

Precision Engineering Solutions



Catalogue No. 2

Tools

WINTER Diamond and cBN Tools for the Tools Industry



Catalogue No. 1: Automotive, Turbines, Bearings

WINTER Diamond and cBN Tools for the Automotive, Turbine and Bearing Industries



Catalogue No. 2: Tools

WINTER Diamond and cBN Tools for the Tools Industry



Catalogue No. 3: Flat and Crystal Glass

WINTER Diamond Tools for Machining Flat and Crystal Glass



Catalogue No. 4: Electronics, Photovoltaics, Optics, Ceramics and Composites

WINTER Diamond and cBN Tools for the Electronic and Photovoltaic Industries, for Machining Optical Glass, Ceramics & Composites



Catalogue No. 5: Dressing Tools

WINTER Diamond Tools for Dressing of Grinding Tools



Catalogue No. 6: WINTER Standard Catalogue

Stock Programme for Diamond and cBN Tools



Tools

WINTER Diamond and cBN Tools for the Tools Industry

Knives

Milling cutters

Mould and die

Service Glossary Contact

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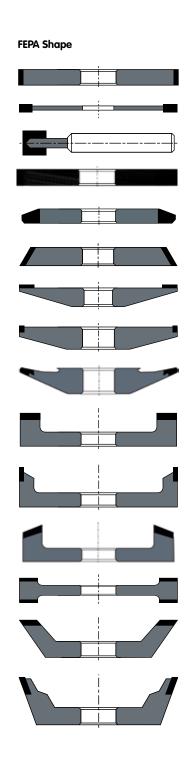
Knives

Milling

Mould and die

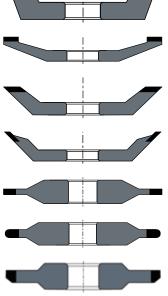
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Quick Reference Grinding Tool Guide



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A good Connection

Always close to the customer and customer-focused, our diverse market presence worldwide reflects the strength of a global player. Saint-Gobain's businesses are spread over 45 countries and new locations are being added frequently. Activities are clearly structured to ensure operational leadership. In Abrasives alone, over 16,000 people are employed. The company is the only manufacturer to offer a comprehensive product range of abrasives and dressing tools for almost all fields of industry. WINTER, as the premium brand for diamond and cBN grinding products, is one of the most well established and respected names in the market. Our combination of quality products, expertise and service, together with the international network of the parent company Saint-Gobain, is the key to success; WINTER grinding tools go with you worldwide, and lead you to your goals.

Saint-Gobain...

- ...was established in 1665 to supply glass for the Hall of Mirrors in the Palace of Versailles.
- ...kits out every second car in Europe with window glass
- ...establishes or acquires a new sales location every day
- ...inaugurates a new plant or a new production line every month
- ...presently has 206,000 employees
- ...generates € 43.4 billion annual turnover



High Performance Materials **Grinding Tools** No. 1 Worldwide

Flat Glass No. 1 in Europe, No. 3 Worldwide

freeglass



WINTER NORTON Industrial Super Abrasives

Glass Packaging



Bonded Abrasives

BAYSTATE

Coated Abrasives

Construction Products



Thin Wheels



Construction Products

Insulating Materials No. 1 Worldwide ISOVER

Plaster/Plaster Boards Rigips No. 1 Worldwide

Ceramics and Plastics No. 1 Worldwide for Thermal and **Mechanical Applications**

VETROTEX

Reinforcement Materials No. 1 Worldwide

Pipes No. 1 Worldwide in Cast Iron Pipes



Building Distribution

No. 1 Worldwide in Tiles, No. 1 in Europe in Construction Materials and Industrial Woodworking



weber Industrial Mortar No. 1 Worldwide in Tile Adhesives

Exterior Siding No. 1 in USA for Exterior Siding No. 3 in USA for Roofing

Worldwide Expertise

Saint-Gobain is in the top one hundred largest industrial groups in the world and is leading in the production of glass, high performance materials and construction products. Two major milestones stand out in the Saint-Gobain Group's long history; it was established in 1665 by Colbert under Louis XIV, then, over 300 years later, Saint-Gobain and Pont-à-Mousson merged in 1970. WINTER joined the group in 1996. Today, the group invests € 390 million per year in research and development and files around 300 patents per year, to support its reputation for innovation and discovery.









The WINTER Brand:

For over 160 years WINTER has been a worldwide synonym for high-quality diamond and cBN grinding tools for industrial production. As pioneer and trend-setter, WINTER has been actively involved in the development of the success story of grinding, as well as in the production of synthetic diamonds.

Custom-made Solutions - the key to success

Over 75% of all WINTER products are developed in close cooperation with our customers. The results are tailored grinding solutions that perfectly fit your special requirements. Our expert teams would also like to help you. Together we will meet your technical challenges.

Market Leader - in front through quality

In Superabrasives, WINTER is No. 1 in Europe with quality products and services. In Europe, over 500 employees in four production sites take care of our customers' needs. Worldwide, over 2,000 people are employed in our global business.

INNOVATIONS

To this day, the WINTER philosophy is closely connected to innovation and technical progress. We thank our customers for over 160 years of momentum, challenges and confidence. And in the future our next generation of innovations will ensure your success.

PRECISION

From ACCURACY to Z-AXIS - the WINTER precision alphabet spells the suitable solution for your needs. Profile accuracies below 1 µm and a surface finish in the nanometer range are achieved regularly. You can trust WINTER.

WINTER

PERFORMANCE

The WINTER performance package contains top quality precision grinding tools, comprehensive service and individual customer care - which ranges from best grinding tool selection through to process optimisation. Benefit from our full service, and make use of our leading technical expertise to increase your profitability.

QUALITY

Since the foundation of the company, WINTER has stood for quality at the highest level. It begins with the first customer contact, and covers the identification of appropriate tool specifications, manufacturing, customer support and the final optimisation of your production process. **WINTER quality: Satisfaction guaranteed!**

Quality, Environmental Protection and Safety

As a responsible manufacturer of quality grinding tools, WINTER production is eco-friendly and avoids waste of precious resources according to the latest international standards and certification requirements. WINTER is certified to ISA 9001 (Quality Management), ISO 14001 (environmental management) and OHSAS 18001 (health and safety management). All rotating WINTER tools bear the OSA safety seal (OSA: Organization for the Safety of Abrasives), granting WINTER the customers' highest safety tool in application.





WINTER

Milling cutters

and die

Shank tools

Saws

Inserts

Knives

Milling

Mould and die

Service Glossary Contact



Snapshots of a long history

WINTER was established in 1847 by Ernst Winter as a family-owned company. We still adhere to the original goal of developing ultra-hard crystal tools of the highest quality. Our claim is to be the best. In numerous fields of application for diamond and cBN grinding tools we have been pioneers, and today we still follow this way as trend-setters and the technology leader.







Ernst Winter Goldsmith and diamantaire, started his diamond tool workshop in 1847.





Laser reflectors ground with WINTER diamond tools enable the most accurate astronomic and geographic measurements.









OCLORE MEDALLE: SOLDEN MEDALLE: BOLDEN MEDALLE: OCLORE MEDALLE: HAMBURG-EIMSBÜTTEL HAMBURG-EIMSBÜTTEL HAMBURG-EIMSBÜTTEL Hamburg-1889 WESAUSSTELLUNG DARS: 1909 WESAUSSTELLUNG

Success from the beginning

Former letterhead and contemporary advertisement of WINTER with images showing medals received at important exhibitions.





Celebrities

Even Helmut Schmidt (Federal Republic of Germany's former Chancellor) acted as a WINTER "diamond maker" in 1983.



Posters and Brochures in the course of time



WINTER Facts

> Shank tools

> > Saws

Inserts

PCD PCBN

Knives

Milling cutters

Mould



Mould and die

Service

Innovations: Yesterday's vision of the

WINTER bridges the combination of inventive skills, creativity, identification of challenges and the ambition to meet our customers' expectations: WINTER developments of the past are found in industrial museums. Yesterday's vision of the future is today's standard. We are committed to over 160 years of company history: Today and in the future, we work hand in hand with our customers on innovations and their ecomomical implementation.

1847

WINTER produced lithography diamonds, replacing the conventional steel tips.

WINTER introduced special cutting wheel

products for slicing advanced ceramics

2008

WINTER offered metal bonded tools with internal cooling for creep-feed glass edging.

With Q-Flute+Dress, WINTER offered the first resin bonded grinding wheel dressable with a diamond rotary dresser.

1975

WINTER DMC diamond grinding wheels and BMC cBN grinding wheels came into the market: WINTER MC grinding wheels allow cost-effective profile grinding for difficult to machine work pieces. They also reduce thermal effects of the near-surface microstructure and assure extremely long profile lifetime. WINTER DMC and BMC grinding wheels can be profiled by crushing directly on the grinding machine.

WINTER SG-CNC rotary dressers conquered the market. They have made dressing of vitrified cBN grinding wheels possible.

1969

wide, WINTER presented cBN grinding tools with a special resin bond (KSS) for HSS tool grinding.

As the first grinding tool manufacturer world-

1935

WINTER produced the first phenolic bond grinding wheel to replace previously used grinding wheels with loose, hammered or rolled-in grain.

1548. from L. innovatus, pp. of innovare "to renew or change", from in- "into" + novus "new"

1988

New super-light cutting wheels with carbon fibre bodies were patented.



WINTER was the first in Europe producing grinding tools with synthetic diamonds. In combination with WINTER special resin bonds, full performance benefits were achieved.







Shank

2001

like SiC.

Contact



1971

At the European Machine Tool Exhibition WINTER showed for the first time a novel grinding wheel type that met the demand for short grinding cycle times. The structure of metallic and non-metallic bond components allows the efficient grinding of tungsten carbide and steel combinations. (M+789).



2003

WINTER developed the DDS (Diamond Dressing System), permitting the dressing of vitrified and resin bonded grinding wheels directly on the production machine. Until then, it was performed on external machines. Due to its free standing layer, outstanding profile grinding capability is achieved.

1992

New standards are set with the "34SG" series in the field of laminated safety glass and fire-resistant glass machining.

1929

WINTER started producing diamond micro-grain by the sedimentation process.

1875

Delivery of WINTER diamond particles to Zeiss Jena, enabling the engraving of 150 lines per millimeter.

valtilon

In general linguistic usage as a nonspecific term in the sense of new ideas and inventions and their conversion to economic use.

2006

N7 as a glass-ceramic bond system was introduced to the market. This bond can be precisely engineered to meet individual customer application requirements: Very high bond-hardness, optimised wetting of the grains and perfect development of bond bridges enable the creation of very high porosity for cool grinding and extremely long tool life.

1950-1954

WINTER developed a large variety of electroplated tools: Files, grinding pins, cutting wheels, drills...





2008

WINTER tools "Ti-Tan" and "Furioso" are a new generation of extremely wear-resistant stationary dressers.

1982

The patented dressing process "TDC" (Touch Dressing cBN) was developed by WINTER.

1977 / 78

WINTER presented the special bond "VF/VFF" for grinding and finishing polycristalline diamond and cBN materials.

1996

For four generations the company, founded by Ernst WINTER in 1847, was familiy-owned. In 1996 it was taken over by the French Saint-Gobain group.



2001

"Tiger" caused a stir with a new revolutionary grinding wheel geometry for narrow tooth gaps in saw manufacturing.

WINTER

Shank

Sau

naorte

PCD

Knive

Milling

Mould and die

Milling

Mould and die

Service Glossary Contact

Your best solution

WINTER diamond tools gain great recognition in the fields of quality, performance and cost effectiveness. This is no coincidence, as WINTER is not limited to manufacturing excellent grinding tools: more than 75% of the cases are tailor-made solutions, developed in close cooperation with the customer. This successful engineering is based on a modular performance package, specifically equipped according to individual needs.

Tailor-made products

Optimised grinding solutions for your specific application provide the greatest benefit: In the end, you generate cost savings through more productivity, less down time, and better quality.

Each one of your technological challenges is an incentive for our product managers and our application engineers to achieve the best grinding results. Please contact us.

Besides the high percentage of custom-made solutions, WINTER offers a comprehensive range of stock products - and can supply these short term straight to your production line.



Focused on the goal ahead

Comprehensive technical advice in all questions about WINTER products and grinding processes.

Our field sales force and our customer service are at your disposal.



Advice



Expertise

Advantage in accumulated knowledge:
Seminars about current grinding issues as well as training programs matching our customers requirements.











The cream of the crop In order to meet your production-oriented challenges, take advantage

of our dedicated specialists: In the R&D department and the European Grinding Technology Centre about 50 scientists are at your disposal for developing grinding tools and processes.

Solution





Fine Tuning

Our application engineers and our product developers will help you. Either at your premises, or in our EGTC (European Grinding Technology Centre), where we can optimise your production process, without interfering with your workflow.

Please ask your sales advisor - contact

details on the last page.

WINTER

Shank tools

Inserts

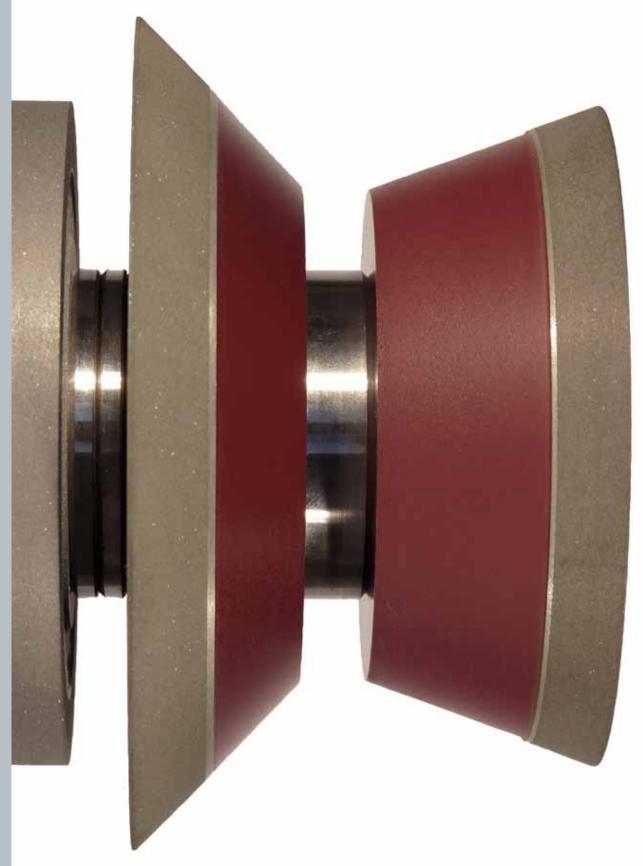
PCD PCBN

Knives

Milling cutters

Mould and die

Abrasive products for machining shank tools



The product range for shank tools is extensive. Different materials and tool geometries make various demands on the grinding tools used in manufacture.

Shorter grinding times, better suitability for automation and longer dressing intervals are required. Specific grinding wheel characteristics such as edge stability and free-grinding behaviour have to be carefully balanced.

Information

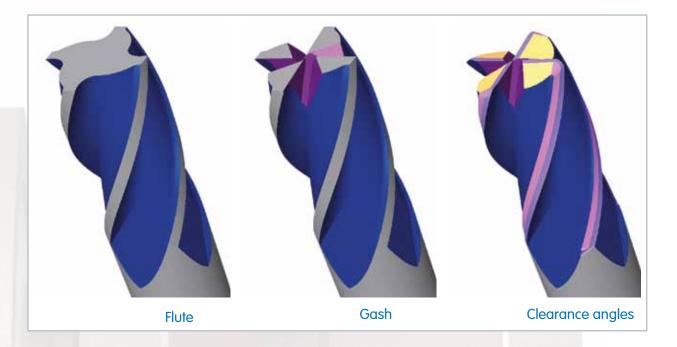
Further information on applications and products can be found at www.winter-superabrasives.com

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Service Glossary Contact

General information

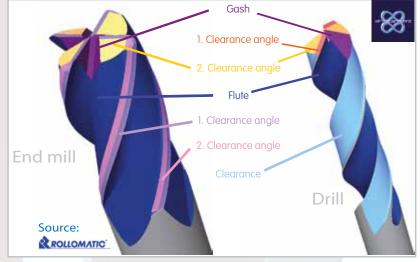
Drills, end mills, reamers, stepped tools and special-purpose tools in varying designs and geometries are described as shank tools. Tool geometries are produced by grinding in successive production steps. A typical sequence starts with the preparation of the blank, (tools for trimming blanks can be found in the section for 'Diamond and cBN cut-off wheels') which is followed by flute grinding, gashing and grinding of the clearance angles.



This section is structured according to the procedure described.

Here you see an example of an end mill and a drill. Generally, the same tool geometries are used for the individual process steps. Only flute grinding uses different grinding wheel designs.

While 1A1 and 1V1 grinding wheels are used primarily for end mills, profile grinding wheels such as 14F1 and similar (WINTER shape 700) are preferred for drill production.



Flute grinding

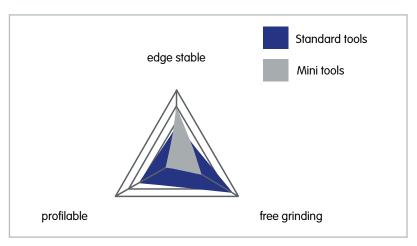
Diamond and cBN grinding wheels for flute grinding

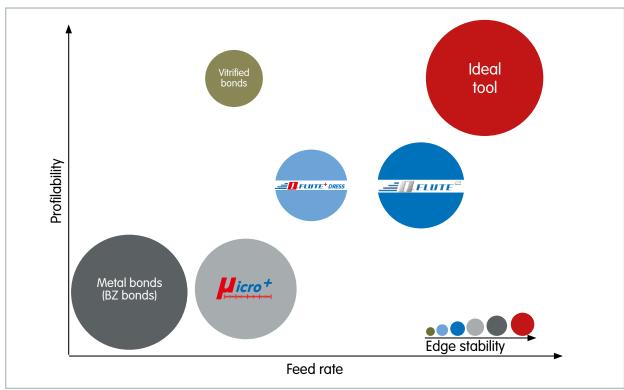
Flute grinding is the most time-consuming and thus most cost-intensive manufacturing step during drill and end mill production. It is necessary to optimise the machine and cooling lubricant systems as well as the abrasives. In recent years, machines have become more compact, spindle power has increased, axis paths have been reduced and machine controls have become more efficient. At the same time, WINTER has developed flute grinding tools which meet these increasing requirements and which now enable the improved machine capacity to deliver a higher and more economic output. Matched to the application and the system environment, innovative WINTER flute grinding wheels are always the best solution.



Grinding wheels in the Q-Flute range have proved to be particularly useful for standard tools. The combination of excellent free-grinding behaviour and profile retention allows economic flute grinding with high feed rates. Q-Flute grinding wheels can also be dressed on the grinding machines.

Mini and micro tools require bond systems with exceptional edge stability. WINTER metal bonds (BZ bonds) and high-performance resin bonds (µicro*) are the number one choice here.





WINTER Facts

Shank

Saws

serts

PCD PCBN

Knives

Milling

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Service Glossary Contact

Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use
BZ480	A	Metal bond for mini and micro tools
µicro⁺ series	T	Wear-resistant high-performance resin bonds for mini and micro tools
W+3060		High-performance resin bond for deep grinding, particularly wear-resistant
Q-Flute ²		High-performance resin bond for flute grinding
Q-Flute+ Dress		High-performance resin bond for flute grinding
K+920		More wear-resistant resin bond also dry grinding
K+921		More wear-resistant resin bond preferably wet grinding
K+1421R		Standard resin bond for CNC applications
K+1421N		Standard resin bond for CNC applications
K+1421J		Standard resin bond for CNC applications
K+4821	ı	Free-grinding resin bond for CNC applications, e.g. for Cermet
cBN grinding wheels	Wear resistance	Recommendations for use
MSS444	A	Metal bond for mini and micro tools
Q-Flute ²	T	High-performance resin bond for flute grinding
Q-Flute+ Dress		High-performance resin bond for flute grinding

Standard dimensions for flute grinding

KSS920

KSS12N

Workpiece	Material	Machine	Peripheral grinding v	Coolant	
			Shape	Bond	
Drills End mills Reamers	Tungsten carbide HSS Cermet	All CNC tool grinding machines	1A1, 1V1, 14F1 a.o. Ø 50250 T 330 X 515	See table above	Oil Emulsion
Micro drills Mini end mills Burrs	Tungsten carbide HSS	Precision tool grin- ding machines for mini and micro tools	3A1, 4A9, 14V1 Ø 50200 U 26 X 510	See table above	Oil Emulsion

More wear-resistant resin bond also dry grinding

Standard resin bond for CNC applications

Other dimensions on request

High-performance flute grinding

WINTER Q-Flute² is the latest flute grinding development from WINTER.

With Q-Flute², clearly improved material removal rates are possible whilst at the same time maintaining edge stability, resulting in a successful combination of durability and free-grinding behaviour. Dramatically increased feed rates with simultaneously longer dressing intervals are possible.

Application areas

The new Q-Flute² is the solution for all flute grinding applications in the diameter range above 3 mm. This bond system is applicable not only under oil but also under emulsion or water. It provides outstanding results when grinding tungsten carbide and HSS tools.

Specification Applications

D54 Q-Flute² Tungsten carbide, oil cooling

D54 Q-Flute² W Tungsten carbide, water-based cooling B64 Q-Flute² HSS, oil cooling and water-based cooling

See application examples on the following page

Process parameters for flute grinding of tungsten carbide and HSS tools (Q'_,)

	Feed Rate v _r (mm/min)																		
		30	40	50	60	70	80	90	100	120	140	160	180	200	220	240	260	280	300
	2.0	1.0	1.3	1.7	2.0	2.3	2.7	3.0	3.3	4.0	4.7	5.3	6.0	6.7	7.3	8.0	8.7	9.3	10.0
	2.2	1.1	1.5	1.8	2.2	2.6	2.9	3.3	3.7	4.4	5.1	5.9	6.6	7.3	8.1	8.8	9.5	10.3	11.0
	2.4	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.8	5.6	6.4	7.2	8.0	8.8	9.6	10.4	11.2	12.0
	2.6	1.3	1.7	2.2	2.6	3.0	3.5	3.9	4.3	5.2	6.1	6.9	7.8	8.7	9.5	10.4	11.3	12.1	13.0
	2.8	1.4	1.9	2.3	2.8	3.3	3.7	4.2	4.7	5.6	6.5	7.5	8.4	9.3	10.3	11.2	12.1	13.1	14.0
<u></u>	3.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
Infeed a _e [mm]	3.2	1.6	2.1	2.7	3.2	3.7	4.3	4.8	5.3	6.4	7.5	8.5	9.6	10.7	11.7	12.8	13.9	14.9	16.0
g Q	3.4	1.7	2.3	2.8	3.4	4.0	4.5	5.1	5.7	6.8	7.9	9.1	10.2	11.3	12.5	13.6	14.7	15.9	17.0
Jee	3.6	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	7.2	8.4	9.6	10.8	12.0	13.2	14.4	15.6	16.8	18.0
<u> </u>	3.8	1.9	2.5	3.2	3.8	4.4	5.1	5.7	6.3	7.6	8.9	10.1	11.4	12.7	13.9	15.2	16.5	17.7	19.0
	4.0	2.0	2.7	3.3	4.0	4.7	5.3	6.0	6.7	8.0	9.3	10.7	12.0	13.3	14.7	16.0	17.3	18.7	20.0
	4.2	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0	8.4	9.8	11.2	12.6	14.0	15.4	16.8	18.2	19.6	21.0
	4.4	2.2	2.9	3.7	4.4	5.1	5.9	6.6	7.3	8.8	10.3	11.7	13.2	14.7	16.1	17.6	19.1	20.5	22.0
	4.6	2.3	3.1	3.8	4.6	5.4	6.1	6.9	7.7	9.2	10.7	12.3	13.8	15.3	16.9	18.4	19.9	21.5	23.0
	4.8	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0	9.6	11.2	12.8	14.4	16.0	17.6	19.2	20.8	22.4	24.0
	5.0	2.5	3.3	4.2	5.0	5.8	6.7	7.5	8.3	10.0	11.7	13.3	15.0	16.7	18.3	20.0	21.7	23.3	25.0

Minimum Q'w for < D46

Minimum Q'w for > D46

Minimum Q'w for D46 & D54

Minimum Q'w for D46 & D54

The feed rates stated are guidelines only and apply to both diamond and cBN tools. Feed rates have to be adjusted for small workpiece diameters, extreme flute widths and grinding wheels with a diameter of less than 100 mm.

WINTER

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PCD PCBN

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WINTER Q-Flute² examples of use

Application example 1

Grinding tool: B64 Q-Flute²

Grinding machine: ITM **Coolant**: Oil

Work piece: HSS counterbore, Ø 15 mm

Grinding parameters

Specific material removal rate: $Q'_{w} = 12.5 \text{ mm}^3/\text{mm} \cdot \text{s}$

Benefit:

20% reduced grinding time 3- to 4-fold longer dressing interval Substantially lower wear

Application example 2

Grinding tool: D54 Q-Flute² **Grinding machine:** ANCA **Coolant:** Oil

Work piece: Tungsten carbide end mill, Ø 12.5mm

Grinding parameters

Feed rate: $v_{\rm f} = 250$ mm/min Infeed: $a_{\rm e} = 4$ mm Cutting speed: $v_{\rm c} = 18$ m/s

Specific material removal rate: $Q'_{w} = 16 \text{ mm}^{3}/\text{mm} \cdot \text{s}$

Benefit:

25% higher feed rate Huge time savings Significant cost savings

Application example 3

Grinding tool: D54 Q-Flute² W **Grinding machine:** Saacke UW II D **Coolant:** Water

Work piece: Tungsten carbide stepped drill; Ø 16 mm

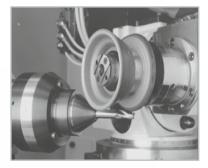
Grinding parameters

Feed rate: $v_f = 120 \text{ mm/min}$ Infeed: $a_e = 7.2 \text{ mm}$ Cutting speed: $v_c = 18 \text{ m/s}$

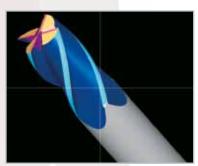
Specific material removal rate: $Q'_{w} = 14.4 \text{ mm}^{3}/\text{mm} \cdot \text{s}$

Benefit:

33% higher feed rate 50% longer dressing interval Substantial increase in capacity









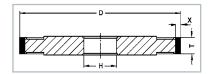


Dressing recommendations

Shape	D	Т	н	Abrasive	Grit size Hardness Structure	Bond	Order number	Comment
1	250	10	51	31C	120 JOT 8	V500	66243571002	for Geiger
1	200	10	32	31C	120 JOT 8	V500	69210444752 ¹⁾	for Cleveland
				39C	120	KVS	69936675637	for Cleveland

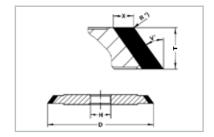
¹⁾ Available while stocks last

All dimensions in mm



1A1 Stock programme

Diamond grinding wheels											
Shape	D	T	x	Н	Grit size	Bond	Body	Order number			
SP1A1	100	8	10	20	D54	Q-Flute ²	С	60157687140			
SP1A1	100	10	10	20	D54	Q-Flute ²	С	60157680365			
SP1A1	100	12	10	20	D54	Q-Flute ²	С	60157697235			
SP1A1	100	15	10	20	D54	Q-Flute ²	С	60157680730			
SP1A1	125	8	10	20	D54	Q-Flute ²	С	66260113945			
SP1A1	125	10	10	20	D54	Q-Flute ²	С	60157688224			
SP1A1	125	12	10	20	D54	Q-Flute ²	С	60157687848			
SP1A1	125	15	10	20	D54	Q-Flute ²	С	66260117916			



1V1 Stock programme

Diamond o	Diamond grinding wheels										
Shape	D	T	X	۷°	Н	Grit size	Bond	Body	Order number		
SP1V1	100	10	10	10	20	D54	Q-Flute ²	С	66260137553		
SP1V1	100	12	10	10	20	D54	Q-Flute ²	С	66260113283		
SP1V1	100	15	10	10	20	D54	Q-Flute ²	С	60157680737		
SP1V1	125	10	10	10	20	D54	Q-Flute ²	С	66260129330		
SP1V1	125	12	10	10	20	D54	Q-Flute ²	С	66260113290		
SP1V1	125	15	10	10	20	D54	Q-Flute ²	С	66260128867		

Further Q-Flute 2 1V1 grinding wheels with a 45 $^\circ$ angle can be found in the 'Gashing' section of this catalogue.

Besides flute grinding, the items listed on this page are suitable for gashing of shank tools, depending on the machine software.

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Dressing on the production machine

Each tool change on a grinding machine causes a degree of run-out and positional error, which can produce small deviations from the nominal tool geometry. Demands made on the accuracy of shank tools, however, are constantly increasing. WINTER Q-Flute+ Dress is the solution to this problem. Q-Flute+ Dress combines innovative flute grinding with the precise touch dressing process. This innovative technology enables considerable quality improvements to the main and minor cutting edges, without adversely affecting grinding performance. By regularly regenerating the wheel topography, tighter tolerances and fully automatic shift operations are possible.

Areas of application

As well as outstanding profilability, Q-Flute+ Dress particularly excels within the fine grit range, making it suitable for a wide variety of applications.

Specification

D25...D107 Q-Flute+ Dress B35...B126 Q-Flute+ Dress

Applications

Tungsten carbide, primarily oil cooling HSS, primarily oil cooling

WINTER Q-Flute⁺ Dress examples of use

Application example 1

Grinding tool: D64 Q-Flute+ Dress **Dressing tool:** WINTER DDS roller dresser **Grinding machine:** Walter Helitronic

Coolant:

Workpiece: **Grinding parameters**

Feed rate: Infeed:

Cutting speed: Specific material removal rate:

Dressing parameters

Speed grinding wheel: Speed roller dresser: Speed ratio: Overlap rate: Dressing infeed:

Benefit:

Very good cutting quality Maximum profile accuracy

Tightest tolerances

Oil

Tungsten carbide end mill, Ø 16 mm

 $v_f = 150 \text{ mm/min}$ $a_0 = 3.2 \text{ mm}$ $v_{a} = 18 \text{ m/s}$

 $Q'_{w} = 8 \text{ mm}^{3}/\text{mm} \cdot \text{s}$

 $n_c = 2750 \text{ min}^{-1}$ $n_{z} = 2005 \text{ min}^{-1}$ $q_d = 0.7$

 $U_d = 3$ $a_{ed} = 3 \mu m$

Application example 2

Grinding tool: Grinding machine:

Coolant: Workpiece:

Grinding parameters

Feed rate:

Infeed: Cutting speed: Specific material removal rate:

Dressing parameters

See application example 1

Benefit:

Outstanding runout accuracy

Good surface quality Perfect edge quality

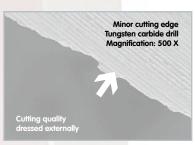
D35 Q-Flute+ Dress Walter Helitronic

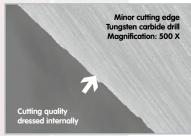
Tungsten carbide end mill, Ø 10 mm

 $v_f = 200 \text{ mm/min}$ $a_0 = 3.5 \, \text{mm}$ $v_{c} = 18 \text{ m/s}$

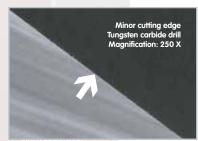
 $Q'_{w} = 11.6 \text{ mm}^{3}/\text{mm} \cdot \text{s}$











WINTER Diamond Dressing System (DDS)

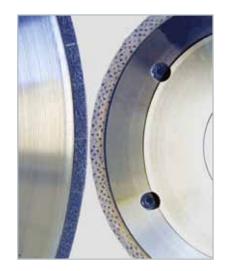
The Diamond Dressing System (DDS) allows CNC dressing of diamond grinding wheels directly on production grinders.

Despite the extreme hardness of diamond in both cases, the same physical correlations are found when dressing softer abrasive materials such as ${\rm Al_2O_3}$, SiC, SG, TG and cBN.

Even when dressing specifically designed diamond grinding wheels with the DDS roller dresser, the result can be influenced by overlap rate and speed ratio.

Dressing parameters

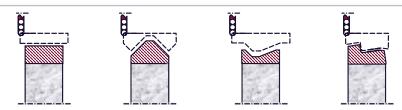
 $\begin{array}{ll} \text{Speed ratio:} & q_{d} = 0.6...0.9 \\ \text{Overlap rate:} & U_{d} = 2...6 \\ \text{Dressing infeed:} & \alpha_{ed} = 1...10 \ \mu\text{m} \end{array}$



Profile examples

CNC-precision dressing on the production machine

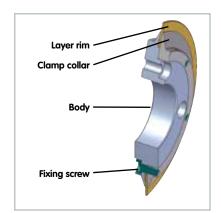
- greater profile accuracy
- very easy to automate
- dressing with production speeds



Characteristics

The DDS diamond CNC dresser consists of a single sintered diamond layer, which is clamped in a two-piece steel holder. This ensures a constant layer width with a consistently high active diamond content throughout its entire lifetime. The design permits the highest possible degree of flexibility when dressing different profiles in a single working cycle. The only requirement is a grinding machine with CNC dressing spindle and an acoustic emission contact sensor.

With this dressing system, a broad range of different profiles can be created in a single working step.



Please note

Further information and types of form rollers for CNC dressing can be found in catalogue no. 5 'Dressing tools'.

WINTER Facts

> Shank tools

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acort

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Precision flute grinding for mini and micro tools

As well as innovation in new materials and tool designs, the recent trend towards miniaturisation has become considerably more important.

From mini- and micro- down to nano tools, nowadays tools with outer diameters below 0.1 mm are no longer exceptional. The production of these tools demands special grinding wheels with very small and stable edge radii.

Resin bonded grinding wheels are competing against metal bonded versions which are considerably slower by comparison (approx. 50% of the feed rate of resin bonds) but they are characterized by greater edge stability. Metal bonded grinding wheels achieve a dressing interval up to five times longer.

The decision whether to use resin bonds or metal bonds is often a matter of personal preference. It is a question of process control whether profile retention with slower feed rates or high output with high feed rates will be cost-effective. The WINTER range therefore consists of metal bonds with great edge stability (BZ bonds for diamond and MSS bonds for cBN) as well as resin bonds with perfect edge stability which are marketed under µicro+ brand. The tools of the WINTER µicro+ range are grinding wheel systems that have been specifically developed for these requirements, which despite fast feed rates are characterised by their perfect edge stability compared to traditional resin bonds.

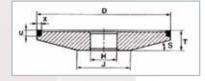
Areas of application

Classic areas of application are mini and micro drills and end mills for electronics, medical technology and automotive industry. In addition, these grinding wheels can be used for similar metal removal tasks, e.g. burrs.

Recommendations diamond

Ø 0.05 mm - 0.75 mm	D10D20A	µicro+2013	C150
Ø 0.75 mm - 2 mm	D20AD26	µicro⁺2012	C150
Ø 0.75 mm - 2 mm	D20AD46	BZ480	C150
Ø 2 mm - 4 mm	D32D64	µicro⁺2062	C150
Recommendations cBN			
Ø 0.75 mm - 2 mm	B15B35	µicro+2002-72	V300
Ø 0.75 mm - 2 mm	DOE DAG	MSS444	V240
D 0.75 111111 Z 111111	B25B46	14155444	V Z 4 U
Ø 2 mm - 4 mm	B30B64	SP4006T	V240 V240

4A9 Stock programme



Diamond g	Diamond grinding wheels											
Shape	D	U	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
1SP4A9	100	1.2	6	10	D20A	μicro+2013	C150	А	66260119853	T = 8 S = 60°		
2SP4A9	150	1.6	6	31.75	D20A	μicro+2013	C150	U	66260118891	T = 8 S = 60°		

Knives

Milling cutters

Flute grinding

WINTER µicro+ examples of use

Application example 1

Grinding tool: D54 µicro+ 2062 C135 A

Grinding machine: Kirner K360

Coolant: Oil

Tungsten carbide burr, Ø 1/2" Workpiece:

Grinding parameters Right-hand gearing

Feed rate: $v_f = 270 \text{ mm/min}$ Infeed: $a_{0} = ca. 0.7 \text{ mm}$ Cutting speed: $v_{c} = 28 \text{ m/s}$

Specific material removal rate: $Q'_{w} = 3.15 \text{ mm}^{3}/\text{mm} \cdot \text{s}$

Left-hand gearing

Feed: $v_f = 1080 \text{ mm/min}$ Cutting speed: $v_c = 28 \text{ m/s}$ Benefit:

Up to 50% increase in feed rate Impressive increase in capacity Huge reduction in costs



Application example 2

Grinding tool: D15B µicro+ 6055T C125 A **Grinding machine:** Rollomatic 620XS Coolant:

Workpiece:

Grinding parameters

Feed rate: Infeed: Cutting speed: Benefit:

45% cycle time reduction Perfect edge quality Longer dressing intervals

Oil

Tungsten carbide drill, Ø 0.8 mm

 $v_f = 40 \text{ mm/min}$ $a_0 = 0.3 \text{ mm}$

 $v_{c} = 25 \text{ m/s}$



Application example 3

Grinding tool: Grinding machine:

Coolant: Workpiece:

Grinding parameters

Feed rate: Infeed:

Benefit:

Cutting speed:

Good dressability Very good surface quality Maximum profile accuracy D15B µicro+ 6005T-23 C125 E

Rollomatic Nano6

Tungsten carbide end mill, Ø 0.05 mm

 $v_f = 0.8 \text{ mm/min}$ $a_{0} = 0.015 \text{ mm}$ $v_c = 25 \text{ m/s}$





Licro+

WINTER

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Mould and die

Standard flute grinding

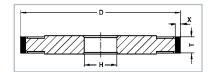
1A1 / 14A1 Stock programme

Diamond grinding wheels										
Shape	D	Т	x	н	Grit size	Bond	Concen- tration	Body	Order number	
KIAI	75	3	5	20	D46	K+920	C100	А	60157643388	
K1A1	75	10	5	20	D64	K+1421R	C100	Н	66260339426	
KIAI	100	10	5	20	D64	K+1421R	C100	Н	66260339422	
K1A1	100	12	5	20	D64	K+1421R	C100	Н	66260347629	
K1A1	100	15	5	20	D64	K+1421R	C100	Н	66260339419	
					D91	K+1421J	C75	Н	66260355621	
K14A1	125	5	5	20	D54	K+4821	C100	А	60157643037	
K1A1	125	5	10	20	D64	K+1421R	C100	А	66260350079	
K1A1	125	5	15	20	D126	K+921	C100	А	66260131770	
K1A1	125	6	15	20	D64	K+921	C100	А	66260132044	
K1A1	125	8	15	20	D64	K+921	C100	А	66260131843	
					D126	K+921	C125	А	66260130889 1)	
K1A1	125	10	10	20	D64	K+1421R	C100	А	66260341750	
K1A1	125	10	15	20	D64	K+921	C100	А	66260374178	
K1A1	125	12	10	20	D64	K+1421R	C100	А	66260352659	
K1A1	125	16	10	20	D64	K+1421J	C100	А	66260351497 2)	
1K14A1	150	2.3	7	50	D64	K+920	C75	А	66260128377 ²⁾	
					D151	K+920	C100	А	66260129975 ²⁾	
3K14A1	150	3.6	6	32	D151	K+920	C100	А	66260130484	
K1A1	150	12	10	20	D64	K+1421R	C100	А	66260352657	

Diamond g	Diamond grinding wheels											
Shape	D	T	X	Н	Grit size	Bond	Concen- tration	Body	Order number			
1SP1A1	100	6	5	20	D46	W+3060	C125	А	66260134471 2)			
1SP1A1	100	8	10	20	D46	W+3060	C125	А	66260134472 ²⁾			
1SP1A1	100	10	15	20	D46	W+3060	C125	А	60157643656 ²⁾			
1SP1A1	125	10	10	20	D46	W+3060	C125	А	66260112833 ²⁾			

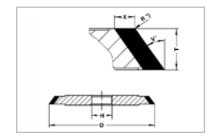
¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last



1A1 Stock programme

cBN grinding	cBN grinding wheels											
Shape	D	T	X	Н	Grit size	Bond	Concen- tration	Body	Order number			
K1A1	75	10	5	20	B107	KSS12N	V240	Н	66260352656 ¹⁾			
K1A1	100	10	5	20	B107	KSS12N	V240	Н	66260352654			
K1A1	100	15	5	20	B107	KSS12N	V240	Н	66260347909			
K1A1	125	6	5	20	B107	KSS12N	V240	А	662601181671)			
K1A1	125	10	5	20	B107	KSS12N	V240	Α	66260352653			
K1A1	150	12	5	20	B107	KSS12N	V240	А	66260352652			



1V1 Stock programme

Diamond grinding wheels											
Shape	D	Т	x	۷°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K1V1	75	10	5	10	20	D64	K+1421R	C100	Н	66260339433	
1K1V1	100	10	5	10	20	D64	K+1421R	C100	Н	66260339432	
1K1V1	100	15	5	10	20	D64	K+1421R	C100	Н	66260339431 1)	
KIVI	100	15	5	20	20	D64	K+1421R	C100	Н	66260347907 2)	
KIVI	100	15	5	30	20	D64	K+1421R	C100	Н	66260342813	
1K1V1	125	6	5	20	20	D64	K+1421R	C100	А	66260117593 1)	$R = 0.2^{3}$
1K1V1	125	10	5	10	20	D64	K+1421R	C100	А	66260352633	
3K1V1	125	10	5	20	20	D64	K+1421R	C100	А	66260346267 2)	$R = 0.5^{3}$
1K1V1	125	10	5	30	20	D64	K+1421R	C100	А	66260115545 ²⁾	
1K1V1	125	15	5	10	20	D64	K+1421R	C100	А	66260352641 1)	
1K1V1	125	15	5	20	20	D64	K+1421R	C100	А	66260345983	$R = 0.9^{3}$
KIVI	125	15	5	30	20	D64	K+1421R	C100	А	66260352640 1)	
KIVI	150	12	5	15	20	D64	K+1421R	C100	А	66260119886 1)	

¹⁾ Delivery time 5 - 6 weeks

WINTER Facts

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> > aws

Inserts

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Milling cutters

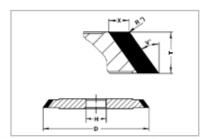
Mould and die

²⁾ Available while stocks last

³⁾ Typically for Hertel SE Drill

Mould and die

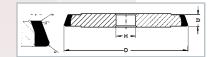
Service Glossary Contact



1V1 Stock programme

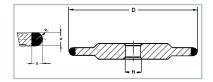
cBN grindin	cBN grinding wheels										
Shape	D	Т	X	V°	Н	Grit size	Bond	Concen- tration	Body	Order number	
1K1V1	100	10	5	10	20	B107	KSS12N	V240	Н	66260127891 1)	
1K1V1	100	15	5	10	20	B107	KSS12N	V240	Н	66260116353 ²⁾	
K1V1	100	15	5	20	20	B107	KSS12N	V240	Н	66260115554 1)	
K1V1	100	15	5	30	20	B107	KSS12N	V240	Н	66260115756 2)	
1K1V1	125	12	5	10	20	B107	KSS12N	V240	А	66260119462 1)	
KIVI	150	12	5	15	20	B107	KSS12N	V240	А	66260127964 1)	

700 Delivery programme



Diamond g	Diamond grinding wheels										
Shape	D	U	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment	
2K700	125	6	3	20	D46	K+1421R	C100	Н	66260119545 1)	Drill 3) Ø 36 mm	
2K700	125	10	5	20	D46	K+1421R	C100	А	6626038409511	Drill ³⁾ Ø 68 mm	
1K700	125	12	5	20	D46	K+1421R	C100	А	66260352647 1)	Drill ³⁾ Ø 811 mm	
1K700	125	16	5	20	D46	K+1421R	C100	Н	66260384094 1)	Drill ³⁾ Ø 1115 mm	
1K700	125	22	5	20	D64	K+1421R	C100	А	66260127878 1)	Drill ³⁾ Ø 1520 mm	

- ¹⁾ Delivery time 5 6 weeks
- ²⁾ Available while stocks last
- ³⁾ Typically for Hertel SE Drill



14F1 Stock programme

Diamond 9	Diamond grinding wheels											
Shape	D	U	X	R	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment	
1K14F1	100	4	6	2	20	D64	K+1421R	C100	Н	66260339416		
K14F1	125	3	5	1.5	20	D64	K+1421R	C100	Н	66260114821		
1K14F1	150	1	5	0.5	20	D64	K+888TY	C125	Α	66260116538		
K14F1	150	1.2	5	0.6	20	D46	K+888R	C100	Α	66260351382	3)	
K14F1	150	2	5	1	20	D64	K+888R	C100	Α	66260348744	3)	
1K14F1	150	3	7	1.5	20	D126	K+920	C100	А	66260133404		
K14F1	150	4	5	2	20	D64	K+1421R	C100	Α	66260351943 1)	3)	
K14F1	150	5	7	2.5	20	D64	K+1421R	C100	Α	66260129473 1)		
17K14F1	200	2	7	1	20	D64	K+920	C100	E	60157695294		
4K14F1	200	3	7	1.5	20	D126	K+920	C100	E	66260381129		
						D151	K+1313RY	C100	E	66260134511		
2K14F1	200	5	7	2.5	20	D126	K+920	C100	Α	66260136115		
						D151	K+1313RY	C100	Α	66260132727 1)		
						D252	K+920	C100	Α	66260132184 2)		

cBN grind	cBN grinding wheels											
Shape	D	U	x	R	Н	Grit size	Bond	Concen- tration	Body	Order number		
K14F1	100	3	5	1.5	20	B107	KSS12N	V240	А	66260340210		
K14F1	100	4	5	2	20	B107	KSS12N	V240	А	66260116260		
1K14F1	100	4	5	2	20	B151	KSSJY-63	V240	Н	60157643640 ²⁾		
3K14F1	125	4	5	2	20	B107	KSS12N	V240	А	66260352649 2)		
K14F1	150	4	5	2	20	B107	KSS12N	V240	А	66260352648 1)		
17K14F1	200	2	7	1	20	B64	KSS007N-63	V180	E	60157695901		
4K14F1	200	3	7	1.5	20	B181	KSS007N-63	V180	E	66260133528		
2K14F1	200	5	7	2.5	20	B181	KSS007N-63	V180	А	60157695651		

Besides flute grinding, the items listed in this section are also suitable for gashing, radius sharpening and profile grinding, depending on machine software.

