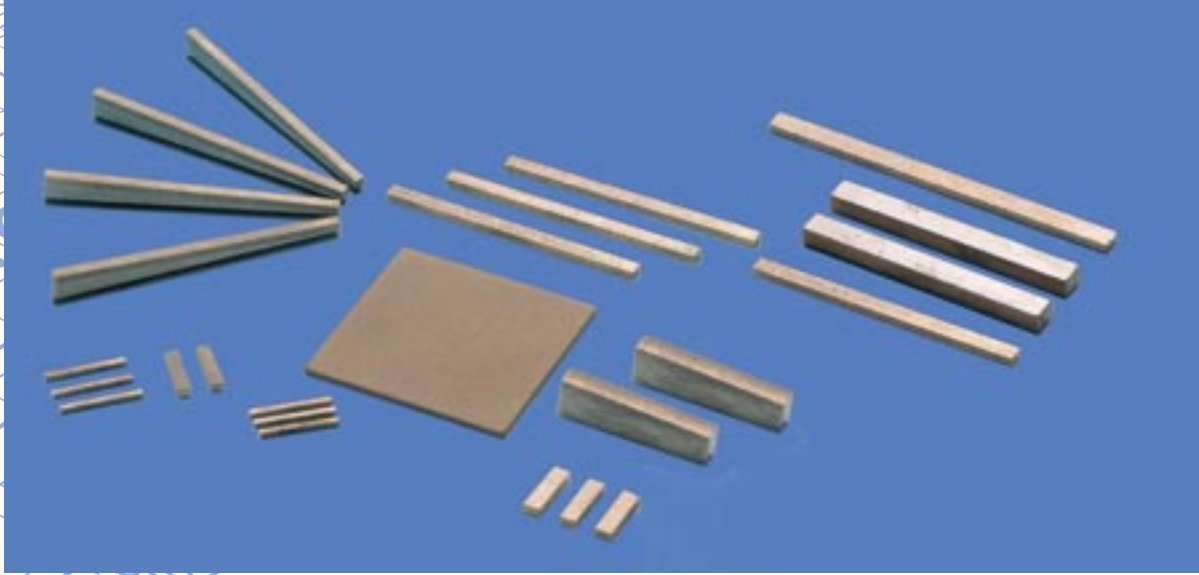
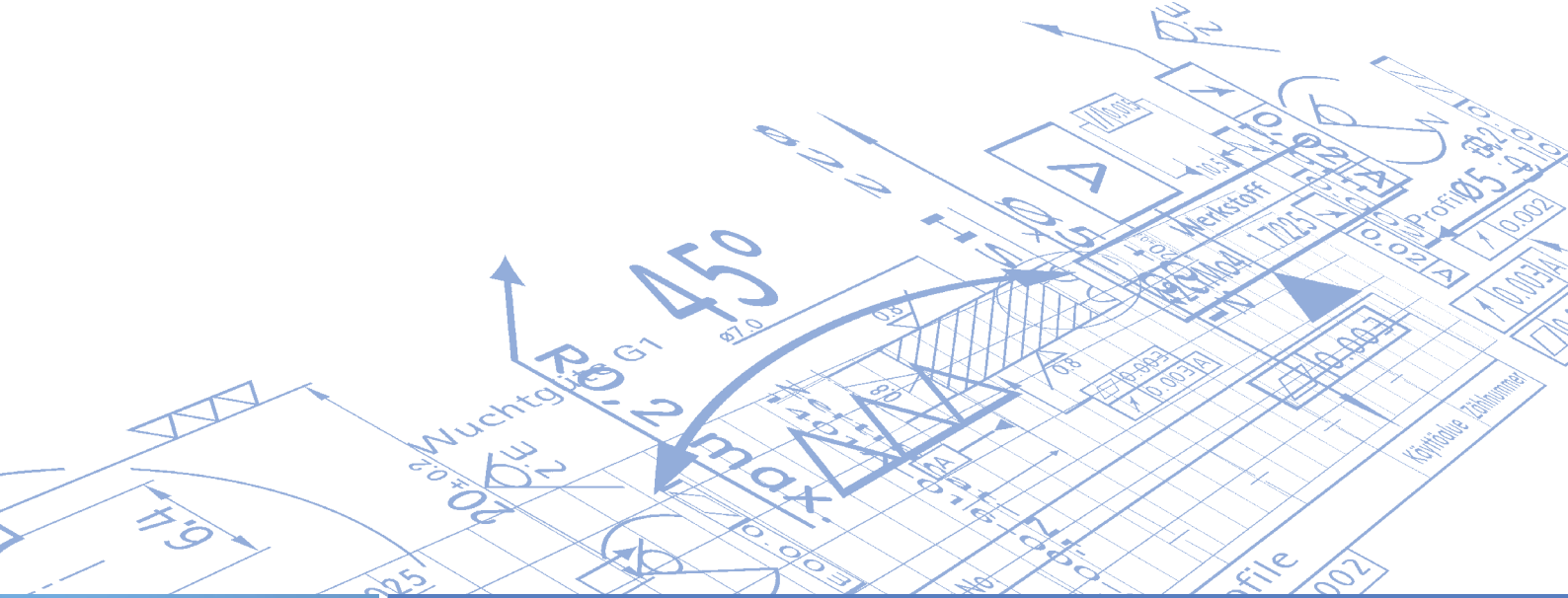


