004 \times d_1$	110	$0,004 \times d_1$	130	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	60	$0,002 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4.2	50	$0,002 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
N	1.1												
	1.2												
	1.3												
	1.4	290	$0,006 \times d_1$	350	$0,008 \times d_1$	410	$0,009 \times d_1$	460	$0,010 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5	230	$0,006 \times d_1$	280	$0,007 \times d_1$	320	$0,008 \times d_1$	370	$0,009 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.6	140	$0,005 \times d_1$	170	$0,006 \times d_1$	200	$0,007 \times d_1$	220	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	90	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	90	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	90	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,005 \times d_1$		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	50	$0,002 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	50	$0,002 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1												
3.2													
4.1													
4.2													
4.3													
4.4													
5.1													
5.2	50	$0,002 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$				<input checked="" type="checkbox"/>	
5.3													
S	1.1	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	1.2	50	$0,002 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	1.3	30	$0,002 \times d_1$	40	$0,002 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	2.2	20	$0,002 \times d_1$	20	$0,003 \times d_1$	25	$0,003 \times d_1$	30	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	2.3	10	$0,002 \times d_1$	15	$0,002 \times d_1$	15	$0,003 \times d_1$	20	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.4	20	$0,002 \times d_1$	25	$0,003 \times d_1$	35	$0,003 \times d_1$	30	$0,004 \times d_1$				<input checked="" type="checkbox"/>
2.5	10	$0,002 \times d_1$	10	$0,002 \times d_1$	10	$0,003 \times d_1$	20	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
2.6	10	$0,002 \times d_1$	10	$0,003 \times d_1$	10	$0,003 \times d_1$	20	$0,004 \times d_1$				<input checked="" type="checkbox"/>	
H	1.1												
	1.2												
	1.3												
	1.4												
	1.5												

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

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

- Hochleistungswerkzeug zum Schruppen und Schlichten
- Keine Vibrationen durch spezielle Geometrie
- Verschiedene Eckenradien pro Schneidendurchmesser
- Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)

- High performance tool for roughing and finishing
- Special geometry prevents vibration
- Several corner radii per cutting diameter
- Internal coolant supply, axial exit (ICA)

N

ICA



HM

DIN 6535



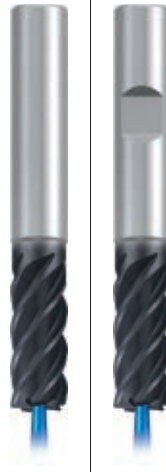
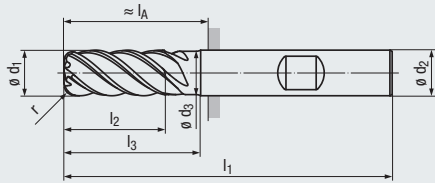
38°

KB x 45°

ER

1-2°

Optional



Inox



Inox

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- Speziell für schwer zerspanbare Werkstoffe geeignet
- In allen zähen Werkstoffen einsetzbar
- Zum HPC-Schruppen und Schlichten geeignet
- Zur effizienten Bearbeitung von Titan

Applications – material (see page 3)

- Especially suitable for difficult to cut materials
- For all tough materials
- Suitable for HPC roughing and finishing
- For efficient machining of titanium

ALCR

P	1.1-3.1	4.1-5.1
M	1.1-4.1	
N	2.1-2.8, 5.2	
S	1.1-1.3	2.1-2.6

ALCR

P	1.1-3.1	4.1-5.1
M	1.1-4.1	
N	2.1-2.8, 5.2	
S	1.1-1.3	2.1-2.6

DIN 6527 – Lange Ausführung · Long design

Bestell-Code · Order code

$\varnothing d_1$ h10	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	KB	Z (Flutes)	Dimens.- Code	2590LZ	2591LZ			
6	13	20	57	5,8	6	21	0,12	5	.006	●	●			
8	19	25	63	7,7	8	27	0,12	5	.008	●	●			
10	22	30	72	9,5	10	32	0,2	5	.010	●	●			
12	26	35	83	11,5	12	38	0,2	5	.012	●	●			
16	32	40	92	15,5	16	44	0,2	5	.016	●	●			
20	38	50	104	19,5	20	54	0,3	5	.020	●	●			

DIN 6527 – Lange Ausführung · Long design

Bestell-Code · Order code

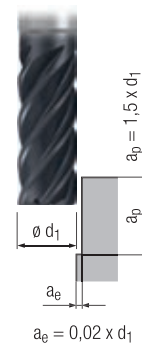
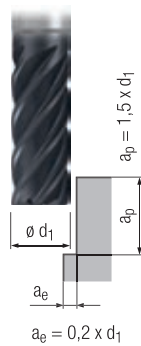
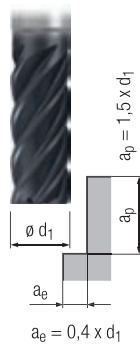
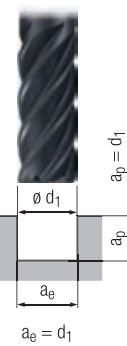
$\varnothing d_1$ h10	r ±0,01	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	Z (Flutes)	Dimens.- Code			2592LZ	2593LZ	
6	0,5	13	20	57	5,8	6	21	5	.006005			●	●	
6	1	13	20	57	5,8	6	21	5	.006010			●	●	
8	0,5	19	25	63	7,7	8	27	5	.008005			●	●	
8	1	19	25	63	7,7	8	27	5	.008010			●	●	
8	2	19	25	63	7,7	8	27	5	.008020			●	●	
10	0,5	22	30	72	9,5	10	32	5	.010005			●	●	
10	1	22	30	72	9,5	10	32	5	.010010			●	●	
10	2	22	30	72	9,5	10	32	5	.010020			●	●	
10	2,5	22	30	72	9,5	10	32	5	.010025			●	●	
12	1	26	35	83	11,5	12	38	5	.012010			●	●	
12	2	26	35	83	11,5	12	38	5	.012020			●	●	
12	2,5	26	35	83	11,5	12	38	5	.012025			●	●	
12	3	26	35	83	11,5	12	38	5	.012030			●	●	
12	4	26	35	83	11,5	12	38	5	.012040			●	●	
16	1	32	40	92	15,5	16	44	5	.016010			●	●	
16	2	32	40	92	15,5	16	44	5	.016020			●	●	
16	2,5	32	40	92	15,5	16	44	5	.016025			●	●	
16	3	32	40	92	15,5	16	44	5	.016030			●	●	
16	4	32	40	92	15,5	16	44	5	.016040			●	●	
20	1	38	50	104	19,5	20	54	5	.020010			●	●	
20	2	38	50	104	19,5	20	54	5	.020020			●	●	
20	2,5	38	50	104	19,5	20	54	5	.020025			●	●	
20	3	38	50	104	19,5	20	54	5	.020030			●	●	
20	4	38	50	104	19,5	20	54	5	.020040			●	●	

Eckenradius · Corner radius



Hartmetall-Schafffräser – lange Ausführung
Solid carbide end mills – long design

N



Gültig für · Valid for

- 2590LZ
- 2591LZ
- 2592LZ
- 2593LZ

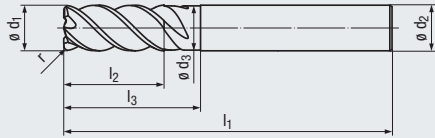
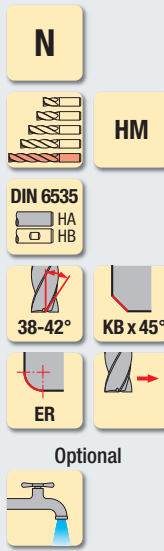
Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

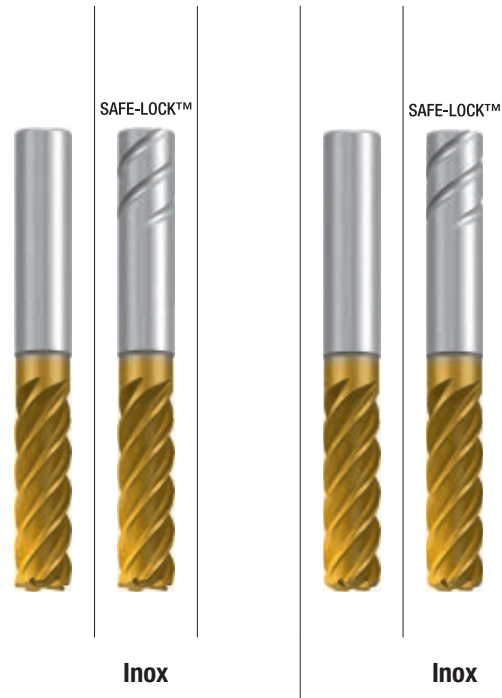
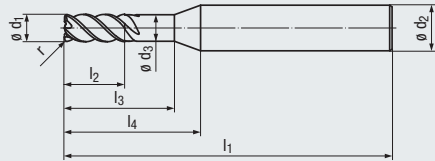
	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]					
P	1.1	140	$0,005 \times d_1$	150	$0,006 \times d_1$	160	$0,007 \times d_1$	170	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	150	$0,006 \times d_1$	160	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	120	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,005 \times d_1$	150	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	110	$0,003 \times d_1$	120	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	1.1	90	$0,004 \times d_1$	110	$0,005 \times d_1$	120	$0,005 \times d_1$	130	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	2.1	80	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$	120	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	3.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$	110	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	4.1	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$				<input checked="" type="checkbox"/>
K	1.1												
	1.2												
	2.1												
	2.2												
	3.1												
	3.2												
	4.1												
4.2													
N	1.1												
	1.2												
	1.3												
	1.4												
	1.5												
	1.6												
	2.1	200	$0,007 \times d_1$	220	$0,007 \times d_1$	240	$0,008 \times d_1$	260	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	200	$0,007 \times d_1$	220	$0,007 \times d_1$	240	$0,008 \times d_1$	260	$0,008 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	200	$0,007 \times d_1$	220	$0,007 \times d_1$	240	$0,008 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	180	$0,006 \times d_1$	200	$0,006 \times d_1$	220	$0,007 \times d_1$	240	$0,007 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	180	$0,006 \times d_1$	200	$0,006 \times d_1$	220	$0,007 \times d_1$	240	$0,007 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	180	$0,006 \times d_1$	200	$0,006 \times d_1$	220	$0,007 \times d_1$	240	$0,007 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	120	$0,004 \times d_1$	140	$0,004 \times d_1$	160	$0,005 \times d_1$	180	$0,005 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.8	100	$0,003 \times d_1$	120	$0,003 \times d_1$	140	$0,004 \times d_1$	160	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3.1													
3.2													
4.1													
4.2													
4.3													
4.4													
5.1													
5.2	70	$0,003 \times d_1$	80	$0,004 \times d_1$	80	$0,005 \times d_1$	100	$0,005 \times d_1$				<input checked="" type="checkbox"/>	
5.3													
S	1.1	70	$0,005 \times d_1$	90	$0,005 \times d_1$	100	$0,006 \times d_1$	100	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	1.2	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	1.3	50	$0,002 \times d_1$	60	$0,002 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	2.2	20	$0,002 \times d_1$	25	$0,002 \times d_1$	30	$0,003 \times d_1$	35	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.3	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.4	20	$0,002 \times d_1$	25	$0,002 \times d_1$	30	$0,003 \times d_1$	35	$0,003 \times d_1$				<input checked="" type="checkbox"/>
2.5	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
2.6	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
H	1.1												
	1.2												
	1.3												
	1.4												
	1.5												

- Hochleistungswerkzeug
- Schlicht-Verzahnung für zähe Werkstoffe
- Keine Vibrationen durch spezielle Geometrie
- Verschiedene Eckenradien pro Schneiddurchmesser
- Schneidlänge 3 x d₁

