

General information

Storage

Diamond and CBN grinding wheels should be carefully stored in original package. Keep core oiled.

Machines

Machines should be in good working condition, well maintained and free of vibration. Special attention should be given that the spindle runs true and that the spindle bearings are in good condition.

Wheel Mounting

After cleaning and checking the mounting arbor and flange, the wheel should be running true to within 0.02 mm.

Wheel Truing

• **On Manual Machine** For truing Diamond and CBN wheels we recommend that the wheels be trued "in situ" by using a Break Truing device (see page 3-Truing and Dressing section). Dressing is done by applying a soft grade dressing stick which should be held manually or mechanically to Diamond/CBN layer of wheel (see page 4-Truing and Dressing section).

• On CNC Machines

Diamond and CBN wheel ordering

Toogal identifies its wheels according to the FEPA rules for designating Diamond and CBN wheels.

While Diamond is designated by the letter D (not to be confused with Diameter). CBN is designated by the letter B.

For example:

D91 for Diamond and B91 for CBN. US mesh size like D#170/200 or B#170/200 can be used (see page 5 for comparison).

For concentration use the letter C to designate Diamond and V for CBN. Concentration C100 for a Diamond wheel is equal to V240 in CBN wheel.

Example for ordering grit size and concentration in Diamond/CBN:

D91 (D#170/200) C100 for Diamond-and B91 (B#170/200) V240 for CBN.

Bond Types available

1. Metal bond (M):

Metal bonds are in most cases bronze bonds.

Metal bonds are designed for long life and maintain physical dimensions, but do not remove material at the same rate as synthetic resin. Metal wheels are used mainly for wet grinding.

Applications: profiling and face grinding.

2. Resin bonds (R)

Synthetic resin bonds are used for dry and wet grinding, both on manual and automatic feed machines, as they have free cutting characteristics and are more adaptable to the required application parameters.

Applications: for all applications

3. Polyimide bonds (PI)

Polyimide bonds are different family of Resin bonds, designed to withstand much higher working temperatures with better Diamond retention.

Applications: face and peripheral grinding.

4. Hybrid bonds (RM): Resin-Metal

High efficiency production of WC round tolls & cutting inserts.

Applications: flute and gash grinding.

Concentration

The concentration figure specifies the proportion of diamond or CBN in the abrasive layer. As general rule for the selection of the appropriate concentration, a high concentration can be recommended for small contact areas and coarse grits, and a low concentration is advisable for large contact areas and fine grits.

High concentrations C100... C125 / V240... V300:

- High requirements for profile and edge stability.
- Small abrasive layer thickness.
- Hard bond.
- Coarser grit.
- Creep feed grinding.

Standard concentration C50... C75/V120... V180:

- Straight wheels for surface and cylindrical grinding.
- Cup Wheels e.g. for tool grinding.
- Larger abrasive layer thickness.
- Soft bond
- Finer grit.

Low concentration C25... C50/V90... V120:

- Cup wheels with extremely wide rim widths.
- Wheels with extremely fine grit size.

Toolgal defines wheel types and dimensions according to the FEPA rules. This catalogue shows the **most common shapes** and dimensions in accordance with those rules.

To order wheels please refer to the letter in the drawings, as shown on the drawing of the specific wheel you wish to order.

Sample order form for 14A1 wheel:

Type	D	U	X	T	H	Specification
14A1	150	5	3	8	20	Diamond D91C75 CBN B91 V180

Sample order form for 1EE1 wheel:

Type	D	U	X	T	H	Specification
1E1	150	6	2	6	25	Diamond D91C75 CBN B91 V180

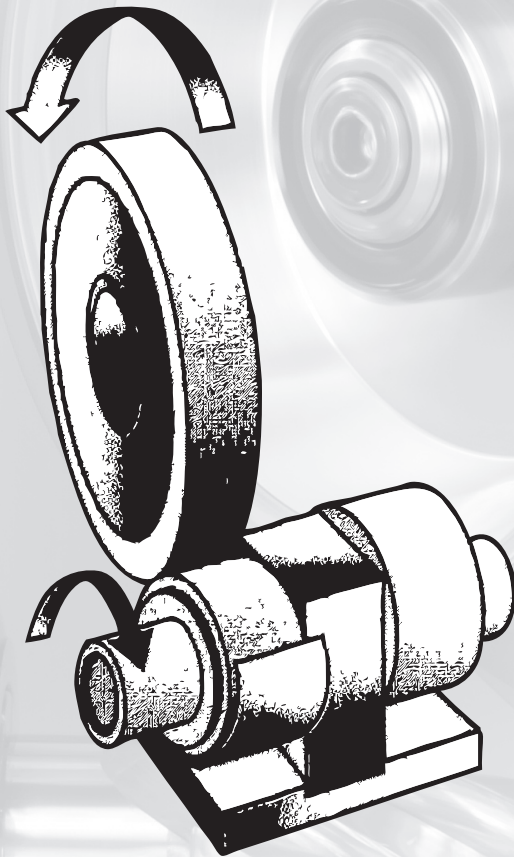
Truing and dressing of diamond and CBN grinding wheels

The purpose of truing diamond or CBN wheels is to guarantee the geometry of the wheel and to eliminate true or plane running errors. Wheels that have become deformed due to uneven wear or which do not run true, can be reshaped or trued again. For this purpose the surface of the grinding rim is brought to the desired shape by means of silicon carbide or corundum wheels Al_2O_3 .

The truing operation consists of truing part of the wheel in order to provide a regular and continuous contact between the rotating wheel and the place to be worked. The brake truing device is designed for truing cup and peripheral wheels on machines with a vertical or horizontal spindle. Its robustness and handiness make it an indispensable device for precision work.

The dressing of a wheel consists of eliminating the glazing due to the truing action and in making the wheel sharp again, therefore, is an absolute necessity. The wheels should preferably be dressed directly on the machine by pressing the sharpening stone against the grinding rim of the rotating wheel. Minimal coolant flow is beneficial; in any case the stone should be at least moistened. Optimum grinding performance is achieved if the wheel is subsequently used in the same direction of rotation. This is particularly true for CBN wheels. Due to the difference in the chip formation when grinding high-speed steels or similar materials, the CBN grain must penetrate deeper into the material and the chip requires a larger chip space for removal. The same applies to diamond grinding wheels.

This operation is absolutely indispensable when we are working with diamond or CBN wheels. The sharpening is achieved by an abrasive stick being held in contact with Diamond/CBN rim of the wheel when the wheel is rotating at working speed.



A coolant may be used with low flow to form an abrasive slurry between wheel and stick. When a wheel works under optimum conditions, the surface largely sharpens itself by splintering worn grits and exposing new ones. If the grinding forces become too high because of an excessive feed rate, low speed of the wheel or high table speed, the abrasive grain can drop prematurely out of the bond. With slow feed rate, high speeds or slow table speeds, the grinding forces are lower. This can result in flattening of the abrasive grains and unfavourable results. In both cases the self-sharpening effects can be improved through corresponding modification of the machining parameters.

Coolant:

- Synthetic oil - Most popular
- Emulsion (water based)

Water with rust inhibitor added is sufficient for diamond grinding wheels. The life of CBN grinding tools can be recommended by significantly increased by using pure oil. In any case an emulsion with an oil concentration as manufacturer should be used.