WINTER Facts

> Shank tools

> > Saw

serts

PCD

Knives

Milling cutters

Mould and die

¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last

³⁾ Typically for Hertel SE-Drill

Shank

Saws

Knives

Milling cutters



Diamond and cBN grinding wheels for gashing

Gashing reduces the width of the chisel edge of a drill or end mill in order to reduce the forces during subsequent use of the tool. 12V9 wheels or pointed 1V1 / 14V1 wheels are generally used (the typical angle is 45°). Occasionally, 1A1 and 11V9 wheels are used. The advantage of 1V1 wheels over 12V9 wheels is a more rigid body.



Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use
V-Pro4073		High-performance resin bond for gashing and grinding of clearance angles
W+3060		High-performance resin bond for deep grinding, particularly wear-resistant
Q-Flute ²		High-performance resin bond for flute grinding
K+980		More wear-resistant, resin bond with high edge stability
K+921		More wear-resistant resin bond preferably wet grinding
K+1421R		Standard resin bond for CNC applications
K+888R		Universal resin bond for dry grinding
K+1410	·	Free-grinding resin bond for dry grinding
cBN grinding wheels	Wear resistance	Recommendations for use
KSS980	A	More wear-resistant, resin bond with high edge stability
KSSJY	_	Universal resin bond for wet grinding
KSS12N		Standard resin bond for CNC applications

Standard dimensions for gashing

Workpiece	Material	Machine	Peripheral grinding who	eel	Coolant Oil Emulsion
			Shape	Bond	
Drills End mills Reamers	Tungsten Carbide HSS Cermet	All CNC tool grinding machines	1A1, 1V1 Ø 50150 T 330 X 515	Q-Flute ² Q-Flute ⁺ Dress K+ / KSS bonds	
Workpiece		Machine		Coolant	
Workpiece	Material	Machine	Cup grinding wheel		Coolant
Workpiece	Material	Machine	Cup grinding wheel Shape	Bond	Coolant

Other dimensions on request

Service Glossary Contact

All dimensions in mm

Innovative gashing with V-Pro

The WINTER V-Pro grinding wheel programme completes the portfolio of diamond and cBN grinding wheels for machining shank tools on CNC grinding machines. The innovative hybrid bond shows remarkable edge stability in combination with increased infeed rates. V-Pro achieves significant leaps forward in reduction of production time, as proved in the application examples below.

Apart from 12V9 grinding wheels, V-Pro is available in other geometries for gashing milling and drilling tools.



Application example - gashing of tungsten carbide drills

Grinding tool: D64 V-Pro4073 C125 A

Grinding machine: ANCA TX7+

Coolant: Öl

Workpiece: Tungsten carbide drill, Ø 9mm

Grinding parameters

Feed rate: $v_f = 60 \text{ mm/min}$ Infeed: $a_0 = 0.5 \, \text{mm}$ Cutting speed: $v_c = 18 \text{ m/s}$

Benefit:

Reduction of down time through increased dressing intervals

25% reduction of grinding time

Considerable improvement of productivity

Application example - re-grinding of tungsten carbide end mills

Grinding tool: D64 V-Pro4073 C125 A Grinding machine: Schneeberger Norma

Coolant: Öl

Workpiece: Tungsten carbide end mill, Ø 18mm

Grinding parameters

Feed rate: $v_i = 100 \text{ mm/min}$ Infeed: $a_{0} = 0.3 \text{ mm}$ Cutting speed: $v_c = 25 \text{ m/s}$

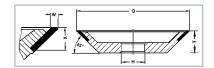
Benefit:

Very long lifetime

30% reduction of grinding time

Enormous cost savings

12V9 Stock programme



Diamond grinding wheels										
Shape	D	W	x	Н	Bond	Concentra- tion	Body	Order number	Comment	
4SP12V9	100	3	10	20	D46	V-Pro4073	А	7958711384	T = 20	
					D64	V-Pro4073	А	69014147396		
1SP12V9	125	3	10	20	D46	V-Pro4073	А	7958709321	T = 25	
					D64	V-Pro4073	А	69014144422		

11V9 V-Pro grinding wheels ex stock are shown in the next section "clearance angle grinding" of this chapter.







WINTER

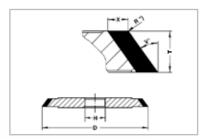
Shank

Milling cutters

Mould

Service Glossary Contact

Standard grinding wheels for gashing

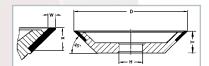


1V1 / 14V1 Stock programme

Diamond g	Diamond grinding wheels										
Shape	D	Т	x	۷°	Н	Grit size	Bond	Concen- tration	Body	Order number	
SP1V1	100	10	10	45	20	D54	Q-Flute ²		А	66260129991	
KIVI	100	15	5	45	20	D64	K+1421R	C100	Н	66260352665	
1K14V1	125	4	6	45	20	D64	K+921	C100	А	66260352637 1)	
1K1V1	125	10	5	45	20	D64	K+1421R	C100	А	66260352664	
SP1V1	125	10	10	45	20	D54	Q-Flute ²		А	66260115514	
KIVI	125	15	5	45	20	D64	K+1421R	C100	А	66260352639 1)	

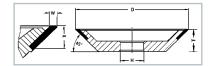
cBN grindi	cBN grinding wheels										
Shape	D	T	X	۷°	Н	Grit size	Bond	Concen- tration	Body	Order number	
KIVI	100	15	5	45	20	B107	KSS12N	V240	Н	66260352663 ¹⁾	
1K1V1	125	12	5	45	20	B107	KSS12N	V240	А	66260352661	

12V9 Stock programme



Diamond grinding wheels										
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
2K12V9	50	2	6	20	D64	K+1421R	C100	А	66260128817	T = 19, S = 45°
3K12V9	75	2	10	20	D64	K+1421R	C100	Н	66260338583	T = 20, S = 45°
2K12V9	75	3	10	20	D64	K+1421R	C100	Н	66260352673	T = 20, S = 45°
6K12V9	100	2	10	20	D64	K+1421R	C100	Н	66260344811	T = 20, S = 45°
					D64	K+1410	C125	Н	69014163229 1)	
3K12V9	100	3	10	20	D64	K+1421R	C100	Н	66260339437	T = 20, S = 45°
					D126	K+888R	C100	Н	66260128545	





12V9 Stock programme

Diamond	Diamond grinding wheels										
Shape	D	w	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment	
SP12V9	100	2	6	20	D46	W+3060	C125	Н	66260348949 1)	$T = 20$, $S = 45^{\circ}$	
2SP12V9	125	2	6	20	D46	W+3060	C125	Н	66260350500 1)	$T = 20$, $S = 45^{\circ}$	
9K12V9	125	2	2 10	10	20	D64	K+1410	C125	Н	69014182731	T = 25, S = 45°
						D64	K+980-42	C125	Н	60157672850	
					D91	K+921	C125	Н	66260383462		
					D91	K+1410	C125	Н	66260340845 1)		
5K12V9	125	3	10	20	D64	K+1421R	C100	Н	66260334260	$T = 25$, $S = 45^{\circ}$	
5K12V9	150	3	10	20	D64	K+1421R	C100	Н	66260117874	T = 25, S = 45°	

cBN grind	cBN grinding wheels									
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
3K12V9	75	2	10	20	B107	KSS12N	V240	Н	66260352670	T = 20, S = 45°
6K12V9	100	2	10	20	B107	KSS12N	V240	Н	66260352669	T = 20, S = 45°
					B107	KSS980-60	V240	Н	60157685426	
1K12V9	100	3	15	20	B107	KSS12N	V240	Н	66260352668	T = 20, S = 45°
					B151	KSSJY-77	V240	Н	60157642984	
9K12V9	125	2	10	20	B107	KSS980-60	V240	Н	60157685183	T = 25, S = 45°
6K12V9	125	3	15	20	B107	KSS12N	V240	Н	66260352667	T = 25, S = 45°
					B151	KSSJY-77	V240	Н	66260128064	
5K12V9	125	3	10	20	B107	KSS12N	V240	Н	66260354629	T = 25, S = 45°

1) Available while stocks last

Besides gashing, the items listed on these pages are also suitable for flute grinding, clearance grinding and radius sharpening depending on machine software.

WINTER

Shank tools

Saw

nserts

PCD

Knives

Milling cutters

Mould and die

Diamond and cBN grinding wheels for clearance angle grinding

Grinding clearance angles on the cutting edge of a tool reduces the contact area between the tool and the workpiece during drilling or milling processes. One or two clearance angles are usually ground on the face. Up to two clearance angles / clearances can be produced on the circumference; on some tools these take the form of radial clearance grinding. For grinding clearance angles 11V9 cup wheels or similar geometries are typically used. Our extensive standard range can be found on the following pages of this catalogue. 12V9 or surface grinding wheels are also used. Compatible tools with these geometries are listed in the chapters on flute grinding and gashing.



Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use
V-Pro4073		High-performance resin bond for gashing and grinding of clearance angles
W+3060	1	High-performance resin bond for deep grinding, particularly wear-resistant
K+980		More wear-resistant, resin bond with high edge stability
K+921		More wear-resistant resin bond preferably wet grinding
K+1421R		Standard resin bond for CNC applications
K+888R		Universal resin bond for dry grinding
K+1410	·	Free-grinding resin bond for dry grinding
cBN grinding wheels	Wear resistance	Recommendations for use
KSS980	A	More wear-resistant, resin bond with high edge stability
KSSJY	Ţ	Universal resin bond for wet grinding
KSS12N		Standard resin bond for CNC applications

Standard dimensions for the grinding of clearance angles

Workpiece	Material	Machine	Cup grinding wheel		Coolant Oil Emulsion
			Shape	Bond	
Drills End mills Reamers	Tungsten Carbide HSS Cermet	All CNC tool grinding machines	6A9, 11V9, 12A2, Ø 75125 W 23 X 10	K+ / KSS / W+ bonds	

Other dimensions on request

Innovative clearance angle grinding with V-Pro

The WINTER V-Pro grinding wheel programme completes the portfolio of diamond and cBN grinding wheels for machining shank tools on CNC grinding machines. The innovative hybrid bond shows remarkable edge stability in combination with increased infeed rates. V-Pro achieves significant leaps forward in reduction of production time, as proved in the application examples below.

Apart from 11V9 grinding wheels, V-Pro is available in other geometries for clearance angle grinding on milling and drilling tools.





D64 V-Pro4073 C125 A **Grinding tool:**

Grinding machine: SAACKE **Coolant:** Oil

Work piece: Tungsten carbide drills; Ø11 mm

Grinding parameters

 $v_f = 120 \text{ mm/min}$ Feed rate: Infeed: $a_0 = 1.2 \text{ mm}$ $v_{c} = 17 \text{ m/s}$ Cutting speed:

Benefit:

2 times longer dressing interval

Huge time savings

Significant increase in productivity

Application example - Clearance angle re-grinding (face and circumference)

D64 V-Pro4073 C125 A **Grinding tool:**

Grinding machine: HAWEMA Coolant:

Work piece: Tungsten carbide drills and end mills Ø6...25 mm

Grinding parameters

Feed rate: $v_f = 80 \text{ mm/min}$ Infeed: $a_0 = app. 1 mm$ Cutting speed: $v_c = 16...20 \text{ m/s}$

Benefit:

Very low edge wear Long dressing intervals Perfect surface quality

11V9 Stock programme

Diamond grinding wheels W X Comment **Shape** Н **Bond** Concentra-**Body** Order number 1SP11V9 3 10 V-Pro4073 T = 3075 20 D46 7958711381 D64 V-Pro4073 D 7958708546 3SP11V9 3 100 10 20 D46 V-Pro4073 7958704895 T = 35D64 V-Pro4073 D 69014133000 1SP11V9 3 D46 V-Pro4073 7958711383 T = 40125 10 20 D D64 V-Pro4073 7958709384

12V9 V-Pro grinding wheels ex stock are shown in the previous section "gashing" of this chapter.

All dimensions in mm



WINTER

Shank

Milling cutters

Mould and die

Glossary

Shank tools

Saws

Inserts

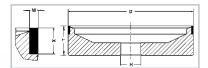
Knives

Milling cutters

Mould and die

Service Glossary Contact

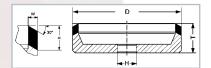
Standard grinding wheels for clearance angle grinding



6A9 Stock programme

Diamon	d grindin	g whee	els							
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
11K6A9	100	3	10	20	D64	K+1421R	C100	Н	66260339412	T = 30
1K6A9	125	3	10	20	D126	K+920	C100	А	60157643461	T = 30

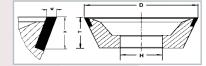
6V5 Stock programme



Diamond (grinding	g whee	els								
Shape	D	W	x	۷°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K6V5	100	4.5	10	30	20	D64	K+1421R	C100	Н	66260370517	T = 34

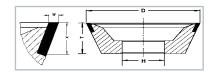
cBN grindi	ing wh	eels									
Shape	D	W	X	V°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K6V5	100	4.5	10	30	20	B107	KSS12N	V240	Н	66260370513 ²⁾	T = 34

11V9 Stock programme



Diamond grinding wheels																								
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment														
7K11V9	75	2	10	20	D64	K+1421R	C100	Н	66260338587	T = 30														
					D64	K+1410	C125	Н	60157685425 1)															
2K11V9	75	3	10	20	D64	K+1421R	C100	Н	66260347304	T = 30														
8K11V9	100	2	10	20	D64	K+1421R	C100	Н	66260338586	T = 35														
						D64	K+1410	C125	Н	69014163728														
								D64	K+980-42	C125	Н	66260324844												
																							D91	K+921
					D91	K+1410	C125	Н	66260336262 2)															
					D126	K+888R	C100	Н	66260344473															

All dimensions in mm

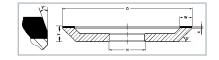


11V9 Stock programme

Diamond grinding wheels										
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
2SP11V9	100	2	10	20	D46	W+3060	C125	Н	66260346785 2)	T = 35
10K11V9	100	3	10	20	D46	K+1421R	C100	Н	66260346530 ²⁾	T = 35
					D64	K+1421R	C100	Н	66260334264	
11K11V9	125	3	10	20	D64	K+1421R	C100	Н	66260338584	T = 40

cBN grinding wheels											
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment	
7K11V9	75	2	10	20	B107	KSS12N	V240	Н	66260352681	T = 30	
					B107	KSS980-60	V240	Н	60157685182		
2K11V9	75	3	10	20	B107	KSS12N	V240	Н	66260352679 2)	T = 30	
8K11V9	100	2	10	20	B107	KSS12N	V240	Н	66260352678	T = 35	
					B107	KSS980-60	V240	Н	69014163185		
					B151	KSSJY-63	V240	Н	66260128341 2)		
10K11V9	100	3	10	20	B107	KSS12N	V240	Н	66260352675	T = 35	
11K11V9	125	3	10	20	B107	KSS12N	V240	Н	66260352674	T = 40	

12A2 Stock programme



Diamond	grindin	g whe	els								
Shape	D	W	X	S°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
2K12A2	125	15	3	45	20	D46	K+1421R	C100	Н	66260352597	V = 20° T = 26

cBN grind	ing wh	eels									
Shape	D	W	X	S°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
2K12A2	125	15	3	45	20	B91	KSSJY-63	V240	Н	66260352594	V = 20°
						B91	KSS12N	V240	Н	66260352593	T = 26

¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last

Shank tools

Saws

Inserts

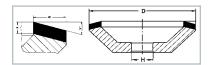
PCD PCBN

Knives

Milling cutters

Mould and die

Service Glossary Contact



12V5 Stock programme

Diamond grir	inding	whee	els								
Shape D	D	w	X	V °	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
K12V5 10	100	10	5	20	20	D46	K+1421R	C100	Н	66260352645	T = 28

cBN grind	ing wh	eels									
Shape	D	w	X	V°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
K12V5	100	10	5	20	20	B91	KSS12N	V240	Н	66260127380 1)	T = 28

Apart from grinding clearance angles, the items listed on these pages are also suitable for flute grinding, OD grinding, gashing, radial clearance grinding and radius sharpening, depending on the machine software.

¹⁾ Delivery time 5 - 6 weeks

All dimensions in mm

niversal arindina

Diamond and cBN grinding wheels for universal grinding

Universal grinding tasks include all the applications on universal tool grinding machines. Grinding wheels for grinding and re-sharpening of different tools are listed. Depending on the type of bond, the grinding wheels are suitable for either / or dry and wet grinding. According to the tool type and machine type, different geometries are required. Different types of cup wheels and several surface grinding wheels are listed on the following pages. Detailed information on fields of application is shown below each table. 1A1 grinding wheels for OD and ID grinding are listed in the 'Mould and Die' chapter.



Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use
BZ560		Metal bond for wet and dry grinding
Resimet (T64A01)		Special bond for tungsten carbide-steel combination grinding, dry
M+789	A	Special bond for tungsten carbide-steel combination grinding, dry
K+1313RY	T	Resin bond for tungsten carbide-steel combination grinding, wet
K+1421N		Standard resin bond for CNC applications
K+1414R		Resin bond for tungsten carbide-steel combination grinding, dry
K+1414N		Resin bond for tungsten carbide-steel combination grinding, dry
K+1414J		Resin bond for tungsten carbide-steel combination grinding, dry
K+888RY		Universal resin bond for wet grinding
K+888NY		Universal resin bond for wet grinding
K+888R		Universal resin bond for dry grinding
K+888N		Universal resin bond for dry grinding
K+888J		Universal resin bond for dry grinding
K+888FM		Fine-grit resin bond for polish grinding
K+1410		Free-grinding resin bond for dry grinding
K+777R		Universal resin bond for fine-grain applications
K+777N		Universal resin bond for fine-grain applications
K+777J		Universal resin bond for fine-grain applications
KR250		Free-grinding resin bond, wet/dry grinding
K+730		Very free-grinding fine-grain bond, dry grinding possible

WINTER

Shank tools

Saw

PCD

. . . .

Milling

cutters

Mould and die

Selection assistant for WINTER bond systems

cBN grinding wheels	Wear resistance	Recommendations for use
Resimet (T45AZW01)		Special bond for dry grinding
KSS920	A	More wear-resistant resin bond also dry grinding
KSSTY		Universal resin bond for wet grinding
KSSRY		Universal resin bond for wet grinding
KSS12		Standard resin bond for CNC applications
KSS10N		Universal resin bond for tool grinding
KSS10J		Universal resin bond for tool grinding
KR102		Free-grinding resin bond for wet grinding
KSS007		Free-grinding resin bond for dry grinding and under oil
KSS1065	ı	Particularly free-grinding dry grinding bond

Standard dimensions for manual grinding

Cermet

Workpiece	Material	Machine	Peripheral grinding v	vheel	Coolant
			Shape	Bond	
Drills End mills Reamers Cutting chisels Gravers	Tungsten carbide HSS Cermet	All universal tool grinding machines	1A1, 14A1, 14F1, Ø 75125 U 24.4 X 36	Various bonds (see above)	Dry Emulsion
Workpiece	Material	Machine	Cup grinding wheel		Coolant
			Shape	Bond	
Drills End mills	Tungsten carbide HSS	All universal tool grinding machines	4A2, 11V9, 12A2, Ø 75175	Various bonds (see above)	Dry Emulsion

W 3...10

X 1...10

Other dimensions on request

Reamers

Gravers

Cutting chisels

1A1 Stock programme

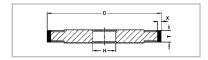


Diamond grinding wheels

Shape	D	Т	x	Н	Grit size	Bond	Concen- tration	Body	Order number
KIAI	75	10	6	20	D151	K+1313RY	C100	Н	66260135746
K1A1	100	6	10	20	D64	K+888R	C50	А	66260131547
KIAI	100	10	4	20	D126	K+1414N	C100	А	66260127052

For grinding tungsten carbide and carbide-tipped tools, for example OD grinding. Suitable for use on universal tool grinding machines.

1A1 Stock programme

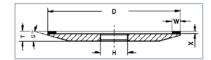


cBN grindin	cBN grinding wheels											
Shape	D	Т	x	Н	Grit size	Bond	Concen- tration	Body	Order number			
K1A1	100	10	2	20	B126	KSSRY	V180	Н	66260136247			
K1A1	125	10	2	20	B126	KSS10N	V120	Н	66260134925			

Application

For grinding HSS tools, for example OD grinding. Suitable for use on universal tool grinding machines.

4A2 Stock programme



Diamond grinding wheels												
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
K4A2	100	6	2	20	D64	K+888N	C50	Н	66260137071 2)	S = 15°, T = 8		
					D91	K+888N	C50	Н	66260136265 2)			
6K4A2	125	5	2	20	D46	K+888J	C50	Н	60157643448	S = 15°, T = 10		
					D46	K+1410	C75	Н	66260115833			
					D64	K+888R	C50	Н	60157643256			
					D64	K+1410	C100	Н	66260128030			
K4A2	125	5	2	20	D91	K+888R	C50	Н	66260133740 2)	S = 15°, T = 6		
K4A2	150	5	4	20	D64	K+888N	C50	Н	60157643184	S = 15°, T = 13		
K4A2	175	5	4	20	D64	K+888N	C50	Н	60157643327	S = 15°, T = 13		

cBN grinding wheels												
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
K4A2	100	4	2	20	B107	KSS10N	V120	Н	60157642646 1)	S = 15°, T = 8		
K4A2	125	4	2	20	B107	KSS10N	V120	Н	60157642812 1)	S = 15°, T = 6		
K4A2	125	5	4	20	B126	KSS10J	V120	Н	60157642977 2)	S = 11°, T = 15		
3K4A2	150	3	2	20	B151	KSSRY	V240	А	66260134960 ²⁾	S = 20°, T = 17		
K4A2	150	4	2	20	B107	KSS10N	V120	Н	60157642791	S = 15°, T = 6		
K4A2	150	4	3	20	B91	KSS12N	V240	А	66260127081 1)	S = 15°, T = 12		
K4A2	175	5	4	20	B126	KSS10J	V120	Н	60157643668	S = 15°; T = 13		
K4A2	200	6	2	20	B107	KSS10J	V120	Н	60157643223 2)	S = 15°; T = 11		

Application

For face grinding, T < 10 mm: especially for narrow chip space. Suitable for universal tool grinding machines.

All dimensions in mm

WINTER

Shank tools

Saw:

nserts

PCD

nives

Milling cutters

Mould and die

¹⁾ Delivery time 5 to 6 weeks

²⁾ Available while stocks last

WINTER Facts



Saws

Inserts

PCD PCBN

Knives

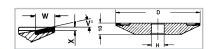
Milling cutters

Mould and die

Service Glossary Contact

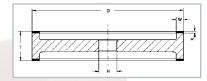


²⁾ Available while stocks last



cBN grinding wheels											
Shape	D	W	x	V°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K4V4	100	6	1	10	20	B151	KSSTY	V180	Α	66260135829	T = 10

Application
For face grinding

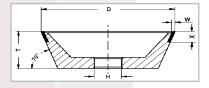


9A3 Stock programme

4V4 Stock programme

Diamond	Diamond grinding wheels											
Shape	D	W	x	T	Н	Grit size	Bond	Concen- tration	Body	Order number		
1K9A3	175	5	2	30	20	D64	K+888N	C50	Α	66260112486 1)		
						D126	K+888N	C75	Α	66260116615 2)		
K9A3	175	6	2	35	20	D15B	K+777J	C31	А	66260136274 2)		
K9A3	175	8	2	35	20	D46	K+888NY	C31	Α	66260136275 2)		
						D64	K+888NY	C31	Α	66260134834		

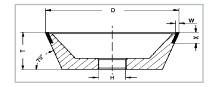
Application
For grinding carbide-tipped cutters



11V9 Stock programme

Diamond	Diamond grinding wheels												
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment			
K11V9	75	2	10	20	D15C	K+888R	C50	Н	66260111375	T = 30			
					D46	K+888R	C75	D	66260128403				
					D64	K+888R	C75	D	60157644128				
					D91	K+888R	C75	D	66260136470				
					D126	K+888R	C75	D	66260135883				
K11V9	100	1.5	10	20	D126	K+1421N	C125	D	66260115029	T = 35			

All dimensions in mm



11V9 Stock programme

Diamond grinding wheels																							
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment													
K11V9	100	2	10	20	D15A	K+777R	C75	Н	66260110921	T = 35													
					D46	K+1414N	C75	D	66260114079 1)														
					D64	K+888R	C75	D	60157642864														
					D64	K+888R	C75	Н	60157642816														
					D91	K+888R	C75	D	60157642783														
					D126	KR250	C75	Α	66260338889 1)														
					D126	K+888R	C75	D	66260137065														
					D126	K+1414J	C75	D	66260100363														
					D126	K+1414N	C75	D	60157643573														
					D126	K+1414N	C75	Н	66260388358 1)														
					D151	K+1410	C75	D	66260129623														
K11V9	100	3	10	20	D46	K+1414N	C75	D	60157643080	T = 35													
				20	20	20										D64	K+888R	C75	D	60157643467			
					D91	K+888R	C75	D	66260134899														
											D126	K+888R	C75	D	60157642950								
									D126	K+1410	C75	D	66260136164										
																						D126	K+1414N
					D151	K+1410	C75	D	66260355670														
					D151	K+4821	C100	D	60157643167 1)														

Application

For grinding tungsten carbide and carbide-tipped tools, gashing and grinding of clearance angles. For use on universal tool grinding machines, dry and wet. Also for graver grinding machines.

WINTER

Shank tools

Saws

acort.

CBN

Knives

Milling cutters

Mould and die

¹⁾ Available while stocks last







Inserts

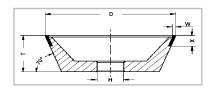
PCD PCBN

Knives

Milling cutters

Mould and die

Service Glossary Contact

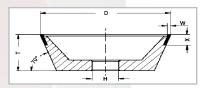


11V9 Stock programme

Diamond grinding wheels												
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
M11V9	95.3	3.2	9.3	20	D91	M+789	C50	D	60157642796	T = 35		
					D126	M+789	C50	D	66260136404			
					D126	M+789	C75	D	60157643011			
M11V9	125	3	10	20	D126	M+789	C75	D	60157643328	T = 40		

Application

For grinding tungsten carbide-tipped tools with up to 50% shank material. For use on universal tool and graver grinding machines, dry and wet. Well suited for creep-feed grinding, e.g. for halving of gravers.



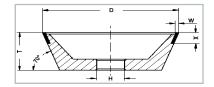
Diamond (Diamond grinding wheels																	
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment								
RM11V9	90	3	6	20	D64	T64A01	C50	С	66260388178	T = 35								
					D107	T64A01	C50	С	69014160168									
					D107	T64A01	C75	С	66260397170 1)									
					D126	T64A01	C50	С	66260393781									
					D151	T64A01	C50	С	66260392872 1)									
RM11V9	90	3	6	31,75	D64	T64A01	C75	С	66260394059 2)	T = 35								
					D107	T64A01	C50	С	66260397766									
RM11V9	125	3	6 20	6	6	6	6	6 20	5 20	6 20	6 20	20	D107	T64A01	C50	С	66260394017 1)	T = 40
					D151	T64A01	C50	С	69014158820 1)									

Application

For grinding tungsten carbide-tipped tools with up to 50% shank material. For use on universal tool and graver grinding machines, dry and wet. Well suited for creep-feed grinding, e.g. for halving of gravers.

¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last



11V9 Stock programme

cBN grindin	g whe	els								
Shape	D	w	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
K11V9	75	2	6	20	B181	KSS007N	V180	D	60157643817 *)	T = 30
K11V9	75	2	10	20	B126	KSS10N	V180	D	60157643665	T = 30
					B181	KSS007N	V180	D	66260136571 *)	
K11V9	75	3	10	20	B126	KSS10N	V180	D	60157643113	T = 30
K11V9	100	2	10	20	B91	KSS12N	V180	D	66260128013	T = 35
					B126	KSS007N	V180	D	60157643642 *)	
					B126	KSS10N	V180	D	60157643300	
					B151	KSS1065V-63	V180	Н	66260355615	
					B181	KSS007N	V180	D	66260135739 *)	
					B181	KSS007N-63	V180	D	60157642872 *)	
K11V9	100	3	10	20	B126	KSS10N	V180	D	60157643042	T = 35
K11V9	125	2	10	20	B126	KSS10N	V180	Н	60157643879	T = 40
					B181	KSS007N	V180	D	66260135770 *)	

^{*)} KSS007N for high material removal rate at $v_{_{c}}$ > 30 m/s. Infeed $\alpha_{_{e}}$ = 0.05...0.15 mm

Application

For grinding HSS tools, for gashing and grinding of clearance angles. For use on universal tool and graver grinding machines, dry and wet.

cBN grindin	ng whe	els								
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
RM11V9	90	3	6	20	B151	T45AZW01	C50	С	69014157884 1)	T = 30
					B151	T45AZW01	C75	С	69014159273	

Application

For grinding HSS tools. For use on universal tool and graver grinding machines, dry and wet.

WINTER

Shank tools

Saws

nserts

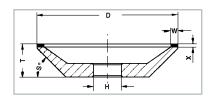
PCD

Knives

Milling cutters

Mould and die

¹⁾ Available while stocks last



12A2 Stock programme

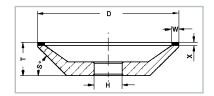
Diamond	grindir	ng whe	els								
Shape	D	w	x	S°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K12A2	75	3	4	45	20	D7	K+730	C50	В	60157643560	T = 24
						D15B	K+777J	C50	В	66260135928	
						D46	K+888J	C75	D	60157643552	
						D64	K+888J	C75	D	66260136270	
						D91	K+888R	C75	Н	60157642779 1)	
						D126	K+888R	C75	А	66260136273	
K12A2	100	5	2	45	20	D46	K+888N	C50	Н	60157643097	T = 25
						D91	K+888R	C50	Н	60157643285	
						D91	K+888R-69	C50	А	66260147081	
K12A2	100	6	4	45	20	D64	K+888R	C50	D	60157642582	T = 27
						D126	K+888R	C75	D	60157642588	
K12A2	100	8	4	45	20	D126	K+888R	C50	Н	60157667189 2)	T = 27
K12A2	100	10	2	45	20	D64	K+888J	C50	Н	66260136330	T = 25
						D126	K+888J	C50	Н	60157642866	
K12A2	100	10	4	45	20	D126	K+888N	C75	Н	66260135975	T = 27
1K12A2	100	10	6	45	20	D151	K+1313RY	C75	А	60157643556 ²⁾	T = 29
K12A2	125	6	2	45	20	D46	K+888R	C50	Н	60157642628	T = 25
						D91	K+888R	C50	Н	66260136340 1)	
						D126	K+888R	C50	Н	66260129825 1)	
K12A2	125	10	2	45	20	D64	K+888J	C75	Н	66260113330 2)	T = 25
						D91	K+888J	C50	Н	60157642876 2)	
K12A2	125	12.5	2	45	20	D64	K+888J	C50	Н	60157642835	T = 25
						D91	K+888J	C50	Н	60157642684	
						D126	K+888J	C50	Н	60157642792	
K12A2	150	15	2	45	20	D91	K+777N	C50	Н	66260136459	T = 25

Application

For grinding tungsten carbide and carbide-tipped tools, e.g. reamers, gravers and cutters. For use on universal tool grinding machines, dry and wet grinding.

¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last



12A2 Stock programme

Diamond 9	grindin	g whee	els								
Shape	D	w	x	S°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
M12A2	75	3	4	45	20	D91	M+789	C50	А	60157643230	T = 24
M12A2	100	6	4	45	20	D91	M+789	C50	Н	60157642871	T = 27
						D126	M+789	C50	Н	60157642688	

Application

For grinding tungsten carbide-tipped tools with up to 50% shank material. For use on universal tool and graver grinding machines, dry and wet grinding. Well suited for creep-feed grinding, e.g. for halving of gravers.

Diamond o	grindin	g whe	els							
Shape	D	w	x	S°	Н	Grit size	Bond	Concen- tration	Body	Order number
BZ12A2	125	10	1	45	20	D91	BZ560	C75	E	60157642968

Application

Universally suited for all robust applications, e.g. on all grinding machines for tungsten carbide lathe tools. Suitable for dry and wet grinding.

cBN grind	ing who	eels									
Shape	D	W	X	S°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K12A2	75	3	4	45	20	B46	KSS10N	V180	Н	60157643055	T = 24
						B91	KSS10N	V180	Н	66260135831	
K12A2	100	5	2	20	20	B126	KSS10J	V120	Н	66260136215 1)	T = 12
K12A2	100	5	2	45	20	B126	KSS10J	V120	Н	60157643373	T = 25
K12A2	150	4	6	45	32	B76	KR102	V240	А	66260340323 1)	T = 29
K12A2	150	5	2	20	20	B126	KSS10J	V120	Н	66260134924	T = 18
K12A2	175	5	2	20	20	B126	KSS10J	V120	Н	60157643523 1)	T = 20
K12A2	175	5	4	20	20	B126	KSS10J	V120	Н	66260128803	T = 22
K12A2	200	5	4	20	20	B126	KSS10J	V120	Н	66260127109	T = 24

Application

For grinding HSS tools, especially cutting face. Suitable for use on universal tool grinding machines, dry and wet.

1) Available while stocks last

WINTER

Shank tools

Saws

corte

PCD

Cnives

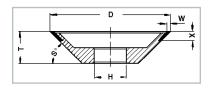
Milling cutters

Mould and die

Shank tools

Mould and die

Service Glossary Contact



12V9 Stock programme

Diamond g	rinding	whee	ls							
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
K12V9	75	2	6	20	D64	K+888R	C75	D	60157643020	T = 20, S = 45°
3K12V9	75	2	8	20	D15C	K+888R	C100	Н	60157643483 2)	T = 20, S = 45°
K12V9	75	2	10	20	D15B	K+888FM	C100	Н	66260129105	T = 20, S = 45°
					D46	K+888R	C100	Н	66260131408 2)	
2K12V9	75	2	10	20	D15C	K+777N	C75	Н	66260116643	T = 25, S = 45°
					D46	K+888R	C75	D	66260111062 2)	
					D64	K+888R	C75	D	60157642957	
					D91	K+888R	C75	D	66260132226	
					D126	K+888R	C75	D	60157643465	
1K12V9	75	2.3	7.1	20	D46	K+1410	C75	Н	66260136382 1)	$T = 26$, $S = 45^{\circ}$
K12V9	75	3	6	20	D46	K+1414N	C75	Н	66260119257	T = 20, S = 45°
K12V9	100	1.5	6	20	D151	K+888RY	C75	Н	60157643322	T = 20, S = 45°
K12V9	100	2	6	20	D91	K+888R	C75	Н	66260114858	$T = 20$, $S = 45^{\circ}$
5K12V9	100	2	10	20	D46	K+888R	C75	D	66260118421	T = 25, S = 45°
					D64	K+888R	C75	D	66260136069	
					D91	K+888R	C75	D	66260130027 2)	
					D126	K+888R	C75	D	60157643198	
3K12V9	100	3	6	20	D91	K+888R	C75	А	66260107650	T = 20, S = 30°

Application

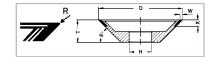
or grinding tungsten carbide tools, gashing and grinding of cutting faces. For use on universal tool grinding machines, dry and wet.

cBN grindi	ng wh	eels								
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
7K12V9	50	2	6	20	B126	KSS10N	V180	D	66260136491	T = 16, S = 45°
2K12V9	75	2	10	20	B126	KSS10N	V180	D	66260136065	T = 25, S = 45°

¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last

WINDIE B



12V9 Stock programme

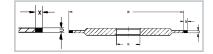
cBN grindi	ing whe	eels								
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
3K12V9	75	3	6	20	B181	KSS007N	V180	D	60157643923 *)	T = 20 S = 45°, R = 1
K12V9	100	2	6	20	B126	KSS10N	V180	D	60157643398	T = 35 S = 45°
5K12V9	100	2	10	20	B126	KSS10N	V180	D	60157643440	T = 25 S = 45°
4K12V9	100	2	10	20	B181	KSS007N-63	V180	Н	66260114593 *)	T = 24 S = 45°
6K12V9	100	3	6	20	B181	KSS007N	V180	D	60157643800 *)	T = 20 S = 45°, R = 1
7K12V9	100	3	6	20	B181	KSS007N	V180	А	60157643335 *)	T = 20 S = 35°, R = 1
1K12V9	100	3	15	20	B151	KSS007N-77	V180	Н	60157642915 *)	T = 22 S = 45°
3K12V9	125	3	6	20	B181	KSS007N	V180	D	60157643131 *)	T = 25 S = 45°, R = 1
K12V9	125	3	10	20	B151	KSS007N-77	V180	D	66260112846 *)	T = 40 S = 45°

*) KSS007N for high material removal rate at $v_c > 30$ m/s, infeed $a_e = 0.05...0.15$ mm

Application

For grinding HSS tools, e.g. cutting face and for gashing. Suitable for use on all universal tool grinding machines, wet and dry.

