

VITRIFIED BONDED GRINDING TOOLS with CBN and diamond



C O M E T



VITRIFIED BONDED GRINDING TOOLS WITH CBN AND DIAMOND

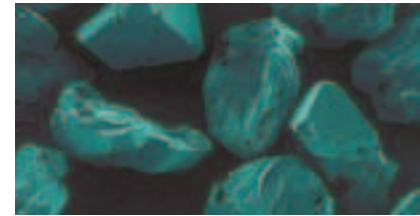
Highly productive grinding of hard-to-work materials, such as high-speed steels, tool steels, high-alloy chromium, titanium and nickel steels, and very hard tungsten carbides, requires appropriate grinding tools to ensure cost-efficient machining of these materials, as well as fulfill their greater dimensional accuracy and ground surface quality requirements.

ADVANTAGES:

- Small tool wear:
 - long tool life;
- Low dressing frequency:
 - reduced nonproductive time;
 - reduced tool inspection costs;
 - ideal for mass production;
- Simple dressing:
 - frequent dressing with diamond dressing tools is not required as is the case with conventional vitrified bonded grinding tools;
 - additional opening of the grinding surface structure is not necessary;
 - suitable for automated dressing;
- Good profile stability:
 - it is easier to achieve constant dimensions and shapes;
- Can be produced with controlled porosity, which enables:
 - cold grinding due to reduced workpiece heating;
 - pores serve as openings for chip removal;
 - pores feed the coolant into the grinding zone;
 - open structure of these grinding tools enables optimal penetration of sharp grit into the workpiece surface;
- Small cutting forces:
 - reduced probability of workpiece overheating;
- High productivity;
- High-quality workpiece surface;
- Cost reduction;



CBN grit



Diamond grit

Applicability with respect to workpiece material:

Diamond grinding wheels	CBN grinding wheels
Tungsten carbides	High-speed steels (HSS)
Grey alloy	Tool steels
Ceramics	Alloyed tool steel
Ferrites	Bearing steels
Glass	Stainless steel
Precious stones (gems)	Chromium steels
Stone	Cementation steels
Concrete	Heat-resistant steels
Plastics	Special casting steels
Brick	

Grinding tool quality symbols

Abrasive grit quality	Abrasive size	Hardness		Structure/ Porosity		Bond	Concentration
01B	126	P		4		V	C100
01B	427	Coarse	L	Soft	1	V = Vitrified	50
02B	301		M		2		75
03B	252		N		3		100
04B	181		O		4		125
01D	151		P		4		150
02D	126		R		5		175
	107		S		6		200
	91		T	Hard	7		
	76						
	64						
	54						
	46						
	40						
	30						
	25	Fine					

Abrasive grit quality

The quality of superabrasive grits should be selected depending on the type of grinding and the quality of workpiece material.

DIAMOND grit (D) for non-steel materials (tungsten carbides, ceramics, etc.).

CBN grit (B) for steels.

The quality of superabrasive grits is represented by their properties, such as shape, friability, hardness, toughness, thermal stability and type of grit coating. For special cases or problems, please consult Comet's technical department.

ABRASIVE GRIT	DIAMOND - D	CBN - B
GRIT TYPE	01 D	01 B
	02 D	02 B
		03 B
		04 B

Properties of diamond and CBN grit

PROPERTY	Unit	Diamond	CBN
Density	g/cm ³	3.52	3.48
Hardness (Knoop)	kg/mm ³	7000	4700
Hardness (Mohs)	-	10	9/10
Thermal stability	°C	600-700	1100-1400



Grit size

Grit size is designated according to the FEPA standard and should be selected on the basis of the required surface. The size of abrasive grits determines the effect of grinding and the quality of ground surface. The most cost-effective choice is the coarsest granulation that still achieves the required surface finish. If a greater amount of material needs to be removed during grinding, a combination of coarse grinding and finish grinding is the most cost-effective.

When a vitrified bonded grinding tool with CBN and diamond grit is used instead of a Al-oxide- containing grinding tool, a much finer granulation should be selected in order to achieve the same surface quality (Al-oxide 100 replaces B76). For granulations according to the FEPA standard, see comparative table below, which also presents values according to the US standard ASTM and grit sizes in mm.

	FEPA	ASTM E 11 70 (Mesh)	Size (mm)
Coarse	427	40/50	0.425 - 0.300
	301	50/60	0.300 - 0.250
	252	60/80	0.250 - 0.180
Medium	181	80/100	0.180 - 0.150
	151	100/120	0.150 - 0.125
	126	120/140	0.125 - 0.106
	107	140/170	0.106 - 0.090
	91	170/200	0.090 - 0.075
Fine	76	200/230	0.075 - 0.063
	64	230/270	0.063 - 0.053
	54	270/325	0.053 - 0.045
	46	325/400	0.045 - 0.038
Very fine	40	600	
	30	700	
	25	800	

Surface roughness depends on the size of superabrasive grits.