Cutting fluids

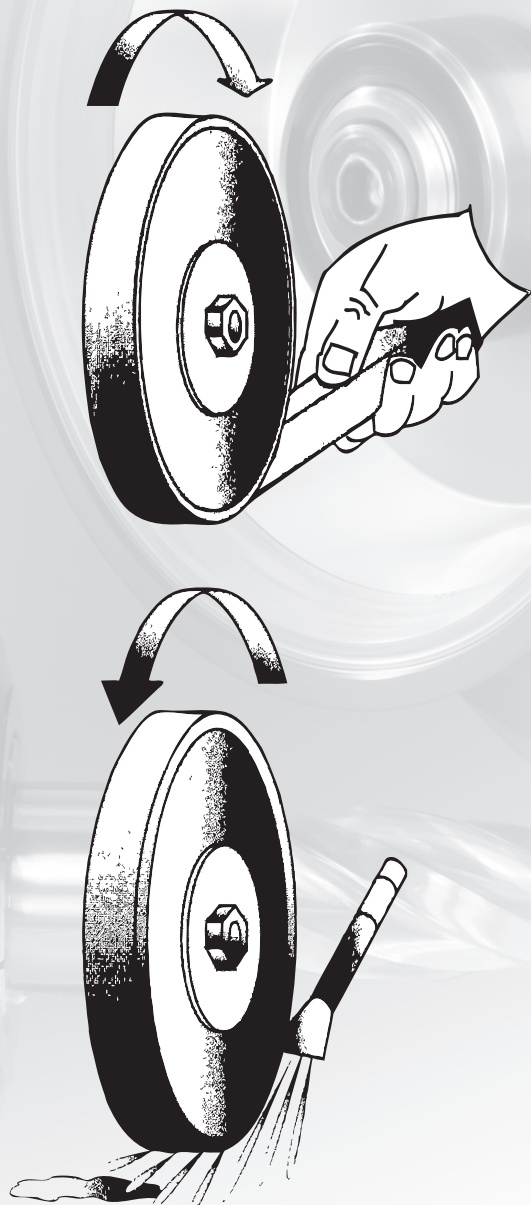
Cutting fluids should be used whenever possible when using diamond wheels to reduce the heat generated by grinding and extend the wheel life. If it is necessary to grind dry, as in tool and cutter grinding, a resin-bond wheel should be used.

Coolant flow

The best cooling effects is achieved when the outlet speed of the cooling lubricant is adapted to the peripheral speed of the grinding wheel, and the nozzle opening is only slightly wider than the grinding rim.

A small trickle of coolant occasionally applied is worse than no coolant at all. This causes alternate heating and quenching, which can cause damage to the diamond wheel and carbide tools.

Today, there is a wide range of resin-bonded grinding wheels which have been specifically designed to be used dry when grinding cemented carbide tools. These wheels are very effective and maintain productivity without the use of any coolant.



TOOLGAL STANDARD CATALOGUE

No.	Type			Application															
				Flute	Relief	Cut Off	Proping	OD	Gash	Weldone	Groves	Perepherial	Crash	Insert Profiling	End Face	Internal	Round Tools	Face Grinding	Side Grinding
1	1A1	3A1	14A1	RM, P, R	R	R	RM, M	RM, R	RM						RM, R	R	R	R	R
2	1A1R					R, RM													
3	1A1W														RM, R, M				
4	1B1	3B1	14B1	RM, R, M					RM, R, M	RM, M	RM, M	RM, M							
5	1D1	3D1	14D1					RM		RM, R, M						RM, R			
6	1F1	3F1	14F1	RM, R, M					RM						CR, M				
7	1E1	3E1	14E1	RM, M			RM, M, R				RM, R, M								
8	1L1	3L1	14L1		R			R								R			
9	1M1	3M1	14M1	RM, P, R				R	R RM							R			
10	1V1	3V1	14V1	RM, R					RM										
11	1Y1							R											
12	4A2																	RM, M, R	
13	4V4 (12V4)				RM, R														
14	6A2 (6AA2)				R			R RM											R
15	6A9							R RM											RM, P, R
16	9A3										RM, R								
17	11A2										RM, R								
18	11V5				R														
19	11V2				R													RM, R	
20	11V9				R RM									RM, R					
21	12A2	12A2J									R								
23	12C9																		RM, M, R
24	12V2	12V2J			R									RM, R					RM, M, R
25	12V5				R														
26	12V9	12V9J			R				RM, R										RM, R

Bond Type: **R** - Resin Bond **M, CR** - Metal Bond **P** - Polyimide **RM** - Hybrid

Bonds are available by various requests

FEPA Standard Grinding Wheels Shapes

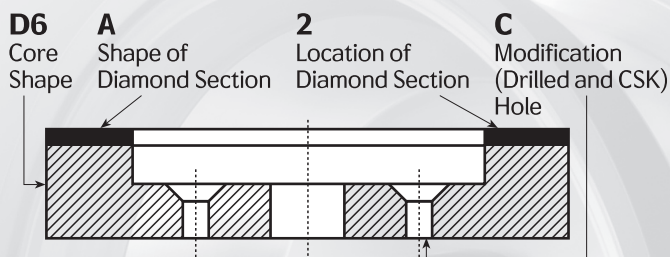
Designation of wheel shape

Position 1: basic core shape

Position 2: shape of the abrasive section

Position 3: location of the abrasiv section

Position 4: core modification



Shape code of the abrasive section

Symbol	Form	Symbol	Form	Symbol	Form	Symbol	Form	Symbol	Form
A		D		FF		L		QQ	
AH		DD		G		LL		S	
B		E		H		M		U	
C		EE		J		P		V	
CH		F		K		Q		Y	

Basic core shape code

Symbol	Form	Symbol	Form
1		9	
2		11	 less than 90° and over 45°
3		12	 45° or less
4		14	
6		15	

Location code of the abrasive section

Symbol	Location	Diagram	Symbol	Location	Diagram
1	periphery		3	both sides	
2	side		4	inside bevel or arc	

Grinding wheels common designations

Code of designation	Outline drawing	Code of designation	Outline drawing	Code of designation	Outline drawing
1A1		14EE1		9A3	
14A1		1FF1		6A9	
1L1		6A2		11V9	
1E6Q		11A2			
14E6Q		12A2		12V9	

General safety rules:

- 1.** Always strictly follow the safety rules prescribed for Toolgal tools as well as the instructions for the use of machines and/or electrical tools.
Always strictly keep to safety rules issued by organization responsible for the prevention of accidents.
- 2.** To avoid risks associated with the use of rotating tools it is strongly recommended to use the utmost caution and concentration when working.
- 3.** Always wear correctly sized gloves that allow the sensitivity necessary to operate the tool correctly and give adequate protection in the event of the blade being touched during use.
- 4.** Install only tools in perfect condition that are recommended for the material to be worked and that are suitable for the type of machine used.
- 5.** Do not use cracked or deformed tools.
- 6.** Check that the balancing, keying and centering of rotary tools is carried out correctly.
- 7.** Fix the tool correctly using the proper tightening and adjustment devices.
- 8.** Remove all tightening and adjustment devices before use.
- 9.** Check that the tool rotates in the correct direction.
- 10.** Always use safety glasses or protective screens to protect the eyes.
- 11.** The work area and the area around the machine must be free of obstacles.
- 12.** The work area must be properly lit.
- 13.** Before starting any kind of work, install all of the safety devices prescribed by the builder of the machine or power tool.

General safety rules:

- 14.** Any shaving / dust suction equipment must be used at the same time as the tool.
- 15.** The operator must be at least 18 years old and of the minimum age prescribed by the laws in force. They must be adequately trained in the use of the machine or power tool.
- 16.** Avoid using machines of power tools in the event of any illness or physical condition that may reduce reflexes or awareness and increase exposure to risk.
- 17.** Do not use the machine or power tool under the influence of alcohol or drugs.

Grit size

Diamond and CBN size codes

US mesh size	60/70	70/80	80/100	100/120	120/140	140/170	170/200	200/230	230/270	270/325	325/400	400/500
FEPA	D251	D213	D181	D151	D126	D107	D91	D76	D64	D54	D46	D39

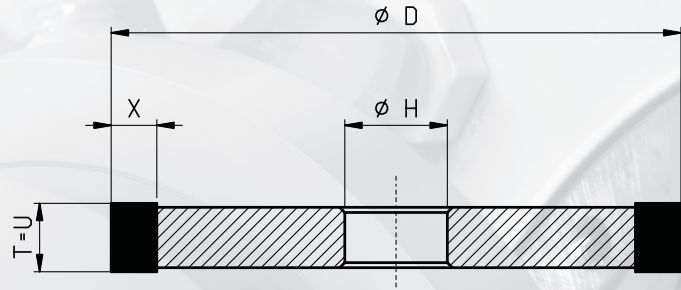
Availability

Micron size	0-1/2	0-1	0-2	1-2	1-3	2-4	3-6	4-8	5-10	6-12	10-15
Approx. Mesh size Equivalents	D60,000	D28,000	D14,000	D13,000	D12,000	D8,000	D5,000	D3,000	D2,200	D1,800 MD 10	D1,400
Micron size	10-20	12-22	15-25	20-30	22-36	30-40	36-54	40-60			
Approx. Mesh size Equivalents	D1,200	D1,100	D1,000 MD 20	D800 MD25	D700	D600	D500	D400			

