MOLDINO
The Edge To Innovation

Indexable ball end mill for finishing

ABPF type

Ball Precision F ABPF

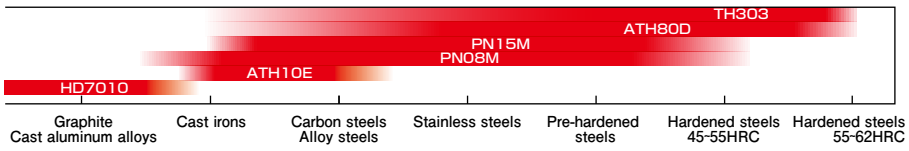
MOLDINO Tool Engineering, Ltd.

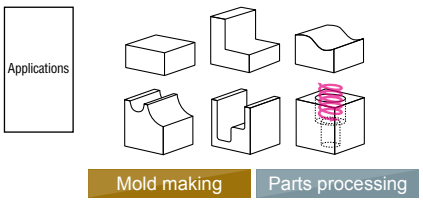
New Product News | No.0902E-18 | 2022-11

High cutting performance by S-shaped cutting edge! High helix edge shape provides a beautiful cutting surface. Insert for high-accuracy machining suppresses chatter even in corners.

Tougher and Stronger

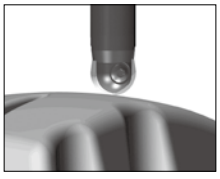
Introducing 6 Modular Mill Type with Air hole items!





Features 01 Set up *R* accuracy : ±0.01mm

・High accuracy is exhibited from the ball tip to the outer circumference.



Features 02 Excellent cutting performance and beautiful cutting surface finish.

・High helix edge shape suppresses growth of cutting force.

Features 03 New material for longer life.

・Multi-layer coating provides long life.

※For details regarding cutting performance, see p.18.

An effect by high helix edge shape

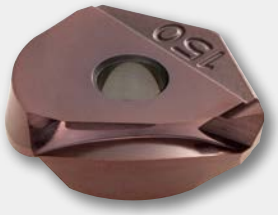
Typical conventional problem

Chattering happened frequently while cutting R-shape or similar.
The more the cutting force, the more the chattering which makes cutting mark on the work surface.

Reduce cutting force

High helix edge shape suppresses rapid growth of cutting force.
This relieves chattering while cutting and improves cutting surface finish.

- Improved cutting surface finish.
- Less chattering on corner.



Merit

Improved machining performance and machining accuracy can be expected, reducing work for downstream processes.

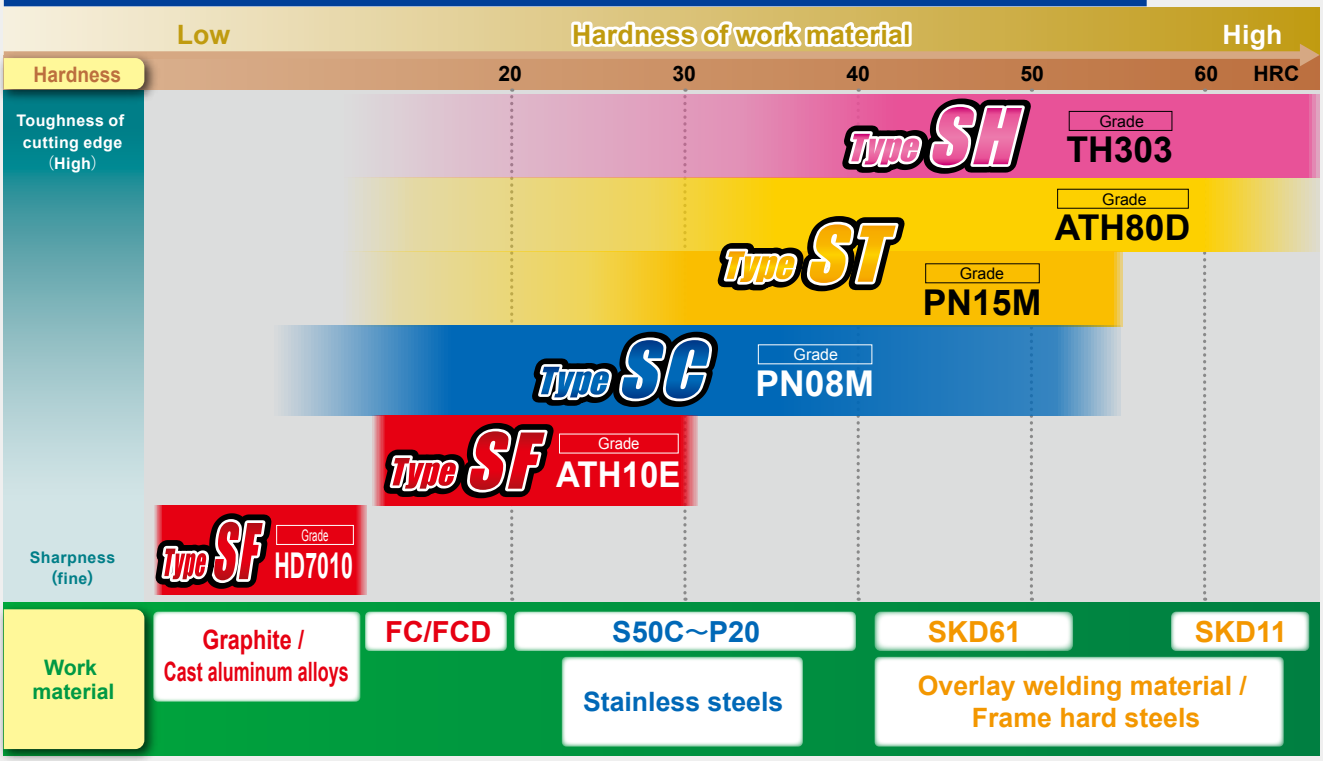
Improved quality | Cost reduction | Time savings

