WINTER
diamond tools
CBN tools

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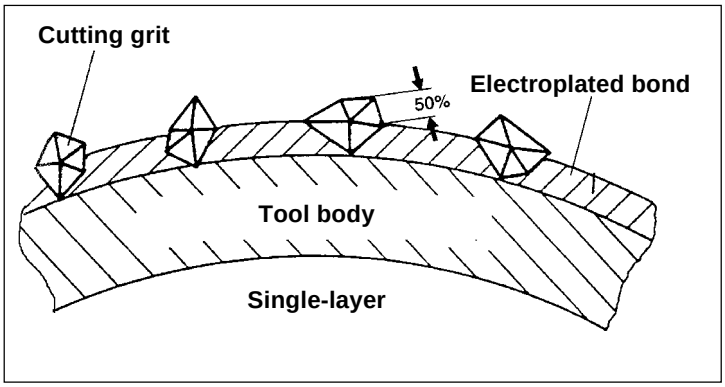
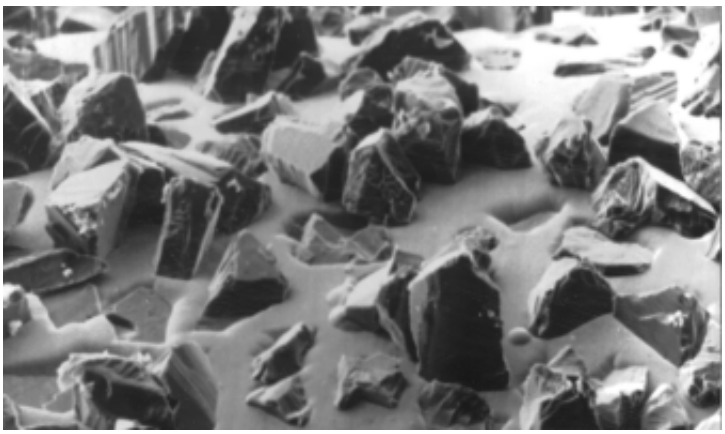
Introduction

WINTER's know-how in the manufacture of electroplated diamond tools has been gathered in decades of experience, producing consistently high product quality. The manufacturing process is carefully controlled for optimum matching of tool to application, with specific selection of electroplated bond, diamond type, grit size and surface geometry.

WINTER electroplated diamond tools with the identification "S" have a single diamond layer in which the diamond grits are bonded by an electroplated deposit. The bond is built up starting from the body of the tool, leaving the points of the diamonds about 50% exposed; thus the diamonds protrude to differing extents from the bond, within the scope of the grit size distribution and their random position on the tool body. This means that they are free-cutting and highly resistant to wear right from the start, requiring only relatively low grinding or contact pressure – higher pressure simply increases tool wear without improving stock removal.





Grinding layer of an electroplated single-layer diamond tool in new condition.

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Fig. 1: Cubic Boron Nitride (CBN)

Introduction

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

International Standardization of Grit Sizes for Diamond and Cubic Boron Nitride

Sieve Grit Designations							**Micron Powder Size**		
Diamond FEPA Standard **WINTER designation**		**CBN** FEPA Standard **WINTER designation**		**Diamond + CBN** US Standard ASTM-E-11-70		Nominal mesh size to ISO 6106 DIN 848 Part 1, 1980	**Diamond WINTER designation**	**CBN WINTER designation**	For comparsion grit size
narrow	wide	narrow	wide	narrow	wide	µm			µm
D1181	**D 1181**	B1181	B 1181	**16/ 18**	**16/20**	1180/1000	**D 25**		32-52
D1001		B1001		**18/ 20**		1000/ 850	**D 20 B**	B 30	30-40
D 851	**D 852**	B 851	B 852	**20/ 25**	**20/30**	850/ 710	**D 20 A**		25-30
D 711		B 711		**25/ 30**		710/ 600	**D 15**		10-25
D 601	**D 602**	B 601	B 602	**30/ 35**	**30/40**	600/ 500	**D 15 C**		20-25
D 501		B 501		**35/ 40**		500/ 425	**D 15 B**	B 15	15-20
D 426	**D 427**	**B 426**	**B 427**	**40/ 45**	**40/50**	425/ 355	**D 15 A**	B 9	10-15
D 356		**B 356**		**45/ 50**		355/ 300	**D 7**	B 6	5-10
D 301		**B 301**		**50/ 60**		300/ 250	**D 3**	B 3	2- 5
D 251	**D 252**	**B 251**	**B 252**	**60/ 70**		250/ 212	**D 1**	B 1	1- 2
D 213		**B 213**		**70/ 80**		212/ 180	**D0.7**		0.5- 1
D 181		**B 181**		**80/100**		180/ 150	**D0.25**		< 0.5
D 151		**B 151**		**100/120**		150/ 125			
D 126		**B 126**		**120/140**		125/ 106			
D 107		**B 107**		**140/170**		106/ 90			
D 91		**B 91**		**170/200**		90/ 75			
D 76		**B 76**		**200/230**		75/ 63			
D 64		**B 64**		**230/270**		63/ 53			
D 54		**B 54**		**270/325**		53/ 45			
D 46		**B 46**		**325/400**		45/ 38			