- High performance tool
- Finishing end mill for tough materials
- Special geometry prevents vibration
- Several corner radii per cutting diameter
- Flute length 3 x d₁



Design I₄:



Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- Speziell für schwer zerspanbare Werkstoffe geeignet
- In allen zähen Werkstoffen einsetzbar
- Zum HSC-Schlichten geeignet

Applications – material (see page 3)

- Especially suitable for difficult to cut materials
- For all tough materials
- Suitable for HSC finishing

TIN / TIALN

- P 1.1-5.1
- M 1.1-4.1
- K 1.1-4.2
- N 2.1-2.8, 5.2 1.2-1.6
- S 1.1-2.6

TIN / TIALN

- P 1.1-5.1
- M 1.1-4.1
- K 1.1-4.2
- N 2.1-2.8, 5.2 1.2-1.6
- S 1.1-2.6

3 x d₁ – Extra lange Ausführung · Extra long design

Bestell-Code · Order code											2644T	2644TS			
∅ d ₁ h10	l ₂	l ₃	l ₁	∅ d ₃	l ₄	∅ d ₂ h6	KB	Z (Flutes)	Dimens.- Code						
3	9	12	62	2,9	23	6	0,07	4	.003	●	○				
4	12	16	62	3,8	25	6	0,07	4	.004	●	○				
5	15	20	62	4,8	25	6	0,12	4	.005	●	○				
6	18	25	62	5,8	–	6	0,12	4	.006	●	○				
8	24	30	68	7,7	–	8	0,12	5	.008	●	○				
10	30	35	80	9,5	–	10	0,2	5	.010	●	○				
12	36	45	93	11,5	–	12	0,2	5	.012	●	○				
16	48	60	112	15,5	–	16	0,2	5	.016	●	○				
20	60	75	130	19,5	–	20	0,3	5	.020	●	○				

3 x d₁ – Extra lange Ausführung · Extra long design

Eckenradius · Corner radius

Bestell-Code · Order code										2654T	2654TS				
∅ d ₁ h10	r	l ₂	l ₃	l ₁	∅ d ₃	l ₄	∅ d ₂ h6	Z (Flutes)	Dimens.- Code						
12	2,5	36	45	93	11,5	–	12	5	.012025	●	○				
12	3	36	45	93	11,5	–	12	5	.012030	●	○				
12	4	36	45	93	11,5	–	12	5	.012040	●	○				
16	2,5	48	60	112	15,5	–	16	5	.016025	●	○				
16	3	48	60	112	15,5	–	16	5	.016030	●	○				
16	4	48	60	112	15,5	–	16	5	.016040	●	○				
20	2,5	60	75	130	19,5	–	20	5	.020025	●	○				
20	3	60	75	130	19,5	–	20	5	.020030	●	○				
20	4	60	75	130	19,5	–	20	5	.020040	●	○				

Andere Eckenradien auf Anfrage lieferbar
Other corner radii available on request

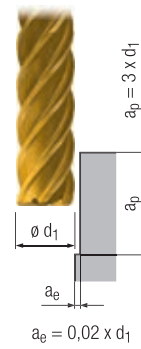
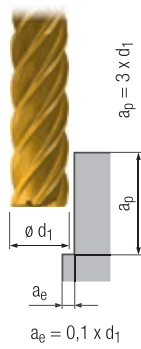
SAFE-LOCK™

Informationen zum SAFE-LOCK™-Spannsystem siehe Seite 415 im FRANKEN Katalog 250
Information regarding SAFE-LOCK™ clamping system, see page 415 in FRANKEN Catalogue 250



Hartmetall-Schaftfräser – extra lange Ausführung
Solid carbide end mills – extra long design

N
3 x d₁



Gültig für · Valid for

- 2644T
- 2644TS
- 2654T
- 2654TS

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

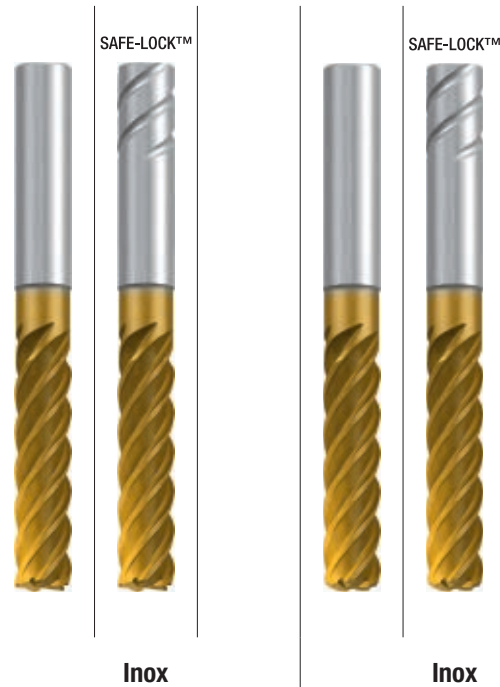
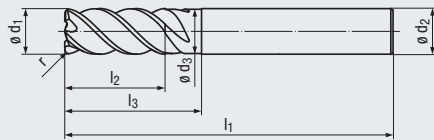
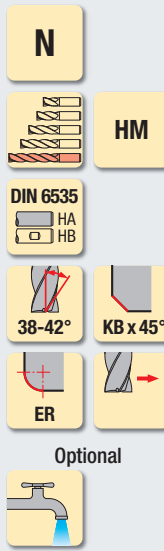
	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]			MMS MQL		
P	1.1	120	0,005 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	110	0,004 x d ₁	130	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	90	0,004 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	70	0,003 x d ₁	80	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	60	0,003 x d ₁	70	0,003 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
M	1.1	120	0,003 x d ₁	140	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.1	100	0,003 x d ₁	120	0,004 x d ₁				<input checked="" type="checkbox"/>
	3.1	70	0,003 x d ₁	80	0,003 x d ₁				<input checked="" type="checkbox"/>
	4.1	50	0,003 x d ₁	60	0,003 x d ₁				<input checked="" type="checkbox"/>
K	1.1	120	0,005 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	120	0,005 x d ₁	140	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	110	0,004 x d ₁	130	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	110	0,004 x d ₁	130	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	90	0,004 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	90	0,004 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	70	0,003 x d ₁	80	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.2	60	0,003 x d ₁	70	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
N	1.1	360	0,009 x d ₁	430	0,011 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	360	0,008 x d ₁	430	0,010 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	360	0,007 x d ₁	430	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	240	0,008 x d ₁	290	0,010 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5	230	0,007 x d ₁	280	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.6	160	0,006 x d ₁	190	0,007 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	110	0,005 x d ₁	130	0,006 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	110	0,005 x d ₁	130	0,006 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	110	0,005 x d ₁	130	0,006 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	100	0,004 x d ₁	120	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	100	0,004 x d ₁	120	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	100	0,004 x d ₁	120	0,005 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	60	0,003 x d ₁	70	0,004 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	60	0,003 x d ₁	70	0,004 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	60	0,003 x d ₁	70	0,004 x d ₁				<input checked="" type="checkbox"/>	
5.3									
S	1.1	90	0,004 x d ₁	100	0,005 x d ₁				<input checked="" type="checkbox"/>
	1.2	70	0,003 x d ₁	80	0,004 x d ₁				<input checked="" type="checkbox"/>
	1.3	70	0,003 x d ₁	80	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.1	70	0,004 x d ₁	80	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.2	30	0,003 x d ₁	40	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.3	20	0,002 x d ₁	25	0,002 x d ₁				<input checked="" type="checkbox"/>
	2.4	30	0,003 x d ₁	45	0,003 x d ₁				<input checked="" type="checkbox"/>
2.5	20	0,002 x d ₁	20	0,002 x d ₁				<input checked="" type="checkbox"/>	
2.6	20	0,003 x d ₁	20	0,003 x d ₁				<input checked="" type="checkbox"/>	
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

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

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

- Hochleistungswerkzeug
- Schlicht-Verzahnung für zähe Werkstoffe
- Keine Vibrationen durch spezielle Geometrie
- Verschiedene Eckenradien pro Schneidendurchmesser
- Extra lange Ausführungen
- Schneidenlänge 4 x d₁

- High performance tool
- Finishing end mill for tough materials
- Special geometry prevents vibration
- Several corner radii per cutting diameter
- Extra long design
- Flute length 4 x d₁



Beschichtung · Coating

- Einsatzgebiete – Material (siehe Seite 3)**
- Speziell für schwer zerspanbare Werkstoffe geeignet
 - In allen zähen Werkstoffen einsetzbar
 - Zum HSC-Schlichten geeignet

- Applications – material (see page 3)**
- Especially suitable for difficult to cut materials
 - For all tough materials
 - Suitable for HSC finishing

TIN / TIALN

- P 1.1-5.1
- M 1.1-4.1
- K 1.1-4.2
- N 2.1-2.8, 5.2 1.1-1.6
- S 1.1-2.6

TIN / TIALN

- P 1.1-5.1
- M 1.1-4.1
- K 1.1-4.2
- N 2.1-2.8, 5.2 1.1-1.6
- S 1.1-2.6

4 x d₁ – Extra lange Ausführung · Extra long design

Bestell-Code · Order code									2645T	2645TS			
ø d ₁ h10	l ₂	l ₃	l ₁	ø d ₃	ø d ₂ h6	KB	Z (Flutes)	Dimens.- Code					
6	24	30	68	5,8	6	0,12	4	.006	●	○			
8	32	40	80	7,7	8	0,12	5	.008	●	○			
10	40	50	95	9,5	10	0,2	5	.010	●	○			
12	48	60	107	11,5	12	0,2	5	.012	●	○			
16	64	75	128	15,5	16	0,2	5	.016	●	○			
20	80	90	150	19,5	20	0,3	5	.020	●	○			

4 x d₁ – Extra lange Ausführung · Extra long design

Bestell-Code · Order code									Eckenradius · Corner radius				
ø d ₁ h10	r	l ₂	l ₃	l ₁	ø d ₃	ø d ₂ h6	Z (Flutes)	Dimens.- Code		2655T	2655TS		
12	2,5	48	60	107	11,5	12	5	.012025		●	○		
12	3	48	60	107	11,5	12	5	.012030		●	○		
12	4	48	60	107	11,5	12	5	.012040		●	○		
16	2,5	64	75	128	15,5	16	5	.016025		●	○		
16	3	64	75	128	15,5	16	5	.016030		●	○		
16	4	64	75	128	15,5	16	5	.016040		●	○		
20	2,5	80	90	150	19,5	20	5	.020025		●	○		
20	3	80	90	150	19,5	20	5	.020030		●	○		
20	4	80	90	150	19,5	20	5	.020040		●	○		

Andere Eckenradien auf Anfrage lieferbar
Other corner radii available on request

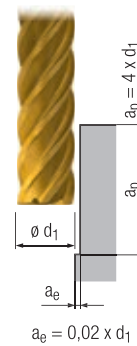
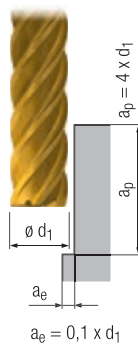
SAFE-LOCK™

Informationen zum SAFE-LOCK™-Spannsystem siehe Seite 415 im FRANKEN Katalog 250
Information regarding SAFE-LOCK™ clamping system, see page 415 in FRANKEN Catalogue 250



Hartmetall-Schaftfräser – extra lange Ausführung
Solid carbide end mills – extra long design