Improved tool life

Less cutting force reduces chipping due to wear and impact, thus tool life is improved.

Recommended grades map

Recommendation of based on hardness of work materials



Technology

PVD Technology — TH3 Coating TH303

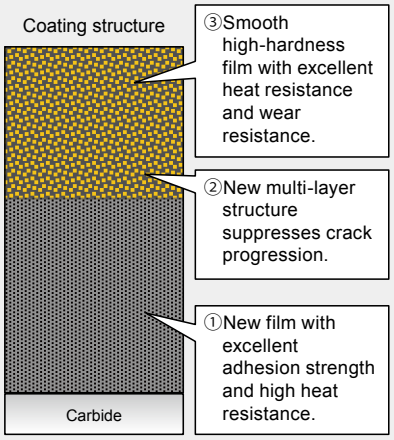
Features

- TH coating has further evolved to the new 3rd-generation TH coating.
- New film composition and film structure improves heat resistance and wear resistance.
- New multi-layer structure provides excellent durability and suppresses crack progression.

Strong fields

- High-speed finishing of hardened steels (45 to 65 HRC) such as SKD11, SKD61, SKH, SUS420 types, etc.
- High-speed finishing of pre-hardened steels such as P20, P21, etc.
- TH308 uses ultra-fine carbide alloy with excellent wear resistance and TH3 coating to demonstrate good performance especially for finishing of high-hardness materials.

Characteristics



PVD Nano Technology — Super Coating “Panacea Technology” PN

Features

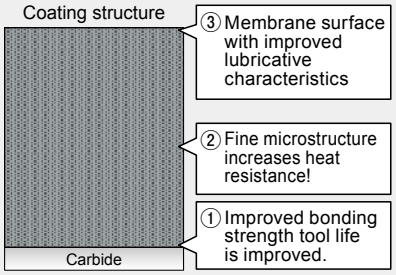
- Industry’s first multi-layer structure provides improved adhesion and membrane hardness as well as improving the oxidation-resistance temperature.
- PN coating Improve the friction coefficient, reduces generation of heat on cutting.

Strong fields

- Exhibits stable tool life in cutting materials such as plastic injection molds etc. where tool seizure often occurs. Realizes longer tool life in cutting prehardened steels such as carbon steels, alloy steels, stainless steels, hot and cold tool steel, etc.
- PN08M adopts micro-grain substrate and PN Coating.Improve the cutting performance for plastic injection mold finishing.
- PN15M adopts micro-grain substrate and PN Coating.Improve the cutting performance for overhang cutting.

Characteristics

Cross-sectional structure and characteristics of PN coating membrane

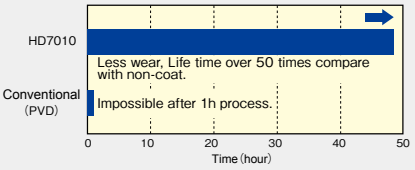


High adhesion Diamond coating — Diamond Coating HD

Characteristics

- Uses diamond with good crystallization. Ideal for cutting of graphite, high-silicon aluminum alloys and fiber-reinforced plastics (FRP).
- Our exclusive pre-treatment technology is used to provide higher adhesion due to anchor effect.
- Special material for Diamond Coating is adopted for base metal.

