



2. 0. 1. 5 NEW PRODUCT

New Diamond Coating Series
Router for composite material
0.03mm Micro-miniature Ball Nose Endmill
 $\pm 3\mu\text{m}$ Tolerance Ultra Precision Ball Nose Endmill



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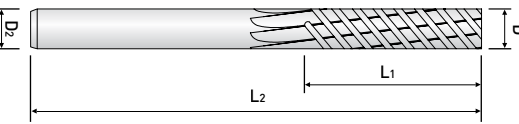
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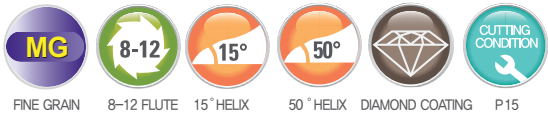
ROUTER



WROU...Series

WINNER ROUTER SERIES

- Suitable for Ceramic machining such as Graphite and Non-ferrous metal
- Suitable for composite material machining such as CFRP, AFRP and GFRP

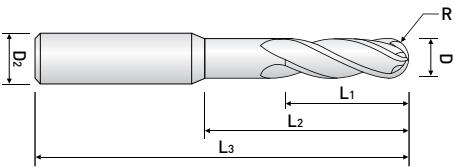


EDP. No.	Diameter	Cutting Length	Overall Length	Shank Diameter	No.OF FLUTE	END STYLE	COATING
	D	L ₁	L ₂	D ₂			
WROU060XN	6	25	63	6	8	X	X
WROU060YN						O	X
WROU060XC	6	25	63	6	8	X	O
WROU060YC						O	O
WROU080XN	8	25	63	8	10	X	X
WROU080YN						O	X
WROU080XC	8	25	63	8	10	X	O
WROU080YC						O	O
WROU100XN	10	28	63	10	12	X	X
WROU100YN						O	X
WROU100XC	10	28	63	10	12	X	O
WROU100YC						O	O
WROU120XN	12	38	89	12	12	X	X
WROU120YN						O	X
WROU120XC	12	38	89	12	12	X	O
WROU120YC						O	O

Tolerance

Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
All Size	0~-0,13	

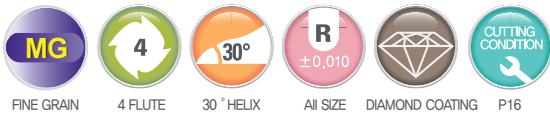
4 FLUTE, DIAMOND COATING, BALL NOSE



WGB504...Series

4 FLUTE, DIAMOND COATING, BALL NOSE ENDMILL

- High performance on Graphite and Non-ferrous metal

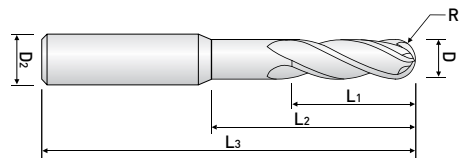


EDP. No.	Diameter	Corner R	Cutting Length	Neck Length	Overall Length	Shank Diameter
	D	R	L ₁	L ₂	L ₃	D ₂
WGB504 010	1.0	0.5	3	—	60	4
WGB504 010 10				10		
WGB504 010 15				15		
WGB504 010 20				20	80	
WGB504 010 25				25		
WGB504 010 30				30		
WGB504 015	1.5	0.75	4	—	60	4
WGB504 015 10				10	80	
WGB504 015 15				15		
WGB504 015 20				20		
WGB504 015 25				25		
WGB504 015 30				30		
WGB504 020	2.0	1.0	6	—	60	4
WGB504 020 10				10	80	
WGB504 020 15				15		
WGB504 020 20				20		
WGB504 020 25				25		
WGB504 020 30				30	100	
WGB504 020 40	40					
WGB504 030	3.0	1.5	9	—	60	4
WGB504 030 15				15	100	
WGB504 030 20				20		
WGB504 030 25				25		
WGB504 030 30				30		
WGB504 030 40				40		
WGB504 030 50	50					
WGB504 040 060	4.0	2.0	12	—	60	4
WGB504 040 080					80	
WGB504 040 110					110	
WGB504 040 130					130	
WGB504 040 150					150	
WGB504 050 080	5.0	2.5	15	25	80	6
WGB504 050 110					110	
WGB504 060 090	6.0	3.0	20	—	90	6
WGB504 060 110					110	
WGB504 060 130					130	
WGB504 060 150					150	
WGB504 060 180					180	

