



CERATIZIT GROUP

# PcBN

## Cutting Tools



**SBC ■ PBC ■ Sandwich**

coated ■ uncoated

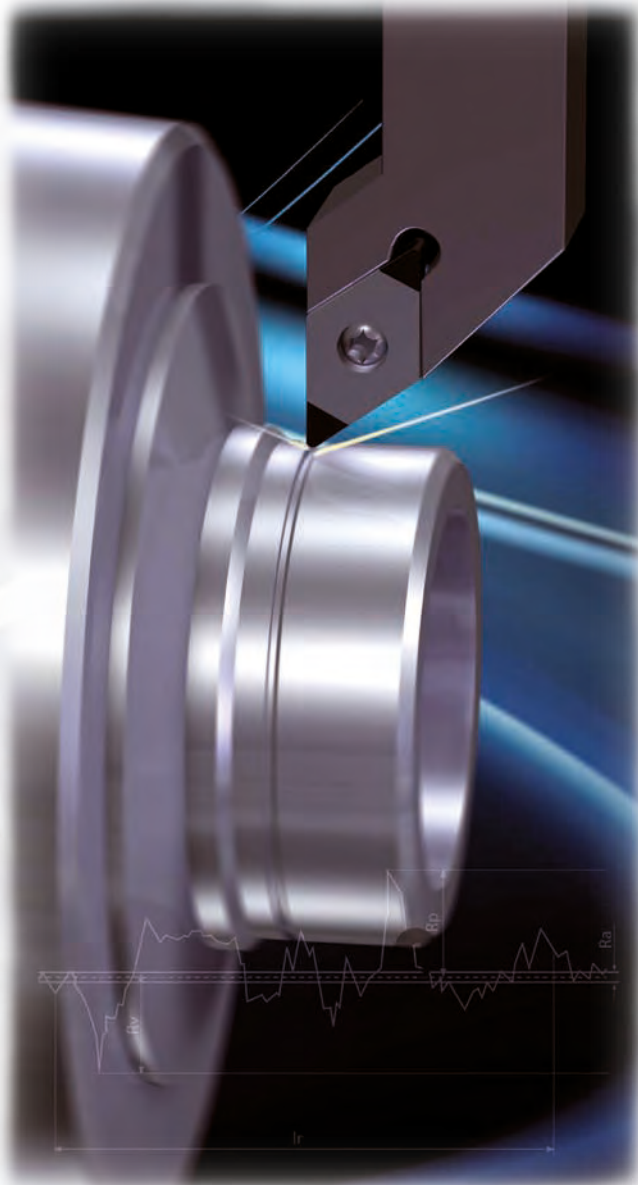


**Turning ■ Grooving ■ Boring ■ Milling**



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Dear customers and business partners,

The great challenges of future cutting techniques can only be mastered by ultra-hard cutting materials. For decades we have been pioneering the development and production of efficient cutting tools made of diamond and PcBN. Our tools are practically applied in all industries world-wide, for example in automotive engineering and associated suppliers, aircraft and engine construction, mechanical engineering, precision engineering and medical engineering.

On the following pages we will introduce our broad range of PcBN cutting tools. We have uniformly put the coated and uncoated tools together into one catalogue. This adds up to a comprehensive selection covering practically every application possible.

- 14 different PcBN grades
- Instant delivery ex stock
- Please take note of our regrinding service

In case of suggestions or queries in order to increase performance and improve your product quality, we will gladly be at your service.

Please take note of our new catalogue on our cutting tools tipped with our 5 different ultrahard diamond cutting materials.

*Sincerely,*  
**BECKER Diamantwerkzeuge GmbH**

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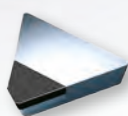
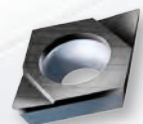
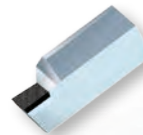
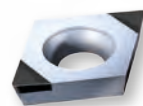
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## ■ Important information

### Personal assistance















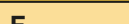

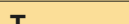





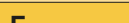







Using the PcBN grades is a very complex matter. So we would be glad to be of your personal assistance.

Please contact us by email or by phone.

Tel. +49 (0) 89 890 228-16  
sales@beckerdiamant.de

### Description of chamfer geometries

Please see below our chamfer geometries for all different PcBN grades.

BECKER item description for the chamfer geometry of all uncoated PcBN-grades		
PcBN-grade	Geometry "ISO"	Geometry "BECKER"
SBC-1	T 	H 
SBC-10	F 	A 
	T 	G 
SBC-25	F 	A 
	T 	F 
SBC-40	F 	A 
	T 	G 
PBC-10	F 	A 
	T 	F 
PBC-15	F 	A 
	T 	C 
PBC-25	F 	A 
	T 	D 
PBC-40	F 	A 
	T 	E 

### Cutting length and cutting time

In order to fully exploit the performance of our PcBN cutting materials, measured by the number of parts produced, the following factors are crucial:

The total cutting length of a workpiece has to be calculated and observed. This varies enormously depending on the feed rate. Therefore the required surface finish has to be observed precisely (see page 12 and 19). The real cutting length that can be achieved during hardturning is between 3,000 and 12,000 meters per cutting edge. The real cutting time per item determines the number of parts produced, and is controlled by the cutting speed and the feed rate. Thus the ideal aim for each workpiece to strive for is the lowest possible cutting length, the shortest cutting time at the highest possible cutting speed. Please refer to our diagrams on pages 14 to 17.

#### Cutting length in meters

$$SCL = \frac{D_m \times 3,14 \times l_m}{1000 \times f_n}$$

#### Operating duration in minutes

$$T_c = \frac{l_m}{f_n \times n}$$

**SCL** = Cutting length in meters (spiral cutting length)

**D<sub>m</sub>** = Diameter in mm

**l<sub>m</sub>** = Turning length

**f<sub>n</sub>** = Feed rate per revolution in mm

**n** = Spindle RPM

**T<sub>c</sub>** = Operating duration in minutes

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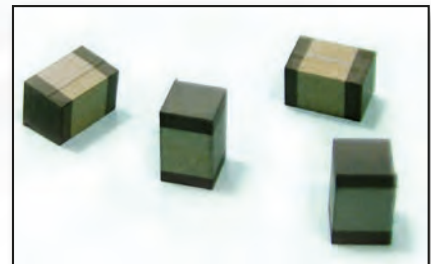
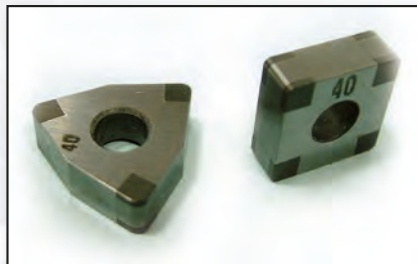
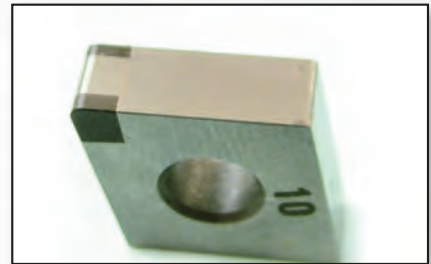
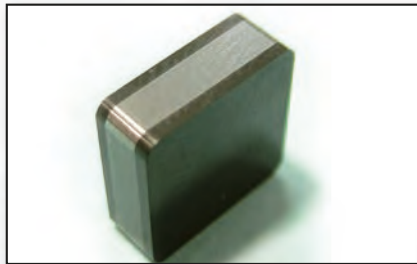
cutting materials



## Sandwich – The Cost Killer

Besides the manufacturing of double fullface inserts we cut the new sandwich blanks into rectangular segments and braze them into the correspondingly prepared carbide blanks for negative inserts. Thus we automatically receive 2 cutting edges per brazed

segment each of which has a large volume of PcBN cutting material. This manufacturing process both saves a huge amount of resources and makes a lot of sense economically. We also point out the possibility of regrinding



We manufacture all shapes of negative inserts in multiple corner tipping or double fullface type from these blanks. As the production costs of these sandwich blanks are nearly identical to the established,

one-sidedly tipped PcBN blanks there is a considerable price advantage per cutting edge or total layer.

The new sandwich blanks are manufactured in 4 different grades:

PBC-10S (BH-C), 95 % content, special grade for machining grey cast iron und super alloys.
PBC-15S (BH-C), 90 % content, special grade for machining nodular cast iron and powder steel.
PBC-25S (BL-C), 65 % content, special grade for hard turning, favoured in continuous cut.
PBC-40S (BL-C), 55 % content, special grade for hard turning, favoured in interrupted cut.

The development of ultrahard cutting materials is practiced intently on a world-scale and therefore constant progress in the machining is guaranteed. We have committed ourselves to these developments to

standardly offer to our customers the most suitable ultrahard cutting materials, tools and tool systems.



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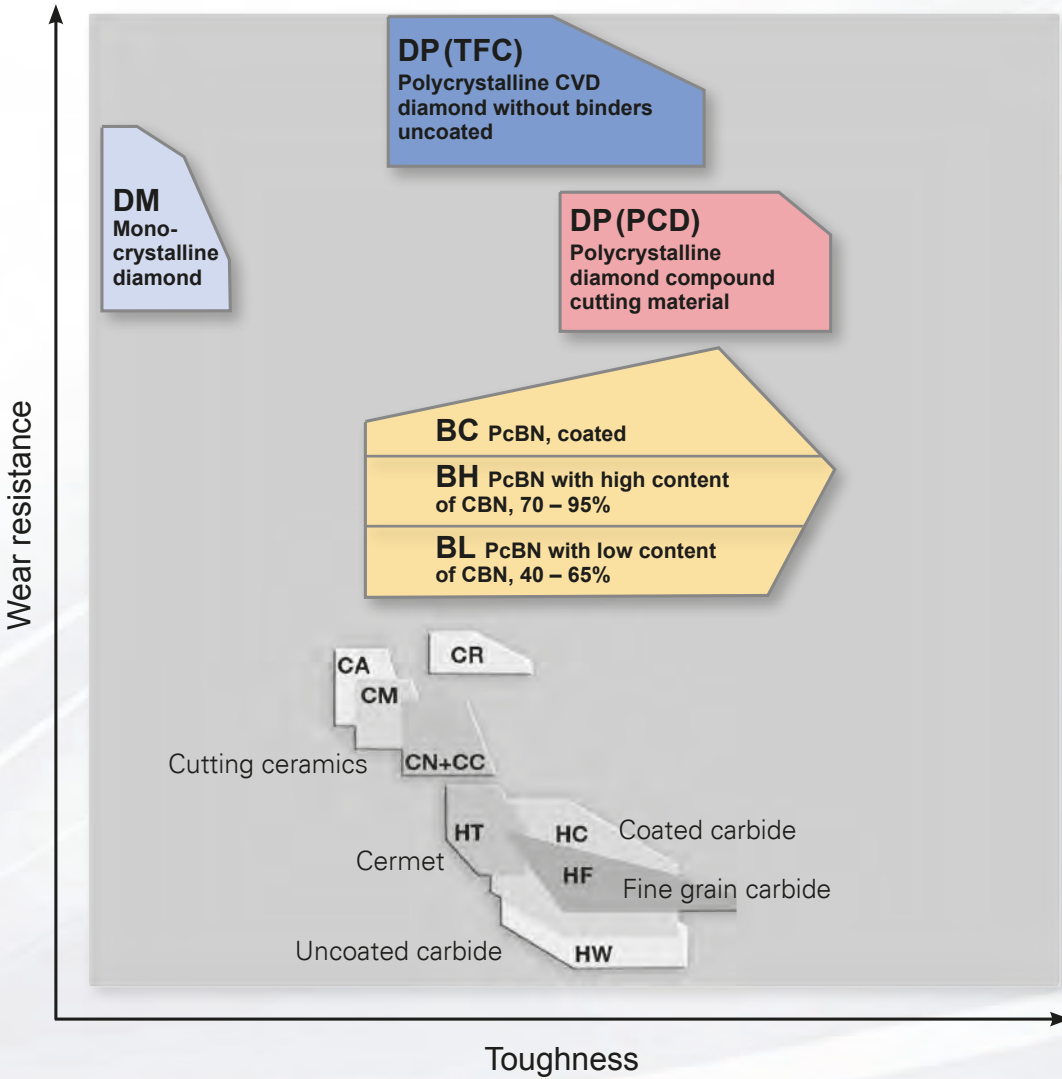
TURNING

GROOVING

BORING

MILLING

## Groups of cutting materials (DIN ISO 513)



Additional ISO designation codes for carbide (also Cermet) and ceramics have been added to the DIN ISO 513 (2001) standard. Furthermore new ident letters for the ultrahard cutting materials polycrystalline cubic boron nitride, monocrystalline and polycrystalline diamond have been introduced.

<p><b>HW</b> = Uncoated carbide</p> <p><b>HF</b> = Fine grained carbide</p> <p><b>HT</b> = Cermet, TiC or TiN</p> <p><b>HC</b> = Carbide / Cermet as above, but coated</p>	<p><b>DM</b> = Monocrystalline diamond</p> <p><b>DP</b> = Polycrystalline diamond-compound</p> <p><b>PD</b> = CVD - thickfilm diamond</p>
<p><b>CA</b> = Ceramics, main content <math>Al_2O_3</math></p> <p><b>CM</b> = Mixed ceramics, main content <math>Al_2O_3</math>, plus components other than oxides</p> <p><b>CN</b> = Siliconnitride ceramics, main content <math>Si_3N_4</math></p> <p><b>CR</b> = Ceramics, main content <math>Al_2O_3</math> reinforced</p> <p><b>CC</b> = Ceramics as above, but coated</p>	<p><b>BL</b> = Polycrystalline Cubic Boron Nitride with low content of CBN (40 – 65%)</p> <p><b>BH</b> = Polycrystalline Cubic Boron Nitride with high content of CBN (70 – 95%)</p> <p><b>BC</b> = Polycrystalline Cubic Boron Nitride as above, but coated</p>

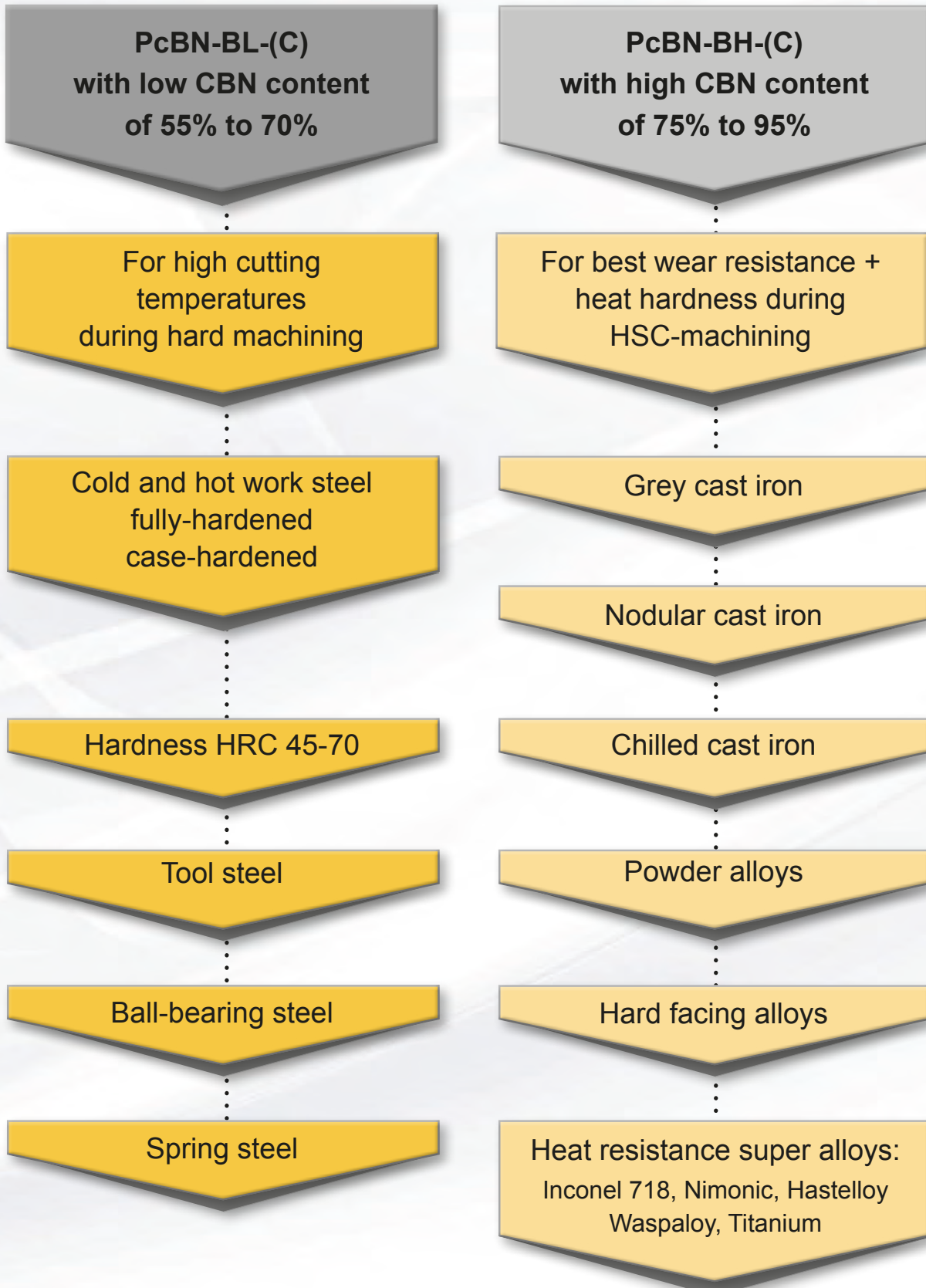
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## Material grade overview