Machining example of Graphite (HD7010)



Cutting conditions
Cutter Body : ABPF10S10WL140(ϕ10)
v_c=200m/min n=6,370min^{-1}
v_f=2,500mm/min(f_z=0.2mm/t)
a_p×a_e=0.5×0.3mm Dry

High helix edge shape inserts

		TH303	ATH80D	ATH10E	PN08M	PN15M	HD7010
P	Carbon steels	□	□	□	■	□	
K	FC・FCD Cast irons	□	□	■	□	□	
	Graphite						■
N	Aluminum alloys						■
H	Hardened steels	■	■		□	□	

■ : General cutting, First recommendation

□ : General cutting, Second recommendation

Shape	Item code	Tolerance class	TH303	ATH80D	ATH10E	PN08M	PN15M	HD7010	RE	LE	INSL	DC	T	Shape
Type SH	ZPFG06N-SH	F	●						3	3	5	6	2	Fig.1
	ZPFG080-SH		●						4	4.4	9.7	8	2.1	
	ZPFG100-SH		●						5	5.6	12.1	10	2.7	
	ZPFG120-SH		●						6	6.6	14.6	12	3.2	
	ZPFG160-SH		●						8	9	16.6	16	4.2	Fig.2
	ZPFG200-SH		●						10	11.5	20.3	20	5.2	
	ZPFG250-SH		●						12.5	14.5	24.1	25	6.2	
	ZPFG300-SH		●						15	18.5	29.2	30	7.2	
Type ST	ZDFG06N-ST	F		●			●		3	3	5	6	2	Fig.1
	ZDFG080-ST			●			●		4	4.4	9.7	8	2.1	
	ZDFG100-ST			●			●		5	5.6	12.1	10	2.7	
	ZDFG120-ST			●			●		6	6.6	14.6	12	3.2	
	ZDFG160-ST			●			●		8	9	16.6	16	4.2	Fig.2
	ZDFG200-ST			●			●		10	11.5	20.3	20	5.2	
	ZDFG250-ST			●			●		12.5	14.5	24.1	25	6.2	
	ZDFG300-ST			●			●		15	18.5	29.2	30	7.2	
Type SC	ZDFG06N-SC	F				●			3	3	5	6	2	Fig.1
	ZDFG080-SC					●			4	4.4	9.7	8	2.1	
	ZDFG100-SC					●			5	5.6	12.1	10	2.7	
	ZDFG120-SC					●			6	6.6	14.6	12	3.2	
	ZDFG160-SC					●			8	9	16.6	16	4.2	Fig.2
	ZDFG200-SC					●			10	11.5	20.3	20	5.2	
	ZDFG250-SC					●			12.5	14.5	24.1	25	6.2	
	ZDFG300-SC					●			15	18.5	29.2	30	7.2	
Type SF	ZDFG06N-SF	F						●※	3	3	5	6	2	Fig.1
	ZDFG080-SF							●※	4	4.4	9.7	8	2.1	
	ZDFG100-SF							●※	5	5.6	12.1	10	2.7	
	ZDFG120-SF							●※	6	6.6	14.6	12	3.2	
	ZDFG160-SF				●			●※	8	9	16.6	16	4.2	Fig.2
	ZDFG200-SF				●			●※	10	11.5	20.3	20	5.2	
	ZDFG250-SF				●				12.5	14.5	24.1	25	6.2	
	ZDFG300-SF				●				15	18.5	29.2	30	7.2	

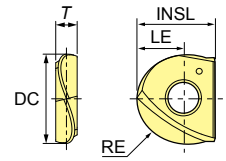


Fig.1

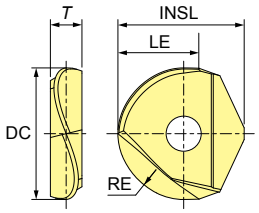


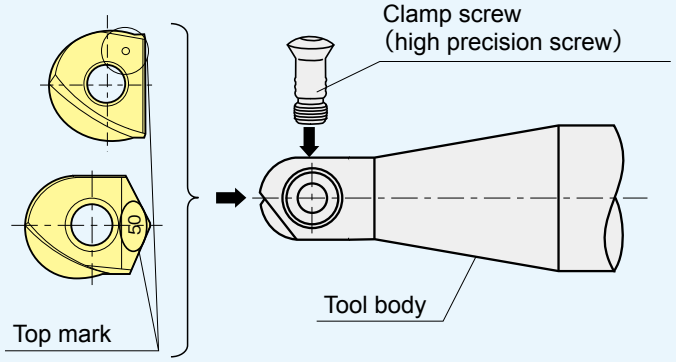
Fig.2

※mark : Regrinding of HD7010 tools cannot be performed. Inserts other than HD7010 with diameters of Ø10 or more can be regrinded. Insert Ø16 or above may be re-ground up to twice.

Please inquire insert re-grinding / re-coating to sales office.

