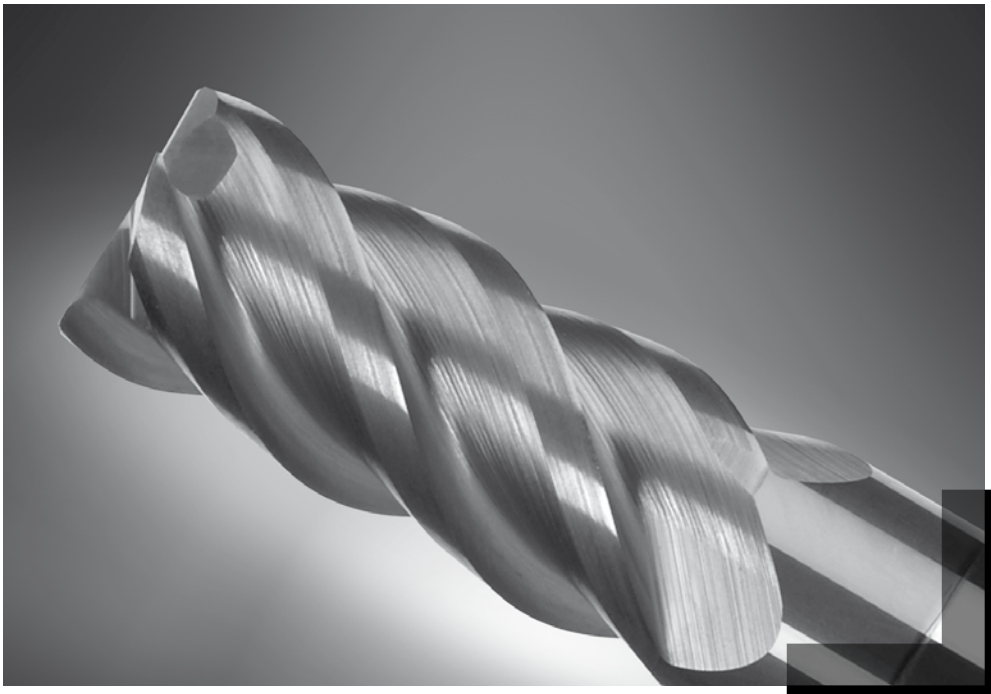
KOMET GROUP

KomPass – Milling

TOOLS + IDEAS®

KomPass Milling – BENEFITS for you



KOMET GROUP – MILLING expertise

The KOMET GROUP is recognised internationally as a leader in innovation for high-precision drilling, reaming and threading and, as such, sees itself as more than simply a manufacturer of precision tools and rather as a provider of innovative ideas – true to the company motto "TOOLS PLUS IDEAS".

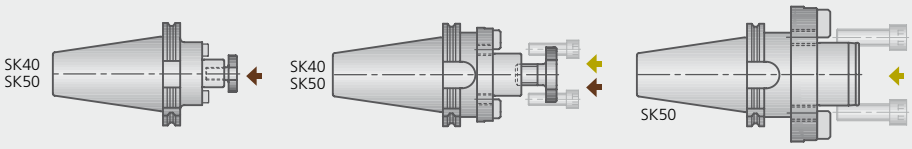
Our extensive range of milling tools guarantees the production of optimum surfaces in terms of quality and performance. Thanks to maximum process reliability, our tools form the basis for cost-effective production at our customer sites.

Special solutions for your milling operations – Greater range of functions, lower machining costs
Chapter 8

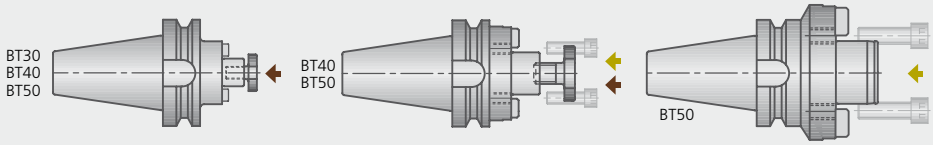
Programme Summary

6 Adaptors

Taper shanks FA
DIN 69871
▸ 106 – 107

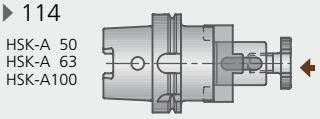


Taper shanks FA
JIS B 6339 (MAS 403 BT)
▸ 108 – 109

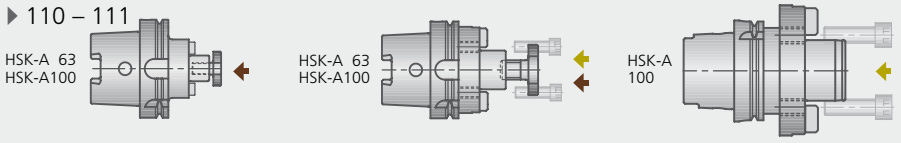


HSK-A Adaptors ISO 12164-1

Combination milling cutter arbor FAK
▸ 114

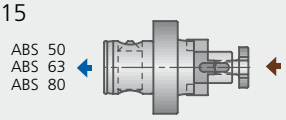


Milling cutter arbor FA
▸ 110 – 111

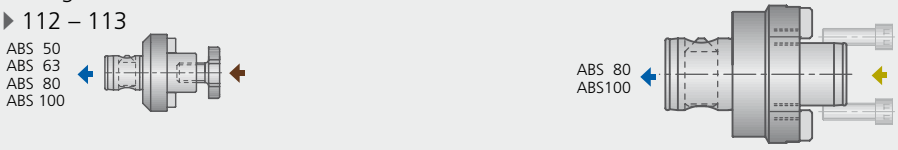


ABS® Adaptors

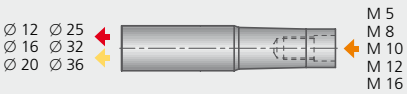
Combination milling cutter arbor FAK
▸ 115



Milling cutter arbor FA
▸ 112 – 113



Adaptors
for screw-on milling cutter
▸ 116

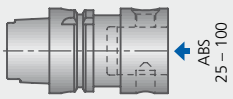


Adaptors see catalogue "KomPass – Bore machining"

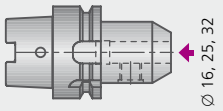
Shrink fit technology
THERMOGRIP®

HSK-A Adaptors ISO 12164-1

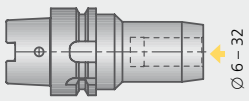
with ABS® connection
HSK-A 32 – HSK-A 100



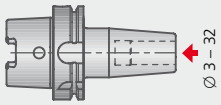
Adaptor sleeve Weldon
HSK-A 50, 63, 100



Expanding chuck
HSK-A 50, 63, 100

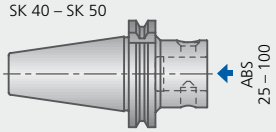


Thermal expansion chuck
HSK-A 32 – HSK-A 100

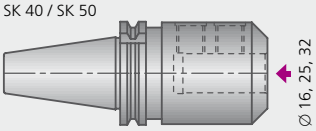


Taper shanks DIN 69871

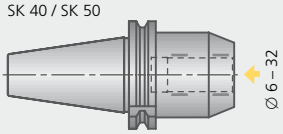
with ABS® connection
SK 40 – SK 50



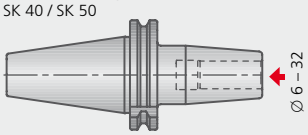
Adaptor sleeve Weldon
SK 40 / SK 50



Expanding chuck
SK 40 / SK 50

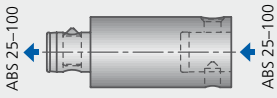


Thermal expansion chuck
SK 40 / SK 50

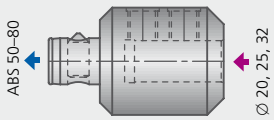


ABS® Adaptors

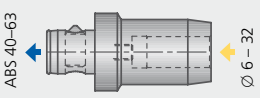
Extension



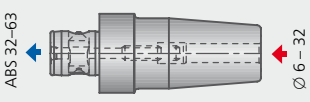
Adaptor sleeve Weldon



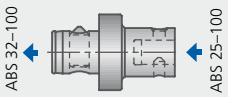
Expanding chuck



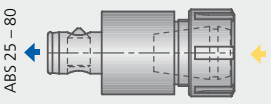
Thermal expansion chuck



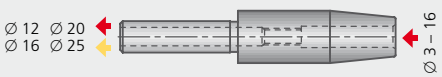
Reducer



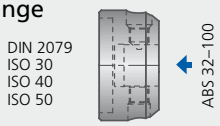
Collet holder SZV



Extension / Reducer



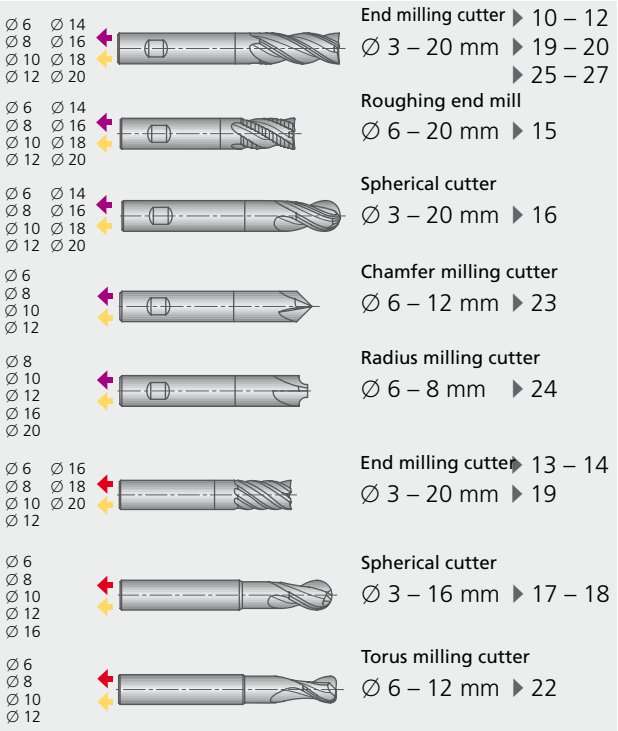
Spindle adaptor flange
with ABS® connection



Key

- ABS® connection
- Cylindrical connection
- Weldon connection
- Shrink connection
- Screw connection
- DIN 6357 adaptor
- DIN 6358 adaptor

1 Solid carbide milling cutter



End milling cutter ▸ 10 – 12
Ø 3 – 20 mm ▸ 19 – 20
▸ 25 – 27

Roughing end mill
Ø 6 – 20 mm ▸ 15

Spherical cutter
Ø 3 – 20 mm ▸ 16

Chamfer milling cutter
Ø 6 – 12 mm ▸ 23

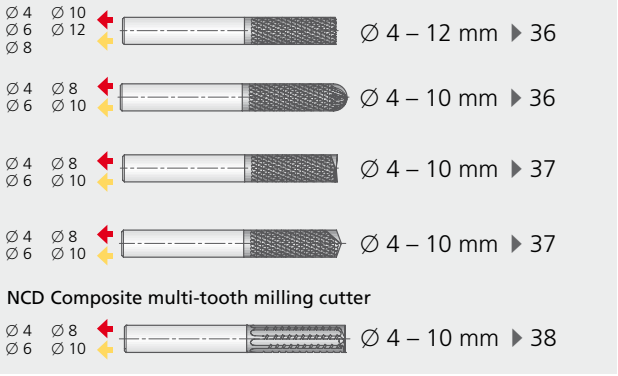
Radius milling cutter
Ø 6 – 8 mm ▸ 24

End milling cutter ▸ 13 – 14
Ø 3 – 20 mm ▸ 19

Spherical cutter
Ø 3 – 16 mm ▸ 17 – 18

Torus milling cutter
Ø 6 – 12 mm ▸ 22

2 NCD Composite milling cutter



Ø 4 – 12 mm ▸ 36

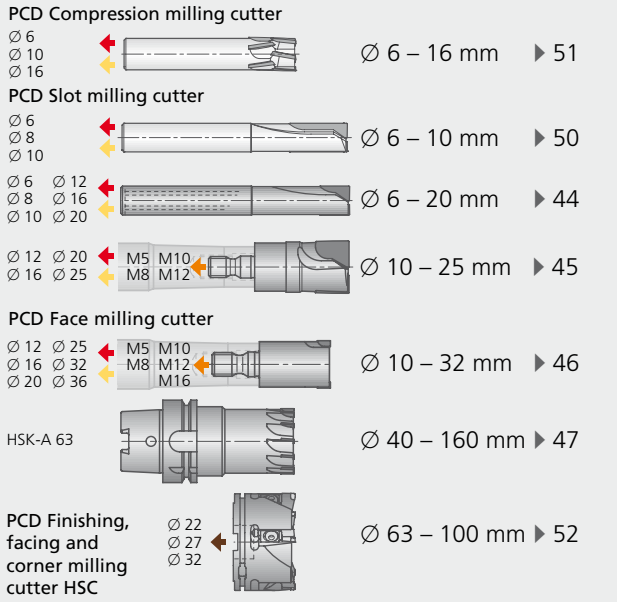
Ø 4 – 10 mm ▸ 36

Ø 4 – 10 mm ▸ 37

Ø 4 – 10 mm ▸ 37

Ø 4 – 10 mm ▸ 38

3 PCD Milling cutter



Ø 6 – 16 mm ▸ 51

Ø 6 – 10 mm ▸ 50

Ø 6 – 20 mm ▸ 44

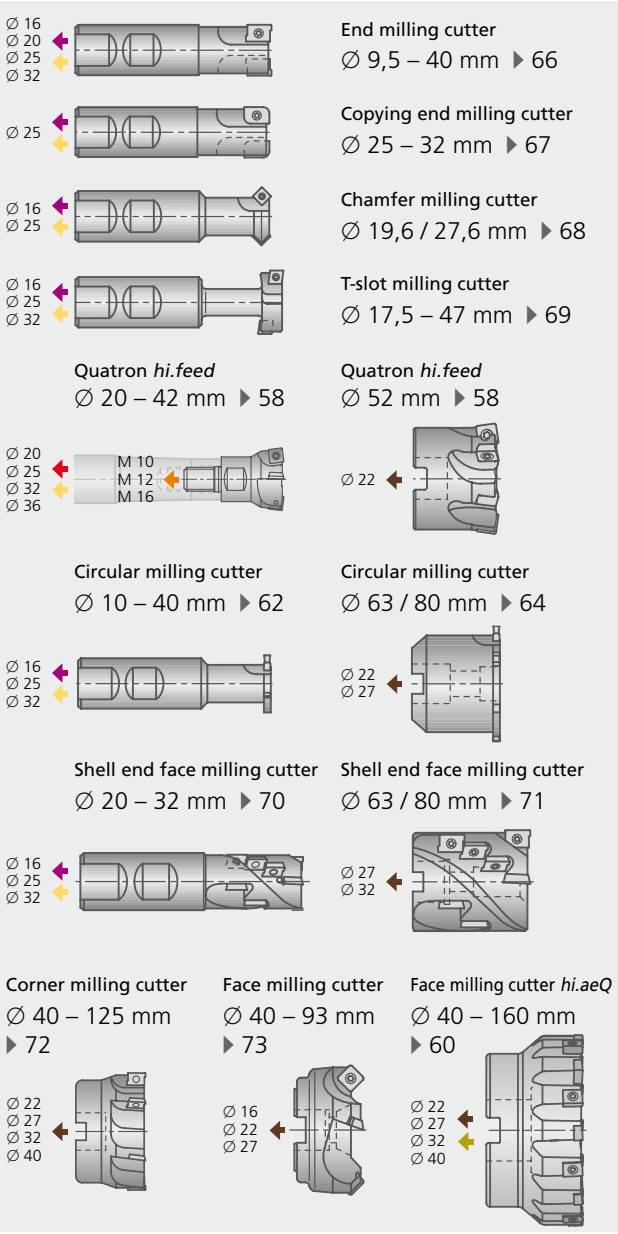
Ø 10 – 25 mm ▸ 45

Ø 10 – 32 mm ▸ 46

Ø 40 – 160 mm ▸ 47

Ø 63 – 100 mm ▸ 52

4 Indexable insert mills



End milling cutter
Ø 9,5 – 40 mm ▸ 66

Copying end milling cutter
Ø 25 – 32 mm ▸ 67

Chamfer milling cutter
Ø 19,6 / 27,6 mm ▸ 68

T-slot milling cutter
Ø 17,5 – 47 mm ▸ 69

Quatron *hi.feed*
Ø 20 – 42 mm ▸ 58

Quatron *hi.feed*
Ø 52 mm ▸ 58

Circular milling cutter
Ø 10 – 40 mm ▸ 62

Circular milling cutter
Ø 63 / 80 mm ▸ 64

Shell end face milling cutter
Ø 20 – 32 mm ▸ 70

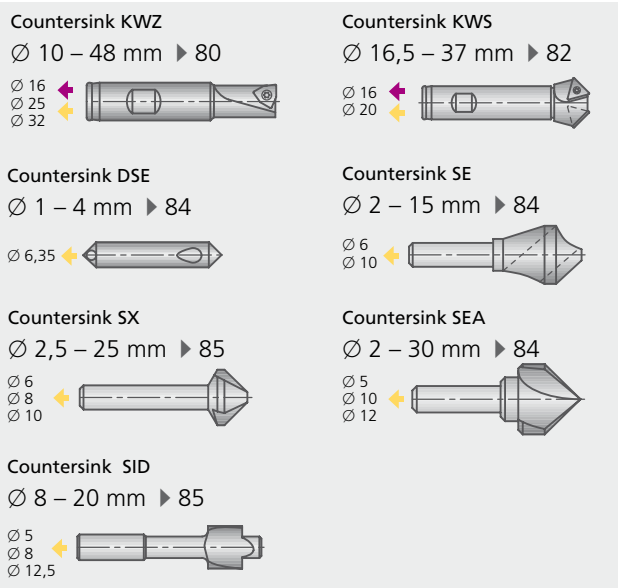
Shell end face milling cutter
Ø 63 / 80 mm ▸ 71

Corner milling cutter
Ø 40 – 125 mm
▸ 72

Face milling cutter
Ø 40 – 93 mm
▸ 73

Face milling cutter *hi.aeQ*
Ø 40 – 160 mm
▸ 60

5 Countersinking tool



Countersink KWZ
Ø 10 – 48 mm ▸ 80

Countersink KWS
Ø 16,5 – 37 mm ▸ 82

Countersink DSE
Ø 1 – 4 mm ▸ 84

Countersink SE
Ø 2 – 15 mm ▸ 84

Countersink SX
Ø 2,5 – 25 mm ▸ 85

Countersink SEA
Ø 2 – 30 mm ▸ 84

Countersink SID
Ø 8 – 20 mm ▸ 85

JEL® Solid carbide milling cutter

JEL® Solid carbide milling cutter

The new solid carbide shank milling cutter range provides tools to meet all demands in the 3.0 - 25.0 mm diameter range.

They are used in cast iron and steel materials; soft and hard machining (up to 65 HRC); and in mould and die making.

The product range is completed with tools for aluminium and non-ferrous metal working.

BENEFITS for you:

- Comprehensive standard range from stock
- High productivity due to the perfectly tuned grade profile and coating for all of the workpiece materials
- Original regrinding service and recoating service is guaranteed by a comprehensive network of professional KOMET SERVICE® partners

Versions:

End milling cutter, roughing end mill, HPC milling cutter, spherical cutter, torus milling cutter, chamfer milling cutter, radius milling cutter

KOMET® JEL®

JEL® Solid carbide milling cutter Page

JEL ® Solid carbide milling cutter

Overview

Material Group		Strength Rm (N/mm²)	Hardness HB	Type	End milling cutter F044 UNI	End milling cutter F064 UNI	End milling cutter HPC	End milling cutter F072 XH	End milling cutter F041 XH	Roughing end mill F544	Spherical cutter F344
				Diameter	∅ 3 – 20 mm	∅ 6 – 20 mm	∅ 6 – 20 mm	∅ 3 – 20 mm	∅ 6 – 16 mm	∅ 6 – 20 mm	∅ 3 – 20 mm
				No. of teeth	2 – 4	2 – 4	4	4 – 8	6 – 16	4	2 – 4
				Shank	DIN 6535 HB	DIN 6535 HB	DIN 6535 HB	DIN 6535 HA	DIN 6535 HA	DIN 6535 HB	DIN 6535 HB
				Coating	TiAlN	TiAlN	TiAlN	AlTiN	AlTiN	TiAlN	TiAlN
				Facet	0,05-0,35 mm	0,1-0,35 mm	0,2-0,5 mm	0,05-0,2 mm	–	0,5-1,0 mm	–
				Corner radius	–	–	–	–	–	–	1,5-10,0 mm
				Page	10	11	12	13	14	15	16
				Material							
P	1.1	≤400	≤120	magnetic soft iron	●	●	●	◐	◐	●	●
P	1.2	≤700	≤200	structural, case hardened steel	●	●	●	◐	◐	●	●
P	1.3	≤850	≤250	carbon steel	●	●	●	◐	◐	●	●
P	1.4	≤850	≤250	alloy steel	●	●	●	◐	◐	●	●
P	1.5	>850 ≤1200	>250 ≤350	alloy/heat treated steel	●	●	●	◐	◐	●	●
P	1.6	>1200	>350	alloy/heat treated steel	●	●	●	◐	◐	●	●
H	1.7	≤1400	≤400	hardened steel to 56 HRC				○	○		
H	1.8	≤2200	≤600	hardened steel to 65 HRC				◑	○		
M	2.1	≤850	≤250	stainless steel, sulphuretted	◐	◐	◐			◐	◐
M	2.2	≤850	≤250	austentic	◐	◐	◐			◐	◐
M	2.3	≤1000	≤300	ferritic, ferritic & austentic, martensitic	◐	◐	◐			◐	◐
K	3.1	≤500	≤150	grey cast iron	●	●	●			●	●
K	3.2	>500 ≤1000	>150 ≤300	grey cast iron, heat treated	●	●	●			●	●
K	3.3	400-500	200-250	vermicular cast iron	●	●	●			●	●
K	3.4	≤700	≤200	spheroidal graphite cast iron	●	●	●			●	●
K	3.5	>700 ≤1000	>200 ≤300	spheroidal graphite cast iron, heat treated	●	●	●			●	●
K	3.6	≤700	≤200	malleable iron	●	●	●			●	●
K	3.7	>700 <1000	>200 ≤300	malleable iron, heat treated	●	●	●			●	●
S	4.1	≤700	≤200	pure titanium	◐	◐	◐			◐	◐
S	4.2	≤900	≤270	titanium alloys	◐	◐	◐			◐	◐
S	4.3	>900 ≤1250	>270 ≤300	titanium alloys	◐	◐	◐			◐	◐
S	5.1	≤500	≤150	pure nickel	◐	◐	◐			◐	◐
S	5.2	≤900	<270	nickel alloys, heat resistant	◐	◐	◐			◐	◐
S	5.3	>900 ≤1200	>270 ≤350	nickel alloys, high heat resistant	◐	◐	◐			◐	◐
N	6.1	≤350	≤100	non-alloy copper	◐	◐	◐			◐	◐
N	6.2	≤700	≤200	short chip, brass, bronze, red brass	◐	◐	◐			◐	◐
N	6.3	≤700	≤200	long chip brass	◐	◐	◐			◐	◐
N	6.4	≤500	≤470	Cu-Al-Fe alloy (Ampco)	◐	◐	◐			◐	◐
N	7.1	≤350	≤100	Al, Mg non-alloy	◐	◐	◐			◐	◐
N	7.2	≤600	≤180	Al wrought alloy, breaking strain (A5) <14 %	◐	◐	◐			◐	◐
N	7.3	≤600	≤180	Al wrought alloy, breaking strain (A5) ≥14 %	◐	◐	◐			◐	◐
N	7.4	≤600	≤180	Al cast alloy, Si <10 %	◐	◐	◐			◐	◐
N	7.5	≤600	≤180	Al cast alloy, Si ≥10 %	◐	◐	◐			◐	◐
N	8.1			thermoplastics	◐	◐	◐			◐	◐
N	8.2			thermosetting plastics	◐	◐	◐			◐	◐
N	8.3			fibre reinforced plastics	◐	◐	◐			◐	◐

● main area of application ◐ suitable in some cases

Overview

Spherical cutter F322 XH	Spherical cutter F942 XH	End milling cutter F144	End milling cutter F142 XH	End milling cutter F170 XH	Torus milling cutter F742 XH	Chamfer milling cutter FK02	Radius milling cutter FZ02	End milling cutter F065 AL	End milling cutter F066 HF	End milling cutter FJ35 AL
Ø 3 – 16 mm	Ø 6 – 16 mm	Ø 3 – 20 mm	Ø 4 – 10 mm	Ø 6 – 10 mm	Ø 6 – 12 mm	Ø 6 – 12 mm	Ø 6 – 8 mm	Ø 3 – 20 mm	Ø 6 – 25 mm	Ø 4 – 8 mm
2	2 – 4	2 – 4	2 – 4	6	2	3 – 4	4	2 – 3	2	1
DIN 6535 HA	DIN 6535 HA	DIN 6535 HA/HB	DIN 6535 HA	DIN 6535 HA	DIN 6535 HA	DIN 6535 HB	DIN 6535 HB	DIN 6535 HB	DIN 6535 HA	DIN 6535 HA
AlTiN	AlTiN	TiAlN	AlTiN	AlTiN	AlTiN	TiAlN	TiAlN	TiAlN	TiB2	TiAlN
–	–	–	–	–	–	–	–	–	–	–
1,5-8,0 mm	3,0-8,0 mm	0,5-2,0 mm	0,5-2,0 mm	0,3-1,0 mm	1,5-3,0 mm		0,5-6,0 mm	–	–	–
17	18	19	20	21	22	23	24	25	26	27
										
◐	◐	●	◐	◐	◐	●	●			
◐	◐	●	◐	◐	◐	●	●			
◐	◐	●	◐	◐	◐	●	●			
◐	◐	●	◐	◐	◐	●	●			
◐	◐	●	◐	◐	◐	●	●			
◐	◐	●	◐	◐	◐	●	●			
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		◐				●	●	●		●
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		◐				●	●	●		●
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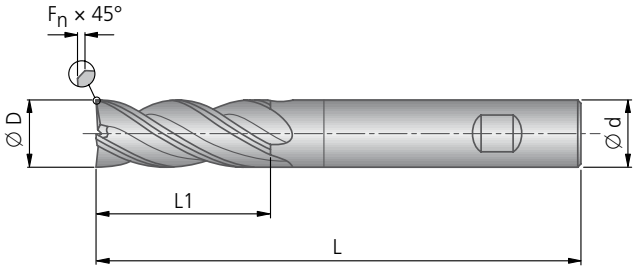
		◐				●	●	●	●	●
		◐				●	●	●		●
		◐				●	●	●		●
		◐				●	●	●		●

JEL® F044 UNI

Ø 3 – 20 mm

End milling cutter for universal use

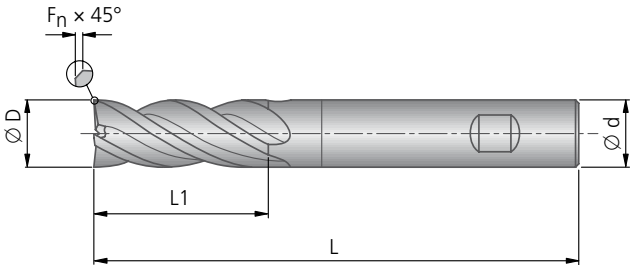
for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 48 HRC		F_n 30°	TiAlN	2 / 3 / 4	DIN 6535 HB Weldon



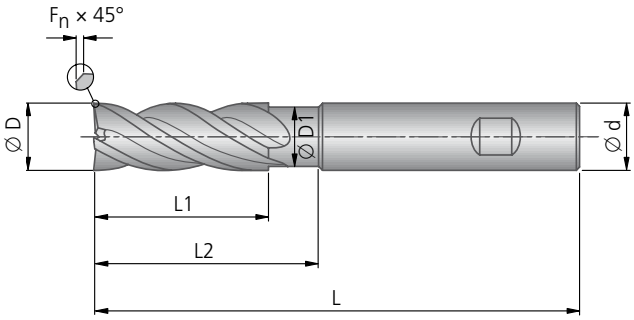
Ø D_{h10}	Cylindrical shank Ø d_{h6}	L	L1	F_n	Article	Order No.
Z = 2 30°						
3	6	57	8	0,05	F044 UNI 3,0 NZ2 30° short TiAlN	70900157020300
4	6	57	11	0,05	F044 UNI 4,0 NZ2 30° short TiAlN	70900157020400
5	6	57	13	0,05	F044 UNI 5,0 NZ2 30° short TiAlN	70900157020500
6	6	57	13	0,10	F044 UNI 6,0 NZ2 30° short TiAlN	70900157020600
8	8	63	19	0,15	F044 UNI 8,0 NZ2 30° short TiAlN	70900163020800
10	10	72	22	0,20	F044 UNI 10,0 NZ2 30° short TiAlN	70900172021000
12	12	82	26	0,25	F044 UNI 12,0 NZ2 30° short TiAlN	70900182021200
14	14	82	26	0,30	F044 UNI 14,0 NZ2 30° short TiAlN	70900182021400
16	16	92	32	0,30	F044 UNI 16,0 NZ2 30° short TiAlN	70900192021600
18	18	92	32	0,35	F044 UNI 18,0 NZ2 30° short TiAlN	70900192021800
20	20	105	38	0,35	F044 UNI 20,0 NZ2 30° short TiAlN	70900105022000
Z = 3 30°						
3	6	57	8	0,05	F044 UNI 3,0 NZ3 30° short TiAlN	70901157030300
4	6	57	11	0,05	F044 UNI 4,0 NZ3 30° short TiAlN	70901157030400
5	6	57	13	0,05	F044 UNI 5,0 NZ3 30° short TiAlN	70901157030500
6	6	57	13	0,10	F044 UNI 6,0 NZ3 30° short TiAlN	70901157030600
8	8	63	19	0,15	F044 UNI 8,0 NZ3 30° short TiAlN	70901163030800
10	10	72	22	0,20	F044 UNI 10,0 NZ3 30° short TiAlN	70901172031000
12	12	82	26	0,25	F044 UNI 12,0 NZ3 30° short TiAlN	70901182031200
14	14	82	26	0,30	F044 UNI 14,0 NZ3 30° short TiAlN	70901182031400
16	16	92	32	0,30	F044 UNI 16,0 NZ3 30° short TiAlN	70901192031600
18	18	92	32	0,35	F044 UNI 18,0 NZ3 30° short TiAlN	70901192031800
20	20	105	38	0,35	F044 UNI 20,0 NZ3 30° short TiAlN	70901105032000
Z = 4 30°						
3	6	57	8	0,05	F044 UNI 3,0 NZ4 30° short TiAlN	70902157040300
4	6	57	11	0,05	F044 UNI 4,0 NZ4 30° short TiAlN	70902157040400
5	6	57	13	0,05	F044 UNI 5,0 NZ4 30° short TiAlN	70902157040500
6	6	57	13	0,10	F044 UNI 6,0 NZ4 30° short TiAlN	70902157040600
8	8	63	19	0,15	F044 UNI 8,0 NZ4 30° short TiAlN	70902163040800
10	10	72	22	0,20	F044 UNI 10,0 NZ4 30° short TiAlN	70902172041000
12	12	82	26	0,25	F044 UNI 12,0 NZ4 30° short TiAlN	70902182041200
14	14	82	26	0,30	F044 UNI 14,0 NZ4 30° short TiAlN	70902182041400
16	16	92	32	0,30	F044 UNI 16,0 NZ4 30° short TiAlN	70902192041600
18	18	92	32	0,35	F044 UNI 18,0 NZ4 30° short TiAlN	70902192041800
20	20	105	38	0,35	F044 UNI 20,0 NZ4 30° short TiAlN	70902105042000

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 48 HRC		F_n 35° / F_n 45°	TiAlN	2 / 4	DIN 6535 HB Weldon

short dimension



long version
with neck groove



Ø D_{h10}	Cylindrical shank Ø d_{h6}	Ø D1	L	L1	L2	F_n	Article	Order No.
Z = 2 35°								
6	6	–	50	15	–	0,10	F064 UNI 6,0 NZ2 35° short TiAlN	70903150020600
6	6	5,8	75	24	39	0,10	F064 UNI 6,0 NZ2 35° long TiAlN	70903175020600
8	8	–	60	20	–	0,15	F064 UNI 8,0 NZ2 35° short TiAlN	70903160020800
8	8	7,7	75	32	39	0,15	F064 UNI 8,0 NZ2 35° long TiAlN	70903175020800
10	10	–	75	25	–	0,20	F064 UNI 10,0 NZ2 35° short TiAlN	70903175021000
10	10	9,6	100	40	60	0,20	F064 UNI 10,0 NZ2 35° long TiAlN	70903100021000
Z = 4 45°								
6	6	–	50	15	–	0,10	F064 UNI 6,0 NZ4 45° short TiAlN	70904150040600
6	6	5,8	75	24	39	0,10	F064 UNI 6,0 NZ4 45° long TiAlN	70904175040600
8	8	–	60	20	–	0,15	F064 UNI 8,0 NZ4 45° short TiAlN	70904160040800
8	8	7,7	75	32	39	0,15	F064 UNI 8,0 NZ4 45° long TiAlN	70904175040800
10	10	–	75	25	–	0,20	F064 UNI 10,0 NZ4 45° short TiAlN	70904175041000
10	10	9,6	100	40	60	0,20	F064 UNI 10,0 NZ4 45° long TiAlN	70904100041000
12	12	–	82	26	–	0,25	F064 UNI 12,0 NZ4 45° short TiAlN	70904182041200
12	12	11,6	105	48	60	0,25	F064 UNI 12,0 NZ4 45° long TiAlN	70904105041200
14	14	–	82	26	–	0,30	F064 UNI 14,0 NZ4 45° short TiAlN	70904182041400
16	16	–	92	32	–	0,30	F064 UNI 16,0 NZ4 45° short TiAlN	70904192041600
18	18	–	92	32	–	0,35	F064 UNI 18,0 NZ4 45° short TiAlN	70904192041800
20	20	–	105	38	–	0,35	F064 UNI 20,0 NZ4 45° short TiAlN	70904105042000

Cutting values for milling: Pages 28-29.

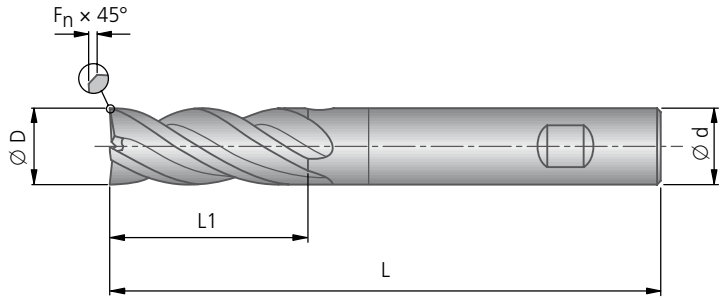
JEL® HPC

Ø 6 – 20 mm

End milling cutter for roughing and finishing

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 44 HRC		F_n 35°/38°	TiAlN	4	DIN 6535 HB Weldon

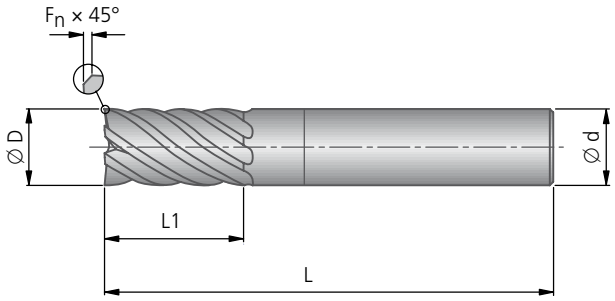
- low-vibration running thanks to the uneven spiral angle of 35°/38°
- two front cutters that cut as far as the centre



Z = 4						
Ø D_{h10}	Cylindrical shank Ø d_{h6}	L	L1	F_n	Article	Order No.
6	6	57	13	0,2	HPC 6,0 NZ4 35-38° TiAlN	**70906157040600**
8	8	63	19	0,2	HPC 8,0 NZ4 35-38° TiAlN	**70906163040800**
10	10	72	22	0,3	HPC 10,0 NZ4 35-38° TiAlN	**70906172041000**
12	12	83	26	0,3	HPC 12,0 NZ4 35-38° TiAlN	**70906183041200**
14	14	83	26	0,3	HPC 14,0 NZ4 35-38° TiAlN	**70906183041400**
16	16	92	32	0,4	HPC 16,0 NZ4 35-38° TiAlN	**70906192041600**
20	20	104	38	0,5	HPC 20,0 NZ4 35-38° TiAlN	**70906104042000**

End milling cutter for finish machining on hardened steel

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 46-56 HRC		F_n 50°	AlTiN	4 / 6 / 8	DIN 6535 HA



Ø D_{h10}	Cylindrical shank Ø d_{h6}	L	L1	F_n	Article	Order No.
Z = 4						
3	6	50	4	–	F072 XH 3,0 NZ4 50° short AlTiN	**78910250040300**
4	6	50	5	–	F072 XH 4,0 NZ4 50° short AlTiN	**78910250040400**
Z = 6						
6	6	57	13	–	F072 XH 6,0 NZ6 50° short AlTiN	**78910257060600**
8	8	63	19	–	F072 XH 8,0 NZ6 50° short AlTiN	**78910263060800**
10	10	72	22	0,1	F072 XH 10,0 NZ6 50° short AlTiN	**78910272061000**
12	12	82	26	0,1	F072 XH 12,0 NZ6 50° short AlTiN	**78910282061200**
Z = 8						
16	16	92	32	0,2	F072 XH 16,0 NZ8 50° short AlTiN	**78910292081600**
18	18	92	32	0,2	F072 XH 18,0 NZ8 50° short AlTiN	**78910292081800**
20	20	105	38	0,2	F072 XH 20,0 NZ8 50° short AlTiN	**78910205082000**

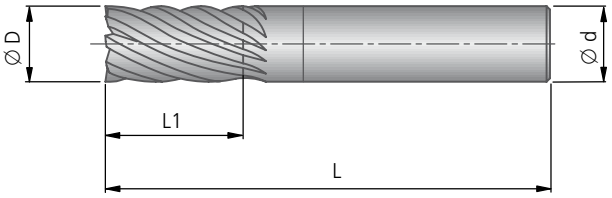
Cutting values for milling: Pages 28-29.

JEL® F041 XH

Ø 6 – 16 mm

End milling cutter for finish machining on hardened steel

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 50–65 HRC		F_n 30°	AlTiN	6 / 8 / 10 12 / 16	DIN 6535 HA

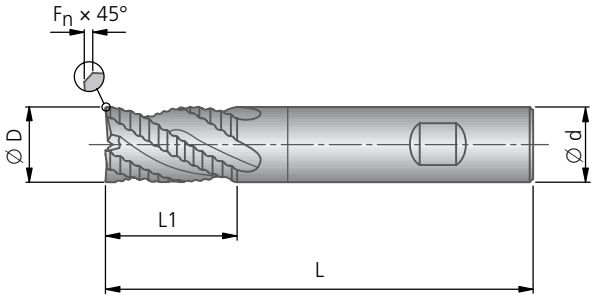


Z = 6 - 16						
Ø D_{h10}	Cylindrical shank Ø d_{h6}	L	L1	Z	Article	Order No.
6	6	57	13	6	F041 XH 6,0 NZ6 30° short AlTiN	**78911257060600**
8	8	63	19	8	F041 XH 8,0 NZ8 30° short AlTiN	**78911263080800**
10	10	72	22	10	F041 XH 10,0 NZ10 30° short AlTiN	**78911272101000**
12	12	82	26	12	F041 XH 12,0 NZ12 30° short AlTiN	**78911282121200**
16	16	92	32	16	F041 XH 16,0 NZ16 30° short AlTiN	**78911292161600**

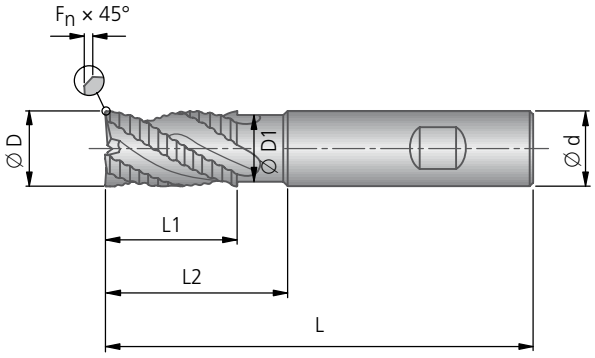
Roughing end mill with cord profile

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 48 HRC		F_n 30°	TiAlN	4	DIN 6535 HB Weldon

∅ 6 - 8 mm
without neck groove



≥ ∅ 10 mm
with neck groove



Z = 4								
Ø D_{h10}	Cylindrical shank Ø d_{h6}	Ø D1	L	L1	L2	F_n	Article	Order No.
6	6	–	57	13	–	0,3	F544 6,0 NZ4 30° short TiAlN	**70905157040600**
8	8	–	63	19	–	0,3	F544 8,0 NZ4 30° short TiAlN	**70905163040800**
10	10	9,6	72	22	32	0,5	F544 10,0 NZ4 30° short TiAlN	**70905172041000**
12	12	11,6	82	26	37	0,5	F544 12,0 NZ4 30° short TiAlN	**70905182041200**
14	14	13,6	82	26	37	0,5	F544 14,0 NZ4 30° short TiAlN	**70905182041400**
16	16	15,6	92	32	44	0,5	F544 16,0 NZ4 30° short TiAlN	**70905192041600**
18	18	17,4	92	32	44	0,5	F544 18,0 NZ4 30° short TiAlN	**70905192041800**
20	20	19,4	105	38	55	0,5	F544 20,0 NZ4 30° short TiAlN	**70905104042000**

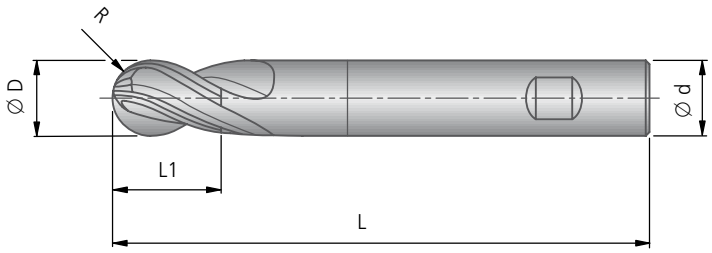
Cutting values for milling: Pages 28-29.

