OPEN JOINT-STOCK COMPANY

abrasives & grinding

SCIENTIFIC INDUSTRIAL COMPLEX

CUBIC BORON NITRIDE AND DIAMOND **GRINDING TOOLS** ABRASIVE STONES AND PASTES

SAINT-PETERSBURG
2014

OJSC “Research and Production Complex “Abrasives and Grinding”

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Introduction

Open Joint Stock Company "Research and Production Complex "Abrasives and Grinding" is a modern high-performance enterprise for production of superhard materials (diamond, cubic boron nitride) abrasive tools on resinoid and vitrified bonds. Our tools are widely used for grinding, sharpening, superfinishing and honing.

Our production facilities are located in the North-West of the Russian Federation, in St.-Petersburg. Since 2000 OJSC "Research and Production Complex "Abrasives and Grinding" is the successor of "All-Union Scientific and Research Institute for Abrasives and Grinding" ("VNIIASH").

Founded in 1931, "VNIIASH" - All-Union Scientific and Research Institute for Abrasives and Grinding - was the only research organization in the Soviet Union and then in Russia and CIS dedicated to the development of new abrasive tools, technologies of their production and application. During the existence of the Institute all the technical documentation for the factories in process of construction and renovation, most part of abrasive materials production and application technological processes was developed. Many developments were awarded by State Prizes, and one of them was synthesis and industrial dissemination of cubic boron nitride (elbor).

Throughout the research and production complex existence our technologists have developed and mastered over 4500 kinds of abrasive tools. Today we do not allow ourselves "to mark time": developping new types of bonds, purchasing modern equipment, holding staff trainings, our company is constantly striving for enhancement. The complex of such measures and the use of innovative technology enables the manufacture of tools characterized by high performance and durability that ensures economic effect of their application.

Strict compliance with the contractual terms of orders execution and high quality of products have enabled the supply of manufactured tools to leading companies in mechanical engineering, woodworking and oil and gas industry of Russian Federation, neighbouring countries and beyond.

OJSC "RPC "Abrasives and Grinding" is the manufacturer, and that is exactly why we are always open to dialogue regarding the most acceptable conditions of work with consumers.

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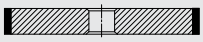
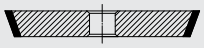
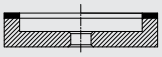
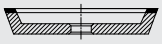
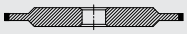
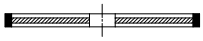
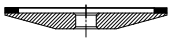
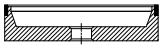
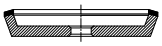
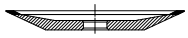
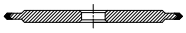
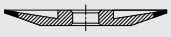
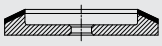
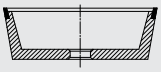
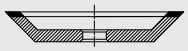
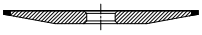
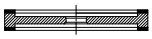
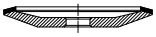
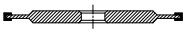
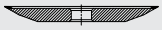
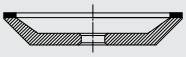
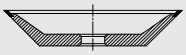
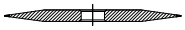
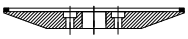
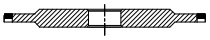
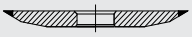
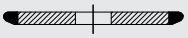
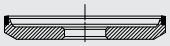
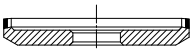
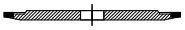
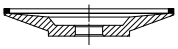
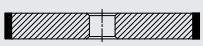
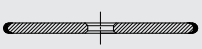
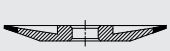
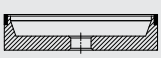
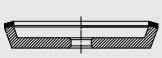
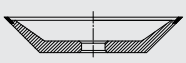
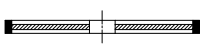
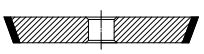
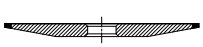
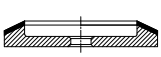
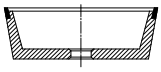
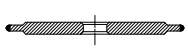
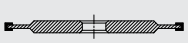
1A1 14 	1V1 16 	6A2 18 	11V2 20 	12A9 21	14A1 23 
1A1R 15 	4A2 25 	6A9 19 	11V5 20 	12R4 21 	14EE1 24 
1E1 15	4BT9 17 	6V5 18 	11V9 20 	12V2-45 22 	14F1 24
1EE1 15	4ET9 17 	9A3 19 	12A2-20 21	12V5-20 22 	14U1 23 
1FF1 16	4V2-30 18 	11A2 19	12A2-45 22 	12V9 23 	SKE 24
1E1 25 	1K222 (9) 26 	4A2 26	14B1 27 	K222 (3) 28	K222 (6) 29
1E1 (2) 25 	1K222 (10) 26	4FV9 27 	14ER1 28	K222 (4) 27 	K222 (7) 29
K222 (1) 25 	1K700 26	14A1 27 	K222 (2) 28	K222 (5) 28	K222 (8) 29 

Standard sizes for precise tools produced for imported CNC machines

1A1 30 	1FF1 31 	4BT9 32 	6A9 32 	11V5 33 	12V9 34 
1A1R 30 	1V1 31 	4ET9 32 	6V5 33 	11V9 33 	14F1 34 
14U1 34 					

Standard sizes for precise sharpening tools produced for woodworking industry

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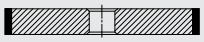
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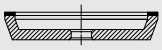
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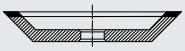
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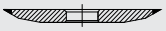
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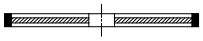
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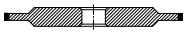
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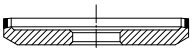
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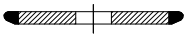
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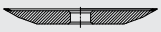
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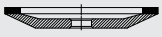
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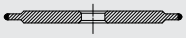
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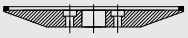
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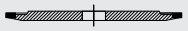
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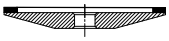
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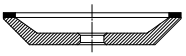
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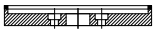
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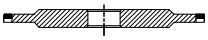
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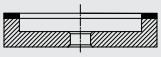
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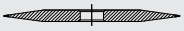
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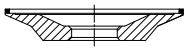
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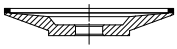

Standard sizes for CBN vitrified bonded tools produced

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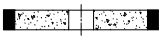
1A2 48

1E1 (1) 49

1E6Q 50

1V1 (2) 50

4V9 51

1A1 48

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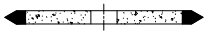
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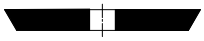
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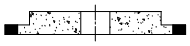
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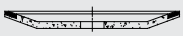
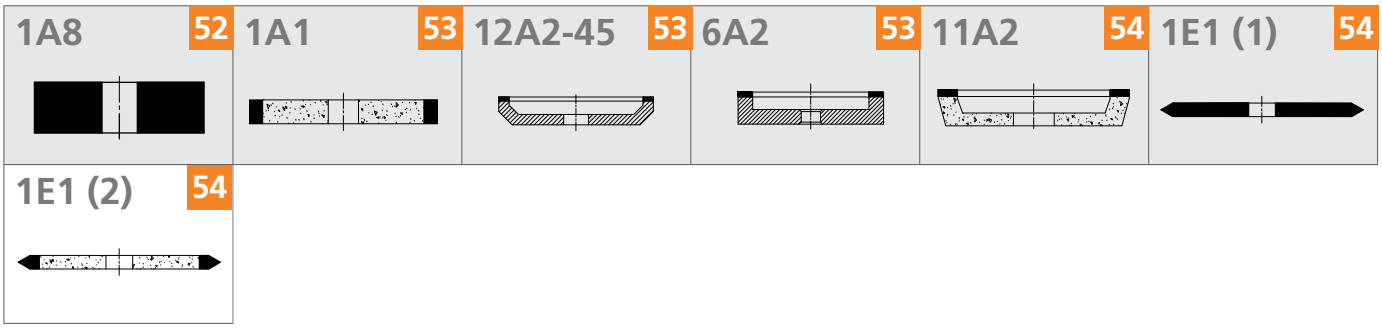


Standard sizes for SD vitrified bonded tools produced



Standard sizes for CBN vitrified bonded stones produced

Reference information

Superhard materials

Synthetic diamond (SD) and cubic boron nitride (CBN) (trademarks-CBN kubonit, borazon) are superhard materials (SHM), the hardness of which exceeds the hardness of conventional abrasives.

Advantages of SHM tools

Due to the unique physical characteristics synthetic diamond and cubic boron nitride are used for high-performance processing. The main advantages of grinding wheels on the basis of these materials are:

- High durability and wheel profile retention;
- Reducing the processing time;
- Reduced auxiliary time for tool replacement;
- Exclusion of structural changes in the material being processed by the low temperature of grinding;
- Improving the quality of processed surface of parts.

Basic characteristics of CBN and SD compared to other grinding materials

Grinding material	Density, kg/m^3	Microhardness, 102 * MPa	Resistance to heat, K
Synthetic diamond	3480-3560	1000	1000-1100
Cibic boron nitride	3420-3450	800-950	1400-1500
Borium	2380-2520	370-470	1000-1100
Silicone carbide	3120-3200	330-360	1600-1700
Electrocorundum	3960-3980	200-230	2000-2100

SHM grit sizes and marks of superhard materials

Under controlled synthesis SHM with different physical and mechanical properties (strength, structure and shape of the crystals) are produced.

Synthetic diamond polishing powders of marks AC6-AC20, grit size 250/200-50/40.
Synthetic diamond micro-polishing powders of marks ACM and ACH, grit size 40/28-1/0.
Cubic boron nitride polishing powders of marks CBN30, CBN50, grit size 250/200-50/40.
Cubic boron nitride micro-polishing powders of mark CBN30, grit size 40/28-1/0.
* See grit sizes correspondence table on page 7.

Grit sizes correspondence table for domestic and foreign SHM powders

Old Russian standard GOST 9206-80	New Russian standard GOST P 53922	FEPA		US- standard (ACTME-11)	ISO-standard (6106-2005)
micron	micron	Diamond	CBN	Mesh	micron
250/200	251	D251	B251	60/70, 70/80	251/212
200/160	213, 181	D181	B181	80/100	212/180,180/150
160/125	151	D151	B151	100/120	150/125
125/100	126	D126	B126	120/140	125/106
100/80	107, 91	D107, D91	B107, B91	140/170, 170/200	106/90, 90/75
80/63	76	D76	B76	200/230	75/63
63/50	64	D64	B64	230/270	63/53
50/40	54, 46	D54, D46	B54, B46	270/325, 325/400	53/45,45/38

Tool grit size is chosen according to the processing conditions and the workpieces quality requirements.

Grit size selection recommendations

When choosing grit size it is necessary to take into consideration following factors:
- the processing performance;
- the treated surface roughness;
- the type of finish (roughing, finishing).

For higher grinding performance when roughing it is necessary to use larger grit size.
The smaller the grit size, the lower the treated surface roughness is.

Approximate values of roughness depending on SHM grit size:

SHM grit size	Surface roughness, micron	
	Ra	Rz
160/125 (151)	1,4-1,6	5,6-8,0
125/100 (126)	1,2-1,4	5,0-5,6
100/80 (107)	1,0-1,2	4,0-5,0
80/63 (76)	0,6-0,8	2,5-3,2
63/50 (64)	0,4-0,6	1,6-2,5
50/40 (54)	0,2-0,4	1,0-1,6

Approximate values of roughness depending on the type of bond:

Elbor wheel grit size	Roughness Ra, micron	
	Vitrified bond	Resinoid bond
200/160 (B 213)	1,20…0,63	0,80…0,50
125/100 (B 126)	0,50…0,32	0,32…0,25
80/63 (76)	0,32…0,16	0,20…0,16
50/40 (B 54)	0,20…0,16	0,16…0,12

* See grit sizes correspondence table on page 8.

SHM concentration

The concentration determines the SHM content in one volume unit of tool working layer:

Relative SHM concentration, %	SHM content, carat/cm^3
50	2,2
75	3,3
100	4,4
125	5,5
150	6,6
175	7,7
200	8,8

Concentration choice recommendations

High concentrations (125, 150, 175, 200%) are used for:
- Deep grinding;
- Shallow thickness of tool working layer;
- Strict requirements regarding tool profile retention during processing;
- Grit sizes > 100/80 (107).

Low concentrations (50, 75%) are used for:
- Large width of tool working layer;
- Grit sizes < 100/80 (107).

Bond types for diamond and elbor tools

Various resinoid and vitrified bonds are used for the manufacture of diamond and cubic boron nitride tools.
The choice of bond directly affects the processing, since it determines the the wheel hardness, abrasion resistance, heat dissipation, removal of cuttings from the cutting zone, the possibility of self-sharpening during grinding.

Resinoid bond
Resinoid bonded wheels are used for solid alloy, nonmetal materials, high-speed and structural steels processing.

Vitrified bond
Vitrified bonded wheels are characterized by high cutting performance and its persistence during operation, high working profile durability that provides high precision, less heat generation, what contributes to high surface layer quality of workpieces.

Recommendations for grinding

Cooling during processing
The grinding process with cooling is preferable to grinding process without cooling from the viewpoint of tool durability and processing performance. Cooling improves grinding conditions by reducing cutting zone temperature, removing sludge, lowering the possibility of grinding burns on the treated surface.

Processed materials:

DIAMOND (SD)

- Hard alloy
- Composites based on diamond and CBN
- Hard alloy together with steel
- Hard alloy together with composites
- Instrumental (cutting) ceramics
- Oxide and non-oxide technical ceramics
- Semiconducting materials
- Glass, quartz, glass ceramics
- Marble, granite
- Precious and semi-precious stones
- Heat resistant alloys
- Titanium alloys
- Surfaces after nitriding,
- carbonitriding, chrome plating
- Plasma and detonation coatings

CUBIC BORON NITRIDE (CBN)

- Carbon and high-speed instrumental steels
- Structural and hardened alloy steels
- Case-hardening, nitriding and carbonitriding steels
- Stainless steels (corrosion resistant) and heat-resistant steels
- Heat-resistant nickel-based alloys
- Titanium alloys
- Gray cast, high-strength and hardened (chilled) irons
- Wear Resistant Coatings - plasma, detonation, hard chrome
- Ferrites

Workpieces:

DIAMOND (SD)

- Cutting and measuring tools of hard alloy
- Cutting tools of composites based on diamond and CBN dies, punches
- Gauges
- Compressor blades

CUBIC BORON NITRIDE (CBN)

- Cutting and measuring tools of high speed steel
- Bed plates of metal-cutting machines
- Gear wheels
- Bearing rings
- Lead screws and hobs
- Crankshafts and camshafts
- Spline shafts
- Crush rollers

Grinding speed choice

When grinding materials of usual processability grinding speed increase under otherwise equal conditions typically leads to:

- Grinding wheels durability increase;
- Processed surface roughness reduction;
- Cutting force Pz / Py decrease;
- Wheels wear decrease;
- Increased temperature in the cutting zone.

Formula to calculate the wheel speed depending on the spindle rotation frequency and the wheel diameter

$$V = \frac{\pi * D * n}{60 * 1000}$$

Where V – wheel speed (m/sec)
D – wheel diameter (mm)
n – spindle rotation frequency (r/min)

Table to determine spindle speed depending on the speed and the diameter of the wheel.

Ø мм	Surface speed Vc (m/s)								
	20	**25**	**30**	**35**	**40**	**45**	**50**	**63**	**80**
20	19100	23870	28650	33420	38200	42970	47750	60160	76390
25	15280	19100	22920	26740	30560	34380	38200	48130	61120
32	11940	14920	17900	20890	23870	26860	29840	37600	47750
40	9550	11940	14320	16710	19100	21490	23870	30080	38200
50	7640	9550	11460	13370	15280	17190	19100	24060	30560
63	6060	7580	9090	10610	12130	13640	15160	19100	24250
80	4770	5970	7160	8360	9550	10740	11940	15040	19100
100	3820	4770	5730	6680	7640	8590	9550	12030	15280
115	3320	4150	4980	5810	6640	7470	8300	10460	13290
125	3060	3820	4580	5350	6110	6880	7640	9630	12220
150	2550	3180	3820	4460	5090	5730	6370	8020	10190
175	2180	2730	3270	3820	4370	4910	5460	6880	8730
180	2120	2650	3180	3710	4240	4770	5310	6680	8490
200	1910	2390	2860	3340	3820	4300	4770	6020	7640
230	1660	2080	2490	2910	3320	3740	4150	5230	6640
250	1530	1910	2290	2670	3060	3440	3820	4810	6110
300	1270	1590	1910	2230	2550	2860	3180	4010	5090
350	1090	1360	1640	1910	2180	2460	2730	3440	4370
400	950	1190	1430	1670	1910	2150	2390	3010	3820
450	850	1060	1270	1490	1700	1910	2120	2670	3400
500	760	950	1150	1340	1530	1720	1910	2410	3060

Recommended grinding speed

CTM	Without cooling	With cooling
AC	15-20 м/с	20-60 m/sec
CBN	15-30 м/с	35-50 m/sec

Making an order for resinoid and vitrified bonded wheels

Marking example for ordering:

type	D	T	H	W	X	SHM mark	SHM grit size	Bond mark	Concentra-tion	Operating speed
1E1	125	10	32	4	5	AC6	125/100 (126)	D21	100%	50 m/sec

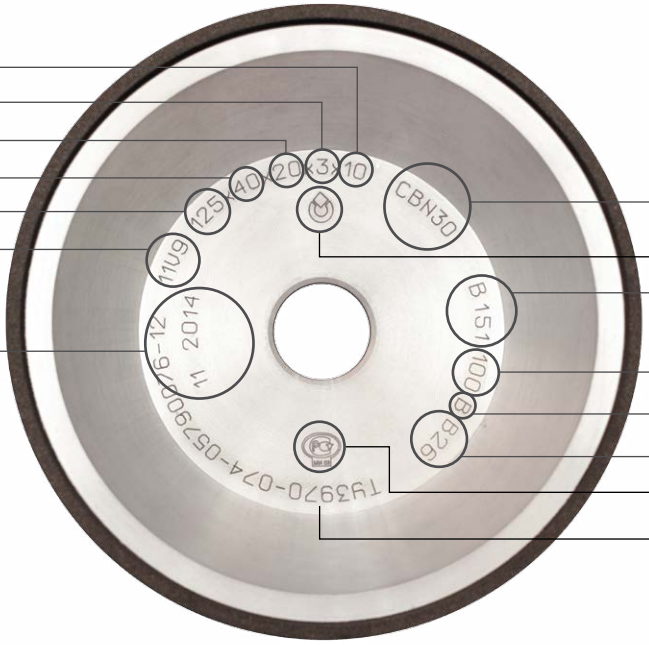
When ordering the wheel it is necessary to provide the following minimal information:

- type of the wheel;
- the size of the wheel (to follow strictly the sequence of wheel size notation, given at the end of each table of standard sizes);
- mark of abrasive material (SD or CBN);
- grit size;
- bond mark;
- concentration;
- the operating speed the wheel.

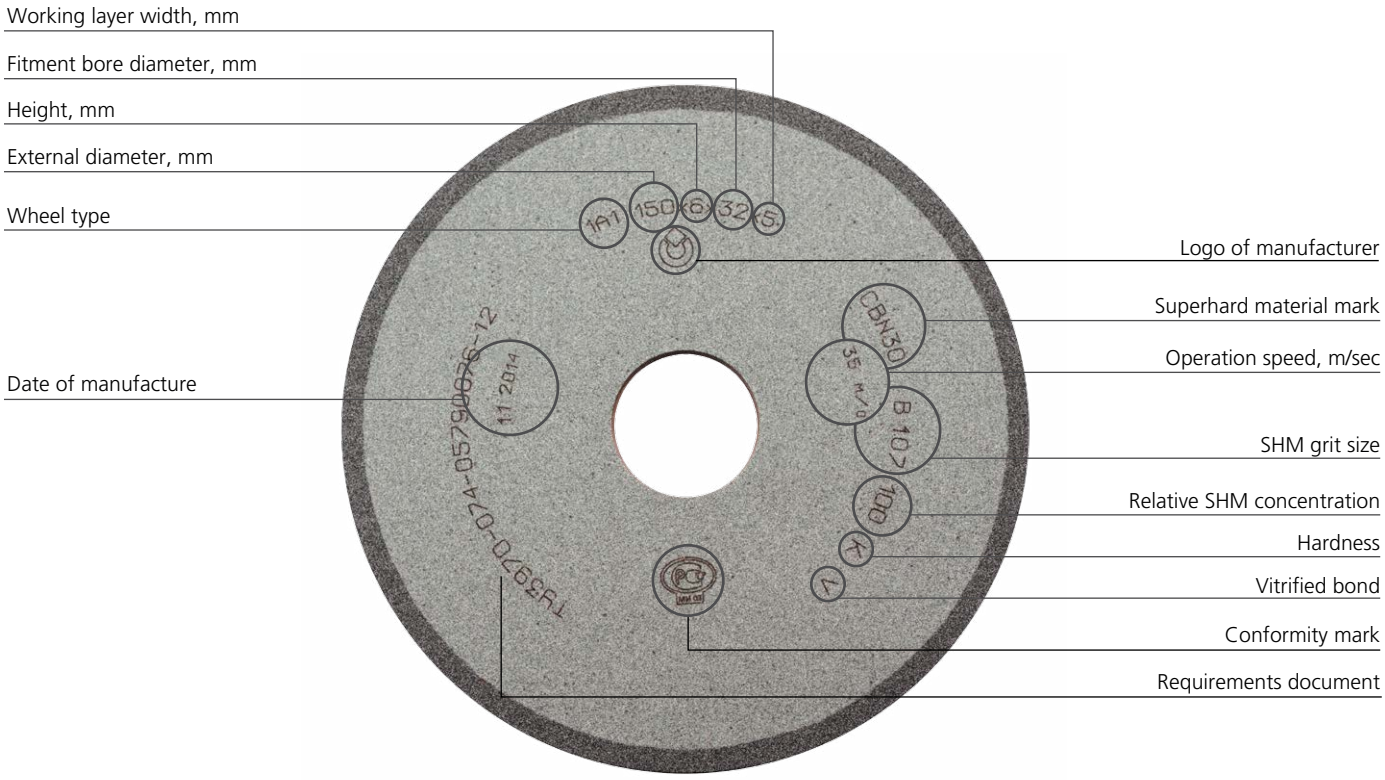
For the most accurate selection of wheel features for a particular grinding operation it is necessary to provide the following data:

- information about the machine: the type, the drive power;
- information about the workpiece: characteristic of the material, roughness parameter required value;
- mode of grinding: wheel rotation speed, workpiece rotation speed, longitudinal feed, cross feed, infeed, the type of coolant and its consumption.