N
4 x d₁



Gültig für · Valid for

- 2645T
- 2645TS
- 2655T
- 2655TS

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

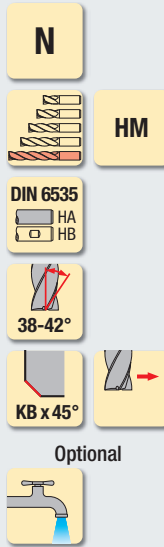
	V _c [m/min]	f _z [mm]	V _c [m/min]	f _z [mm]			MMS MQL		
P	1.1	100	0,005 x d ₁	120	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	90	0,004 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	70	0,004 x d ₁	90	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	60	0,003 x d ₁	70	0,003 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	50	0,003 x d ₁	60	0,003 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
M	1.1	100	0,003 x d ₁	120	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.1	80	0,003 x d ₁	100	0,003 x d ₁				<input checked="" type="checkbox"/>
	3.1	60	0,003 x d ₁	70	0,003 x d ₁				<input checked="" type="checkbox"/>
	4.1	40	0,003 x d ₁	50	0,003 x d ₁				<input checked="" type="checkbox"/>
K	1.1	100	0,005 x d ₁	120	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	100	0,005 x d ₁	120	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	90	0,004 x d ₁	110	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	90	0,004 x d ₁	110	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	70	0,004 x d ₁	90	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	70	0,004 x d ₁	90	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	60	0,003 x d ₁	70	0,003 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.2	50	0,003 x d ₁	60	0,003 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
N	1.1	300	0,009 x d ₁	430	0,009 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	300	0,008 x d ₁	430	0,009 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	300	0,007 x d ₁	430	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	200	0,008 x d ₁	290	0,009 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5	180	0,007 x d ₁	280	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.6	130	0,006 x d ₁	190	0,007 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	90	0,005 x d ₁	110	0,006 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	90	0,005 x d ₁	110	0,006 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	90	0,005 x d ₁	110	0,006 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	80	0,004 x d ₁	100	0,004 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	80	0,004 x d ₁	100	0,004 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	80	0,004 x d ₁	100	0,004 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	50	0,003 x d ₁	60	0,003 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	50	0,003 x d ₁	60	0,003 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1								
	3.2								
4.1									
4.2									
4.3									
4.4									
5.1									
5.2	50	0,003 x d ₁	60	0,003 x d ₁				<input checked="" type="checkbox"/>	
5.3									
S	1.1	70	0,004 x d ₁	80	0,004 x d ₁				<input checked="" type="checkbox"/>
	1.2	60	0,003 x d ₁	70	0,003 x d ₁				<input checked="" type="checkbox"/>
	1.3	60	0,003 x d ₁	70	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.1	60	0,004 x d ₁	70	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.2	15	0,003 x d ₁	30	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.3	25	0,002 x d ₁	20	0,002 x d ₁				<input checked="" type="checkbox"/>
	2.4	25	0,003 x d ₁	30	0,003 x d ₁				<input checked="" type="checkbox"/>
2.5	20	0,002 x d ₁	20	0,002 x d ₁				<input checked="" type="checkbox"/>	
2.6	20	0,003 x d ₁	20	0,003 x d ₁				<input checked="" type="checkbox"/>	
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

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

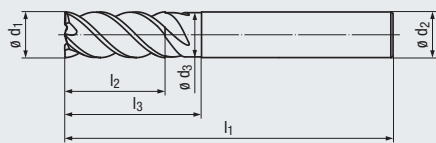
v_c = Schnittgeschwindigkeit · Cutting speed
f_z = Vorschub pro Zahn · Feed per tooth

- Hochleistungswerkzeug
- Schlicht-Verzahnung für zähe Werkstoffe
- Keine Vibrationen durch spezielle Geometrie
- Extra lange Ausführungen
- Schneidenlänge 5 x d₁

- High performance tool
- Finishing end mill for tough materials
- Special geometry prevents vibration
- Extra long design
- Flute length 5 x d₁



Inox



Beschichtung · Coating

TIN / TIALN

Einsatzgebiete – Material (siehe Seite 3)

Applications – material (see page 3)

- Speziell für schwer zerspanbare Werkstoffe geeignet
- In allen zähen Werkstoffen einsetzbar
- Zum HSC-Schlichten geeignet

- Especially suitable for difficult to cut materials
- For all tough materials
- Suitable for HSC finishing

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	2.1-2.8, 5.2 1.1-1.6
S	1.1-2.6

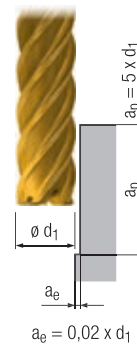
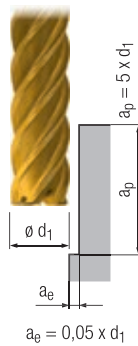
5 x d₁ – Extra lange Ausführung · Extra long design

Bestell-Code · Order code									2596T
∅ d ₁ h10	l ₂	l ₃	l ₁	∅ d ₃	∅ d ₂ h6	KB	Z (Flutes)	Dimens.- Code	
10	50	60	105	9,5	10	0,2	5	.010	●
12	60	70	118	11,5	12	0,2	5	.012	●
16	80	90	142	15,5	16	0,2	5	.016	●
20	100	110	163	19,5	20	0,2	5	.020	●



Hartmetall-Schaftfräser – extra lange Ausführung
Solid carbide end mills – extra long design

N
5 x d₁



Gültig für · Valid for
2596T

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]			MMS MQL		
P	1.1	100	0,005 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	90	0,004 x d ₁	100	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	70	0,004 x d ₁	80	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	60	0,003 x d ₁	70	0,003 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	50	0,003 x d ₁	60	0,003 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
M	1.1	100	0,003 x d ₁	110	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.1	80	0,003 x d ₁	90	0,003 x d ₁				<input checked="" type="checkbox"/>
	3.1	60	0,003 x d ₁	70	0,003 x d ₁				<input checked="" type="checkbox"/>
	4.1	40	0,003 x d ₁	50	0,003 x d ₁				<input checked="" type="checkbox"/>
K	1.1	100	0,005 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	100	0,005 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	90	0,004 x d ₁	100	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	90	0,004 x d ₁	100	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	70	0,004 x d ₁	80	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	70	0,004 x d ₁	80	0,004 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	60	0,003 x d ₁	70	0,003 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.2	50	0,003 x d ₁	60	0,003 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
N	1.1	270	0,009 x d ₁	380	0,009 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	270	0,008 x d ₁	380	0,009 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	270	0,007 x d ₁	380	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	170	0,008 x d ₁	240	0,009 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5	150	0,007 x d ₁	230	0,008 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.6	100	0,006 x d ₁	140	0,007 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	70	0,005 x d ₁	90	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	70	0,005 x d ₁	90	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	70	0,005 x d ₁	90	0,005 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	60	0,004 x d ₁	80	0,004 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	60	0,004 x d ₁	80	0,004 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	60	0,004 x d ₁	80	0,004 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	50	0,003 x d ₁	60	0,003 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	50	0,003 x d ₁	60	0,003 x d ₁	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1								
	3.2								
4.1									
4.2									
4.3									
4.4									
5.1									
5.2	40	0,003 x d ₁	50	0,003 x d ₁				<input checked="" type="checkbox"/>	
5.3									
S	1.1	50	0,003 x d ₁	60	0,004 x d ₁				<input checked="" type="checkbox"/>
	1.2	40	0,003 x d ₁	50	0,003 x d ₁				<input checked="" type="checkbox"/>
	1.3	40	0,003 x d ₁	50	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.1	50	0,003 x d ₁	60	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.2	10	0,003 x d ₁	15	0,003 x d ₁				<input checked="" type="checkbox"/>
	2.3	20	0,002 x d ₁	25	0,002 x d ₁				<input checked="" type="checkbox"/>
	2.4	20	0,003 x d ₁	25	0,003 x d ₁				<input checked="" type="checkbox"/>
2.5	15	0,002 x d ₁	20	0,002 x d ₁				<input checked="" type="checkbox"/>	
2.6	15	0,003 x d ₁	20	0,003 x d ₁				<input checked="" type="checkbox"/>	
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

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

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

- Hochleistungswerkzeug zur trochoidalen Bearbeitung
- Neuentwickelte Geometrie mit Spanteilern
- Vibrationsarme Bearbeitung
- Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)
- 4 Baulängen verfügbar
- Bearbeitungstiefen bis 5 x d₁ möglich

- High-performance tool for trochoidal machining
- Newly developed geometry with chip breaker
- Low-vibration machining
- Internal coolant supply, axial exit (ICA)
- 4 lengths available
- Axial depths of cut up to 5 x d₁

NF mittel medium


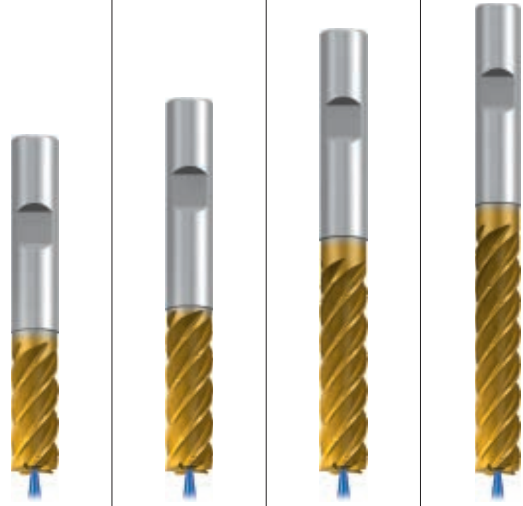
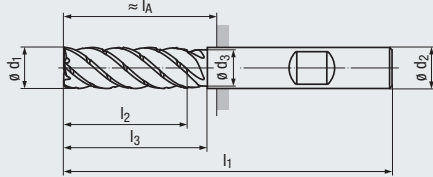
HM

DIN 6535 HA HB

ICA

38-42° **KB x 45°**

Optional

Inox

Beschichtung · Coating

TIN / TIALN

Einsatzgebiete – Material (siehe Seite 6)

Applications – material (see page 6)

- Zum Prozesssicheren trochoidalen Schruppen
- Speziell für schwer zerspanbare Werkstoffe geeignet
- In allen zähen Werkstoffen einsetzbar
- Zur Schlichtbearbeitung geeignet

- For process-reliable trochoidal roughing operations
- Especially suitable for difficult to cut materials
- For all tough materials
- Suitable for finishing

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

2 x d₁ – Lange Ausführung · Long design

Bestell-Code · Order code										2537TZ		
∅ d ₁ h10	l ₂	l ₃	l ₁	∅ d ₃	∅ d ₂ h6	l _A	KB	Z (Flutes)	Dimens.- Code			
6	13	20	57	5,8	6	21	0,12	4	.006	●		
8	19	25	63	7,7	8	27	0,12	5	.008	●		
10	22	30	72	9,5	10	32	0,2	5	.010	●		
12	26	35	83	11,5	12	38	0,2	5	.012	●		
16	32	40	92	15,5	16	44	0,2	5	.016	●		
20	40	50	104	19,5	20	54	0,3	5	.020	●		

3 x d₁ – Extra lange Ausführung · Extra long design

Bestell-Code · Order code										2539TZ		
∅ d ₁ h10	l ₂	l ₃	l ₁	∅ d ₃	∅ d ₂ h6	l _A	KB	Z (Flutes)	Dimens.- Code			
6	18	25	62	5,8	6	26	0,12	4	.006	●		
8	24	30	68	7,7	8	32	0,12	5	.008	●		
10	30	35	80	9,5	10	40	0,2	5	.010	●		
10	30	35	80	9,5	10	40	0,2	6	.010006	●		
12	36	45	93	11,5	12	48	0,2	5	.012	●		
12	36	45	93	11,5	12	48	0,2	6	.012006	●		
16	48	55	108	15,5	16	64	0,2	5	.016	●		
16	48	55	108	15,5	16	64	0,2	7	.016007	●		
20	60	70	126	19,5	20	80	0,3	5	.020	●		
20	60	70	126	19,5	20	80	0,3	7	.020007	●		