Surface Quality

FEPA-Grit Size		Mean Roughness(um)		Surface Quality	Grinding Process
Diamond	CBN	Diamond	CBN	N	
	B301		2.10	N8	Very rough grinding
	B225		1.77	N8-N7	
	B213		1.41	N7	
	B181		1.12	N7-N6	
	B151		0.75	N6	
	B126		0.66	N6	
D181	B107	0.53	0.53	N6-N5	Rough grinding
D151	B91	0.50	0.50	N6-N5	
D126	B76	0.45	0.45	N6-N5	
D107	B64	0.40	0.40	N5	Semi-finish grinding
D91	B54	0.33	0.33	N5-N4	
D76	B46	0.25	0.25	N5-N4	
D64		0.18		N4	Fine grinding
D54		0.16		N4-N3	
D46		0.15		N4-N3	
MD25		0.12		N3	Ultrafine grinding
MD20		0.05		N3-N2	
MD10		0.025		N3-N2	

	N1	N2	N3	N4	N5	N6	N7	N8
Ra μm	0.025	0.05	0.10	0.2	0.4	0.8	1.60	3.20
Rt μm	0.500	0.80	1.25	2.5	5.0	8.0	16.0	32.0
Rz μm	0.400	0.63	1.00	2.0	4.0	6.3	10.0	16.0



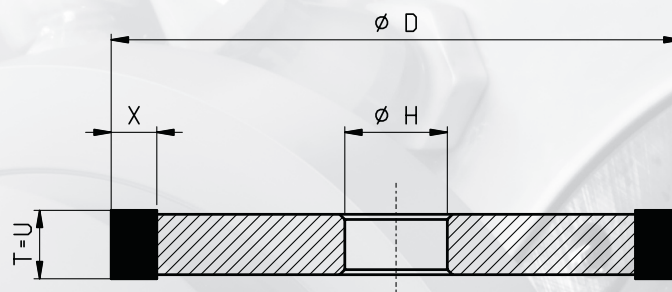
D	T=U	X				
75	4	3	4	5	6	
75	6	3	4	5	6	
75	8	3	4	5	6	
75	10	3	4	5	6	
75	12	3	4	5	6	
100	4	4	5	6	8	10
100	6	4	5	6	8	10
100	8	4	5	6	8	10
100	10	4	5	6	8	10
100	12	4	5	6	8	10
100	15			6	8	10
100	20			6	8	10
125	4	4	5	6	8	10
125	6	4	5	6	8	10
125	8	4	5	6	8	10
125	10	4	5	6	8	10
125	12	4	5	6	8	10
125	15	4	5	6	8	10
125	20	4	5	6	8	10
150	4	3	5	6	8	10
150	6	3	5	6	8	10
150	8	3	5	6	8	10
150	10	3	5	6	8	10
150	12		5	6	8	10
150	15		5	6	8	10
150	20			6	8	10



With Coolant



Without Coolant



D	T=U	X				
175	6	4	6	8	10	
175	10	4	6	8	10	
175	12	4	6	8	10	
175	15	4	6	8	10	
200	8	4	6	8	10	12
200	10	4	6	8	10	12
200	12	4	6	8	10	12
200	15	4	6	8	10	12
200	20	4	6	8	10	12
250	4	4	5	6	8	
250	6	4	5	6	8	
250	8	4	5	6	8	
305	6		6			
305	8		6			
305	10		6			
305	12		6			
305	14		6			
305	16		6			
305	20		6			
305	28		6			
350	12		6			
350	15		6			
350	30		6			
400	25		6			



With Coolant



Without Coolant

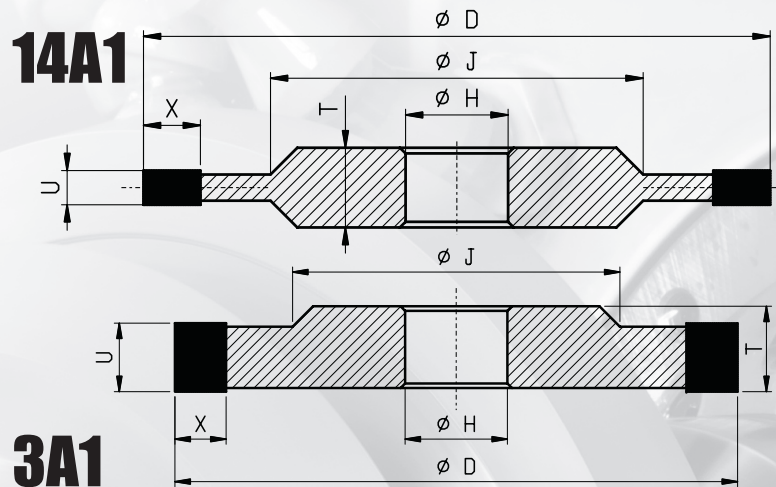
Sample Order:

Type	D	U	X	H	Specification
1A1	100	4	8	20	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.

14A1 & 3A1

TOOLGAL STANDARD CATALOGUE



$$J=D-2X-24$$

3A1

D	U	T	X			
75	3	6	3	4	5	6
75	4	6	3	4	5	6
100	3	8	3	5	8	10
100	4	8	3	5	8	10
100	5	8	3	5	8	10
100	6	8	3	5	8	10
125	3	8	3	5	8	10
125	4	8	3	5	8	10
125	5	8	3	5	8	10
125	6	8	3	5	8	10
150	3	8	3	5	8	10
150	4	8	3	5	8	10
150	5	8	3	5	8	10
150	6	8	3	5	8	10
175	3	8	3	5	8	10
175	4	8	3	5	8	10
175	5	8	3	5	8	10
175	6	8	3	5	8	10
200	3	10	3	5	8	10
200	4	10	3	5	8	10
200	5	10	3	5	8	10
200	6	10	3	5	8	10
200	8	10	3	5	8	10

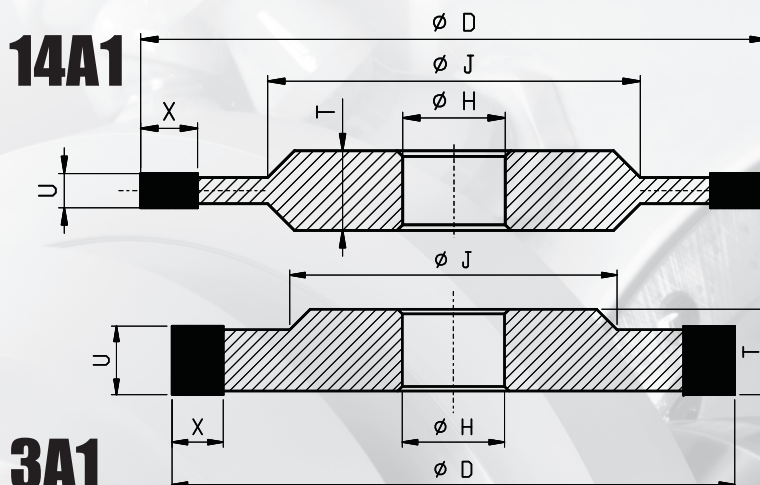


With Coolant



Without Coolant

14A1 & 3A1



$J=D-2X-24$

3A1

D	U	T			X			
250	3		10		4	6	8	10
250	4		10		4	6	8	10
250	5		10		4	6	8	10
250	6		10		4	6	8	10
250	8		10		4	6	8	10
305	4	16				6		
305	5	16				6		
305	6	16				6		
350	3	16	20	25		6	8	10
350	4	16	20	25		6	8	10
350	5	16	20	25		6	8	10
350	6	16	20	25		6	8	10
350	8	16	20	25		6	8	10
350	10	16	20	25		6	8	10
350	12	16	20	25		6	8	10
350	15	16	20	25		6	8	10
400	3	16	20	25	4	6	8	10
400	4	16	20	25	4	6	8	10
400	5	16	20	25	4	6	8	10
400	6	16	20	25	4	6	8	10
400	8	16	20	25	4	6	8	10
400	10	16	20	25	4	6	8	10
400	12	16	20	25	4	6	8	10
400	15	16	20	25	4	6	8	10



