
VEHICLES


AEROSPACE


GEARS & BEARINGS


ENGINEERING


WIND ENERGY

A NEW GENERATION OF MILLING CUTTERS

High-speed Roughing and Finishing

CeramTec
THE CERAMIC EXPERTS

DISCOVER A MULTITUDE OF **SOLUTIONS**

AEROSPACE
The aerospace industry places extremely high demands on machining. In this field, machining capacity and process safety are the decisive parameters, and our CSA cutting materials together with our Monsoon Tool Technology tools are the optimal solution. Component examples: Jet engine components such as blisks.

AUTOMOTIVE INDUSTRY
For over 50 years, precision tools from CeramTec have been an integral part of highly productive machining solutions for components from the automotive industry. With our tool solutions, the implementation of concrete cost savings and increased productivity is always top priority. Component examples: Brake discs, gear components, fly wheels, clutch plates, brake components, drive shafts, hydraulic elements, engine/ motor components.

MACHINERY AND PLANT ENGINEERING
Manufacturing complex components made of different materials with extreme precision and optimal surface quality in an economic way – that is the basic structure of requirements for which we work together with our customers to create innovative, costefficient machining solutions. Component examples: gearbox housings, flanges, guides, shafts, rollers.

GEAR TECHNOLOGY, DRIVE TECHNOLOGY AND BEARING INDUSTRY
Surface quality, tolerances and the tool life of the cutting materials are the quality standards for hard machining. Our unique range of cutting materials made of PCBN and ceramics, together with our perfectly matched tools, set
the bar in this industry. In practice, this results in highly efficient and cost-effective machining. Component examples: Gear wheels, shafts, large gearbox components, bearing rings and rolling elements.

WIND ENERGY
In the field of wind energy, special machining solutions are often required because the components involved are frequently very large. Strict tolerance requirements and a high level of surface quality place exceptional demands on the cutting materials and tool holders. By observing and analysing the determining factors for machining, we are able to provide our customers with extremely efficient and cost-effective machining solutions. Component examples: Rotor flanges, rotor blade connections, planetary gear holders, gearbox housings, gear components.

VEHICLE MANUFACTURING INDUSTRY

MOTOR INDUSTRY

The high-performance materials that are used in this industry require cutting materials that ensure an extremely high level of process reliability and a consistently high quality level. Our cutting materials and tools are the perfect solution.
Component examples: Connecting rods, pulley wheels, cylinder heads, cylinder liners.

TRANSPORT

When machining components for the transport industry, special solutions are often required in order for the machining process to remain economic and efficient. Our tools and cutting materials make these kinds of solutions possible.
Component examples: Wheel rims, shafts, bearings.

AGRICULTURAL AND CONSTRUCTION MACHINERY

We offer highly efficient bearing solutions for components for agricultural and construction machinery. Our range of solutions are currently used for machining of soft steel as well as processing cast iron and hardened parts. Component examples: Brake components, drive shafts, hydraulic elements, motor components.

AUTOMOTIVE

For over 50 years, precision tools from CeramTec have been an integral part of highly productive machining solutions for components from the automotive industry:
Component examples: Brake discs, brake drums, fly wheels, connecting rods, gear components, engine blocks.


Motor industry


Transport

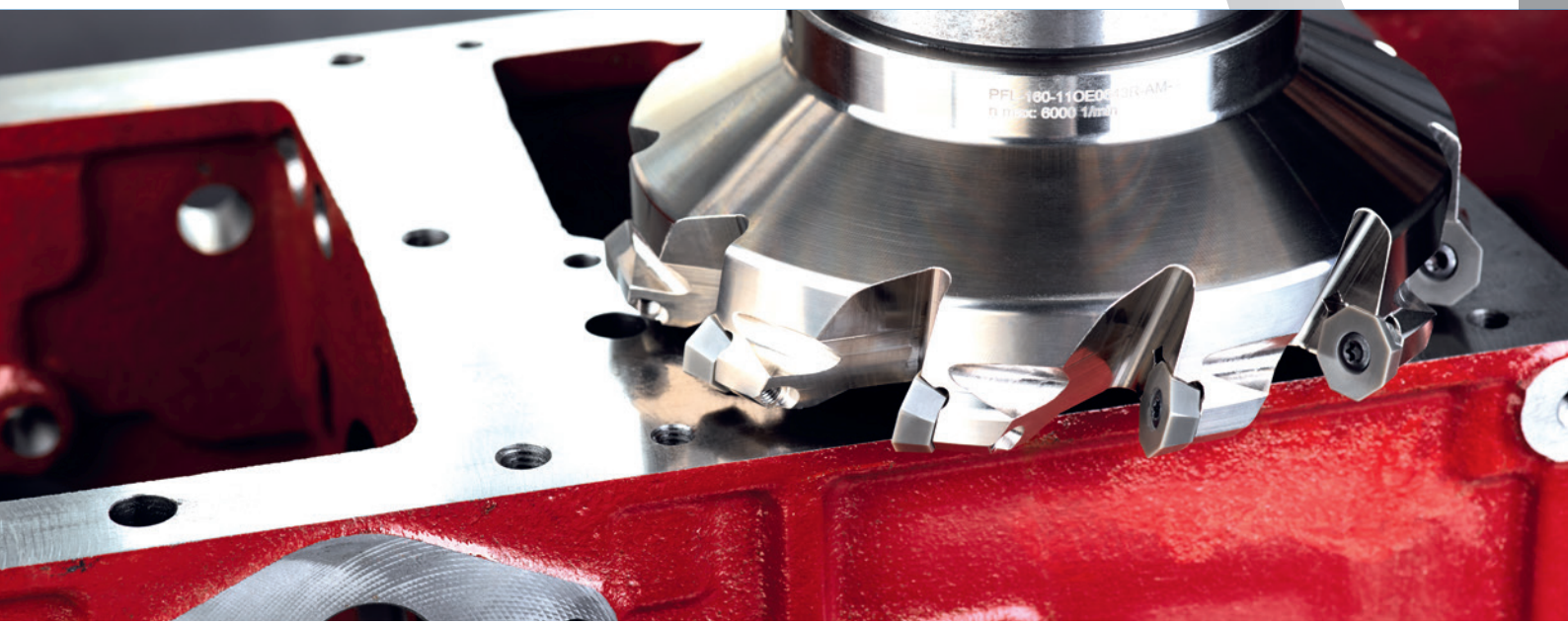

Agricultural and construction machinery


Automotive

SPK

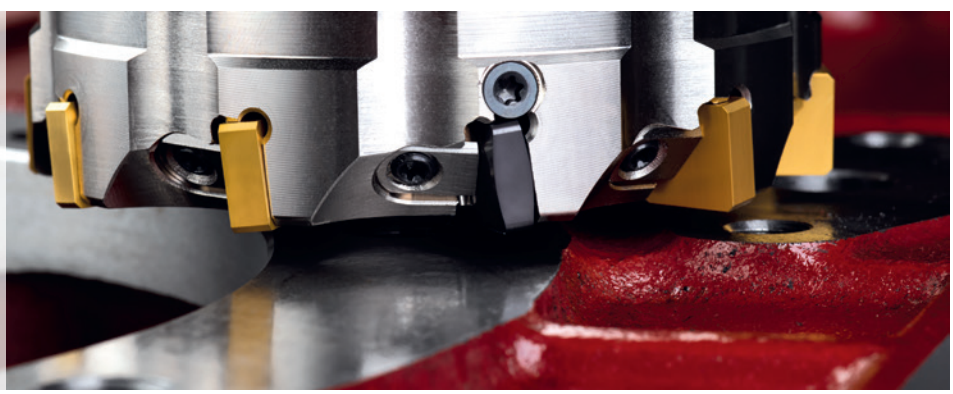
THE PRODUCTIVITY EXPERTS

Contents



PMK - High-speed Roughing and Finishing 6
Applications ..... 7 - 8
PDK ... 88R-AM Face Milling Cutters with Inserts ..... 10 - 11
PEK ... 88R-AM Face Milling Cutters 12
PMK ... 88R-AM Face Milling Cutters 13
PMKS ... 88R-AM Coarse Pitch Face Milling Cutters 14
Inserts for the PEK, PMK and PMKS Face Milling Cutters 15
PFK ... 88R-AM Face Milling Cutters with Inserts ..... 16 - 17
PFK ... 75R-AM Face Milling Cutters with Inserts ..... 18 - 19
PFK ... 45R-AM Face Milling Cutters with Inserts ..... 20 - 21
PFK ... 47R-AM Face Milling Cutters with Inserts ..... 22 - 23
PFK ... 90R-AM Square Shoulder Milling Cutters with Inserts ..... 24 - 25
BFL-SP13/75° Face Milling Cutters 27
PFL-SP13/88° Face Milling Cutters 28
PFL-SP13/75° Face Milling Cutters 29
PFL-SP13/45° Face Milling Cutters 30
Inserts for BFL-SP + PFL-SP Milling Cutters 31
Soft-Cut Milling System, PFL-OEHX with Inserts ..... 32 - 33
PFL-OP06 Face Milling Cutters with Inserts ..... 34 - 35
PFL-ON06 Face Milling Cutters with Inserts ..... 36 - 37
SPK Designation System for Milling Tools ..... 38 - 39
Designation System for Inserts according to ISO 1832 ..... 40 - 41
Basics for Milling 42
Mounting Dimension Table According to DIN 8030 43
Classification of Milling Cutters by Application ..... 44 - 45
Instructions for Fine Adjustment 46
Troubleshooting 47

The PMK face milling cutters system is ideally suited for the rough milling and finishing of GJL (grey cast iron) and GJS (ductile cast iron) materials. They work with an approach angle of 88°.