Grit size according to FEPA		Surface finish R_a (micron)	Surface quality N	Grinding method
Diamond	CBN			
	B181	1.12	N7 - N6	Very coarse grinding
	B151	0.75	N6	
	B126	0.66	N6	
D181	B107	0.53	N6 - N5	
D151	B91	0.50	N6 - N5	
D126	B79	0.45	N6 - N5	
D107	B64	0.40	N5	
D91	B54	0.33	N5 - N4	Medium fine grinding
D79	B46	0.25	N5 - N4	
D64	B35	0.18	N4	
D54		0.16	N4 - N3	
D46		0.15	N4 - N3	
Microns			N3 - N2	Polishing

Bond

In addition to abrasive grit, the bond with which the abrasive grit is bonded into the grinding tool is also very important for effective grinding. The hardness, structure and thus also grinding properties of the grinding tool depend on the type and amount of the bonding material within the grinding tool.

CBN and diamond grinding tools are distinguished by a solid bond and good profile durability.

Concentration

Concentration indicates the amount of superabrasive grits in the grinding tool.

A concentration of 100 denotes 4.4 carat in 1 cm³ of the abrasive layer (1 carat equals 0.2 g).

The value of 100 is most commonly used.

Values between 100 and 200 are used for internal grinding.

Increased concentration of superabrasive grit increases the tool's grinding capacity, life and productivity.

Concentration	CBN in diamond grit		
	Carat/cm ³	g/cm ³	Vol (%)
50	2.2	0.44	12.5
75	3.3	0.66	18.8
100	4.4	0.88	25
125	5.5	1.10	31.3
150	6.6	1.32	37.5
175	7.7	1.54	43.8
200	8.8	1.76	50

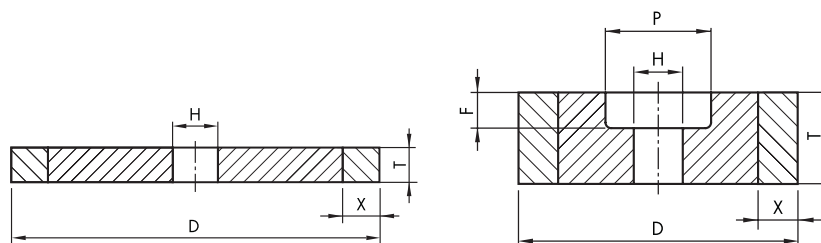
Recommended grinding parameters for vitrified bonded CBN grinding tools

	Grinding tool peripheral speed m/s	Workpiece peripheral speed m/min	Longitudinal feed rate m/min	Transverse feed rate mm/stroke	Grinding depth mm
External cylindrical grinding	30-35	10-25	0.5-1.0	/	0.01-0.05
Internal cylindrical grinding	8-35	10-30	0.3-1.0	/	0.002-0.005
Flat surface grinding	30-35	/	8-10	0.3-0.6	0.04-0.1
Threading	30-45	0.2-0.5	/	/	up to 0.4 mm/stroke
Tool sharpening (for machining of metals)	35-40	/	1.0-2.0	/	0.03-0.08
Slotting	25-30	/	2.0-2.5	/	0.01-0.06

1A1

D x T x H - X - P x F

Straight grinding wheel*



Ordering example:

1A1 125 x 15 x 20 - 3 - 50 x 5

02B126P4VC100

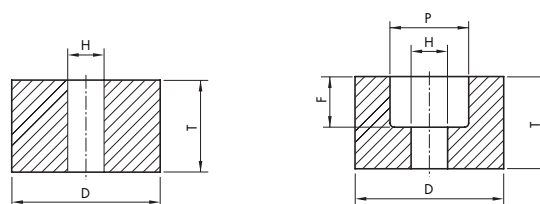
D	T	H	X	P	F
25	6-20		3		
32	6-20		3		
40	6-20		3.5		
100	6-20	by	3.5	by	max.
125	6-20	agreement	3.5	agreement	T/2
150	6-20		3.5		
175	6-20		3.5		
200	6-20		5		

*abrasive ceramics core

1A8

D x T x H - P x F

Grinding roll



Ordering example:

1A8 16 x 16 x 4 - 6 x 8

01D107P4VC125

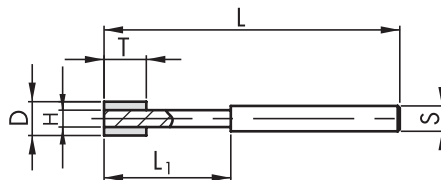
D	T	H	P	F
6	4-15	3		
8	2-15	3 (4)		
10	4-16	3 (4)		
13	4-16	4 (6)	by	max.
16	4-16	4 (6,8)	agreement	T/2
18	4-16	4 (6)		
20	4-20	6 (8,10)		