JEL® F344

Ø 3 – 20 mm

Spherical cutter for universal use

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 48 HRC		30°	TiAlN	2 / 4	DIN 6535 HB Weldon

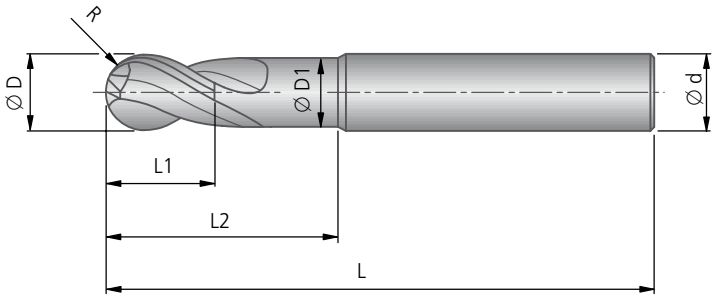


Z = 2						
Ø D_{h10}	Cylindrical shank Ø d_{h6}	L	L1	R±0,02	Article	Order No.
3	6	60	6	1,5	F344 3,0 R1,5 NZ2 30° short TiAlN	70950460020300
4	6	75	8	2,0	F344 4,0 R2,0 NZ2 30° long TiAlN	70950475020400
5	6	50	10	2,5	F344 5,0 R2,5 NZ2 30° short TiAlN	70950450020500
5	6	75	10	2,5	F344 5,0 R2,5 NZ2 30° long TiAlN	70950475020500
6	6	50	12	3,0	F344 6,0 R3,0 NZ2 30° short TiAlN	70950450020600
6	6	75	12	3,0	F344 6,0 R3,0 NZ2 30° long TiAlN	70950475020600
8	8	60	16	4,0	F344 8,0 R4,0 NZ2 30° short TiAlN	70950460020800
8	8	100	16	4,0	F344 8,0 R4,0 NZ2 30° long TiAlN	70950400020800
10	10	75	20	5,0	F344 10,0 R5,0 NZ2 30° short TiAlN	70950475021000
10	10	100	20	5,0	F344 10,0 R5,0 NZ2 30° long TiAlN	70950400021000
12	12	105	30	6,0	F344 12,0 R6,0 NZ2 30° short TiAlN	70950405021200
14	14	105	30	7,0	F344 14,0 R7,0 NZ2 30° short TiAlN	70950405021400
16	16	160	40	8,0	F344 16,0 R8,0 NZ2 30° long TiAlN	70950460021600
18	18	160	40	9,0	F344 18,0 R9,0 NZ2 30° long TiAlN	70950460021800
20	20	160	55	10,0	F344 20,0 R10,0 NZ2 30° long TiAlN	70950460022000
Z = 4						
5	6	50	10	2,5	F344 5,0 R2,5 NZ4 30° short TiAlN	70951450040500
6	6	50	12	3,0	F344 6,0 R3,0 NZ4 30° short TiAlN	70951450040600
8	8	60	16	4,0	F344 8,0 R4,0 NZ4 30° short TiAlN	70951460040800
10	10	75	20	5,0	F344 10,0 R5,0 NZ4 30° short TiAlN	70951475041000
12	12	105	30	6,0	F344 12,0 R6,0 NZ4 30° short TiAlN	70951405041200
14	14	105	30	7,0	F344 14,0 R7,0 NZ4 30° short TiAlN	70951405041400
16	16	160	40	8,0	F344 16,0 R8,0 NZ4 30° long TiAlN	70951460041600
18	18	160	40	9,0	F344 18,0 R9,0 NZ4 30° long TiAlN	70951460041800
20	20	160	55	10,0	F344 20,0 R10,0 NZ4 30° long TiAlN	70951460042000

Spherical cutter for use on hardened steel

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 50–65 HRC		20°	AlTiN	2	DIN 6535 HA

with neck groove ■
front cutting technology for plunging ■



Z = 2								
Ø D_{h10}	Cylindrical shank Ø d_{h6}	Ø D1	L	L1	L2	R±0,02	Article	Order No.
3	6	–	50	4	10	1.5	F322 XH 3,0 R1,5 NZ2 20° AlTiN	**78952450020300**
4	6	–	50	5	16	2,0	F322 XH 4,0 R2,0 NZ2 20° AlTiN	**78952450020400**
6	6	5,6	80	6	20	3,0	F322 XH 6,0 R3,0 NZ2 20° AlTiN	**78952480020600**
8	8	7,6	80	8	25	4,0	F322 XH 8,0 R4,0 NZ2 20° AlTiN	**78952480020800**
10	10	9,6	105	10	30	5,0	F322 XH 10,0 R5,0 NZ2 20° AlTiN	**78952405021000**
12	12	11,6	105	12	32	6,0	F322 XH 12,0 R6,0 NZ2 20° AlTiN	**78952405021200**
16	16	15,6	105	16	36	8,0	F322 XH 16,0 R8,0 NZ2 20° AlTiN	**78952405021600**

Cutting values for milling: Pages 28-29.

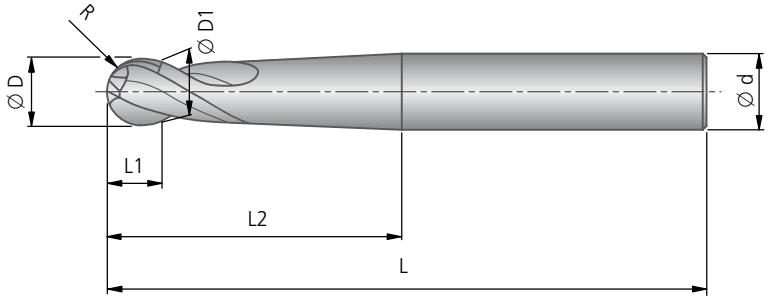
JEL® F942 XH

Ø 6 – 16 mm

Spherical cutter for use on hardened steel

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 50–65 HRC		30°	AlTiN	2 / 4	DIN 6535 HA

■ conical version

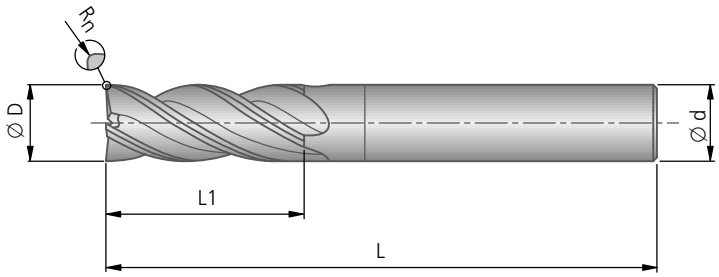


Ø D_{h10}	Cylindrical shank Ø d_{h6}	Ø D1	L	L1	L2	R±0,02	Article	Order No.
Z = 2								
6	6	4,7	100	4,9	30	3,0	F942 XH 6,0 R3,0 NZ2 30° AlTiN	78953400020600
8	8	6,5	100	6,3	36	4,0	F942 XH 8,0 R4,0 NZ2 30° AlTiN	78953400020800
10	10	8,2	100	7,9	43	5,0	F942 XH 10,0 R5,0 NZ2 30° AlTiN	78953400021000
12	12	9,8	100	9,5	52	6,0	F942 XH 12,0 R6,0 NZ2 30° AlTiN	78953400021200
16	16	13,4	160	12,4	61	8,0	F942 XH 16,0 R8,0 NZ2 30° AlTiN	78953460021600
Z = 4								
6	6	4,7	100	4,9	30	3,0	F942 XH 6,0 R3,0 NZ4 30° AlTiN	78954400040600
8	8	6,5	100	6,3	36	4,0	F942 XH 8,0 R4,0 NZ4 30° AlTiN	78954400040800
10	10	8,2	100	7,9	43	5,0	F942 XH 10,0 R5,0 NZ4 30° AlTiN	78954400041000
12	12	9,8	100	9,5	52	6,0	F942 XH 12,0 R6,0 NZ4 30° AlTiN	78954400041200
16	16	13,4	160	12,4	61	8,0	F942 XH 16,0 R8,0 NZ4 30° AlTiN	78954460041600

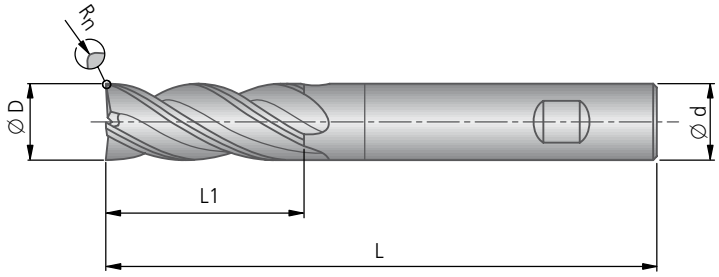
for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 48 HRC		R_n 35° / R_n 45°	TiAlN	2 / 4	DIN 6535 HA Ød2 <6mm / DIN 6535 HB Weldon

with corner radius ■

Ø d1 < 6 mm



Ø d1 ≥ 6 mm



Ø D_{h10}	Cylindrical shank Ø d_{h6}	L	L1	R_n ±0,02	Article	Order No.
Z = 2 35°						
3	4	50	8	0,5	F144 3,0 R0,5 NZ2 35° TiAlN	78955150020302
4	4	50	10	0,5	F144 4,0 R0,5 NZ2 35° TiAlN	78955150020402
4	4	50	10	1,0	F144 4,0 R1,0 NZ2 35° TiAlN	78955150020403
6	6	50	15	0,5	F144 6,0 R0,5 NZ2 35° TiAlN	70955150020602
6	6	50	15	1,0	F144 6,0 R1,0 NZ2 35° TiAlN	70955150020603
8	8	60	20	0,5	F144 8,0 R0,5 NZ2 35° TiAlN	70955160020802
8	8	60	20	1,0	F144 8,0 R1,0 NZ2 35° TiAlN	70955160020803
10	10	75	25	0,5	F144 10,0 R0,5 NZ2 35° TiAlN	70955175021002
10	10	75	25	1,0	F144 10,0 R1,0 NZ2 35° TiAlN	70955175021003
10	10	75	25	2,0	F144 10,0 R2,0 NZ2 35° TiAlN	70955175021005
12	12	82	26	1,5	F144 12,0 R1,5 NZ2 35° TiAlN	70955182021204
12	12	82	26	2,0	F144 12,0 R2,0 NZ2 35° TiAlN	70955182021205
16	16	92	32	1,5	F144 16,0 R1,5 NZ2 35° TiAlN	70955192021604
16	16	92	32	2,0	F144 16,0 R2,0 NZ2 35° TiAlN	70955192021605
20	20	105	38	1,5	F144 20,0 R1,5 NZ2 35° TiAlN	70955105022004
20	20	105	38	2,0	F144 20,0 R2,0 NZ2 35° TiAlN	70955105022005
Z = 4 45°						
3	4	50	8	0,5	F144 3,0 R0,5 NZ4 45° TiAlN	78956150040302
4	4	50	10	0,5	F144 4,0 R0,5 NZ4 45° TiAlN	78956150040402
4	4	50	10	1,0	F144 4,0 R1,0 NZ4 45° TiAlN	78956150040403
6	6	50	15	0,5	F144 6,0 R0,5 NZ4 45° TiAlN	70956150040602
6	6	50	15	1,0	F144 6,0 R1,0 NZ4 45° TiAlN	70956150040603
8	8	60	20	0,5	F144 8,0 R0,5 NZ4 45° TiAlN	70956160040802
8	8	60	20	1,0	F144 8,0 R1,0 NZ4 45° TiAlN	70956160040803
10	10	75	25	0,5	F144 10,0 R0,5 NZ4 45° TiAlN	70956175041002
10	10	75	25	1,0	F144 10,0 R1,0 NZ4 45° TiAlN	70956175041003
10	10	75	25	2,0	F144 10,0 R2,0 NZ4 45° TiAlN	70956175041005
12	12	82	26	1,5	F144 12,0 R1,5 NZ4 45° TiAlN	70956182041204
12	12	82	26	2,0	F144 12,0 R2,0 NZ4 45° TiAlN	70956182041205
16	16	92	32	1,5	F144 16,0 R1,5 NZ4 45° TiAlN	70956192041604
16	16	92	32	2,0	F144 16,0 R2,0 NZ4 45° TiAlN	70956192041605
20	20	105	38	1,5	F144 20,0 R1,5 NZ4 45° TiAlN	70956105042004
20	20	105	38	2,0	F144 20,0 R2,0 NZ4 45° TiAlN	70956105042005

Cutting values for milling: Pages 28-29.

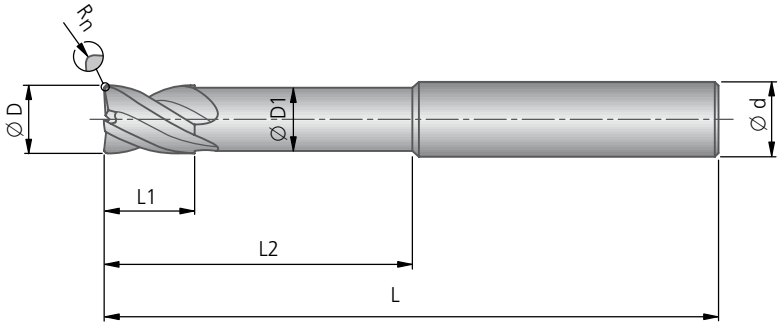
JEL® F142 XH

Ø 4 – 10 mm

End milling cutter for use on hardened steel

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 46-56 HRC		R_n 30°	AlTiN	2 / 4	DIN 6535 HA

- with corner radius
- with neck groove
- two front cutters to the centre

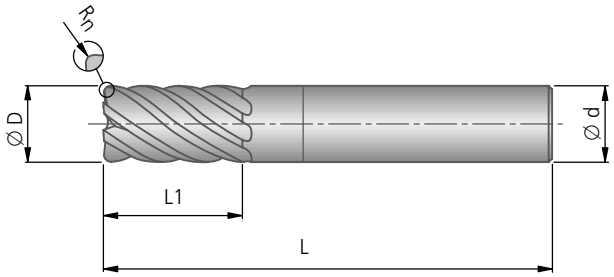


Ø D_{h10}	Cylindrical shank Ø d_{h6}	Ø D1	L	L1	L2	R_n ±0,02	Article	Order No.
Z = 2								
4	6	3,7	50	4	10	0,5	F142 XH 4,0 R0,5 NZ2 30° AlTiN	78912250020402
6	6	5,6	50	6	15	0,5	F142 XH 6,0 R0,5 NZ2 30° AlTiN	78912250020602
8	8	7,6	60	8	20	0,5	F142 XH 8,0 R0,5 NZ2 30° AlTiN	78912260020802
8	8	7,6	60	8	20	1,0	F142 XH 8,0 R1,0 NZ2 30° AlTiN	78912260020803
8	8	7,6	60	8	20	2,0	F142 XH 8,0 R2,0 NZ2 30° AlTiN	78912260020805
10	10	9,6	75	10	25	0,5	F142 XH 10,0 R0,5 NZ2 30° AlTiN	78912275021002
10	10	9,6	75	10	25	1,0	F142 XH 10,0 R1,0 NZ2 30° AlTiN	78912275021003
10	10	9,6	75	10	25	2,0	F142 XH 10,0 R2,0 NZ2 30° AlTiN	78912275021005
Z = 4								
4	6	3,7	75	4	10	0,5	F142 XH 4,0 R0,5 NZ4 30° AlTiN	78913275040402
6	6	5,6	75	6	15	0,5	F142 XH 6,0 R0,5 NZ4 30° AlTiN	78913275040602
6	6	5,6	75	6	15	1,0	F142 XH 6,0 R1,0 NZ4 30° AlTiN	78913275040603
8	8	7,6	100	8	20	0,5	F142 XH 8,0 R0,5 NZ4 30° AlTiN	78913200040802
8	8	7,6	100	8	20	1,0	F142 XH 8,0 R1,0 NZ4 30° AlTiN	78913200040803
10	10	9,6	100	10	25	1,0	F142 XH 10,0 R1,0 NZ4 30° AlTiN	78913200041003
10	10	9,6	100	10	25	2,0	F142 XH 10,0 R2,0 NZ4 30° AlTiN	78913200041005

End milling cutter for finish machining on hardened steel

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 50–65 HRC		R_n 50°	AlTiN	6	DIN 6535 HA

with corner radius ■



Z = 6						
Ø D_{h10}	Cylindrical shank Ø d_{h6}	L	L1	R_n ±0,02	Article	Order No.
6	6	50	15	0,3	F170 XH 6,0 R0,3 NZ6 50° AlTiN	**78914250060601**
6	6	50	15	0,5	F170 XH 6,0 R0,5 NZ6 50° AlTiN	**78914250060602**
8	8	60	20	0,3	F170 XH 8,0 R0,3 NZ6 50° AlTiN	**78914260060801**
8	8	60	20	0,5	F170 XH 8,0 R0,5 NZ6 50° AlTiN	**78914260060802**
10	10	75	25	0,5	F170 XH 10,0 R0,5 NZ6 50° AlTiN	**78914275061002**
10	10	75	25	1,0	F170 XH 10,0 R1,0 NZ6 50° AlTiN	**78914275061003**

Cutting values for milling: Pages 28-29.

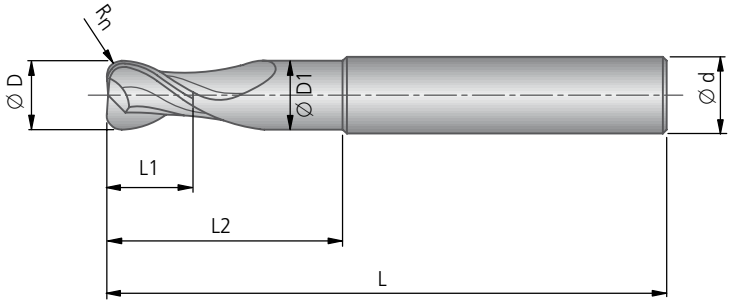
JEL® F742 XH

Ø 6 – 12 mm

Torus milling cutter

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H	< 46-56 HRC		R_n 30°	AlTiN	2	DIN 6535 HA

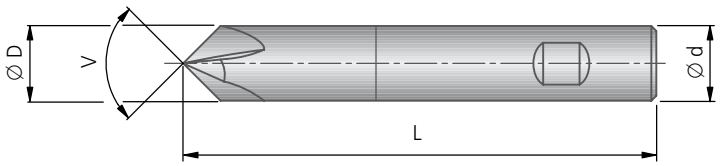
- with neck groove
- front cutting for plunging
- used especially in mould and die making for copy milling



Z = 2								
Ø D_{h10}	Cylindrical shank Ø d_{h6}	Ø D1	L	L1	L2	R_n ±0,02	Article	Order No.
6	6	5,4	100	8	30	1,5	F742 XH 6,0 R1,5 NZ2 30° AlTiN	**78915200020604**
8	8	7,2	100	10	30	2,0	F742 XH 8,0 R2,0 NZ2 30° AlTiN	**78915200020805**
10	10	9	100	12	35	2,5	F742 XH 10,0 R2,5 NZ2 30° AlTiN	**78915200021006**
12	12	11	105	14	40	3,0	F742 XH 12,0 R3,0 NZ2 30° AlTiN	**78915205021207**

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	coating	no. of teeth Z	tool holder
P M K N S H	< 58 HRC		TiAlN	3 / 4	DIN 6535 HB Weldon

for chamfering and deburring of workpiece edges ■



Ø D	Cylindrical shank Ø d_{h6}	L	V	Article	Order No.
Z = 3					
6	6	57	60°	FK02 6,0 60° NZ3 TiAlN	**70920557030600**
6	6	57	90°	FK02 6,0 90° NZ3 TiAlN	**70921557030600**
8	8	63	60°	FK02 8,0 60° NZ3 TiAlN	**70920563030800**
8	8	63	90°	FK02 8,0 90° NZ3 TiAlN	**70921563030800**
Z = 4					
10	10	72	60°	FK02 10,0 60° NZ4 TiAlN	**70920572041000**
10	10	72	90°	FK02 10,0 90° NZ4 TiAlN	**70921572041000**
12	12	82	60°	FK02 12,0 60° NZ4 TiAlN	**70920582041200**
12	12	82	90°	FK02 12,0 90° NZ4 TiAlN	**70921582041200**

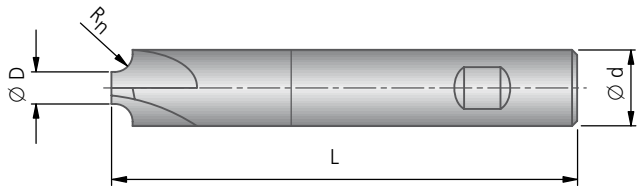
Cutting values for milling: Pages 28-29.

JEL® FZ02 Ø 6 – 8 mm

Radius milling cutter

for material ● main area of application ◐ suitable in some cases	for material strength	machining direction	coating	no. of teeth Z	tool holder
P M K N S H	< 58 HRC		TiAlN	4	DIN 6535 HB Weldon

■ for chamfering and deburring edges and contours

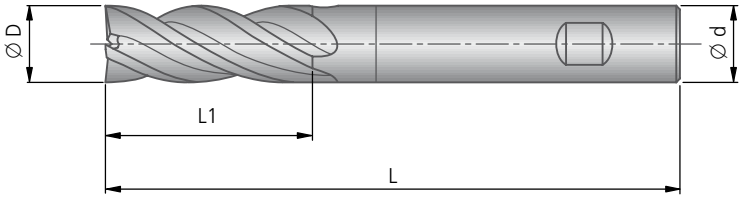


Z = 4					
Ø D_{h6}	Cylindrical shank Ø d_{h6}	L	R_n±0,02	Article	Order No.
6	8	70	1,0	FZ02 6,0 R1,0 NZ4 TiAlN	**70922570040603**
6	10	75	2,0	FZ02 6,0 R2,0 NZ4 TiAlN	**70922575040605**
6	12	75	3,0	FZ02 6,0 R3,0 NZ4 TiAlN	**70922575040607**
6	16	75	5,0	FZ02 6,0 R5,0 NZ4 TiAlN	**70922575040609**
7	8	70	0,5	FZ02 7,0 R0,5 NZ4 TiAlN	**70922570040702**
8	16	75	4,0	FZ02 8,0 R4,0 NZ4 TiAlN	**70922575040808**
8	20	80	6,0	FZ02 8,0 R6,0 NZ4 TiAlN	**70922580040809**

End milling cutter for machining aluminium and non-ferrous metals

for material ● main area of application ◐ suitable in some cases	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H		45°	TiAlN	2 / 3	DIN 6535 HB Weldon

front-cutting ■
short and long versions ■



Ø D_{h6}	Cylindrical shank Ø d_{h6}	L	L1	Article	Order No.
Z = 2					
3	6	57	9	F065 AL 3,0 NZ2 45° short TiAlN	**70933057020300**
4	6	57	12	F065 AL 4,0 NZ2 45° short TiAlN	**70933057020400**
5	6	57	15	F065 AL 5,0 NZ2 45° short TiAlN	**70933057020500**
6	6	57	13	F065 AL 6,0 NZ2 45° short TiAlN	**70933057020600**
6	6	75	24	F065 AL 6,0 NZ2 45° long TiAlN	**70933075020600**
8	8	63	19	F065 AL 8,0 NZ2 45° short TiAlN	**70933063020800**
8	8	75	32	F065 AL 8,0 NZ2 45° long TiAlN	**70933075020800**
10	10	72	22	F065 AL 10,0 NZ2 45° short TiAlN	**70933072021000**
10	10	100	40	F065 AL 10,0 NZ2 45° long TiAlN	**70933000021000**
12	12	82	26	F065 AL 12,0 NZ2 45° short TiAlN	**70933082021200**
16	16	92	32	F065 AL 16,0 NZ2 45° short TiAlN	**70933092021600**
20	20	105	38	F065 AL 20,0 NZ2 45° short TiAlN	**70933005022000**
Z = 3					
3	6	57	9	F065 AL 3,0 NZ3 45° short TiAlN	**70934057030300**
4	6	57	12	F065 AL 4,0 NZ3 45° short TiAlN	**70934057030400**
5	6	57	15	F065 AL 5,0 NZ3 45° short TiAlN	**70934057030500**
6	6	57	13	F065 AL 6,0 NZ3 45° short TiAlN	**70934057030600**
8	8	63	19	F065 AL 8,0 NZ3 45° short TiAlN	**70934063030800**
10	10	72	22	F065 AL 10,0 NZ3 45° short TiAlN	**70934072031000**
12	12	82	26	F065 AL 12,0 NZ3 45° short TiAlN	**70934082031200**
16	16	92	32	F065 AL 16,0 NZ3 45° short TiAlN	**70934092031600**
20	20	105	38	F065 AL 20,0 NZ3 45° short TiAlN	**70934005032000**

Cutting values for milling: Pages 28-29.

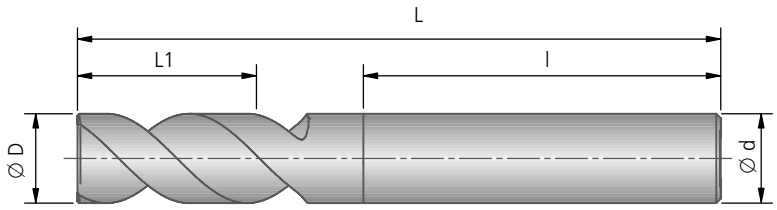
JEL® F066 HF

Ø 6 – 25 mm

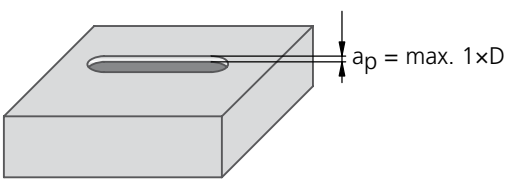
High-speed end milling cutter for aluminium machining

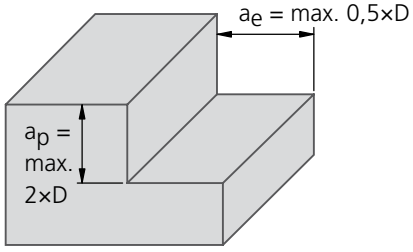
for material ● main area of application ◐ suitable in some cases	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H		45°	TiB_2	2	DIN 6535 HA

■ front-cutting



Z = 2					
Ø D	Cylindrical shank Ø d × l	L	L1	Article	Order No.
6	6 × 36	57	12	F066 HF 6,0 NZ2 TiB_2	**78931057000600**
8	8 × 36	63	16	F066 HF 8,0 NZ2 TiB_2	**78931063000800**
10	10 × 40	72	20	F066 HF 10,0 NZ2 TiB_2	**78931072001000**
12	12 × 45	83	24	F066 HF 12,0 NZ2 TiB_2	**78931083001200**
16	16 × 48	90	35	F066 HF 16,0 NZ2 TiB_2	**78931090001600**
20	20 × 50	104	40	F066 HF 20,0 NZ2 TiB_2	**78931004002000**
25	25 × 56	120	45	F066 HF 25,0 NZ2 TiB_2	**78931020002500**

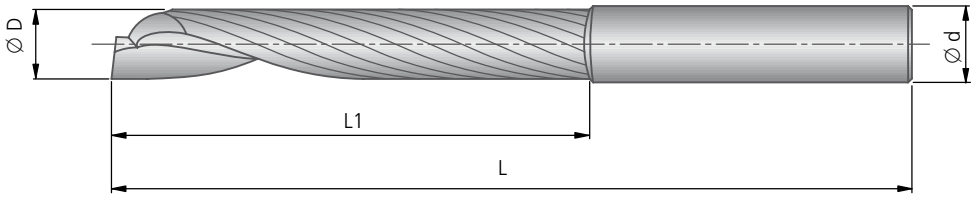




End milling cutter with special geometry for aluminium and plastic machining

for material ● main area of application ◐ suitable in some cases	machining direction	helix angle	coating	no. of teeth Z	tool holder
P M K N S H		25°	TiAlN	1	DIN 6535 HA

contour milling ■
1 cutting edge ■



Z = 1					
Ø D_{h6}	Cylindrical shank Ø d_{h6}	L	L1	Article	Order No.
4	4	50	12	FJ35 AL 4,0 NZ1 25° short TiAlN	**78935050010400**
4	4	75	20	FJ35 AL 4,0 NZ1 25° long TiAlN	**78935075010400**
5	5	50	16	FJ35 AL 5,0 NZ1 25° short TiAlN	**78935050010500**
5	5	75	28	FJ35 AL 5,0 NZ1 25° long TiAlN	**78935075010500**
6	6	50	16	FJ35 AL 6,0 NZ1 25° short TiAlN	**78935050010600**
6	6	75	35	FJ35 AL 6,0 NZ1 25° long TiAlN	**78935075010600**
8	8	50	18	FJ35 AL 8,0 NZ1 25° short TiAlN	**78935050010800**
8	8	100	40	FJ35 AL 8,0 NZ1 25° long TiAlN	**78935000010800**

Cutting values for milling: Pages 28-29.

JEL® Solid carbide milling cutter

Recommended application areas

Material Group		Strength Rm (N/mm²)	Hardness HB	Type	End milling cutter F044 UNI		End milling cutter F064 UNI		End milling cutter HPC		End milling cutter F072 XH		End milling cutter F041 XH		Roughing end mill F544		Spherical cutter F344	
				Diameter	Ø 3 – 20 mm		Ø 6 – 20 mm		Ø 6 – 20 mm		Ø 3 – 20 mm		Ø 6 – 16 mm		Ø 6 – 20 mm		Ø 3 – 20 mm	
				No. of teeth	2 – 4		2 – 4		4		4 – 8		6 – 16		4		2 – 4	
				Shank	DIN 6535 HB		DIN 6535 HB		DIN 6535 HB		DIN 6535 HA		DIN 6535 HA		DIN 6535 HB		DIN 6535 HB	
				Coating	TiAlN		TiAlN		TiAlN		AlTiN		AlTiN		TiAlN		TiAlN	
				Page	10		11		12		13		14		15		16	
				Material	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf
P	1.1	≤400	≤120	magnetic soft iron	165	2	165	2	180	2					165	2	170	p4
P	1.2	≤700	≤200	structural, case hardened steel	135	2	135	2	160	2					150	2	160	p4
P	1.3	≤850	≤250	carbon steel	125	2	125	2	140	2					140	2	150	p4
P	1.4	≤850	≤250	alloy steel	125	2	125	2	140	2					140	2	150	p4
P	1.5	>850 ≤1200	>250 ≤350	alloy/heat treated steel	100	1	100	1	120	1					120	1	130	p4
P	1.6	>1200	>350	alloy/heat treated steel	90	1	90	1	100	1					100	1	95	p3
H	1.7	≤1400	≤400	hardened steel to 56 HRC							80	4	80	4				
H	1.8	≤2200	≤600	hardened steel to 65 HRC							60	4	60	4				
M	2.1	≤850	≤250	stainless steel, sulphuretted	75	1	75	1	110	1							95	p3
M	2.2	≤850	≤250	austentic	65	1	65	1	110	1							85	p2
M	2.3	≤1000	≤300	ferritic, ferritic & austentic, martensitic	70	1	70	1	110	1							75	p3
K	3.1	≤500	≤150	grey cast iron	150	2	150	2	150	2					160	2	225	p4
K	3.2	>500 ≤1000	>150 ≤300	grey cast iron, heat treated	130	2	130	2	130	2					140	2	210	p4
K	3.3	400-500	200-250	vermicular cast iron	130	2	130	2	130	2					140	2	210	p4
K	3.4	≤700	≤200	spheroidal graphite cast iron	130	2	130	2	130	2					140	2	190	p4
K	3.5	>700 ≤1000	>200 ≤300	spheroidal graphite cast iron, heat treated	110	2	110	2	110	2					120	2	160	p4
K	3.6	≤700	≤200	malleable iron	110	2	110	2	110	2					120	2	145	p4
K	3.7	>700 <1000	>200 ≤300	malleable iron, heat treated	110	2	110	2	110	2					120	2	145	p4
S	4.1	≤700	≤200	pure titanium	60	1	60	1	60	1					65	1		
S	4.2	≤900	≤270	titanium alloys	60	1	60	1	60	1					65	1		
S	4.3	>900 ≤1250	>270 ≤300	titanium alloys	55	1	55	1	55	1					60	1		
S	5.1	≤500	≤150	pure nickel	45	1	45	1	45	1							55	p2
S	5.2	≤900	<270	nickel alloys, heat resistant	35	1	35	1	35	1							55	p2
S	5.3	>900 ≤1200	>270 ≤350	nickel alloys, high heat resistant	30	1	30	1	30	1							45	p2
N	6.1	≤350	≤100	non-alloy copper	175	3	175	3							190	3	145	p5
N	6.2	≤700	≤200	short chip, brass, bronze, red brass	160	3	160	3							180	3	140	p5
N	6.3	≤700	≤200	long chip brass	175	3	175	3							190	3	145	p5
N	6.4	≤500	≤470	Cu-Al-Fe alloy (Ampco)	100	3	100	3							110	3	80	p5
N	7.1	≤350	≤100	Al, Mg non-alloy	280	3	280	3							310	3	520	p5
N	7.2	≤600	≤180	Al wrought alloy, breaking strain (A5) <14 %	260	3	260	3							285	3	460	p5
N	7.3	≤600	≤180	Al wrought alloy, breaking strain (A5) ≥14 %	260	3	260	3							285	3	460	p5
N	7.4	≤600	≤180	Al cast alloy, Si <10 %	240	3	240	3							270	3	270	p5
N	7.5	≤600	≤180	Al cast alloy, Si ≥10 %	200	3	200	3							220	3	220	p5
N	8.1			thermoplastics	160	3	160	3							175	3	210	p5
N	8.2			thermosetting plastics	175	3	175	3							190	3	225	p5
N	8.3			fibre reinforced plastics	145	3	145	3							160	3	190	p5

v_c = Cutting speed; Kf = Correction factor for feed f_z (page 31)

Recommended application areas

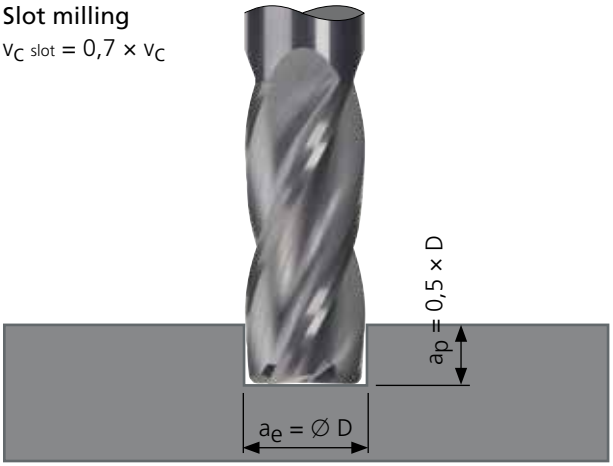
Spherical cutter F322 XH Ø 3 – 16 mm 2 DIN 6535 HA AlTiN 17		Spherical cutter F942 XH Ø 6 – 16 mm 2 – 4 DIN 6535 HA AlTiN 18		End milling cutter F144 Ø 3 – 20 mm 2 – 4 DIN 6535 HA/HB TiAlN 19		End milling cutter F142 XH Ø 4 – 10 mm 2 – 4 DIN 6535 HA AlTiN 20		End milling cutter F170 XH Ø 6 – 10 mm 6 DIN 6535 HA AlTiN 21		Torus milling cutter F742 XH Ø 6 – 12 mm 2 DIN 6535 HA AlTiN 22		Chamfer milling cutter FK02 Ø 6 – 12 mm 3 – 4 DIN 6535 HB TiAlN 23	Radius milling cutter FZ02 Ø 6 – 8 mm 4 DIN 6535 HB TiAlN 24	End milling cutter F065 AL Ø 3 – 20 mm 2 – 3 DIN 6535 HB TiAlN 25		End milling cutter F066 HF Ø 6 – 25 mm 2 DIN 6535 HA TiB2 26		End milling cutter FJ35 AL Ø 4 – 8 mm 1 DIN 6535 HA TiAlN 27	
v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	v_c (m/min)	v_c (m/min)	Kf	v_c (m/min)	Kf	v_c (m/min)	Kf
235	p4	225	p4	165	2					225	p4	165	165						
220	p4	210	p4	135	2					210	p4	135	135						
205	p4	200	p4	125	2					200	p4	125	125						
205	p4	200	p4	125	2					200	p4	125	125						
180	p4	175	p4	100	1					175	p4	100	100						
135	p3	125	p3	90	1					125	p3	90	90						
145	p1	140	p1			80	p4	80	4	140	p1								
125	p1	120	p1			60	p4	60	4	120	p1								
				75	1							75	75						
				65	1							65	65						
				70	1							70	70						
305	p4	300	p4	150	2					300	p4	150	150						
280	p4	275	p4	130	2					275	p4	130	130						
280	p4	275	p4	130	2					275	p4	130	130						
260	p4	250	p4	130	2					250	p4	130	130						
220	p4	210	p4	110	2					210	p4	110	110						
200	p4	190	p4	110	2					190	p4	110	110						
200	p4	190	p4	110	2					190	p4	110	110						
				60	1							60	60						
				60	1							60	60						
				55	1							55	55						
				45	1							45	45						
				35	1							35	35						
				30	1							30	30						
				175	3							175	175	150	3			150	3
				160	3							160	160	140	3			140	3
				175	3							175	175	150	3			150	3
				100	3							100	100	80	3			80	3
				280	3							280	280	500	3	300 - 600	3	500	3
				260	3							260	260	420	3	300 - 600	3	420	3
				260	3							260	260	420	3	300 - 600	3	420	3
				240	3							240	240	270	3	200 - 500	3	270	3
				200	3							200	200	220	3	100 - 300	3	220	3
				160	3							160	160	150	3			150	3
				175	3							175	175	160	3			160	3
				145	3							145	145	120	3			120	3

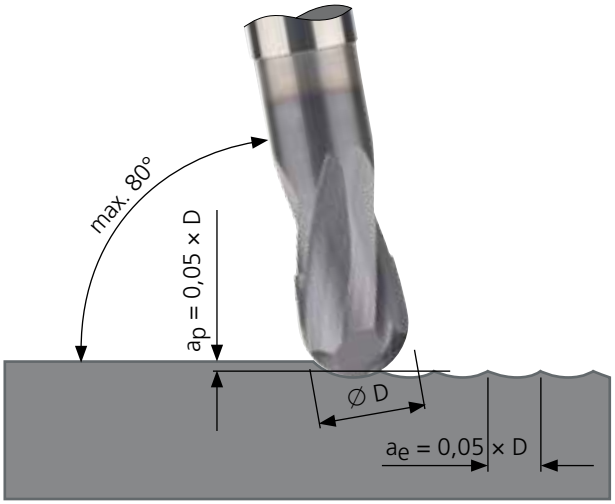
JEL ® Solid carbide milling cutter

Technical notes

Slot milling

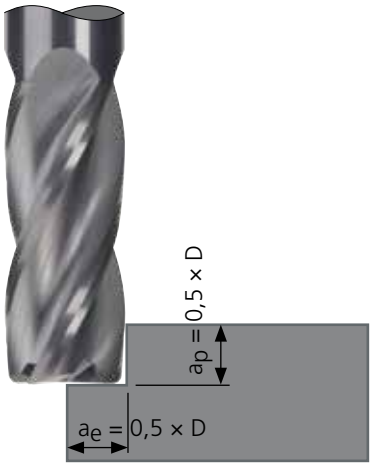
$v_{C\ slot} = 0{,}7 \times v_C$





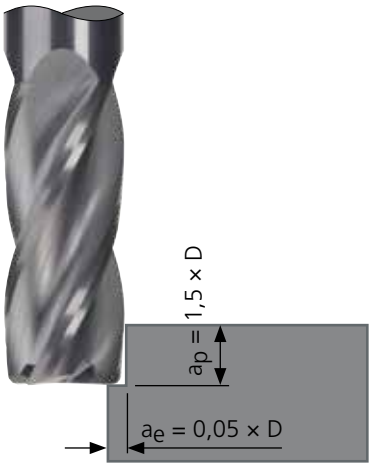
Rough milling

$v_{C\ rough} = v_C$



Finish milling

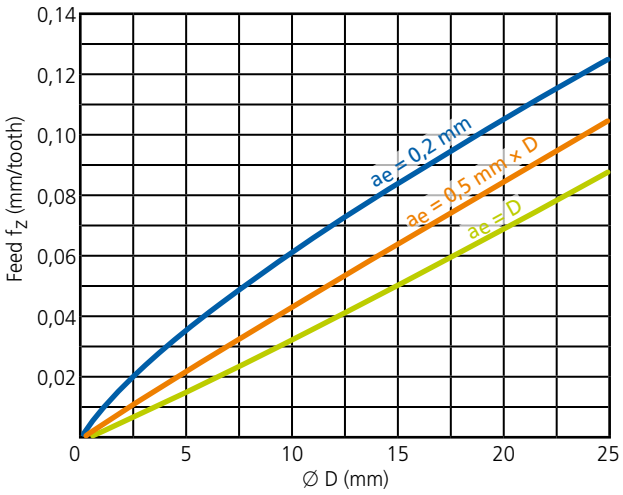
$v_{C\ finish} = 1{,}5 \times v_C$



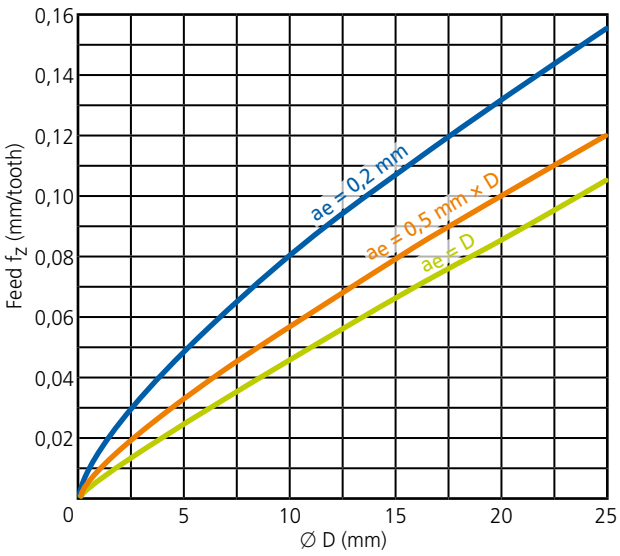
Correction factor Kf

for feed f_z

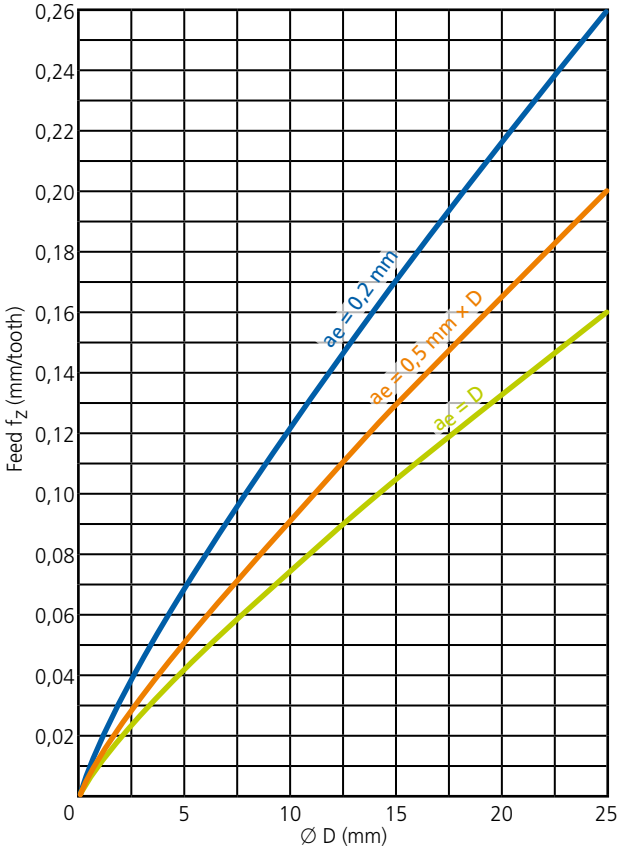
Kf 1



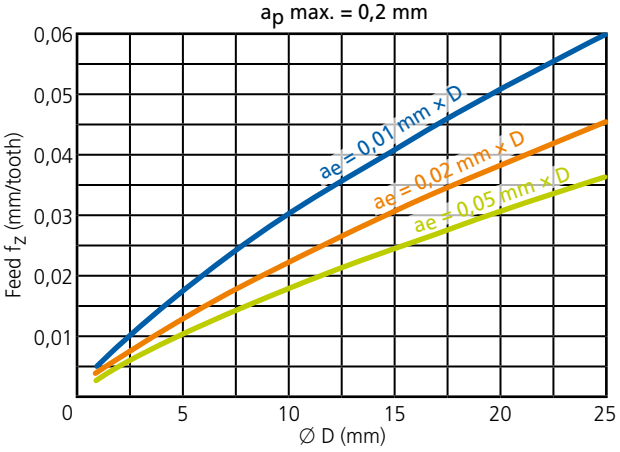
Kf 2



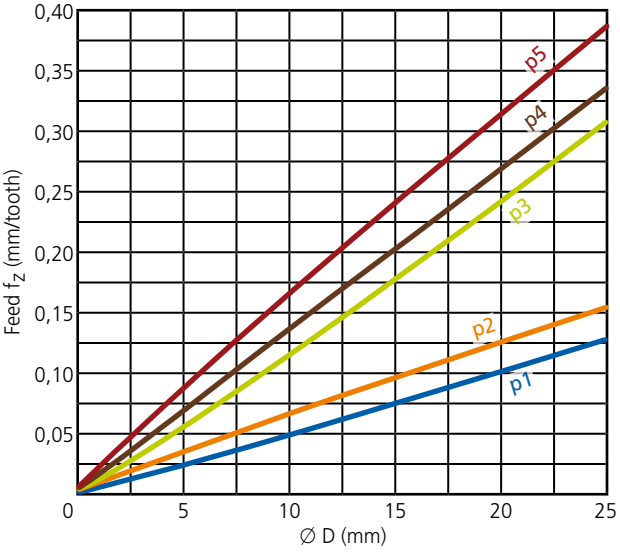
Kf 3



Kf 4 – hardened steel
a_p max. = 0,2 mm



Kf p1-p5



KOMET® Diamond coated milling tools

In an era of increasing awareness of the issues surrounding energy, energy conservation and energy efficiency, the lightweight construction segment is becoming more and more important. At a rapid pace, composite materials are carving out ever larger market shares.

