

Radius cutter for mould and die

BRP

For Pocketing, Ramping,
Helical Cutting, Copying...

**A wide range of tool
bodies and inserts
available.**



MIRACLE Coated VP15TF

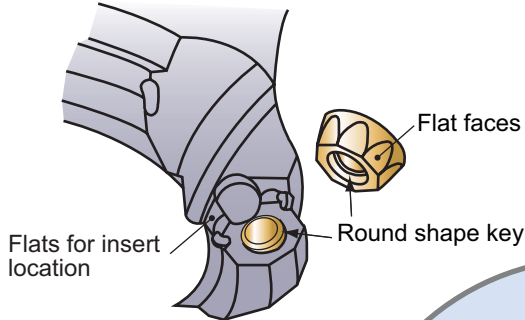
MIRACLE coating displays high welding resistance making it suitable for a wide range of workpiece materials from mild and low carbon steels through to stainless and hardened steels.

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Features

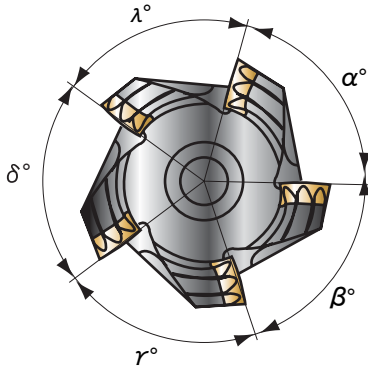
Prevention of insert movement



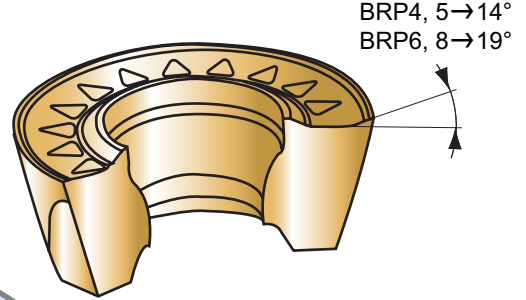
Matching location seat and faces prevents the insert from rotating. Extra positional security is provided by the round location key that prevents movement during the high load and centrifugal forces on the insert during cutting.

Prevents chattering and vibration

The cutting edges are arranged in an irregular pitch. This prevents synchronized vibration and helps to eliminate chattering.



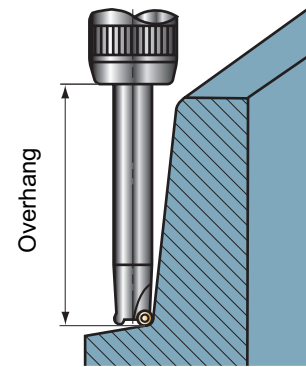
Increased feed rates



JS type breaker for excellent sharpness. With improved chip control to help prevent fracturing means that feed rates can be increased by 15%.

Complete series

The optimum tool can be selected from a wide variety of diameters and insert sizes.



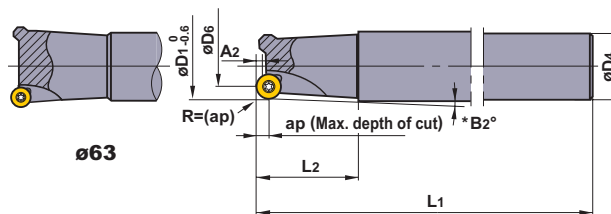
Insert		Tolerance	Horn type	Coated			Cermets		Carbide	Geometry	Dimensions (mm)	
Shape	Order number			F7030	F620	VP15TF	NX4545	UT120T			D1	S1
	RPMW08T2M0E	M	●				●			8	2.78	
	10T3M0E	M	●				●	10		3.97		
	1204M0E	M	●	▲			●	12		4.76		
	1606M0E	M	●	▲			●	16		6.35		
	RPMW08T2M0T	M	●		●			8		2.78		
	10T3M0T	M	●		●			10		3.97		
	1204M0T	M	●		●			12		4.76		
	1606M0T	M	●		●			16		6.35		
	RPMT08T2M0E-JS	M	●		●					8	2.78	
	10T3M0E-JS	M	●		●			10		3.97		
	1204M0E-JS	M	●	▲	●		●	12		4.76		
	1606M0E-JS	M	●	▲	●		●	16		6.35		
				●		●						

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*Please allow for an inclination angle of $B2^\circ+1^\circ$.