Set-up Procedures of Inserts

1. Clean the insert seat:
   Using air-blow or alike, clean the seat.
2. Put in the insert with its top positioned to the screw-tightening side of the tool body.
3. Tighten the clamp screw with the special wrench. Please do not press down the insert during this tightening process.
4. This is the end of insert set-up.



To meet the specification for precision of ±0.01mm, please follow this procedure.

Attention

Never tighten the clamp screw without putting the insert. The tool body may be deformed, resulting in improper insert mounting or deterioration of mounting accuracy.

Do not tighten the screw without putting insert

●: Stocked items. No mark : Manufactured upon request only.

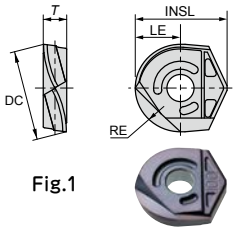
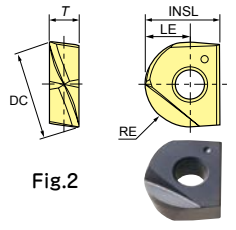
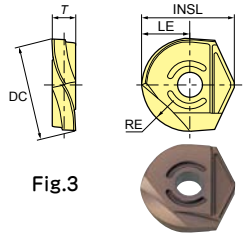
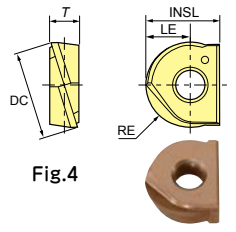
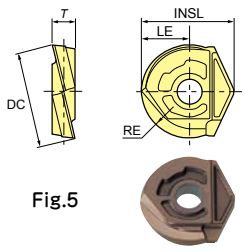
Line Up

Inserts

P	Carbon steels	⊓	⊓			■	
K	FC・FCD Cast irons	⊓	⊓	⊓	⊓	■	
	Graphite						
N	Aluminum alloys						
H	Hardened steels	⊓	⊓	⊓	■	⊓	

■ : General cutting, First recommendation

⊓ : General cutting, Second recommendation

Shape	Item code	Toleranceclass	C Coating		TH Coating		ACS Coating	CBN	Size (mm)					
			PCA12M	PCA08M	PTH08M	ATH80D	ACS05E	BH200	RE	LE	INSL	DC	*T*	Shape
 Fig.1	ZPFG080	F						-	4	4.4	9.7	8	2.1	Fig.1
	※ ZPFG100							-	5	5.5	12.1	10	2.7	
	※ ZPFG120							-	6	6.6	14.6	12	3.2	
	※ ZPFG160							●	8	8.8	16.6	16	4.2	
	※ ZPFG200							●	10	11	20.3	20	5.2	
	※ ZPFG250							●	12.5	13.7	24.1	25	6.2	
	※ ZPFG300							●	15	16.5	29.2	30	7.2	
	※ ZPFG320		●	●	●			-	16	17.6	30.2	32	7.2	
 Fig.2	ZPFG060-GF	F	-	-	-			-	3	3.3	5	6	2	Fig.2
	ZPFG080-GF		-	-	-			-	4	4.4	9.7	8	2.1	Fig.3
	ZPFG080-GH		-	-	-			-	4	4.4	9.7	8	2.1	
	※ ZPFG100-GF		-	-	-			-	5	5.5	12.1	10	2.7	
	※ ZPFG100-GH		-	-	-			-	5	5.5	12.1	10	2.7	
	※ ZPFG120-GF		-	-	-			-	6	6.5	14.6	12	3.2	
	※ ZPFG120-GH		-	-	-			-	6	6.5	14.6	12	3.2	
 Fig.3	※ ZPFG160-GF		-	-	-			-	8	8.5	16.6	16	4.2	
	※ ZPFG160-GH		-	-	-			-	8	8.5	16.6	16	4.2	
	※ ZPFG200-GF		-	-	-			-	10	10.5	20.3	20	5.2	
	※ ZPFG200-GH		-	-	-			-	10	10.5	20.3	20	5.2	
	※ ZPFG250-GF		-	-	-			-	12.5	13.1	24.1	25	6.2	
	※ ZPFG250-GH		-	-	-			-	12.5	13.1	24.1	25	6.2	
	※ ZPFG300-GF		-	-	-			-	15	15.8	29.2	30	7.2	
	※ ZPFG300-GH		-	-	-			-	15	15.8	29.2	30	7.2	
G type:GF/GH Regrinding possible	※ ZPFG320-GF		-	-	-		●	-	16	16.8	30.2	32	7.2	
	※ ZPFG320-GH		-	-	-	●		-	16	16.8	30.2	32	7.2	
 Fig.4	ZDFG060-WF	F						-	3	3	5	6	2	Fig.4
	ZDFG060-WH							-	3	3	5	6	2	
	ZDFG080-WF							-	4	4	9.7	8	2.1	Fig.5
	ZDFG080-WH							-	4	4	9.7	8	2.1	
	ZDFG100-WF							-	5	5	12.1	10	2.7	
	ZDFG100-WH							-	5	5	12.1	10	2.7	
	ZDFG120-WF							-	6	6	14.6	12	3.2	
	ZDFG120-WH							-	6	6	14.6	12	3.2	
 Fig.5	ZDFG160-WF							-	8	8	16.6	16	4.2	
	ZDFG160-WH							-	8	8	16.6	16	4.2	
	ZDFG200-WF							-	10	10	20.3	20	5.2	
	ZDFG200-WH							-	10	10	20.3	20	5.2	
	ZDFG250-WF							-	12.5	12.5	24.1	25	6.2	
	ZDFG250-WH							-	12.5	12.5	24.1	25	6.2	
	ZDFG300-WF							-	15	15	29.2	30	7.2	
	ZDFG300-WH							-	15	15	29.2	30	7.2	
W type:WF/WH For vertical wall machining; Regrinding is not possible.	ZDFG320-WF						●	-	16	16	30.2	32	7.2	
	ZDFG320-WH					●		-	16	16	30.2	32	7.2	