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## PcBN-cutting materials - coated

Grades - Applications

Becker	ISO	Composition	Application
<b>PBC-10S</b>	<b>BH-C</b>	Coated PcBN-grade with very high CBN-content (95%) in sandwich and standard design, fine grit size (1 – 1,5 µm).	Grey cast iron (GG25) Powder steel Super alloys $a_p = 0,1 - 0,7$ mm
<b>PBC-15S</b>	<b>BH-C</b>	Coated PcBN-grade with high CBN content (90%) in sandwich and standard design, super fine grit size (0,75 µm).	Nodular cast iron Grey cast iron Powder steel Super alloys $a_p = 0,05 - 0,7$ mm
<b>PBC-25S</b>	<b>BL-C</b>	Coated PcBN-grade with low CBN content (65%) in sandwich and standard design, fine grit size (1 – 2 µm). Ideal for hard turning in continuous cut.	Hard turning, dry + wet HRC = 48 - 62 $a_p = 0,02 - 0,4$ mm $R_a = 0,2 - 3,2$ µm
<b>PBC-40S</b>	<b>BL-C</b>	Coated PcBN-grade with low CBN content (55%) in sandwich and standard design, super fine grit size (0,75 µm). Grade for slightly- to heavily-interrupted cut.	Hard turning, dry + wet HRC = 48 - 65 $a_p = 0,05 - 0,4$ mm $R_a = 0,1 - 3,2$ µm
<b>SBC-25C</b>	<b>BL-C</b>	Coated solid PcBN-grade with low CBN content (65%), fine grit size (3µm). Grade for hard turning in continuous cut and higher depth of cut.	Hard turning, dry + wet HRC = 48 - 65 $a_p = 0,04 - 0,8$ mm $R_a = 0,2 - 3,2$ µm
<b>SBC-40C</b>	<b>BL-C</b>	Coated solid PcBN-grade with low CBN content (65%), super fine grit size (1 µm). Grade for hard turning in slightly to heavily interrupted cut and higher depth of cut.	Hard turning, dry + wet HRC = 48 - 65 $a_p = 0,05 - 0,8$ mm $R_a = 0,1 - 3,2$ µm



## PcBN-cutting materials - uncoated

### Grades - Applications

Becker	ISO	Composition	Application
SBC- 1	BH	Uncoated solid PcBN-grade with high CBN-content (90%), coarse grit size (8 – 12 $\mu\text{m}$ ). Highest compression strength and thermal stability of all PcBN-grades.	Chilled cast iron Ni-hard Grey cast iron $a_p = 0,5 - 10 \text{ mm}$
SBC-10	BH	Uncoated solid PcBN-grade with high CBN content (80%), fine grit size (3 $\mu\text{m}$ ).	Grey cast iron Super alloys Powder steel $a_p = 0,3 - 8,0 \text{ mm}$
SBC-25	BL	Uncoated solid PcBN-grade with low CBN content (65%), fine grit size (3 $\mu\text{m}$ ). Favoured application in continuous cut.	Hard turning, dry + wet HRC = 56 – 65 $a_p = 0,05 - 6,0 \text{ mm}$ $R_a = 0,2 - 3,2 \mu\text{m}$
SBC-40	BL	Uncoated solid PcBN-grade with low CBN content (65%), super fine grit size (1 $\mu\text{m}$ ). For slightly- to heavily-interrupted cut.	Hard turning, dry + wet HRC = 56 – 65 $a_p = 0,05 - 6,0 \text{ mm}$ $R_a = 0,2 - 3,2 \mu\text{m}$
PBC-10	BH	Uncoated PcBN-grade with very high CBN content (95%) in standard design. Fine grit size (1 – 1,5 $\mu\text{m}$ ).	Grey cast iron Super alloys Powder steel $a_p = 0,1 - 0,4 \text{ mm}$
PBC-15	BH	Uncoated PcBN-grade with high CBN content (90%) in standard design. Super fine grit size (0,75 $\mu\text{m}$ ).	Nodular cast iron Powder steel Super alloys Grey cast iron $a_p = 0,05 - 0,4 \text{ mm}$
PBC-25	BL	Uncoated PcBN-grade with low CBN content (65%) in standard design. Fine grit size (3 $\mu\text{m}$ ), for continuous and very slightly-interrupted cut.	Hard turning, dry + wet HRC = 52 - 65 $a_p = 0,05 - 0,4 \text{ mm}$ $R_a = 0,2 - 3,2 \mu\text{m}$
PBC-40	BL	Uncoated PcBN-grade with low CBN content (65%) in standard design. Super fine grit size (1 $\mu\text{m}$ ), for continuous to heavily-interrupted cut.	Hard turning, dry + wet HRC = 54 - 65 $a_p = 0,05 - 0,4 \text{ mm}$ $R_a = 0,2 - 3,2 \mu\text{m}$



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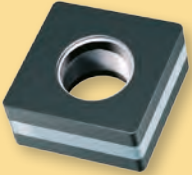
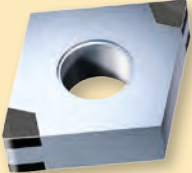
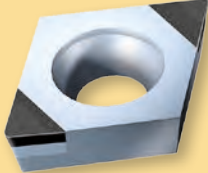
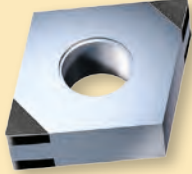
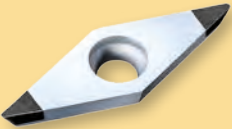
GROOVING

BORING

MILLING

## ■ Tipping versions

Of all coated grades - ISO-BECKER

ISO	Becker	Design	Grades	Becker	ISO
E	SE		Coated sandwich PcBN grades, double-sided layer thickness approx. 0,7 – 0,8 mm	<b>PBC-10S</b> <b>PBC-15S</b> <b>PBC-25S</b> <b>PBC-40S</b>	<b>BH-C</b> <b>BH-C</b> <b>BL-C</b> <b>BL-C</b>
C	SC		Coated sandwich PcBN grades, layer thickness approx. 0,6 – 0,8 mm	<b>PBC-10S</b> <b>PBC-15S</b> <b>PBC-25S</b> <b>PBC-40S</b>	<b>BH-C</b> <b>BH-C</b> <b>BL-C</b> <b>BL-C</b>
A	MC		Coated standard PcBN grades, layer thickness approx. 0,6 – 0,8 mm	<b>PBC-10S</b> <b>PBC-15S</b> <b>PBC-25S</b> <b>PBC-40S</b>	<b>BH-C</b> <b>BH-C</b> <b>BL-C</b> <b>BL-C</b>
A-S	MC-S		Coated solid PcBN grades, layer thickness approx. 1,2 – 1,3 mm	<b>SBC-25C</b> <b>SBC-40C</b>	<b>BL-C</b> <b>BL-C</b>
A-S	MC-S		Coated solid PcBN grades, layer thickness approx. 1,3 mm	<b>SBC-25C</b> <b>SBC-40C</b>	<b>BL-C</b> <b>BL-C</b>

## Tipping versions

Of all uncoated grades with carbide layer – ISO-BECKER

ISO	Becker	Design	Grades	Becker	ISO
A	EW		Uncoated standard PcBN grade, carbide reinforced	PBC-10 PBC-15 PBC-25 PBC-40	BH BH BL BL
A	MW		Uncoated standard PcBN grade, carbide reinforced	PBC-10 PBC-15 PBC-25 PBC-40	BH BH BL BL
A	MC		Uncoated standard PcBN grade, carbide reinforced	PBC-10 PBC-15 PBC-25 PBC-40	BH BH BL BL
	GS		Uncoated standard PcBN grade, carbide reinforced	PBC-10 PBC-15 PBC-25 PBC-40	BH BH BL BL
F	VM		Uncoated standard PcBN grade, carbide reinforced	PBC-10 PBC-15 PBC-25 PBC-40	BH BH BL BL



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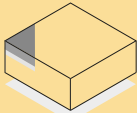
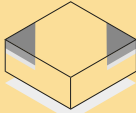
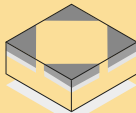
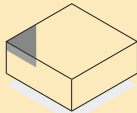
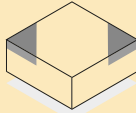
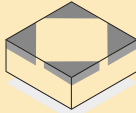
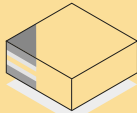
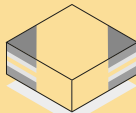

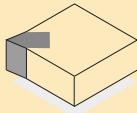
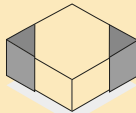
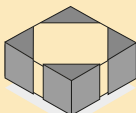
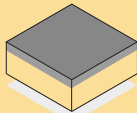
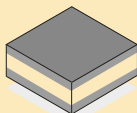
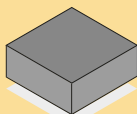
## Tipping versions

Of all uncoated solid grades without carbide layer ISO-BECKER

ISO	Becker	Design	Grades	Becker	ISO
A-S	EWS		Uncoated solid PcBN grade, without carbide reinforcement	SBC-1 SBC-10 SBC-25 SBC-40	BH BH BL BL
A-S	MC-S		Uncoated solid PcBN grade, without carbide reinforcement	SBC-1 SBC-10 SBC-25 SBC-40	BH BH BL BL
D	PC-S		Uncoated solid PcBN grade, without carbide reinforcement	SBC-1 SBC-10 SBC-25 SBC-40	BH BH BL BL
D	PC-S4		Uncoated solid PcBN grade, without carbide reinforcement	SBC-1	BH BH BL BL
D	PC-M		Uncoated solid PcBN grade, without carbide reinforcement	SBC-1 SBC-10 SBC-25 SBC-40	BH BH BL BL
D	PC-M4		Uncoated solid PcBN grade, without carbide reinforcement	SBC-1	BH BH BL BL
S	SBC		Uncoated solid PcBN grade, without carbide reinforcement	SBC-1 SBC-10 SBC-25 SBC-40	BH BH BL BL

## Tipping versions

Of all our PcBN grades with the recommended maximum depth of cut

ISO	Becker	Design	Number of tipped corners		Recommended max. depth of cut
			2	4	
A	EW MW MC	 1 tipped corner, carbide reinforced			EW..... $a_p = 0,4$ mm MW..... $a_p = 0,7$ mm MC..... $a_p = 0,4$ mm
A-S	EWS MC-S	 1 tipped corner, solid grades			EWS..... $a_p = 0,8$ mm MC-S..... $a_p = 0,8$ mm
C	SC	 2 tipped corners, carbide reinforced			SC..... $a_p = 0,7$ mm
D	PC-S PC-S4 PC-M PC-M4	 1 tipped edge, solid grades			PC-S..... $a_p = 2,0$ mm PC-S4..... $a_p = 3,0$ mm PC-M..... $a_p = 2,0$ mm PC-M4..... $a_p = 3,0$ mm
F	VM	 Fullface			VM..... $a_p = 0,7$ mm
E	SE	 Double-sided fullface			SE..... $a_p = 0,7$ mm
S	SBC	 Solid			SBC..... $a_p = 10$ mm



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TECHNOLOGY

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GROOVING

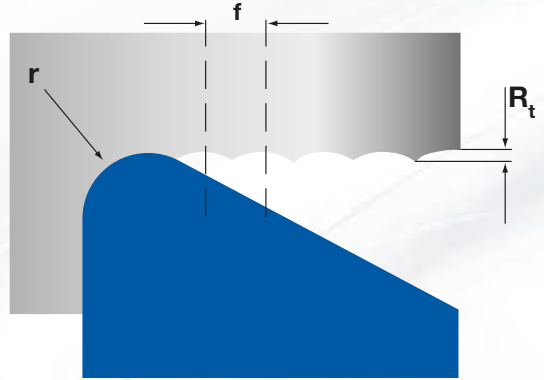
BORING

MILLING

## Wiper Geometry and Surface Finish

The theoretical  $R_t$  surface roughness value can be determined with the radius and the feed rates on hand. The required surface finish can be calculated very precisely in advance, provided all relevant peripheral prerequisites are given. As an example instable conditions of machine and/or workpiece, incorrect chucking, faulty or wrong tool system, wrong cutting speed and depth of cut etc. will all impair the results.

The theoretically computed profile height is generally underrun when hardturning with PcBN. A special cutting mechanism with a high cutting pressure is in operation (self-induced hot-cutting process). This smoothes the theoretical profile with a better surface finish.

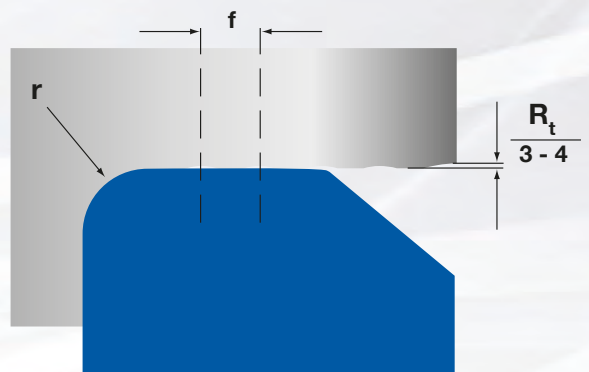


All values converted to  $\mu\text{m}$

$$R_t = \frac{f^2}{8 \times r} \quad r = \frac{f^2}{8 \times R_t} \quad f = \sqrt{8 \times r \times R_t}$$

Theoretical surface roughness	Corner radius					
	$R_t$	Feed rate per revolution ( $f = \text{mm/rev}$ )				
$R_a$	$R_t$	$r = 0,2$	$r = 0,4$	$r = 0,8$	$r = 1,2$	$r = 1,6$
0,6	1,6	$f = 0,05$	$f = 0,07$	$f = 0,10$	$f = 0,12$	$f = 0,14$
1,6	4	$f = 0,08$	$f = 0,11$	$f = 0,15$	$f = 0,19$	$f = 0,23$
3,2	10	$f = 0,12$	$f = 0,17$	$f = 0,24$	$f = 0,29$	$f = 0,36$
6,3	16	$f = 0,16$	$f = 0,22$	$f = 0,30$	$f = 0,37$	$f = 0,45$

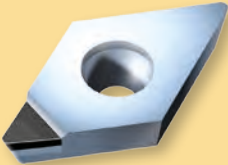
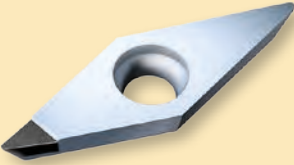
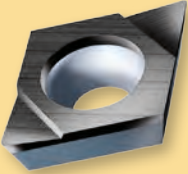
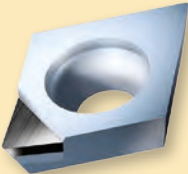
A clear improvement of the theoretical surface roughness can be achieved with our WIPER geometry. For the high-performance cutting of all aspects we have developed a number of inserts with WIPER geometry for internal, external and milling processes. This WIPER edge replaces the minor cutting edge reducing its angle to a minimum, whereas it automatically improves the theoretically computed surface roughness by 2 to 4 times.