Outstanding material properties, however, also present challenges for the manufacturers of precision tools. The extremely high strength and complex make-up of these materials are placing new demands on the tools that work them: the high degree of abrasiveness means that conventional tools in drilling and milling setups last only a few metres.

In light of this requirement, the KOMET GROUP has developed a brand new class of tools distinguished by their innovative geometry, suitability for new machining strategies involving very high cutting parameters and also by the use of intelligent cutting materials. These new solutions range from single-edge to multi-tooth milling cutters and from drills with a new chamfer geometry to indexable tools having a special insert arrangement.

Cutting materials have also followed the trend: KOMET RHOBEST® diamond coatings and PCD solutions are demonstrating that they are fully equipped for the task.

Versions:

- NCD Composite milling cutter, HSC
- NCD Composite multi-tooth milling cutter
- PCD Slot milling cutter and PCD Compression milling cutter see chapter 3
- NCD and PCD High-performance drill see catalogue "TOOLS PLUS IDEAS"

KOMET® NCD

Classification of composite materials and typical applications

FIBROUS COMPOSITE MATERIALS

Fibrous composites are inhomogeneous materials that are essentially an assembly of three components – fibres and matrices or binders.

Typical fibres include carbon fibre (CFRP), glass fibre (GFRP) or aramid fibre (AFRP). With respect to their tensile strength, they are categorised into HT (high tenacity), UT (ultra high tenacity) and IM (intermediate modulus). Depending on the properties desired, the fibres differ in length, thickness and relative orientation (unidirectional, bidirectional, multidirectional).

As matrices, there are currently more than 100 different resins/polymers available on the market, which is just a hint at how varied these materials are. "Cold" cutting is generally recommended for duroplastics (90%) and thermoplastics (PEEK, PEI, PPS, etc.), while elastomers (PUR) should be cut at "high speed".

Applications: Aerospace, automotive, medical industry, sports industry, wind farms, transport, building/architecture

HYBRIDS

Hybrids are material combinations of at least three layers of metals, polymers and fibrous composites.

Application: Aircraft construction

HONEYCOMBS

These materials are usually three-layer composite constructions with a honeycomb-shaped core made, for example, of aluminium, polycarbonate or polypropylene and are therefore characterised by their extremely lightweight and highly stiff properties.

Applications: Satellite engineering, packaging industry, exhibition stand, model and aircraft construction

METAL MATRIX COMPOSITE MATERIAL

Metal matrix composites (MMC) have at least two constituent materials, usually a ceramic or organic component bonded in a metal matrix.

Applications: Engine building, cylinder liners, connecting rods

The non-homogeneous nature of these new lightweight materials imposes exacting and individual requirements on the machining process. Not only does the KOMET GROUP offer a standard product range, it is an expert partner for its customers – with absolute focus on problem-solving.

Thanks to full process control in-house – from carbide/cutting material selection, consolidated expertise and many years of experience in grinding through to final coating – the KOMET GROUP is your single source of smart and viable machining solutions.

The standard product range presented here enables you to order the right tool for your applications and feasibility tests with zero fuss.

All other specifications including inch measurements can be created for you on request and tailored to your individual requirements.

We would be delighted to collaborate with you to develop new machining strategies. We offer a modern machining environment to conduct tests in-house or we can visit you to coordinate further. Interested? Simply contact our experts in lightweight construction at www.kometgroup.com

Material				Tool	Page
CFRP	GFRP	CFRP/Al stacks	Honey-combs		
●	●			 NCD Composite milling cutter, HSC type FZ, flat head **78980..**	36
●	●			 NCD Composite milling cutter, HSC type FZ, burr style 78981..	36
●	●			 NCD Composite milling cutter, HSC type FZ, ball nose 78982..	36
●	●			 NCD Composite milling cutter, HSC type GZ, ball nose 78983..	36
●	●			 NCD Composite milling cutter, HSC type FZ, 2 front cutters 78984..	37
●	●			 NCD Composite milling cutter, HSC type GZ, 2 front cutters 78985..	37
●	●			 NCD Composite milling cutter, HSC type FZ, 2 front cutters, 135° drill centre 78986..	37
●	●			 NCD Composite milling cutter, HSC type GZ, 2 front cutters, 135° drill centre 78987..	37
●	●	●	●	 NCD Composite multi-tooth milling cutter straight teeth 78988..	38
●	●	●	●	 NCD Composite multi-tooth milling cutter helical teeth, pull cut 78989..	38

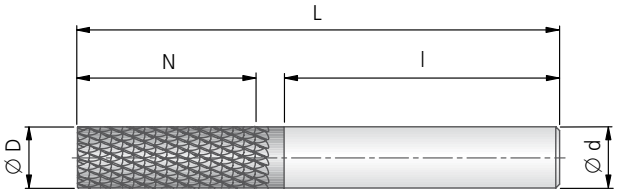
● main area of application, ◐ suitable in some cases. Other materials and combinations on request.

NCD high-performance drill Drillmax 90

With a point angle of 90°, the Drillmax 90 NCD high-performance drill is excellently suited for drilling composite materials.

NCD Composite milling cutter, HSC

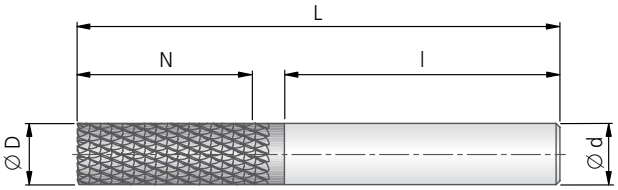
- milling and trimming
- type FZ (fine-tooth)
- flat head
- shank to DIN 6535 HA
- cutting material: diamond



78980.. type FZ				
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	Order No.
4	4 × 20	40	15	78980040000400
4	4 × 55	75	15	78980075000400
6	6 × 25	50	18	78980050000600
6	6 × 48	75	18	78980075000600
8	8 × 30	63	25	78980063000800
8	8 × 42	75	25	78980075000800
10	10 × 37	72	30	78980072001000

NCD Composite milling cutter, HSC

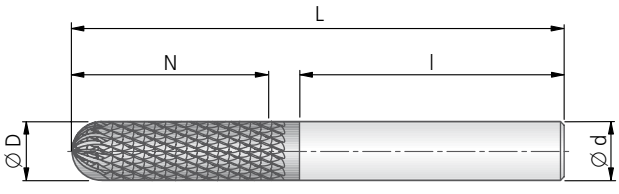
- milling and trimming
- type FZ (fine-tooth)
- burr style
- shank to DIN 6535 HA
- cutting material: diamond

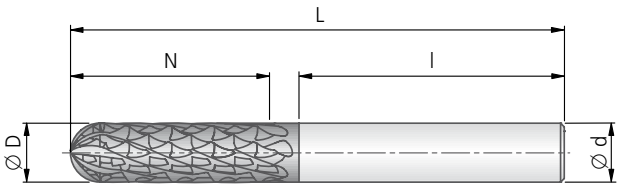


78981.. type FZ				
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	Order No.
4	4 × 20	40	15	78981040000400
4	4 × 55	75	15	78981075000400
6	6 × 25	50	18	78981050000600
6	6 × 48	75	18	78981075000600
8	8 × 30	63	25	78981063000800
8	8 × 42	75	25	78981075000800
10	10 × 37	72	30	78981072001000
12	12 × 32	83	32	78981083001200

NCD Composite milling cutter, HSC

- slot milling and plunge milling
- type FZ (fine-tooth), type GZ (coarse-tooth)
- ball nose
- shank to DIN 6535 HA
- cutting material: diamond



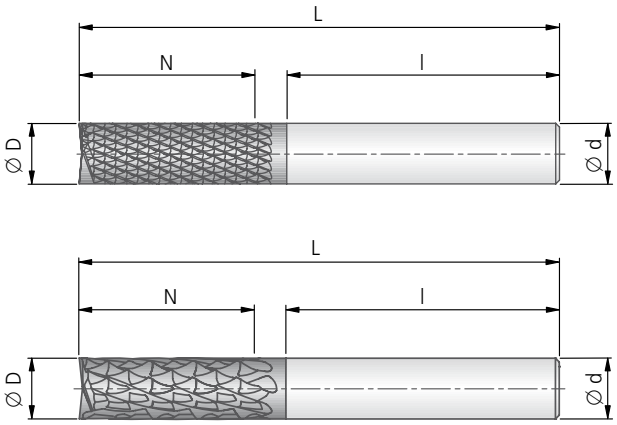


78982.. type FZ				
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	Order No.
4	4 × 28	50	16	78982050000400
6	6 × 34	60	19	78982060000600
8	8 × 28	63	25	78982063000800
10	10 × 40	72	25	78982072001000

78983.. type GZ				
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	Order No.
4	4 × 28	50	16	78983050000400
6	6 × 34	60	19	78983063000600
8	8 × 28	63	25	78983060000800
10	10 × 40	72	25	78983072001000

NCD Composite milling cutter, HSC

- **plunge milling and trimming**
- type FZ (fine-tooth), type GZ (coarse-tooth)
- 2 front cutters
- shank to DIN 6535 HA
- cutting material: diamond

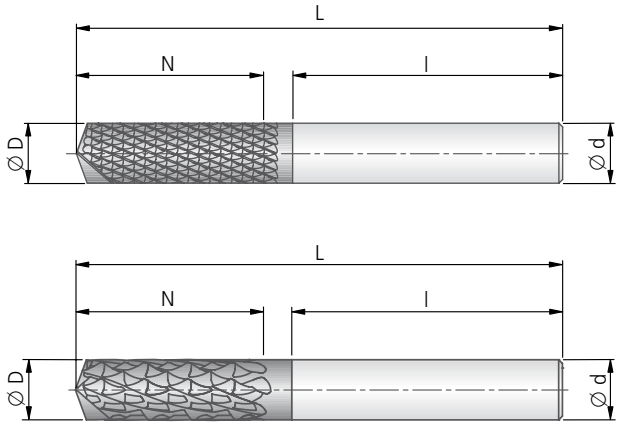


78984.. type FZ				
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	Order No.
4	4 × 28	50	16	78984050000400
4	4 × 52	75	15	78984075000400
6	6 × 34	60	19	78984060000600
6	6 × 38	75	30	78984075000600
8	8 × 28	63	25	78984063000800
8	8 × 30	75	35	78984075000800
10	10 × 40	72	25	78984072001000

78985.. type GZ				
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	Order No.
4	4 × 28	50	16	78985050000400
4	4 × 52	75	15	78985075000400
6	6 × 34	60	19	78985060000600
6	6 × 38	75	30	78985075000600
8	8 × 28	63	25	78985063000800
8	8 × 30	75	35	78985075000800
10	10 × 40	72	25	78985072001000

NCD Composite milling cutter, HSC

- **trimming, slot milling, plunge milling and shoulder milling**
- type FZ (fine-tooth), type GZ (coarse-tooth)
- 2 front cutters, 135° drill centre
- shank to DIN 6535 HA
- cutting material: diamond



78986.. type FZ				
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	Order No.
4	4 × 28	50	16	78986050000400
4	4 × 52	75	15	78986075000400
6	6 × 34	60	19	78986060000600
6	6 × 48	75	18	78986075000600
8	8 × 28	60	25	78986060000800
8	8 × 30	75	25	78986075000800
10	10 × 40	72	25	78986072001000

78987.. type GZ				
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	Order No.
4	4 × 28	50	16	78987050000400
4	4 × 52	75	15	78987075000400
6	6 × 34	60	19	78987060000600
6	6 × 48	75	18	78987075000600
8	8 × 28	60	25	78987060000800
8	8 × 30	75	25	78987075000800
10	10 × 40	72	25	78987072001000

Recommended application areas

NCD Composite milling cutter, HSC (78980.. · 78981.. · 78982.. · 78983.. · 78984.. · 78985.. · 78986.. · 78987..)

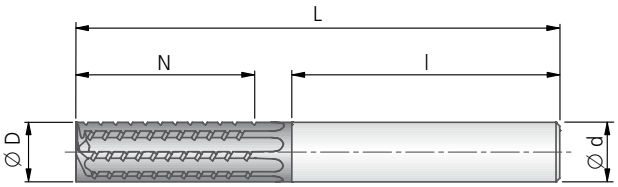
Machining: trimming, circular cutting, grooving, ramping, plunging, pocket and slot milling

Cutting speed v_c (m/min) Feed f (mm/rev)	Ø 4 mm		Ø 6 mm		Ø 8 mm		Ø 10 mm		Ø 12 mm	
	v_c	f	v_c	f	v_c	f	v_c	f	v_c	f
CFRP	100-200	0,06-0,10	100-300	0,08-0,12	100-300	0,10-0,15	100-300	0,10-0,20	100-300	0,10-0,25
GFRP	120-200	0,06-0,12	100-300	0,08-0,15	100-300	0,10-0,20	100-300	0,10-0,25	100-300	0,10-0,30

Important: See chapter 8 for more application details and safety notes!

NCD Composite multi-tooth milling cutter

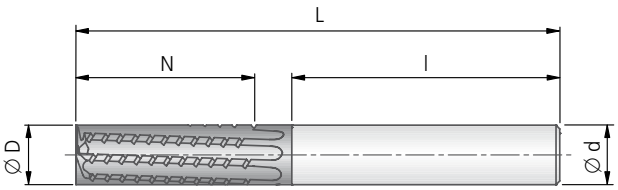
- straight teeth
- burr style, every second tooth exposed
- fine chip breaker
- shank to DIN 6535 HA
- cutting material: diamond



78988..					
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	No. of teeth Z	Order No.
4	6 × 30	60	16	6	78988060000400
6	6 × 28	60	20	8	78988060000600
6	6 × 30	75	28	8	78988075000600
8	8 × 28	63	22	8	78988063000800
8	8 × 32	75	32	8	78988075000800
10	10 × 30	72	32	8	78988072001000

NCD Composite multi-tooth milling cutter

- helical teeth, pull cut
- burr style, every second tooth exposed
- fine chip breaker
- shank to DIN 6535 HA
- cutting material: diamond



78989..					
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	No. of teeth Z	Order No.
4	6 × 30	60	16	6	78989060000400
6	6 × 28	60	20	8	78989060000600
6	6 × 30	75	28	8	78989075000600
8	8 × 28	63	22	8	78989063000800
8	8 × 32	75	32	8	78989075000800
10	10 × 30	72	32	8	78989072001000

Recommended application areas

NCD Composite multi-tooth milling cutter (78988.. · 78989..)								
Machining: trimming, circular cutting, axial grooving, pocket and slot milling								
Cutting speed v_c (m/min) Feed f_z (mm/tooth)	Ø 4 mm		Ø 6 mm		Ø 8 mm		Ø 10 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
CFRP	100 - 200	0,02 - 0,04	100 - 300	0,02 - 0,06	100 - 300	0,02 - 0,08	100 - 300	0,02 - 0,10
GFRP	100 - 200	0,02 - 0,06	100 - 300	0,02 - 0,08	100 - 300	0,02 - 0,10	100 - 300	0,02 - 0,12
CFRP/Al stacks	100 - 200	0,02 - 0,04	100 - 300	0,02 - 0,06	100 - 300	0,02 - 0,08	100 - 300	0,02 - 0,10
Honeycombs	100 - 200	0,02 - 0,04	100 - 300	0,02 - 0,06	100 - 300	0,02 - 0,08	100 - 300	0,02 - 0,10

Important: See chapter 8 for more application details and safety notes!

Nano technology in lightweight construction

Already in 1994, RHOBEST has been developing and continually adapting the nanocrystalline diamond coating to the tools used in specific machining processes.

In 2011, this nanotechnology became part of the KOMET GROUP. With KOMET RHOBEST® diamond coating technology, the surfaces and properties of tools for machining composite materials can be individually tailored to meet the requirements of the particular application.

KOMET RHOBEST® diamond coating technology has made it possible to manufacture ultrananocrystalline, highly pure and extremely hard diamond coatings that join with the tool surface to form a compact and stable unit.

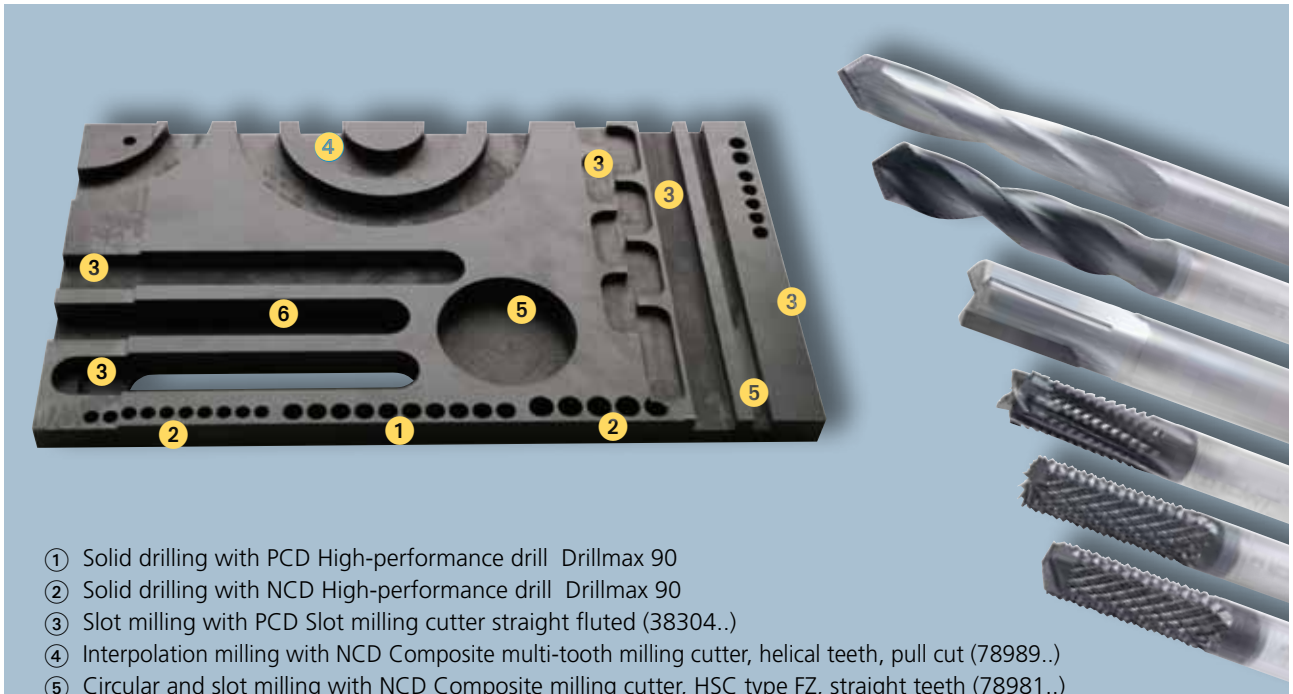
Standard technology

micro — KOMET RHOBEST® technology — ultra nano

Thanks to this nanostructure, the geometry and surface of the optimised tool are retained, thin coatings are compact, wear-resistant and high-performing. The sharpness of the tool – an important prerequisite for the machining of fibrous composite materials – is preserved.

With KOMET RHOBEST® diamond-coated tools, we meet the requirements for machining new lightweight materials – absence of burr and fibre, a smooth, flat cutting edge, suitability for painting and bonding, short machining times and long tool life.

Machining CFRP material



① Solid drilling with PCD High-performance drill Drillmax 90
② Solid drilling with NCD High-performance drill Drillmax 90
③ Slot milling with PCD Slot milling cutter straight fluted (38304..)
④ Interpolation milling with NCD Composite multi-tooth milling cutter, helical teeth, pull cut (78989..)
⑤ Circular and slot milling with NCD Composite milling cutter, HSC type FZ, straight teeth (78981..)
⑥ Slot milling with NCD Composite milling cutter, HSC type FZ, 2 front cutters, 135° drill centre (78986..)

KOMET® PCD Slot milling cutter and PCD Face milling cutter

PCD screw-in cutters for grooving and face milling

Milling shoulders and grooves, making circular drilled holes on a helix path, and face and peripheral milling are typical operations that occur frequently when machining components.

Among the selling points of the new JEL® PCD milling cutters are that they are highly flexible and easy to handle.

The modular system allows you to choose between brazed PCD face milling cutters and PCD slot milling cutters. It also contains a vibration-dampened tool shank available in various lengths.

The milling heads are available in diameters of 10 to 32 mm. The heads can be changed quickly and easily on the machine itself.

BENEFITS for you:

- Tool versatility and reduction of costs thanks to modular head system
- Great flexibility since a variety of lengths can be adapted
- Good availability: PCD slot milling cutter and PCD face milling cutter: available ex stock

Application:

- For roughing and finishing in aluminium
- Face milling, slot milling, peripheral milling and circular milling, as well as machining shoulders and grooves
- As a "problem solver" for long overhangs

Machining example:

Tool: JEL® PCD slot milling cutter ∅20 NZ2, internal cooling
Part: Inverter housing, AlSi9

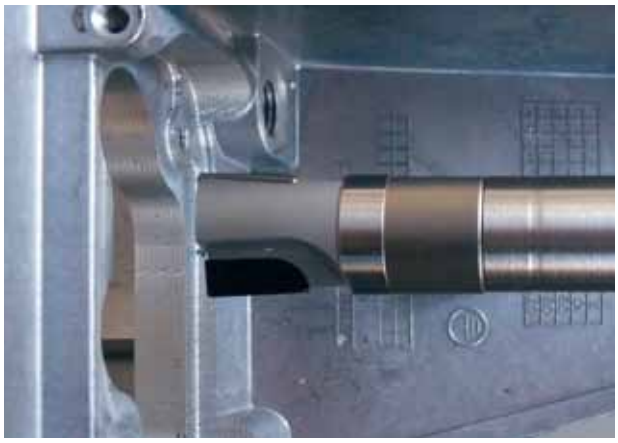
Machining: Pocket milling, root face 12 mm thick, drilling, roughing, finishing

Current situation: Solid carbide tool, A = 230 mm

Problem: Heavy vibrations

Solution: JEL® PCD slot milling cutter shrinked into heavy metal extension

Cutting data:
v_C = 754 m/min
= 12,000 rpm (Smax.)
f_Z = 0.2 mm/tooth
= 4,800 mm/min



PCD Face milling cutter
The JEL® PCD face milling cutter is noteworthy for its outstanding cost efficiency. High feeds, cutting depth and longest tool lifes can be achieved thanks to the high number of teeth and solid design.

BENEFITS for you:

- Cutting depths of up to 8 mm
  thanks to firmly soldered cutting edges in a solid basic body
- Short cycle times
  thanks to maximum number of cutting edges and highest cutting speeds
- No adjustment necessary
  thanks to Monoblock design
- Attainable surface quality
  Rz < 10 µm (type 150)
  thanks to fine balancing and extremely tight manufacturing tolerances
- Available in two variants
  type 140: for Rz > 10 µm - with eroded cutting edge design
  type 150: for Rz < 10 µm - with special cutting edge design
- Internal cooling supply
  Fed to the cutting edge via a coolant screw
- Available at short notice
  PCD face milling cutter available ex stock

PCD Milling cutter

Applications:
Mainly suited to roughing and finishing cast or solid aluminium.

Sectors: Automotive, aerospace, aluminium foundries, pneumatics and hydraulics

Machining example:
Part: housing
Machine: Chiron Mill 2000
Machining: Face milling of the sealing surface and mounting domes, upper side and underside
Material: GAlSi9
Cutting depth: 4 mm
Tool: 37150026004000, PCD face milling cutter ∅40, NZ10 HSK-A63
Cutting data:
v_c=1,507 m/min
= 12,000 rpm (Smax.)
f_z = 0.05 mm/tooth
= 6,000 mm/min
Surface finish: R_z 1.51-2.50

PCD tools for defined surfaces

Use of PCD monotools in the production of aluminium components is wide spread. This system is distinguished by the minimum effort required to set an increased number of teeth, as well as its long service life and very low roughness depths.

If, however, areas of surface roughness are required or need to be even rougher than the very good standard surfaces produced during PCD machining, then PCD tools often meet their limits.

This can be remedied with a PCD auxiliary cutter(s) individually adapted to the application situation, which can also be fitted retroactively in existing standard tools.

These can be precisely adjusted axially with face-milling cutters and radially with drilling and reaming tools for the required surface finish. This means that the required roughness can be achieved, for example for seals. Not only are larger Rz values attainable, but improvements to the surface, e.g. by means of a wiper edge insert, are also possible.

Application:
- Bearing plate
- End faces of cylinder heads (liquid seal)

BENEFITS for you:

- Defined surfaces
- Variable surface finish can be achieved
- Can be retroactively fitted in standard tools
- Cutters can be custom designed to the application

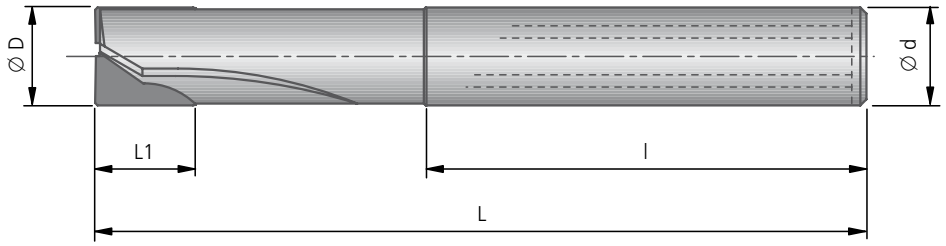
Surfaces can be defined
by adjustable PCD cutters

JEL® PCD

Ø 6 – 20 mm

PCD Slot milling cutter

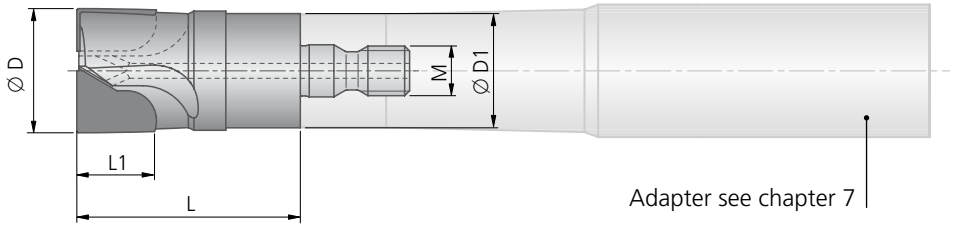
- excellent tool characteristics for top quality and long tool life
- suitable for: Internal circular interpolation milling, external circular interpolation milling, centred boring
- 1 cutting edge over centre
- straight fluted
- internal coolant supply
- shank-∅ DIN 6535 form HA
- solid carbide basic body
- cutting material PCD



Ø D	Cylindrical shank Ø d × l	L	L1	No. of teeth Z	kg	Order No.
1×D						
6	6 × 36	57	6	2		38390000000600
8	8 × 36	63	8	2		38390000000800
10	10 × 40	72	10	2		38390000001000
12	12 × 45	83	12	2		38390000001200
16	16 × 48	90	16	3		38391000001600
20	20 × 50	104	20	3		38391000002000
2×D						
6	6 × 36	57	12	2		38392057000600
8	8 × 36	63	16	2		38392063000800
10	10 × 40	72	20	2		38392072001000
12	12 × 45	83	24	2		38392083001200
16	16 × 48	90	32	3		38393090001600
20	20 × 50	104	40	3		38393004002000

PCD Slot milling cutter

screw-on ■
internal coolant supply, lateral discharge ■



Ø D	M	Tightening torque	Ø D1	L	L1	No. of teeth Z	kg	Order No.
10	M5	7 Nm	9,6	28	10	2	0,018	**37340099001000**
12	M5	7 Nm	9,6	28	12	2	0,018	**37340099001200**
16	M8	15 Nm	13,8	32	16	3	0,036	**37340099001600**
20	M10	30 Nm	18,0	45	20	3	0,095	**37340099002000**
25	M12	50 Nm	21,0	45	20	3	0,165	**37340099002500**

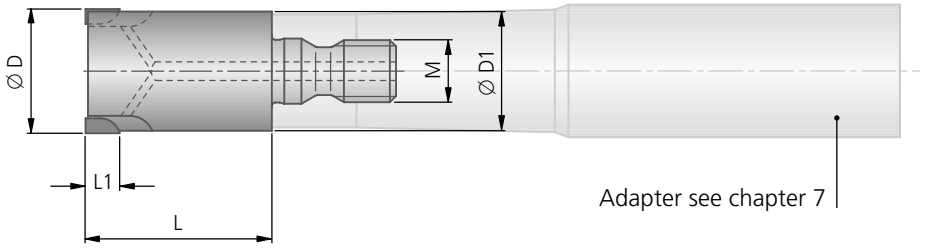
Cutting values for milling: Page 48.

JEL® PCD

Ø 10 – 32 mm

PCD Face milling cutter

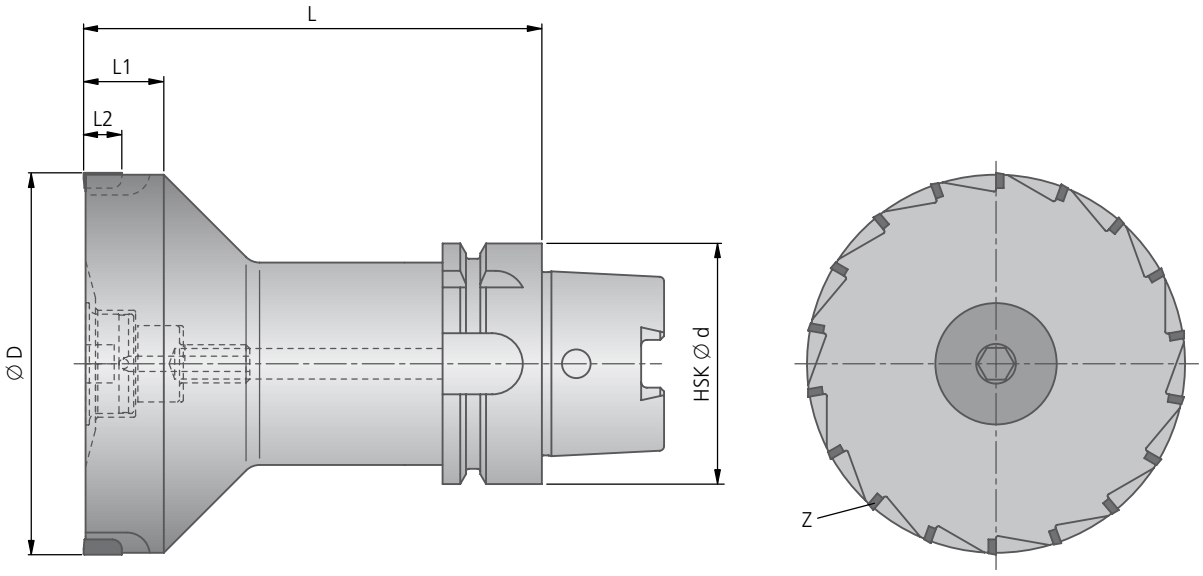
- screw-on
- internal coolant supply, lateral discharge



Ø D	M	Tightening torque	Ø D1	L	L1	No. of teeth Z	kg	Order No.
10	M5	7 Nm	9,6	22	5	2	0,012	**37341099001000**
12	M5	7 Nm	9,6	28	5	2	0,018	**37341099001200**
16	M8	15 Nm	13,8	28	10	3	0,040	**37341099001600**
20	M10	30 Nm	18,0	30	10	4	0,070	**37341099002000**
25	M12	50 Nm	21,0	35	10	5	0,140	**37341099002500**
32	M16	100 Nm	29,0	35	10	6	0,250	**37341099003200**

PCD Face milling cutter

- internal coolant supply ■
- chamfer type 140: eroded cutting edge ■
- chamfer type 150: specially design cutting edge ■



							Typ 140 · R_z > 10 µm	Typ 150 · R_z < 10 µm
Ø D	HSK Ø d	L ±0,02	L1	L2	No. of teeth Z	kg	Order No.	Order No.
40	63	100	21	10	10	1,4	37140026004000	37150026004000
50	63	100	21	10	12	1,7	37140026005000	37150026005000
63	63	100	20	10	14	2,0	37140026006300	37150026006300
80	63	100	20	10	16	2,5	37140026008000	37150026008000
100	63	100	20	10	18	3,2	37140026010000	37150026010000
125	63	100	23	10	22	4,3	37140026012500	37150026012500
160	63	100	22	10	22	6,2	37140026016000	37150026016000

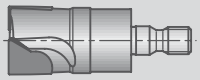
Other connections and cutting edge shapes available on request.

Supply includes:
PCD face milling cutter with coolant screw and coolant supply kit.

Cutting values for milling: Page 49.

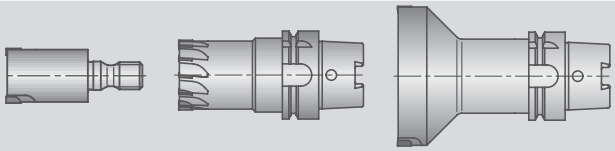
JEL® PCD Slot milling cutter

Recommended application areas

Guideline values for milling					PCD Slot milling cutter									
Material group		Strength Rm (N/mm²)	Hardness HB	v_c (m/min) = Cutting speed f_b (mm/rev.) = Drilling feed f_z (mm/tooth) = Milling feed Surface uncoated Material										
					∅ 6		∅ 8		∅ 10		∅ 12		∅ 16 | 20 | 25	
					v_c m/min	f_z mm/tooth	v_c m/min	f_z mm/tooth	v_c m/min	f_z mm/tooth	v_c m/min	f_z mm/tooth	v_c m/min	f_z mm/tooth
P	1.1	≤400	≤120	magnetic soft iron										
P	1.2	≤700	≤200	structural, case hardened steel										
P	1.3	≤850	≤250	carbon steel										
P	1.4	≤850	≤250	alloy steel										
P	1.5	>850 ≤1200	>250 ≤350	alloy/heat treated steel										
P	1.6	>1200	>350	alloy/heat treated steel										
H	1.7	≤1400	≤400	hardened steel to 45 HRC										
H	1.8	≤2200	≤600	hardened steel to 58 HRC										
M	2.1	≤850	≤250	stainless steel, sulphuretted										
M	2.2	≤850	≤250	austentic										
M	2.3	≤1000	≤300	ferritic, ferritic & austentic, martensitic										
K	3.1	≤500	≤150	grey cast iron										
K	3.2	>500 ≤1000	>150 ≤300	grey cast iron, heat treated										
K	3.3	400-500	200-250	vermicular cast iron										
K	3.4	≤700	≤200	spheroidal graphite cast iron										
K	3.5	>700 ≤1000	>200 ≤300	spheroidal graphite cast iron, heat treated										
K	3.6	≤700	≤200	malleable iron										
K	3.7	>700 <1000	>200 ≤300	malleable iron heat treated										
S	4.1	≤700	≤200	pure titanium										
S	4.2	≤900	≤270	titanium alloys										
S	4.3	>900 ≤1250	>270 ≤300	titanium alloys										
S	5.1	≤500	≤150	pure nickel										
S	5.2	≤900	<270	nickel alloys, heat resistant										
S	5.3	>900 ≤1200	>270 ≤350	nickel alloys, high heat resistance										
N	6.1	≤350	≤100	non-alloy copper										
N	6.2	≤700	≤200	short chip, brass, bronze, red brass	200-600	0,04-0,08	200-800	0,04-0,10	300-800	0,04-0,12	300-1000	0,04-0,15	300-1000	0,06-0,20
N	6.3	≤700	≤200	long chip brass										
N	6.4	≤500	≤470	Cu-Al-Fe alloy (Ampco)										
N	7.1	≤350	≤100	Al, Mg non-alloy	200-800	0,04-0,08	200-800	0,04-0,10	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20
N	7.2	≤600	≤180	Al wrought alloy, breaking strain (A 5) <14 %	200-800	0,04-0,08	200-800	0,04-0,10	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20
N	7.3	≤600	≤180	Al wrought alloy, breaking strain (A 5) ≥14 %	200-800	0,04-0,08	200-800	0,04-0,10	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20
N	7.4	≤600	≤180	Al cast alloy, Si <10 %	200-800	0,04-0,08	200-800	0,04-0,10	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20
N	7.5	≤600	≤180	Al cast alloy, Si ≥10 %	200-800	0,04-0,08	200-800	0,04-0,10	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20
N	8.1			thermoplastics										
N	8.2			thermosetting plastics										
N	8.3			fibre reinforced plastics	200-500	0,02-0,06	200-500	0,03-0,08	200-600	0,03-0,10	200-600	0,04-0,12	500-1200	0,05-0,15

Cutting values shown are relating to the basic recommendations for cutting materials given.

Recommended application areas

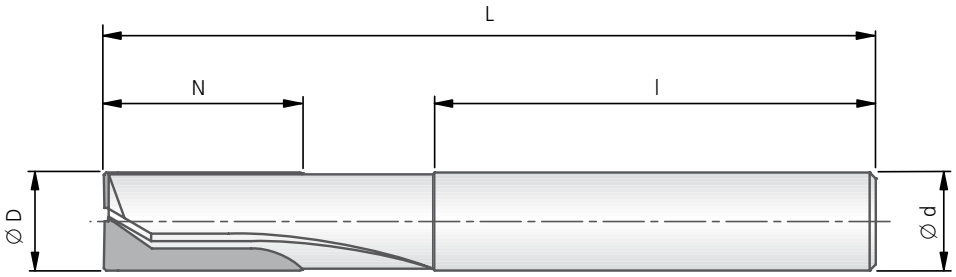
Guideline values for milling					PCD Face milling cutter							
Material group		Strength Rm (N/mm²)	Hardness HB	v_c (m/min) = Cutting speed f_b (mm/rev.) = Drilling feed f_z (mm/tooth) = Milling feed Surface uncoated Material								
					∅ 10		∅ 12		∅ 16 | 20 | 25 | 32		∅ 40 – 160	
					v_c m/min	f_z mm/tooth	v_c m/min	f_z mm/tooth	v_c m/min	f_z mm/tooth	v_c m/min	f_z mm/tooth
P	1.1	≤400	≤120	magnetic soft iron								
P	1.2	≤700	≤200	structural, case hardened steel								
P	1.3	≤850	≤250	carbon steel								
P	1.4	≤850	≤250	alloy steel								
P	1.5	>850 ≤1200	>250 ≤350	alloy/heat treated steel								
P	1.6	>1200	>350	alloy/heat treated steel								
H	1.7	≤1400	≤400	hardened steel to 45 HRC								
H	1.8	≤2200	≤600	hardened steel to 58 HRC								
M	2.1	≤850	≤250	stainless steel, sulphuretted								
M	2.2	≤850	≤250	austentic								
M	2.3	≤1000	≤300	ferritic, ferritic & austentic, martensitic								
K	3.1	≤500	≤150	grey cast iron								
K	3.2	>500 ≤1000	>150 ≤300	grey cast iron, heat treated								
K	3.3	400-500	200-250	vermicular cast iron								
K	3.4	≤700	≤200	spheroidal graphite cast iron								
K	3.5	>700 ≤1000	>200 ≤300	spheroidal graphite cast iron, heat treated								
K	3.6	≤700	≤200	malleable iron								
K	3.7	>700 <1000	>200 ≤300	malleable iron heat treated								
S	4.1	≤700	≤200	pure titanium								
S	4.2	≤900	≤270	titanium alloys								
S	4.3	>900 ≤1250	>270 ≤300	titanium alloys								
S	5.1	≤500	≤150	pure nickel								
S	5.2	≤900	<270	nickel alloys, heat resistant								
S	5.3	>900 ≤1200	>270 ≤350	nickel alloys, high heat resistance								
N	6.1	≤350	≤100	non-alloy copper								
N	6.2	≤700	≤200	short chip, brass, bronze, red brass	300-800	0,04-0,12	300-1000	0,04-0,15	300-1000	0,06-0,20	1000-1500	0,04-0,15
N	6.3	≤700	≤200	long chip brass								
N	6.4	≤500	≤470	Cu-Al-Fe alloy (Ampco)								
N	7.1	≤350	≤100	Al, Mg non-alloy	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20	1000-3500	0,04-0,15
N	7.2	≤600	≤180	Al wrought alloy, breaking strain (A 5) <14 %	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20	1000-3500	0,04-0,15
N	7.3	≤600	≤180	Al wrought alloy, breaking strain (A 5) ≥14 %	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20	1000-3500	0,04-0,15
N	7.4	≤600	≤180	Al cast alloy, Si <10 %	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20	1000-1500	0,04-0,15
N	7.5	≤600	≤180	Al cast alloy, Si ≥10 %	400-1000	0,04-0,12	400-1500	0,04-0,15	400-1500	0,06-0,20	1000-1500	0,04-0,15
N	8.1			thermoplastics								
N	8.2			thermosetting plastics								
N	8.3			fibre reinforced plastics	200-600	0,03-0,10	200-600	0,04-0,12	500-1200	0,05-0,15	500-1200	0,05-0,15

Important: See chapter 8 for more application details and safety notes!