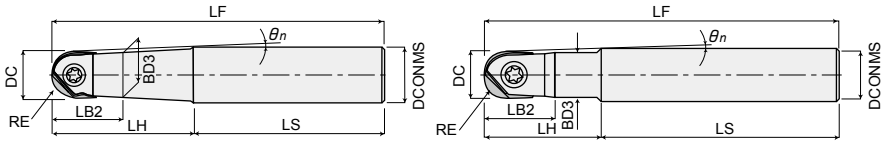
※mark : Re-grinding is applicable with insert ϕ10 or above. Insert ϕ16 or above may be re-ground up to twice.

Please inquire insert re-grinding / re-coating to sales office.

● : Stocked items. No mark : Manufactured upon request only. — : No Manufactured.

Steel Shank ABPF○○S○○(L/L○○○)

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

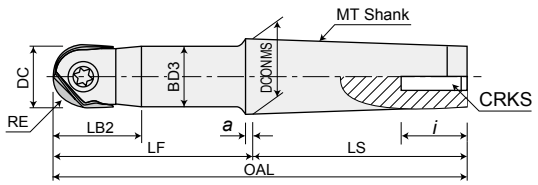


Type A (Taper neck) Type B (Straight neck)

	Item code	Stock	No.of inserts	Size (mm) DC	RE	LF	DCONMS	LB2	LH	BD3	LS	θn	Shape	Inserts
Regular	ABPF06S10	●	1	6	3	80	10	15	30	5.4	50	4.3°	A	ZPFG06N-SH ZDFG06N-S□
	ABPF08S12	●	1	8	4	100	12	10	22	7.5	78	6.4°	A	ZPFG080-SH ZDFG080-S□
	ABPF10S12	●	1	10	5	100	12	13	25	9.5	75	2.9°	A	ZPFG100-SH ZDFG100-S□
	ABPF12S12	●	1	12	6	110	12	15	30	11.5	80	—	B	ZPFG120-SH ZDFG120-S□
	ABPF16S20	●	1	16	8	130	20	27	50	15	80	2.8°	A	ZPFG160-SH ZDFG160-S□
	ABPF20S25	●	1	20	10	140	25	35	60	19	80	2.9°	A	ZPFG200-SH ZDFG200-S□
	ABPF25S32	●	1	25	12.5	150	32	43	70	24	80	3.5°	A	ZPFG250-SH ZDFG250-S□
	ABPF30S32	●	1	30	15	160	32	55	80	29	80	1.2°	A	ZPFG300-SH ZDFG300-S□
	ABPF32S32	●	1	32	16	160	32	58	80	31	80	—	B	ZPFG320(-G□) ZDFG320-W□
Under neck long	ABPF08S12L	●	1	8	4	130	12	10	50	7.5	80	2.5°	A	ZPFG080-SH ZDFG080-S□
	ABPF10S16L	●	1	10	5	150	16	13	50	9.5	100	3.9°	A	ZPFG100-SH ZDFG100-S□
	ABPF12S16L	●	1	12	6	160	16	15	60	10.8	100	2.2°	A	ZPFG120-SH ZDFG120-S□
	ABPF16S20L	●	1	16	8	160	20	27	65	15	95	2.1°	A	ZPFG160-SH ZDFG160-S□
	ABPF20S25L	●	1	20	10	180	25	35	80	19	100	2.1°	A	ZPFG200-SH ZDFG200-S□
	ABPF20S20L120	●	1	20	10	220	20	35	120	19	100	—	B	
	ABPF20S20L150	●	1	20	10	250	20	35	150	19	100	—	B	
	ABPF25S32L	●	1	25	12.5	200	32	43	90	24	110	2.6°	A	ZPFG250-SH ZDFG250-S□
	ABPF25S32L150	●	1	25	12.5	250	32	43	150	24	100	1.5°	B	
	ABPF30S32L	●	1	30	15	220	32	55	100	29	120	0.7°	A	ZPFG300-SH ZDFG300-S□
	ABPF30S32L150	●	1	30	15	250	32	55	150	29	100	0.5°	B	
	ABPF30S32L200	●	1	30	15	300	32	55	200	29	100	0.3°	B	
	ABPF32S32L	●	1	32	16	220	32	58	100	31	120	—	B	ZPFG320(-G□) ZDFG320-W□