4 x d₁ – Extra lange Ausführung · Extra long design

Bestell-Code · Order code										2541TZ		
∅ d ₁ h10	l ₂	l ₃	l ₁	∅ d ₃	∅ d ₂ h6	l _A	KB	Z (Flutes)	Dimens.- Code			
6	24	30	68	5,8	6	32	0,12	4	.006	●		
8	32	40	80	7,7	8	44	0,12	5	.008	●		
10	40	50	95	9,5	10	55	0,2	5	.010	●		
10	40	50	95	9,5	10	55	0,2	6	.010006	●		
12	48	60	107	11,5	12	62	0,2	5	.012	●		
12	48	60	107	11,5	12	62	0,2	6	.012006	●		
16	64	75	128	15,5	16	80	0,2	5	.016	●		
16	64	75	128	15,5	16	80	0,2	7	.016007	●		
20	80	90	150	19,5	20	100	0,3	5	.020	●		
20	80	90	150	19,5	20	100	0,3	7	.020007	●		

5 x d₁ – Extra lange Ausführung · Extra long design

Bestell-Code · Order code										2543TZ		
∅ d ₁ h10	l ₂	l ₃	l ₁	∅ d ₃	∅ d ₂ h6	l _A	KB	Z (Flutes)	Dimens.- Code			
10	50	60	105	9,5	10	65	0,2	5	.010	●		
12	60	70	118	11,5	12	73	0,2	5	.012	●		
16	80	90	142	15,5	16	94	0,2	5	.016	●		
20	100	110	163	19,5	20	113	0,3	5	.020	●		

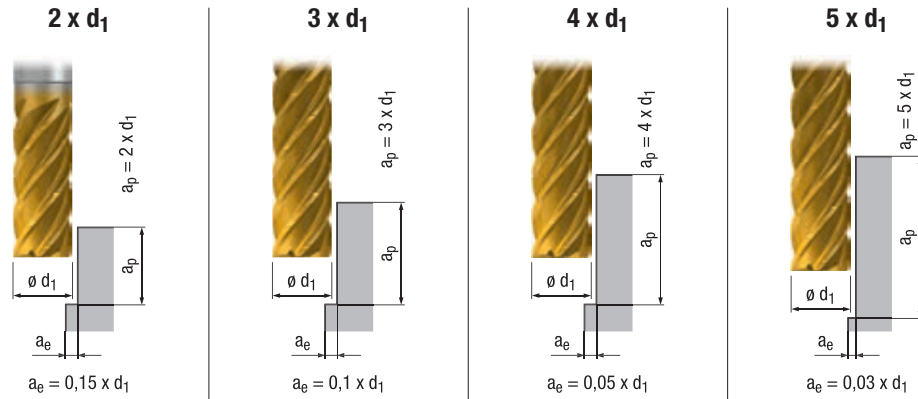


Hartmetall-Schafffräser „Trochoid“ – lange und extra lange Ausführung
Solid carbide end mills “Trochoid” – long and extra long design

NF

Gültig für · Valid for

- 2537TZ
- 2539TZ
- 2541TZ
- 2543TZ



Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

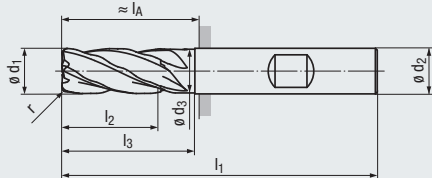
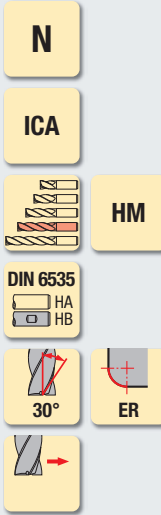
All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]					
P	1.1	340	0,012 x d ₁	320	0,012 x d ₁	300	0,011 x d ₁	260	0,010 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	320	0,011 x d ₁	300	0,011 x d ₁	270	0,010 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	300	0,010 x d ₁	280	0,010 x d ₁	250	0,009 x d ₁	210	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	270	0,009 x d ₁	250	0,009 x d ₁	230	0,008 x d ₁	200	0,007 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	5.1	250	0,008 x d ₁	230	0,008 x d ₁	200	0,007 x d ₁	180	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
M	1.1	150	0,008 x d ₁	140	0,008 x d ₁	130	0,008 x d ₁	120	0,007 x d ₁				<input checked="" type="checkbox"/>
	2.1	130	0,008 x d ₁	120	0,008 x d ₁	110	0,008 x d ₁	100	0,007 x d ₁				<input checked="" type="checkbox"/>
	3.1	110	0,007 x d ₁	100	0,007 x d ₁	90	0,007 x d ₁	80	0,006 x d ₁				<input checked="" type="checkbox"/>
	4.1	100	0,007 x d ₁	90	0,007 x d ₁	80	0,007 x d ₁	70	0,006 x d ₁				<input checked="" type="checkbox"/>
K	1.1	210	0,009 x d ₁	200	0,009 x d ₁	190	0,009 x d ₁	180	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2	210	0,009 x d ₁	200	0,009 x d ₁	190	0,009 x d ₁	180	0,008 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.1	200	0,007 x d ₁	180	0,007 x d ₁	170	0,007 x d ₁	160	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2	200	0,007 x d ₁	180	0,007 x d ₁	170	0,007 x d ₁	160	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.1	160	0,007 x d ₁	150	0,007 x d ₁	140	0,007 x d ₁	130	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.2	160	0,007 x d ₁	150	0,007 x d ₁	140	0,007 x d ₁	130	0,006 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.1	140	0,005 x d ₁	130	0,005 x d ₁	120	0,005 x d ₁	110	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2	100	0,005 x d ₁	90	0,005 x d ₁	80	0,005 x d ₁	70	0,005 x d ₁	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
N	1.1	350	0,014 x d ₁	320	0,014 x d ₁	300	0,014 x d ₁	280	0,012 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	350	0,013 x d ₁	320	0,013 x d ₁	300	0,013 x d ₁	280	0,011 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	350	0,012 x d ₁	320	0,012 x d ₁	300	0,012 x d ₁	280	0,010 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4												
	1.5												
	1.6												
	2.1	200	0,009 x d ₁	190	0,009 x d ₁	180	0,009 x d ₁	180	0,009 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	200	0,009 x d ₁	190	0,009 x d ₁	180	0,009 x d ₁	180	0,009 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	200	0,009 x d ₁	190	0,009 x d ₁	180	0,009 x d ₁	180	0,009 x d ₁	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	180	0,007 x d ₁	160	0,007 x d ₁	150	0,007 x d ₁	150	0,007 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	180	0,007 x d ₁	160	0,007 x d ₁	150	0,007 x d ₁	150	0,007 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	180	0,007 x d ₁	160	0,007 x d ₁	150	0,007 x d ₁	150	0,007 x d ₁	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	100	0,005 x d ₁	90	0,005 x d ₁	80	0,005 x d ₁	80	0,005 x d ₁			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	100	0,005 x d ₁	90	0,005 x d ₁	80	0,005 x d ₁	80	0,005 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	120	0,005 x d ₁	110	0,005 x d ₁	100	0,005 x d ₁	90	0,005 x d ₁				<input checked="" type="checkbox"/>	
5.3													
S	1.1	140	0,007 x d ₁	130	0,007 x d ₁	120	0,007 x d ₁	110	0,006 x d ₁				<input checked="" type="checkbox"/>
	1.2	130	0,007 x d ₁	120	0,007 x d ₁	110	0,007 x d ₁	100	0,006 x d ₁				<input checked="" type="checkbox"/>
	1.3	120	0,006 x d ₁	110	0,006 x d ₁	100	0,006 x d ₁	90	0,005 x d ₁				<input checked="" type="checkbox"/>
	2.1	100	0,004 x d ₁	90	0,004 x d ₁	80	0,004 x d ₁	60	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.2	30	0,004 x d ₁	30	0,004 x d ₁	25	0,004 x d ₁	20	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.3	40	0,004 x d ₁	40	0,004 x d ₁	35	0,004 x d ₁	30	0,004 x d ₁				<input checked="" type="checkbox"/>
	2.4	40	0,004 x d ₁	40	0,004 x d ₁	35	0,004 x d ₁	30	0,004 x d ₁				<input checked="" type="checkbox"/>
2.5	30	0,004 x d ₁	35	0,004 x d ₁	30	0,004 x d ₁	25	0,004 x d ₁				<input checked="" type="checkbox"/>	
2.6	30	0,004 x d ₁	30	0,004 x d ₁	25	0,004 x d ₁	20	0,004 x d ₁				<input checked="" type="checkbox"/>	
H	1.1												
	1.2												
	1.3												
	1.4												
	1.5												



- Schruppfräser mit Wellenprofil in der Spanfläche
- Erzeugt glatte Oberflächen
- Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)
- Vibrationsmindernde Geometrie

- Roughing end mill with wave profile on the rake face
- Generates smooth surfaces
- Internal coolant supply, axial exit (ICA)
- Low-vibration geometry



Inox

Beschichtung · Coating

ALCR

Einsatzgebiete – Material (siehe Seite 3)

Applications – material (see page 3)

- Volumenerspannung
- Speziell für schwer zerspanbare Werkstoffe geeignet
- Zum HPC-Schruppen geeignet
- Zur effizienten Bearbeitung von Titan und Inconel

- High-volume machining
- Especially suitable for difficult to cut materials
- Suitable for HPC roughing
- For efficient machining of titanium and Inconel

P	1.1-3.1	4.1-5.1
M	1.1-4.1	
N	2.1-2.8, 5.2	
S	1.1-2.6	

DIN 6527 – Lange Ausführung · Long design

Eckenradius · Corner radius

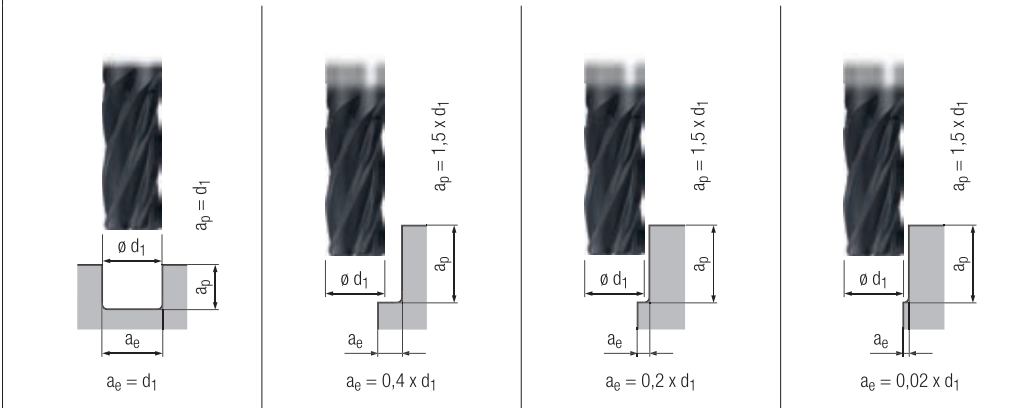
Bestell-Code · Order code										2561LZ		
$\varnothing d_1$ h10	r	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	Z (Flutes)	Dimens.- Code			
12	1	26	35	83	11,5	12	38	5	.012010	●		
12	2	26	35	83	11,5	12	38	5	.012020	●		
12	2,5	26	35	83	11,5	12	38	5	.012025	●		
12	3	26	35	83	11,5	12	38	5	.012030	●		
12	4	26	35	83	11,5	12	38	5	.012040	●		
16	1	32	40	92	15,5	16	44	5	.016010	●		
16	2	32	40	92	15,5	16	44	5	.016020	●		
16	2,5	32	40	92	15,5	16	44	5	.016025	●		
16	3	32	40	92	15,5	16	44	5	.016030	●		
16	4	32	40	92	15,5	16	44	5	.016040	●		
20	2	38	50	104	19,5	20	54	5	.020020	●		
20	2,5	38	50	104	19,5	20	54	5	.020025	●		
20	3	38	50	104	19,5	20	54	5	.020030	●		
20	4	38	50	104	19,5	20	54	5	.020040	●		



