

Radius Mill 4corner

ASRF *mini type*

Radius Mill 4 Corners ASRF



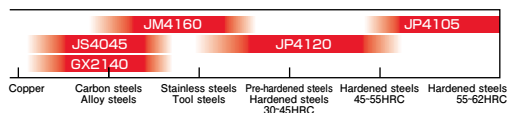
MOLDINO Tool Engineering, Ltd.

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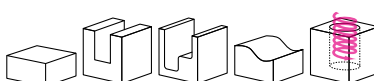
New proposal to reduce cost and cutting force during high-feed-rate processing Line up of undercut shank type

Features of ASRF mini type

- 01** Improvements in clamp rigidity, which affects tool life.
- 02** 3 types of chip breakers for various applications.
- 03** Economical 4-corner inserts.



Applications



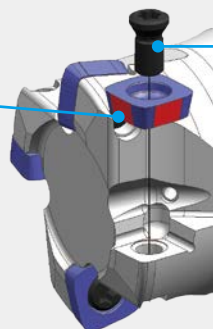
Features

01

Improvements in clamp rigidity, which affects tool life.

- Size of insert holding screw was increased.
- Larger contact surface with holder

Broader holder contact surface increases clamp rigidity.



Increased screw strength:
M2.5 □ M3.0

Features

02

3 types of shapes to select from according to the use application.

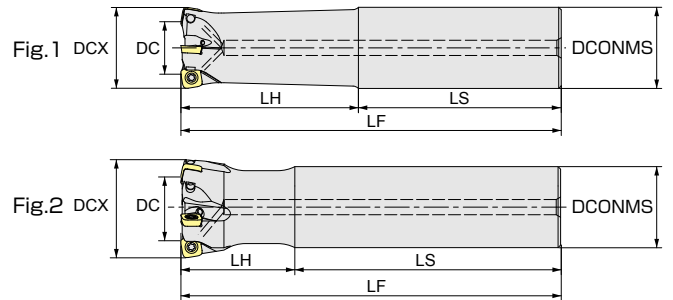
- The economical four corner inserts.
- In addition to the conventional free-cutting breaker, an LF breaker with the emphasis on further cutting performance has been added. This expands the applicable range for high-feed-rate machining.

Cutting force 100%	93%	85%
SPNW General edge type	SPMT Sharp edge type	SPMT-LF Ultra sharp edge type

Shank type

ASRF 30 R-

Numeric figure comes in a circle ○ and alphabetical character comes in a square □



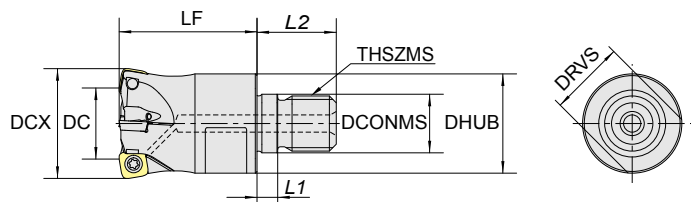
With air hole

Item code		Stock	No. of flutes	Size (mm)						Shape
				DCX	DC	LF	LH	LS	DCONMS	
Regular	ASRFS3020R-2	●	2	20	8	130	50	80	20	Fig.1
	ASRFS3025R-3	●	3	25	13	140	60	80	25	Fig.1
	ASRFS3032R-4	●	4	32	20	150	70	80	32	Fig.1
	ASRFS3040R-5	●	5	40	28	150	45	105	32	Fig.2
Long	ASRFL3020R-2	●	2	20	8	160	80	80	20	Fig.1
	ASRFL3022R-2	●	2	22	10	160	30	130	20	Fig.2
	ASRFL3025R-3	●	3	25	13	180	100	80	25	Fig.1
	ASRFL3028R-3	●	3	28	16	180	35	145	25	Fig.2
	ASRFL3032R-3	●	3	32	20	200	120	80	32	Fig.1
	ASRFL3035R-3	●	3	35	23	200	40	160	32	Fig.2
	ASRFL3040R-3	●	3	40	28	220	45	175	32	Fig.2