◤ = Grits recommended by WINTER

FEPA = Fédération Européenne des Fabricants de Produits Abrasifs.

The grit sizes in which diamond files can be supplied are shown in the relevant tables. For other requirements please contact us.

NOTE:
CBN grits are **not used** on files, because the specific benefit of higher temperature resistance of CBN is not applicable in filing, but CBN is inferior to diamond in terms of hardness and wear resistance.

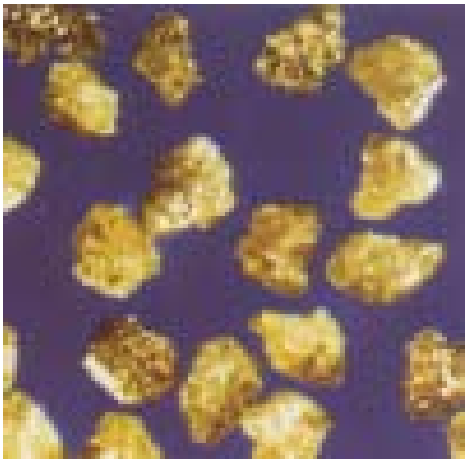

Fig. 2: Synthetic diamond

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Overview of materials

Material to be machined	Diamond files and diamond sawing wires	Diamond bandsaws
Aluminium oxide, presintered		X
Bones	X	X
Brake linings	X	X
Carbide	X	
Carbide (green)	X	X
Cast stone		X
Ceramics (tiles)	X	X
CFRP	X	X
Epoxy resin	X	X
Ferrites		X
Fish (frozen)		X
Glass (optical)		X
Graphite	X	X
GRP	X	X
Implants		X
Laminates	X	X
Minerals	X	X
Natural stone		X
Oxide ceramics	X	
Plaster		X
Quartz glass		X
Sand-lime brick		X
Silicon		X
Steel (hardened)	X	
Thermoset plastics	X	X

WINTER
diamond foles

Needle files for hand use

WINTER diamond files are mainly used in the tool and die making industry, where they are used for work on moulds and punching, drawing and stamping tools. They feature free-cutting ability, edge stability and long life.

Plastic screw-on handle

Profile	Cross section of core mm	Length of diamond layer mm	Overall length mm	Shank dia. mm	Grit size	Article No.
Flat blunt 2112	5 x 1 5 x 1	85 85	140 140	3 3	D91 D126	**80900017** **80900025**
Flat blunt with rounded edges 2112r	5 x 1	85	140	3	D91	**80900317**
Flat pointed 2122	5 x 1 5 x 1	85 85	140 140	3 3	D91 D126	**80900041** **80903314**
Triangular 2132	3.5 3.5 3.5	85 85 85	140 140 140	3 3 3	D20B D91 D126	**82090801** **80900074** **80900082**
Square 2142	2.5 2.5	85 85	140 140	3 3	D91 D126	**80900106** **80900114**
Screw-on handle						**55500073**

Grit sizes: **D126** for general application, **D91** for precision filing, **D20B** for special applications.
Other specifications on request.