In practise these are the two possibilities for high-performance and high-tech cutting:

- 1) 2-4x higher feed rate = same surface finish
- 2) same feed rate = 2-4x improved surface finish

## Positive Top Rake Geometries

Top Rake Geometries		PcBN-grades	Applications
	<b>EW-ISO-insert</b> Positive Neutral 1 tipped corner	<b>PBC-10</b> <b>PBC-15</b> <b>PBC-25</b> <b>PBC-40</b>	<b>Low cutting pressure</b> <ul style="list-style-type: none"> <li>Thin-walled or instable workpieces</li> <li>Internal boring</li> <li>Minor tolerances</li> <li>Lowest depths of cut</li> </ul>
	<b>EWS-ISO-insert</b> Positive Neutral 1 tipped corner	<b>SBC-10</b> <b>SBC-25</b> <b>SBC-40</b>	<b>Low cutting pressure</b> <ul style="list-style-type: none"> <li>Thin-walled or instable workpieces</li> <li>Internal boring</li> <li>Minor tolerances</li> <li>Lowest depths of cut</li> </ul>
	<b>MiniCut-insert</b> Positive Neutral Fullface	<b>PBC-15</b> <b>PBC-25</b>	<b>Low cutting pressure</b> <ul style="list-style-type: none"> <li>Thin-walled or instable workpieces</li> <li>Internal boring</li> <li>Minor tolerances</li> <li>Lowest depths of cut</li> </ul>
	<b>EW-MiniCut-insert</b> Positive Neutral 1 tipped corner	<b>PBC-10</b> <b>PBC-25</b> <b>PBC-40</b>	<b>Low cutting pressure</b> <ul style="list-style-type: none"> <li>Thin-walled or instable workpieces</li> <li>Internal boring</li> <li>Minor tolerances</li> <li>Lowest depths of cut</li> </ul>

Since their introduction our uncoated PcBN-inserts with positive top rake geometries have captured a considerable potential with our customers. Even though these particular positive top rake geometries are disregarded in any global documentation on cutting technology with PcBN cutting materials, we have been offering those positive insert geometries ex stock with great success.

Those positive geometries are applied for very complex cutting operations both for the machining of cast iron and for hardturning. In particular for very thin-walled and instable workpieces. The possible depths of cut are very low and thus minor tolerances are achieved. As a result of the extremely low cutting pressure, these geometries are preferentially applied for internal turning operations, in parts with unusual projecting lengths.

### Insert type with positive top rake geometry

**T**



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## ■ Cutting data Application range

Application range for PBC-10, PBC-10S, SBC-1 and SBC-10										
GREY CAST IRON: GG20 - GG25 - GG30 - GG40										
$v_c$ : m/min	Cutting edge design (T-land + honing)									
	A	B	C	D	E	F	G	H		
Cutting speed ↑ 1750 1500 1250 1000 750 500 300	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	
	Feed rate	f: 0,02 - 0,25	f: 0,04 - 0,25	f: 0,05 - 0,25	f: 0,05 - 0,40	f: 0,06 - 0,50	f: 0,08 - 0,35	f: 0,10 - 0,35	f: 0,12 - 0,35	Feed rate
	Depth of cut PBC-10S	$a_p$ : 0,02 - 0,25	$a_p$ : 0,03 - 0,3	$a_p$ : 0,06 - 0,4	$a_p$ : 0,06 - 0,4	$a_p$ : 0,08 - 0,5	$a_p$ : 0,08 - 0,4	$a_p$ : 0,1 - 0,4	$a_p$ : 0,12 - 0,4	Depth of cut PBC-10S
	Depth of cut SBC-1								$a_p$ : 0,15 - 10	Depth of cut SBC-1
	Depth of cut SBC-10 solid	$a_p$ : 0,05 - 3,0						$a_p$ : 0,3 - 8,0		Depth of cut SBC-10 solid
	Cutting conditions	Continuous to heavily interrupted cut								Cutting conditions

Application range for PBC-10, PBC-10S and SBC-10										
SUPER ALLOYS: Inconel 718, Nimonic, Hastelloy, Waspaloy										
$v_c$ : m/min	Cutting edge design (T-land + honing)									
	A	B	C	D	E	F	G	H		
Cutting speed ↑ 700 600 500 400 300 200 100	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	$v_c$	
	Feed rate	f: 0,02 - 0,25	f: 0,04 - 0,25	f: 0,05 - 0,25	f: 0,05 - 0,40	f: 0,06 - 0,50	f: 0,08 - 0,35	f: 0,10 - 0,35	f: 0,12 - 0,35	Feed rate
	Depth of cut PBC-10S	$a_p$ : 0,02 - 0,4	$a_p$ : 0,03 - 0,4	$a_p$ : 0,06 - 0,4	$a_p$ : 0,06 - 0,4	$a_p$ : 0,08 - 0,5	$a_p$ : 0,08 - 0,4	$a_p$ : 0,1 - 0,4	$a_p$ : 0,12 - 0,4	Depth of cut PBC-10S
	Depth of cut SBC-10	$a_p$ : 0,02 - 0,3						$a_p$ : 0,05 - 0,4		Depth of cut SBC-10
	Cutting conditions	Continuous to medium interrupted cut								Cutting conditions





## ■ Cutting data Application range

Application range for PBC-15S and PBC-15										
NODULAR CAST IRON: GGG30 - GGG40 - GGG50 - GGG60										
v <sub>c</sub> : m/min	Cutting edge design (T-land + honing)									
	A	B	C	D	E	F	G	H		
Cutting speed ↑	1750									
	1500									
	1250	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	
	1000									
	750									
	500									
	250									
Feed rate	f: 0,02 - 0,25	f: 0,04 - 0,25	f: 0,05 - 0,25	f: 0,05 - 0,35	f: 0,06 - 0,35	f: 0,08 - 0,35	f: 0,10 - 0,35	f: 0,12 - 0,35	Feed rate	
Depth of cut PBC-15S	a <sub>p</sub> : 0,05 - 0,25	a <sub>p</sub> : 0,05 - 0,3	a <sub>p</sub> : 0,06 - 0,4	a <sub>p</sub> : 0,06 - 0,4	a <sub>p</sub> : 0,08 - 0,5	a <sub>p</sub> : 0,08 - 0,4	a <sub>p</sub> : 0,1 - 0,4	a <sub>p</sub> : 0,12 - 0,4	Depth of cut PBC-15S	
Depth of cut PBC-15	a <sub>p</sub> : 0,04 - 0,25		a <sub>p</sub> : 0,04 - 0,4						Depth of cut PBC-15	
Cutting conditions	Continuous to medium interrupted cut								Cutting conditions	

Application range for PBC-15S and PBC-15										
POWDER STEEL: Sint D11- Sint D39										
v <sub>c</sub> : m/min	Cutting edge design (T-land + honing)									
	A	B	C	D	E	F	G	H		
Cutting speed ↑	800									
	700									
	600	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	v <sub>c</sub>	
	500									
	400									
	300									
	200									
Feed rate	f: 0,02 - 0,25	f: 0,04 - 0,25	f: 0,05 - 0,25	f: 0,05 - 0,35	f: 0,06 - 0,35	f: 0,08 - 0,35	f: 0,10 - 0,35	f: 0,12 - 0,35	Feed rate	
Depth of cut PBC-15S	a <sub>p</sub> : 0,02 - 0,4	a <sub>p</sub> : 0,03 - 0,4	a <sub>p</sub> : 0,06 - 0,4	a <sub>p</sub> : 0,06 - 0,4	a <sub>p</sub> : 0,08 - 0,4	a <sub>p</sub> : 0,08 - 0,4	a <sub>p</sub> : 0,1 - 0,4	a <sub>p</sub> : 0,12 - 0,4	Depth of cut PBC-15S	
Depth of cut PBC-15	a <sub>p</sub> : 0,02 - 0,3		a <sub>p</sub> : 0,04 - 0,4						Depth of cut PBC-15	
Cutting conditions	Continuous to heavily interrupted cut								Cutting conditions	



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## Cutting data Application range

Application range for PBC-25S and PBC-25										
Hardturning, favoured in continuous cut, $a_p = 0,02 - 0,4$ mm, HRC 48 - 62										
$v_c$ : m/min	Cutting edge design (T-land + honing)								$R_a$ ( $\mu\text{m}$ )	
	A	B	C	D	E	F	G	H		
350										0,1 $\mu\text{m}$
300										0,2 $\mu\text{m}$
250	$v_c$									0,4 $\mu\text{m}$
200		$v_c$								0,8 $\mu\text{m}$
150	$R_a$	$R_a$	$v_c$	$R_a$	$v_c$	$R_a$	$v_c$	$R_a$	$v_c$	1,6 $\mu\text{m}$
100										3,2 $\mu\text{m}$
50										6,4 $\mu\text{m}$
Feed rate	f: 0,02 - 0,15	f: 0,03 - 0,15	f: 0,04 - 0,20	f: 0,05 - 0,25	f: 0,06 - 0,25	f: 0,06 - 0,25	f: 0,06 - 0,20	f: 0,06 - 0,20	Feed rate	
Depth of cut PBC-25S	$a_p$ : 0,04 - 0,25	$a_p$ : 0,04 - 0,3	$a_p$ : 0,06 - 0,4	$a_p$ : 0,06 - 0,4	$a_p$ : 0,08 - 0,4	$a_p$ : 0,08 - 0,4	$a_p$ : 0,1 - 0,4	$a_p$ : 0,12 - 0,4	Depth of cut PBC-25S	
Depth of cut PBC-25	$a_p$ : 0,02 - 0,25			$a_p$ : 0,05 - 0,4					Depth of cut PBC-25	
Cutting conditions	Continuous cut								Cutting conditions	

Application range for SBC-25C and SBC-25										
Hardturning, favoured in continuous Cut, $a_p = 0,04 - 6,0$ mm, HRC 48 - 65										
$v_c$ : m/min	Cutting edge design (T-land + honing)								$R_a$ ( $\mu\text{m}$ )	
	A	B	C	D	E	F	G	H		
350										0,1 $\mu\text{m}$
300										0,2 $\mu\text{m}$
250	$v_c$									0,4 $\mu\text{m}$
200		$v_c$								0,8 $\mu\text{m}$
150		$R_a$	$v_c$	$R_a$	$v_c$	$R_a$	$v_c$	$R_a$	$v_c$	1,6 $\mu\text{m}$
100	$R_a$									3,2 $\mu\text{m}$
50										6,4 $\mu\text{m}$
Feed rate	f: 0,02 - 0,20	f: 0,03 - 0,20	f: 0,03 - 0,20	f: 0,05 - 0,20	f: 0,06 - 0,25	f: 0,08 - 0,25	f: 0,08 - 0,25	f: 0,08 - 0,25	Feed rate	
Depth of cut SBC-25C	$a_p$ : 0,04 - 0,5	$a_p$ : 0,05 - 0,5	$a_p$ : 0,05 - 0,8	$a_p$ : 0,08 - 0,8	$a_p$ : 0,08 - 0,8	$a_p$ : 0,12 - 0,8	$a_p$ : 0,15 - 0,8	$a_p$ : 0,2 - 0,8	Depth of cut SBC-25C	
Depth of cut SBC-25	$a_p$ : 0,04 - 2,0					$a_p$ : 0,12 - 2,0			Depth of cut SBC-25	
Depth of cut SBC-25 solid						$a_p$ : 0,25 - 6,0			Depth of cut SBC-25 solid	
Cutting conditions	Continuous cut								Cutting conditions	

## Cutting data Application range

Application range for PBC-40S and PBC-40										
Hardturning, favoured in interrupted cut, $a_p$ : 0,05 - 0,4 mm, HRC 48 - 65										
$v_c$ : m/min	Cutting edge design (T-land + honing)								$R_a$ ( $\mu\text{m}$ )	
	A	B	C	D	E	F	G	H		
350									$R_a$	0,1 $\mu\text{m}$
300									$R_a$	0,2 $\mu\text{m}$
250	$v_c$								$R_a$	0,4 $\mu\text{m}$
200	$R_a$	$v_c$	$R_a$		$R_a$	$R_a$	$R_a$		$R_a$	0,8 $\mu\text{m}$
150	$R_a$	$v_c$	$R_a$	$v_c$	$R_a$	$R_a$	$R_a$	$R_a$	$R_a$	1,6 $\mu\text{m}$
100	$R_a$	$v_c$	$R_a$	$v_c$	$R_a$	$R_a$	$R_a$	$R_a$	$R_a$	3,2 $\mu\text{m}$
50	$R_a$	$v_c$	$R_a$	$v_c$	$R_a$	$R_a$	$R_a$	$R_a$	$R_a$	6,4 $\mu\text{m}$
Feed rate	f: 0,02 - 0,12	f: 0,03 - 0,15	f: 0,05 - 0,20	f: 0,06 - 0,20	f: 0,06 - 0,25	f: 0,06 - 0,25	f: 0,08 - 0,20	f: 0,08 - 0,20	Feed rate	
Depth of cut PBC-40S	$a_p$ : 0,05-0,25	$a_p$ : 0,06 - 0,3	$a_p$ : 0,08 - 0,3	$a_p$ : 0,08 - 0,3	$a_p$ : 0,10 - 0,4	$a_p$ : 0,10 - 0,4	$a_p$ : 0,15 - 0,4	$a_p$ : 0,20 - 0,4	Depth of cut PBC-40S	
Depth of cut PBC-40	$a_p$ : 0,04-0,25				$a_p$ : 0,07 - 0,4				Depth of cut PBC-40	
Cutting conditions	very slightly		slightly		medium		heavily		Cutting conditions	
	Interrupted cut									

Application range for SBC-40C and SBC 40										
Hardturning, favoured in interrupted Cut, $a_p$ = 0,05 - 6,0 mm, HRC 48 - 65										
$v_c$ : m/min	Cutting edge design (T-land + honing)								$R_a$ ( $\mu\text{m}$ )	
	A	B	C	D	E	F	G	H		
350									$R_a$	0,1 $\mu\text{m}$
300									$R_a$	0,2 $\mu\text{m}$
250	$v_c$								$R_a$	0,4 $\mu\text{m}$
200	$R_a$	$v_c$	$R_a$		$R_a$	$R_a$	$R_a$		$R_a$	0,8 $\mu\text{m}$
150	$R_a$	$R_a$	$R_a$	$v_c$	$R_a$	$R_a$	$R_a$	$R_a$	$R_a$	1,6 $\mu\text{m}$
100	$R_a$	$R_a$	$R_a$	$v_c$	$R_a$	$R_a$	$R_a$	$R_a$	$R_a$	3,2 $\mu\text{m}$
50	$R_a$	$R_a$	$R_a$	$v_c$	$R_a$	$R_a$	$R_a$	$R_a$	$R_a$	6,4 $\mu\text{m}$
Feed rate	f: 0,02 - 0,20	f: 0,03 - 0,20	f: 0,03 - 0,20	f: 0,05 - 0,25	f: 0,06 - 0,25	f: 0,06 - 0,25	f: 0,06 - 0,25	f: 0,06 - 0,25	Feed rate	
Depth of cut SBC-40C	$a_p$ : 0,05-0,5	$a_p$ : 0,05 - 0,5	$a_p$ : 0,05 - 0,8	$a_p$ : 0,08 - 0,8	$a_p$ : 0,10 - 0,8	$a_p$ : 0,12 - 0,8	$a_p$ : 0,15 - 0,8	$a_p$ : 0,20 - 0,8	Depth of cut SBC-40C	
Depth of cut SBC-40	$a_p$ : 0,05-2,0						$a_p$ : 0,12 - 2,0		Depth of cut SBC-40	
Depth of cut SBC-40 solid							$a_p$ : 0,25 - 6,0		Depth of cut SBC-40 solid	
Cutting conditions	very slightly		slightly		medium		heavily		Cutting conditions	
	Interrupted cut									



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## ■ ToolScout

In order for all users to exploit the full potential of our extremely high performance PcBN cutting materials, the following explanations and hints are of importance.

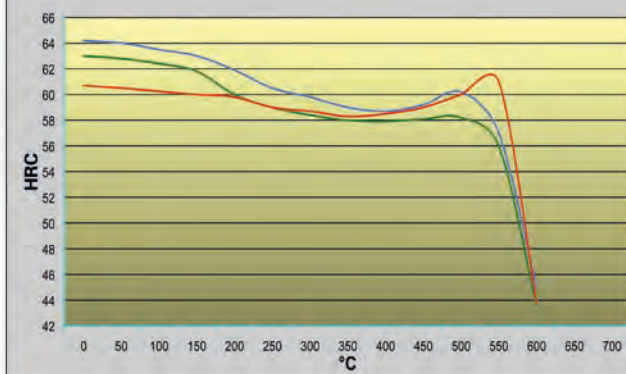
As shown in our previous catalogue supplement we offer our 6 coated PcBN-grades in up to 8 different chamfer geometries per cutting material as well as in various tipping options (see page 8). This large standard range enables us to meet basically all imaginable application profiles ex stock.

### Hard machining with PcBN

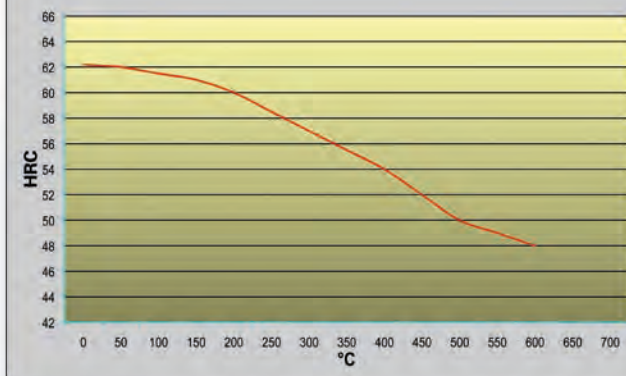
The cutting of hardened steel is generally referred to as hard machining. This cutting mechanism is a self-induced hot cutting process. This requires a defined and high temperature of about 550 to 750°C on the cutting zone. This necessary temperature is being produced by the transformation of existing energies into heat. This energy is released in the form of cutting speed  $v_c$ , feed rate  $f$ , depth of cut  $a_p$  as well as the chamfer geometries A-H of the PcBN cutting edges. Cooling is generally not required. Below we have illustrated 3 diagrams of hardness values. You can make out the decreasing hardness with the rising of the temperature. However significant differences are shown.