Example of tool marking



Notation for resinoid bonded wheel



Notation for vitrified bonded wheel

Grinding tools on resinoid bonds (CBN, SD)

The main applications of grinding wheels on resinoid bonds are:

- sharpening
- profile grinding
- surface grinding
- cylindrical grinding
- optical grinding
- cutting

Diamond tools are used for processing:

- hard alloys
- structural and impact-resistant ceramics
- hard alloys with steel
- polycrystalline SD and CBN

Tools of CBN are used for processing:

- high-speed, instrumental steels
- hard-processing alloyed steels and alloys

Resinoid bonded wheels are produced with a relative SHM concentration in the layer of 50,75,100,125%.

Our company produces elbor and diamond wheels, both on traditional bonds and on new bonds.

The traditional bonds include: B2-01, V1-02, V1-01, V1-13, etc. They were put into production in the 70-80's of the last century, and nowadays they are considered to be obsolete.

In the mid-90s, our technologists have developed new types of bonds: D20, B20, D21, B21, B23, B24, D24 and D25, and in the early 2000s the production of other bonds of new type was launched: D26, B26, D27, D28, D30, B30 and D31, B31.

New bonds provide a significant increase of wheels resource, as confirmed by tests held on the largest industrial enterprises of Russian Federation, CIS and other foreign countries.

Resinoid bonds for diamond wheels

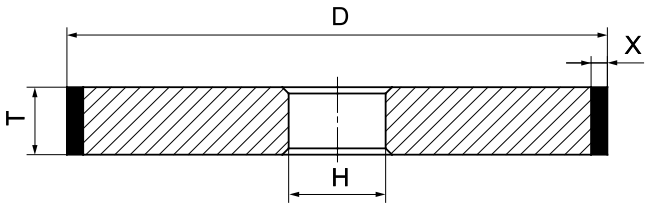
Old marking	New marking	Application requirements
B2-01	D20	Wheels are designed for multipass grinding of hard alloyed workpieces, they are caracterized by high cutting performance and moderate wear resistance when grinding without coolant.
B1-02 B1-01 B1-13	D21	Wheels are designed for multipass grinding of hard alloyed workpieces both with coolant, and without coolant, they have greater wear resistance than wheels on D20 bond. It is the standard bond for all types of processed materials.
B1-02, B1-01 B1-09, B1-11 B1-13, B2-01	D24	Wheels are designed for multi-pass and creep feed grinding of hard alloyed workpieces, including processing on CNC machines,for multipass grinding of hard-alloyed workpieces with steel base and some non-metallic materials both with and without coolant.
B2-01 B1-01	D25	Wheels are designed for hard alloyed workpieces multipass grinding with coolant, they have greater hardness and wear resistance than wheels on D21 bond.
B1-02, B1-01 B1-11 B2-02	D26	Wheels are designed for creep feed grinding of hard alloyed workpieces on CNC machines, multipass and profile grinding with coolant of hard-alloyed workpieces and hard-alloyed workpieces with steel base. Hardness and edges wear resistance is higher than on D24 bond.
B1-02, B1-02 B1-01, B1-11	D27	Wheels are designed for multipass grinding and cutoff of workpieces made of nonmetallic materials and hard alloys with coolant. Wheels have lower hardnessthan on bonds D26 and D24.
	D28	Wheels are intended for grinding polycrystalline SD and CBN.
	D30	Wheels are intended for cutting hard alloys without coolant.
	D31	Wheels are intended for cutting hard alloys with coolant.

Resinoid bonds for CBN wheels

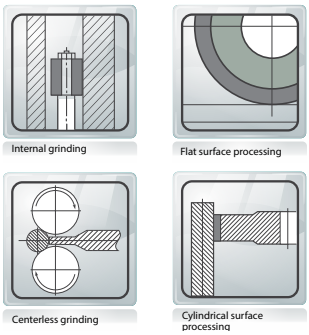
Marking	Application requirements
B20	Wheels are designed for multipass grinding without coolant, they are caracterized by high cutting performance and moderate wear resistance.
B21	Wheels are designed for multipass grinding both with coolant, and without coolant, they have greater wear resistance than wheels on B20 bond. Bond is particularly effective in cup grinding wheels manufacture for processing without coolant (6A2, 11A2, 12A2, etc.)
B23	Wheels are designed for multipass and profile grinding with coolant, they have high cutting performance.
B24	Wheels are mainly used for multipass grinding both with and without coolant, creep feed grinding on CNC machines. Wheels are caracterized by higher wear resistance and hardness than on B21 bonds.
B26	Wheels are intended for creep feed grinding and multipass grinding on CNC machines, profile grinding with coolant. Wheels are caracterized by higher wear resistance and hardness than on B24 bonds.
B3O	Wheels are intended for cutting high speed steel workpieces without coolant.
B31	Wheels are intended for cutting high speed steel workpieces with coolant.

Standard sizes of resinoid bonded wheels manufactured

1A1



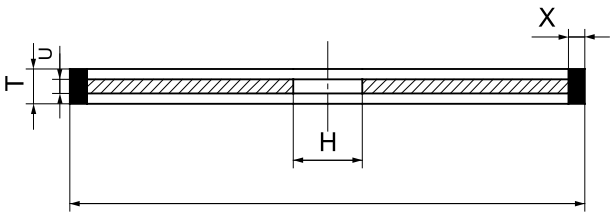
Application: external grinding of cylindrical and conical surfaces, internal grinding of cylindrical and conical surfaces, including coordinate grinding, centerless grinding (using a set of wheels), surface grinding, sharpening of cutting tools.

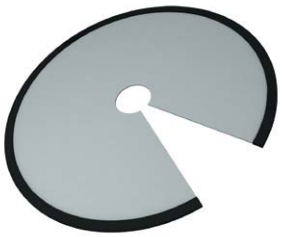


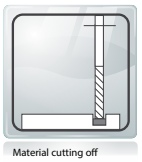
D	T	X	H
15	10-20	2	6
18	15-20	2	6
20	4-20	2	6
25	5-20	2	10
30	10-30	5	8-16
35	3-15	5	6-16
35	20-30	5	8-16
40	3-20	3; 5	6-20
50	2-6	2; 3; 8	13-20
50	4-10	4	6-20
50	2-15	5	6-20
50	20-30	5	10-20
60	4-10	3; 6	10-20
70	4-15	5	20
75	3-7	3; 4; 5; 6	15-32
75	8-16	5	20-32
80	3-8	6	20-32
80	4-10	10	20-32
80	5-12	3	20-32
100	3-12	3; 4	20-32

D	T	X	H
100	3-25	5	20-32
100	5-14	10	20-32
125	3-12	3	20-32
125	3-10	4; 6	20-40
125	3-25	5	20-40
125	4-20	10	20-32
150	3-12	3	20-76
150	3-30	5	20-76
150	4-15	10	20-76
175	4-15	3; 5	20-76
200	6-12	3	20-76
200	10-25	4	20-76
200	4-40	5	20-127
200	4-20	10	32-127
200	8-20	15	32-127
250	8-25	5	32-127
300	10-40	5	76; 127; 203
350	10-25	5	127; 203
400	10-40	5	127; 203

1A1R



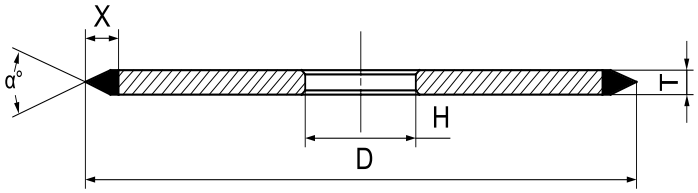


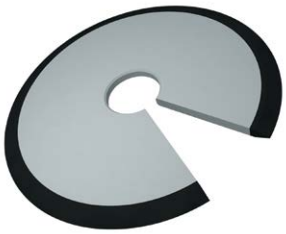


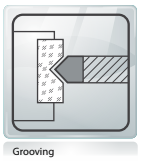
Application: cutting of products from steels, alloys and solid non-metals.

D	T	X	U	H
75	0,6; 0,8; 1,0; 1,2	5	0,4-1,0	20
100	0,6; 0,8; 1,0; 1,2	5	0,4-1,0	20
125	0,6; 0,8; 1,0; 1,2; 1,4	5	0,6-1,2	20; 32
150	0,8; 1,0; 1,2; 1,4; 1,5	5	0,6-1,2	20; 32
180	0,9; 1,1	7,5	0,7-0,9	32
202	1,0; 1,2; 1,4; 1,5	6	0,8-1,1	32; 60

1E1



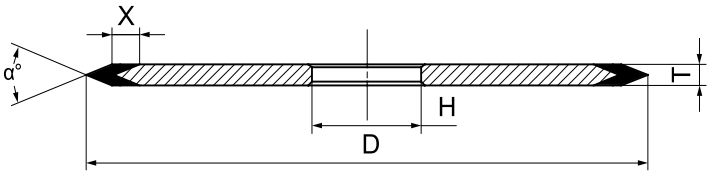


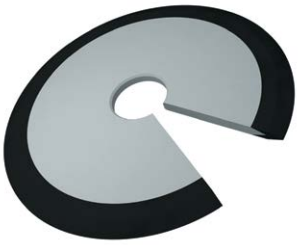


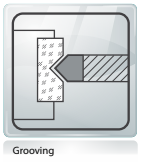
Application: grooving, thread grinding, profile grinding.

D	T	X	H	α°
80	8	6; 10	20	90°
100	6; 10	10	20-32	90°
125	6	10	20-32	90°
150	6	10	20-60	90°
200	6	10	32-76	90°

1EE1



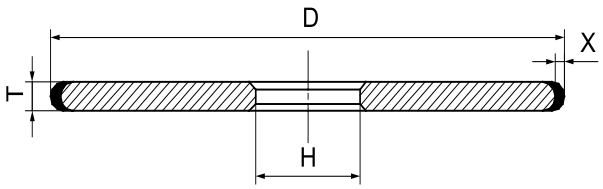


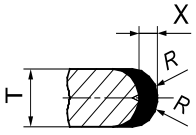


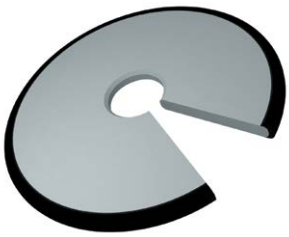
Application: profile grinding, thread grinding, slotting and grooving.

D	T	X	H	α°
80	10	3	20; 32	75°
100	6	3	20; 32	90°
125	6; 8; 10	4	20; 32	90°
125	16	3	20; 32	40°
150	6; 8	3	20; 32	90°

1FF1







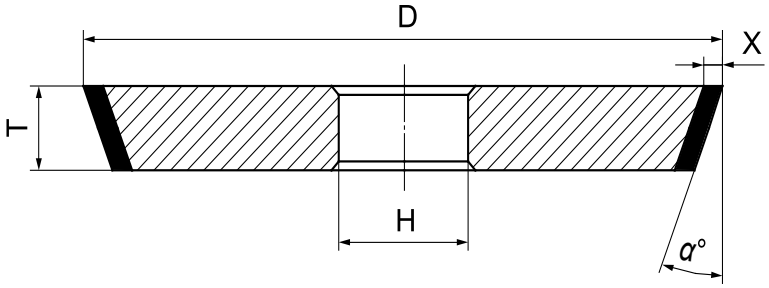
Profile grinding

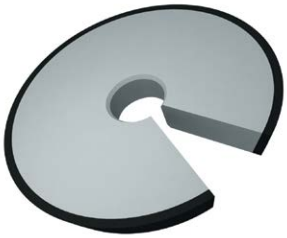
Structural profiles processing

Application: structural profiles grinding, including on profile grinding machines, slotting chip-breaking grooves of cutters, broaches, drills web thinning, etc.

D	T	X	H	R
50	3	4	16	1,5
75	4	3	20	2,0
75	5	3	20	2,5
100	4-8	3	20-32	2,0-4,0
125	6-20	4	20-32	3-10
150	5-8	3	20-60	2,5-4,0
200	6-24	3	32-76; 127	3-12

1V1





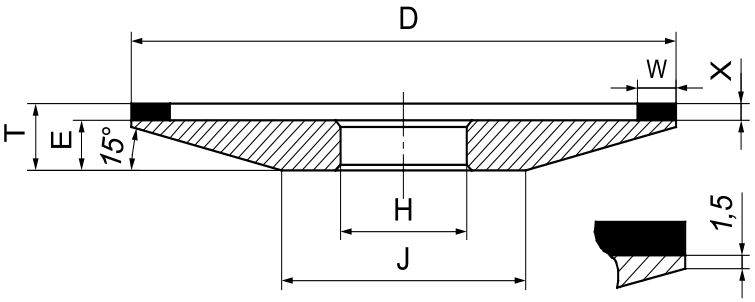
Creep feed grinding

Application: profile grinding, sharpening of cutting tools, conical surfaces grinding.

D	T	X	H	α°
50	3	3	7-20	20°
50	6-10	5	7-20	10°; 20°
50	8	3; 8	20	30°
60	6; 8	10	20	10°; 15°
60	6; 8; 10	10	20	30°
60	8; 10	6	20	45°
70	8	5	20	10°-30°
75	8	5	20-32	20°-30°
75	10	4; 5; 10	20-32	45°
75	10	5	20-32	15°-30°
80	10	8	20-32	10°-30°
100	6; 8	3	20-32	20°
100	8	3	20-32	15°-30°
100	8	5	20-32	45°

D	T	X	H	α°
100	8	10	20-32	15°-30°
100	10	4	20-32	30°
100	10	4	20-32	45°
100	10; 12	10	20-32	5°-30°
100	12	8	20-32	45°
100	15; 20	5	20-32	15°; 20°
125	10	10	20-32	30°; 45°
125	6; 8; 10	5; 10	20-32	10°-20°
125	12	4	20-32	15°-30°; 45°
125	15	4; 10	20-32	10°; 15°
125	20	3	20-32	10°; 15°
125	30	7	20-32	20°
150	10	5; 10	20-32	10°-20°
150	10; 12	4	20-32	15°; 20°

4A2

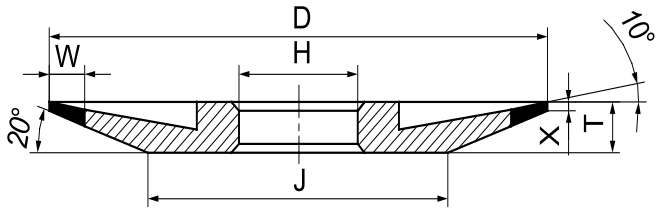


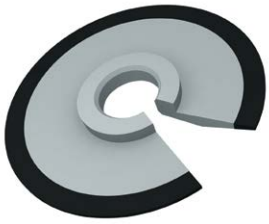
Application: sharpening of cutting tools, including multiblade, surface grinding with the lace of a wheel.

D	T-X	W	X	H	E	J
50	5	3; 5	2; 3; 4	13-20	5	24
60	5	3; 6	2; 3; 4	16-25	5	34
75	6	3; 4; 5; 6	1,5; 2; 3; 4	16-25	6	41
80	6	3; 4; 6; 10	1,5; 2; 3; 4	16-32	6	46
100	6	3; 4; 5; 6; 10	1,5; 2; 3; 4	16-32	6	66
100	6	15	2; 3; 4	16-32	6	66
125	7	3; 4; 5; 6	1,5; 2; 3; 4	16-32	7	84

D	T-X	W	X	H	E	J
125	7	8; 10; 15	2; 3; 4	16-32	7	84
150	9	3; 4; 5	1,5; 2; 3; 4	16-60	9	94
150	9	6; 10	2; 3; 4	16-60	9	94
150	9	15; 20; 30	3; 4	16-60	9	94
175	11	5; 10	2; 3; 4	20-76	11	104
200	13	5; 6	1,5; 2; 3; 4	20-76	13	114
200	13	10; 15; 20	3; 4	20-76	13	114
250	15	5; 10	3; 4	32-127	15	149

4BT9

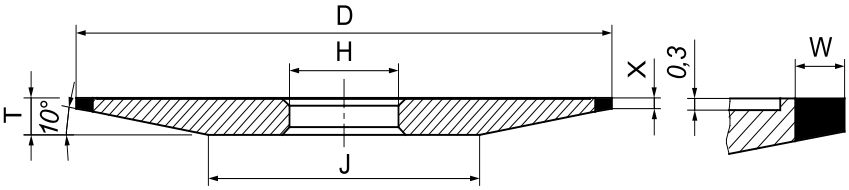


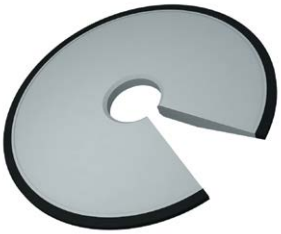


Application: sharpening of cutting tools.

D	T	X	W	H	J
75	8	1; 2	10	20-32	36
100	8; 10	1; 2	6; 10	20-40	50
125	10; 12	1; 2	10	20-40	65

4ET9

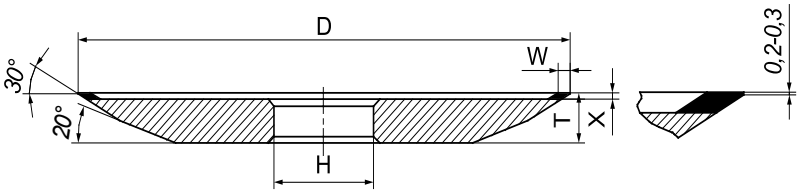


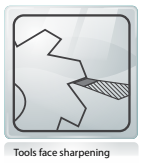


Application: sharpening of cutting tools.

D	T	W	X	H	J min
60	6	5	0,2	20	28
100	6	4; 5	1; 2; 3	20-32	43
100	8	5	0,2	20	50
125	8	5	1; 2; 3	20-32	57
150	10	5	1; 2; 3	22-32	59

4V2-30

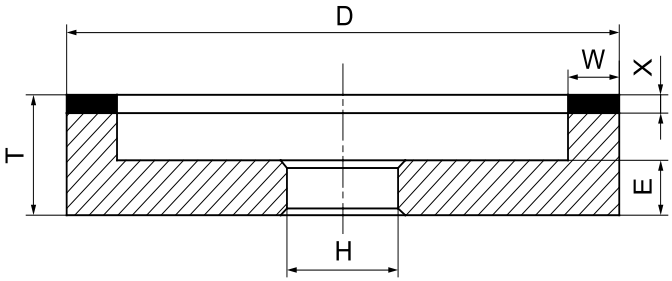


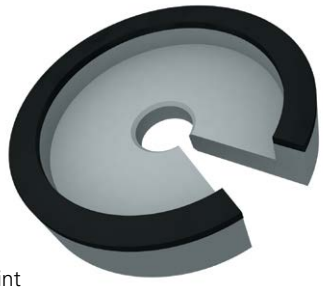


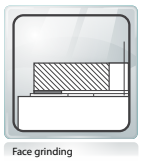
Application: cutting tools face sharpening.

D	T	W	X	H	E
80	9	4	2	20-32	7
100	10	4	2	20-32	8
125	13	4	2	20-32	11
150	13	4	2	20-32	11
175	12,5	4	2,5	20-32	10
200	13	4	2	20-32	11

6A2





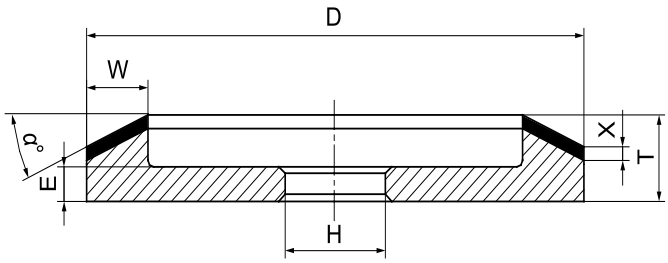


Application: sharpening of front and rear surfaces cutters and rear surfaces of multipoint cutting tools, surface grinding with the lace of a wheel.

D	T-X	W	X	H	E
50	12; 16; 20	3; 5	2; 3; 4; 5	16-25	10
60	20	3; 6	3; 4	16-25	10
75	20	3; 4; 5; 6; 10	3; 4; 5	16-32	10
80	20	3; 4; 6; 10	3; 4	16-32	10
80	35-45	4	3; 4; 5	16-32	10
100	23	3; 4; 5; 6; 8; 10	2; 3; 4; 5	16-32	10
125	23	15; 20	3; 4; 5	16-32	10

D	T-X	W	X	H	E
125	23	3; 4; 5; 6; 10	3; 4; 5	16-32	10
150	23	4; 30	3; 4	16-60	10
150	23	3; 5; 6; 10; 15; 20	3; 4; 5	16-60	10
175	25	5; 10	3; 4; 5	16-76	10
200	25	15	3; 4	20-127	13
200	25	5; 6; 10; 20	3; 4; 5	20-127	13
250	25	5; 10	4; 5	32-127	13

6V5

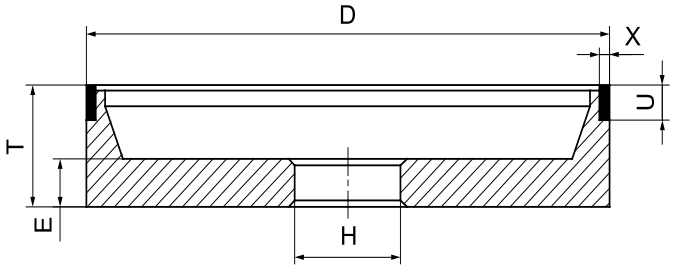


Application: sharpening of cutting tools.

