

APPLICATION GUIDE

TOOLGAL'S BONDS

TOOLGAL BONDS ARE DIVIDED INTO 4 MAIN GROUPS:

- **Phenol group** (Toolgal code CB)

Pressed with thermal stability - 200°C

Main applications: OD, Mini Tools, Cylindrical Grinding

- **Polyimide group** (Toolgal code PI)

Pressed with thermal stability - 350°C.

Main applications: Inserts grinding, Dry grinding

- **Metal bond group** (Toolgal code HBBM or CR)


with thermal stability - 670° C - 800° C

Main applications: Groove grinding, Threaded tools, special profiling/shapes

- **Composite group** (Toolgal code RM)

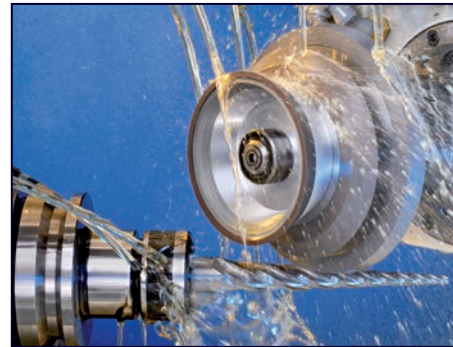
Double matrix resin & metal pressed with thermal stability - 350°C

Main applications: Fluting, Gashing

Selection assistant for TOOLGAL bond system		
Grinding Wheels	Wear resistance	Recommendations for use
RM6/7		High-performance resin bond for deep grinding, particularly wear-resistant
RM5		High-performance resin bond for flute grinding
PI		More wear-resistant resin bond preferably wet grinding
CB		Standard resin bond for CNC application

RM SERIES GENERAL GRINDING ADVANTAGES

- Excellent surface quality at maximum feed rate
- Consistent work-piece dimensions for uniformity
- Very low spindle load reduces thermal and mechanical load
- High wear resistance for longer life
- Cost effectiveness
- Wide range fits all types of CNC machines



FLUTE GRINDING

RM6/7 Recommended for tough and long production runs Q.W 6.7

RM5 Recommended for standard production runs Q.W 4

- Low cutting force
- Fast cutting speed
- High feed rate at low load
- Superior surface quality
- Maintains perfect wheel form
- Preserves work-piece core diameter
- Longer intervals between dressing
- Optimal grit size D64 (270#)

RECOMMENDED CUTTING SPEED

BOND	APPLICATION	MATERIAL	M/S	SFM	FEED RATE	DEPTH OF CUT	QW mm ³ / mm*s
RM 6	Flute	WC	18	3,150-3,550	80-120 mm/min	Up to 4mm	6.7
RM 7	Flute	WC	16	3,150-3,550	80-120 mm/min	Up to 3.6mm	6.7
RM 5	Flute	WC	18	3,150-3,550	80 mm/min	Up to 3.0mm	4

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 Wheel 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	8.3	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)											

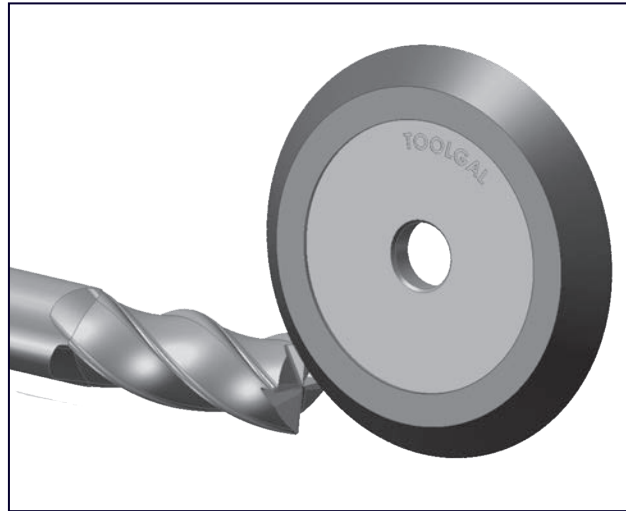
■ Non Economic
 ■ Small Tools
 ■ Standard Stock Removal
 ■ High Stock Removal
 ■ Not Recommended