During the self-induced hot cutting process with our PcBN-grades the ideal hardness in the shear zone is at 40 to 45 HRC. This means that in such a case different cutting temperatures between 550°C up to 750°C are necessary.

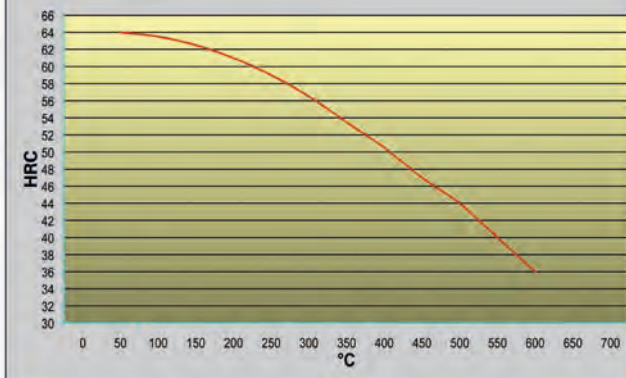
Hardness Values 1.2379 (X155CrVMo 12 - 1)



Hardness Values 1.7131 (16MnCr5)



Hardness Values 1.3505 (100Cr6)



At a temperature of approx. 600°C the steel grade 1.2379 still has a hardness of about 58 HRC, the steel grade 1.7131 about 48 HRC, and the steel grade 1.3505 only achieves about 36 HRC. The original hardness of each steel grade had been about 62 HRC.



In order to produce and maintain the ideal cutting temperature in the shear zone, it is obligatory to strictly stick to three particularities.

- the thermal conductivity of the PcBN-grade used (55% - 65% CBN)
- the applied chamfer geometry A-H, and also the positive top rake geometry (see page 13)
- as well as the hardness diagrams (hardness diagram with rising temperature)

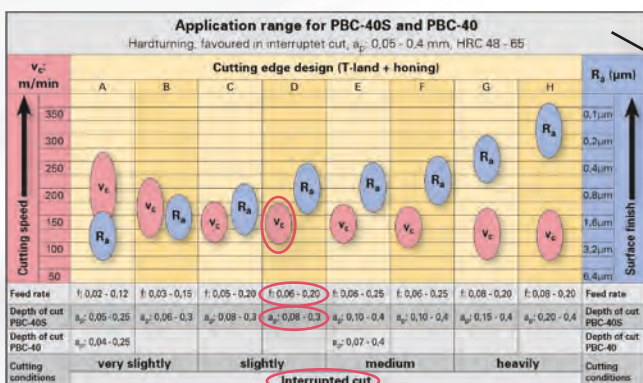
In order to give you professional advice on our standard range for the intended application, the following checklist has to be strictly respected:

- precise specification of the steel grade and its hardness HRC
- the required surface finish  $R_a$  has to be determined as well as the depth of cut
- please decide if your cut is continuous to slightly-interrupted or medium to heavily-interrupted

Please select the PcBN grade as described on pages 6 and 7.

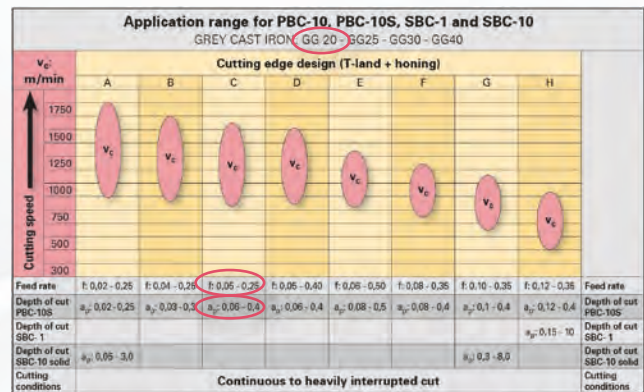
Becker	ISO	Composition	Application
PBC-25S	BL-C	Coated PcBN-grade with low CBN content (65%) in sandwich and standard design, fine grit size (1 - 2 $\mu\text{m}$ ). Ideal for hard turning in continuous cut.	Hard turning, dry + wet HRC = 48 - 62 $a_p = 0,02 - 0,4 \text{ mm}$ $R_a = 0,2 - 3,2 \mu\text{m}$
<b>PBC-40S</b>	BL-C	Coated PcBN-grade with low CBN content (55%) in sandwich and standard design, super fine grit size (0,75 $\mu\text{m}$ ). Grade for slightly- to heavily-interrupted cut.	Hard turning, dry + wet HRC = 48 - 65 $a_p = 0,05 - 0,4 \text{ mm}$ $R_a = 0,1 - 3,2 \mu\text{m}$

Now please choose the according chamfer geometry for the required surface finish, as shown in our diagrams on pages 16 and 17.



### Soft machining with PcBN

Soft machining encompasses the cutting of all materials in their natural hardness without any hardening process or similar applied. Thus the result means not any microstructural transformation has occurred. However it is absolutely necessary to keep materials in mind (super alloys, titanium etc.) that require a very high cutting temperature of 700 to 1.110 °C, which can only be generated with the cutting material grade PcBN.



On pages 14 and 15 we have listed different application examples each explained by a simple diagram. On the left-hand side we have indicated the recommended cutting speed, and on the lower lines the according feed rate and depth of cut.

### Example:

100Cr6 – HRC 62  
 $a_p = 0,25 \text{ mm}$ ,  $f = 0,1 \text{ mm}$   
 interrupted cut  
 required  $R_a = 0,6 \mu\text{m}$

**PcBN grade = PBC-40S**  
**chamfer "D" at  $v_c$  160 m/min**  
**insert: CNGA120408-D-40S-4SC**



CERATIZIT GROUP

ultrahard

cutting materials

TECHNOLOGY

TURNING

GROOVING

BORING

MILLING

# ISO-Insert Nomenclature

Order designation

**1 Basic shape**

**2 Clearance**

**3 Tolerance class**

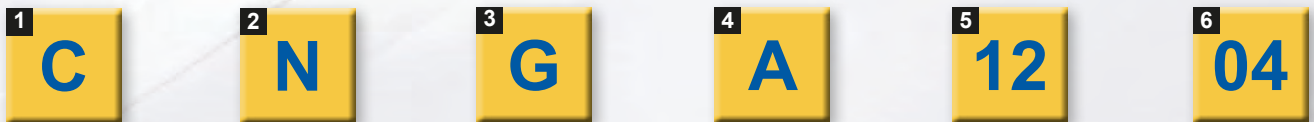
**Tolerances in mm**

	m	s	d
A	0,005	0,025	0,025
F	0,005	0,025	0,013
C	0,013	0,025	0,025
H	0,013	0,025	0,013
E	0,005	0,025	0,025
G	0,025	0,130	0,025

	m	s	d <sup>1)</sup>
J	0,005	0,025	0,05 0,15
K	0,013	0,025	0,05 0,15
L	0,025	0,025	0,05 0,15
M <sup>1)</sup>	0,08 0,20	0,130	0,05 0,15
N <sup>1)</sup>	0,08 0,20	0,250	0,05 0,15
U <sup>1)</sup>	0,13	0,38 0,130	0,08 0,15

<sup>1)</sup> The exact tolerance is determined by size of insert.



**4 Insert type**

**5 Insert size**

If less than 10 use 0 in first place, decimals are omitted (Example: 9,525 mm = 09)

**6 Thickness in mm**

If less than 10 use 0 in first place, decimals are omitted (Example: 3,18 mm = 03)



**7 Corner configuration**

**Radius**  
 02 = 0,2 mm  
 04 = 0,4 mm  
 08 = 0,8 mm  
 12 = 1,2 mm  
 16 = 1,6 mm  
 00 = round insert (inch)  
 M0 = round insert (metr.)

**10 Solid-PcBN grades**

SBC-1 } Cast iron, powder steel (PM)  
 SBC-10 }

SBC-25C } Hardtuning  
 SBC-25 }  
 SBC-40C }  
 SBC-40 }

**11 Cutting edges**

Number of cutting edges:  
 2-8

**12 Tipping versions**

**Solid PcBN grades**

EWS		PC-M	
MC-S		PC-M4	
PC-S		SBC	
PC-S4			

**7 08**

**8 W**

**9 D**

**10 15S**

**11 4**

**12 SC**

**8 Wiper edge**

**W** = Wiper-edge, right + left hand  
**WR** = Wiper-edge, right hand  
**WL** = Wiper-edge, left hand

**9 Cutting edge design**

Cutting edge design  
 T-land + honing

Conditions  
 A - H  
 see pages 14-17

**10 Carbide Reinforced PcBN grades**

PBC-10S } Cast iron, powder steel (PM)  
 PBC-10 }  
 PBC-15S }  
 PBC-15 }

PBC-25S } Hardtuning  
 PBC-25 }  
 PBC-40S }  
 PBC-40 }

**12 Tipping versions**

**Carbide reinforced PcBN grades**

EW		MW		SE	
MC		GS			
SC		VM			



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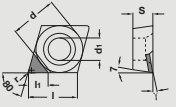
# TURNING | ISO

## CCGT

Standard tipped corners (positive)

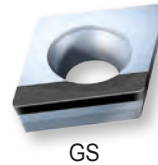


EW

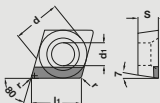
insert size	uncoated				coated																dimensions																	
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
060202-EW	●				●		●																														0,2	3,4
060204-EW	●				●		●																										6,35	2,8	2,38	6,45	0,4	3,1
060208-EW	●				●		●																														0,8	2,8
09T302-EW	●				●		●																														0,2	3,4
09T304-EW	●				●		●																										9,52	4,4	3,97	9,70	0,4	3,1
09T308-EW	●				●		●																														0,8	2,8

## CCGW

Standard tipped corners



GS

insert size	uncoated				coated																dimensions																
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S				 right hand shown																
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	r	l <sub>1</sub>
060204R/L-GS	●	●	●	●	●	●	●	●																									6,35	2,8	2,38	0,4	6,45
060208R/L-GS	●	●	●	●	●	●	●	●																												0,8	
09T304R/L-GS	●	●	●	●	●	●	●	●																									9,52	4,4	3,97	0,4	9,70
09T308R/L-GS	●	●	●	●	●	●	●	●																												0,8	





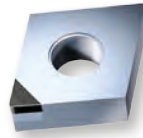


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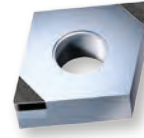
# TURNING | ISO

## ■ CNGA

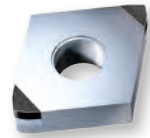
Standard tipped corners



EW



2MC

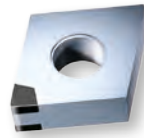


W-2MC

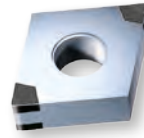
insert size	uncoated				coated																dimensions																			
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																							
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1		
120402-EW	●	●	●	●	●	●	●	●																									12,70	5,13	4,76	12,90	0,2	3,4		
120404-EW	●	●	●	●	●	●	●	●																															0,4	3,1
120408-EW	●	●	●	●	●	●	●	●																															0,8	2,8
120412-EW	●	●	●	●	●	●	●	●																															1,2	2,5
120404-2MC	●	●	●	●	●	●	●	●																															0,4	3,0
120408-2MC	●	●	●	●	●	●	●	●																															0,8	2,7
120412-2MC	●	●	●	●	●	●	●	●																															1,2	2,4
120402W-2MC	●	●	●	●	●	●	●	●																															0,2	3,4
120404W-2MC	●	●	●	●	●	●	●	●																															0,4	3,0
120408W-2MC	●	●	●	●	●	●	●	●																															0,8	2,7

## ■ CNGA

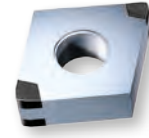
Sandwich tipped corners



2SC



4SC

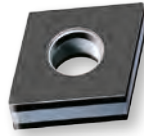


W-4 SC

insert size	uncoated				coated																dimensions																		
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																						
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1	
120404-2SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	12,70	5,13	4,76	12,90	0,4	2,8	
120408-2SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							0,8	2,5
120412-2SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							1,2	2,2
120404W-2SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							0,4	2,8
120408W-2SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							0,8	2,5
120404-4SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							0,4	2,8
120408-4SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							0,8	2,5
120412-4SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							1,2	2,2
120404W-4SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							0,4	2,8
120408W-4SC					●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							0,8	2,5

## CNGA

Double fullface

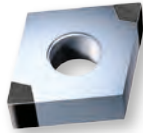


SE

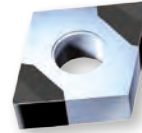
insert size	uncoated				coated																dimensions																					
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																									
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>				
120408-SE					●				●				●				●				●				●				●				●				12,70	5,13	4,76	12,90	0,8	
120412-SE					●				●				●				●				●				●				●				●				12,70	5,13	4,76	12,90	1,2	

## CNGA

Solid tipped corners



PC-M

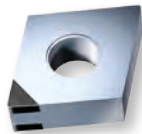


PC-M/4

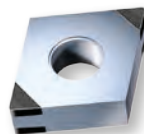
insert size	uncoated				coated																dimensions																								
	SBC-1	SBC-10	SBC-25	SBC-40	SBC-25C								SBC-40C																																
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>																
120404-PC-M	●			●																																								0,4	2,8
120408-PC-M	●			●																																				0,8	2,6				
120412-PC-M	●			●																																				1,2	2,4				
120408-PC-M/4	●																																							0,8	4,2				

## CNGA

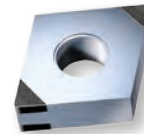
Solid tipped corners



2MC/S



4MC/S



W-4MC/S

insert size	uncoated				coated																dimensions																								
	SBC-1	SBC-10	SBC-25	SBC-40	SBC-25C								SBC-40C																																
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>																
120404-2MC/S												●				●				●				●				●				●				●								0,4	2,8
120408-2MC/S												●				●				●				●				●				●				●								0,8	2,5
120412-2MC/S												●				●				●				●				●				●				●								1,2	2,2
120404W-2MC/S												●				●				●				●				●				●				●								0,4	2,8
120408W-2MC/S												●				●				●				●				●				●				●								0,8	2,5
120404-4MC/S												●				●				●				●				●				●				●								0,4	2,8
120408-4MC/S												●				●				●				●				●				●				●								0,8	2,6
120412-4MC/S												●				●				●				●				●				●				●								1,2	2,2
120404W-4MC/S												●				●				●				●				●				●				●								0,4	2,8
120408W-4MC/S												●				●				●				●				●				●				●								0,8	2,6

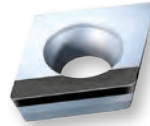


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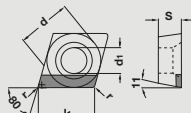
# TURNING | ISO

## CPGW

Standard tipped corners

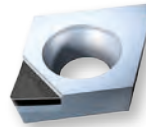


GS

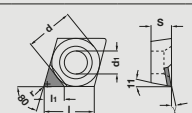
insert size	uncoated				coated																dimensions																	
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S				 right hand shown																	
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
050204R/L-GS	●	●			●	●	●	●																									5,56	2,50	2,38		0,4	5,6
060204R/L-GS	●	●			●	●	●	●																									6,35	2,80	2,38		0,4	6,5
060208R/L-GS	●	●			●	●	●	●																													0,8	6,5

## CPGT

Standard tipped corners (positive)

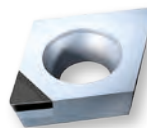


EW

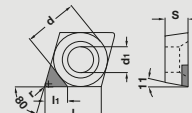
insert size	uncoated				coated																dimensions																	
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
04T102-EW	●				●		●	●																									4,76	2,10	1,98	4,80	0,2	2,2
04T104-EW	●				●		●	●																													0,4	2,0
05T102-EW	●				●		●	●																									5,56	2,50	1,98	5,60	0,2	2,4
05T104-EW	●				●		●	●																													0,4	2,2
050202-EW	●		●		●		●	●																									5,56	2,50	2,38	5,60	0,2	2,4
050204-EW	●		●		●		●	●																													0,4	2,2
060204-EW	●		●		●		●	●																									6,35	2,80	2,38	6,45	0,4	3,4
060208-EW	●		●		●		●	●																													0,8	2,8