1A8W

D x T x H - S x L

Grinding tool - mounted point



Ordering example:

1A8 16 x 16 x 4 - 6 x 8

01D107P4VC125

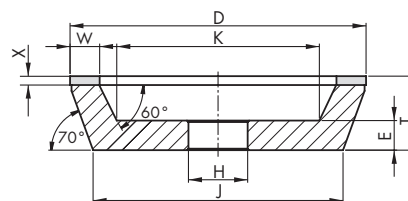
D	T	H	S	L	L1
6	6	3	6	70	20
8	8-10	3(4)	6	70	20
10	8-10	3(4)	6	70	
13	8-10	4(6)	6	70	
16	8-15	4(6)	(6) 8	70	
18	8-15	4(6)	(6) 8	70	
20	8-15	6(8)	(6) 8	70	



11A2

D x T x H - W x X x E

Grinding tool - conical cup*



Ordering example:

11A2 125 x 23 x 20 - 10 x 5 x 10

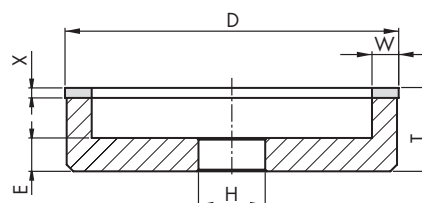
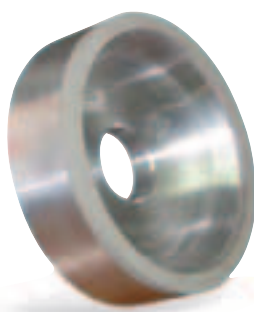
01D107P4VC100

D	T	H	W	X	E
50	13		5, 10	2, 3, 5	8
75	18		5, 10	2, 3, 5	10
100	22		5, 10	2, 3, 5	10
125	23	by	5, 10	2, 3, 5	10
150	23	agreement	5, 10	2, 3, 5	10
175	23		5, 10	2, 3, 5	10
200	23		5, 10	2, 3, 5	10

6A2

D x T x H - W x X x E

Grinding tool - cylindrical cup*



Ordering example:

6A2 125 x 22 x 20 - 5 x 3 x 10

01D107P4VC100

D	T	H	W	X	E
50	20		5, 10	2, 3, 5	8
75	20		5, 10	2, 3, 5	10
100	22		5, 10	2, 3, 5	10
125	22	by	5, 10	2, 3, 5	10
150	22	agreement	5, 10	2, 3, 5	10
175	25		5, 10	2, 3, 5	12
200	25		5, 10	2, 3, 5	12

*aluminium core

Quality of grinding wheels

External Cylindrical Grinding

Ground material		Roughing	Finishing
Steels 	Hardened, low-alloy steel up to 62 HRc	02B107Q3VC100	02B64Q3VC100
	Hardened, high-alloy steel over 62 HRc (example HSS)	02B107P4VC100	02B64P4VC100
	Stainless steel (example INOX)	02B107P4VC100	02B64P4VC100
Hard metals 			
	Tungsten carbides	01D107P4VC100	01D46P4VC100

Internal Cylindrical Grinding

Ground material		Roughing	Finishing
Steels 	Hardened, low-alloy steel up to 62 HRc	02B107P4VC125	02B46P4VC125
	Hardened, high-alloy steel over 62 HRc (example HSS)	02B107P4VC125	02B46P4VC125
Hard metals 			
	Tungsten carbides	01D107P4VC125	01D54P4VC125





COMET IN THE WORLD

OUR OWN COMPANIES

COBRA G.m.b.h.**COFLEX L.t.d.****ECOPACK d.o.o.****TOROFLEX G.m.b.h.**A
M
SI
D

JOINT VENTURES

COMET-ASIA**IDNINA a.d.****ZOMKO k.f.t.**IR
MK
H

DISTRIBUTORS

ABRACS L.t.d.**COMET d.o.o.****COMSIT S.R.O.****DOMET-PROM d.o.o.****EOSPECIAL d.j.l.****EXPOTRADE ABRASIVE s.r.l.****FENGTAI****JOSEPH GERSON L.t.d.****LOUIS VIELVA I.t.d.a.****MOHSENI TRADING Co.****VIVA-B****W.GRANOWSKI Pty. Ltd.**GB
HR
SK
HR
BA
RO
CN
GR
CL
IR
BG
AU



C O M E T

Umetni brusi in nekovine, d.d.
Tovarniška 5, 3214 Zreče, Slovenija
<http://www.comet.si> E-mail: comet@comet.si
Tel.: +386 (0)3 7575 000
Fax: +386 (0)3 7575 100