GASH

RM6 Recommended for tough and long production runs

RM5 Recommended for standard production runs

- Good profile and corner stability
- Fast cutting speed
- Sharp wheel edge
- Optimal grit size: D64 C100 (270#)



RECOMMENDED CUTTING SPEED

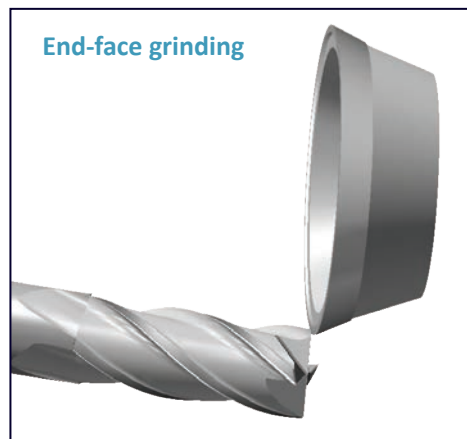
BOND	APPLICATION	MATERIAL	M/S	SFM
RM 6	Gash	WC	22	3,150-3,550
RM 5	Gash	WC	22	3,150-3,550

CLEARANCE ANGLES

(end-face and OD)

CB4/RM6

- Ideal for end-face and outside diameter (OD) applications, first and second relief clearance angle
- Exceptional surface quality prevents tool cutting and edge chipping
- Optimal grit size D46 (400#)



MINI CARBIDE TOOLS

CB4 or PI

- Perfect edge stability
- Good surface finish
- Polished with up to very fine D7 grit(Mirror finishing)



GROOVE/THREADED TOOLS GRINDING

Pure Metal HBBM or RM515

Hard bond which keep corner and profile.

Recommended C100 – C150

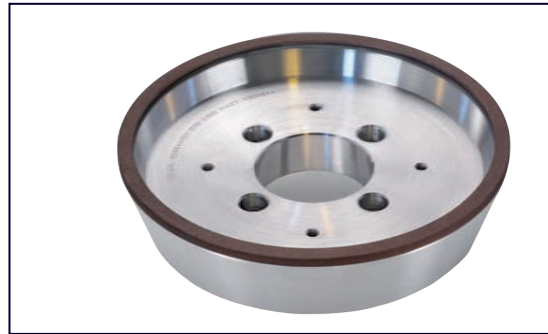
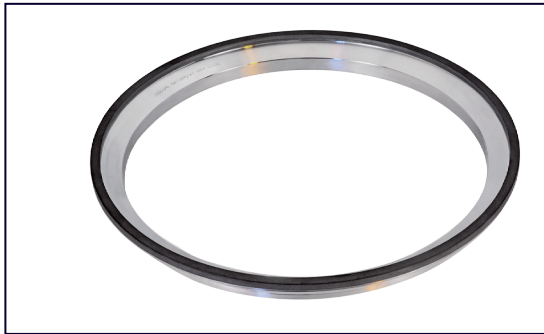
Grit sizes D25 -D126 (760# -140#)



HSS CIRCULAR TOOLS GRINDING ON CNC MACHINES THE 9 SERIES

RM921G	for fluting
RM901	for fluting
RM944	for gashing
CB951	for OD and End-Face
CB964	CBN wheels for dry grinding applications

