Diamond & CBN Grinding Wheels

Made with Resinoid, Metallic or Vitrified bonds.

Used for grinding of Ceramics, Tungsten Carbide, Semiconductor and Automobile parts.

SHINHAN DIAMOND

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Shinhan Diamond Industrial Co., Ltd. has produced a variety of diamond tools from products for construction and stone to those for precision industries and high-tech materials such as silicon wafers for semi-conductor and the flat panel display including LCD and OLED since its establishment in 1978.

Diamond & CBN Grinding Wheels

www.shinhandia.co.kr

Basic Information

How to order Diamond & CBN Wheel

To meet your requirements in every way, we need the following information :

01. Shape and Dimension of the wheel
02. Grit size (Mesh)
03. Concentration
04. Bond (Resinoid, Vitrified, Metallic, Electroplated)
05. Quantity
06. In addition to the above, please include the following details to ensure accurate production :

A. Working Conditions

- Machine Name & HP
- RPM of Diamond or CBN wheel
- RPM of Workpiece
- Table Speed (m/min)
- Feed Rate
- Depth of Cut (mm)
- Total Removal Rate
- Wet or Dry
- Cycle Time
- Grinding Method
- Coolant
- Dressing Method

B. Workpiece

- Material of Workpiece
- Shape of Workpiece
- Hardness of Workpiece

C. Required Quality

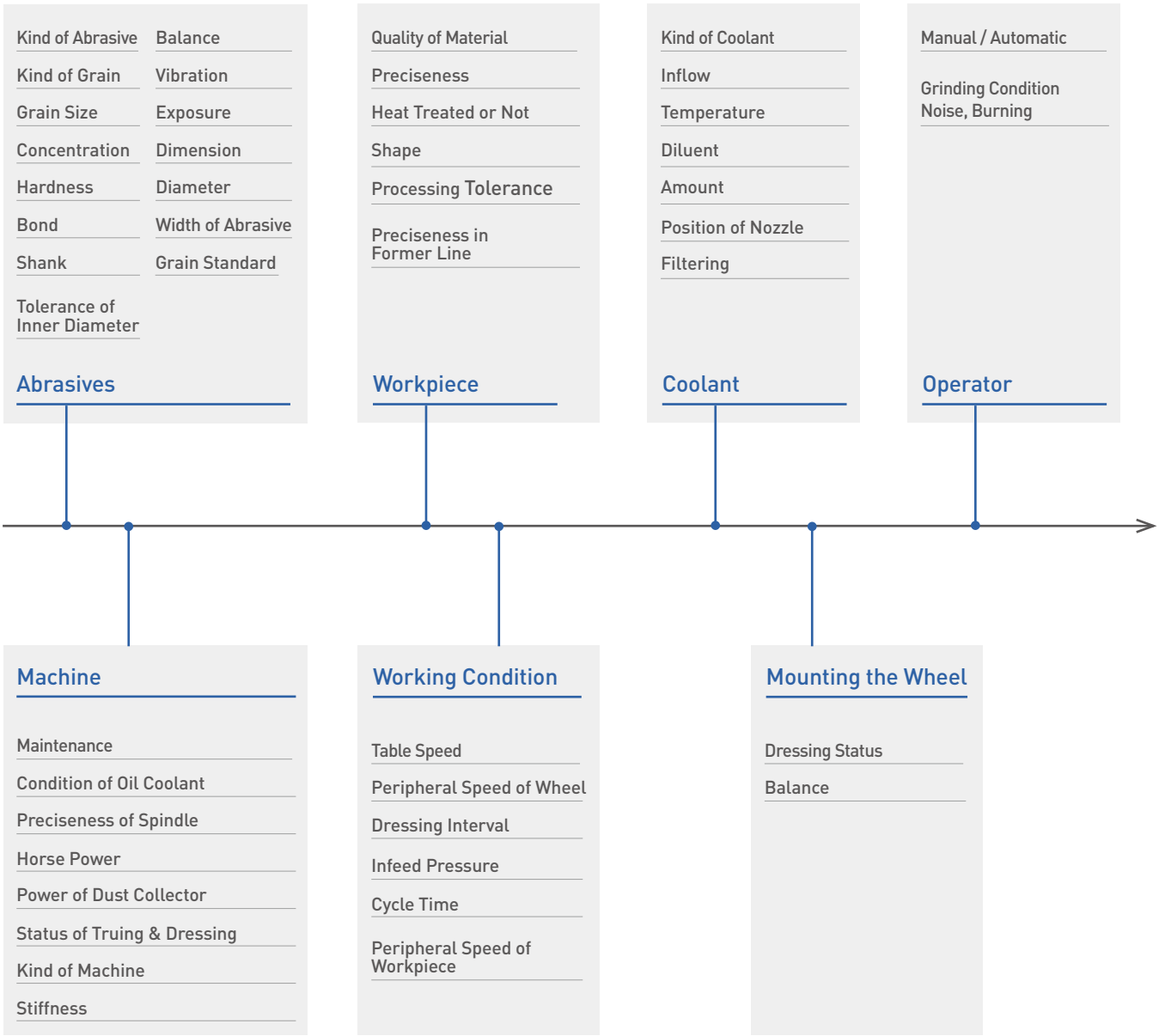
- Surface Roughness (Rmax, Ra or Rz)
- Tool Life
- Grinding Speed (m/mm)
- Others

D. Required Quality

When placing a repeat order, please specify the Product Code No. of Shinhan Diamond marked on the previous wheel.

Ref) Please refer to the list which shows all factors that affect grinding efficiency of the wheels.

Factors of Grinding Efficiency



Selection Criteria Diamond & CBN Grinding Wheels

Type of Abrasive

- **D** – Natural Diamond
- **SD** – Synthetic Diamond
- **SDC** – Synthetic Diamond Coated
- **CBN** – Cubic Boron Nitride

Grade of Hardness

- **J** – Softer
- **L** – Soft
- **N** – Normal
- **P** – Hard
- **R** – Harder

Type of Bond

- **B** – Resinoid
- **M** – Metallic
- **V** – Vitrified
- **EP** – Electroplated

Coolant

- **W** – Wet
- **D** – Dry
- **W/D** – Wet & Dry

D 140 N 100 B - 3.0 W

Concentration

50	= 2.2 ct/cc	**100**	= 4.4 ct/cc
75	= 3.3 ct/cc	**125**	= 5.5 ct/cc
		150	= 6.6 ct/cc

Depth of Abrasive

X Layer

Grit Size

US (JIS) Mesh	FEPA (μm)	Application
30 / 40 #	D 602	Grinding
40 / 50 #	D 427	
50 / 60 #	D 301	
60 / 80 #	D 252	
80 / 100 #	D 181	
100 / 120 #	D 151	
120 / 140 #	D 126	
140 / 170 #	D 107	
170 / 200 #	D 91	
200 / 230 #	D 76	
230 / 270 #	D 64	
270 / 325 #	D 54	
325 / 400 #	D 46	
400 / 500 #	40 ~ 60	

US (JIS) Mesh	FEPA (μm)	Application
500 #	30 ~ 40	Lapping
600 #	22 ~ 36	
800 #	20 ~ 30	
1,000 #	15 ~ 25	
1,200 #	10 ~ 20	
1,500 #	8 ~ 16	Polishing
1,800 #	6 ~ 12	
2,000 #	5 ~ 10	
3,000 #	4 ~ 8	
5,000 #	3 ~ 6	
8,000 #	2 ~ 4	
12,000 #	1 ~ 3	
14,000 #	0 ~ 2	
28,000 #	0 ~ 1	
60,000 #	0 ~1 /2	

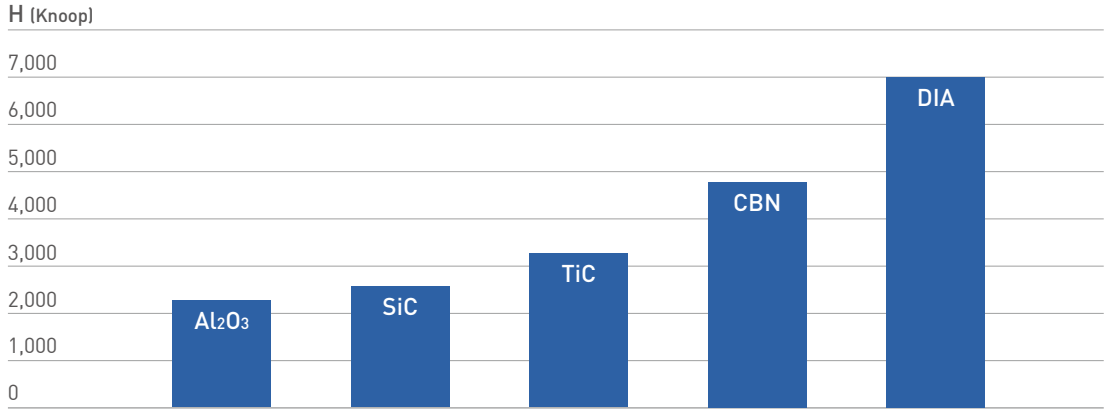
Grit Size (π)≒15000/M (M:Mesh Size)

Properties of Abrasive Diamond & CBN Grinding Wheels

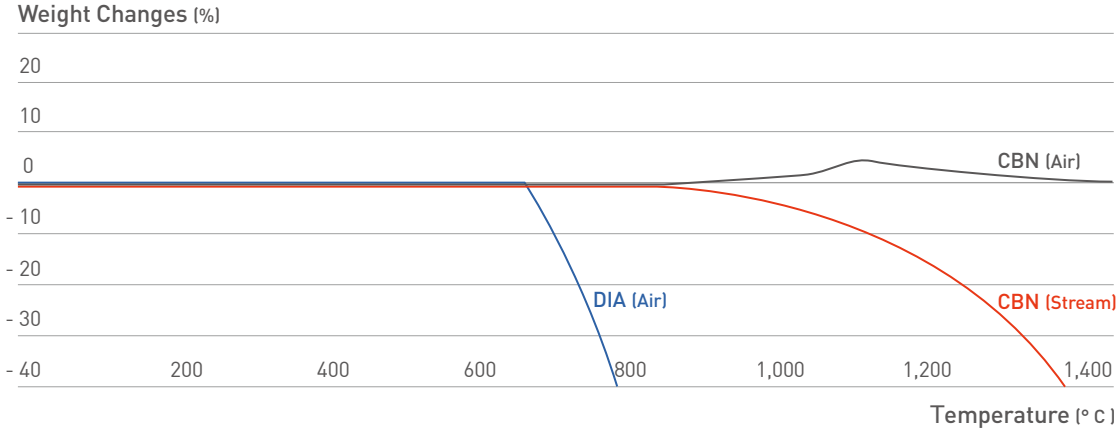
Properties of Abrasive which determine the application range of Diamond and CBN wheels.

Property	Unit	Diamond	CBN
Density	g/cm^3	3.52	3.48
Hardness (Knoop)	kg/mm^2	7,000	4,700
Hardness (Mohs)	–	10	9 ~ 10
Thermal Stability	° C	600 ~ 700	1,100 ~ 1,400
Chemical Formula	–	C	B, N

Physical Properties of Diamond and CBN



Diamond and CBN are harder than conventional abrasives that consist of ceramic materials.



CBN has more resistance than diamond against oxidization in high temperatures and it also shows less weight change caused by oxidization in high temperatures.

CBN Cubic Boron Nitride

CBN, which is next to diamond in hardness has the following specific properties.

CBN used for Steel

CBN is a more suitable element than diamond when grinding steel. Intense heat is generated by the friction between the workpiece and grits on the grinding wheel during operaton. CBN shows high heat resistance up to about 1200 °C while diamond is an inflammable element that begins to oxidize at about 600 °C. Also CBN does not have a chemical reaction to ferrous metals, whereas diamond is sensitive to ferrous metal as it contains carbon.

CBN used for Hardened Steel

Hardened steel (over HRC60) could be processed with resin bonded grinding wheel that contains CBN coated with Ni. It has good grinding ability on various kinds of hardware such as Inconel Alloy 600 (Ni alloy contains Cr 16 % and Fe 7 %), Incolloy, Niconic, Hastelloy and super heat resistance against alloy and magnetic material like Alnico.

Grinding of Soft Steel

CBN metal bonded grinding wheel is useful for grinding the steel or cast iron which is under HRC 50 in hardness. Since the surface of CBN grit chemically acts on metal bond, it has excellent grip and makes soft steel easily ground with low cost.