Tolerance

Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
up to 12	0~-0,020	
over 12	0~-0,030	h6

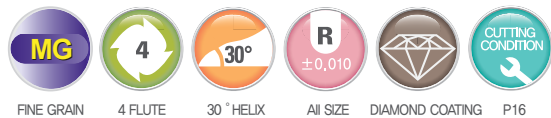
4 FLUTE, DIAMOND COATING, BALL NOSE



WGB504...Series

4 FLUTE, DIAMOND COATING, BALL NOSE ENDMILL

► High performance on Graphite and Non-ferrous metal

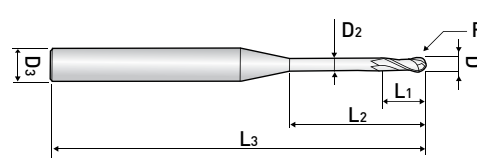


EDP No.	Diameter	Corner R	Cutting Length	Neck Length	Overall Length	Shank Diameter
	D	R	L ₁	L ₂	L ₃	D ₂
WGB504 080 110	8,0	4,0	25	–	110	8
WGB504 080 130					130	
WGB504 080 150					150	
WGB504 080 200					200	
WGB504 100 110	10,0	5,0	30	–	110	10
WGB504 100 130					130	
WGB504 100 150					150	
WGB504 100 180					180	
WGB504 100 200					200	
WGB504 120 110	12,0	6,0	35	–	110	12
WGB504 120 130					130	
WGB504 120 150					150	
WGB504 120 180					180	
WGB504 120 200					200	
WGB504 160 150	16,0	8,0	50	–	150	16
WGB504 160 200	20,0	10,0	60	–	200	20
WGB504 200 150					150	
WGB504 200 200					200	

Tolerance

Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
up to 12	0~-0,020	h6
over 12	0~-0,030	

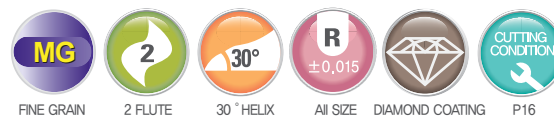
2 FLUTE, DIAMOND COATING, BALL NOSE



G...Series

2 FLUTE, DIAMOND COATING, BALL NOSE ENDMILL

► High performance on Graphite and Non-ferrous metal



EDP. No.	Diameter	Corner R	Cutting Length	Neck Length	Overall Length	Neck Diameter	Shank Diameter
	D	R	L ₁	L ₂	L ₃	D ₂	D ₃
G00501003	0,5	0,25	1	3	50	0,45	4
G00501006				6			
G00501010				10			
G00601203	0,6	0,3	1,2	3	50	0,55	4
G00601206				6			
G00601208				8			
G00601210				10			
G00601212				12			
G0080164	0,8	0,4	1,6	4	50	0,75	4
G0080166				6			
G0080168				8			
G0100306	1	0,5	3	6	60	0,95	4
G0100308				8			
G0100310				10			
G0100312				12			
G0100314				14			
G0100316				16			
G0100318				18			
G0100320				20			
G0120410	1,2	0,6	4	10	70	1,15	4
G0150510	1,5	0,75	5	10	60	1,45	4
G0150512				12			
G0150516				16			
G0150520				20			
G0150525				25	70		
G0150530				30			

Tolerance

Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
All Size	0~-0,030	h6

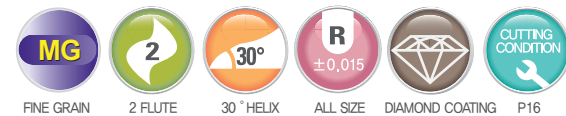
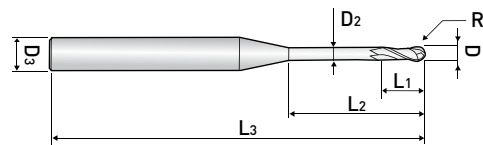
2 FLUTE, DIAMOND COATING, BALL NOSE