14A1 Stock programme



Diamond o	grindin	g whe	els						
Shape	D	U	x	Н	Grit size	Bond	Concen- tration	Body	Order number
1K14A1	75	2	6	20	D64	K+888R	C75	А	66260136218
K14A1	100	2	5	20	D76	K+1414N	C75	А	60157642932
					D126	K+888R	C75	Α	66260113077

Application

For use on universal tool grinding machines, for gashing of tungsten carbide drills.

Shank tools

WINTER

Saws

nserts

PCD PCBN

Knives

Milling cutters

Mould and die

Shank tools

Saws

PCD PCBN

Knives

Milling cutters

D!.....



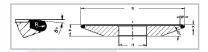
Diamond	grindiı	ng whe	eels							
Shape	D	U	x	R	Н	Grit size	Bond	Concen- tration	Body	Order number
K14F1	100	4	5	2	20	D107	K+888R	C100	Н	66260136216

Application

For profile grinding of tungsten carbide tools.

700 Stock programme

14F1 Stock programme



Diamond	grindir	ng whe	eels								
Shape	D	U	x	R	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K700	75	2.2	3	1	20	D126	K+888R	C100	А	60157643225	S = 5°
1K700	100	2.2	3	1	20	D151	K+1414R	C100	А	60157643078 ¹⁾	S = 5°
1K700	100	4.4	5	2	20	D126	K+888R	C100	А	60157643091 1)	S = 5°

Application

For grinding spiral tungsten carbide tools, e.g. on NC tool grinding machines.

cBN grind	ling wh	eels									
Shape	D	U	X	R	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K700	75	2.2	3	1	20	B126	KSS10N	V180	А	66260135767	S = 5°
						B151	KSSRY	V240	А	66260100354 1)	
1K700	100	2.2	3	1	20	B126	KSS10N	V180	А	60157643543 2)	S = 5°
1K700	100	4.4	5	2	20	B126	KSS920	V180	А	60157643948 2)	S = 5°
						B181	KSS007N	V180	А	60157642878	
1K700	125	4.4	5	2	20	B126	KSS920	V180	А	66260135867	S = 5°
						B181	KSS007N	V180	А	60157642948	

Application

For grinding spiral HSS tools, e.g. on NC tool grinding machines. Reciprocating and creep-feed grinding. Suitable for cutting face grinding.

2) Available while stocks last

Mould and die

¹⁾ Delivery time 5 - 6 weeks

periol tools

Diamond and cBN grinding wheels for special tools

This chapter provides an insight into special tools. It is impossible to itemize the wide variety of shank tools in detail. If you require grinding tools for different operations, please contact us, we will find the best solution for you.

Profile grinding of tungsten carbide dowel drills

Application example

Grinding tool: D64 K+888R C75 or K+921 C100

Grinding machine: Deckel S11 **Coolant:** Dry

Workpiece: Tungsten carbide dowel drills, Ø 4 to 18 mm

Grinding parameters

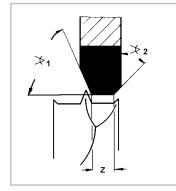
Feed: $v_f = approx. 300 \text{ mm/min (manual)}$

Infeed: $a_e = by hand$ Cutting speed: $v_c = 18 \text{ m/s}$

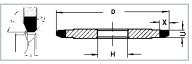
Benefit:

High profile retention, quick removal of wear mark

Good surface, no heat damage



WINTER



1D1 Stock programme

Diamon	Diamond grinding wheels												
Shape	D	U	x	Z	≱1	≯2	Н	Grit size	Bond	Concentration	Body	Order number	Comment
1K1D1	75	4.5	6	0.9	67.5	45	20	D64	K+888R	C75	Н	60157642996	for Ø 4
1K1D1	75	4.5	6	1.4	67.5	45	20	D64	K+888R	C75	Н	66260116659	for Ø 5
1K1D1	75	4.5	6	1.9	67.5	45	20	D64	K+888R	C75	Н	66260136519	for Ø 6
1K1D1	75	5	6	2.8	67.5	45	20	D64	K+888R	C75	Н	66260136520	for Ø 8
1K1D1	75	6	6	3.7	67.5	45	20	D64	K+888R	C75	Н	66260136522	for Ø 10

cBN grin	cBN grinding wheels												
Shape	D	U	X	Z	≱1	≫2	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K1D1	75	4.5	6	0.9	67.5	45	20	B107	KSS10N	V180	Н	60157642715 2)	for Ø 4
1K1D1	75	4.5	6	1.9	67.5	45	20	B107	KSS10N	V180	Н	60157643017 2)	for Ø 6
1K1D1	75	5	6	2.8	67.5	45	20	B107	KSS10N	V180	Н	60157642955 1)	for Ø 8

Application

For profile grinding of dowel drills (clearance) with simultaneous grinding of centre point tips and rough cutting edges. Other dimensions can be supplied. When ordering, please state drill diameter or Z dimension.

All dimensions in mm

x	-	
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WINTER Facts

> Shank tools

> > Saw

PCD

Knives

Milling

Mould

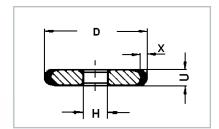
¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last

Saws

Service Glossary Contact

Grinding wheels for machining router bits

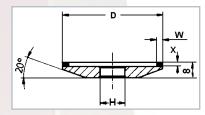


1FF1 Delivery programme

Diamond (Diamond grinding wheels									
Shape	D	U	x	R	Н	Grit size	Bond	Concen- tration	Body	Order number
1K1FF1	40	6	2.5	3	10	D64	K+888R	C75	Α	60157642702 1)

Application

For grinding the cutting face of single-edge router bits.



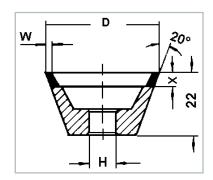
4A2 Delivery programme

Diamond g	Diamond grinding wheels										
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment	
K4A2	50	3	2	10	D64	K+888N	C50	Α	60157642922 2)	R = 1	

cBN grindi	cBN grinding wheels								
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number
1K4A2	50	3	2	10	B107	KSS10J	V120	А	66260136536 ¹⁾

For grinding tooth faces of small router bits with chip thickness restriction.

- ¹⁾ Delivery time 5 6 weeks ²⁾ Available while stocks last

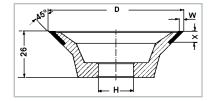


11V2 Stock programme

cBN grindin	cBN grinding wheels									
Shape	D	w	x	н	Grit size	Bond	Concen- tration	Body	Order number	
K11V2	40	2	5	10	B126	KSS10N	V180	Н	66260134764	

Application

For grinding of single- or multi-edge router bits (cutting face bevel).



12V9 Stock programme

Diamond g	Diamond grinding wheels									
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number	
1K12V9	75	2.3	7.1	20	D46	K+888R	C75	Н	60157642595	
				D64	K+888R	C75	Н	60157642687		

cBN grindir	cBN grinding wheels									
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number	
2K12V9	75	2.3	7.1	20	B126	KSS007-63	V180	Н	66260113221	

For grinding of single- or multi-edge router bits (cutting face bevel).

WINTER

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Service

All dimensions in mm

Application examples for special tools

Application example 1

Grinding tool: **Grinding machine:**

Coolant: Workpiece:

Grinding parameters

Feed: Infeed: Cutting speed: Benefit:

Very good surface quality Superb edge stability

Peel grinding of stepped drills

D64 BZ4415 C100 E Rollomatic NP4

Tungsten carbide drill Ø 14 mm by Ø 10.3 mm

 $v_{i} = 3.6 \text{ mm/min}$ $a_{0} = 1.85 \text{ mm}$ $v_c = 63 \text{ m/s}$

WINTER



Application example 2

Grinding of knurled profile on roughing mills D64 SP4006R C125 A **Grinding tool: Grinding machine:** Walter Helitronic

Coolant:

Workpiece: Tungsten carbide roughing end mill Ø 20 mm

flute length 90 mm

Grinding parameters

Feed: $v_f = 100 \text{ mm/min}$ $a_{e} = 2.5 \text{ mm}$ Infeed: $v_{c} = 25 \text{ m/s}$ Cutting speed:

Specific material removal rate: $Q'_{w} = 4.16 \text{ mm}^{3}/\text{mm} \cdot \text{s}$

Substantially faster than crushable metal bonds Higher tool life than crushable metal bonds



Application example 3 Thread grinding on taps

Grinding tool: D25 V+2046 N1TC-23 C100 E

Grinding machine: SMS Coolant: Oil

Workpiece: Tungsten carbide tap

Grinding parameters

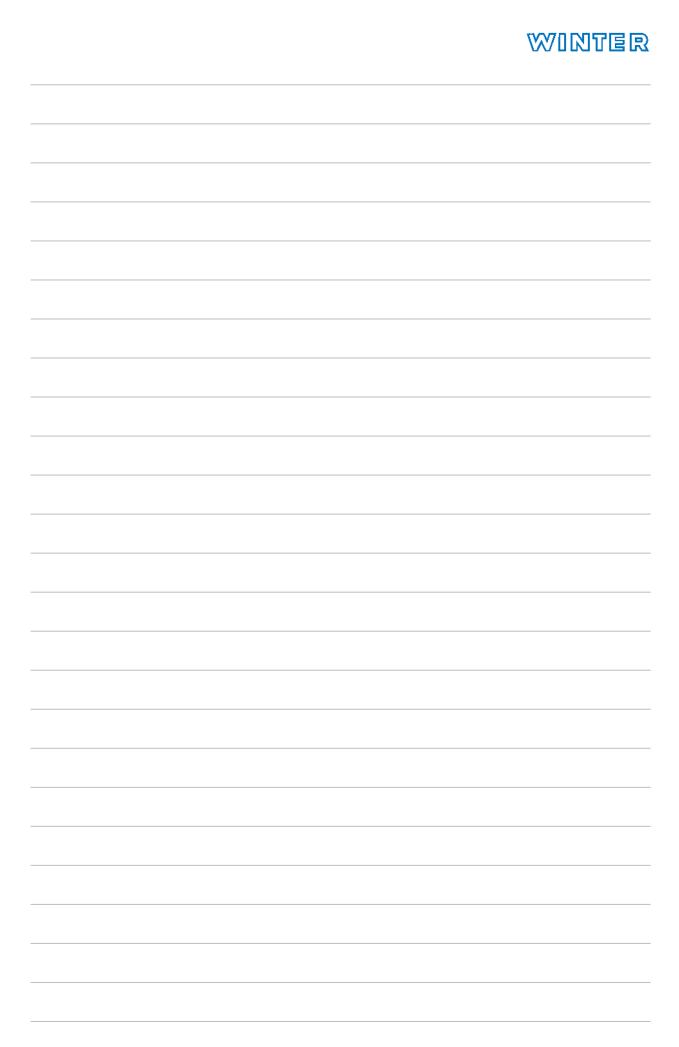
Feed: $v_f = 10 \text{ mm/min}$ Infeed: $a_0 = 0.4 \text{ mm}$ $n_{w} = 5 \text{ min}^{-1}$ Workpiece speed: $v_{c} = 45 \text{ m/s}$ Cutting speed: Specific material removal rate: $Q'_{w} = 0.1 \text{ mm}^{3}/\text{mm} \cdot \text{s}$

Simple-to-dress diamond grinding wheel (with profile roller, see photo)

Good adherence to profile, thus high tool life

WINTER







WINTER Facts

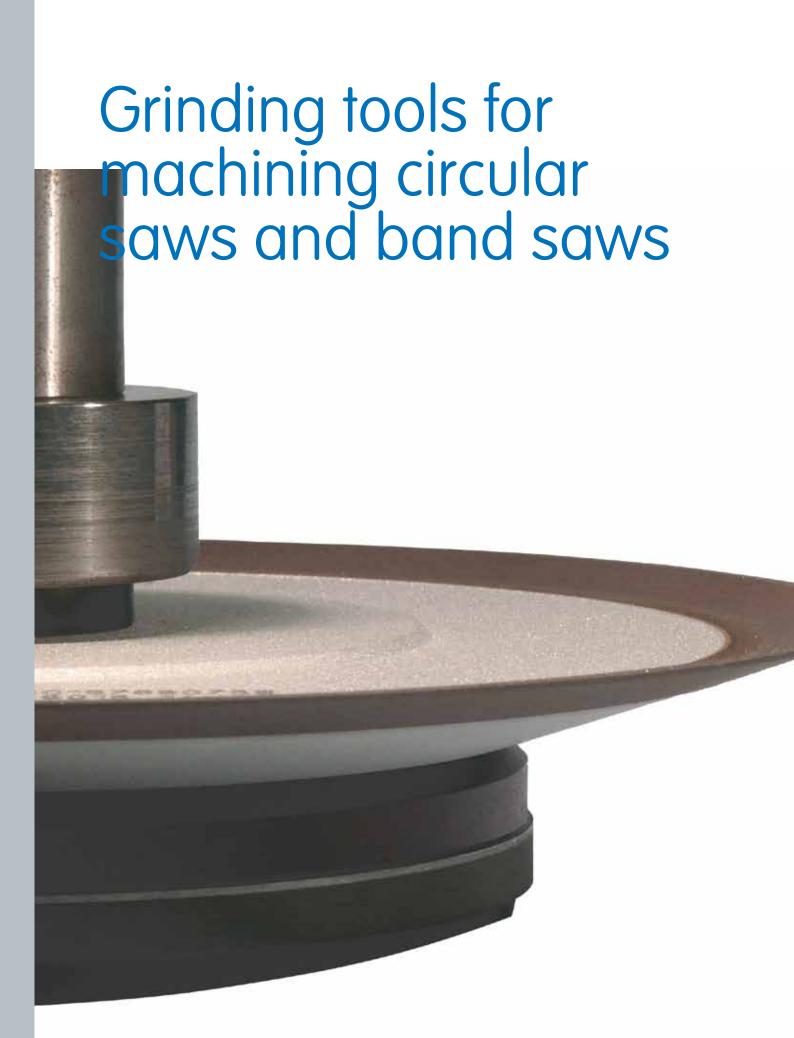
> Shank tools

> > Saws

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Milling cutters

Mould and die



Various types of saws (e.g. circular saws and band saws) are used in the woodworking and plastics processing industries.

Grinding technology is used to create the tooth geometry of these saws. A basic distinction can be made between one-piece saws and composite saws.

For example, HSS band saws and HSS circular saw blades are one-piece saws. The tooth geometry required for these saws is ground under CNC-controll using radial grinding wheels (see our 'profile S' programme). Saws of this type are sometimes also manufactured as segmented saws.

Composite saws, on the other hand, have carbide, cermet or diamond tips brazed onto a metal core. The shape of the teeth (face, top and flank) is then ground sequentially (see illustration on next page).

Information

Further information on applications and products can be found at www.winter-superabrasives.com

- 60 Grinding tools for machining carbidetipped circular saw blades
- 61 Grinding wheels for the tooth face
- 66 Grinding wheels for top grinding
- 72 Grinding wheels for flank grinding
- 75 Grinding pins for hollow ground saw blades
- 76 Grinding wheels for chip breaker flutes
- 77 Grinding wheels for Stellite circular saw blades
- 78 Grinding wheels for HSS circular saw blades
- 80 Grinding wheels for machining band saws

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Grinding tools for machining carbide-tipped circular saw blades

The manufacture of tungsten carbide-tipped circular saw blades consists of a number of steps that are performed sequentially on different machines. The first step is flank grinding, followed by the face and top grinding. Next the chip breaker flutes and hollow-tooth profiles are produced as required.



These steps can be carried out on a number of different machines, each needing its own grinding wheel geometry. With the unusually large range of WINTER grinding wheels available we offer the optimum tool for all machines and applications. The following table is colour coded to help you quickly and easily find the wheel you need for your saw grinding machine.

Machine	Machine type	Coding			
	CB, CC, CE, CEN, CEP, CHC, CHC, CHM, CHP, CHT, CNHB, CX and others	1			
Vollmer Biberach	CHD	2			
	CC, CEF, CFL, CHAFT, CHAFTE, CHHF, CHF and others	3			
	Finimat 600	1			
	Finimat 800, Finimax	2			
Valles an Damah an	Finimat Beta, Gamma	3			
Vollmer Dornhan	Uniläpp	4			
	Uniläpp F2	5			
	Duo TS	6			
	NC2, NC3, C4, C5	1			
Woodtronic	CNC5	2			
	CNC6F	3			
	Akemat B / B10	1			
Akemat	Akemat U / U10	2			
	Akemat F / F10	3			
	Unimat	1			
Widma	HKS700/HIII				
	HKS400, FS1000	3			

For universal grinding machines and for Widma machines with bore H20 (BS700, HKS 500, HKS700/H, HKS700/HI, HKS700/HI and others), please see our product programme in the chapter 'Milling cutters'.

Grinding wheels for the tooth face

Depending on the tooth pitch, differently shaped grinding wheels are needed to grind the tooth face. The greater the number of teeth around the circumference, the narrower the space between them and the thinner the grinding wheel has to be. Even the narrowest tooth gaps can be machined with our Tiger grinding wheels. For reasons of stability, conventional tooth gaps are mainly ground using 4A2, 12V2 or 222 grinding wheels.



Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use
Tiger / Tiger II	A	Wear-resistant resin bond for tooth-face grinding
K+920 / K+921		Wear-resistant resin bond for tooth-face grinding
K+4821		Free-grinding CNC bond, e.g. for Cermet
K+888TY		Universal resin bond for wet grinding
K+888RY		Universal resin bond for wet grinding

Standard dimensions for grinding the tooth face

Workpiece	Material	Machine	Cup grinding wheels	•	Coolant
			Shape	Bond	
Circular saw blade tooth face grinding	Tungsten carbide Cermet	All established saw grinding machines	4A2, 12V2, 12V9, 222 Ø 100200 W 2.38 X 25.5	Various bonds (see above)	Emulsion Oil

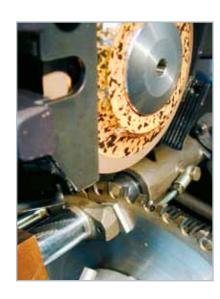
Other dimensions on request



The WINTER Tiger grinding wheel is the solution for economically grinding the cutting face on carbide-tipped saw blades.

The innovative geometry of the Tiger grinding wheel enables the tooth face to be ground without difficulty even where the chip spaces are narrow. The new design of the Tiger grinding wheel enables markedly narrower pitches to be machined.

The approved WINTER K+bonds also guarantee long wheel life. Consequently, Tiger grinding wheels make every face grinding process not only faster, but economically more attractive.



WINTER

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The Tiger II grinding wheel from WINTER is the improved version of the proven Tiger face grinding wheel.

It is designed with a stable aluminium body that reduces grinding pressure even further and in addition offers a high degree of fracture resistance.

With an angle of 25°, and on the new Tiger II 20° an even narrower angle of just 20°, narrow pitches are no problem for the Tiger II grinding wheel.

The Tiger II grinding wheel is the perfect combination of innovative wheel geometry and WINTER's powerful K+ bonds.



Recommended use

Grinding tool: Tiger or Tiger II

Machine: Vollmer CHD

Coolant: Oil

Workpiece: Carbide-tipped circular saw

Grinding parameters

Feed: $v_f = 3...10 \text{ mm/s}$ Infeed: $\alpha_e = 0.05...0.2 \text{ mm}$ Cutting speed: $v_c = 45 \text{ m/s}$

Specific material removal rate: $Q'_{w} = 0.15...2 \text{ mm}^{3}/\text{mm} \cdot \text{s}$

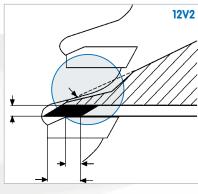
Benefit:

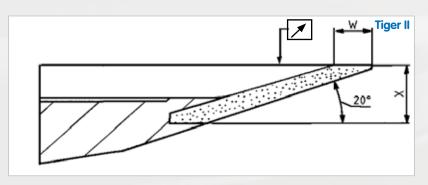
For narrow chip spaces High fracture resistance Short grinding times Long lifetime

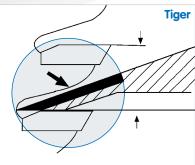


Advantages of the Tiger and Tiger II face grinding wheels

- Versions available for all automatic saw sharpening machines
- Particularly suitable for very narrow chip spaces
- Produces a very flat cutting face with no distortion
- No aluminium welding
- Self-dressing body (Tiger, Tiger II has no support of layer)
- Shorter grinding times, reduced grinding path (see diagram)
- Very long wheel life







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12V9 (Tiger) Stock programme

Diamond	Diamond grinding wheels														
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment				
3K12V9	100	2,3	4	25		Tiger		D	66260387961	1 2 1	S = 20°, T = 10				
3K12V9	125	2,3	4	25		Tiger		D	66260135761	2 1 2	S = 20°, T = 10				
1K12V9	125	2,3	4	32		Tiger		D	66260383182	1	S = 20°, T = 13				
1K12V9	150	2,3	4	32		Tiger		D	66260385221	1	S = 20°, T = 13				
1K12V9	155	2,3	4	32		Tiger		D	66260378555 2)	1 1	S = 20°, T = 13				
						Tiger G		D	66260354959	1 1					
1K12V9	200	2,3	4	32		Tiger		D	66260383180	2 2 2	S = 20°, T = 13				

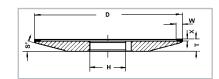
May differ slightly from illustration depending on the machine's adapter flange



12V2 (Tiger II) Stock programme

Diamond	Diamond grinding wheels														
Shape	D	w	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment				
1K12V2	125	2.5	5.5	32		Tiger II		Α	66260375783	1	S = 25°, T = 13				
1K12V2	125	2.9	5.5	32		Tiger II 20°		А	60157695569	1	S = 20°, T = 13				
1K12V2	155	2.5	5.5	32		Tiger II		Α	69014168642	1 1	S = 25°, T = 13				
1K12V2	160	2.5	5.5	32		Tiger II		Α	60157672258 1)	1	S = 25°, T = 13				
1K12V2	200	2.5	5.5	32		Tiger II		Α	66260382131	2 2 2	S = 25°, T = 13				
1K12V2	200	2.9	5.5	32		Tiger II 20°		А	60157680758	2 2 2	S = 20°, T = 13				

May differ slightly from illustration depending on the machine's adapter flange



4A2 Stock programme

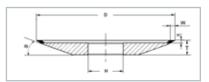
Diamono	Diamond grinding wheels														
Shape	D	w	X	Н	Grit size	Bond	Con- cen- tration	Body	Order number	Machine	Comment				
1K4A2	100	4	1	25	D64	K+888RY	C100	Н	66260137093 ²⁾	1 2 1	S = 15°, T = 8				
1K4A2	100	4	3	25	D46	K+888RY	C75	Н	66260137095	1 2 1	S = 25°, T = 12				

¹⁾ Delivery time 5 - 6 weeks

Glossary Contact

All dimensions in mm Machine colour codes, see page 60

²⁾ Available while stocks last



12V2 Stock programme

Diamond	l grindir	ng whee	els								
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment
2K12V2	100	4	2	25	D46	K+921	C125	А	66260128232	1 2 1	S = 20°, T = 10 V = 30°
					D76	K+4821	C125	А	66260333648	1 2 1	V = 30
2K12V2	125	4	2	25	D46	K+921	C125	А	66260127431 2)	2 1 2	S = 25°, T = 11 V = 30°
					D76	K+4821	C125	А	66260112238 1)	2 1 2	V = 30
5K12V2	125	4	2	32	D20A	K+730	C75	Α	66260114168	1	S = 20°, T = 13 V = 30°
					D46	K+921	C125	Α	66260115804	1	V = 30
					D46	K+4821	C125	А	66260134429	1	
					D76	K+888RY	C125	Α	66260135735	1	
					D76	K+4821	C125	А	66260134487	1	
6K12V2	150	4	2	32	D46	K+921	C125	А	66260127225	1 1	S = 15°, T = 13
					D46	K+888RY	C125	А	66260113968	1 1	V = 30°
					D64	K+921	C125	А	66260118587	1 1	
1K12V2	200	2	2	32	D46	K+921	C125	А	66260133948	2 2 2	S = 20°, T = 13 V = 30°
2K12V2	200	4	2	32	D25	K+921	C100	А	66260130483	2 2 2	S = 20°, T = 13
					D46	K+921	C125	А	66260117017	2 2 2	V = 30°
					D76	K+888RY	C125	А	66260115113	2 2 2	

May differ slightly from illustration depending on the machine's adapter flange

Saws

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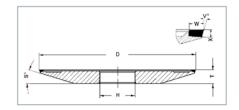
Service Glossary Contact

222 Delivery programme

Diamono	l grindi	ng whe	els								
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment
1K222	125	3	3.3	25	D54	K+888RY	C75	А	60157642734	4	S = 25°, T = 26 V = 15°

¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last

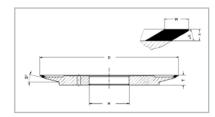


222 Stock programme

Diamone	d grind	ing who	eels								
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment
1K222	100	2	1.6	25	D76	K+888RY	C125	А	60157643361 2)	1 2 1	S = 15°, T = 8 V = 15°
1K222	100	3	3.3	25	D54	K+888RY	C75	А	60157642681 2)	1 2 1	S = 15°, T = 10
					D76	K+888RY	C75	Α	66260137081	1 2 1	V = 15°
2K222	100	3	1.8	25	D54	K+888RY	C75	А	60157642713	1 2 1	S = 15°, T = 8 V = 15°
					D64	K+888RY	C75	А	66260135818 2)	1 2 1	V = 15°
1K222	125	2.5	1.2	32	D54	K+888RY	C75	А	60157642666	1	S = 15°, T = 11.5 V = 15°
					D76	K+888RY	C125	А	66260135745	1	V = 15
1K222	125	3	3.8	32	D54	K+888RY	C75	А	60157642674	1	S = 15°, T = 14 V = 15°
1K222	150	3	1.5	32	D64	K+920	C100	А	66260135724	1 1	S = 15°, T = 11.5 V = 15°
5K222	150	3	2	32	D91	K+888TY	C150	А	60157643360	1 1	S = 15°, T = 12 V = 15°
1K222	160	3	2	32	D64	K+921	C125	А	66260128437 ²⁾	1	S = 15°, T = 12 V = 15°

May differ slightly from illustration depending on the machine's adapter flange

¹⁾ Delivery time 5 - 6 weeks



Diamone	d grind	ing wh	eels								
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment
1K222	175	4	2	50.8	D76	K+888RY	C125	А	66260136435	3 5	S = 15°, T = 12 V = 30°

WINTER Facts

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²⁾ Available while stocks last

Saws

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Grinding wheels for top grinding

Top grinding describes the peripheral grinding process of circular saw blades. This has two purposes: it ensures that the circularity of the saw is optimized and it defines the wedge and clearance angles, both of which are crucial for the cutting performance of any circular saw.



Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use						
K+921	A	More wear-resistant resin bond preferably wet grinding						
K+1313RY	1	Resin bond for mixed grinding and wet grinding						
K+1421R		Standard resin bond for CNC applications						
K+4821		Free-grinding CNC bond, e.g. for Cermet						
K+888RY		Universal resin bond for wet grinding						
K+1066		Resin bond for top grinding (resharpening, copes with body contact)						
K+434						Free-grinding resin bond (synthetic coolant)		
K+777N		Free-grinding resin bond (production grinding, oil)						
K+777J	l l	Free-grinding resin bond (production grinding, oil)						

Workpiece	Material	Machine	Grinding wheel		Coolant
			Shape	Bond	
Circular saw blade tooth top grinding	Tungsten carbide Cermet	All established saw grinding machines	4B1, 14M1, 222, Ø 100200 W 36 resp. U 58 X 310	Various bonds (see above)	Emulsion Oil

Other dimensions on request

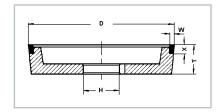
3M1 Double-layer stock programme



Diamoi	nd grind	ling w	heels										
Shape	D	U	x	۷°		Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment
1K3M1	125	5	5	15	2B	32	D20B	K+1313RY	C100	Α	60157643272 1)	2	T = 8 mm
							D126		C125				$U_{\text{fine}} = 2.5$
1K3M1	127	5	6	15	2B	32	D54	K+1313RY	C75	Α	60157643404	2	T = 8 mm
							D126		C100				$U_{\text{fine}} = 2.5$

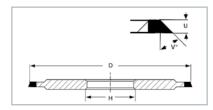
¹⁾ Available while stocks last

All dimensions in mm Machine colour codes, see page 60



11V9 Stock programme

Diamond	Diamond grinding wheels													
Shape	Shape D W X H Grit size Bond Concentration Concentration Machine Comment													
1K11V9	100	3	6	25	D54	K+888RY	C100	А	60157643081 1)	1 2	S = 5°, T = 20			



14B1 Stock programme

Diamon	Diamond grinding wheels													
Shape	Shape D U X V° H Grit Bond Concentration Body Order number Machine Comment													
2K14B1	127	5	7	15	32	D54	K+921	C125	А	66260114938 11	2	T = 8		

Coarse gift Fine gift And Description H

14B1 Double-layer stock programme

Diamon	d grind	ing w	heels										
Shape	D	U	x	۷°		Н	Grit size	Bond	Concentration	Body	Order number	Machine	Comment
1K14B1	127	5	7	5	2B	32	D46	K+4821	C75	Н	66260134416	2	T = 8
							D107		C100				$U_{\text{fine}} = 2.5$
1K14B1	127	5	7	15	2B	32	D54	K+1313RY	C100	А	66260117412	2	T = 8
							D126		C125				$U_{\text{fine}} = 2.5$
							D46	K+4821	C75	А	60157643587	2	T = 8
							D107		C100				$U_{\text{fine}} = 2.5$

¹⁾ Available while stocks last

WINTER

Shank tools

Saws

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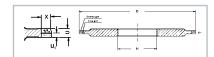
PCD

Knives

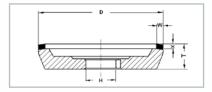
Milling cutters

Mould and die

14M1 Double-layer stock programme



Diamon	d grind	ing w	heels										
Shape	D	U	X	۷°		н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment
1K14M1	150	5	8	8	2B	32	D46	K+921	C75	А	66260130887	1 2	$U_{\text{fine}} = 2.5$
							D107		C100				
							D46	K+1421R	C75	А	66260346277 1)	1 2	$U_{\text{fine}} = 2.5$
							D107		C100				
1K14M1	200	5	8	8	2B	32	D20B	K+1066	C75	А	66260379464	2	$U_{\text{fine}} = 2.0$
							D91		C100				
1K14M1	200	5	8	8	2B	32	D46	K+921	C75	Α	66260375347	2	$U_{\text{fine}} = 2.5$
							D107		C100				



222 Stock programme

Diamon	d grindi	ng wh	neels									
Shape	D	w	X	V°	Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment
5K222	100	5	4	4	25	D76	K+888RY	C75	Н	60157643743	1 2 1 2	T = 20

WINTER Facts

Shank tools

Saws

Inserts

PCD PCBN

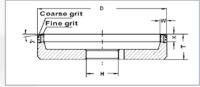
Knives

Milling cutters

Mould and die

Service Glossary Contact

222 Double-layer stock programme



Diamon	d grind	ing wl	heels										
Shape	D	w	x	۷°		Н	Grit size	Bond	Concentration	Body	Order number	Machine	Comment
6K222	100	5	6	8	2B	25	D46	K+888RY	C75	Н	66260135827	1 2	T = 20
							D126		C100				$W_{fine} = 2.5$
1K222	100	5	10	8	2B	25	D46	K+434	C75	Н	66260135783	1 2	T = 24
							D126		C100				$W_{fine} = 2.5$
2K222	100	5	10	8	2B	25	D46	K+888RY	C100	Н	60157643263	1 2	T = 24
							D126		C125				$W_{fine} = 2.0$
9K222	125	5	6	8	2B	25	D46	K+888RY	C75	Н	60157643868	4 1	T = 20
							D126		C100				$W_{fine} = 2.5$

¹⁾ Delivery time 5 - 6 weeks

WINTER Facts

Shank

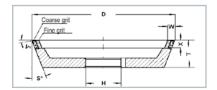
PCD PCBN

Knives

Milling cutters

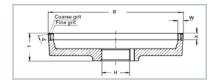
Mould and die

WINTER



222 Double-layer stock programme

Diamon	d grind	ing w	heels										
Shape	D	w	x	V°		н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment
4K222	100	5	6	8	2B	25	D46	K+888RY	C75	Н	60157642914	1 2	T = 20 W _{fine} = 2.5
							D126		C100				$VV_{fine} = 2.5$



Diamon	d grind	ing w	heels										
Shape	D	w	x	۷°		Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment
4K222	125	5	6	8	2B	25	D46	K+888RY	C75	Н	60157643430 1)	4	S = 20°, T = 26
							D126		C100				$W_{fine} = 2.5$

D W X

222 Stock programme

Diamon	d grind	ing wl	neels											
Shape	Shape D W X V° H Grit Bond Concentration Body Order number Machine Comment													
1K222	125	3	5	5		25	D54	K+888RY	C100	Α	60157642941	4	S = 5°, T = 26	



Diamon	d grind	ing wl	neels									
Shape	D	w	X	۷°	Н	Grit size	Bond	Concent- ration	Body	Order number	Machine	Comment
1K222	125	3	6,5	5	32	D54	K+888RY	C100	А	60157642641	1 2	S = 35°, T = 18
						D126	K+888RY	C100	Α	66260111456	1 2	

¹⁾ Available while stocks last

Service Glossary Contact

All dimensions in mm Machine colour codes, see page 60

WINTER Facts

Saws

Inserts

PCD PCBN

Knives

Milling cutters

222 Stock programme

Diamon	d grind	ing wh	neels									
Shape	D	w	x	V °	Н	Grit size	Bond	Concentration	Body	Order Number	Machine	Comment
27K222	125	5	6	8	32	D91	K+4821	C100	А	60157643295	1 2	T = 18
18K222	125	5	10	8	32	D64	K+777N	C75	Н	60157643301	1 2	T = 22

Coarse grit Fine grit W

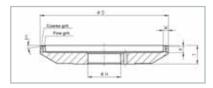
222 Double-layer stock programme

Diamon	d grind	ing wl	heels											
Shape	D	w	×	۷°		Н	Grit size	Bond	Concentration	Body	Order Number	M	achine	Comment
3K222	125	5	6	8	2B	32	D46	K+434	C75	Н	66260136498	1	2	T = 18
							D126		C100					$W_{fine} = 2.5$
							D46	K+888RY	C75	Н	66260136530	1	2	
							D126		C100					
							D46	K+888RY	C100	Н	66260112775 1)	1	2	
							D126		C125					
5K222	125	5	10	8	2B	32	D15C	K+888RY	C50	Н	66260115711	1	2	$T = 22$ $W_{fine} = 2.5$
							D91		C75					fine 2.3
							D20B	K+1066	C100	Н	66260127556	1	2	
							D126		C125					
							D25	K+888RY	C100	Н	60157643637	1	2	
							D76		C125					
							D46	K+434	C75	Н	60157642597	1	2	
							D126		C100					
							D46	K+921	C100	Н	66260133442	1	2	
							D126		C125					
							D46	K+1066	C100	Н	66260134470	1	2	
							D126		C125					
							D64	K+777J	C75	Н	66260390259 1)	1	2	
							D107		C100					

¹⁾ Available while stocks last

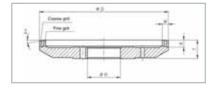
Service Glossary Contact

Mould and die



222 Double-layer stock programme

Diamono	d grind	ling w	heels										
Shape	D	w	x	V°		Н	Grit size	Bond	Concen- tration	Body	Order Number	Machine	Comment
52K222	125	5	6	5	2B	32	D20B	K+1313RY	C75	Н	66260352075	1 2	$T = 18$ $W_{fine} = 2.5$
							D126	K+1313RY-42	C75				$VV_{fine} = 2.5$



222 Triple-layer stock programme

Diamono	d grindi	ng wh	eels											
Shape	D	w	x	۷°		Н	Grit size	Bond	Concen- tration	Body	Order Number	M	achine	Comment
5K222	125	6	6	8	3B	32	D20B	K+1066	C75	Н	66260132898	1	2	T = 18
							D46		C100					$W_{\text{fine}} = 2$ $W_{\text{coarse}} = 2$
							D126		C100					

222 Double-layer stock programme

Diamond grinding wheels													
Shape	D	w	X	۷°		Н	Grit size	Bond	Concentration	Body	Order Number	Machine	Comment
31K222	125	5	6	8	2B	50.8	D46	K+888RY	C75	Н	66260135844	3 5	$T = 20$ $W_{\text{fine}} = 2.5$
							D126		C100				
8K222	125	5	10	8	2B	50.8	D20B	K+1313RY	C75	Н	60157642975 1)	3 5	T = 20
							D126	K+1313RY-42	C100				$W_{fine} = 2.5$
							D46	K+888RY	C75	Н	66260135843	3 5	
							D126		C100				

¹⁾ Available while stocks last

WINTER Facts

Shank tools

Saws

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PCD PCBN

Knives

Milling cutters

Mould and die

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Shanl

Saws

Insert

PCD PCB

Knive

Milling cutters

Mould and die

Service Glossary Contact

Grinding wheels for flank grinding

The cutting width of the circular saw blade is defined during the flank grinding process.

Two grinding wheels are simoultaneously fed from both sides to obtain the defined tooth width.



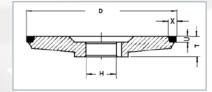
Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use					
K+921	A	More wear-resistant resin bond preferably wet grinding					
K+888NY	Ť	Universal resin bond for wet grinding					
K+888JY		Universal resin bond for wet grinding					
K+730		Very free-grinding fine-grain bond, dry grinding possible					

Standard dimensions for grinding tooth flanks

Workpiece	Material	Machine	Peripheral grinding v	Coolant		
			Shape	Bond		
Circular saw blade tooth flank grinding	Tungsten carbide Cermet	All established saw grinding machines	700 Ø 76100 U 2.5 4 X 4.56.5	Various bonds (see above)	Emulsion Oil	

Other dimensions on request

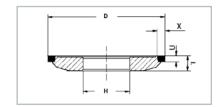


700 Stock programme

Diamon	and grinding wheels											
Shape	D	U	X		Н	Grit size	Bond	Concen- tration	Body	Order Number	Machine	Comment
1K700	76	4	4,5		20	D54	K+921	C75	А	66260133242	3 6	T = 14
						D91	K+730-42	C50	А	60157643342	3 6	
						D126	K+888NY	C75	А	66260136474 1)	3 6	

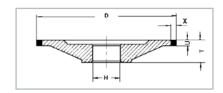
¹⁾ Available while stocks last

WINTER

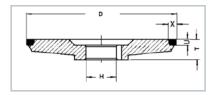


700 Stock programme

Diamond grinding wheels												
Shape	D	U	x	Н	Grit size	Bond	Concen- tration	Body	Order Number	Machine	Comment	
1K700	80	4	5	32	D64	K+921	C75	А	66260132865	3 3	T = 10	
1K700	86	2.5	5	32	D54	K+921	C50	А	69014158598 1)	3 3	T = 10	
1K700	86	4	5	32	D54	K+921	C75	А	66260130320	3 3	T = 10	



Diamon	d grindi	ing wh	eels								
Shape	D	U	X	Н	Grit size	Bond	Concen- tration	Body	Order Number	Machine	Comment
1K700	100	4	4	20	D126	K+888NY	C75	Н	60157642956	3	T = 16.5



Diamon	Diamond grinding wheels												
Shape	D	U	x	Н	Grit size	Bond	Concen- tration	Body	Order Number	Machine	Comment		
1K700	100	4	4.5	20	D54	K+921	C75	Α	66260130080	6 3 3	T = 14		
					D91	K+730-42	C50	А	66260136591	6 3 3			
					D91	K+888JY	C50	А	60157642952	6 3 3			
					D126	K+888NY	C75	А	66260136408	6 3 3			
2K700	100	4	6,5	20	D54	K+921	C75	А	66260134535 2)	6 3 3	T = 14		
					D126	K+888NY	C75	А	66260137143	6 3 3			

¹⁾ Delivery time 5 - 6 weeks

WINTER Facts

Shank tools

Saws

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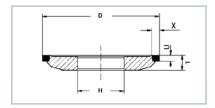
PCD PCBN

Knives

Milling cutters

Mould and die

²⁾ Available while stocks last



700 Stock programme

Diamon	d grindi	ing wh	eels								
Shape	D	U	x	Н	Grit size	Bond	Concen- tration	Body	Order Number	Machine	Comment
1K700	100	4	5	32	D54	K+921	C75	А	66260131923	3 3	T = 10
					D64	K+921	C75	Α	66260137345	3 3	
					D91	K+730-42	C50	Α	60157642622	3 3	
					D107	K+888NY	C75	Α	66260136539	3 3	
					D126	K+888NY	C75	А	60157643744	3 3	

700 Double-layer stock programme

Dian	nond	grindi	ing wh	eels									
Shap	е	D	U	X		Н	Grit size	Bond	Concen- tration	Body	Order Number	Machine	Comment
3K70	00	86	4	5	2B	32	D54	K+921	C68	А	66260386978	3 3	T = 10
							D91		C75				$U_{\text{fine}} = 2.0$
8K70	00	100	4	6.5	2B	32	D46	K+921	C50	А	66260399091	3 3	T = 10
							D91		C75				$U_{\text{fine}} = 2.0$

WINTER Facts

Shank tools

Saws

Inserts

PCD PCBN

Knives

Milling cutters

Mould and die

Grinding pins for hollow ground saw blades

There is a wide variety of tooth geometries to choose from for composite circular saw blades. Depending on the intended use of the saw, the tooth design can be flat, alternate, trapezoid or any combination of these.