Right hand tool holder only. Tolerance when setting with master inserts.

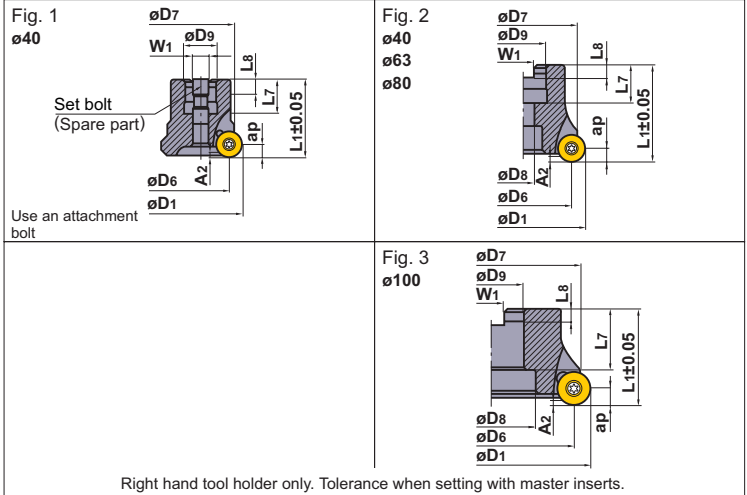
Corner rad.	Shank type	Order number	Stock	Number of teeth	Dimensions (mm)						Insert	Clamp screw	wrench					
					D1	D6	L1	D4	L2	A2				B2°				
4	Standard	BRP4NR121S12	●	1	12	3.7	85	12	25	0.2	0°25'	①RPMW 08T2M0E ②RPMT 08T2M0E-JS	CS250560T	TKY08F				
		161S16	●	1	16	7.7	85	16	25	1.0	0°25'							
		202S20	●	2	20	11.7	100	20	30	2.0	0°20'							
		253S25	●	3	25	16.7	115	25	35	2.0	0°20'							
	Long	121LS12	●	1	12	3.7	150	12	70	0.2	0°10'							
		161LS16	●	1	16	7.7	150	16	70	1.0	0°10'							
		202LS20	●	2	20	11.7	180	20	100	2.0	0°05'							
		253LS25	●	3	25	16.7	180	25	100	2.0	0°05'							
	Extra long	202ELS20	●	2	20	11.7	250	20	130	2.0	0°05'							
		253ELS25	●	3	25	16.7	250	25	130	2.0	0°05'							
		Standard	BRP5NR161S16	●	1	16	5.7	80	16	25	0.3				0°30'	①RPMW 10T3M0E ②RPMT 10T3M0E-JS	CS350760T	TKY15F
			201S20	●	1	20	9.7	100	20	30	1.2				0°25'			
252S25	●		2	25	14.7	115	25	35	2.5	0°20'								
323S32	●		3	32	21.7	125	32	45	2.5	0°15'								
Long	161LS16	●	1	16	5.7	150	16	70	0.3	0°10'								
	201LS20	●	1	20	9.7	180	20	100	1.2	0°05'								
	252LS25	●	2	25	14.7	180	25	100	2.5	0°05'								
	323LS32	●	3	32	21.7	200	32	120	2.5	0°05'								
Extra long	252ELS25	●	2	25	14.7	250	25	130	2.5	0°05'								
	323ELS32	●	3	32	21.7	300	32	180	2.5	0°05'								
	Standard	BRP6PR322S32	●	2	32	19.7	125	32	45	4	0°15'	①RPMW 1204M0E ②RPMT 1204M0E-JS	TS43	TKY15D				
		403S32	●	3	40	27.8	125	32	45	4	-							
504S32		●	4	50	37.7	150	32	50	4	-								
504S42		●	4	50	37.7	150	42	50	4	-								
Long	322LS32	●	2	32	19.7	200	32	120	4	0°05'								
	403LS32	●	3	40	27.8	200	32	120	4	-								
	504LS32	●	4	50	37.7	250	32	150	4	-								
	504LS42	●	4	50	37.7	250	42	150	4	-								
Extra long	322ELS32	●	2	32	19.7	300	32	50	4	0°15'								
	403ELS32	●	3	40	27.8	300	32	120	4	-								
	403ELS42	●	3	40	27.8	300	42	50	4	1°30'								
	504ELS42	●	4	50	37.7	300	42	50	4	-								
8	Standard	BRP8PR402S32	●	2	40	23.7	125	32	45	5.5	-	①RPMW 1606M0E ②RPMT 1606M0E-JS	TS54	TKY25D				
		503S32	●	3	50	33.7	150	32	50	5.5	-							
		503S42	●	3	50	33.7	150	42	50	5.5	-							
		634S32	●	4	63	46.7	150	32	50	5.5	-							
	Long	634S42	●	4	63	46.7	150	42	50	5.5	-							
		402LS32	●	2	40	23.7	200	32	120	5.5	-							
		503LS32	●	3	50	33.7	250	32	150	5.5	-							
		503LS42	●	3	50	33.7	250	42	150	5.5	-							
	Extra long	634LS32	●	4	63	46.7	250	32	150	5.5	-							
		634LS42	●	4	63	46.7	250	42	150	5.5	-							
		402ELS32	●	2	40	23.7	300	32	50	5.5	-							
		402ELS42	●	2	40	23.7	300	42	50	5.5	1°35'							
Extra long	503ELS42	●	3	50	33.7	300	42	50	5.5	-								
	503ELS42	●	3	50	33.7	300	42	50	5.5	-								
	634ELS42	●	4	63	46.7	300	42	50	5.5	-								
	634ELS42	●	4	63	46.7	300	42	50	5.5	-								