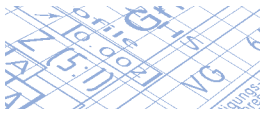
# WINTER

Precision Grinding Solutions



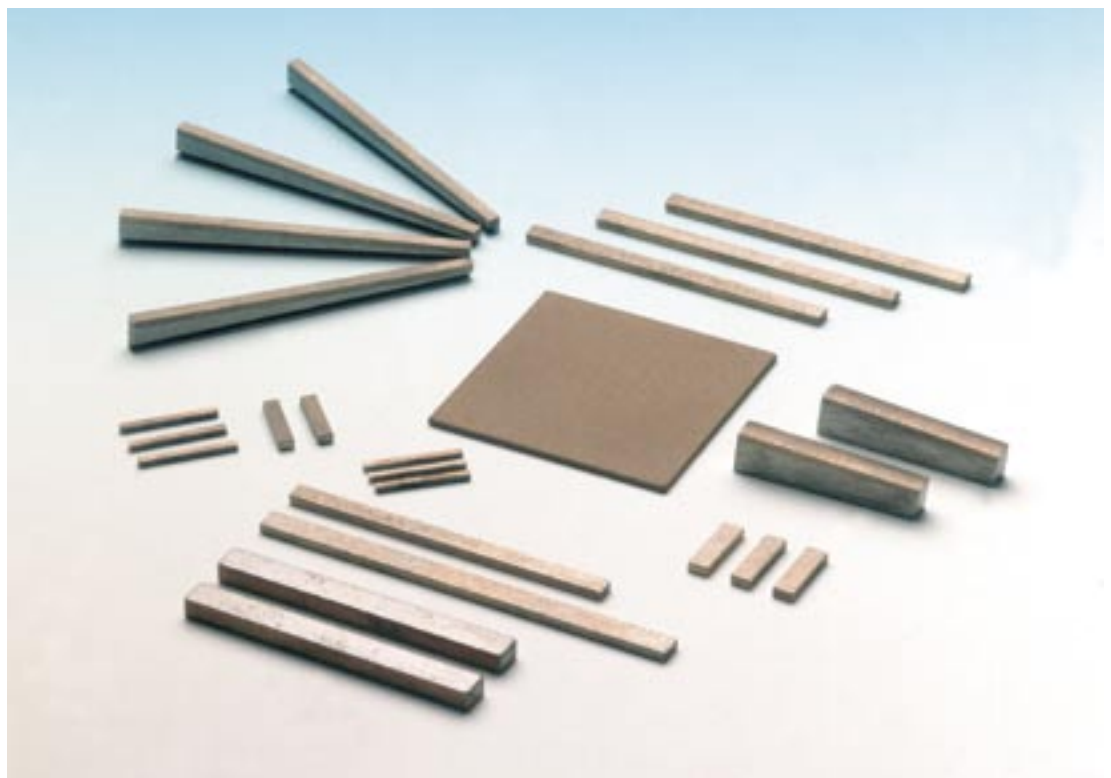
Diamond  
and CBN tools for honing

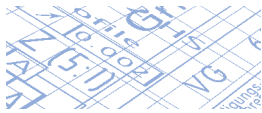




# Diamond and CBN tools for honing

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# Diamond and CBN tools for honing

## Introduction

WINTER diamond and CBN honing tools have a worldwide reputation for quality and cost-effectiveness.