Excellent Grinding Characteristics of CBN

- Low Grinding Temperature
- Excellent Grinding Ability
- Longer Life
- Lower Cost
- Higher Grinding Ratio
- Longer Dressing Interval
- Precise Measurements
- The Improvement of Working Circumstance

Application

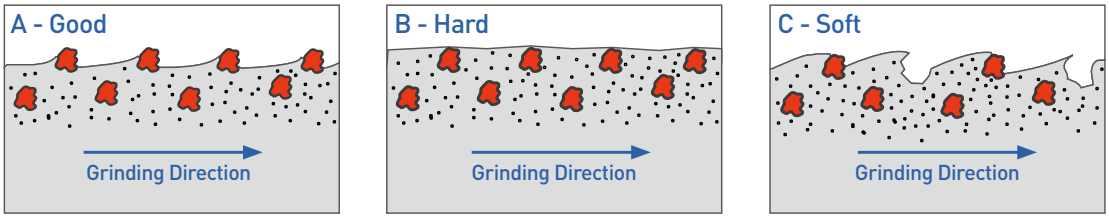
CBN is recommended for grinding, lapping, honing and polishing of the following materials.

- Cutting Tools
- Mold
- Autimobile Parts
- Balls
- Roller Bearing
- Parts of Oil Pressure Machine
- Jet Engine Parts
- Others

Selection Criteria of Diamond & CBN Grinding Wheels

Hardness

It designates the resistance of the bond to grits being removed during the grinding process. With the neutral level of N, as it goes toward A, bonding strength gets softer and grinding ability gets increased. On the contrary, as it goes toward Z, life of the grinding wheel gets increased and grinding ability gets



decreased.

The wear resistance of grinding wheel is a very important factor when performing grinding operations. In reference to diagram A, the grinding wheel with optimal wear-resistance shows a suitable edge of diamond grits which allow longer life of the wheel and low grinding resistance during use. In reference to diagram B, excessively hard bond prohibits suitable exposure of diamond grits and causes deficient grinding. In reference to diagram C, as the bond is not strong enough to hold the diamond grits during grinding process, the abrasive grits easily fall off, and it cause a bad effect on the life of the tool.

Concentration

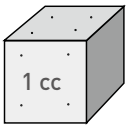
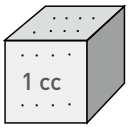
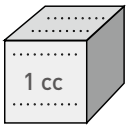
Concentration is defined as the volume of abrasive grits in one cubic centimeter. (= $1cm^3$)

As the concentration gets increased, the life of the grinding wheel becomes longer.

A higher concentration also gives better results on the workpiece material, such as less chipping and better surface roughness. However, as the concentration gets increased, the cost becomes increased but the grinding performance becomes worse.

ex.) When concentration is 100,
- **Amount = 4.4 cts/cc**
- **Weight = 1 ct × 0.2 g = 0.88 g/cc**
- **Volume = 25 %**

The above formula is applicable to both Diamond and CBN.

Disposition of the Grits							
Concentration	25	50	75	100	125	150	200
cts / cc	1.1	2.2	3.3	4.4	5.5	66	8.8
Grit vol. (%)	6.25	12.5	18.75	25	31.25	37.5	50.0

Bond

In order to effectively grind a large range of materials, various bonding systems are used to hold the abrasive grits to the surface of the wheel.
Resinoid, Vitrified, Metallic, and Electroplated bonds are mainly used.

Resinoid Bond (code B)

Resinoid bonds are manufactured with a mixture of measured amounts of phenolic or polyimid resin and filling agent. Phenolic resinoid bond is predominantly used at present, but polyimid bond is often used to increase wear resistance of the grinding wheels. Phenolic resin is used of DIAMOND / CBN grinding wheels for medium finish or finish grinding, and it shows various properties when mixed with organic or inorganic fillers.

Resinoid bond wheels can be designed for both wet and dry grinding modes, shows good free cutting qualities.

Vitrified bond (code V)

Vitrified bonds, also known as ceramic bonds, show higher bonding strength than resinoid bonds.

Vitrified bond wheels which are good for free cutting, produce good surface roughness, have good wear resistance and retain straightness and form very well. The porosity(pores) or open structure of vitrified grinding wheels can be controlled to provide chip pocket, allow coolant in, and prevent wheel loading.

Equipped with a roller diamond dresser,the vitrified bond wheels can be widely used in the automobile parts industry as well as bore processing of bearings.

Metallic bond (code M)

Metallic bonds are formed from compounds of various metal powders such as Cobalt, Copper, Brass, Iron, Tin, Nickel, Tungsten, Silver and so on. Through powder metallurgical method, metal bonded wheels are produced, which are recognized for excellent form-holding capabilities, high wear resistance and strength in structure. They are suitably used in such fields of industry as requiring high productivity with longer life of wheel for brittle materials (Glass, Ferite, Si, Ge,& Ceramics), high form retention for plunge, profile grinding & NC grinding machine and conductivity for electrolytic grinding.

Furthermore, metal bond wheels are useful in the honing operation for ceramic and cast iron under low rpm because of their high wear resistance.

Electroplated bond (code EP)

Nickel is the most commonly-used-metal because it has good plating qualities and provides excellent bonding strength. This bonding process makes it relatively easy to produce wheels of any form or contour, depending on the shape and size of the steel core. This wheel shows such characteristics as highest stock removal capability, maximum abrasive particle exposure, and easily produce complex forms while consisting of a single layer of superabrasive particles bonded to the wheel surface.

Electroplated bonds are especially useful for grinding deep forms such as gear teeth, splines and grooves, as well as eye-glasses and silicon wafer.

Application

Application of Diamond Grinding Wheel

R : Resinoid **M** : Metallic **V** : Vitrified **EP** : Electroplated

Workpiece Material		Grinding Method or Shape of Abrasives					Application	
		ST Type	Cup Type	Cutting Type	Flunge Type	Core Drill	Machinery	Others
Tungsten Carbide & Others	T.C. Alloys	R, M	R, M, V	R, M	EP	M	All kinds of Cutting Tools	
	Sintered T.C. Alloys	EP	EP	EP	R, EP	EP	Wear Resistant Parts	
	Cermet	R	R	R, M	M, EP	M	T. A Tip	
Ceramic	Refractory Material	M	M	M	M, EP	M		Tile
	Graphite	M	M	M, EP	R, M, EP	M		Material for Furnace
	Al_2O_3, ZrO_2, etc.	R, M	R, M	R, M	R, M, EP	M	Throw-away Tip Cutter	
	LiNbO, etc.	R, M	R, M	R, M	R, M, EP	M	Throw-away Tip Mechanical Seal	
	Sic, Sin, etc.	R	R	R, M	M, EP	M		
Automobile Glass	Optical Glass	M	R, M	M	M, EP	M		
	Flat Glass	M	R, M	R, M			Rear View Mirror Window Glass	Mirror, Windows, Furniture
	Tube Glass	M	R, M	R, M	M, EP			Physical Instrument
	Quarts Glass	M	R, M	R, M, EP	M	M		
	Others	M	M	M		M		Industrial Products
Building & Construction Material	Stone		R, M	M		M		Tomb Stone Buillding Material
	Concrete, Asphalt			M		M		Road, Building
	Synthetic Material	M	M	M		M		Material for Wall
Jewelry & Semi-Jewelry	Diamond	R, M, V	R, M, V				Wear Resistant Parts	Medical Supplies Industrial Products
	Ruby	R, M, V	R, M, V					
	Crystal	R, M	R, M, V					
	Semi-Jewelry	M	R, M	M	M, EP	M		
Ferrite	Permanent Magnet	M	M	M	EP			
	Audio-Frequency	R, M	R, M	R, M	R, M, EP			
	High-Frequency	R, M	R, M	R, M	R, M, EP			
Semi - Conductor	Si, Ge	M	R, M, V, EP	R, M, EP	M			
	Ga, AS, Others	M	R, M, V, EP	R, M, EP	M			
Plastic	Acrylic Resin	M, EP	M, EP	M, EP	M, EP	EP		Industrial Products
	FRP	M, EP	M, EP	M, EP	EP	EP		Instrument
	Plastic	EP	EP				Break Lining	
	Rubber	EP	EP	EP	EP		Tire	
Others	Shell	EP	EP	EP	EP	EP		"Baduk" Stone
	Teeth	EP	EP		EP			Dental Instrument
Metal	Cast Iron	R, M	R, M					
	Semi-Alloys			M, EP			Machinery Part	
	Sn-Co		R	R, M, EP				

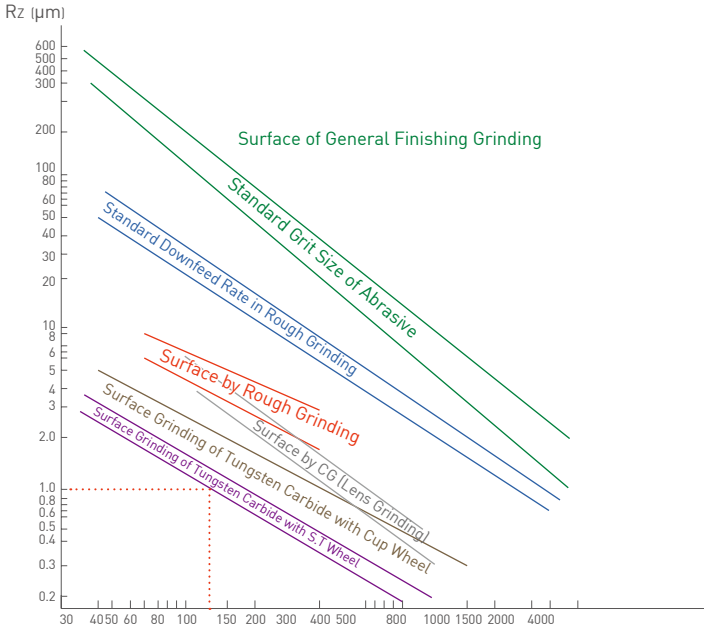
Application of CBN Grinding Wheel

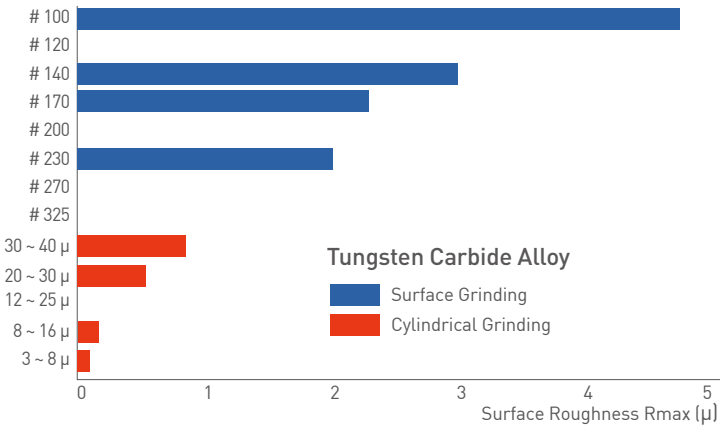
Workpiece Material			Application			
			Internal Combustion Engine	Normal Machinery Parts	Tools	Electronic Parts
Hardened Tool	H. S. S (SKH)		Vane-Pump Parts	Roll, Spindle & Anvil of Micrometer	End Mill, Tap Drill, Hob, Bite	
	Hardened Tool Alloy	SKS				
		SKD		Roll, Gauge	Mold & Dies	
	Carbon Steel			Knife, Razor Blade	Mold	
Structural Alloy	S - C		CAM	Mission Parts		
	SCM / SNC		Fuel Gear Injection	Pressure Cylinder Parts		
	SNCM / SACM		Crank Gear Parts for Pump		Mold	
Bearing Steel	SUJ			Bearing		
Cast Iron			Oil Seal, Cam	Compressor Parts, Machine Tool Parts		
Sintered Metal (with Fe)			Power Steering Parts	Compressor Parts		
Magnetic Alloy	Sn - Co					Video Drum Head Magnet
Super Alloy				Jet Engine		

Application of Diamond Grinding Wheel

Relation between The Grit size of Superabrasive and Surface Roughness

Mesh Size & Surface Roughness





Diamond Grit Size & Surface Roughness

Cylindrical Grinding	Grindng	Surface Grinding
300D × 15T (1A1) SDC P75B	Specification	175D × 6T (1A1) SDC P75B
2,200 m/min	Peripheral Speed	1,500 m/min
50 m/min	Table Speed	10 m/min
0.4 mm/pass	Cross Feed	2 mm/pass
2.5 ~ 5 μm	Down Feed	20 μm
2 ~ 4 Times	Spark Out	3 Times
W2 (× 50)	Coolant	W2 (× 50)

There is no big difference between surface and cylindrical grinding in case of fine finish.

Formula of Abrasive & Surface

1. Size (μ) $\fallingdotseq \frac{15{,}000}{M \text{ (Mesh Size)}}$

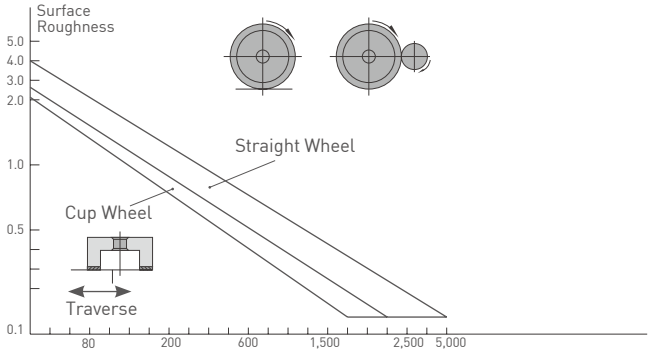
2. Surface Roughness (Rmax) $\fallingdotseq \frac{\text{Size (μm)}}{X}$

Quality of Material

X = 50 High Speed Steel
X = 25 Alloy Steel
X = Cast Iron

It will actually be much coarser than above mentioned.