ABPF○○MT○

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



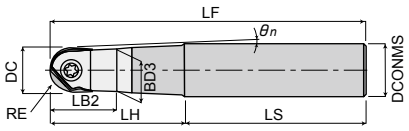
Item code	Stock	No.of inserts	Size (mm) DC	RE	MT No.	OAL	LB2	LF	LS	DCONMS	BD3	a	i	CRKS	Inserts
ABPF20MT2	●	1	20	10	MT2	129	35	65	64	17.78	19	5	24	M10	ZPFG200-SH ZDFG200-S□
ABPF25MT3	●	1	25	12.5	MT3	166	43	85	81	23.825	24	5	28	M12	ZPFG250-SH ZDFG250-S□
ABPF30MT4	●	1	30	15	MT4	217.5	55	115	102.5	31.267	29	6.5	32	M16	ZPFG300-SH ZDFG300-S□
ABPF32MT4	●	1	32	16	MT4	217.5	58	115	102.5	31.267	31	6.5	32	M16	ZPFG320(-G□) ZDFG320-W□

Line Up

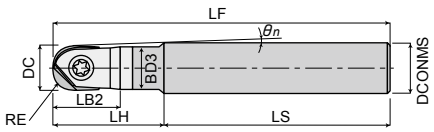
Carbide shank

ABPF○○S○○W(□/□○○○)

Numeric figure in a circle ○ and
Alphabetical character comes in a square □.



Type A (Taper neck)



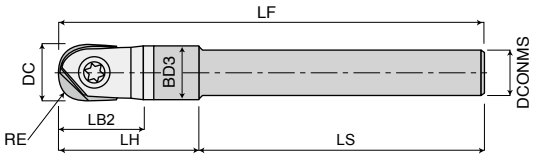
Type B (Straight neck)