G...Series

2 FLUTE, DIAMOND COATING, BALL NOSE ENDMILL

► High performance on Graphite and Non-ferrous metal



EDP. No.	Diameter	Corner R	Cutting Length	Neck Length	Overall Length	Neck Diameter	Shank Diameter
	D	R	L ₁	L ₂	L ₃	D ₂	D ₃
G0200812	2	1	8	12	60	1,95	4
G0200816				16			
G0200820				20			
G0200825				25	70		
G0200830				30			
G0200835				35			
G0200840				40	80		
G0201020			10	20	80		
G0201020L				100			
G0251020	2,5	1,25	10	20	80	2,43	4
G0301216	3	1,5	12	16	60	2,9	6
G0301220				20	70		
G0301225				25			
G0301230				30	80		
G0301235				35			
G0301240				40	90		
G0301245				45			
G0301525			15	25	80		4
G04015S			4	2	15		—
G04015M	—	80				—	
G04015L	—	120				—	
G0401520	20	60				3,9	6
G0401525	25	70					
G0401530	30	80					
G0401535	35						
G0401540	40	90					
G0401545	45						
G0401550	50	100					
G0402030	20	30			80		

Tolerance		
Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
All Size	0~-0,030	

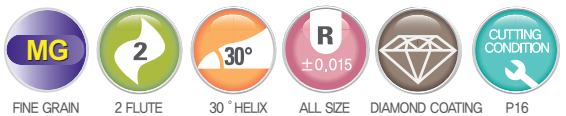
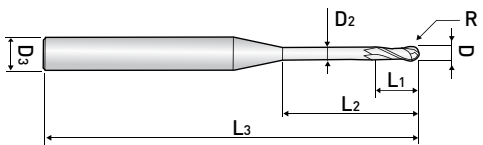
2 FLUTE, DIAMOND COATING, BALL NOSE



G...Series

2 FLUTE, DIAMOND COATING, BALL NOSE ENDMILL

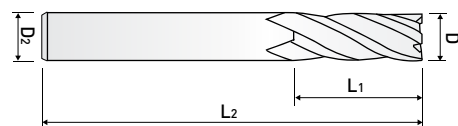
► High performance on Graphite and Non-ferrous metal



EDP. No.	Diameter	Corner R	Cutting Length	Neck Length	Overall Length	Neck Diameter	Shank Diameter
	D	R	L ₁	L ₂	L ₃	D ₂	D ₃
G0503050	5	2,5	30	50	100	4,8	6
G0503050L					150		
G06020S	6	3	20	—	70	—	6
G06020M				—	100	—	
G06020L				—	150	—	
G0603050			30	50	100	5,8	
G0603050L					150		
G08025S	8	4	25	—	70	—	8
G08025M				—	110	—	
G08025L				—	160	—	
G0804060			40	60	110	7,8	
G0804060L					200		
G10030S	10	5	30	—	80	—	10
G10030M				—	120	—	
G10030L				—	170	—	
G1005070			50	70	120	9,7	
G1005070L					200		
G12035S	12	6	35	—	80	—	12
G12035M				—	130	—	
G12035L				—	180	—	
G1205575			55	75	130	11,7	
G1205575L					200		

Tolerance		
Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
All Size	0~-0,030	

4 FLUTE, DIAMOND COATING SQUARE



WGE504...Series

4 FLUTE, DIAMOND COATING SQUARE ENDMILL

► High performance on Graphite, Reinforced plastic and Non-ferrous metal

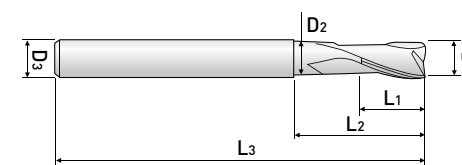


EDP No.	Diameter	Cutting Length	Overall Length	Shank Diameter
	D	L ₁	L ₂	D ₂
WGE504 020	2,0	6	50	4
WGE504 020 08		8		
WGE504 020 10		10		
WGE504 025	2,5	8	50	4
WGE504 030	3,0	8	50	6
WGE504 030 10		10		
WGE504 030 12		12		
WGE504 030 16		16	60	
WGE504 030 20		20		
WGE504 040	4,0	10	50	6
WGE504 040 12		12	60	
WGE504 040 16		16		
WGE504 040 20		20		
WGE504 040 25		25		
WGE504 050	5,0	15	60	6
WGE504 060	6,0	15	60	6
WGE504 060 20		20	110	
WGE504 060 30		30	150	
WGE504 080	8,0	20	70	8
WGE504 080 30		30	110	
WGE504 080 40		40	150	
WGE504 100	10,0	25	75	10
WGE504 100 40		40	110	
WGE504 100 50		50	150	
WGE504 120	12,0	30	80	12
WGE504 120 50		50	120	
WGE504 120 60		60	160	
WGE504 160	16,0	50	110	16
WGE504 160 70		70	160	
WGE504 160 90		90	160	
WGE504 160 100		100	200	
WGE504 160 120		120	250	
WGE504 200	20,0	70	160	20
WGE504 200 90		90	160	
WGE504 200 100		100	200	
WGE504 200 120		120	250	