Difference of Surface Roughness in Accordance with the Shape of Wheel

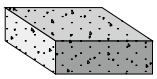
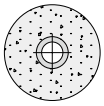


Conversion Table of Surface Roughness

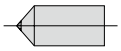
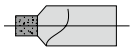
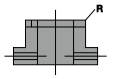
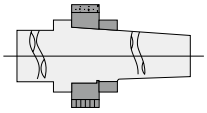
Ra max.(μm)	Ra (μm)	Rrms (μm)	Rz (μm)	Rrms (μm)
0.1	0.02	0.02	0.1	1
0.2	0.03	0.04	0.2	2
0.3	0.05	0.06	0.3	3
0.4	0.07	0.08	0.4	4
0.5	0.09	0.10	0.5	5
0.6	0.10	0.11	0.5	6
0.7	0.12	0.13	0.7	7
0.8	0.14	0.15	0.7	8
0.9	0.15	0.17	0.8	9
1.0	0.17	0.19	0.9	10
1.2	0.20	0.23	1.1	12
1.4	0.24	0.27	1.3	14
1.6	0.27	0.30	1.4	16
1.8	0.31	0.34	1.6	18
2.0	0.34	0.38	1.8	20
2.4	0.41	0.46	2.2	24
2.8	0.48	0.53	2.5	28
3.2	0.54	0.61	2.8	32
3.6	0.61	0.69	3.2	36
4.0	0.68	0.76	3.6	40
4.5	0.77	0.86	4.1	45
5.0	0.85	0.96	4.5	50
5.5	0.94	1.05	5.0	55
6.0	1.02	1.14	5.4	60
7.0	1.19	1.33	6.3	70
8.0	1.36	1.52	7.2	80
9.0	1.53	1.71	8.1	90
10.0	1.70	1.90	9.0	100

Truing and Dressing of Grinding Wheel

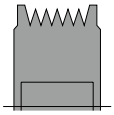
Method How to Use Conventional Grinding Stone

Truing Wheel Shape		Specification Grit Size	Operation System	Characteristic
G. C Stone		# 60 ~ # 400	Fixed	1. Grinding the workpiece by making the broken pieces of GC is conducted by appling the grinding stone to the workpiece without any special equipment for it. 2. Dressing can be done during truing operation. 3. It can be simply done by manual operation but the performance is worse than other ways.
Parallel Type		# 80 ~ # 400	Linkage	1. Used widely and by hand. 2. Dressing can be done during truing operation.
			Peripheral Operation	1. Lower risk when being touched by abrasives than that of Linkage. 2. Truing and Dressing can be done easily.

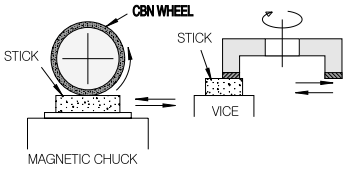
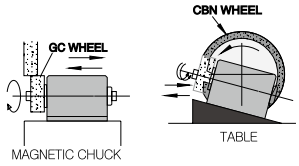
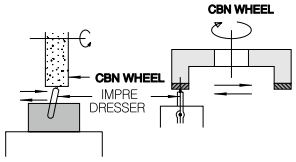
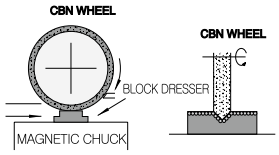
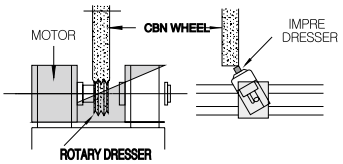
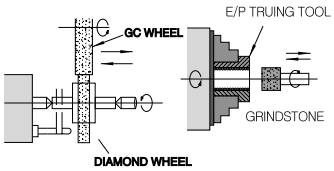
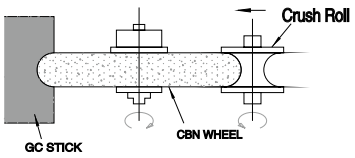
Method How to Use Diamond Tools

Truing Wheel Shape			Specification Grit Size	Operation System	Characteristic
Diamond Dresser	Single		0.5 ct ~ 1.0 ct	Fixed	1. Operation is available by existing dressing equipment and by hand. 2. It is widely used. 3. Good for complicated shape like R-shape or screw shape, but tool life is short.
	Impre		# 80 ~ # 200		1. Same as above. 2. Because edge of dresser is flat (around 5ø), it is not suitable for truing of flange shape.
	Block		# 60 ~ # 80		1. Because of excellent exposure of Diamond, quick and precise truing is available. 2. Instead , tool life is short.
			# 80		1. It is effective for truing of Metal bonded CBN grinding wheel since it makes the dressing easier after truing.
	Roller			Peripheral Operation	1. It can be used for truing of Resinoid and Vitrified CBN grinding wheel. 2. In case of Vitrified CBN grinding wheel, Dressing and Truing can be done at the same time. 3. It shows excellent surface roughness.
Abrasives			# 60 ~ # 80	Peripheral Operation	1. Truing lead time is very short and it does not need special equipment for it. 2. Tool life is short.
					1. It shows similar performance with electroplated Roller Dresser but the tool life is longer because of multi layers of Diamond grits.
			# 80 ~ # 100		1. It is much more effective for truing of Metallic CBN grinding wheel since it makes the dressing easier after truing as well.

Method How to Use Crushroll

Truing Wheel Shape	Specification Workpiece Material	Hardness	Operation System	Characteristic
	SKD-11	HRc 60	Linkage	1. It is recommendable for plunge typed truing of crushable bond or Vitrified CBN grinding wheel. 2. Precise plunge typed truing is available, and dressing can be done during truing operation at the same time.

Factors of Grinding Efficiency of the Wheel

CBN Wheel						How to Work	Remark
Type		Bond					
ST	Cup	B	M	V	P		
○	○	○	○	○	○		1. The grit size of GC stone is determined in accordance with the grit size of CBN wheel. 2. Low rpm and small amount of coolant are preferable.
○	○	◉	○	◉	○		1. In case of using linkage, slanting angle should be as followings: Brake type = 15° ~ 25° Free type = 30° ~ 45°
○	○	◉	◉		○		
○	○	△	×	◉	×		1. Infeed should be determined according to condition of the wheel. (2~10 μm) 2. Recommendable peripheral speed is 500 ~1,000 m/min.
○	○	◉	×	◉	○		
○	×	○	△	◉	×		1. Peripheral speed of CBN wheel should be 1,000m/min with enough coolant for suitable work. 2. Dressing should be done by both sides and infeed rate should be determined according to vibration of the wheel.
○	×	○	×	◉	×		
○	×	○	◉	○	×		
○	○	○	×	◉	×		1. Profile tolerance of mounting surface of Roller Dresser should be below 3 μm. 2. Infeed of Roller Dresser should be controlled as following. Traverse type : 0.002 ~ 0.005 mm Plunge type : 0.001 ~ 0.005 mm
○	×	◉	△	◉	×		1. RPM of truing tool should be ranged from 150 to 300 and Up-Cutting method is required when truing. 2. Infeed rate should be 5 ~ 10 μm and enough coolant is required when truing. 3.Truing should be done by both sides with controlling proper spark-out .
○	×	○	×	◉	×		
○	×	○	◉	○	×		
○	×	△	◉	◉	×		1. There are two methods: one is to use its own wheel, the other is to coordinate the devises to the machine.

◉ Optimum ○ Good △ Normal × Bad

To Achieve the Best Performance

Diamond Grinding Wheel

Diamond grinding wheels become more and more important as more rigid and harder materials are introduced. Even though diamond is the hardest material and has good abrasion resistance, it is easily broken on impact. And it also becomes weak in high temperatures and begins to oxidize from about 600 °C.

Please consider the following checkpoints to achieve the best grinding performance of the wheel.

Peripheral Speed (πDN/1000) m/min

For general grinding abrasives, peripheral speed is over 300m/min. However, increasing the peripheral speed of a diamond grinding wheel is not always efficient. The peripheral speed of a Diamond grinding wheel varies according to the working condition and has a great influence on grinding efficiency.

It is almost impossible to set peripheral speed at once, but we recommend you to follow general information as belows :

Resinoid Bond	Metallic Bond
Wet Grinding: 1,000 ~ 1,800 m/min	Wet Grinding: 800 ~ 1,500 m/min
Dry Grinding : 700 ~ 1,000 m/min	Dry Grinding : 600 ~ 1,000 m/min

Please, Reduce the speed in the case of dry and deep grinding.

Feed Rate or Grinding Pressure.

Generally a deeper grinding is more efficient, but if you use the Diamond grinding wheel over its capacity, it will extremely shorten the life of a Diamond grinding wheel.

Please follow the information below to maximize the tool life :

 # 100 ~ 120: 0.025 mm
 # 140 ~ 200: 0.012 mm

Smaller than # 230 : Less than 0.01 mm

Table Speed and Cross Feed

Table speed is determined by peripheral speed and feed rate, but 5~ 10m/min is preferable in the case of wet surface grinding. And low table speed is preferable in the case of simultaneous grinding of workpiece with two different materials welded, interrupted, and dry grinding by Cup wheel. For back and forth feed of surface grinding it is better to follow 1/5 ~ 1/10 of wheel width.

The degree of work done by feed rate, cross feed and table speed is often called Material removal rate or Grinding ratio. High productivity will be realized with high removal rate but grinding ratio will be decrease.

To Achieve the Best Performance

Cutting Fluids

With coolant supply, it is possible to have better preciseness and finish of the workpiece, while having much influences on grinding wheel capabilities.

It is better to focus on the cooling and rinsing of grinding wheels when you choose the kind of coolant, and carefully determine the effective amount of coolant and supply to the grinding surface directly.

Pure oil is the best coolant in terms of rinsing, but you can use synthetic emulsion fluid if pure oil is not available.Supplying coolant to the exact grinding point is much more efficient than supplying coolant to the body of the wheel or workpiece.

Preciseness of Machine

Because a diamond is very weak and easily broken on impact, it is very important to mount the wheels to the axis accurately for efficient grinding performance.

For excellent grinding capabilities, the stiffness and rigidity of machine are basically required. With the shake or vibration of the machine, diamond grits could be easily broken on impact and abnormal abrasion of the wheels could be resulted.

Loading and Vibration

As the sharpness of diamond grits is getting blunt due to the chip of workpiece during grinding process, it is necessary that the grinding wheel should be used with diamond grits exposed sharp to keep grinding efficiency better. If grit is damaged by aggressive power or bond looses the grip retension force, it is recommended to turn the switch off and to put GC stick on the grinding surface of the wheel at a low speed. Turning it on and off repeatedly could be effective in getting rid of small loading of the wheel.

Diamond grinding wheels are basically designed to protect the wheel loading caused by chip from workpiece. Therefore, using wheels without the chip and finding the exact cause of the loading is the best way to increase grinding efficiency.

For more details, please refer to “Truing and Dressing of grinding wheels”.

CBN Grinding Wheel

Peripheral Speed of Conventional Abrasive (π DN/ 1000) m/min

In CBN resin bonded grinding wheels, generally, high peripheral speed improves tool life in wet grinding, but can lead to burning in dry grinding, so it is recommended to use it under 1500m/min in dry grinding.

Item	Resin Bond	Metal Bond
Wet	1,500 ~ 2,500 m/min	800 ~ 1,500 m/min
Dry	800 ~ 1,500 m/min	N / A

In CBN metal bonded grinding wheels, the bond is so hard that grinding performance gets lower in high peripheral speed.

However, using straight-typed wheels in internal grinding with deep infeed and slow table speed, high peripheral speed like 2000 ~ 3000m/min leads to good results.

Infeed and Table Speed

Not fixed in conditions. Refer to the following numerical values of resin bond wheels of which the grit is bigger than #200.

Surface Grinding	Infeed × Cross Feed × Table Speed	1.9 cm^3 /min
Cylindrical Grinding	Workpiece's outdiameter × Infeed × Table speed	3.1cm^3 /min
Internal Grinding	Workpiece's bore × Workpiece's length × Grinding time Grinding time : sec (60 sec/min)	1.3 cm^3 /min
Tool Grinding	Infeed × Workpiece's grinding width × Table speed	0.4 cm^3 /min

Over 0.02mm/min of infeed is recommended in general grinding except for bore grinding, but in finer grits than #230, appropriate infeed should be selected. It is recommended to use metal bonded wheels in rough conditions.