A saw can also have hollow ground teeth. The concave shape of the teeth gives very fine cuts with no burrs, thus making the saw highly suitable for processing veneered wood and laminated chipboards.

The rounded shape of hollow ground teeth is produced with 1A1W grinding pins.



Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use
KS449	•	More wear-resistant resin bond preferably wet grinding
K+920	T	More wear-resistant resin bond also for dry grinding
K+921		More wear-resistant resin bond preferably wet grinding
K+888TY		Universal resin bond for wet grinding
K+888RY	ı	Universal resin bond for wet grinding

in 12

1A1W Stock programme

Diamond	l grindi	ing to	ols									
Shape	D	T	X	S	L ₂	S ₁	L ₄	Grit size	Bond	Concen- tration	Order number	Chamfer angle
5K1A1W	5	3	1,5	6	42	3,5	10	D76	K+921	C125	60157643650	V = 2°50′
3K1A1W	6	3	1,5	6	42	5,1	10	D76	K+921	C125	66260111416	V = 2°50′
8K1A1W	6,5	3	1,75	6	33	4,1	10	D76	K+921	C125	66260134445	V = 2°
2K1A1W	6,5	3	1,75	6	42	3,1	10	D76	K+921	C125	66260134718	V = 2°50′
								D91	K+888TY	C150	60157643974	
6K1A1W	6,5	3	1,75	6	42	4,1	10	D76	K+888RY	C125	66260111088	
								D76	K+921	C125	66260368674	
1K1A1W	6,5	3	1,75	6	42	5,1	10	D76	K+920	C125	66260110241	V = 2°50′
								D76	K+921	C125	66260133964	
1K1A1W	6,5	3	2	6	42	4,5	10	D76	KS449	C125	66260341274	
2K1A1W	7	3	2	6	42	5,1	10	D20B	K+921	C125	66260347880	V = 2°50′
								D76	K+921	C125	66260133966	
								D91	K+888TY	C150	60157643957	
								D91	K+920	C125	60157644164	
								D91	K+921	C125	60157643351	

All dimensions in mm

WINTER Facts

> Shank tools

> > Saws

serts

PCD

Knives

Milling cutters

Mould and die

Facts

Grinding wheels for chip breaker flutes

Chip breaker flutes are sometimes ground into the clearance area of the saw tooth in order to optimize the chip breakage and chip removal during sawing operations. Profile wheels (WINTER shape 34P) or 1A1R grinding wheels with resin or metal bonds are used for this.



Selection assistant for WINTER bond systems

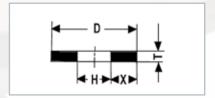
Diamond grinding wheels	Wear resistance	Recommendations for use
BZ457	A	Standard metal bond for chip breaker flutes
MR875		Standard metal bond for chip breaker flutes
K+888RY		Universal resin bond for wet grinding

34P Stock programme



Diamond gri	Diamond grinding wheels												
Shape	D	T	x	E	R	Н	Grit size	Bond	Concen- tration	Order number			
1BZ34P	125	0.5	5	0.4	0.25	32	D126	BZ457	C135	66260388921			
1K34P	125	8.0	5	0.6	0.4	32	D151	K+888RY	C75	66260383651			

1A1R Delivery programme



Diamond gri	Diamond grinding wheels												
Shape	D	Т	x	Н	Grit size	Bond	Concen- tration	Order number					
1BZ1A1R	30	0.3	11	8	D76	MR875	C125	66260337005 1)					
1BZ1A1R	30	0.4	11	8	D91	MR875	C125	66260340908 1)					

¹⁾ Delivery time 7 weeks, minimum order quantity 6 pcs.

All dimensions in mm

WINTER

Shanl

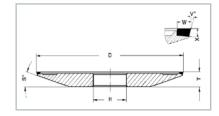
Knives

Milling

and die

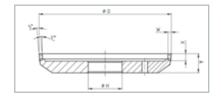
Grinding wheels for Stellite circular saw blades

Typical applications such as face, top and flank grinding are performed on HSS and Stellite circular saws as well as on tungsten carbide-tipped saw blades. The kinematics of the applications are identical with those for tungsten carbide-tipped saws. The bond KSSRY has been particularly developed for cBN grinding wheels.



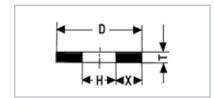
222 Stock programme for face grinding

cBN grinding wheels												
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment	
1K222	125	3	3.8	32	B107	KSSRY	V180	А	60157643417	1	S = 15°, T = 14 V = 15°	



222 Stock programme for top grinding

cBN gr	cBN grinding wheels												
Shape	D	W	X	V°	Н	Grit size	Bond	Concen- tration	Body	Order number	Machine	Comment	
1K222	125	3	6.5	5	32	B107	KSSRY	V240	Α	60157643394	1 2	S = 35°, T = 18	



1A1R Stock programme for chip breaker flutes

cBN grinding wheels								
Shape	D	T	x	н	Grit size	Bond	Concen- tration	Order number
1BZ1A1R	25	0.3	8.5	8	B91	MR875	V300	66260341266

Please note

Please refer to our stock programme in chapter "Milling cutters".

All dimensions in mm Machine colour codes, see page 60

Shank

Saws



Grinding wheels for HSS circular saw blades

HSS saw blades are ground from the solid on special CNC grinding machines. Very wear resistant profile wheels like 14F1 and similar (WINTER shape 700) ensure economic grinding processes. First choice for this application is the WINTER 'profile S' programme, which is used with success for both initial profiling and re-sharpening.



Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use		
profile S50	A	Universal bond for HSS saws (emulsion coolant)		
profile S		Universal bond for HSS saws (oil cooling)		
Diamond grinding wheels	Wear resistance	Recommendations for use		
K+888TY		Universal resin bond for wet grinding		

Standard dimensions for grinding one-piece circular saw blades

Workpiece	Material	Machine	Peripheral grinding v	Coolant	
			Shape	Bond	
Circular saw blades	HSS Tungsten carbide	All established saw grinding machines	700 Ø 150, 200 U 1.36 X 6.515	profile S profile S50 K+888TY	Oil Emulsion

Other dimensions on request

Application example (initial profiling)

Grinding tool: profile S **Machine:** Loroch KBN 710

Coolant: Oil

Workpiece: HSS circular saw blade, Ø 275 mm

Thickness 2.5 mm, 140 teeth

Grinding parameters

Feed rate: $v_f = 20$ teeth / min Infeed: $a_e = 2.47$ mm Cutting speed: $v_c = 60$ m/s

Benefit:

35% increased feed 37% shorter grinding time

No burn

Very little burr formation

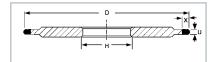


Service

Mould

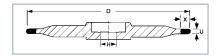
Milling cutters

WINTER

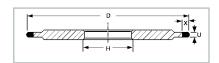


700 Stock programme

cBN grin	cBN grinding wheels										
Shape	D	U	x	R	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K700	200	1.3	6.5	0.65	32		profile S		E	66260395757	Oil
2K700	200	1.6	7	0.8	32		profile S		E	66260391758	Oil
3K700	200	2	8	1	32		profile S		E	66260395659	Oil
2K700	200	2.5	8	1.25	32		profile S		E	69014169272	Oil
5K700	200	3	10	1.5	32		profile S		E	66260399460	Oil
3K700	200	3.5	10	1.75	32		profile S		E	66260394362 2)	Oil
1K700	200	4	12.5	2	32		profile S		E	66260399763	Oil
1K700	200	5	15	2.5	32		profile S		E	66260398364 2)	Oil



cBN grin	cBN grinding wheels										
Shape	D	U	X	R	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
2K700	150	1.3	8	0.65	20		profile S50		E	60157685427	Emulsion
6K700	150	2	8	1	20		profile S50		E	60157685429	Emulsion
2K700	150	2.5	8	1.25	20		profile S50		E	60157685430 2)	Emulsion
3K700	150	3	8	1.5	20		profile S50		E	60157685431	Emulsion



Diamono	Diamond grinding wheels										
Shape	D	U	x	R	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1K700	200	1.3	6.5	0.65	32	D91	K+888TY	C125	E	66260129165 1)	Oil / Emulsion
3K700	200	2	8	1	32	D91	K+888TY	C125	E	66260117948 1)	Oil / Emulsion
5K700	200	3	10	1.5	32	D91	K+888TY	C125	E	69014129762 1)	Oil / Emulsion

Tungsten carbide saw blades are primarily designed with carbide tips on steel blades. However, some applications require solid metal blades. Here, the same wheel geometries as for HSS saw blades are applicable.

All dimensions in mm

WINTER

¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last

Grinding wheels for machining band saws

Band saws are ground using peripheral grinding wheels. These have either simple profiles (14F1, 1V1) or coordinate profiles (WINTER shape 700).

Typical machines are the Vollmer-Biberach and Iseli. These machines are fitted with either cBN grinding wheels or conventional AL_2O_3 wheels.



Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use
KM64	†	Standard resin bond for Stellite
KSS007N		Free-grinding resin bond for dry grinding

Standard dimensions for grinding band saws

Workpiece	Material	Machine	Peripheral grinding wheel		Coolant	
			Shape	Bond		
Band saws	HSS Stellite	All established band saw grinding machines	14F1, 1V1, 700 Ø 250, 300 U (variable) X (variable)	KSS007 KM64	Oil Emulsion	

Other dimensions on request

Application example (initial profiling)

Grinding tool: 1V1-300-10-10 50.8 B126 KM64 V24

Machine: Vollmer CA 300 Coolant: Emulsion

Workpiece: Stellite-tipped band saw, I = 11.76 m,

Thickness 1.8 mm, 300 teeth

Grinding parameters

Feed rate: $v_f = 20$ teeth / min Infeed: $a_e = 1$ mm Cutting speed: $v_c = 63$ m/s

Benefit: Very low wear

Good price-performance ratio





Because of the large number of profiles, we do not keep grinding wheels in stock. Please get in touch with us to find the best solutions for your machining requirements.



WINTER Facts

Shank tools

Saws

PCD PCBN

Knives

Milling cutters

Mould and die

Grinding tools for the production of inserts



In the area of inserts, a wide variety of materials and tool geometries are machined. This makes great demands on the grinding tools required.

As a fundamental principle, there is a discernible trend towards higher requirements of the edge quality. Whereas a few years ago, grit sizes of D76 and coarser were used, currently grit sizes of D54 and finer are state of the art. In addition, a specialisation on individual types of inserts has occurred within the industry. The universal grinding wheel is a thing of the past. Increasing cost pressure has resulted in a growing need for optimisation. The different requirements of individual insert types mean that individual solutions are needed.

Information

Further information about applications and products can be found at www.winter-superabrasives.com

- 84 Trends in the machining of inserts
- 86 Diamond grinding wheels for top and bottom grinding of inserts
- 86 Top and bottom grinding
- 87 Top and bottom grinding with planetary kinematics
- 88 Diamond grinding wheels for peripheral grinding of inserts
- 90 Diamond grinding wheels for profile grinding of inserts

Trends in the machining of inserts

The current WINTER grinding wheel programme for the machining of inserts offers solutions for all application areas in this industry sector. Customised to the respective grinding task and the system environment, the innovative diamond grinding wheels from WINTER offer the ideal solutions under both oil and emulsion cooling.

Requirements of different inserts

WINTER	Standard tungsten carbide inserts	Large tungsten carbide inserts	Polished tungsten carbide inserts	Cermet inserts	Ceramic inserts
Low wheel wear	X			X	X
High feed rates	X	X		X	
Cool grinding behaviour		X	X	X	
Optimal edge qualities			X		Х

Inserts are produced in very large quantities: Every year, almost a billion inserts are produced around the world. Time savings of just a few seconds per insert can thus mean great increases in capacity. For this reason, more rigid, efficient and increasingly automated machines with shorter axis paths and faster control systems are being developed. In order to be able to meet these growing possibilities, the development of fast grinding, innovative grinding wheel systems continues apace in the insert production area.

In the development of materials, the requirements are also increasing. As a basic principle, the inserts must be harder than the material to be machined. Accordingly, the grinding tools also need to be optimised. In addition to the commercial aspects, the trend towards miniaturisation is becoming increasingly important in the insert industry. Although the requirements regarding cutting edge qualities are growing, e.g. in aluminium machining, the inserts are becoming increasingly smaller. This requires increased usage of fine-grit diamond grinding wheels during the peripheral and top and bottom grinding of inserts.

Development trend in the peripheral grinding of inserts

In the past	Today				
All types	Standard tungsten carbide insert*	Polished tungsten carbide insert	Cermet insert	Ceramic insert	
Standard resin bonds	High-performance resin bonds	Standard resin or ceramic bonds	Standard or high-performance resin bonds	High-performance resin or ceramic bonds	
Different grit sizes D25D91	Medium grit sizes D35D54	Small grit sizes D15AD35	Medium grit sizes D35D54	Small grit sizes D15AD35	
Various concentrations C75C125	Medium to high concentrations C100C125	Low to medium concentrations C75C100	Medium to high concentrations C100C125	Various concentrations C75C125	

^{*)} Large carbide inserts: Standard resin bonds up to D91



Dressing Recommendations:

The success of the grinding process does not depend solely on the selection of the right grinding wheel. Grinding wheels are increasingly being adapted more closely to the respective requirements. Thus, the right conditioning and subsequently the selection of the best dressing tool are growing substantially in importance.

SAINT-GOBAIN Abrasives uses its decades of experience in this regard as a system supplier and provides customised dressing and grinding wheels in line with the job requirements.

Specification		Area of use		
NORTON	22A150H8V200	Level+ GPK	D64 - D151	
NORTON	22A120I8V200	Level+	D64 - D151	
NORTON	31C120L8V5209	Insert+	D54 - D64	
NORTON	31C180L8V5209	Insert+	D35 - D46	
NORTON	31C240Jot9V5209	Insert+	D20 - D30	

Information

Fax +49 9382 602-186

Contact for NORTON dressing wheels: Saint-Gobain Abrasives GmbH Dr.-Georg-Schäfer-Straße 1 D-97447 Gerolzhofen Tel. +49 9382 602-0

Shank

Saws

Inserts

PCD PCBN

Knives

Milling cutters

Mould and die

Shank

Inserts



Diamond grinding wheels for top and bottom grinding of inserts

With the Level+ series for the top and bottom grinding of inserts, WINTER is setting new standards with regard to evenness

The WINTER Level+ products, grinding wheel systems that have been specially developed for this application, are characterised by very free-grinding behaviour. The grinding pressure can be significantly reduced and therefore long dressing intervals become possible.

The unique grinding characteristics of this product family also permit substantially higher feed rates so that impressive increases in productivity can be achieved.

Top and bottom grinding

Standard dimensions for top and bottom grinding of inserts

Workpiece	Material	Machine	Cup grinding wheel	Coolant	
			Shape	Bond	
Inserts Plane knives etc.	Tungsten carbide Ceramic	Diskus Viotto Wendt 	6A2 Ø 300500 W 40190 X 38	WINTER LEVEL+	Oil Emulsion

Other dimensions on request

Application example:

Workpiece: Tungsten carbide insert

Level+ 219 **Grinding tool: Grinding machine:** Viotto **Coolant: Emulsion**

Grinding parameters

Feed rate: $v_{i} = 25 \text{ mm/min}$ Speed (top): $n = 900 \text{ min}^{-1}$ Speed (bottom): $n = 350 \text{ min}^{-1}$ Allowance / side: $a_{a} = 0.15 \text{ mm}$ Dressing interval: 15 inserts t = 88 sCycle time:

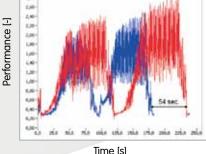
Benefit:

20% higher feed rate 25% savings in grinding time 33% longer dressing interval

More constant grinding characteristics

Lower power consumption





RED = Competition **BLUE** = Level⁺

The illustration shows the time savings compared to the competition, based on two ground workpieces.

Milling cutters

and die

Service Contact

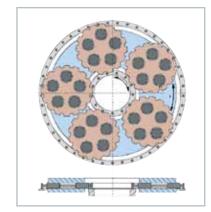
All dimensions in mm

Top and bottom grinding with planetary kine-

matics

The Level⁺ GPK (Grinding with Planetary Kinematics) grinding wheel is a variant from the Level⁺ family, developed for top and bottom grinding with planetary kinematics.

The Level+ GPK is characterised by very free-grinding behaviour, which means that short grinding times, high material removal rates and high outputs are possible. In addition to the commercial benefits, this specification also has very constant grinding behaviour with tight dimensional tolerances and excellent surface qualities and workpiece evenness.



Standard dimensions for top and bottom grinding with planetary kinematics

Workpiece	Material	Machine	Cup grinding wheel	Coolant	
			Shape	Bond	
Inserts Plane knives etc.	Tungsten carbide	AMT Melchiorre Peter Wolters Stähli	6A2 Ø 5001020 W 40190	WINTER LEVEL+GPK	Oil Emulsion

Other dimensions on request

Application example:

Workpiece: Tungsten carbide insert
Grinding tool: D46 Level+ GPK
Grinding machine: Peter Wolters AC 700

Coolant: Emulsion

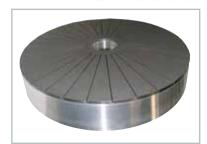
Grinding parameters

Workpieces / load: 204 inserts
Allowance / side: $a_e = 0.25 \text{ mm}$ Cycle time: t = 180 s

Benefit:

 $\begin{array}{ll} \mbox{Dimensional tolerance} & 5 \ \mbox{\mu m} \\ \mbox{Surface quality (R}_{\mbox{\tiny a}}) & 0.25 \ \mbox{\mu m} \\ \mbox{Flatness} & 1 \ \mbox{\mu m} \end{array}$





Shank

WINTER

Sav

Inserts

PCD

Knives

Milling cutters

Mould and die

Shank

Inserts



Diamond grinding wheels for peripheral grinding of inserts

The WINTER INSERT⁺ family consists of specially developed grinding wheels for every type of insert. The programme includes in particular free-grinding specifications, with which e.g. in the area of standard inserts superb material removal rates can be achieved, as well as very robust, low-wear systems for the area of special inserts (ceramic, cBN...). For polished inserts, fine-grit variants are included in the portfolio, where an impressive combination of best cutting edge quality and high material removal rate is achieved. Let yourself be convinced by the performance of our systems!

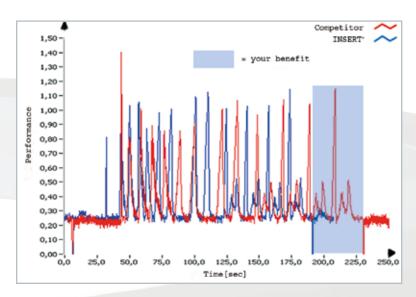
WINTER INSERT+

Can be used for the grinding of

- Tungsten carbide
- Cermet
- cBN
- Ceramic

...under emulsion and oil Chipping < 10 µm

Picture: In this example, the time benefit generated by WINTER INSERT⁺ is 30 seconds per insert!



Application recommendations

WINTER	Standard tungsten carbide inserts	Large tungsten carbide inserts	Polished tungsten carbide inserts	Cermet inserts	Ceramic inserts
D64D76		INSERT+ 980 INSERT+ 4017			
D46D54	INSERT+ 4821 INSERT+ 3102			INSERT+ 980 INSERT+ 4006	INSERT+ 980
D25D35	INSERT* 4006		INSERT+ 3102	INSERT* 4017	
D15D20			INSERT+ 980		

Grinding wheels for machining cBN inserts please find in chapter "Grinding tools for PCD and PCBN machining".

Standard dimensions for peripheral grinding of inserts

Workpiece	Material	Machine	Cup grinding wheel		Coolant
			Shape	Bond	
Insert	Tungsten carbide Cermet Ceramic cBN	Agathon EWAG WAIDA Wendt	2A2T, 11A2, Ø 250, 350, 400 W 325 X 315	WINTER INSERT+	Oil Emulsion

Other dimensions on request

Milling cutters

Knives

Mould

Service Glossary Contact

All dimensions in mm

INSERT"

Peripheral grinding

WINTER

Shank

INSERT⁺ examples of use

Application example 1

Workpiece: Tungsten carbide insert **Grinding tool:** D46 INSERT+ 4006N-98 C110 A

Grinding machine: Agathon 400 Penta

Coolant: Oil

Grinding parameters

 $v_f = 30/15 \text{ mm/min}$ Feed rate (sides):

Cutting speed: $v_{c} = 21 \, \text{m/s}$ Allowance / side: $a_0 = 0.1 \, \text{mm}$ Dressing interval: 100 inserts Cycle time: t = 90 s

Benefit:

15% higher feed rate 8% lower cycle time 10-fold dressing interval

Reduced wear of the grinding wheel



Application example 2 Workpiece: Polished tungsten carbide insert **Grinding tool:** D35 INSERT+ 3102-44 C100

Grinding machine: Agathon 250 PA-CNC

Coolant: **Emulsion**

Grinding parameters

Feed rate (sides): $v_f = 10/8 \text{ mm/min}$ $v_{c} = 21 \text{ m/s}$ Cutting speed: Allowance / side: $a_{0} = 0.3 \text{ mm}$ Dressing interval: 15 inserts Cycle time: t = 120 s

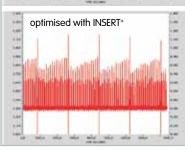
Benefit

15% longer dressing interval 66% lower dressing amount

Reduced wear of the grinding wheel

Picture "optimised with INSERT+" Stable grinding process,

substantially lower grinding pressure



Picture Standard:

Increasing power consumption Dressing effect insufficient

Application example 3

Workpiece: Cermet insert

Grinding tool: D35 Insert+4017T-44 C100 **Grinding machine:** Agathon 350 Combi

Coolant:

Grinding parameters

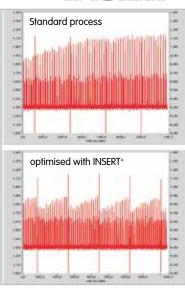
Feed rate (sides): $v_f = 6 \text{ mm/min}$ Cutting speed: $v_c = 21 \,\text{m/s}$ Allowance / side: $a_{a} = 0.15 \text{ mm}$ Dressing interval: 1 insert Cycle time: t = 164 s

Benefit

40% higher lifetime

48 seconds time savings per insert More than 20% cost reduction per insert





and die Glossary

Mould

Knives

Milling

cutters

Shank

Inserts

Diamond grinding wheels for profile grinding of inserts

The profiling of inserts is a multi-faceted process. Various contours are generated, from simple flutes to complex profiles on the periphery of the inserts. Therefore, the applied profile wheels (e.g. 1E1, 1F1 or 1V1) are made from metal or resin bonds. With multi-process profiles (e.g. grooves for positive locking of the inserts in rotary holders), crushable metal or vitrified bond systems are frequently used.

Application example multi-profile wheel

Workpiece: Tungsten carbide insert with 120° tapered flute (4fold flute width 2.5 mm) 14A1-125-5-10 20 D64 Q-Flute

Grinding wheel: **Coolant: Emulsion**

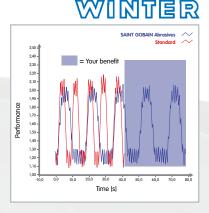
Grinding parameters

Profile depth: 0.7 mm Infeed: $a_0 = 0.7 \, \text{mm}$ Cutting speed: $v_c = 2.8 \text{ m/s}$ Feed rate: $v_f = 260 \text{ mm/min}$ $Q'_{w} = 3 \text{ mm}^{3}/\text{mm} \cdot \text{s}$

Specific Material Removal Rate:

Benefit:

47% time savings



Application example profile wheel

Workpiece: Tungsten carbide insert

with pre-sintered threaded profile Grinding wheel: MC1A1-150-4.5-5 D64 DMC C75

Coolant: Emulsion

Grinding parameters

Profile depth: 0.95 mm Residual allowance: 0.6 mm Infeed: $a_0 = 0.6 \text{ mm}$ Cutting speed: $v_c = 23 \text{ m/s}$ Feed rate: $v_i = 150 \text{ mm/min}$ Specific Material Removal Rate: $Q'_{w} = 1.5 \text{ mm}^3/\text{mm} \cdot \text{s}$

Benefit:

80% cost savings



DMC conditions of use

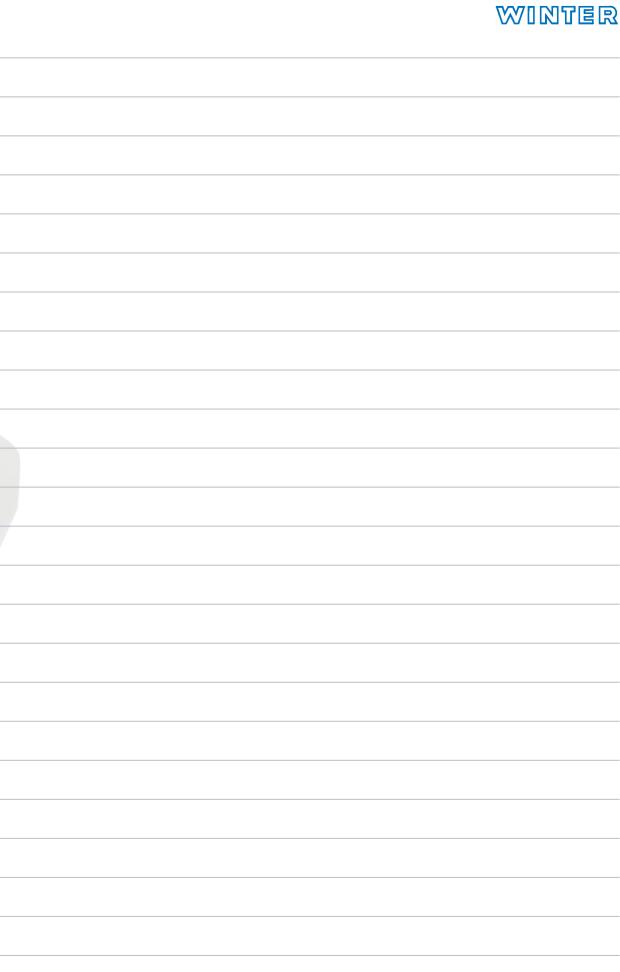
The crushing device should be part of the original machine; at least it should be strongly mounted onto the machine. By doing so, the advantages of profiling, without annoying tool changing, can be utilised. Pre-forming of the layer to the required profile is also possible

Crushing can be carried out either with a powered grinding wheel, which drives the profiling roller, or with a powered profiling roller driving the grinding wheel. (If attention is not paid to this point, the wear of the profile roller will increase). Profile crushing should always be performed using flood coolant, as the grinding wheel and the crushing roll must be lubricated. Additionally, during crushing, the abrasive layer must be cleaned with a WINTER stone No. 2 or No. 5. This reduces profile distortion that may occur due to adherent wheel particles.

and die

Milling cutters

Contact



Milling cutters

Mould and die

Grinding tools for PCD and PCBN machining



Diamond is the hardest known material and is used as MCD (monocrystalline diamond) and PCD (polycrystalline diamond) in the tools industry in a multitude of ways. The machining of diamond is not only difficult due to its hardness. Diamond is very brittle and therefore needs very free-cutting grinding wheels to generate good cutting edge qualities.

In addition to diamond, polycrystalline boron nitride (PCBN) cutting tools are increasingly being used in the industry; cBN is the second hardest known material and offers enormous lifetime benefits in comparison with tungsten carbide tools when turning and milling hardened steel, cast iron and sintered metals.

Information

Further information on applications and products can be found at www.winter-superabrasives.com

- 94 Grinding of PCD and PCBN inserts
- 95 Innovative vitrified bond PCX
- 96 High-performance grinding of solid PCBN inserts
- 97 Standard tools for manual PCD machining

Grinding of PCD and PCBN inserts

The machining of superhard materials such as PCD and PCBN places particularly great demands on grinding tools. There are hardly any differences in hardness between the workpiece and the diamond grain used in the grinding wheel, meaning that wear-resistant but free-grinding systems are required. Depending on the application, metal, vitrified, hybrid or resin bonds are used. Some standard specifications are available ex stock. With regard to your specific application, please simply ask us.

Selection assistant fo	Selection assistant for WINTER bond systems							
Diamond grinding wheels	Wear resistance	Recommendations for use						
VFK		Metal bond for rough pre-grinding						
VF	A	Metal bond for pre-grinding						
VFF		Metal bond universal for pre- and finish grinding						
VP		Metal bond for polish grinding						
VPP		Metal bond for finest polish grinding						
INSERT+CBN		HHybrid bond for solid PCBN inserts						
PCX2050J		More wear resistant vitrified bond for profile tools, also for MCD						
PCX2350H		Universal vitrified bond, also for high carbide proportions						
PCX4350H		Most free grinding vitrified bond for large contact areas, small grit sizes						

Standard dimensions for the grinding of PCD and PCBN tools

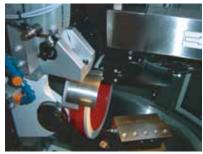
Workpiece	Material	Machine	Cup grinding wheel		Coolant
			Shape	Bond	
Inserts Milling cutters etc.	PCD PCBN	Manual and CNC tool grinding machines	2A2, 6A2, 11A2, Ø 100400 W 320 X 615	Vitrified, hybrid or metal bonds	Oil Emulsion

Workpiece	Material	aterial Machine Peripheral grinding whe		eel	Coolant
			Shape	Bond	
Inserts Milling cutters etc.	PCD PCBN	CNC tool grinding machines OD grinding machines	1A1, 14A1, etc. Ø 100500 U 315 X 510	Vitrified, resin or metal bonds	Oil Emulsion

Other dimensions on request

Innovative vitrified bond PCX

WINTER PCX raises the bar for machining hard materials like PCD and PCBN (especially very brittle grades with low cBN percentages <80% cBN). More and more often, very fine grit sizes are preferred to meet the increasing demand on cutting edge quality. Due to the freegrinding behaviour of the new PCX range, coarser grit sizes achieve the same edge quality as formerly used grinding wheels with finer grits. PCX allows high feed rates and reduced recondition intervals and thus combines perfect cutting edge qualities with improved productivity.





Grinding tool: D15A PCX2350H C120A **Grinding machine: EWAG EASYGRIND**

Coolant: Emulsion

Workpiece: PCD milling insert (brazed, high carbide proportion)

Grinding parameters

 $v_{f} = 2 \text{ mm/min}$ Feed rate: Stock: $a_{0} = 0.3 \text{ mm}$ $v_{c} = 11 \text{ m/s}$ Cutting speed:

Benefit:

45% time savings Very good edge quality

Perfect surface quality on carbide backing

Application example 2

Grinding tool: D15A PCX2350H C120A

Grinding machine: Coburn RG5 **Coolant: Emulsion**

Workpiece: PCD insert (brazed, low carbide proportion)

Grinding parameters

Feed rate: Pressure controlled Stock: $a_{a} = 0.4 \text{ mm}$ Cutting speed: $v_{c} = 9.5 \text{ m/s}$

Benefit:

Reduced cycle time

Edge chipping 6 µm (cutting face) Applicable for roughing and finishing

6A2 Stock programme

Diamond g	Diamond grinding wheels										
Shape	D	w	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment	
4VG6A2	150	10	10	40	D15A	PCX2350H	C120	А	7958704537	T = 40, E = 10	
3VG6A2	150	20	10	40	D10	PCX2350H	C120	А	69014142334	T = 40, E = 10	
					D15A	PCX2350H	C120	А	69014142337		
2VG6A2	200	20	10	40	D15A	PCX2350H	C120	А	7958706277	T = 40, E = 13	



WINTER

Shank

Knives

Milling cutter

and die

High-performance grinding of solid PCBN inserts

The grindability of the manifold PCBN grades differs considerably because of the large variety of combinations of cBN content, cBN grit size and binder.

The features required for individual application areas are determined by the stipulated variables. For e. g. milling operations with interupted cut, hard and tough PCBN grades with high cBN content are necessary. These inserts mostly consist of solid PCBN - a challenge for their grinding tools: excellent freegrinding behaviour and fast cutting features prevent the insert as well as the grinding wheel surface from being glazed.

Hybrid bonded tools proved to be the ideal solution for these fields of application. WINTER INSERT*CBN has been developed especially for grinding solid PCBN inserts and has meanwhile become established. The very good freegrinding behaviour of Insert*CBN grants an enormous productivity increase within tight dimension tolerance and outstanding cutting edge quality.

Application example 1

Grinding tool: D46 INSERT+CBN C100 A
Grinding machine: WENDT WAC 725
Coolant: Emulsion
Workpiece: solid PCBN insert

Grinding parameters

Feed rate: $v_f = 8 \text{ mm/min (sides)}, v_f = 20 \text{ mm/min (radii)}$

Stock: $a_e = 0.25 \text{ mm}$ Cutting speed: $v_c = 20 \text{ m/s}$ Dressing interval: continuously

Benefits:

30% reduction of wheel wear

10% time saving

16% grinding cost reduction

Application example 2

Grinding tool: D46 INSERT+CBN C100 A

Grinding machine: EWAMATIC
Coolant: Dielectric fluid
Workpiece: solid PCBN insert

Grinding parameters

Feed rate: $v_f = 6 \text{ mm/min}$ Stock: $a_e = 0.2 \text{ mm}$ Cutting speed: $v_c = 22 \text{ m/s}$ Dressing interval: $1 \times per \text{ workpiece}$

Benefits:

60% reduction of grinding time Very good edge quality Perfect diminsional stability

Anwendungsbeispiel 3

Grinding tool: D46 INSERT+CBN C100 A
Grinding machine: Agathon 400 Penta

Coolant: Öl

Workpiece: solid PCBN insert

Grinding parameters

Feed rate: $v_f = 6 \text{ mm/min (sides)}, v_f = 20 \text{ mm/min (radii)}$

Stock: $a_e^i = 0.2 \text{ mm}$ Cutting speed: $v_c = 20 \text{ m/s}$ Dressing interval: $1 \times per \text{ workpiece}$

Benefits:

Outstanding grinding behaviour Enormous reduction of grinding time

Considerable increase of lifetime in comparison to refence tool

INSERT"

INSERT"

INSERT#

All dimensions in mm

CD / PCRN inserts

WINTER

Shank

Standard tools for manual PCD machining

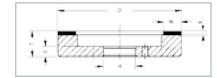
Apart from modern vitrified and hybrid bonds, metal bonded PCD grinding tools are still popular. These multi-purpose tools feature impressive lifetime, and are insensitive to variations in grinding pressure - which is important for manual applications. The selection assistant at the beginning of this chapter will help you to choose the best bond for your grinding task.

2A2T Stock programme



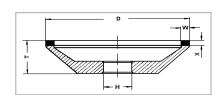
Diamond	grindin	g whee	ls								
Shape	D	w	X	Т	н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1BZ2A2T	150	20	4	15	112		VFF		А	66260134939	T = 15.3 mm ¹⁾

6A2 Stock programme



Diamond	Diamond grinding wheels										
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment	
8BZ6A2	150	6	8	40		VFK		А	60157643172	T = 26 mm E = 10 mm ¹⁾	
1BZ6A2	150	20	4	40		VF		А	66260135795	T = 40 mm	
						VFF		А	60157643132	E = 10 mm 1)	
						VP		А	66260135772		

May differ slightly from illustration depending on the machine's adapter flange



12A2 Stock programme

Diamond	grindin	g wheel	s								
Shape	D	w	x	s°	н	Grit size	Bond	Concen- tration	Body	Order number	Comment
1BZ12A2	125	15	4	45	20		VFF		А	60157643666	T = 26 mm E = 10 mm ³⁾

¹⁾ For EWAG manual machines

Milling cutters

and die

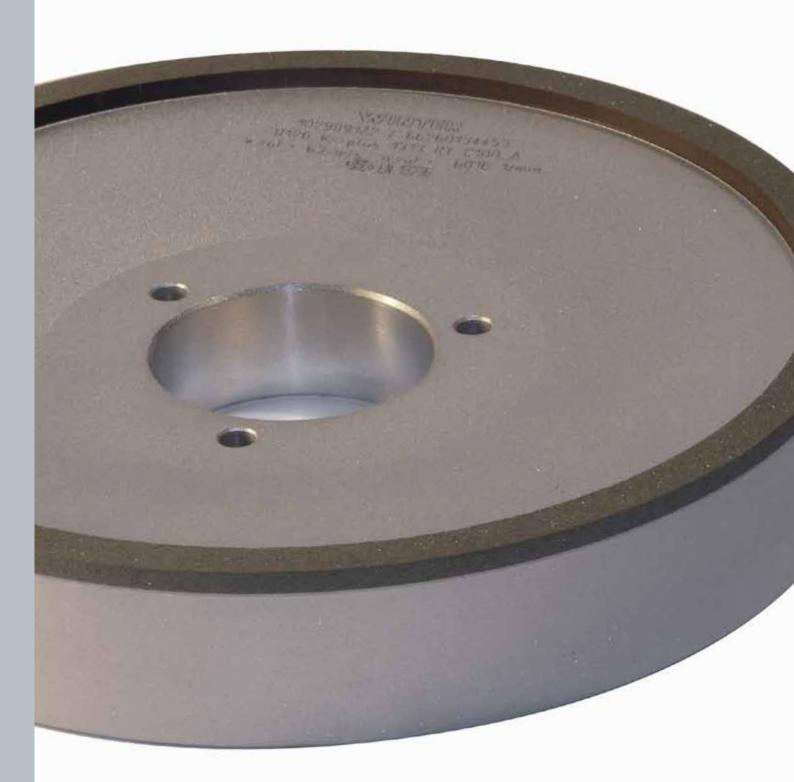
Service Glossary Contact

All dimensions in mm

²⁾ For Micro-Point

³⁾ For Kelch SZ32K

Grinding tools for knife machining



The knife industry includes various grinding applications in the manufacture of industrial knives such as flat, circular or profile knives.

The sharpness of the blade is the quality criterion for every type of knife. That is why most importance is given to the grinding of the blade facets. At the same time, this is also the most frequent application for superabrasive grinding tools in knife machining.

Information

Further information on applications and products can be found at www.winter-superabrasives.com

- 100 Diamond and cBN grinding wheels for surface and profile grinding
- 101 Grinding of flat and circular knives
- 103 Grinding of profile knives

Diamond and cBN grinding wheels for surface and profile grinding

WINTER offers metal and resin bonded grinding wheels for polish grinding of paper knives as well as roughly ground chopping knives for the recycling and shredding sector.

Both cup wheels for the grinding of flat and circular knives as well as peripheral wheels for the profiling of e.g. profile knives are available ex stock.