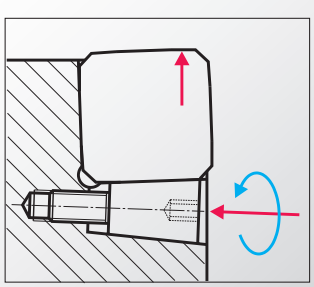
FINISHING WITH PMK

In order to attain outstanding surface qualities during finishing, the PMK series has been fitted with fine adjustable insert seats, that can be set in the Z-direction. This setting option allows users to pre-set the specially-developed finishing inserts in the µm range. The inserts in the fixed insert seats take over the cutting work, while, thanks to their slightly elevated position, the finishing inserts can generate high surface qualities of up to 0.5 µm Ra. The mixed assembly of the milling cutter – the main work is performed with ceramics, the surface quality with PCBN – enables highly productive milling and high feed rate, with outstanding tool lifes. This also means that the cutting material can be optimally adapted to the workpiece material.

ROUGHING WITH PMK

For HPC rough milling operations using the PMK milling cutter system, the adjustable insert seats are equipped with roughing inserts which are set to the same height as the inserts in the fixed insert seats. With the appropriate milling cutter diameters, a cutting depth of up to 5 mm at a feed rate of 0.30 mm per tooth can be reliably achieved during rough milling operations.

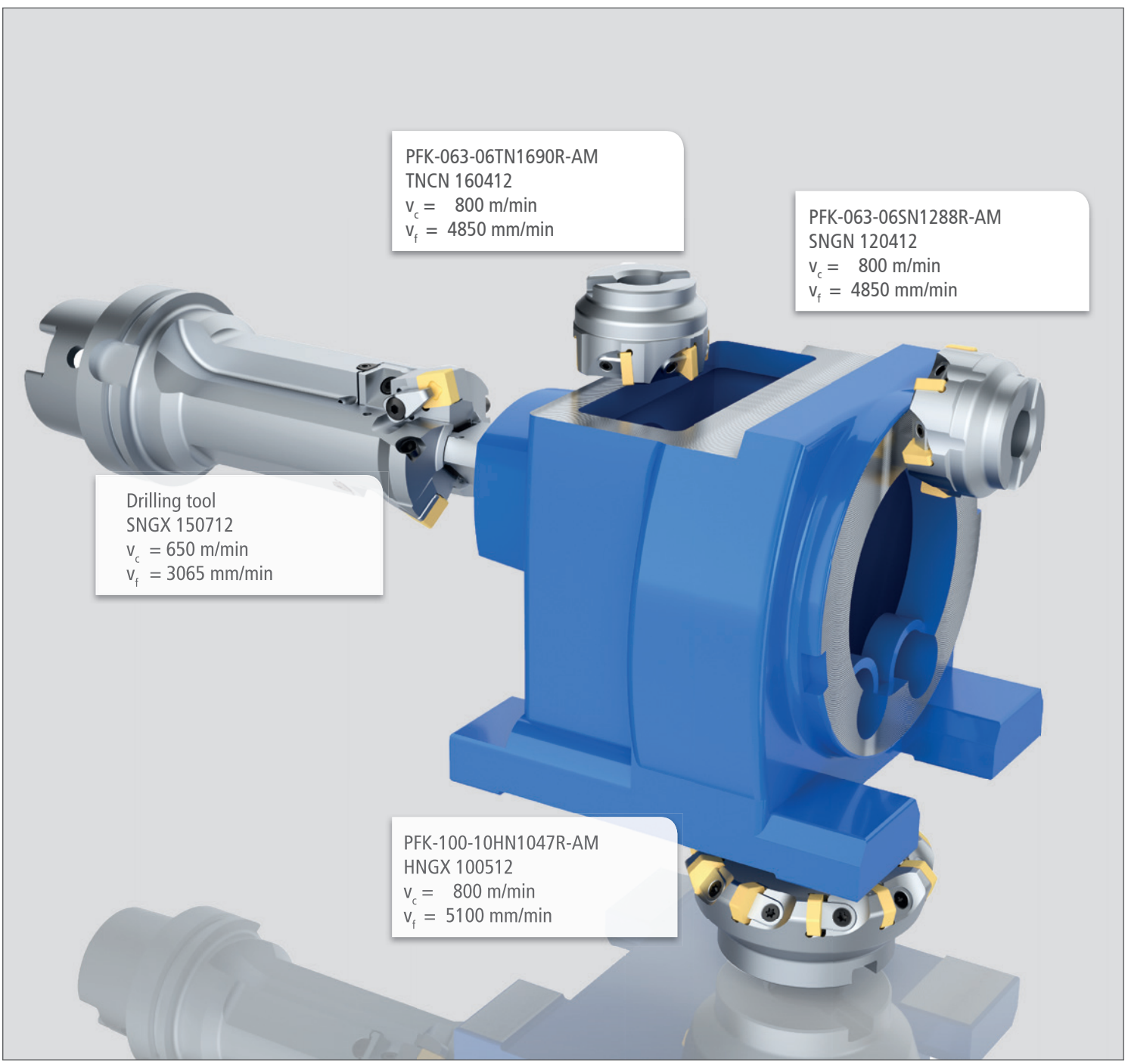
Fine adjustment



EASY CHANGE
TECHNOLOGIE

Thanks to the simple procedure for switching between rough milling and finishing in the milling cutter system, combined with the high cutting data that can be achieved, this high-performance system offers outstanding productivity.

FACE MILLING AND BORING OF A HOUSING MADE OF GJL 250



TOOL LIFE INCREASED BY 215%

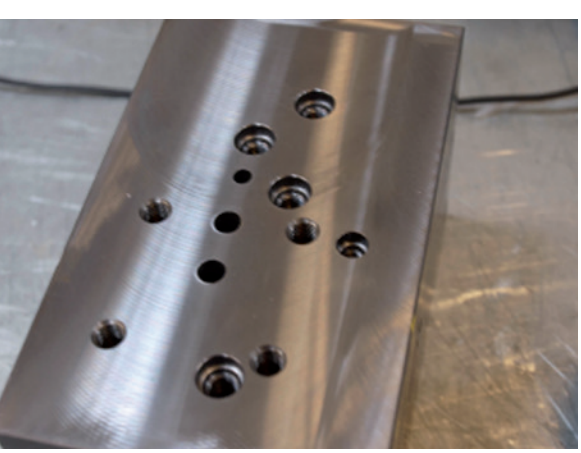
SEMI-FINISHING OF A HYDRAULIC BLOCK

REQUIREMENTS:
- INCREASE TOOL LIFE
- SHORTEN PROCESSING TIME

CONDITIONS:
- SURFACE QUALITY

MIXED EQUIPMENT OF SiAlON SL808 AND CBN WBN115

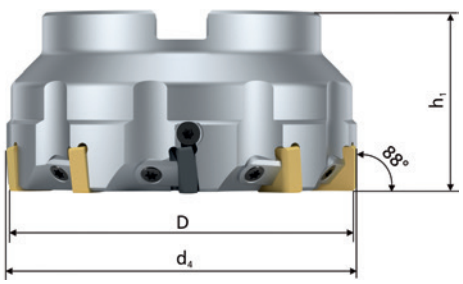
SPK ENGINEERING FOR INCREASING EFFICIENCY THROUGH
- DEFINITION OF THE MILLING STRATEGY
- DETERMINATION OF CUTTING PARAMETERS



Semi-finishing of a hydraulic block made of GJS 400

	Competition	SPK Cutting Tools
Cutting material:	Tungsten carbide	**SL808 / WBN115**
Milling cutter:	D = 80 mm, t = 8	PMK 080-08SN1288R-AM
Insert:	-	SNGN 12 04 12
Feed speed v_f:	1624 mm/min	3520 mm/min
Cutting speed v_c:	510 m/min	553 m/min
Feed rate f_z:	0,10 mm/t	0,20 mm/t
Depth of cut a_p:	0,50 mm	0,50 mm
Cutting width a_e:	65 mm	65 mm
Machining time:	**0,44 min**	**0,20 min**
Tool life:	**100 %**	**215 %**

PDK ... 88R-AM Face Milling Cutters



Axial rake angle γ_a = -6°
Radial rake angle γ_r = -6° to -9° depending on Ø
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

f_z = 0,14 - 0,3 mm/tooth

12.5 • 6.3 • 0.5

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PDK-063-06SN1288R-AM	778.00.004.22	63	6 (5+1)	64	40	13000
PDK-080-08SN1288R-AM	778.00.003.42	80	8 (7+1)	81	50	10000
PDK-100-10SN1288R-AM	778.00.003.92	100	10 (9+1)	101	50	8000
PDK-125-12SN1288R-AM	778.00.003.72	125	12 (10+2)	126	63	8000
PDK-160-14SN1288R-AM	778.00.004.32	160	14 (12+2)	161	63	6000
PDK-200-16SN1288R-AM	778.00.004.02	200	16 (14+2)	201	63	4000
PDK-250-18SN1288R-AM	778.00.003.12	250	18 (15+3)	251	63	3000

Example:
t = 6 (5+1): 6 teeth, 1 of which is adjustable

D = 63 mm - 315 mm


70.91.55.547.0


70.91.50.354.0

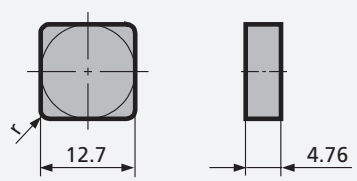
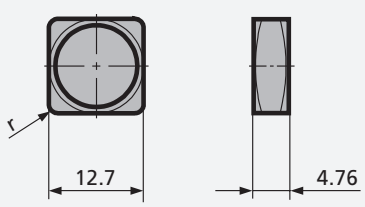
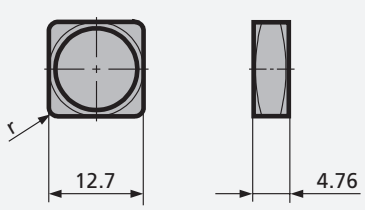