## CPGW

Standard tipped corners



EW

insert size	uncoated				coated																dimensions																	
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
04T102-EW	●				●		●	●																									4,76	2,10	1,98	4,80	0,2	2,2
04T104-EW	●				●		●	●																													0,4	2,0
05T102-EW	●				●		●	●																									5,56	2,50	1,98	5,60	0,2	2,4
05T104-EW	●				●		●	●																													0,4	2,2
050202-EW	●		●		●		●	●																									5,56	2,50	2,38	5,60	0,2	2,4
050204-EW	●		●		●		●	●																													0,4	2,2
060202-EW	●		●		●		●	●																									6,35	2,80	2,38	6,45	0,2	3,4
060204-EW	●		●		●		●	●																													0,4	3,1
060208-EW	●		●		●		●	●																													0,8	2,8

## DCGT

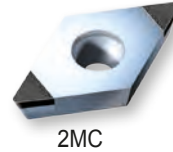
Standard tipped corners (positive)



insert size	uncoated				coated																dimensions																								
	PBC-10		PBC-15		PBC-25		PBC-10S				PBC-15S				PBC-25S				PBC-40S				d		s	l	r	l <sub>1</sub>																	
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r
070202-EW	●	●	●	●																												6,35	2,80	2,38	7,75	0,2	3,9								
070204-EW	●	●	●	●																																	0,4	3,5							
070208-EW	●	●	●	●																																	0,8	3,0							
11T302-EW	●	●	●	●																													9,52	4,40	3,97	11,60	0,2	3,9							
11T304-EW	●	●	●	●																																	0,4	3,5							
11T308-EW	●	●	●	●																																	0,8	3,0							

## DCGW

Standard tipped corners



insert size	uncoated				coated																dimensions																								
	PBC-10		PBC-15		PBC-25		PBC-10S				PBC-15S				PBC-25S				PBC-40S				d		s	l	r	l <sub>1</sub>																	
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r
070202-EW	●	●	●	●																													6,35	2,80	2,38	7,75	0,2	3,9							
070204-EW	●	●	●	●																																		0,4	3,5						
070208-EW	●	●	●	●																																		0,8	3,0						
070202-2MC	●				●	●	●	●								●	●	●	●																			0,2	3,9						
070204-2MC	●				●	●	●	●								●	●	●	●																			0,4	3,5						
070208-2MC	●				●	●	●	●								●	●	●	●																			0,8	3,0						
11T302-EW	●	●	●	●																													9,52	4,40	3,97	11,60	0,2	3,9							
11T304-EW	●	●	●	●																																	0,4	3,5							
11T308-EW	●	●	●	●																																	0,8	3,0							
11T302-2MC	●				●	●	●	●								●	●	●	●																			0,2	3,9						
11T304-2MC	●				●	●	●	●								●	●	●	●																			0,4	3,5						
11T308-2MC	●				●	●	●	●								●	●	●	●																			0,8	3,0						
150404-EW	●	●																															12,70	5,50	4,76	15,50	0,4	3,5							
150408-EW	●	●																																			0,8	3,0							



# TURNING | ISO

TECHNOLOGY

TURNING

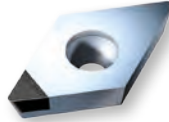
GROOVING

BORING

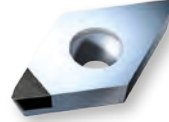
MILLING

## DCGW

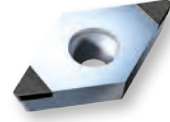
Solid tipped corners



EWS



W-EWS



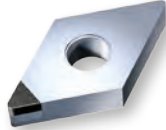
2MC/S

insert size	uncoated								coated																		dimensions					
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C									SBC-40C														
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1			
070202-EWS		●	●	●	●	●	●																									
070204-EWS		●	●	●	●	●	●																									
070208-EWS		●	●	●	●	●	●																									
070201R/L-W-EWS*		●	●	●	●	●	●																									
070202R/L-W-EWS*		●	●	●	●	●	●																	6,35	2,80	2,38	7,75		0,2 3,0			
070204R/L-W-EWS*		●	●	●	●	●	●																						0,4 3,0			
070202-2MC/S								●	●		●	●		●	●		●			●									0,2 3,4			
070204-2MC/S								●	●		●	●		●	●		●			●									0,4 3,0			
070208-2MC/S								●			●	●	●		●		●			●									0,8 2,6			
11T301R/L-W-EWS*		●	●	●	●	●	●																						0,1 3,0			
11T302R/L-W-EWS*		●	●	●	●	●	●																						0,2 3,0			
11T304R/L-W-EWS*		●	●	●	●	●	●																						0,4 3,0			
11T308R/L-W-EWS*		●	●	●	●	●	●																	9,52	4,40	3,97	11,60		0,8 3,0			
11T302-2MC/S								●	●	●		●	●		●	●	●		●										0,2 3,4			
11T304-2MC/S								●			●	●	●	●	●		●			●	●	●							0,4 3,0			
11T308-2MC/S								●		●	●	●	●	●		●	●	●		●	●	●							0,8 2,6			

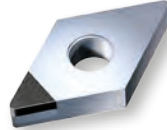
\* Wiper = 93° holder

## ■ DNGA

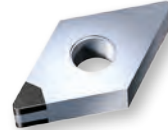
Standard tipped corners  
Sandwich tipped corners



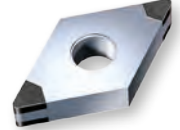
EW



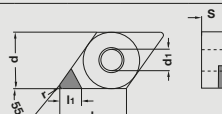
MW



2SC



4SC

insert size	uncoated				coated																dimensions																								
	PBC-10		PBC-15		PBC-25				PBC-40				PBC-10S				PBC-15S				PBC-25S				PBC-40S																				
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r
110402-EW	●	●	●	●	●	●	●	●																																				0,2	3,9
110404-EW	●	●	●	●	●	●	●	●																																9,52	3,81	4,76	11,60	0,4	3,5
110408-EW	●	●	●	●	●	●	●	●																																				0,8	3,0
150402-EW	●	●	●	●	●	●	●	●																																				0,2	3,9
150404-EW	●	●	●	●	●	●	●	●																																				0,4	3,5
150408-EW	●	●	●	●	●	●	●	●																																				0,8	3,0
150408-MW	●	●	●	●	●	●	●	●																																				0,8	5,0
150412-MW	●	●	●	●	●	●	●	●																																12,70	5,13	4,76	15,50	1,2	4,5
150404-2SC									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													0,4	2,8
150408-2SC									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													0,8	2,6
150404-4SC									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													0,4	2,8
150408-4SC									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													0,8	2,6
150604-EW	●	●	●	●	●	●	●	●																																				0,4	3,5
150608-EW	●	●	●	●	●	●	●	●																																				0,8	3,0
150604-MW	●	●	●	●	●	●	●	●																																				0,4	5,5
150608-MW	●	●	●	●	●	●	●	●																																				0,8	5,0
150612-MW	●	●	●	●	●	●	●	●																																12,70	5,13	6,35	15,50	1,2	4,5
150604-2SC									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													0,4	2,8
150608-2SC									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													0,8	2,6
150604-4SC									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													0,4	2,8
150608-4SC									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													0,8	2,6

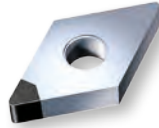


CERATIZIT GROUP

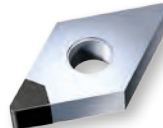
# TURNING ISO

## ■ DNGA

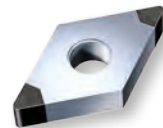
Solid tipped corners



PC-S



PC-S/4

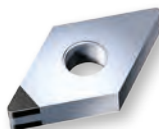


PC-M

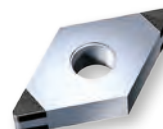
insert size	uncoated								coated																dimensions					
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C													
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>	
150404-PC-S	●	●	●	●	●	●	●																	12,70	5,13	4,76	15,50	0,4	2,8	
150408-PC-S	●	●	●	●	●	●	●																					0,8	2,6	
150412-PC-S	●	●	●	●	●	●	●																					1,2	2,4	
150404-PC-M	●		●		●		●																					0,4	2,8	
150408-PC-M	●		●		●		●																					0,8	2,6	
150412-PC-M	●		●		●		●																					1,2	2,4	
150604-PC-S	●	●	●	●	●	●	●																					0,4	2,8	
150608-PC-S	●	●	●	●	●	●	●																					0,8	2,6	
150612-PC-S	●	●	●	●	●	●	●																					1,2	2,4	
150604-PC-S/4	●																										0,4	4,0		
150608-PC-S/4	●																											0,8	3,6	
150612-PC-S/4	●																											1,2	3,2	
150604-PC-M	●		●		●		●																					0,4	2,8	
150608-PC-M	●		●		●		●																					0,8	2,6	
150612-PC-M	●		●		●		●																					1,2	2,4	

## ■ DNGA

Solid tipped corners



2MC/S



4MC/S

insert size	uncoated								coated																dimensions					
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C													
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>	
150604-2MC/S								●		●	●	●	●	●				●	●	●	●	●	●		12,70	5,13	6,35	15,50	0,4	2,8
150608-2MC/S								●		●	●	●	●	●				●	●	●	●	●	●					0,8	2,5	
150612-2MC/S								●		●	●	●	●	●				●	●	●	●	●	●					1,2	2,2	
150604-4MC/S								●		●	●	●	●	●				●	●	●	●	●	●					0,4	2,8	
150608-4MC/S								●		●	●	●	●	●				●	●	●	●	●	●					0,8	2,5	
150612-4MC/S								●		●	●	●	●	●				●	●	●	●	●	●					1,2	2,2	



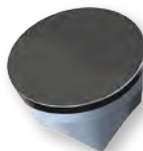
## RCGW Fullface



VM

insert size	uncoated				coated																dimensions																	
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
0602M0-VM	●	●			●	●	●	●																									6,00	2,80	2,38			
0803M0-VM	●	●			●	●	●	●																									8,00	3,40	3,18			
1003M0-VM		●				●	●	●																									10,00	4,40	3,18			
10T3M0-VM		●				●	●	●																											3,97			
1204M0-VM		●				●	●	●																									12,00	4,40	4,76			

## RCGX Fullface



VM

insert size	uncoated				coated																dimensions																	
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
060600-VM			●	●	●	●	●	●																									6,35		6,35			
090700-VM			●	●	●	●	●	●																									9,52		7,94			
120700-VM			●	●	●	●	●	●																									12,70		7,94			

## RNGA Fullface Double fullface



VM



SE

insert size	uncoated				coated																dimensions																	
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
090300-VM	●	●			●	●	●	●																									9,52	3,81	3,18			
120400-VM	●	●			●	●	●	●																														
120400-SE						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	12,70	5,13	4,76							



# TURNING | ISO

## RNGN

Fullface  
Double fullface



VM



SE

insert size	uncoated				coated																dimensions																										
	PBC-10		PBC-15		PBC-25				PBC-40				PBC-10S				PBC-15S				PBC-25S				PBC-40S																						
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1	
090300-VM	●	●			●	●	●	●																																9,52		3,18					
090300-SE									●	●						●	●	●	●	●	●																					12,70		3,18			
120300-SE									●	●						●	●	●	●	●	●													12,70		4,76											
120400-VM	●	●			●	●	●	●																																12,70		4,76					
120400-SE									●	●						●	●	●	●	●	●																										

## RNGN

Solid

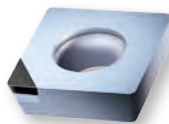


SBC

insert size	uncoated				coated																dimensions									
	SBC-1		SBC-10		SBC-25				SBC-40				SBC-25C								SBC-40C									
	H	A	G		A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1
090300-SBC	●				●				●															9,52		3,18				
120300-SBC	●				●																			12,70		3,18				
120400-SBC	●																							12,70		4,76				

## SCGW

Standard tipped corners



EW

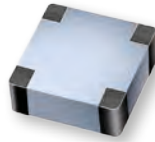


GS

insert size	uncoated				coated																dimensions																																		
	PBC-10		PBC-15		PBC-25				PBC-40				PBC-10S				PBC-15S				PBC-25S				PBC-40S																														
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1									
09T304-EW	●	●	●	●	●	●	●	●																																9,52	4,40	3,97	9,52			0,4	3,5								
09T308-EW	●	●	●	●	●	●	●	●																																														0,8	3,4
09T304-GS	●	●	●	●	●	●	●	●																																						0,4	9,5								
09T308-GS	●	●	●	●	●	●	●	●																																						0,8	9,5								
120404-EW	●	●			●	●																																		12,70	5,50	4,76	12,70			0,4	3,5								
120408-EW	●	●			●	●																																								0,8	3,4								
120412-EW	●	●			●	●																																								1,2	3,2								

## SNGN

Solid tipped corners

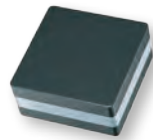


PC-M

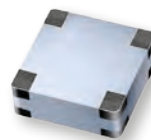
insert size	uncoated								coated																dimensions					
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C													
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>	
090304-PC-M	●				●		●																	9,52		3,18	9,52	0,4	3,0	
090308-PC-M	●			●	●	●	●																						0,8	2,8
090312-PC-M	●			●	●	●	●																						1,2	2,6
120404-PC-M	●	●	●		●	●	●																						0,4	3,0
120408-PC-M	●	●	●	●	●	●	●																	12,70		4,76	12,70	0,8	2,8	
120412-PC-M	●	●	●	●	●	●	●																						1,2	2,6

## SNGN

Sandwich tipped corners  
Double fullface



SE



8SC

insert size	uncoated								coated																dimensions																											
	PBC-10		PBC-15		PBC-25		PBC-40		PC-10S				PBC-15S				PBC-25S				PBC-40S																															
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>						
090308-SE								●	●	●						●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	9,52		3,18	9,52	0,8			
120308-SE								●	●	●						●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	12,70		3,18	12,70	0,8	
120408-8SC								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	12,70		4,76	12,70	0,8	2,8
120412-8SC								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	12,70		4,76	12,70	1,2	2,6
120408-SE								●	●	●						●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	12,70		4,76	12,70	0,8	
120412-SE								●	●	●						●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	12,70		4,76	12,70	1,2		

## SNGN

Solid



SBC

insert size	uncoated								coated																dimensions						
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C														
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>		
090304-SBC	●		●		●		●																	9,52		3,18			0,4	9,5	
090308-SBC	●		●		●		●																							0,8	9,5
090312-SBC	●		●		●		●																							1,2	9,5

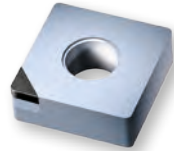


CERATIZIT GROUP

# TURNING ISO

## ■ SNGA

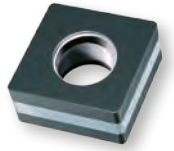
Standard/Sandwich tipped corners  
Double fullface



EW



8SC

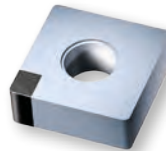


SE

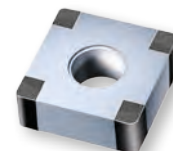
insert size	uncoated				coated																dimensions																	
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
120404-EW	●	●	●	●	●	●	●	●																													0,4	3,5
120408-EW	●	●	●	●	●	●	●	●																													0,8	3,4
120412-EW	●	●	●	●	●	●	●	●																													1,2	3,2
120408-8SC					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	12,70	5,13	4,76	12,70	0,8	2,8								
120412-8SC					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					1,2	2,6									
120408-SE					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					0,8										
120412-SE					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					1,2										

## ■ SNGA

Solid tipped corners



PC-S

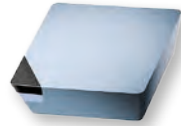


PC-M

insert size	uncoated				coated												dimensions												
	SBC-10		SBC-25		SBC-25C						SBC-40C																		
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
120404-PC-S	●	●	●	●	●	●	●	●																				0,4	3,0
120408-PC-S	●	●	●	●	●	●	●	●																				0,8	2,8
120412-PC-S	●	●	●	●	●	●	●	●																				1,2	2,6
120404-PC-M	●		●		●		●																	12,70	5,13	4,76	12,70	0,4	3,0
120408-PC-M	●		●		●		●																					0,8	2,8
120412-PC-M	●		●		●		●																					1,2	2,6

## SPGN

Standard tipped corners

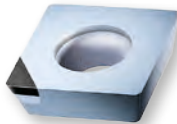


EW

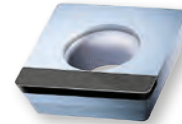
insert size	uncoated				coated																dimensions																	
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
120308-EW	●	●																															12,70		3,18	12,70	0,8	3,4
120312-EW	●	●																																			1,2	3,2

## SPGW

Standard tipped corners



EW



GS

insert size	uncoated				coated																dimensions																					
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																									
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>				
09T304-EW	●	●																																							0,4	3,5
09T308-EW	●	●																																			0,8	3,4				
09T304-GS	●	●																															9,52	4,40	3,97	9,52	0,4	9,5				
09T308-GS	●	●																																			0,8	9,5				
120404-EW	●	●																																			0,4	3,5				
120408-EW	●	●																																			0,8	3,4				
120412-EW	●	●																																			1,2	3,2				