Selection assistant fo	r WINTER bond	l systems					
Diamond grinding wheels	Wear resistance	Recommendations for use					
BZ587	A	Standard metal bond for knife machining					
K+1313RY	Ī	Resin bond for tungsten carbide-steel combination grinding, wet					
K+920		More wear-resistant resin bond also for dry grinding					
K+4821		Free-grinding CNC bond, e.g. for Cermet					
K+888RY		Univeral resin bond for wet grinding					
cBN grinding wheels	Wear resistance	Recommendations for use					
MSS587	A	Standard metal bond for knife machining					
KSS920	1	More wear-resistant resin bond also for dry grinding					
KSSRY		Univeral resin bond for wet grinding					
KSSJY		Univeral resin bond for wet grinding					
KSS007N		Free-grinding resin bond for dry grinding					

Standard dimensions for knife machining

Workpiece	Material	Machine	Cup grinding wheel		Coolant
			Shape	Bond	
Flat knives Circular knives etc.	Tungsten carbide HSS	Göckel Reform Weinig	6A2, 222, Ø 100200 W 38 X 48	K+, KSS, BZ and MSS bonds	Oil Emulsion

Workpiece	Material	Machine	Peripheral grinding who	eel	Coolant	
			Shape	Bond		
Profile knives etc.	HSS	Universal blade grinding machi- nes	14F1, 14A1 Ø 200 U 24 X 37	KSS bonds	Oil Emulsion	

Other dimensions on request

Grinding of flat and circular knives

6A2 Stock programme

Metal bor	Metal bonded diamond grinding wheels												
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment			
3BZ6A2	200	8	4	75	D64	BZ587	C25	А	60157642913	T = 35 mm ³⁾			
6BZ6A2	200	8	8	20	D64	BZ587	C25	А	66260111969	T = 31 mm ¹⁾			
5BZ6A2	200	8	8	50	D64	BZ587	C25	А	66260110549	T = 31 mm ²⁾			
3BZ6A2	200	8	8	75	D64	BZ587	C25	А	66260348688	T = 35 mm ³⁾			

May differ slightly from illustration depending on the machine's adapter flange

Resin bon	Resin bonded diamond grinding wheels												
Shape	D	W	×	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment			
14K6A2	200	8	4	50	D126	K+1313RY	C100	А	66260134453	T = 35 mm ²⁾			
26K6A2	200	8	4	75	D126	K+1313RY	C100	А	60157643892	T = 35 mm ³⁾			

May differ slightly from illustration depending on the machine's adapter flange $\,$

- 1) Universal tool grinding machines (bore can be adapted)
- ²⁾ Göckel grinding machines
- 3) Reform grinding machines

Saw

WINTER

Inserts

PCD PCBN

Kilives

Milling cutters

Mould and die

Saws

Shank tools

WINTER



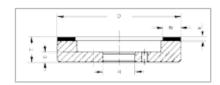


Knives

Milling cutters

Mould and die

Service Glossary Contact



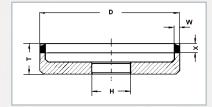
6A2 Stock programme

Metal bor	Metal bonded cBN grinding wheels												
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment			
5BZ6A2	200	8	8	50	B126	MSS587	V120	А	66260133248	T = 31 mm ²⁾			
3BZ6A2	200	8	8	75	B126	MSS587	V120	А	66260368698	T = 35 mm ³⁾			

May differ slightly from illustration depending on the machine's adapter flange

Resin bon	Resin bonded cBN grinding wheels												
Shape	Shape D W X H Grit Bond Concentration Body Order number Comment												
2K6A2	125	3	4	20	B107	KSSRY	V120	Н	66260134792	T = 18 mm 4)			
1K6A2	150	4	6	20	B181	KSS007N-63	V180	А	60157643468	T = 29 1)			

May differ slightly from illustration depending on the machine's adapter flange



222 Stock programme

cBN grind	cBN grinding wheels												
Shape	D	w	۷°	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
3K222	100	3	3	6	20	B126	KSSRY	V120	Α	60157643658	T = 30 mm ⁴⁾		

- ¹⁾ Universal tool grinding machines (bore can be adapted)
- ²⁾ Göckel grinding machines
- 3) Reform grinding machines
- 4) Weinig grinding machines

All dimensions in mm

Grinding of profile knives

14A1 Stock programme



Diamond	Diamond grinding wheels												
Shape	D	U	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment			
2K14A1	200	4	10	60	D46	K+888RY	C100	А	66260112982 1)	T = 6 ²⁾			

cBN grind	cBN grinding wheels											
Shape	D	U	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
1K14A1	200	4	3	60	B91	KSSRY	V240	Н	60157643410	T = 5 ²⁾		

14F1 Stock programme



Diamond	Diamond grinding wheels												
Shape	D	U	X	R	н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
4K14F1	200	2	5	1	60	D54	K+888RY	C75	А	60157643156 1)	T = 6 ²⁾		
K14F1	200	3	5	1.5	60	D64	K+920	C100	А	66260336122 1)	T = 10 ²⁾		
3K14F1	200	4	6	2	60	D46	K+888RY	C100	Н	66260111253	T = 5 ²⁾		
						D151	K+1313RY	C100	Н	66260114210			
9K14F1	200	2	7	1	20	D64	K+4821	C100	А	66260119930 1)	T = 10		
					30	D64	K+4821	C100	А	66260127332 1)			
					31.75	D64	K+4821	C100	А	66260127734 1)			
					32	D64	K+4821	C100	А	66260350546 1)			
					40	D64	K+4821	C100	А	66260127638 1)			
					50	D64	K+4821	C100	А	66260118539 1)			
					60	D64	K+4821	C100	А	66260131361 1)			
13K14F1	200	2	7	1	60	D64	K+4821	C100	А	66260119140	T = 5 ²⁾		
7K14F1	200	4	7	2	20	D151	K+4821	C100	А	66260119142 1)	T = 10		
					30	D151	K+4821	C100	А	66260395343 1)			
					31.75	D151	K+4821	C100	А	66260127145 1)			
					32	D151	K+4821	C100	А	66260350535 1)			
					40	D151	K+4821	C100	А	66260117349 1)			
					50	D151	K+4821	C100	А	66260117251 1)			
9K14F1	200	4	7	2	60	D151	K+4821	C100	А	66260127453	T = 5 ²)		

May differ slightly from illustration depending on the machine's adapter flange

All dimensions in mm

WINTER

Knives

cutters

and die

¹⁾ Delivery time 5 - 6 weeks

²⁾ Weinig grinding machines

Shank tools

Saws

Inserts

PCD PCBN

Knives

Milling cutters

Mould and die

Service Glossary Contact

14F1 Stock programme



cBN grind	ling who	eels									
Shape	D	U	X	R	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
5K14F1	200	2	5	1	60	B126	KSS920	V180	А	60157642627	T = 6 ²⁾
9K14F1	200	2	7	1	20	B126	KSSRY	V180	А	66260119631 1)	T = 10
					30	B126	KSSRY	V180	А	66260128533 1)	
					31.75	B126	KSSRY	V180	А	66260127835 1)	
					32	B126	KSSRY	V180	А	66260350545 1)	
					40	B126	KSSRY	V180	А	66260127441 1)	
					50	B126	KSSRY	V180	А	66260127044 1)	
					60	B126	KSSRY	V180	А	66260131760 ¹⁾	T = 10 ²⁾
13K14F1	200	2	7	1	60	B126	KSSRY	V180	А	66260119546	T = 5 ²⁾
K14F1	200	3	5	1.5	60	B151	KSSRY	V180	А	66260130748	T = 10 ²⁾
1K14F1	200	4	3	2	60	B151	KSSRY	V240	Н	60157642904	T = 5 ²⁾

May differ slightly from illustration depending on the machine's adapter flange

222 Stock programme

cBN grind	cBN grinding wheels												
Shape	D	w	×	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment			
4K222	150	2	3.3	20	B107	KSSJY	V180	А	60157642630	S = 23° T = 17			

700 Stock programme

			7777n	
-	 7799	-		4

Diamond grinding wheels											
Shape	D	U	x	R	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
7K700	200	1	5	0.5	20	D64	K+920	C75	E	60157678914	T = 10
7K700	200	1	5	0.5	20	D126	K+920	C75	E	60157678913	T = 10

cBN grinding wheels											
Shape	D	U	X	R	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
7K700	200	1	5	0.5	20	B151	KSSR	V180	E	60157678949	T = 10

¹⁾ Delivery time 5 - 6 weeks

All dimensions in mm

²⁾ Weinig grinding machines



WINTER Facts

Shank tools

PCD PCBN

Knives

Milling cutters

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Grinding wheels for the machining of milling tools



In the woodworking industry, milling cutters are used for a variety of machining tasks. In this sector, there is a very wide range of milling cutters. The most common are groove, joint, rebating, chamfering and profile cutters. There are one-piece milling cutters as well as screwed and welded designs. All of these tools place different demands on the grinding process.

Another major application area is hob grinding. Hobs are used in gear manufacturing and need to be ground and re-sharpened precisely with superabrasive grinding wheels.

- 108 Diamond and cBN grinding wheels for grinding of cutting faces and clearances
- 109 Face grinding of profile cutters
- 113 Top grinding of profile cutters
- 114 Grinding of hobs

Information

Further information on applications and products can be found at www.winter-superabrasives.com

Service Glossary Contact

Diamond and cBN grinding wheels for grinding of cutting faces and clearances

The grinding of milling tools represents the last machining step in the manufacture and re-working of milling cutters. In a similar way to shank tools and saw blades, the tool faces and the clearances (top) are the main applications for grinding. The machining of the top is particularly important here, as the runout of the milling tools is ensured in this manufacturing step. This then forms the basis for an even cutting performance.



Selection assistant for WINTER bond systems								
Diamond grinding wheels	Wear resistance	Recommendations for use						
K+1421R		Standard resin bond for CNC applications						
K+1414N	†	Resin bond for tungsten carbide-steel combination grinding, dry						
K+1414J		Resin bond for tungsten carbide-steel combination grinding, dry						
K+888R		Universal resin bond for dry grinding						
K+888N		Universal resin bond for dry grinding						
K+888J		Universal resin bond for dry grinding						
K+1410	•	Free-grinding resin bond for dry grinding						
cBN	Wear	Recommendations for use						
grinding wheels	resistance	Recommendations for use						
KM64		Particularly wear-resistant bond for machining of hobs						
KSSTY	A	Universal resin bond for wet grinding						
KSSRY		Universal resin bond for wet grinding						
KSSJY		Universal resin bond for wet grinding						
KSS12N		Standard resin bond for CNC applications						
KSS10N		Universal resin bond for tool grinding						
KSS10J		Universal resin bond for tool grinding						
KSS007N		Free-grinding resin bond for dry grinding						

Standard dimensions for the machining of milling tools for the woodworking industry

Workpiece	Material	Machine	Cup grinding wheel		Coolant	
			Shape	Bond		
Milling tools for the wookworking industry	Tungsten carbide HSS	Universal tool grinding machines	4A2, 12A2, 222, Ø 100200 W 38 X 24	K+, KSS bonds	Oill Emulsion (dry)	

Standard dimensions for the machining of hobs

Workpiece	Material	Machine	Cup grinding wheel		Coolant	
			Shape	Bond		
Hobs	Tungsten carbide HSS	Universal tool grinding machines	4BT9, 222 Ø 100150 W 110 X 13.3	K+, KSS, KM bonds	Oil Emulsion	

Other dimensions on request

Face grinding of profile cutters

L W

4A2 Stock programme

Diamond grinding wheels												
Shape	D	w	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
K4A2	100	6	2	20	D64	K+888N	C50	Н	66260137071 2)	S = 15°, T = 8		
					D91	K+888N	C50	Н	66260136265 ²⁾			
6K4A2	125	5	2	20	D46	K+888J	C50	Н	60157643448	S = 15°, T = 10		
					D64	K+888R	C50	Н	60157643256			
K4A2	125	5	2	20	D91	K+888R	C50	Н	66260133740 1)	S = 15°, T = 6		
1K4A2	125	6	2	20	D46	K+1410	C75	Н	66260115833	S = 15°, T = 10		
					D64	K+1410	C100	Н	66260128030			
K4A2	150	5	4	20	D64	K+888N	C50	Н	60157643184	S = 15°, T = 13		
K4A2	175	5	4	20	D64	K+888N	C50	Н	60157643327	S = 15°, T = 13		

¹⁾ Delivery time 5 - 6 weeks

WINTER Facts

> Shank tools

> > Saws

serts

PCD PCBN

Knives

Milling cutters

Mould and die

²⁾ Available while stocks last

WINTER Facts





Inserts



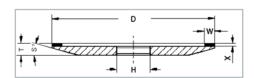
Knives

Milling cutters

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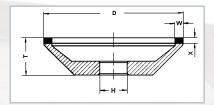
Mould and die

Service Glossary Contact



4A2 Stock programme

cBN grinding wheels													
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment			
K4A2	100	4	2	20	B107	KSS10N	V120	Н	60157642646 1)	S = 15°, T = 8			
K4A2	125	4	2	20	B107	KSS10N	V120	Н	60157642812 1)	S = 15°, T = 6			
K4A2	125	5	4	20	B126	KSS10J	V120	Н	60157642977 1)	S = 11°, T = 15			
3K4A2	150	3	2	20	B151	KSSRY	V240	А	66260134960 ²⁾	S = 20°, T = 17			
K4A2	150	4	2	20	B107	KSS10N	V120	Н	60157642791	S = 15°, T = 6			
K4A2	150	4	3	20	B91	KSS12N	V240	А	66260127081	S = 15°, T = 12			
K4A2	175	5	4	20	B126	KSS10J	V120	Н	60157643668	S = 15°, T = 13			
K4A2	200	6	2	20	B107	KSS10J	V120	Н	60157643223 1)	S = 15°, T = 11			



12A2 Stock programme

cBN grinding wheels													
Shape	D	W	X	S	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
K12A2	100	5	2	20	20	B126	KSS10J	V120	Н	66260136215	T = 12		
K12A2	125	5	2	20	20	B126	KSS10J	V120	Н	66260136538 2)	T = 16		

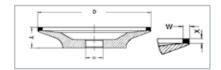
12V2 Stock programme

Diamond grinding wheels												
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
1K12V2	125	5	3	20	D64	K+888N	C50	Н	60157642736	S = 30°, T = 26		
1K12V2	125	5	4	20	D46	K+888N	C50	Н	66260129020	S = 29°, T = 26		
1K12V2	125	8	4	20	D46	K+888N	C50	Н	60157642744	S = 30°, T = 26		
					D64	K+888N	C75	Н	66260136367			

¹⁾ Delivery time 5 - 6 weeks

²⁾ Available while stocks last

WINTER



222 Stock programme

Diamond grinding wheels												
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
1K222	125	5	4	20	D64	K+1414J	C50	Н	66260135758	S = 20°, T = 23		
16K222	125	5	4	20	D151	K+888R	C75	Н	66260100321	S = 20°, T = 23		
					D181	K+888R	C100	Н	60157643406			
20K222	125	5	4	20	D46	K+888J	C50	Н	66260349438	S = 20°, T = 23		
					D46	K+1410	C75	Н	66260111759			
					D64	K+888R	C50	Н	66260117305			
					D64	K+1410	C75	Н	66260335191			
					D91	K+888R	C50	Н	66260117906			
					D126	K+888R	C50	Н	66260118608			
					D151	K+888R	C75	Н	66260130346			
					D181	K+1410	C100	D	66260115578			
					D181	K+1410	C100	Н	66260352288			

cBN grind	cBN grinding wheels													
Shape	D	W	X	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment				
20K222	125	5	4	20	B64	KSS007N-63	V120	D	66260115588	S = 20°, T = 23				
					B107	KSS10J	V120	Н	66260133018					
					B126	KSS10J	V120	Н	66260350216					
					B151	KSS007N-63	V120	Н	66260135854					
22K222	125	5	4	20	B107	KSS10J	V120	Н	60157642903	$S = 20^{\circ}, T = 23^{1}$				
1K222	150	5	4	20	B107	KSS007N-63	V120	Н	66260115865	S = 20°, T = 23				

 $^{^{1)}}$ 3 × 120° M6, pitch circle 32 $3 \times 120^{\circ} \emptyset$ 6.6, pitch circle 36

Shank tools

Inserts

PCD PCBN

Knives

Milling cutters

Mould and die

Service Glossary Contact

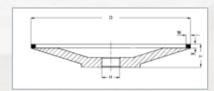
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222 Stock programme

Diamond grinding wheels												
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
2K222	150	3	3.3	20	D46	K+1410	C75	А	66260129203 ²⁾	S = 12°, T = 12		
					D64	K+1410	C75	А	66260345390			
2K222	200	3	3.3	20	D64	K+1410	C75	А	66260340765	S = 12°, T = 12		

cBN grir	cBN grinding wheels													
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment				
4K222	150	2	3.3	20	B107	KSSJY	V180	А	60157642630	$S = 23^{\circ}, T = 17^{1}$				
2K222	150	3	3.3	20	B64	KSS007N-63	V120	А	66260119538 2)	S = 12°, T = 12				
					B107	KSS007N-63	V180	А	66260345388					
5K222	175	3	3.3	20	B107	KSS007N-63	V180	А	66260347845	S = 12°, T = 12				
2K222	200	3	3.3	20	B107	KSS007N-63	V180	А	66260340761	S = 12°, T = 12				

May differ slightly from illustration depending on the machine's adapter flange



222 Stock programme

Diamond	Diamond grinding wheels												
Shape	D	W	x	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment			
14K222	150	5	4	20	D64	K+888R	C50	Н	66260135778	S = 20°, T = 23			
					D151	K+1414N	C75	Н	66260128468				
2K222	175	5	4	20	D64	K+888R	C50	Н	66260135779	S = 18°, T = 26			
6K222	200	5	4	20	D64	K+888R	C50	Н	60157643208	S = 16°, T = 28			

cBN grinding wheels												
Shape	D	W	x	н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
14K222	150	5	4	20	B54	KSS10J	V120	Н	66260110861	S = 20°, T = 23		
					B107	KSS10J	V120	Н	66260135777			
2K222	175	5	4	20	B107	KSS10J	V120	Н	66260135775	S = 18°, T = 26		
6K222	200	5	4	20	B107	KSS10J	V120	Н	60157643768	S = 16°, T = 28		

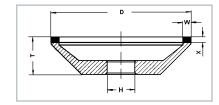
¹⁾ Drawing see page 104

All dimensions in mm

²⁾ Available while stocks last



Top grinding of profile cutters



12A2 Stock programme

Diamond grinding wheels											
Shape	D	W	X	S	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment
K12A2	100	5	2	45	20	D46	K+888N	C50	Н	60157643097	T = 25
						D91	K+888R	C50	Н	60157643285	
						D91	K+888R-69	C50	А	66260147081	
K12A2	100	6	4	45	20	D64	K+888R	C50	D	60157642582	T = 27
						D126	K+888R	C75	D	60157642588	
K12A2	125	6	2	45	20	D91	K+888R	C50	Н	66260136340 1)	T = 25

cBN gr	cBN grinding wheels												
Shape	D	w	x	S	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment		
K12A2	100	5	2	45	20	B126	KSS10J	V120	Н	60157643373	T = 25		

¹⁾ Delivery time 5 - 6 weeks

WINTER Facts

Shank tools

Saws

Insert

PCD PCBN

Knives

Milling cutters

Mould and die

Service Glossary Contact

Grinding of hobs

D W -×

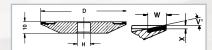
4BT9 Stock programme

Diamond	Diamond grinding wheels											
Shape D W X V° H Grit Bond Concentration Body Order number Comment											Comment	
K4BT9	100	10	1	5	20	D126	K+1421R	C75	Α	66260348380	$S = 20^{\circ}$, $T = 10$ Up to module 6	

cBN grinding wheels												
Shape	D	w	x	V°	Н	Grit size	Bond	Concen- tration	Body	Order number	Comment	
K4BT9	100	10	1	5	20	B126	KSS12N	V180	А	66260132772	$S = 20^{\circ}$, $T = 10$ Up to module 6	
1SP4BT9	150	10	3	8	50.8	B126	KM64	V300	A	66260354043 1)	S = 20°, T = 10 R = 1.5 Up to module 8	

For creep feed and reciprocal grinding of straight- or spiral-fluted gear hobs

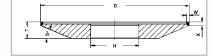
4V4 Stock programme



cBN grind	cBN grinding wheels												
Shape	Shape D W X V° H Grit Bond Concentration Body Order number Comment												
1K4V4	100	6	1	10	20	B151	KSSTY	V180	А	66260135829	T = 10 Up to module 6		

For creep feed and reciprocal grinding of straight-fluted hobs

222 Stock programme



cBN grind	cBN grinding wheels												
Shape D W X H Grit size Bond Concentration Body Order number Comment													
1K222	150	2	3.3	50.8	B151	KSSRY	V300	А	60157644021	S = 20°, T = 17 up to module 6			
1K222	200	2	3.3	50.8	B151	KSSRY	V300	А	66260134942	S = 23°, T = 22 up to module 12			

For creep feed and reciprocal grinding of straight-fluted hobs

All dimensions in mm

¹⁾ Available while stocks last



WINTER Facts

Shank tools

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Grinding tools for the mould-and-die industry



In the mould and die industry small lot sizes are the order of the day. More often than not, products are manufactured on a 'one-off' basis according to exact customer specification; this requires flexible and efficient solutions.

Many companies use a high proportion of manual production steps. CNC operations and automated production lines are unusual, due to small lot sizes.



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Diamond and cBN grinding wheels for surface and OD grinding

Vitrified and resin bonded diamond and cBN grinding wheels are used for surface and OD grinding.

The WINTER MAXI stock programme offers a substantial choice of resin bonded 1A1 standard grinding wheels for machining tungsten carbide and steel. Vitrified bonded tools are also specified for individual machining tasks. Please contact us regarding your requirements.





D T	10 mm	15 mm	20 mm	30 mm
200 mm	Dia/cBN	Dia/cBN	Dia	
225 mm	Dia/cBN	Dia/cBN		
250 mm	Dia/cBN	Dia/cBN	Dia/cBN	
300 mm	Dia	Dia/cBN	Dia/cBN	Dia/cBN
350 mm	Dia		Dia/cBN	Dia/cBN
400 mm	Dia	cBN	Dia/cBN	Dia/cBN
450 mm			cBN	
500 mm			Dia/cBN	Dia
600 mm				Dia
750 mm			Dia/cBN	
800 mm				Dia/cBN

Available ex stock

Extended programme delivery time 5-6 weeks

Also availabe ex stock: K1A1-300-25-5 127 diamond.



Selection assistant fo	or WINTER bond	systems
Diamond grinding wheels	Wear resistance	Recommendations for use
Maxi 1313RY		Special resin bond for tungsten carbide-steel combination grinding, wet
Maxi 1414R	A	Special resin bond for tungsten carbide-steel combination grinding, dry
Maxi 888RY		Universal resin bond for wet grinding
Maxi 888NY		Universal resin bond for wet grinding
Maxi 8837		Standard bond for surface and OD grinding
Maxi 125		Universal resin bond for surface and OD grinding $> \varnothing 250$
Maxi 280	l I	Universal resin bond for surface and OD grinding $< \varnothing 250$
Maxi 777J		Universal resin bond for fine grit applications
cBN grinding wheels	Wear resistance	Recommendations for use
Maxi RY		Universal resin bond for wet grinding
Maxi NY	_ ♠	Universal resin bond for wet grinding
Maxi 191		Universal resin bond for surface and OD grinding
Maxi 10N		Universal resin bond for tool grinding
Maxi 67		Standard bond for surface and OD grinding



Shank tools

Saws

nserts

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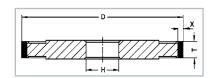
Milling cutters

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1A1 Stock programme



Diamond	grinding	wheels							
Shape	D	T	x	н	Grit size	Bond	Concen- tration	Body	Order number
K1A1	200	10	5	51	D20B	Maxi 777J	C50	В	66260119254
					D64	Maxi 280	C75	А	66260119608 ²⁾
					D91	Maxi 280	C75	А	66260119610 ²⁾
					D91	Maxi 888NY	C75	В	66260119259
					D126	Maxi 888NY	C75	В	66260119262
K1A1	200	15	5	51	D64	Maxi 280	C75	А	66260119613 ²⁾
					D126	Maxi 280	C75	А	66260119612 ²⁾
K1A1	200	20	5	51	D126	Maxi 888NY	C75	В	66260119266
K1A1	225	10	5	51	D91	Maxi 280	C75	Н	66260119623
					D91	Maxi 888NY	C75	В	66260119268 ²⁾
K1A1	225	15	5	51	D126	Maxi 888NY	C75	В	66260119327 ²⁾
K1A1	250	10	5	51	D126	Maxi 280	C75	Н	66260119626 ²⁾
					D126	Maxi 888NY	C75	В	66260119328 ²⁾
K1A1	250	15	5	51	D46	Maxi 888NY	C75	В	66260119334 ²⁾
					D91	Maxi 280	C75	Н	66260119641 2)
					D126	Maxi 280	C75	Н	66260119642
					D126	Maxi 888NY	C75	В	66260119336 ²⁾
K1A1	250	15	5	76	D126	Maxi 888NY	C75	В	66260119337
K1A1	250	20	5	76	D126	Maxi 1313RY	C75	В	66260119339
K1A1	300	10	5	127	D91	Maxi 8837	C75	В	66260119219
					D126	Maxi 1313RY	C75	В	66260119213 2)
					D126	Maxi 8837	C75	В	66260119221
K1A1	300	15	5	127	D91	Maxi 125	C75	Н	66260119648 ²⁾
					D91	Maxi 8837	C75	В	66260119208
					D126	Maxi 1313RY	C75	В	66260119206
					D126	Maxi 8837	C75	В	66260119210
K1A1	300	20	5	127	D126	Maxi 8837	C75	В	66260119204
K1A1	300	25	5	127	D91	Maxi 8837	C75	В	66260119193 ²⁾
					D126	Maxi 8837	C75	В	66260119190 2)
K1A1	300	30	5	127	D126	Maxi 125	C75	Н	66260119652 ²⁾
					D126	Maxi 8837	C75	В	66260119189 ²⁾
K1A1	350	10	5	127	D126	Maxi 8837	C75	В	66260119187
K1A1	350	20	5	127	D126	Maxi 8837	C75	В	66260119185

WINTER Facts

Shank tools

Saws

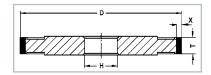
PCD PCBN

Knives

Milling cutters

Mould and die

WINTER



1A1 Stock programme

Diamond (grinding v	wheels							
Shape	D	T	x	Н	Grit size	Bond	Concen- tration	Body	Order number
KIAI	350	30	5	127	D126	Maxi 8837	C75	В	66260119184 ²⁾
KIAI	400	10	5	127	D20A	Maxi 777N	C50	В	66260119180
					D126	Maxi 8837	C75	В	66260119231
KIAI	400	20	5	127	D126	Maxi 1313RY	C75	В	66260119174
			D126	Maxi 8837	C75	В	66260119177		
KIAI	400	30	5	127	D126	Maxi 8837	C75	В	662601194312)
KIAI	500	20	5	203,2	D126	Maxi 8837	C75	В	66260119514
					D126	Maxi 1313RY	C75	В	66260119518
KIAI	500	30	5	203,2	D126	Maxi 8837	C75	В	66260119523
KIAI	600	30	5	305	D126	Maxi 8837	C75	В	66260119524
KIAI	750	20	5	305	D126	Maxi 1313RY	C75	А	662601195291)
KIAI	800	30	5	305	D126	Maxi 8837	C75	А	662601195311)

¹⁾ Delivery time 5 - 6 weeks ²⁾ Available while stocks last



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Shank tools

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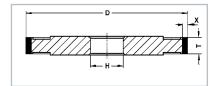
Inserts

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Milling cutters



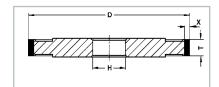


1A1 Stock programme

cBN grinding wheels											
Shape	D	Т	x	н	Grit size	Bond	Concen- tration	Body	Order number		
KIAI	200	10	5	51	B91	Maxi 191	V180	А	66260119656 2)		
					B126	Maxi 10N	V120	В	66260119532 2)		
					B126	Maxi 191	V180	А	66260119658		
KIAI	200	15	5	51	B91	Maxi 191	V180	А	66260119660 2)		
					B107	Maxi 10N	V120	В	66260119536 ²⁾		
					B126	Maxi 191	V180	А	66260119661		
K1A1	225	10	5	51	B91	Max i 191	V180	Н	66260119743 2)		
					B126	Maxi 10N	V120	В	66260119537		
					B126	Maxi 191	V180	Н	66260119747		
K1A1	225	12	5	51	B126	Maxi 10N	V120	В	66260119539 2)		
K1A1	225	15	5	51	B91	Maxi 191	V180	Н	66260119748		
					B126	Maxi 10N	V120	В	66260119543		
					B126	Maxi 191	V180	Н	66260119750 ²⁾		
KIAI	250	10	5	51	B91	Maxi 191	V180	Н	66260119751 2)		
					B126	Maxi 191	V180	Н	66260119752		
K1A1	250	15	5	51	B91	Maxi RY	V150	В	66260119547 2)		
					B91	Maxi 191	V180	Н	66260119753		
					B126	Maxi 10N	V120	В	66260119391		
KIAI	250	20	5	51	B91	Maxi 191	V180	Н	66260119757 2)		
					B126	Maxi 10N	V120	В	66260119393		
KIAI	300	15	5	76	B91	Maxi 191	V180	Н	66260119769 2)		
					B126	Maxi 191	V180	Н	66260119776		
K1A1	300	15	5	76,2	B126	Maxi 67	V120	В	66260119390		
KIAI	300	15	5	127	B126	Maxi 67	V120	В	66260119386		
KIAI	300	20	5	76	B91	Maxi 191	V180	Н	66260119778		
					B126	Maxi 191	V180	Н	66260119780		
KIAI	300	20	5	76,2	B126	Maxi 67	V120	В	66260119382		
KIAI	300	20	5	127	B126	Maxi 67	V120	В	66260119384		
KIAI	300	30	5	127	B126	Maxi 67	V120	В	66260119366		
KIAI	350	20	5	127	B126	Maxi 67	V120	В	66260119367		
					B126	Maxi 191	V180	Н	66260119781		
K1A1	350	30	5	127	B126	Maxi 67	V120	В	66260119370		

Mould and die

WINTER



1A1 Stock programme

cBN grind	cBN grinding wheels											
Shape	D	Т	x	Н	Grit size	Bond	Concen- tration	Body	Order number			
KIAI	400	15	5	127	B126	Maxi 191	V180	Н	66260119785			
KIAI	400	20	5	127	B126	Maxi 67	V120	В	66260119374			
					B126	Maxi 67	V180	В	66260119376			
K1A1	400	30	5	127	B126	Maxi 67	V120	В	66260119380			
					B126	Maxi 67	V180	В	66260119381			
K1A1	450	20	5	203,2	B126	Maxi 67	V120	В	66260119405 ²⁾			
K1A1	500	20	5	203,2	B126	Maxi 67	V120	В	66260119409			
K1A1	750	20	5	305	B126	Maxi 67	V120	А	66260119425 1)			
K1A1	800	30	5	305	B126	Maxi 67	V120	А	662601194261)			

¹⁾ Delivery time 5 - 6 weeks ²⁾ Available while stocks last



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Diamond and cBN grinding tools for ID grinding

Many different materials are machined by ID grinding. The bond type of the grinding pin must be chosen according to the material.

Vitrified bonds:

High resistance to wear and temperature, dressable, especially suited for hardened steels

Resin bonds:

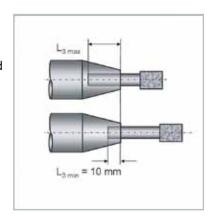
Universally suitable for dry and wet grinding, especially for tungsten carbide and HSS

Sintered metal bonds:

Extremely wear resistant with stable edge holding; well suited for short-chipping materials such as glass and ceramics

Electroplated metal bonds:

Single layer, high removal rates, surface roughness depending on grit size and condition of wear, especially suited for roughing tungsten carbide, glass and HSS



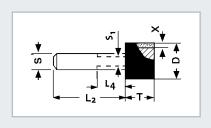
When choosing your grinding pin, please note that the diameter of the ID grinding tool should be no more than 70% of your bore. This keeps the contact area between the grinding pin and the workpiece in a comfortable range and avoids burning. When in use, grinding pins are particularly prone to bending stress which can lead to tool failure if a particular threshold value is exceeded. For this reason, the permitted speed n_{perm} of a grinding pin must not be exceeded. It is printed on the packaging label and is often engraved on the shaft of the grinding pin. The permitted speed shown there applies to a minimum clamping length of $L_{3\,\text{min}} = 10\,\text{mm}$.

Increasing the clamping length $L_{3 \min}$ will result in a new permitted speed. The ratio of increased clamping length and increase of permitted speed is not proportional but requires a recalculation of the new maximum of speed. It is imperative to observe the permitted speed at all costs.

If the permitted speed is smaller than the adjustable speed of the grinding spindle, a different technical solution is required. If you have further questions, please contact us, we are pleased to help.

Dimensioning explanation

Sample de	Sample design K1A1W-8-6-2-6-60-4.1-8 D126 K+888RY C100								
K		Manufacturing process – internal abbreviation							
Shape	1A1W	Cylindrical design							
D	8	Head diameter							
T	6	Head length							
X	2	Layer thickness							
S	6	Shaft diameter							
L ₂	60	Shaft length							
S ₁	4.1	Diameter of recess							
L ₄	8	Length of recess							
D126 K+88	38RY C100	Specification sample of resin bond grinding pin							

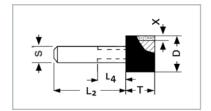


All dimensions in mm

D arindina- vitrified bonds

Vitrified bonded grinding tools

Grinding pins and grinding wheels with vitrified bonds are used in wet grinding. Over and above the tried and tested WINTER VSS cBN vitrified bond systems, the N7 bond range which is well-known for OD grinding, has recently produced outstanding ID grinding results. Due to their high porosity, these innovative glass-ceramic systems permit cool grinding and a long tool life at the same time. They are also available now as mini grinding tools with 'N7 bore'.



Design matrix

C75-C200 V180-V480	Diamet	Diameter D												
Layer thickness T	3	4	5	6	7	8	10	12	14	15	16	18	24	
3	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	
	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	
4	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	
	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	
5	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	
	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	
6	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	
	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	
8	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	Dia/	
	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	cBN	
10	-	Dia/ cBN												
12	-	Dia/ cBN												
16	-	-	Dia/ cBN											

Shaft materials:

Steel All applications
Tungsten carbide Dimensions on request

Minimum order quantity for manufacture of non-stock items: 5 pieces per item Special geometries on request

WINTER

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Grinding pins / Grinding wheels - summary and recommendations for use

Bond type	Vitrified bond					
Abrasive	cBN (diamond on request)					
Bond designation	Vitrified					
Features	Extremely high grit retention; protection against abrasion; very good profiling characteristics, highly porous, thus good transport for the cooling lubricant into and chip removal from the contact zone					
Application areas	Predominantly hardened chrome steels, HSS and tool steels					
Recommended use						
Grinding wheel shape	1A1W grinding pins and 1A8 grinding wheels					
Grit size d _k	B15 - B126					
Bond	"N7 Bore" (glass ceramic system); VSS (cBN ceramic)					
Circumferential speed v _c	40–80 m/s, please observe n _{perm}					
Table feed rate v _f	0.12 m/min					
Workpiece speed n _w	1001000 min ⁻¹					
Infeed $a_{_{\rm e}}$	0.0020.020 mm					
Coolant	Oil and emulsion					

Important notes when using grinding pins (see also page 124)

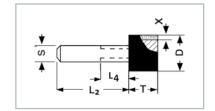
1A1W Grin	1A1W Grinding pins in vitrified bond										
Shape	D	T	Clamping length $L_{3 min}$	n _{perm} (1/min)	Clamping length $L_{3 \text{ max}}$	n _{perm} (1/min)					
1A1W	3.0	6.0	10.0	16,000	52.0	139,000					
1A1W	4.0	6.0	10.0	16,000	52.0	137,000					
1A1W	5.0	6.0	10.0	16,000	52.0	144,000					
1A1W	6.0	6.0	10.0	32,000	52.0	150,000					
1A1W	6.0	8.0	10.0	32,000	50.0	150,000					
1A1W	7.0	6.0	10.0	32,000	52.0	136,000					
1A1W	7.0	8.0	10.0	31,000	50.0	136,000					
1A1W	8.0	6.0	10.0	32,000	52.0	120,000					
1A1W	8.0	10.0	10.0	30,000	48.0	120,000					
1A1W	9.0	6.0	10.0	31,000	48.0	106,000					
1A1W	10.0	6.0	10.0	30,000	52.0	96,000					
1A1W	10.0	10.0	10.0	27,000	48.0	96,000					
1A1W	12.0	6.0	10.0	29,000	52.0	80,000					
1A1W	12.0	12.0	10.0	25,000	46.0	80,000					
1A1W	14.0	6.0	10.0	28,000	52.0	68,000					
1A1W	15.0	6.0	10.0	27,000	52.0	64,000					
1A1W	15.0	15.0	10.0	20,000	43.0	64,000					
1A1W	16.0	6.0	10.0	27,000	52.0	60,000					
1A1W	18.0	6.0	10.0	25,000	52.0	53,000					
1A1W	20.0	6.0	10.0	24,000	52.0	48,000					
1A1W	24.0	6.0	10.0	22,000	52.0	40,000					

 $\rm n_{\rm perm}$ (rpm) according to clamping length $\rm L_{\rm _3}$

All dimensions in mm

arinding - vitrified bonds

WINTER



1A1W Delivery programme

cBN grindin	cBN grinding pins											
Shape	D	Т	x	S	L ₂	L ₄	Fine (B64)	Medium (B91)	Rough (B126)			
VG1A1W	5	6	1,5	3	60	8	66260398856	66260397474	66260392338			
VG1A1W	6	6	1,5	6	60	8	66260391458	66260397676	66260392340			
VG1A1W	7	6	2	6	60	8	66260398560	66260388279	66260399742			
VG1A1W	8	6	2	6	60	8	66260394162	66260394381	66260398844			
VG1A1W	9	10	2	6	60	12	66260397564	66260390983	66260391946			
VG1A1W	10	10	2	6	60		66260398666	66260392785	66260392048			
VG1A1W	11	10	2	6	60		66260396167	66260392086	66260387849			
VG1A1W	12	10	2	6	60		69014161068	66260395187	66260391750			
VG1A1W	13	10	2	6	60		66260393169	66260397188	66260396651			
VG1A1W	14	10	2	6	60		66260397570	66260395789	66260399052			
VG1A1W	15	10	3	6	60		69014163671	66260396690	66260396253			

Delivery time 5 weeks Minimum delivery 5 pieces per item

D H

1A8 Delivery programme

cBN grinding	cBN grinding wheels										
Shape	D	T	X	Н	Fine (B64)	Medium (B91)	Rough (B126)				
VG1A8	10	10	2.5	5	66260394977	66260396154	66260393099				
VG1A8	10	14	2.5	5	66260388678	69014159655	66260389500				
VG1A8	11	10	2.5	6	66260388179	69014158156	69014162201				
VG1A8	11	14	2.5	6	66260393580	66260395957	69014162502				
VG1A8	12	10	3	6	66260397982	66260391958	66260397203				
VG1A8	12	15	2	8	66260396791	66260399966	69014163811				
VG1A8	13	10	3.5	6	69014158584	66260396259	69014161804				
VG1A8	13	15	3.5	6	66260392385	69014157860	66260388105				
VG1A8	15	10	4.5	6	66260391986	69014161961	66260392006				
VG1A8	15	15	4.5	6	66260395087	66260394662	69014170907				
VG1A8	18	10	5	8	69014170892	66260397567	66260393912				
VG1A8	18	15	5	8	66260398493	69014163168	66260397713				
VG1A8	20	10	7	6	66260397088	69014158063	69014167508				
VG1A8	20	15	7	6	66260395689	66260398864	69014158009				

All dimensions in mm

WINTER Facts

> Shank tools

> > Saws

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PCD

Knives

Milling cutters

Mould and die

D K

1A8 Delivery programme

cBN grinding	g wheels						
Shape	D	T	X	Н	Fine (B64)	Medium (B91)	Rough (B126)
VG1A8	20	20	7	6	66260396590	66260394465	66260397310
VG1A8	22	10	6	10	66260393995	66260394469	66260393414
VG1A8	22	15	6	10	69014158496	66260398870	66260393415
VG1A8	22	20	6	10	66260386897	69014165871	66260399016
VG1A8	24	10	7	10	66260392798	66260394272	66260394617
VG1A8	24	15	7	10	66260391599	69014160973	66260388018
VG1A8	24	20	7	10	66260388800	66260397874	66260399819
VG1A8	25	10	7.5	10	66260395803	66260399076	66260397621
VG1A8	25	15	7.5	10	69014159404	66260396477	66260392422
VG1A8	25	20	7.5	10	69014160101	69014162775	69014162620
VG1A8	27	18	8.5	10	66260387505	66260389478	69014158723
VG1A8	27	24	8.5	10	66260391606	66260389179	66260395124
VG1A8	28	19	9	10	69014167707	66260394180	66260399125
VG1A8	30	15	10	10	69014164708	66260395081	69014158026
VG1A8	30	20	10	10	66260396010	66260391583	66260391728
VG1A8	30	25	10	10	66260398109	66260399382	69014160727
VG1A8	32	15	11	10	69014161611	69014160784	66260386429
VG1A8	32	20	11	10	66260392312	66260393285	66260399630
VG1A8	32	25	11	10	66260396513	66260392286	69014162531
VG1A8	35	15	12.5	10	66260392314	66260396987	69014169332
VG1A8	35	20	12.5	10	66260393015	66260399488	69014167833
VG1A8	35	25	12.5	10	66260397416	66260397189	69014158134
VG1A8	37	15	12	13	66260394217	66260397990	66260398735
VG1A8	37	20	12	13	66260387318	66260398291	66260392838
VG1A8	37	25	12	13	66260397619	69014174592	66260388739
VG1A8	40	15	13.5	13	69014159520	69014158293	66260392840
VG1A8	40	20	13.5	13	66260396621	66260391194	69014158641
VG1A8	40	25	13.5	13	66260391722	66260394395	66260399842
VG1A8	45	15	16	13	66260399723	69014160796	69014158343
VG1A8	45	20	16	13	66260394724	66260387297	66260398944
VG1A8	45	25	16	13	66260397525	66260393298	66260395145

Delivery time 5 weeks

 \emptyset < 25 mm minimum delivery 5 pieces per item

 $\emptyset \ge 25$ mm minimum delivery 2 pieces per item

Mould and die

Inserts

PCD PCBN

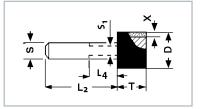
Knives

Milling cutters

) arindina - resin bonds

Resin bonded grinding tools

Resin bonded grinding pins and grinding wheels are used for dry and wet grinding and for manual and automatic grinding as this type of bond can easily be adapted to the required application parameters. As a result of extensive research and development, the characteristics of phenolic or polyimide resins have led to standard bonds which are used in over 50% of all manufactured grinding tools, including both diamond and cBN tools.