D	T	W	X	H	α°	E
75	25	6	3	20	15° - 30°	10
100	25; 26	3; 4	3	20-32	15°	10
100	25; 26	6; 10	3	20-32	15° - 30°	10

D	T	W	X	H	α°	E
125	25; 26	3; 4; 5	3	20-32	15°	10
125	25; 26	6	3	20-32	15° - 30°	10
150	25; 26	3; 4; 5	3	20-60	15°	10

6A9



Creep feed grinding

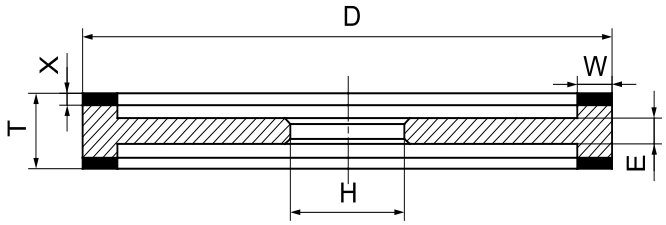
Tools top sharpening

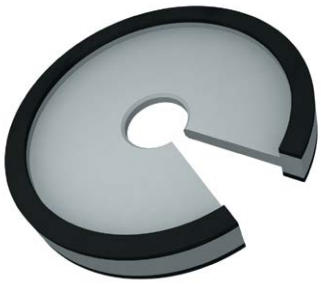
Application: sharpening of cutting tools.

D	T	X	U	H	E
75	25; 35	3	6	20-32	10
75	25	3	10	20-32	10
100	30	3	6	20-32	10-13
100	30	3	10	20-32	10-13
100	20	5	6	20-32	10

D	T	X	U	H	E
125	18; 30	3	6	20-32	10-13
125	30	3	10	20-32	10-13
125	18	5	6	20-32	10
150	35	3	6	20-60	10-13
150	35	3	10	20-60	10-13

9A3





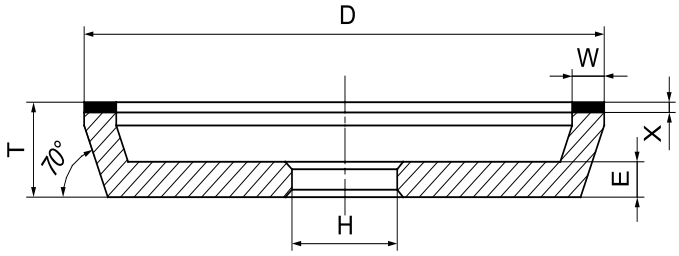
One-pass groove grinding

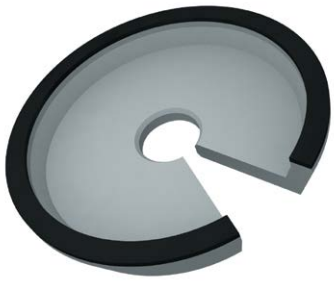
Application: sharpening of cutting tools, surface grinding with the lace of a wheel, groove grinding. Processing of work surfaces of gages, micrometers and other elements of the measuring instruments.

D	T	W	X	H	E
125	22	10; 20	3; 4	20-32	10
150	20	10	3	32	12
150	25	15	3; 4	20-60	14

D	T	W	X	H	E
150	25	10	3; 4	32	14
175	25	10	3; 4	20-60	14
175	35	10	3; 4	20-60	14

11A2





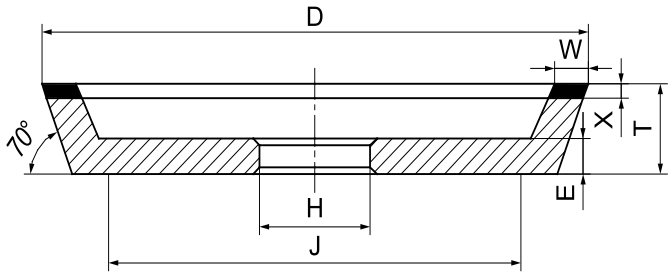
Tools top sharpening

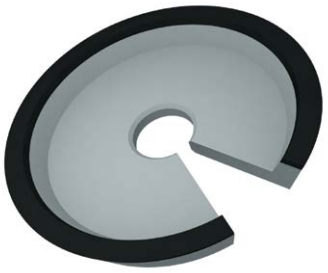
Application: sharpening of front and rear surfaces of cutters, sharpening of rear surfac of multipoint cutting tools, flat grinding.

D	T-X	W	X	H	E
50	16	3; 5	2; 3; 4; 5	16	10
60	20	3; 6	3; 4	16-25	10
75	20	3; 5; 10	3; 4; 5	16-32	10
75	20	4; 6	3; 4	16-32	10
80	20	3; 6	3; 4	16-32	10
80	20	4; 10	3; 4; 5	16-32	10
100	23	3; 4	2; 3; 4; 5	16-32	10
100	23	5; 6; 10; 15	3; 4; 5	16-32	10

D	T-X	W	X	H	E
125	23	3; 5; 6; 10; 15; 20	3; 4; 5	16-32	10
125	23	4; 8	3; 4	16-32	10
150	23	3; 4; 30	3; 4	16-60	10
150	23	5; 6; 10; 15; 20	3; 4; 5	16-60	10
175	25	5; 10	3; 4; 5	16-76	10
200	25	6; 15	3; 4	20-127	13
200	25	5; 10; 20	3; 4; 5	20-127	13
250	25	5; 10	3; 4; 5	32-127	13

11V2





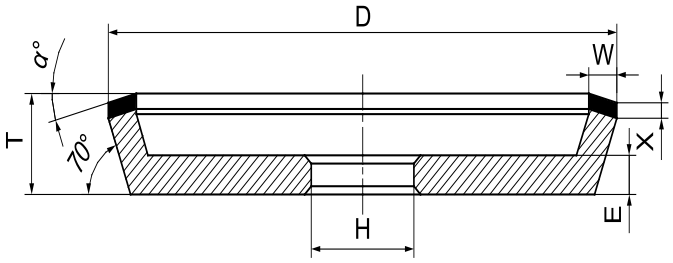
Face grinding

Tools face sharpening

Application: sharpening of cutting tools.

D	T	W	X	H	E	J
75	25	5	3	20	10	56
100	25	3; 5; 10	3	20; 32	10	82
150	25	5; 10	4	20; 32	10	132

11V5



Tools face sharpening

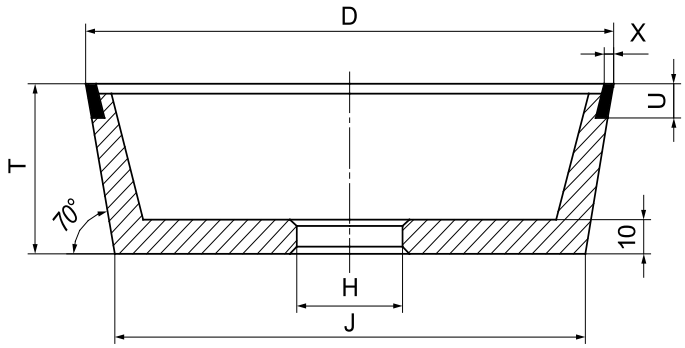
Tools top sharpening

Application: sharpening of cutting tools.

D	T	W	X	H	α°	E
75	25	6	3	20	15° - 30°	10
100	25; 26	3; 4	3	20-32	15°	10
100	25; 26; 35	6; 10	3	20-32	15° - 30°	10

D	T	W	X	H	α°	E
125	25; 26	3; 4; 5	3	20-32	15°	10
125	25; 26	6	3	20-32	15° - 30°	10
150	25; 26	3; 4; 5	3	20-60	15°	10

11V9



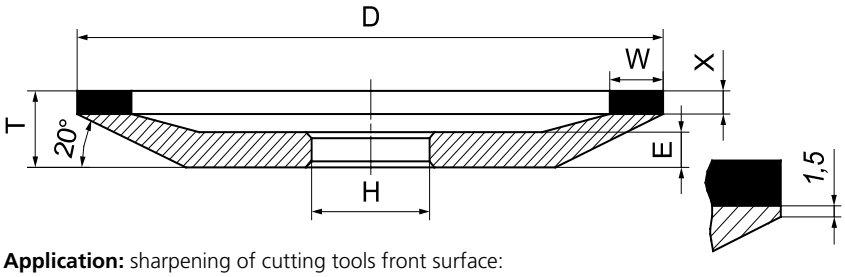
Creep feed grinding

Application: sharpening of cutting tools, including front and back surfaces of multiblade tools with helical tooth.
Surfaces grinding with high depth-feed.

D	T	X	U	H	J
50	30	2	6	16; 20	28
75	20; 30	2; 3	6	16-32	53
75	20; 25; 30	2; 3	10	20-32	53
100	35	2; 3; 4	6	20-32	75

D	T	X	U	H	J
100	20; 35	2; 3	10	20-32	75
125	25; 40	2; 3	10	20-51	96
150	45	2; 3	10	20-51	114

12A2-20



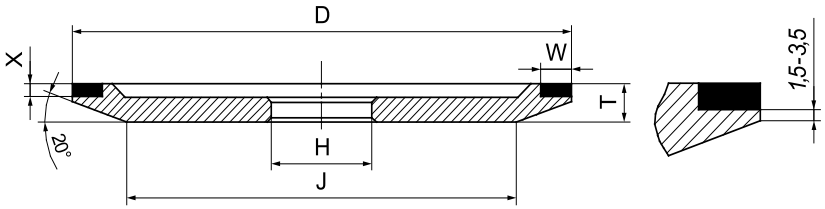
Tools face sharpening

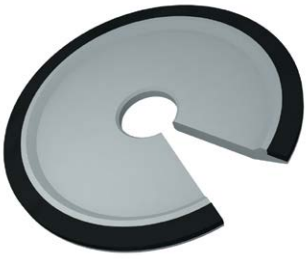
Application: sharpening of cutting tools front surface: reamers, mills, broaches, etc.

D	T-X	W	X	H	E
50	6	3; 5	1,5; 2; 3; 4	13-20	4
60	8	3; 6	1,5; 2; 3; 4	16-25	6
75	8	3; 4; 5; 6; 10	1,5; 2; 3; 4	13-32	6
80	8	3; 4; 6; 10	1,5; 2; 3; 4	16-32	6
100	10	3; 4; 5; 6	1,5; 2; 3; 4	16-32	8
100	10	10; 15	2; 3; 4	16-32	8
125	14	3; 4; 5; 6; 8	1,5; 2; 3; 4	16-32	8

D	T-X	W	X	H	E
125	14	10; 15; 20	2; 3; 4	16-32	8
150	16	3; 4; 5; 6	1,5; 2; 3; 4	16-60	9
150	16	10; 15; 20	2; 3; 4; 5	16-60	9
150	16	30	3; 4	16-32	9
175	18	5; 10	2; 3; 4	16-60	10
200	16; 20	5; 6; 10; 15; 20	2; 3; 4	16-76	12
250	23	5; 10	2; 3; 4	32-127	13

12A9





Tools top sharpening

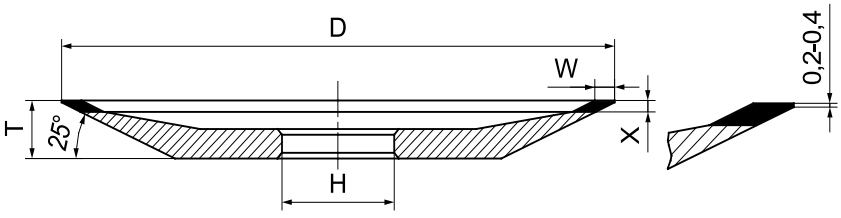
Creep feed grinding

Application: sharpening of cutting tools.

D	T	X	W	H	J min
60	8	3; 4	6	20	35
75	10	3; 4	6	20-32	39
80	10	3; 4	6; 10	20-32	44

D	T	X	W	H	J min
100	10	3; 4	6; 10	20-32	64
125	10	3; 4	6; 10	20-32	89
150	12	3; 4	10	20-60	103

12R4



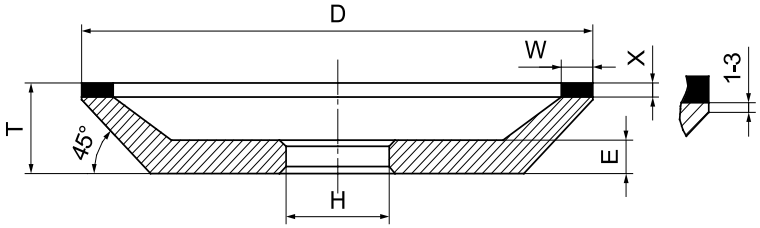
Tools face sharpening

Application: sharpening of cutting tools front surface: reamers, mills, broaches, etc.

D	T	W	X	H
50	8	2	3	16; 20
75	10	2	3	20
80	10	2	3	20
100	10	2; 3	3	20-32
125	12	2; 4	3	20-50,8

D	T	W	X	H
125	13	3	2	20-50,8
150	16	3	4	20-50,8
150	16	3; 5	5	20-50,8
150	16	5	3	20-50,8
160	16	3	5	32

12A2-45



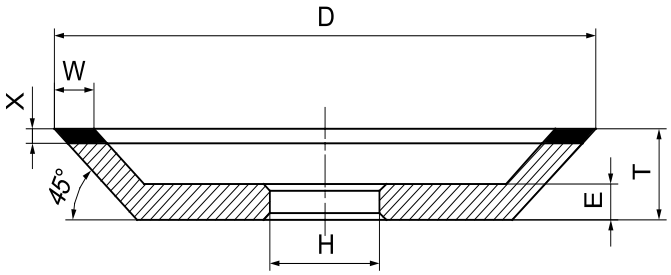
Tools top sharpening

Application: sharpening of cutting tools front and rear surfaces, surface grinding with the lace of a wheel. Finish and fine grinding of rotational surfaces.

D	T-X	W	X	H	E
50	16	3; 5	2; 3; 4; 5	16; 20	8
50	16	8	2; 3; 4	16	8
60	16; 20	3	2; 3; 4	16-25	8; 10
60	16; 20	6	2; 3; 4	16-25	8; 10
75	20	3; 4; 5; 6; 10	2; 3; 4; 5	16-32	10
80	20	3; 4; 6; 10	2; 3; 4; 5	16-32	10
100	23	3; 4; 5; 6; 10; 15	2; 3; 4; 5	16-32	10
110	29	7,5	3	32	10

D	T-X	W	X	H	E
125	23	3; 4; 5; 6; 8; 10; 15	2; 3; 4; 5	16-32	10
125	23	20	3; 4; 5	16-32	10
150	23	30	3; 4	16-60	10
150	23	3; 4; 5; 6; 10; 15; 20	3; 4; 5	16-60	10
150	35	10	5	32	1
175	25	5; 10	2; 3; 4; 5	16-76	10
200	25	5; 6; 10; 15; 20	3; 4; 5	20-127	13
250	25	5; 10	3; 4; 5	32-127	13

12V2-45



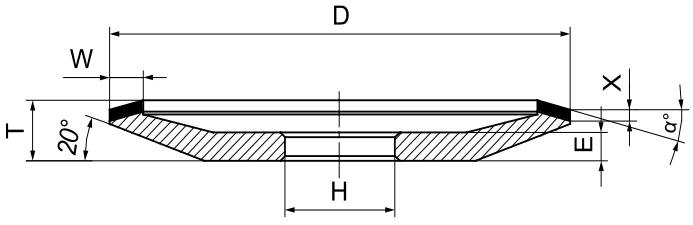
Tools top sharpening

Tools face sharpening

Application: sharpening of cutting tools.

D	T	W	X	H	E
75	25	5	3	20-32	10
100	25	5; 10	3	20-32	10
125	25	5; 10	3	20-32	10
150	25	5	4	20-32	10
150	25	10	3	20-32	10

12V5-20



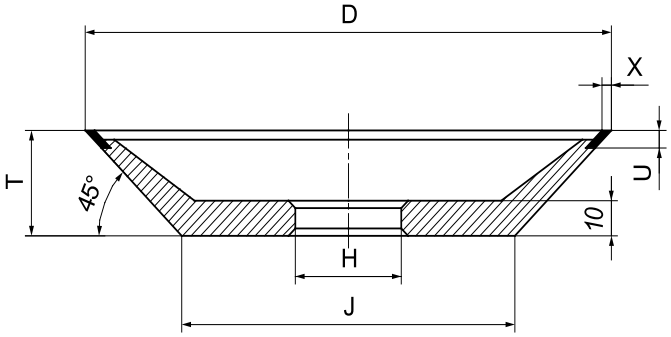
Tools face sharpening

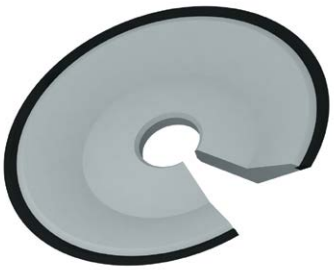
Gear cutter sharpening

Application: sharpening of front surface of cutting tools, including those with helical tooth.

D	T	W	X	H	α°	E
75	14	6	3	20	15°; 25°	6
100	16	6	3	16-32	15°; 25°	8
100	16; 20	10	3	16-32	15°; 25°	8
125	17	6	2; 3	16-32	15°; 25°	9

12V9





Tools face sharpening

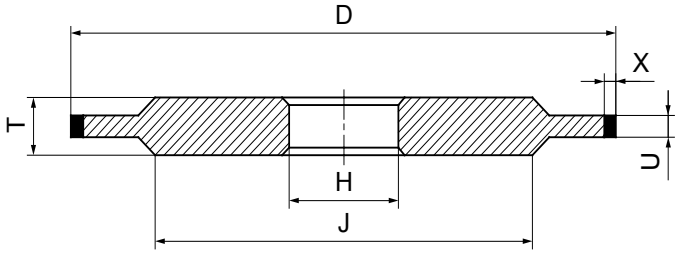
Creep feed grinding

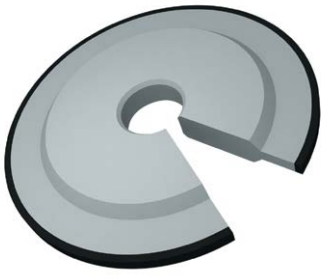
Application: sharpening of front surface of cutting tools, including multiblade tools with helical tooth.

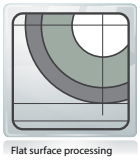
D	T	X	U	H	J
50	20	1,5; 2	6	16; 20	30
75	20	2; 3; 5	6; 10	20	35
100	20	2; 3	6; 10	20-32	60

D	T	X	U	H	J
125	25	2; 3	10	20-51	75
125	25	3	15	20-51	75
150	30	2; 3	10	20-51	120

14A1





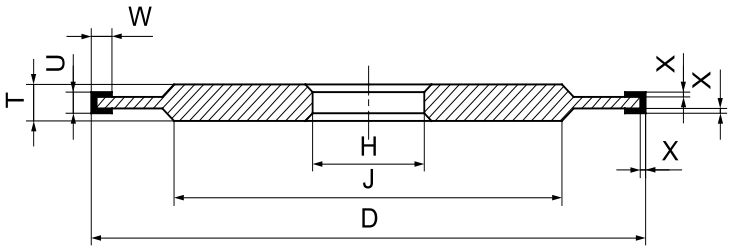

Flat surface processing

Application: cylindrical external and internal grinding, centerless grinding (using a set of wheels), flat grinding, grinding of flutes.

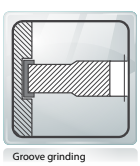
D	T	U	X	H	J
50	6	3-4	4; 5	20	30
75	8	2-6	3; 4; 5; 6	15-25	40-50
75	6	1,5-5	3; 4; 5; 6	15-25	40-50
80	6; 8	5; 6	6	20-32	40-50
100	6; 8	1,5-5	3; 4; 5	20-32	60-70
125	6	1,5-5	3; 4; 5	20-32	80-100
125	6	2-6	6	20-32	80-100
150	6; 8	1,5-2	3; 4; 5	20-60	100-120
150	6; 8; 10; 11	3-6	3; 4; 5; 8	20-60	100-120
150	6; 8-10	3-6	10	20-60	100-120

D	T	U	X	H	J
175	6-10	2-6	5	20-60	120-140
200	5,5-10	1,5	4	20-76	120-160
200	5,5-10	2-6	5	20-76	120-160
200	10	4	10	20-76	120-160
250	12-15	3-5	5	32-127	200
250	16-20	6-10	5	32-127	200
300	14-16	8; 10	5	127-203	240
350	14-20	8; 10	5	127-203	280
400	18-25	8; 10; 15; 20	5	127-203	330

14U1



One-pass groove grinding

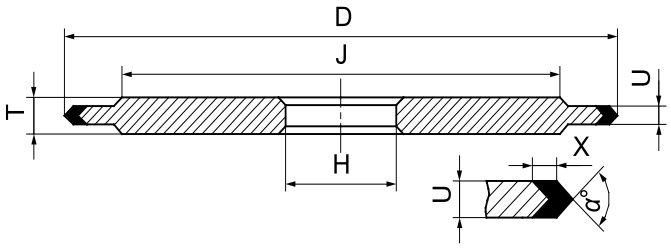

Groove grinding

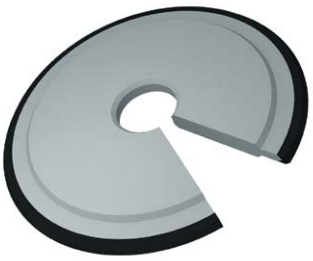
Application: groove cutting, groove end faces grinding, cylindrical and flat surfaces grinding.

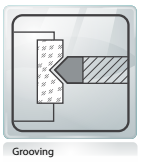
D	T	X	W	U	H	J
125	8; 10	2	4; 6	6; 8	20-32	65
150	8	2	4	6	20-32	80
150	8; 10; 12	2	6	6; 8; 10	20-32	80

D	T	X	W	U	H	J
200	16	3	10	12; 14	20-32	50
200	16	3	10	12; 14	40-76	120

14EE1





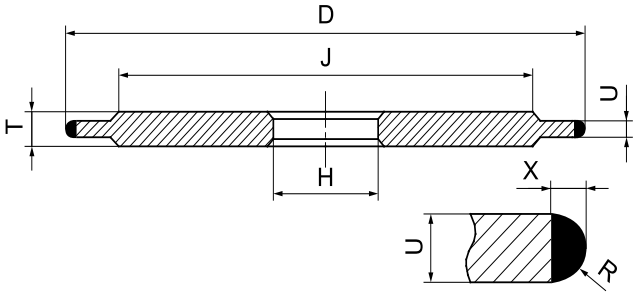


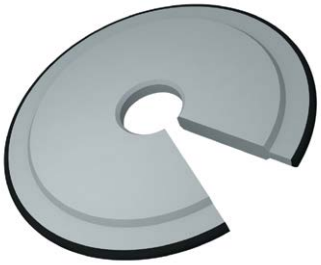
Application: shaped surfaces grinding on profile-grinding machines, thread grinding, grooving and fluting.