With Coolant



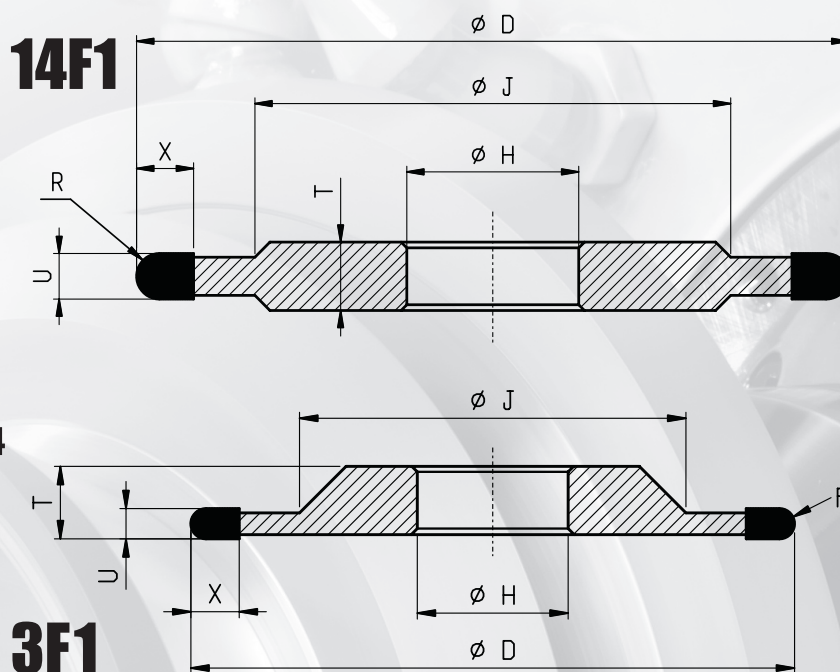
Without Coolant

Sample Order:

Type	D	U	X	T	H	Specification
14A1	100	3	8	8	20	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.

14F1 & 3F1



D	U	T	X			R
75	3	6	4	5	6	1.5
75	4	6	5	6	7	2
75	5	6	6	7	8	2.5
100	3	8	4	5	6	1.5
100	4	8	5	6	7	2
100	5	8	6	7	8	2.5
100	6	8	7	8		3
100	7	8	7	8		3.5
125	3	8	4	5	6	1.5
125	4	8	5	6	7	2
125	5	8	6	7	8	2.5
125	6	8	7	8		3
125	7	8	7	8		3.5
150	3	8	4	5	6	1.5
150	4	8	5	6	7	2
150	5	8	6	7	8	2.5
150	6	8	7	8		3
150	7	8	7	8		3.5

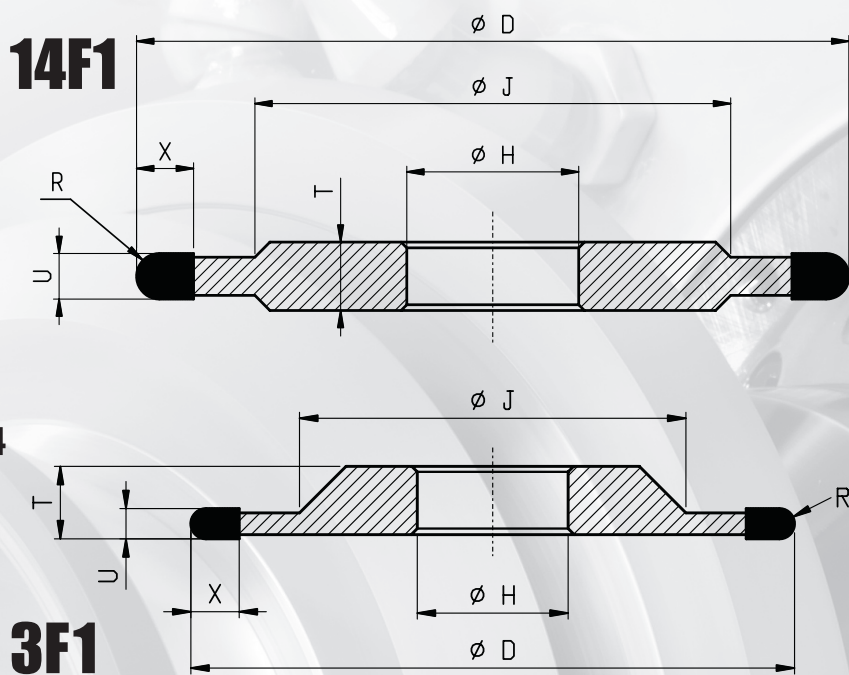


With Coolant



Without Coolant

14F1 & 3F1



D	U	T	X			R
175	3	8	4	5	6	1.5
175	4	8	5	6	8	2
175	5	8	6	7	10	2.5
175	6	8	7	8		3
175	7	8	7	8		3.5
200	3	8	4	5	6	1.5
200	4	8	5	6	8	2
200	5	8	6	8	10	2.5
200	6	8	7	8		3
200	7	8	7	8		3.5



With Coolant

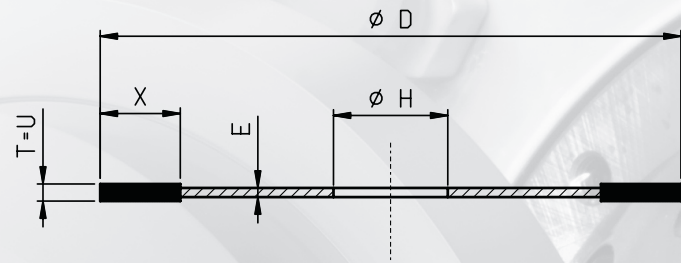


Without Coolant

Sample Order:

Type	D	U	X	H	T	T	V	R	Specification
3F1	175	4	6	20	14	14	2	1.5	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T=U	E	X	10	3/4"	20	22	25	1 1/4"	32	40	2"	51
75	1.5	0.8	7	X		X			X				
100	1.5	0.8	7.5	X	X	X	X		X				
125	1.5	0.8	7.5	X		X	X		X				
150	1.5	1	8.5		X	X			X	X	X		X
175	1.4	1	8.5			X	X	X	X	X			
200	1.6	1	8.5			X	X		X			X	X
250	1.7	1.2	6.5				X			X			



With Coolant

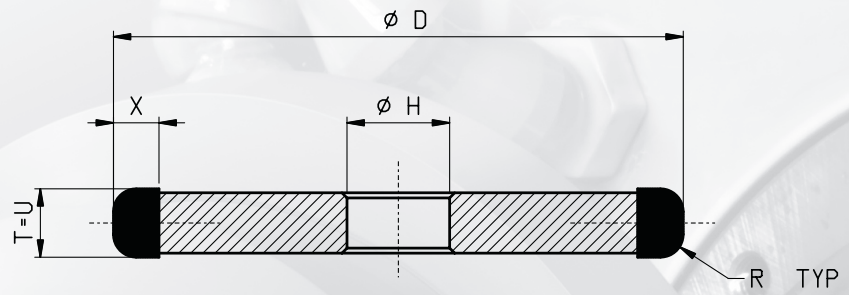


Without Coolant

Sample Order:

Type	D	T	X	H	Specification
1A1R	100	1.5	7.5	20	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T=U	X			R	
75	4	3	4	5	6	0.5
75	6	3	4	5	6	0.5
75	8	3	4	5	6	0.5
100	4	4	5	6	8	0.5
100	6	4	5	6	8	0.5
100	8	4	5	6	8	0.5
125	4	4	5	6	8	0.5
125	6	4	5	6	8	0.5
125	8	4	5	6	8	0.5
150	4	4	5	6	8	0.5
150	6	4	5	6	8	0.5
150	8	4	5	6	8	0.5
200	4	4	5	6	8	0.5
200	6	4	5	6	8	0.5
200	8	4	5	6	8	0.5
250	4	4	5	6	8	0.5
250	6	4	5	6	8	0.5
250	8	4	5	6	8	0.5
305	4		6			0.5
305	6		6			0.5
305	8		6			0.5
305	10		6			0.5
305	12		6			0.5
305	14		6			0.5
305	16		6			0.5
305	20		6			0.5
305	28		6			0.5