JEL ® PCD – for machining composite materials

PCD Slot milling cutter

- straight fluted
- shank to DIN 6535 HA
- cutting material: PCD



38304..					
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	No. of teeth Z	Order No.
6	6 × 36	57	12	2	38304057000600
8	8 × 36	63	16	3	38304063000800
10	10 × 40	72	20	4	38304072001000

Recommended application areas

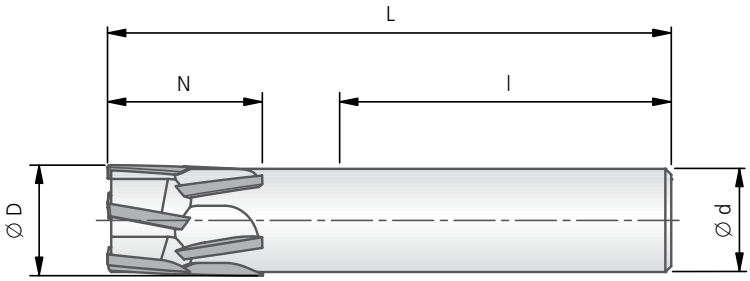
PCD Slot milling cutter (38304..)						
Machining: trimming, face milling, plunge milling						
Cutting speed v_c (m/min) Feed f_z (mm/tooth)	Ø 6 mm		Ø 8 mm		Ø 10 mm	
	v_c	f_z	v_c	f_z	v_c	f_z
CFRP	200-400	0,02-0,06	200-400	0,03-0,08	200-400	0,03-0,10
GFRP	200-400	0,02-0,08	200-400	0,03-0,10	200-400	0,03-0,12
CFRP/Al stacks	200-400	0,02-0,06	200-400	0,03-0,08	200-400	0,03-0,10
Honeycombs	200-400	0,02-0,06	200-400	0,03-0,08	200-400	0,03-0,10

PCD high-performance drill Drillmax

With a point angle of 90° and 130°, the Drillmax PCD high-performance drill is excellently suited for drilling composite materials.

PCD Compression milling cutter

staggered cut with dual right and left helix ■
shank to DIN 6535 HA ■
cutting material: PCD ■



38300..					
Ø D_{h10}	Cylindrical shank Ø d_{h6} × l	L	N	No. of teeth Z	Order No.
6	6 × 36	57	10	3	38300057000600
10	10 × 40	72	16	4	38300072001000
16	16 × 48	90	20	5	38300090001600

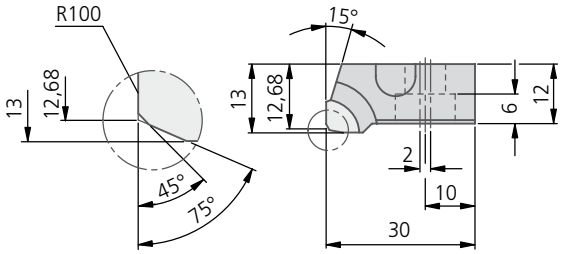
Recommended application areas

PCD Compression milling cutter (38300..)								
Machining: trimming, pocket and slot milling								
Cutting speed v_c (m/min) Feed f_z (mm/tooth)	Ø 6 mm		Ø 8 mm		Ø 10 mm		Ø 16 mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
CFRP	200-400	0,02-0,06	200-400	0,03-0,08	200-400	0,03-0,10	200-400	0,03-0,12
GFRP	200-400	0,02-0,08	200-400	0,03-0,10	200-400	0,03-0,12	200-400	0,03-0,15
CFRP/Al stacks	200-400	0,02-0,06	200-400	0,03-0,08	200-400	0,03-0,10	200-400	0,03-0,12
Honeycombs	200-400	0,02-0,06	200-400	0,03-0,08	200-400	0,03-0,10	200-400	0,03-0,12

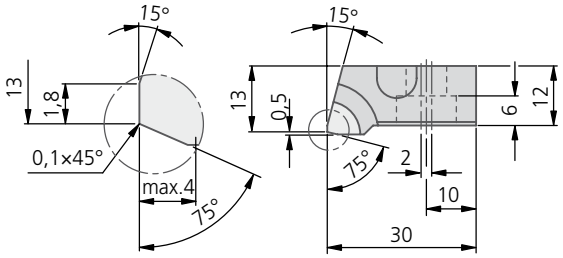
Finishing, facing and corner milling cutter for HSC operations

Cartridges

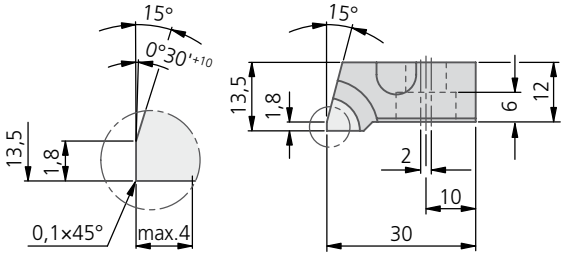
Corner cartridge F51 34130



Facing cartridge F51 34120

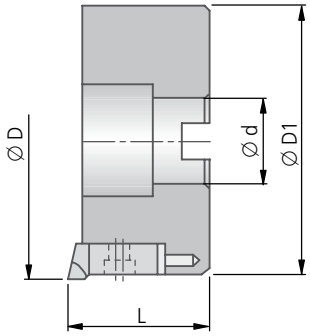


Finishing cartridge F51 34110



Basic body

Dimensions to DIN 8030



Supply of basic body includes:
Basic body incl. balancing screws and clamping screws already fitted. Cartridges not included.

Supply of cartridges includes:
Cartridges without clamping screws.

Clamping screw for cartridges: Order No. 55024 06012

Examples for ordering:
Corner mill – complete tool ∅ 63 mm, Z = 3
1 × basic body F51 02340
3 × corner cartridge F51 34110

Face milling cutter complete tool ∅ 80 mm, Z = 5
1 × basic body F51 02350
4 × facing cartridge F51 34120
1 × finishing cartridge F51 34130

Note:
If the basic body and the cartridges are ordered together as shown in the order example, the tool is supplied fully assembled and adjusted. For safety reasons, only use holding screws as shown.

Basic body							Clamping screw		Cartridge with PCD insert		
Ø D	Order No.	Ø d^{H7}	L	Ø D1	Z	kg	Size	Torque setting Milling cutter arbor	Corner cartridge Order No.	Facing cartridge Order No.	Finishing cartridge Order No.
63	**F51 02340**[1)]	22	48	61	3	0,75	M10	70 Nm	**F51 34110**	**F51 34120**	**F51 34130**
80	**F51 02350**	27	50	78	5	0,57	M12				
100	**F51 02360**	32	50	98	6	0,95	M16				

[1)] basic steel body

Special milling cutter features:

Internal coolant supply
applied with clamping screw provided

Balance
Balanced to DIN 69888 and additional screws for precision balancing

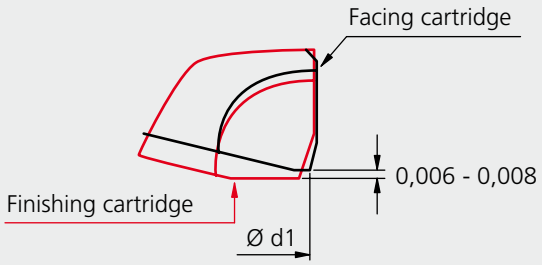
Setting
Secure adjusting screws for setting axial run-out on the milling head

Cartridges
PCD cartridges manufactured to high precision for maximum stability and perfect circular cutting movement

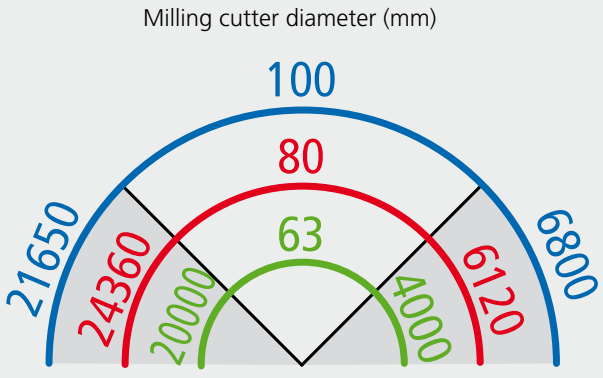
Milling cutter body
Manufactured from special aluminium alloy with high tensile strength, considerably reduced weight and excellent surface finish (Note 63 mm diameter body in steel)

Secure srews
Strong, high quality screws in hardened threaded inserts and with additional lateral screws

Setting notes for combination finishing and facing cartridge



Spindle speeds and cutting speeds



n (min⁻¹)
permissible maximum spindle speed

v_c (m/min)
Permissible maximum cutting speed

The innovative *hi.aeQ* arbor face milling cutter is excellently suited for reliable step and face milling of cast iron materials. It features a high number of teeth and low cutting forces.

8 usable cutting edges provided by the tangential inserts which are fitted alternately vertically and horizontally.

The combination of their innovative design and special indexable insert geometry makes KOMET® milling cutters exceptionally suitable for machining an extremely wide variety of different materials.

BENEFITS for you:

- Wide selection of different milling cutters
- Wide selection of indexable inserts with different coatings for optimum machining results

1 Chamfer milling cutter
2 T-slot milling cutter
3 Circular milling cutter ∅ 25 mm
4 Copying end milling cutter ∅ 32 mm
5 End milling cutter ∅ 32 mm
6 Quatron *hi.feed* ∅ 32 mm

Application example:

Quatron *hi.feed* ∅ 42 mm Z5,
Inserts with BK8430

Machining: ∅ 69,7 mm

Cutting values:
v_c = 200 m/min
v_f = 13600 mm/min
f_z = 1,8 mm/rev

Tool life:
25 - 40 holes per cutting edge

Indexable insert mills

KOMET® Quatron *hi.feed*

The success enjoyed by our tried and tested KUB Quatron® solid drill range continues in our milling cutter range. With the successful Quatron indexable insert developed from solid drilling technology, we are extending our experience to the Quatron *hi.feed* milling cutter.

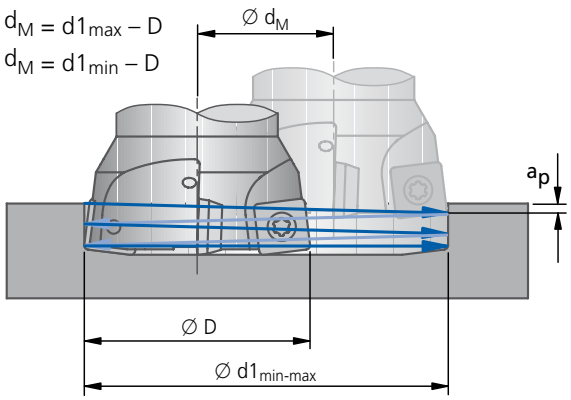
Plunge milling (also known more simply as plunging) is a type of machining particularly suitable for cutting deep grooves and large cavities. Plunge milling can be the ideal solution for large projection lengths and unstable conditions.

Application:
The Quatron *hi.feed* is a high-performance roughing tool for the fast removal of large quantities of cut metal.

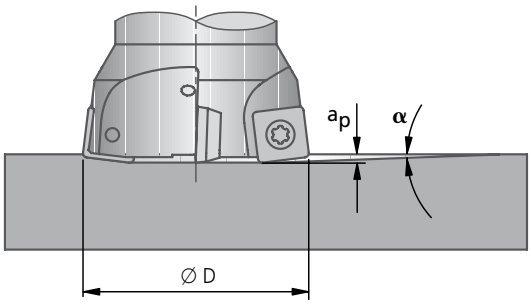
BENEFITS for you:

- Mill cutting bores with just one tool rather than enlarging them with several drilling tools
- Four cutting edges per insert lowers production costs per cutter
- Increase in productivity thanks to high-volume chip removal
- Deflection of passive forces in an axial direction. Plunge milling puts less stress on the spindle thanks to the lower loading
- Variable manufacture of different diameters
- Low cutting pressure
- A tough substrate allows universal use for steel, cast iron and stainless materials
- Capable of high feed rates – up to 2 mm per cutting edge
- Ideal when producing larger drilled holes using small and low-performance machines

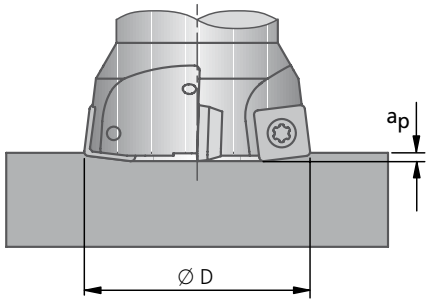
Circular interpolation into solid material



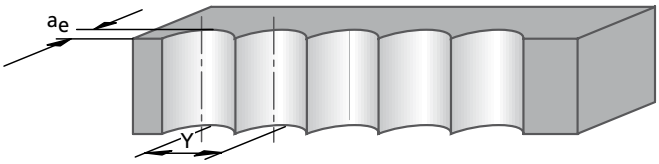
Inclined plunging

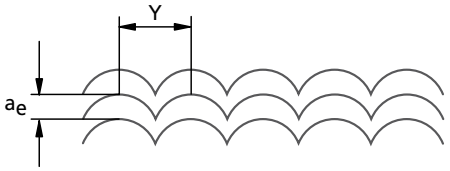


Axial plunging

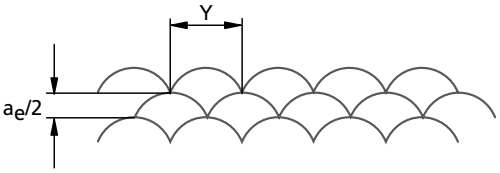


Plunge milling





Tool offset with optimum coverage



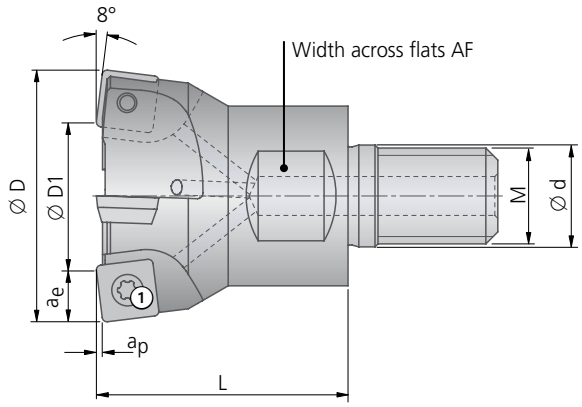
Tool offset for unstable conditions

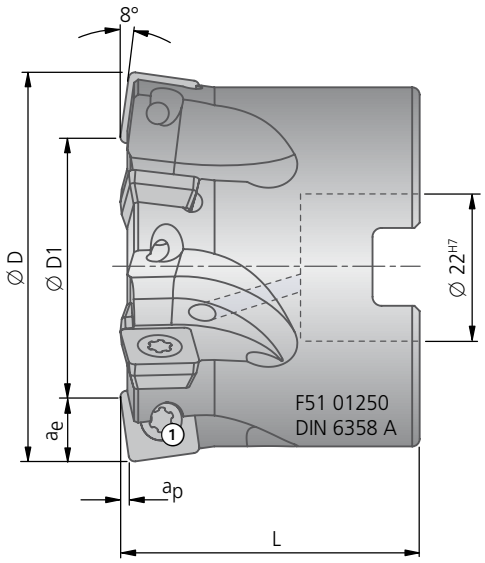
Milling cutter dia. **Ø D**	Machining dia. **Ø d1** min-max	Ramping angle **α**	Cutting depth a_p max	a_e max
20	30-38	2,8°	0,67	5,0
25	41-48	2,8°	0,72	5,6
32	52-62	2,5°	0,88	7,0
35	56-68	2,5°	0,88	7,0
42	69-82	2,3°	1,1	8,5
52	87-100	2,3°	1,1	8,5

f_z min-max			Y max
initial	min	max	
0,10	0,08	0,15	< 0,7 × D

Milling cutter

- screw-on
- central internal coolant supply
- MQL processing or with air recommended





Z = effective number of teeth for calculating v_f

Quatron *hi.feed*												Basic recommendation	
Ø D	Order No.	Ø d	M	Ø D1	L	a_p max	a_e	Z	AF	kg	Clamping screw ① Order No. Article	Insert -01 Order No. ▽▽ size ISO code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
20	**F51 01190**	10,5	M10	10	30	0,67	5	3	15	0,06	**N00 56041** S/M2×4,3-6IP 0,62 Nm	**W83 13010.048425** SOEX 050204-01 BK8425	● ◐ ●
25	**F51 01200**	12,5	M12	14	35	0,72	5,6	3	17	0,09	**N00 57553** S/M2,2×5,5-6IP 1,01 Nm	**W83 18010.068425** SOEX 060306-01 BK8425	● ◐ ●
32	**F51 01210**	17	M16	18	42	0,88	7,0	4	27	0,21	**N00 57571** S/M2,5×6,3-8IP 1,28 Nm	**W83 23010.088425** SOEX 07T308-01 BK8425	● ◐ ●
35	**F51 01230**	17	M16	21	42	0,88	7,0	4	27	0,23			
42	**F51 01220**	17	M16	25	42	1,1	8,5	4	27	0,26	**N00 57261** S3575-15IP 2,8 Nm	**W83 32010.088425** SOEX 090408-01 BK8425	● ◐ ●
42	**F51 01240**	17	M16	25	42	1,1	8,5	5	27	0,25			
52	**F51 01250**	DIN 6358 A		35	40	1,1	8,5	6	–	0,37			

Supply includes: Milling cutter with clamping screws ①.
Please order insert separately. Screwdriver see chapter 8.

Guideline values for milling: Page 59.

Guideline values for milling						v_c (m/min)	f_z (mm/tooth)											
							Feed											
							Ø 20		Ø 25		Ø 32		Ø 35		Ø 42		Ø 52	
Material group		Strength Rm (N/mm²)	Hardness HB	Material	Material example, material code/DIN	Cutting speed	normal	plunge milling	normal	plunge milling	normal	plunge milling	normal	plunge milling	normal	plunge milling	normal	plunge milling
P	1.0	≤500		non-alloy steels	St37-2 / 1.0037; 9SMn28 / 1.0715; St44-2 / 1.0044	300	0,5-1,2	0,05-0,11	0,5-1,2	0,05-0,11	0,5-1,6	0,06-0,13	0,5-1,6	0,06-0,13	0,5-2,0	0,07-0,15	0,5-2,0	0,07-0,15
P	2.0	500-900		non-alloy / low alloy steels	St52-2 / 1.0050, C55 / 1.0525, 16MnCr5 / 1.7131	250	0,5-1,2	0,05-0,11	0,5-1,2	0,05-0,11	0,5-1,6	0,06-0,13	0,5-1,6	0,06-0,13	0,5-2,0	0,07-0,15	0,5-2,0	0,07-0,15
P	2.1	<500		lead alloys	9SMnPb28 / 1.0718	300	0,5-1,2	0,05-0,11	0,5-1,2	0,05-0,11	0,5-1,6	0,06-0,13	0,5-1,6	0,06-0,13	0,5-2,0	0,07-0,15	0,5-2,0	0,07-0,15
P	3.0	>900		non alloy / low alloy steels: heat resistant structural, heat treated, nitride and tools steels	42CrMo4 / 1.7225, CK60 / 1.1221	200	0,5-1,2	0,05-0,11	0,5-1,2	0,05-0,11	0,5-1,6	0,06-0,13	0,5-1,6	0,06-0,13	0,5-2,0	0,07-0,15	0,5-2,0	0,07-0,15
P	4.0	>900		high alloy steels	X6CrMo4 / 1.2341, X165CrMoV12 / 1.2601	180	0,5-1,2	0,05-0,11	0,5-1,2	0,05-0,11	0,5-1,6	0,06-0,13	0,5-1,6	0,06-0,13	0,5-2,0	0,07-0,15	0,5-2,0	0,07-0,15
P	4.1			HSS		80	0,5-1,2	0,05-0,11	0,5-1,2	0,05-0,11	0,5-1,6	0,06-0,13	0,5-1,6	0,06-0,13	0,5-2,0	0,07-0,15	0,5-2,0	0,07-0,15
S	5.0		250	special alloys: Inconel, Hastelloy, Nimonic, stc.	Inconel 718 / 2.4668, Nimonic 80A / 2.4631													
S	5.1	400		titanium, titanium alloys	TiAl5Sn2 / 3.7114													
M	6.0	≤600		stainless steels	X2CrNi189 / 1.4306, X5CrNiMo1810 / 1.4401													
M	6.1	<900		stainless steels	X8CrNb17 / 1.4511, X10CrNiMoTi1810 / 1.4571													
M	7.0	>900		stainless / fireproof steels	X10CrAl7 / 1.4713, X8CrS-38-18 / 1.4862													
K	8.0		180	gray cast iron	GG-25 / 0.6025, GG-35 / 0.6035													
K	8.1		250	alloy gray cast iron	GG-NiCr202 / 0.6660													
K	9.0	≤600	130	spheroidal graphite cast iron, ferritic	GGG-40 / 0.7040													
K	9.1		230	spheroidal graphite cast iron, ferritic / perlitic	GGG-50 / 0.7050 GGG-55 / 0.7055 GTW-55 / 0.8055													
K	10.0	>600	250	spheroidal graphite cast iron, perlitic malleable iron	GGG-60 / 0.7060 GTS-65 / 0.8165													
K	10.1		200	alloyed spheroidal graphite cast iron	GGG-NiCr20-2 / 0.7661													
K	10.2		300	vermicular cast iron	GGV Ti < 0,2 GGV Ti > 0,2													
N	12.0		90	copper alloy, brass, lead-alloy bronze, lead bronze: good cut	CuZn36Pb3 / 2.1182, G-CuPb15Sn / 2.1182													
N	12.1		100	copper alloy, brass, bronze: average cut	CuZn40Al1 / 2.0550, E-Cu57 / 2.0060													
N	13.0		60	wrought aluminium alloys	AlMg1 / 3.3315, AlMnCu / 3.0517													
N	13.1		75	cast alum. alloy: Si-content <10% magnesium alloy	G-AlMg5 / 3.3561, G-AlSi9Mg / 3.2373													
N	14.0		100	cast alum.alloy: Si-content >10%	G-AlSi10Mg / 3.2381													
H	15.0	1400		hardened steels < 45 HRC														
H	16.0	1800		hardened steels > 45 HRC														

on request

on request

Cutting values shown are maximum values relating to the basic recommendations for cutting materials given.

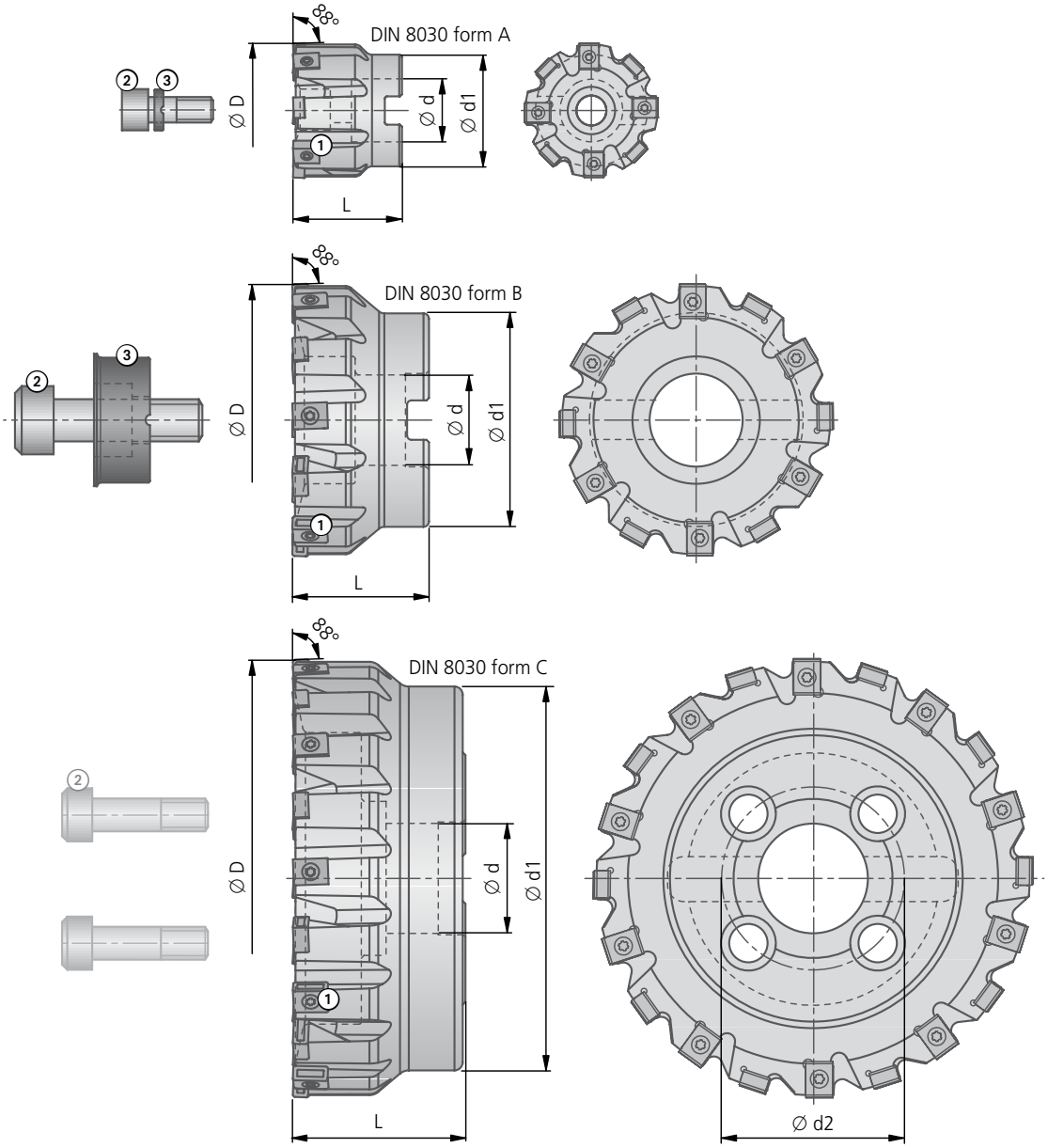
Important: See chapter 8 for more application details and safety notes !

KOMET® *hi.aeQ* Ø 40 – 160 mm

Arbor face milling cutter

The innovative *hi.aeQ* arbor face milling cutter is excellently suited for reliable face milling of cast iron materials. It features a high number of teeth and low cutting forces.

The Q80 tangential indexable inserts used are designed for counterboring and milling operations. Thanks to a standing-lying arrangement, each insert has eight usable cutting edges. The extremely stable tangential indexable inserts, when combined with selected cutting tool materials and coatings, provide a great economic advantage when machining cast iron materials.

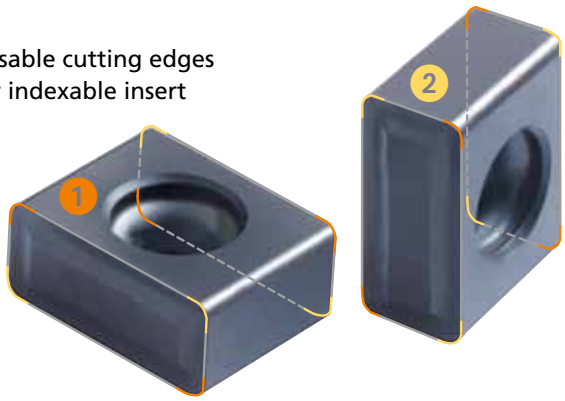


BENEFITS for you:

- High stability for high cutting efficiency thanks to the use of tangential screw-fit Q80 indexable inserts
- Eight usable cutting edges thanks to indexable inserts which are fitted in an alternately standing and lying arrangement
- Low power consumption thanks to low cutting forces and a low-vibration, quiet milling characteristic reduces the spindle loads
- This concept guarantees extremely high process reliability when combined with modern, matched substrates and coatings
- Both PVD and CVD-coated indexable inserts are available
- If internal coolant supply is used, optimum cooling of every cutting edge is achieved by using the coolant sleeve

Arbor face milling cutter

8 usable cutting edges
per indexable insert



Z = effective number of teeth for calculating v_f

hi.aeQ											Basic recommendation	
Ø D	Order No.	DIN 8030 form	Ø d^{H6}	Ø d1	Bolt-hold circle Ø d2	L	a_p max	Z	kg	Clamping screw ① Order No. Article	Insert Order No. ISO code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
40	**F51 14040**	A	16	36	–	40	3	6	0,36	**N00 57251** S3076-8IP 2,25 Nm	**Q80 20050.062715** LNGU 090406 EN-05 BK2715	●
50	**F51 14050**	A	22	41	–	40	3	8	0,36		**Q80 20050.066115** LNGU 090406 EN-05 BK6115	●
63	**F51 14060**	A	22	48	–	40	4	8	0,52	**N00 57411** S4010-15IP 4,3 Nm	**Q80 32000.012715** LNGU 120508 EN-05 BK2715	●
80	**F51 14080**	B	27	60	–	50	4	10	0,99			
100	**F51 14100**	B	32	78	–	50	4	12	1,71		**Q80 32000.016115** LNGU 120508 EN-05 BK6115	●
125	**F51 14120**	B	40	100	–	63	4	16	3,53			
160	**F51 14160**	C	40	140	66,7	63	4	20	5,66			

Ø D	Coolant sleeve ③ Order No.	kg	Cylindrical screw ② Order No.
40	**L01 01020**	0,05	**55011 08025**
50	**L01 01030**	0,05	**55011 10025**
63	**L01 01040**	0,022	**55011 10025**
80	**L01 01050**	0,152	**55011 12040**
100	**L01 01060**	0,170	**55011 16030**
125	**L01 01070**	0,396	**55011 20040**
160	–		**55011 12040**

Supply includes milling cutter Ø 40 - 63 mm: with clamping screws ① and cylindrical screw ②.
Supply includes milling cutter Ø 80 - 160 mm: with clamping screws ①.

Supply includes coolant sleeve ③: with cylindrical screw ②.

Please order inserts separately.
Screwdriver see chapter 8.

Guideline values for milling: Page 76-77.

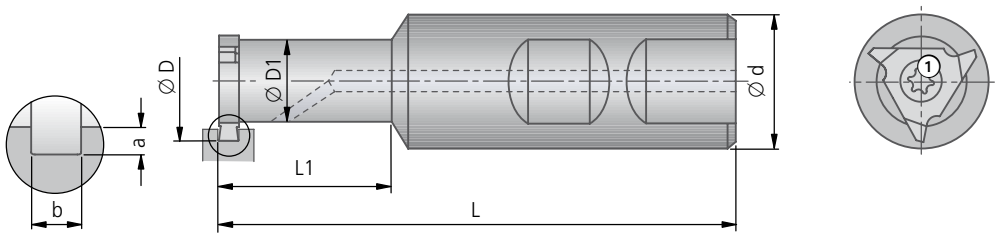
Application example

Workpiece: Reinforcing ring
Material: EN-GJS -400-18V-LT
Machine: DMC 340 FD
v_c = 200 m/min
n = 509 rev/min
f_z = 0,3 mm
f = 4,8 mm/rev
v_f = 2445 mm/min
a_p = 4 mm

Quiet and quick machining

Circular milling cutter

- central coolant supply
- cylindrical shank to DIN 1835 T1 B
- calculations for circular milling see page 75



Design:
The dimension b is determined by the slot widths with H13 tolerance for holding rings to DIN 471 and DIN 472; this is the higher tolerance limit for the slot widths which can be produced.

y = number of inserts = 1
z = effective number of teeth for calculating v_f = 3

Circular milling cutter										Basic recommendation		
									Clamping screw ①	Insert		for workpiece material
Ø D	Order No.	b^{H13}	a	Ø D1	Ø d_{h6}	L	L1	kg	Order No. Article	Order No. ▽▽size	ISO-Code	● main area of application ◐ suitable in some cases P M K N S H
10	**F51 70050**	1,1	0,9	8,2	16	84	24	0,09	**N00 57221** S2553-7IP 0,9 Nm	**Q12 18000.108425** **Q12 18000.102715** **Q12 18000.1022**	TPAX1102ZZ R-110 BK8425 TPAX1102ZZ R-110 BK2715 TPAX1102ZZ R-110 K20	●◐ ● ●
16	**F51 70080**	1,1 1,3 1,6	0,9 1,3 1,4	13	16	84	24	0,11	**N00 57281** S3598-15IP 2,8 Nm	**Q12 32000. .. 8425** **Q12 32000. .. 2715** **Q12 32000. .. 22**	TCAX16T3ZZ R- ... BK8425 TCAX16T3ZZ R- ... BK2715 TCAX16T3ZZ R- ... K20	●◐ ● ●

15 b = 1,1 mm 110
16 b = 1,3 mm 130
17 b = 1,6 mm 160

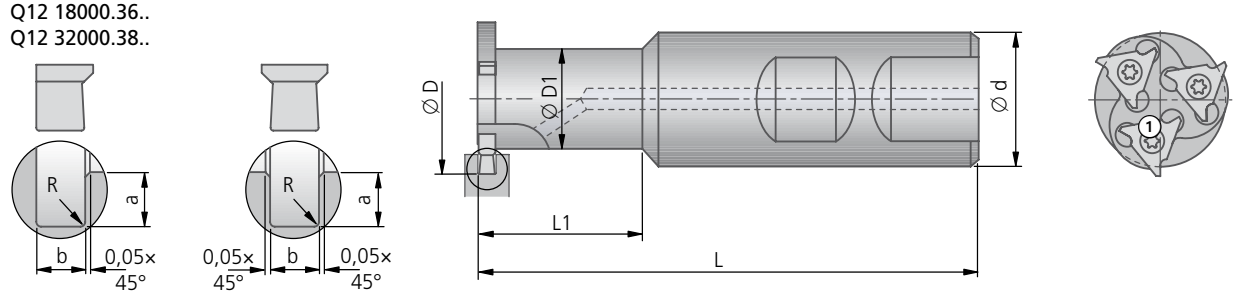
For further details on selecting insert types, see chapter 6.

Supply includes: Circular milling cutter with clamping screw ①.
Please order insert separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Circular milling cutter

central coolant supply ■
cylindrical shank to DIN 1835 T1 B ■
calculations for circular milling see page 75 ■

Q12 18000.36..
Q12 32000.38..



Design:
The dimension b is determined by the slot widths with H13 tolerance for holding rings to DIN 471 and DIN 472; this is the higher tolerance limit for the slot widths which can be produced.

y = number of inserts = 3
z = effective number of teeth for calculating v_f = 3

Circular milling cutter											Basic recommendation		
Ø D	Order No.	b^{H13}	a	R	Ø D1	Ø d_{h6}	L	L1	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽ size	.36.. ISO-Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
25	**F51 70121**	1,6 1,85	1,0 1,25	0,1 0,1	20,5	25	100	42	0,35	**N00 57221** S2553-7IP 0,9 Nm	**Q12 18000. ..8425** **Q12 18000. ..2715**	TNAX1103ZZ R-... BK8425 TNAX1103ZZ R-... BK2715	● ◐ ● ●
25	**F51 70140**	2,15 2,65	1,5 1,75	0,1 0,2	20,5	25	100	42	0,30		**Q12 18000. ..22**	TNAX1103ZZ R-... K20	●

For further details on selecting insert types, see chapter 6.

31	b = 1,6 mm	160
32	b = 1,85 mm	185
33	b = 2,15 mm	215
34	b = 2,65 mm	265
36	b = 2,65 mm	265

Circular milling cutter											Basic recommendation		
Ø D	Order No.	b^{H13}	a	R	Ø D1	Ø d_{h6}	L	L1	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽ size	.38.. ISO-Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
40	**F51 70201**	2,65 3,15 4,15	1,75 1,75 2,5	0,2 0,2 0,3	33	32	110	49,5	0,65	**N00 57281** S3598-15IP 2,8 Nm	**Q12 32000. ..8425** **Q12 32000. ..2715** **Q12 32000. ..22**	TNAX1604ZZ R-... BK8425 TNAX1604ZZ R-... BK2715 TNAX1604ZZ R-... K20	● ◐ ● ● ●

For further details on selecting insert types, see chapter 6.

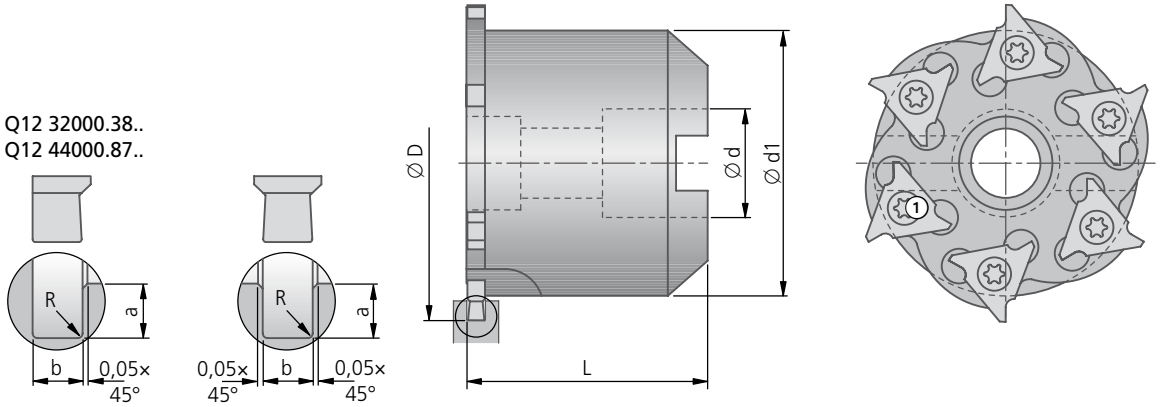
41	b = 2,65 mm	265
42	b = 3,15 mm	315
43	b = 4,15 mm	415
38	b = 4,15 mm	415

Supply includes: Circular milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Guideline values for milling: Page 76-77.

Circular milling cutter

- location to DIN 6358 A
- calculations for circular milling see page 75



Design:
The dimension b is determined by the slot widths with H13 tolerance for holding rings to DIN 471 and DIN 472; this is the higher tolerance limit for the slot widths which can be produced.

y = number of inserts = 6
z = effective number of teeth for calculating v_f = 6

Circular milling cutter										Basic recommendation		
									Clamping screw ①	Insert .38..		for workpiece material ● main area of application ◐ suitable in some cases
Ø D	Order No.	b	a	R	Ø d^{H7}	Ø d1	L	kg	Order No. Article	Order No. ▽▽ size	ISO-Code	P M K N S H
63	F51 71031	2,65 3,15 4,15	1,75 1,75 2,5	0,2 0,2 0,3	22	55	40	0,63	N00 57281 S3598-15IP 2,8 Nm	Q12 32000. ..8425 Q12 32000. ..2715 Q12 32000. ..22	TNAX1604ZZ R-... BK8425 TNAX1604ZZ R-... BK2715 TNAX1604ZZ R-... K20	● ◐ ● ●

For further details on selecting insert types, see chapter 6.

41	b = 2,65 mm	265
42	b = 3,15 mm	315
43	b = 4,15 mm	415
38	b = 4,15 mm	415

Circular milling cutter										Basic recommendation		
									Clamping screw ①	Insert .87..		for workpiece material ● main area of application ◐ suitable in some cases
Ø D	Order No.	b	a	R	Ø d^{H7}	Ø d1	L	kg	Order No. Article	Order No. ▽▽ size	ISO-Code	P M K N S H
80	F51 71101	4,15 4,65 5,15	2,5 3,4 4,0	0,3	27	68	50	1,25	N00 57281 S3598-15IP 2,8 Nm	Q12 44000. ..8425 Q12 44000. ..2715 Q12 44000. ..22	TNAX2206ZZ R-... BK8425 TNAX2206ZZ R-... BK2715 TNAX2206ZZ R-... K20	● ◐ ● ●

For further details on selecting insert types, see chapter 6.

84	b = 4,15 mm	415
85	b = 4,65 mm	465
86	b = 5,15 mm	515
87	b = 5,15 mm	515

Supply includes: Circular milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Order No. / Order date | Please state Customer No. | Signature | KOMET internal

Company:
Adress:

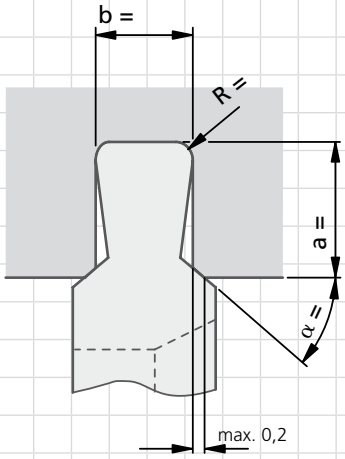
Contact:
Department:
Phone:
Fax:
E-Mail:

☐ Order ☐ Inquiry Quantity:

Material to be machined:

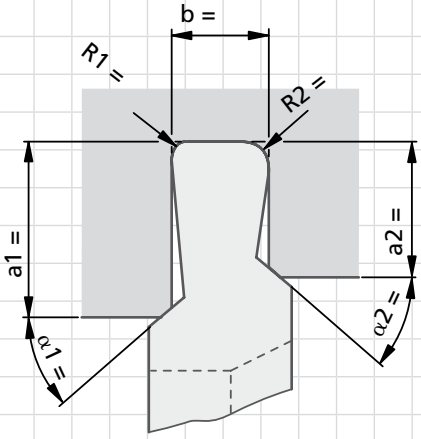
symmetrical

Parameters				
Insert size	Groove width b	Groove depth a max.	Radius R	Chamfer angle α
XQ12 18...	1,60 – 2,65	2,2	0,1 – 0,5	30° – 60°
XQ12 32...	2,65 – 4,15	3,2	0,1 – 0,5	30° – 60°
XQ12 44...	4,15 – 5,80	5,2	0,1 – 0,5	30° – 60°



asymmetrical

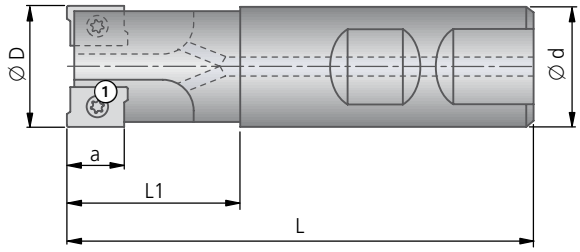
Parameters					
Insert size	Groove width b	Groove depth a1	Groove depth a2	Radius R1 / R2	Chamfer angle α1 / α2
XQ12 18...	1,60 – 2,65	2,5	2,2	$0,0 - \frac{b}{2}$	15° – 75°
XQ12 32...	2,65 – 4,15	3,5	3,2	$0,0 - \frac{b}{2}$	30° – 60°
XQ12 44...	4,15 – 5,80	5,5	5,2	$0,0 - \frac{b}{2}$	30° – 60°



Please provide workpiece sketch !