70.91.50.356.0

Torx bit 15

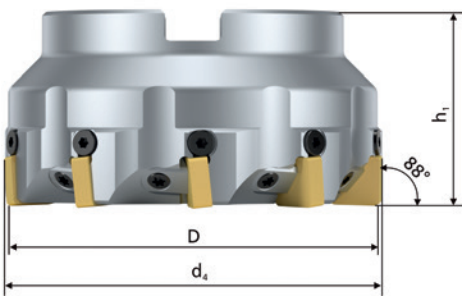

70.91.55.708.0

T-handle

70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
SNGN 12 04 .. T	SNGN 12 04 12 T01020	SL 808	17.10.058.20.1
	SNGN 12 04 12 T	SC 30	46.10.001.40.2
SNGX 12 04 .. T124	SNGX 12 04 12 T124	SC 30	46.10.016.99.2
			
SNHX 12 04 .. T125	SNHX 12 04 12 T125	SH 2	36.10.266.99.7
	SNHX 12 04 12 T125 - S	WBN 115	12.18.801.99.0

PEK ... 88R-AM Face Milling Cutters



Axial rake angle γ_a = -6°
Radial rake angle γ_r = -7° to -10° depending on Ø
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

f_z = 0,12 - 0,3 mm/tooth

6.3 • 3.2 • 0.8

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max} (rpm)
PEK-050-05SN1288R-AM	771.00.036.22	50	5	51	40	18000
PEK-063-06SN1288R-AM	771.00.036.32	63	6	64	40	13000
PEK-080-08SN1288R-AM	771.00.036.42	80	8	81	50	10000
PEK-100-10SN1288R-AM	771.00.036.52	100	10	101	50	8000
PEK-125-12SN1288R-AM	771.00.036.62	125	12	126	63	6000
PEK-160-15SN1288R-AM	771.00.036.72	160	15	161	63	6000
PEK-200-20SN1288R-AM	771.00.036.82	200	20	201	63	4000
PEK-250-24SN1288R-AM	771.00.036.92	250	24	251	63	3000

D = 50 mm


70.91.55.677.0


70.91.50.328.0

Torx bit 10


70.91.55.707.0

D = 63 mm - 160 mm


70.91.55.547.0


70.91.50.354.0


70.91.50.356.0

Torx bit 15


70.91.55.708.0

T-handle

70.91.55.706.0

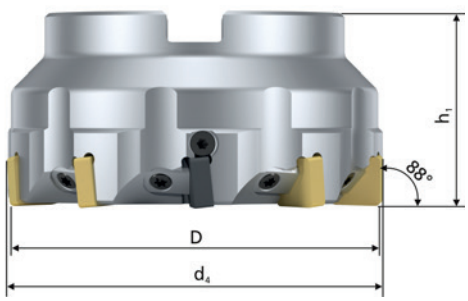
Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

f_z = 0,12 - 0,3 mm/tooth

12.5 • 6.3 • 0.8



Axial rake angle γ_a = -6°
Radial rake angle γ_r = -6° to -9° depending on Ø
Mounting According to DIN 8030

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max} (rpm)
PMK-063-06SN1288R-AM	771.00.033.32	63	6 (5+1)	64	40	13000
PMK-080-08SN1288R-AM	771.00.033.42	80	8 (7+1)	81	50	10000
PMK-100-10SN1288R-AM	771.00.033.52	100	10 (9+1)	101	50	8000
PMK-125-12SN1288R-AM	771.00.033.62	125	12 (10+2)	126	63	6000
PMK-160-14SN1288R-AM	771.00.033.72	160	14 (12+2)	161	63	6000
PMK-200-16SN1288R-AM	771.00.033.82	200	16 (14+2)	201	63	4000
PMK-250-21SN1288R-AM	771.00.033.92	250	21 (18+3)	251	63	3000

Example:
t = 6 (5+1): 6 teeth, 1 of which is adjustable

D = 63 mm - 315 mm


70.91.55.547.0 70.91.50.354.0

70.91.50.356.0

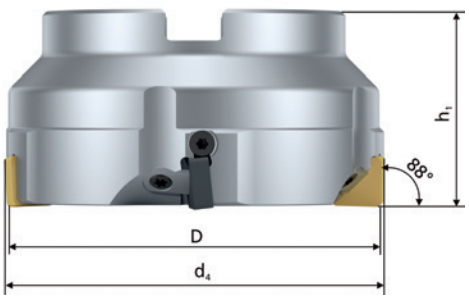
Torx bit 15

70.91.55.708.0

T-handle

70.91.55.706.0

PMKS ... 88R-AM Coarse Pitch Face Milling Cutters



Axial rake angle γ_a = -6°
Radial rake angle γ_r = -7° to -9° depending on Ø
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✓ Unstable ✓ Stable ✓

f_z = 0,16 - 0,3 mm/tooth

12.5 • 6.3 • 0.5

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PMK S 063-04SN1288R-AM	778.00.000.32	63	4 (3+1)	64	40	13000
PMK S 080-05SN1288R-AM	778.00.000.42	80	5 (4+1)	81	50	10000
PMK S 100-05SN1288R-AM	778.00.000.52	100	5 (4+1)	101	50	8000
PMK S 125-06SN1288R-AM	778.00.000.62	125	6 (5+1)	126	63	8000
PMK S 160-08SN1288R-AM	778.00.000.72	160	8 (7+1)	161	63	6000

Example:
t = 6 (5+1): 6 teeth, 1 of which is adjustable

D = 63 mm - 160 mm


70.91.55.547.0


70.91.50.354.0


70.91.50.356.0

Torx bit 15


70.91.55.708.0

T-handle

70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
SNCN 12 04 ZN T	SNCN 12 04 ZN T00520	SL 808	17.10.409.03.1
		SL 854 C	17.10.409.03.9
SNGN 12 04 .. T	SNGN 12 04 08 T01020	SL 500	36.10.009.20.0
		SL 808	17.10.009.20.1
	SNGN 12 04 12 T01020	SL 500	36.10.058.20.0
		SL 808	17.10.058.20.1
		SL 854 C	17.10.058.20.9
		SL 858 C	21.10.058.20.1
SNGN 12 04 ZN T - . 88Z240	SNGN 12 04 ZN T01020 - 88Z240	SC 60	46.10.048.20.6
		SL 500	36.10.493.20.0
		SL 808	17.10.493.20.1
	SNGN 12 04 ZN T01020 - S 88Z240	WBN 115	12.12.089.20.0
SNGN 12 04 08 T - 88Z240	SNGN 12 04 08 T01020 - 88Z240	SC 60	46.10.049.20.6
		SL 500	36.10.503.20.0
		SL 808	17.10.503.20.1
		SL 854 C	17.10.503.20.9
SNGN 12 04 ZN T - S 88Z300	SNGN 12 04 ZN T01015 - S 88Z300	WBN 101	20.12.085.37.1
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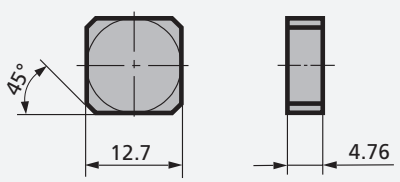
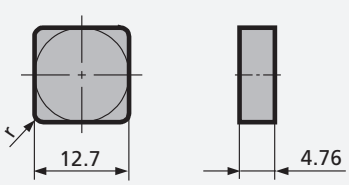
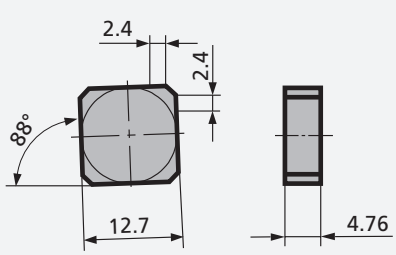
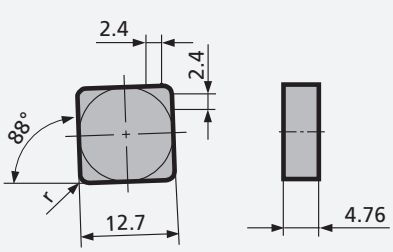
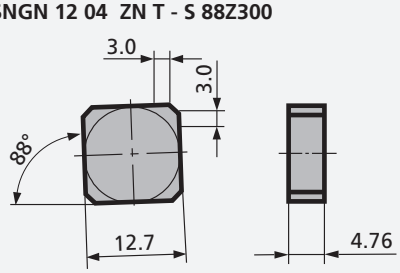


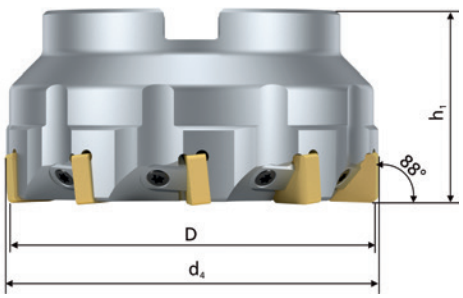








PFK ... 88R-AM Face Milling Cutters



Axial rake angle γ_a = -6°
Radial rake angle γ_r = -7° to -12° depending on Ø
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

f_z = 0,14 - 0,3 mm/tooth

12.5 • 6.3 • 3.2

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFK-040-04SN0988R-AM	771.00.030.12	40	4	41	40	23000
PFK-050-05SN1288R-AM	771.00.030.22	50	5	51	40	18000
PFK-063-06SN1288R-AM	771.00.030.32	63	6	64	40	13000
PFK-080-08SN1288R-AM	771.00.030.42	80	8	81	50	10000
PFK-100-10SN1288R-AM	771.00.030.52	100	10	101	50	8000
PFK-125-12SN1288R-AM	771.00.030.62	125	12	126	63	8000
PFK-160-15SN1288R-AM	771.00.030.72	160	15	161	63	6000