Design matrix

C75-C150 V120-V240	Diamet	Diameter D												
Layer thickness T	3	4	5	6	7	8	10	12	14	15	16	18	24	
2	Dia/ cBN													
3	Dia/ cBN													
4	Dia/ cBN													
5	Dia/ cBN													
6	Dia/ cBN													
8	-	Dia/ cBN												
10	-	Dia/ cBN												
12	-	-	Dia/ cBN											
16	-	-	-	-	-	-	Dia/ cBN							

Shaft materials:

Steel All applications
Tungsten carbide Dimensions on i

Tungsten carbide Dimensions on request Dimensions on request

Minimum order quantity for manufacture of non-stock items: 5 pieces per item Special geometries on request

WINTER

Shank

Saws

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PCD

Knives

Milling cutters

Mould and die

Shank tools

Grinding pins / Grinding wheels – summary and recommendations for use

Bond type	Resin bond				
Abrasive	Diamond	cBN			
Bond designation	K+888RY for grinding pins 1A1W K+888RY for grinding wheels 1A1	KSSRY for grinding pins 1A1W KSSRY for grinding wheels 1A1			
Features	Consistently good material removal rate, good service life, cool and soft grinding behaviour, roughness depth according to grit size and conditions of use. Wet and dry grinding	Consistently good material removal rate, good service life, cool and soft grinding behaviour, roughness depth according to grit size and conditions of use. Wet and dry grinding			
Application areas	Tungsten carbide For carbide-tipped saw blades, drawing dies and other mould and die manufacturing. On ID and coordinate grinding machines.	HSS and hardened chrome steels: Case-hardened steels with bore diameters up to 20 mm. On ID and coordinate grinding machines.			
Recommended use					
Shape (Order Number)	1A1W grinding pins and 1A1 grinding wheels	1A1W grinding pins und 1A1 grinding wheels			
Grit size d _k	D7 - D15C - D46 - D64 - D76 - D91 - D126	B91 - B126 - B151			
Bonds	K+ and KS Bonds	KSS Bonds			
Concentration	C50 to C150	V120 to V240			
Circumferential speed v _c	1525 m/s wet 1020 m/s dry	30 m/s wet Please observe n _{perm}			
Table feed rate v _f	0.55 m/min	0.55 m/min			
Workpiece speed rate $\rm n_{_{\rm w}}$	1001000 min ⁻¹	1001000 min ⁻¹			
Feed rate s (= $v_f \cdot 10^3 : n_w$)	1 to 5 mm	1 to 5 mm			
Infeed a _e	25% of d _k	25% of d _k			
Coolant	Oil and emulsion	Oil and emulsion			

Selection assistant for WINTER bond systems

Diamond grinding wheels	Wear resistance	Recommendations for use					
KS449		More wear-resistant resin bond preferably wet grinding					
K+920	A	Nore wear-resistant resin bond preferably also dry grinding					
K+921		More wear-resistant resin bond preferably wet grinding					
K+888TY		Universal resin bond for wet grinding					
K+888RY		Universal resin bond for wet grinding					
K+1410		Free-grinding resin bond for dry grinding					
K+777R		Universal resin bond for fine grit applications					
cBN grinding wheels	Wear resistance	Recommendations for use					
KSSRY	A	Universal resin bond for wet grinding					
KSS10N		Universal resin bond for tool arinding					

WINTER Facts

Shank tools

Knives

Milling cutters

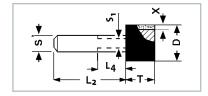
Service Glossary Contact



Important notes when using grinding pins (see also page 124)

1A1W grin	1A1W grinding pins in resin bond											
Shape	D	Т	Clamping length $L_{3 min}$	n _{perm} (1/min)	Clamping length $L_{3 \text{ max}}$	n _{perm} (1/min)						
1A1W	3.0	6.0	10.0	16,000	52.0	139,000						
1A1W	4.0	6.0	10.0	16,000	52.0	137,000						
1A1W	5.0	6.0	10.0	16,000	52.0	144,000						
1A1W	6.0	6.0	10.0	32,000	52.0	150,000						
1A1W	6.0	8.0	10.0	32,000	50.0	150,000						
1A1W	7.0	6.0	10.0	32,000	52.0	136,000						
1A1W	7.0	8.0	10.0	31,000	50.0	136,000						
1A1W	8.0	6.0	10.0	32,000	52.0	120,000						
1A1W	8.0	10.0	10.0	30,000	48.0	120,000						
1A1W	9.0	6.0	10.0	31,000	48.0	106,000						
1A1W	10.0	6.0	10.0	30,000	52.0	96,000						
1A1W	10.0	10.0	10.0	27,000	48.0	96,000						
1A1W	12.0	6.0	10.0	29,000	52.0	80,000						
1A1W	12.0	12.0	10.0	25,000	46.0	80,000						
1A1W	14.0	6.0	10.0	28,000	52.0	68,000						
1A1W	15.0	6.0	10.0	27,000	52.0	64,000						
1A1W	15.0	15.0	10.0	20,000	43.0	64,000						
1A1W	16.0	6.0	10.0	27,000	52.0	60,000						
1A1W	18.0	6.0	10.0	25,000	52.0	53,000						
1A1W	20.0	6.0	10.0	24,000	52.0	48,000						
1A1W	24.0	6.0	10.0	22,000	52.0	40,000						

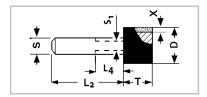
 $\rm n_{\rm perm}$ (rpm) according to clamping length $\rm L_{\rm _3}$



1A1W Stock programme

Diamond g	Diamond grinding pins										
Shape	D	T	x	S	L ₂	S ₁	L ₄	Grit size	Bond	Concen- tration	Order number
KIAIW	3	6	0.65	3	60	1.7	8	D15C	K+888RY	C100	60157643985
								D46	K+888RY	C100	60157643693
								D64	K+888RY	C100	60157644200
								D91	K+888RY	C100	66260110217
								D126	K+888RY	C100	66260133993
KIAIW	4	6	1.15	3	60	1.7	8	D15C	K+888RY	C100	66260100083
								D46	K+888RY	C100	60157644166
								D64	K+888RY	C100	60157643874
								D91	K+888RY	C100	60157643582
								D126	K+888RY	C100	66260133998
5K1A1W	5	3	1.5	6	42	3.5	10	D76	K+921	C125	60157643650

All dimensions in mm



1A1W Stock programme

Diamond grinding pins											
Shape	D	Т	x	S	L ₂	S ₁	L ₄	Grit size	Bond	Concen- tration	Order number
KIAIW	5	6	1.5	3	60	2.1	8	D7	K+777R	C100	60157644191
								D15C	K+888RY	C100	60157643428
								D46	K+888RY	C100	66260110138
								D64	K+888RY	C100	60157643946
								D91	K+888RY	C100	66260134002 2)
								D126	K+888RY	C100	66260134003
3K1A1W	6	3	1.5	6	42	5.1	10	D76	K+921	C125	66260111416 1)
KIAIW	6	6	1.5	6	60	3	8	D15C	K+888RY	C100	66260100095
								D46	K+888RY	C100	60157643902
								D64	K+888RY	C100	66260134007
								D91	K+888RY	C100	66260110235
KIAIW	6	6	1.5	6	60	3.1	8	D64	K+888RY	C125	66260134006
								D126	K+888RY	C100	66260134009
KIAIW	6	8	1.5	6	60	3	8	D46	K+888RY	C100	60157643976
8K1A1W	6	8	1.5	6	75	3.1	10	D7	K+777R	C68	66260100311 2)
								D15C	K+888RY	C100	60157643224
								D46	K+888RY	C100	60157644144
8K1A1W	6.5	3	1.75	6	33	4.1	10	D76	K+921	C125	66260134445 1)
2K1A1W	6.5	3	1.75	6	42	3.1	10	D76	K+921	C125	66260134718 1)
								D91	K+888TY	C150	60157643974 1)
6K1A1W	6,5	3	1,75	6	42	4,1	10	D76	K+888RY	C125	66260111088
								D76	K+921	C125	66260368674
1K1A1W	6.5	3	1.75	6	42	5.1	10	D76	K+920	C125	66260110241 1)
								D76	K+921	C125	66260133964 1)
1K1A1W	6.5	3	2	6	42	4.5	10	D76	KS449	C125	66260341274
1K1A1W	6.5	6	1.75	6	60	3.1	8	D76	K+888RY	C100	66260113144
2K1A1W	7	3	2	6	42	5,1	10	D20B	K+921	C125	66260347880 ¹⁾
								D76	K+921	C125	66260133966 1)
								D91	K+888TY	C150	60157643957 1)
								D91	K+920	C125	60157644164 ¹⁾
								D91	K+921	C125	60157643351 1)

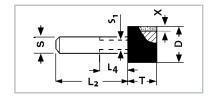
Mould and die Service Glossary Contact

PCD PCBN

Knives

Milling cutters

WINTER



1A1W Stock programme

Diamond g	rinding	pins									
Shape	D	T	x	S	L ₂	S	L ₄	Grit size	Bond	Concen- tration	Order number
K1A1W	7	6	2	6	60	3.1	8	D64	K+888RY	C100	66260134014
								D64	K+888RY	C125	60157644032
								D91	K+888TY	C150	66260134654
KIAIW	7	8	2	6	60	3	10	D46	K+888RY	C100	60157643998
KIAIW	8	6	2	6	60	4.1	8	D15C	K+888RY	C100	60157643754
								D46	K+888RY	C100	60157643962
								D64	K+888RY	C100	60157644087
								D64	K+888RY	C125	66260134020
								D91	K+888RY	C100	66260134022
								D126	K+888RY	C100	66260134023
KIAIW	8	10	2	6	60	4.1	12	D15C	K+888RY	C100	60157644127
								D46	K+888RY	C100	66260134026
								D126	K+888RY	C100	66260134028
18K1A1W	8	10	2	6	75	4.1	12	D46	K+888RY	C100	66260100352
KIAIW	10	6	2	6	60			D46	K+888RY	C100	66260100065
								D64	K+888RY	C100	60157643781
								D64	K+888RY	C125	60157643973
								D91	K+888RY	C100	60157644098
								D126	K+888RY	C100	66260134036
KIAIW	10	10	2	6	60			D15C	K+888RY	C100	66260110355
								D46	K+888RY	C100	66260134038
								D126	K+888RY	C100	66260134040
22K1A1W	10	10	2	6	75			D7	K+777R	C68	60157643977 2)
								D15C	K+888RY	C100	66260110521
								D46	K+888RY	C100	60157644085
KIAIW	12	6	2	6	60			D46	K+888RY	C100	60157644002
								D64	K+888RY	C100	60157643710
								D64	K+888RY	C125	66260134081
								D91	K+888RY	C100	66260100327
								D126	K+888RY	C100	66260134045
KIAIW	12	12	2	6	60			D126	K+888RY	C100	66260100092

 $^{^{1)}}$ Layer chamfer angle $V^{\circ} = 2^{\circ}50'$

All dimensions in mm

Shank tools

Saws

serts

PCD PCBN

Knives

Milling cutters

Mould and die

²⁾ Available while stocks last

Knives

Milling cutters

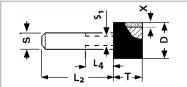
Mould and die

Service Glossary Contact

K1A1W

14

6



1A1W Stock programme

Diamond g	grinding	pins									
Shape	D	Т	x	S	L ₂	S ₁	L ₄	Grit size	Bond	Concen- tration	Order number
20K1A1W	12	12	2	6	70			D15C	K+888RY	C100	66260110836
(IAIW	14	6	2	6	60			D64	K+888RY	C100	60157644132 ²
								D126	K+888RY	C100	66260114956
KIAIW	15	6	2	6	60			D126	K+888RY	C100	66260134054
(IAIW	16	6	2	6	60			D46	K+888RY	C100	66260110126
								D64	K+888RY	C100	60157643934
								D126	K+888RY	C100	66260134059
CIAIW	18	6	2	6	60			D126	K+888RY	C100	66260127657
<1A1W	24	6	2	6	60			D126	K+888RY	C100	66260112903
:BN grindi	ng pins										
Shape	D	T	x	S	L ₂	S ₁	L ₄	Grit size	Bond	Concen- tration	Order number
<1A1W	3	6	0.65	3	60	1.8	8	B126	KSSRY	V240	66260134724
(1A1W	4	6	1.15	3	60	1.8	8	B91	KSSRY	V240	66260134738
								B126	KSSRY	V240	66260134735
								B151	KSSRY	V240	66260134733
KIAIW	5	6	1.5	3	60	2.1	8	B91	KSSRY	V240	66260134750
								B126	KSSRY	V240	66260134743
KIAIW	6	6	1.5	6	60	3.1	8	B91	KSSRY	V240	66260133970
								B126	KSSRY	V240	66260133969
								B151	KSSRY	V240	60157643991 ²
(IAIW	6	8	1.5	6	60	3	10	B126	KSSRY	V240	66260134754
<1A1W	7	6	2	6	60	3	8	B126	KSSRY	V240	66260133906
<1A1W	8	6	2	6	60	4	8	B91	KSSRY	V240	66260134097
								B126	KSSRY	V240	66260133918
								B151	KSSRY	V240	60157643512
<1A1W	8	10	2	6	60	4	12	B126	KSSRY	V240	66260133924
(IAIW	10	6	2	6	60			B91	KSSRY	V240	66260134124
								B126	KSSRY	V240	66260133971
CIAIW	10	10	2	6	60			B126	KSSRY	V240	66260133936
CIAIW	12	6	2	6	60			B126	KSSRY	V240	60157643978
K1A1W	12	12	2	6	60			B126	KSSRY	V240	66260133954

B126

KSSRY

V240

All dimensions in mm

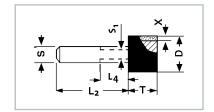
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WINTER



1A1W Stock programme

cBN grindin	cBN grinding pins										
Shape	D	T	x	S	L ₂	S ₁	L ₄	Grit size	Bond	Concen- tration	Order number
KIAIW	15	6	2	6	60			B126	KSSRY	V240	66260133963
KIAIW	16	6	2	6	60			B126	KSSRY	V240	60157644185
KIAIW	18	6	2	6	60			B126	KSSRY	V240	66260100280
KIAIW	20	6	2	6	60			B126	KSSRY	V240	60157644104

Z i

1A1/14A1 Stock programme

Diamond g	Diamond grinding wheels											
Shape	D	T	x	Н	Grit size	Bond	Concen- tration	Order number				
K14A1	40	2	5	10	D15C	K+888R	C125	66260132228 2)				

cBN grindir	cBN grinding wheels										
Shape	D	T	x	Н	Grit size	Bond	Concen- tration	Order number			
K1A1	10	10	2	4	B126	KSSRY	V180	66260136508			
K1A1	12	10	2	6	B126	KSSRY	V180	66260135986			
K1A1	15	10	2	6	B126	KSSRY	V180	66260135985			
K1A1	18	10	2	6	B126	KSSRY	V180	66260136448			
K1A1	20	10	2	8	B126	KSSRY	V180	66260136444			
KIAI	20	15	2	8	B126	KSSRY	V180	66260135984			
K1A1	25	10	2	8	B126	KSSRY	V180	66260134811			
K1A1	25	15	2	8	B126	KSSRY	V180	66260134883			
KIAI	30	10	2	10	B126	KSSRY	V180	66260136445			
KIAI	30	15	2	10	B126	KSSRY	V180	66260135983			
KIAI	50	10	2	20	B126	KSSRY	V180	66260134895			

²⁾ Available while stocks last

WINTER Facts

Shank

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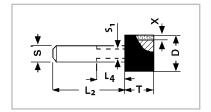
Knives

Milling cutters

Mould and die

Metal bonded grinding tools

Metal bonded grinding pins are distinguished by a high level of profile retention and shock resistance. In addition, they conduct heat away fast, which is of particular benefit especially when sensitive materials are being machined.



Design matrix

C75-C150 V180-V300	Diamete	Diameter D									
Layer thickness T	3	4	5	6	8	10	12	15	16	20	24
3	Dia/ cBN										
4	Dia/ cBN										
5	Dia/ cBN										
6	Dia/ cBN										
8	-	-	-	Dia/ cBN							
10	-	-	-	-	Dia/ cBN						
12	-	-	-	-	-	-	Dia/ cBN	Dia/ cBN	Dia/ cBN	Dia/ cBN	Dia/ cBN
15			-	-	-	-	-	Dia/ cBN	Dia/ cBN	Dia/ cBN	Dia/ cBN

Shaft materials

Steel All dimensions

Tungsten carbide Dimensions on request Heavy metal Dimensions on request

Minimum order quantity for manufacture of non-stock items: 5 pieces per item Special geometries on request

WINTER Facts

Shank

Saws

Inserts

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Knives

Milling cutters

Mould and die



Grinding pins / Grinding wheels – summary and recommendations for use

Bond type	Sintered metal bond					
Abrasive	Diamond (cBN on request)					
Bond designation	BZ351 for grinding pins 1A1W					
Features	Long service life, good material removal rate, great edge stability, surface roughness according to grit size and conditions of use. Suitable for wet and dry grinding, preferred for wet grinding.					
Application areas	Tungsten carbide, hard short-chip materials (e.g. oxide ceramics), flat and hollow glass. On internal cylindrical and coordinate grinding machines. On high-speed manual machines.					
Recommended use						
Shape (Order number)	1A1W grinding pins					
Grit size d _k	D64 - D91 - D126 - D151					
Bond	BZ351					
Concentration	C100					
Circumferential speed $v_{\rm c}$	1520 m/s wet 1218 m/s dry					
Table feed rate $v_{\rm f}$	0,55 m/min					
Workpiece speed rate $n_{_{\!\scriptscriptstyle W}}$	30400 min ⁻¹					
Feed rate s (= $v_f \cdot 10^3 : n_w$)	1 to 10 mm					
Infeed a _e	2 to 5% of d _k					
Coolant	Emulsion Spray mist or compressed air					

Important notes when using grinding pins (see also page 124)

1A1W grindi	1A1W grinding pins in sintered metal bond									
Shape	D	Т	Clamping length $L_{3 \text{ min}}$	n _{perm} (1/min)	Clamping length $L_{3 \text{ max}}$	n _{perm} (1/min)				
1A1W	3.0	6.0	10.0	16,000	52.0	130,000				
1A1W	4.0	6.0	10.0	15,000	52.0	138,000				
1A1W	5.0	6.0	10.0	14,000	52.0	141,000				
1A1W	6.0	6.0	10.0	32,000	52.0	150,000				
1A1W	6.0	8.0	10.0	30,000	50.0	150,000				
1A1W	8.0	6.0	10.0	30,000	52.0	120,000				
1A1W	8.0	10.0	10.0	27,000	48.0	120,000				
1A1W	10.0	6.0	10.0	29,000	52.0	96,000				
1A1W	10.0	10.0	10.0	25,000	48.0	96,000				
1A1W	12.0	6.0	10.0	27,000	52.0	80,000				
1A1W	12.0	12.0	10.0	22,000	46.0	80,000				
1A1W	15.0	6.0	10.0	25,000	52.0	64,000				
1A1W	15.0	15.0	10.0	18,000	43.0	62,000				
1A1W	20.0	6.0	10.0	22,000	52.0	48,000				
1A1W	24.0	6.0	10.0	20,000	52.0	40,000				

 n_{perm} (rpm) according to clamping length L_3

WINTER Facts

> Shank tools

> > Saws

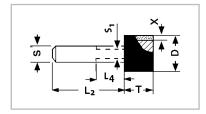
nserts

PCD PCBN

Knives

Milling cutters

Mould and die



1A1W Stock programme

Diamond grinding pins											
Shape	D	T	×	S	L ₂	S ₁	L ₄	Grit size	Bond	Concen- tration	Order number
3BZ1A1W	3	6	0.75	3	60	2.1	8	D126	BZ351	C100	66260100307
BZ1A1W	4	6	1	3	60			D91	BZ351	C100	66260100317
7BZ1A1W	4	6	1	3	60			D126	BZ351	C100	60157644115
BZ1A1W	5	6	1	3	60			D91	BZ351	C100	60157644066
								D126	BZ351	C100	60157643774
BZ1A1W	6	6	1	6	60			D126	BZ351	C100	66260100322
BZ1A1W	8	6	1	6	60			D91	BZ351	C100	60157644100 1)
BZ1A1W	10	10	1	6	60			D126	BZ351	C100	60157644096

¹⁾ Available while stocks last

WINTER Facts

Shank tools

Saws

Inserts

PCD PCBN

Knives

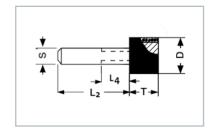
Milling cutters

Mould and die

Ogrinding - electroplated

Electroplated grinding pins

Electroplated grinding pins have three distinct advantages. Various special profiles can be manufactured to customer specifications and small head diameters from 0.4 mm are producible. Furthermore, distinct grain protrusion of diamond and cBN grits ensure high material removal rates. Apart from the extensive stock programme, various profile pins are available at short notice (see profile examples below). Please include the dimensions for D, T, S, S, R, V and $L_{\rm 2^{\prime}}$, when ordering. For spherical pin, the head length 'T' should be specified as 'O'. The front face of the head of electroplated grinding pins from 6 mm diameter and above is specially designed to reduce the contact area.

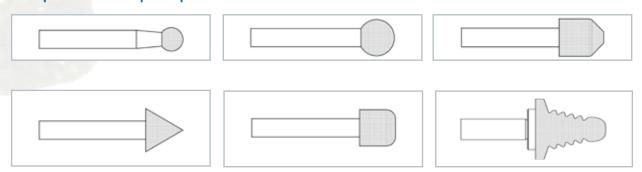


Minimum order quantity for manufacture of non-stock items: 5 pieces per item

Grinding pins / Grinding wheels - summary and recommendations for use

Bond type	Electroplated single-layer metal bond					
Abrasive	Diamond	cBN				
Bond designation	WINTER S for grinding pins 1A1W and grinding wheels 1A1	WINTER GSS for grinding pins 1A1W and grinding wheels 1A1				
Features	High material removal rate, surface roughness according to grit size and wear level, special shapes possible. Dry and wet grinding	High material removal rate, uniform surface roughness after an initial running-in period, special shapes possible. Dry and wet grinding				
Application areas	Carbide, hard short-chip materials (e.g. ceramic oxide), pre-sintered carbide. On ID and coordinate grinding machines.	HSS and high-alloyed hardened steel. On ID and coordinate grinding machines.				
Recommended use						
Shape (Order Number)	1A1W grinding pins and 1A1 grinding wheels	1A1W grinding pins und 1A1 grinding wheels				
Grit size d _k	D46 - D64 -D91 D126 - D181	B46 - B64 - B91 B126 - B151 -B252				
Bonds	G820	G825				
Concentration	S33	S33				
Circumferential speed $v_{\rm c}$	20 m/s wet15 m/s dry Please observe n _{perm}	30 m/s wet20 m/s dry Please observe n _{perm}				
Table feed rate v _f	0.55 m/min	0.55 m/min				
Workpiece speed rate n _w	1001000 min ⁻¹	1001000 min ⁻¹				
Feed rate s (= $v_f \cdot 10^3 : n_w$)	1 to 5 mm	1 to 5 mm				
Infeed a _e	20% of d _k	20% of d _k				
Coolant	Dry, emulsion or oil	Dry, emulsion or oil				

Examples of common profile pins



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Shank tools

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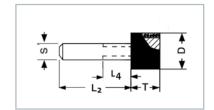
Important notes when using grinding pins (see also page 124)

hape	D	T	Clamping length $L_{3 min}$	n _{perm} (1/min)	Clamping length $L_{3 \text{ max}}$	n _{perm} (1/min)
1A1W	0.5	2.0	10.0	12,000	33.0	27,000
SIAIW	0.6	2.0	10.0	18,000	33.0	41,000
SIAIW	0.6	4.0	10.0	18,000	33.0	45,000
SIAIW	0.7	2.0	10.0	23,000	33.0	57,000
SIAIW	0.7	4.0	10.0	24,000	33.0	62,000
SIAIW	0.8	2.0	10.0	24,000	31.0	50,000
SIAIW	0.8	4.0	10.0	30,000	31.0	70,000
SIAIW	0.9	2.0	10.0	30,000	31.0	66,000
SIAIW	0.9	4.0	10.0	30,000	31.0	70,000
SIAIW	1.0	2.0	10.0	35,000	31.0	82,000
SIAIW	1.0	4.0	10.0	36,000	31.0	88,000
S1A1W	1.1	4.0	10.0	42,000	28.0	91,000
S1A1W	1.2	4.0	10.0	45,000	28.0	106,000
S1A1W	1.3	4.0	10.0	48,000	28.0	120,000
S1A1W	1.4	4.0	10.0	50,000	28.0	134,000
S1A1W	1.5	4.0	10.0	50,000	28.0	134,000
SIAIW	1.6	4.0	10.0	52,000	28.0	147,000
S1A1W	1.7	4.0	10.0	53,000	28.0	150,000
S1A1W	1.8	4.0	10.0	54,000	28.0	150,000
SIAIW	1.9	4.0	10.0	54,000	28.0	150,000
SIAIW	2.0	4.0	10.0	57,000	24.0	138,000
S1A1W	2.2	4.0	10.0	57,000	24.0	143,000
S1A1W	2.4	4.0	10.0	56,000	24.0	145,000
S1A1W	2.5	4.0	10.0	56,000	24.0	146,000
S1A1W	2.6	4.0	10.0	55,000	24.0	146,000
S1A1W	2.8	4.0	10.0	54,000	24.0	145,000
S1A1W	3.0	5.0	10.0	55,000	20.0	106,000
S1A1W	3.5	5.0	10.0	51,000	20.0	96,000
S1A1W	4.0	5.0	10.0	29,000	35.0	132,000
S1A1W	4.5	5.0	10.0	28,000	30.0	83,000
S1A1W	5.0	7.0	10.0	28,000	40.0	85,000
S1A1W	6.0	7.0	10.0	39,000	40.0	150,000
S1A1W	7.0	8.0	10.0	39,000	40.0	136,000
S1A1W	8.0	10.0	10.0	38,000	40.0	120,000
S1A1W	10.0	10.0	10.0	36,000	40.0	96,000
S1A1W	12.0	10.0	10.0	33,000	40.0	80,000
SIAIW	15.0	10.0	10.0	30,000	40.0	64,000

 $\rm n_{\rm perm}$ (rpm) according to clamping length $\rm L_{\rm _3}$

All dimensions in mm

WINTER



1A1W Stock programme

Diamond grinding pins										
Shape	D	т	S	L ₂	L ₄	Grit size	Bond	Concen- tration	Order number	
SIAIW	0.5	2	3	38	5	D91	G820	S33	60157644111	
SIAIW	0.6	4	3	36	3	D91	G820	S33	66260110736	
SIAIW	0.7	4	3	36	3	D91	G820	S33	60157644152	
SIAIW	0.8	2	3	38	7	D91	G820	S33	60157643877	
SIAIW	0.8	4	3	36	5	D91	G820	S33	60157643493	
SIAIW	1	4	3	36	5	D91	G820	S33	66260134647	
						D126	G820	S33	60157643706	
SIAIW	1.2	4	3	36	8	D91	G820	S33	60157643847	
						D126	G820	S33	60157643955	
SIAIW	1.3	4	3	36	8	D126	G820	S33	60157643988 1)	
SIAIW	1.5	4	3	36	8	D91	G820	S33	66260134656	
						D126	G820	S33	60157643944	
SIAIW	2	4	3	36	12	D46	G820	S33	60157643916	
						D91	G820	S33	66260134665	
						D126	G820	S33	66260134666	
						D181	G820	S33	60157643806	
SIAIW	2.2	4	3	36	12	D91	G820	S33	66260134668	
SIAIW	2.5	4	3	36	12	D91	G820	S33	66260134670	
						D126	G820	S33	66260134671	
SIAIW	3	5	3	35	15	D91	G820	S33	66260134675	
						D126	G820	S33	66260134676	
						D181	G820	S33	60157643785	
SIAIW	3.5	5	3	35		D91	G820	S33	66260134678	
						D126	G820	S33	66260134679	
SIAIW	4	5	3	45		D91	G820	S33	66260134681	
						D126	G820	S33	66260134682	
						D181	G820	S33	66260100058	
SIAIW	4	6	3	50		D91	G820	S33	66260110226	
SIAIW	4.5	5	3	45		D126	G820	S33	60157643674	
SIAIW	4.5	6	3	50		D91	G820	S33	66260110137	
SIAIW	5	6	3	50		D91	G820	S33	66260100334	

¹⁾ Available while stocks last

All dimensions in mm

WINTER Facts

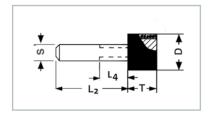
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PCD PCBN

Knives

Milling cutters

Mould and die



1A1W Stock programme

Diamond grinding pins										
Shape	D	Т	S	L ₂	L ₄	Grit size	Bond	Concen- tration	Order number	
S1A1W	5	7	3	43		D91	G820	S33	66260134687	
						D126	G820	S33	66260134688	
						D181	G820	S33	60157644114	
SIAIW	6	7	6	53	13	D91	G820	S33	66260134690	
						D126	G820	S33	66260134691	
						D181	G820	S33	66260134692	
SIAIW	6	7	6	75		D91	G820	S33	60157643963	
SIAIW	7	8	6	52		D91	G820	S33	66260134693	
						D126	G820	S33	66260134694	
						D181	G820	S33	60157643771	
SIAIW	8	10	6	50		D91	G820	S33	66260134696	
						D126	G820	S33	66260134697	
						D181	G820	S33	66260134698	
SIAIW	8	10	6	75		D91	G820	S33	66260110242	
						D181	G820	S33	66260110167	
SIAIW	10	10	6	50		D91	G820	S33	66260134699	
						D126	G820	S33	66260134700	
						D181	G820	S33	66260134701	
SIAIW	10	10	6	75		D91	G820	S33	60157644175	
						D181	G820	S33	60157644083	
SIAIW	12	10	6	50		D91	G820	S33	66260134702	
						D126	G820	S33	66260134703	
SIAIW	12	10	6	75		D91	G820	S33	60157643803	
						D181	G820	S33	60157644091	
SIAIW	15	10	6	50		D126	G820	S33	60157643885	

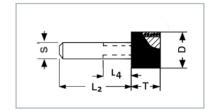
Milling cutters

PCD PCBN

Knives

Mould and die

WINTER



1A1W Stock programme

cBN grinding pins										
Shape	D	т	S	L ₂	L ₄	Grit size	Bond	Concen- tration	Order number	
SIAIW	0.5	2	3	38	5	B91	G825	S33	66260110140	
SIAIW	0.6	2	3	38	5	B91	G825	S33	60157644065	
SIAIW	0.6	4	3	36	3	B91	G825	S33	66260134726	
SIAIW	0.7	2	3	38	5	B91	G825	S33	60157643505	
SIAIW	0.7	4	3	36	3	B91	G825	S33	66260100338	
SIAIW	0.8	2	3	38	7	B91	G825	S33	60157643862	
SIAIW	0.8	4	3	36	5	B91	G825	S33	633 66260134726 633 60157643505 633 66260100338 633 66260134734 633 66260100335 633 66260134741 633 66260134744 633 66260134742 633 66260134749 633 66260134749 633 66260134751 633 66260134751 633 66260134751 633 66260134749 633 66260134749 633 66260134757 633 6626010421 633 66260134757 633 66260134757 633 66260134757 633 66260134757 633 66260134757 633 66260134757 633 66260134757 633 66260134757 633 66260134757 633 66260134757	
						B126	G825	S33	60157643870	
SIAIW	0.9	4	3	36	5	B126	G825	S33	66260100335	
SIAIW	V 1	2	3	38	7	B91	G825	S33	66260134741	
						B126	G825	S33	66260134739	
SIAIW	1	4	3	36	5	B91	G825	S33	66260134744	
						B126	G825	S33	66260134742	
SIAIW	1.2	4	3	36	8	B91	G825	S33	66260134751	
						B126	G825	S33	66260134749	
SIAIW	1.3	4	3	36	8	B91	G825	S33	66260110421	
SIAIW	1.4	4	3	36	8	B126	G825	S33	66260101138	
SIAIW	1.5	4	3	36	8	B91	G825	S33	66260134757	
						B126	G825	S33	66260134755	
SIAIW	1.6	4	3	36	8	B91	G825	S33	66260110135	
SIAIW	1.7	4	3	36	8	B126	G825	S33	60157643451	
SIAIW	1.8	4	3	36	8	B91	G825	S33	60157643816	
						B126	G825	S33	60157643992	
SIAIW	2	4	3	36	12	B91	G825	S33	66260133913	
						B126	G825	S33	66260133911	
						B151	G825	S33	60157644057	
SIAIW	2.5	4	3	36	12	B91	G825	S33	66260133920	
						B126	G825	S33	66260133919	
SIAIW	2.8	4	3	36	12	B91	G825	S33	60157643883	
						B126	G825	S33	66260107667	
SIAIW	3	5	3	35	15	B91	G825	S33	66260133929	
						B126	G825	S33	66260133927	
						B151	G825	S33	66260133926	

WINTER Facts

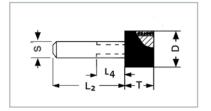
PCD PCBN

Knives

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1A1W Stock programme

	cBN grinding pins											
	Shape	D	T	S	L ₂	L ₄	Grit size	Bond	Concen- tration	Order number		
	S1A1W 3.5	5	3	35		B91	G825	S33	60157643964			
							B126	G825	S33	66260133931		
							B151	G825	S33	66260133930		
	S1A1W	4	5	3	45		B91	G825	S33	66260133937		
							B126	G825	S33	66260133935		
							B151	G825	S33	60157643772		
	SIAIW	4.5	5	3	45		B126	G825	S33	66260133939		
	SIAIW	5	7	3	43		B91	G825	S33	66260133944		
							B126	G825	S33	66260100061		
							B151	G825	S33	60157643453		
	SIAIW	6	7	6	53	13	B91	G825	S33	66260133947		
							B126	G825	S33	66260133946		
							B151	G825	S33	60157643694		
	SIAIW	6	7	6	68		B252	G825	S33	66260100064		
	SIAIW	6	7	6	75		B126	G825	S33	60157643703		
	SIAIW	7	8	6	52		B91	G825	S33	66260133951		
							B126	G825	S33	66260133949		
							B151	G825	S33	60157643834		
	SIAIW 8	8	10	6	50		B91	G825	S33	66260133955		
							B126	G825	S33	66260133953		
							B151	G825	S33	66260133952		
	SIAIW	8	10	6	70		B252	G825	S33	60157643793		
	SIAIW	8	10	6	75		B126	G825	S33	60157643605		
	SIAIW	10	10	6	50		B91	G825	S33	66260133958		
							B126	G825	S33	66260133957		
							B151	G825	S33	66260133956		
	SIAIW	10	10	6	75		B126	G825	S33	60157644046		
	SIAIW	12	10	6	50		B126	G825	S33	66260133960		
							B151	G825	S33	66260133959		
	SIAIW	12	10	6	75		B126	G825	S33	66260100091		
	SIAIW	15	10	6	50		B126	G825	S33	60157644004		
							B151	G825	S33	60157643797		

All dimensions in mm

WINTER Facts

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WINTER

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All dimensions in mm

Small grinding tools for coordinate grinding

Apart from the range of 1A1W grinding pins, WINTER is also offering a programme of small grinding tools with special geometries (07B grinding pin) and 11V2 grinding wheels for coordinate grinding. Specific standard solutions are available ex stock.



Application areas

Grinding die sockets and beverage can ironing rings for the packaging industry on coordinate grinding machines

Specification: 1K07B-12-5-2-6-40 *B126 KSS10N V240

Workpiece: HSS DM05, EW9Co10 Hardness: 62 – 64 HRC

Machining parameters

Cutting speed: $v_c = 30 \text{ m/s}$

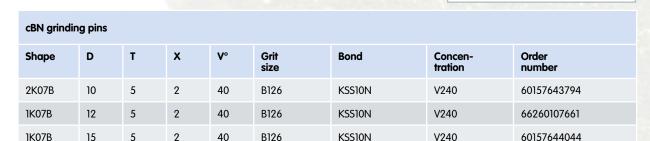
Feed rate: $v_f = 80...100 \text{ mm/min}$ Infeed: $a_e = 0.02 \text{ mm}$

Coolant: Oil or emulsion (1 to 4%)

Selection assistant for WINTER bond systems

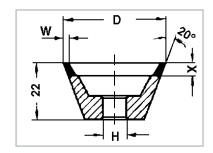
Diamond grinding tools	Wear resistance	Recommendations for use
K+888R		Universal resin bond for dry grinding
cBN grinding tools	Wear resistance	Recommendations for use
KSS12N	A	Standard resin bond for CNC applications
KSS10N	T	Universal resin bond for tool grinding

07B Stock programme



Coordinate arindina

WINTER



11V2 Stock programme

Diamond g	Diamond grinding wheels												
Shape	D	w	x	Н	Grit size	Bond	Concen- tration	Body	Order number				
2K11V2	40	2	5	10	D64	K+888R	C75	Н	60157642670				

cBN grindin	cBN grinding wheels													
Shape	D	w	X	Н	Grit size	Bond	Concen- tration	Body	Order number					
2K11V2	20	2	5	8	B126	KSS10N	V120	Н	60157643218 1)					
					B126	KSS12N	V180	Н	60157643026					
K11V2	30	2	5	8	B126	KSS12N	V180	Н	66260136462					
K11V2	40	2	5	10	B126	KSS10N	V180	Н	66260134764					

¹⁾ Delivery time 5 - 6 weeks

WINTER Facts

> Shank tools

> > Saws

....

PCD

Knives

Milling cutters

Mould and die

Diamond and cBN cut-off wheels

Diamond cutting wheels are used for efficient cutting of hard, short-chipping and wear resistant materials such as glass, ceramics and carbide. The current trend towards sintered materials has increased the use of diamond cutting wheels. They are successfully used in the food industry and medical science, due to their clean and almost residue-free cutting ability.

cBN was developed as an addition to diamond. The specific characteristics of this cutting material permit the machining of high-performance high-speed steel and hardened steel from 55 HRC as well as magnetic materials. The cutting wheels consist of a steel core with the cutting layer on the periphery. The cutting layer in sintered metal, resin or electroplated metal bond contains either diamond or cBN. The combination of bond, type of abrasive, concentration and grit size leads to



different tool characteristics which are specified to meet the requirements of different processes and applications.

European Standard EN 13236:2000 - common maximum operating speeds for cut-off wheels

					Maximum m/s accord	operating s ding to bond	peed in I type
Core		Abrasive section	Application mode	Grinding mode	Resin	Metal	Electro- plated
					В	M	G
		closed	mechanically and manually guided	wet cut-off grinding	63	80	80
		ciosed	cut-off grinding	dry cut-off grinding	-	80	80
	metal blank,		mechanically and			40 ª	50 °
	e.g. cast, rolled, forged	segmented	manually guided	wet cut-off grinding	-	80	80
Metal			cut-off grinding	dry cut-off grinding	-	63	80
		closed or segmented	manually guided cut-off grinding	wet and dry cut-off grinding	-	63 b	80
	sintered	closed	mechanically and manually guided cut-off grinding	wet cut-off grinding	F	63	-
Resin		closed	mechanically and manually guided cut-off grinding	wet and dry cut-off grinding	63	-	-

^a For difficult to machine materials, like e.g. granite, diorite, quartzite, armoured concrete

^b The abrasive section must be welded or sintered to the core for cut-off wheels for free hand cutting with metal bond abrasive sections

utting off

Application notes

1. Which materials can be cut?

As a general rule, diamond cutting wheels are used to cut hard, short-chipping materials such as glass, ceramics (fired and unfired), carbide, graphite, guartz, ferrite and semiconductor materials.

Materials with an affinity for carbon, such as iron-based alloys, are cut using cubic boron nitride (cBN). High-alloy steels such as HSS and chrome steel with 12% Cr are typical examples. Ideally, steel should have a minimum hardness of 55 HRC. Soft, long-chipping materials accumulate in the chip space, so they tend to clog. Compromises can be achieved with electroplated bonds.