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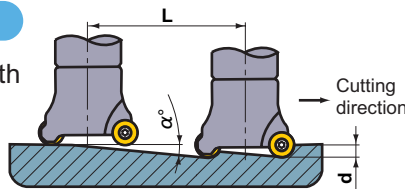


Light alloy	Cast iron	General steel	Stainless steel	Hardened steel
➔				

Corner rad. (a)	Order number	Stock	Number of teeth	Dimensions (mm)									Tool weight (kg)	Max. Depth of cut		Figure	
				R	D6	D1	D7	L1	D9	L7	D8	W1		L8	ap		A2
6	BRP6P-040A03R	●	3		27.8	40	33.8	40	16	18	-	8.4	5.6	0.4	6	4	Fig. 1
	-050A04R	●	4		37.7	50	43.3	50	22	20	11	10.4	6.3	0.5	6	4	Fig. 2
	R05004B	●	4		37.7	50	43.3	63	22.225	29	11	8.4	5	0.5	6	4	Fig. 2
	-063A05R	●	5		50.7	63	56	50	22	20	11	10.4	6.3	0.7	6	4	Fig. 2
	R06305B	●	5		50.7	63	56	63	22.225	29	11	8.4	5	0.7	6	4	Fig. 2
	R08006C	●	6		67.7	80	72.7	50	25.4	26	13	9.5	6	1.2	6	4	Fig. 2
8	BRP8P-063A04R	●	4		46.7	63	54.4	50	22	20	11	10.4	6.3	0.7	8	5.5	Fig. 2
	R06304B	●	4		46.7	63	54.4	63	22.225	29	11	8.4	5	0.7	8	5.5	Fig. 2
	R08005C	●	5		63.7	80	70.8	50	25.4	26	13	9.5	6	1.2	8	5.5	Fig. 2
	R10006D	●	6		83.7	100	90.5	50	31.75	32	45	12.7	8	1.6	8	5.5	Fig. 3