D	T	U	X	H	α°	Jmax
75	6	3	3	32	90°	50
100	6	3; 4	6	20-32	35°	70
100	6	3; 4	5	20-32	45°	70
100	6	3; 4	4	20-32	60°	70
100	6	3; 4	3	20-32	90°	70
125	6	3; 4	6	20-32	35°	100
125	6	3; 4	5	20-32	45°	100
125	6	3; 4	4	20-32	60°	100
125	6	3; 4	3	20-32	90°	100

D	T	U	X	H	α°	Jmax
150	6	3; 4	6	20-60	35°	120
150	6	3; 4	5	20-60	45°	120
150	6	3; 4	4	20-60	60°	120
150	6	3; 4	3	20-60	90°	120
200	6; 10	4; 5	6	20-127	35°	160
200	6; 10	4; 5	5	20-127	45°	160
200	6; 10	4; 5	4	20-127	60°	160
200	6; 10	4; 5	3	20-127	90°	160

14F1

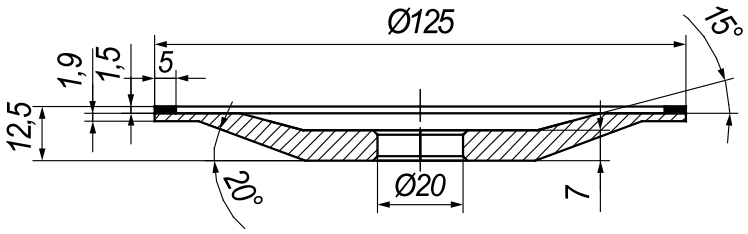


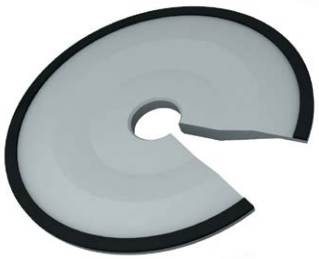


Application: grinding of figurine-shaped surfaces on profile grinding machines, grooves and flutes processing.

D	T	U	X	H	R	J
75	6	1,5-4	4; 5	20-25	0,75-2,0	50
100	6	1,0-5	5	20-32	0,5-2,5	70
125	6	1,0-5	5	20-32	0,5-2,5	90
150	8	1,5-5	5; 10	20-60	0,75-2,5	120
175	8; 10	2-5	5	20-76	1,0-2,5	140
200	6; 8; 10	1,5	4	20-76	0,75	140-160
200	6; 8; 10	2-5	5	20-76	1,0-2,5	140-160

SKE

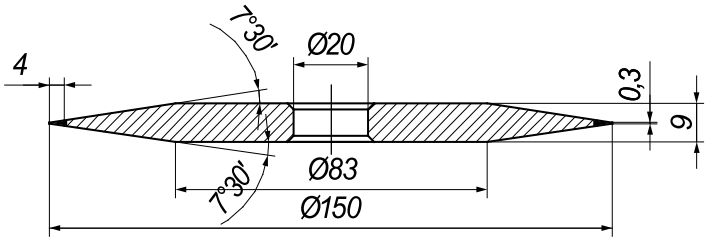


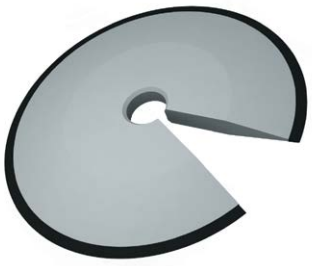


Application: tools face sharpening

D	T	W	X	H
125	12,5	5	1,5	20

1E1



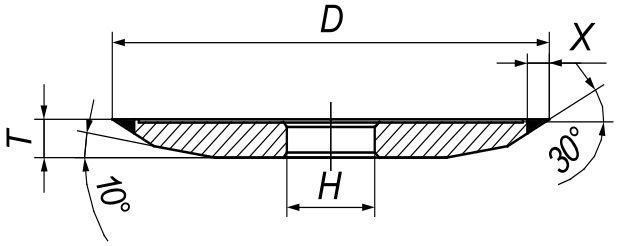


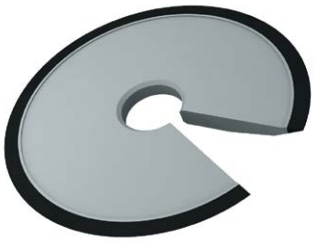
Profile grinding

Application: profile grinding

D	T	W	X	H
150	10	4	0,3	20

1E1 (2)



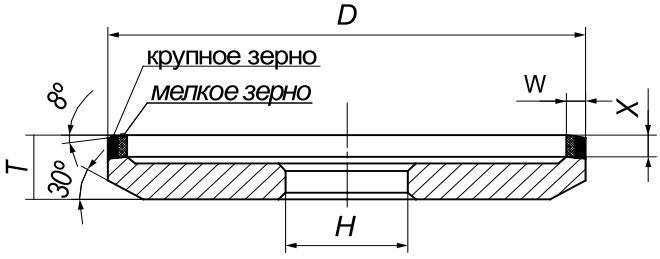


Tools face sharpening

Application: tools face sharpening

D	T	X	H
60	6	5	20
100	8	5	20
150	8; 9	4	20; 22-32

K222 (1)

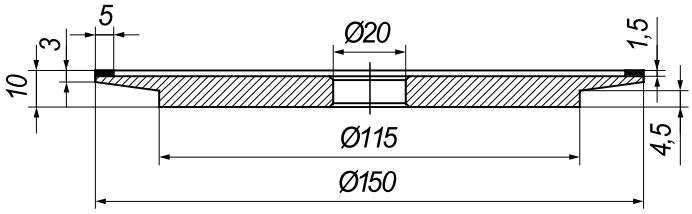


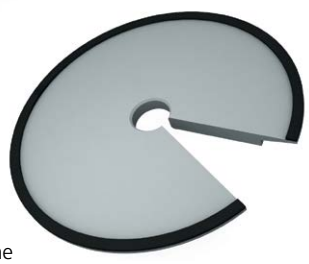
Tools top sharpening

Application: tools face sharpening

	D	T		W	X	H
3K222	125	18	5	2,5 x 2,5; 3,0 x 2,0	6	32
5K222	125	22; 20	5	2,5 x 2,5; 3,0 x 2,0	10	32
27K222	125	18		5	6	32

4A2



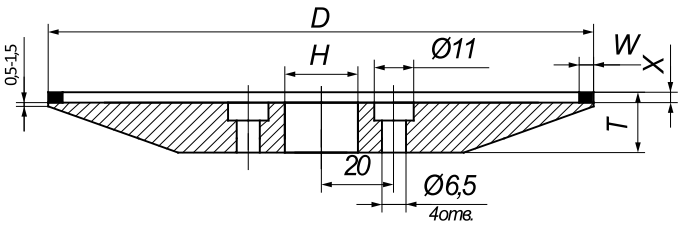


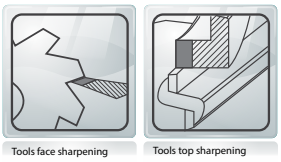
Tools face sharpening

Application: sharpening of cutting tools, including multiblade ones, surface grinding with the lace of a wheel.

D	T	W	X	H
150	10	5	1,5	20

1K222 (9)

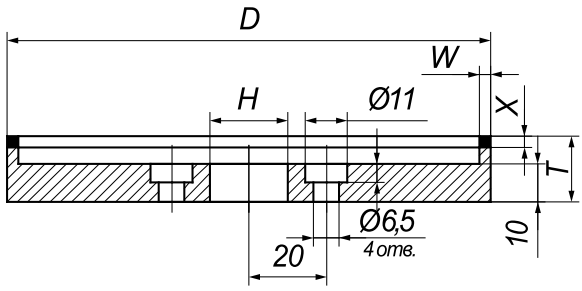




Application: tools face sharpening, tools top sharpening, face grinding, flat blades sharpening

D	T	W	X	H
150	17; 18	3	3; 4	20
150	17; 18	4	3; 4	20
150	17; 18	5	3; 4	20
200	20; 21	5	2	20

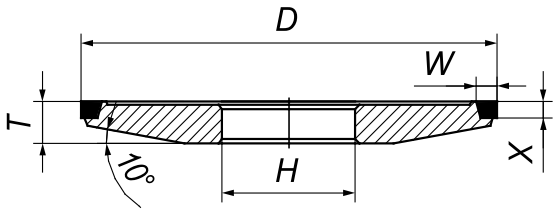
1K222 (10)



Application: tools face sharpening

D	T	W	X	H
125	17; 18	3	3; 4	20
125	17; 18	4	3; 4	20

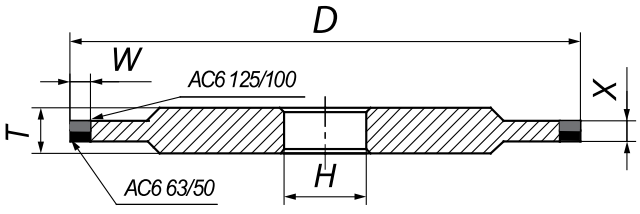
1K700



Application: tools face sharpening

D	T	W	X	H
100	10	2,5; 5; 6,5	4	32
125	10	5	4; 5	32

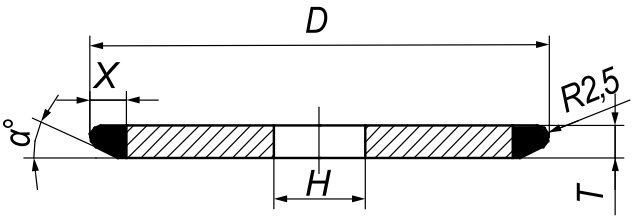
14B1

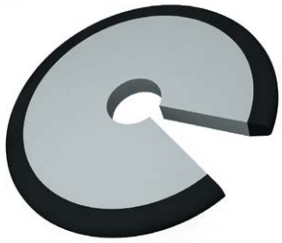


Application: tools top sharpening

D	T	W	X	H
125	8	5; 6; 10	5	32

4FV9

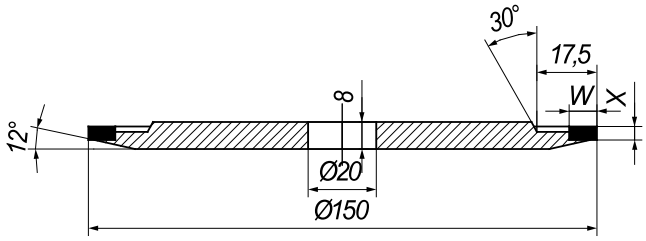




Application: processing of shaped profile

D	T	X	H	R	α°
100	5-7,5	8	20	2,5	30

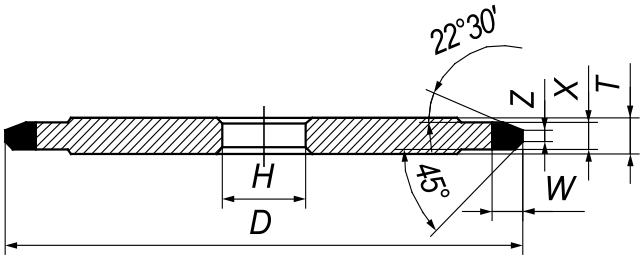
14A1

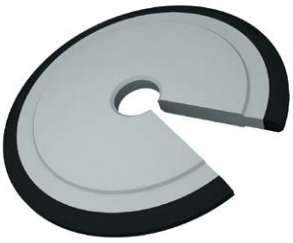


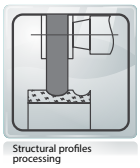
Application: tools face sharpening

D	T	W	X	H
150	8	8	4	20
150	8	4	2	20

14ER1





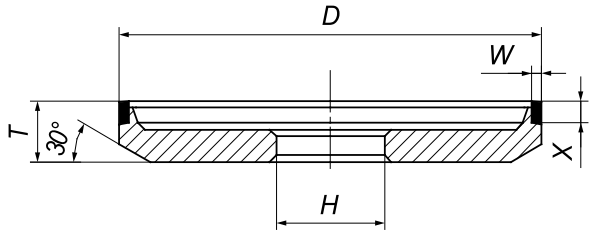


Application: processing of shaped profile, profile grinding

D	T	W	X	Z	H
75; 80	6	6	4,5	0,9; 1,4; 1,9	20
75; 80	6	6	5	2,8	20
75; 80	8	6	6	3,7	20
75; 80	8	6	7	4,5	20

D	T	W	X	Z	H
125	8,5	6	4,5	0,9; 1,4; 1,9; 2	20; 32
125	8,5	6	5	2,8	20; 32
125	8,5	6	6	3,7	20; 32
125	8,5	6	7	4,5	20; 32

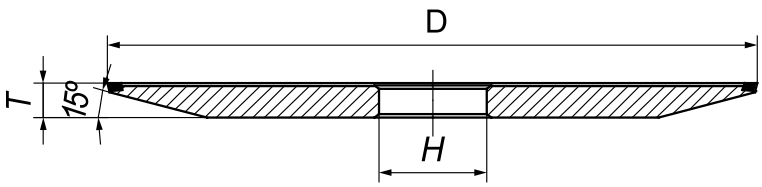
K222 (4)

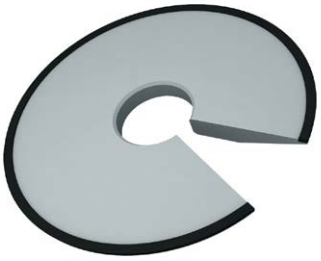


Application: tools top sharpening

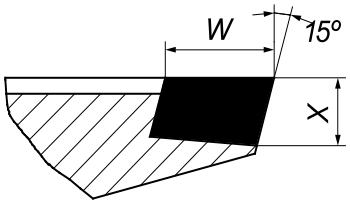
	D	T	W	X	H
1K222	125	18	3	6,5	32

K222 (2)



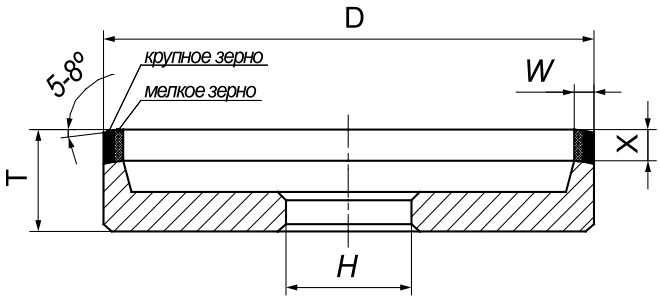


Application: tools face sharpening



	D	T	W	X	H
2K222	100	8	3	1,8	20; 25; 32
1K222	100	8	3	3,8	25
4K222	125	8	3	1,8	25; 32
1K222	125	13	3	3,8	25; 32
5K222	150	12	3	2	32

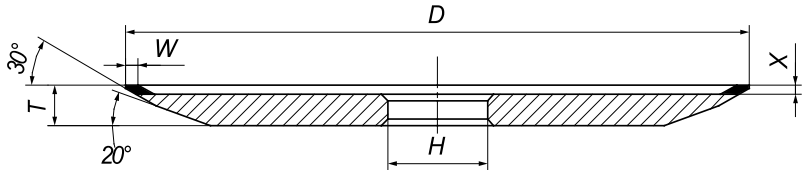
K222 (3)



Application: tools top sharpening

	D	T	W	X	H
6K222	100	20	5	6	25; 20
1K222	100	24	5	10	25; 20
1K222	125	24	5	6	25; 32
1K222	100	16	5	6	25

K222 (5)

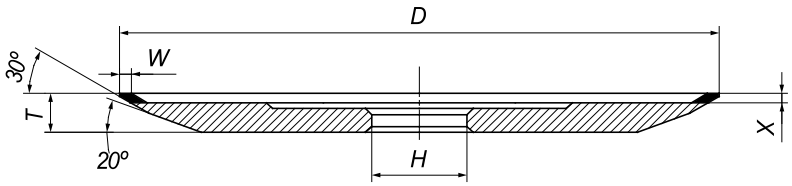


Application: tools face sharpening

	D	T	W	X	H
2K (4V2)	80	9	4	2	20; 32
2K (4V2)	100	10	4	2	20; 32
5K (4V2)	125	13	4	2	20-32

	D	T	W	X	H
6K (4V2)	150	13	4	2	32
2K (4V2)	175	12.5	4	2.5	32
2K (4V2)	200	13	4	2	32

K222 (6)

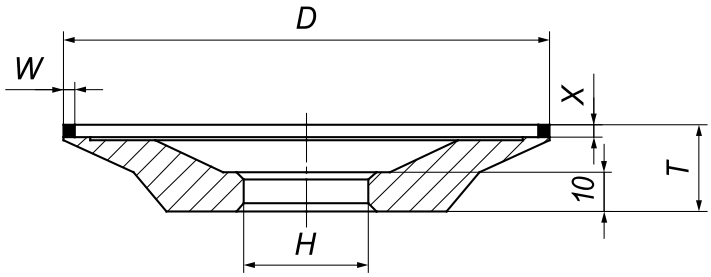


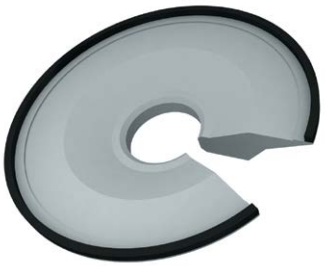
Application: tools face sharpening

	D	T	W	X	H
2K(12V2)	100	10	4	2	20; 25; 32
2K(12V2)	125	13	4	2	20; 25; 32
2K(12V2)	200	13	4	2	32

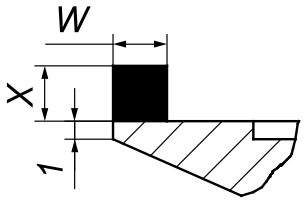
	D	T	W	X	H
5K(12V2)	80	9	4	2	20; 25; 32
5K(12V2)	150	13	4	2	25; 32
6K(12V2)	150	13	4	2	32

K222 (7)



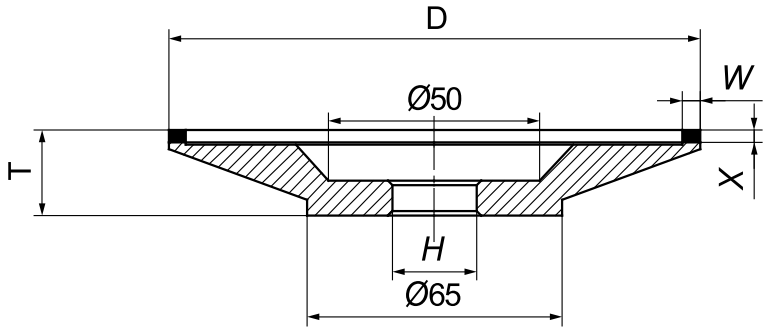


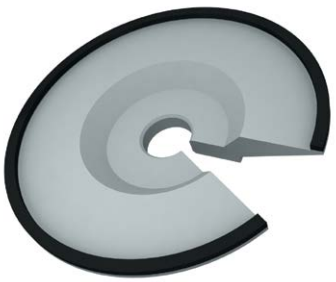
Application: tools face sharpening



	D	T	W	X	H
20K222 (13A2)	125	22	3	3	по указанным размерам
20K222 (13A2)	125	23	5	4	по указанным размерам
20K222 (13A2)	125	23	6	5	по указанным размерам

K222 (8)





Application: tools face sharpening

	D	T	W	X	H
14K222	150	23	4; 5*; 6	4	по указанным размерам
2K222	175	26	5*	4	по указанным размерам
6K222	200	28	5*; 6	4	по указанным размерам

* основной размер

Precise grinding tools for imported CNC machines

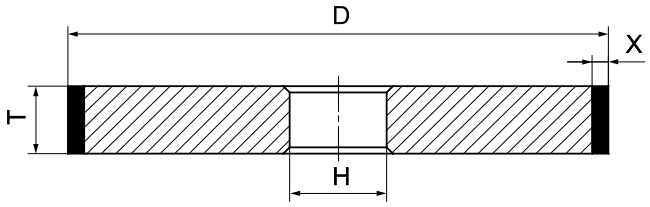
Grinding tools for CNC machines are caracterized by low wear, high performance capacity, cutting properties and tool edge resistance.

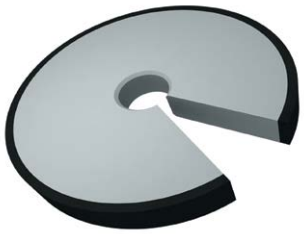
Main applications:

- cutting tools production;
- sharpening of metal cutting tools in creep feed and pendulum grinding mode.