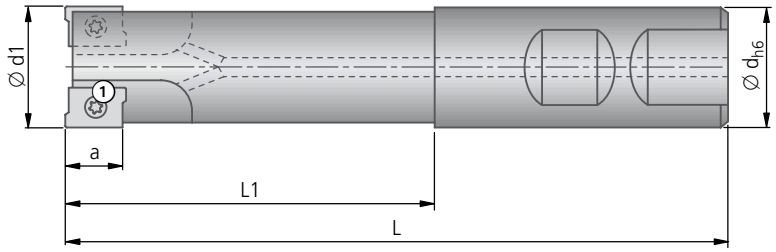
End milling cutter

- central coolant supply
- cylindrical shank to DIN 1835 T1 B
- instructions for slot milling see page 74



y = number of inserts
z = effective number of teeth for calculating v_f

End milling cutter										Basic recommendation		
Ø D	Order No.	Ød$_{h6}$	L	L1	a	y	z	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽ size	ISO Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
9,5	**F51 50251**	16	80	17	9	1	1	0,09	**N00 57321** S2556-8IP 1,28 Nm	**Q36 18000.01..**	APKT 1003PD-R ...	● ◐ ● ● ●
10,0	**F51 50052**	16	80	17	9	1	1	0,09				
12,0	**F51 50062**	16	80	21	9	1	1	0,09				
14,0	**F51 50072**	16	80	23	9	1	1	0,10				
16,0	**F51 50082**	16	85	26	9	2	2	0,10				
20,0	**F51 50102**	20	90	26	9	3	3	0,18				
25,0	**F51 50122**	25	100	32	11	3	3	0,31	**N00 57341** S3066-9IP 2,25 Nm	**Q36 24000.02..**	APKT 1203PD-R ...	● ◐ ● ● ●
32,0	**F51 50162**	25	100	42	11	4	4	0,35				
40,0	**F51 50181**	32	115	40	11	3	3	0,57	**N00 57411** S40101-15IP 4,3 Nm	**Q36 38000.07..**	APKT 1605PD-RM ...	● ◐ ● ● ●



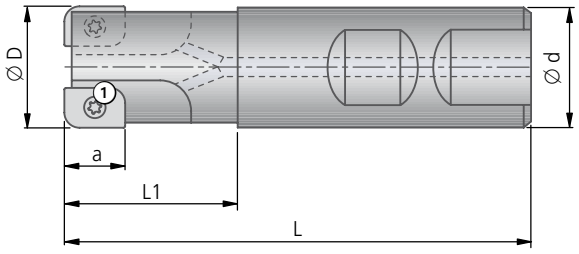
End milling cutter										Basic recommendation		
Ø D	Order No.	Ød$_{h6}$	L	L1	a	y	z	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽ size	ISO Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
20,0	**F51 50410**	20	126	75	11	2	2	0,24	**N00 57341** S3066-9IP 2,25 Nm	**Q36 24000.02..**	APKT 1203PD-R ...	● ◐ ● ● ●
25,0	**F51 50420**	25	142	85	11	3	3	0,44				
32,0	**F51 50460**	32	182	120	11	3	3	0,91				

For further details on selecting insert types, see chapter 6.

Supply includes: End milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Copying end milling cutter

central coolant supply ■
cylindrical shank to DIN 1835 T1 B ■



y = number of inserts
z = effective number of teeth for calculating v_f

Copying end milling cutter										Basic recommendation		
Ø D	Order No.	Ød$_{h6}$	L	L1	a	y	z	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽ size	ISO Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
25	**F51 50620**	25	100	32	11	3	3	0,30	**N00 57341** S3066-9IP 2,25 Nm	**Q36 24000.04..**	APKT 120316PD-R ...	● ◐ ● ●
32	**F51 50660**	25	100	42	11	4	4	0,37		**Q36 24000.05..** **Q36 24000.06..**	APKT 120324PD-R ... APKT 120332PD-R ...	● ◐ ● ●

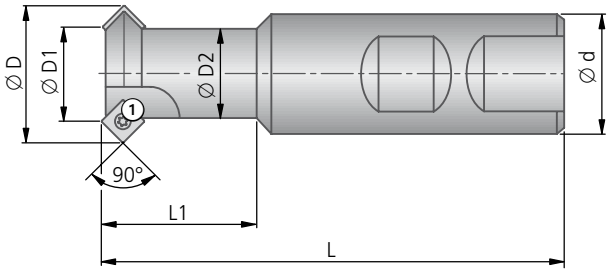
For further details on selecting insert types, see chapter 6.

Supply includes: Copying end milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Guideline values for milling: Page 76-77.

Chamfer milling cutter

- cylindrical shank to DIN 1835 T1 B
- reverse circular milling possible



y = number of inserts
z = effective number of teeth for calculating v_f

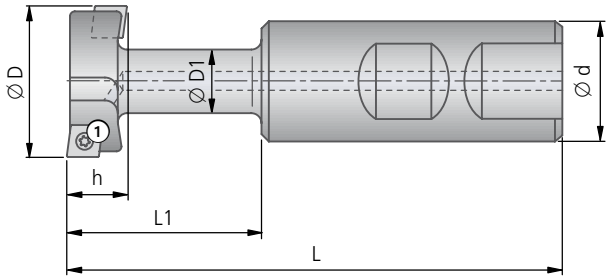
Chamfer milling cutter											Basic recommendation		
Ø D	Ø D1	Order No.	$Ød_{h6}$	ØD2	L	L1	y	z	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽ size	ISO Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
19,6	11,5	**F53 30110**	16	11	80	29	1	1	0,10	**N00 57221** S2553-7IP 0,9 Nm	**Q09 18000.172725**	SPMT060304 BK2725	● ◐
											Q09 18000.1722	SPMT060304 K20	● ● ●
27,6	19,5	**F53 30191**	25	19	90	31	2	2	0,28		**Q09 18000.1787**	SPMT060304 BK87	●

For further details on selecting insert types, see chapter 6.

Supply includes: Chamfer milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

T-slot milling cutter

central coolant supply ■
cylindrical shank to DIN 1835 T1 B and D ■



y = number of inserts
z = effective number of teeth for calculating v_f

T-slot milling cutter											Basic recommendation		
Ø D	Order No.	Ød$_{h6}$	ØD1	h$_{-0,1}$	L	L1	y	z	kg	Clamping screw ① Order No. Article	Insert Q09.. Q15.. Order No. ▽▽size	ISO Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
17,5	**F51 60081** TNS.010.001.00	16	9	8,0	80	25	2	1	0,09	**N00 57221** S2553-7IP 0,9 Nm	**Q09 13000.0103** **Q09 13000.0122**	SPGW050204 P25M SPGW050204 K20	● ◐ ● ●
20,5	**F51 60101** TNC.012.001.00	16	11	9,0	85	30	2	1	0,10	**N00 57221** S2553-7IP 0,9 Nm	**Q15 18000.01..** **Q15 18000.0261**	CPMT060304 ... CPMW060304 BK61	● ◐ ●
23,5	**F51 60121** TNC.014.001.00	25	13	10,0	95	32	2	1	0,26				
30,5	**F51 60151** TNC.018.001.00	25	17	11,6	105	40	4	2	0,30				
37,5	**F51 60191** TNC.022.001.00	32	21	16,0	115	50	4	2	0,53	**N00 57261** S3575-15IP 2,8 Nm	**Q15 32000.04..** **Q15 32000.0322**	CPMT09T308 ... CPMW09T308 K20	● ◐ ● ●
47,0	**F51 60231** TNC.028.001.00	32	27	20,0	125	60	4	1	0,65				

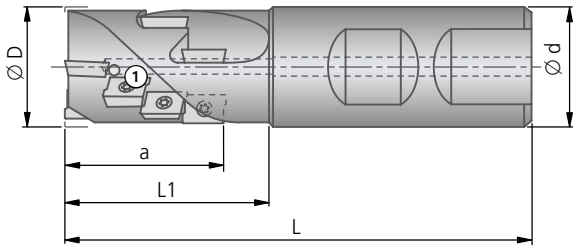
For further details on selecting insert types, see chapter 6.

Supply includes: T-slot milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Guideline values for milling: Page 76-77.

Shell end face milling cutter

- central coolant supply
- cylindrical shank to DIN 1835 T1 B



y = number of inserts
z = effective number of teeth for calculating v_f

Shell end face milling cutter										Basic recommendation		
									Clamping screw ①	Insert		for workpiece material
Ø D	Order No.	Ød$_{h6}$	L	L1	a	y	z	kg	Order No. Article	Order No. ▽▽ size	ISO Code	● main area of application ◐ suitable in some cases P M K N S H
20	**F51 40300***	25	100	33	27	6	2	0,26	**N00 57321** S2556-8IP 1,28 Nm	**Q36 18000.01..**	APKT 1003PD-R ...	● ● ● ● ●
20	**F51 40310**	25	90	24	18	4	2	0,25				
25	**F51 40320**	25	100	41	27	6	2	0,29				
32	**F51 40360**	32	110	49	26	12	3	0,53				

* only suitable for edge cutting

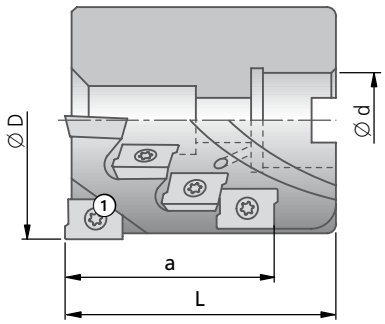
For further details on selecting insert types, see chapter 6.

Supply includes: Shell end face milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Guideline values for milling: Page 76-77.

Shell end face milling cutter

central coolant supply ■
location to DIN 6358 A ■



y = number of inserts
z = effective number of teeth for calculating v_f

Shell end face milling cutter									Basic recommendation		
Ø D	Order No.	Ød^{H7}	L	a	y	z	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽size	ISO Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
63	**F51 42060**	27	60	42	9	3	0,71	**N00 57411** S40101-15IP 4,3 Nm	**Q36 38000.07..**	APKT 1605PD-R ...	● ◐ ● ● ●
80	**F51 42080**	32	70	55	16	4	0,39				

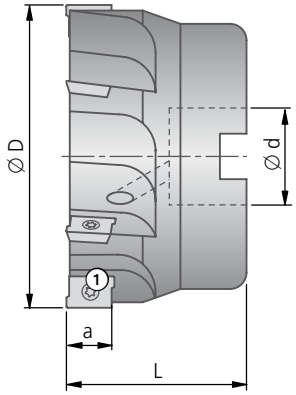
For further details on selecting insert types, see chapter 6.

Supply includes: Shell end face milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Guideline values for milling: Page 76-77.

Corner milling cutter

- central coolant supply
- location to DIN 6358 A



y = number of inserts
z = effective number of teeth for calculating v_f

Corner milling cutter									Basic recommendation		
								Clamping screw ①	Insert		for workpiece material
Ø D	Order No.	Ød^{H7}	L	a	y	z	kg	Order No. Article	Order No. ▽▽ size	ISO Code	● main area of application ◐ suitable in some cases P M K N S H
40	**F51 12040**	22	40	11	4	4	0,18	**N00 57341** S3066-9IP 2,25 Nm	**Q36 24000.02..**	APKT 1203PD-R ...	● ◐ ● ● ●
50	**F51 12050**	22	40	11	4	4	0,28				
63	**F51 12060**	22	40	11	5	5	0,54				
80	**F51 12180**	27	50	11	6	6	1,19				
80	**F51 12080**	27	50	15	5	5	1,13	**N00 57411** S40101-15IP 4,3 Nm	**Q36 38000.07..**	APKT 1605PD-R ...	● ◐ ● ● ●
100	**F51 12100**	32	50	15	6	6	1,91				
125	**F51 12120**	40	63	15	7	7	4,00				

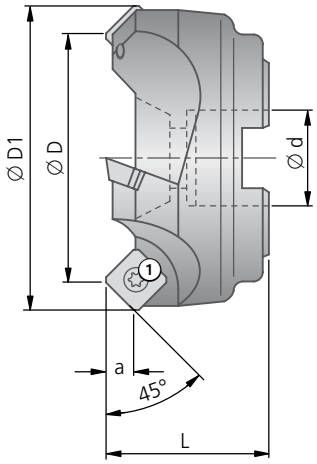
For further details on selecting insert types, see chapter 6.

Supply includes: Corner milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Guideline values for milling: Page 76-77.

Face milling cutter

location to DIN 6358 A and B ■



y = number of inserts
z = effective number of teeth for calculating v_f

Face milling cutter											Basic recommendation	
Ø D	Ø D1	Article	Order No.	Ød^{H7}	L	a	y	z	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽ size	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
40	53	PFS.040.001.79	**F51 01040**	16	40	6	3	3	0,38	**N00 57301** S45100-20IP 6,25 Nm	**Q09 44000. ..** SEHW 1204 ...	● ◐ ● ●
50	63	PFS.050.001.79	**F51 01050**	22	40	6	4	4	0,46			
63	76	PFS.063.001.79	**F51 01060**	22	40	6	4	4	0,67			
80	93	PFS.080.001.79	**F51 01080**	27	50	6	5	5	1,17			

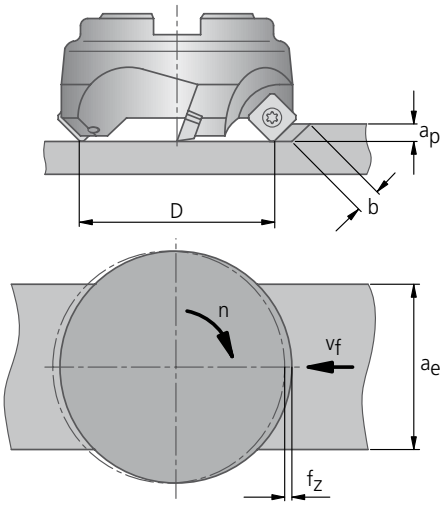
For further details on selecting insert types, see chapter 6.

Supply includes: Face milling cutter with clamping screws ①.
Please order inserts separately. Screwdriver see chapter 8.
Copaslip grease for screw should be included in first order. Order No. 4700100100.

Guideline values for milling: Page 76-77.

Calculation information

a_e = milling width in mm
a_p = cutting depth in mm
b = chip width in mm
D = tool diameter in mm
f_z = feed/tooth in mm
n = speed in min^{-1}
k_c = specific cutting force in N/mm²
P_e = power requirement in KW
v_c = cutting speed in m/min
v_f = feed rate in mm/min
z = tooth load
η = working angle



	Workpiece material	Brinell-hardness HB	Specific cutting force k_c (N/mm²) Feed f_z (mm/tooth) 0,1	0,2	0,3	0,4
P	Carbon steel 0,2%C	150	3200	2700	2450	2300
	Carbon steel 0,45%C	190	3550	3000	2750	2550
	Carbon steel 0,83%C	250	3900	3300	3000	2800
	Alloy steel	up to 200	3550	3000	2750	2550
		200 - 250	3900	3300	3000	2800
		275 - 325	4300	3600	3300	2100
		325 - 375	4600	3900	3600	3300
		375 - 425	4850	4100	3750	3500
		425 - 475	5000	4300	3900	3700
M	Stainless steel, ferritic	135 - 175	3100	3600	2350	2200
		175 - 225	4150	3500	3200	3000
	Stainless steel, martensitic	275 - 325	4700	4000	3650	3400
		375 - 425	5300	4500	4100	3850
	Stainless steel, austenitic	135 - 425	4150	3500	3200	3000
K	Cast steel, carbon	up to 150	2850	2400	2200	2050
		150 - 200	3150	2650	2400	2250
	Cast steel, alloy	200 - 250	3400	2900	2650	2450
		250 - 300	3700	3200	2900	2700
	Malleable iron, ferritic	110 - 145		2000		
	Malleable iron, perlitic	200 - 250		2000		
	Grey cast iron, low tensile strengh	180		1400		
	Grey cast iron, high tensile strengh, alloy	250		1800		
	Spheroidal graphite cast iron, ferritic	160		1500		
	Spheroidal graphite cast iron, perlitic	250		2250		
	Chill cast iron	400		3500		

Cutting speed:

$$v_c = \frac{n \times p \times D}{1000} \quad (m/min)$$

Power requirement:

$$P_e = \frac{a_p \times a_e \times v_f \times k_c}{60 \times 10^6 \times \eta} \quad (kW)$$

Feed rate:

$$v_f = f_z \times z \times n \quad (mm/min)$$

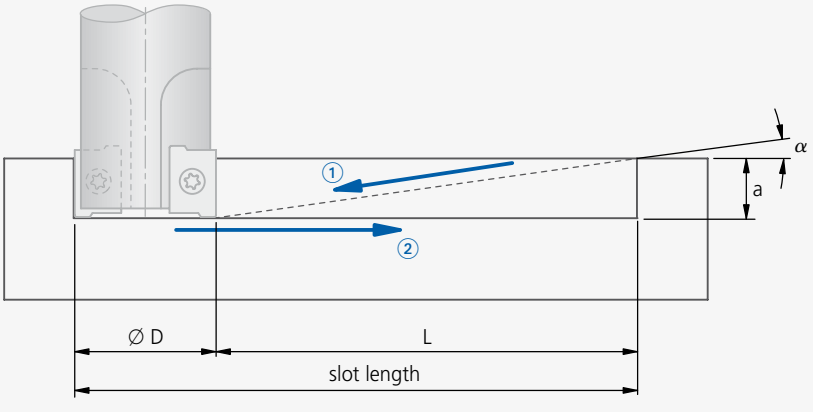
Spindle speed:

$$n = \frac{v_c \times 1000}{p \times D} \quad (min^{-1})$$

Instructions for slot milling into the solid

Milling dia. Ø D	L	a_p max	Max. angle of entry α in relation to diameter d1 α max
9,5	91,5	8	5°
10,0	91,5	8	5°
12,0	14,4	9	32°
14,0	12,8	9	35°
16,0	33,6	9	15°
20,0	128,7	9	4°
25,0	128,7	9	4°
32,0	343,0	9	1,4°
40,0 (F51 50181)	186,0	15	3°

Single angled entry
It it is not possible to obtain the required slot depth by a single entry, this is achieved by entering more than once.

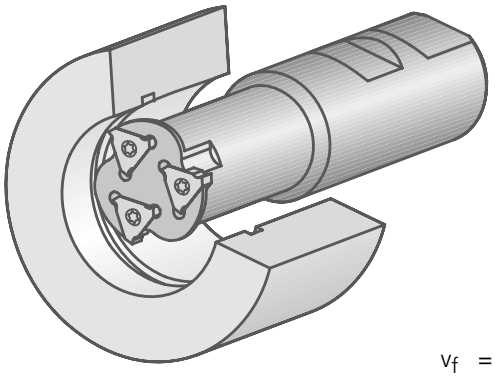


Calculations for circular milling

R = workpiece radius in mm
r = milling cutter radius in mm
a_r = radial cutting depth in mm
φ = approach angle in °
h_m = average chip thickness in mm
n = spindle speed in min^{-1}
z = number of teeth (effectively cutting)

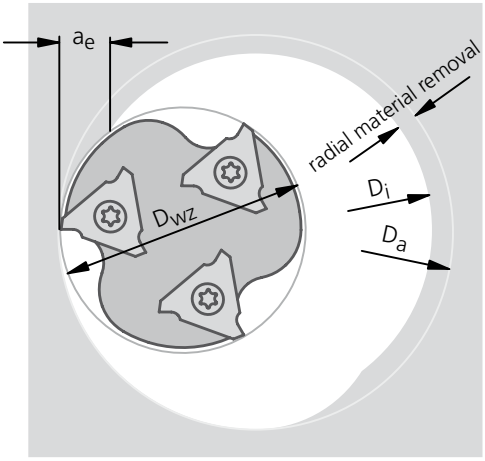
The average chip thickness is determined by considering workpiece and tool geometry data.
The total cutting time must allow for the entry and exit times.
Axial "chambering" is also possible with these interpolating milling cutters.

Circular milling, internal



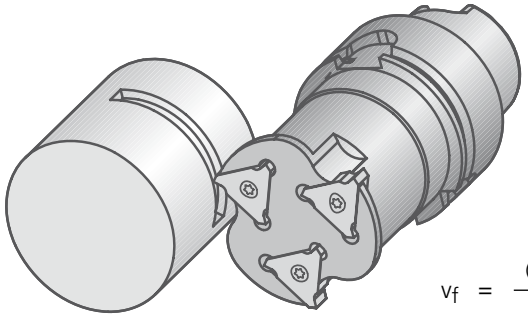
$$a_e = \frac{D_a^2 - D_i^2}{4\,(D_a - D_{wz})}$$

$$v_f = \frac{(D_a - D_{wz}) \times n \times z_{eff} \times f_z}{D_a}$$



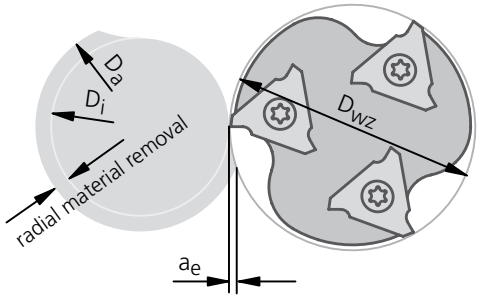
a_e > radial material removal

Circular milling, external



$$a_e = \frac{D_a^2 - D_i^2}{4\,(D_i - D_{wz})}$$

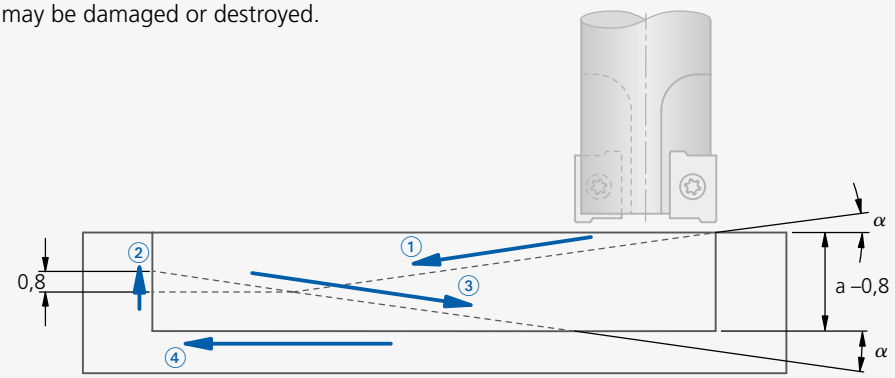
$$v_f = \frac{(D_i - D_{wz}) \times n \times z_{eff} \times f_z}{D_i}$$



a_e < radial material removal

Multiple entry

It should be noted that there must be an allowance of 0,8 mm when the milling cutter is reversed. If this allowance is not made, the tool may be damaged or destroyed.



Recommended application areas

Guideline values for milling						Cutting speed v_c (m/min)													
						T-slot milling = v_c – 50 %													
						uncoated		CVD coated				PVD coated							Cermet
Material group		Strength Rm (N/mm²)	Hardness HB	Material	Material example, material code/DIN	P25M	K10 / K20	BK6110	BK6115	BK64	BK74	BK2715	BK2725	BK2730	BK68	BK78	BK80	BK8425	BK8440	CK37
P	1.0	≤500		non-alloy steels	St37-2 / 1.0037; 9SMn28 / 1.0715; St44-2 / 1.0044	60-100				100-180	100-180		90-160	120-180	90-160	120-180	90-160	100-180	80-160	180-350
P	2.0	500-900		non-alloy / low alloy steels	St52-2 / 1.0050, C55 / 1.0525, 16MnCr5 / 1.7131	60-100				100-180	100-180		90-160	120-180	90-160	120-180	90-160	100-180	80-160	180-350
P	2.1	<500		lead alloys	9SMnPb28 / 1.0718	60-100				100-180	100-180		90-160	120-180	90-160	120-180	90-160	100-180	80-160	180-350
P	3.0	>900		non alloy / low alloy steels: heat resistant structural, heat treated, nitride and tools steels	42CrMo4 / 1.7225, CK60 / 1.1221	40-70				60-120	60-120		50-110	120-160	50-110	90-160	50-110	70-130	60-110	160-280
P	4.0	>900		high alloy steels	X6CrMo4 / 1.2341, X165CrMoV12 / 1.2601	40-70				60-120	60-120		50-110	120-160	50-110	90-160	50-110	70-130	60-110	160-280
P	4.1			HSS		–				–	–		–	–	–	–	–	–	–	–
S	5.0		250	special alloys: Inconel, Hastelloy, Nimonic, stc.	Inconel 718 / 2.4668, Nimonic 80A / 2.4631		20-40				40-60									
S	5.1	400		titanium, titanium alloys	TiAl5Sn2 / 3.7114		10-30				40-60									
M	6.0	≤600		stainless steels	X2CrNi189 / 1.4306, X5CrNiMo1810 / 1.4401					60-140	80-160					80-160	100-180	80-160	70-150	200-260
M	6.1	<900		stainless steels	X8CrNb17 / 1.4511, X10CrNiMoTi1810 / 1.4571					60-140	80-160					80-160	100-180	80-160	70-150	200-260
M	7.0	>900		stainless / fireproof steels	X10CrAl7 / 1.4713, X8CrS-38-18 / 1.4862					60-140	80-160					80-160	100-180	80-160	70-150	200-260
K	8.0		180	gray cast iron	GG-25 / 0.6025, GG-35 / 0.6035		60-150	180-350	150-330			140-250	60-140	120-260	60-140			140-200		250-320
K	8.1		250	alloy gray cast iron	GG-NiCr202 / 0.6660		60-150	150-280	120-260			110-200	60-140	120-260	60-140			140-200		250-320
K	9.0	≤600	130	spheroidal graphite cast iron, ferritic	GGG-40 / 0.7040		60-150	160-320	140-300			130-230	60-140	120-260	60-140			140-200		250-320
K	9.1		230	spheroidal graphite cast iron, ferritic / perlitic	GGG-50 / 0.7050 GGG-55 / 0.7055 GTW-55 / 0.8055		60-150	150-280	120-260			110-200	60-140	120-260	60-140			140-200		250-320
K	10.0	>600	250	spheroidal graphite cast iron, perlitic malleable iron	GGG-60 / 0.7060 GTS-65 / 0.8165		60-150	130-250	110-230			100-180	60-140	120-260	60-140			140-200		250-320
K	10.1		200	alloyed spheroidal graphite cast iron	GGG-NiCr20-2 / 0.7661		60-150	130-250	110-230			100-180	60-140	120-260	60-140			140-200		250-320
K	10.2		300	vermicular cast iron	GGV Ti < 0,2 GGV Ti > 0,2		60-100	110-210	90-200			90-150	–	–	–			–		–
N	12.0		90	copper alloy, brass, lead-alloy bronze, lead bronze: good cut	CuZn36Pb3 / 2.1182, G-CuPb15Sn / 2.1182		200-500													
N	12.1		100	copper alloy, brass, bronze: average cut	CuZn40Al1 / 2.0550, E-Cu57 / 2.0060		200-500													
N	13.0		60	wrought aluminium alloys	AlMg1 / 3.3315, AlMnCu / 3.0517		200-500													
N	13.1		75	cast alum. alloy: Si-content <10% magnesium alloy	G-AlMg5 / 3.3561, G-AlSi9Mg / 3.2373		200-500													
N	14.0		100	cast alum.alloy: Si-content >10%	G-AlSi10Mg / 3.2381		200-500													
H	15.0	1400		hardened steels < 45 HRC																
H	16.0	1800		hardened steels > 45 HRC																

Cutting values shown are maximum values relating to the basic recommendations for cutting materials given.

Guideline values for milling						Feed f_z (mm/tooth)									
						Q09			Q12	Q15	Q36				Q80
Material group		Strength Rm (N/mm²)	Hardness HB	Material	Material example, material code/DIN	Face milling cutter	T-slot milling cutter	Chamfer milling cutter	Circular milling cutter	T-slot milling cutter	Corner milling cutter	Shell end face milling cutter	End milling cutter	Copying end milling cutter	Arbor face mill.cutter *hi.aeQ*
P	1.0	≤500		non-alloy steels	St37-2 / 1.0037; 9SMn28 / 1.0715; St44-2 / 1.0044	0,08-0,40	0,04-0,12	0,05-0,20	0,05-0,12	0,04-0,12	0,08-0,35	0,06-0,30	0,06-0,30	0,06-0,30	
	2.0	500-900		non-alloy / low alloy steels	St52-2 / 1.0050, C55 / 1.0525, 16MnCr5 / 1.7131	0,08-0,40	0,04-0,12	0,05-0,20	0,05-0,12	0,04-0,12	0,08-0,35	0,06-0,30	0,06-0,30	0,06-0,30	
	2.1	<500		lead alloys	9SMnPb28 / 1.0718	0,08-0,40	0,04-0,12	0,05-0,20	0,05-0,12	0,04-0,12	0,08-0,35	0,06-0,30	0,06-0,30	0,06-0,30	
	3.0	>900		non alloy / low alloy steels: heat resistant structural, heat treated, nitride and tools steels	42CrMo4 / 1.7225, CK60 / 1.1221	0,08-0,30	0,04-0,12	0,05-0,20	0,05-0,12	0,04-0,12	0,08-0,25	0,06-0,25	0,06-0,25	0,06-0,25	
	4.0	>900		high alloy steels	X6CrMo4 / 1.2341, X165CrMoV12 / 1.2601	0,05-0,25	0,04-0,12	0,05-0,20	0,05-0,12	0,04-0,12	0,08-0,25	0,06-0,25	0,06-0,25	0,06-0,25	
	4.1			HSS		–	–	–	–	–	–	–	–	–	
S	5.0		250	special alloys: Inconel, Hastelloy, Nimonic, stc.	Inconel 718 / 2.4668, Nimonic 80A / 2.4631			0,05-0,20			0,04-0,10	0,04-0,10	0,04-0,10		
	5.1	400		titanium, titanium alloys	TiAl5Sn2 / 3.7114			0,05-0,20			0,04-0,10	0,04-0,10	0,04-0,10		
M	6.0	≤600		stainless steels	X2CrNi189 / 1.4306, X5CrNiMo1810 / 1.4401	0,05-0,20		0,05-0,20	0,05-0,10		0,05-0,15	0,05-0,15	0,05-0,15	0,05-0,15	
	6.1	<900		stainless steels	X8CrNb17 / 1.4511, X10CrNiMoTi1810 / 1.4571	0,05-0,20		0,05-0,20	0,05-0,10		0,05-0,15	0,05-0,15	0,05-0,15	0,05-0,15	
	7.0	>900		stainless / fireproof steels	X10CrAl7 / 1.4713, X8CrS-38-18 / 1.4862	0,05-0,20		0,05-0,20	0,05-0,10		0,05-0,15	0,05-0,15	0,05-0,15	0,05-0,15	
K	8.0		180	gray cast iron	GG-25 / 0.6025, GG-35 / 0.6035	0,08-0,40	0,04-0,15	0,05-0,20	0,05-0,15	0,04-0,15	0,10-0,30	0,10-0,30	0,10-0,30	0,10-0,30	0,25-0,35
	8.1		250	alloy gray cast iron	GG-NiCr202 / 0.6660	0,08-0,40	0,04-0,15	0,05-0,20	0,05-0,15	0,04-0,15	0,10-0,30	0,10-0,30	0,10-0,30	0,10-0,30	0,25-0,35
	9.0	≤600	130	spheroidal graphite cast iron, ferritic	GGG-40 / 0.7040	0,08-0,40	0,04-0,15	0,05-0,20	0,05-0,15	0,04-0,15	0,10-0,30	0,10-0,30	0,10-0,30	0,10-0,30	0,25-0,35
	9.1		230	spheroidal graphite cast iron, ferritic / perlitic	GGG-50 / 0.7050 GGG-55 / 0.7055 GTW-55 / 0.8055	0,08-0,30	0,04-0,15	0,05-0,20	0,05-0,15	0,04-0,15	0,10-0,30	0,10-0,30	0,10-0,30	0,10-0,30	0,25-0,35
	10.0	>600	250	spheroidal graphite cast iron, perlitic malleable iron	GGG-60 / 0.7060 GTS-65 / 0.8165	0,08-0,30	0,04-0,15	0,05-0,20	0,05-0,15	0,04-0,15	0,10-0,30	0,10-0,30	0,10-0,30	0,10-0,30	0,25-0,35
	10.1		200	alloyed spheroidal graphite cast iron	GGG-NiCr20-2 / 0.7661	0,08-0,30	0,04-0,15	0,05-0,20	0,05-0,15	0,04-0,15	0,10-0,30	0,10-0,30	0,10-0,30	0,10-0,30	0,25-0,35
	10.2		300	vermicular cast iron	GGV Ti < 0,2 GGV Ti > 0,2	0,08-0,30	0,04-0,15	0,05-0,20	0,05-0,15	0,04-0,15	0,10-0,30	0,10-0,30	0,10-0,30	0,10-0,30	0,25-0,35
N	12.0		90	copper alloy, brass, lead-alloy bronze, lead bronze: good cut	CuZn36Pb3 / 2.1182, G-CuPb15Sn / 2.1182	0,05-0,40	0,05-0,15	0,05-0,20	0,05-0,25	0,05-0,15	0,10-0,45	0,10-0,45	0,10-0,45	0,10-0,45	
	12.1		100	copper alloy, brass, bronze: average cut	CuZn40Al1 / 2.0550, E-Cu57 / 2.0060	0,05-0,30	0,05-0,15	0,05-0,20	0,05-0,25	0,05-0,15	0,10-0,45	0,10-0,45	0,10-0,45	0,10-0,45	
	13.0		60	wrought aluminium alloys	AlMg1 / 3.3315, AlMnCu / 3.0517	0,05-0,30	0,05-0,15	0,05-0,20	0,05-0,25	0,05-0,15	0,10-0,45	0,10-0,45	0,10-0,45	0,10-0,45	
	13.1		75	cast alum. alloy: Si-content <10% magnesium alloy	G-AlMg5 / 3.3561, G-AlSi9Mg / 3.2373	0,10-0,50	0,05-0,15	0,05-0,20	0,05-0,25	0,05-0,15	0,10-0,45	0,10-0,45	0,10-0,45	0,10-0,45	
	14.0		100	cast alum.alloy: Si-content >10%	G-AlSi10Mg / 3.2381	0,10-0,50	0,05-0,15	0,05-0,20	0,05-0,25	0,05-0,15	0,10-0,45	0,10-0,45	0,10-0,45	0,10-0,45	
H	15.0	1400		hardened steels < 45 HRC											
	16.0	1800		hardened steels > 45 HRC											

Cutting values shown are maximum values relating to the basic recommendations for cutting materials given.

Important: See chapter 8 for more application details and safety notes !

KOMET® Countersinking tool KWS
for producing 60° and 90°
counterbores

KOMET® Countersinking tool KWZ
for producing 90° counterbores to DIN 974 T1
for cap head screws

KOMET® SEA and SX countersinks
attract customers due to a perfect machining result.

The relief-ground cone on the tool forms the cutting edge at the hole exit. The KOMET® countersinks guarantee smooth running even for deep countersinking operations.

This is achieved due to a special KOMET® relief-grinding process on the cone envelope, which also prevents damage to machine, workpiece and tool.

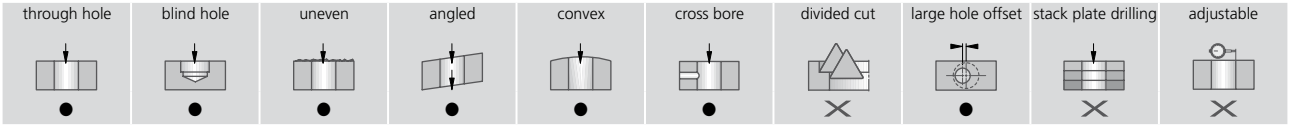
KOMET® SE countersink
The cutting edge is formed by the specially designed countersink cone.

As a result of this design, the countersinking area almost corresponds to the countersink diameter. The structural design of these countersinks ensures optimum chip flow as well as burr-free and smooth-running countersinking and deburring on almost all types of material.

KOMET®

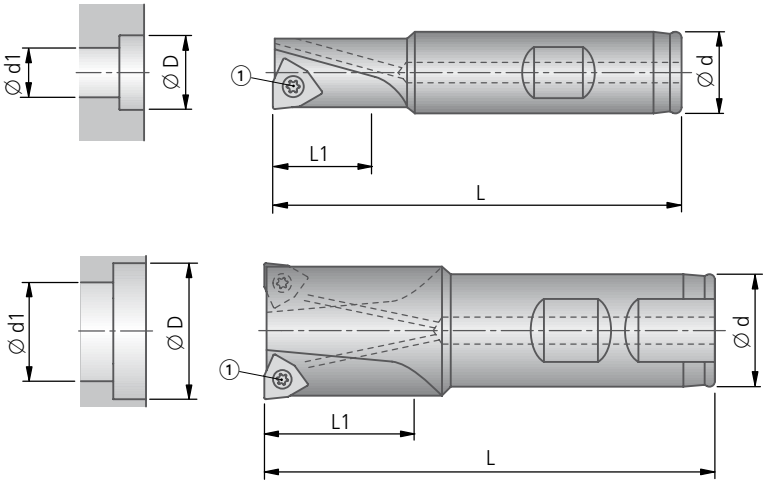
KOMET®	Page
Countersinking tool	
KWZ ∅ 10 – 48 mm	80 – 81
KWS ∅ 19 – 37 mm	82 – 83
Countersinking and chamfering tools	
DSE ∅ 1 – 4 mm	84
SE ∅ 2 – 15 mm	84
SEA ∅ 2 – 30 mm	84
SX ∅ 2,5 – 35 mm	85
SID ∅ 8 – 20 mm with pilot	85

Countersinking tool KWZ



● very good ◐ good ○ possible ✕ not possible

- central coolant supply from dia. 15 mm
- shank design to DIN 1835/B T1 A and B
- for producing 90° counterbores to DIN 974 T1 for cap head screws



y = number of inserts
z = effective number of teeth for calculating v_f

KWZ										Basic recommendation		
Ø D	Order No. Article	Rough bore Ø Ød1 min	Ød	L	Counter-sink depth L1 max	y	z	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽ size	ISO-Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
10	**F10 10021** KWZ-M5K1	5,3	16	80	10	1	1	0,09	**N00 56041** S/M2×4,3-6IP 0,62 Nm	**W29 10010.048425** **W29 10010.0421**	WOEX 030204-01 BK8425 WOEX 030204-01 K10	● ◐ ● ● ◐ ○
11	**F10 10031** KWZ-M6K1	6,4	16	80	11	1	1	0,10				
15	**F10 10040** KWZ-M8K1	8,4	16	80	15	1	1	0,10	**N00 55581** M2,5×4,5-8IP 1,28 Nm	**W29 24010.048425** **W29 24010.0421**	WOEX 05T304-01 BK8425 WOEX 05T304-01 K10	● ◐ ● ● ◐ ○
18	**F10 10050** KWZ-M10K1	10,4	16	80	18	1	1	0,11	**N00 57511** S/M2,5×7,2-8IP 1,28 Nm	**W29 24010.048425** **W29 24010.0421**	WOEX 05T304-01 BK8425 WOEX 05T304-01 K10	● ◐ ● ● ◐ ○
20	**F10 10060** KWZ-M12K1	13	25	100	20	1	1	0,28				
24	**F10 11070** KWZ-M14K2	15	25	100	24	2	2	0,29				
26	**F10 11080** KWZ-M16K2	17	25	100	26	2	2	0,31				
30	**F10 11090** KWZ-M18K2	19	25	100	30	2	2	0,34	**N00 57521** S/M3,5×7,3-10IP 2,8 Nm	**W29 34010.048425** **W29 34010.0421**	WOEX 06T304-01 BK8425 WOEX 06T304-01 K10	● ◐ ● ● ◐ ○
33	**F10 11100** KWZ-M20K2	21	25	100	33	2	2	0,36	**N00 57531** S/M4,5×9-15IP 6,25 Nm	**W29 42010.048425** **W29 42010.0421**	WOEX 080404-01 BK8425 WOEX 080404-01 K10	● ◐ ● ● ◐ ○
36	**F10 11110** KWZ-M22K2	21	25	100	36	2	2	0,39				
40	**F10 11120** KWZ-M24K2	25	25	100	40	2	2	0,45				
48	**F10 11130** KWZ-M30K2	28	32	120	48	2	2	0,85	**N00 57531** S/M4,5×9-15IP 6,25 Nm	**W29 50010.048425** **W29 50010.0421**	WOEX 100504-01 BK8425 WOEX 100504-01 K10	● ◐ ● ● ◐ ○

Supply includes: Countersinking tool with clamping screw ①.
Please order inserts separately. Screwdriver see chapter 8.