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diamond foles

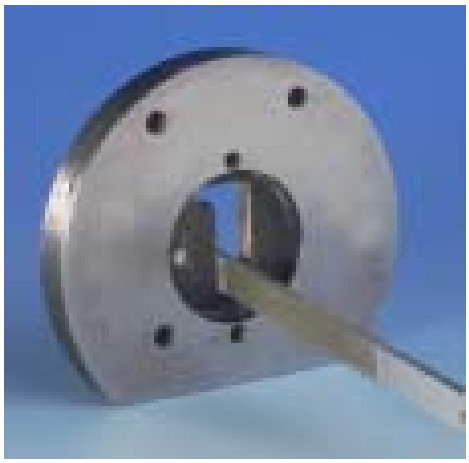
Needle files for hand use

Plastic screw-on handle

Profile	Cross section of core mm	Length of diamond layer mm	Overall length mm	Shank dia. mm	Grit size	Article No.
Half-round 2152	5 x 2 5 x 2 5 x 2	85 85 85	140 140 140	3 3 3	D20B D91 D126	**82090807** **80900130** **80900147**
Round 2162	Ø 3 Ø 3 Ø 3	85 85 85	140 140 140	3 3 3	D20B D91 D126	**80903696** **80900163** **80900171**
Knife 2172	5 x 1.5 5 x 1.5	85 85	140 140	3 3	D91 D126	**80900196** **80900203**
Crossing 2192	5 x 2 5 x 2	85 85	140 140	3 3	D91 D126	**80900252** **80900260**
Barrette 2102t	5 x 2 5 x 2	85 85	140 140	3 3	D20B D91	**80903688** **80900293**
Screw-on handle						**55500073**

Grit sizes: **D126** for general application, **D91** for precision filing, **D20B** for special applications.
Other specifications on request.

WINTER
diamond files

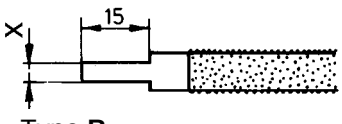


Files for hand and machine use

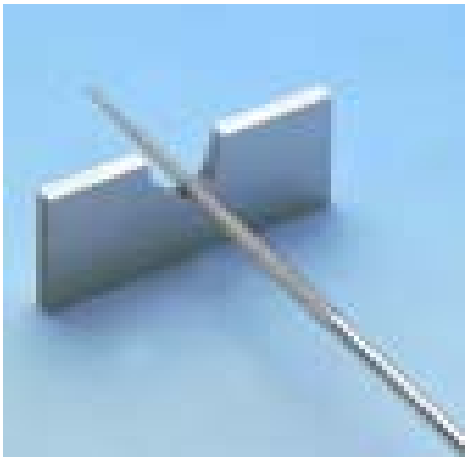
Profile		Cross section of core mm	Length of diamond layer mm	Overall length mm	Type	Grit size	Article No.
Flat	7	4.5 x 2	80	150	**A**	D91	**80900552**
		4.5 x 2	80	150	**A**	D126	**80900560**
	13	9 x 3.2	80	150	**A**	D91	**80900585**
		9 x 3.2	80	150	**A**	D126	**80900593**
		9 x 3.2	80	150	**A**	D181	**80900600**
	16	11 x 4	120	200	**A**	D91	**80900617**
		11 x 4	120	200	**A**	D126	**80900625**
		11 x 4	120	200	**A**	D181	**80900633**
Square	22	3	80	125	**A**	D126	**80900682**
	23	4	80	150	**A**	D91	**80900730**
	25	5	80	125	**A**	D91	**80900706**
	29	8	80	150	**A**	D126	**80900771**
	32	10	120	200	**B /** X= 6 mm	D126	**80900803**

Grit sizes: **D126** for general application, **D181** for rough filing, **D91** for precision filing.
Other specifications on request.

Type **A**



Type **B**



WINTER
diamond files

Files for hand and machine use

Profile		Cross section of core mm	Length of diamond layer mm	Overall length mm	Type	Grit size	Article No.
Triangular	45	8	80	150	**C/**X= 3.5 mm	D91	**80900941**
		8	80	150	**C/**X= 3.5 mm	D126	**80900958**
	48	10	120	200	**C/**X= 4.5 mm	D91	**80900974**
		10	120	200	**C/**X= 4.5 mm	D126	**80900982**
Round	70	Ø 3	80	125	**B/**X= 2 mm	D91	**80901151**
	76	Ø 6.3	80	150	**C/**X= 4 mm	D126	**80901224**
Half-round	89	5 x 3	80	125	**A**	D126	**80901346**
	92	8 x 3	80	150	**A**	D91	**80901395**
		8 x 3	80	150	**A**	D126	**80901402**
		8 x 3	80	150	**A**	D181	**80901410**
	96	10 x 5	120	200	**A**	D126	**80901435**

Grit sizes: **D126** for general application, **D181** for rough filing, **D91** for precision filing.
Other specifications on request.