D = 40 mm - 50 mm

70.91.55.677.0 70.91.50.328.0

Torx bit 10

70.91.55.707.0

D = 63 mm - 160 mm

70.91.55.547.0 70.91.50.354.0

70.91.50.356.0

Torx bit 15

70.91.55.708.0

T-handle

70.91.55.706.0

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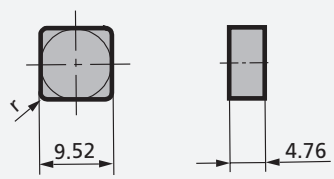
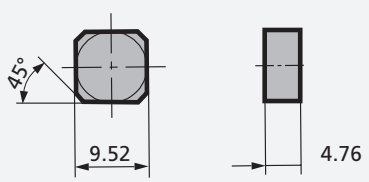
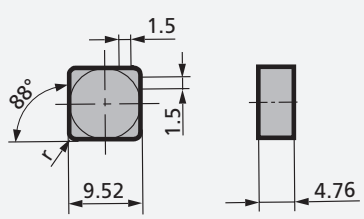
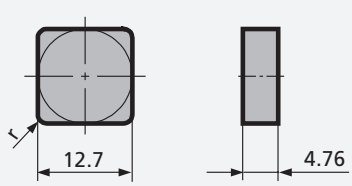
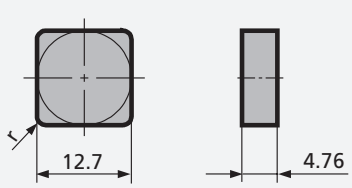
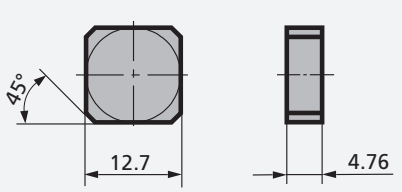
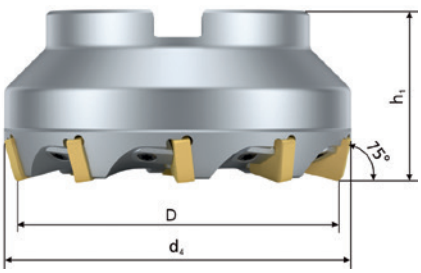
			
SNCN 09 04 ZN T	SNCN 09 04 ZN T00520	SL 500	36.10.445.03.0
		SL 808	17.10.445.03.1
		SL 854 C	17.10.445.03.9
			
SNGN 09 04 04 T - 88Z150	SNGN 09 04 04 T01020 - 88Z150	SL 808	17.10.490.20.1
	SNGN 090404 T01020 - S 88Z150	WBN 115	12.12.093.20.0
			
SNCN 12 04 .. T	SNCN 12 04 04 T00520	SL 500	36.10.431.03.0
		SL 808	17.10.431.03.1
		SL 858 C	21.10.431.03.1
			
SNGN 12 04 .. T	SNGN 12 04 08 T01020	SL 500	36.10.009.20.1
		SL 808	17.10.009.20.1
		SL 854 C	17.10.009.20.9
	SNGN 12 04 12 T01020	SL 500	36.10.058.20.0
		SL 808	17.10.058.20.1
		SL 854 C	17.10.058.20.9
		SL 858 C	21.10.058.20.1
SNCN 12 04 ZN T	SNCN 12 04 ZN T00520	SL 500	36.10.409.03.0
		SL 808	17.10.409.03.1
		SL 854 C	17.10.409.03.9
			



Axial rake angle γ_a = -6°
Radial rake angle γ_r = -10°
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

f_z = 0,14 - 0,3 mm/tooth

12.5 • 6.3

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFK-050-05SN1275R-AM	771.00.031.22	50	5	56	40	18000
PFK-063-06SN1275R-AM	771.00.031.32	63	6	69	40	13000
PFK-080-08SN1275R-AM	771.00.031.42	80	8	86	50	10000
PFK-100-10SN1275R-AM	771.00.031.52	100	10	106	50	8000
PFK-125-12SN1275R-AM	771.00.031.62	125	12	131	63	8000
PFK-160-15SN1275R-AM	771.00.031.72	160	15	166	63	6000

D = 50 mm


70.91.55.677.0


70.91.50.328.0

Torx bit 10


70.91.55.707.0

D = 63 mm - 160 mm


70.91.55.547.0


70.91.50.354.0

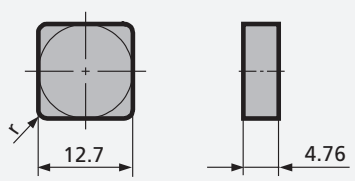
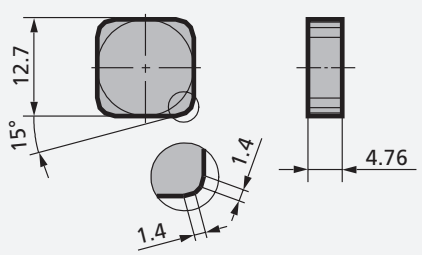

70.91.50.356.0

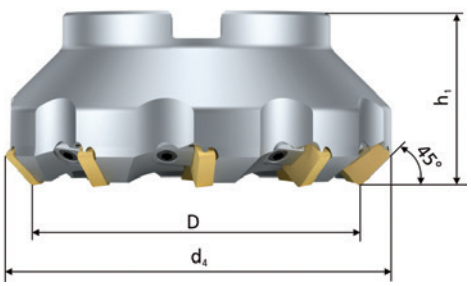
Torx bit 15


70.91.55.708.0

T-handle

70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
SNGN 1204 .. T 	SNGN 12 04 08 T01020	SL 500	36.10.009.20.0
		SL 808	17.10.009.20.1
		SL 854 C	17.10.009.20.9
	SNGN 12 04 12 T01020	SL 500	36.10.058.20.0
		SL 808	17.10.058.20.1
		SL 854 C	17.10.058.20.9
SNGN 12 04 EN T 	SNGN 12 04 EN T01020	SL 500	36.10.261.20.0



Axial rake angle $\gamma_a = -6°$
Radial rake angle $\gamma_r = -12°$
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

f_z = 0,14 - 0,3 mm/tooth

12.5 • 6.3 • 3.2

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFK-050-05SN1245R-AM	771.00.032.22	50	5	65	40	18000
PFK-063-06SN1245R-AM	771.00.032.32	63	6	78	40	13000
PFK-080-08SN1245R-AM	771.00.032.42	80	8	95	50	10000
PFK-100-10SN1245R-AM	771.00.032.52	100	10	115	50	8000
PFK-125-12SN1245R-AM	771.00.032.62	125	12	140	63	8000
PFK-160-12SN1245R-AM	771.00.032.72	160	15	175	63	6000

D = 50 mm


70.91.55.677.0


70.91.50.328.0

Torx bit 10


70.91.55.707.0

D = 63 mm - 160 mm


70.91.55.547.0


70.91.50.354.0


70.91.50.356.0

Torx bit 15

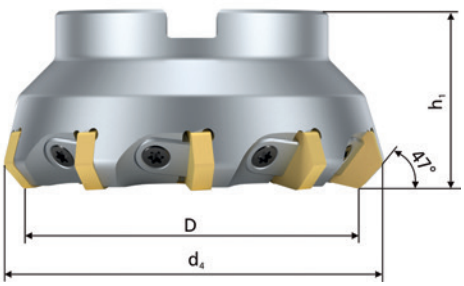

70.91.55.708.0

T-handle

70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
SNCN 12 04 ZN T	SNCN 12 04 ZN T00520	SL 500	36.10.409.03.0
		SL 854 C	17.10.409.03.9
SNGN 12 04 .. T	SNGN 12 04 12 T01020	SL 500	36.10.058.20.0
		SL 808	17.10.058.20.1
		SL 854 C	36.10.058.20.9
SNGN 12 04 AN T	SNGN 12 04 AN T01020	SL 500	36.10.232.20.0
		SL 808	17.10.232.20.1

PFK ... 47R-AM Face Milling Cutters



Axial rake angle γ_a = -6°
Radial rake angle γ_r = -10°
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

f_z = 0,30 mm/tooth

12.5 • 6.3

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFK-080-08HN1047R-AM	771.00.049.45	80	8	92,5	50	10000
PFK-100-10HN1047R-AM	771.00.049.55	100	10	112,5	50	8000
PFK-125-12HN1047R-AM	771.00.049.65	125	12	137,5	63	6000
PFK-160-16HN1047R-AM	771.00.049.75	160	16	172,5	63	5000

D = 80 mm - 160 mm


70.91.55.704.0

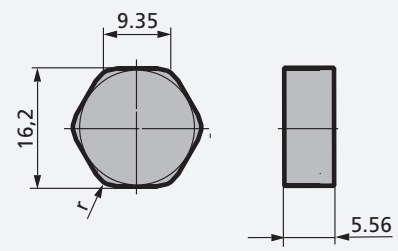
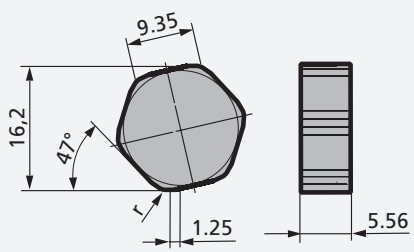