Recommended application areas

Guideline values for countersinking

Material group		Strength Rm (N/mm²)	Hardness HB	Material	Material example, material code/DIN	v_c Cutting speed v_c (m/min)	Max. f (mm/rev) Ø 10 – 15	Ø 18 – 20	Ø 24 – 30	Ø 33 – 48
P	1.0	≤500		non-alloy steels	St37-2 / 1.0037; 9SMn28 / 1.0715; St44-2 / 1.0044	180-240	0,06-0,12	0,12-0,20	0,15-0,25	0,20-0,30
P	2.0	500-900		non-alloy / low alloy steels	St52-2 / 1.0050, C55 / 1.0525, 16MnCr5 / 1.7131	180-240	0,06-0,12	0,12-0,20	0,25-0,40	0,25-0,40
P	2.1	<500		lead alloys	9SMnPb28 / 1.0718	160	0,06-0,12	0,20	0,20-0,30	0,20-0,40
P	3.0	>900		non alloy / low alloy steels: heat resistant structural, heat treated, nitride and tools steels	42CrMo4 / 1.7225, CK60 / 1.1221	140	0,06-0,10	0,18	0,20-0,35	0,25-0,40
P	4.0	>900		high alloy steels	X6CrMo4 / 1.2341, X165CrMoV12 / 1.2601	120	0,04-0,08	0,15	0,20-0,30	0,20-0,35
P	4.1			HSS		–	–	–	–	–
S	5.0		250	special alloys: Inconel, Hastelloy, Nimonic, stc.	Inconel 718 / 2.4668, Nimonic 80A / 2.4631	30	0,05	0,10	0,12	0,15
S	5.1	400		titanium, titanium alloys	TiAl5Sn2 / 3.7114	30	0,05	0,10	0,12	0,15
M	6.0	≤600		stainless steels	X2CrNi189 / 1.4306, X5CrNiMo1810 / 1.4401	120	0,08	0,15	0,16	0,18
M	6.1	<900		stainless steels	X8CrNb17 / 1.4511, X10CrNiMoTi1810 / 1.4571	120	0,08	0,15	0,16	0,18
M	7.0	>900		stainless / fireproof steels	X10CrAl7 / 1.4713, X8CrS-38-18 / 1.4862	100	0,05	0,10	0,10	0,12
K	8.0		180	gray cast iron	GG-25 / 0.6025, GG-35 / 0.6035	160	0,15	0,30	0,40	0,60
K	8.1		250	alloy gray cast iron	GG-NiCr202 / 0.6660	140	0,15	0,25	0,30	0,40
K	9.0	≤600	130	spheroidal graphite cast iron, ferritic	GGG-40 / 0.7040	140	0,15	0,25	0,30	0,35
K	9.1		230	spheroidal graphite cast iron, ferritic / perlitic	GGG-50 / 0.7050 GGG-55 / 0.7055 GTW-55 / 0.8055	120	0,12	0,20	0,25	0,35
K	10.0	>600	250	spheroidal graphite cast iron, perlitic malleable iron	GGG-60 / 0.7060 GTS-65 / 0.8165	120	0,10	0,18	0,25	0,30
K	10.1		200	alloyed spheroidal graphite cast iron	GGG-NiCr20-2 / 0.7661	120	0,10	0,18	0,20	0,30
K	10.2		300	vermicular cast iron	GGV Ti < 0,2 GGV Ti > 0,2	100	0,10	0,15	0,20	0,25
N	12.0		90	copper alloy, brass, lead-alloy bronze, lead bronze: good cut	CuZn36Pb3 / 2.1182, G-CuPb15Sn / 2.1182	300	0,05	0,10	0,12	0,15
N	12.1		100	copper alloy, brass, bronze: average cut	CuZn40Al1 / 2.0550, E-Cu57 / 2.0060	300	0,05	0,10	0,12	0,15
N	13.0		60	wrought aluminium alloys	AlMg1 / 3.3315, AlMnCu / 3.0517	300	0,05	0,12	0,15	0,20
N	13.1		75	cast alum. alloy: Si-content <10% magnesium alloy	G-AlMg5 / 3.3561, G-AlSi9Mg / 3.2373	250	0,06	0,16	0,20	0,25
N	14.0		100	cast alum.alloy: Si-content >10%	G-AlSi10Mg / 3.2381	200	0,10	0,20	0,25	0,30
H	15.0	1400		hardened steels < 45 HRC		50	0,05	0,10	0,15	0,20
H	16.0	1800		hardened steels > 45 HRC		50	0,05	0,10	0,15	0,20

Alternative Inserts

	ØD	Order No. ▽▽ Size	ISO-Code	for workpiece material P	M	K	N	S	H
Insert -01 -03 -11									
for better chip control	10 – 11	W29 10030.046425 W29 10110.0477	WOEX 030204-03 BK6425 WOEX 030204-11 BK77	●	○		●	◐	◑
	15 – 26	W29 24030.046425 W29 24110.0477	WOEX 05T304-03 BK6425 WOEX 05T304-11 BK77	●	○		●	◐	◑
	30	W29 34030.046425 W29 34110.0477	WOEX 06T304-03 BK6425 WOEX 06T304-11 BK77	●	○		●	◐	◑
	33 – 40	W29 42030.046425 W29 42110.0477	WOEX 080404-03 BK6425 WOEX 080404-11 BK77	●	○		●	◐	◑
	48	W29 50030.046425 W29 50110.0477	WOEX 100504-03 BK6425 WOEX 100504-11 BK77	●	○		●	◐	◑
for higher cutting speed	10 – 11	–							
	15 – 26	W29 24010.046425 W29 24010.047615	WOEX 05T304-01 BK6425 WOEX 05T304-01 BK7615	●		●			
	30	W29 34010.0460 W29 34010.0461	WOEX 06T304-01 BK60 WOEX 06T304-01 BK61	●		●			
	33 – 40	W29 42010.0460 W29 42010.0461	WOEX 080404-01 BK60 WOEX 080404-01 BK61	●		●			
	48	W29 50010.0460 W29 50010.0461	WOEX 100504-01 BK60 WOEX 100504-01 BK61	●		●			
for greater strength	10 – 11	W29 10010.047930	WOEX 05T304-01 BK7930	●	○	●		◐	○
	15 – 26	W29 24010.047930	WOEX 05T304-01 BK7930	●	○	●		◐	○
	30	W29 34010.047930	WOEX 06T304-01 BK7930	●	○	●		◐	○
	33 – 40	W29 42010.047930	WOEX 080404-01 BK7930	●	○	●		◐	○
	48	W29 50010.047930	WOEX 100504-01 BK7930	●	○	●		◐	○

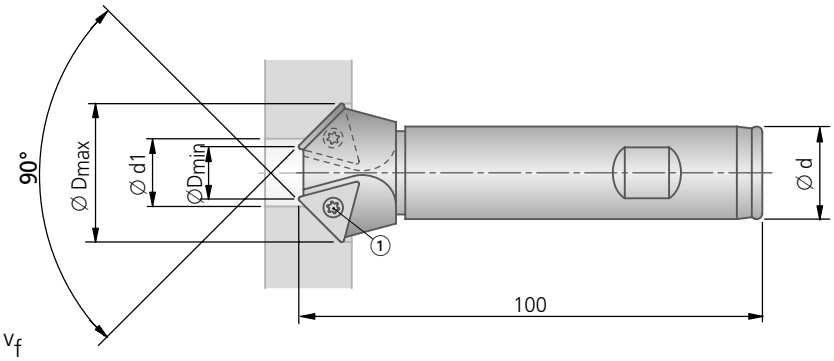
Cutting values shown are maximum values relating to the basic recommendations for cutting materials given.

Important: See chapter 8 for more application details and safety notes !

KOMET® Countersinking and chamfering tools

shank design to DIN 1835/B	for producing the 90° and 60° countersinks to DIN 74, page 1, Form A, fine	for milling of trapezoidal slots	for circular milling on machining centres	for chamfering on machining centres

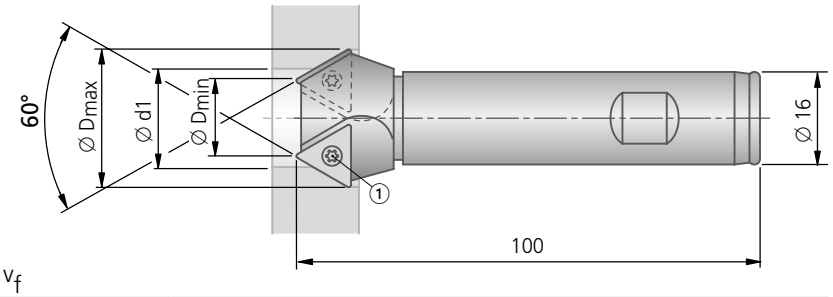
Countersinking tool 90°
Ø 19,0 - 37,0 mm



y = number of inserts
z = effective number of teeth for calculating v_f

KWS 90°									Basic recommendation		
Ø D max	Ø D min	Order No. Article	Rough bore Ø Ø d1 min	Ø d	y	z	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽size	ISO-Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
19	7	**F10 00051** KWS-M10	9,5	16	2	2		**N00 56111** S/M2,6×6,2-8IP 1,28 Nm	**W30 14660.338425** **W30 14660.3321**	TOHX 090204EN-U8.77 BK8425 TOHX 090204EN-U8.77 K10	● ◐ ● ● ● ● ○
23	11	**F10 00061** KWS-M12	12	16	2	2					
26	11	**F10 00071** KWS-M14	12	16	2	1		**N00 56111** S/M2,6×6,2-8IP 1,28 Nm	**W30 14720.048425** **W30 14720.0421**	TOHX 090204EN-G10 BK8425 TOHX 090204FN-G12 K10	● ◐ ● ● ● ● ○
30	12	**F10 00081** KWS-M16	13	20	2	2		**N00 56211** S/M3,5×7,3-10IP 2,8 Nm	**W30 26720.0560** **W30 26720.0521**	TOHX 140605EN-G12 BK60 TOHX 140605FN-G12 K10	● ◐ ● ● ● ● ○
34	16	**F10 00091** KWS-M18	17	20	2	2					
37	19	**F10 00101** KWS-M20	20	20	2	2					

Countersinking tool 60°
Ø 16,5 - 25,5 mm



y = number of inserts
z = effective number of teeth for calculating v_f

KWS 60°								Basic recommendation		
Ø D max	Ø D min	Order No. Article	Rough bore Ø Ø d1 min	y	z	kg	Clamping screw ① Order No. Article	Insert Order No. ▽▽size	ISO-Code	for workpiece material ● main area of application ◐ suitable in some cases P M K N S H
16,5	8,1	**F10 00350** KWS-M10/12-60	8,5	1	1	0,14	**N00 56111** S/M2,6×6,2-8IP 1,28 Nm	**W30 14660.338425** **W30 14660.3321**	TOHX 090204EN-U8.77 BK8425 TOHX 090204EN-U8.77 K10	● ◐ ● ● ● ● ○
20	11,6	**F10 00370** KWS-M14-60	12	2	2	0,14				
22	13,6	**F10 00380** KWS-M16-60	14	2	2	0,15				
23,5	15,1	**F10 00390** KWS-M18-60	15,5	2	2	0,15	**N00 56111** S/M2,6×6,2-8IP 1,28 Nm	**W30 14720.048425** **W30 14720.0421**	TOHX 090204EN-G10 BK8425 TOHX 090204FN-G12 K10	● ◐ ● ● ● ● ○
25,5	17,1	**F10 00400** KWS-M20-60	17,5	2	2	0,16				

Supply includes: Countersinking tool with clamping screw ①.
Please order inserts separately. Screwdriver see chapter 8.

Recommended application areas

Guideline values for countersinking						v_C	Max. f (mm/rev)
Material group		Strength Rm (N/mm²)	Hardness HB	Material	Material example, material code/DIN	Cutting speed v_C (m/min)	Ø 16,5 – 37
P	1.0	≤500		non-alloy steels	St37-2 / 1.0037; 9SMn28 / 1.0715; St44-2 / 1.0044	250	0,16
P	2.0	500-900		non-alloy / low alloy steels	St52-2 / 1.0050, C55 / 1.0525, 16MnCr5 / 1.7131	200	0,20
P	2.1	<500		lead alloys	9SMnPb28 / 1.0718	250	0,30
P	3.0	>900		non alloy / low alloy steels: heat resistant structural, heat treated, nitride and tools steels	42CrMo4 / 1.7225, CK60 / 1.1221	150	0,20
P	4.0	>900		high alloy steels	X6CrMo4 / 1.2341, X165CrMoV12 / 1.2601	120	0,15
P	4.1			HSS		100	0,18
S	5.0		250	special alloys: Inconel, Hastelloy, Nimonic, stc.	Inconel 718 / 2.4668, Nimonic 80A / 2.4631	50	0,12
S	5.1	400		titanium, titanium alloys	TiAl5Sn2 / 3.7114	100	0,20
M	6.0	≤600		stainless steels	X2CrNi189 / 1.4306, X5CrNiMo1810 / 1.4401	160	0,15
M	6.1	<900		stainless steels	X8CrNb17 / 1.4511, X10CrNiMoTi1810 / 1.4571	120	0,15
M	7.0	>900		stainless / fireproof steels	X10CrAl7 / 1.4713, X8CrS-38-18 / 1.4862	100	0,15
K	8.0		180	gray cast iron	GG-25 / 0.6025, GG-35 / 0.6035	150	0,40
K	8.1		250	alloy gray cast iron	GG-NiCr202 / 0.6660	120	0,30
K	9.0	≤600	130	spheroidal graphite cast iron, ferritic	GGG-40 / 0.7040	120	0,30
K	9.1		230	spheroidal graphite cast iron, ferritic / perlitic	GGG-50 / 0.7050 GGG-55 / 0.7055 GTW-55 / 0.8055	100	0,30
K	10.0	>600	250	spheroidal graphite cast iron, perlitic malleable iron	GGG-60 / 0.7060 GTS-65 / 0.8165	100	0,20
K	10.1		200	alloyed spheroidal graphite cast iron	GGG-NiCr20-2 / 0.7661	80	0,20
K	10.2		300	vermicular cast iron	GGV Ti < 0,2 GGV Ti > 0,2	50	0,20
N	12.0		90	copper alloy, brass, lead-alloy bronze, lead bronze: good cut	CuZn36Pb3 / 2.1182, G-CuPb15Sn / 2.1182	250	0,30
N	12.1		100	copper alloy, brass, bronze: average cut	CuZn40Al1 / 2.0550, E-Cu57 / 2.0060	250	0,20
N	13.0		60	wrought aluminium alloys	AlMg1 / 3.3315, AlMnCu / 3.0517	250	0,20
N	13.1		75	cast alum. alloy: Si-content <10% magnesium alloy	G-AlMg5 / 3.3561, G-AlSi9Mg / 3.2373	150	0,30
N	14.0		100	cast alum.alloy: Si-content >10%	G-AlSi10Mg / 3.2381	120	0,25
H	15.0	1400		hardened steels < 45 HRC		50	0,15
H	16.0	1800		hardened steels > 45 HRC		25	0,10

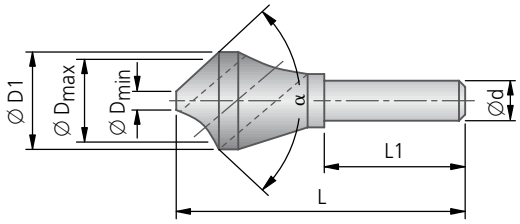
Cutting values shown are maximum values relating to the basic recommendations for cutting materials given.

Important: See chapter 8 for more application details and safety notes !

KOMET® Countersinking and chamfering tools

Countersinking tool SE Ø 2 - 15 mm

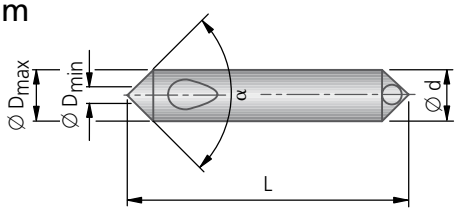
with cylindrical shank
head and shank in HSS



for bore dia. Ø D min – max	α	Article	Order No.	Ø d	Ø D1	L	L1	kg
2 – 5	90°	SE2/5-90ZYL	H20 21011	6	10	45	28,5	0,01
	60°	SE2/5-60ZYL	H20 21511	6	10	50	25	0,01
5 – 10	90°	SE5/10-90ZYL	H20 21021	6	14	56	30,5	0,02
	60°	SE5/10-60ZYL	H20 21521	6	14	63	28	0,02
10 – 15	90°	SE10/15-90ZYL	H20 21031	10	21	67	31,5	0,05

Countersinking tool DSE Ø 1 - 4 mm

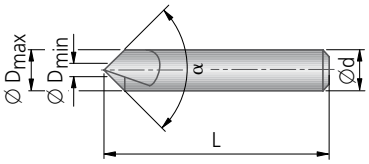
60° taper angle can be supplied on request



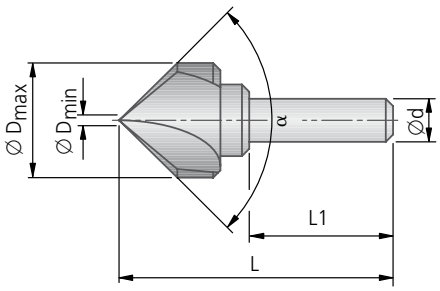
for bore dia. Ø D min – max	α	Article	Order No.	Ø d	L	kg
1 – 4	90°	DSE2/5-90ZYL	H20 21111	6,35	45	0,01

Countersinking tool SEA Ø 2 - 30 mm

head and shank in HSS, *shank section in steel
single cutting edge



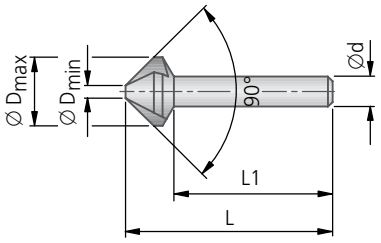
SEA 6 / SEA 9



for bore dia. Ø D min – max	α	Article	Order No.	Ø d	L	L1	kg
2 – 5	90°	SEA6-90	H20 43011	5	50	–	0,02
2 – 10	90°	SEA9-90	H20 43021	10	60	–	0,03
2 – 15	90°	SEA13-90	H20 43111	10	65	52	0,04
2 – 20	90°	SEA19-90	H20 43121	10	73	48	0,06
2 – 25	90°	SEA25-90	H20 43121	10	80	50	0,07
3 – 30	90°	SEA32-90*	H20 43141	12	82	52	0,11

Countersinking tool SX Ø 2,5 - 25 mm

with cylindrical shank
produced in HSS



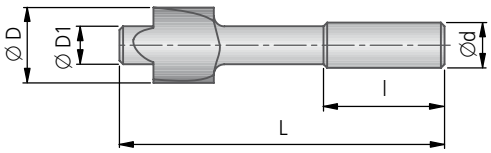
for bore dia. Ø D min – max	Article	Order No.	Ø d	L	L1	kg	for countersink screw DIN 963 964	63 91	84	inch size
2,5 – 10,0	SX10/74-90ZYL	**H20 42011**	6	50	40,2	0,01	M5			
2,5 – 10,4	SX10,4-90ZYL	**H20 42021**	6	50	40,1	0,01		M6	M5	3/16
2,8 – 12,4	SX12,4-90ZYL	**H20 42041**	8	56	44,2	0,02			M6	1/4
3,2 – 15,0	SX15/74-90ZYL	**H20 42061**	10	60	46	0,04	M8			
3,2 – 16,5	SX16,5-90ZYL	**H20 42071**	10	60	44,8	0,04		M10	M8	5/16
3,5 – 20,5	SX20,5-90ZYL	**H20 42101**	10	63	44,6	0,05				
3,8 – 25,0	SX25-90ZYL	**H20 42121**	10	67	45,3	0,06			M12	

BENEFITS for you:

- Efficient - 3 cutting edges cut simultaneously, making higher feed rates possible
- Cuts evenly because each of the 3 cutting edges has only to cut a third of the material
- Very well suited for deburring work due to their completely chatter-free operation

Countersinking tool SID Ø 8 - 20 mm

with pilot for through hole
DIN ISO 273 fine



for bore dia. Ø D	Article	Order No.	Ø d × l	Ø D1	L	kg
8,0	SID-M4F	**H20 32121**	5 × 31,5	4,3	71	0,01
10,0	SID-M5F	**H20 32131**	8 × 35,5	5,3	80	0,03
11,0	SID-M6F	**H20 32141**	8 × 35,5	6,4	80	0,04
15,0	SID-M8F	**H20 32151**	12,5 × 40	8,4	100	0,06
18,0	SID-M10F	**H20 32161**	12,5 × 40	10,5	100	0,08
20,0	SID-M12F	**H20 32171**	12,5 × 40	13,0	100	0,10

KOMET ®

Inserts

KOMET ® inserts and the appropriate tools provide the user with an efficient system for machining any materials.

KOMET®

Summary and list of codes

uncoated

Cutting material type	Order No.	Norm code	Application range: Wear resistance + / Toughness factor − … Wear resistance − / Toughness factor + (01 05 10 15 20 25 30 35 40 45 50)	Properties	Cutting element
P25M	03	HW-P25	P M K N S H	uncoated: • with excellent wear resistance and good toughness factor • suitable for medium to high cutting speeds for roughing and finishing, also for interrupted cut • for non-alloy steel, malleable cast iron, stainless steel and cast steel	W01 Q09 W27 Q36 W29 W30 W34 W59 W60 W79
K10	21	HW-K10	P M K N S H	uncoated: • chamfered and neutral cutter geometry suitable for all grades of cast iron • positively sintered (PD) and ground geometry is used for aluminium e.g.: 12° and 20° top rake, ground sharply and not rounded	W00 W37 W01 W59 W04 W60 W24 W79 W27 W83 W29 W85 W30 C83 W32 Q36 W34
K10 / fine grain	23	HW-M10 HW-K15	P M K N S H	uncoated: • fine grain carbide with high wear and thermal resistance • mainly for machining aluminium; PVD coated, also suitable for machining general steels and rust-resistant materials	W57..12 W58..12 C85.. C86.. Q80..
K20	22	HW-K20	P M K N S H	uncoated: • with large application range for cast iron materials • medium to high cutting speeds for roughing and finishing • wet and dry machining also possible • for cast iron, malleable cast iron, aluminium/copper/brass and bronze alloys; main application area in milling	Q09.. Q12.. Q15..

01 05 10 15 20 25 30 35 40 45 50 — main area of application / suitable in some cases

Cermet uncoated

Cutting material type	Order No.	Norm code	Application range: Wear resistance + / Toughness factor − … Wear resistance − / Toughness factor + (01 05 10 15 20 25 30 35 40 45 50)	Properties	Cutting element
CK37	37	HT-P20	P M K N S H	uncoated: • good balance of wear resistance and toughness • allows interrupted cuts and light roughing operations	W29..00 W30.. W79.. Q09..

01 05 10 15 20 25 30 35 40 45 50 — main area of application / suitable in some cases

CVD coated

Cutting material type	Order No.	Norm code		Application range: Wear resistance + / Toughness factor − … Wear resistance − / Toughness factor + (01 05 10 15 20 25 30 35 40 45 50)	Properties	Cutting element
BK61	61	HC-K15	P M K N S H	K: 05–25; < 52 HRC	CVD-TiC-Al_2O_3: • aluminium oxide coating (ceramic) for higher cutting speeds in all cast iron materials • not for use with aluminium materials !	Q15..
BK6110	6110	HC-P10 HC-K10	P M K N S H	P: 05–15; K: 05–25; < 52 HRC	CVD-TiCN-TiN-Al_2O_3: • for final machining bores in cast iron and steel materials • excellent dimensional stability due to combination of wear resistant substrate and ceramic, surface treated coating	W30.. H80.. Q36..
BK6115	6115	HC-P20 HC-K20	P M K N S H	P: 15–30; K: 10–30; <52HRC	CVD-TiCN-TiN-Al_2O_3: • high quality, surface treated coating • mainly for machining cast iron materials under standard to stable conditions, also at high cutting speeds	W01.. W29..00 W29..01 W29..02 W79.. W80..01 W83..01 Q80..
BK64	64	HC-P35 HC-M15	P M K N S H	P: 25–40; M: 15–30	CVD-TiC-TiN: • multiple coating on P 40 carbide base • suitable for interrupted cut	Q09.. Q36..
BK68	68	HC-P20	P M K N S H	P: 15–30; K: 15–30	CVD-TiCN: • coated milling tools for high cutting speeds, particularly in the areas of steel and iron casting • high wear resistance, even with insufficient cooling lubricant supply	Q36..

01 05 10 15 20 25 30 35 40 45 50 — main area of application; suitable in some cases

Guidelines
for selecting inserts

All dimensions shown are subject to tolerance in accordance with the relevant requirement.

Workpiece material	
Mild steel/tool steel	P
Stainless and acid-resistant steel	M
Grey cast iron, spheroidal cast iron	K
Non-ferrous metals	N
Heat-resistant steels	S
Hardened tool steel	H

Key
Abbreviations used

d1	mm	Incircle diameter
s	mm	Indexable insert thickness
l	mm	theoretical usable length of cutting edge
γ	°	Rake angle
f	mm	Construction auxiliary dimension
R	mm	Corner radius
d2	mm	Hole diameter

New 4-digit cutting material code e.g.

BK6115
- 15 — toughness grade (05…50)
- 61 — coating type (e.g. CVD Al_2O_3)
- BK — cutting material type: carbide + coating

Summary and list of codes

PVD coated

Cutting material type	Order No.	Norm code	Application range: Wear resistance + / Toughness factor −	Properties	Cutting element
BK2715	2715	HC-K20	P, K	PVD-TiAlN: • models designed especially for continuous drilling and milling in GJL and GJS • high wear resistance, good edge stability and sufficient toughness reserves • for double-edged continuous drilling, also suitable for high-strength steels and non-ferrous metals	H60.. Q12.. Q80..
BK2725	2725		P, M, K	PVD-TiAlN: • coated carbide in the P15-P30, M20-M25 and K15-K25 application areas with universal properties, for a wide scope of applications, also for difficult conditions in the medium speed range	H71.. Q09..
BK2730	2730	HC-M25	P, M, K	PVD-TiAlN: • extremely fine grades • extremely good edge stability and maximum wear resistance at medium and high speed ranges	W29..20 W80..01 W82..21 W83..21 Q80..
BK78	78	HC-P25	P, M	PVD-TiAlN: • coated carbide on P25M base with high wear resistance • medium to high cutting speed for roughing and finishing and with interrupted cut • for non alloy steel, cast steel and die steels	Q36..
BK80	80	HC-P35	P, M	PVD-TiCN: • for milling with a wide range of applications in steel and cast iron materials • excellent balance between wear resistance and srength makes this suitable for universal use	Q36..
BK8425	8425	HC-P25	P, M, K	PVD-TiAlN/TiN: • grade for universal application with increased wear resistance due to innovative PVD coating in multi-layer Ausführung	W01 H70 W29 Q09 W30 Q12 W59 Q15 W80 Q36 W83
BK8440	8440	HC-P35	P, M, K	PVD-TiCN/TiN: • coating on extremely tough substrate • for medium cutting speeds and also suitable for interrupted cut	W00.. H60.. Q15..
BK87	87	HC-P35	P, M	PVD-TiN: • coated carbide on P40 base • medium to high cutting speeds for roughing and finishing and with interrupted cut • for non alloy steel, cast steel and die steels	Q09..

Application range: 01 05 10 15 20 25 30 35 40 45 50

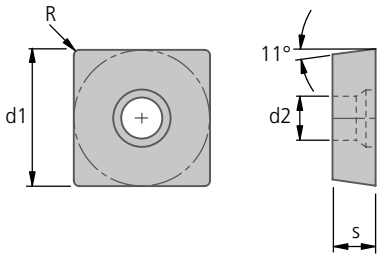
main area of application — suitable in some cases

Application range:

T slot cutter

Precision inserts ground on all sides with rounded cutting edges. Suitable for machining steel and cast iron materials in conjunction with positive axial position.

Cutter geometry:



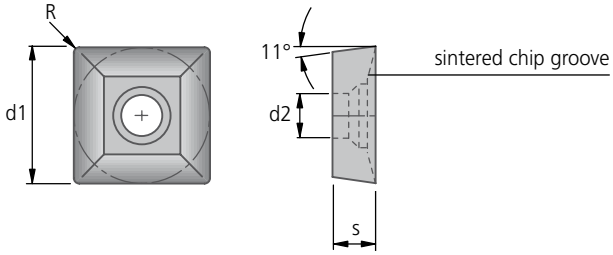
Article ISO Description	Order No. enter carbide code ▼	Carbide grades uncoated P25M 03	K20 22	d1	d2	s	R
SPGW 050204	Q09 13000.01..	▲	▲	5,57	2,8	2,38	0,4
Mild steel/tool steel P		●		Order example: Article SPGW 050204 Carbide grade P25M Order No. Q09 13000.0103			
Stainless and acid-resistant steel M		●					
Grey cast iron, spheroidal cast iron K			●				
Non-ferrous metals N			●				
Heat-resistant steels S							
Hardened tool steel H							

Inserts

Application range:

Chamfering
Inserts with sintered positive chip groove and rounded cutting edge. Because of its positive chip geometry, this insert produces a good cutting result even under difficult and critical cutting conditions.

Cutter geometry:



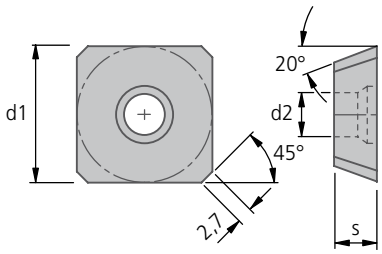
Article ISO Description	Order No.	Carbide grades			d1	d2	s	R
		uncoated	PVD coated					
	enter carbide code ▼	K20	BK2725	BK87				
		22	2725	87				
SPMT 060304	Q09 18000.17..	▲	▲	▲	6,35	2,8	3,18	0,4
Mild steel/tool steel P			●	●	Order example: Article SPMT 060304 Carbide grade BK2725 Order No. Q09 18000.172725			
Stainless and acid-resistant steel M			●	◐				
Grey cast iron, spheroidal cast iron K		●						
Non-ferrous metals N		●						
Heat-resistant steels S		●						
Hardened tool steel H								

▲ Availability: for delivery see current price and stock list

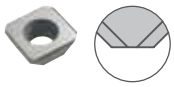
Application range:

Face milling cutter
Insert precision ground on all sides.

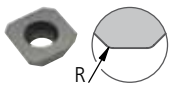
Cutter geometry:



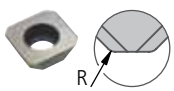
Article ISO Description	Order No.	Carbide grades			Cermet	d1	d2	s	R
		uncoated	CVD coated	PVD coated	uncoated				
	enter carbide code ▼	K20	BK64	BK8425	CK37				
		22	64	8425	37				
SEHW 1204 AFTN	Q09 44000.13..	▲		▲		12,7	5,5	4,76	–
SEHW 1204 AFFN-V	Q09 44000.02..	▲			▲				1,0
SEHW 1204 AFTN-V	Q09 44000.15..			▲	▲				1,0
SEHT 1204 AFEN	Q09 44000.23..		▲						1,0
Mild steel/tool steel P			●	●	●	Order example:			
Stainless and acid-resistant steel M			◐	◐	●	Article			
Grey cast iron, spheroidal cast iron K		●		◐	◐	SEHW 1204 AFTN			
Non-ferrous metals N		●				Carbide grade			
Heat-resistant steels S						K20			
Hardened tool steel H						Order No.			
						Q09 44000.1322			



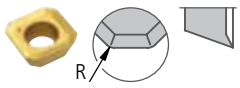
Q09 44000.13.. : Without chamfering (blending radius) from main to secondary cutting edge, main edge chamfered. Main cutting edge stabilised by chamfering. Particularly suitable for heavy duty cutting through rolling mill or forge skin, at medium cutting speeds. Used particularly for steel and cast iron materials with medium to high tensile strength.



Q09 44000.02.. : With chamfering (blending radius) from main to secondary cutting edge, sharp edged. The insert provides a specially shaped, positive cutter geometry for machining CrNi and unusual materials. Materials which tend to produce a build-up on the cutting edge can also be successfully machined with this geometry. Used in the lower cutting speed ranges with medium chip cross sections.



Q09 44000.15.. : With chamfering (blending radius) from main to secondary cutting edge, main edge chamfered. For roughing and finishing at medium to high cutting speeds and feed rates. Main cutting edge stabilised by chamfer. The rounded transition to the sharp secondary cutting edge produces a high quality surface finish. The wide application range is particular suitable for steel and cast iron materials.



Q09 44000.23..

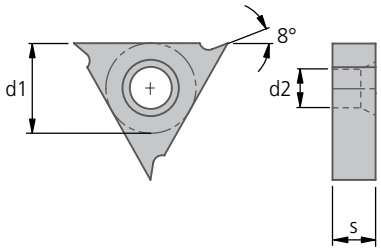
Inserts

Application range:

Slot milling cutter
Slot milling cutter adaptor

Positive chip angle produces soft cut. The cutting edge is designed for machining steel or cast iron/aluminium.

Cutter geometry:



Article ISO Description	Order No.	Carbide grades			d1	d2	s	for milling width
		uncoated	PVD coated					
								
	enter carbide code ▼	K20	BK2715	BK8425				
		22	2715	8425				
TCAA 1102ZZ R	Q12 18000.01..	▲	▲	▲	6,35	2,8	2,6	4 - 5
TCAA 1102ZZ L	Q12 18000.02..	▲	▲	▲				
TCAA 1103ZZ R	Q12 18000.03..	▲	▲	▲	6,35	2,8	3,2	6
TCAA 1103ZZ L	Q12 18000.04..	▲	▲	▲				
TNAA 16T3ZZ R	Q12 32000.05..	▲	▲	▲	9,52	4,4	3,97	7
TNAA 16T3ZZ L	Q12 32000.06..	▲	▲	▲				
TNAA 1604ZZ N	Q12 32000.07..	▲	▲	▲	9,52	3,4	4,76	8 - 9
TNAA 1604ZZ R	Q12 32000.52..	▲	▲	▲	9,52	4,4	4,76	8 - 9
TNAA 1604ZZ L	Q12 32000.53..	▲	▲	▲				
TNAA 1606ZZ R	Q12 32000.08..	▲	▲	▲	9,52	4,4	6,4	10 - 12
TNAA 1606ZZ L	Q12 32000.09..	▲	▲	▲				
Mild steel/tool steel P				●	Order example:			
Stainless and acid-resistant steel M				◐	Article			
Grey cast iron, spheroidal cast iron K			●	◐	TCAA 1102ZZ R			
Non-ferrous metals N		●			Carbide grade			
Heat-resistant steels S					K20			
Hardened tool steel H					Order No.			
					Q12 18000.0122			

▲ Availability: for delivery see current price and stock list

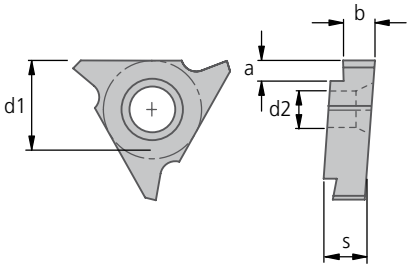
Application range:

Circular milling

Internal and external circular milling of longitudinal or annular slots for circlips/safety rings.
The cutting edge geometry produces a good machining result for steel, cast iron and aluminium when used with the appropriate carbide grades.

Design:
Dimension b is aligned with the slot width to H13 tolerance for circlips to DIN 471 and DIN 472. This relates to the upper tolerance limit for the slot widths which can be still be produced to the correct dimension after wear.

Cutter geometry:



Article ISO Description	Order No.	Carbide grades uncoated	Carbide grades PVD coated		d1	d2	s	b^{H13}	a max
	enter carbide code ▼	 K20 **22**	 BK2715 **2715**	 BK8425 **8425**					
TCAX 1103ZZ R-160	**Q12 18000.11..**	▲	▲	▲	6,35	2,8	3,2	1,60	1,4
TCAX 1103ZZ R-185	**Q12 18000.12..**	▲	▲	▲				1,85	1,7
TCAX 1103ZZ R-215	**Q12 18000.13..**	▲	▲	▲				2,15	2,0
TCAX 1103ZZ R-265	**Q12 18000.14..**	▲	▲	▲				2,65	2,2
TNAX 1604ZZ R-265	**Q12 32000.18..**	▲	▲	▲	9,52	3,4	4,76	2,65	2,2
TNAX 1604ZZ R-315	**Q12 32000.19..**	▲	▲	▲				3,15	2,2
TNAX 1604ZZ R-415	**Q12 32000.20..**	▲	▲	▲				4,15	3,2
TNAX 2206ZZ R-415	**Q12 44000.21..**	▲	▲	▲	12,7	5,5	6,4	4,15	4,0
TNAX 2206ZZ R-465	**Q12 44000.22..**	▲	▲	▲				4,65	4,5
TNAX 2206ZZ R-515	**Q12 44000.23..**	▲	▲	▲				5,15	4,5
TNAX 2206ZZ R-620	**Q12 44000.25..**	▲	▲	▲				6,20	6,0

Mild steel/tool steel P			●
Stainless and acid-resistant steel M			◑
Grey cast iron, spheroidal cast iron K		●	◐
Non-ferrous metals N	●		
Heat-resistant steels S			
Hardened tool steel H			

Order example:
Article
TCAX 1103ZZ R-160
Carbide grade
K20
Order No.
Q12 18000.1122

Inserts

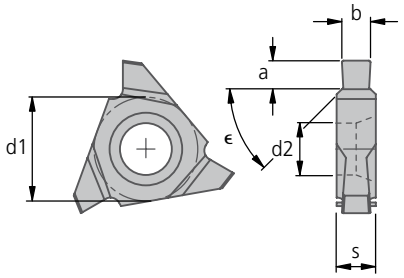
Application range:

Circular milling

Internal and external circular milling of longitudinal or annular slots for circlips/safety rings.
The cutting edge geometry produces a good machining result for steel, cast iron and aluminium when used with the appropriate carbide grades.

Design:
Dimension b is aligned with the slot width to H13 tolerance for circlips to DIN 471 and DIN 472. This relates to the upper tolerance limit for the slot widths which can be still be produced to the correct dimension after wear.

Cutter geometry:



Dimensions "a" and "b" apply for the resulting workpiece contour.

Article ISO Description	Order No. enter carbide code ▼	Carbide grades uncoated K20 22	Carbide grades PVD coated BK2715 2715	Carbide grades PVD coated BK8425 8425	d1	d2	s	b^{H13}	a	chamfer ϵ
TPAX 1103ZZ R-110F	Q12 18000.10..	▲	▲	▲	6,35	2,9	3,2	1,1	0,9	–
TNAX 1103ZZ R-160F	Q12 18000.31..	▲	▲	▲	6,35	2,9	3,2	1,6	1,0	45°
TNAX 1103ZZ R-185F	Q12 18000.32..	▲	▲	▲				1,85	1,25	
TNAX 1103ZZ R-215F	Q12 18000.33..	▲	▲	▲				2,15	1,5	
TNAX 1103ZZ R-265F	Q12 18000.34..	▲	▲	▲				2,65	1,75	
TCAX 16T3ZZ R-110F	Q12 32000.15..	▲	▲	▲	9,52	4,4	3,96	1,1	0,9	–
TCAX 16T3ZZ R-130F	Q12 32000.16..	▲	▲	▲				1,3	1,3	
TCAX 16T3ZZ R-160F	Q12 32000.17..	▲	▲	▲				1,6	1,4	
TNAX 1604ZZ R-265F	Q12 32000.41..	▲	▲	▲	9,52	4,4	4,76	2,65	1,75	45°
TNAX 1604ZZ R-315F	Q12 32000.42..	▲	▲	▲				3,15	1,75	
TNAX 1604ZZ R-415F	Q12 32000.43..	▲	▲	▲				4,15	2,5	
TNAX 2206ZZ R-415F	Q12 44000.84..	▲	▲	▲	12,7	5,5	6,4	4,15	2,5	45°
TNAX 2206ZZ R-465F	Q12 44000.85..	▲	▲	▲				4,65	3,4	
TNAX 2206ZZ R-515F	Q12 44000.86..	▲	▲	▲				5,15	4,0	
TNAX 2206ZZ R-515F	Q12 44000.87..	▲	▲	▲				5,15	4,0	

Mild steel/tool steel P			●
Stainless and acid-resistant steel M			◐
Grey cast iron, spheroidal cast iron K		●	◐
Non-ferrous metals N	●		
Heat-resistant steels S			
Hardened tool steel H			

Order example:
Article
TPAX 1103ZZ R-110F
Carbide grade
K20
Order No.
Q12 18000.1022

▲ Availability: for delivery see current price and stock list

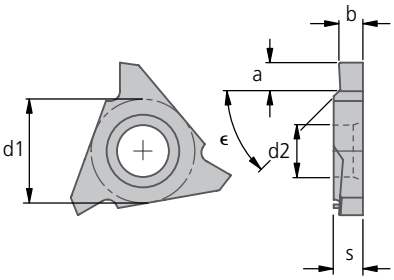
Application range:

Circular milling

Internal and external circular milling of longitudinal or annular slots for circlips/safety rings.
The cutting edge geometry produces a good machining result for steel, cast iron and aluminium when used with the appropriate carbide grades.

Design:
Dimension b is aligned with the slot width to H13 tolerance for circlips to DIN 471 and DIN 472. This relates to the upper tolerance limit for the slot widths which can be still be produced to the correct dimension after wear.

Cutter geometry:



Dimensions "a" and "b" apply for the resulting workpiece contour.

Article ISO Description	Order No.	Carbide grades			d1	d2	s	b^{H13}	a	chamfer ϵ
		uncoated	PVD coated							
	enter carbide code ▼	 K20 **22**	 BK2715 **2715**	 BK8425 **8425**						
TNAX 1103ZZ R-265F	**Q12 18000.36..**	▲	▲	▲	6,35	2,9	3,2	2,65	1,75	45°
TNAX 1604ZZ R-415F	**Q12 32000.38..**	▲	▲	▲	9,52	4,4	4,76	4,15	2,5	45°

Mild steel/tool steel P		●	Order example: Article TNAX 1103ZZ R-265F Carbide grade K20 Order No. Q12 18000.3622
Stainless and acid-resistant steel M		◐	
Grey cast iron, spheroidal cast iron K	●	◐	
Non-ferrous metals N	●		
Heat-resistant steels S			
Hardened tool steel H			

Inserts

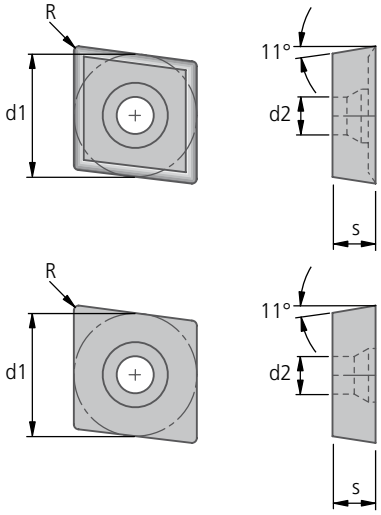
Application range:

T slot cutter

CPMT:
Inserts with sintered peripheral positive chip guide and chamfered cutting edge. Particularly suitable for T slot cutting for steel materials.

CPMW:
Insert with chamfered cutting edge.
Because of its cutting geometry, particularly suitable for machining cast iron materials.

Cutter geometry:



Article ISO Description	Order No.	Carbide grades: uncoated	CVD coated	PVD coated	PVD coated	d1	d2	s	R
	enter carbide code ▼	K20 **22**	BK61 **61**	BK8425 **8425**	BK8440 **8440**				
CPMT 060304	**Q15 18000.01..**			▲	▲	6,35	2,8	3,18	0,4
CPMW 060304	**Q15 18000.02..**		▲						
CPMW 09T308	**Q15 32000.03..**	▲				9,52	4,3	3,97	0,8
CPMT 09T308	**Q15 32000.04..**			▲	▲				
Mild steel/tool steel P				●	●				
Stainless and acid-resistant steel M				◑	◑				
Grey cast iron, spheroidal cast iron K		●	●	◑					
Non-ferrous metals N		●							
Heat-resistant steels S									
Hardened tool steel H			◑ <52HRC						

Order example:
Article
CPMT 060304
Carbide grade
BK8425
Order No.
Q15 18000.018425

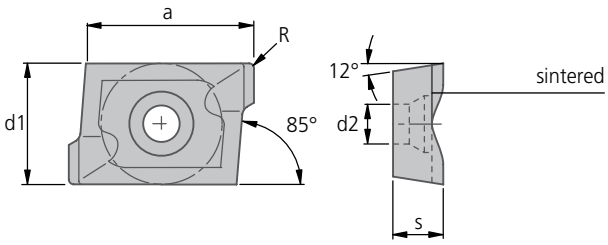
▲ Availability: for delivery see current price and stock list

Application range:

Corner milling cutter
Shell end face milling cutter
End milling cutter
Face milling cutter 75°

Highly positive cutter geometry with specially designed face cutter allows high feed rates and a good surface quality.
Soft cutting also possible even with unstable machining conditions. The special cutter geometry allows the insert to be used universally in the appropriate grades both for machining steel, cast iron and aluminium.

Cutter geometry:



Article ISO Description	Order No.	Carbide grades: uncoated		CVD coated			PVD coated			d1	d2	s	a	R
	enter carbide code ▼	P25M 03	K10 21	BK6110 6110	BK64 64	BK68 68	BK78 78	BK80 80	BK8425 8425					
APKT 1003PD-R	Q36 18000.01..	▲	▲	▲	▲	▲	▲	▲	▲	6,7	2,8	3,5	9	0,35
APKT 1203PD-R	Q36 24000.02..	▲	▲	▲	▲	▲	▲	▲	▲	8,0	3,5	3,8	11	0,6
APKT 1605PD-RM	Q36 38000.07..	▲	▲	▲	▲		▲	▲	▲	11,1	4,5	5,26	15	0,8
Mild steel/tool steel P		●			●	●	●	●	●					
Stainless and acid-resistant steel M					◑		●	●	●					
Grey cast iron, spheroidal cast iron K			●	●		◑			●					
Non-ferrous metals N			●											
Heat-resistant steels S			●											
Hardened tool steel H														

Order example:
Article
APKT 1003PD-R
Carbide grade
P25M
Order No.
Q36 18000.0103

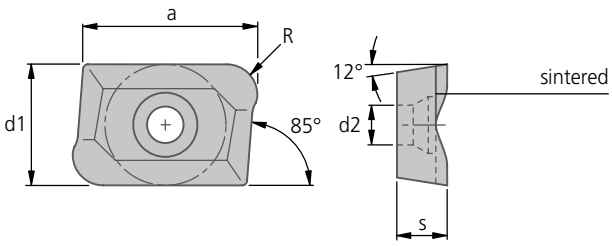
Inserts

Application range:

Copy end milling cutter

A special cutter geometry whose main feature is a positive peripheral top rake, produces a soft cut particularly in the radius range of the insert; this requires low cutting forces and produces good chip formation.
The insert can be used universally in various carbide grades both for steel and cast iron.