Modular Type

ASRFM30 R-M1

Numeric figure comes in a circle ○



With air hole

Item code		Stock	No. of flutes	Size (mm)							
				DCX	DC	LF	L1	L2	DCONMS	DHUB	THSZMS
ASRFM3020R-2-M10		●	2	20	8	30	5.5	19	10.5	17.8	M10
※ ASRFM3022R-2-M10		●	2	22	10	30	5.5	19	10.5	17.8	M10
ASRFM3025R-3-M12		●	3	25	13	35	5.5	22	12.5	20.8	M12
※ ASRFM3028R-3-M12		●	3	28	16	35	5.5	22	12.5	20.8	M12
ASRFM3032R-4-M16		●	4	32	20	40	6	23	17	28.8	M16
※ ASRFM3035R-4-M16		●	4	35	23	40	6	23	17	28.8	M16
※ ASRFM3040R-5-M16		●	5	40	28	40	6	23	17	28.8	M16

[Note] When ※ and carbide shank are used together as a set, there is no interference.

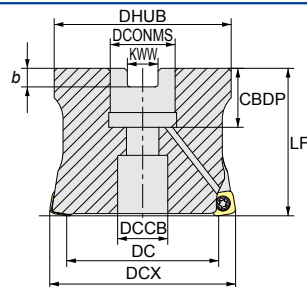
Do not apply lubricants such as grease, etc. to the "contact faces" and "modular screws" of the "modular mill", "dedicated shanks" and "dedicated arbor".

Line Up

Bore type

ASRFB30 R(M)- - ()

Numeric figure comes in a circle ○



With air hole

Item code		Stock	No.of flutes	Size (mm)								
				DCX	DC	DHUB	LF	CBDP	KWW	<i>b</i>	DCONMS	DCCB
Internal diameter inch size	ASRFB3050R-7	●	7	50	38	47	50	19	8.4	5	22.225	17
	ASRFB3063R-8	●	8	63	51	60	50	19	8.4	5	22.225	20
Internal diameter mm size	ASRFB3040RM-5-16	●	5	40	28	35	40	19	8.4	5.6	16	13.5
	ASRFB3050RM-7-22	●	7	50	38	40	50	20	10.4	6.3	22	17
	ASRFB3063RM-8-22	●	8	63	51	60	50	20	10.4	6.3	22	17
	ASRFB3063RM-8-27	●	8	63	51	60	50	22	12.4	7	27	20

[Note] Arbor screw is not included.

Inserts

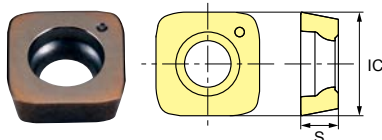


Fig.3 General edge type

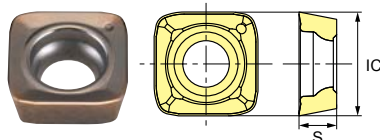


Fig.4 Sharp edge type

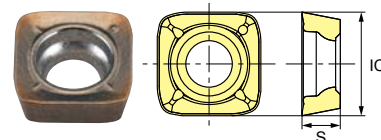


Fig.5 Ultra sharp edge type

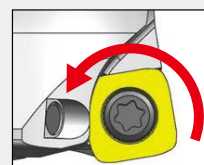
P	Carbon steels						 : General cutting, First recommended  : General cutting, Second recommended				
M	SUS, etc.										
K	FC・FCD Cast irons										
H	Hardened steels										
Item code		Tolerance class	AJ Coating			GX Coating	JS Coating	Size (mm)		Shape	
			JP4105	JP4120	JM4160	GX2140	JS4045	IC	S		
SPNW07T2TR		N	●	●	●	●	●	7.8	2.8	Fig.3	
SPMT07T2TR		M		●	●		●	7.8	2.8	Fig.4	
SPMT07T2ER-LF				●※ ₁	●			7.8	2.8	Fig.5	

[Note] Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.

※1 Cutting of M (SUS, etc.) and S (titanium alloys, Ni-based alloys).

- **Attention for the corner change**

- Please turn the insert counterclockwise upon corner change of insert.