Hartmetall-Schaftfräser „N-Wave“ – lange Ausführung
Solid Carbide End Mills “N-Wave” – long design

N

Gültig für · Valid for
2561LZ



Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]	V_c [m/min]	f_z [mm]					
P	1.1	140	$0,005 \times d_1$	150	$0,006 \times d_1$	160	$0,007 \times d_1$	170	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	130	$0,004 \times d_1$	140	$0,005 \times d_1$	150	$0,006 \times d_1$	160	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	120	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,005 \times d_1$	150	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	110	$0,003 \times d_1$	120	$0,004 \times d_1$	130	$0,004 \times d_1$	140	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1	100	$0,003 \times d_1$	110	$0,003 \times d_1$	120	$0,004 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	1.1	90	$0,004 \times d_1$	110	$0,005 \times d_1$	120	$0,005 \times d_1$	130	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	80	$0,004 \times d_1$	100	$0,004 \times d_1$	110	$0,005 \times d_1$	120	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$	110	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	100	$0,005 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
K	1.1												
	1.2												
	2.1												
	2.2												
	3.1												
	3.2												
	4.1												
4.2													
N	1.1												
	1.2												
	1.3												
	1.4												
	1.5												
	1.6												
	2.1	200	$0,007 \times d_1$	220	$0,007 \times d_1$	240	$0,008 \times d_1$	260	$0,008 \times d_1$		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	200	$0,007 \times d_1$	220	$0,007 \times d_1$	240	$0,008 \times d_1$	260	$0,008 \times d_1$		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	200	$0,007 \times d_1$	220	$0,007 \times d_1$	240	$0,008 \times d_1$	260	$0,008 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	180	$0,006 \times d_1$	200	$0,006 \times d_1$	220	$0,007 \times d_1$	240	$0,007 \times d_1$		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	180	$0,006 \times d_1$	200	$0,006 \times d_1$	220	$0,007 \times d_1$	240	$0,007 \times d_1$		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	180	$0,006 \times d_1$	200	$0,006 \times d_1$	220	$0,007 \times d_1$	240	$0,007 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	120	$0,004 \times d_1$	140	$0,004 \times d_1$	160	$0,005 \times d_1$	180	$0,005 \times d_1$		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.8	100	$0,003 \times d_1$	120	$0,003 \times d_1$	140	$0,004 \times d_1$	160	$0,004 \times d_1$		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3.1													
3.2													
4.1													
4.2													
4.3													
4.4													
5.1													
5.2	70	$0,003 \times d_1$	80	$0,004 \times d_1$	80	$0,005 \times d_1$	100	$0,005 \times d_1$				<input checked="" type="checkbox"/>	
5.3													
S	1.1	70	$0,005 \times d_1$	90	$0,005 \times d_1$	100	$0,006 \times d_1$	100	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	1.2	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	1.3	50	$0,002 \times d_1$	60	$0,002 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	2.2	20	$0,002 \times d_1$	25	$0,002 \times d_1$	30	$0,003 \times d_1$	35	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.3	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.4	20	$0,002 \times d_1$	25	$0,002 \times d_1$	30	$0,003 \times d_1$	35	$0,003 \times d_1$				<input checked="" type="checkbox"/>
2.5	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
2.6	15	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
H	1.1												
	1.2												
	1.3												
	1.4												
	1.5												

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

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

- Hochleistungswerkzeug
- Vielzahnfräser
- Neuentwickelte, vibrationsarme Geometrie
- Sehr stabile Werkzeugausführung
- Eingeschränkte Schneidendurchmesser-Toleranz

- High performance tool
- Multi-tooth end mill
- Newly developed, low-vibration geometry
- Very stable tool design
- Tighter cutting diameter tolerance

H

HM

DIN 6535
HA
HB

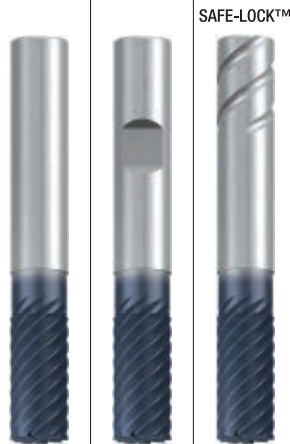
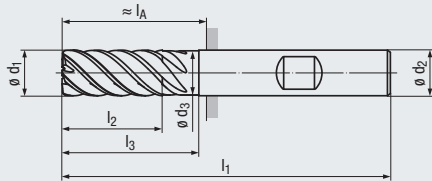
ASME B94.19

40°

KB x 45°

Optional

44-66 HRC



Hard materials

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- In fast allen Werkstoffen einsetzbar
- Hartbearbeitung bis 66 HRC möglich
- Sehr gut zum HSC-Schlichten geeignet

Applications – material (see page 3)

- For almost all materials
- Hard machining of up to 66 HRC
- Very suitable for HSC finishing

TIALN

P	1.1-5.1	
M	1.1-2.1	3.1-4.1
K	1.1-2.1	2.2
K	3.1-4.1	4.2
S	1.1-2.6	
H	1.1-1.5	

DIN 6527 – Lange Ausführung · Long design

Bestell-Code · Order code											2887A	2886A	2887AS			
$\varnothing d_1$	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h5	l_A	KB	Z (Flutes)	Dimens.- Code							
6	-0,02	13	20	57	5,8	6	21	0,08	6	.006	●	●	○			
8	-0,04	19	25	63	7,7	8	27	0,08	8	.008	●	●	○			
10	-0,04	22	30	72	9,5	10	32	0,08	10	.010	●	●	○			
12	-0,04	26	35	83	11,5	12	38	0,08	12	.012	●	●	○			
16	-0,04	32	40	92	15,5	16	44	0,1	16	.016	●	●	○			
20	-0,04	38	50	104	19,5	20	54	0,1	20	.020	●	●	○			
[mm]																
1/4	-0.0016	17/32	3/4	2 1/4	0.242	1/4	–	0.003	6	.0250	●		○			
5/16	-0.0016	3/4	1	2 1/2	0.301	5/16	–	0.003	8	.03125	●		○			
3/8	-0.0016	7/8	1 1/8	2 3/4	0.358	3/8	–	0.003	10	.0375	●		○			
1/2	-0.0016	1 1/8	1 3/8	3 1/4	0.480	1/2	–	0.004	12	.0500	●		○			
5/8	-0.0016	1 1/4	1 1/2	3 1/2	0.605	5/8	–	0.004	16	.0625	●		○			
3/4	-0.0016	1 1/2	1 7/8	4	0.730	3/4	–	0.004	18	.0750	●		○			
[inch]																

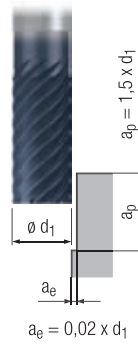
SAFE-LOCK™

Informationen zum SAFE-LOCK™-Spannsystem siehe Seite 415 im FRANKEN Katalog 250
 Information regarding SAFE-LOCK™ clamping system, see page 415 in FRANKEN Catalogue 250



Hartmetall-Schafffräser – lange Ausführung
Solid carbide end mills – long design

H



Gültig für · Valid for

2886A
2887A
2887AS

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

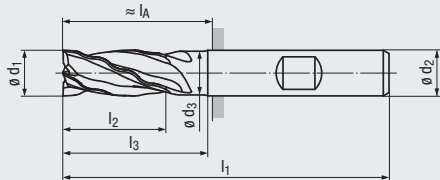
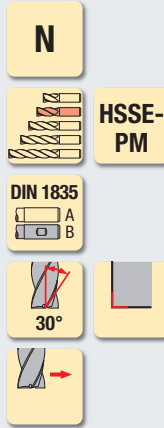
All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

	v_c [m/min]	f_z [mm]					
P	1.1	260	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	220	0,005 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	190	0,005 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	160	0,004 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1	130	0,003 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	1.1	130	0,004 x d_1				<input checked="" type="checkbox"/>
	2.1	100	0,004 x d_1				<input checked="" type="checkbox"/>
	3.1	80	0,003 x d_1				<input checked="" type="checkbox"/>
	4.1	50	0,003 x d_1				<input checked="" type="checkbox"/>
K	1.1	260	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	260	0,006 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	220	0,005 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	220	0,005 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	190	0,005 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	190	0,005 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	160	0,004 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4.2	130	0,004 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
N	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							
S	1.1	130	0,004 x d_1				<input checked="" type="checkbox"/>
	1.2	100	0,004 x d_1				<input checked="" type="checkbox"/>
	1.3	60	0,003 x d_1				<input checked="" type="checkbox"/>
	2.1	100	0,003 x d_1				<input checked="" type="checkbox"/>
	2.2	50	0,003 x d_1				<input checked="" type="checkbox"/>
	2.3	30	0,003 x d_1				<input checked="" type="checkbox"/>
	2.4	30	0,003 x d_1				<input checked="" type="checkbox"/>
2.5	30	0,003 x d_1				<input checked="" type="checkbox"/>	
2.6	30	0,003 x d_1				<input checked="" type="checkbox"/>	
H	1.1	160	0,003 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	130	0,003 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.3	110	0,003 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.4	80	0,002 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.5	60	0,002 x d_1	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

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

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

- Schlichtfräser mit Wellenprofil in der Spanfläche
- Erzeugt glatte Oberflächen
- Vibrationsmindernde Geometrie
- Schneidstoff aus Pulverstahl
- Finishing end mill with wave profile on the rake face
- Generates smooth surfaces
- Low-vibration geometry
- Powder metal cutting material



Inox

Beschichtung · Coating

ALCR

Einsatzgebiete – Material (siehe Seite 3)

Applications – material (see page 3)

- Für Materialien mit einer Zugfestigkeit bis 1200 N/mm²
- Zum Schlichtfräsen, insbesondere von Titan und rostfreien Legierungen
- Vorteile bei der Bearbeitung von labilen Werkstücken
- Hohes Zeitspanvolumen möglich

- For materials with a tensile strength of up to 1200 N/mm²
- For finish milling, particularly titanium and stainless alloys
- Advantages in machining delicate workpieces
- Enables high metal removal rates

P	1.1-4.1
M	1.1-2.1 3.1-4.1
K	1.1-4.2
S	1.1-1.2 1.3

DIN 844 – Kurze Ausführung · Short design

Scharfkantig · Sharp-edged

Bestell-Code · Order code

1391L

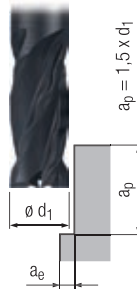
$\varnothing d_1$ k10	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A 	Z (Flutes)	Dimens.- Code			
12	26	36	83	11,5	12	38	4	.012	●		
16	32	42	92	15	16	44	4	.016	●		
20	38	52	104	19	20	54	4	.020	●		
25	45	63	121	24	25	65	4	.025	●		





HSS-Schaftfräser „N-Wave“ – kurze Ausführung
HSS end mills “N-Wave” – short design