Standard sizes for precise tools produced for imported CNC machines

1A1

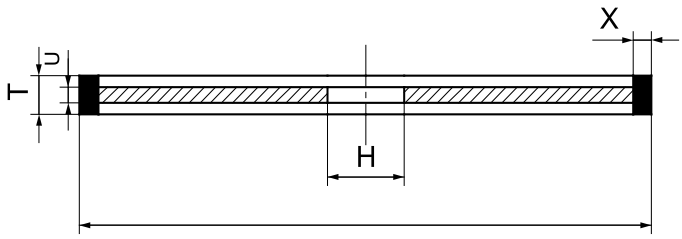


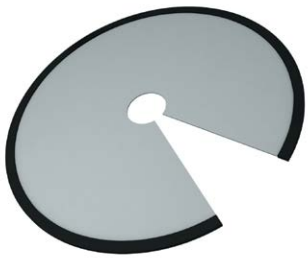


D	T	X	H
50	2-6	2; 3; 8	13-20
50	2-15	5	6-20
60	4-10	3; 6	10-20
70	4-15	5	20
75	3-7	3; 4; 5; 6	15-32
75	8-16	5	20-32
100	3-12	3; 4	20-32
100	3-25	5	20-32

D	T	X	H
100	5-14	10	20-32
125	3-12	3	20-32
125	3-10	4; 6	20-40
125	3-25	5	20-40
125	4-20	10	20-32
150	3-12	3	20-76
150	3-30	5	20-76
150	4-15	10	20-76

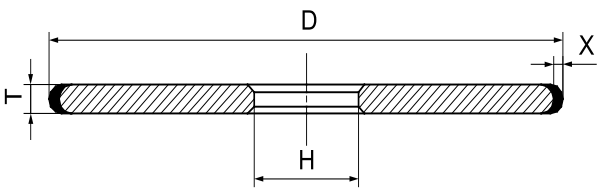
1A1R

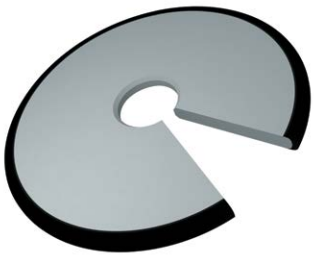




D	T	X	U	H
100	0,6; 0,8; 1,0; 1,2	5	0,4-1,0	20
125	0,6; 0,8; 1,0; 1,2; 1,4	5	0,6-1,2	20; 32
150	0,8; 1,0; 1,2; 1,4; 1,5	5	0,6-1,2	20; 32
180	0,9; 1,1	7,5	0,7-0,9	32
202	1,0; 1,2; 1,4; 1,5	6	0,8-1,1	32; 60

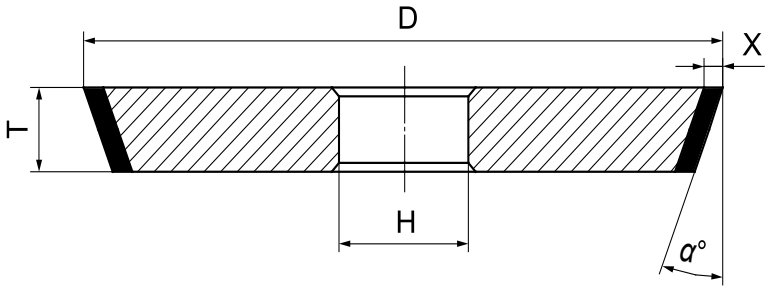
1FF1

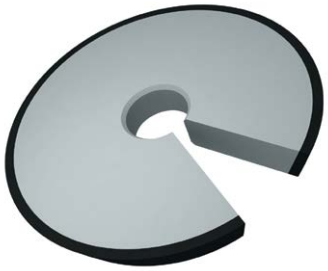




D	T	X	H	R
50	3	4	16	1,5
75	4	3	20	2,0
75	5	3	20	2,5
100	4-8	3	20-32	2,0-4,0
125	6-20	4	20-32	3-10
150	5-8	3	20-60	2,5-4,0

1V1

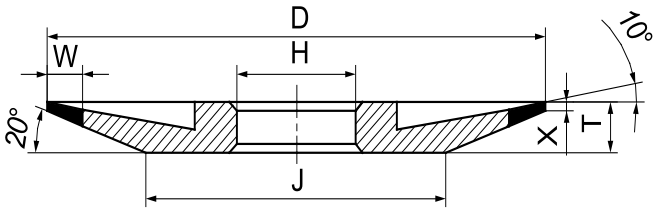


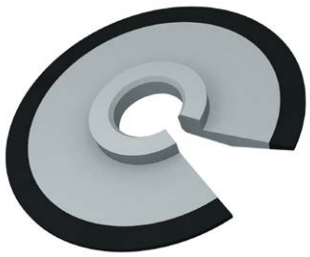


D	T	X	H	α°
50	3	3	7-20	20°
50	6-10	5	7-20	10°; 20°
50	8	3; 8	20	30°
60	6; 8	10	20	10°; 15°
60	6; 8; 10	10	20	30°
60	8; 10	6	20	45°
70	8	5	20	10°-30°
75	8	5	20-32	20°-30°
75	10	4; 5; 10	20-32	45°
75	10	5	20-32	15°-30°
80	10	8	20-32	10°-30°
100	6; 8	3	20-32	20°
100	8	3	20-32	15°-30°
100	8	5	20-32	45°

D	T	X	H	α°
100	8	10	20-32	15°-30°
100	10	4	20-32	30°
100	10	4	20-32	45°
100	10; 12	10	20-32	5°-30°; 45°
100	15; 20	5	20-32	15°; 20°
125	10	10	20-32	30°; 45°
125	6; 8; 10	5; 10	20-32	10°-20°
125	12	4	20-32	15°-30°; 45°
125	15	4; 10	20-32	10°; 15°
125	20	3	20-32	10°; 15°
125	30	7	20-32	20°
150	10	5; 10	20-32	10°-20°
150	10; 12	4	20-32	15°; 20°

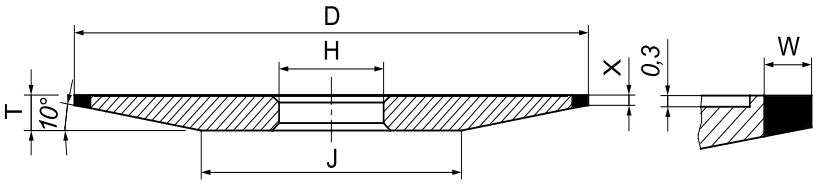
4BT9

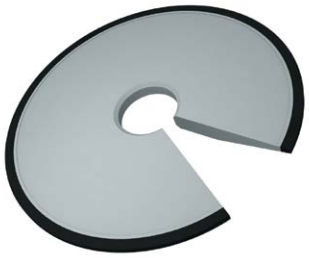




D	T	X	W	H	J
75	8	1; 2	10	20-32	36
100	8; 10	1; 2	6; 10	20-40	50
125	10; 12	1; 2	10	20-40	65

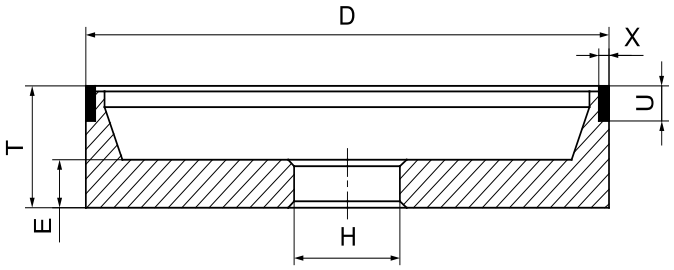
4ET9





D	T	W	X	H	J min
60	6	5	0,2	20	28
100	6	4; 5	1; 2; 3	20-32	43
100	8	5	0,2	20	50
125	8	5	1; 2; 3	20-32	57
150	10	5	1; 2; 3	22-32	59

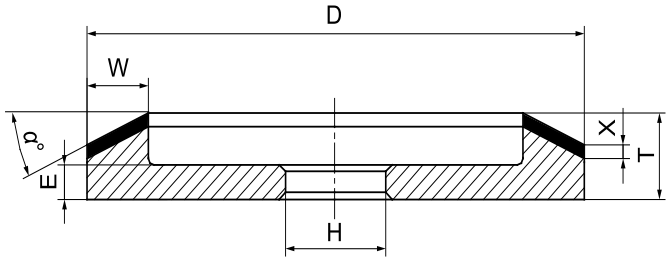
6A9

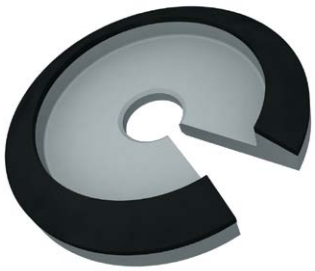


D	T	X	U	H	E
75	25; 35	3	6	20-32	10
75	25	3	10	20-32	10
100	30	3	6	20-32	10-13
100	30	3	10	20-32	10-13
100	20	5	6	20-32	10

D	T	X	U	H	E
125	18; 30	3	6	20-32	10-13
125	30	3	10	20-32	10-13
125	18	5	6	20-32	10
150	35	3	6	20-60	10-13
150	35	3	10	20-60	10-13

6V5

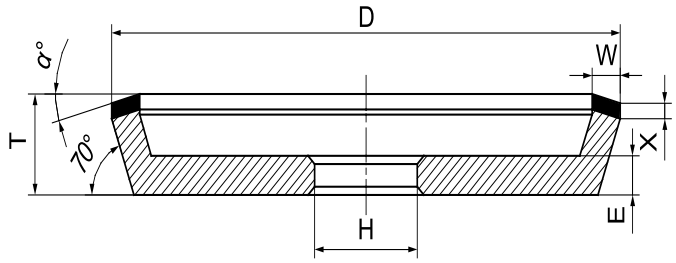




D	T	W	X	H	α°	E
75	25	6	3	20	15° - 30°	10
100	25; 26	3; 4	3	20-32	15°	10
100	25; 26	6; 10	3	20-32	15° - 30°	10

D	T	W	X	H	α°	E
125	25; 26	3; 4; 5	3	20-32	15°	10
125	25; 26	6	3	20-32	15° - 30°	10

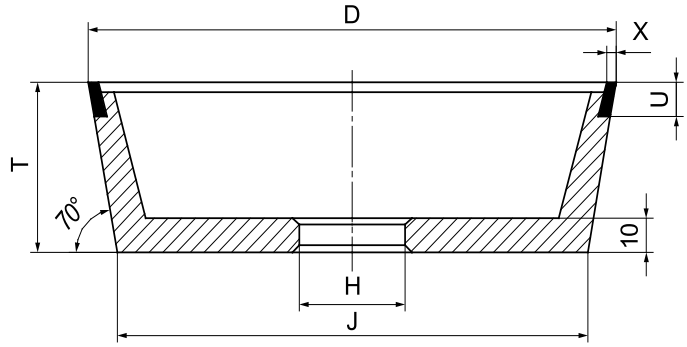
11V5



D	T	W	X	H	α°	E
75	25	6	3	20	15° - 30°	10
100	25; 26	3; 4	3	20-32	15°	10
100	25; 26	6; 10	3	20-32	15° - 30°	10

D	T	W	X	H	α°	E
125	25; 26	3; 4; 5	3	20-32	15°	10
125	25; 26	6	3	20-32	15° - 30°	10

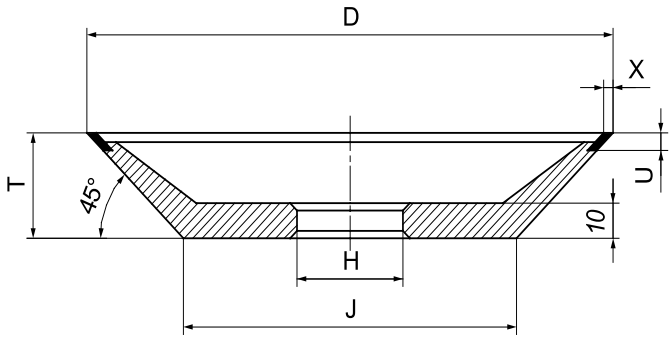
11V9

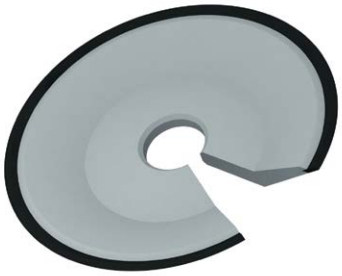


D	T	X	U	H	J
50	30	2	6	16; 20	28
75	20; 30	2; 3	6	16-32	53
75	20; 25; 30	2; 3	10	20-32	53
100	35	2; 3; 4	6	20-32	75

D	T	X	U	H	J
100	20; 35	2; 3	10	20-32	75
125	25; 40	2; 3	10	20-51	96
150	45	2; 3	10	20-51	114

12V9

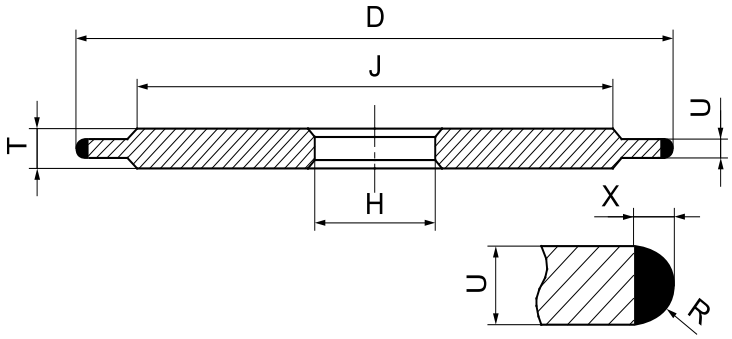


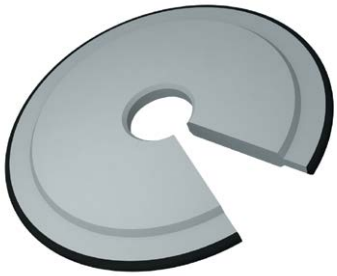


D	T	X	U	H	J
50	20	1,5; 2	6	16; 20	30
75	20	2; 3; 5	6; 10	20	35
100	20	2; 3	6; 10	20-32	60

D	T	X	U	H	J
125	25	2; 3	10	20-51	75
125	25	3	15	20-51	75
150	30	2; 3	10	20-51	120

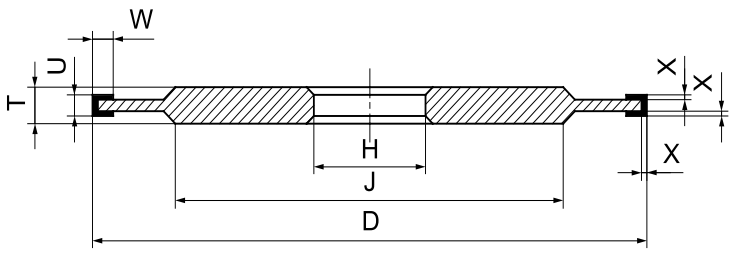
14F1

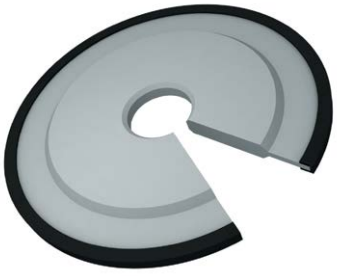




D	T	U	X	H	R	J
75	6	1,5-4	4; 5	20-25	0,75-2,0	50
100	6	1,0-5	5	20-32	0,5-2,5	70
125	6	1,0-5	5	20-32	0,5-2,5	90
150	8	1,5-5	5	20-60	0,75-2,5	120

14U1



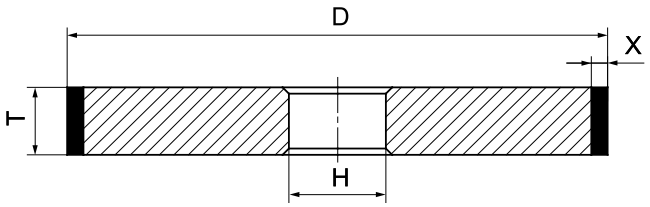


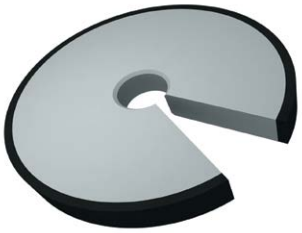
D	T	X	W	U	H	J
125	8; 10	2	4; 6	6; 8	20-32	65
150	8	2	4	6	20-32	80
150	8; 10; 12	2	6	6; 8; 10	20-32	80
200	16	3	10	12; 14	20-32	50
200	16	3	10	12; 14	40-76	120

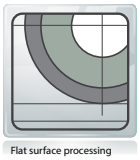
Precise sharpening tools for woodworking industry

Standard sizes for resinoid bonded wheels produced

1A1





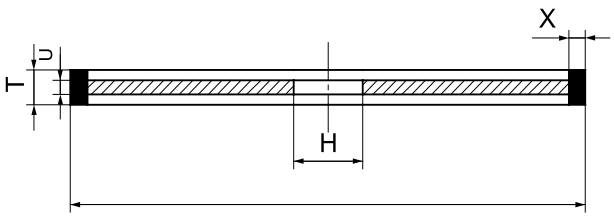


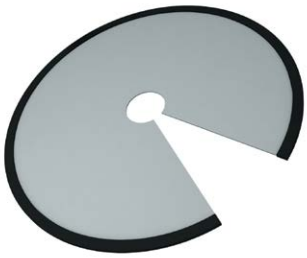
Application: external grinding of cylindrical and conical surfaces, internal grinding of cylindrical and conical surfaces, including coordinate, centerless grinding (using a set of wheels), flat grinding, sharpening of cutting tools.

D	T	X	H
50	2-6	2; 3; 8	13-20
70	5-10	5	20-32
75	5-10	5	20-32
80	3-8	6	20
100	3-12	3; 4	20-32

D	T	X	H
100	3-25	5	20-32
125	3-12	3	20-32
125	3-25	5	20-40
125	5-20	10	20-32
150	5-15	10	20-32

1A1R

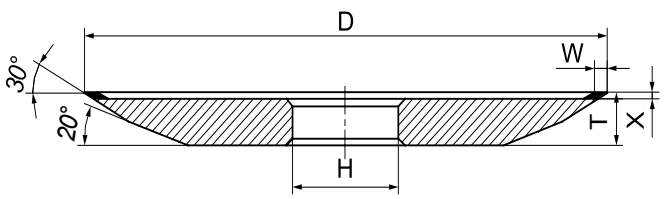


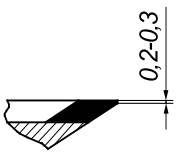


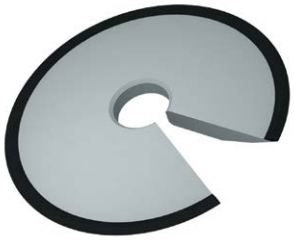
Application: cutting of products from steels, alloys and solid non-metals.

D	T	X	U	H
125	0,8; 1,0; 1,2	5	0,6-1,2	20; 32
150	0,8; 1,0; 1,2	5	0,6-1,2	20; 32
202	1,0	6	0,8-1,1	32; 60

4V2-30





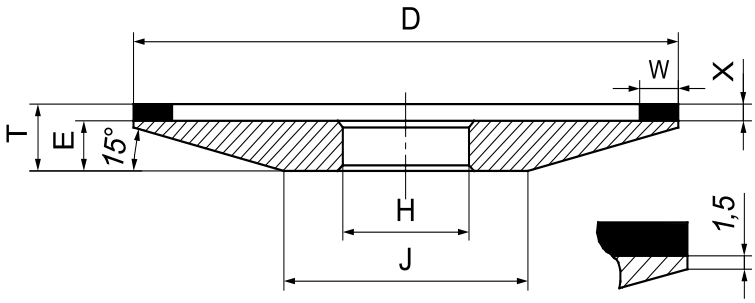


Application: cutting tools face sharpening.

D	T	W	X	H	E
80	9	4	2	20-32	7
100	10	4	2	20-32	8
125	13	4	2	20-32	11

D	T	W	X	H	E
150	13	4	2	20-32	11
175	12,5	4	2,5	20-32	10
200	13	4	2	20-32	11

4A2

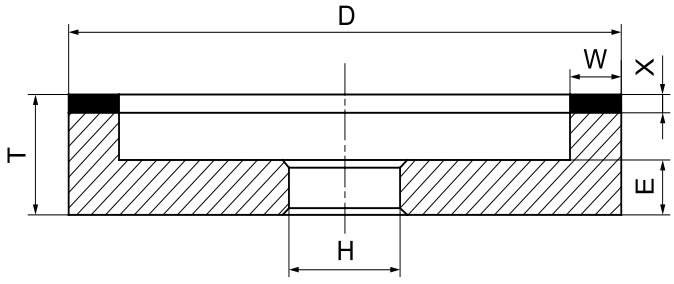


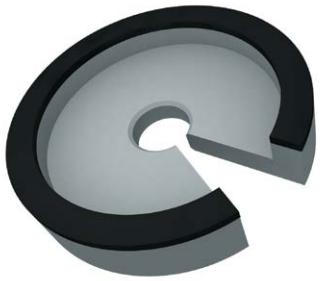
Application: sharpening of cutting tools, including multiblade ones, surface grinding with the lace of a wheel.

D	T-X	W	X	H	E	J
50	5	3; 5	2; 3; 4	13-20	5	24
60	5	3; 6	2; 3; 4	16-25	5	34
75	6	3; 4; 5; 6	1,5; 2; 3; 4	16-25	6	41
80	6	3; 4; 6; 10	1,5; 2; 3; 4	16-32	6	46
100	6	3; 4; 5; 6; 10	1,5; 2; 3; 4	16-32	6	66
100	6	15	2; 3; 4	16-32	6	66
125	7	3; 4; 5; 6	1,5; 2; 3; 4	16-32	7	84
125	7	8; 10; 15	2; 3; 4	16-32	7	84

D	T-X	W	X	H	E	J
150	9	3; 4; 5	1,5; 2; 3; 4	16-60	9	94
150	9	6; 10	2; 3; 4	16-60	9	94
150	9	15; 20; 30	3; 4	16-60	9	94
175	11	5; 10	2; 3; 4	20-76	11	104
200	13	5; 6	1,5; 2; 3; 4	20-76	13	114
200	13	10; 15; 20	3; 4	20-76	13	114
250	15	5; 10	3; 4	32-127	15	149

6A2

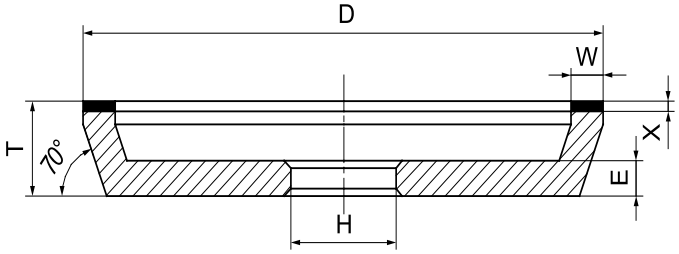


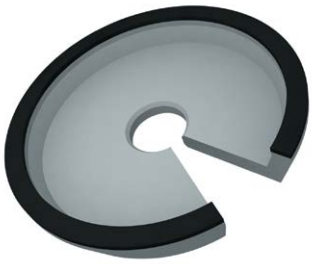


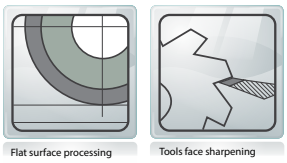
Application: sharpening of front and rear surfaces cutters and rear surfaces of multipoint cutting tools, surface grinding with the lace of a wheel.