Grinding Fluid

CBN grits are so much influenced by coolant in high temperature that they easily become dull without coolant.

Pure oil is the most proper coolant for CBN grinding wheels. But, when using a water-soluble fluid, it should be diluted by around 20 times and injected with a large amount to the grinding points, and this is an important factor to keep the tool life longer.

Truing and Dressing

CBN wheels can have a vibration problem due to tolerance between wheel flange bore and outdiameter of shaft although wheel is precisely balanced and processed to size at the factory. For more information, refer to "Truing and Dressing of grinding wheels".

The Optimal Condition Peripheral Speed & Revolution per Minute (RPM)

Even though a diamond grinding wheel can be used at a high speed, excessive high speed can heat up Diamond grits and wear it out easily, and decrease the efficiency of diamond grinding wheel.

While diamond grinding wheel shows excellent grinding ability at a high speed, the stiffness and rigidity of grinding machine are also factors to affect grinding performance.

Peripheral speed is concerned with the increase and the decrease of grinding load and low peripheral speed is generally more suitable for dry grinding than wet grinding.

Refer to the following table to choose proper peripheral speed.

Bond	Diamond		CBN	
	Dry	Wet	Dry	Wet
Metal	500 ~ 700	700 ~ 1,100	Partially Applied	800 ~ 1,500
Resin	700 ~ 1,000	1,000 ~ 1,800	800 ~ 1,500	1,500 ~ 2,500
Vitrified	700 ~ 1,200	1,200 ~ 1,800	800 ~ 1,200	1,200 ~ 2,400
Electroplated	700 ~ 1,200	1,200 ~ 2,400	900 ~ 1,400	1,200 ~ 2,400

$V\,(m/min) = \pi \times D\,(mm) \times N\,(rpm) / 1000$

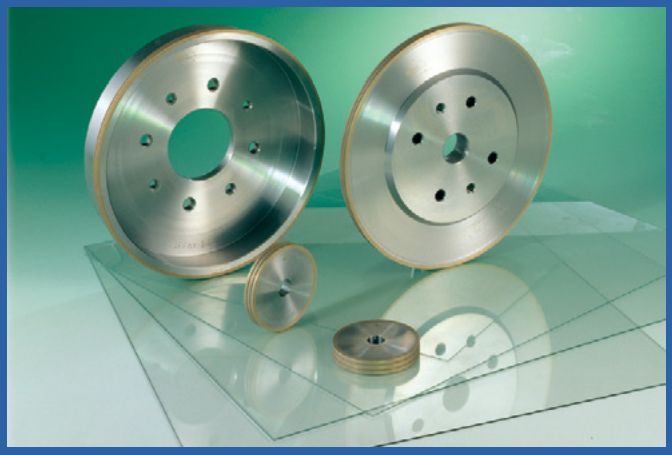
	500	700	800	900	1,000	1,200	1,400	1,500	1,800	2,000	2,400
10	15,900	22,300	25,500	28,600	31,800	38,200	44,600	47,700	57,300	63,700	7,640
20	7,960	11,100	12,700	14,300	15,900	19,100	22,300	23,900	28,600	31,800	38,200
30	5,310	7,430	8,490	9,550	10,600	12,700	14,900	15,900	19,100	21,200	25,500
50	3,180	4,460	5,090	5,730	6,370	7,640	8,910	9,550	11,500	12,700	15,300
75	2,120	2,970	3,400	3,820	4,240	5,090	5,941	6,370	7,640	8,490	10,200
100	11,590	2,230	2,550	2,860	3,180	3,820	4,60	4,770	5,730	6,370	7,640
125	1,270	1,780	2,040	2,290	2,550	3,060	3,570	3,820	4,580	5,090	6,110
150	1,060	1,490	1,700	1,910	2,120	2,550	2,970	3,280	3,820	4,240	5,090
175	910	1,270	1,460	1,640	1,820	2,180	2,550	2,730	3,270	3,640	4,370
200	800	1,110	1,270	1,430	1,590	1,910	2,230	2,390	2,860	3,180	3,820
250	640	890	1,020	1,150	1,270	1,530	1,780	1,910	2,290	2,550	3,060
300	530	740	850	950	1,060	1,270	1,490	1,590	1,910	2,120	2,550
350	450	640	730	820	910	1,090	1,270	1,360	1,640	1,820	2,180
400	400	560	640	720	800	950	1,110	1,190	1,430	1,590	1,910
500	320	450	510	570	640	760	890	950	1,150	1,270	1,530

Standard Type of Diamond & CBN Wheel

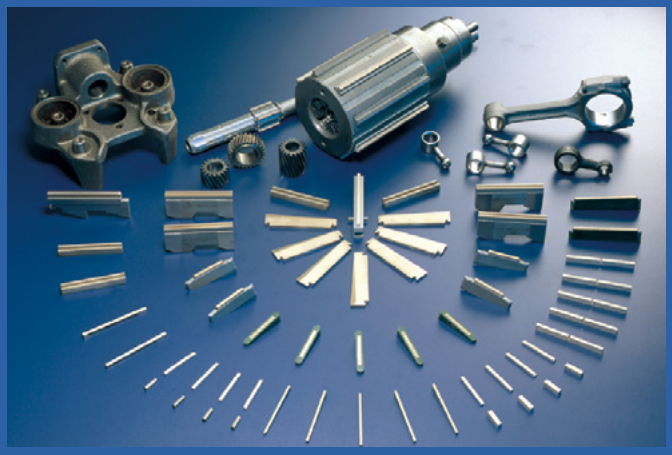
Metal Bond Wheel

Resin Bond Wheel

Diamond Edge Wheels for TFT Glass



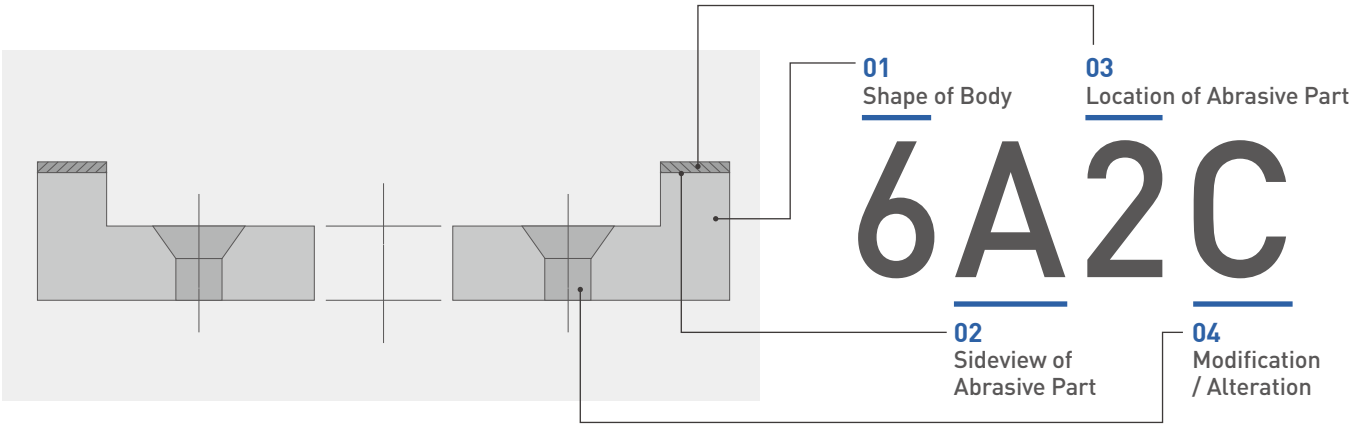
Diamond / CBN Honing Stones for Automobile Parts



Flat Glass Grinding & Drilling

Diamond Wheels for Tools

Standard Type of Diamond & CBN Wheel



01 Shape of Body

1

2

3

4

6

9

11
Over 45° / Below 90°

12
Below 45°

14

02 Sideview of Abrasive Part

A AH

B C

CH D

DD E

EE F

FF G

H J

K L

LL M

P Q

QQ S

U V

Y

03 Location of Abrasive Part

1

2

3

4

5

6

7

8

9

10

04 Modification / Alteration

B

C

H

M

P

R

S

SS

T

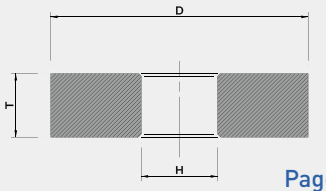
O

V

Y

Standard Type of Diamond & CBN Wheel

1A8 / W01A



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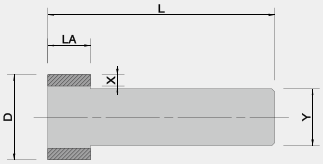
DW / W01B



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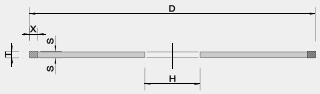
1A1R / W02A



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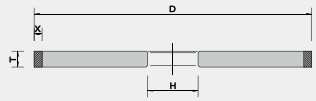
1A1 / W03A



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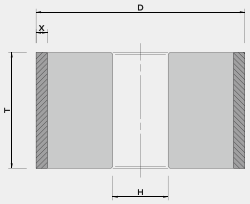
1A1Centerless / W03T



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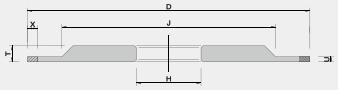
3A1 / W03B



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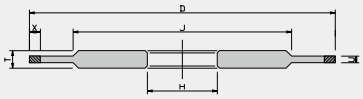
14A1 / W03C



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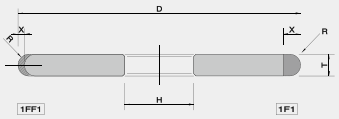
1FF1, 1F1 / W03D



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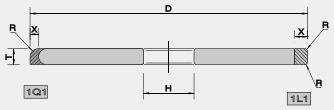
1Q1, 1L1 / W03Z



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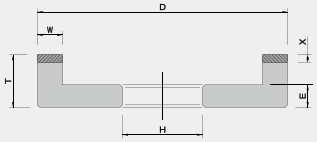
6A2 / W04A



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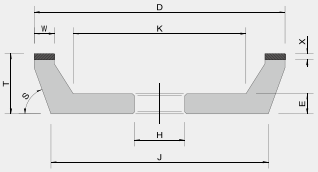
11A2 / W05A



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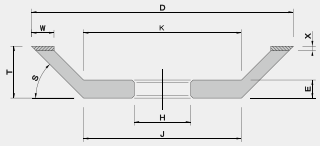
12V2 / W05B



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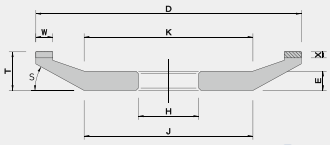
12A2-20°, 12A2-45° / W05C



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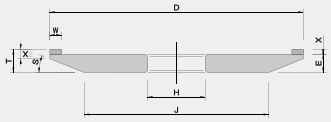
4A2 / W05F



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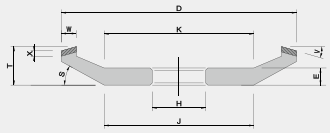
12V5 / W05Z



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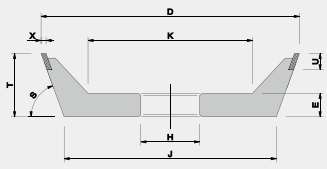
11V9, 12V9 / W06A



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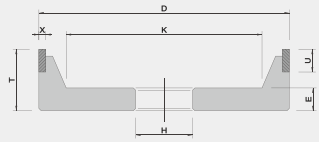
6A9 / W06B



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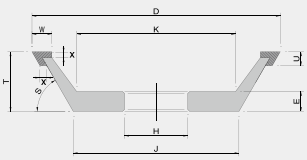
11E9 / W07A



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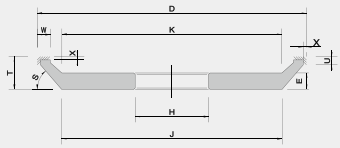
Standard Type of Diamond & CBN Wheel

11C9, 12C9 / W07B



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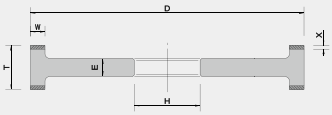
9A3 / W09A



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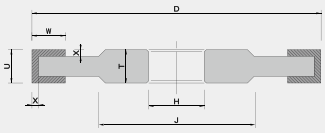
14U1 / W10A



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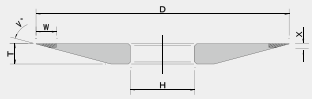
4B2 / W11A



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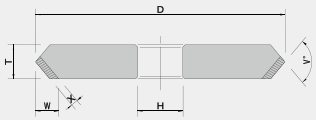
1B5 / W11B



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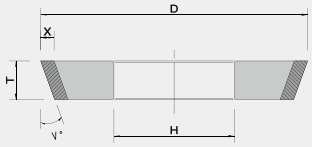
1V1 / W11C