Ramping

● Ramping angle and cutting length



Formula for min. cutting length, L min., according to max. ramp angle

$$L = \frac{d}{\tan \alpha} \text{ (mm)}$$

Type	Tool diameter (ø)	Max. ramp angle (°) α° max	tan α	Min cutting length according to max. ramp angle L min (mm) *				
				d=2mm	d=4mm	d=5mm	d=6mm(max)	d=8mm(max)
BRP4	12	5.02	0.088	22	45	—	—	—
	16	12.2	0.216	9	18	—	—	—
	20	14.52	0.259	7	15	—	—	—
	25	8.8	0.155	12	25	—	—	—
BRP5	16	4.52	0.079	25	50	63	—	—
	20	11.4	0.202	9	19	24	—	—
	25	14.4	0.257	7	15	19	—	—
	32	8.37	0.147	13	27	33	—	—
BRP6	32	15.91	0.285	7	14	17	21	—
	40	10.29	0.181	11	22	27	33	—
	50	7.12	0.125	16	32	40	48	—
	63	5.08	0.089	22	44	56	67	—
	80	3.69	0.064	31	62	77	93	—
BRP8	40	18.86	0.342	5	11	14	17	23
	50	11.91	0.211	9	18	23	28	37
	63	8.01	0.141	14	28	35	42	56
	80	5.60	0.098	20	40	50	61	81
	100	4.13	0.072	27	55	69	83	110

* Decimal points are omitted for the L min. values

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Helical milling

● Hole diameter and depth of cut

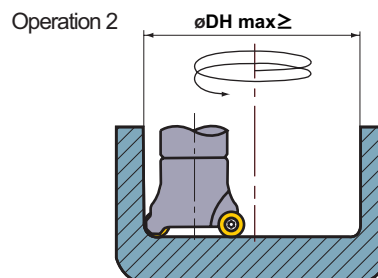
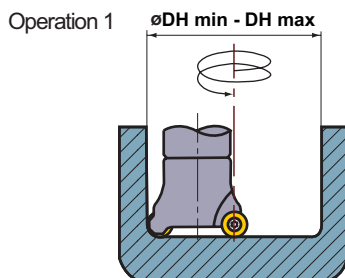
Type	Tool diameter $\phi D1$ (mm)	Minimum cutting diameter							Maximum cutting diameter						
		ϕDH_{min}^{*1}	ϕdc^{*2}	Inclination angle (α°)					ϕDH_{min}^{*1}	ϕdc^{*2}	Inclination angle (α°)				
				d=2mm	d=4mm	d=5mm	d=6mm	d=8mm			d=2mm	d=4mm	d=5mm	d=6mm	d=8mm
BRP4	12	16	4	d=1mm, $\alpha^\circ=4.55^\circ$					22	10	3.64	—	—	—	—
	16	24	8	4.55	9.10	—	—	—	30	14	2.60	5.20	—	—	—
	20	32	12	3.04	6.08	—	—	—	38	18	2.03	4.05	—	—	—
	25	42	17	2.15	4.29	—	—	—	48	23	1.59	3.17	—	—	—
BRP5	16	22	6	d=1mm, $\alpha^\circ=3.04^\circ$					30	14	2.60	—	6.50	—	—
	20	30	10	3.64	—	9.10	—	—	38	18	2.03	—	5.08	—	—
	25	40	15	2.43	—	6.08	—	—	48	23	1.59	—	3.98	—	—
	32	54	22	1.66	—	4.15	—	—	62	30	1.22	—	3.04	—	—
BRP6	32	52	20	1.82	3.64	—	5.45	—	62	30	1.22	2.43	—	3.64	—
	40	68	28	1.30	2.60	—	3.90	—	78	38	0.96	1.92	—	2.88	—
	50	88	38	0.96	1.92	—	2.88	—	98	48	0.76	1.52	—	2.28	—
	63	114	51	0.72	1.43	—	2.14	—	124	61	0.60	1.20	—	1.79	—
	80	148	68	0.54	1.07	—	1.61	—	158	78	0.47	0.94	—	1.40	—
BRP8	40	64	24	—	3.04	—	4.55	6.06	78	38	—	1.92	—	2.88	3.38
	50	84	34	—	2.14	—	3.22	4.28	98	48	—	1.52	—	2.28	3.04
	63	110	47	—	1.55	—	2.33	3.10	124	61	—	1.20	—	1.79	2.39
	80	144	64	—	1.14	—	1.71	2.28	158	78	—	0.94	—	1.40	1.87
	100	184	84	—	0.87	—	1.30	1.74	198	98	—	0.74	—	1.12	1.49