The range of tools has been constantly expanded and improved in the course of decades of experience in work with industry.

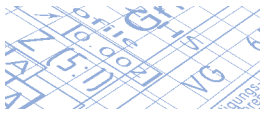
This brochure gives useful notes on selection and application of the appropriate diamond and CBN honing tools.

The recommendations are intended as guidelines. It is not possible to cover all details in a brochure like this, but we are pleased to offer you personal consulting services by our specialist engineers. They can work in consultation with you to specify the appropriate solution for your specific needs.



We are naturally also willing to assist you in optimising existing applications.





# Diamond and CBN tools for honing

## Metal bonds

Article-No. **08B**  
with diamond-free sublayer

Diamond layer  
 $B + 0,2$   
 $X_1$   
 $S$   
 $\pm$  Toleranc to DIN 7168 m  
diamond-free sublayer

Layer and base with restricted tolerances

Layer depth  $X \geq 1$  Diamond-free sublayer  $S \geq 0,5$   
Layer width  $B \geq 2$  Layer length  $L \leq 150$

80-100 mm length 0,1  
> 100 mm length 0,2

Article-No. **08D**  
without

Layer depth  $X \geq 1$   
Layer width  $B \geq 2$   
Layer length  $L \leq 150$

Article-No. **08E**  
Layer and base with restricted tolerances

$B \pm 0,01$   
 $L_1 \pm 0,3$  ( $L_3$ )  
 $X_1 \pm 0,025$   
 $L_2$

Toleranc on angle  $\beta$ :  
 $L_3 \leq 12,5: \pm 15'$   
 $L_3 > 12,5: \pm 10'$

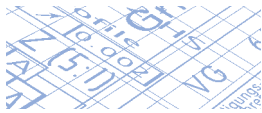
Layer depth  $X \geq 1$   
Layer width  $B \geq 2$   
Layer length  $L \leq 150$

08B und 08D können nur in Verbindung mit einem Leistenträger zum Einsatz kommen.  
08E ist inklusive Leistenträger zum direkten Einbau ausgelegt.

**Order example**

Article-No.	L	B	X	$X_1$	R	Grit size	Bond	Concentration
08B	- 75	- 5	- 2	- 5	- 40	D76	BZ 387	C 75





# Diamond and CBN honing plates

## Resinoid bonds

Article-No.  
**K 08D - 50 - 50 - X**  
 without sublayer X = 1,5 - 5 mm

In resinoid bond

### To cut the plates, use:

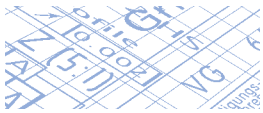
- a) Hand saw or jig saw
- b) For faster and cleaner cutting, use a diamond cut-off wheel, BZ type
- Diameter : 100 - 150 mm
- Cutting width : 0.6 - 0.8 mm
- Layer specification : D 151 / BZ 309 / C 45

### To attach sticks to holders, use:

- a) UHU-Plus
- b) Technicoll 2000 (Beiersdorf, Hamburg)
- c) Loctite 307 / Activator T Nr. 747
- d) etc.

To detach from holders heat to approx. 300° C in furnace.