N



$$a_p = 1,5 \times d_1$$



$$a_p = \max. l_2$$

Gültig für · Valid for
1391L

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary

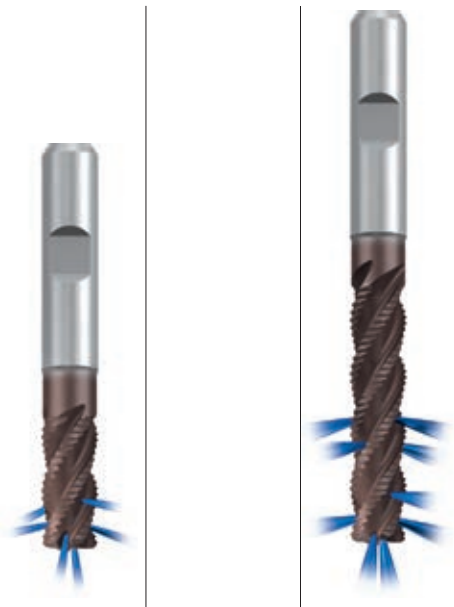
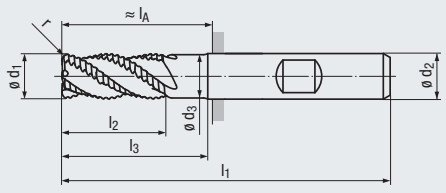
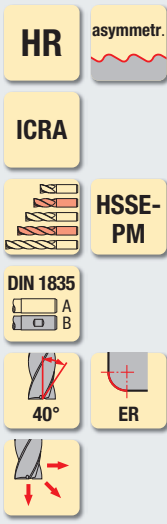
		$a_e = 0,25 \times d_1$	$a_e = 0,1 \times d_1$	$a_e = 0,2 \text{ mm}$					
	V_c [m/min]	f_z [mm]	f_z [mm]	f_z [mm]			MMS MQL		
P	1.1	66	$0,0038 \times d_1$	$0,0053 \times d_1$	$0,0067 \times d_1$		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	61	$0,0035 \times d_1$	$0,0048 \times d_1$	$0,0062 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	44	$0,0032 \times d_1$	$0,0044 \times d_1$	$0,0056 \times d_1$				<input checked="" type="checkbox"/>
	4.1	42	$0,0029 \times d_1$	$0,0040 \times d_1$	$0,0050 \times d_1$				<input checked="" type="checkbox"/>
	5.1								
M	1.1	31	$0,0032 \times d_1$	$0,0044 \times d_1$	$0,0056 \times d_1$				<input checked="" type="checkbox"/>
	2.1	26	$0,0029 \times d_1$	$0,0040 \times d_1$	$0,0050 \times d_1$				<input checked="" type="checkbox"/>
	3.1	22	$0,0026 \times d_1$	$0,0035 \times d_1$	$0,0045 \times d_1$				<input checked="" type="checkbox"/>
	4.1	20	$0,0022 \times d_1$	$0,0031 \times d_1$	$0,0039 \times d_1$				<input checked="" type="checkbox"/>
K	1.1	53	$0,0038 \times d_1$	$0,0053 \times d_1$	$0,0067 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	46	$0,0035 \times d_1$	$0,0048 \times d_1$	$0,0062 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	42	$0,0035 \times d_1$	$0,0048 \times d_1$	$0,0062 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	37	$0,0032 \times d_1$	$0,0044 \times d_1$	$0,0056 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	32	$0,0029 \times d_1$	$0,0040 \times d_1$	$0,0050 \times d_1$				<input checked="" type="checkbox"/>
	3.2	28	$0,0029 \times d_1$	$0,0040 \times d_1$	$0,0050 \times d_1$				<input checked="" type="checkbox"/>
	4.1	44	$0,0035 \times d_1$	$0,0048 \times d_1$	$0,0062 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.2	30	$0,0032 \times d_1$	$0,0044 \times d_1$	$0,0056 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
N	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									
S	1.1	44	$0,0032 \times d_1$	$0,0044 \times d_1$	$0,0056 \times d_1$				<input checked="" type="checkbox"/>
	1.2	31	$0,0029 \times d_1$	$0,0040 \times d_1$	$0,0050 \times d_1$				<input checked="" type="checkbox"/>
	1.3	22	$0,0026 \times d_1$	$0,0035 \times d_1$	$0,0045 \times d_1$				<input checked="" type="checkbox"/>
	2.1								
	2.2								
	2.6								
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

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

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

- Hochleistungs-Schrupfräser mit asymmetrischen Spanteilern
- Erzeugt Oberflächenmarkierungen
- Neuentwickelte Geometrie
- Zentrumschneidend
- Schneidstoff aus Pulverstahl
- Innere Kühlschmierstoff-Zufuhr, Austritt radial und axial (ICRA)
- Zahlreiche Kühlkanal-Austritte
- Baumaßergänzung zu TiNox-Cut Schruppschichtfräsern aus Hartmetall

- High-performance roughing end mill with asymmetrical chip breakers
- Generates milling marks
- Newly developed geometry
- Centre cutting
- Powder metal cutting material
- Internal coolant supply, radial and axial exit (ICRA)
- Numerous coolant outlet channels
- These HSS end mill are an extension of the solid carbide TiNox-Cut line



Inox

Inox

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 3)

- Für Materialien mit einer Zugfestigkeit bis 1300 N/mm²
- Zum Schrumpfräsen, insbesondere von Titan und rostfreien Legierungen
- Innere Kühlschmierstoff-Zufuhr ermöglicht optimale Kühlschmierung und Spanabfuhr
- Großes Abtragsvolumen durch kurze Späne

Applications – material (see page 3)

- For materials with a tensile strength of up to 1300 N/mm²
- For roughing, especially titanium and corrosion resistant alloys
- Internal coolant-lubricant supply permits optimum cooling-lubrication and chip evacuation
- Short chips allow high machining volume

TIALCN

TIALCN

M	1.1-2.1	3.1-4.1
S	1.1-1.2	1.3

M	1.1-2.1	3.1-4.1
S	1.1-1.2	1.3

DIN 844 – Kurze Ausführung · Short design

Eckenradius · Corner radius

Bestell-Code · Order code

1395WZ

$\varnothing d_1$ k10	r	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	Z (Flutes)	Dimens.- Code			
16	2	32	42	92	15	16	44	4	.016020	●		
16	4	32	42	92	15	16	44	4	.016040	●		
20	2	38	52	104	19	20	54	4	.020020	●		
20	4	38	52	104	19	20	54	4	.020040	●		
25	2	45	63	121	24	25	65	5	.025020	●		
25	4	45	63	121	24	25	65	5	.025040	●		
32	2	53	70	133	31	32	73	6	.032020	●		
32	4	53	70	133	31	32	73	6	.032040	●		

DIN 844 – Lange Ausführung · Long design

Eckenradius · Corner radius

Bestell-Code · Order code

1399WZ

$\varnothing d_1$ k10	r	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	Z (Flutes)	Dimens.- Code			
16	2	63	73	123	15	16	75	4	.016020	●		
16	4	63	73	123	15	16	75	4	.016040	●		
20	2	75	89	141	19	20	91	4	.020020	●		
20	4	75	89	141	19	20	91	4	.020040	●		
25	2	90	108	166	24	25	110	5	.025020	●		
25	4	90	108	166	24	25	110	5	.025040	●		
32	2	106	123	186	31	32	126	6	.032020	●		
32	4	106	123	186	31	32	126	6	.032040	●		

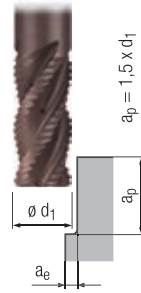
Werkzeug mit glattem Schaft: Bestell-Code 1095WZ (kurze Ausführung) und 1099WZ (lange Ausführung)
Tool with straight shank: order code 1095WZ (short design) and 1099WZ (long design)



HSS-Schaftfräser – kurze und lange Ausführung
HSS end mills – short and long design

HR

kurze Ausführung
short design



lange Ausführung
long design



Gültig für · Valid for
1395WZ
1399WZ

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary



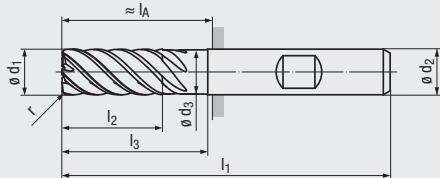
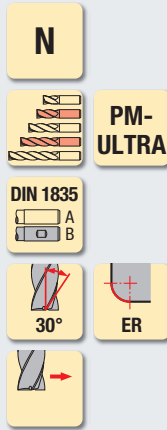
		$a_e = 0,5 \times d_1$		$a_e = 0,25 \times d_1$		$a_e = 0,25 \times d_1$		$a_e = 0,1 \times d_1$					
		v_c [m/min]	f_z [mm]	f_z [mm]	v_c [m/min]	f_z [mm]	f_z [mm]						
P	1.1												
	2.1												
	3.1												
	4.1												
	5.1												
M	1.1	28	$0,0025 \times d_1$	$0,0038 \times d_1$	15	$0,0018 \times d_1$	$0,0027 \times d_1$						■
	2.1	24	$0,0023 \times d_1$	$0,0034 \times d_1$	14	$0,0016 \times d_1$	$0,0024 \times d_1$						■
	3.1	20	$0,0020 \times d_1$	$0,0030 \times d_1$	12	$0,0014 \times d_1$	$0,0022 \times d_1$						■
	4.1	18	$0,0018 \times d_1$	$0,0027 \times d_1$	11	$0,0013 \times d_1$	$0,0019 \times d_1$						■
K	1.1												
	1.2												
	2.1												
	2.2												
	3.1												
	3.2												
	4.1												
4.2													
N	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													
S	1.1	40	$0,0025 \times d_1$	$0,0038 \times d_1$	15	$0,0018 \times d_1$	$0,0027 \times d_1$						■
	1.2	28	$0,0023 \times d_1$	$0,0034 \times d_1$	15	$0,0016 \times d_1$	$0,0024 \times d_1$						■
	1.3	20	$0,0020 \times d_1$	$0,0030 \times d_1$	12	$0,0014 \times d_1$	$0,0022 \times d_1$						■
	2.1												
	2.2												
	2.6												
H	1.1												
	1.2												
	1.3												
	1.4												
	1.5												

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

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

- Hochleistungs-Schlichtfräser
- Vielzahnig
- Vibrationsarme Bearbeitung erzeugt glatte Oberflächen
- Neuentwickelte Geometrie mit ungleich geteilten Schneiden
- Schneidstoff aus Pulverstahl „PM-ULTRA“

- High-performance finishing end mill
- Multi-tooth design
- Low-vibration machining generates smooth surfaces
- Newly developed geometry with variable spacing of cutting edges
- Cutting material made of powder metal "PM-ULTRA"



Inox



Inox

Beschichtung · Coating

TIALN

TIALN

Einsatzgebiete – Material (siehe Seite 3)

Applications – material (see page 3)

- Für Materialien mit einer Zugfestigkeit bis 1300 N/mm²
- Besonders zum Schlichtfräsen von Titan und rostfreien Legierungen geeignet

- For materials with a tensile strength of up to 1300 N/mm²
- Especially suitable for finishing titanium and corrosion resistant alloys

M	1.1-2.1	3.1-4.1
S	1.1-1.2	1.3

M	1.1-2.1	3.1-4.1
S	1.1-1.2	1.3

DIN 844 – Kurze Ausführung · Short design

Eckenradius · Corner radius

Bestell-Code · Order code

1365A

$\varnothing d_1$ h8	r ±0,05	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	Z (Flutes)	Dimens.- Code			
25	2	45	63	121	24	25	65	8	.025020	●		
25	4	45	63	121	24	25	65	8	.025040	●		
32	2	53	70	133	31	32	73	10	.032020	●		
32	4	53	70	133	31	32	73	10	.032040	●		