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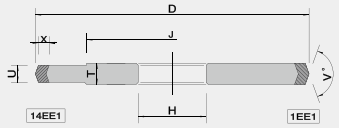
14EE1, 1EE1 / W11D



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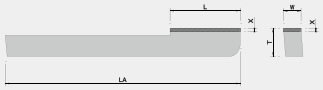
HH1 / W12A



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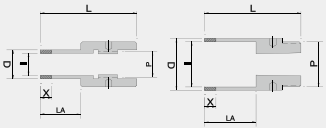
2FF2 / W13A



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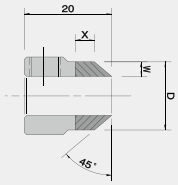
6V2 / W13B



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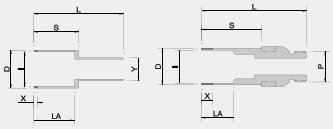
6F2 / W14A



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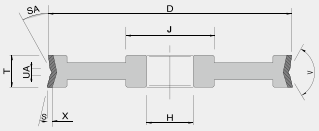
1DD6Y / W15A



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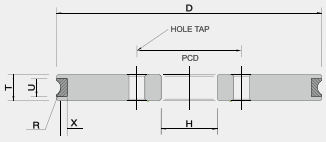
1FF6Y, 1EE6Y, 1LL6Y / W16A, W16B, W16C



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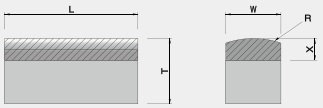
HMF / W17A



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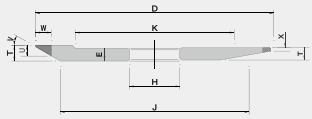
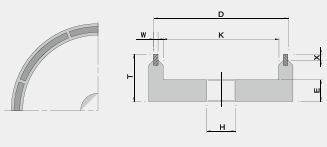
4M1 / W18A



Page 33

6A2S / W19A



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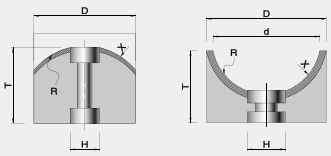
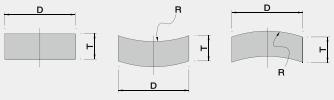
6P5, 6P4 / W20A



Page 33

P / W21D



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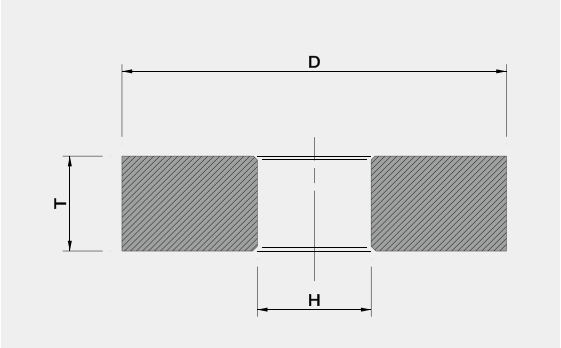
Standard Type of Diamond & CBN Wheel

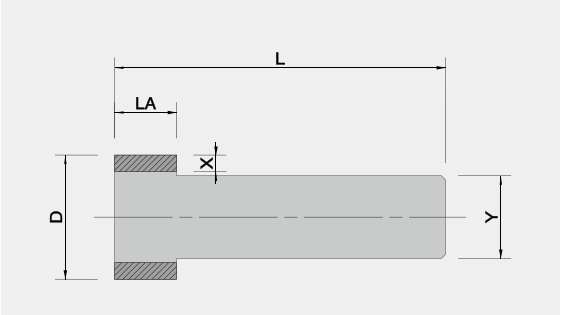
1A8 / W01A



D	T
8	10
10	10
15	12
20	15, 20
25	15, 20
30	15, 20
35	15, 20
40	15, 20
50	15, 20
60	10, 15

H : Must be specified in inquiry / order

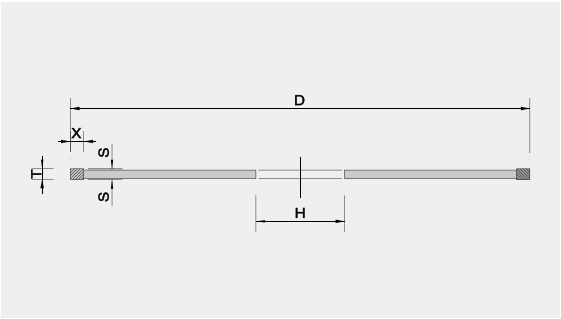
DW / W01B



		Metal	Resin	Vitri
D	LA	X	X	X
3	3	1	1	
4	8, 10	1 ~ 2	1	
5	5, 10, 12	1 ~ 2	1 ~ 2	1 ~ 2
6	10, 12	2	1.5 ~ 2	1 ~ 2
7	10, 12	2	1.5 ~ 2	1 ~ 2
8	10, 12	2	1.5 ~ 2	1 ~ 2
10	10, 12	2	1.5 ~ 2	2 ~ 3
12	10, 12	2 ~ 3	1.5 ~ 2	2 ~ 3
15	10, 12	2 ~ 3	2 ~ 3	2 ~ 3
20	10, 12	3	2 ~ 3	2 ~ 5
30	10, 15, 20	3	2 ~ 3 ~ 5	2 ~ 10
50	16, 20	3	8	2 ~ 10

Y : Must be specified in inquiry / order

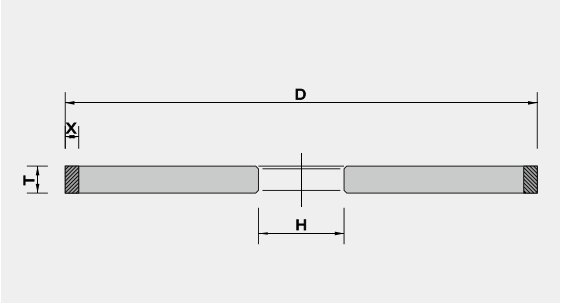
1A1R / W02A



	Metal	Resin	Resin
D	T	T	X
75	0.6 ~ 1.0	0.6 ~ 1.0	3 ~ 5
100	0.6 ~ 1.0	0.6 ~ 1.0	3 ~ 5
120	0.6 ~ 1.0	0.6 ~ 1.0	3 ~ 5
125	0.6 ~ 1.0	0.6 ~ 1.0	3 ~ 5
150	0.6 ~ 1.0	0.6 ~ 1.0	3 ~ 5
175	0.8 ~ 2.0	0.8 ~ 2.0	3 ~ 5
200	0.8 ~ 2.0	0.8 ~ 2.0	3 ~ 5
250	1 ~ 2	1 ~ 2	3 ~ 5
300	1 ~ 2	1 ~ 2	3 ~ 5
350	1.5 ~ 2	1.5 ~ 2	3 ~ 5

H, S : Must be specified in inquiry / order

1A1 / W03A



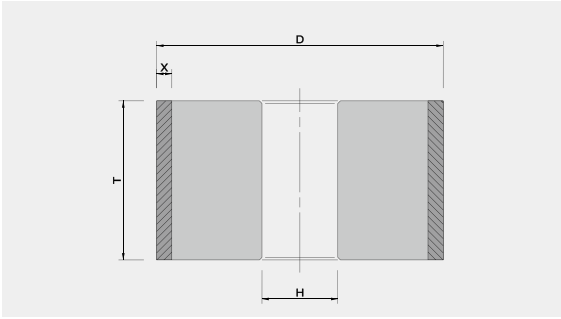
		Metal	Resin	Vitri
D	T	X	X	X
20	4 ~ 10	2 ~ 5	2 ~ 3	2 ~ 5
25	4 ~ 10	2 ~ 5	2 ~ 3	2 ~ 5
40	4 ~ 10	2 ~ 5	2 ~ 3	2 ~ 5
50	4 ~ 10	2 ~ 5	2 ~ 3	2 ~ 10
75	3 ~ 10	2 ~ 5	3 ~ 5	2 ~ 10
100	3 ~ 12	2 ~ 5	3 ~ 5	2 ~ 10
125	4 ~ 20	2 ~ 5	3 ~ 5	2 ~ 10
150	4 ~ 20	2 ~ 5	3 ~ 5	3 ~ 10
175	5 ~ 20	2 ~ 5	3 ~ 5	3 ~ 10
200	5 ~ 20	2 ~ 5	3 ~ 5	3 ~ 10

		Metal	Resin	Vitri
D	T	X	X	X
250	10 ~ 60	3 ~ 5	3 ~ 5	3 ~ 10
300	10 ~ 60	3 ~ 5	3 ~ 5	3 ~ 10
350	10 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10
400	15 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10
500	15 ~ 30	3 ~ 5	3 ~ 5	3 ~ 10
600	15 ~ 30	3 ~ 5	3 ~ 5	3 ~ 10
750	15 ~ 30	3 ~ 5	5	3 ~ 10
800	15	3 ~ 5	5	3 ~ 10
850	20 ~ 30	3 ~ 5	5	3 ~ 10

H, T : Must be specified in inquiry / order

Standard Type of Diamond & CBN Wheel

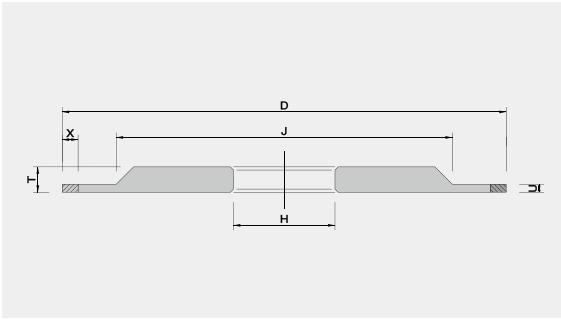
1A1 Centerless / W03T



		Metal	Resin	Vitri
D	T	X	X	X
250	100	3 ~ 5	3 ~ 5	3 ~ 5
305	40 ~ 100	3 ~ 5	3 ~ 5	3 ~ 5
350	40 ~ 150	3 ~ 5	3 ~ 5	3 ~ 5
380	150	3 ~ 5	3 ~ 5	3 ~ 5
405	150 ~ 205	3 ~ 5	3 ~ 5	3 ~ 5
500	200	3 ~ 5	3 ~ 5	3 ~ 5

H, T : Must be specified in inquiry / order

3A1 / W03B

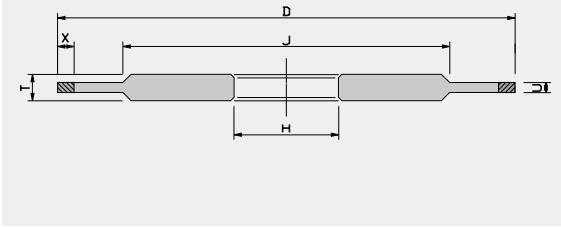


		Metal	Resin	Vitri
D	U	X	X	X
75	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
100	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
125	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
150	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
175	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
200	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
250	10 ~	3 ~ 5	3 ~ 5	3 ~ 5
300	12 ~	3 ~ 5	3 ~ 5	3 ~ 5

		Metal	Resin	Vitri
D	U	X	X	X
400	1 ~ 10	3 ~ 5	3 ~ 5	3 ~ 5
500		3 ~ 5	3 ~ 5	3 ~ 5
600		3 ~ 5	3 ~ 5	3 ~ 5
700			5	
750			5	
800			5	
850			5	

H, J, T, U : Must be specified in inquiry / order

14A1 / W03C

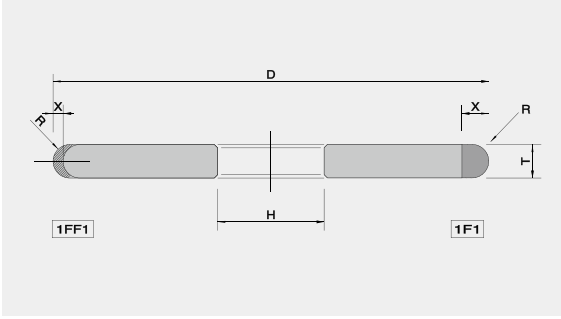


		Metal	Resin	Vitri
D	U	X	X	X
75	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
100	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
125	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
150	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
175	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
200	6 ~	3 ~ 5	3 ~ 5	3 ~ 5
250	10 ~	3 ~ 5	3 ~ 5	3 ~ 5
300	12 ~	3 ~ 5	3 ~ 5	3 ~ 5

		Metal	Resin	Vitri
D	U	X	X	X
400	1 ~ 10	3 ~ 5	3 ~ 5	3 ~ 5
500		3 ~ 5	3 ~ 5	3 ~ 5
600		3 ~ 5	3 ~ 5	3 ~ 5
700			5	
750			5	
800			5	
850			5	