Cutter geometry:



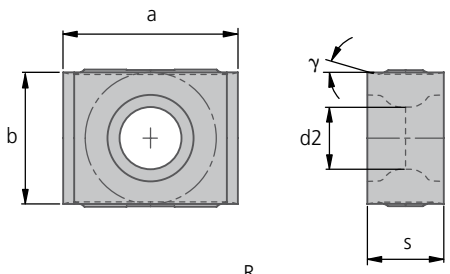
Article ISO Description	Order No.	Carbide grades uncoated P25M 03	uncoated K10 21	CVD coated BK64 64	CVD coated BK68 68	d1	d2	s	a	R
	enter carbide code ▼									
APKT 120316PD-R	Q36 24000.04..	▲	▲	▲	▲	8,0	3,5	3,8	11	1,6
APKT 120324PD-R	Q36 24000.05..	▲		▲						2,4
APKT 120332PD-R	Q36 24000.06..	▲	▲	▲	▲					3,2
Mild steel/tool steel P		●	◐	●	●	Order example: Article APKT 120316PD-R Carbide grade P25M Order No. Q36 24000.0403				
Stainless and acid-resistant steel M		●		◑						
Grey cast iron, spheroidal cast iron K			●		◐					
Non-ferrous metals N			●							
Heat-resistant steels S										
Hardened tool steel H										

▲ Availability: for delivery see current price and stock list

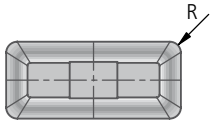
Application range:

Roughing
Milling

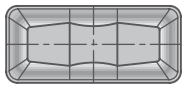
Cutter geometry:



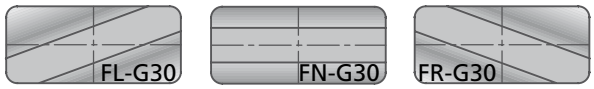
Geometry 05: Cast materials, some steel materials



Geometry 17: Steel materials, also stainless



Geometry -G30: Aluminium materials and non-ferrous metals.
Left, neutral and right cutting edge shape



Article ISO Description	Order No. enter carbide code ▼	Carbide grades uncoated K10 23	PVD coated BK2715 2715	PVD coated BK2730 2730	CVD coated BK6115 6115	d2	a	b	s	γ	R
LNGU 06T204 EN-05	Q80 09050.04..		▲	▲	▲	2,3	6,35	4,73	2,88	14°	0,4
LNGU 090406 EN-05	Q80 20050.06..		▲	▲	▲	3,4	9,52	7,25	4,17	14°	0,6
LNGU 120508 EN-05	Q80 32000.01..		▲	▲	▲	4,5	12,7	9,52	5,56	10°	0,8
LNGU 120508 EN-17	Q80 32000.02..			▲		4,5	12,7	9,52	5,56	12°	0,8
LNHU 120508 FL-G30	Q80 32230.08..	▲				4,5	12,7	9,55	5,56	30°	0,8
LNHU 120508 FN-G30	Q80 32530.08..	▲									
LNHU 120508 FR-G30	Q80 32630.08..	▲									

Mild steel/tool steel	P			◐ ●	◐
Stainless and acid-resistant steel	M			◐ ◐	
Grey cast iron, spheroidal cast iron	K		●	● ◑	●
Non-ferrous metals	N	●			
Heat-resistant steels	S				
Hardened tool steel	H				

Order example:
Article
LNGU 120508 EN-05
Carbide grade
BK2715
Order No.
Q80 32000.012715

ISO Codes for Inserts

W	N	M	G	0 8	0 4	0 8	F	L	–	0 1
①	②	③	④	⑤	⑥	⑦	⑧	⑨		⑩

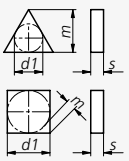
① Form

Code		
R		
S	90°	
L	90°	
A	85°	
T	60°	
C	80° / 100°	
E	75°	
D	55°	
V	35°	
W	80°	

② Clearance angle

Code		
N	0°	
B	5°	
C	7°	
O	according to manufacturer specification (with KOMET 8°)	
P	11°	
E	20°	

③ Tolerance



Code	m	s	d
A	±0,005	±0,025	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,13	±0,025
H	±0,013	±0,025	±0,013
K	±0,013	±0,025	±0,05...±0,15
M	±0,08...±0,18[1)]	±0,13	±0,05...±0,13[1)]
U	±0,13...±0,38[1)]	±0,13	±0,08...±0,25[1)]

Tolerance in mm

Ø *d1* IC	at *m* Class M	at *m* Class U	at *d1* Class M	at *d1* Class U
6,35	±0,08	±0,13	d±0,05	±0,08
9,52	±0,08	±0,13	d±0,05	±0,08
12,70	±0,13	±0,20	±0,08	±0,13
15,87	±0,15	±0,27	±0,10	±0,18
19,05	±0,15	±0,27	±0,10	±0,18
25,40	±0,18	±0,38	±0,13	±0,25

④ Type

Code	
A	no chipformer, with hole
M	chipformer on one side, with hole
G	chipformer both sides, with hole
R	chipformer on one side, no hole
W	no chipformer, countersunk hole 40-60°
B	no chipformer, countersunk hole 70-90°
T	chipformer on one side, countersunk hole 40-60°
H	chipformer on one side, countersunk hole 70-90°
P	neg/pos. one or two sides, with hole
U	chipformer both sides, with countersunk hole
X	special design, drawing required

⑤ Cutting edge length *l*

Code

d1 mm	at code A	C	D	L	R	S	T	V	W
3,97							06		02
4,80		04							03
5,56		05				05	09		
6,35	10	06	07			06	11	11	04
7,94		08				07	13	13	
8,00	12				08	08	14		05
9,52		09	11	12		09	16	16	
10,00					10				06
10,90	16								
12,00					12				08
12,70		12	15			12	22	22	
15,00									10
15,88						15	27		
16,00					16				
17,60									12
19,05		19				19	33		13
20,00					20				
25,00					25				
25,40						25			

⑥ Thickness *s*

Code	
T0	1,20 mm
01	1,59 mm
T1	1,80 mm
02	2,38 mm
T2	2,97 mm
03	3,18 mm
T3	3,97 mm
04	4,76 mm
05	5,30 mm
06	6,35 mm
07	7,94 mm

⑦ Corner radius *R*

Code	
00	0,0 mm
01	0,1 mm
02	0,2 mm
03	0,3 mm
04	0,4 mm
05	0,5 mm
06	0,6 mm
08	0,8 mm
12	1,2 mm
16	1,6 mm
20	2,0 mm
24	2,4 mm
ZZ	Face cutting edge

⑧ Cutting edge design

Code	
F	sharp
E	rounded
T	chamfered (negative)
S	chamfered + rounded

⑨ Cutting direction of insert

Code	
R	R.H.
L	L.H.
N	R.H. and L.H.

⑩ Chipfomer

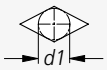
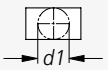
Code	
-01	medium
-05	Cast iron
-11	Aluminium
-13	
-14	finishing
-15	semi-finishing
-21	
-32	
-33	

Numerical coding for inserts Q..

Q	2	1	4	4	0	0	0	.	0	1	2	7	3	0
Q	8	0	3	2	0	0	0	.	0	1	6	1	1	5
①	②		③		④		⑤		⑥		⑦			

①	Main group for standard inserts
Code	

②	Secondary group number insert geometry
Code	ISO basic forms
09	S... square 90°
12	T... triangular 60°
15	C... rhomboid 80°
21	E... rhomboid 75°
36	A... rhomboid form
80	L... square 90°

③	Inscribed circle *d1*	
	Code	
	13	5,56 mm
	18	6,35 mm
	24	8,0 mm
	32	9,52 mm
	38	11,1 mm
	44	12,7 mm
	53	15,88 mm

④	Serial number
00 ... 99	Code

⑤	Modification code
1 ... 9	Code

⑥	Serial number
01 ... 99	Code

⑦	Material grade
Code	
03	P25M
04	P40
22	K20
2715	BK2715
2730	BK2730
6115	BK6115
...	

KOMET ®

Adaptors – Perfecting the connection

With our comprehension programme of tool adaptors we have the right answer for every requirement.

Adaptors with connections specified by manufacturers available on request.

BENEFITS for you:

- Maximum tool change accuracy
- Perfect static rigidity
- High radial rigidity
- Short tool change times
- Ideal dimensions
- Low weight

KOMET® Adaptors

Symbols

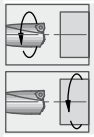
Machine adaptor
Connection on machine side p.ex.
taper shank
DIN 69871 AD/B;
HSK-A ISO 12164-1

Balancing note
Balance as despatched

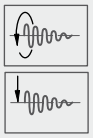
Coolant
Coolant supply
p.ex. central

Concentricity
p.ex. ≦ 5µm

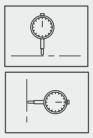
Lightweight



Tool
rotating
stationary



Vibration dampening
p.ex.
torsion damping
bending vibration



adjustable
p.ex.
radially
axially

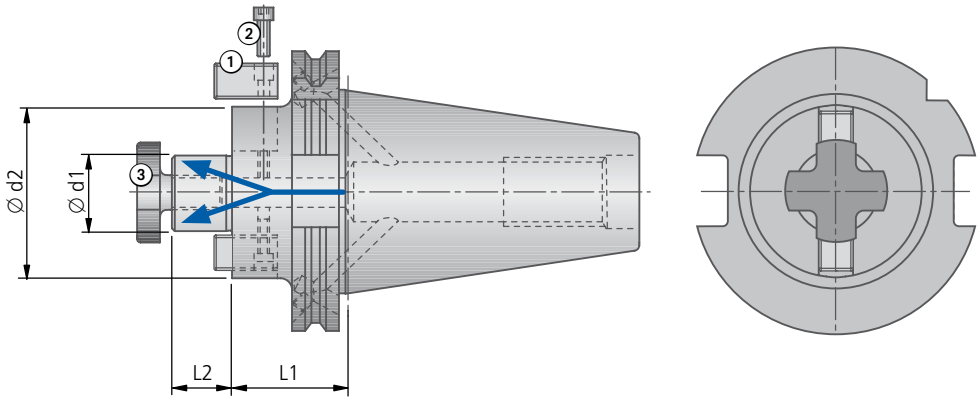
KomLoc® HSK clamping system
p.ex. system K

Tool holder
Connection on tool side p.ex.
Whistle Notch
Weldon
ABS®

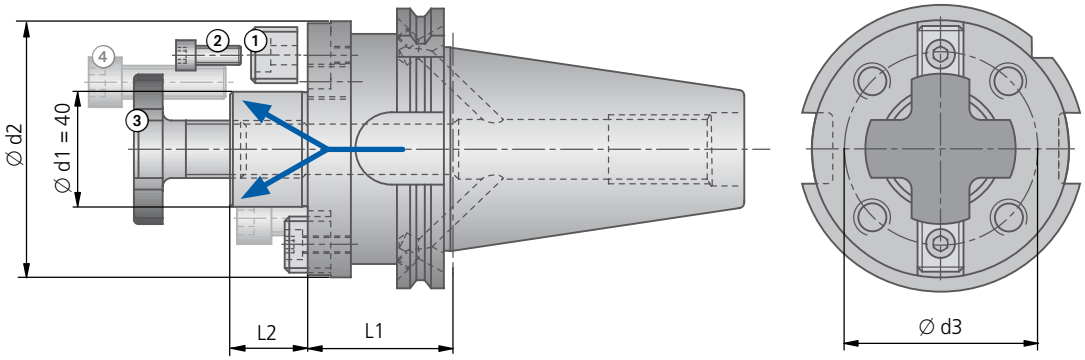
KOMET® DIN 69871 AD/B

Taper shank with milling cutter arbor FA

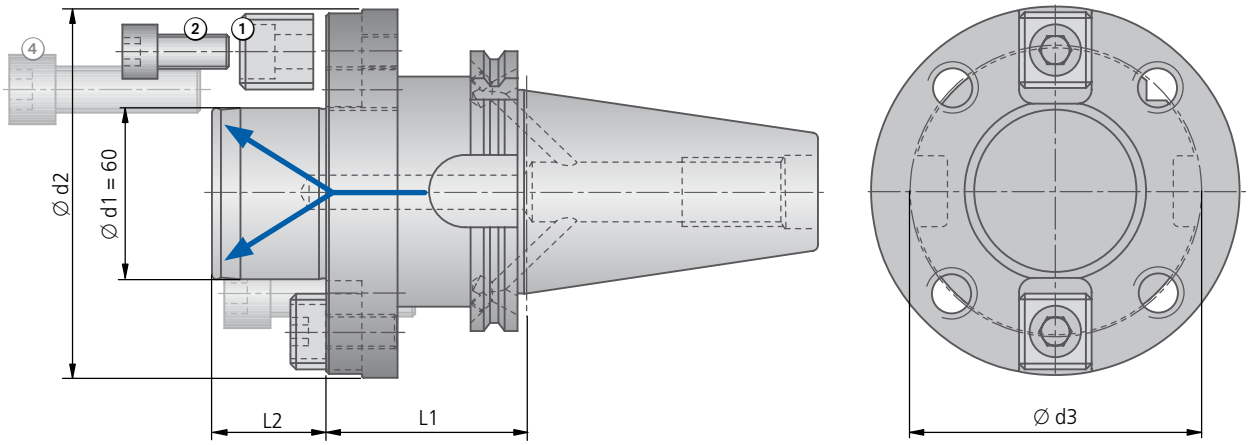
tool holder ...FA..	tool holder ...FA40	tool holder ...FA60	balancing note (chapter 8)	internal coolant supply	rotating tool	rotating tool
DIN 6358	DIN 6358 DIN 6357	DIN 6357	balanced G6,3 8.000 min^{-1}			DIN 69871 AD/B



...FA40



...FA60



Taper shank in form B complete with conversion kit (for form AD). Please order pull stud separately (page 117).

Note: With coolant supply through spindle, use pull stud with through hole.
To close off central coolant hole, use pull stud without through hole.

SK FA											Screws ④ for cutter heads with internal bore location
Order No. Article	SK	Ø d1	Ø d2	Bolthole circle Ø d3	L1	L2	kg	Key block ① Order No. Article	Cylindrical screw ② DIN 912 Order No. Article	Cutter clamping screw ③ DIN 6367 Order No. Article	Order No. Article
A51 14100 SK40-FA16-35	40	16	38	–	35	17	1,0	**N12 20340** 8×8×14	**55011 03008** M3×8	**55062 00008** M8	–
A51 14110 SK40-FA22-35	40	22	48	–	35	19	1,0	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A51 14120 SK40-FA27-40	40	27	50	–	40	21	1,1	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A51 14130 SK40-FA32-50	40	32	78	–	50	24	1,3	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A51 14140 SK40-FA40-50*	40	40	88	66,7	50	27	1,6	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A51 14210 SK50-FA22-44	50	22	48	–	44	19	3,0	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A51 14220 SK50-FA27-44	50	27	50	–	44	21	3,2	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A51 14230 SK50-FA32-40	50	32	78	–	40	24	4,0	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A51 14240 SK50-FA40-50*	50	40	88	66,7	50	27	4,2	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A51 14250 SK50-FA60-70*	50	60	129	101,6	70	40	4,8	**N12 20390** 25,4×25×31	**55011 12025** M12×25	–	**55011 16050** M16×50

SK FA..-160											Screws ④ for cutter heads with internal bore location
Order No. Article	SK	Ø d1	Ø d2	Bolthole circle Ø d3	L1	L2	kg	Key block ① Order No. Article	Cylindrical screw ② DIN 912 Order No. Article	Cutter clamping screw ③ DIN 6367 Order No. Article	Order No. Article
A51 14300 SK40-FA16-160	40	16	38	–	160	17	2,1	**N12 20340** 8×8×14	**55011 03008** M3×8	**55062 00008** M8	–
A51 14310 SK40-FA22-160	40	22	48	–	160	19	2,7	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A51 14320 SK40-FA27-160	40	27	58	–	160	21	3,7	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A51 14330 SK40-FA32-160	40	32	78	–	160	24	5,8	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A51 14340 SK40-FA40-160*	40	40	88	66,7	160	27	6,6	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A51 14410 SK50-FA22-160	50	22	48	–	160	19	4,2	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A51 14420 SK50-FA27-160	50	27	50	–	160	21	5,3	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A51 14430 SK50-FA32-160	50	32	78	–	160	24	7,2	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A51 14440 SK50-FA40-160*	50	40	88	66,7	160	27	8,8	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A51 14450 SK50-FA60-160*	50	60	129	101,6	160	40		**N12 20390** 25,4×25×31	**55011 12025** M12×25	–	**55011 16050** M16×50

*** FA40 and 60 with 4 additional screw-in threads for cutter heads with tool clamping to DIN 2079.**

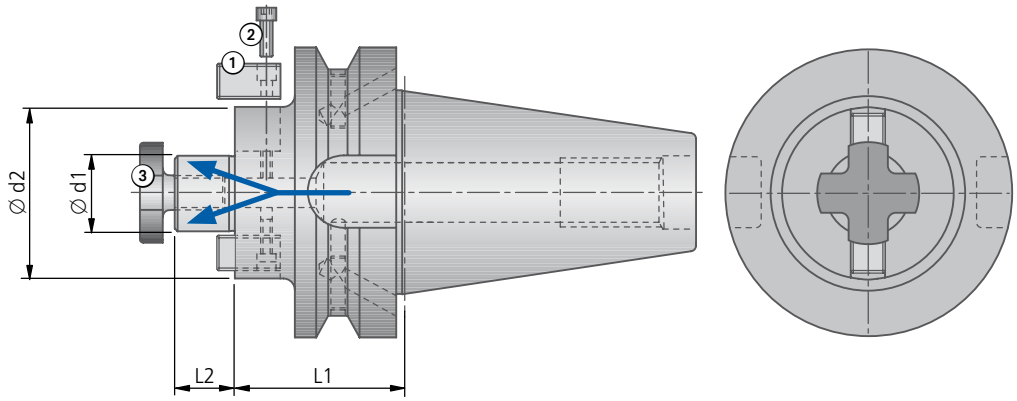
Supply includes ...FA..: Milling cutter arbor with cutter clamping screw ③, key block ① and cylindrical screw ②.
Supply includes ...FA40: Milling cutter arbor with cutter clamping screw ③, key block ① and cylindrical screw ②.
Supply includes ...FA60: Milling cutter arbor with key block ① and cylindrical screw ②.
Please order screws ④ for mounting the cutter heads separately.

DIN 6368 Key (page 119) on request.

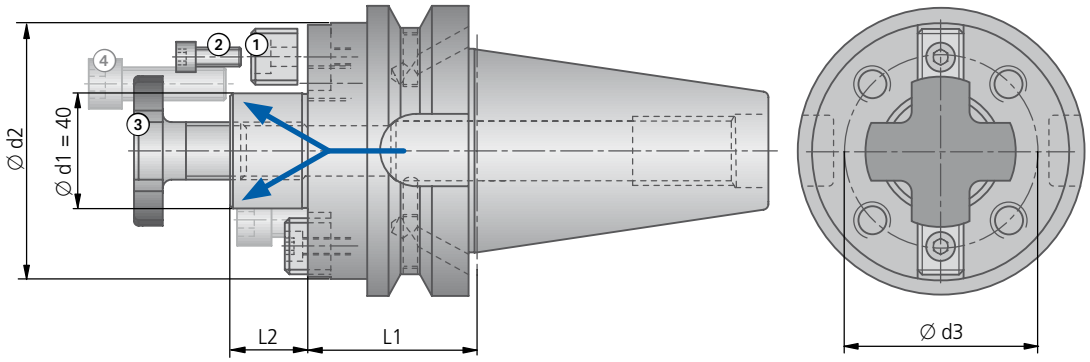
KOMET® JIS B 6339 (MAS 403 BT)

Taper shank with milling cutter arbor FA

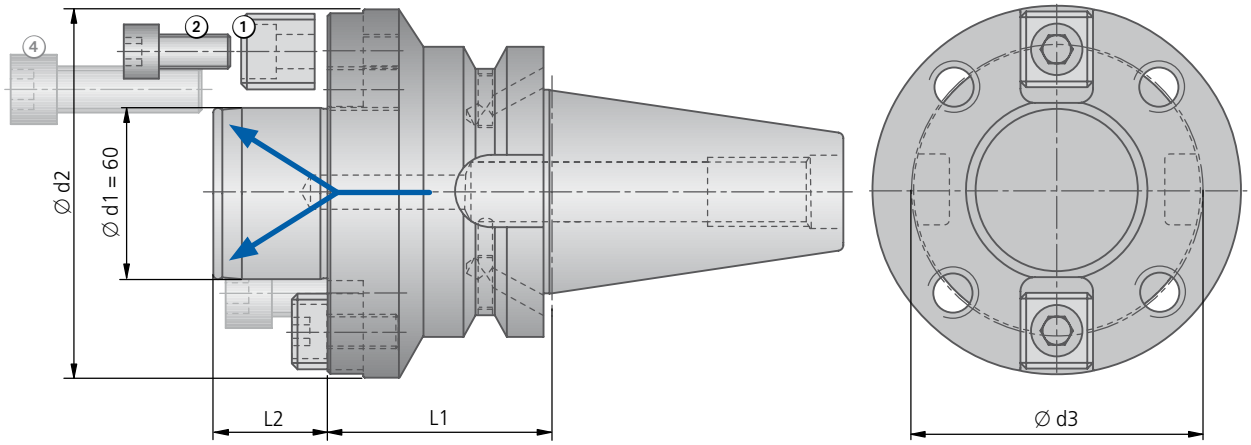
tool holder ...FA..	tool holder ...FA40	tool holder ...FA60	balancing note (chapter 8)	internal coolant supply	rotating tool	rotating tool
DIN 6358	DIN 6358 / DIN 6357	DIN 6357	balanced G6,3 8.000 min^{-1}			JIS B 6339



...FA40



...FA60



Taper shank in form B complete with conversion kit (for form AD). Please order pull stud separately (page 117).

Note: With coolant supply through spindle, use pull stud with through hole.
To close off central coolant hole, use pull stud without through hole.

Taper shank with milling cutter arbor FA

BT FA											Screws ④ for cutter heads with internal bore location
Order No. Article	BT	Ø d1	Ø d2	Bolthole circle Ø d3	L1	L2	kg	Key block ① Order No. Article	Cylindrical screw ② DIN 912 Order No. Article	Cutter clamping screw ③ DIN 6367 Order No. Article	Order No. Article
A51 15000 BT30-FA16-40	30	16	38	–	40	17	0,7	**N12 20340** 8×8×14	**55011 03008** M3×8	**55062 00008** M8	–
A51 15010 BT30-FA22-40	30	22	48	–	40	19	0,9	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A51 15020 BT30-FA27-40	30	27	58	–	40	21	1,0	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A51 15030 BT30-FA32-50	30	32	78	–	50	24	1,8	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A51 15100 BT40-FA16-40	40	16	38	–	40	17	1,1	**N12 20340** 8×8×14	**55011 03008** M3×8	**55062 00008** M8	–
A51 15110 BT40-FA22-40	40	22	48	–	40	19	1,1	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A51 15120 BT40-FA27-40	40	27	58	–	40	21	1,2	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A51 15130 BT40-FA32-50	40	32	78	–	50	24	1,4	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A51 15140 BT40-FA40-50*	40	40	88	66,7	50	27	1,7	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A51 15210 BT50-FA22-63	50	22	48	–	63	19	3,5	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A51 15220 BT50-FA27-63	50	27	58	–	63	21	3,7	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A51 15230 BT50-FA32-60	50	32	78	–	60	24	3,6	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A51 15240 BT50-FA40-60*	50	40	88	66,7	60	27	3,7	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A51 15250 BT50-FA60-80*	50	60	129	101,6	80	40	8,5	**N12 20390** 25,4×25×31	**55011 12025** M12×25	–	**55011 16050** M16×50

BT FA..-160											Screws ④ for cutter heads with internal bore location
Order No. Article	BT	Ø d1	Ø d2	Bolthole circle Ø d3	L1	L2	kg	Key block ① Order No. Article	Cylindrical screw ② DIN 912 Order No. Article	Cutter clamping screw ③ DIN 6367 Order No. Article	Order No. Article
A51 15300 BT40-FA16-160	40	16	38	–	160	17	2,2	**N12 20340** 8×8×14	**55011 03008** M3×8	**55062 00008** M8	–
A51 15310 BT40-FA22-160	40	22	48	–	160	19	3,0	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A51 15320 BT40-FA27-160	40	27	58	–	160	21	3,8	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A51 15330 BT40-FA32-160	40	32	78	–	160	24	4,6	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A51 15340 BT40-FA40-160*	40	40	88	66,7	160	27	6,9	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A51 15410 BT50-FA22-160	50	22	48	–	160	19	4,3	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A51 15420 BT50-FA27-160	50	27	58	–	160	21	6,0	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A51 15430 BT50-FA32-160	50	32	78	–	160	24	8,0	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A51 15440 BT50-FA40-160*	50	40	88	66,7	160	27	9,0	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A51 15450 BT50-FA60-160*	50	60	129	101,6	160	40		**N12 20390** 25,4×25×31	**55011 12025** M12×25	–	**55011 16050** M16×50

*** FA40 and 60 with 4 additional screw-in threads for cutter heads with tool clamping to DIN 2079.**

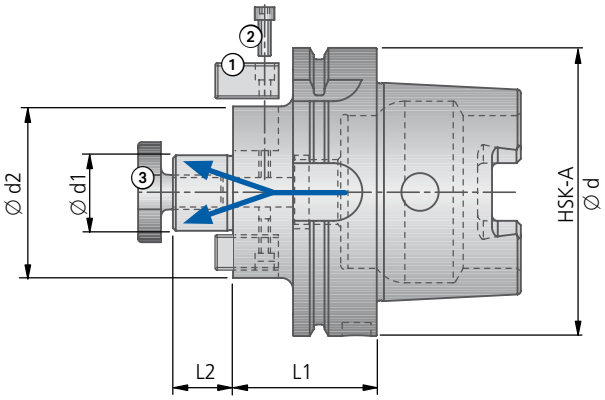
Supply includes ...FA..: Milling cutter arbor with cutter clamping screw ③, key block ① and cylindrical screw ②.
Supply includes ...FA40: Milling cutter arbor with cutter clamping screw ③, key block ① and cylindrical screw ②.
Supply includes ...FA60: Milling cutter arbor with key block ① and cylindrical screw ②.
Please order screws ④ for mounting the cutter heads separately.

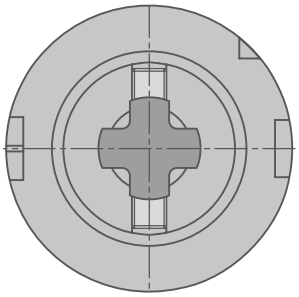
DIN 6368 Key (page 119) on request.

KOMET® ISO 12164-1

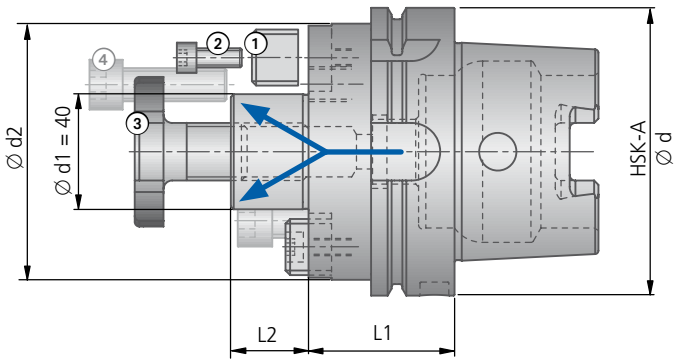
HSK-A Milling cutter arbor FA

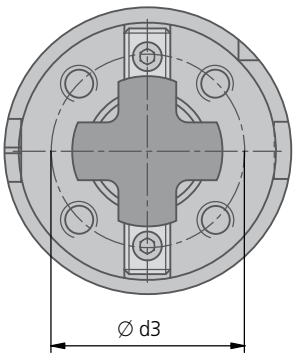
tool holder ...FA..	tool holder ...FA40 / FA50	tool holder ...FA60	balancing note (chapter 8)	internal coolant supply	rotating tool	rotating tool
DIN 6358	DIN 6358 / DIN 6357	DIN 6357	balanced G2,5 15.000 min^{-1}			HSK-A ISO 12164-1



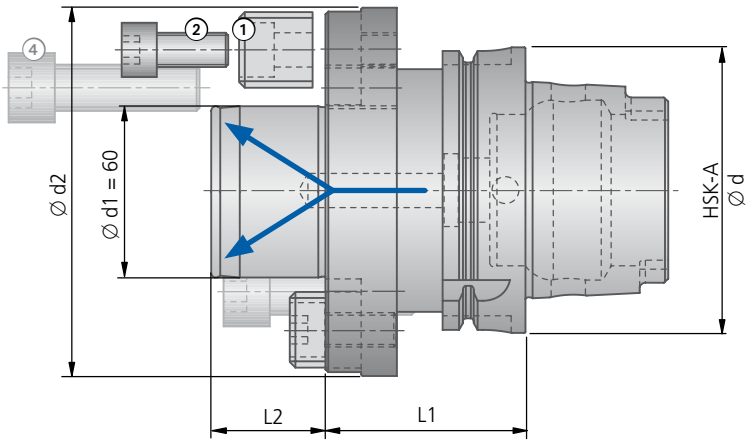


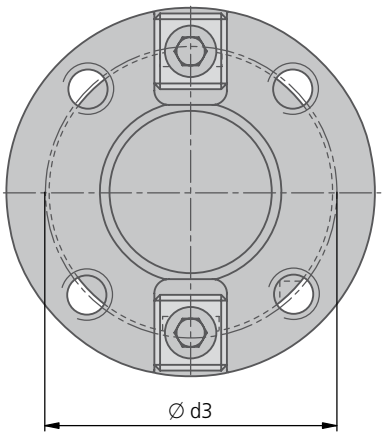
...FA40 / FA50





...FA60





HSK-A FA											Screws ④ for cutter heads with internal bore location
Order No. Article	HSK-A Ø d	Ø d1	Ø d2	Bolthole circle Ø d3	L1	L2	kg	Key block ① Order No. Article	Cylindrical screw ② DIN 912 Order No. Article	Cutter clamping screw ③ DIN 6367 Order No. Article	Order No. Article
A06 33902 HSK-A63-FA16-50	63	16	38	–	50	17	1,1	**N12 20340** 8×8×14	**55011 03008** M3×8	**55062 00008** M8	–
A06 33912 HSK-A63-FA22-50	63	22	48	–	50	19	1,1	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A06 33922 HSK-A63-FA27-60	63	27	58	–	60	21	1,3	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A06 33932 HSK-A63-FA32-60	63	32	78	–	60	24	1,4	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A06 33942 HSK-A63-FA40-60*	63	40	88	66,7	60	27	1,9	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A06 53902 HSK-A100-FA16-50	100	16	38	–	50	17	2,3	**N12 20340** 8×8×14	**55011 03008** M3×8	**55062 00008** M8	–
A06 53912 HSK-A100-FA22-50	100	22	48	–	50	19	2,5	**N12 20350** 10×10×17	**55011 04008** M4×8	**55062 00010** M10	–
A06 53922 HSK-A100-FA27-50	100	27	58	–	50	21	2,7	**N12 20360** 12×14×20	**55011 04012** M4×12	**55062 00012** M12	–
A06 53932 HSK-A100-FA32-50	100	32	78	–	50	24	2,8	**N12 20370** 14×14×22	**55011 05012** M5×12	**55062 00016** M16	–
A06 53942 HSK-A100-FA40-60*	100	40	88	66,7	60	27	3,8	**N12 20380** 15,9×16×21	**55011 06016** M6×16	**55062 00020** M20	**55011 12040** M12×40
A06 53951 HSK-A100-FA50-70*	100	50	95	101,6	70	30		**N12 20400** 18×18×27	**55011 08020** M8×20	**55062 00024** M24	**55011 16050** M16×50
A06 53961 HSK-A100-FA60-70*	100	60	129	101,6	70	40	6,0	**N12 20390** 25,4×25×31	**55011 12025** M12×25	–	**55011 16050** M16×50

*** FA40, 50 and 60 with 4 additional screw-in threads for cutter heads with tool clamping to DIN 2079.**

Supply includes ...FA..: Milling cutter arbor with cutter clamping screw ③, key block ① and cylindrical screw ②.

Supply includes ...FA40/FA50: Milling cutter arbor with cutter clamping screw ③, key block ① and cylindrical screw ②.

Supply includes ...FA60: Milling cutter arbor with key block ① and cylindrical screw ②.

Please order screws ④ for mounting the cutter heads separately.
Please order coolant supply connection separately (page 119).

DIN 6368 Key (page 119) on request.

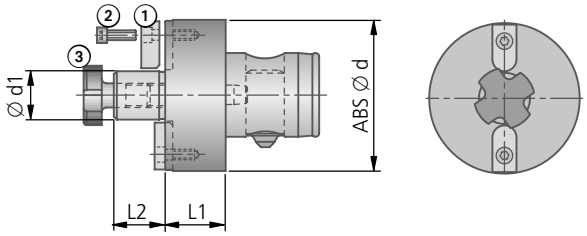
KOMET ABS®

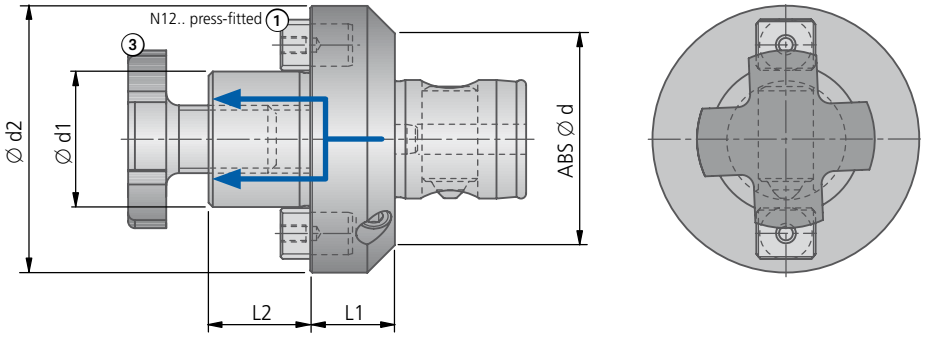
Milling cutter arbor FA / FAM

tool holder ..FA	tool holder ..FAM	internal coolant supply	rotating tool	machine adaptor
DIN 6358	DIN 6357			ABS®

...FA:

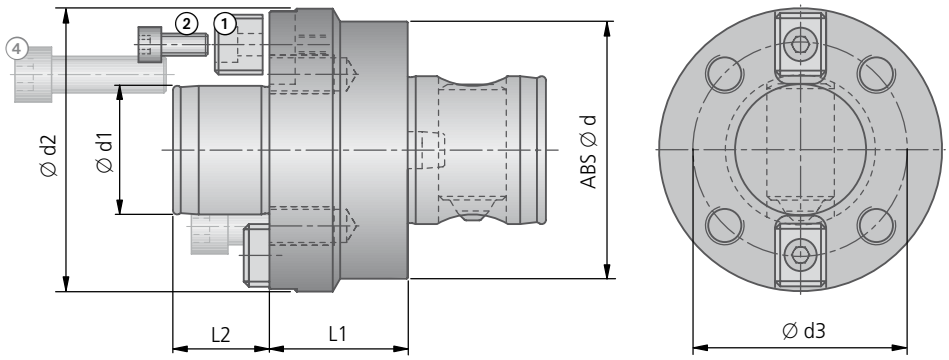
A40 24023 (ABS50 FA16)
without internal coolant supply





...FAM: Milling cutter adaptor with 4 screw-in threads for cutter heads with tool clamping to DIN 2079.

without internal coolant supply



ABS® FA									
Order No. Article	ABS Ø d	Ø d1	Ø d2	L1	L2	kg	Drive key ① Key block Order No.	Cylindrical screw ② DIN 912 Order No. Article	Cutter clamping screw ③ DIN 6367 Order No. Article
A40 24023 ABS50 FA16	50	16	–	20	17	0,48	**A40 24020.12**	**55011 03010** M3×10	**55062 00008** M8
A40 24034 ABS50 FA22	50	22	50	20	19	0,51	**N12 20120**	–	**55062 00010** M10
A40 24043 ABS50 FA27	50	27	50	20	21	0,57	**N12 20140**	–	**55062 00012** M12
A40 24053 ABS50 FA32	50	32	63	20	24	0,80	**N12 20170**	–	**55062 00016** M16
A40 25032 ABS63 FA22	63	22	63	22	19	0,84	**N12 20120**	–	**55062 00010** M10
A40 25042 ABS63 FA27	63	27	63	22	21	0,90	**N12 20140**	–	**55062 00012** M12
A40 25052 ABS63 FA32	63	32	63	22	24	0,99	**N12 20170**	–	**55062 00016** M16
A40 25062 ABS63 FA40	63	40	80	22	27	1,41	**N12 20200**	–	**55062 00020** M20
A40 26042 ABS80 FA27	80	27	80	25	21	1,59	**N12 20140**	–	**55062 00012** M12
A40 26052 ABS80 FA32	80	32	80	25	24	1,68	**N12 20170**	–	**55062 00016** M16
A40 26062 ABS80 FA40	80	40	80	25	27	1,85	**N12 20200**	–	**55062 00020** M20
A40 27052 ABS100 FA32	100	32	100	25	24	2,10	**N12 20170**	–	**55062 00016** M16
A40 27062 ABS100 FA40	100	40	100	25	27	2,34	**N12 20200**	–	**55062 00020** M20

Supply includes:
Milling cutter adaptor ..FA with drive key/key block ①/cylindrical screw ② and cutter clamping screw ③.

ABS® FAM										Screws ④ for cutter heads with internal bore location
Order No. Article	ABS Ø d	Ø d1	Ø d2	Bolthole circle Ø d3	L1	L2	kg	Key block ① Order No. Article	Cylindrical screw ② DIN 912 Order No. Article	Order No. Article
A40 16062 ABS 80-FAM40	80	40	88	66,7	43	30	2,60	**56341 00001** A40	**55011 06016** M6×16	**55011 12040** M12×40
A40 17062 ABS100-FAM40	100	40	88	66,7	38	30	3,50	**56341 00001** A40	**55011 06016** M6×16	**55011 12040** M12×40
A40 17072 ABS100-FAM60	100	60	130	101,6	56	40	6,50	**56341 00003** A50	**55011 12025** M12×25	**55011 16050** M16×50

Supply includes:
Milling cutter adaptor ..FAM with key block ① and cylindrical screw ②.
Please order screws ④ for mounting the cutter heads separately.

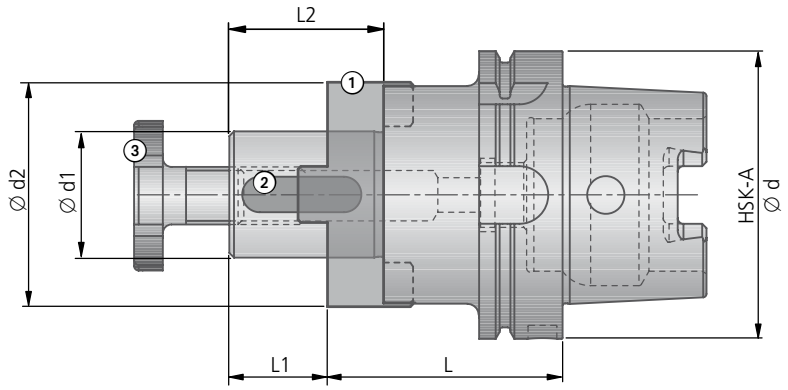
DIN 6368 Key (page 119) on request.

KOMET® ISO 12164-1

HSK-A Combination milling cutter arbor

tool holder	location	balancing note (chap. 8)	rotating tool	machine adaptor
DIN 6358	DIN 69882-2	pre-balanced G6,3 15.000 min^{-1}		HSK-A ISO 12164-1

■ for milling cutters with longitudinal or cross slots



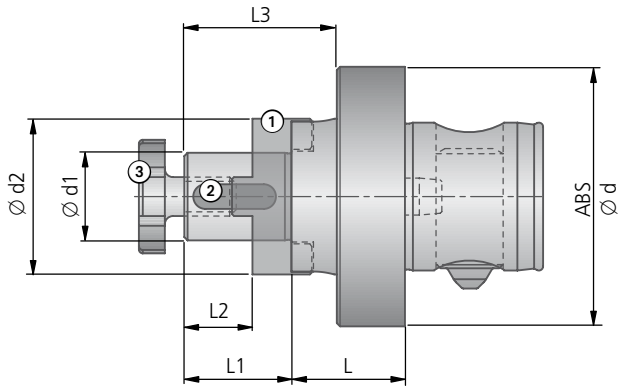
HSK-A FAK										
Order No. Article	HSK-A Ø d	Ø d1	Ø d2	L	L1	L2	kg	Driving ring ① DIN 6366 Part 1 Order No. Article	Feather key ② DIN 6885 Part 1 Order No. Article	Cutter clamping screw ③ DIN 6367 Order No. Article
A06 23751 HSK-A50-FAK16	50	16	32	50	17	27	0,62	**55237 00016** 16×10	**51305 04020** A4×4×20	**55062 00008** M8
A06 23761 HSK-A50-FAK22	50	22	40	50	19	31	0,60	**55237 00022** 22×12	**51305 06025** A6×6×25	**55062 00010** M10
A06 23771 HSK-A50-FAK27	50	27	48	65	21	33	1,05	**55237 00027** 27×12	**51305 07025** A7×7×25	**55062 00012** M12
A06 23781 HSK-A50-FAK32	50	32	58	65	24	38	1,25	**55237 00032** 32×14	**51305 08028** A8×7×28	**55062 00016** M16
A06 33750 HSK-A63-FAK16	63	16	32	60	17	27	0,96	**55237 00016** 16×10	**51305 04020** A4×4×20	**55062 00008** M8
A06 33760 HSK-A63-FAK22	63	22	40	60	19	31	1,10	**55237 00022** 22×12	**51305 06025** A6×6×25	**55062 00010** M10
A06 33770 HSK-A63-FAK27	63	27	48	60	21	33	1,22	**55237 00027** 27×12	**51305 07025** A7×7×25	**55062 00012** M12
A06 33780 HSK-A63-FAK32	63	32	58	60	24	38	1,45	**55237 00032** 32×14	**51305 08028** A8×7×28	**55062 00016** M16
A06 33790 HSK-A63-FAK40	63	40	70	70	27	41	2,10	**55237 00040** 40×14	**51305 10032** A10×8×32	**55062 00020** M20
A06 53750 HSK-A100-FAK16	100	16	32	60	17	27	2,20	**55237 00016** 16×10	**51305 04020** A4×4×20	**55062 00008** M8
A06 53760 HSK-A100-FAK22	100	22	40	60	19	31	2,48	**55237 00022** 22×12	**51305 06025** A6×6×25	**55062 00010** M10
A06 53770 HSK-A100-FAK27	100	27	48	60	21	33	2,55	**55237 00027** 27×12	**51305 07025** A7×7×25	**55062 00012** M12
A06 53780 HSK-A100-FAK32	100	32	58	60	24	38	2,80	**55237 00032** 32×14	**51305 08028** A8×7×28	**55062 00016** M16
A06 53790 HSK-A100-FAK40	100	40	70	70	27	41	3,55	**55237 00040** 40×14	**51305 10032** A10×8×32	**55062 00020** M20
A06 53800 HSK-A100-FAK50	100	50	90	80	30	46	5,00	**55237 00050** 50×16	**51305 12036** A12×8×36	**55062 00024** M24

Supply includes: Milling cutter adaptor with driving ring ①, feather key ② and cutter clamping screw ②.
Please order coolant supply connection and key separately (page 119).