*1 DH=Hole diameter : ϕ (mm)

*2 dc=Tool pass diameter : ϕ (mm)

BRP4 DH min = $(D1 - 4) \times 2$, DH max = $(D1 - 1) \times 2$, d max = 4 (mm)
BRP5 DH min = $(D1 - 5) \times 2$, DH max = $(D1 - 1) \times 2$, d max = 5 (mm)
BRP6 DH min = $(D1 - 6) \times 2$, DH max = $(D1 - 1) \times 2$, d max = 6 (mm)
BRP8 DH min = $(D1 - 8) \times 2$, DH max = $(D1 - 1) \times 2$, d max = 8 (mm)
dc = (Tool pass diameter) = DH - D

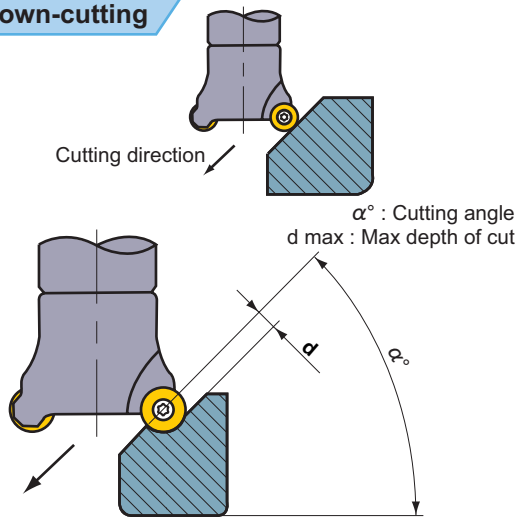
⚠ **Caution** When machining with a diameter larger than DH max, helical milling as shown below is recommended.



Copying

●Machining angle and maximum depth of cut

Oblique down-cutting



●Formulae for d max

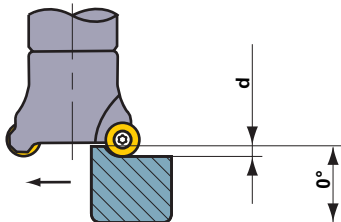
	Formulas for d max
$\alpha^\circ \geq \beta^\circ$ (in the table below)	$d \text{ max} = R$
$\alpha^\circ \leq \beta^\circ$ (in the table below)	$d \text{ max} = R + R \times \sin(\alpha^\circ - \beta^\circ)$

β° : Angle to use with the formula

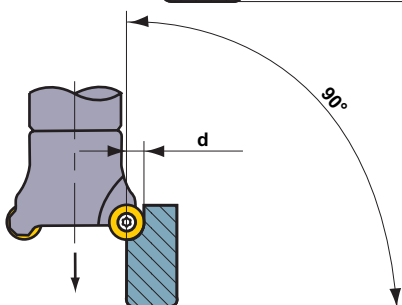
Type	Cutter diameter	β° (°)	R
BRP4	ø12	71.8	4
	ø16	48.6	
	ø20, 25	30.0	
BRP5	ø16	70.1	5
	ø20	49.5	
	ø25, 32	30.0	
BRP6	Common for all diameters	19.5	6
BRP8	Common for all diameters	18.2	8