Parts

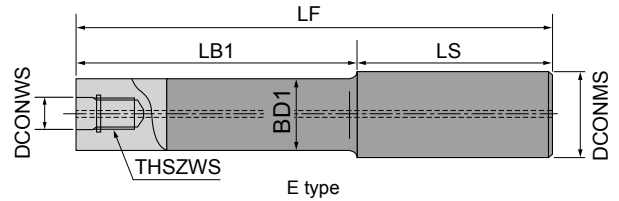
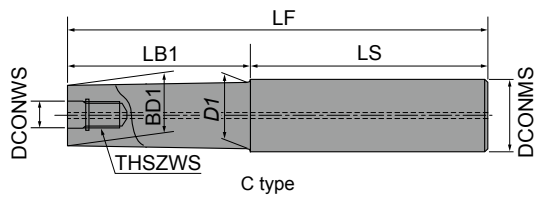
Parts		Clamp screw		Screw driver	Screw anti-seizure agent
Cutter body	Shape		Fastening torque (N · m)		
ASRF S/L/M/B30...		265-143	2.0	104-T10	P-37

[Note] The clamp screw is a consumable part. Since replacement life depends on the use environment, it is recommended that it be replaced at an early stage. One spare clamp screw is provided for cutter bodies with 3 or less flutes, and two for 4 or more flutes.

● : Stocked Items.

The Shanks for Modular Mill

Carbide Shank



Item code	Stock	Size(mm)								Shape	Cutter body	Note
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	D1			
ASC20-10.5-120-50Z	●	10.5	M10	120	50	70	18.5	20	19.5	C	φ20※1 φ22	With Air hole
ASC20-10.5-170-90Z	●			170	90	80						
ASC20-10.5-220-120Z	●			220	120	100						
ASC20-10.5-270-150Z	●			270	150	120						
ASC20-10.5-220-50Z	●	10.5	M10	220	50	170	18.5	20	19.5	C	φ20※1 φ22	
ASC20-10.5-270-50Z	●			270		220						
ASC25-12.5-145-65	●	12.5	M12	145	65	80	23	25	—	E	φ25※1 φ28	
ASC25-12.5-215-115	●			215	115	100						
ASC25-12.5-265-145	●			265	145	120						
ASC25-12.5-315-195	●			315	195	120						
ASC25-12.5-265-65	●	12.5	M12	265	65	200	23	25	—	E	φ25※1 φ28	
ASC25-12.5-315-65	●			315		250						
ASC32-17-160-80	●	17	M16	160	80	80	28	32	—	E	φ32※1 φ35 φ40	
ASC32-17-210-110	●			210	110	100						
ASC32-17-260-140	●			260	140	120						
ASC32-17-310-190	●			310	190	120						
ASC32-17-360-240	●			360	240	120						
ASC32-17-260-80	●	17	M16	260	80	180	28	32	—	E	φ32※1 φ35 φ40	
ASC32-17-310-80	●			310		230						
ASC32-17-360-80	●			360		280						

[Note] For ※1, since the cutter diameter is smaller than the shank diameter, interference occurs at the shank.

High-feed tools lineup

Type	Feature				Holder	Insert			Programming R (mm)	APMX (mm)
	Economical (No. of corners)	High accuracy (Less uncut remnants)	Supports for high-hardened steel	Efficiency (No. of Flutes)		No. of corners	Shape	Inscribed circle code		
TD4N 	◎	◎	○ ~62HRC	◎ High Efficiency multi-flutes	φ16~40	4		06	2.0	1.0
ASR Multi-Flutes 		○	○ ~62HRC	◎ High Efficiency multi-flutes	φ16~66	2		06 12	2.0 3.0	1.5 2.0
ASRF-mini 	◎		○ ~62HRC	○ General	φ20~63	4		07	2.0	1.2
ASR 		○	○ ~60HRC	○ General	φ20~100	2		08~15	3.0	2.0
ASRT 	○	○	○ ~62HRC	○ General	φ25~100	3		09~14		
ASRF 	◎		○ ~60HRC	○ General	φ32~100	4		12		
TD6N 	◎	○	○ ~50HRC	○ General	φ50~125	6		14 14	3.0	1.5 3.0
TR4F 	◎		○ ~60HRC	○ General	φ32~125	4		12		1.2
								15		2.0

※ Various other tools for roughing are also available.

※ For more information on tool specifications, please refer to our general catalog or visit our website. (<http://www.moldino.com>)

Recommended Cutting Conditions

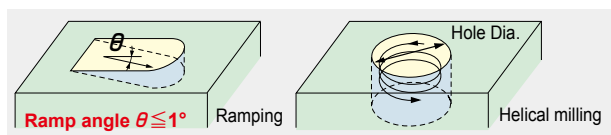
※ Red indicates primary recommended insert grade.