## TBGN

Fullface



VM

insert size	uncoated				coated																dimensions																									
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																													
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>								
060102-VM	●	●																																											0,2	6,5
060104-VM	●	●																																							0,4	6,5				
060108-VM	●	●																																							0,8	6,5				

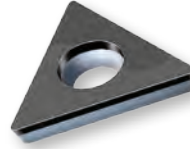


CERATIZIT GROUP

# TURNING | ISO

## TBGW

Fullface

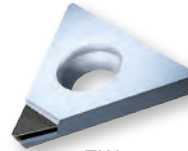


VM

insert size	uncoated				coated																dimensions																
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																				
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r
060102-VM	●	●			●	●	●																									3,97	2,30	1,59		0,2	6,5
060104-VM	●	●			●	●	●																													0,4	6,5
060108-VM	●	●			●	●	●																													0,8	6,5

## TCGT

Standard tipped corners (positive)

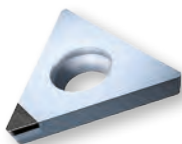


EW

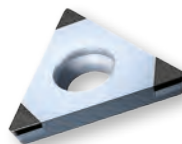
insert size	uncoated				coated																dimensions																
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																				
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r
090202-EW	●	●	●	●	●	●	●																									5,56	2,50	2,38	9,60	0,2	3,8
090204-EW	●	●	●	●	●	●	●																													0,4	3,5
110202-EW	●	●	●	●	●	●	●																									6,35	2,80	2,38	11,00	0,2	3,8
110204-EW	●	●	●	●	●	●	●																													0,4	3,5

## TCGW

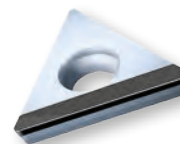
Standard tipped corners



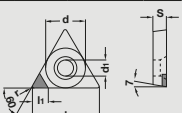
EW



3MC

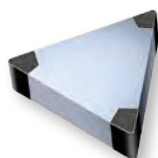


GS

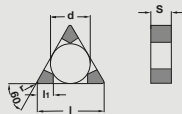
insert size	uncoated								coated																dimensions																																						
	PBC-10		PBC-15		PBC-25		PBC-40		PBC-10S				PBC-15S				PBC-25S				PBC-40S																																										
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>																	
090202-EW	●	●			●	●	●																															0,2	3,8																								
090204-EW	●	●	●	●	●	●	●																															0,4	3,5																								
090208-EW	●	●			●	●	●																															0,8	3,0																								
090202-3MC								●	●	●	●							●	●	●	●																5,56	2,50	2,38	9,60	0,2	2,6																					
090204-3MC								●	●	●	●	●						●	●	●	●	●																0,4	2,2																								
090208-3MC								●	●	●	●	●						●	●	●	●	●																0,8	1,8																								
090204-GS	●	●			●	●	●																															0,4	9,6																								
110202-EW	●	●			●	●	●																															0,2	3,8																								
110204-EW	●	●	●	●	●	●	●																															0,4	3,5																								
110208-EW	●	●			●	●	●																															0,8	3,0																								
110202-3MC								●	●	●	●							●	●	●	●																	6,35	2,80	2,38	11,00	0,2	2,9																				
110204-3MC								●	●	●	●	●						●	●	●	●	●																	0,4	2,5																							
110208-3MC								●	●	●	●	●						●	●	●	●	●																	0,8	2,1																							
110204-GS	●	●			●	●	●																																0,4	11,0																							
110208-GS	●				●	●	●																															0,8	11,0																								
16T304-3MC								●	●	●	●							●	●	●	●																	0,4	3,2																								
16T308-3MC								●	●	●	●							●	●	●	●																	0,8	2,7																								
16T304-GS	●				●	●	●																															0,4	16,5																								
16T308-GS	●				●	●	●																															0,8	16,5																								

## TNGN

Solid tipped corners



PC-M

insert size	uncoated								coated																dimensions																	
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C																									
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>													
160404-PC-M	●		●		●	●																															9,52		4,76	16,50	0,4	3,0
160408-PC-M	●		●		●	●																																		0,8	2,6	
160412-PC-M	●		●		●	●																																		1,2	2,4	



# TURNING | ISO

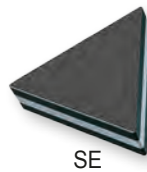
## TNGN Solid



SBC

insert size	uncoated								coated																dimensions						
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C														
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	h <sub>1</sub>		
110304-SBC	●			●			●																							0,4	
110308-SBC	●			●			●																							0,8	
110312-SBC	●			●			●																							1,2	

## TNGN Double fullface



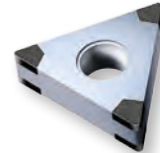
SE

insert size	uncoated								coated																																dimensions					
	PBC-10		PBC-15		PBC-25		PBC-40		PBC-10S								PBC-15S								PBC-25S								PBC-40S													
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	h <sub>1</sub>
110304-SE								●	●	●						●	●	●	●	●														6,35		3,18	11,00	0,4								
110308-SE								●	●	●					●	●	●	●	●															6,35		3,18	11,00	0,8								
160404-SE								●	●	●					●	●	●	●	●															9,52		4,76	16,50	0,4								
160408-SE								●	●	●					●	●	●	●	●															9,52		4,76	16,50	0,8								
160412-SE								●	●	●					●	●	●	●	●															9,52		4,76	16,50	1,2								

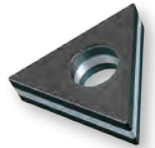
## TNGA Standard- / Sandwich tipped corners Double fullface



EW



6SC



SE

insert size	uncoated								coated																																dimensions					
	PBC-10		PBC-15		PBC-25		PBC-40		PBC-10S								PBC-15S								PBC-25S								PBC-40S													
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	h <sub>1</sub>
110304-EW	●	●			●	●	●	●	●	●					●	●	●	●	●														6,35	2,26	3,18	11,00	0,4	2,8								
110308-EW	●	●			●	●	●	●	●	●					●	●	●	●	●														6,35	2,26	3,18	11,00	0,8	2,5								
110304-SE								●	●	●					●	●	●	●	●														6,35	2,26	3,18	11,00	0,4									
110308-SE								●	●	●					●	●	●	●	●														6,35	2,26	3,18	11,00	0,8									
160404-EW	●	●			●	●	●	●	●	●					●	●	●	●	●														9,52	3,81	4,76	16,50	0,4	3,5								
160408-EW	●	●			●	●	●	●	●	●					●	●	●	●	●														9,52	3,81	4,76	16,50	0,8	3,0								
160412-EW	●	●			●	●	●	●	●	●					●	●	●	●	●														9,52	3,81	4,76	16,50	1,2	2,6								
160404-6SC								●	●	●					●	●	●	●	●														9,52	3,81	4,76	16,50	0,4	2,8								
160408-6SC								●	●	●					●	●	●	●	●														9,52	3,81	4,76	16,50	0,8	2,5								
160412-6SC								●	●	●					●	●	●	●	●														9,52	3,81	4,76	16,50	1,2	2,2								
160404-SE								●	●	●					●	●	●	●	●														9,52	3,81	4,76	16,50	0,4									
160408-SE								●	●	●					●	●	●	●	●														9,52	3,81	4,76	16,50	0,8									
160412-SE								●	●	●					●	●	●	●	●														9,52	3,81	4,76	16,50	1,2									

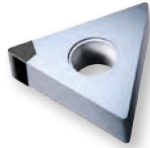


# TURNING ISO

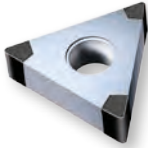


## TNGA

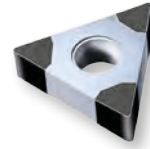
Solid tipped corners



PC-S



PC-M

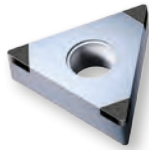


PC-M/4

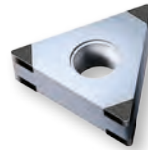
insert size	uncoated								coated																dimensions									
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C																	
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>					
160404-PC-S	●	●	●	●	●	●	●																	9,52	3,81	4,76	16,50	0,4	3,0					
160408-PC-S	●	●	●	●	●	●	●																									0,8	2,6	
160412-PC-S	●	●	●	●	●	●	●																										1,2	2,4
160404-PC-M	●		●		●		●																										0,4	3,0
160408-PC-M	●		●		●		●																										0,8	2,6
160412-PC-M	●		●		●		●																										1,2	2,4
160404-PC-M/4	●																																0,4	4,5
160408-PC-M/4	●																																0,8	4,2
160412-PC-M/4	●																																1,2	4,0

## TNGA

Solid tipped corners



3MC/S

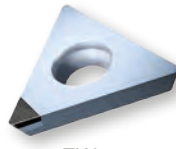


6MC/S

insert size	uncoated								coated																dimensions									
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C																	
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>					
160404-3MC/S								●	●		●	●	●				●	●	●	●	●	●		9,52	3,81	4,76	16,50	0,4	3,0					
160408-3MC/S								●	●	●	●	●	●	●			●	●	●	●	●	●											0,8	2,6
160412-3MC/S								●	●		●	●	●	●				●	●	●	●	●											1,2	2,4
160404-6MC/S								●	●		●	●	●				●	●	●	●	●	●											0,4	3,0
160408-6MC/S								●	●	●	●	●	●	●			●	●	●	●	●	●											0,8	2,6
160412-6MC/S								●	●		●	●	●	●				●	●	●	●	●											1,2	2,4

## TPGA

Standard tipped corners



EW

insert size	uncoated				coated																								dimensions																			
	PBC-10		PBC-15		PBC-25		PBC-40		PBC-10S						PBC-15S						PBC-25S						PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>		
110302-EW	●				●		●																																								0,2	3,8
110304-EW	●	●	●	●	●	●	●																																								0,4	3,5
110308-EW	●				●		●																																								0,8	3,0

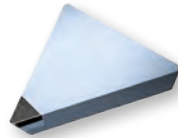


CERATIZIT GROUP

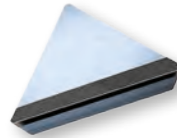
# TURNING ISO

## TPGN

Standard tipped corners



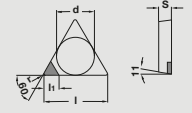
EW



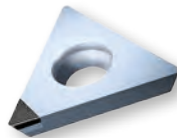
GS



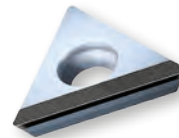
VM

insert size	uncoated				coated																dimensions																										
	PBC-10		PBC-15		PBC-25		PBC-40		PBC-10S				PBC-15S				PBC-25S				PBC-40S																										
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H			A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r
110302-EW	●	●			●	●	●	●																																						0,2	3,8
110304-EW	●	●	●	●	●	●	●	●																														0,4	3,5								
110308-EW	●	●			●	●	●	●																														0,8	3,0								
110304-GS		●		●		●	●	●																									6,35		3,18	11,00		0,4	11,0								
110308-GS		●		●		●	●	●																														0,8	11,0								
110304-VM		●		●		●	●	●																														0,4	11,0								
110308-VM		●		●		●	●	●																														0,8	11,0								
160304-EW	●	●			●	●	●	●																														0,4	3,5								
160308-EW	●	●			●	●	●	●																														0,8	3,0								
160304-GS		●		●		●	●	●																									9,52		3,18	16,50		0,8	16,5								
160308-GS		●		●		●	●	●																														0,8	16,5								

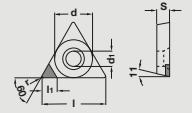
Standard tipped corners



EW

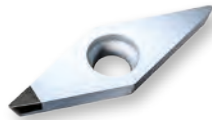


GS

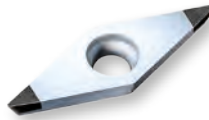
insert size	uncoated				coated																dimensions																										
	PBC-10		PBC-15		PBC-25		PBC-40		PBC-10S				PBC-15S				PBC-25S				PBC-40S																										
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H			A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r
090202-EW	●				●	●	●	●																																						0,2	3,8
090204-EW	●	●		●	●	●	●	●																									5,56	2,50	2,38	9,60		0,4	3,5								
090204-GS		●		●		●	●	●																														0,4	9,6								
110202-EW		●		●		●	●	●																														0,2	3,8								
110204-EW		●		●		●	●	●																									6,35	2,80	2,38	11,00		0,4	3,5								
110208-GS		●		●		●	●	●																														0,8	11,0								
110302-EW	●	●			●	●	●	●																														0,2	3,8								
110304-EW	●	●		●	●	●	●	●																														0,4	3,5								
110308-EW	●	●			●	●	●	●																									6,35	2,80	3,18	11,00		0,8	3,0								
110304-GS	●	●		●	●	●	●	●																														0,4	11,0								
110308-GS	●	●			●	●	●	●																														0,8	11,0								
160404-EW	●	●		●	●	●	●	●																														0,4	3,5								
160408-EW	●	●			●	●	●	●																									9,52	4,40	4,76	16,50		0,8	3,0								
160408-GS		●		●		●	●	●																														0,8	16,5								

## ■ VBGW

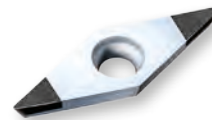
Solid tipped corners



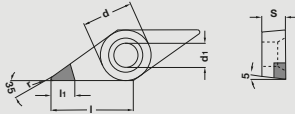
EWS



2MC-S

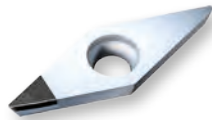


2MC-S/4

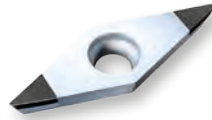
insert size	uncoated								coated																dimensions					
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C													
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1	
110202-EWS		●	●	●	●	●	●																	6,35	2,90	2,38	11,10	0,2	3,5	
110204-EWS		●	●	●	●	●	●																						0,4	3,1
160402-EWS		●	●	●	●	●	●																						0,2	3,5
160404-EWS		●	●	●	●	●	●																						0,4	3,1
160408-EWS		●	●	●	●	●	●																						0,8	2,8
160402-2MC-S		●	●	●	●	●	●																						0,2	3,5
160404-2MC-S		●	●	●	●	●	●																						0,4	3,1
160408-2MC-S		●	●	●	●	●	●																						0,8	2,8
160404-2MC-S/4	●																												0,4	4,4
160408-2MC-S/4	●																												0,8	4,2
160412-2MC-S/4	●																												1,2	4,0

## ■ VBGW

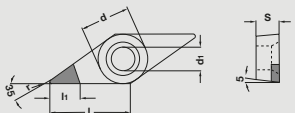
Standard tipped corners



MW



2MC

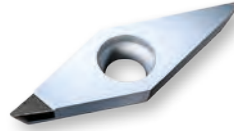
insert size	uncoated				coated																																dimensions																	
	PBC-10		PBC-15		PBC-25		PBC-40		PBC-10S								PBC-15S								PBC-25S								PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1								
110202-MW	●	●	●	●	●	●	●																																										6,35	2,90	2,38	11,00	0,2	4,7
110204-MW	●	●	●	●	●	●	●																																														0,4	4,5
110208-MW	●	●	●	●	●	●	●																																														0,8	4,2
160402-MW	●	●	●	●	●	●	●																																														0,2	5,3
160404-MW	●	●	●	●	●	●	●																																														0,4	5,0
160408-MW	●	●	●	●	●	●	●																																														0,8	4,4
160412-MW	●	●	●	●	●	●	●																																														1,2	3,9
160416-MW	●				●	●	●																																													1,6	3,5	
160404-2MC								●	●	●	●						●	●	●	●				●	●	●	●																									0,4	3,1	
160408-2MC								●	●	●	●						●	●	●	●				●	●	●	●																										0,8	2,5



# TURNING | ISO

## VC GT

Solid tipped corners (positive)

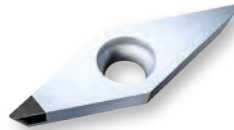


EWS

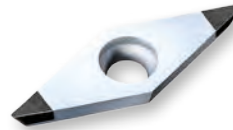
insert size	uncoated								coated																dimensions					
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C													
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>	
070202-EWS		●		●		●																		3,97	2,20	2,38	6,90	0,2	3,5	
070204-EWS		●		●		●																					0,4	3,2		
110302-EWS		●		●		●																		6,35	2,90	3,18	11,10	0,2	3,5	
110304-EWS		●		●		●																					0,4	3,2		
130302-EWS		●		●		●																		7,94	3,40	3,18	13,30	0,2	3,5	
130304-EWS		●		●		●																					0,4	3,2		
160402-EWS		●		●		●																						0,2	3,5	
160404-EWS		●		●		●																		9,52	4,40	4,76	16,60	0,4	3,2	
160408-EWS		●		●		●																						0,8	2,8	