Combination milling cutter arbor

tool holder	rotating tool	machine adaptor
DIN 6358		ABS®

for milling cutters with longitudinal or cross slots ■



ABS® FAK											
Order No. Article	ABS Ø d	Ø d1	Ø d2	L	L1	L2	L3	kg	Driving ring ① DIN 6366 Part 1 Order No. Article	Feather key ② DIN 6885 Part 1 Order No. Article	Cutter clamping screw ③ DIN 6367 Order No. Article
A40 04022 ABS50 FAK16	50	16	32	22	27	17	39	0,46	**55237 00016** 16×10	**51305 04020** A4×4×20	**55062 00008** M8
A40 04032 ABS50 FAK22	50	22	40	22	31	19	43	0,59	**55237 00022** 22×12	**51305 06025** A6×6×25	**55062 00010** M10
A40 05021 ABS63 FAK16	63	16	32	26	27	17	42	1,0	**55237 00016** 16×10	**51305 04020** A4×4×20	**55062 00008** M8
A40 05031 ABS63 FAK22	63	22	40	26	31	19	46	1,15	**55237 00022** 22×12	**51305 06025** A6×6×25	**55062 00010** M10
A40 05041 ABS63 FAK27	63	27	48	26	33	21	48	1,25	**55237 00027** 27×12	**51305 07025** A7×7×25	**55062 00012** M12
A40 06031 ABS80 FAK22	80	22	40	33	31	19	51	1,8	**55237 00022** 22×12	**51305 06025** A6×6×25	**55062 00010** M10
A40 06041 ABS80 FAK27	80	27	48	33	33	21	53	1,9	**55237 00027** 27×12	**51305 07025** A7×7×25	**55062 00012** M12
A40 06051 ABS80 FAK32	80	32	58	33	38	24	58	2,3	**55237 00032** 32×14	**51305 08028** A8×7×28	**55062 00016** M16
A40 06061 ABS80 FAK40	80	40	70	33	41	27	61	2,75	**55237 00040** 40×14	**51305 10032** A10×8×32	**55062 00020** M20

Supply includes: Milling cutter adaptor with driving ring ①, feather key ② and cutter clamping screw ②.

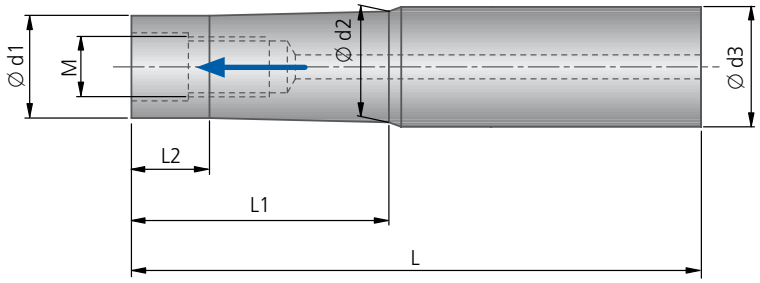
DIN 6368 Key (page 119) on request.

JEL ®

Adaptor for screw-on milling cutter

tool holder	internal coolant supply	rotating tool	machine adaptor
Thread			DIN 6535 HA

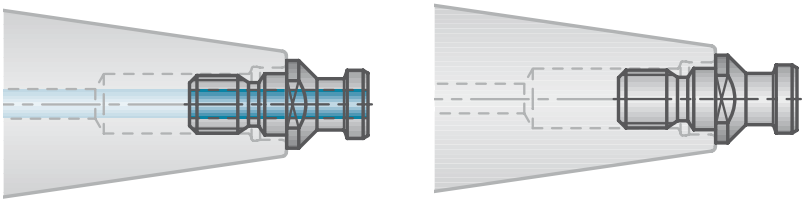
■ cylindrical shank for shrink fit chuck



Order No.	M	Ø d1	Ø d2	Cylindrical shank Ø d3	L	L1	L2	kg
58797012000065*	M5	9,5	11,5	12	65	20	7,8	0,054
58798012000085	M5	9,5	11,8	12	85	40	9	0,147
58798012000105	M5	9,5	11,8	12	105	60	9	0,166
58798012000125	M5	9,5	11,8	12	125	80	9	0,197
58797016000088*	M8	13,8	15,8	16	88	40	7,8	0,122
58798016000108	M8	14,2	15,8	16	108	60	9	0,333
58798016000128	M8	14,2	15,8	16	128	80	9	0,402
58798016000148	M8	14,2	15,8	16	148	100	9	0,451
58798016000168	M8	14,2	15,8	16	168	120	9	0,522
58798016000198	M8	14,2	15,8	16	198	150	9	0,678
58797020000095*	M10	18,0	19,8	20	95	45	7,8	0,208
58798020000110	M10	18,5	19,8	20	110	60	9	0,552
58798020000130	M10	18,5	19,8	20	130	80	9	0,654
58798020000150	M10	18,5	19,8	20	150	100	9	0,754
58798020000170	M10	18,5	19,8	20	170	120	9	0,850
58798020000190	M10	18,5	19,8	20	190	140	9	0,958
58797025000106*	M12	21,0	24,8	25	106	50	7,8	0,347
58798025000131	M12	23,0	24,8	25	131	75	9	1,022
58798025000156	M12	23,0	24,8	25	156	100	9	1,225
58798025000181	M12	23,0	24,8	25	181	125	9	1,417
58798025000206	M12	23,0	24,8	25	206	150	9	1,620
58798025000231	M12	23,0	24,8	25	231	175	9	1,822
58797032000110*	M16	29,0	31,9	32	110	50	7,8	0,619
58798032000160	M16	29,0	31,9	32	160	100	16	2,612
58798032000210	M16	29,0	31,9	32	210	150	16	3,310
58798032000260	M16	29,0	31,9	32	260	200	16	4,174
58798032000310	M16	29,0	31,9	32	310	250	16	4,955
58798036000160	M16	31,5	34,8	36	160	100	9	2,406
58798036000310	M16	31,5	34,8	36	310	250	9	

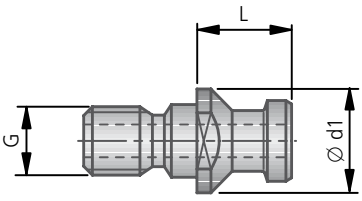
Variant: heavy metal, *steel

Note:
With coolant supply through spindle, use pull stud with through hole.
To close off central coolant hole, use pull stud without through hole.



DIN 69872 A

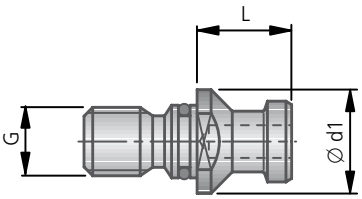
with through hole



DIN 69872 A				
ISO size	Order No.	Ø d1	L	G
40	55391 01240	23	26	M16
45	55391 01645	30	30	M20
50	55391 02050	36	34	M24

DIN 69872 B

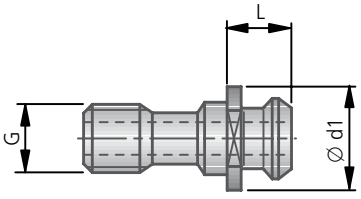
sealed,
for coolant through collar



DIN 69872 B				
ISO size	Order No.	Ø d1	L	G
40	55392 01240	23	26	M16
45	55392 01645	30	30	M20
50	55392 02050	36	34	M24

ISO 7388/2 B

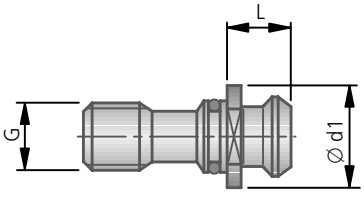
with through hole



ISO 7388/2 B				
ISO size	Order No.	Ø d1	L	G
40	55391 51640	22,5	16,40	M16
45	55391 52045	30,0	20,95	M20
50	55391 52450	37,0	25,55	M24

ISO 7388 B

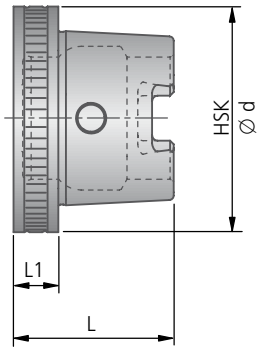
sealed,
for coolant through collar



ISO 7388 B				
ISO size	Order No.	Ø d1	L	G
40	55392 51640	22,5	16,40	M16
45	55392 52045	30,0	20,95	M20
50	55392 52450	37,0	25,55	M24

HSK-A/C Plugs

For sealing HSK units against dirt or other contamination.

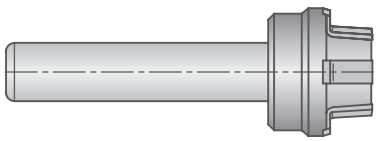


Article	Order No.	HSK Ø d	L	L1
HSK-C 40	**A06 13470**	40	30	10
HSK-C 50	**A06 23470**	50	37,5	12,5
HSK-C 63	**A06 33470**	63	44,5	12,5
HSK-C 80	**A06 43470**	80	56	16
HSK-C100	**A06 53470**	100	66	16

Periphery

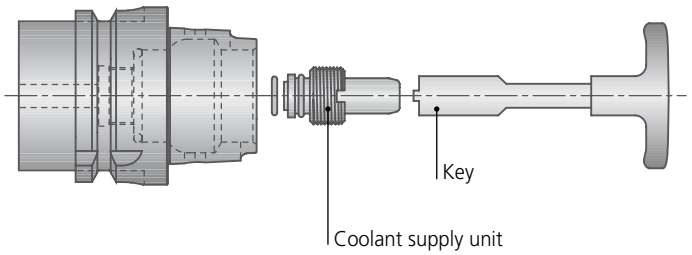
Wiper for taper and face

Wiper for cleaning taper and face on machine spindle.

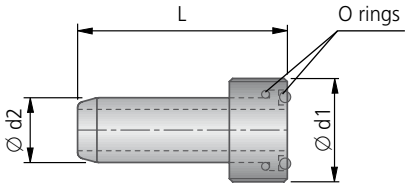


for HSK size	Order No.
32	**51391 01032**
40	**51391 01040**
50	**51391 01050**
63	**51391 01063**
80	**51391 01080**
100	**51391 01100**

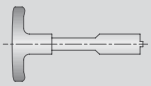
Mounting of the coolant supply unit



Note:
The coolant supply unit should be fitted in the tool with the key, to ensure a seal is produced.
A coolant supply unit specifically for the machine can also be fitted, if required, using the thread in the tool.



Supply coolant supply unit includes:
Coolant tube, locking collar and two O rings.

HSK-A size	Key	Coolant supply unit						
						O ring face side and over tube		
	Order No.	Order No.	Ø d1	Ø d2	L	Article		Order No.
32	18021 01032	51391 00032	M10×1,0	6	26	5×1,2	2×	52914 00512
40	18021 01040	51391 00040	M12×1,0	8	29,1	7,5×1,5	2×	52914 00751
50	18021 01050	51391 00050	M16×1,0	10	32,7	9×2	2×	52914 00920
63	18021 01063	51391 00063	M18×1,0	12	36,2	10×2,5 10×2	1× 1×	52914 01025 52914 01020
80	18021 01080	51391 00080	M20×1,5	14	39,7	13×2	2×	52914 01320
100	18021 01100	51391 00100	M24×1,5	16	43,6	14×3	2×	52914 01430

Note re. supply:
The coolant supply connection for the tool adaptors must be ordered separately.
Only use the keys listed for assembly.
This will prevent coolant flowing back into the machine spindle/clamping system.
A specific coolant hose for the machine can also be fitted on all HSK adaptors.

Key
on request

Size	Order No.
16	18701 80016
22	18701 80022
27	18701 80027
32	18701 80032
40	18701 80040
50	18701 80050

IDEEN-FABRIK +

The ideas factory

The IDEEN-FABRIK reflects the evolution of the KOMET GROUP from a tool manufacturer into a creative expert for solutions covering all aspects of boring, reaming, thread milling and mechatronic tools.

The central objective is to offer our customers and employees scope for creative working and learning.

On a total area of 2,500 m², we have created a modern, multi-storey factory environment. The IDEEN-FABRIK was deliberately not constructed as a separate, detached training building, but integrated directly above a manufacturing business.

While the metal swarf flies down below, ideas are exchanged above. By this, we aim to demonstrate that the work here is always associated with new ideas and creative ambition.

With the IDEEN-FABRIK and the comprehensive seminar programme for customers and employee qualification, we aim to offer you a measurable and permanent competitive advantage in your markets.

Ask for our no-obligation specialist seminar brochure.

TOOLS+IDEAS®

The KOMET GROUP is the worldwide technology leader for innovative tool concepts and complete solutions for drilling machining.

Our customers know us as a manufacturer of premium tools, and know the ideas behind our solutions. The further creativity is still unused, and remains to be discovered. We have set ourselves the objective of exploiting the added value thus created for the benefit of our customers.

We call this TOOLS+IDEAS. A new and different way of being able to offer our customers long-term, sustainable advantages through a plus in support and services.

Our IDEEN-FABRIK in Besigheim is the first step in this direction.

Informations

KOMET® – Expertise in special solutions

Application examples

Special solutions for your milling operations – Greater range of functions, lower machining costs

Developing customer-specific solutions has always been a showcase discipline at KOMET®.
Due to requirements relating to design, tolerance and other quality considerations, machining tasks can often not be accomplished using standard tools.
Special process evaluations and tool developments are then required.

BENEFITS for you:

- Optimised application design
- Idle times are significantly reduced
- KOMET® experts provide individual and professional advice
- Combining several machining operations
- Highest efficiency and productivity

Special side and face milling cutters for machining the bearing seat webs in a crankcase

Application example:
Material: GSJ 40
Cutting data:
Cutting speed
v_c = 100 m/min
Feed
f = 0,12 mm

Special milling cutters for machining brake calliper lugs

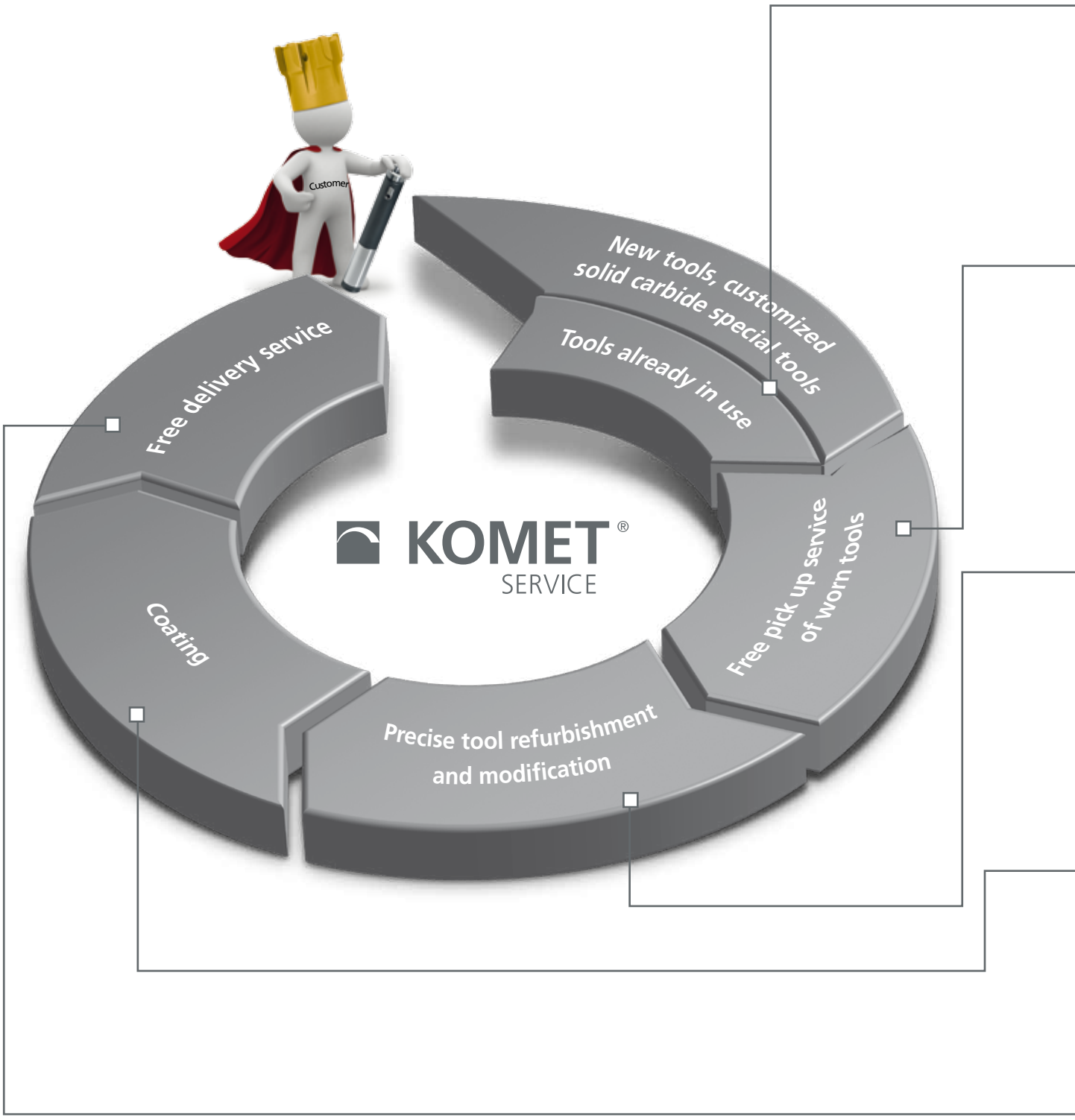
Application example:
Material: GSJ 50
Cutting data:
Cutting speed
v_c = 140 m/min
Feed
f = 0,1 mm

Special milling cutters for machining the sealing grooves in a pump housing

Application example:
Material: GJL 300
Cutting data:
Cutting speed
v_c = 130 m/min
Feed
f = 0,1 mm

KOMET SERVICE ®
the service brand name of the KOMET GROUP

A network of local partners that provide professional tool refurbishment, trade tools and manufacture customized solid carbide special tools. Everything from a single source. Fast, flexible and always close to you.



From stock or individually manufactured

Get your solid carbide TOOL*life* tools directly from your KOMET SERVICE ® partner or have your own customized solid carbide special tools manufactured.
Your KOMET SERVICE ® partner will happily refurbish these tools along with all tools from other brands.

One call does it all

Get on a regular pick-up schedule or arrange a one-time pick-up of your tools needing refurbishment by your KOMET SERVICE ® partner. It's fast and it's free.

Tools refurbished to original quality

Our refurbishing experts fairly assess the current state of your tools (irrespective of the manufacturer) in order to recommend refurbishment or replacement.
KOMET GROUP tools are refurbished according to strict criteria to restore the original geometry or original tipping. By request you receive a measurement report. Our partners will also professionally modify tools for you, quickly and flexibly.

Coating – fully customized

KOMET GROUP tools are of course given the original coatings once more. We customize our service to your needs, even with other standard coatings, all within a few days.

Just-in-time delivery

Your KOMET SERVICE ® partner will return your KOMET GROUP tools refurbished to their original quality within 5 or 10 days (without or with coating) – safely stored in the KOMET SERVICE ® TOOL *life* box.

KOMET SERVICE® Partner

Fast, flexible and always close to you

① Görans Slipservice AB
Ångpannegatan 3
SE-417 05 Göteborg
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Fax +46 31 229684
gorans@kometservice.com

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D-23948 Rolofshagen
Tel. +49 3881 4822
Fax +49 3881 725976
krause@kometservice.com

③ Werkzeugservice Wulf e.K.
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D-30900 Wedemark
Tel. +49 5130 37670
Fax +49 5130 376729
wulf@kometservice.com

④ Herbert Schaube Werkzeugschleiferei
Alt-Blankenburg 25
D-13129 Berlin
Tel. +49 30 47471037
Fax +49 30 4744194
schaube@kometservice.com

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D-37154 Northeim
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nb@kometservice.com

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Tel. +49 7572 760310
Fax +49 7572 7603126
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Tel. +49 8441 859160
Fax +49 8441 8591620
wema@kometservice.com

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A-4596 Steinbach/Steyr
Tel. +43 7257 7366
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gradauer@kometservice.com

⑳ DHB Werkzeugtechnik GmbH
Gösgerstrasse 15
CH-5012 Schönenwerd
Tel. +41 62 8494192
Fax +41 62 8494193
dhb@kometservice.com

㉑ AFLY, Affûtage Lyonnais S.A.S.
200 rue Léon Blum
F-69100 Villeurbanne
Tel. +33 472 148939
Fax +33 472 140320
afly@kometservice.com

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7171 Torbram Road, Unit C-2
L4T 3W4, Mississauga, Ontario, CA
Tel. +1 9056773090
Fax +1 9056773091
castelar@kometservice.com

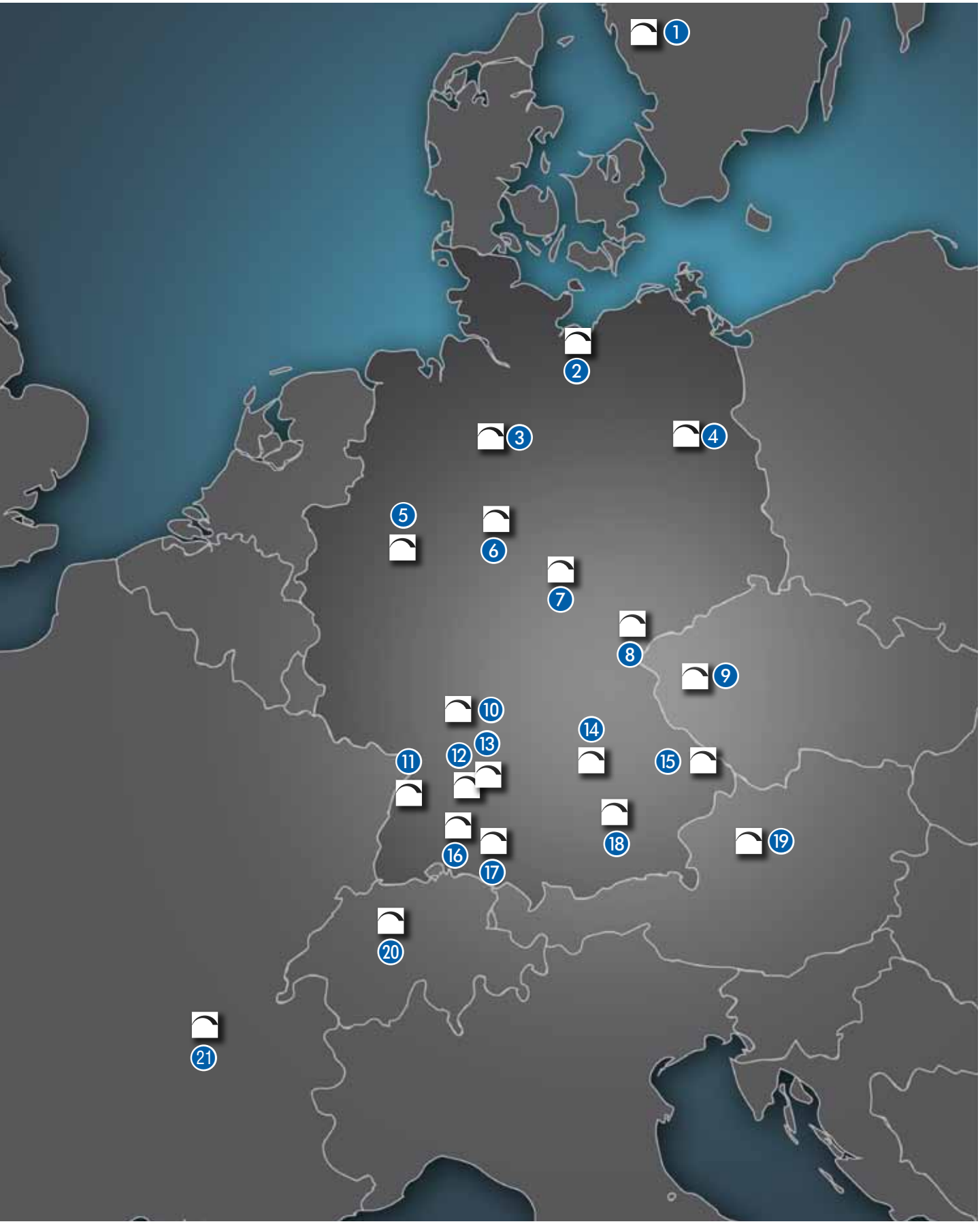
[2] TechFab Inc.
400 Ave Marien
H1B4V6, Montreal-Est, Quebec, CA
Tel.: +1 5146408451
Fax: +1 5146408473
techfab@kometservice.com

[3] Integrity Saw & Tool
507 West Rolling Meadows Drive
Fond du Lac, WI 54937, USA
Tel.: +1 920 923 4474
Fax: +1 920 923 4407
integrity@kometservice.com

[4] Ekstrom Carlson
5248 27th Avenue
Rockford, IL 61109, USA
Tel. +1 815 394 1744
Fax +1 815 316 8120
ekstrom@kometservice.com

[5] Countyline Tool, Inc.
3303 N. Main Street
East Peoria, IL 61611, USA
Tel. +1 309 694 2400
Fax +1 309 694 2445
countyline@kometservice.com

[6] Tri-State Tool Grinding
5311-A Robert Ave
Cincinnati, OH 45248, USA
Tel.: +1 513 347 0100
Fax: +1 513 347 3728
tristate@kometservice.com



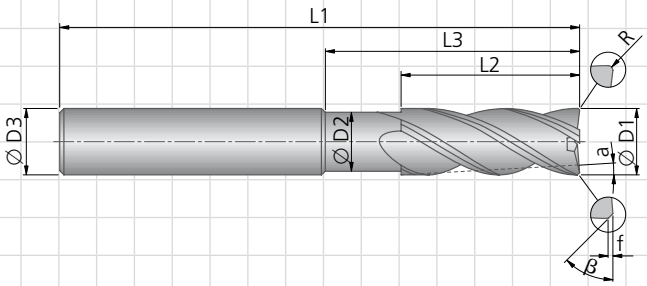
www.kometservice.com

KOMET SERVICE

Inquiry special tools: Milling cutter

Company:	Contact:
Customer No.:	Department:
Adress:	Phone:
	Fax:
	E-Mail:

Workpiece drawing:



Tool: milling cutter	Dimensions	Tolerance
machining ☐ roughing ☐ finishing		
∅ D1		
neck groove	☐ yes	☐ no
neck dia. D2		
shank dia. D3		
L1		
L2		
L3		
conical	☐ yes	☐ no
angle of taper α		
no. of teeth z		
front milling	☐ yes	☐ no
face milling	☐ yes	☐ no
corner type	☐ A	☐ B
corner radius R		
bevel f		
bevel angle β	☐ 45°	☐ ____°
straight fluted	☐	
right hand spiraled, helix angle λ	☐ λ =	
left hand spiraled, helix anglel λ	☐ λ =	
cutting direction	☐ R.H.	☐ L.H.
coating	☐ yes	☐ no
inner cooling lubricant supply	☐ yes: ☐ side ☐ central	
cooling lubricant discharge	☐ no	
cylindrical shank DIN 6535	☐ HA ☐ other:	☐ HE ☐ HB
Machine data		
machine type		
spindle type / size		
spindle power (kW)		
cutting speed v_c (m/min)		

Workpiece:

Tools required _____units

Workpiece _____units/year

Material to be machined:

- ☐ construction steel, good machinability
- ☐ tool steel
- ☐ stainless steel
- ☐ hardened steel
- ☐ malleable cast iron
- ☐ spheroidal graphite cast iron
- ☐ non-ferrous metals (refractory)
- ☐ non-ferrous metals (malleable)
- ☐ _____

Material name
Strength Rm (N/mm²)
Hardness (HRc, HB, HV, ...)

A fax form is available to download from www.kometgroup.com

KOMET SERVICE

Inquiry special tools: Form cutter

Company:	Contact:
Customer No.:	Department:
Adress:	Phone:
	Fax:
	E-Mail:

Workpiece drawing:

Workpiece:

Tools required _____units

Workpiece _____units/year

Material to be machined:

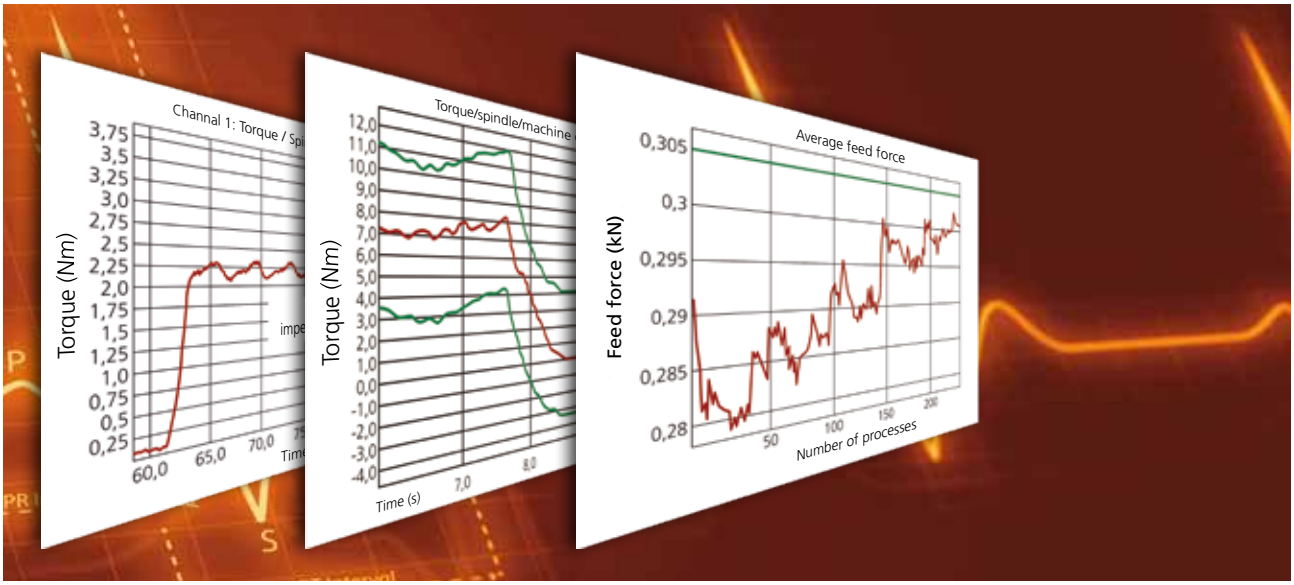
- ☐ construction steel, good machinability
- ☐ tool steel
- ☐ stainless steel
- ☐ hardened steel
- ☐ malleable cast iron
- ☐ spheroidal graphite cast iron
- ☐ non-ferrous metals (refractory)
- ☐ non-ferrous metals (malleable)
- ☐ _____

Material name
Strength Rm (N/mm²)
Hardness (HRc, HB, HV, ...)

Tool: form cutter	Dimensions	Tolerance
shank dia.		
overall length		
no. of teeth z		
straight fluted	☐	
right hand spiraled, helix angle λ	☐ λ =	
left hand spiraled, helix anglel λ	☐ λ =	
cutting direction	☐ R.H.	☐ L.H.
coating	☐ yes	☐ no
inner cooling lubricant supply cooling lubricant discharge	☐ yes: ☐ side ☐ central ☐ no	
cylindrical shank DIN 6535	☐ HA ☐ other:	☐ HE ☐ HB
Machine data		
machine type		
spindle type / size		
spindle power (kW)		
cutting speed v_C (m/min)		

KOMET® BRINKHAUS

ToolScope – Next generation process monitoring



Visualisation Monitoring Optimisation Documentation

Growing automation in the machining industry increases the demand for more process and machine tool monitoring, which can help minimize machine down time and reduce scrap rates, thereby improving the delivery times to your customers.

Based on the latest technology of process and machine tool monitoring, the ToolScope System from KOMET® BRINKHAUS relies on a unique, patented method for statistical process monitoring which not only detects breakage but also recognizes considerably smaller process deviations. In addition to the usual procedures of process control, the ToolScope System provides a procedure for monitoring quality while a process is running.

BRINKHAUS ToolScope adds considerable value to your production

BRINKHAUS ToolScope has an advantage over other systems not only because it features the latest technology, but also because of its modularity and user-friendliness. It provides for simple and safe application of the system in many different areas, even with small batch runs. Indeed, the built-in dynamic monitoring capabilities alleviate the need for a "learning period" before the system can start monitoring a process.

BENEFITS for you:

- Online visualization of the process (oscilloscope function) to support the set-up procedure, e.g. in order to promptly detect the jamming of chips
- Six Sigma Module: statistical process verification and process quality monitoring
- Dynamic Monitoring Module: Process monoitoring for small batch runs which alleviates the need for a learning
- Adaptive Control (AC) Module: Optimization of the essential operating time through process acceleration for tools that are underused, and speed reduction for tools that are overused
- Measuring without (additional) sensors: The sensor data is read directly from the CNC via Profibus or TCP/IP
- Automatic documentation of the process data as a PDF, PNG or Excel file
- Monitoring for tool wear and missing tool
- Monitoring of any and all possible sensor signals
- Evaluating analogue sensor signals with up to 10 kHz
- Monitoring of the vibration behavior of bearings, axles, spindles and tools
- Operation via the machine control system HMI or using a touch screen

Dimensions (W×D×H)	Data – mm *(inch)*	Note
IPC version	400×220×110 *(15.748×8.661×4.331)*	
DIN Rail Module	200×140×110 *(7.874×5.512×4.331)*	
Touch Panel PC version	410×320×90 *(16.142×12.598×3.543)*	15" Display

Interfaces	Sample rate	Note
Profibus with synchronous actions	approx. 20 - 30 Hz	
Profibus with compile cycle	approx. 100 - 500 Hz	See below
TCP/IP	yes	
Analog input channels	up to 10 kHz	8 inputs, during monitoring perhaps lower sample rate
Digital input/output channels		8 input/output channels each

Supported control systems
Siemens 840D SL, 840D PL, Heidenhain, Fanuc, Beckhoff from year 2000 and later, other control systems and year of manufacture available upon request.

Profibus connection	
Requirements for compile cycle Sample rate approx. 100 Hz	**Drive hardware:** SIMODRIVE 611D based drive system, digital drive, delivers digital current/torque information **Control hardware:** SINUMERIK 840D, • NCU: 572.3 or 573.2 or higher (572.2 only SW4.4), • storage: min. 32 MB, • PROFIBUS interface **Control software:** SINUMERIK 840D technology board, version 05.03.06 (NCU_05.03.18) or 04.04.11 (NCU_04.04.37) or higher
Requirements for compile cycle Sample rate approx. 100 - 500 Hz	**In addition to the above mentioned requirements, the following must apply:** **Control software:** SINUMERIK 840D, NC-Software ≥ 06.03

Visualization on HMI (only Siemens)	
Requirements	Windows 95 and later, network card

Start monitoring with the BRINKHAUS ToolScope system
Monitoring can automatically be started by changing from G0 to G1. Furthermore the processes can automatically be stored in reference to the tool number, workpiece number, program name, etc.

Functionality	
Visualization	Each process can easily and continously be visualized (oscilloscope function).
Data logging	Each process is automatically stored on the hard disk (logbook).
Filtering	The system offers a variety of filters such as average value, effective value, RMS, variance, etc. as standard for the filtering of the input signals.
Monitoring tool breakage	The basic system contains a self learning algorithm to recognize tool breakage. The tolerance bands are simply and automatically identified.
Monitoring tool wear	The system offers tracing and monitoring of tool wear. By setting warning thresholds, the operator can be forewarned of worn tools.
Six Sigma Strategy (optional) Online statistical process control	With this monitoring algorithm, minimal process deviations such as wear, larger cavities, changes in material can be recognized during consistant serial production processes. This is equivalent to conducting real-time quality control while a process is running.
Adaptive Control (AC) Module (optional)	With adaptive control, the feed is optimized so that the effective power of the tool remains as constant as possible. Therefore, the essential operation time can significantly be reduced, e.g. during roughing. Moreover, the feed can be reduced if an effective power limit is exceeded, thus protecting the tool.
Dynamic Monitoring Module (optional)	With this monitoring strategy, the process and the tool can be monitored from as early as lot size 1. Here the system is also fully self-learing.

BRINKHAUS ToolScope Basic system including installation / commissioning: Order No. E65 01010		
Enhanced with:	Dynamic Monitoring Module Order No. E65 21020	Adaptive Control (AC) Module Order No. E65 21030

KOMET ®

Screwdriver

To ensure the correct starting torque on screws, the torque key from the TORX PLUS ® system has. Complies with the following requirements: EN ISO 6789, BS EN 26789, ASME B107.14M (with certificate).

Torque wrench TorqueFix ®

with fixed preset torque
accuracy: ± 6% release torque: + 30%

TorqueFix ®			appropriate replaceable blade
Size	Torque	Order No.	Order No.
5IP	0,38 Nm	L05 00901	L05 00700
6IP	0,62 Nm	L05 00911	L05 00710
6IP	1,01 Nm	L05 03301	
7IP	0,90 Nm	L05 00921	L05 00720
8IP	1,28 Nm	L05 00931	L05 00730
8IP	2,25 Nm	L05 03311	
9IP	2,50 Nm	L05 00941	L05 00740
10IP	2,80 Nm	L05 00951	L05 00750
15IP	4,30 Nm	L05 00961	L05 00760
20IP	6,25 Nm	L05 00971	L05 00770

Supply includes: Torque wrench without replaceable blade.

Torque wrench easyTorque

with fixed preset torque
accuracy: ± 10% release torque: unbounded

easyTorque			appropriate replaceable blade
Size	Torque	Order No.	Order No.
5IP	0,38 Nm	L05 00902	L05 00700
6IP	0,62 Nm	L05 00912	L05 00710
6IP	1,01 Nm	L05 00922	
8IP	1,28 Nm	L05 00932	L05 00730
8IP	1,8 Nm	L05 03320	
8IP	2,25 Nm	L05 00942	
9IP	2,50 Nm	L05 00952	L05 00740
10IP	2,80 Nm	L05 00962	L05 00750
15IP	4,30 Nm	L05 00972	L05 00760

Supply includes: Torque wrench without replaceable blade.

Torque wrench TorqueVario ®

adjustable with scale

TorqueVario ®			appropriate replaceable blade
Size	Torque	Order No.	Order No.
5IP – 7IP	0,38 - 1,01 Nm	L05 00781	L05 00700
			L05 00710
			L05 00720
9IP – 20IP	2,25 - 6,25 Nm	L05 00791	L05 00740
			L05 00750
			L05 00760
			L05 00770

Supply includes:
Torque wrench with adjusting key L05 00990, without replaceable blade.

Changing the torque

① Remove blade
② Insert adjusting key in variable torque key handle and turn to set the required torque. The appropriate IP size can be read from the graduated scale.
③ Push blade in again

TorxPlus ®

Size	Order No.	Size	Order No.
5IP	L05 00800	9IP	L05 00840
6IP	L05 00810	10IP	L05 00850
7IP	L05 00820	15IP	L05 00860
8IP	L05 00830	20IP	L05 00870

The old Torx keys do fit the new TORX PLUS ® shape but we recommend only. TORX PLUS ® keys be used for tightening screws.

TORX PLUS ® is a registered trademark for the Camcar Division of Textron Inc.

The application details given depend on the environmental and application conditions (e.g. machine, ambient temperature, lubricant/coolant used and machining result required): they are based on the correct application conditions, correct use and compliance with the spindle speed limits given for the tools.

Balancing note:

Tool holders or adaptors are only balanced as supplied, i.e. no allowance has been made for items which can alter this, such as boring tools, milling cutters, inserts, etc. When used at high speeds, we recommend precision balancing be carried out when the tool is fitted ready for use.

Hazard warning:

If using tungsten carbide-based hard metal products together with cobalt as a binder metal, please read our safety data sheets, which are available for you to download from our website.
(http://www.kometgroup.com/navigation-top/download/service/datenblaetter.html)

Numerical index

Fax Order +49 7143 373233

KOMET GROUP

KomPass – Milling

Customer No. – please specify	Order No.	Order date	Supplier No.

Company

Contact person (surname) Name

Branch Department/site

Street

Town/city, postcode

Tel. Fax

Date Signature

Delivery address (if different)

Company

Contact person (surname) Name

Branch Department/site

Street

Town/city, postcode

Tel. Fax

Order quantity	Order No.	Tool name / Item Article	Customer material number	Additional information

TOOLS PLUS IDEAS –
a PLUS for our customers and the environment

The company targets

The KOMET GROUP pursues a consistent policy of investments and achieves long-term and profitable growth via continuous improvement of products and processes as well as via consistent qualification of employees. This increases the value of the company. The KOMET GROUP consistently increases its innovation quota via research and development, offering the market new products every year. The KOMET GROUP is a premium quality manufacturer and motivates employee qualification and customers in their IDEAS FACTORY. The training quota of vocational beginners is exemplary for the entire field of business.

The products and services

KOMET GROUP products and services offer the customer incomparable added value. The KOMET GROUP develops, manufactures and sells the most comprehensive, modular portfolio on bore machining as full-range suppliers. The KOMET GROUP offers the most innovative technologies, thereby taking the highest economic viability, best quality and most attractive designs into account. The KOMET GROUP sees itself not purely as a tool manufacturer, but rather as suppliers of innovative solutions and ideas for the benefit of the customer: TOOLS AND IDEAS.

The customer

The KOMET GROUP places value on long-term, binding customer relations, seeing itself as a partner of the customer in a balance of benefit supplies and benefit harvests. The KOMET GROUP records customers' demands and then produces the most effective ideas and tool solutions for their machining tasks. The KOMET GROUP offers the customer information and collaboration via their worldwide presence in local Service Centres. The IDEAS FACTORY supports vocation-related training and further qualifications for customers.

The environment / surroundings

The KOMET GROUP feels itself obliged to avoid any wastage, and therefore commits itself to responsible usage of raw materials and careful utilisation of remaining materials. The KOMET GROUP management is well aware of its responsibilities towards society, and creates the foundations for modern working environments and working conditions. The specifications on ergonomics and work safety are taken into account. Beholden to the founder, Robert Breuning, the KOMET GROUP supports the site at Besigheim, maintaining direct contact to schools and social facilities in the region.

With these claims in mind, the KOMET GROUP has introduced a modern, integrated management system, known as KMS (KOMET Management System), which is certified in accordance with ISO 9001:2008, ISO 14001:2009 and the German „Akkreditierungs-und Zulassungsverordnung Arbeitsförderung – AZAV".

Certification

http://www.kometgroup.com/navigation-top/download/service/zertifikate.html

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