With Coolant

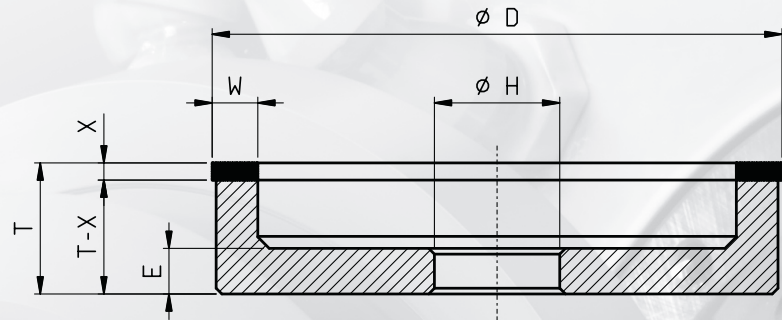


Without Coolant

Sample Order:

Type	D	U	X	H	R	Specification
1L1	150	4	8	20	0.5	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



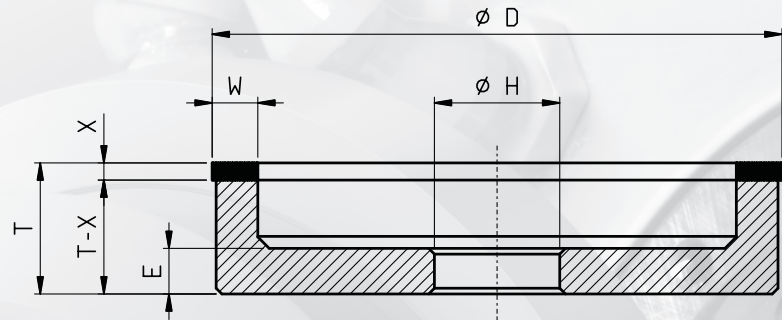
D	T-X	E	W	X	X	X
75	20	10	3	3	4	5
75	20	10	5	3	4	5
75	20	10	8	3	4	5
75	20	10	10	3	4	5
100	22	10	3	3	4	5
100	22	10	5	3	4	5
100	22	10	6	3	4	5
100	22	10	8	3	4	5
100	22	10	10	3	4	5
100	22	10	15	3	4	5
125	22	10	3	3	4	5
125	22	10	5	3	4	5
125	22	10	6	3	4	5
125	22	10	8	3	4	5
125	22	10	10	3	4	5
125	22	10	12	3	4	5
125	22	10	15	3	4	5
150	22	10	3	3	4	5
150	22	10	5	3	4	5
150	22	10	6	3	4	5
150	22	10	8	3	4	5
150	22	10	10	3	4	5
150	22	10	12	3	4	5
150	22	10	15	3	4	5
150	22	10	20	3	4	5



With Coolant



Without Coolant



D	T-X	E	W	X		
175	25	13	3	3	4	5
175	25	13	5	3	4	5
175	25	13	6	3	4	5
175	25	13	8	3	4	5
175	25	13	10	3	4	5
175	25	13	12	3	4	5
175	25	13	15	3	4	5
175	25	13	20	3	4	5
200	25	13	3	3	4	5
200	25	13	5	3	4	5
200	25	13	6	3	4	5
200	25	13	8	3	4	5
200	25	13	10	3	4	5
200	25	13	12	3	4	5
200	25	13	15	3	4	5
200	25	13	20	3	4	5
250	25	13	3	3	4	5
250	25	13	5	3	4	5
250	25	13	6	3	4	5
250	25	13	8	3	4	5
250	25	13	10	3	4	5
250	25	13	12	3	4	5
250	25	13	15	3	4	5
250	25	13	20	3	4	5



With Coolant

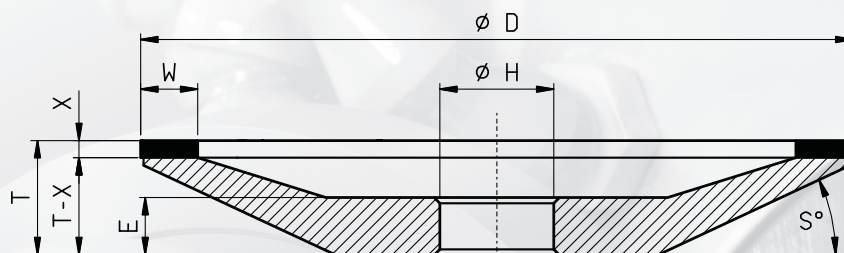


Without Coolant

Sample Order:

Type	D	W	X	H	E	Specification
6A2	75	10	3	20	10	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T-X (S=45°)	T-X (S=20°)	E (S=45°)	E (S=20°)	W	X		
75	17	8	10	6	3	3	4	5
75	17	8	10	6	5	3	4	5
75	17	8	10	6	6	3	4	5
75	17	8	10	6	10	3	4	5
100	23	10	10	8	3	3	4	5
100	23	10	10	8	5	3	4	5
100	23	10	10	8	6	3	4	5
100	23	10	10	8	8	3	4	5
100	23	10	10	8	10	3	4	5
125	23	14	10	8	3	3	4	5
125	23	14	10	8	5	3	4	5
125	23	14	10	8	6	3	4	5
125	23	14	10	8	8	3	4	5
125	23	14	10	8	10	3	4	5
125	23	14	10	8	12	3	4	5
125	23		10		15	3	4	5
150	23	16	10	9	5	3	4	5
150	23	16	10	9	6	3	4	5
150	23	16	10	9	10	3	4	5
150	23	16	10	9	12	3	4	5
150	23	16	10	9	15	3	4	5
175		18		10	5	3	4	5
175		18		10	6	3	4	5
175		18		10	10	3	4	5
175		18		10	15	3	4	5
200		20		12	5	3	4	5
200		20		12	10	3	4	5
200		20		12	15	3	4	5



With Coolant

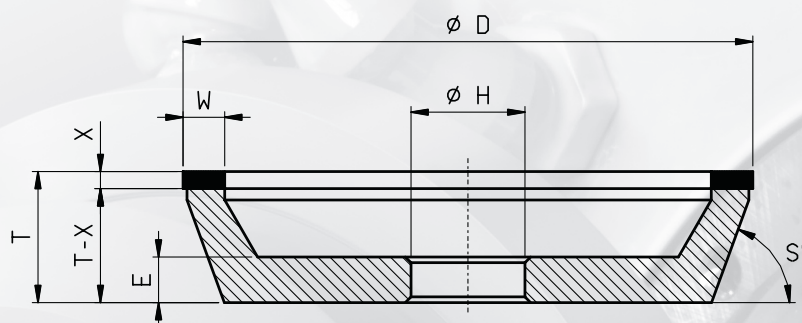


Without Coolant

Sample Order:

Type	D	W	X	T	H	S	Specification
12A2	125	10	3	26	20	45°	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T-X	S	E	W	X		
75	20	70 ⁰	10	3	3	4	5
75	20	70 ⁰	10	5	3	4	5
75	20	70 ⁰	10	6	3	4	5
75	20	70 ⁰	10	10	3	4	5
100	23	70 ⁰	10	3	3	4	5
100	23	70 ⁰	10	5	3	4	5
100	23	70 ⁰	10	6	3	4	5
100	23	23	10	8	3	4	5
100	23	70 ⁰	10	10	3	4	5
125	23	70 ⁰	10	3	3	4	5
125	23	70 ⁰	10	5	3	4	5
125	23	70 ⁰	10	6	3	4	5
125	23	70 ⁰	10	8	3	4	5
125	23	70 ⁰	10	10	3	4	5
125	23	70 ⁰	10	12	3	4	5
150	23	70 ⁰	10	5	3	4	5
150	23	70 ⁰	10	6	3	4	5
150	23	70 ⁰	10	10	3	4	5
150	23	70 ⁰	10	12	3	4	5
150	23	70 ⁰	10	15	3	4	5