70.91.50.357.0

Torx bit 25

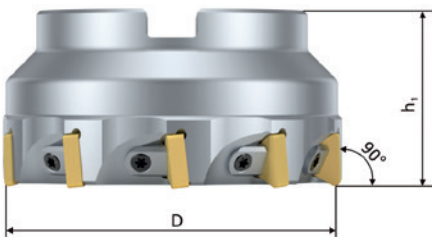

70.91.55.710.0

T-handle

70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
HNGX 10 05 .. T 	HNGX 10 05 12 T01020	SL 500	36.60.123.20.0
		SL 808	17.60.123.20.1
	HNGX 10 05 16 T01020	SL 500	36.60.124.20.0
		SL 808	17.60.124.20.1
HNGX 10 05 16 T - 47Z125 	HNGX 10 05 16 T01020 - 47Z125	SL 500	36.60.120.20.0
	HNGX 10 05 16 T03020 - 47Z125	SL 808	17.60.120.23.1

PFK ... 90R-AM Square Shoulder Milling Cutters



Axial rake angle γ_a = -6°
Radial rake angle γ_r = -10°
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✓ Unstable ✓ Stable ✓

f_z = 0,30 mm/tooth

12.5 • 6.3

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFK-050-05TN1690R-AM	771.00.042.23	50	5	-	40	18000
PFK-063-06TN1690R-AM	771.00.042.33	63	6	-	40	13000
PFK-080-08TN1690R-AM	771.00.042.43	80	8	-	50	10000
PFK-100-10TN1690R-AM	771.00.042.53	100	10	-	50	8000
PFK-125-12TN1690R-AM	771.00.042.63	125	12	-	63	6000
PFK-160-16TN1690R-AM	771.00.042.73	160	16	-	63	5000

D = 50 mm


70.91.55.677.0


70.91.50.328.0

Torx bit 10


70.91.55.707.0

D = 63 mm - 160 mm


70.91.55.547.0


70.91.50.354.0

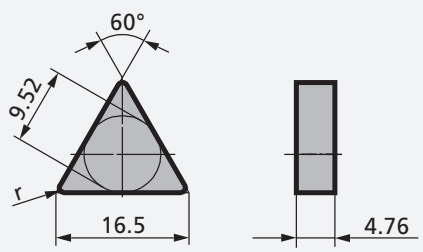
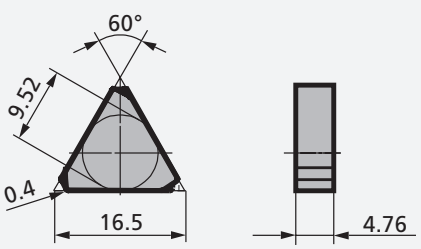

70.91.50.356.0

Torx bit 15


70.91.55.708.0

T-handle

70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
TNCN 16 04 .. T 	TNCN 16 04 04 T01020	SL 808	17.30.190.20.1
		SL 854 C	17.30.190.20.9
	TNCN 16 04 08 T01020	SL 808	17.30.191.20.1
		SL 854 C	17.30.191.20.9
	TNCN 16 04 12 T01020	SL 808	17.30.192.20.1
		SL 854 C	17.30.192.20.9
TNCN 16 04 PC T 	TNCN 16 04 PC T01020	SL 808	17.30.189.20.1

PFL – New Milling Cutter Generation for High-speed Machining with a Positive Geometry

The PFL milling cutter series was especially designed for face milling of components made from GJL (grey cast iron) and GJS (ductile cast iron) with SiALON cutting materials.

The PFL milling cutter family comprises two classic series with a positive geometry:

- PFL-OP: the milling cutter line for roughing and finishing
- PFL-SP: this milling cutter series was designed for finishing and for medium rough milling operations with low axial cutting forces.

PFL-OP

This roughing and finishing specialist is equipped with positive octagon inserts. The design with eight cutting edges ensures a high level of efficiency. With a feed rate of up to 0.35 mm per tooth and a maximum cutting depth of approx. 4 mm, the milling cutters in the PFL-OP series offer extremely productive milling operations at high achining speeds.

PFL-SP

With their positive square inserts, the milling cutters of the PFL-SP series are ideal for machining even the most unstable or thin-walled workpieces under high-performance conditions. PFL-SP milling cutters are available with approach angles of 88°, 75° and 45°. Edge breakage and burr formation can be well avoided, while low axial forces can be achieved. The milling cutter allows cutting depths of up to 6 mm and a maximum feed rate of 0.3 mm per tooth.

With the further expansion of the face milling cutter series through the PFL-OP and PFL-SPK series, SPK Cutting Tools is bringing important innovations to the face milling. Minimum machining forces are attainable with the highest cutting values – even under the most rough and unfavourable cutting conditions. The positive milling cutter geometries open up a broad scope of applications, ranging from thin-walled to unstable and stable components. High productivity, efficiency and a high degree of process reliability were the most important criteria during the series' development.

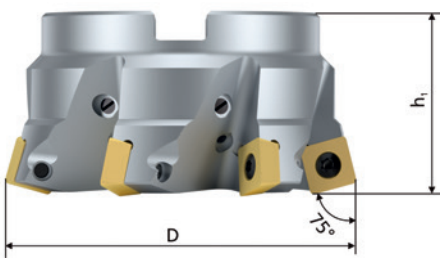
Recommendation

■ GJL (grey cast iron) ▣ GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

f_z = 0,16 - 0,8 mm/tooth

12.5 • 6.3



Axial rake angle γ_a = +5°
Radial rake angle γ_r = -0°
$a_{p\ max}$ = 2,5 mm
Mounting According to DIN 8030

BFL - SP13 / 75°	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
BFL-063-05SP1375R-AMCL	775.00.000.32	63	5	-	40	13000
BFL-080-06SP1375R-AMCL	775.00.000.42	80	6	-	50	10000
BFL-100-07SP1375R-AMCL	775.00.000.52	100	7	-	50	8000


70.91.50.689.0

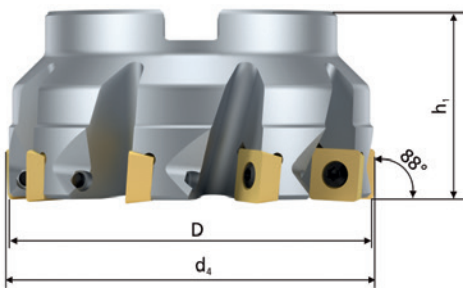
Torx bit 20

70.91.55.709.0

T-handle


70.91.55.706.0

PFL-SP13 / 88° Face Milling Cutters



Axial rake angle γ_a = +5°
Radial rake angle γ_r = -5° to -9° depending on Ø
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✓ Unstable ✓ Stable ✓

f_z = 0,14 - 0,30 mm/tooth

12.5 • 6.3

PFL - SP13 / 88°	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFL-063-05SP1388R-AM	771.00.000.32	63	5	64	40	13000
PFL-080-07SP1388R-AM	771.00.000.42	80	7	81	50	10000
PFL-100-09SP1388R-AM	771.00.000.52	100	9	101	50	8000
PFL-125-11SP1388R-AM	771.00.000.62	125	11	126	63	8000
PFL-160-13SP1388R-AM	771.00.000.72	160	13	161	63	6000
PFL-200-17SP1388R-AM	771.00.000.82	200	17	201	63	4000


70.91.50.689.0

Torx bit 20

70.91.55.709.0

T-handle


70.91.55.706.0

Recommendation

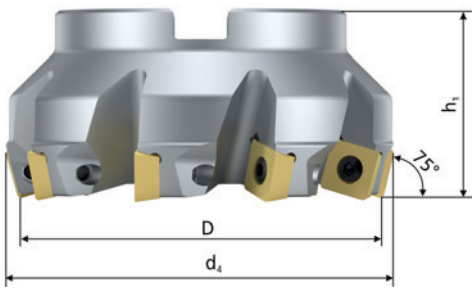
GJL (grey cast iron) ■ GJS (ductile cast iron) ■

WORKPIECE

Thin-walled ✓ Unstable ✓ Stable ✓

f_z = 0,16 - 0,3 mm/tooth

12.5 • 6.3



Axial rake angle γ_a = +5°
Radial rake angle γ_r = -5° to -9° depending on Ø
Mounting According to DIN 8030

PFL - SP13 / 75°	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFL-050-04SP1375R-AM	771.00.001.22	50	4	56,5	40	18000
PFL-063-05SP1375R-AM	771.00.001.32	63	5	69,5	40	13000
PFL-080-07SP1375R-AM	771.00.001.42	80	7	86,5	50	10000
PFL-100-09SP1375R-AM	771.00.001.52	100	9	106,5	50	8000
PFL-125-11SP1375R-AM	771.00.001.62	125	11	131,5	63	8000
PFL-160-13SP1375R-AM	771.00.001.72	160	13	166,5	63	6000
PFL-200-17SP1375R-AM	771.00.001.82	200	17	206,5	63	4000


70.91.50.689.0

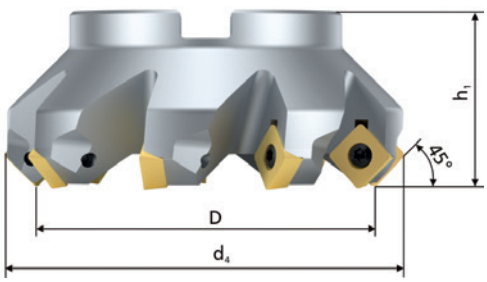
Torx bit 20


70.91.55.709.0

T-handle

70.91.55.706.0

PFL-SP13 / 45° Face Milling Cutters



Axial rake angle γ_a = +5°
Radial rake angle γ_r = -5° to -9° depending on Ø
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✓ Unstable ✓ Stable ✓

f_z = 0,16 - 0,3 mm/tooth

12.5 • 6.3

PFL - SP13 / 45°	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max} (rpm)
PFL-050-05SP1345R-AM	771.00.002.22	50	5	67	40	18000
PFL-063-06SP1345R-AM	771.00.002.32	63	6	80	40	13000
PFL-080-07SP1345R-AM	771.00.002.42	80	7	97	50	10000
PFL-100-09SP1345R-AM	771.00.002.52	100	9	117	50	8000
PFL-125-11SP1345R-AM	771.00.002.62	125	11	142	63	8000
PFL-160-13SP1345R-AM	771.00.002.72	160	13	177	63	6000
PFL-200-17SP1345R-AM	771.00.002.82	200	17	217	63	4000