H, J, T, U : Must be specified in inquiry / order

1FF1, 1F1 / W03D

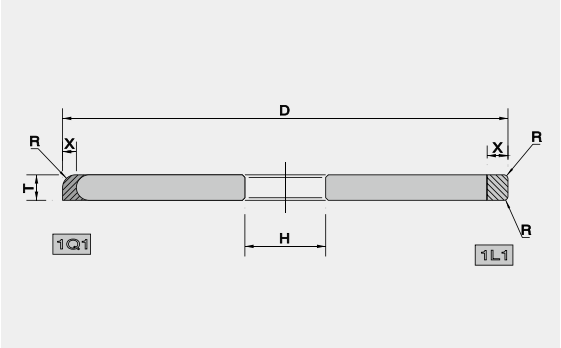


		Metal	Resin	Vitri	
D	T	X	X	X	R
50	3 ~ 10	3 ~ 5	3 ~ 5	3 ~ 5	More than T/2
75	3 ~ 10	3 ~ 5	3 ~ 5	3 ~ 5	More than T/2
100	3 ~ 10	3 ~ 5	3 ~ 5	3 ~ 5	More than T/2
125	3 ~ 10	3 ~ 5	3 ~ 5	3 ~ 5	More than T/2
150	3 ~ 10	3 ~ 5	3 ~ 5	3 ~ 5	More than T/2
200	3 ~ 10	3 ~ 5	3 ~ 5	3 ~ 5	More than T/2
250	10 ~ 15	3 ~ 5	3 ~ 5	3 ~ 5	More than T/2
300	10 ~ 20	3 ~ 5	3 ~ 5	3 ~ 5	More than T/2

H : Must be specified in inquiry / order

Standard Type of Diamond & CBN Wheel

1Q1, 1L1 / W03Z

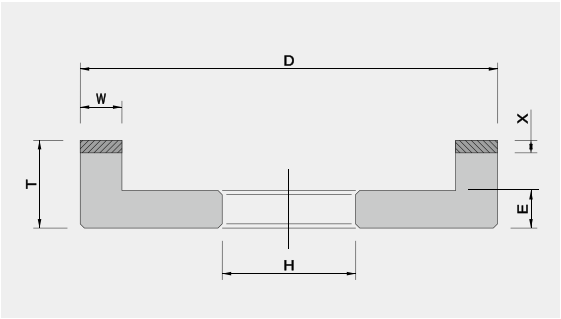


D	T	Metal X	Resin X	Vitri X	
20	4 ~ 10	2 ~ 5	2 ~ 3	2 ~ 5	
25	4 ~ 10	2 ~ 5	2 ~ 3	2 ~ 5	
40	4 ~ 10	2 ~ 5	2 ~ 3	2 ~ 5	
50	4 ~ 10	2 ~ 5	2 ~ 3	2 ~ 10	
75	3 ~ 10	2 ~ 5	3 ~ 5	2 ~ 10	
100	3 ~ 12	2 ~ 5	3 ~ 5	2 ~ 10	
125	4 ~ 20	2 ~ 5	3 ~ 5	2 ~ 10	
150	4 ~ 20	2 ~ 5	3 ~ 5	3 ~ 10	
175	5 ~ 20	2 ~ 5	3 ~ 5	3 ~ 10	3~4~5
200	5 ~ 20	2 ~ 5	3 ~ 5	3 ~ 10	

D	T	Metal X	Resin X	Vitri X	
250	10 ~ 60	3 ~ 5	3 ~ 5	3 ~ 10	3 ~ 5
300	10 ~ 60	3 ~ 5	3 ~ 5	3 ~ 10	3 ~ 5
350	10 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10	3 ~ 5
400	15 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10	3 ~ 5
500	15 ~ 30	3 ~ 5		3 ~ 5	
600	15 ~ 30	3 ~ 5		3 ~ 5	
750	15 ~ 30			5	
800	15			5	
850	20 ~ 30			5	

H, R : Must be specified in inquiry / order

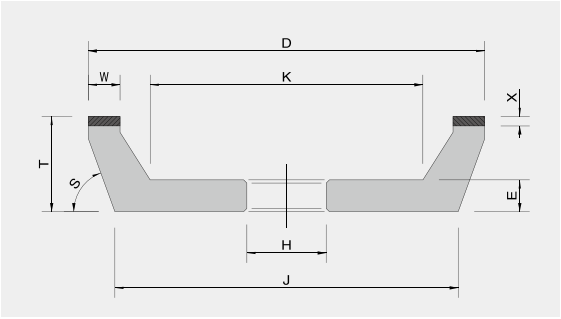
6A2 / W04A



D	W	Metal X	Resin X	Vitri X
50	3 ~ 5	2 ~ 10	2 ~ 10	3 ~ 10
75	3 ~ 10	2 ~ 10	2 ~ 10	3 ~ 10
100	3 ~ 15	2 ~ 10	2 ~ 10	3 ~ 10
125	3 ~ 20	2 ~ 10	2 ~ 10	3 ~ 10
150	3 ~ 30	2 ~ 10	2 ~ 10	3 ~ 10
200	3 ~ 5	2 ~ 10	2 ~ 10	3 ~ 10
250	6 ~ 40	2 ~ 10	2 ~ 10	3 ~ 10
300	3 ~ 100	2 ~ 10	2 ~ 10	3 ~ 10
400	10 ~ 100	2 ~ 10	2 ~ 10	3 ~ 10

T, H, E : Must be specified in inquiry / order

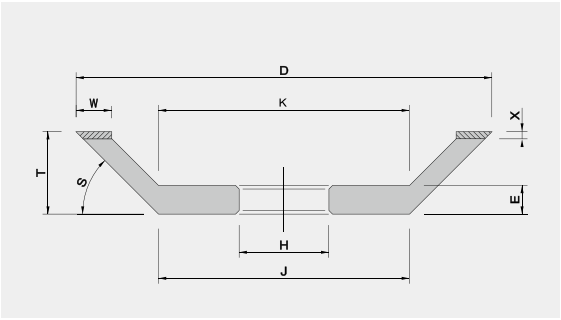
11A2 / W05A



D	W	Metal X	Resin X	Vitri X
75	3	2 ~ 10	2 ~ 5	3 ~ 10
100	3	2 ~ 10	2 ~ 5	3 ~ 10
125	3	2 ~ 10	2 ~ 5	3 ~ 10
150	5 ~ 10	2 ~ 10	2 ~ 5	3 ~ 10
200	5 ~ 10	2 ~ 10	2 ~ 5	3 ~ 10
250	10 ~ 15	2 ~ 10	2 ~ 5	3 ~ 10
300	20	2 ~ 10	3 ~ 10	3 ~ 10
400	30	2 ~ 10	3 ~ 10	3 ~ 10
600	50	3 ~ 10	3 ~ 10	

H, S, K, J, E : Must be specified in inquiry / order

12V2 / W05B

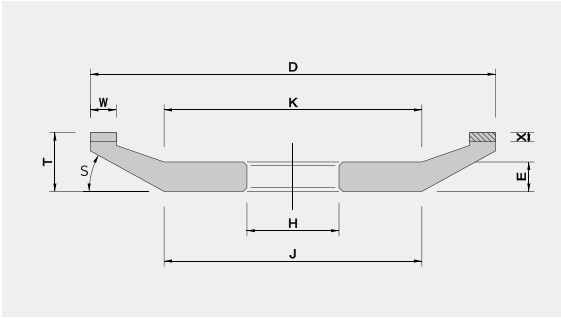


D	W	Metal X	Resin X	Vitri X
75	5 ~ 8	2 ~ 5	3 ~ 5	3 ~ 10
100	5 ~ 10	2 ~ 5	3 ~ 5	3 ~ 10
125	5 ~ 10	2 ~ 5	3 ~ 5	3 ~ 10
150	5	2 ~ 5	3 ~ 5	3 ~ 10
200	3 ~ 10	2 ~ 5	3 ~ 5	3 ~ 10
305	3	2 ~ 5	3 ~ 5	3 ~ 10
355	10	2 ~ 5	3 ~ 5	3 ~ 10

H, K, J, S, T ,E : Must be specified in inquiry / order

Standard Type of Diamond & CBN Wheel

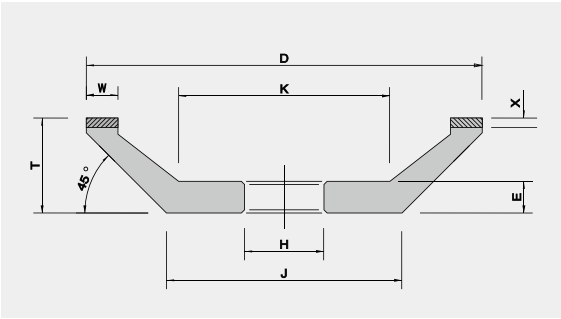
12A2-20° / W05C



		Metal	Resin	Vitri
D	W	X	X	X
75	3 ~ 10	2 ~ 10	2 ~ 5	3 ~ 10
100	5 ~ 10	2 ~ 10	2 ~ 5	3 ~ 10
125	5 ~ 10	2 ~ 10	2 ~ 5	3 ~ 10
150	5 ~ 10	2 ~ 10	2 ~ 5	3 ~ 10
175	5 ~ 10	2 ~ 10	2 ~ 5	3 ~ 10
200	5 ~ 10	2 ~ 10	2 ~ 5	3 ~ 10

H, T, X2, K, J, E : Must be specified in inquiry / order

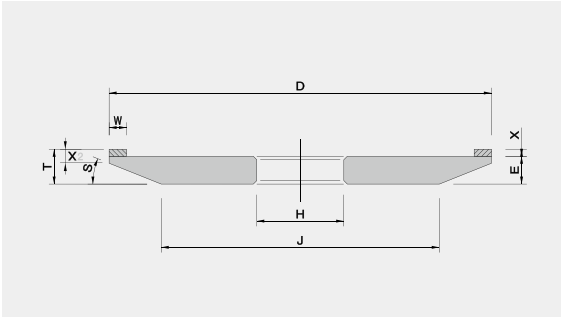
12A2-45° / W05C



		Metal	Resin	Vitri
D	W	X	X	X
75	3 ~ 10	2 ~ 10	2 ~ 5	3 ~ 8
100	5 ~ 10	2 ~ 10	2 ~ 5	3 ~ 8
125	5 ~ 12.5	2 ~ 10	2 ~ 5	3 ~ 8
150	5 ~ 15	2 ~ 10	2 ~ 5	3 ~ 8
175	5 ~ 15	2 ~ 10	2 ~ 5	3 ~ 8
200	10 ~ 20	2 ~ 10	2 ~ 5	3 ~ 8

H, K, J, T, E : Must be specified in inquiry / order

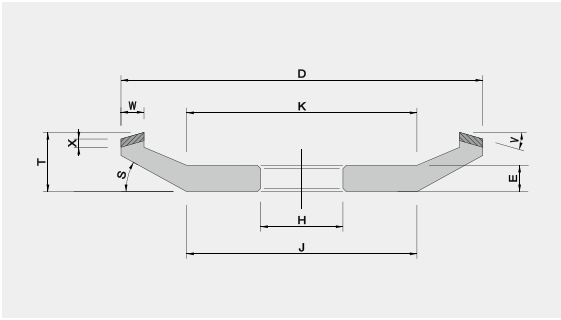
4A2 / W05F



		Metal	Resin	Vitri
D	W	X	X	X
100	4 ~ 6	2 ~ 5	2 ~ 5	3 ~ 5
125	5 ~ 8	2 ~ 5	2 ~ 5	3 ~ 5
150	4 ~ 8	2 ~ 5	2 ~ 5	3 ~ 5
200	10	2 ~ 5	2 ~ 5	3 ~ 5

H, S, K, T, X2, E : Must be specified in inquiry / order

12V5 / W05Z

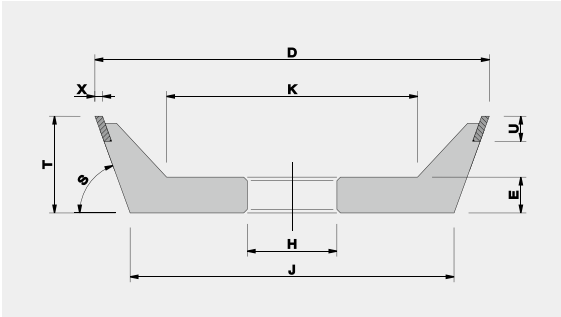


		Metal	Resin	Vitri
D	W	X	X	X
75	3 ~ 10	2 ~ 10	2 ~ 3 ~ 4	2 ~ 5
100	5 ~ 10	2 ~ 10	2 ~ 3 ~ 4	2 ~ 5
125	5 ~ 10	2 ~ 10	2 ~ 3 ~ 4	2 ~ 5
150	5 ~ 10	2 ~ 10	2 ~ 3 ~ 4	2 ~ 5
175	5 ~ 10	2 ~ 10	2 ~ 3 ~ 4	2 ~ 5
200	5 ~ 10	2 ~ 10	2 ~ 3 ~ 4	2 ~ 5