With Coolant

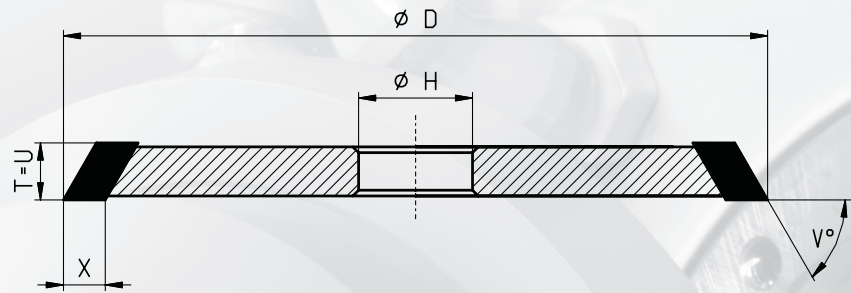


Without Coolant

Sample Order:

Type	D	W	X	T	E	H	S	Specification
11A2	100	10	3	26	10	20	70 ⁰	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T=U	X		80°	70°	60°	45°
75	8	5	6	X	X	X	X
75	10	5	6	X	X	X	X
100	8	6	10	X	X	X	X
100	10	6	8	10	X	X	X
125	8	6	10	X	X	X	X
125	10	6	8	10	X	X	X
150	8	6	10	X	X	X	X
150	10	6	8	10	X	X	X
175	8	6	10	X	X	X	X
175	10	6	8	10	X	X	X
200	8	6	10	X	X	X	X
200	10	6	8	10	X	X	X



With Coolant

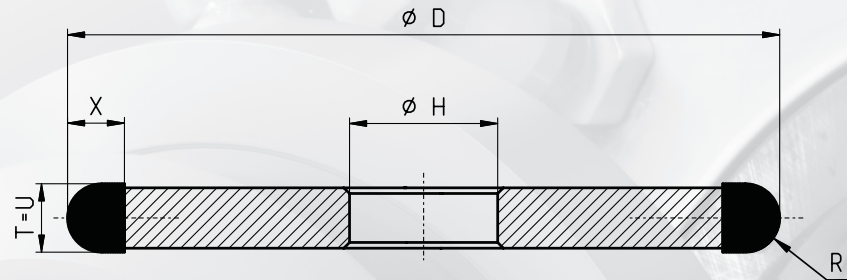


Without Coolant

Sample Order:

Type	D	U	X	H	V	Specification
14V1	150	8	6	25	45°	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T=U	X			R
75	3	4	5	6	1.5
75	4	5	6	7	2
75	5	6	7	8	2.5
75	6	7	8		3
75	7	7	8		3.5
100	3	4	5	6	1.5
100	4	5	6	7	2
100	5	6	7	8	2.5
100	6	7	8		3
100	7	7	8		3.5
125	3	4	5	6	1.5
125	4	5	6	7	2
125	5	6	7	8	2.5
125	6	7	8		3
125	7	7	8		3.5
150	3	4	5	6	1.5
150	4	5	6	7	2
150	5	6	7	8	2.5
150	6	7	8		3
150	7	7	8		3.5
175	3	4	5	6	1.5
175	4	5	6	7	2
175	5	6	7	8	2.5
175	6	7	8		3
175	7	7	8		3.5



With Coolant

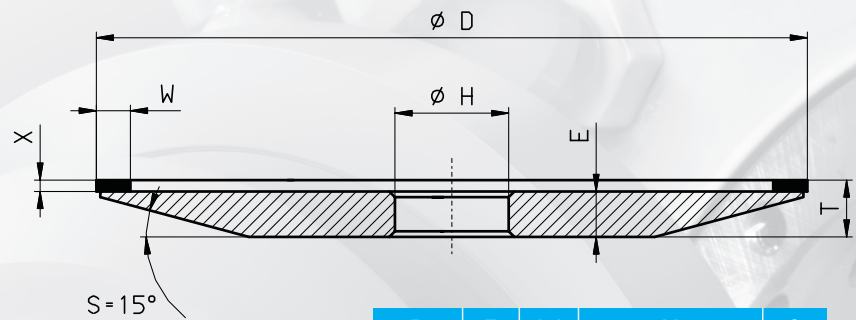


Without Coolant

Sample Order:

Type	D	U	X	H	R	Specification
1F1	175	4	7	20	2	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	E	W	X	S		
100	6	3	3	4	5	15 ⁰
100	6	4	3	4	5	15 ⁰
100	6	5	3	4	5	15 ⁰
100	6	6	3	4	5	15 ⁰
125	7	5	3	4	5	15 ⁰
125	7	6	3	4	5	15 ⁰
125	7	8	3	4	5	15 ⁰
125	7	10	3	4	5	15 ⁰
150	9	5	3	4	5	15 ⁰
150	9	6	3	4	5	15 ⁰
150	9	8	3	4	5	15 ⁰
150	9	10	3	4	5	15 ⁰



With Coolant



Without Coolant

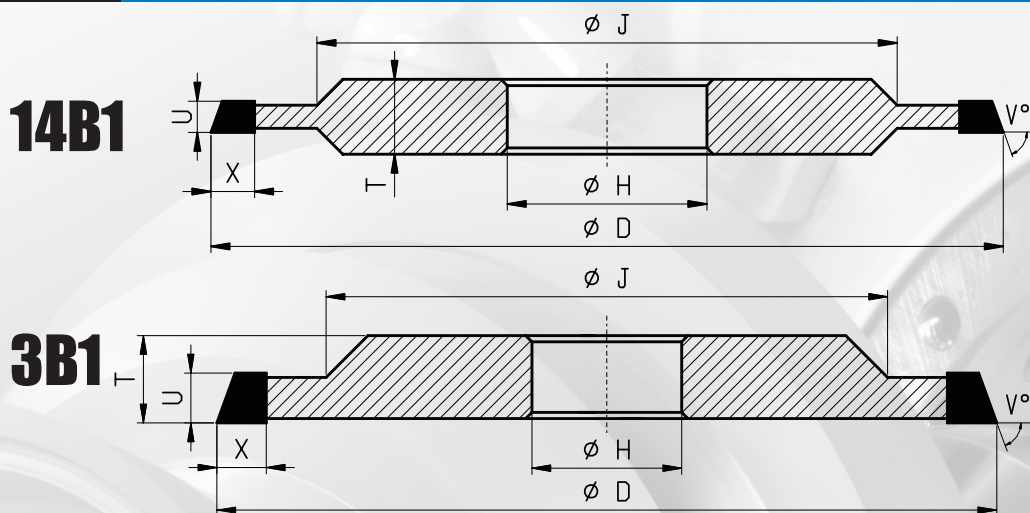
Sample Order:

Type	D	W	X	H	T	V	Specification
4A2	125	5	3	20	10	15 ⁰	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.

14B1 & 3B1

TOOLGAL STANDARD CATALOGUE



$J = D - 2X - 24$

D	U	T	X				80°	70°	60°	45°
75	3	6	5	6	8	10	X	X	X	X
75	4	6	5	6	8	10	12	X	X	X
75	5	6	5	6	8	10	12	15	X	X
100	3	8	5	6	8	10		X	X	X
100	4	8	5	6	8	10	12	X	X	X
100	5	8	5	6	8	10	12	15	X	X
100	6	8	5	6	8	10	12	15	X	X
125	3	8	5	6	8	10		X	X	X
125	4	8	5	6	8	10	12	X	X	X
125	5	8	5	6	8	10	12	15	X	X
125	6	8	5	6	8	10	12	15	X	X
150	3	8	5	6	8	10		X	X	X
150	4	8	5	6	8	10	12	X	X	X
150	5	8	5	6	8	10	12	15	X	X
150	6	8	5	6	8	10	12	15	X	X
175	3	8	5	6	8	10		X	X	X
175	4	8	5	6	8	10	12	X	X	X
175	5	8	5	6	8	10	12	15	X	X
175	6	8	5	6	8	10	12	15	X	X
200	3	10	5	6	8	10		X	X	X
200	4	10	5	6	8	10	12	X	X	X
200	5	10	5	6	8	10	12	15	X	X
200	6	10	5	6	8	10	12	15	X	X



With Coolant

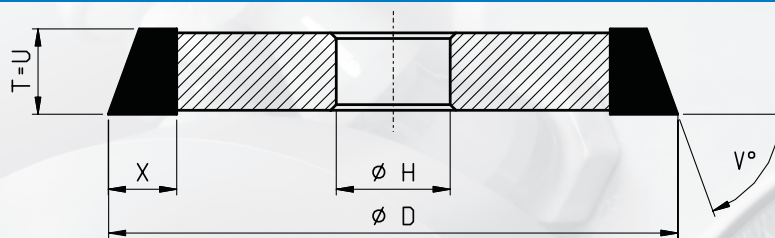


Without Coolant

Sample Order:

Type	D	U	X	H	T	V	Specification
14B1 + 3B1	125	6	5	20	8	70°	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T=U	X						V			
		5	6	8	10	12	15	80°	70°	60°	45°
75	4							X	X	X	X
75	5						15	X	X	X	X
75	6						15	X	X	X	X
75	8						15	X	X		
75	10						15	X	X		
100	4							X	X	X	X
100	5						15	X	X	X	X
100	6						15	X	X	X	X
100	8						15	X	X		
100	10						15	X	X		
125	4							X	X	X	X
125	5						15	X	X	X	X
125	6						15	X	X	X	X
125	8						15	X	X		
125	10						15	X	X		
150	4							X	X	X	X
150	5						15	X	X	X	X
150	6						15	X	X	X	X
150	8						15	X	X		
150	10						15	X	X		
175	5							X	X	X	X
175	6						15	X	X	X	X
175	8						15	X	X		
175	10						15	X	X		
200	5							X	X		
200	6						15	X	X		
200	8						15	X	X		
200	10						15	X	X		



With Coolant

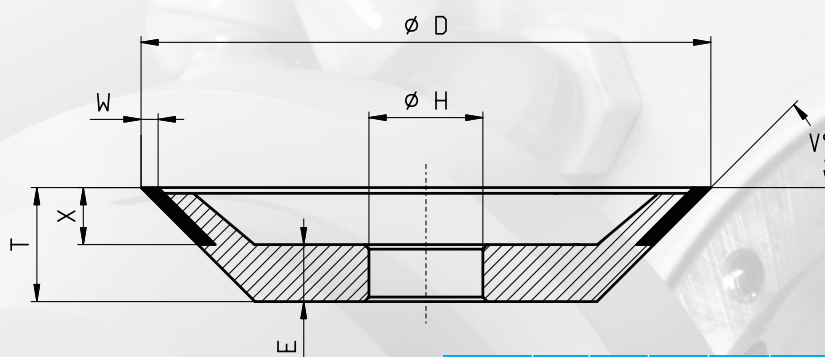


Without Coolant

Sample Order:

Type	D	U	X	H	V	Specification
1B1	125	6	5	20	70°	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T	E	W	X	V
75	16	10	2	10	45 ⁰
75	16	10	3	10	45 ⁰
100	20	10	2	10	45 ⁰
100	20	10	3	10	45 ⁰
125	25	10	2	10	45 ⁰
125	25	10	3	10	45 ⁰
150	25	10	2	10	45 ⁰
150	25	10	3	10	45 ⁰



With Coolant

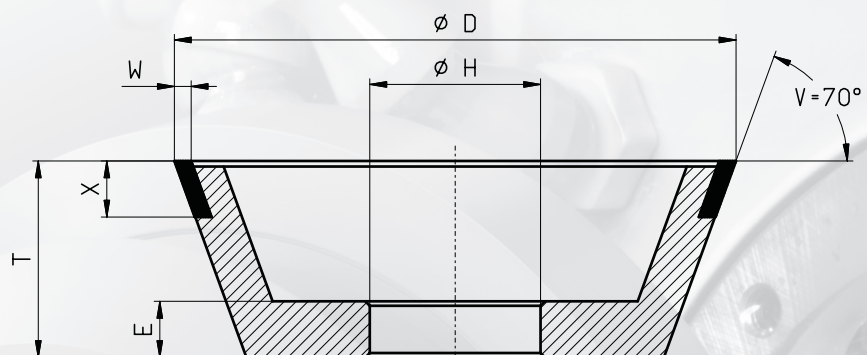


Without Coolant

Sample Order:

Type	D	X	W	E	H	T	V	Specification
12V9	100	10	3	10	20	20	45 ⁰	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T	E	W	X	V
75	30	10	2	10	70 ⁰
75	30	10	3	10	70 ⁰
90	35	10	3	10	70 ⁰
100	35	10	2	10	70 ⁰
100	35	10	3	10	70 ⁰
125	40	10	2	10	70 ⁰
125	40	10	3	10	70 ⁰
150	40	10	2	10	70 ⁰
150	40	10	3	10	70 ⁰



With Coolant

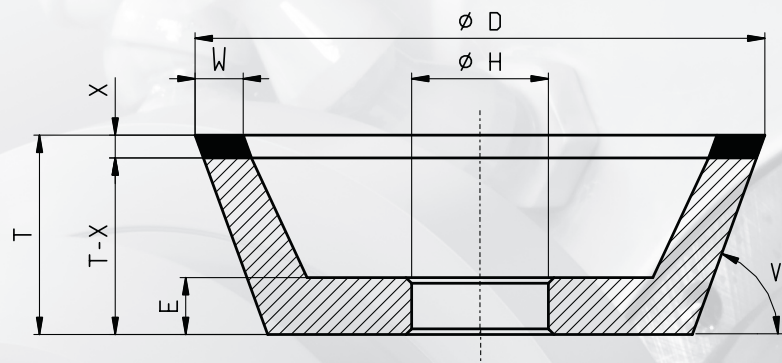


Without Coolant

Sample Order:

Type	D	W	X	H	T	V	Specification
11V9	100	3	10	20	35	70 ⁰	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	W	X	T-X	E	V
100	8	5	30	10	70 ⁰
100	6	6	34	10	70 ⁰
100	6	10	30	10	70 ⁰
125	5	10	30	10	70 ⁰
125	5	6	14	10	70 ⁰
150	6	10	30	10	70 ⁰
200	3	10	15	10	70 ⁰



With Coolant

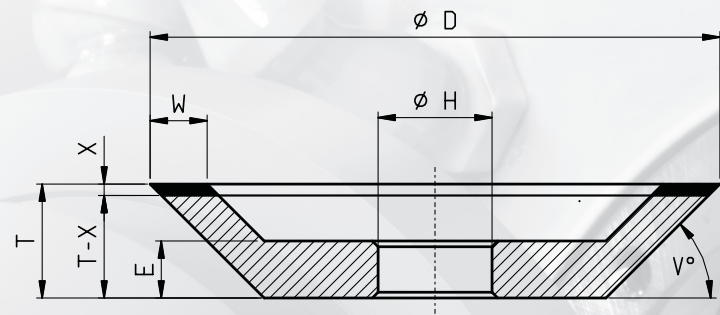


Without Coolant

Sample Order:

Type	D	W	X	T	E	H	V	Specification
11V2	100	6	10	40	10	25	70 ⁰	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	W	X	T-X	E	V
100	10	2	18	10	45 ⁰
100	10	3	18	10	45 ⁰
125	10	5	12	10	45 ⁰



With Coolant

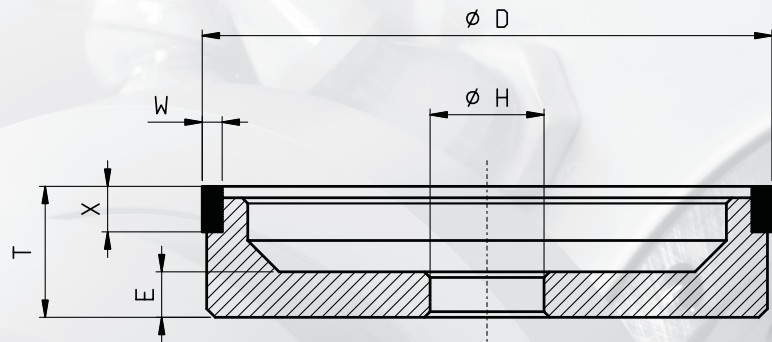


Without Coolant

Sample Order:

Type	D	W	X	T	H	V	Specification
12V2	100	10	3	21	20	45 ⁰	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T	E	W	X
50	25	10	3	10
75	25	10	3	10
100	25	10	3	10
125	25	10	3	10
150	25	10	3	10



With Coolant

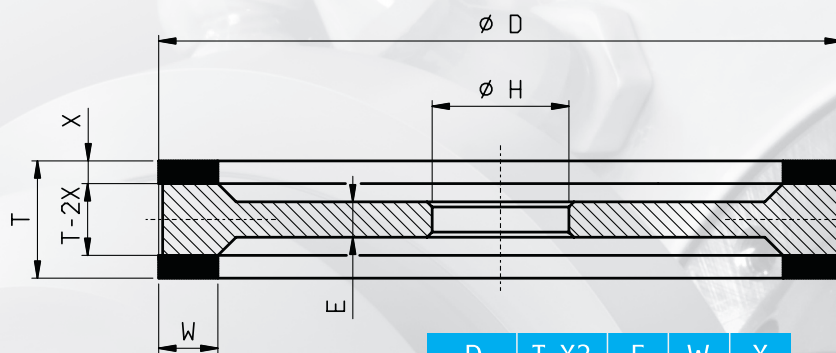


Without Coolant

Sample Order:

Type	D	X	W	T	E	H	Specification
6A9	125	3	10	25	10	20	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.