Type **A** Type **B** Type **C**

WINTER
diamond files

Files for
hand filing machines (Diprofil)

Profile	Cross section of core mm	Length of diamond layer mm	Overall length mm	Shank dia. mm	Grit size	Article No.
Flat, 2 faces 309a	5 x 2	25	60	3	D126	**80901995**
Round 345	Ø 4	15	50	3	D126	**80902286**
Triangular 367	3.5	15	50	3	D91	**80903566**
373	4.5	15	50	3	D126	**80902586**
375	4.5	25	60	3	D126	**80902618**

Grit sizes: **D126** for general application, **D91** for precision filing.
Other specifications on request.

WINTER
diamond files
diamond sawing wires

Rifflers for hand use

Profile	Cross section of core mm	Length of diamond layer mm	Overall length mm	Shank dia. mm	Grit size	Article No.
 15R	4 x 2	25	155		D126	**80900358**
 18R	3 x 1.5	25	155		D126	**80900414**

Grit sizes: **D126** for general application.
Other specifications on request.

Sawing wires for hand and machine use

Profile		Cross section of core mm	Length of diamond layer mm	Overall length mm	Shank dia. mm	Grit size	Article No.
Round	701	Ø 0.80	65	130	0.5	D126	**80902731**
	702	Ø 1.30	65	130	1	D126	**80902748**
	704	Ø 2.30	65	130	2	D126	**80902764**

Clamping zone free of diamond on both sides (20 / 45mm)
Grit sizes: **D126** for general application.
Other specifications on request.

WINTER
diamond bandsaws

Diamond bandsaws for various application

Industrial production processes require cutting of a large number of materials (see also Overview of materials on page 5). Diamond bandsaws are gaining ever greater importance in this process. The diamond bandsaw blade has proved to be a successful problem solution in many applications. It comprises a commercially available bandsaw, coated with an electroplated diamond layer, so it can be used on practically all bandsawing machines.
The special WINTER know-how for manufacture and selection of bandsaw material has been developed in accordance with the needs of practical application.
Three different bandsaw types have become established, and are described in more detail on page 14.

Notes on selection of bandsaw type

1. Bandsaw cross section

The cross section should be specified as wide and as thick as possible. However, note the diameter of the pulley. Band thickness (dimension E) should be in the range 1:1000 with respect to the diameter of the pulley. Band height (dimension F) is determined by the type of cut. For straight cuts, specify the maximum possible band height.

For contours, band height should be selected as follows:

Smallest cuttable radius (mm)	16	40	65	95	145	185	305
Band height (mm)	6	10	12	15	20	25	30