H, K, J, S, V, T, E : Must be specified in inquiry / order

Standard Type of Diamond & CBN Wheel

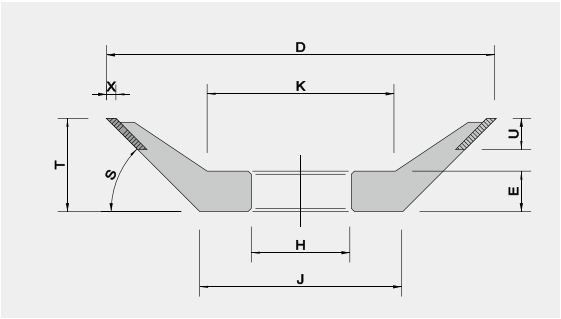
11V9 / W06A



	Metal	Resin	Vitri	
D	X	X	X	U
75		2 ~ 3		6 ~ 10
90		2 ~ 3		10
95.3		2 ~ 3		6 ~ 10
100		2 ~ 5	3 ~ 5	6 ~ 10
125		2 ~ 5	3 ~ 5	6 ~ 10
150		2 ~ 5	3 ~ 5	6 ~ 10

H, K, J, S, E, T : Must be specified in inquiry / order

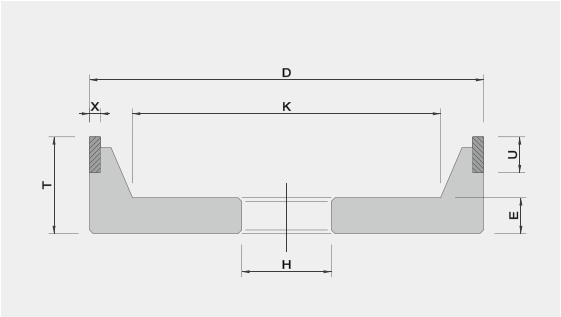
12V9 / W06A



	Metal	Resin	Vitri	
D	X	X	X	U
75		1.5 ~ 2 ~ 3		6 ~ 10
100		2 ~ 3		6 ~ 10
125		2 ~ 3		6 ~ 10

H, K, J, S, E, T : Must be specified in inquiry / order

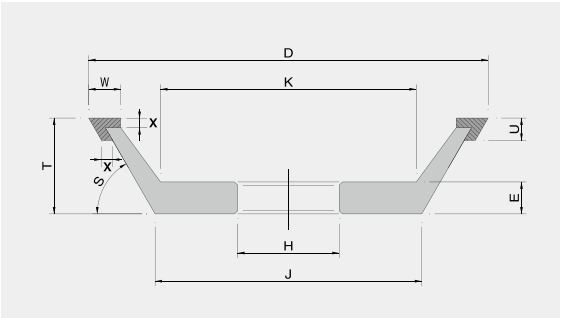
6A9 / W06B



	Metal	Resin	Vitri	
D	X	X	X	U
20	2 ~ 3	2 ~ 3	2.5 ~ 5	20
25	2 ~ 3	2 ~ 3	2.5 ~ 5	20
30	2 ~ 3	2 ~ 3	2.5 ~ 5	20
40	2 ~ 3	2 ~ 3	2.5 ~ 5	25
100	2 ~ 3	2 ~ 3	2.5 ~ 5	40
150	2 ~ 3	2 ~ 3	2.5 ~ 5	50

T, K, E : Must be specified in inquiry / order

11E9 / W07A

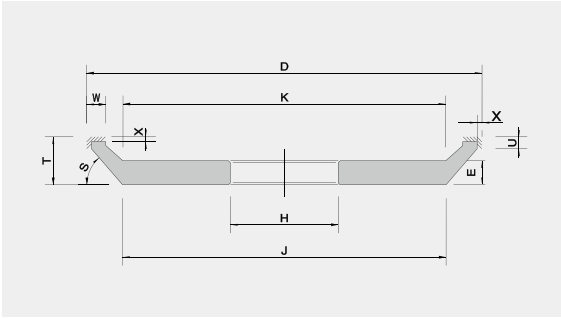


	Resin			
D	T	W	X	U
75	30 ~ 35	8 ~ 10	2	5
100	30 ~ 35	7 ~ 10	3 ~ 5	5
125	20 ~ 30	10 ~ 15	2 ~ 3	3.5 ~ 7
150	20 ~ 30	10 ~ 15	1.5 ~ 3	5 ~ 10

H, K, J, S, E : Must be specified in inquiry / order

Standard Type of Diamond & CBN Wheel

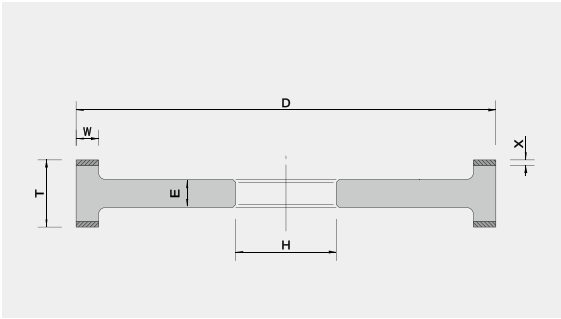
11C9, 12C9 / W07B



		Metal	Resin	Vitri		
D	W	X	X	X	T	E
75	6 ~ 10	2 ~ 5	2 ~ 5	2 ~ 10	22	10
100	6 ~ 10	2 ~ 5	2 ~ 5	2 ~ 10	22	10
125	10 ~ 15	2 ~ 5	2 ~ 5	2 ~ 10	24	12
150	10 ~ 15	2 ~ 5	2 ~ 5	2 ~ 10	24	12

H, K, J, S, U : Must be specified in inquiry / order

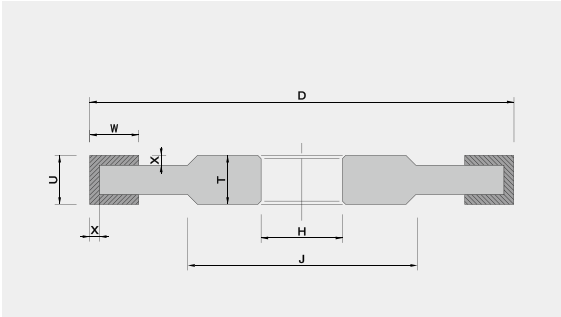
9A3 / W09A



		Metal	Resin	Vitri	
D	W	X	X	X	E
100	6 ~ 10	3 ~ 5	2 ~ 5	3 ~ 10	10
125	5 ~ 15	3 ~ 5	2 ~ 5	3 ~ 10	10
150	6 ~ 15	3 ~ 5	2 ~ 5	3 ~ 10	14
175	6 ~ 15	3 ~ 5	2 ~ 5	3 ~ 10	14
200	8 ~ 15	3 ~ 5	2 ~ 5	3 ~ 10	18
250	8 ~ 15	3 ~ 5	2 ~ 5	3 ~ 10	18

H, T : Must be specified in inquiry / order

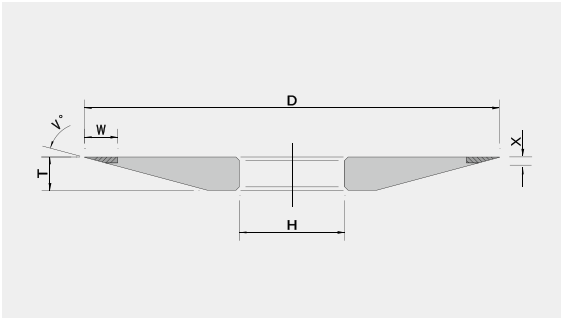
14U1 / W10A



			Metal	Resin	
D	U	W	X	X	T
100	4 ~ 6	4 ~ 6	1 ~ 2	1 ~ 2	8
125	3 ~ 10	4 ~ 10	1 ~ 3	1 ~ 3	10
150	4 ~ 10	4 ~ 10	1 ~ 3	1 ~ 3	10
200	10	10	2 ~ 3	2 ~ 3	10
250	10	10	2 ~ 3	2 ~ 3	10

H, J : Must be specified in inquiry / order

4B2 / W11A

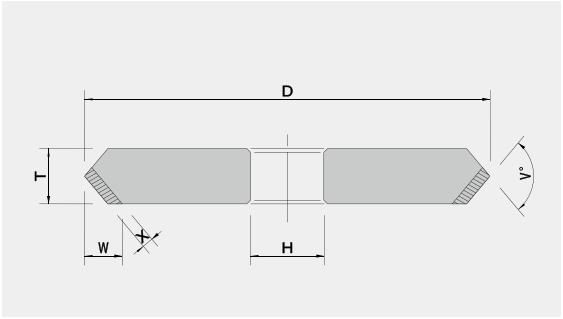


		Metal	Resin	Vitri
D	W	X	X	X
50	5 ~ 10	1 ~ 3	2	3
75	5 ~ 10	1 ~ 3	2	3
90	5 ~ 10	1 ~ 3	2	3
100	5 ~ 10	1 ~ 3	2	3
125	5 ~ 10	1 ~ 3	2	3
150	5 ~ 10	1 ~ 3	2	3
180	5 ~ 10	1 ~ 3	2 ~ 3	

H, V°, T : Must be specified in inquiry / order

Standard Type of Diamond & CBN Wheel

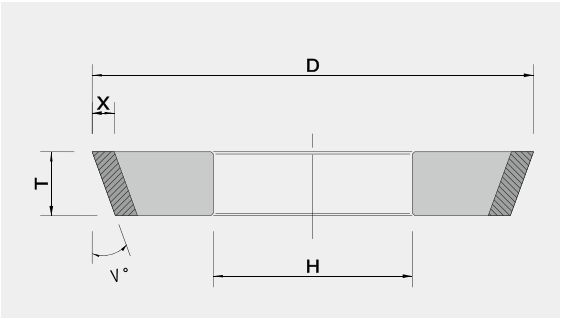
1B5 / W11B



		Metal	Resin	Vitri
D	T	X	X	X
75	3	3 ~ 5	3 ~ 5	3 ~ 5
	4		3 ~ 5	3 ~ 5

H, V, W : Must be specified in inquiry / order

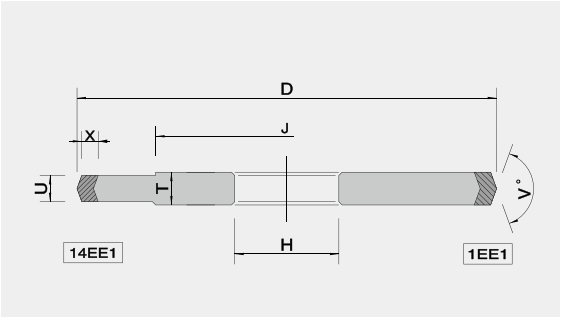
1V1 / W11C



		Metal	Resin	Vitri
D	T	X	X	X
30	3	2 ~ 3	1	
50	5	2 ~ 3	3	3 ~ 10
100	6 ~ 10	3 ~ 5	2 ~ 4	3 ~ 10
120	6 ~ 10	3 ~ 5	2 ~ 5	3 ~ 10
150	10 ~ 15	3 ~ 5	3 ~ 5	3 ~ 10
175	10 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10
200	15 ~ 25	3 ~ 5	3 ~ 5	3 ~ 10

H, V° : Must be specified in inquiry / order

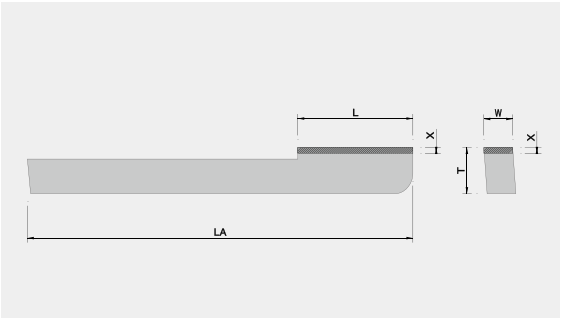
14EE1 / 1EE1 / W11D



		Metal	Resin	Vitri
D	U	X	X	X
100	3 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10
125	3 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10
150	3 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10
200	3 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10
250	3 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10
300	3 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10
350	3 ~ 20	3 ~ 5	3 ~ 5	3 ~ 10