Work material	Recommended inserts grade	Tool dia. DCX	φ 20		φ 25		φ 32		φ 40		φ 40	φ 50	φ 63
		Type	Regular	Long	Regular	Long	Regular	Long	Regular	Long	Bore	Bore	Bore
		flutes	2	2	3	3	4	3	5	3	5	7	8
Carbon steels Alloy steels <30HRC	※ GX2140 JS4045	<i>n</i> (min ⁻¹)	2710	2390	2170	1910	1690	1490	1350	1190	1350	1080	860
		<i>Vc</i> (m/min)	170	150	170	150	170	150	170	150	170	170	170
		<i>Vf</i> (mm/min)	7040	6210	8460	7440	8780	5810	8770	4640	8770	9820	8940
		<i>fz</i> (mm/t)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
		<i>ap</i> (mm)	0.8	0.6	0.8	0.6	0.8	0.6	0.8	0.6	0.8	0.8	0.8
		<i>ae</i> (mm)	12	12	15	15	20	20	24	24	24	30	38
		<i>Q</i> (cm ³ /min)	68	45	102	67	140	70	168	67	168	236	272
		<i>Q</i> (min ⁻¹)	2390	2070	1910	1660	1490	1290	1190	1040	1190	960	760
Alloy steels Tool steels 30 ~ 40HRC	JS4045 JP4120	<i>Vc</i> (m/min)	150	130	150	130	150	130	150	130	150	150	150
		<i>Vf</i> (mm/min)	5730	4960	6870	5970	7150	4640	7140	3740	7140	8060	7290
		<i>fz</i> (mm/t)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
		<i>ap</i> (mm)	0.8	0.6	0.8	0.6	0.8	0.6	0.8	0.6	0.8	0.8	0.8
		<i>ae</i> (mm)	12	12	15	15	20	20	24	24	24	30	38
		<i>Q</i> (cm ³ /min)	55	36	82	54	114	56	137	54	137	193	222
		<i>n</i> (min ⁻¹)	1590	1430	1270	1150	1000	900	800	720	800	640	510
		<i>Vc</i> (m/min)	100	90	100	90	100	90	100	90	100	100	100
Pre-Hardened steels 40 ~ 50HRC	JP4120 JS4045	<i>Vf</i> (mm/min)	3810	2860	4570	3450	4800	2700	4800	2160	4800	5370	4890
		<i>fz</i> (mm/t)	1.2	1	1.2	1	1.2	1	1.2	1	1.2	1.2	1.2
		<i>ap</i> (mm)	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.5	0.5
		<i>ae</i> (mm)	12	12	15	15	20	20	24	24	24	30	38
		<i>Q</i> (cm ³ /min)	23	14	34	21	48	22	58	21	58	81	93
		<i>n</i> (min ⁻¹)	1590	1430	1270	1150	1000	900	800	720	800	640	510
		<i>Vc</i> (m/min)	100	90	100	90	100	90	100	90	100	100	100
		<i>Vf</i> (mm/min)	3180	2280	3810	2760	4000	2160	4000	1720	4000	4480	4080
Stainless steels	JM4160	<i>fz</i> (mm/t)	1	0.8	1	0.8	1	0.8	1	0.8	1	1	1
		<i>ap</i> (mm)	0.8	0.5	0.8	0.5	0.8	0.5	0.8	0.5	0.8	0.8	0.8
		<i>ae</i> (mm)	12	12	15	15	20	20	24	24	24	30	38
		<i>Q</i> (cm ³ /min)	31	14	46	21	64	22	77	21	77	108	124
		<i>n</i> (min ⁻¹)	3180	2870	2550	2290	1990	1790	1590	1430	1590	1270	1010
		<i>Vc</i> (m/min)	200	180	200	180	200	180	200	180	200	200	200
		<i>Vf</i> (mm/min)	9540	6880	11470	8240	11940	6440	11920	5140	11920	13330	12120
		<i>fz</i> (mm/t)	1.5	1.2	1.5	1.2	1.5	1.2	1.5	1.2	1.5	1.5	1.5
Cast irons	JP4120 GX2140	<i>ap</i> (mm)	0.8	0.6	0.8	0.6	0.8	0.6	0.8	0.6	0.8	0.8	0.8
		<i>ae</i> (mm)	12	12	15	15	20	20	24	24	24	30	38
		<i>Q</i> (cm ³ /min)	92	50	138	74	191	77	229	74	229	320	368
		<i>n</i> (min ⁻¹)	1270	1110	1020	890	800	700	640	560	640	510	400
		<i>Vc</i> (m/min)	80	70	80	70	80	70	80	70	80	80	80
		<i>Vf</i> (mm/min)	1520	1110	1830	1330	1920	1050	1920	840	1920	2140	1920
		<i>fz</i> (mm/t)	0.6	0.5	0.6	0.5	0.6	0.5	0.6	0.5	0.6	0.6	0.6
		<i>ap</i> (mm)	0.5	0.3	0.5	0.3	0.5	0.3	0.5	0.3	0.5	0.5	0.5
High-Hardened steels 50 ~ 55HRC	JP4105 JP4120	<i>ae</i> (mm)	12	12	15	15	20	20	24	24	24	30	38
		<i>Q</i> (cm ³ /min)	9	4	14	6	19	6	23	6	23	32	36
		<i>n</i> (min ⁻¹)	1040	960	830	760	650	600	520	480	520	410	330
		<i>Vc</i> (m/min)	65	60	65	60	65	60	65	60	65	65	65
		<i>Vf</i> (mm/min)	~ 830	~ 670	~ 990	~ 790	~ 1040	~ 630	~ 1040	~ 500	~ 1040	~ 1140	~ 1050
		<i>fz</i> (mm/t)	~ 0.4	~ 0.35	~ 0.4	~ 0.35	~ 0.4	~ 0.35	~ 0.4	~ 0.35	~ 0.4	~ 0.4	~ 0.4
		<i>ap</i> (mm)	~ 0.3	~ 0.2	~ 0.3	~ 0.2	~ 0.3	~ 0.2	~ 0.3	~ 0.2	~ 0.3	~ 0.3	~ 0.3
		<i>ae</i> (mm)	10	10	12	12	16	16	20	20	20	25	32
High-Hardened steels 55 ~ 62HRC	JP4105	<i>Q</i> (cm ³ /min)	~ 2	~ 1	~ 4	~ 2	~ 5	~ 2	~ 6	~ 2	~ 6	~ 9	~ 10