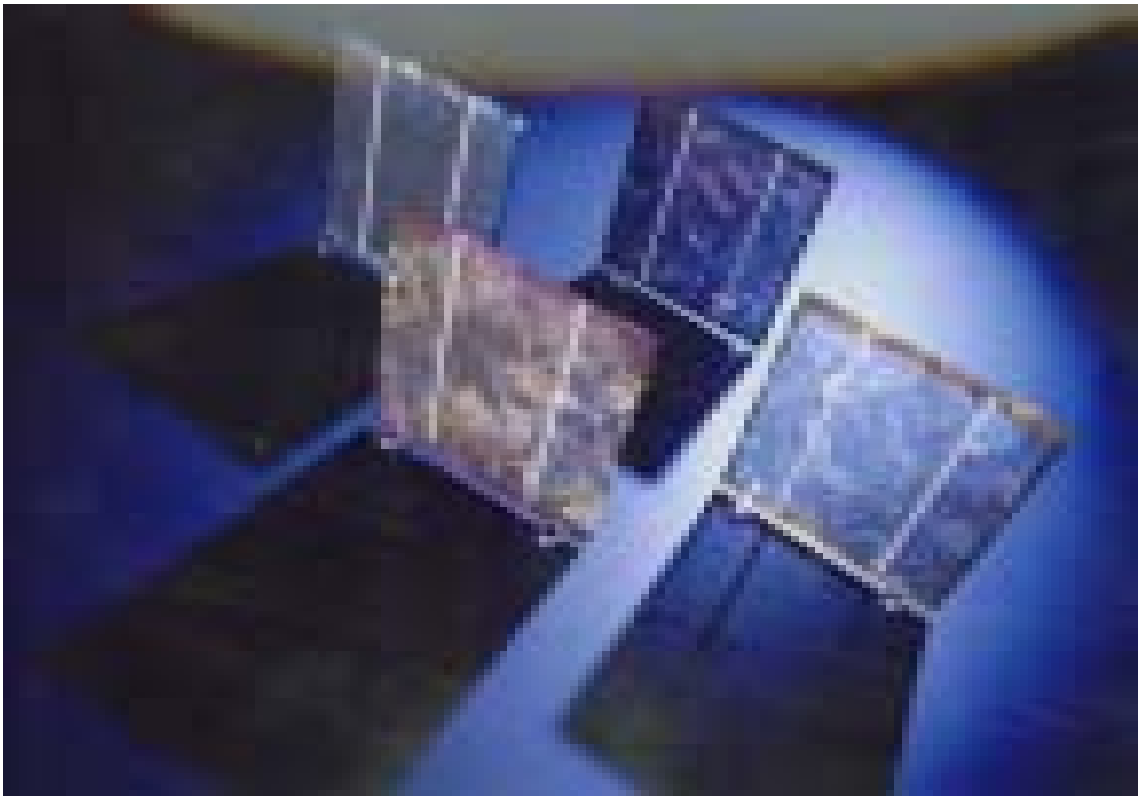
2. Cutting edge / tooth shape

In principle, cutting edge S37B can be used for cutting all materials. This cutting edge is recommended for thin-walled and delicate materials.
If segmented edges are used, there should always be two teeth simultaneously engaging the material. The advantages of segmented design are better transport of coolant and better chip removal, with softer, long-chipping materials. However, the cut edge on the material is somewhat rougher.

3. Diamond grit size

Specification depends on the desired surface finish, cutting characteristics of the material, cutting width and machine parameters. Long-chipping materials should be cut with coarser grit sizes.

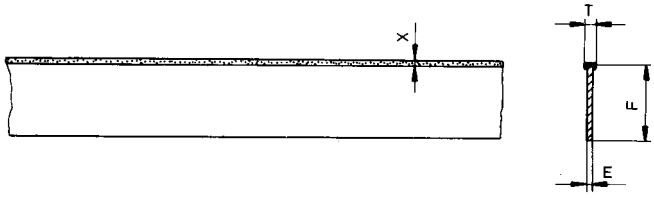
Application example of WINTER tools in advanced technologies e.g. in the photovoltaic industry



WINTER
diamond bandsaws

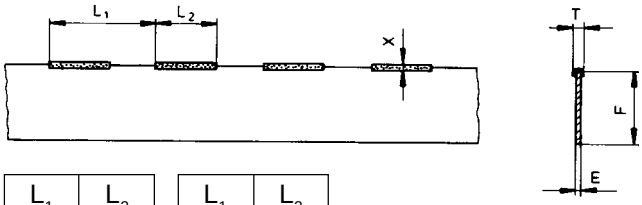
Diamond bandsaws for various applications

Type S 37 B
Continuous cutting edge
Depth of diamond layer X: 1.0mm



Type S 37 BA
Segmented cutting edge
Depth of diamond layer X: 1.0mm

Pitch L_1 and segment length L_2 according to specification or application.
The following variations are possible:

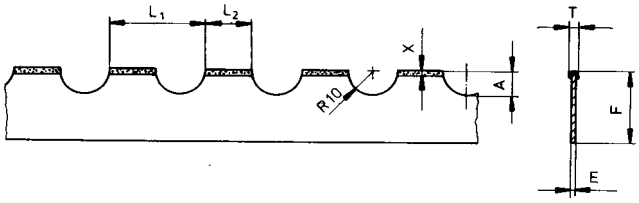


L_1	L_2
30	21
30	15
28	19
24	12

L_1	L_2
21	12
20	11
17.5	8.5
10	4

Type S 37 BC Segmented cutting edge

Pitch L_1 mm		Tooth height A mm
17.3	+ tooth length L_2	5
18.2	+ tooth length L_2	6
19	+ tooth length L_2	7
19.6	+ tooth length L_2	8
19.9	+ tooth length L_2	9
20	+ tooth length L_2	10



Tooth length L_2: 8 to 20mm variable
Depth of diamond layer X : 1.0mm

Diamond bandsaws for various applications

Band cross sections

Available band cross sections mm	Available diamond grit sizes "D" and resulting "T" mm							
F x E	D 46	D 64	D 91	D 126	D 181	D 213	D 301	D 427
	T	T	T	T	T	T	T	T
6 x 0.40	0.50	0.60	0.65	0.75	0.85	-	-	-
10 x 0.40	0.50	0.60	0.65	0.75	0.85	-	-	-
10 x 0.60	0.70	0.80	0.85	0.90	1.05	1.10	1.40	1.60
10 x 0.70	0.80	0.90	0.95	1.00	1.15	1.20	1.50	1.70
12 x 0.45	0.55	0.65	0.70	0.75	0.90	-	-	-
12 x 0.70	0.80	0.90	0.95	1.00	1.15	1.20	1.50	1.70
15 x 0.45	0.55	0.65	0.70	0.75	0.90	-	-	-
15 x 0.60	0.70	0.80	0.85	0.90	1.05	1.10	1.40	1.60
20 x 0.50	0.60	0.70	0.75	0.75	0.95	1.00	-	- -
20 x 0.60	0.70	0.80	0.85	0.90	1.05	1.10	1.40	1.60
25 x 0.50	0.60	0.70	0.75	0.75	0.95	1.00	-	-
25 x 0.60	0.70	0.80	0.85	0.90	1.05	1.10	1.40	1.60
25 x 0.70	0.80	0.90	0.95	1.00	1.15	1.20	1.50	1.70
30 x 0.70	0.80	0.90	0.95	1.00	1.15	1.20	1.50	1.70
30 x 0.80	0.90	1.00	1.05	1.10	1.25	1.30	1.60	1.80
Other dimensions	Maximum stretched length: 10,000 mm (L ± 20 mm) All bands endless welded.							

Order example:

Article No.	Stretched length L	Tooth length L_2	Cutting width T	Depth of diamond layer X	Height of band F	Thickness of band E	Pitch L_1	Tooth height A	Diamond grit size	Diamond concen-tration	No. of segments
S 37 B	2500	-	0.85	1.0	10	0.40	-	-	D 181	S 33	-
S 37 BA	3000	11	1.40	1.0	15	0.60	20	-	D 301	S 33	150
S 37 BC	3600	10	1.50	1.0	25	0.70	30	10	D 301	S 33	120

WINTER
diamond tools
CBN tools

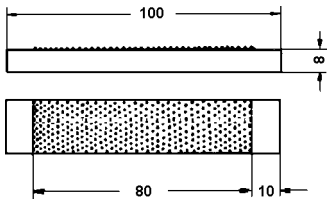
Further
electroplated diamond tools

1S 09 H-80-20-8

Order No. 80902901

WINTER diamond dressing stick

For dressing resin-bond CBN grinding wheels (KSS) on surface grinding machines. Use with cutting fluid, subsequent sharpening with WINTER Stone required.



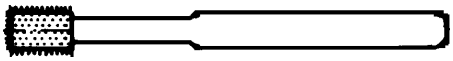
1S 09 G-72.5-0.7-2-89 / D91 / G820 / S 33

Order No. 80903200

“BALDUIN” ampoule cutter

For medical staff.
For fast, easy opening of glass ampoules.

Electroplated grinding pins, from Ø 0.4mm, and grinding wheels



See brochure “Diamond and CBN tools for ID grinding”.
This brochure is available from us on request.

Cut-off wheels

See brochure: “Diamond and CBN tools for hard, short-chipping materials”.
This brochure is available from us on request.

Customised manufacture of electroplated tools is also possible.

Please send us your inquiry so that we can submit a quotation.