⚠ **Caution** ⚠ Cutting condition if $\alpha^\circ = 0^\circ$ or 90°

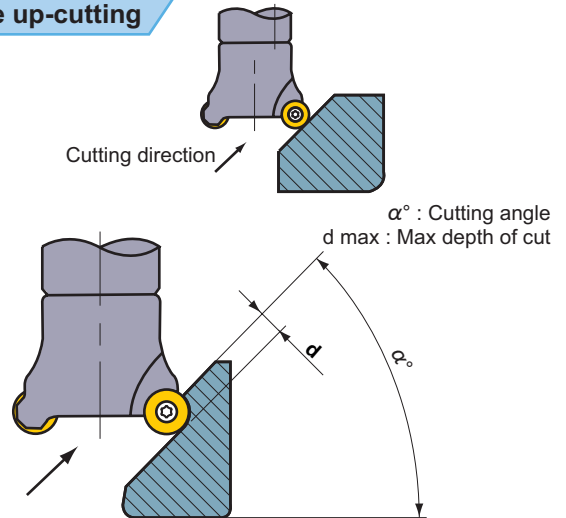
• $\alpha^\circ = 0^\circ$



• $\alpha^\circ = 90^\circ$



Oblique up-cutting



●Formulae for d max

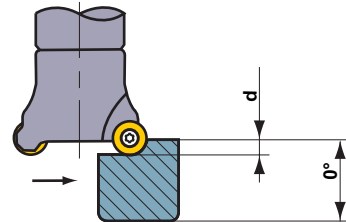
	Formulas for d max
$\alpha^\circ \geq \beta^\circ$ (in the table below)	$d \text{ max} = R$
$\alpha^\circ \leq \beta^\circ$ (in the table below)	$d \text{ max} = R + R \times \sin(\beta^\circ - \alpha^\circ)$

β° : Angle to use with the formula

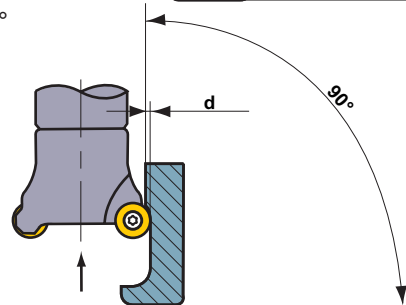
Type	Cutter diameter	β° (°)	R
BRP4	ø12	18.2	4
	ø16	15.7	
	ø20, 25	52.2	
BRP5	ø16	21.6	5
	ø20	23.1	
	ø25, 32	53.8	
BRP6	Common for all diameters	48.6	6
BRP8	Common for all diameters	48.6	8

⚠ **Caution** ⚠ Cutting condition if $\alpha^\circ = 0^\circ$ or 90°

• $\alpha^\circ = 0^\circ$



• $\alpha^\circ = 90^\circ$



Recommended cutting conditions

● Cutting speed (m/min)

Workpiece	Hardness	Coated		Carbide	
		F7030	VP15TF	UTi20T	
P Mild steel	180HB ≤	250 (200 - 300)	250 (200 - 300)	150 (100 - 200)	
	Carbon steel Alloy steel	180 - 280HB	180 (130 - 220)	180 (130 - 220)	140 (100 - 170)
		280 - 380HB	160 (110 - 190)	160 (110 - 190)	100 (70 - 120)
	Pre-hardened steel	35 - 45HRC	120 (80 - 140)	120 (80 - 140)	90 (60 - 100)
High alloy steel	300HB	130 (90 - 160)	130 (90 - 160)	100 (70 - 120)	
M Stainless steel	260HB ≤	180 (130 - 220)	180 (130 - 220)	140 (100 - 170)	
K Cast iron	Tensile strength ≤ 350N/mm ²	-	170 (130 - 220)	140 (100 - 170)	
	Ductile cast iron	Tensile strength 360 - 500N/mm ²	-	140 (100 - 180)	120 (80 - 140)
		Tensile strength 500 - 800N/mm ²	-	110 (80 - 140)	90 (70 - 110)
H Sintered steel	45 - 60HRC	-	60 (50 - 100)	60 (40 - 70)	

The characters in bold are the 1st recommended grades.

● Feed per tooth (mm/tooth)