INSERT GRINDING

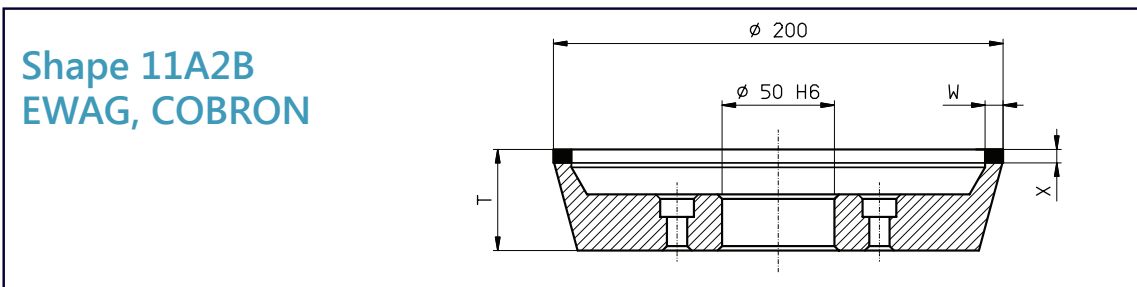
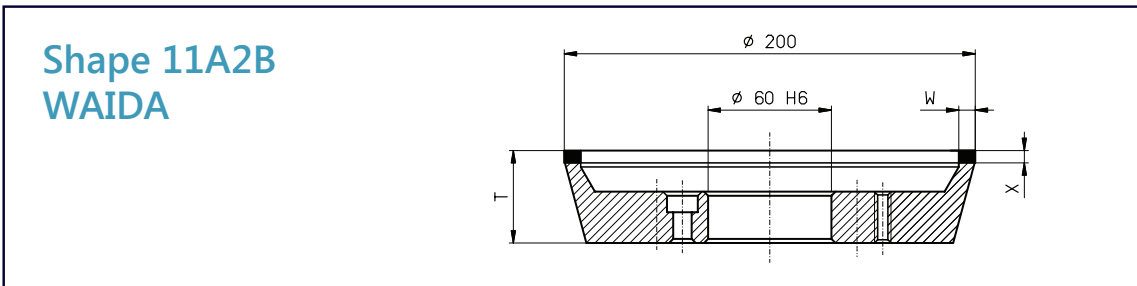


CB4 or PI

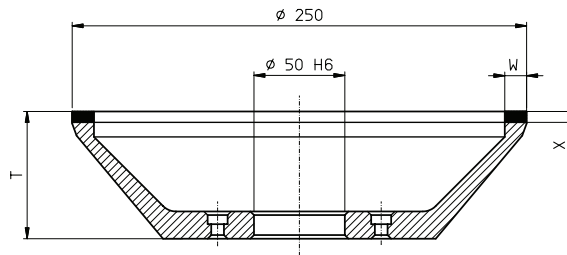
- Ideal for peripheral grinding of carbide inserts to achieve highly polished surface on MACHINES such as: **WAIDA , AGATHON, EWAG and Wendt**
- Long dressing interval
- Durable with high wear resistance (0.1µm per insert)

- TOOLGAL CB4 or PI
- Gives the wheel long life time
- Gives long interval between dressing
- Gives the inserts excellent finishing Less than 5µm chipping on edge surface maximizes the cost effectiveness of your inserts production

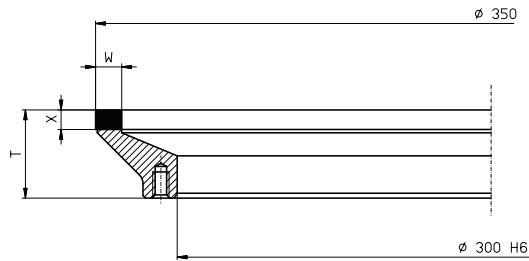
WORKPIECE	BOND	GRIT SIZE
Standard tungsten carbide inserts	CB or PI family High performance resin bond	D35-D54
Polished tungsten carbide inserts		D15-D35