DIN 844 – Lange Ausführung · Long design

Eckenradius · Corner radius

Bestell-Code · Order code

1390A

$\varnothing d_1$ h8	r ±0,05	l_2	l_3	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	l_A	Z (Flutes)	Dimens.- Code			
25	2	90	108	166	24	25	110	8	.025020	●		
25	4	90	108	166	24	25	110	8	.025040	●		
32	2	106	123	186	31	32	126	10	.032020	●		
32	4	106	123	186	31	32	126	10	.032040	●		

Werkzeug mit glattem Schaft: Bestell-Code 1065A (kurze Ausführung) und 1090A (lange Ausführung)
Tool with straight shank: order code 1065A (short design) and 1090A (long design)

PM-ULTRA

Eigenschaften des neuen Schneidstoffes:

- Stahl ohne Kohlenstoffgehalt
- Mischung aus Kobalt, Molybdän und Eisen, ohne Verlust der Zähigkeit
- Hohe Warmfestigkeit des Schneidstoffes
- Verbindet die Eigenschaften von HSS und Hartmetall
- Erhöhung der Schnittgeschwindigkeit um bis zu 30-50% im Vergleich zu HSSE-PM
- Problemloses Be- und Entschichten der Werkzeuge möglich
- Kosteneinsparung durch Reduzierung der Bearbeitungszeiten auf Grund höherer Schnittgeschwindigkeiten
- Längere Standzeit des Schneidstoffes

PM-ULTRA

Characteristics of the new cutting material:

- Carbon-free material
- Cobalt, molybdenum, iron alloy, with outstanding toughness
- High heat resistant cutting material
- Combines the characteristics of HSS and carbide
- Up to 30-50% higher cutting speed in comparison with HSSE-PM
- Easy tool coating and decoating
- Increased cutting speeds reduce machining time and save cost
- Cutting material with longer life



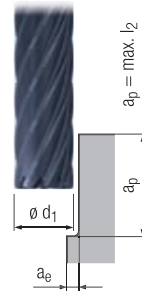
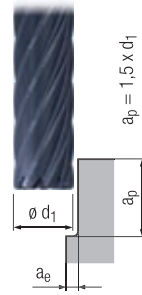
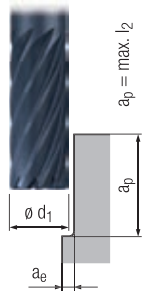
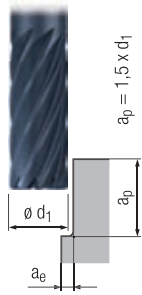
HSS-Schaftfräser – kurze und lange Ausführung
HSS end mills – short and long design

N

Gültig für · Valid for
1365A
1390A

kurze Ausführung
short design

lange Ausführung
long design



$a_e = 0,1 \times d_1$

$a_e = 0,2 \text{ mm}$

$a_e = 0,1 \times d_1$

$a_e = 0,2 \text{ mm}$

Alle Schnittdaten dienen als Orientierungshilfe und sind ggf. auf die technischen Voraussetzungen vor Ort abzustimmen

All cutting data serve as an orientation guide and must be adapted to the technical conditions on site if necessary



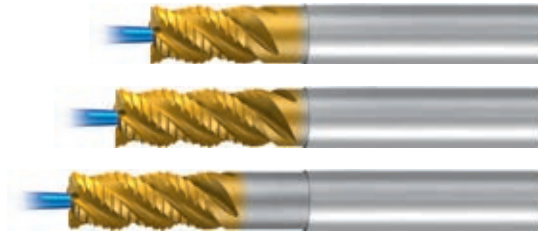
		kurze Ausführung short design		lange Ausführung long design					
		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]				
P	1.1								
	2.1								
	3.1								
	4.1								
	5.1								
M	1.1	56	$0,0014 \times d_1$	$0,0022 \times d_1$	30	$0,0010 \times d_1$	$0,0012 \times d_1$		■
	2.1	48	$0,0013 \times d_1$	$0,0020 \times d_1$	29	$0,0009 \times d_1$	$0,0011 \times d_1$		■
	3.1	40	$0,0011 \times d_1$	$0,0018 \times d_1$	24	$0,0008 \times d_1$	$0,0010 \times d_1$		■
	4.1	36	$0,0010 \times d_1$	$0,0015 \times d_1$	22	$0,0007 \times d_1$	$0,0008 \times d_1$		■
K	1.1								
	1.2								
	2.1								
	2.2								
	3.1								
	3.2								
	4.1								
N	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									
S	1.1	80	$0,0014 \times d_1$	$0,0022 \times d_1$	30	$0,0010 \times d_1$	$0,0012 \times d_1$		■
	1.2	56	$0,0013 \times d_1$	$0,0020 \times d_1$	30	$0,0009 \times d_1$	$0,0011 \times d_1$		■
	1.3	40	$0,0011 \times d_1$	$0,0018 \times d_1$	24	$0,0008 \times d_1$	$0,0010 \times d_1$		■
	2.1								
	2.2								
	2.6								
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

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

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

Hartmetall-Schafffräser ohne und mit Eckenradius, mit innerer Kühlschmierstoff-Zufuhr, zur Schruppschicht-Bearbeitung

Solid carbide end mills with and without corner radius, with internal coolant supply, for semi-finishing applications



- Zähes Hartmetall-Substrat und hochwarmfeste Beschichtung für hohe Standzeiten
- Optimierte Spannutengeometrie für den sicheren Spanabtransport bei langspanenden, zähen Werkstoffen
- Innere Kühlschmierstoff-Zufuhr mit axialem Austritt (ICA) zur sicheren Spanabfuhr
- Schruppschicht-Verzahnung zur Reduzierung der Schnittkräfte beim Schruppen
- Optimierte Schneidenausführung der Schruppschicht-Verzahnung für hohe Standzeiten

- Tough carbide substrate and high-heat-resistant coating for long tool life
- Optimised flute geometry for safe chip evacuation in long-chipping, tough materials
- Internal coolant supply with axial exit (ICA) for safe chip evacuation
- Semi-finishing profile for reduced cutting forces in roughing operations
- Optimised cutting edge design of the semi-finishing profile for long tool life

Hartmetall-Schafffräser „Base“

Solid carbide end mills „Base“



- Leistungsfähiges Hartmetallsubstrat
- Universalwerkzeug für die Bearbeitung von rost- und säurebeständigen Stählen
- Zum Schruppen und Schlichten geeignet
- Trockenbearbeitung einiger rost- und säurebeständiger Sonderlegierungen (z.B. 1.4301, 1.4571, 1.4404) möglich

- High performance carbide substrate
- Universal tool for machining of stainless- and acid-resistant steels
- Suitable for both roughing and finishing
- For dry machining of some stainless- and acid-resistant special alloys (e.g. 1.4301, 1.4571, 1.4404)

Hartmetall-Schafffräser ohne und mit Eckenradius, mit innerer Kühlschmierstoff-Zufuhr, zum Schruppen und Schlichten

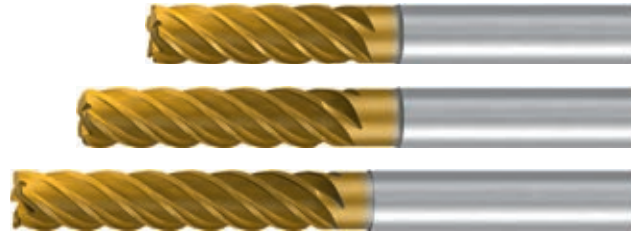
Solid carbide end mills with and without corner radius, with internal coolant supply, for roughing and finishing applications



- Verschleißfestes Hartmetall-Substrat und hochwarmfeste, glatte Beschichtung für hohe Standzeiten
- Optimierte Spannutengeometrie für den sicheren Spanabtransport bei langspanenden, zähen Werkstoffen
- Zum Schruppen und Schlichten hervorragend geeignet
- Innere Kühlschmierstoff-Zufuhr mit axialem Austritt (ICA) zur sicheren Spanabfuhr
- Optimierte Schneidenausführung für ruhige, vibrationsfreie Bearbeitung

- Wear-resistant carbide substrate and high-heat-resistant smooth coating for long tool life
- Optimised flute geometry for safe chip evacuation in long-chipping, tough materials
- Perfectly suited for both roughing and finishing
- Internal coolant supply with axial exit (ICA) for safe chip evacuation
- Optimised cutting edge design for smooth, vibration-free operation

Hartmetall-Schafffräser ohne und mit Eckenradius, zum Schlichten

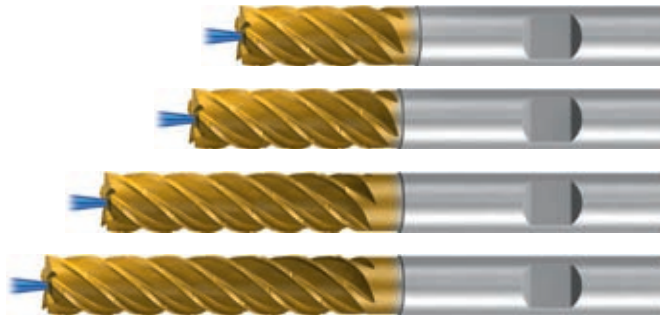


- Verschleißfestes Hartmetall-Substrat und hochwarmfeste Beschichtung für hohe Standzeiten
- Spezielle Schneidenausführung für vibrationsarme Schlichtbearbeitung
- Nutzbare Schneidenslängen $3 \times d_1$, $4 \times d_1$ und $5 \times d_1$ für alle Schlichtbearbeitungen

Solid carbide end mills with corner radius, for finishing applications

- Wear-resistant carbide substrate and high-heat-resistant coating for long tool life
- Special cutting edge design for low-vibration finishing operation
- Usable flute length in $3 \times d_1$, $4 \times d_1$ and $5 \times d_1$ for all finishing operations

Hartmetall-Schafffräser mit innerer Kühlschmierstoff-Zufuhr, zur trochoidalen Bearbeitung



- Zähes Hartmetall-Substrat und hochwarmfeste Beschichtung für hohe Standzeiten
- Besonders für schwer zerspanbare Werkstoffe und dünnwandige Bauteile geeignet
- Innere Kühlschmierstoff-Zufuhr mit axialem Austritt (ICA) zur sicheren Spanabfuhr
- Werkzeug- und Maschinenbelastung werden reduziert
- Zeitspanvolumen auf leistungsschwachen, dynamischen Maschinen wird erhöht
- Auch bei labiler Werkstückspannung einsetzbar

Solid carbide end mills with internal coolant supply, for trochoidal machining

- Tough carbide substrate and high-heat-resistant coating for long tool life
- Suitable in particular for difficult to machine materials and thin-walled components
- Internal coolant supply with axial exit (ICA) for safe chip evacuation
- Stress on tools and machine is reduced
- Increase of metal removal rate on low-powered dynamic machines
- Suitable also with unstable workpiece clamping conditions

Hartmetall-Schafffräser „N-Wave“ mit Eckenradius, mit innerer Kühlschmierstoff-Zufuhr zum Schlichten



- Verschleißfestes Hartmetall-Substrat und hochwarmfeste Beschichtung für hohe Standzeiten
- Schlichtfräser mit Wellenprofil in der Spanfläche
- Innere Kühlschmierstoff-Zufuhr mit axialem Austritt (ICA) zur sicheren Spanabfuhr
- Erzeugt glatte Oberflächen
- Vibrationsmindernde Geometrie

Solid carbide end mills „N-Wave“ with corner radius, with internal coolant supply, for finishing applications