Tolerance

Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
All Size	0~-0,030	h6

2 FLUTE, DIAMOND COATING SQUARE



GE...Series

2 FLUTE, DIAMOND COATING SQUARE ENDMILL

► High performance on Graphite and Non-ferrous metal



EDP. No.	Diameter	Cutting Length	Neck Length	Overall Length	Neck Diameter	Shank Diameter	
	D	L ₁	L ₂	L ₃	D ₂	D ₃	
GE00501006	0.5	1	6	50	0.45	4	
GE00601206	0.6	1.2	6	50	0.55	4	
GE00601210			10				
GE00701506	0.7	1.5	6	50	0.65	4	
GE00802006	0.8	2	6	50	0.75	4	
GE0100308	1	3	8	60	0.95	4	
GE0100310			10				
GE0100312			12				
GE0150412	1.5	4	12	60	1.45	4	
GE0200612	2	6	12	60	1.95	4	
GE0200612S6	2.5	8	12	60	2.43	6	
GE0250812			12			4	
GE0301012	3	10	12	60	2.9	4	
GE0301016			16			6	
GE0301012S6			12				
GE0301016S6			16				
GE04012S	4	12	—	60	—	6	
GE0401216			16		3.9		
GE0401220			20				
GE0501520	5	15	20	60	4.8	6	
GE06020S	6	20	—	60	—	6	
GE0602030			30	80	5.8		
GE0603050			50	150			
GE08025S	8	25	—	70	—	8	
GE0802540			40	100	7.8		
GE0804070			70	150			
GE10030S	10	30	—	80	—	10	
GE1003050			50	100	9.7		
GE1004580			80	160			
GE12030S	12	30	—	80	—	12	
GE1203050			50	110	11.7		
GE1205080			80	160			

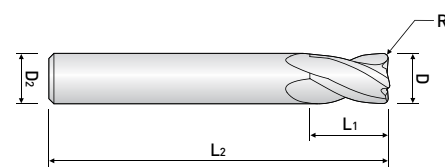
Tolerance

Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
All Size	0~-0,030	h6

4 FLUTE, DIAMOND COATING RADIUS



WGR504...Series



4 FLUTE, DIAMOND COATING RADIUS ENDMILL

- ▶ Improve coating stability by applying high-end Diamond Coating
- ▶ Applicable non-ferrous metal such as Graphite and Reinforced plastic



EDP No.	Diameter	Corner Radius	Cutting Length	Overall Length	Shank Diameter
	D	R	L ₁	L ₂	D ₂
WGR504 030 02 080	3,0	0,2	8	80	4
WGR504 030 03 080		0,3			
WGR504 030 05 080		0,5			
WGR504 040 03 100	4,0	0,3	10	100	4
WGR504 040 05 100		0,5			
WGR504 040 10 100		1,0			
WGR504 060 03 110	6,0	0,3	15	110	6
WGR504 060 05 110		0,5			
WGR504 060 10 110		1,0			
WGR504 080 05 110	8,0	0,5	20	110	8
WGR504 080 10 110		1,0		130	
WGR504 080 05 130		0,5			
WGR504 080 10 130		1,0			
WGR504 100 05 130	10,0	0,5	25	130	10
WGR504 100 10 130		1,0		150	
WGR504 100 05 150		0,5			
WGR504 100 10 150		1,0			
WGR504 120 05 130	12,0	0,5	30	130	12
WGR504 120 10 130		1,0		150	
WGR504 120 05 150		0,5			
WGR504 120 10 150		1,0			
WGR504 160 05 200	16,0	0,5	32	200	16
WGR504 160 10 200		1,0			
WGR504 200 05 200	20,0	0,5	40	200	20
WGR504 200 10 200		1,0			