2. Which cutting layer specification?

The following is indispensable for correct selection of layer specification:

- full description of workpiece material
- cutting edge quality requirements (e.g. maximum size of edge chipping)
- machining parameters, range of variants (e.g. speed from/to, feed rate from/to)
- details of drive power (see point 4)
- details of coolants

3. Which tool dimensions?

The tool dimensions are determined by the machine and the height of workpiece to be cut. Normally, the flange diameter should not fall below 1/3 of the cutting wheel diameter, i.e. the maximum workpiece height which can be sawn is less than one third of the blade diameter.

A stable cutting wheel core is essential for chip-free cutting edges. The directional stability of the blade can also be enhanced by increasing the flange diameter (diameter size required). Proportionately larger flanges are advisable for high cutting rates. A summary of the internationally approved designations for continuous-rim cutting wheels and the associated flanges has been compiled by FEPA.

4. Which machine?

Generally valid principles apply to the highest possible dynamic stability, since any oscillation during the cutting operation can have a negative effect on tool behaviour. Peripheral speed plays an important role in the adaptation of the tool to the cutting operation, and should therefore be adjustable, at least by means of a change of drive pulley.

Sufficient motor drive output is essential as an undersized motor will prevent the optimum utilization of the diamond tool. Diamond and bond must be made to work hard if the self-sharpening effect is to occur. Bonds will have greater resistance to wear and will thus be more economical if the spindle drive permits high cutting rates. Cutting wheels with diameters exceeding 300 mm should be used with a drive power of at least 1.5 kW; for ganged wheels, a further 0.5 kW should be allowed for each additional cutting wheel.

5. Which operation parameters?

In the vast majority of cases, the full material thickness is cut in a single pass at a suitably chosen feed rate. However, step cutting rather than full cutting is used for particularly dense materials such as sapphire which wears the diamond layer without simultaneously removing a corresponding amount of the bond. The smaller the ratio of depth of cut to feed rate i.e. the shallower the cut, the greater is the sharpening effect of the cutting process. Feed rate is directly dependent on the spindle drive power and the hardness or toughness of the material to be cut. A general specification of cutting rates cannot be given in view of the large number of different materials which can be cut with the different cutting wheel types. There are optimal ranges of peripheral speed, dependent on the cutting operation. In general, low peripheral speeds (20–30 m/s) are used for dense, fine-debris materials, whereas higher speeds (30–40 m/s) are used for porous, coarse-debris materials.

6. Coolant or dry cut?

Metal bonded cutting wheels are invariably used with coolant (with the exception of the electroplated S-type), resin bond closed-rim blades can also work dry. Different coolants are used for the different workpiece materials, e.g. water, mineral based oils, emulsions, synthetic oils etc. It is important for coolant flow to be sufficient and to be accurately directed to the tool/workpiece interface. The coolant is supplied via coolant nozzles, by a special flange or by emersion.

WINTER

Shank tools

Saws

serts

PCD PCBN

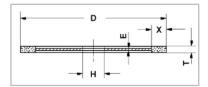
inives

Milling cutters

Mould and die

Resin bonded cut-off wheels

Resin bonded cutting wheels feature exceptionally good free-cutting characteristics due to low cutting forces and low cutting temperatures. The result is fast cutting with clean cut surfaces without edge chipping – which is particularly important for thinwalled hollow workpieces.



FEPA designation	D	T	X	E	Н	Grit size	Normal concentrations
KIAIR	100	0.6	5	0.5			
		8.0	5	0.6			
		1.0	5	8.0			
		1.2	5	1.0			
K1A1R	125	0.6	5	0.5			
		8.0	5	0.6			
		1.0	5	8.0			
		1.2	5	1.0			
K1A1R	150	0.6	7	0.5			
		8.0	7	0.6			
		1.0	7	8.0			
		1.2	7	1.0	st		
		1.5	7	1.3	ənbe	5	
K1A1R	175	8.0	7	0.6	on re	D3(
		1.0	7	8.0	ers	213,	
		1.2	7	1.0	ımet	31, D	
		1.5	7	1.3	e dio	, DI	
KIAIR	200	8.0	7	0.6	Standard bore diameter 20 mm, other bore diameters on request	The following grif sizes are available: Diamond: D46, D64, D91, D107, D126, D151, D181, D213, D301 cBN: B91, B107, B126, B151, B181	The following concentrations are available: Diamond: C38, C50, C75, C100 CBN: V120, V180, V240
	1.0 7 0.8		ther	le: 26, [vailo		
		1.2	7	0.9	, o	The following grif sizes are available: Diamond: D46, D64, D91, D107, D126, cBN: B91, B107, B126, B151, B181	ā 0
		1.5	7	1.2	E C	9107 107 118	ns a
KIAIR	250	1.0	7	0.7	er 2(s are 191, [3151,	atio
		1.2	7	0.9	met	sizes ,4, D 26, B	o, C 240
		1.4	7	1.1	dia	grif s 7, D6 7, B15	The following concentrations ar Diamond: C38, C50, C75, C100 CBN: V120, V180, V240
		1.7	7	1.4	oore	ing 9 D46 3107	ing . C38 V18
KIAIR	300	1.0	7	0.7	ard	llow ond: 1, 1	llow 7120,
		1.2	7	0.9	and	ame fo	amo S.Z.
		1.4	7	1.1	ξ	₽ 2 8	₽ ⊡ 8
		1.7	7	1.4			
KIAIR	400	1.2	7	0.9			
		1.5	7	1.2			
		1.7	7	1.4			
		1.9	7	1.6			
		2.3	7	2.0			
K1A1R	500	2.3	7	2.0			
K1A1R	550	2.3	7	2.0			

Standard tolerances

 \emptyset < 100 mm T ± 0,07

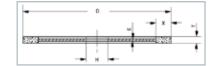
 $\emptyset \le 250 \text{ mm}$ T ± 0,10

 $\emptyset \ge 300 \text{ mm}$ T + 0,20 - 0,10



Selection assistant for WINTER bond systems

Diamond cut-off wheels	Wear resistance	Recommendations for use
K+4821	A	Special resin bond for cutting-off tungsten carbide
K+888RY		Universal resin bond
cBN cutting wheels	Wear resistance	Recommendations for use
KSSY		Universal resin bond



1A1R Stock programme

Diamon	d grind	ing whe	eels								
Shape	D	T	X	E	Н	Grit size	Bond	Concen- tration	Body	Order number	Comments
KIAIR	100	1	5	8.0	20	D151	K+888RY	C50	E	69014185139	for Ceramics
						D151	K+4821	C100	E	69014185128	for Tungsten Carbide
2K1A1R	125	0.6	5	0.6	32	D151	K+888RY	C75	E	66260387932	for Tungsten Carbide 4 × 90° Ø6 reference circle Ø90
KIAIR	125	1	5	8.0	20	D151	K+4821	C100	E	69014185129	for Tungsten Carbide
KIAIR	150	1	7	0.8	20	D151	K+4821	C100	E	69014185130	for Tungsten Carbide
11K1A1R	150	1	7	0.8	20	D151	K+4821	C100	E	66260112766	for Tungsten Carbide 3 x 120° Ø4.5 reference circle Ø33.5
KIAIR	150	1	7	0.8	32	D151	K+4821	C100	E	69014185153	for Tungsten Carbide
K1A1R	200	1.2	7	0.9	30	D151	K+4821	C100	E	69014185154	for Tungsten Carbide
KIAIR	200	1.2	7	0.9	22	D151	K+4821	C100	E	66260386423	for Tungsten Carbide
KIAIR	250	1.2	7	0.9	25	D91	K+888RY	C50	E	66260118203	for Ceramics
KIAIR	250	1,5	7	1.2	32	D126	K+4821	C38		60157692084	for Tungsten Carbide manual cut-off

cBN grin	cBN grinding wheels													
Shape	D	Т	x	E	н	Grit size	Bond	Concen- tration	Body	Order number	Comments			
K1A1R	100	1	5	0.8	20	B151	KSSRY	V180	E	66260388124	for HSS			
K1A1R	125	1	5	0.8	20	B151	KSSRY	V180	E	66260386108	for HSS			
K1A1R	150	1	7	0.8	20	B151	KSSRY	V180	E	66260385838	for HSS			

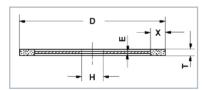
All dimensions in mm

WINTER Facts

Knives

Metal bonded cut-off wheels

These bronze bonds. developed specially for saw blades, are wear resistant and relatively insensitive to shock. They feature considerably longer life than resin bonds, yet give much greater cutting forces, higer cutting temperatures and shorter cutting times.



FEPA designation	D	Т	x	E	Н	Grit size	Normal concentrations
BZ1A1R	100	0,5	5	0,4			
		0,6	5	0,5			
		0,8	5	0,6			
		1,0	5	0,8			
		1,2	5	1,0			
		1,5	5	1,3			
BZ1A1R	100	0,6	10	0,4			
		8,0	10	0,6			
		1,0	10	0,8			
		1,2	10	1,0			
		1,5	10	1,3			
BZ1A1R	125	0,5	5	0,4			
		0,6	5	0,5			
		0,8	5	0,6			
		1,0	5	0,8			
		1,2	5	1,0			
		1,5	5	1,3			
BZ1A1R	125	0,6	10	0,4	ţ,		
		0,8	10	0,6	due		
		1,0	10	0,8	n re		
		1,2	10	1,0	ers o	301	
		1,5	10	1,3	mete	Ω	
BZ1A1R	150	0,6	5	0,5	dia	. D21	
		0,8	5	0,6	oore)181,	:: <u>p</u>
		1,0	5	0,8	hert	9: 51, E	aila
		1,2	5	0,9	o, of	ļab O	790 d
		1,5	5	1,2	Ē	avaj 212 <i>6</i> 8181	15, C
		1,8	5	1,5	ır 20	are 07, I 151,	3, C
BZ1A1R	150	8,0	10	0,6	nete	izes I, D1 6, B	entre , C2 240
		1,0	10	8,0	diar	grif s D9 B12	C19 (C19
		1,2	10	1,0	Standard bore diameter 20 mm, other bore diameters on request	The following grit sizes are available: Diamond: D64, D91, D107, D126, D151, D181, D213, D301 cBN: B91, B107, B126, B151, B181	The following concentrations are available: Diamond: Cl6, Cl9, C23, C45, C90 cBN: V120, V180, V240
		1,5	10	1,3	ard b	lowi nd: 91, B	The followi Diamond: C cBN: V120,
		1,8	10	1,6	ppur	e fol amo N: B	e fol X: <
BZ1A1R	175	0,8	5	0,6	Stc	Ę P.	Ę ig <u>B</u>
		1,0	5	8,0			
		1,2	5	0,9			
		1,5	5	1,2			
		1,8	5	1,4			
BZ1A1R	175	1,0	10	0,7			
		1,2	10	0,9			
		1,5	10	1,2			
		1,8	10	1,4			

WINTER Facts

> Shank tools

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Knives

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WINTER

FEPA designation	D	T	X	E	Н	Grit size	Normal concentrations
BZ1A1R	200	8,0	5	0,6			
		1,0	5	8,0			
		1,2	5	0,9			
		1,5	5	1,2			
		1,8	5	1,4			
BZ1A1R	200	1,0	10	0,7			
		1,2	10	0,9			
		1,5	10	1,2			
		1,8	10	1,5			
BZ1A1R	250	1,0	5	0,7			
		1,2	5	0,8			
		1,5	5	1,1			
D7141D	050	1,8	5	1,4	uest		
BZ1A1R	250	1,0	10	0,7	red	301	
		1,2	10	0,8	s on	3, D	ài
		1,5	10	1,1	eter	le: D21	lable 0
BZ1A1R	300	1,8 1,2	10	1,4 0,8	diam	ailab 1181, 3181	avai , C9
DZIAIK	300	1,2	5	1,1	ore (s avc 51, E 151, 1	are C45 240
		1,8	5	1,4	er b	s are 5, DI 6, B	ons 223, 0, V
BZ1A1R	300	1,2	10	0,8	Standard bore diameter 20 mm, other bore diameters on request	The following grit sizes are available: Diamond: D64, D91, D107, D126, D151, D181, D213, D301 cBN: B91, B107, B126, B151, B181	The following concentrations are available: Diamond: C16, C19, C23, C45, C90 cBN: V120, V180, V240
DEI/ III	000	1,5	10	1,1	E	grit 107, 3107,	ncer 16, C
		1,8	10	1,4	20	ving 1, D1	0 D Z Z
BZ1A1R	350	1,5	5	1,1	Jefel	ollo V. D9 B : N	win. GB
		1,8	5	1,4	dian	he f D64 cB	follo Dial
		2,0	5	1,6	ore	L :puc	The
BZ1A1R	350	1,5	10	1,1	ard b	ā	
		1,8	10	1,4	ppur	Δ	
		2,0	10	1,6	Stc		
BZ1A1R	400	1,5	5	1,1			
		1,8	5	1,4			
		2,0	5	1,6			
BZ1A1R	400	1,5	10	1,1			
		1,8	10	1,4			
		2,0	10	1,6			
BZ1A1R	450	1,8	5	1,4			
		2,0	5	1,6			
		2,4	5	2,0			
BZ1A1R	450	1,8	10	1,4			
		2,0	10	1,6			
		2,4	10	2,0			

Standard tolerances

 \emptyset < 100 mm T ± 0,07 $\emptyset \le 250 \text{ mm} \quad T \pm 0.10$

 $\emptyset \ge 300 \text{ mm} \quad T + 0.20 \\ - 0.10$

WINTER Facts

Shank tools

PCD PCBN

Knives

Milling cutters

Mould and die

Diamond files

WINTER diamond files are mostly used in tool and die making for finishing form tools, die-cutting tools, drawing dies, and embossing dies. Their particular features are ease of handling, edge stability and long service life. They are available in four different grit sizes:

D181 for rough filing
D126 for universal use
D91 for finish filing
D20B and D46 for special applications
Other specifications on request.



Riffle files for manual applications

Profile 09E		Base body cross-section	Length of diamond layer	Total length	Shaft Ø	Grit size	Order number	Comments
	15R	4 × 2	25	155	-	D126	66260110258	
	16R	4 × 2	25	155	-	D91	66260136434	Delivery time 4 weeks
						D126	66260136235	Delivery time 4 weeks
	18R	3 × 1.5	25	155	-	D91	66260114735	Delivery time 4 weeks
						D126	66260110114	Delivery time 4 weeks
	22R	3 × 3	25	155		D91	66260364429	Delivery time 4 weeks

Other dimensions available at short notice on request.

WINTER Facts

Shank tools

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Mould and die



Needle files for manual applications



Plastic screw-on handle

Profile 09E		Base body cross-section	Length of diamond layer	Total length	Shaft Ø	Grit size	Order number	Comments
	Flat square 2112	5 × 1	85	140	3	D20B	66260111899	Delivery time 4 weeks
	2112					D46	66260112558	Delivery time 4 weeks
ш						D91	66260134227	
						D126	66260134228	
0	Flat square with rounded corners 2112r	5×1	85	140	3	D91	66260134244	
	Flat pointed	5 × 1	85	140	3	D91	66260110341	
	2122					D126	66260134289	Delivery time 4 weeks
	Triangular	3.5	85	140	3	D20B	66260114101	
\triangle	2132					D91	66260134230	
						D126	66260134231	
	Square 2142	2.5	85	140	3	D20B	66260112712	Delivery time 4 weeks
	2142					D91	66260134232	
						D126	66260134233	
	Half-round 2152	5 x 2	85	140	3	D20B	66260114759	Delivery time 4 weeks
	2132					D91	66260110230	
						D126	66260134235	
_	Round 2162	Ø3	85	140	3	D20B	66260134294	
0	2102					D91	60157644163	
						D126	66260134237	
<	Blade 2172	5 × 1.5	85	140	3	D91	66260134238	
7						D126	60157644103	
\sim	Crossing file 2192	5 × 2	85	140	3	D46	66260369574	Delivery time 4 weeks
\circ						D91	66260107652	
	C	5.0	0.5	140	0	D126	66260100060	Delivery time 4 weeks
	Cross section 2102T	5 × 2	85	140	3	D20B	66260134293	Assertiable as help of all
\triangle						D91	66260100085	Available while stocks last
						D126	60157643993	Available while stocks last
Screw-on handl	е						66260391073	

Other dimensions available at short notice on request.

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WINTER

Shank tools

Contra

PCD

Knives

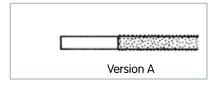
Milling cutters

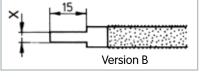
Mould ind die

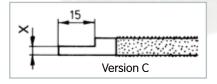
Files for manual and machine use

Profile 09B		Base body cross- section	Length of diamond layer	Total length	Design	Grit size	Order number	Comments
	Flat 7	4.5×2	80	150	Α	D91	66260110152	
						D126	66260100260	
	Flat 13	9 × 3.2	80	150 A		D91	66260100285	
							66260134250	
H-mad						D181	66260100100	
	Flat 16	11 × 4	120	200	А	D91	66260110317	
						D126	66260110225	
						D181	66260100333	
	Square 22	3	80	125	А	D126	60157643682	Delivery time 4 weeks
	Square 23	4	80	150	А	D91	66260110330	Delivery time 4 weeks
_	Square 25	5	80	125	А	D91	60157644206	
L						D126	66260110214	Delivery time 4 weeks
	Square 29	8	80	150	А	D126	60157644171	Available while stocks last
	Square 32	10	120	200	B/X = 6 mm	D126	60157644203	
	Triangular 39	4	80	150	C/X = 2 mm	D91	66260110417	Delivery time 4 weeks
	Triangular 41	4.5	80	125	C/X = 3 mm	D91	66260100385	Delivery time 4 weeks
						D126	60157644093	Delivery time 4 weeks
\triangle	Triangular 45	8	80	150	C/X = 3.5 mm	D91	66260110441	
						D126	66260110458	
	Triangular 48	10	120	200	C/X = 4.5 mm	D91	60157644174	Delivery time 4 weeks
						D126	60157643782	
0	Round 70	Ø3	80	125	B/X = 2 mm	D91	60157643651	Delivery time 4 weeks
	Round 76	Ø 6.3	80	150	C/X = 4 mm	D126	60157643624	
	Half-round 89	5 × 3	80	125	A	D126	66260100346	Delivery time 4 weeks
_	Half-round 92	8 × 3	80	150	А	D91	66260100395	Dalisamskim a 4 seed
						D126	60157644102	Delivery time 4 weeks
	Half-round 96	10 v F	120	200	٨	D181	60157644010	Delivery time 4 weeks
	riuli-rouna 96	10 × 5	120	200	Α	D126	66260110435	

Other dimensions available at short notice on request.







All dimensions in mm

File

WINTER

Shan tools

Saws

Inserts

PCD PCBN

Knives

Milling cutters

Mould and die

Files

Diprofile files for hand file machines



Profile 09C		Base body cross- section	Length of diamond layer	Total length	Shaft Ø	Grit size	Order number	Comments
	Flat, double sided 307A	5 × 2	15	50	3	D126	66260110238	Delivery time 4 weeks
	309A	5 × 2	25	60	3	D126	66260134278	Available while stocks last
	Round 331	Ø1	15	50	3	D91	66260134328	Delivery time 4 weeks
0	339	Ø3	15	50	3	D126	66260129612	Delivery time 4 weeks
	343	Ø3	25	50	3	D126	60157643753	Delivery time 4 weeks
	345	Ø 4	15	50	3	D126	60157643286	Delivery time 4 weeks
^	Triangular 367	3.5	15	50	3	D91	66260100066	Delivery time 4 weeks
\triangle	373	4.5	15	50	3	D126	66260134281	Delivery time 4 weeks
	375	4.5	25	60	3	D126	66260134282	Delivery time 4 weeks

Other dimensions available at short notice on request.

Saw rods for manual and machine use

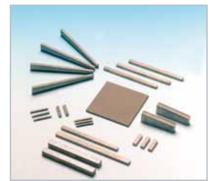
Profile 10E		Base body cross-section	Length of diamond layer	Total length	Shaft Ø	Grit size	Order number	Comments
	Round 701	Ø 0.80	65	130	0.5	D126	66260134284	
0	702	Ø 1.30	65	130	1	D126	66260110148	Delivery time 4 weeks
	703	Ø 2.30	65	130	2	D126	66260100264	Delivery time 4 weeks

Clamping zone free of diamonds both sides (20 / 45 mm) Other dimensions available at short notice on request.

Honing sticks

Honing is classified as machining with undefined cutting edges using a tool where grits are bound together whilst maintaining continuous surface contact between workpiece and tool for improving size, form and surface. A periodic alteration of relative movements takes place between tool and workpiece, producing surfaces with parallel, criss-crossing grooves. In some cases a particular surface finish is required, for example to prevent the rupture of the lubricating film on cylinder liners. The advantages of diamond and CBN honing stones compared to conventional honing stones are

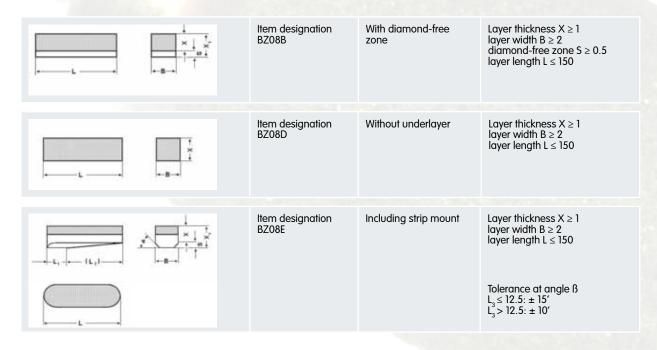
- Longer service life
- Better form stability
- Closer tolerances
- Cooler working, meaning no changes in the surface structure caused by thermal effects
- Less distortion



Diamond is exclusively used for honing workpieces, of all types of iron castings (cast iron, annealed cast iron and some cast steels). Cylinder liners for internal combustion engines are typical examples. cBN is primarily used for honing steel, e.g. machining steel, ball bearing steel, tool steel and alloy steel in all hardness conditions.

To achieve the required surface quality, it is important to correctly specify all process parameters: The right grit type (diamond or cBN), grit size, grit quality, the bond and the concentration must be selected according to the workpiece material and the workpiece hardness. Furthermore, the required surface quality and material removal rate will determine whether the process should be carried out in one step or several operations.

Metal bonded honing sticks



08B and 08D can only be used in conjunction with a strip mount. 08E is designed inclusive of strip mount for direct fitting.

Order example

Shape	L	В	X	X1	R	Grit size	Bond	Concentration
BZ08B	75	5	2	5	40	D76	BZ387	C75



Application data for regrinding metal bonded honing tools

The honing head should be ground to the diameter of the bore to be honed, in order to achieve the shortest possible running-in time after installation, i.e. soldering or gluing the stones to the honing shoes and fixing them to the honing spindle, so that a high percentage contact area is created right from the beginning.

SiC grinding wheel – resin bonded, e.g. Ø 200 mm, dry cut (uni-directional at point of contact)

Grinding speed (diamond /cBN) $v_c = 15 \text{ m/s}$ Grinding speed (SiC) $v_c = 23 \text{ m/s}$

Grit size of diamond and cBN honing sticks	Specifications of the SiC grinding wheels
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

Examples of proven tool designs	Examples of proven tool designs										
Workpiece											
Workpiece material	Grey cast iron		Steel								
Hardness [HB/HRC]	HB 180-220		HRC 62 ±2								
Honing tools	Pre-honing	Finish honing	Pre-honing	Finish honing							
Grit size	D91	D20B	B126	B54							
Bond	BZ387	BZ387	MSS473	MSS473							
Concentration	C100	C100	V120	V120							
Application data											
Circumferential speed $V_{_{\!A}}$ [m/min]	52	52	51	51							
Stroke speed V _H [m/min]	14	14	18	18							
Results											
Roughness R ₁ [µm]	5.8	1.8	4.5	2.2							
Effective material removal rate MRR _{eff} [cm³/min]	0.67	0.2	0.4	0.15							
Material removal rate per stick surface MRR _{Ltotal} [mm3/mm2 · min]	0.4	0.2	0.58	0.22							
Honing ratio G [cm³/cm³]	4,500	3,300	1,200	650							

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Working data and grit sizes

Honing speed

The cutting speed (v_c) is based on the speed at the circumference of the honing tool

 (V_{A}) and its stroke speed (V_{L}) .

Suggested values Median practical values

 $v_c = 30-70 \text{ m/min}$ 52 m/min $v_A = 20-60 \text{ m/min}$ 49 m/min $v_U = 10-30 \text{ m/min}$ 16 m/min

Intersection angle

The ratio of stroke speed (v_{H}) and speed at the circumference (V_{A}) gives the characteristic angle of intersection (α) of the honing pattern. Usually the two speeds are selected so that the intersection angle lies between 25° and 60°, with a median value in practice of 36°.

Contact pressure range

20-200 N/cm² (exceptions up to 600 N/cm²)

Coolant

In honing, mineral oil-based honing oils and water-soluble emulsions are used. Typical fluid use is 30–150 l/min per bore.

Grit sizes

The abrasive grit sizes specified for this process are classified according to FEPA standards, starting with B46 / D46. It is possible to manufacture tools different from those shown in the programmes. Please do not hesitate to contact us if you require assistance. Customers' own tools can also be coated. With regard to the determination of the nominal size, the undersizes which depend on the coating must be specified based on the grit size. Grit size tables can be found in the Service section of this catalogue.

Achievable surface finish values when honing with metal bond honing tools

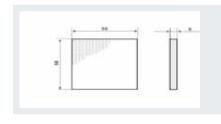
The practical values listed in the adjoining diagram serve as a quick reference. Accurate surface finish values always depend on the bond, grit size and concentration of the honing tool as well as the workpiece material, coolant and the process parameters. It is especially important to maintain a balanced ratio between grit size and concentration in order to prevent excessive levels of contact pressure. Concentration levels should be between C35 and C100 or V120 and V240 respectively, depending on grit size.

R _a ¹) [µm]	R _z ¹) [µm]	R, 1) [µm]	GG HB 180 - 250 Steel HRC 158 Steel soft										
1.6	10.9	12.8											
1.4	9.5	11.2											
1.2	8.2	9.6											
1	6.8	8											
0.9	6.1	7.2										1	
0.8	5.4	6.4											
0.7	4.8	5.6											
0.63	4.25	5											
0.5	3.4	4											
0.4	2.7	3.2											
0.3	2.1	2.4											
0.25	1.7	2											
0.2	1.4	1.6				/							
0.15	1.02	1.2											
0.13	0,85	1											
0.1	0,7	0.8											
0.08	0,54	0.64											
0.063	0,43	0.5											

*WINTER grit sizes
1) Calculation base $1R_a = 8R_t = 0.85 R_g$

Honing

Resin bonded honing sticks



Item designation K08D-50-50-X

Without underlayer

Layer thickness X = 1.5 - 5 mm This blank has no base layer. It consists merely of a resin bonded diamond or cBN layer. The reference notes below show how these blanks are used.

Blanks can be cut into individual honing sticks by using either

a) Hand- or fretsaw

b) Faster and cleaner cutting is achieved with a diamond cutting wheel, model BZ

Diameter: 100 - 150 mm
Thickness of cut: 0.6 - 0.8 mm
Layer specification: D151 BZ309 C45

Bond the stick to the strip mount e.g. with

a) UHU-Plus

b) Technicoll 2000 (Beiersdorf, Hamburg)

c) Loctite 307 / Activator T No. 747

The stick can subsequently be removed from the strip mount by heating to ~ 300 °C in an oven.

Order example

Shape	ι	В	X	Grit size	Bond	Concentration
K08D	50	50	3	B126	KSSTY	V120



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WINTER Diaplast® and WINTER Diaplast® suspension

Apart from bonded abrasives, WINTER also offers an unrivalled range of diamond pastes and suspensions. WINTER Diaplast® and WINTER Diaplast® suspension are the ideal lapping and polishing materials for lab and industrial application.

WINTER Diaplast® means quality:

- Fast removal from the workpiece, meaning economic machining times
- Relief and distortion-free samples
- Outstanding edge definition; optimum surface quality
- Economical in use in conjunction with WINTER Diaplastol thinners

Diamond grit size and grit distribution

WINTER has extensive know-how in the preparation of diamond grits and the manufacture of diamond tools and diamond preparations. Grit sizes D25 to D0.7 are micro grits which are not classified by sieving but by special techniques. WINTER has developed in-house processes with high precision requirements, especially for this purpose. The classification of micron powders carried out by WINTER has closer tolerances than those stipulated by DIN and FEPA.

Up-to-date measuring systems and selection procedures are used for inspection and selection of individual diamond lots according to size and shape, thus ensuring a consistent level of quality.

It is important not only to keep within the specified grit size tolerances but also to maintain the particle size distribution within these limits. Even slightly oversized particles could cause surface scratches, whereas an excessive quantity of fines is uneconomical.

Applications and product specifications

Diamond bond system and solubility

The special characteristics of the paste and liquid carriers developed by WINTER guarantee uniform diamond distribution and thus constant concentration. This provides optimum distribution of the individual particles avoiding the formation of agglomerates.

The viscosity of Diaplast® suspension is carefully controlled to ensure that the suspended state of the diamond particles is maintained over a long period.

In conjunction with our thinner WINTER Diaplastol, it is important that a thin cooling lubricant film is formed to support the material removal rate provided by the diamond particles. The carriers used by WINTER have unlimited shelf life and a high degree of temperature stability.

WINTER Diaplast® diamond compounds types Effizient (Efficient), SS, N, M, E and WINTER Diaplast® suspension are supplied in alcohol/water and/or oil soluble form as standard. They are colourless, have unlimited shelf life and a high degree of temperature stability. All constituents are either biodegradable or do not pose a threat to the environment (special waste disposal procedures are required for larger quantities).

Diaplast® Type T is universally-soluble.

Please note:

For preparatory machining tasks, for example

- diamond cutting wheels (catalogue No. 3, flat and crystal glass)
- diamond grinding wheels (from this catalogue)

are used. Why not make the experience of a leading diamond and cBN tool manufacturer work for you? WINTER is the right partner for lapping and polishing jobs in industry and the laboratory.

Diamond concentration

The decisive parameters for material removal rate are number and size of the cutting edges of the diamond grit that engage the workpiece at any one time. The number of particles per unit of weight decreases with increasing grit size. The diamond content increases with increasing grit size in WINTER diamond compound types SS, N and Effizient and WINTER Diaplast® suspension. Diamond concentration is always the same for types T and E.



Overview	of WINTER diamond pastes
Effizient	Impressive value for money. For fast material removal, short machining times, better surface quality and very good geometric accuracy. Application on special steels, stainless steels.
SS	For very fast material removal, extremely short machining times, top quality surface finish and geometric accuracy. Application on very hard material such as carbide and ceramics; materials with constituents of differing hardnesses; high-precision measuring and sensor surfaces.
N	For producing polished surfaces for metallographic, mineralogic and similar investigations. Applications on special steels, stainless steels.
Т	The most economical paste for standard use in production. Application on large areas, in tool and die making as well as surface machining of rollers made of hardened steel, carbide, hard cast iron etc.
E	Economy paste for universal use. Machining of mass-produced parts and repairs and for when paste is frequently changed.
M	Inexpensive paste of medium concentration, specially developed for metallographic applications.

Applications in the industrial field:

- Aeronautics and astronautics
- Engine construction
- Hydraulics
- Plant manufacturing
- Tools Industry

- Automotive industry
- Engineering
- Manufacture of fittings
- Pump and mixer industry
- Turbine construction
- Electronics
- Glass and plastics
- Medical technology
- Rolling industry
- etc.

Example applications

Typical examples of workpieces successfully lapped and polished with WINTER-Diaplast® diamond paste and WINTER-Diaplast® suspension

- Auditory ossical implants
- Die-cast molded pieces
- Ignition electrodes
- Measuring and sensor tools
- Plungers
- Sapphire windows
- Sliding-ring seals
- Slide rollers
- Wire and thread guides

- Ball bearings
- Drawing dies
- Implants (hip replacements)
- Molded parts
- Pump vanes
- Sealing gaskets
- Slideways
- Switch contacts/-balls
- Wire-drawing dies

- Dental implants
- Embossing punches
- Injection molds
- Pistons for pumps
- Rollers with smooth surfaces
- Sealing surfaces
- Slide bearings
- Valve tapers, balls and seatings
- etc

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Diaplast® delivery programme

T					Diamono	d grit size:	\$				Solubility of the
Туре	D0.25	D0.7	D1	D3	D7	D15	D25	D54	D91	D126	bond *)
Effizient	-	-	Х	Х	Х	X	X	-	-	-	A/O
SS	Χ	X	X	Х	Х	Χ	X	X	-	-	A/O
N	X	X	X	Χ	Х	X	X	X	X	Х	A/O
Μ	Χ	X	X	Х	Х	X	X	X	X	Х	А
E	Χ	X	X	Χ	Х	X	X	X	X	Х	A/O
T	-	-	X	Χ	Х	X	X	X	-	-	U
Colour recognition	Silver	White	Yellow	Green	Red	Blue	Brown	Black	Orange	Lilac	*) A = soluble in alcohol-water
,Efficient' only	Available as dosing syringe in sizes 5 g / 10 g / 20 g Efficient' only available in sizes 5 g and 20 g Other sizes on request									U = universally soluble O = soluble in oil	

Order example: WINTER Diaplast®-Paste - SS - D7 - 10 g - A

Diaplast® suspension

100 ml as combi-system

Flexible bottle with standard screw closure, suitable for use on dosing devices for automatic polishing processes Accessories (additional pack):

- spray-head with eco-friendly mechanical pump system for uniform distribution of the diamonds on large polishing plates or on larger areas for machine polishing
- drip-feed fitting for precisely directed feeding by hand

250 ml with drip-feed fitting

500 ml and 1000 ml as refill bottle

Time		Diamond grit sizes									
Туре	D0.25	D0.7	DI	D3	D7	D15	D25	D54	bond *)		
Suspension	×	-	X	X	X	X	-	-	A/O		
Colour recognition	Silver	-	-	*) A = soluble in							
Available in the following the	alcohol-water O = soluble in oil										

Order exampe: WINTER Diaplast®-Suspension - 100 ml - D3 - A

Diaplastol thinner delivery programme

			Solubility of the bond *)
Diaplastol	Bottle with drip-feed fitting	100 ml	
	Refill bottle	1,000 ml	A/O
	Canister	4,500 ml	
Other sizes on re	quest		*) A = soluble in alcohol-water O = soluble in oil

Order example: WINTER Diaplastol - 100 ml - A

Mould and die



Diaplast® stock programme

EFFIZIENT	Identifica- tion colour	Solubility	5 gramme	10 gramme	20 gramme
DI	Yellow	Soluble in water-alcohol	66260329904	-	66260329980
DI	Tellow	Soluble in oil	66260329990	-	66260329991
D3	Croon	Soluble in water-alcohol	66260329981	-	66260329982
D3	Green	Soluble in oil	66260329992	-	66260329993
D7	D. J	Soluble in water-alcohol	66260329983	-	66260329984
D/	Red	Soluble in oil	66260329994	-	66260329995
D15	Blue	Soluble in water-alcohol	66260329986	-	66260329987
סוט	blue	Soluble in oil	66260329997	-	66260329999
D25	Brown	Soluble in water-alcohol	66260329988	-	66260329989
DZS	DIOWII	Soluble in oil	69014117428	-	69014117429

TYP SS Highest concentration	Identifica- tion colour	Solubility	5 gramme	10 gramme	20 gramme
D0.25	Silver		60157643984	60157643724	66260100076
D0.7	White		66260100265	66260100627	60157667492
D1	Yellow	Soluble in water-	66260110146	66260110232	60157644154
D3	Green	alcohol	66260100287	60157644084	66260113334
D7	Red	(Soluble in oil on	66260110467	66260110535	66260110495
D15	Blue	request)	66260110248	60157644016	66260116707
D25	Brown		60157644020	60157644176	66260114624
D54 FEPA	Black		66260110601	60157643824	69014166621

TYP N High concentration	Identifica- tion colour	Solubility	5 gramme	10 gramme	20 gramme
D0.25	Silver		66260112531	-	66260114891
D0.7	White		66260134316	-	-
D1	Yellow	Calable to contain	60157643805	60157644162	60157643751
D3	Green	Soluble in water- alcohol	66260133498	60157643608	60157644170
D7	Red	(Soluble in oil on	66260133500	66260110340	66260100087
D15	Blue	request)	66260110307	66260100292	60157643708
D25	Brown		66260110180	66260110143	60157644184
D54 FEPA	Black		66260110461	66260100256	66260113661

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Diaplast® stock programme

TYP T Medium concentration	Identification colour	Solubility	5 gramme	10 gramme
DI	Yellow	universal	66260100257	-
D3	Green	universal	66260100365	66260110407
D7	Red	universal	60157644173	66260164645
D15	Blue	universal	60157643981	66260164646
D25	Brown	universal	66260100098	-
D54 FEPA	Black	universal	60157643905	-

TYP E Normal concentration	Identification colour	Solubility	5 gramme	10 gramme
DI	Yellow		66260110438	-
D3	Green		66260134307	-
D7	Red	Soluble in water- alcohol (Soluble in oil on request)	66260134308	-
D15	Blue		66260134309	-
D25	Brown	, 54555,	60157644070	- Po
D54 FEPA	Black		60157644187	-

Diaplast® suspension stock programme

Suspension 100 ml	Identification colour	Solubility	Order number
DI	Yellow	Calubla in water alcabal	66260110642
D3	Green	Soluble in water-alcohol	66260100250
D7	Red	(Soluble in oil on request)	66260110667

Diaplastol thinner stock programme

Diaplastol	Contents	Solubility	Order number
Spray bottle	100 ml	Soluble in water-alcohol	66260118433
Refill bottle	1 litre		66260195804
Canister	4.5 litre	(Soluble in oil on request)	66260195809

Polishing cloths stock programme

Polishing cloths	Application	Diameter [mm]	Order number
		120	66260384527
Polishing cloth soft	for diamond grit size D0.25 - D0.7	200	66260195806
		300	66260100068
		120	66260387665
Polishing cloth 31	for diamond grit size D1 - D3	200	66260195796
	5. 50	300	66260381705
Poliching cloth 1007	for diamond grit size	200	66260386538
Polishing cloth 1007	D7 - D54	300	66260100054

Polishing

Application notes for the preparation of specimens for microscopic examinations

Practical execution

Specimen preparation starts with mounting of the workpiece if applicable. Depending on the state of the specimen, it is rough-ground with silicon carbide abrasive paper or with WINTER diamond grinding wheels. The specimen is then polished with WINTER Diaplast® compound or WINTER Diaplast® suspension.

Sample Mounting

In most cases, the standard mounting media are plastics, which are processed either hot or cold. It is important that the mounting medium should bond to the specimen without any gaps, otherwise abrasive or polishing agents may be deposited between the specimen and the mount. The hardness of the mounting medium should be matched to the hardness of the specimen in order to avoid edge rounding.

Grinding

The surface state of the specimens before polishing is critical for the economic efficiency of polishing with WINTER Diaplast® and for the quality of the final polish. Proper rough grinding can greatly reduce polishing time, enabling economical application of WINTER Diaplast® and giving good surface quality. It is important to ensure that any unevenness caused by sawing is completely removed by the grinding operation.

Polishing

Polishing with WINTER Diaplast® diamond compound or WINTER Diaplast® suspension can be effected on both manual and automatic polishing machines. A separate polishing disc with polishing cloth must be used for every diamond grit size. WINTER polishing cloths can be used on commercial standard machines. Before starting polishing, slightly moisten the polishing cloth and distribute the polishing agent evenly on the polishing cloth. There are some cases where WINTER diamond suspensions are easier to handle than diamond compounds, as diamond distribution on the polishing cloth is more even. Diamond suspensions are preferable for automated polishing operations as feeding during the process is possible. WINTER Diaplast® diamond compound is soon saturated with the swarf of the material being machined, so that a little WINTER Diaplastol thinner must be applied in order to maintain the cutting action of the diamond grit. A thin cooling and lubricating film must be maintained.

The polishing pressure to be applied is dependent on the specimen material and the diamond grit size. As a rule, high polishing pressure can be used with hard materials, and lower pressure should be used for finer diamond grits. The selection of the grit sizes to be used depends mainly on the hardness of the specimens and their individual structural constituents. The greater the hardness of the material to be polished the coarser the grit to be used at the beginning. The finest grit sizes (D0.25 to D1) are generally not used with very hard materials. Remember that the polishing process not only removes the scratch marks of the last grinding operation, but it may be required to remove sufficient material from the specimen surface to expose an undamaged microstructure. This means it is often necessary to start with a larger diamond grit size than would be necessary for removal of the scratch marks from the last grinding operation.

Note

When polishing with WINTER Diaplast® it is important to avoid any transfer of coarser grit to the next finer polishing operation. It is essential not only to keep the polishing device clean, but also to clean the specimens between the individual polishing stages. This may be done under running water with the aid of a brush (for coarser grit sizes) or with a cotton pad (for finer grit sizes). It is also recommended to use an ultrasonic cleaning bath between each polishing step.