※ This cutting condition table shows general guidelines for cutting conditions when L/D < 3. When performing actual machining, adjust the cutting conditions according to the shape to be machined, purpose, machine being used, etc.

- [Note] 1. Before carrying out the work without operator, be sure to remove the chips and confirm the safe condition for cutting.
2. The steel chips may cause cuts, burns or damages to eyes. Be sure to install the safety cover around the tool and wear the safety glasses when carrying out any works.
3. JP4105 is for the high-hardness steels. It is not suitable for Non-heat-treated steel material.
4. The machinability of hardened steels (55 - 62HRC) can vary significantly depending on the particular steel type and tool overhang. Adjust the table feed rate and cutting depth ap to suit machining conditions.
5. For strongly interrupted cutting, when unsupported length is long, or for wet cutting, JM4160 is recommended.
6. Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.
7. Replace the insert in good time to avoid any breakage of the tools because of wear and tear.

Regarding ramping and helical milling diameter

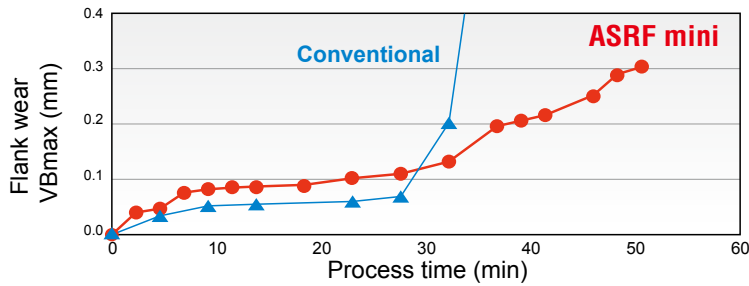


(mm)						
Tool dia. DCX	φ20	φ25	φ32	φ40	φ50	φ63
Ramp angle θ	1° or less					
Hole diameter	26~38	36~48	50~62	66~78	86~98	112~124