D	T-X	W	X	H	E
100	23	3; 4; 5; 6; 8; 10	2; 3; 4; 5	16-32	10
125	23	15; 20	3; 4; 5	16-32	10
125	23	3; 4; 5; 6; 10	3; 4; 5	16-32	10
150	23	4; 30	3; 4	16-60	10
150	23	3; 5; 6; 10; 15; 20	3; 4; 5	16-60	10

11A2





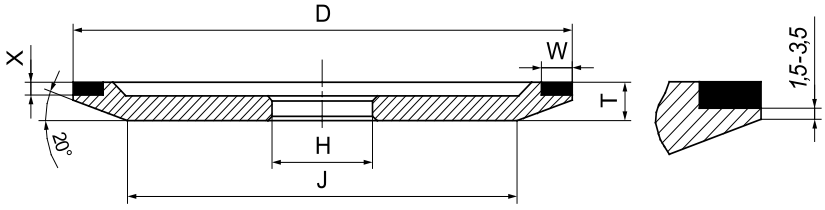


Application: sharpening of front and rear surfaces of cutters, sharpening of rear surfaces of multipoint cutting tools, flat grinding.

D	T-X	W	X	H	E
125	23	3; 5; 6; 10; 15; 20	3; 4; 5	16-32	10
125	23	4; 8	3; 4	16-32	10
150	23	3; 4; 30	3; 4	16-60	10
150	23	5; 6; 10; 15; 20	3; 4; 5	16-60	10

D	T-X	W	X	H	E
175	25	5; 10	3; 4; 5	16-76	10
200	25	6; 15	3; 4	20-127	13
200	25	5; 10; 20	3; 4; 5	20-127	13

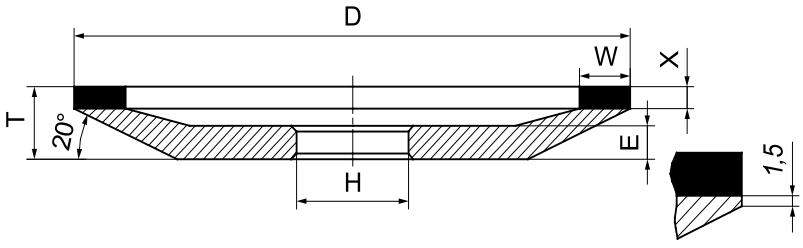
12A9



Application: sharpening of cutting tools.

D	T	X	W	H	J min
100	10	3; 4	6; 10	20-32	64
125	10	3; 4	6; 10	20-32	89

12A2-20

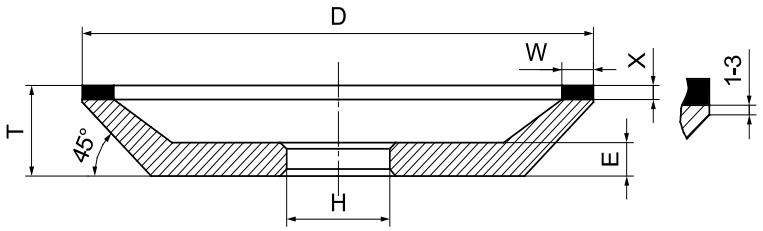


Application: sharpening of cutting tools front surface: reamers, mills, broaches, etc.

D	T-X	W	X	H	E
50	6	3; 5	1,5; 2; 3; 4	13-20	4
60	8	3; 6	1,5; 2; 3; 4	16-25	6
75	8	3; 4; 5; 6; 10	1,5; 2; 3; 4	13-32	6
80	8	3; 4; 6; 10	1,5; 2; 3; 4	16-32	6
100	10	3; 4; 5; 6	1,5; 2; 3; 4	16-32	8
100	10	10; 15	2; 3; 4	16-32	8
125	14	3; 4; 5; 6; 8	1,5; 2; 3; 4	16-32	8

D	T-X	W	X	H	E
125	14	10; 15; 20	2; 3; 4	16-32	8
150	16	3; 4; 5; 6	1,5; 2; 3; 4	16-60	9
150	16	10; 15; 20	2; 3; 4; 5	16-60	9
150	16	30	3; 4	16-32	9
175	18	5; 10	2; 3; 4	16-60	10
200	16; 20	5; 6; 10; 15; 20	2; 3; 4	16-76	12
250	23	5; 10	2; 3; 4	32-127	13

12A2-45



Tools face sharpening

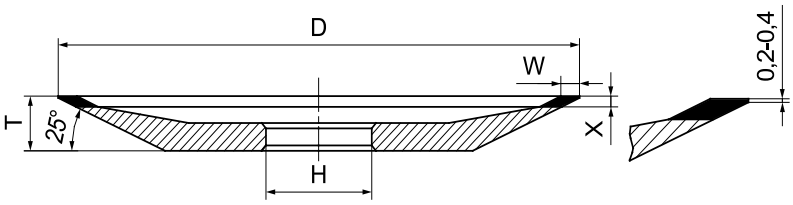
Tools top sharpening

Application: sharpening of cutting tools front and rear surfaces, surface grinding with the lace of a wheel. Finish and fine grinding of rotational surfaces.

D	T-X	W	X	H	E
100	23	3; 4; 5; 6; 10; 15	2; 3; 4; 5	16-32	10
110	29	7,5	3	32	10
125	23	3; 4; 5; 6; 8; 10; 15	2; 3; 4; 5	16-32	10
125	23	20	3; 4; 5	16-32	10
150	23	30	3; 4	16-60	10

D	T-X	W	X	H	E
150	23	3; 4; 5; 6; 10; 15; 20	3; 4; 5	16-60	10
175	25	5; 10	2; 3; 4; 5	16-76	10
200	25	5; 6; 10; 15; 20	3; 4; 5	20-127	13
250	25	5; 10	3; 4; 5	32-127	13

12R4



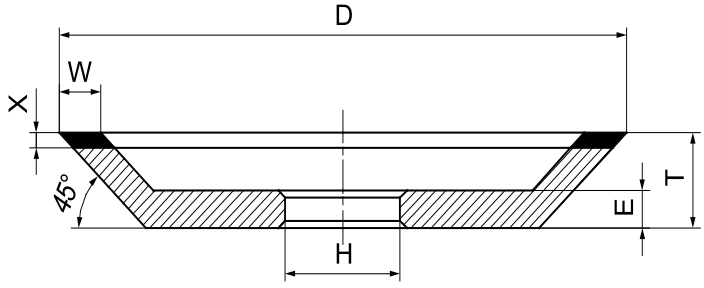
Tools face sharpening

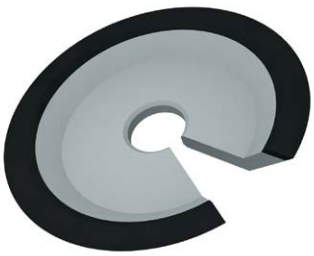
Application: sharpening of cutting tools front surface: reamers, mills, broaches, etc.

D	T	W	X	H
50	8	2	3	16; 20
75	10	2	3	20
80	10	2	3	20
100	10	2; 3	3	20-32
125	12	2; 4	3	20-50,8

D	T	W	X	H
125	13	3	2	20-50,8
150	16	3	4	20-50,8
150	16	3; 5	5	20-50,8
150	16	5	3	20-50,8
160	16	3	5	32

12V2-45





Tools top sharpening

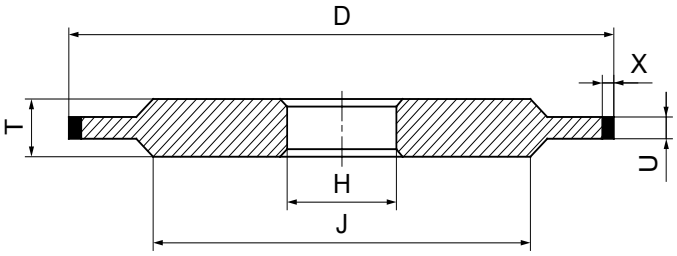
Tools face sharpening

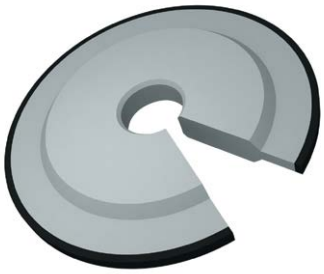
Application: sharpening of cutting tools.

D	T	W	X	H	E
100	25	5; 10	3	20-32	10
125	25	5; 10	3	20-32	10

D	T	W	X	H	E
150	25	5	4	20-32	10
150	25	10	3	20-32	10

14A1



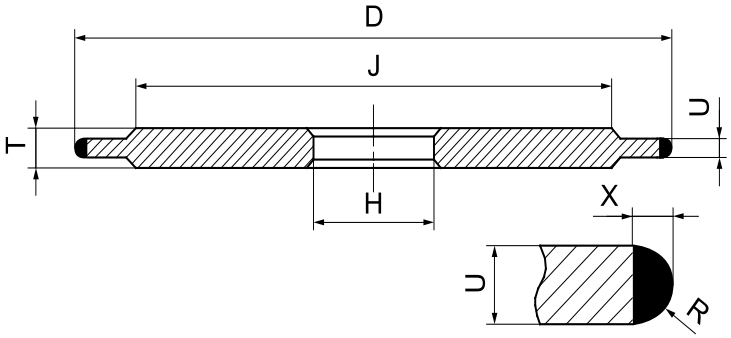


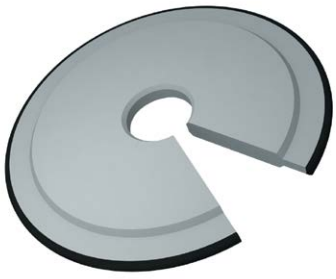
Application: cylindrical external and internal grinding, centerless grinding (using a set of wheels), flat grinding, grinding of flutes.

D	T	U	X	H	J
75	6	1,5-5	5	20-32	40-50
100	6	1,5-5	5	20-32	60-70
125	6	1,5-5	3; 4; 5	20-32	80-100
125	6	2-6	6	20-32	80-100
150	6; 8	1,5-2	3; 4; 5	20-60	100-120
150	6; 8; 10; 11	3-6	3; 4; 5; 8	20-60	100-120
150	6; 8-10	3-6	10	20-60	100-120

D	T	U	X	H	J
175	6-10	2-6	5	20-60	120-140
200	5,5-10	1,5	4	20-76	120-160
200	5,5-10	2-6	5	20-76	120-160
200	10	4	10	20-76	120-160
250	12-15	3-5	5	32-127	200
250	16-20	6-10	5	32-127	200

14F1



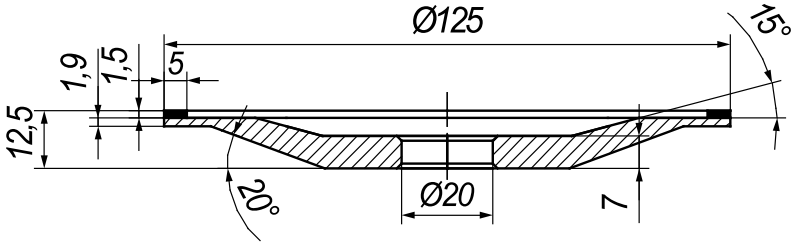


Profile grinding

Application: grinding of figurine-shaped surfaces on profile grinding machines, grooves and flutes processing.

D	T	U	X	H	R	J
75	6	1,5-4	4; 5	20-25	0,75-2,0	50
100	6	1,0-5	5	20-32	0,5-2,5	70
125	6	1,0-5	5	20-32	0,5-2,5	90
150	8	1,5-5	5; 10	20-60	0,75-2,5	120
175	8; 10	2-5	5	20-76	1,0-2,5	140
200	6; 8; 10	1,5	4	20-76	0,75	140-160
200	6; 8; 10	2-5	5	20-76	1,0-2,5	140-160

SKE

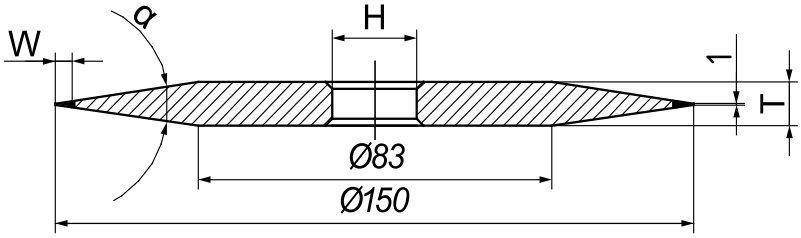


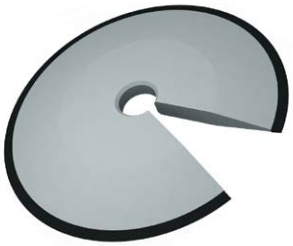
Tools face sharpening

Application: tools face sharpening

D	T	W	X	H
125	12,5	5	1,5	20

1E1



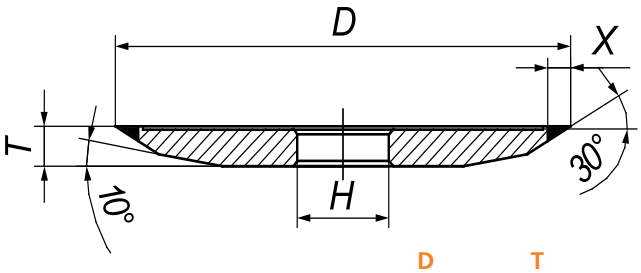


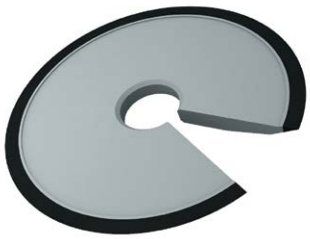
Profile grinding

Application: profile grinding

D	T	W	X	H	α°
150	9	4	0,3; 1,0	22-32	60°
150	9	4	0,3; 1,0	22-32	15°

1E1 (2)



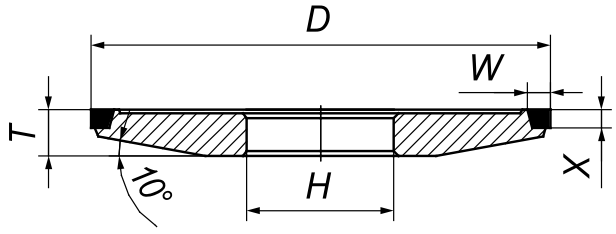


Tools face sharpening

Application: tools face sharpening

D	T	X	H
60	6	5	20
100	8	5	20
150	8; 9	4	20; 22-32

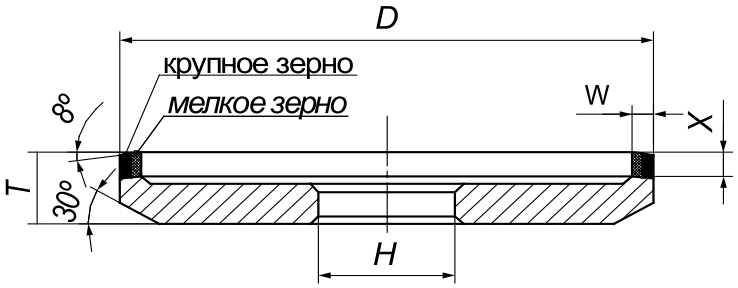
1K700



Application: tools face sharpening

D	T	W	X	H
100	10	5; 6,5	4	32
125	10	5	4; 5	32

K222 (1)

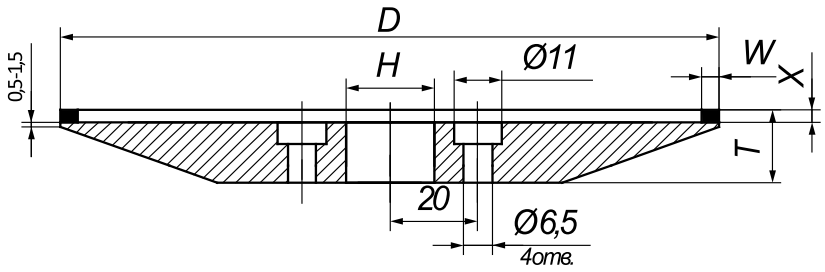


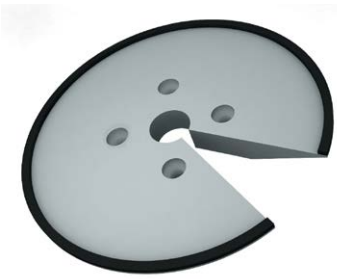
Tools top sharpening

Application: tools face sharpening

	D	T		W	X	H
3K222	125	18	5	2,5 x 2,5 3,0 x 2,0	6	32
5K222	125	22; 20	5	2,5 x 2,5 3,0 x 2,0	10	32
27K222	125	18		5	6	32

1K222 (9)





Tools face sharpening

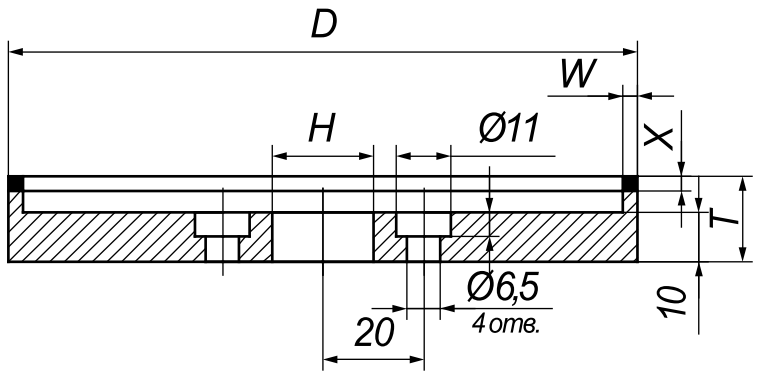
Tools top sharpening

Face grinding
Flat blades sharpening

Application: tools face sharpening, tools top sharpening, face grinding, flat blades sharpening

D	T	W	X	H
150	17; 18	3	3; 4	20
150	17; 18	4	3; 4	20
150	17; 18	5	3; 4	20
200	20	5	2	20
200	24	5	4	20

1K222 (10)

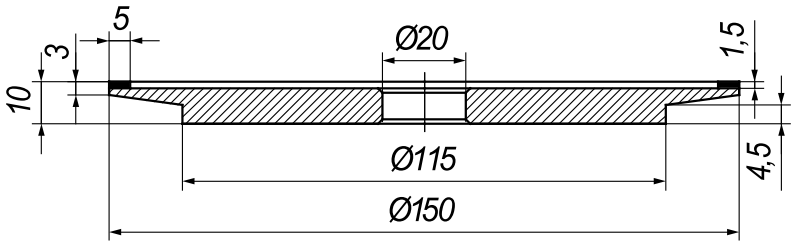


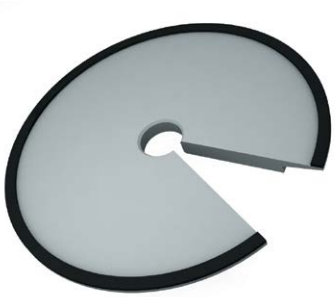
Tools top sharpening

Application: tools face sharpening

D	T	W	X	H
125	17; 18	3; 4; 5	3; 4	20

4A2





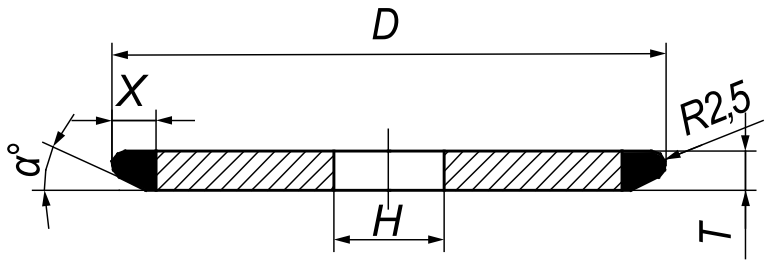
Tools face sharpening

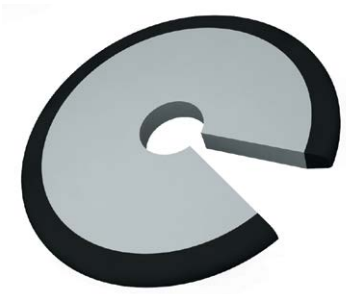
Tools top sharpening

Application: tools face sharpening

D	T	W	X	H
150	10	5	1,5	20

4FV9



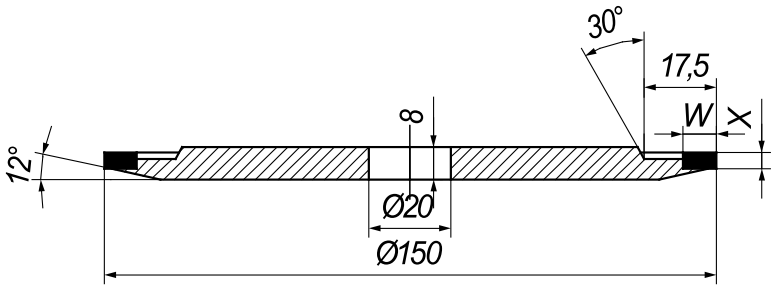


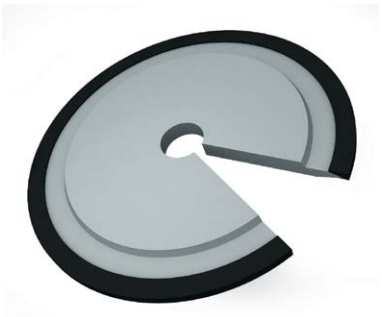
Structural profiles processing

Application: processing of shaped profile

D	T	X	H	R	α°
100	5-7,5	8	20	2,5	30

14A1



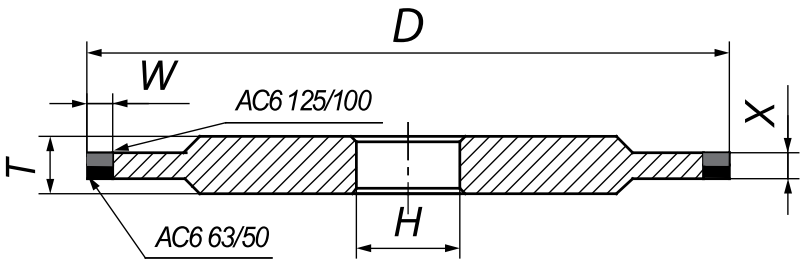


Tools face sharpening

Application: tools face sharpening

D	T	W	X	H
150	8	8	4	20
150	8	4	2	20

14B1

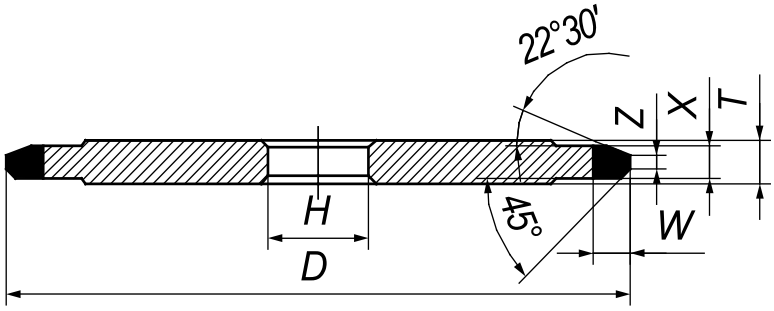


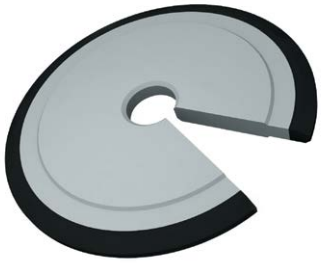
Tools top sharpening

Application: tools top sharpening

D	T	W	X	H
125	8	5; 6; 10	5 (2,5; 2,5)	32
200	8-10	5	5 (2,5; 2,5)	32

14ER1



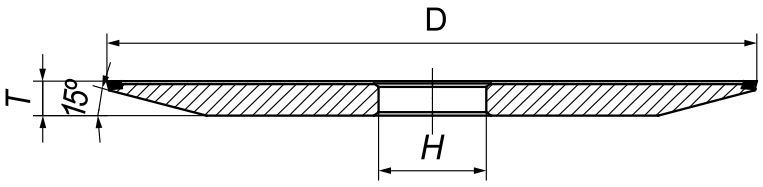


Application: processing of shaped profile, profile grinding

D	T	W	X	Z	H
75; 80	6	6	4,5	0,9; 1,4; 1,9	20
75; 80	6	6	5	2,8	20
75; 80	8	6	6	3,7	20
75; 80	8	6	7	4,5	20

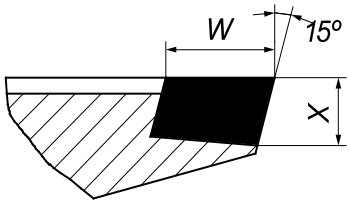
D	T	W	X	Z	H
125	8,5	6	4,5	0,9; 1,4; 1,9; 2	20; 32
125	8,5	6	5	2,8	20; 32
125	8,5	6	6	3,7	20; 32
125	8,5	6	7	4,5	20; 32