Order example							
Article-No.	L	B	X	Grit size	Bond	Concentration	
08D	-	50	-	50	-	3	B 126 KSS-TY V 120



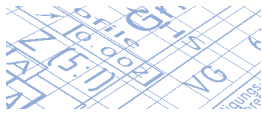
# Diamond and CBN tools for honing

## Tool specification

Customer:	
<b>Honing tools:</b>	
Dimensions	[mm]
Please send drawing	
<b>Workpiece:</b>	
Designation	
Material	
Hardness	[HB/HRC]
Strength	[N/cm <sup>2</sup> ]
Bore diameter & length	[mm]
Allowance on diameter	[mm]
Required surface finish	[R <sub>v</sub> /R <sub>a</sub> ]
<b>Operating parameters:</b>	
Machine	
No. of spindles	
No. of sticks per spindle	
Speed	[min <sup>-1</sup> ]
Stroke length L <sub>H</sub>	[mm]
Double strokes per minute	
Contact pressure	[N/cm <sup>2</sup> ]
Coolant	
<b>Results:</b>	
Surface finish	[R <sub>v</sub> /R <sub>a</sub> ]
Honing time t <sub>e</sub>	[s]
Life per spindle (workpiece quantity)	
Remarks:	

Honing tools are specified in accordance with the intended application. Please give us the following details for this purpose.





# Diamond and CBN tools for honing

## Data for preparation of metal-bond diamond and cbn honing tools

### Data for preparation of metal-bond diamond and cbn honing tools

Examples of proven tool specifications					
Workpiece material		Grey cast iron		Steel	
Hardness	[HB/HRC]	HB 180-220		HRC 62 ±2	
<b>Honing tools</b>					
honing		Rough honing	Finish honing	Rough honing	Finish
Grit size		D 91	D 20 B	B 126	B 54
Bond		BZ 387		MSS 473	
Concentration		C 100		V 120	
<b>Operating parameters</b>					
Rotation speed $V_A$	[m/min]	52		51	
Oscillation speed $V_H$	[m/min]	14		18	
<b>Results</b>					
Roughness	$R_a$ [µm]	5,8	1,8	4,5	2,2
Effective stock removal rate	$Z_{eff}$ [cm <sup>2</sup> /min]	0,67	0,2	0,4	0,15
Stock removal rate per unit of stock area	$Z_{Lges}$ [mm <sup>3</sup> /mm <sup>2</sup> · min]	0,4	0,2	0,58	0,22
G-ratio	$G$ [cm <sup>3</sup> /cm <sup>3</sup> ]	4.500	3.300	1.200	650

**Data for preparation of metal-bond diamond and cbn honing tools**

Unidirectional

Honing head with honing sticks

SiC grinding wheel

**Grinding wheel SiC - bakelite bond, e.g. dia. 200**

Peripheral speed (Diam./CBN)  $v_c = 15$  m/s

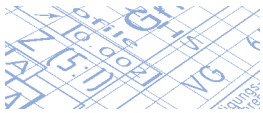
Peripheral speed (SiC)  $v_c = 23$  m/s

Dry grinding

Grit size of diamond & CBN honing sticks	Spekifikation of SiC grinding wheel
D15 / B15	400 HB3
D20 / B30	320 HB3
D46 / B46	240 HB3
D64 / B64	180 HB3
D91 / B91	120 HB3
D126 / B126	80 JB3
D151 / B151	80 JB3
D181 / B181	80 JB3

Note: Grinding direction of honing spindle has to be opposite to operation direction in order to get best use of created grit protusion.