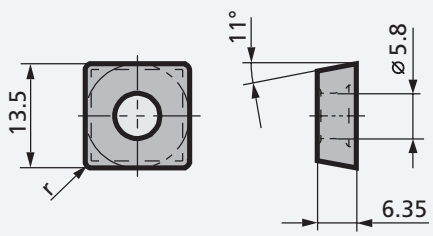
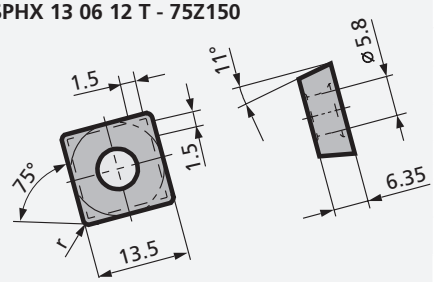
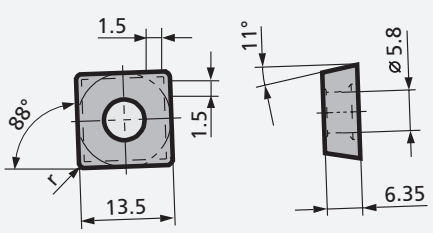

70.91.50.689.0

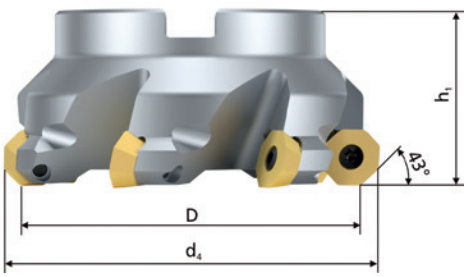
Torx bit 20

70.91.55.709.0

T-handle


70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
SPHX 13 06 12 T	SPHX 13 06 12 T01020	SL 808	17.16.535.20.1
	SPHX 13 06 12 T02030	SL 808	17.16.535.52.1
SPHX 13 06 12 T - 75Z150	SPHX 13 06 12 T01020 - 75Z150	SL 808	17.16.537.20.1
			
SPHX 13 06 12 T - 88Z150	SPHX 13 06 12 T01020 - 88Z150	SL 808	17.16.536.20.1
			



Axial rake angle $\gamma_a = +14°$
Radial rake angle $\gamma_r = +2°$
$a_{p\,max} = 4$ mm
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✓ Unstable ✓

$f_z = 0{,}16 - 0{,}3$ mm/tooth

12.5 • 6.3 •

Type	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFL-050-04OE0643R-AM	771.00.005.24	50	4	60,2	40	18000
PFL-063-05OE0643R-AM	771.00.005.34	63	5	73,2	40	13000
PFL-080-06OE0643R-AM	771.00.005.44	80	6	90,2	50	10000
PFL-100-07OE0643R-AM	771.00.005.54	100	7	110,2	50	8000
PFL-125-09OE0643R-AM	771.00.005.64	125	9	135,2	63	8000
PFL-160-11OE0643R-AM	771.00.005.74	160	11	170,2	63	6000
PFL-200-13OE0643R-AM	771.00.005.84	200	13	210,2	63	4000


70.91.50.689.0

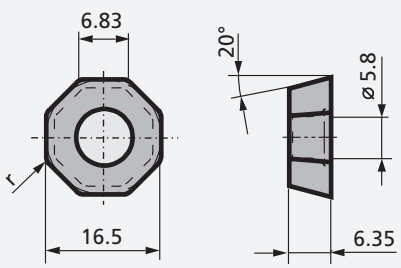
Torx bit 20

70.91.55.709.0

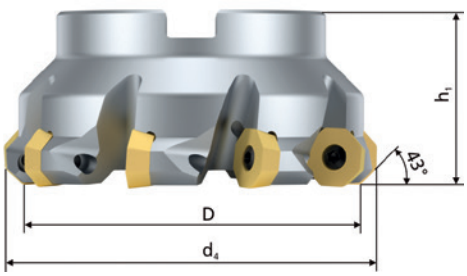
T-handle


70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
OEHX 06 06 16 T	OEHX 06 06 16 T01020	SL 808	17.76.016.20.1



PFL-OP06 Face Milling Cutters



Axial rake angle $\gamma_a = +5°$
Radial rake angle $\gamma_r = -5°$ to $-7°$ depending on Ø
$a_{p\,max} = 4$ mm
Mounting According to DIN 8030

Recommendation

GJL (grey cast iron) GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

$f_z = 0{,}16$ - $0{,}35$ mm/tooth

12.5 • 6.3

PFL - OP06	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFL-050-05OP0643R-AM	771.00.004.24	50	5	61	40	18000
PFL-063-06OP0643R-AM	771.00.004.34	63	6	74	40	13000
PFL-080-07OP0643R-AM	771.00.004.44	80	7	91	50	10000
PFL-100-09OP0643R-AM	771.00.004.54	100	9	111	50	8000
PFL-125-11OP0643R-AM	771.00.004.64	125	11	136	63	8000
PFL-160-13OP0643R-AM	771.00.004.74	160	13	171	63	6000
PFL-200-15OP0643R-AM	771.00.004.84	200	15	211	63	4000


70.91.50.689.0

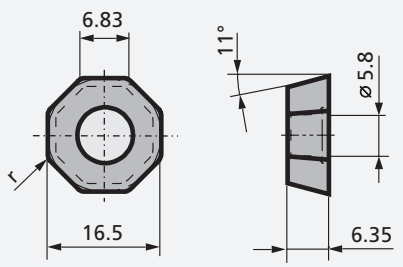
Torx bit 20

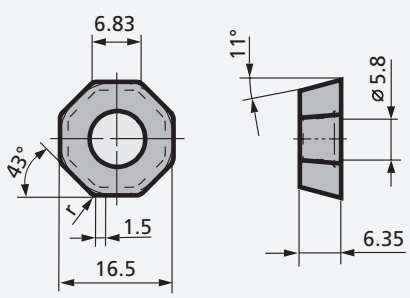
70.91.55.709.0

T-handle

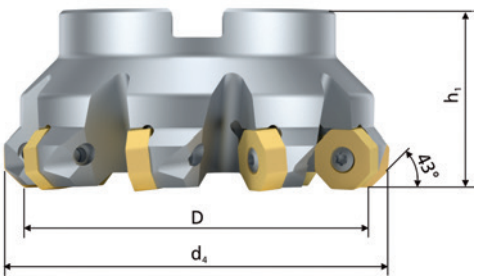

70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
OPHX 06 06 16 T	OPHX 06 06 16 T01020	SL 808	17.76.014.20.1
OPHX 06 06 08 T - 43Z150	OPHX 06 06 08 T01020 - 43Z150	SL 808	17.76.015.20.1





PFL-ON06 Face Milling Cutters



Axial rake angle γ_a = -6°
Radial rake angle γ_r = -6°
$a_{p\,max}$ = 4 mm
Mounting According to DIN 8030

Recommendation

■ GJL (grey cast iron) ■ GJS (ductile cast iron)

WORKPIECE
Thin-walled ✗ Unstable ✗ Stable ✓

f_z = 0,16 - 0,30 mm/tooth

12.5 • 6.3

PFL - ON06	SPK ref. no.	Dimensions				
		D	t	d_4	h_1	n_{max}(rpm)
PFL-063-06ON0643R-AM	771.00.039.34	63	6	74	40	13000
PFL-080-07ON0643R-AM	771.00.039.44	80	7	91	50	10000
PFL-100-09ON0643R-AM	771.00.039.54	100	9	111	50	8000
PFL-125-10ON0643R-AM	771.00.039.64	125	10	136	63	8000
PFL-160-13ON0643R-AM	771.00.039.74	160	13	171	63	6000


70.91.50.689.0

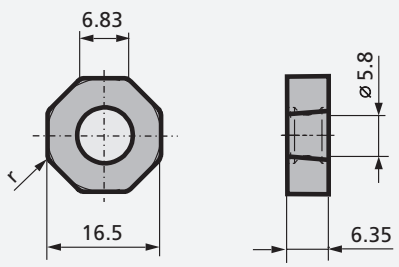
Torx bit 20

70.91.55.709.0

T-handle


70.91.55.706.0

INSERT	ISO	GRADE	SPK REF. NO.
ONHQ 06 06 16 T	ONHQ 06 06 16 T01020	SL 808	17.76.017.20.1

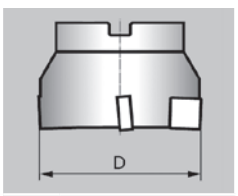


B	Boring tool
P	Face milling cutter
E	Shoulder milling cutter

Tool type

K	Wedge clamping
L	Hole clamping
X	Special clamping

Attachment type



050	50 mm
063	63 mm
080	80 mm
100	100 mm
125	125 mm
...	...
315	315 mm
...	...