Item code	Stock	No.of inserts	Size (mm)									Shape	Inserts
			DC	RE	LF	DCONMS	LB2	LH	BD3	LS	θn		
ABPF06S06W	●	1	6	3	90	6	10.3	25	5.5	65	—	B	ZPFG06N-SH
ABPF06S06WL65	●	1	6	3	120	6	10.3	65	5.5	55	—	B	ZDFG06N-S□
ABPF08S08W-90-25	●	1	8	4	90	8	25	25	7.5	65	—	B	
ABPF08S08W	●	1	8	4	100	8	30	30	7.5	70	—	B	
ABPF08S08W-115-50	●	1	8	4	115	8	50	50	7.5	65	—	B	
ABPF08S08WL	●	1	8	4	130	8	65	65	7.5	65	—	B	ZPFG080-SH
ABPF08S08W-140-75	●	1	8	4	140	8	75	75	7.5	65	—	B	ZDFG080-S□
ABPF08S08WL95	●	1	8	4	160	8	95	95	7.5	65	—	B	
ABPF08S08W-175-110	●	1	8	4	175	8	110	110	7.5	65	—	B	
ABPF08S12WLT75		1	8	4	140	12	14	75	7.5	65	1.62°	A	
ABPF10S10W-90-25	●	1	10	5	90	10	18	25	9.5	65	—	B	
ABPF10S10W	●	1	10	5	100	10	18	35	9.5	65	—	B	
ABPF10S10W-115-50	●	1	10	5	115	10	18	50	9.5	65	—	B	
ABPF10S10WL	●	1	10	5	140	10	18	75	9.5	65	—	B	ZPFG100-SH
ABPF10S10WL95	●	1	10	5	160	10	18	95	9.5	65	—	B	ZDFG100-S□
ABPF10S10W-185-120	●	1	10	5	185	10	18	120	9.5	65	—	B	
ABPF10S10WL140	●	1	10	5	220	10	18	140	9.5	80	—	B	
ABPF10S12WLT75		1	10	5	140	12	18	75	9.5	65	0.82°	A	
ABPF12S12W-95-30	●	1	12	6	95	12	21	30	11.5	65	—	B	
ABPF12S12W	●	1	12	6	110	12	21	45	11.5	65	—	B	
ABPF12S12W-125-60	●	1	12	6	125	12	21	60	11.5	65	—	B	
ABPF12S12WL	●	1	12	6	150	12	21	85	11.5	65	—	B	ZPFG120-SH
ABPF12S12WL100	●	1	12	6	200	12	21	100	11.5	100	—	B	ZDFG120-S□
ABPF12S12WL120	●	1	12	6	200	12	21	120	11.5	80	—	B	
ABPF12S12WL150	●	1	12	6	220	12	21	150	11.5	70	—	B	
ABPF12S16WLT85		1	12	6	150	16	21	85	11.5	65	1.45°	A	
ABPF16S16W-105-35	●	1	16	8	105	16	27	35	15	70	—	B	
ABPF16S16W-120-50	●	1	16	8	120	16	27	50	15	70	—	B	
ABPF16S16W60	●	1	16	8	130	16	27	60	15	70	—	B	
ABPF16S16WL80	●	1	16	8	160	16	27	80	15	80	—	B	
ABPF16S16WL100	●	1	16	8	200	16	27	100	15	100	—	B	ZPFG160-SH
ABPF16S16WE	●	1	16	8	200	16	27	120	15	80	—	B	ZDFG160-S□
ABPF16S16WE150	●	1	16	8	220	16	27	150	15	70	—	B	
ABPF16S16W-250-180	●	1	16	8	250	16	27	180	15	70	—	B	
ABPF16S20WLT100		1	16	8	165	20	27	100	15	65	1.25°	A	
ABPF20S20W-120-40	●	1	20	10	120	20	35	40	19	80	—	B	
ABPF20S20W-140-60	●	1	20	10	140	20	35	60	19	80	—	B	
ABPF20S20W80	●	1	20	10	160	20	35	80	19	80	—	B	
ABPF20S20WL100	●	1	20	10	220	20	35	100	19	120	—	B	
ABPF20S20WL120	●	1	20	10	220	20	35	120	19	100	—	B	ZPFG200-SH
ABPF20S20WE	●	1	20	10	250	20	35	150	19	100	—	B	ZDFG200-S□
ABPF20S20W-270-190	●	1	20	10	270	20	35	190	19	80	—	B	
ABPF20S20WE220	●	1	20	10	300	20	35	220	19	80	—	B	
ABPF20S25WLT115		1	20	10	195	25	35	115	19	80	1.37°	A	
ABPF25S25W-130-50	●	1	25	12.5	130	25	43	50	24	80	—	B	
ABPF25S25W-160-80	●	1	25	12.5	160	25	43	80	24	80	—	B	
ABPF25S25W100	●	1	25	12.5	220	25	43	100	24	120	—	B	
ABPF25S25WL120	●	1	25	12.5	220	25	43	120	24	100	—	B	ZPFG250-SH
ABPF25S25WL150	●	1	25	12.5	250	25	43	150	24	100	—	B	ZDFG250-S□
ABPF25S25WE	●	1	25	12.5	300	25	43	190	24	110	—	B	
ABPF25S25W-300-220	●	1	25	12.5	300	25	43	220	24	80	—	B	
ABPF25S32WLT135		1	25	12.5	215	32	43	135	24	80	1.64°	A	
ABPF30S32W-160-80	●	1	30	15	160	32	55	80	29	80	—	B	
ABPF30S32W100	●	1	30	15	180	32	55	100	29	80	0.7°	B	
ABPF30S32W120	●	1	30	15	220	32	55	120	29	100	0.6°	B	
ABPF30S32WL150	●	1	30	15	250	32	55	150	29	100	0.4°	B	ZPFG300-SH
ABPF30S32W-260-180	●	1	30	15	260	32	55	180	29	80	—	B	ZDFG300-S□
ABPF30S32W-290-210	●	1	30	15	290	32	55	210	29	80	—	B	
ABPF30S32WE	●	1	30	15	350	32	55	230	29	120	0.3°	B	
ABPF30S32WLT160		1	30	15	240	32	55	160	29	80	0.4°	A	
ABPF32S32W120	●	1	32	16	200	32	58	120	31	80	—	B	ZPFG320(-G□)
ABPF32S32WL150	●	1	32	16	250	32	58	150	31	100	—	B	ZDFG320-W□
ABPF32S32WE220	●	1	32	16	300	32	58	220	31	80	—	B	

●: Stocked Items. No Mark: Manufactured upon request only.