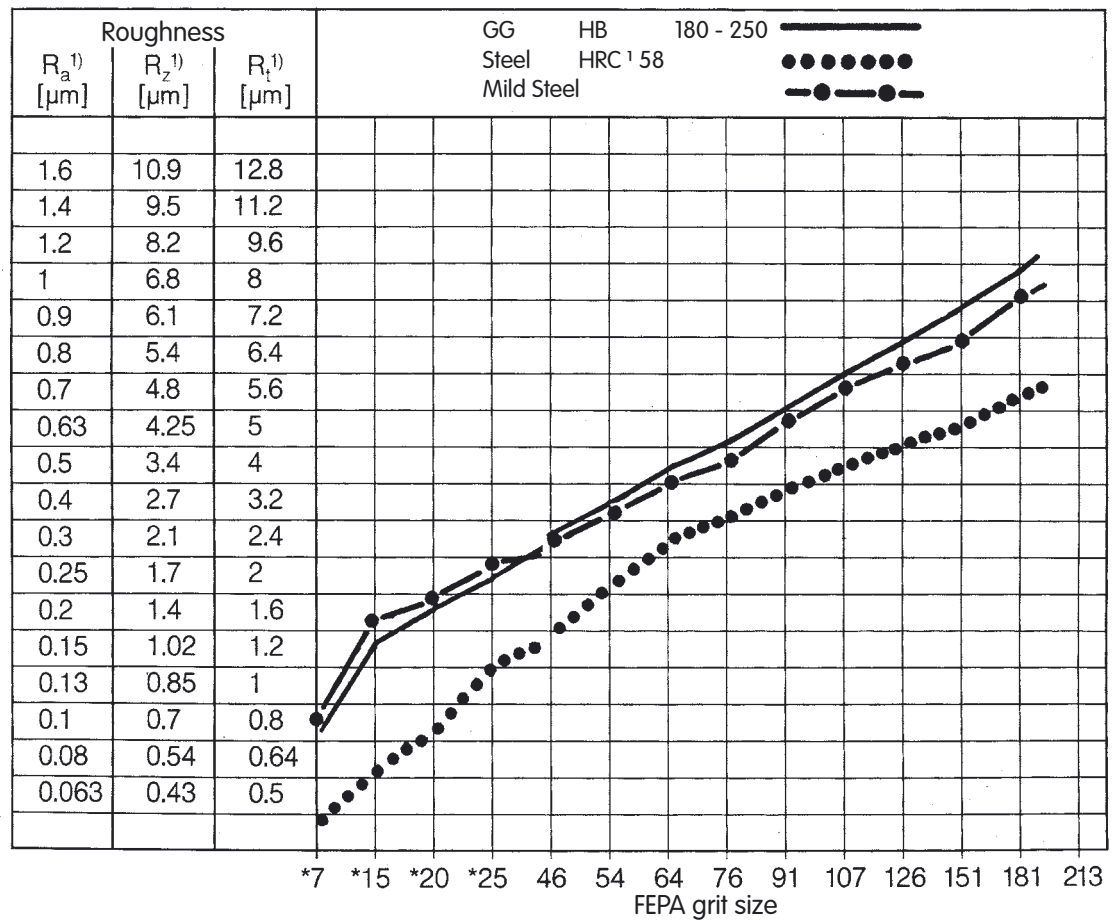


# Diamond and CBN tools for honing

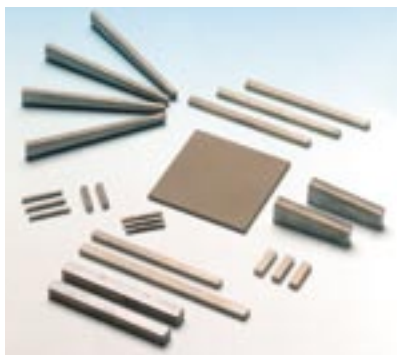
## Attainable surface finishes in honing with metal bond honing tools

The practical data compiled in the following diagram can only be regarded as an orientation aid.

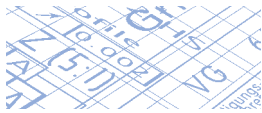
The interdependencies between bond, concentration, workpiece material, operating parameters etc. and the scatter that exists within any grit size specification mean that it is impossible to assign a certain grit size to a certain roughness height.



\* WINTER micron powders  
 1) Calculation basis:  $1 R_a = 8 R_t$ ;  $1 R_t = 0,85 R_z$   
 (see DIN ISO 1302 Annex 2, Tab. 1, footnote 1)