K222 (2)



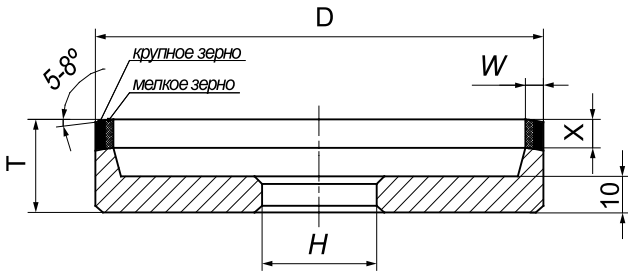
Tools face sharpening

Application: tools face sharpening



	D	T	W	X	H
2K222	100	8	3	1,8	20; 25; 32
1K222	100	8	3	3,8	25
4K222	125	8	3	1,8	25; 32
1K222	125	13	3	3,3; 3,8	25; 32

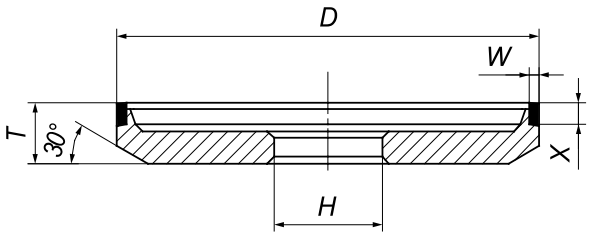
K222 (3)



Application: tools top sharpening

	D	T	W	X	H
6K222	100	20	5 (2,5+2,5)	6	25; 20
1K222	100	24	5 (2,5+2,5)	10	25; 20
1K222	125	24	5+5 (2,5+2,5)	6	25; 32
1K222	100	16	5 (2,5+2,5)	6	25

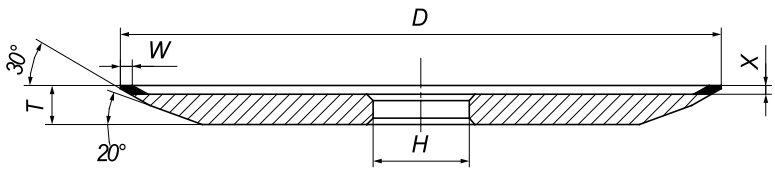
K222 (4)



Application: tools top sharpening

	D	T	W	X	H
1K222	125	18	3	6,5	32

K222 (5)

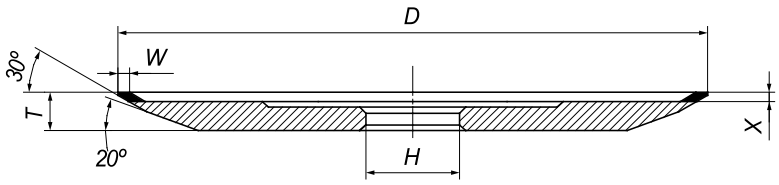


Application: tools face sharpening

	D	T	W	X	H
2K (4V2)	80	9	4	2	20; 32
2K (4V2)	100	10	4	2	20; 32
5K (4V2)	125	13	4	2	20-32

	D	T	W	X	H
6K (4V2)	150	13	4	2	32
2K (4V2)	175	12.5	4	2.5	32
2K (4V2)	200	13	4	2	32

K222 (6)



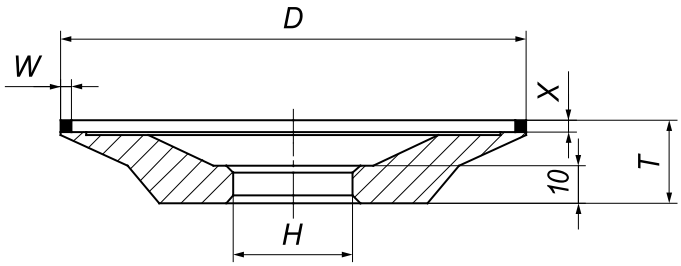
Tools face sharpening

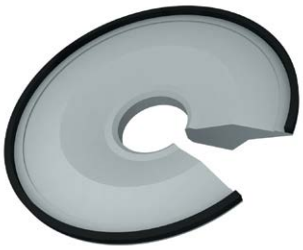
Application: tools face sharpening

	D	T	W	X	H
2K(12V2)	100	10	4	2	20; 25; 32
2K(12V2)	125	13	4	2	20; 25; 32
2K(12V2)	200	13	4	2	32

	D	T	W	X	H
5K(12V2)	80	9	4	2	20; 25; 32
5K(12V2)	150	13	4	2	25; 32
6K(12V2)	150	13	4	2	32

K222 (7)

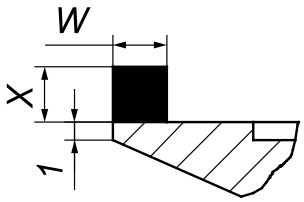




Tools face sharpening

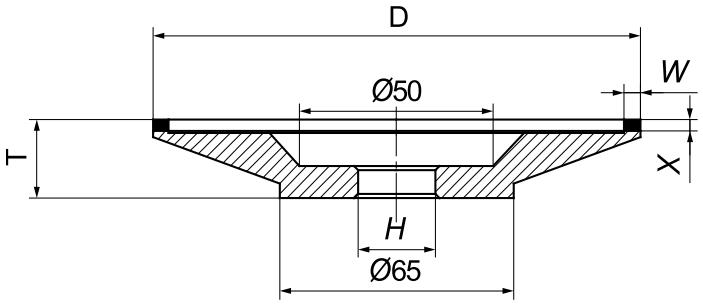
Tools top sharpening

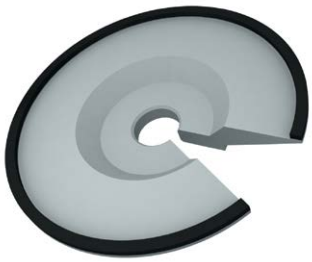
Application: tools face sharpening



	D	T	W	X	H
20K222 (13A2)	125	22	3	3	по указанным размерам
20K222 (13A2)	125	23	5	4	по указанным размерам
20K222 (13A2)	125	23	6	5	по указанным размерам

K222 (8)





Tools face sharpening

Tools top sharpening

Application: tools face sharpening

	D	T	W	X	H
14K222	150	23	4; 5*; 6	4	по указанным размерам
2K222	175	26	5*	4	по указанным размерам
6K222	200	28	5*; 6	4	по указанным размерам

* основной размер

CBN grinding tools on vitrified bond

By its physical and mechanical properties cubic boron nitride (CBN) is similar to the synthetic diamond (SD). However its chemical inertness to iron and high resistance to heat define the area of rational application.

Vitrified bonded CBN tools have following characteristics:

- superior cutting power and its persistence in the operation
- high durability of working profile that provides high-precision parts
- less heat generation, which contributes to obtaining high quality of workpieces surface layer.

Vitrified bonded CBN tools are used for processing:

- hardened and cemented steels
- roller-bearing steels
- instrument and high speed steels, including ones of tungsten and tungsten-molybdenum
- complex alloyed hardened steels
- heat-resistant steels and alloys
- materials sensitive to local temperature stresses and thermal shocks (cast magnets, ferrites)

The main applications of vitrified bonded CBN grinding wheels are as follows:

- sharpening of metal-cutting tools
- internal grinding
- external cylindrical grinding
- flat grinding
- thread grinding (single point and multi-point)
- gear grinding
- spline grinding
- superfinishing
- honing

A new type of vitrified bonded CBN tools are highly porous wheels with high pore volume, that ensures significant reduction of wheel loading and dressing frequency, provides improved coolant supply and decreses the temperature in the grinding zone, thus preventing burns. Such wheels are particularly effective for operations of creep feed grinding and profile grinding when processing ductile, heat-resistant alloys and steels of reduced hardness.

Vitrified bonded wheels are mainly produced with relative CBN concentration of 100%. CBN concentration increase up to 150% improves the wheel cutting ability and durability.

Recommendations for the choice of grinding wheel hardness

When choosing the wheel hardness it is necessary to be guided by the following basic rules:

- For grinding hard materials (hardened steel) as well as for grinding soft, plastic materials (heat-resistant alloys, non-ferrous alloys) soft wheels should be used.
- The smaller the wheel grain is, the less its hardness should be.
- Wheel speed increase requires wheel hardness reduction.
- When grinding with the wheel lace softer wheels are used than when grinding with the wheel periphery.
- In case of extention of contacting surfaces of the wheel and the workpiece softer wheel should be used.
- For profile grinding and grinding of discontinuous surfaces wheel hardness should be increased.
- For rough grinding harder wheel should be used.

Summary recommendations for choosing wheel hardness

Grinding operation	Elbor wheel hardness
External cylindrical: plunge-grinding longitudinal	 C2...CT1 C1...C2
Centerless: plunge-grinding longitudinal	 C2...CT2 C1...CT1
Internal	CT1...T1
Flat: with wheel periphery with wheel lace	 CM2...C1
Gear-grinding: module < 3 mm module > 3 mm	 CM2...C2 CM1...C1
Thread grinding: pitch 0,5-1,0 mm pitch 1,0-1,5 mm pitch 1,5-2,0 mm pitch more than 3 mm	 CT2...T1 CT1...CT2 C1...C2 CM2...C2
Spline grinding	C1...C2
Tool sharpening Hard alloy: Rough Fine High-speed alloy: Rough Fine	 CM2...C1

New marking (GOST P 52587)	Old marking (GOST 19202)
J	M3
K	CM1
L	CM2
M	C1
N	C2
O	CT1
P	CT2
Q	CT3
R	T1
S	T2

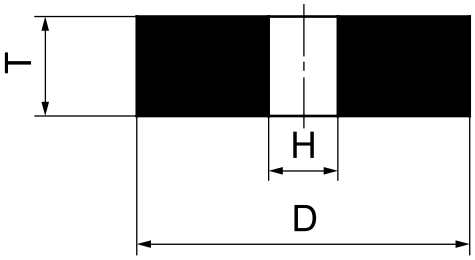
In the process of wheel manufacturing various types of vitrified bonds are used depending on CBN tools area of use.

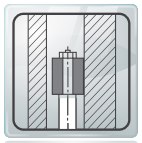
Bond marking	Recommended area of use of wheels
C10	Multipass grinding
K27	Profile grinding, including creep feed grinding
K47	Internal grinding
K70	Sharpening, including deep sharpening

Wheels are produced with following operational speed: 35 m/sec, 50 m/sec. Concentration: 75%, 100%, 125%, 150%.

Standard sizes of vitrified bonded CBN wheels produced

1A8





Application: internal grinding, grinding on jig grinding machines.

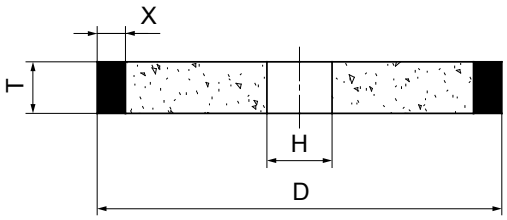
D	T	H
3	6	1,2
4	4-10	1,6
4	6-10	1,8
5	6-10	2
6	6-12	2,6
7	4-14	3
8	4-16	3
8	8-9	4
9	6-16	3; 4
10	2-16	3
10	4-18	4

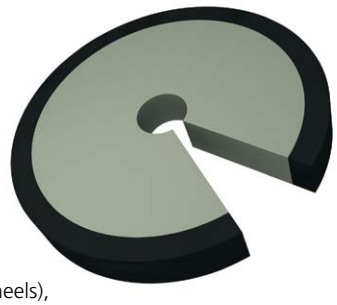
D	T	H
10	8	6
12	3-16	3
12	3-18	4
13	6-14	4
13	4-16	5
14	4-25	5
15	4-25	5
16	3	3
16	4-20	5
16	5-25	6

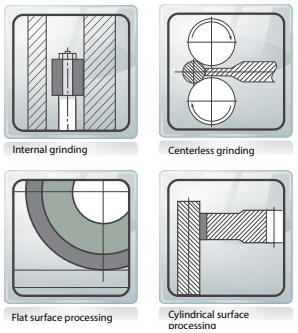
D	T	H
17	3	3
17	4-25	6
18	4-22	6
19	10-35	6
20	4-25	6
22	5-22	8
25	5-32	6; 8; 10
30	5-32	10; 13
32	5-32	10
35	5-35	10; 16

D	T	H
40	5-32	10-20
45	5-25	10-20
50	5-10	10
50	5-50	20
60	10-50	20
70	10-50	20
80	10-50	20
90	10-50	20; 32
100	10-50	20; 32
200	3-20	32

1A1







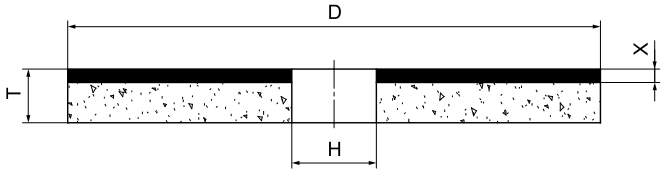
Application: external cylindrical, centerless grinding (using a set of wheels), flat grinding, internal grinding.

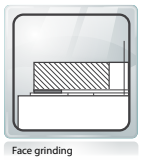
D	T	H	X
20	4-30	6	3
22	10-16	8	3
25	5-30	6-13	5
30	3-30	10-13	5
32	7-30	10-13	5
35	7-35	10-13	5
40	5-40	10-20	5
45	8-25	10-16	5
50	4-32	16-32	5
50	4-10	10-20	10
60	4-50	20-32	5
63	7-50	20-32	5
70	4-50	20-32	5
80	4-50	20-32	5
80	10	20-32	10
90	25-50	20-32	5

D	T	H	X
100	4-50	20-32	5
100	8-15	20	10
100	15-25	20-51	25
110	10-50	20	5
125	3-50	20-32	5
125	5-32	32	10; 20
135	30	32	10
150	3-32	20-32	5
150	3-20	32	10
150	10-32	32-60	20
175	4-20	32-60	5
175	10-20	32	20
200	5-32	32-76	5
200	8-32	32-76	10
200	10-20	32	20
250	5-40	76-127	5

D	T	H	X
250	5-40	76	10
250	5-20	32-76	20
300	8-30	76-127	5
300	8-40	76-160	10
350	8-32	127-160	5
350	8-40	127-160	10
400	10-32	127-203	5
400	8-50	127-203	10
400	15-25	203	15
400	10-25	203	20
450	20-40	203	20
500	10-25	203-305	7
500	10-40	203-305	10
500	10-40	203-305	20
600	16-50	305	10

1A2

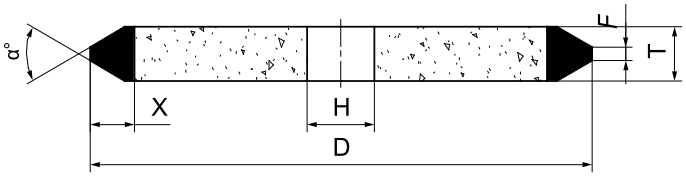




Application: face grinding.

D	T	H	X
100	10-20	20	5-10
150	10-20	20	5-10
200	10-20	32	5-10
250	10-20	76	5-10
300	10-20	76; 127; 203	5-10
350	10-40	127; 160	5-10
400	10-40	127; 160; 203	5-10

1D1



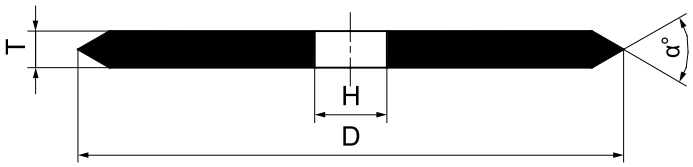
Profile grinding

Application: profile grinding, sharpening of cutting tools, spline grinding, hobbing cutters profile grinding, lead screws thread grinding, etc.

D	T	H	X	F	α°
50	8; 10	10; 16; 20	10	2	60°
60	8-12	13; 16; 20	12	2-4	40°; 60°
70	8	20	10	2	40°; 60°
80	13	16; 20	10; 15	2	40°; 60°
90	10	20	10	2	60°
100	10; 15; 20	20-32	20	2; 3	40°; 60°
100	15	20	25	8	30°
100	20	20	25	3; 5	40°; 60°
125	8; 10	32	10	2	40°; 60°
125	13; 16; 20	32	15	2; 3; 4	40°; 60°
125	20	32	25	2; 3; 4	40°
150	6; 10; 13; 16; 20	32-51	10; 15	2; 3	40°; 60°

D	T	H	X	F	α°
150	10-15	32	20	2; 3	40°; 60°
200	8; 10	32; 76	10	2; 3; 4	40°; 60°
200	8; 10; 12; 13	32; 76	20	2; 3; 4	40°; 60°
250	12	76	10	2; 3; 4	40°; 60°
250	8; 10	76	10	2; 3; 4	40°; 60°
300	8; 10	76; 127	10	2; 3; 4	40°; 60°
350	8; 10; 12	127; 160	10	2; 3; 4	40°; 60°
400	8; 10	127; 203	10; 20	2; 3; 4	40°; 60°
400	8; 10	127; 203	15; 20	2; 3; 4	30°; 40°; 60°
400	15	203	15; 20	2; 3; 4	40°; 60°
500	8; 10	203; 305	10	2; 3; 4	40°; 60°
500	8; 10; 12	203; 305	20	2; 3; 4	40°; 60°

1E1 (1)

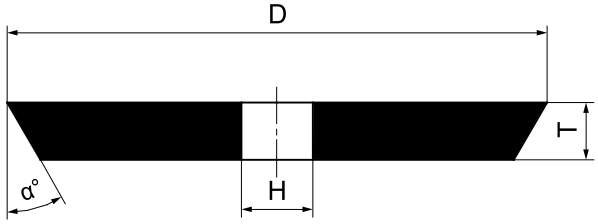


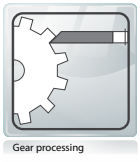
Grooving

Application: profile grinding, thread grinding, grooves grinding.

D	T	H	α°
25	8	8	40°; 60°
35	8	8	40°; 60°

1V1 (1)



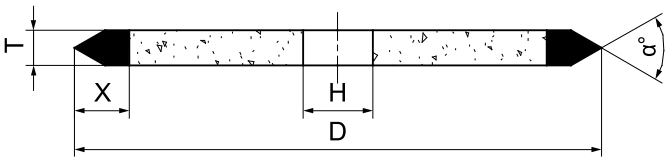

Gear processing

Application: gear processing

D	T	H	α°
25	8	8	15°; 30°; 45°
30	5	10	15°; 30°; 45°
35	8	10	15°; 30°; 45°

D	T	H	α°
50	8	10	15°; 30°; 45°
60	8	20	15°; 30°; 45°
70	8	20	15°; 30°; 45°

1E1 (2)

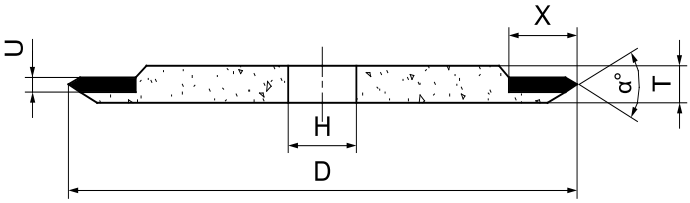


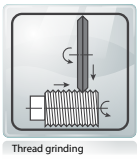
Application: profile grinding, thread grinding, grooves grinding.