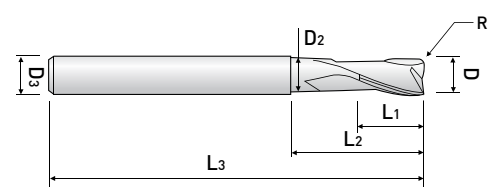
Tolerance

Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
up to 12	0~-0,020	h6
over 12	0~-0,030	

2 FLUTE, DIAMOND COATING RADIUS

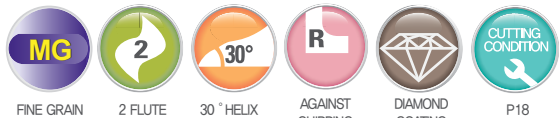


WGR502...Series



2 FLUTE, DIAMOND COATING RADIUS ENDMILL

- ▶ High performance on Graphite and Non-ferrous metal
- ▶ Applicable various Shape machining by applying Variable Corner R

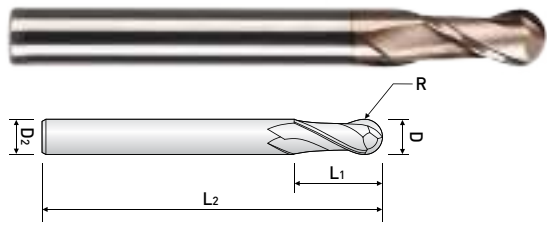


EDP No.	Diameter	Corner Radius	Cutting Length	Neck Length	Overall Length	Neck Diameter	Shank Diameter
	D	R	L1	L2	L3	D2	D3
WGR502 002	0.2	—	0.3	—	40	—	3
WGR502 003	0.3	—	0.5	—	40	—	3
WGR502 004	0.4	—	0.6	—	40	—	3
WGR502 005 025	0.5	0.05	0.7	2.5	40	0.45	3
WGR502 005 040				4			
WGR502 006 030	0.6	0.05	0.9	3	40	0.55	3
WGR502 006 050				5			
WGR502 008 040	0.8	0.05	1.2	4	40	0.75	3
WGR502 008 070				7			
WGR502 010 050	1	0.1	1.5	5	40	0.95	3
WGR502 010 085				8.5			
WGR502 010 120				12			
WGR502 012 060	1.2	0.1	1.8	6	50	1.15	3
WGR502 012 100				10			
WGR502 015 075	1.5	0.15	2.2	7.5	50	1.4	3
WGR502 015 120				12			
WGR502 015 180				18			
WGR502 020 100	2	0.15	2.2	10	60	1.9	3
WGR502 020 160				16			
WGR502 020 250				25			
WGR502 030 100	3	0.2	3	10	65	2.9	4
WGR502 030 150				15			
WGR502 030 200				20			
WGR502 030 250				25	75		
WGR502 030 300	30						
WGR502 040 200	4	0.2	4	20	65	3.9	6
WGR502 040 300				30	75		
WGR502 040 400				40	90		
WGR502 050 200	5	0.3	5	20	75	4.9	6
WGR502 050 300				30			
WGR502 050 400				40	90		
WGR502 050 500				50			
WGR502 060 300	6	0.3	6	30	75	5.9	6
WGR502 060 400				40	90		
WGR502 060 500				50			
WGR502 060 600				60			

Tolerance

Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
All Size	0~-0,020	h6

ULTRA HIGH PRECISION BALL NOSE



WHPB902...Series

ULTRA HIGH PRECISION BALL ENDMILL

- ▶ Longer tool life and improvement on stable machining with the newest W Coating
- ▶ Actualization of high precision by applying the world's first Ultra precision R Tolerance