Milling cutter diameter D

H	120°	⬡
T	60°	△
S	90°	□
O	135°	○

Insert shape

P	F	L	-	080	-	08	S

F	All insert seats fixed
E	All insert seats adjustable
M	Some insert seats adjustable
D	Dual insert seats 90° adjustable, 88° fixed

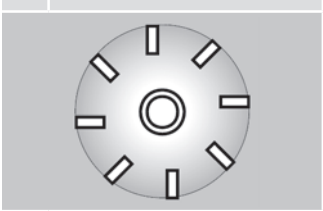
Insert attachment

-	Standard
S	Special milling cutter

Versions

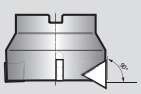
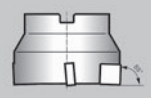
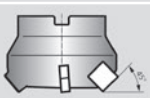
01	1 tooth
02	2 teeth
03	3 teeth
04	4 teeth
...	...
28	28 teeth
...	...

Number of teeth z



	α_n
N	0°
C	7°
P	11°
D	15°
E	20°

Insert clearance angle α_n

90°	
88°	
75°	
45°	

Approach angle κ_r

AM	Metric arbour milling cutters
AI	Inch arbour milling cutters

Holder

P	13	88	R	-	AM	

Insert size

H		O		S		T	
10	16,2	05	13,5	09	9,52	06	3,97
		06	16,5	12	12,7	09	5,56
				13	13,5	11	6,35
				15	15,88	16	9,52
				16	16,5	22	12,70
				19	19,05	27	15,88
						33	19,05

Rotational direction of milling cutter

L	Left
R	Right

Special design

	None
CL	Cutting edge interior cooling
CV	Cooling with a distributor cap

Designation System for Milling Inserts according to ISO 1832

R		○
S	90°	□
T	60°	△
H	120°	⬡
O	135°	⬡

Insert shape

α_n	
N	0°
A	3°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°
G	30°
O	Clearance angle which requires special data.

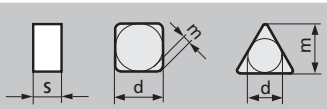
Normal setting angle α_n

Inscribed circle d mm	H 120°	O 135°	RC, RN	S 90°	T 60°
3,97					06
5,56					09
6,35					11
9,52			09	09	16
12,70			12	12	22
13,50		05		13	
15,88	09		15	15	27
16,20	10				
16,50		06			
19,05			19	19	33
25,40			25	25	44

Insert size

S	N	C	N	12	04

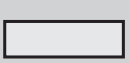
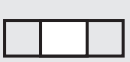
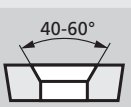
Tolerances



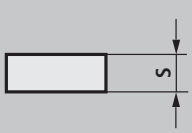
* Permissible deviations for the insert form, depending on the insert size

	S = ± mm	d = ± mm	m = ± mm	Inscribed circle d mm	Tolerance class J, K, L, M	Tolerance class U	Tolerance class M, N	Tolerance class U
					d = ± mm		m = ± mm	
A	0,025	0,025	0,005					
C	0,025	0,025	0,013					
E	0,025	0,025	0,025					
F	0,025	0,013	0,005	3,97	0,05	0,08	0,08	0,13
G	0,130	0,025	0,025	5,56				
H	0,025	0,013	0,013	6,35				
J	0,025	0,05-0,13*	0,005	9,52				
K	0,025	0,05-0,13*	0,013	12,70	0,08	0,13	0,13	0,2
L	0,025	0,05-0,13*	0,025	15,88	0,1	0,18	0,15	0,27
M	0,130	0,05-0,13*	0,08-0,18*	19,05				
U	0,130	0,08-0,25*	0,13-0,38*	25,40	0,13	0,25	0,18	0,38

Insert type

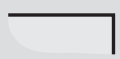
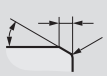
N	
A	
W	
Q	
X	Special version

Insert thickness

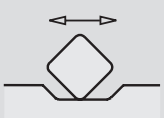


01	1,59
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94
09	9,52
12	12,70

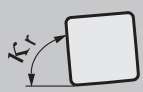
Corner design

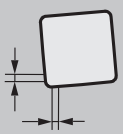
F  Sharp	E  Rounded
T  Chamfered	S  Chamfered and rounded

Cutting direction

R 	
L 	
N 	

Designation key for ZZ geometries

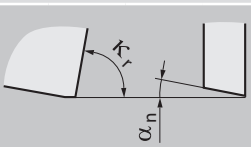




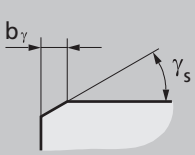
Approach angle κ_r	Width of the ZZ chamfer
43 = 43°	125 = 1,25 mm
47 = 47°	150 = 1,50 mm
75 = 75°	240 = 2,40 mm
88 = 88°	

AN	T	N	01020	-	S	88Z240

Corner radius

Insert with corner radius		Insert with cutting edge			
					
00	RN, RC	Approach angle of the main cutting edge κ_r		Clearance angle α_n	
M0	RB				
02	0,2				
04	0,4				
08	0,8	A	45°	N	0°
12	1,2	D	60°	C	7°
16	1,6	E	75°	P	11°
24	2,4	F	85°	D	15°
32	3,2	P	90°	E	20°
40	4,0	Z	other angles	F	25°

Chamfer design



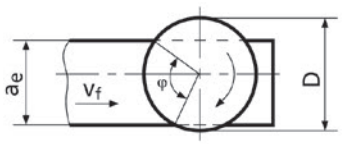
Chamfer width w_γ in 1/100 mm and angle γ_s without degree symbol

e.g.
0,10 x 20° = 01020
0,05 x 20° = 00520

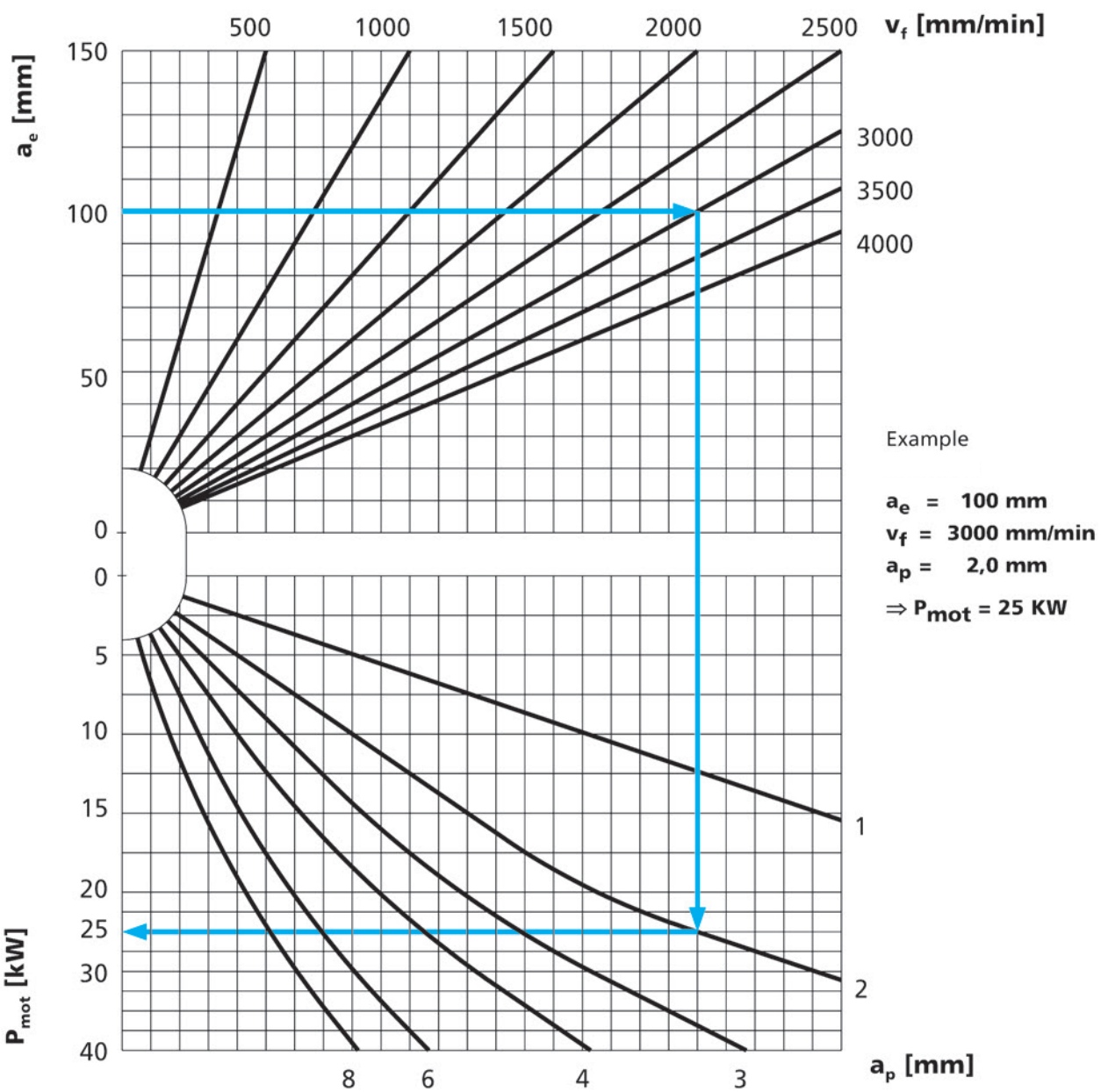
CBN design

S	solid CBN

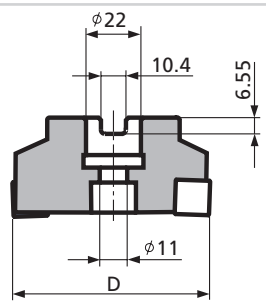
Material GJL / GJS
k_c = 2000 N/mm²
κ_r = 45°
η = 0,8



$$P_{mot} = \frac{a_p \cdot a_e \cdot v_f \cdot k_c}{60 \cdot 10^6 \cdot \eta} \text{ [kW]}$$