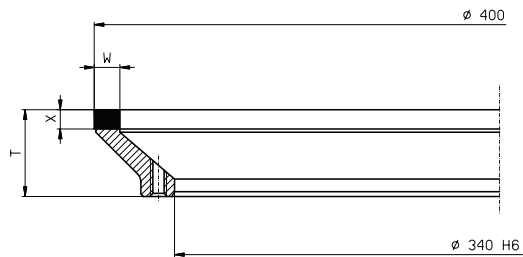
Shape 11A2B
EWAG, COBRON



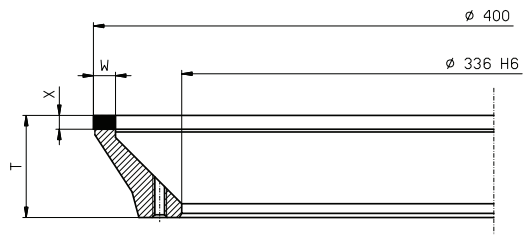
Shape 12A2JT
AGATHON 350



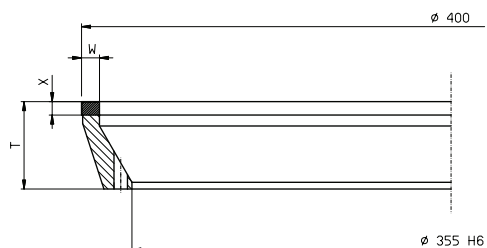
Shape 12A2JT
AGATHON 400 PENTA



Shape 11A2H
WENDT WAC 735
CENTRO



Shape 11A2H
WENDT WAC 735
QUATTRO



Grain Size Vs. Surface Quality (Ra)

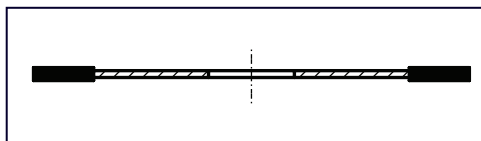
FEPA GRIT		MEAN ROUGHNESS RA (μm)		SURFACE QUALITY	GRINDING PROCESS
DIAMOND	CBN	DIAMOND	CBN	N	
-	B301	-	2.10	N8	
-	B251	-	1.77	N8-N7	Very Rough Grinding
-	B213	-	1.41	N7	
-	B181	-	1.12	N7-N6	
-	B151	-	0.75	N6	
-	B126	-	0.66	N6	
D181	B107	0.53	0.53	N6-N5	
D151	B91	0.50	0.50	N6-N5	Rough Grinding
D126	B76	0.45	0.45	N6-N5	
D107	B64	0.40	0.40	N5	
D91	B54	0.33	0.33	N5-N4	Semi Finish Grinding
D76	B46	0.25	0.25	N5-N4	
D64	-	0.18	-	N4	
D54	-	0.16	-	N4-N3	Fine Grinding
D46	-	0.15	-	N4-N3	
MD24	-	0.12	-	N3	
MD20	-	0.05	-	N3-N2	Ultrafine Grinding
MD10	-	0.025	-	N2-N1	

	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
Ra (μm)	0.500	0.80	1.25	2.5	5.0	8.0	16.01	32.0
Ra (μm)	0.400	0.63	1.00	0.2	4.0	6.3	10.0	16.0

1A1R CUT-OFF WHEELS

For wet and dry cutting/slicing of tungsten-carbide and steel parts

Diameter 75-200 mm



Specifications:

DIAMOND FOR TUNGSTEN-CARBIDE		CBN FOR HSS/STEEL	
Wet	Dry	Wet	Dry
RM501 D126 C100	PI203 D126 C100	RM901 B126 V240	CB964 B126 V180

Wood working and saw blades grinding applications

Face grinding – CB475 D46, D600 C100

Side grinding – C470/5

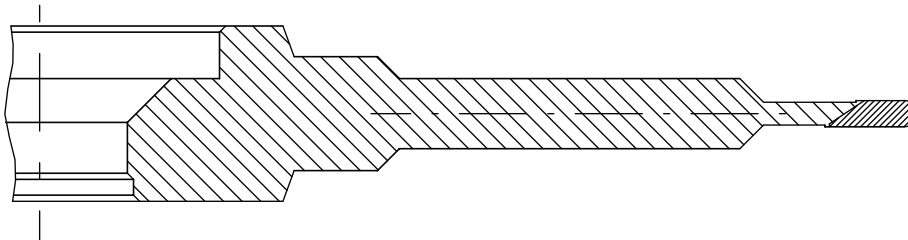
Top (Peripheral) grinding – CB475

Profiling TIGRA CNC– CB331, CB475 ,
C125-HAND, C100

HSS saw blade grinding (Loroch,
SCHMIDT TOMPO) – CB971-V240, CB967-V210



Cod of designation	Outline drawing
6A2	
6A9	
4V2	
12V9	
6A2	
6AA2	
VOLD 9	



ADDITIONAL APPLICATIONS

Cermet grinding – C451, CB352

WC/STEEL grinding – CB967

Crashing wheels- CR bond series

Dry Grinding

WC CB475, PI202 (C75)

HSS CB964 (V180), applicable for wet
grinding applications too