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Polishing recommendations

Material	Specimen pre- machining	WINTER Diaplast® as paste or suspension	Polishing underlay	Notes
Carbides Stellite	Diamond wheel/ foil D126 or D91.	D15 D7 D3 D1*	1007 1007 31 31*	 Polishing stage may in some cases be dispensed with
Ferritic Pearlitic Martensitic Austenitic steels Cast Iron of all types	Wet grinding on diamond foil D46 and/or SiC paper to 600 grit	D15* D7 D3** D1 D0.25***	1007 1007 or 31 31** 31 Soft cloth***	* Only for hardened steel ** Can in some cases be dispensed with *** Not required In hard castings and martensitic steels Intermediate etching with 1% alcohol. HNO ₃ before Diaplast® D1 is advantageous
Aluminium and aluminium alloys	Wet grinding on diamond foil D46 and/or SiC paper to 1000 grit	D7 D3 D1 D0.25	1007 or 31 31 31 or cloth soft Soft cloth*	Use little pressure * Can in some cases be dispensed with
Lead alloys	Wet grinding on SiC paper to 1000 grit	D3 D1 D0.25	31 31 Soft cloth	Use little pressure Samples sensitive to water! Clean only with Alcohol Grinding lubricant: petroleum jelly
Copper and copper alloys	Wet grinding on diamond foil D46 and/or SiC paper to 1000 grit	D7 D3 D1 D0.25*	1007 or 31 31 31 Soft cloth*	* For ultra-pure copper or very soft copper alloys, machining with D0.25 can be dispensed with; instead, use alumina on a soft polishing cloth and give a brief second polish
Magnesium alloys	Wet grinding on SiC paper to 1000 grit	D7 D3 D1 D0.25	1007 or 31 31 31 Soft clotht	Clean samples with alcohol
Nickel and nickel alloys	Wet grinding on diamond foil D46 and/or SiC paper to 1000 grit	D15 D7 D3 D1 D0.25	1007 1007 or 31 31 31 Soft cloth	
Silicon and germanium	Wet grinding on diamond foil D46 and/or SiC paper to 1000 grit	D7 D3 D1 D0.25	1007 31 31 or cloth soft Soft cloth	
Zinc and zinc alloys	Wet grinding on SiC paper to 1000 grit	D7 D3 D1 D0.25	1007 or 31 31 31 Soft cloth	A brief second polish with alumina 3 on a soft cloth may be required. Rinse with methanol. Intermediate etching with 5% alcoh. HNO ₃ before Diaplast® D1 recommended. Use little pressure



Material	Specimen pre- machining	WINTER Diaplast® As paste or suspension	Polishing underlay	Remarks
Ore samples (of various compositions)	Diamond wheel/foil D126 or D91 or wet grinding to 1000 grit	D15 D7 D3 D1*	1007 1007 31 31*	* Whether machining with WINTER Diaplast D1 and D0.25 is necessary depends on the respective material hardness. In samples with constituents of differing hardnesses this is normally necessary.
Ceramic samples	Diamond wheel D126 Diamond foil D64 or D46	D25 D15* D7 D3 D1 D0.25**	1007 1007* 1007 31 31 Soft cloth**	Dispensed with in samples with constituents whose hardness differences are only slight. Is only necessary in samples also containing softer constituents
Carbon	Saw-cut	D7 D3 D1 D0.25*	1007 31 31 Soft cloth*	* Is only necessary in soft types of carbon.

These recommendations have been compiled on the basis of our experience with common materials. Due to the large variety of alloys and material compositions, optimal results may require slight deviations from the above table in some cases. It is possible, in principle, to miss out individual grit sizes, but this mostly results in longer polishing times which may cause relief formation. Our metallographic laboratory is available for consultation in difficult cases.



WINTER Facts

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Micron powder

WINTER micron powders consist of synthetic diamond, natural diamond and cBN with specific characteristics adapted to different industrial applications. The compounds are divided into the following types:

Туре	Hard material	Colour	Shape and surface
Туре М	Synthetic diamond	Greenish-yellow to pale yellow	Monocrystalline, predominantly blocky, distinct cutting edges, flat cleavage planes, defined structure
Type R	Synthetic diamond	Greenish-grey	Monocrystalline, irregular, blocky, many cutting edges, fragile structure This type of grit is also available with metal coating. Its designation is then RC.
Туре Р	Synthetic diamond	Black to dark grey	Polycrystalline, blocky shapes, many cutting surfaces, no platelets, no needle-shaped particles
Type N	Natural diamond	Colourless to pale grey	Monocrystalline, blocky to splintery, irregular, defined structure, many cutting edges
Туре В	cBN	Black	Monocrystalline, blocky, distinct cutting edges This type of grit is also available with metal coating. Its designation is then BC.

Micron powders with metal coating

For special applications, the use of metal-coated micron powders has proved to be advantageous, for instance in resin bond grinding wheels. WINTER micron powders with metal coating are available in sizes 15–25 μ m, 20–30 μ m and 25–37 μ m. Grit size relates to the size of grit excluding the metal coating.

Quality

Due to the high quality standards WINTER imposes on classification, checking and packing under clean room conditions, a consistent level of grit quality is guaranteed.

Measurement of grit size

There is no universal procedure yet for determination of grit size. The method recommended by FEPA as 'Standard for Diamond Micron Powder Sizes' provides guidelines for grit size determination but they are not universally applied.

WINTER uses optical image analysis for measuring grit size. This method permits the additional determination of the form factor (ratio of width to length of the measured particles) of the grit. The results are comparable with those obtained by FEPA.

Up-to-date methods for chemical purity checking such as energy dispersive analysis (EDA) and atomic absorption spectroscopy (AAS) are also applied.

Aicron powder

WINTER

Micron powders stock programme

Designation type M [µm]	Order number
M 0.0-0.1	130003651
M 0-0.25	130003605
M 0-0.50	130003280
M 0.50-1	130003281
M 0.5-2	130003282
M 1.25-3	130003722
M 1-3	130003283
M 1-3.5	130003480
M 2-4	130003353
M 2-5	130003350
M 3-5	130003565
M 3-7	130003351
M 4-8	130003352
M 5-10	130003621
M 6-10	130003629
M 6-12	130003622
M 8-12	130003354
M 8-25	130003357
M 10-15	130003623
M 10-20	130003355
M 15-20	130003767
M 15-25	130003356
M 20-25	130003768
M 20-30	130003358
M 25-30	130003769
M 25-37	130003359
M 30-60	130003817
M 35-45	130003360
M 40-60	130003361
M 45-55	130003716
M 50-70	130003630

Designation type R [µm]	Order number
R 0-0.50	130003588
R 0.50-1.00	130003589
R 0.5-2	130003554
R 1-3	130003571
R 2-4	130003529
R 2-5	130003262
R 3-6	130003593
R 3-7	130003263
R 4-7	130003598
R 4-8	130003580
R 5-10	130003264
R 6-12	130003591
R 8-15	130003265
R 8-25	130003268
R 10-20	130003266
R 15-25	130003267
R 20-30	130003269
R 25-37	130003270
R 35-45	130003514
R 40-60	130003204
R 60-80	130008113

Designation type P [µm]	Order number
P SS 1-3	130008366
P SS 2-4	130004614
P MYPOLEX 0.0-0.25	130003860
P MYPOLEX 0-0.5	130003284
P MYPOLEX 0-1	130003285
P MYPOLEX 1-2	130003286
P MYPOLEX 1-3	130003287
P MYPOLEX 2-4	130003530
P MYPOLEX 2-5	130003288
P MYPOLEX 3-7	130003289
P MYPOLEX 5-10	130003290
P MYPOLEX 10-20	130003291
P MYPOLEX 20-30	130003292
P MYPOLEX 22-36	130003690
P MYPOLEX 25-37	130003293

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Lapping tools

DIMLAP® lapping tools

DIMLAP® lapping tools are diamond impregnated lapping stones. Unlike loose grit in conventional lapping, the grits are firmly embedded in the bond and cannot be transferred to the workpiece to be machined and have a negative effect on the lapping process. Excellent surface qualities below $R_{\rm i}=0.02~\mu m$ with precise flatness below 0.1 μm are achievable.

DIMLAP® lapping tools should only be used in conjunction with lapping oil. Tools should also be cleaned with lapping oil and a SiC stone.

Benefits

DIMLAP® lapping tools will shorten your machining time by up to 75% and will retain their accuracy 50–100 times longer than conventional lapping tools.

- Astonishingly fast chip removal
- Final accuracy down to better than 0.1 μm
- Possible surface accuracy R_t< 0.02 μm
- Determenistic shape generation of the workpiece



DIMLAP® lapping tools are already frequently employed in the manufacture of precision tools, measuring tools and in the aerospace industry. The same lapping tool can be used for copper, aluminium, ceramics and carbide. The surface quality (R_i) of a carbide workpiece with a diameter of approx. 25 mm was measured within 0.25 µm. After machining with DIMLAP® for 15 minutes, the R_i value was improved to 0.12 µm. This result would have been difficult to achieve using conventional lapping methods.

Delivery programme

DIMLAP® lapping plate

Dimensions: Ø 152mm × 35mm Dimensions: Ø 203mm × 45mm

Available in 325, 600, 1200, 1800 und 3000 mesh

DIMLAP® hand-lapping sticks

Dimensions: 76mm \times 19mm \times 6.35mm, coated area 76mm \times 19mm Dimensions: 127mm \times 19mm \times 6.35mm, coated area 127mm \times 19mm

Available in 325, 600, 1200 mesh Other dimensions and types on request.

Stock programme

Diameter	Height	Grit size [mesh]	Order number
152	35	D1800	66260348496 ²⁾
152	35	D1200	66260341174 1)
152	35	D600	66260336269 1)
203	45	D1800	66260340285 1)
203	45	D600	66260340504 ¹⁾
SiC stone for cleaning of Dimlap®	6 x 25 x 150	600	66260340268
DIMLAP® Lapping oil	100ml		66260118433

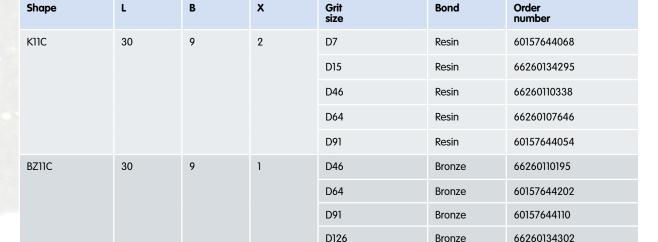
Instructions for use and care for DIMLAP® lapping tools

- 1. All parts to be lapped should have a well-ground surface and should be burr-free.
- 2. DIMLAP® plates should be clean. An appropriate solvent should be used for cleaning, as necessary.
- 3. Apply a few drops of lapping oil to the plate and distribute it evenly across the surface with a tissue. Too much oil prevents good contact between the workpiece and the DIMLAP® plate, especially for fine grit sizes.
- 4. When lapping, the entire surface of the plate should be utilized with figure-of-eight and circular movements. Good surface qualities can also be achieved with straight-line movements.
- 5. If lapping soft material such as aluminium and copper, only slight pressure should be applied so that the plate does not clog.
- 6. DIMLAP® lapping tools should be cleaned regularly using a fine silicon carbide stone (600 mesh) and lapping oil. This method is also suitable for clogged-up lapping tools or in case of burr formation. All abrasive particles should be removed from the surface, before lapping is recommenced.
- 7. DIMLAP® lapping tools should not be exposed to acidic or other corrosive liquids.

Manual lapping tools

WINTER manual lapping tools are used for sharpening, beveling and breaking off edges on tungsten-carbide tools directly on the machine. Resin bonded laps are used for finer cutting edges, i.e. for wood and metal mills or small cutting chisels. The metal bonded, more wear resistant laps are preferred for robust applications like larger cutting chisels or milling heads.

Stock programme



¹⁾ Delivery time 8 weeks

All dimensions in mm

W	NT	ER
	Fa	cts

tools

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nserts

PCBN

Knives

Milling cutters

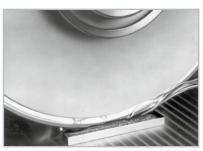
Mould and die

²⁾ Available while stocks last

Dressing tools

Electroplated and sintered-metal bonded dressing tools

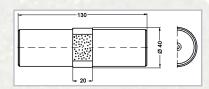
For dressing vitrified and resin bonded diamond and cBN grinding wheels WINTER offers you suitable dressing tools. Thus electro-plated and sinter-metal bonded dressing tools are always available ex stock. Further details will be found in our catalogue No. 5 'Dressing Tools'.



Stock programme

80	10	-

WINTER dressing strip			
Application	Shape	Specification	Order number
For dressing resin bond diamond and cBN grinding wheels on surface grinders. If used with coolant, subsequent sharpening with WA150GV sharpening stone or WINTER stone No. 2 is required.	1S09H-80-20-8	D301 / S11	66260134287

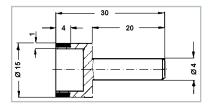


WINTER dressing cylinders			
Application	Shape	Specification	Order number
For dressing resin bond diamond and cBN grinding wheels on surface grinders. If used with coolant, subsequent sharpening with WA150GV sharpening stone or WINTER stone No. 2 is required.	1S44B-40-20	D301 / S11	60157642712 ¹⁾

¹⁾ Delivery time 5 to 6 weeks

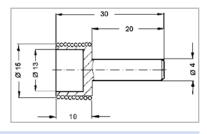
ressing

WINTER

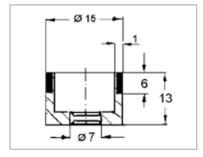


07B Stock programme

Diamond dressing pins metal bonded							
Shape	D	Т	X	Grit size	Bond	Concen- tration	Order number
4BZ07B	15	4	1	D301	BZ 387.1	C135	66260100343



Diamond dressing pins electro-plated							
Shape	D	Т	×	Grit size	Bond	Concen- tration	Order number
50S07B	15	10	4	D426	G825	S33	60157644198



6A9 Delivery programme

Diamond dressing wheels metal bonded								
Shape	D	Т	x	Н	Grit size	Bond	Concen- tration	Order number
1BZ6A9	15	2	1.5	7	D213	BZ387.1	C135	66260112087 1)
2BZ6A9	15	6	1	7	D301	BZ387	C135	66260379145 1)

¹⁾ Delivery time 5 to 6 weeks

Application

For dressing vitrified bonded cBN grinding wheels

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Stationary dressing tools

Examples of stationary dressers

Please refer to our Catalogue No. 5 'Dressing Tools' for our comprehensive product range of stationary dressers

Diamond Fliesen® Tools

Universal dressing tool for profiling and straight dressing. Diamond Fliesen® are characterized by consistent behaviour throughout their service life

Cura sificantian	Grit size	Dimensions	Order		
Specification	Fliese®	Diamond section	Fliese®	number	
TFAS90-20-15-33 D711 T645-J3 E Furioso	D711/J3	20 × 15	20.5 × 33	60157693885 1)	
TFAS90-20-15-33 D711 T645 E	D711	20 × 15	20.5 × 33	69014185720 2)	

¹⁾ For grinding wheels such as Quantum, Vortex (SG, TG, XG, ES, special corundum etc.), of grit size 80 - 120

Igel® / pro-dress®

A robust dressing tool for straight dressing of peripheral and plane surfaces. Igel® are easy to handle and very economical in use. Their main advantage is higher dressing feed speeds.

Specification	a t	Dimensions	nensions	Grit size Igel®	Order number
	ct	Diamond section	Holder		
HIG3.5-8-11-MK1-40 D711 H710	3.5	Ø 8 × 11	MK1 × 40	D711	66260195960 ³⁾

³⁾ For grinding wheels made of fused alumina abrasives, grit size 60 - 80

Pro-dress® is of similar design to Igel®. Its area of application is straight dressing peripheral and plane surfaces with fine and finest grinding wheel grit sizes. The low cutting pressure makes this dressing tool ideally suited for OD grinding and surface grinding.

Profile diamond tools

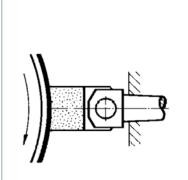
Profile diamonds are tools which have to meet highest demands. These tools are used in areas where highest profile accuracy is required.

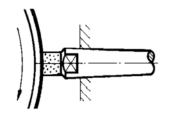
C		Dimensions				Order
Specification	ct	α	R	Length	Diameter	number
40/250 L	0.33	40°	0.250	45.5	Ø 9.52	66260339381

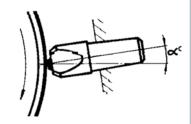
Single point dressing tools

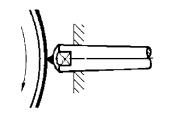
Single point dressing tools are suitable for straight grinding wheels and simple profiles. Depending on quality, the diamonds have several usable points which can be rotated. This is not possible for single-use diamonds with only one point.

Specification	Diamond quality	ct	Working points	Holder	Order number
LEA-1-VATOM-MK1-40	Vatom	1	3	MK1 × 40	66260382005









²⁾ For grinding wheels made of fused alumina abrasives, grit size 80 - 120

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WINTER dressing device

With rotating SiC grinding wheel (centrifugal clutch) for dressing diamond and cBN grinding wheels, complete with one wheel each of 37 C60-MV and 39 C802-15V. **Order no. 66260195821**



Replacement grinding wheels	For grit sizes	Order number
37C46-N5VS	D91 to D181	69936679412
39C60-MV	D64 to D126	66253051624
39C802-IV	≤ D64	66253052726
Accessories	1 set consisting of: 3 clutch segments, 3 springs and 3 screws	66260274670

Only use dry; subsequent sharpening with WINTER stone previously soaked in water only as necessary.

Cleaning and sharpening stones for diamond and cBN grinding wheels

Cleaning and sharpening stones	WINTER	Order number
WINTER stone No. 1AW (100×20×20)	White corundum, vitrified bonded, 60 mesh Sharpening of resin bonded grinding wheels Grit size < D46	66260395639
WINTER stone No. 2 (100×24×13)	White corundum, vitrified bonded, 180 mesh Sharpening of resin bonded and metal bonded grinding and cutting wheels Grit size \geq D46	66260195816
WINTER stone No. 3 (100×40×15)	Silicon carbide, rubber-bonded, 80 mesh Cleaning and sharpening of electro-plated and vitrified bonded grinding wheels and pins	66260195817
WINTER stone No. 3A (80×15×10)	see WINTER stone No. 3	66260389357
WINTER stone No. 3B (100×50×25)	see WINTER stone No. 3	66260386167
WINTER stone No. 4 (90×70×20)	Ruby allumina, vitrified bonded, 60 mesh Sharpening of metal bonded grinding wheels Grit size ≥ D251	60157642665
WINTER stone No. 5 (100×50×25)	see WINTER stone No. 2	66260389054

Cleaning and sharpening stones	<u>flex()vit</u>	Order number
Stone WA150GV (25×25×150)	Cleaning and sharpening of vitrified and resin bonded grinding wheels $\geq \text{D54}$ Recommended for sharpening Q-Flute 2	69936621643
Stone WA220GV (25×25×150)	Cleaning and sharpening of vitrified and resin bonded grinding wheels	69936621630
Stone WA320GV (25×25×150)	Cleaning and sharpening of vitrified and resin bonded grinding wheels $\leq \text{D46}$	69936651380

All dimensions in mm

Compendium

The WINTER brand represents over 160 years of heritage and grinding experience. Many companies worldwide involved in industrial production benefit from this expertise.





180 Service

In addition to design and production of grinding tools, WINTER offers you a multitude of services.

182 Glossary

Compiled for you: this little reference guide explains terms around grinding: bonds, roughness, material removal rates, etc.

192 Index

This catalogue-spanning index helps you to easily find the right information for your application and the corresponding grinding tools.

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Whom to ask first?
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help?

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Service

Competition is keen, and cost pressures are acute. To improve productivity and technical capability, you need a supplier who co-operates efficiently. WINTER not only provides high performance grinding tools but can also assist in analysing your processes, to identify the best solution, and then to implement it together with you.

Advice

Our field service engineers and customer service team are here to help, and can offer advice on all WINTER products and grinding processes. Together with product management and our application engineering team, customised solutions will be found which meet your needs.

Product Development

WINTER, as the grinding industry's technology leader, invests heavily in Research and Development. Basic research supports new customer-specific product and application developments at our global Technology Centres. Our EGTC (European Grinding Technology Centre) with the R&D Department in Norderstedt, closely co-operate with our

Research and Technology Centres in the USA, France and China.

Process Optimisation

At our EGTC (European Grinding Technology Centre), we can evaluate your grinding processes using sophisticated sensing and measurement systems which you may not have access to. So we can demonstrate improvements to your process without interrupting your production. On your factory floor, our application and development engineers continue to support you. Our dedicated specialists are expert in the field of complex grinding systems, and can advise on new production strategies with the help of innovative process diagnostic technology. The result for customers is a fine-tuned production process, and optimised day-to-day operations.

Training and Continuing Education

We offer regular seminars on current issues and developments at our European Grinding Technology Centre (EGTC) in Norderstedt. Economic and advanced production processes are reviewed with top-class experts from different parts of the industry. We invite internal and external consultants on specific subjects to comment on the technological state-of-the-art and development trends.

Ask your field salesman for the latest calendar of scheduled seminars and get yourself registered.

Specific training programmes can also be arranged according to your individual requirements.

Just contact us - we will gladly make an offer that meets your needs.

WINTER offers seminars on topics such as:

- Tool Grinding Technology Forum (expert panel discussion)
- Grinding (basic training)
- Grinding fluids (focused technology review)
- Dressing technology (focused review)



ervice

Field Instrumentation System (FIS)

Optimise your production process

Have us make a FIS process analysis and optimise your production process: field instrumentation system is a portable system to monitor and measure your grinding process. Exact and comparable data is obtained and can contribute to increase your performance:

- Process optimisation, reduction of cycle time
- Prolongation of tool life time
- Machine and process studies
- Analytical determination and benchmarking

Give it a try!



MDress - Mobile Dressing Unit

For better grinding results

Almost every CNC grinding machine can be upgraded by MDress, the mobile rotary diamond dressing unit. Using MDress ensures highly precise reconditioning of grinding wheel profiles. The grinding wheel achieves its ultimate axial and radial running truth directly on the main spindle. Our customers are enabled to test, for example, vitrified bonded grinding wheels, on the CNC grinding machine and obtain a more economic grinding result.

Our application engineers will give you support, to demonstrate an optimised dressing process with the MDress dressing system on your machine at your premises.

Just contact us.



RFID – Radio Frequency Identification

This technology makes it possible to transfer stored data from the grinding wheel to the grinding machine. The advantages are

The increased level of transparency

- Integrated tool-life monitoring
- · Automated scanning and storage of tool use

Shorter set-up times

- Direct access to grinding wheel data by the machine control system
- Elimination of operator error in manual recording and entry of data

Improved profitability

 Reduced machine downtime by automatic data transfer between machine and grinding wheel



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For your reference: a short explanation of grinding terms

Bonds

To meet the challenges of the wide diversity of grinding applications, it is inevitable that a wide range of bond systems is required. Bonds are categorised according to the fundamental material type used, and many variations exist within each type.

Resin Bond Systems

These are based on either phenolic or polyimide resins, usually together with added fillers, as well as the abrasive grains. Resin bonds are at the lower end of the hardness scale, and are used in a wide range of applications due to their fast and cool grinding behaviour.

Sintered Metal Bonds

Most metal bonds are based on bronze, although harder systems may be based on steel or even hardmetal. Sintered bronze bonds are relatively soft and at their softest can overlap the hardest resin bonds. Steel and hardmetal bonds are more wear resistant, so therefore act harder and grip the abrasive grains more strongly, leading to longer tool life, although the abrasive can sometimes appear blunt.

Metal bonded grinding wheels generally grind more slowly, in most applications acting harder, and more grinding heat is developed than in resin bonded wheels. However, metal bonds can also readily dissipate heat, which also impacts the grinding process. Metal bonds are ideal for grinding wheels with sharp edge profiles, and for machining abrasive materials that would otherwise wear the bond. Furthermore, metal bonds are shock-resistant, and are suitable for very aggressive operating conditions. Metal bonds are mostly used in wet grinding. Special variants are crushable, brittle metal bonds that can be dressed on the machine in a special crushing process. These bonds are especially useful in creep feed grinding.

Electroplated Bonds

In this bond system, the metal bond is deposited electrolytically onto a bronze or steel body. The grit is tenaciously achored by the bond, and grain tips can protrude from the bond layer by 30 - 50 % of the grain diameter. This leads to a grinding layer with a very high material-removal-rate capability. However, only the outermost grain layer acts in this way, which is why these tools are mainly designed in single-layer versions. Such single layer bond systems are suitable for profiled wheel bodies of all kinds; profile accuracy is dependent on the grit size specified.

Vitrified Bonds

Vitrified bonds are based on fusible glasses combined with fillers and the abrasive grains. While resin and metal bonds are generally fully dense, vitrified bonds are usually produced with a defined porosity, and are available in different hardness levels. This variation in porosity and hardness is analogous to the vitrified bonds of conventional grinding wheels. The main features of vitrified bonds are:

- Good dressability and profileability
- Free-cutting due to the porosity and self sharpening behaviour
- Fluid availability, due to porosity, in the grinding zone allows cool grinding at low grinding forces
- High cutting speeds and material removal rates are possible.

Concentration

According to the WINTER system, the concentration value defines the volume fraction of diamond or cBN in the abrasive layer as follows:

Diamond				
Concentration	Carat / cm³	Volume %		
C50	2,2	12,5		
C75	3,3	18,75		
C100	4,4	25		
C125	5,5	31,25		

cBN			
Concentration	Carat / cm³	Volume %	
V120	2,09	12	
V180	3,13	18	
V240	4,18	24	
V300	5,22	30	

These definitions are not applicable for single layer electroplated tools.

Conditioning

Conditioning of a grinding wheel consists of dressing and cleaning:

Dressing		Cleaning
Profiling	Sharpening	
Influences macrostructure	Influences microstructure	Influences microstructure
Produces concentricity and grinding wheel profile	Generates topography and grain exposure by eroding the bond	Removes chips from chip space
Need: Shape or re-shape the wheel surface	Need: Create grit protrusion	Need: No change in the surface

Cubic Boron Nitride (cBN)

Boron nitride is found in two structural modifications: Cubic boron nitride (cBN) has the zinc-blende crystal structure equivalent to diamond, and has a hardness just a little below that of diamond. The graphite-like hexagonal modification of boron nitride (hBN) is soft and is used as a lubricant.

Compared to diamond, cBN has technological and economic advantages when grinding materials having a chemical affinity to carbon, such as steels and ferrous alloys. Applications for cBN are becoming increasingly economic, and cBN grinding of workpieces with hardness as low as 50 HRC have been demonstrated.

Diamond

Diamond is one of the three carbon modifications (the others are graphite and the fullerenes) and, with a Moh's hardness of 10, diamond is the hardest material known. The grinding (Rosiwal) hardness is 140 times higher than that of alumina. Because of its hardness and wear resistance, diamond is used for grinding hard, brittle and short-chipping materials. Examples are tungsten carbide, glass, ceramics, quarz, semiconductor materials, graphite and wear-resistant thermal spray alloys as well as hard-facing alloys, plastics with glass fiber reinforcement, and other difficult to machine materials. Both natural and synthetic diamonds are used in industrial applications.

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- Natural diamond: these diamonds were created in the earth's mantle under high pressure and temperature (1200 1400°C). Both single crystals (octahedrons, triangles...) and crushed grit (boart) are used in industrial diamond tools
- Synthetic diamond: synthetic diamond grits are formed in presses in a very high pressure/high temperature (HP/HT)
 process, at up to 60000 bar and 1500°C, using a variety of solvent/catalyst materials which help to convert graphite
 into diamond.
- MCD: large synthetic diamonds that are produced in a HP/HT process similar to synthetic diamond grit.
- PCD: polycrystalline diamond pieces formed by sintering micronized diamond particles together with a binder under HP/HT conditions.
- CVD: these diamonds are manufactured by gas phase deposition (methane, hydrogen) at low pressure using a
 vacuum system.

Direction of Rotation Indicator

Resin and metal bond diamond and cBN grinding wheels always show an indicator for the direction of rotation. At the end of the production chain of a multilayer grinding wheel is the profiling and sharpening process. In the sharpening process, a bond tail is formed behind each of the active abrasive grains. This bond tail supports the grain and prevents the grain from untimely fracture. If the wheel is mounted the wrong way round, this bond tail would precede the grains during cutting, which would lead to lower chip-space, increased grinding pressure, and early grain fracture. Therefore, it is important to adhere to the rotational direction shown by the indication arrow or to re-sharpen the grinding wheel before use, if you chose to change the direction of rotation.

Dressing = Truing + Sharpening

It is necessary to distuinguish between the key wheel preparation steps of truing, sharpening and cleaning of the grinding wheel surface.

Dressing describes the processes of truing and sharpening a grinding wheel. When grinding with conventional alumina or silicon carbide wheels, "dressing" is the combined process of truing and sharpening. However, for superabrasive grinding wheels containing either diamond or cBN abrasives in a resin or metal bond, after truing, a separate sharpening step is usually required to remove some of the bond material and expose the grains. In addition, the grinding wheel surface must be cleaned (Dressing + Cleaning = Reconditioning) periodically. The dressing interval depends upon the grinding process parameters being used, and the type of workpiece material being ground.

Grinding wheel truing generates the correct geometric shape, develops the necessary concentricity, and also removes any surface contamination. In so doing, worn blunted grains are either removed or resharpened, and fresh grains are exposed. To achieve optimum results, dressing tools, dressing parameters and dressing strategy must be finely tuned to the grinding wheel and grinding process. Therefore, different tools and methods are used, such as either alumina-based or SiC sharpending stones, SiC grinding wheels, the WINTER brake-dressing device, CNC rotary dressers, diamond dressing sticks, rotary profile dressers, etc.

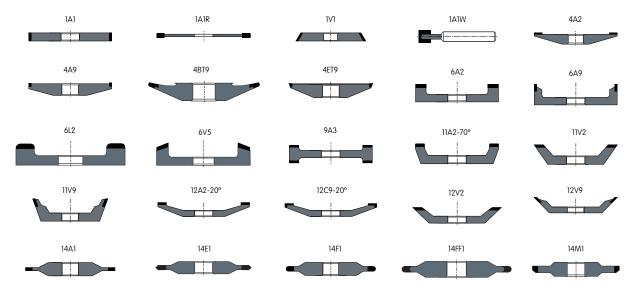
Our engineers can offer advice to help you chose the best method for your application.

FEPA

The Federation of European Producers of Abrasives (FEPA) is a non-profit European organisation which publishes safety guidelines and standards for conventional and superabrasive (diamond and cBN) grinding tools as well as loose abrasive grain (see grit sizes). It also provides standards for the most common grinding wheel shapes and dimensions.

FEPA-Shapes

These drawings show the most important grinding wheel geometries:



Grinding

According to DIN 8589, grinding is defined as material removal using geometrically undefined cutting edges. All grinding wheels with either diamond or cubic boron nitride (cBN) are grinding tools according DIN 8589. The "cutting edges" are composed of the diamond or cBN grit.

Grinding Ratio (G-Ratio)

The grinding-ratio is calculated as a ratio of the ground workpiece volume V_w to the wheel wear volume V_s .

Grinding Wheel Bodies

The body of a grinding wheel provides the static and dynamic stiffness to the tool. Dependent on the kind of grinding layer, it may consist of aluminium, filled resin, brass, steel or ceramics. The body significantly influences the vibration behaviour and the thermal conductivity of the grinding wheel; the following table shows examples for superabrasive grinding wheel bodies.

Body material type	Label	Vibration Absorbtion	Heat Transmission	Mechanical Stiffness
Resin with metal fillers	Н	medium	sufficient	good
Resin with non-metallic fillers	B or D	good	bad	satisfactory (not sufficient with thin- walled bodies)
Aluminium	Α	bad	good	very good
Steel	E	bad	satisfactory	very good
Copper	С	bad	very good	very good
Composite material	CFK	good	bad	good

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Grit Sizes

The seive-sizes for diamond and cBN range according to FEPA standards (also ISO 6106) and are shown in the following table. As abrasives always contain a range of grit sizes, the values given for average grit sizes and particles per carat are approximations. D-prefix indicates diamond, while B-prefix refers to cBN.

FEPA grit size D or B	Standard [Mesh]	Average Grit Size [µm]	Particles per ct
1181	16/18	1100	60
1001	18/20	930	100
851	20/25	780	160
711	25/30	660	270
601	30/35	555	450
501	35/40	465	760
426	40/45	395	1200
356	45/50	330	2100
301	50/60	280	3500
251	60/70	233	6000
213	70/80	197	10000
181	80/100	167	16000
151	100/120	140	28000
126	120/140	118	46000
107	140/170	99	80000
91	170/200	83	135000
76	200/230	72	200000
64	230/270	63	300000
54	270/325	55	460000
46	325/400	47	750000
39	400/500	38	1400000
33	500/600	33	2100000

WINTER has its own classification for fine and microgrit sizes. FEPA standards are similar (M 63...M1.0).

WINTER diamond classification	Grit size [µm]
D 25	40 - 60
D 20 C	34 - 45
D 20 B	25 - 37
D 20 A	20 - 30
D 15	8 - 25
D 15 C	15 - 25



WINTER diamond classification	Grit size [µm]
D 15 B	10 - 20
D 15 A	8 - 15
D 10	6 - 10
D7	5 - 10
D 5	3 - 7
D 3	2 - 5
D1	0,5 - 2
D 0,7	0 - 1
D 0,25	0 - 0,5

Hardness of Abrasives

The hardness value of a material is generally influenced by the method of measurement. Different measuring methods and equipment result in different scales and units which cannot easily be compared. Thus several scales exist, for example:

Moh's hardness: abrasion behaviour (measure of scratch resistance)
Rosiwal hardness: stock removal behaviour (measure of resistance to stock removal)
Vicker's Microhardness: indentation behaviour (resistance to penetration)

In the following table, different hardness values for abrasives are given and compared to some reference materials:

Material	Moh's Hardness	Rosiwal Hardness	Vickers Microhardness (HV)
Diamond	10	140,000	10,000
cBN	9,9		9,000
Silicon carbide	9,6		2,600
Corundum	9	1.000	2,060
Quarz	7	120	1,120
Manganese	5	6.5	540
Gypsum	2	1.25	36
Talc	1	0.03	2.6

Diamond's stock removal resistance (Rosiwal hardness) is 140 times higher than corundum (alumina), even though its penetration hardness (Vickers) is only 5 times higher.

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Material Removal Rate

The material removal rate, MRR or Q_{w} , is expressed in mm³/s and defines the volume of workpiece material ground per unit time (second).

The specific material removal rate, MRR' or $Q'_{w'}$ refers to the removal rate per millimetre of wheel contact width and is expressed in units of [mm³/(s · mm)].

Parameters influencing Grinding Results

The table shows some correlations between process variables and the grinding results.

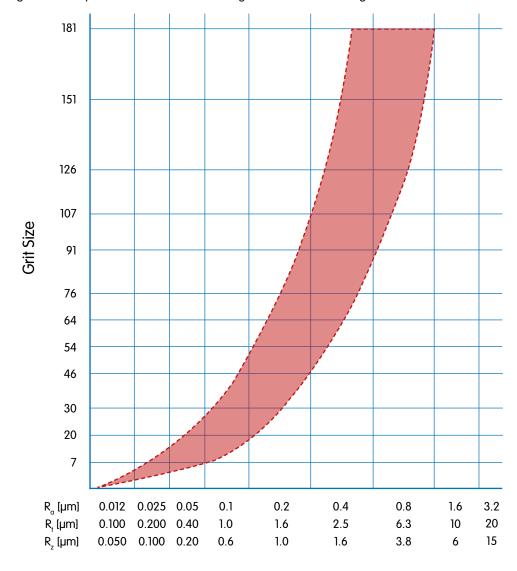
Influencing P	Appraisal criterion Paramters	Cutting Force F F= f()	Grinding Ratio G G= f()	Roughness R _a R _a = f()	Temperature ϑ ϑ = f()
ıramters	Cutting Speed v _c (m/s)	F V _c	G V _c	R_{α} V_{c}	θ
Machine- and Operation Paramters	Material Removal Rate Q _w (mm³/s)	FQ	G Q _w	R_{α} Q_{w}	9 Q _w
Machine-	Coolant (Oil Content)	F Oil Content	G Oil Content	R _a Oil Content	9 Oil Content
Grinding Wheel	Grit Size (μm)	F Grit Size	G Grit Size	R _a Grit Size	9 Grit Size
Grinding	Concentration (Carat/cm³)	F Concentration	G	R _a Concentration	9 Concentration

Roughness

The surface roughness of a ground workpiece is influenced by many diverse parameters:

- Grit size of abrasive grain
- Concentration of abrasive grain
- Specification of bond system
- Type and hardness of work piece
- Grinding process
- Grinding parameters
- Dressing parameters

A general and qualitative correlation between grit size and surface roughness is shown below:





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Specification

The specification is the general description of the grinding tool and contains all relevant information concerning the product's features. In general, the specification always contains the following details:

Example:

11V9	100-2-10-20	D126	K+888R	C75	Α
Shape	Dimension	Grit Size	Bond	Concentration	Body Material

Furthermore, the specification can contain additional information regarding drawing index, production method, structure, and other details.

Superabrasives

Diamond and cubic boron nitride are the hardest materials existing in industry today, according to the current state of knowledge. The levels of hardness of diamond and cBN are significantly higher than those of conventional abrasives like alumina (corundum) and silicon carbide (see hardness).

Wear effects on diamond and cBN

The hardness of an abrasive grit type alone is not sufficient to determine the grinding tool's grinding behaviour. Diamond and cBN grains can wear in many ways, causing different effects.

Primarily, there are two main types of wear.

Mechanical wear:

Abrasion, micro-chipping of cutting edges, grit macrofracture, and breakout of grain from the bond.

Chemical and thermal wear

Carbon diffusion, graphitization, oxidation, and reaction with grinding fluids.

Diamond not only reacts with iron (above a certain threshold temperature), but also with chromium, vanadium and tungsten. cBN does not show chemical reaction with iron or other metals.

Therefore, cBN has proven to give better tool performance when machining, for example, high speed steel, although it is not as hard as diamond.

An outward sign of the occurance of thermo-chemical wear is the rapid appearance of wear flats on the grains, when no grain chipping from mechanical wear is present.

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WINTER Diamond and cBN Tools for the Automotive, Turbine and Bearing Industries



Catalogue No. 2: Tools

WINTER Diamond and cBN Tools for the Tools Industry



Catalogue No. 3: Flat and Crystal Glass

WINTER Diamond Tools for Machining Flat and Crystal Glass



Catalogue No. 4: Electronics, Photovoltaics , Optics, Ceramics and Composites

WINTER Diamond and cBN Tools for the Electronic and Photovoltaic Industries, for Machining Optical Glass, Ceramics & Composites



Catalogue No. 5: Dressing Tools

WINTER Diamond Tools for Dressing of Grinding Tools



Catalogue No. 6: WINTER Standard Catalogue

Stock Programme for Diamond and cBN Tools



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Thank you to Tom, who had his photo taken for our front cover. Tom's mother works in our shipping department.

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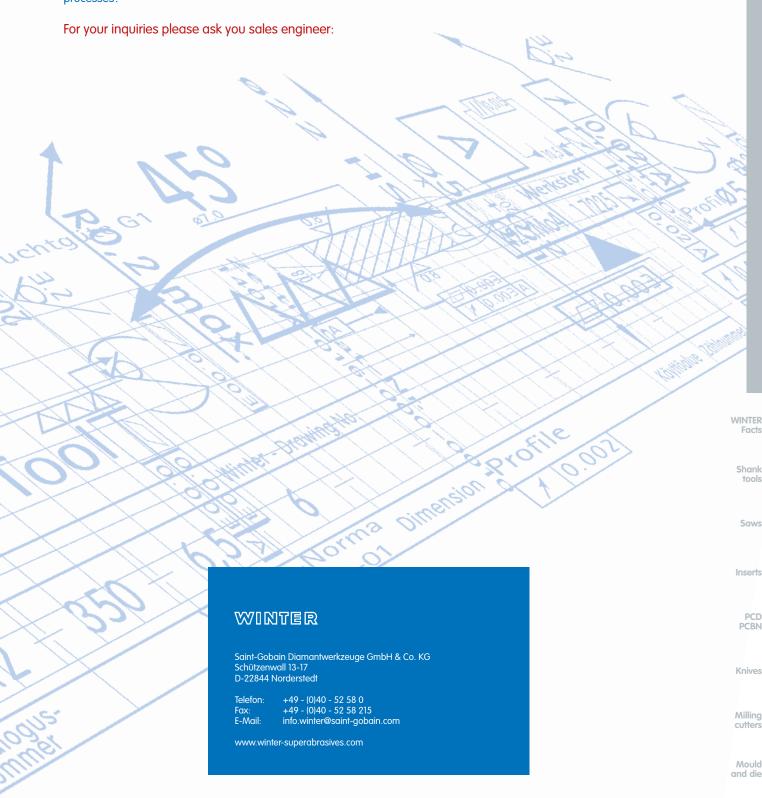
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Whom to ask first? Who is my nearest contact person? Where can I get quick and easy help on grinding tools and grinding processes?



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