D	T	H	X	α°
50	8; 10	10-20	10	40°; 60°
60	8; 10; 11	20	10; 12; 13	40°; 60°
70	8	20	10	40°; 60°; 90°
80	8; 13	16; 20	15; 16	40°; 60°
90	8; 10	20	10	40°; 60°
100	8; 10; 15	20; 32	10; 20; 25	40°; 60°
125	8; 10; 13	32	10	40°; 60°; 90°
125	16; 20	32; 51	15	40°; 60°
125	20	32; 51	25	40°
150	6; 10; 14; 16	32	10; 15	40°; 60°
150	10-15	32	20	40°; 60°

D	T	H	X	α°
200	8; 10	32; 76	10	40; 60°; 90°
200	8; 10; 12	32; 76	20	40°; 60°
250	8; 10; 13	76	10	40°; 60°
250	15	127	20	40°; 60°
300	8; 10	76; 127	10	40°; 60°
350	8; 10	127; 160	10	40°; 60°
400	8; 10; 16	127; 203	10	40°; 60°
400	8; 10	127; 203	15	40°; 60°
400	10	203	20	40°; 60°
500	8; 10	203; 305	10	40°; 60°
500	8; 10; 12	203; 305	20	40°; 60°

1E6Q



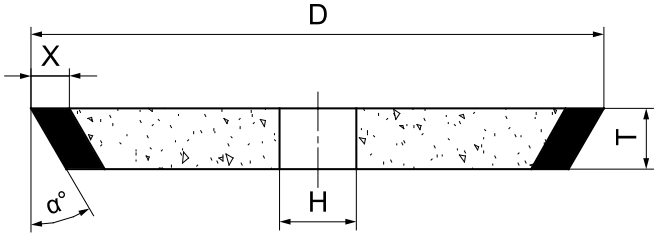


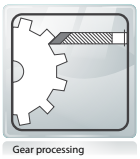
Application: thread grinding.

D	T	H	X	U	α°
80	6	20	10	3	40°; 60°; 90°
100	8	20	10	3	40°; 60°; 90°
150	8	32	10	3	40°; 60°; 90°

D	T	H	X	U	α°
250	8	76	10	3	40°; 60°; 90°
350	8; 10	160	10	3; 4	40°; 60°; 90°
400	10	203	10	4; 6	40°; 60°; 90°

1V1 (2)



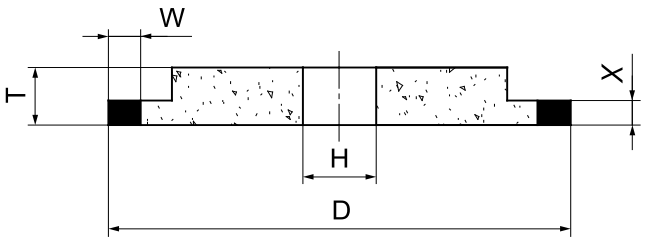


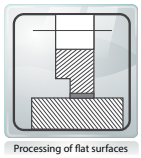
Application: profile grinding, sharpening of cutting tools.

D	T	H	X	α°
80	8	20	10	15°
100	8; 10	32	10	15°
125	8	32	10	15°
125	34	32	12	15°

D	T	H	X	α°
150	10; 20; 32	32	5; 10	15°; 30°
150	40	32	15	15°
250	16	76	20	30°

3A1



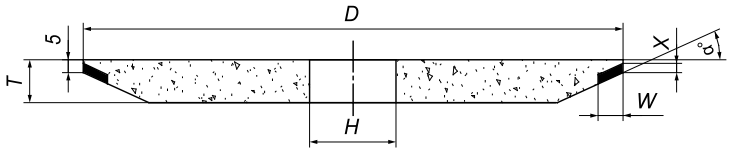

Processing of flat surfaces

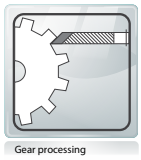
Application: external cylindrical, centerless grinding (using a set of wheels), flat grinding, groove cutting.

D	T	H	W	X
150	10	20; 32	5; 10; 20	2-8
200	10; 12	32; 51	5; 10; 20	3-8; 10
250	10; 12	32; 76	5; 10; 20	3-8

D	T	H	W	X
300	16	127	10	3,5
400	12	127	10	6
500	12	203	10	6

4V9

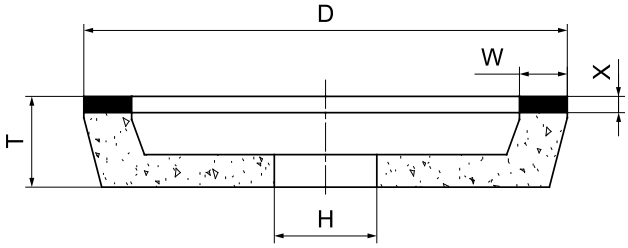


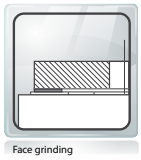

Gear processing

Application: sharpening of cutting tools, including front surface of tools with straight and helical tooth.

D	T	H	W	X	α°
250	20	51	25	3	15°

11A2



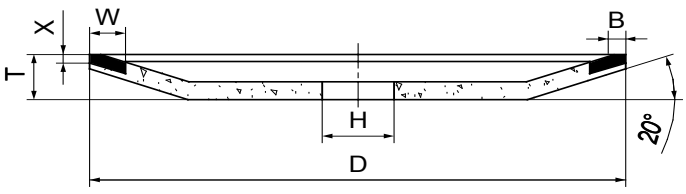

Face grinding

Application: flat grinding with the lace of the wheel, sharpening of cutting tools.

D	T	H	W	X
80	35	20	5	5
100	35	20	10	5

D	T	H	W	X
125	50	32	10	5
150	50	32	10	5

12R9



Tools face sharpening

Application: sharpening of cutting tools.

D	T	H	W	X	B	α°
125	13	32	10	2	2; 4	20°
150	16	32	10	4	4	20°

SD grinding tools on vitrified bond (SD)

Tools are intended for processing hard alloy workpieces, technical ceramics, glass, polymeric materials, polycrystals of cubic boron nitride and diamond, for joint grinding of hard alloy and steel base.

Porous tool structure allows to remove swarf from the cutting zone, thus preventing loading of tool working surface, and improves treated surface quality.

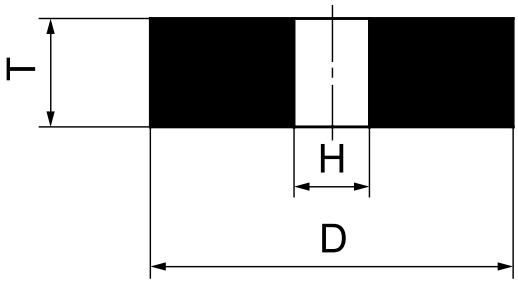
Advantages of this kind of tools:

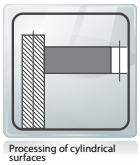
In a joint grinding of hard alloy and steel substrate porous tool structure allows to remove swarf from the cutting zone, thus preventing sticking and loading, and improves the quality of treated surface and enables to obtain a profile with lower economic costs.

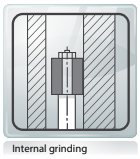
Tools are manufactured from synthetic diamond of normal and increased strength.
Grit sizes: 200/160 - 50/40; (D 213 – D 54); 40/28 - 10/7.
* See grit sizes correspondence table on page 7
Concentration: 75%, 100%, 125%, 150%.

Standard sizes of vitrified bonded SD wheels produced

1A8







Application: holes grinding on intragrinding and jig grinding machines.

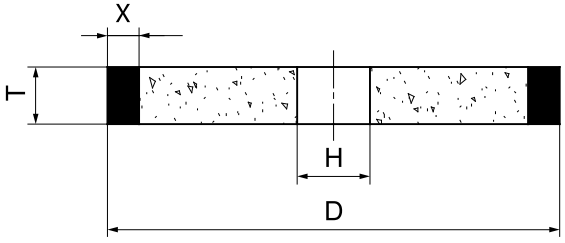
D	T	H
3	6	1,2
4	4-10	1,6
4	6-10	1,8
5	6-10	2
6	6-12	2,6
7	4-14	3
8	4-16	3
8	8-9	4
9	6-16	3; 4
10	2-16	3

D	T	H
10	4-18	4
10	8	6
12	3-16	3
12	3-18	4
13	6-14	4
13	4-16	5
14	4-25	5
15	4-25	5
16	3	3
16	4-20	5

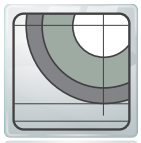
D	T	H
16	5-25	6
17	3	3
17	4-25	6
18	4-22	6
19	10-35	6
20	4-25	6
22	5-22	8
25	5-32	6; 8; 10
30	5-32	10; 13
32	5-32	10

D	T	H
35	5-35	10; 16
40	5-32	10-20
45	5-25	10-20
50	5-10	10
50	5-50	20
60	10-50	20
70	10-50	20
80	10-50	20
90	10-50	20; 32
100	10-50	20; 32
200	3-20	32

1A1



Internal grinding


Flat surface processing

Centerless grinding

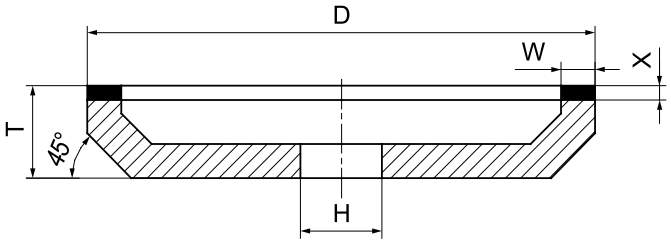
Application: external grinding of cylindrical and conical surfaces, internal grinding of cylindrical and conical surfaces, including coordinate, centerless grinding (using a set of wheels), flat grinding, sharpening of cutting tools.

D	T	H	X
20	4-30	6	3
22	10-16	8	3
25	5-30	6-13	5
30	3-30	10-13	5
32	7-30	10-13	5
35	7-35	10-13	5
40	5-40	10-20	5
45	8-25	10-16	5
50	4-32	16-32	5
50	4-10	10-20	10
60	4-50	20-32	5
63	7-50	20-32	5

D	T	H	X
70	4-50	20-32	5
80	4-50	20-32	5
80	10	20-32	10
90	25-50	20-32	5
100	4-50	20-32	5
100	8-15	20	10
100	15-25	20-51	25
110	10-50	20	5
125	3-50	20-32	5
125	5-32	32	10; 20
135	30	32	10
150	3-32	20-32	5

D	T	H	X
150	3-20	32	10
150	10-32	32-60	20
175	4-20	32-60	5
175	10-20	32	20
200	5-32	32-76	5
200	8-32	32-76	10
200	10-20	32	20
250	5-40	76-127	5
250	5-40	76	10
250	5-20	32-76	20

12A2-45



Tools top sharpening

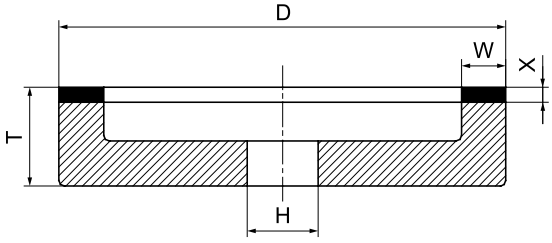
Tools face sharpening

Face grinding

Application: cutting tools top and face sharpening, flat grinding with the lace of the wheel.

D	T-X	X	W	H
75	18	3; 5	5	20
100	23	3; 5	10	20; 32
125	23	3; 5	5	32
150	23	3; 5	5; 10; 20	32

6A2



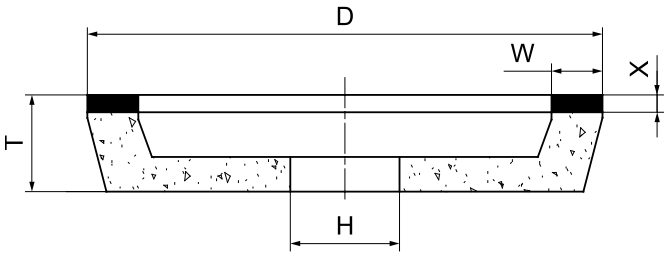
Tools face sharpening

Face grinding

Application: cutting tools sharpening, flat grinding with the lace of the wheel.

D	T-X	X	W	H
75	22	3; 5	5	20
100	22	3; 5	10	20; 32
125	24	3; 5	5	32
150	24	3; 5	5; 10; 20	32

11A2



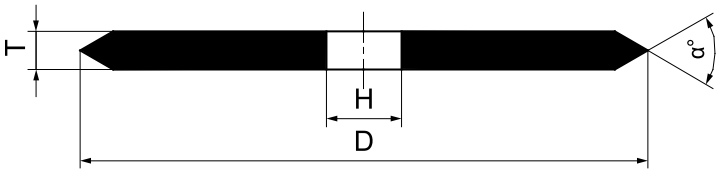
Face grinding

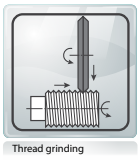
Face grinding

Application: cutting tools sharpening, flat grinding with the lace of the wheel.

D	T	H	W	X
80	35	20	5	5
100	35	20	10	5
125	50	32	10	5
150	50	32	10	5

1E1 (1)



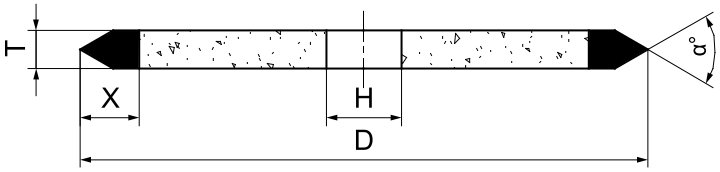

Thread grinding

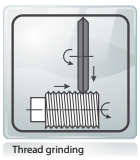
Grooving

Application: profile grinding, thread grinding.

D	T	H	α°
25	8	8	40°; 60°
35	8	8	40°; 60°

1E1 (2)




Thread grinding

Grooving

Application: profile grinding, thread grinding.

D	T	H	X	α°
50	3; 8; 10	10-20	10	40°; 60°
60	3; 8; 10; 11	12-20	10; 12; 13	40°; 60°
70	8	20	10	40°; 60°; 90°
75	8	20	10	60°
80	8; 13	16; 20	15; 16	40°; 60°
90	8; 10	20	10	40°; 60°
100	8; 10; 15	20; 32	10; 20; 25	40°; 60°
125	8; 10; 13	32	10	40°; 60°; 90°

D	T	H	X	α°
125	16; 20	32; 51	15	40°; 60°
125	20	32; 51	25	40°
150	6; 10; 14; 16	32	10; 15	40°; 60°
150	10-15	32	20	40°; 60°
200	8; 10	32; 76	10	40; 60°; 90°
200	8; 10; 12	32; 76	20	40°; 60°
250	8; 10; 13	76	10	40°; 60°
250	15	127	20	40°; 60°

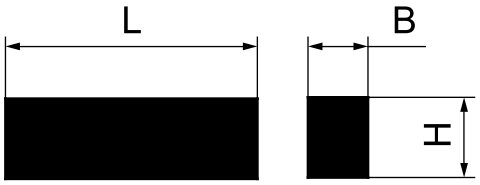
CBN vitrified bonded stones

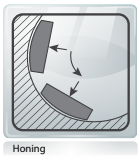
Example for order marking

type	D	T	H	L	CBN mark	Hardness	Grit size of SHM	Bond mark	Concentration
1-1	12	10	15	50	CBN30	CT1	200/160	K	100%

Standard sizes of stones

1

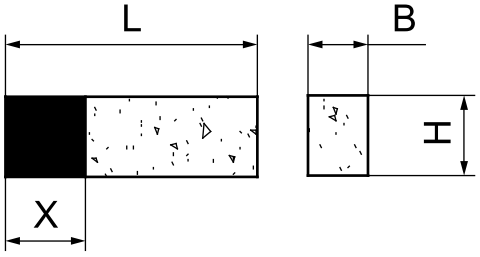


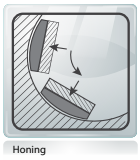


Application: superfinishing of steels, including high-speed and heat resistant steels.

B	H	L
6	4	8
5	5	50
10	10	100
8; 10	8-10	150

1-1

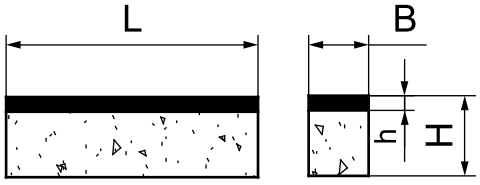




Application: superfinishing of steels, including high-speed and heat resistant steels.

B	H	X	L
12	4-16	15	50

1-2



Application: steels and chromium honing.

B	H	L	h
8; 10	8-10	150	3-10

Abrasive stones

Application: superfinishing and honing of structural alloy and instrumental steels.

Manufacturing methods:
- semidry shaping of grits F 40 - F 1000
- cold slip casting of grits F 600 - F 1200

Stones are manufactured:
- in accordance with GOST 2456-82
- in accordance with OST 2 И70-10-90, OST 2 И70-8-87 for companies of bearing and automotive industries
- on customer's drawings
- sulfur impregnation is performed in order to increase the flexural strength of stones.

Main types of stones defined in the standard GOST 2456-82 for A and B accuracy classes

Type of stone	Type marking	Width, mm (B)	Height, mm (C)	Length, mm (L)
Square stone	БКв	5-45	5-45	50-250
Rectangular stone	БП	6-50	3-40	25-200
Triangled stone	БТ	10,13,16,20,25		100,150

Пример условного обозначения бруска

type	B	C	L	material	grit size	hardness	bond	structure	Method of manufacture	Accuracy class
БКв	20	20	150	25А	М28	СМ2	К	10		А
БП	50	25	150	64С	М7	М3	К		Л	Б

The approximate dependence of processed material surface roughness from abrasive stones grit size

Grit size	Roughness, Ra, micron
40-25	0,32-1,6
16-10	0,28-1,0
8-М40	0,16-0,63
М28	0,12-0,32
М20-М14	0,08-0,28
М10-М7	0,04-0,10

Grinding materials

Grinding materials marking

Name of the material	Marking according to Russian standards	Foreign companies marking
Electrocorundum white	24A, 25A	38A, 43A, 42A, 89A, 9A, AA, EK1, WA, 80A
Silicon carbide green	64C, 63C	39C, C49, 9C, 8C, SC9, GC, SCg, 15C,1C

Grit sizes marking of electrocorundum and silicon carbide grinding materials

GOST 3647-80	GOST P 52381-2005	TU 3980-075-00224450-99	TU Y 3.02-00222226-59-94
14A,25A,54C,64C		25A	64C,54C
		Boksitogorsk alumina	Zaporizhia Abrasives
40	F46	F46	F40
32	F54	F54	F54
25	F60	F60	F60
20	F70	F70	F70
16	F80	F80	F80
12	F100	F100	F100
10	F120	F120	F120
8	F150	F150	F150
6	F180	F180	F180
5	F220	F220	F220
M63		F230	F220
M50		F280	F230
M40		F360	F320
M28		F400	F360
M20		F500	F500
M14		F600	F600
M10		F800	F800
M7		F1000	F1000
M5		F1200	F1200

Determination of grain composition of abrasive grit and grinding powders in accordance with GOST (№ 200 - № 5), in accordance with TU (F4-F220) is carried out by screen analysis method. Micropowder grain composition in accordance with GOST (M63-M5) is determined by microscopic method, in accordance with ISO and TU (F230-F1200) - by the method of sedimentation. Because of the use of sieves with different mesh sizes for abrasive grit and grinding powders, as well as because of the differences in micropowders control methods, correspondence of grit size marking according to GOST, GOST P and TU is approximate.

Grade of grinding stones

Stones hardness control is carried out using the following methods:

- indentation method under GOST P 52587-2006
- acoustic method under GOST P 52710-2007

The approximate ratio between sound index and grade of vitrified bonded abrasive tools

Hardness	14A, 25A	54C, 64C	14A, 25A, 64C	14A, 25A, 64C
	grit size over №8	grit size over №8	№6-M40	Less than M40
H	35,37	-	33,35	33,35
I	39,41	47,49	37,39	35,37
J	41,43	51,53	41,43	39,41
K	45,47	55	43,45	41,43
L	49	57	45,47	43,45
M	51	59	49	45,47
N	53	59	49,51	47,49
O	55	61	51,53	49
P	57	61	53	51
Q	59	63	55	53
R	61	63	55,57	-
S	61	-	57	-
T,U	63			

Grade marking according to the standard of Russian Federation and an approximate grade value according to the international standards

	GOST P 52587-2006	ISO standard	GOST 19202-80
Very soft	F	F	BM1
Very soft	G	G	BM2
Soft	H	H	M1
Soft	I	I	M2
Soft	J	J	M3
Medium soft	K	K	CM1
Medium soft	L	L	CM2
Medium	M	M	C1
Medium	N	N	C2
Medium hard	O	O	CT1
Medium hard	P	P	CT2
Medium hard	Q	Q	CT3
Hard	R	R	T1
Hard	S	S	T2
Very hard	T,U	T,U	BT
Super hard	V,W,X,Y,Z	V,W,Y,Z	ЧТ

Abrasive pastes

Pastes are used for polishing and smooth finishing of workpieces of metal and non-metal materials. Pastes consist of SD or CBN powders, binders and surface-active agents.

Grit size

Pastes are made from SD or CBN powders of following grit sizes:

- polishing SD powders - grit size 125/100-50/40 (126 - 46);
- micro-polishing ACM powders - grit size 60/40-1/0;
- polishing CBN powders - grit size 125/100-50/40 (126 - 46);
- micropolishing CBN powders - grit size 40/28-1/0.

Concentration of pastes

Pastes are made in following concentrations:

- N - normal;
- I - increased;
- H - high.

Mass fraction of CBN and SD depending on the concentration is given below.

Diamond paste

Diamond grit size marking	Diamonds mass fraction at the concentration, %		
	N	I	H
125/100 100/80 80/63	40	60	-
63/50 50/40	20	40	-
60/40 40/28	8	20	40
28/20 20/14 14/10	6	15	30
10/7 7/5 5/3	4	10	20
3/2 2/1 1/0	2	5	10

Cubic boron nitride paste

Diamond grit size marking	Cubic boron nitride mass fraction at the concentration, %		
	N	I	H
125/100 100/80 80/63	40	60	-
63/50 50/40 40/28	20	40	-
28/20	8	20	40
20/14 14/10	6	15	30
10/7 7/5 5/3	4	10	20
3/2 2/1 1/0	2	5	10

On customer request pastes with other SD and CBN mass fractions can be produced.

Features of pastes

Pastes are produced with following types of rinsability:
W - water-rinsable, O-organic solvents-rinsable, WO- both water- and organic solvents-rinsable.
The consistency of pastes is buttery - (B).

Example of paste marking

ACM diamond paste of grit size 20/14, of N concentration, organic solvents-rinsable (O), of buttery consistency (B) is denoted: Diamond paste ACM 20/14, NOB.

OPEN JOINT-STOCK COMPANY

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