# Diamond and CBN tools for honing

## Operating parameters and grit size

<p><b>Cutting speed:</b> The cutting speed (<math>v_c</math>) comprises two components, namely the rotation speed of the honing head (<math>v_A</math>) and its oscillation speed (<math>v_H</math>).</p>	<p>Approximate setting range  <math>v_c = 30-70</math> m/min  <math>v_A = 20-60</math> m/min  <math>v_H = 30-70</math> m/min</p>	<p>Typical speeds in practice          52 m/min          49 m/min          16 m/min</p>
<p><b>Cross hatch angle:</b> The honing operation results in a typical cross hatch pattern, whereby the cross hatch angle (<math>\alpha</math>) is dependent on oscillation speed (<math>v_H</math>) and rotation speed (<math>v_A</math>) of the honing head. These two speeds are normally set in such a way that the cross hatch angle is between <math>25^\circ</math> and <math>60^\circ</math> (typical angle in practice: <math>36^\circ</math>)</p>	$\tan \frac{\alpha}{2} = \frac{v_H}{v_A}$	
<p><b>Specific contact pressure:</b> 20-200 N/cm<sup>2</sup> (exceptionally up to 600 N/cm<sup>2</sup>)</p>		
<p><b>Coolant:</b> The honing process normally uses honing oils on a mineral oil base, and watersoluble emulsions. Flow per bore: 30-150 l/min</p>		

### Grit size

The superabrasive grits used in the tools are classified to the FEPA standard from B46/D46 upwards. Tools can also be manufactured to customer requirements, outside of the production programmes described here. Please contact us for special requirements. We also provide a plating service for tool bodies sent to us by customers. For determination of the size of the finished tool, the undersize of the tool body must be calculated depending on the grit size to be used.

International Standardization of Grit Sizes for Diamond and Cubic Boron Nitride									
Sieve Grit Designations						Micron Powder Size*)			
Diamond FEPA Standard WINTER designation		CBN FEPA Standard WINTER designation		Diamond + CBN US Standard ASTM-E-11-70		Nominal mesh size to ISO 6106 DIN 848 Part 1, 1980 $\mu\text{m}$	Diamond WINTER designation	CBN WINTER designation	For comparison grit size $\mu\text{m}$
narrow	wide	narrow	wide	narrow	wide				
D 1181	D 1181	B 1181	B 1181	16/ 18	16/20	1180/ 1000	D 25		32- 52
D 1001		B 1001		18/ 20		1000/ 850	D 20 B	B 30	30- 40
D 851	D 852	B 851	B 852	20/ 25	20/30	850/ 710	D 20 A		25- 30
D 711		B 711		25/ 30		710/ 600	D 15		10- 25
D 601	D 602	B 601	B 602	30/ 35	30/40	600/ 500	D 15 C		20- 25
D 501		B 501		35/ 40		500/ 425	D 15 B	B 15	15- 20
D 426	D 427	B 426	B 427	40/ 45	40/50	425/ 355	D 15 A	B 9	10- 15
D 356		B 356		45/ 50		355/ 300	D 7	B 6	5- 10
D 301		B 301		50/ 60		300/ 250	D 3	B 3	2- 5
D 251	D 252	B 251	B 252	60/ 70		250/ 212	D 1	B 1	1- 2
D 213		B 213		70/ 80		212/ 180	D 0,7		0,5- 1
D 181		B 181		80/ 100		180/ 150	D 0,25		<0,5
D 151		B 151		100/ 120		150/ 125	= Grits recommended by WINTER		
D 126		B 126		120/ 140		125/ 106	*) Similar FEPA Standard exists with designations M 63... M 1,0		
D 107		B 107		140/ 170		106/ 90	FEPA = Fédération Européenne des Fabricants de Produits Abrasifs.		
D 91		B 91		170/200		90/ 75			
D 76		B 76		200/230		75/ 63			
D 64		B 64		230/270		63/ 53			
D 54		B 54		270/325		53/ 45			
D 46		B 46		325/400		45/ 38			



  
**SAINT-GOBAIN**  
**ABRASIVES**

SAINT-GOBAIN  
Diamantwerkzeuge  
GmbH & Co. KG  
Schützenwall 13-17  
D-22844 Norderstedt, Germany  
P.O.Box 2049  
D-22841 Norderstedt  
Phone: +49 (0)40-52 58-0  
Fax: +49 (0)40-52 58-215  
[winter-superabrasives.com](http://winter-superabrasives.com)  
[info.winter@saint-gobain.com](mailto:info.winter@saint-gobain.com)