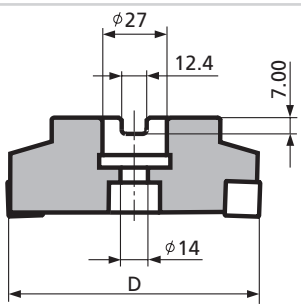


Adaptor style A



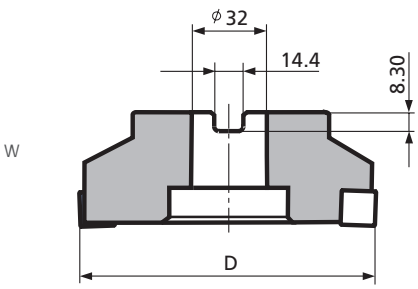
D = 50 mm - 63 mm

Adaptor style A



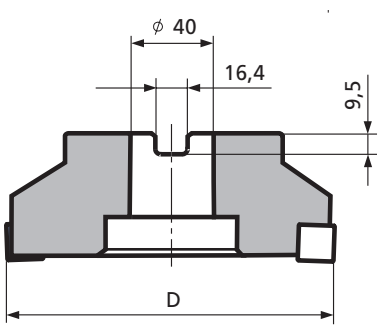
D = 80 mm

Adaptor style B



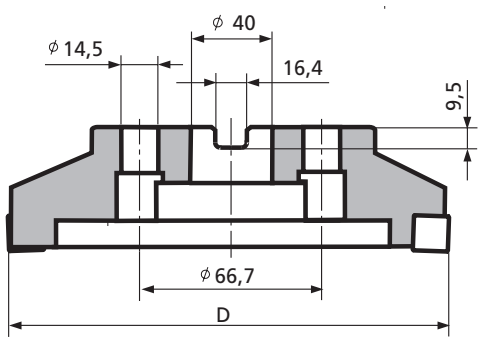
D = 100 mm

Adaptor style B



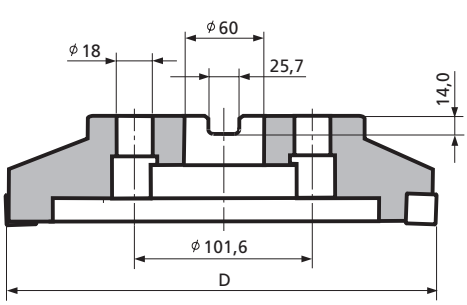
D = 125 mm

Adaptor style C



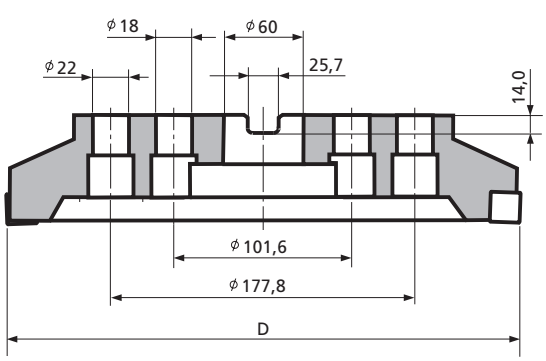
D = 160 mm

Adaptor style C



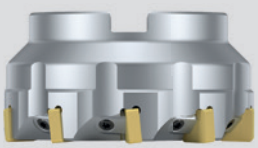
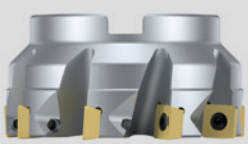
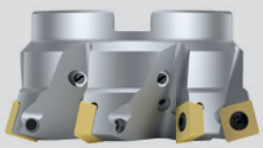
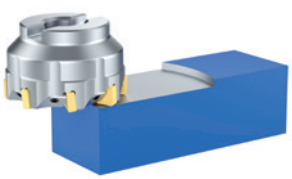
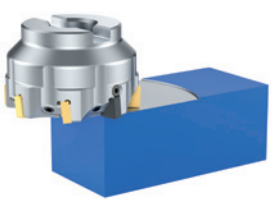
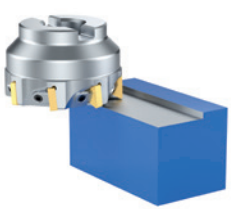
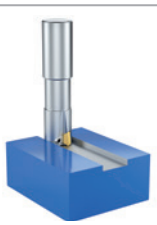
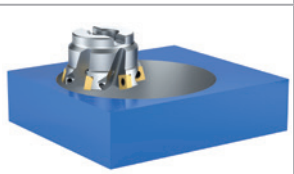
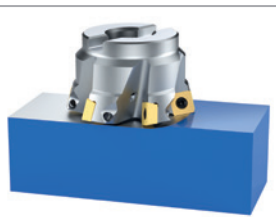
D = 200 - 250 mm

Adaptor style C

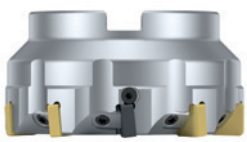
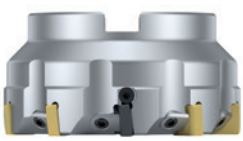
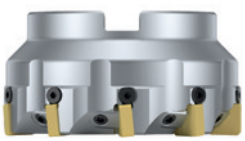
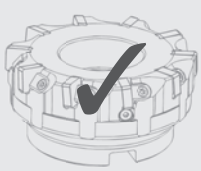
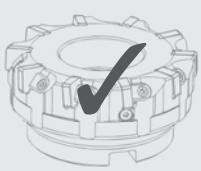


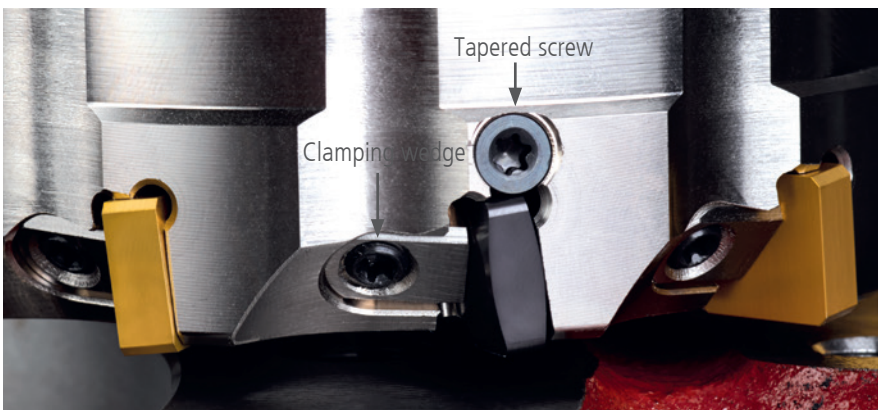
D = 315 mm

ROUGHING

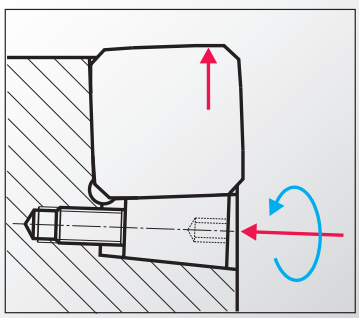
Application		PFK	PFL	BFL
				
Rough facing		✓	✓	✓
Finish facing				
Square shoulder milling		✓		
Groove milling		✓		
Helical milling				✓
High-feed milling				✓

FINISHING

PMK	PDK	PEK	MFS
			
			
			



Fine adjustment



Fine adjustment using a tapered screw

1. Position all the tapered screws so that they are flush on the outer diameter of the milling cutter
2. Place the inserts firmly in the pocket and hand tighten using the clamping wedge
3. Screw in the tapered screws until you feel a slight resistance
4. Place the milling cutter in a setting device and set each of the replaceable inserts to the same height by turning the tapered screw in a clockwise direction in the µm range
5. Tighten the clamping wedge with a torque of 5 Nm

Torques for the PFL-OP and PFL-SP milling cutter series
Torque setting: 5 Nm

Problem	Cause	Action: Switch to a more resistant grade	Switch to a more tougher grade	Cutting speed Vc	Feed rate per tooth fz	Cutting depth ap	Check cutting width ae	Wiper ZZ	Clearance angle	Corner radius	Chamfer	Check workpiece clamping
Increasing flank wear *1	Inappropriate cutting data			↓	↑							
	Inappropriate workpiece shape/ins. *2	✓							↑			
Increasing crater wear	Inappropriate cutting data			↓	↓	↓						
	Inappropriate workpiece shape/ins. *2	✓							↓			
Breakage on cutting edge	Inappropriate cutting data			↓	↓	↓						
	Inappropriate workpiece shape/ins. *2		✓							↑	↑	
Poor surface quality	Inappropriate cutting data				↑			✓				✓
	Inappropriate workpiece shape/ins. *2							✓				✓
Burr formation	Inappropriate cutting data				↓	↓	↓					
	Inappropriate workpiece shape/ins. *2								↑	↓	↓	
Breakage of workpiece edge	Inappropriate cutting data				↓	↓	✓					
	Inappropriate workpiece shape/ins. *2								↑		↓	
Poor planarity/ parallelism	Inappropriate cutting data				↓	↓	↓					✓
	Inappropriate workpiece shape/ins. *2							✓		↓	↓	✓
Heavy chatter/ vibrations	Inappropriate cutting data			↓	↑		✓					✓
	Inappropriate workpiece shape/ins. *2									↓		✓

*1 Use C2 geometry
*2 ins. = indexable insert

www.tools-for-productivity.com

CeramTec GmbH
SPK Cutting Tool Division
Hauptstraße 56
73061 Ebersbach / Fils
Germany

Phone: +49 7163 166-239
Fax: +49 7163 166-388
info@spk-tools.com
www.spk-tools.com / www.ceramtec.com

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