## VC GW

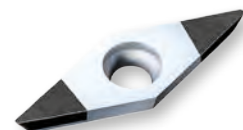
Solid tipped corners



EWS



2MC-S

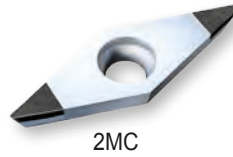
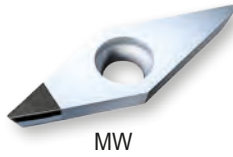


2MC-S/4

insert size	uncoated								coated																dimensions					
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C													
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>	
070202-EWS		●	●	●	●	●																		3,97	2,20	2,38	6,90	0,2	3,5	
070204-EWS		●	●	●	●	●																						0,4	3,2	
110302-MC-S		●	●	●	●	●																		6,35	2,90	3,18	11,10	0,2	3,5	
110304-MC-S		●	●	●	●	●																						0,4	3,2	
130302-2EWS		●	●	●	●	●																		7,94	3,40	3,18	13,30	0,2	3,5	
130304-2EWS		●	●	●	●	●																						0,4	3,2	
160402-EWS		●	●	●	●	●																						0,2	3,5	
160404-EWS		●	●	●	●	●																		9,52	4,40	4,76	16,60	0,4	3,2	
160408-EWS		●	●	●	●	●																						0,8	2,8	
160402-2MC-S		●	●	●	●	●																						0,2	3,5	
160404-2MC-S		●	●	●	●	●																		9,52	4,40	4,76	16,60	0,4	3,2	
160408-2MC-S		●	●	●	●	●																						0,8	2,8	
160404-2MC-S/4	●																											0,4	4,4	
160408-2MC-S/4	●																											0,8	4,2	
160412-2MC-S/4	●																											1,2	4,0	

## VCGW

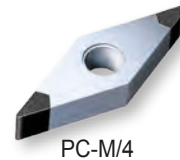
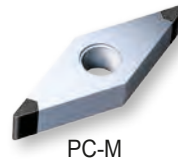
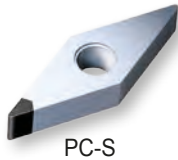
Standard tipped corners



insert size	uncoated				coated																dimensions																								
	PBC-10		PBC-15		PBC-25				PBC-40				PBC-10S				PBC-15S				PBC-25S				PBC-40S																				
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r
070202-MW	●	●	●	●	●	●	●	●																																3,97	2,20	2,38	6,90	0,2	3,8
070204-MW	●	●	●	●	●	●	●	●																																				0,4	3,5
110302-MW	●	●	●	●	●	●	●	●																																				0,2	4,7
110304-MW	●	●	●	●	●	●	●	●																																				0,4	4,5
110308-MW	●	●			●	●	●	●																																6,35	2,90	3,18	11,00	0,8	4,2
110304-2MC					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					0,4	3,1								
110308-2MC					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					0,8	2,5								
160402-MW	●	●	●	●	●	●	●	●																												0,2	5,3								
160404-MW	●	●	●	●	●	●	●	●																												0,4	5,0								
160408-MW	●	●	●	●	●	●	●	●																												0,8	4,4								
160412-MW	●	●	●	●	●	●	●	●																												1,2	3,9								
160404-2MC					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					0,4	3,1								
160408-2MC					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					0,8	2,5								

## VNGA

Solid tipped corners



insert size	uncoated				coated																dimensions																
	SBC-1		SBC-10		SBC-25				SBC-40				SBC-25C								SBC-40C																
	H	A	G		A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>							
160402-PC-S	●	●	●		●	●	●	●																												0,2	3,0
160404-PC-S	●	●	●		●	●	●	●																												0,4	2,8
160408-PC-S	●	●	●		●	●	●	●																												0,8	2,4
160412-PC-S	●	●	●		●	●	●	●																												1,2	2,2
160404-PC-M	●		●		●		●																													0,4	2,8
160408-PC-M	●		●		●		●																													0,8	2,4
160412-PC-M	●		●		●		●																													1,2	2,2
160404-PC-M/4	●																																			0,4	4,4
160408-PC-M/4	●																																			0,8	4,2
160412-PC-M/4	●																																			1,2	4,0

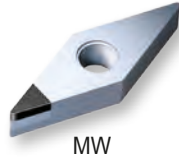


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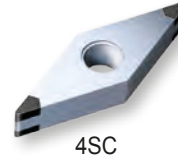
# TURNING | ISO

## VNGA

Standard tipped corners  
Sandwich tipped corners



MW

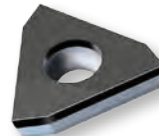


4SC

insert size	uncoated				coated																dimensions																									
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																													
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
160404-MW	●	●	●	●	●	●	●	●																																					0,4	5,0
160408-MW	●	●	●	●	●	●	●	●																													0,8	4,4								
160412-MW	●				●			●																									9,52	3,81	4,76	16,50	1,2	3,9								
160404-4SC									●		●	●	●				●	●	●	●	●	●	●														0,4	2,8								
160408-4SC									●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													0,8	2,2								

## WBGW

Fullface

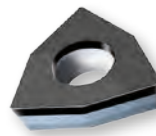


VM

insert size	uncoated				coated																dimensions																	
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
020102L-VM	●	●	●		●	●	●	●																									3,97	2,30	1,59		0,2	4,8
020104L-VM	●	●	●		●	●	●	●																													0,4	4,8

## WCGW

Fullface



VM

insert size	uncoated				coated																dimensions																	
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d <sub>1</sub>	s	l	r	l <sub>1</sub>
020102-VM	●	●	●		●	●	●	●																									3,97	2,30	1,59		0,2	2,7
020104-VM	●	●	●		●	●	●	●																													0,4	2,7

## WNGA

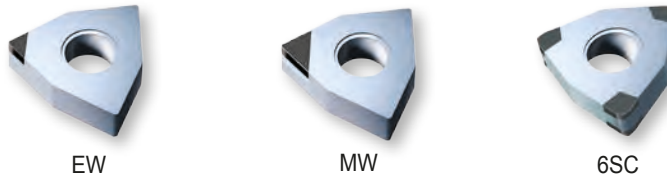
Solid tipped corners



insert size	uncoated								coated																dimensions					
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C													
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1	
080404-PC-S	●	●	●	●	●	●	●																							
080408-PC-S	●	●	●	●	●	●	●																							
080412-PC-S	●	●	●	●	●	●	●																							
080404-PC-M	●		●		●		●																							
080408-PC-M	●		●		●		●																							
080412-PC-M	●		●		●		●																							
080404-PC-M/4	●																													
080408-PC-M/4	●																													
080412-PC-M/4	●																													

## WNGA

Standard tipped corners  
Sandwich tipped corners



insert size	uncoated				coated																dimensions																				
	PBC-10		PBC-15		PBC-25		PBC-40		PBC-10S				PBC-15S				PBC-25S				PBC-40S																				
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1			
080404-EW	●	●	●	●	●	●	●																																		
080408-EW	●	●	●	●	●	●	●																																		
080412-EW	●	●	●	●	●	●	●																																		
080404-MW	●	●	●	●	●	●	●																																		
080408-MW	●	●	●	●	●	●	●																																		
080412-MW	●	●	●	●	●	●	●																																		
080404-6SC								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
080408-6SC								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
080412-6SC								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
080404W-6SC								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
080408W-6SC								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

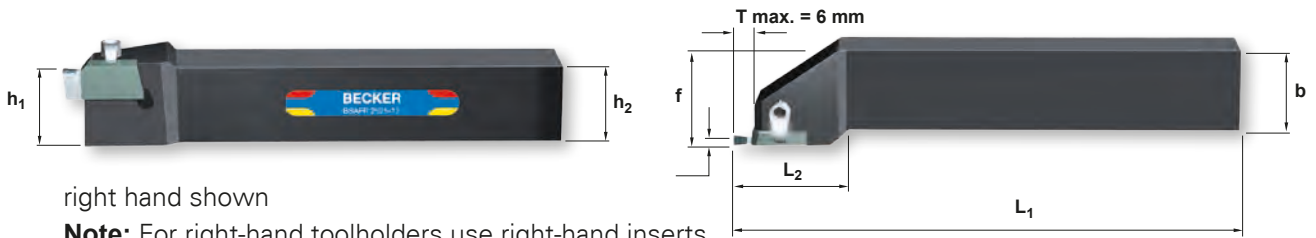


CERATIZIT GROUP

# GROOVING FormCut

## BSAFR/L

Toolholder, external radial grooving



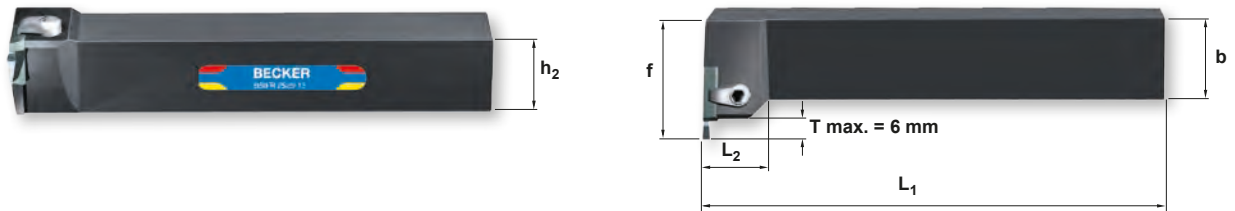
right hand shown

**Note:** For right-hand toolholders use right-hand inserts, for left-hand toolholders use left-hand inserts only.

designation		dimensions					
right-hand	left-hand	$h_1$	$h_2$	$b$	$f$	$L_1$	$L_2$
BSAFR 1616 - 12	BSAFL 1616 - 12	16	16	16	20	106	31
BSAFR 2020 - 12	BSAFL 2020 - 12	20	20	20	24	131	31
BSAFR 2525 - 12	BSAFL 2525 - 12	25	25	25	30	156	31
BSAFR 3225 - 12	BSAFL 3225 - 12	32	32	25	30	176	31

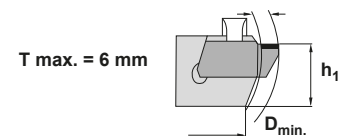
## BSIFR/L

Toolholder, internal radial grooving



right hand shown

**Note:** For right-hand toolholders use left-hand inserts, for left-hand toolholders use right-hand inserts only.



designation		dimensions						
right-hand	left-hand	$h_1$	$h_2$	$b$	$f$	$L_1$	$L_2$	$D_{min.}$
BSIFR 1616 - 12	BSIFL 1616 - 12	16	16	16	28	100	18	50
BSIFR 2020 - 12	BSIFL 2020 - 12	20	20	20	32	125	18	72
BSIFR 2525 - 12	BSIFL 2525 - 12	25	25	25	37	150	18	110
BSIFR 3225 - 12	BSIFL 3225 - 12	32	32	25	37	170	18	110

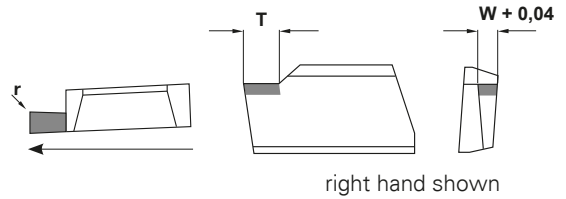
## Spare parts





## ■ BFSN

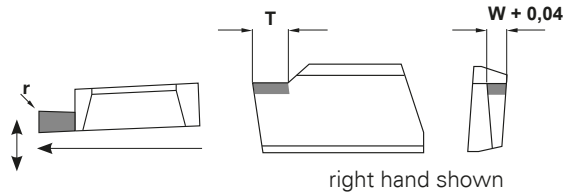
External grooving



insert size	uncoated				coated																												dimensions										
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S							PBC-15S							PBC-25S							PBC-40S																	
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	W	T	r
BFSN-2,5-R/L	●				●																														2,5	5	0,2						
BFSN-3,0-R/L	●				●																																3,0	6	0,2				
BFSN-3,5-R/L	●				●																																	3,5	6	0,2			
BFSN-4,0-R/L	●				●																																	4,0	6	0,2	0,4		
BFSN-4,5-R/L	●				●																																	4,5	6	0,2			
BFSN-5,0-R/L	●				●																																	5,0	6	0,2	0,4		

## ■ BFSV

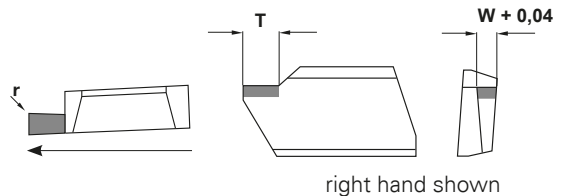
External grooving and turning



insert size	uncoated				coated																												dimensions										
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S							PBC-15S							PBC-25S							PBC-40S																	
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	W	T	r
BFSV-3,0-R/L	●				●																																3,0	6	0,2				
BFSV-3,5-R/L	●				●																																	3,5	6	0,2			
BFSV-4,0-R/L	●				●																																	4,0	6	0,2			
BFSV-4,5-R/L	●				●																																	4,5	6	0,2			
BFSV-5,0-R/L	●				●																																	5,0	6	0,2			

## ■ BFIN

Internal grooving



insert size	uncoated				coated																												dimensions										
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S							PBC-15S							PBC-25S							PBC-40S																	
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	W	T	r
BFIN-2,5-R/L					●	●																																2,5	5	0,2			
BFIN-3,0-R/L	●				●	●																																3,0	6	0,2			
BFIN-3,5-R/L	●				●	●																																3,5	6	0,2			
BFIN-4,0-R/L					●	●																																4,0	6	0,2	0,4		
BFIN-4,5-R/L					●	●																																4,5	6	0,2			



CERATIZIT GROUP

# GROOVING FormCut

TECHNOLOGY

TURNING

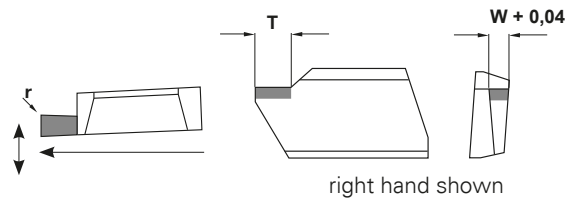
GROOVING

BORING

MILLING

## BFIV

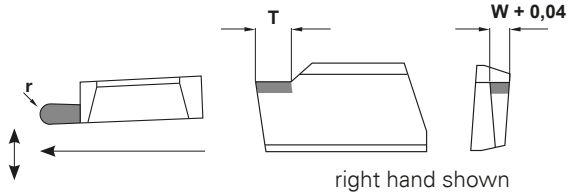
Internal grooving and turning



insert size	uncoated				coated																dimensions															
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																			
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	W	T	r	r
BFIV-3,0-R/L					●	●																											3,0	6	0,2	0,4
BFIV-3,5-R/L	●				●	●																											3,5	6	0,2	0,4
BFIV-4,0-R/L	●				●	●																											4,0	6	0,2	0,5
BFIV-4,5-R/L					●	●																											4,5	6	0,2	0,5
BFIV-5,0-R/L					●	●																											5,0	6	0,2	0,6

## BFRV

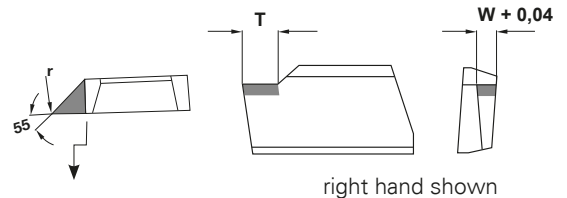
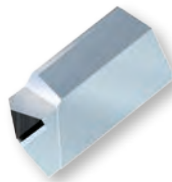
External copying



insert size	uncoated				coated																dimensions															
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																			
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	W	T	r	r
BFRV-3,0-R/L	●				●	●																											3,0	6	1,50	
BFRV-3,5-R/L	●				●	●																											3,5	6	1,75	
BFRV-4,0-R/L	●				●	●																											4,0	6	2,00	
BFRV-4,5-R/L	●				●	●																											4,5	6	2,25	
BFRV-5,0-R/L	●				●	●																											5,0	6	2,50	

## BFDV

External profiling



insert size	uncoated				coated																dimensions															
	PBC-10	PBC-15	PBC-25	PBC-40	PBC-10S				PBC-15S				PBC-25S				PBC-40S																			
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	W	T	r	r
BFDV-0,2-R/L	●				●																												5	5	0,2	
BFDV-0,4-R/L	●				●																												5	5	0,4	
BFDV-0,8-R/L	●				●																												5	5	0,8	
BFDV-1,2-R/L	●				●																												5	5	1,2	

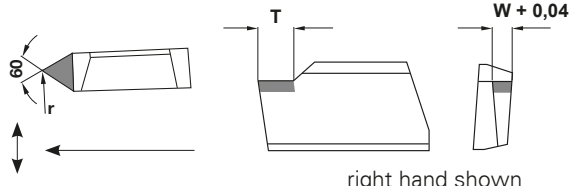
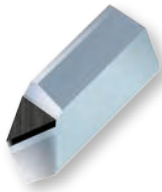
# GROOVING FormCut