- Wear-resistant carbide substrate and high-heat-resistant coating for long tool life
- Finishing end mill with wavy profile on rake face
- Internal coolant supply with axial exit (ICA) for safe chip evacuation
- Generates smooth surfaces
- Low-vibration geometry

**HSS-Schaftfräser „N-Wave“,
zum Schlichten**

**HSS end mills “N-Wave”,
for finishing applications**

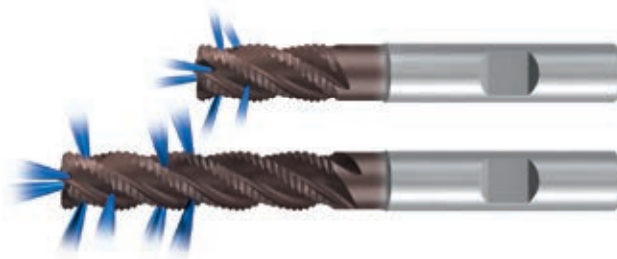


- Schneidstoff aus Pulverstahl
- Schlichtfräser mit Wellenprofil in der Spanfläche
- Erzeugt glatte Oberflächen
- Vibrationsmindernde Geometrie

- Powder metal cutting material
- Finishing end mill with wavy profile on rake face
- Generates smooth surfaces
- Low-vibration geometry

**HSS-Schaftfräser mit Eckenradius,
mit innerer Kühlschmierstoff-Zufuhr,
zum Schrappen**

**HSS end mills with corner radius,
with internal coolant supply,
for roughing applications**



- Schneidstoff aus Pulverstahl
- Neuentwickelte Geometrie mit asymmetrischen Spanteilern
- Innere Kühlschmierstoff-Zufuhr mit radialen und axialen Austritten (ICRA)
- Baumaßergänzung zu TiNox-Cut Schruppschlichtfräsern aus Hartmetall

- Powder metal cutting material
- Newly developed geometry with asymmetrical chip breakers
- Internal coolant supply with radial and axial exit (ICRA)
- These HSS end mills are an extension of the solid carbide semi-finishing end mills

**HSS-Schaftfräser mit Eckenradius,
zum Schlichten**

**HSS end mills with corner radius,
for finishing applications**



- Schneidstoff aus Pulverstahl „PM-ULTRA“
- Vielzahniger Hochleistungs-Schlichtfräser
- Neuentwickelte Geometrie mit ungleich geteilten Schneiden
- Vibrationsarme Bearbeitung erzeugt glatte Oberflächen

- Cutting material made of powder metal “PM-ULTRA”
- Multi-tooth high-performance finishing end mill
- Newly developed geometry with variable spacing of cutting edges
- Low-vibration machining generates smooth surfaces

**Hartmetall-Schaftfräser zur
Hochgeschwindigkeits-Schlichtbearbeitung**

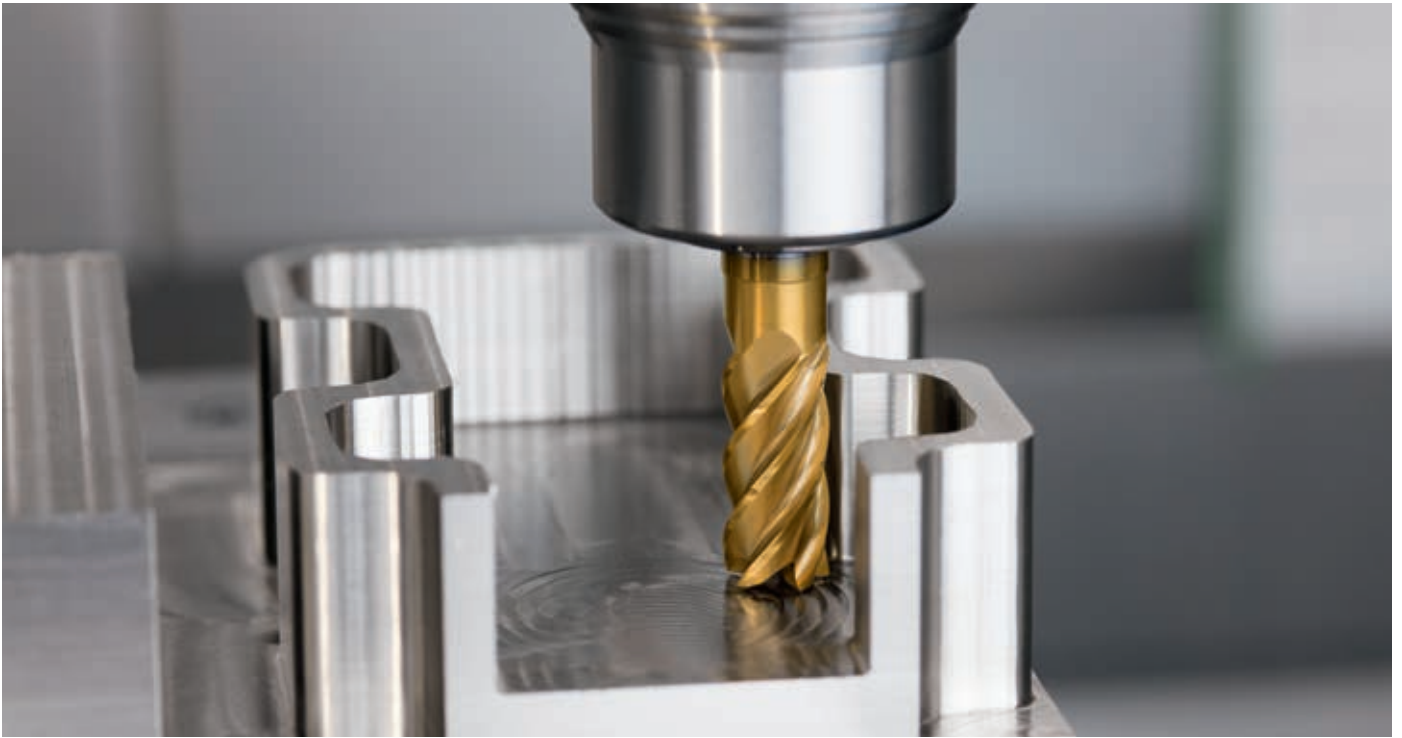
**Solid carbide end mills for
high-speed finishing applications**

FRANKEN
Jet-Cut



- Verschleißfestes Hartmetallsubstrat und Beschichtung, speziell für die HSC-Bearbeitung
- Geometrie zum Schlichten optimiert, mit verstärktem Kerndurchmesser
- Große Schneidenanzahl um hohe Vorschübe bei gleichbleibender Oberflächengüte zu erreichen
- Optimierte Schneidenausführung, für vibrationsarme Bearbeitung

- Wear-resistant solid carbide substrate and coating, particularly for HSC-machining
- Geometry optimised for finishing applications, with reinforced core diameter
- Large number of flutes to achieve high feed rates and a consistently high surface quality
- Optimised design of the cutting edges, for low-vibration machining



Die patentierten Präzisions-Spannhülsen-Aufnahmen FPC sind hochgenaue Werkzeug-Aufnahmen mit mechanischer Klemmung für höchste Spannkraft und Rundlaufgenauigkeit sowie mit sehr guten Dämpfungseigenschaften. Die Werkzeugspannung erfolgt mittels Spannhülsen.

Das Spannen und Lösen des Werkzeugs geschieht mit einem Sechskantschlüssel, welcher seitlich den Spannmechanismus bedient – und das innerhalb weniger Sekunden. Es können alle Zylinderschäfte nach DIN 6535 oder DIN 1835 gespannt werden.

Die Präzisions-Spannhülsen-Aufnahmen FPC eignen sich hervorragend zum Hochleistungs- und Hochgeschwindigkeitsfräsen. Darüber hinaus können diese auch zum Bohren, Reiben oder zur Gewindeherstellung eingesetzt werden.

The patented precision collet holders FPC are highly precise tool holders with mechanical clamping which provide superior clamping force and concentricity as well as excellent shock-absorbing properties. The tools are clamped via collets.

Tools are clamped and unclamped with a hexagon wrench which operates the clamping mechanism at the side – and in just a few seconds. All straight shanks according to DIN 6535 or DIN 1835 can be clamped.

The high-precision collet holders FPC are well suited for high-performance and high-speed milling. In addition they can be used for drilling, reaming and threading operations.

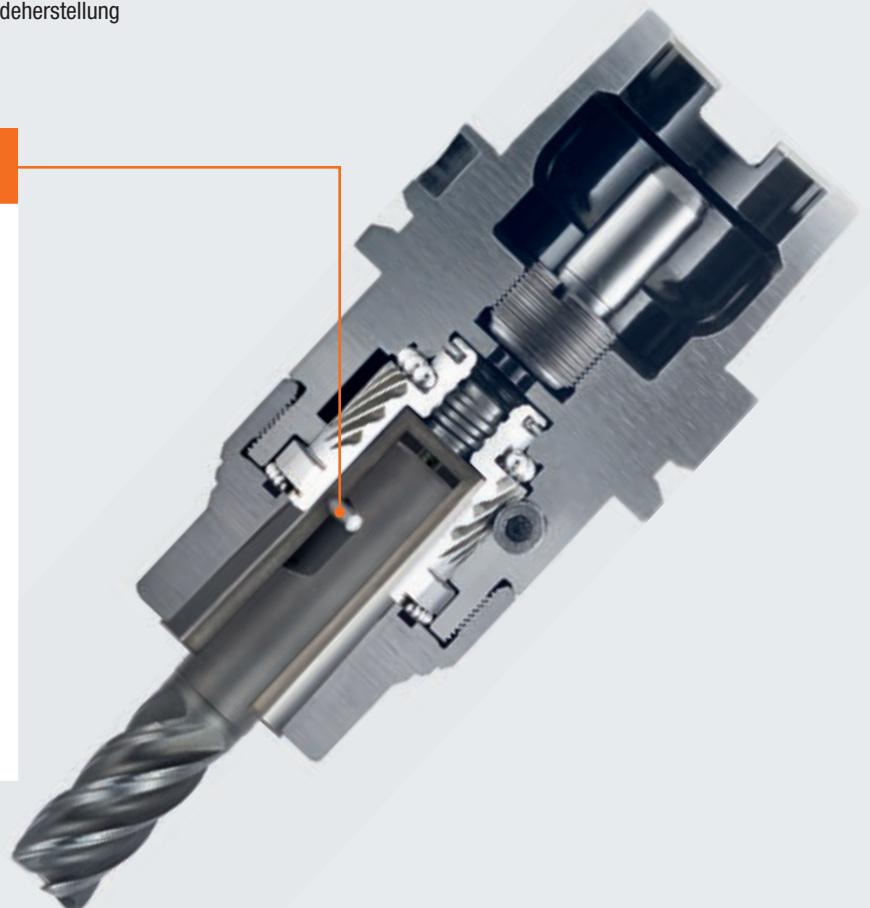
Auszugssicherung „Pin-Lock“ Pull-out prevention “Pin-Lock”

In der modernen Hochleistungszerspanung oder bei der Bearbeitung von schwer zerspanbaren Werkstoffen ist eine Auszugssicherung des Fräswerkzeuges in der Aufnahme unerlässlich. Selbst minimale axiale Bewegung des Werkzeuges kann zu Werkzeugbruch führen.

Das „PIN-Lock“-System garantiert 100% Auszugssicherheit!

In modern high-performance machining or when working with difficult to machine materials a pull-out prevention system for the milling tool in the tool holder is absolutely essential. Even minimal axial movement of the tool can result in breakage of the tool.

The “Pin-Lock” system guarantees 100% pull-out prevention!





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