For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

Cutting performance

01 Results of cutting test on steel for plastic mold (40 HRC)



Cutting conditions

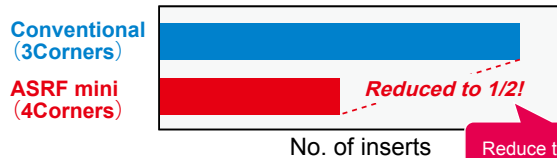
Work material : Steel for plastic mold (40HRC)
 Tool : ASRFM3025R-3-M12 ($\phi 25$ -3 flutes)
 Insert : SPNW07T2TR (JP4120)
 Cutting speed : $V_c=100\text{m/min}$
 Feed rate : $f_z=1.0\text{mm/t}$
 Dry cutting
 Depth of cut : $a_p \times a_e=0.6 \times 16\text{mm}$

02 Example of use for SKD61($\leq 229\text{HB}$) mold machining

Figure Photograph of wear after 105 minutes of machining (Maximum flank surface wear width: 0.055mm)



Figure The number of necessary tools



No. of inserts

Reduce the usage of inserts due to longer tool life and multi-corner than our conventional products

Cutting conditions

Work material : SKD61($\leq 229\text{HB}$)
 Tool : ASRFM3020R-2-M10 ($\phi 20$ -2 flutes)
 Insert : SPNW07T2TR (JP4120)
 Cutting speed : $V_c=81\text{m/min}$
 Feed speed : $V_f=2,580\text{mm/min}$ ($f_z=1.0\text{mm/t}$)
 Wet cutting
 Depth of cut : $a_p \times a_e=0.6 \times 14\text{mm}$

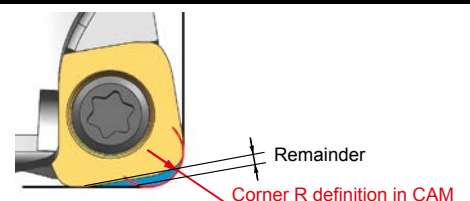
Field data

Product items	Work material	Tool dia. DCX (mm)	Item code	Cutting conditions	Result
Die-cast mold	Alloy tool steels (40HRC)	50	ASRFB3050RM-7-22 SPMT07T2TR (JP4120)	$V_c = 115\text{m/min}$ $V_f = 6,150\text{mm/min}$ $a_p = 0.5\text{mm}$	Multi-flute effect realizes efficiency cutting and long tool life.
Mold parts	Equivalent to SS400 Structural steel	32	ASRFM3032R-4-M16 SPNW07T2TR (JS4045)	$V_c = 160\text{m/min}$ $V_f = 9,850\text{mm/min}$ $a_p = 0.8\text{mm}$	By increases flute rigidity effect, high feed rate per flute realizes efficiency cutting.
Mold parts	Alloy tool steels (35HRC)	25	ASRFM3025R-3-M12 SPMT07T2TR (JP4120)	$V_c = 173\text{m/min}$ $V_f = 9,000\text{mm/min}$ $a_p = 0.8\text{mm}$	The processing cost could be reduced 60% on the long overhang condition by the separated cutting process.
Parts	SUS316	50	ASRFB3050RM-7-22 SPMT07T2ER-LF (JM4160)	$V_c = 120\text{m/min}$ $V_f = 3,000\text{mm/min}$ $a_p = 0.5\text{mm}$	Cutting force is reduced by LF breaker and the heat of cutting process which occurs is suppressed.

Points requiring care when creating the machining program

- Define the tool as the shape of the R2.0 radius.
- Use with axial-direction cutting depths a_p of 1.2mm or less.

Programming R	Remainder (mm)	Over Cut (mm)
R2.0	0.62	0
R2.8	0.5	0.17
R3.0	0.47	0.23





The diagrams and table data are examples of test results, and are not guaranteed values.
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Attentions on Safety

1. Attentions regarding handling

- (1) When removing the tool from the case (package), be careful not to drop it on your foot or drop it onto the tips of your bare fingers.
- (2) When actually setting the inserts, be careful not to touch the cutting flute directly with your bare hands.

2. Attentions regarding mounting

- (1) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
- (2) If abnormal chattering occurs during use, stop the machine immediately and remove the cause of the chattering.

3. Attentions during use

- (1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
- (2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
- (3) The inserts are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be installed and safety equipment such as safety glasses should be worn to create a safe environment for work.
 - Do not use where there is a risk of fire or explosion.
 - Do not use non-water-soluble cutting oils. Such oils may result in fire.
- (4) Do not use the tool for any purpose other than that for which it is intended, and do not modify it.

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