UWC

2

30°

R ±0,0015

R ±0,0025

R ±0,004

W

CUTTING CONDITION

FINE GRAIN

2 FLUTE

30 ° HELIX

R ≤1.5

1.5 < R ≤3

R >3

W COATING

P19

EDP No.	Diameter	Corner R	Cutting Length	Overall Length	Shank Diameter
	D	R	L1	L2	D2
WHPB902 001	0.1	0.05	0.2	40	4
WHPB902 0015	0.15	0.075	0.3	40	4
WHPB902 002	0.2	0.1	0.4	40	4
WHPB902 003	0.3	0.15	0.6	40	4
WHPB902 004	0.4	0.2	0.8	40	4
WHPB902 005	0.5	0.25	1.0	40	4
WHPB902 006	0.6	0.3	1.2	40	4
WHPB902 007	0.7	0.35	1.4	40	4
WHPB902 008	0.8	0.4	1.6	40	4
WHPB902 009	0.9	0.45	1.8	40	4
WHPB902 010	1.0	0.5	2.5	50	6
WHPB902 012	1.2	0.6	3.0	50	6
WHPB902 015	1.5	0.75	4.0	50	6
WHPB902 020	2.0	1	5.0	50	6
WHPB902 025	2.5	1.25	6.0	60	6
WHPB902 030	3.0	1.5	6.0	60	6
WHPB902 040	4.0	2	8.0	70	6
WHPB902 050	5.0	2.5	10.0	80	6
WHPB902 060	6.0	3	12.0	90	6
WHPB902 080	8.0	4	14.0	100	8
WHPB902 100	10.0	5	18.0	100	10
WHPB902 120	12.0	6	24.0	110	12

Tolerance		
Mill Dia.(mm)		Shank Dia.
Dia.	Tolerance	
up to 6	0~-0,012	h6
over 6	0~-0,015	

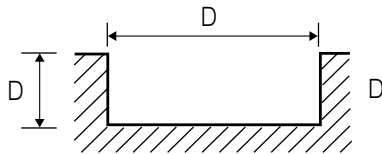
Technical Data



ROUTER Carbon Composite Routers series

SLOTTING

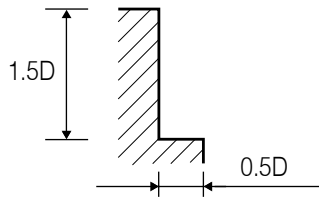
MATERIAL	CFRP, AFRP	GFRP	CARBON, GRAPHITE	PLASTIC	PROCESSED CERAMIC, PROCESSED GLASS
DIAMETER	FEED				
1.6	0.030	0.030	0.040	0.040	0.015
3	0.060	0.060	0.075	0.075	0.030
6	0.120	0.120	0.150	0.150	0.060
10	0.230	0.230	0.290	0.290	0.115
12	0.305	0.305	0.380	0.380	0.150
CUTTING SPEED	120	100	145	245	10



RPM=rev./min.
FEED=mm/min.

SIDE CUTTING

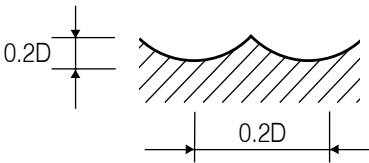
MATERIAL	CFRP, AFRP	GFRP	CARBON, GRAPHITE	PLASTIC	PROCESSED CERAMIC, PROCESSED GLASS
DIAMETER	FEED				
1.6	0.030	0.030	0.040	0.040	0.015
3	0.060	0.060	0.075	0.075	0.030
6	0.120	0.120	0.150	0.150	0.060
10	0.230	0.230	0.290	0.290	0.115
12	0.305	0.305	0.380	0.380	0.150
CUTTING SPEED	150	120	185	305	15



RPM=rev./min.
FEED=mm/min.

4 FLUTE, BALL NOSE WGB504 ... series

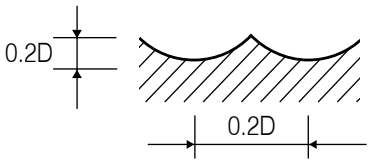
MATERIAL	GRAPHITE	
DIAMETER	RPM	FEED
1.0	20000	700
2.0	16000	1200
3.0	16000	2000
4.0	16000	3100
5.0	15000	3800
6.0	15000	4400
8.0	13000	4500
10.0	12000	4600
12.0	10000	4700
16.0	7500	3800
20.0	6000	3500



RPM=rev./min.
FEED=mm/min.

2 FLUTE, BALL NOSE G ... series

MATERIAL	GRAPHITE	
DIAMETER	RPM	FEED
0.5	16000	480
0.75	16000	640
1	16000	800
1.5	16000	1450
2	16000	2100
3	15000	2950
4	13000	3000
5	11500	3050
6	10500	3150
8	8555	2960

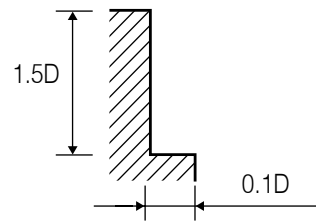


RPM=rev./min.
FEED=mm/min.