H, V°, T, J : Must be specified in inquiry / order

HH1 / W12A

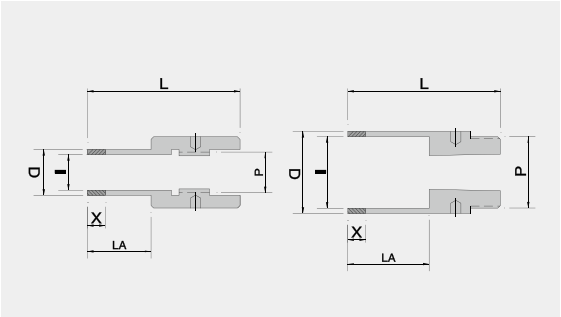


			Resin	
L	LA	W	X	T
40	134	10	2 ~ 4	16
40	134	5	2 ~ 3	16
40	40	10	2 ~ 3	8

H : Must be specified in inquiry / order

Standard Type of Diamond & CBN Wheel

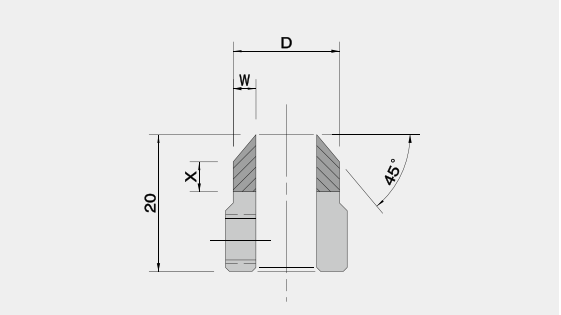
2FF2 / W13A



		Metal
D	I	X
5	1	7
10	6	7
15	11	10
20	16	10
25	21	21
30	26	26
40	36	36
50	46	46

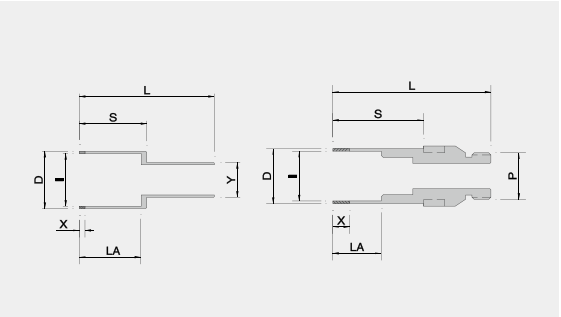
L, LA, P : Must be specified in inquiry / order

6V2 / W13B



		Metal
D	W	X
15	3 ~ 4	3 ~ 5
20	3 ~ 4	3 ~ 5
25	3 ~ 4	3 ~ 5
30	3 ~ 4	3 ~ 5

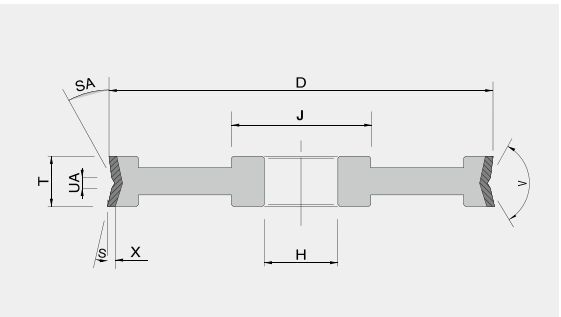
6F2 / W14A



				Metal
D	I	S	L	X
5	3.4	20	50	5
7	5.4	20	50	5
10	8.4	20	50	5
15	13.4	30	70	5
20	18	50	70	5
30	28	50	100	5
40	38	50	100	5
50	48	50	100	5

Y, LA : Must be specified in inquiry / order

1DD6Y / W15A

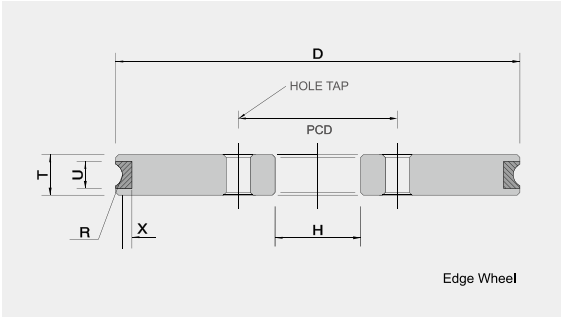


			Metal
D	T	UA	X
100	8 ~ 25	2.5 ~ 3	2 ~ 5
110	8 ~ 25	2.5 ~ 3	2 ~ 5
120	8 ~ 25	2.5 ~ 3	2 ~ 5
150	8 ~ 25	2.5 ~ 3	2 ~ 5

H, V, S, SA, J : Must be specified in inquiry / order

Standard Type of Diamond & CBN Wheel

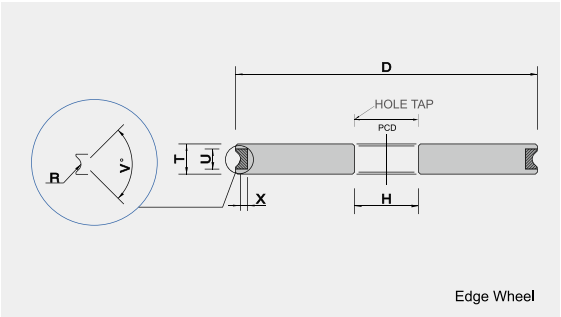
1FF6Y / W16A



D	Metal					Mesh
	Glass Thickness	T	U	R	X	
100, 150, 175, 204, 250	3	10	5	2.04	3	1st 170 / 200#
	4	10	6	2.86	3	2nd 120 / 140# 230 / 270#
	5	10	7	3.5	3	
	6	12	8	4	3	
	8	12	10	6	3	3rd 100 / 120# 200 / 230# 325 / 400#
	10	15	13	7.5	3	
	12	18	16	9.5	3	
	14	20	17	10	3	

H : Must be specified in inquiry / order

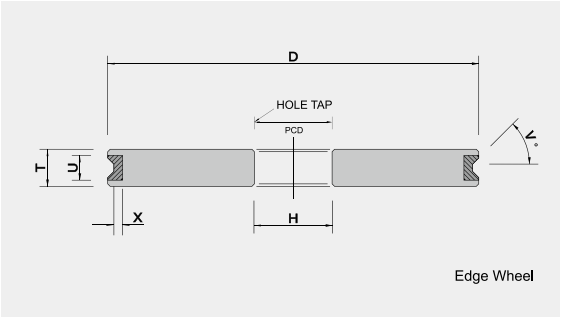
1LL6Y / W16B



D	Metal					Mesh
	Glass Thickness	T	U	R	X	
100, 150, 175, 204, 250	3	11	4.8	1.6	3	140 / 200#
	3.5	11	4.9	2.1	3	
	3.5	11	5.3	2.7	3	
	4	11	5.7	2.3	3	
	5	12	8.2	3.5	3	

H, V° : Must be specified in inquiry / order

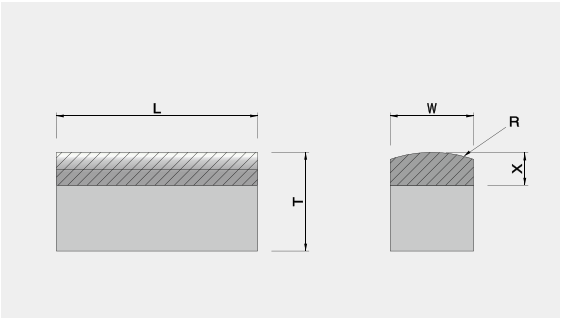
1EE6Y / W16C



D	Metal					Mesh
	Glass Thickness	T	U	V°	X	
100, 150, 175, 204, 250	3	10	5	45	3	1st 170 / 200#
	4	10	7.5	45	3	2nd 120 / 140# 230 / 270#
	5	10	8	45	3	
	6	12	9.5	45	3	
	8	13	12	45	3	3rd 100 / 120# 200 / 230# 325 / 400#
	10	15	14.5	45	3	
	12	18	16.5	45	3	
	14	20	18.5	45	3	

H : Must be specified in inquiry / order

HMF / W17A

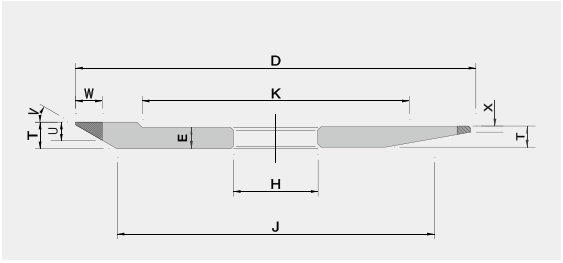


Metal	Vitri		
L	L	T	W
20	20	3 ~ 5	1 ~ 5
30	30	3 ~ 5	1 ~ 5
40	40	3 ~ 5	1 ~ 5
50	50	3 ~ 7	1 ~ 5
60	60	5 ~ 7	1 ~ 5
70	70	5 ~ 7	1 ~ 5

R, X : Must be specified in inquiry / order

Standard Type of Diamond & CBN Wheel

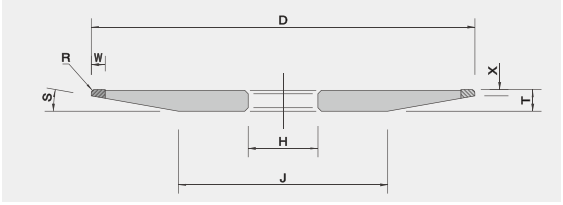
4M1 / W18A



		Metal	
D	T	W	V°
30	6 ~ 7	5 ~ 7	7 ~ 15
50	6	5 ~ 7	7 ~ 15
75	6 ~ 15	5 ~ 7	7 ~ 15
100	8 ~ 10	5 ~ 10	7 ~ 30
150	8 ~ 15	5 ~ 7	7 ~ 20
180	10	5 ~ 7	7 ~ 15

K, K, J, V°, E, U : Must be specified in inquiry / order

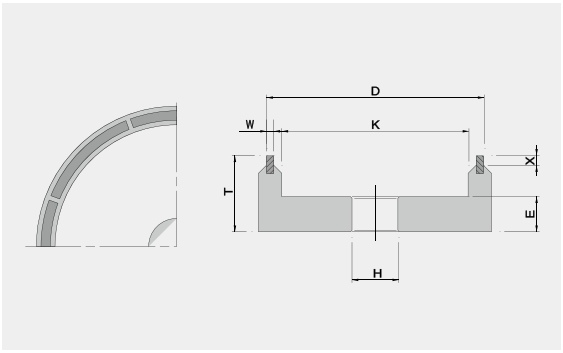
4Q1 / W18A



	Metal	Resin		
D	W	X	X	T
75	4	1 ~ 5	2	6
100	4 ~ 5	1 ~ 2	2	6
125	5	2	2	8
150	5	2	2	10

H, J, R, S : Must be specified in inquiry / order

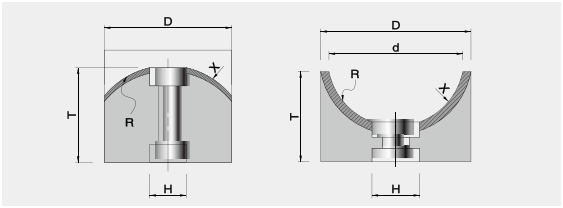
6A2S / W19A



	Metal	Resin	Vitri			
D	W	W	W	X	T	E
100	3 ~ 4 ~ 5		3 ~ 10	5 ~ 10	30 ~ 40	10
150	3 ~ 4 ~ 5		3 ~ 10	5 ~ 10	30 ~ 40	10
200	3 ~ 4 ~ 5		3 ~ 10	5 ~ 10	30 ~ 40	15 ~ 20
250	3 ~ 4 ~ 5	10	3 ~ 10	5 ~ 10	50 ~ 60	15 ~ 20
300	4 ~ 5	100 ~ 150	3 ~ 10	5 ~ 10	60 ~ 70	20
400	4 ~ 5	100		5 ~ 10	100	20
500	4 ~ 5	40		5 ~ 10	100	30
600	4 ~ 5	40		5 ~ 10	100	30
780	4 ~ 5	140		5 ~ 10	100	30

H : Must be specified in inquiry / order

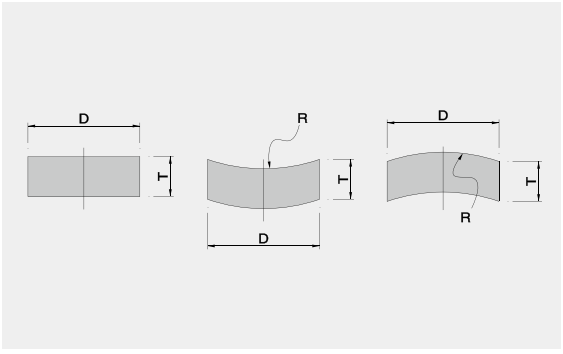
6P5 / 6P4 / W20A



Metal			
D	d	R	X
20	14	d / 2	3 ~ 5
50	44	d / 2	3 ~ 5
70	64	d / 2	3 ~ 5
100	14	d / 2	3 ~ 5

H, T, R : Must be specified in inquiry / order

P / W21D



Metal		
D	T	R
4	3	30, 100
5	3	10, 100, 200
6	3	15, 20, 25, 28, 30, 35, 50, 100, 200
8	3	20, 30, 50, 100, 200, 700
10	3	Straight, 20, 25, 33, 35, 36, 50, 70, 100, 200
12	3	50, 70, 100, 105, 200
14	3	15, 30, 100, 200
15	3	
16	3	30, 70, 80, 95, 100, 120, 150, 200, 250, 300
18	3	70, 80
20	3	40, 70, 74


SHINHAN DIAMOND

Diamond & CBN Grinding Wheels

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