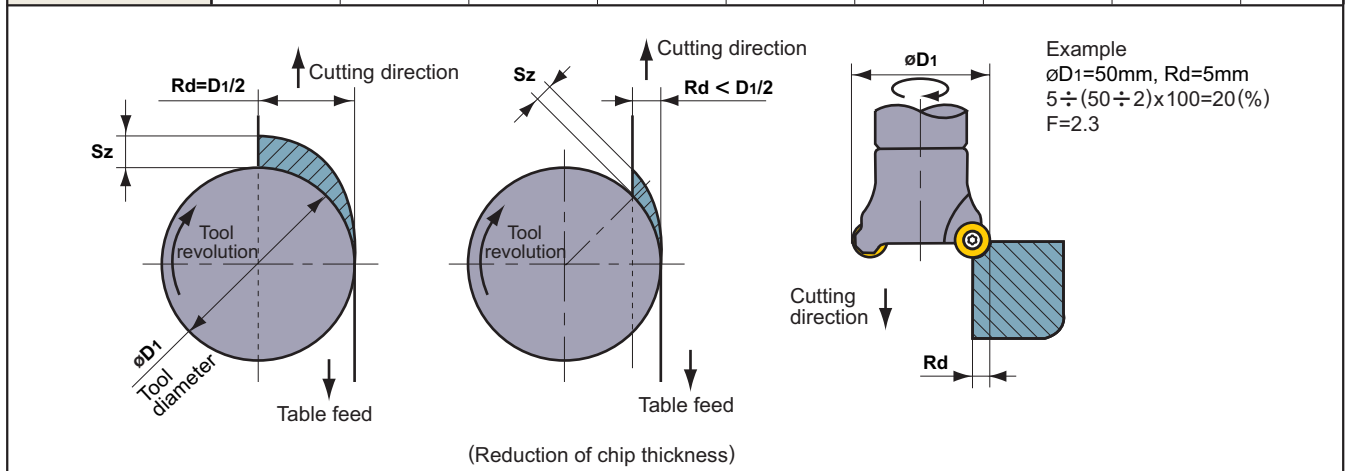
Type	Depth of cut (mm)							
	1	2	3	4	5	6	7	8
BRP4	0.40	0.30	0.20	0.10	—	—	—	—
BRP5	0.40	0.35	0.30	0.20	0.10	—	—	—
BRP6	0.50	0.40	0.30	0.25	0.23	0.20	—	—
BRP8	0.60	0.50	0.45	0.40	0.33	0.30	0.25	0.20

● Correctional value of the table feed relating to cutting width (Rd)

When the cutting width is equal or less than 1/2 the tool diameter : It is recommended to modify table feed rate by multiplying the table feed by the correction value (F).
 When the cutting width is equal or more than 1/2 the tool diameter : Use the feed shown in the table above.

*D = Tool diameter Rd = Cutting width

Rd/(D1/2)(%) *	5	10	15	20	25	30	50	75	100
Correction value F	5	3	2.5	2.3	2	1.8	1.5	1.3	1