TECHNOLOGY

## BFTV

External threading  
(partial profile)



insert size	uncoated				coated																																dimensions						
	PBC-10		PBC-15		PBC-10S								PBC-15S								PBC-25S								PBC-40S														
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	W	T	r
BFTV-0,10-R/L	●						●	●																																5	5	0,10	
BFTV-0,14-R/L	●						●	●																																5	5	0,14	
BFTV-0,18-R/L	●						●	●																																5	5	0,18	
BFTV-0,21-R/L	●						●	●																																5	5	0,21	
BFTV-0,25-R/L	●						●	●																																5	5	0,25	
BFTV-0,28-R/L	●						●	●																																5	5	0,28	
BFTV-0,36-R/L							●	●																																5	5	0,36	
BFTV-0,43-R/L							●	●																																5	5	0,43	

TURNING

Size of radius for metric ISO-thread.			
Size of radius	Pitch P (max.)	Pitch P (min.)	Pitch P (average)
r = 0,10	P = 0,80	P = 0,69	P = 0,75
r = 0,14	P = 1,12	P = 0,97	P = 1,00
r = 0,18	P = 1,44	P = 1,25	P = 1,35
r = 0,21	P = 1,68	P = 1,46	P = 1,55
r = 0,25	P = 2,00	P = 1,74	P = 1,87
r = 0,28	P = 2,24	P = 1,95	P = 2,10
r = 0,36	P = 2,99	P = 2,50	P = 2,70
r = 0,43	P = 3,44	P = 2,99	P = 3,20

GROOVING

BORING

MILLING

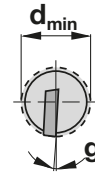
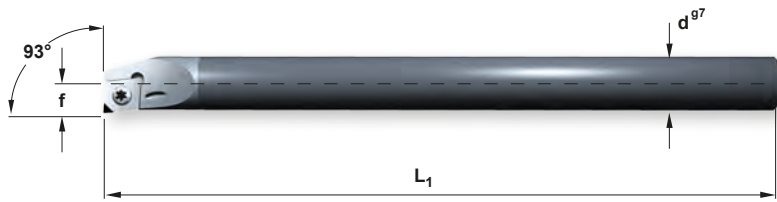


CERATIZIT GROUP

# BORING MiniCut

## Boring bars solid carbide

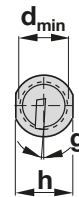
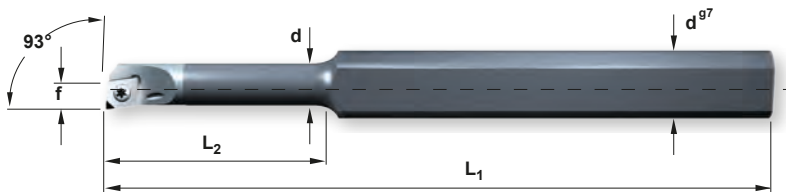
Design E...SEUP L/R



right hand shown

Right-hand boring bar with cylindrical solid carbide shank and internal coolant feed.

order number	insert	dimensions				
		$d_{min}$	$d^{97}$	f	$L_1$	g
E 06 F - SEUP L/R 04	EPH.. 0401..	6,8	6	3,4	80	9°
E 07 H - SEUP L/R 04	EPH.. 0401..	8,4	7	4,4	100	5°
E 08 H - SEUP L/R 04	EPH.. 0401..	9,5	8	4,9	100	5°
E 10 K - SEUP L/R 06	EPH.. 06T1..	11,5	10	5,8	125	5°
E 12 M - SEUP L/R 06	EPH.. 06T1..	13,5	12	6,9	150	3°
E 16 R - SEUP L/R 06	EPH.. 06T1..	18,5	16	9,8	200	0°



right hand shown

Right-hand boring bar with cylindrical solid carbide shank, two clamping surfaces and internal coolant feed.

order number	insert	dimensions							
		$d_{min}$	d	f	$L_1$	$L_2$	$d^{97}$	h	g
E 06 10 H - SEUP L/R 04	EPH.. 0401..	6,8	6	3,4	100	36	10	8	9°
E 07 10 K - SEUP L/R 04	EPH.. 0401..	8,4	7	4,4	125	42	10	8	5°
E 08 10 K - SEUP L/R 04	EPH.. 0401..	9,5	8	4,9	125	48	10	8	5°

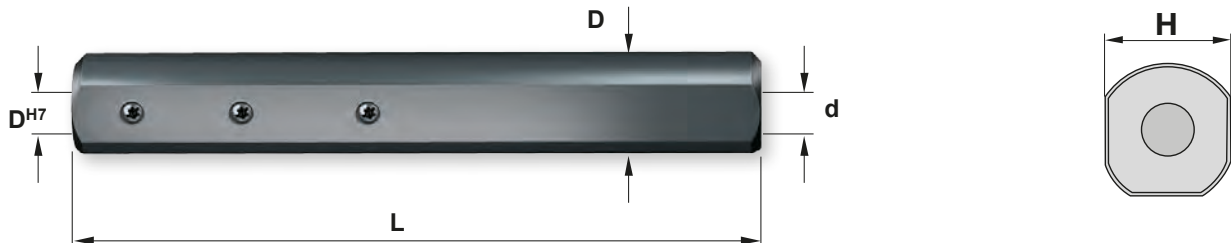
## Spare parts

screws and keys					
order number	SCR-1101	SCR-1102	KEY-2101	KEY-2102	VAR-5101
suitable for	EPH 0401..	EPH 06T1..	SCR-1101	SCR-1102	



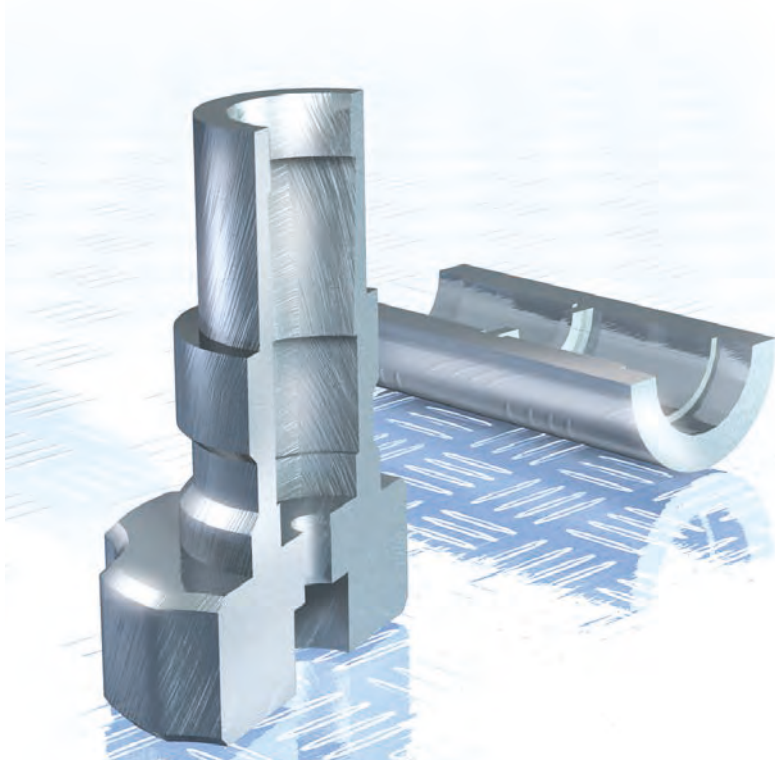
## ■ Adapter sleeve

For boring bars design X...GEUP



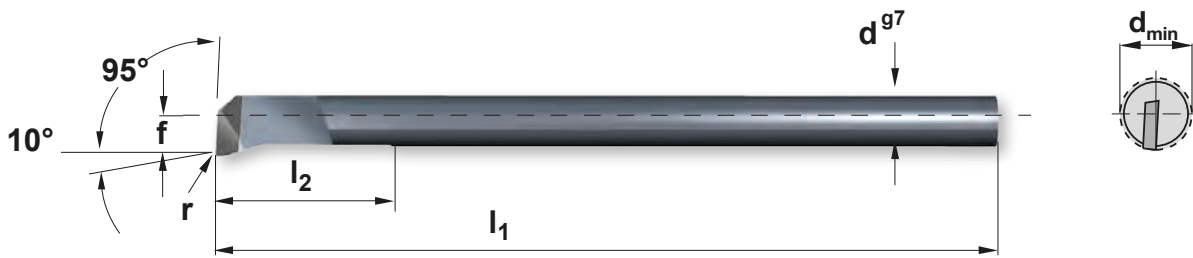
Adapter sleeves enable versatile use of the boring bars in all areas. Coolant feed is provided through the adapter.

order number	for boring bars	dimensions				
		D	d	D <sup>H7</sup>	H	L
Adap - 1635	X 3,5 F-GEUP L/R	16	4	3,5	14	100
Adap - 1640	X 04 F-GEUP L/R	16	5	4,0	14	100
Adap - 1650	X 05 H-GEUP L/R	16	6	5,0	14	100
Adap - 1660	X 06 H-GEUP L/R	16	8	6,0	14	100



## X-GE R/L

Solide carbide boring bars with one clamping surface, brazed cutting edges and internal coolant feed. Adapter sleeve refer to page 52.



right hand shown

order number	uncoated								coated																dimensions					
	SBC-1		SBC-10		SBC-25		SBC-40		SBC-25C								SBC-40C													
	H	A	G	A	F	A	G	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d <sup>g7</sup>	d <sub>min</sub>	f	l <sub>1</sub>	l <sub>2</sub>	r	
X3,5F-GEUP-R/L		●	●	●	●																			3,5	4,0	2,0	80	12	0,1	
X3,5F-GEUP-R/L		●	●	●	●																								0,2	
X04F-GEUP-R/L		●	●	●	●																				4,0	5,0	2,5	80	14	0,1
X04F-GEUP-R/L		●	●	●	●																								0,2	
X04F-GEUP-R/L		●	●	●	●																								0,4	
X05H-GEUP-R/L		●	●	●	●																								0,1	
X05H-GEUP-R/L		●	●	●	●																				5,0	6,0	3,0	100	18	0,2
X05H-GEUP-R/L		●	●	●	●																								0,4	
X06H-GEUP-R/L		●	●	●	●																								0,1	
X06H-GEUP-R/L		●	●	●	●																				6,0	7,0	3,5	100	20	0,2
X06H-GEUP-R/L		●	●	●	●																								0,4	



# MILLING | ISO

TECHNOLOGY

TURNING

GROOVING

BORING

MILLING

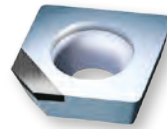
## RDHX Fullface



VM

insert size	uncoated				coated																dimensions													
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S						d	d <sub>1</sub>	s	l	r	l <sub>1</sub>						
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F							G	H	A	B	C	D
0702M0-VM	●		●		●																								7,0	2,7	2,38			
1003M0-VM	●		●		●																								10,0	3,8	3,18			
12T3M0-VM	●		●		●																								12,0	3,8	3,97			

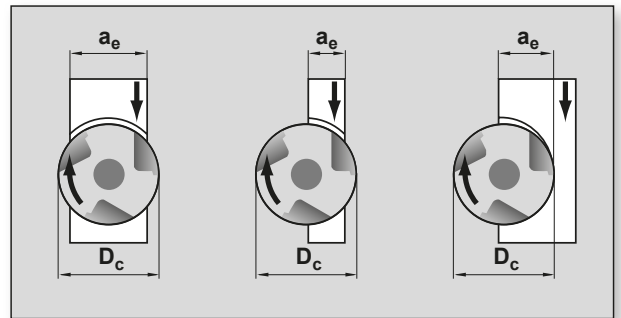
## SDHW-AEN Standard tipped corners



MW

insert size	uncoated				coated																dimensions												
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S						d	d <sub>1</sub>	s	l	r	l <sub>1</sub>					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F							G	H	A	B	C
1204AEN-MW	●																												12,7	5,5	4,76	12,70	4,0

milling Ø D <sub>c</sub> mm	milling width a <sub>e</sub> mm
40	20 - 30
50	30 - 40
63	40 - 55
80	60 - 75
100	80 - 95
125	100 - 115
160	120 - 145
200	140 - 180

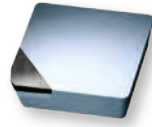


Down-cut milling shown  
We recommend for PcBN down-cut milling



## SPKN-EDR

Standard tipped corners

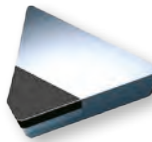


MW

insert size	uncoated				coated																dimensions																	
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1
1203EDR-MW	●				●																												12,7		3,18	12,7		4,0

## TPKN-PDR

Standard tipped corners



MW

insert size	uncoated				coated																dimensions																	
	PBC-10		PBC-15		PBC-10S				PBC-15S				PBC-25S				PBC-40S																					
	A	F	A	C	A	D	A	E	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H	d	d1	s	l	r	l1
1603PDR-MW	●				●																												9,52		3,18	16,50		4,0

### Recommended values for milling

PcBN-grade	$v_c$ m/min		$a_p$ mm	$f_z$ mm
PBC-10 PBC-15	continuous	1200 - 2500	0,25 - 2,0	0,1 - 0,3
	interrupted			
PBC-25	continuous	450 - 900	0,2 - 2,0	0,1 - 0,25
	interrupted	550 - 1200		



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## ■ Trouble Shooting

Trouble Shooting with PcBN diamond cutting edges		
Problem	Possible cause	Suggested action
Poor surface finish	<ul style="list-style-type: none"> <li>- Vibration</li> <li>- Too high feed rate</li> <li>- Too sharp cutting edge</li> <li>- Wrong CBN grade</li> </ul>	<p>Check rigidity of application (toolholder, clamping-system and machine)</p> <p>Lower feed rate, increase corner radius or change to a wiper edge</p> <p>Increase chamfer by reducing cutting speed (page 14-17)</p> <p>Use CBN grade with finer grain size (eg. PBC15 instead of 10 and PBC 40 instead of 25)</p>
Premature wear	<ul style="list-style-type: none"> <li>- Too low cutting speed (no glowing of chips)</li> <li>- Too high cutting speed (flying sparks)</li> <li>- Cutting material not homogeneous</li> <li>- Punctual excessive wear</li> <li>- Coolant</li> </ul>	<p>Increase speed or increase chamfer angle (page 14-17)</p> <p>Decrease speed or decrease chamfer angle (page 14-17)</p> <p>Make sure the cutting material is of the same batch</p> <p>Vary feed position during cutting process (if possible), in order to shift wear stress</p> <p>In case of hard turning do not use coolant if possible. Or adapt coolant according to the CBN grade (binder of CBN tends to be reactive)</p>
Edge chipping	<ul style="list-style-type: none"> <li>- Vibration</li> <li>- Disruptions</li> <li>- Wrong CBN grade</li> </ul>	<p>Check rigidity of application (toolholder, clamping-system and machine)</p> <p>Increase chamfer of cutting edge</p> <p>Use CBN grade with coarser grain size (eg. PBC10 instead of 15 and PBC 25 instead of 40)</p>
Vibration	<ul style="list-style-type: none"> <li>- Poor cutting conditions</li> <li>- Too low feed rate</li> <li>- Too high cutting pressure</li> <li>- Wrong chamfer</li> </ul>	<p>Check stability of machine, toolholder and clamping system, keep working close to clamping system</p> <p>Increase feed rate or cutting depth</p> <p>Select a positiv geometry, reduce radius, don't use wiper geometry</p> <p>Reduce chamfer ancle</p>
<p><b>In addition to the recommendations in this catalogue, the follwoing general rules apply to diamond cutting edge applications:</b></p> <ul style="list-style-type: none"> <li>• Rigid set-up of machines and tools</li> <li>• Work close to clamping system</li> <li>• Select the largest possible edge radius</li> <li>• If possible, prefer inserts with negative geometry</li> </ul>		

# Please observe our full range of tools with ultrahard cutting materials



## ■ Imprint

© BECKER Diamantwerkzeuge GmbH  
Benzstraße 13  
D-82178 Puchheim/Munich, Germany  
Tel. +49 (0) 89 89 02 28-0  
Fax +49 (0) 89 89 02 28-30  
sales@beckerdiamant.de  
www.beckerdiamant.de

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Literal mistakes excepted.**

# PcBN

## Cutting Tools



CERATIZIT GROUP

### **BECKER Diamantwerkzeuge GmbH**

Benzstraße 13

D-82178 Puchheim /München

Tel. +49 (0)89 890 228-0

Fax +49 (0) 89 890 228-30

sales@beckerdiamant.de



[www.beckerdiamant.de](http://www.beckerdiamant.de)