D	T-X2	E	W	X
100	14	10	10	3
100	16	12	10	3
125	16	10	10	3
125	16	12	10	3
150	16	10	10	3
150	16	12	10	3
175	16	10	10	3
175	16	12	10	3
200	16	10	10	3
200	16	12	10	3



With Coolant



Without Coolant

Sample Order:

Type	D	W	X	T	H	Specification
9A3	100	10	3	22	20	Diamond D91 C75 CBN B91 V180

Can be produced in different measures by demand.

iQ Line of Products by Bond

Recommended peripheral speed (Vc) for Diamond grinding wheels various bonds

CB Bond Line						
Applications: General purpose, insert grinding, small tools grinding Grit size: D35-D64, C100-C125						
			Wheels diameter (mm)			
Machine	kw		75	100	125	150
All CNC machines		M/S	25-35			

RM5 Bond Line						
Application: Flute grinding Medium MRR ($Q_w = 4-6 \text{ mm}^3/\text{mm/s}$) and Gash operation Grit size: D46-D91, C100						
			Wheels diameter (mm)			
Machine	kw		75	100	125	150
All CNC machines	<10	M/S	15-18		18-22	
*Cutting speed for Gash can be increased up to 25 m/s for better surface quality						

RM6, RM7 Bond Line						
Application: Flute grinding very high MRR ($Q_w = 6-12 \text{ mm}^3/\text{mm/s}$) and Gash operation Grit size: D64-D91, C100						
			Wheels diameter (mm)			
Machine	kw		75	100	125	150
Low medium power	<10	M/S	13-18		15-18	
High power	>10	M/S	10-18		13-18	
*Required cutting speed for Gash operation: 25 m/s						

General machine operating instructions:

Adjust the spindle RPM within the recommended range to the point of optimal spindle load.

Incorrect spindle RPM:

*Cutting speed lower than recommended might result in high wear of the wheel and poor hold of the form.

*Cutting speed higher than recommended might result in over heating, burning and clogging of the wheel.

RPM Table		Wheels diameter (mm)			
		75	100	125	150
Peripheral Speed (m/s)	13	3310	2480	1990	NR
	15	3820	2870	2290	1910
	18	4590	3440	2750	2290
	22	5610	4200	3360	2800
	25	6380	4780	3830	3180
	30	7660	5730	4590	3820
	35	8940	6690	5360	4460

iQ Line of Products by Application

Recommended peripheral speed (Vc) for Diamond grinding wheels by application

Application: Flute grinding					
Bond type: RM5, RM6, RM7 Grit size: D46-D91					
		Wheels diameter (mm)			
Machine	kw	75	100	125	150
		Vc (m/s)			
Low medium power	<10	13-18		15-18	
High power	>10	10-18		15-18	

Application: Flute grinding small diameter tools (ø0.5-3mm)					
Bond type: CB Grit size: D46-D91					
		Wheels diameter (mm)			
Machine	kw	75	100	125	150
		Vc (m/s)			
All CNC machines		25-35			

Application: Gash grinding					
Bond type: RM5, RM6, RM7, CB Grit size: D46-D91					
		Wheels diameter (mm)			
Machine	kw	75	100	125	150
		Vc (m/s)			
All CNC machines		25-35			

Application: Gash grinding small diameter tools (ø0.5-3mm)					
Bond type: RM5, RM6, RM7, CB Grit size: D46-D91					
		Wheels diameter (mm)			
Machine	kw	75	100	125	150
		Vc (m/s)			
All CNC machines		18-22(*)		18-25(*)	

(*) up to 35m/s for CB bond type.

General machine operating instructions:

Adjust the spindle RPM within the recommended range to the point of optimal spindle load.

Incorrect spindle RPM:

*Cutting speed lower than recommended might result in high wear of the wheel and poor hold of the form.

*Cutting speed higher than recommended might result in over heating, burning and clogging of the wheel.

RPM Table		Wheels diameter (mm)			
		75	100	125	150
Peripheral Speed (m/s)	13	3310	2480	1990	NR
	15	3820	2870	2290	1910
	18	4590	3440	2750	2290
	22	5610	4200	3360	2800
	25	6380	4780	3830	3180
	30	7660	5730	4590	3820
	35	8940	6690	5360	4460

Qw' Table

$$Qw' = \frac{Ae \cdot F}{60}$$

Qw' - specific material removal rate [(mm³ / mm/min)]
F - feed rate [mm /min]
Ae - depth of cut [mm]

Toolgal's Wheels can generate the highest Qw' possible.
 To maximize the Qw' please follow the recommendation below

Ae (mm) ▶	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
40						2.7	3.0	3.3	3.7	4.0	4.3
50					2.9	3.3	3.8	4.2	4.6	5.0	5.4
60				3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.0
80			3.3	4.0	4.7	5.3	6.0	6.7	7.3	8.0	8.7
90		3.0	3.8	4.5	5.3	6.0	6.8	7.5	8.3	9.0	9.8
100	2.5	3.3	4.2	5.0	5.8	6.7	7.5	9.0	9.2	10.0	10.8
120	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	NR	NR
140	3.5	4.7	5.8	7.0	8.2	9.3	10.5	11.7	NR	NR	
160	4.0	5.3	6.7	8.0	9.3	10.7	12.0	NR	NR		
180	4.5	6.0	7.5	9.0	10.5	12.0	NR	NR			
200	5.0	6.7	8.3	10.0	11.7	NR	NR				
F (mm/min) ▲											

■ Non Economic
 ■ Small Tools
 ■ Standard Stock Removal
 ■ High Stock Removal
 ■ Not Recommended

Spindle RPM Recommendation Table

Vc (m/s) ▶	22	20	18	15	13	10
100	4200	3820	3440	2870	2480	1910
120	3360	3060	2750	2290	1990	NR
140	2800	2550	2290	1910	NR	
160	2400	2180	1970	NR		
180	2100	1910	NR			
Vc (m/s) ▶						

■ Low Power Spindle
 ■ High Power Spindle
 ■ Not Recommended

Kibbutz Degania

Degania Celebrates



Kibbutz Degania was founded in 1910 by a group of 12 young individuals who emigrated from Eastern Europe with the aim of renewing Jewish life and working in the land of Israel. Extremely difficult conditions such as harsh weather, swamps, malaria and antagonistic authorities led them to realize that only through shared efforts and mutual help could they reach their goals and overcome these difficult circumstances.

Degania was first of about 280 "kibbutzim" established in Israel over the past 100 years, based on the socialist ideas of complete equality of all members and equal sharing of property and assets.

KIBBUTZ DEGANIA 'A', started as a simple farming community and is now a modern agricultural settlement using up-to-date technology in all branches: banana, date, orchard and olive plantations, dairy farm and poultry.

The fourth kibbutz-born generation today continues to progress and develop the community in their forefather's traditions. On October 2010 Degania celebrates its Centennial Anniversary.



TOOLGAL'S DEVOTION TO EXCELLENCE

In 1968 Toolgal Industrial Diamonds Ltd. was founded in Degania. Throughout the years, Toolgal's R&D team has established Toolgal at the frontier of diamond tools market designing and producing state of the art diamond and CBN tools while ensuring repeatability of the highest performance. In its continuous strive to surpass its competition Toolgal remains Devoted to Excellence in every aspect of trade.