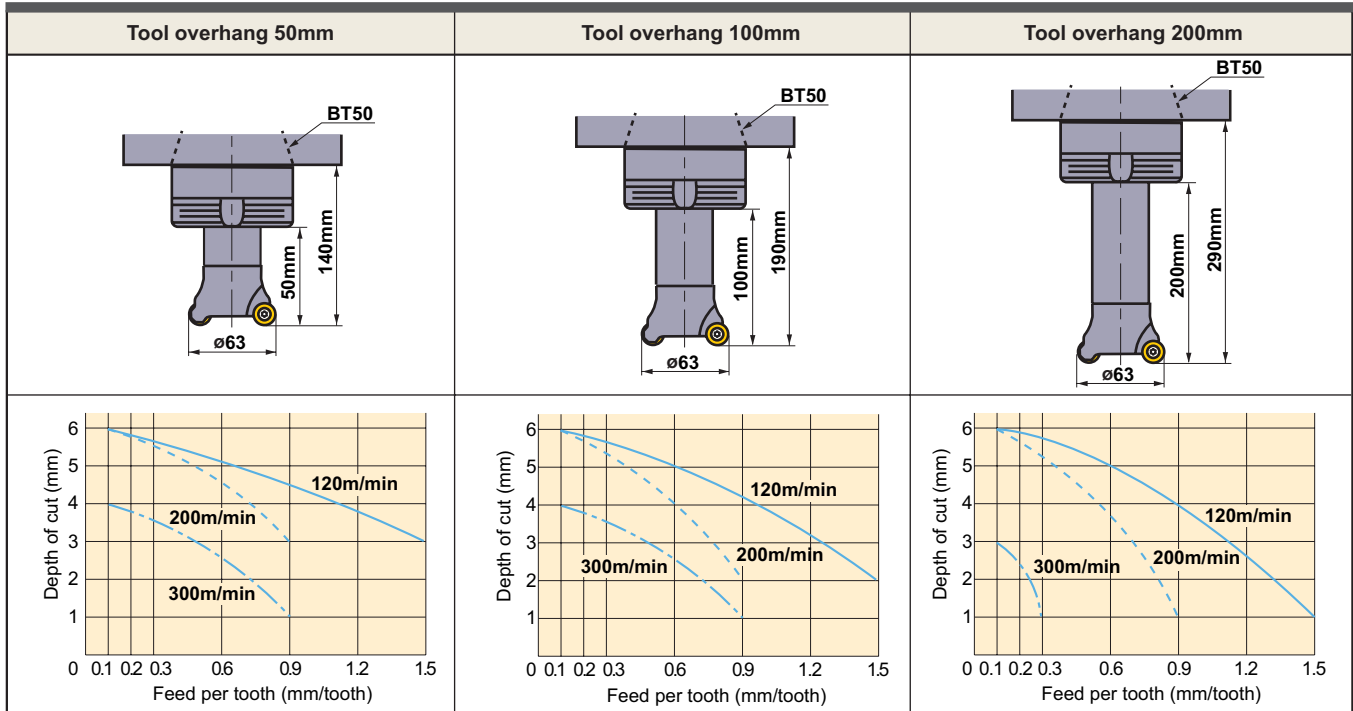


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Cutting performance

● Application range for standard length of overhang

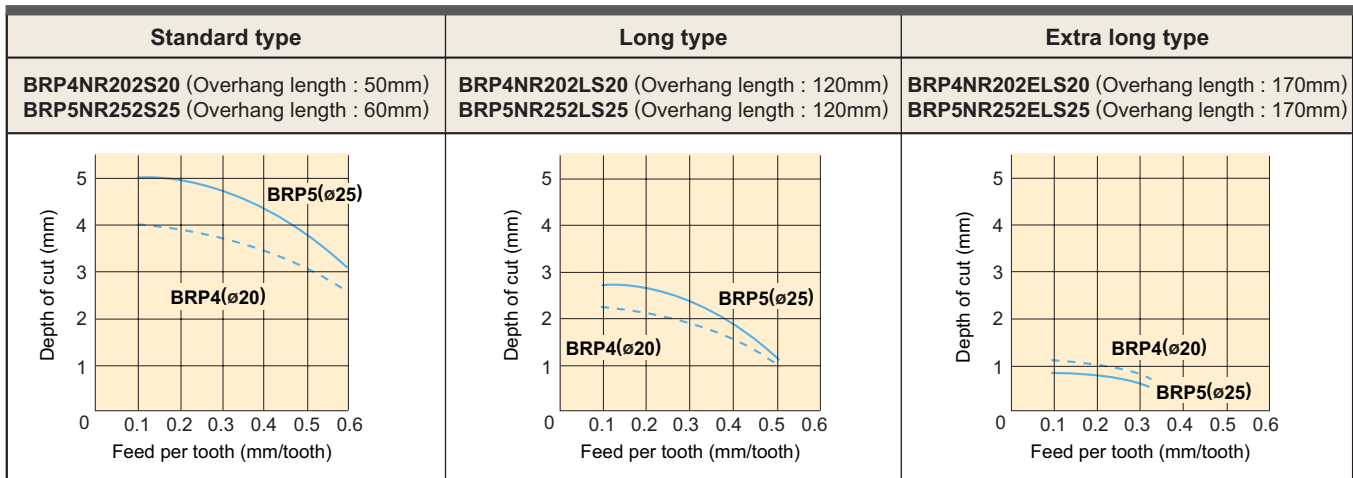
Workpiece : JIS S50C Cutting width : 31mm
Tool : BRP8PR634ELS42



Note : Valid application range is the area below the lines on the graph.

● Application range for standard shank types

Workpiece : JIS S50C Cutting speed : 200m/min
Cutting width : 3/5D Dry cutting



For Your Safety

- Don't handle inserts without gloves. ● Please machine within the recommended application range and change worn tools before breakage occurs. ● Please use the guards provided and wear safety glasses.
- When using compounded cutting oils, fire precautions should be taken. ● When attaching inserts or spare parts, use the appropriate wrench or spanner. ● When using tools at high speeds, please ensure all conditions are correct to prevent poor tool run-out, vibration and abnormal sounds etc.

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(Tools specifications subject to change without notice.)