4 FLUTE, SQUARE GE504 ...series

MATERIAL	GRAPHITE	
DIAMETER	RPM	FEED
3.0	20000	1600
4.0	18000	1900
5.0	14000	2400
6.0	11000	2800
8.0	8000	2600
10.0	6500	2400
12.0	5500	2400
16.0	4200	2450
20.0	3300	2400

※ Please reduce cutting speed 50% from the above table when using long and extra long type

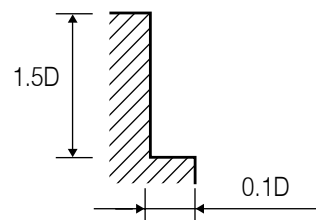


RPM=rev./min.
FEED=mm/min.

2날 스퀘어 GE ...series

MATERIAL	GRAPHITE	
DIAMETER	RPM	FEED
0.4	40000	200
0.6	40000	350
0.8	40000	550
1.0	40000	700
2.0	25000	800
3.0	20000	800
4.0	18000	950
5.0	14000	1200
6.0	11000	1400
8.0	8000	1300
10.0	6500	1200
12.0	5500	1200

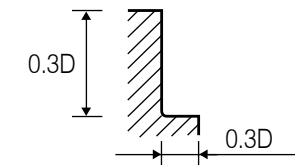
※ Please reduce cutting speed 50% from the above table when using long and extra long type



RPM=rev./min.
FEED=mm/min.

4 FLUTE, CORNER RADIUS WGR504 ... series

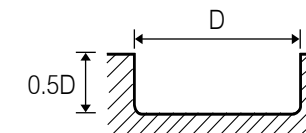
MATERIAL	GRAPHITE	
DIAMETER	RPM	FEED
4.0	40000	3500
6.0	40000	5600
8.0	32000	5600
10.0	26000	5700
12.0	21000	5450
16.0	15800	5450
20.0	12800	5500



RPM=rev./min.
FEED=mm/min.

2 FLUTE, CORNER RADIUS WGR502 ... series

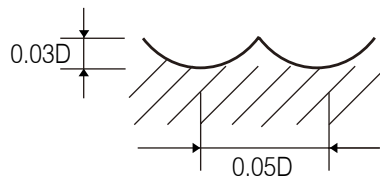
MATERIAL	GRAPHITE	
DIAMETER	RPM	FEED
0.4	40000	640
0.6	40000	640
0.8	40000	800
1.0	40000	960
1.2	40000	1200
1.5	40000	1440
2.0	40000	1600
3.0	27000	1900
4.0	20000	2300
5.0	16000	2300
6.0	14000	2300



RPM=rev./min.
FEED=mm/min.

ULTRA HIGH PRECISION BALL NOSE WHPB902 ... series

	ALLOY STEELS / CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRC35		~HRC35~ HRC45		HRC45~HRC55	
STRENGTH	~1100N/ mm ²		1100~1500N/ mm ²		1500~2000N/ mm ²	
DIAMETER	RPM	FEED	RPM	FEED	RPM	FEED
0.1	40000	550	40000	500	33000	400
0.2	30000	720	30000	630	27000	575
0.3	30000	900	30000	810	27000	720
0.4	30000	1140	30000	1020	27000	900
0.5	30000	1440	30000	1260	27000	1140
0.6	30000	1740	30000	1500	27000	1320
0.8	30000	2340	30000	1980	27000	1800
1.0	30000	2880	30000	2520	27000	2280
1.2	30000	3060	28800	2580	25800	2310
1.5	30000	3240	28800	2700	25800	2400
2.0	29820	3420	28680	2880	24000	2400
3.0	19860	3600	19080	3180	15900	2400
4.0	14940	3600	14340	3180	12000	2400
5.0	11160	3480	10680	2940	9000	2250
6.0	8340	2910	8040	2460	6600	1860
8.0	6660	2520	6420	2100	5400	1620
10.0	5580	2220	5340	1860	4500	1440
12.0	4170	1770	4008	1500	3360	1440
16.0	3340	1590	3210	1320	2700	1020
20.0	2670	1410	2580	1170	2160	900
25.0	2130	1150	2060	950	1730	730



RPM=rev./min.
FEED=mm/min.