ABPFU○○W○○○ Under neck type

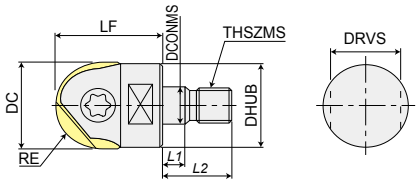
Numeric figure in a circle ○ and Alphabetical character comes in a square □.



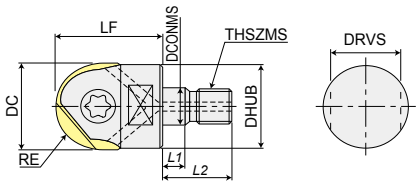
Item code	Stock	No.of inserts	Size (mm)								Inserts	
			DC	RE	LF	DCONMS	LB2	LH	BD3	LS		
ABPFU16W220	●	1	16	8	220	15	27	39	15	181	ZPFG160-SH	ZDFG160-S□
ABPFU20W270	●	1	20	10	270	18	35	51	19	219	ZPFG200-SH	ZDFG200-S□
ABPFU25W300	●	1	25	12.5	300	23	43	61	24	239	ZPFG250-SH	ZDFG250-S□
ABPFU30W300	●	1	30	15	300	28	55	73	29	227	ZPFG300-SH	ZDFG300-S□

Modular Mill Type ABPFM○○

Numeric figure in a circle ○ and Alphabetical character comes in a square □.



Item code	Stock	No.of inserts	Size (mm)									Inserts	
			DC	RE	LF	DCONMS	THSZMS	DHUB	*L1*	*L2*	DRVS		
ABPFM10	●	1	10	5	26	6.5	M6	9.8	5.5	14.5	7	ZPFG100-SH	ZDFG100-S□
ABPFM12	●	1	12	6	26	6.5	M6	9.8	5.5	14.5	7	ZPFG120-SH	ZDFG120-S□
ABPFM16	●	1	16	8	32	8.5	M8	12.8	5.5	17	10	ZPFG160-SH	ZDFG160-S□
ABPFM20	●	1	20	10	38	10.5	M10	17.8	5.5	19	15	ZPFG200-SH	ZDFG200-S□
ABPFM25	●	1	25	12.5	38	12.5	M12	20.8	5.5	22	17	ZPFG250-SH	ZDFG250-S□
ABPFM30	●	1	30	15	43	17	M16	28.8	6	23	22	ZPFG300-SH	ZDFG300-S□
ABPFM32	●	1	32	16	43	17	M16	28.8	6	23	22	ZPFG320(-G□)	ZDFG320-W□



With air hole

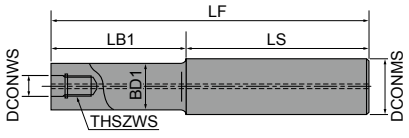
Item code	Stock	No.of inserts	Size (mm)									Inserts	
			DC	RE	LF	DCONMS	THSZMS	DHUB	*L1*	*L2*	DRVS		
ABPFM10-M6H	●	1	10	5	26	6.5	M6	9.8	5.5	14.5	7	ZPFG100-SH	ZDFG100-S□
ABPFM12-M6H	●	1	12	6	26	6.5	M6	9.8	5.5	14.5	7	ZPFG120-SH	ZDFG120-S□
ABPFM16-M8H	●	1	16	8	32	8.5	M8	12.8	5.5	17	10	ZPFG160-SH	ZDFG160-S□
ABPFM20-M10H	●	1	20	10	38	10.5	M10	17.8	5.5	19	15	ZPFG200-SH	ZDFG200-S□
ABPFM25-M12H	●	1	25	12.5	38	12.5	M12	20.8	5.5	22	17	ZPFG250-SH	ZDFG250-S□
ABPFM30-M16H	●	1	30	15	43	17	M16	28.8	6	23	22	ZPFG300-SH	ZDFG300-S□

[Note] Do not apply lubricants such as grease, etc. to the “contact faces” and “modular screws” of the “modular mill”, “dedicated shanks” and “dedicated arbor”.

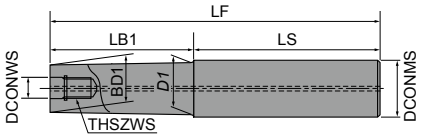
●: Stocked Items. No Mark: Manufactured upon request only.

The Shanks for Modular Mill

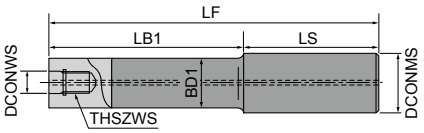
Carbide Shank



A type



B type



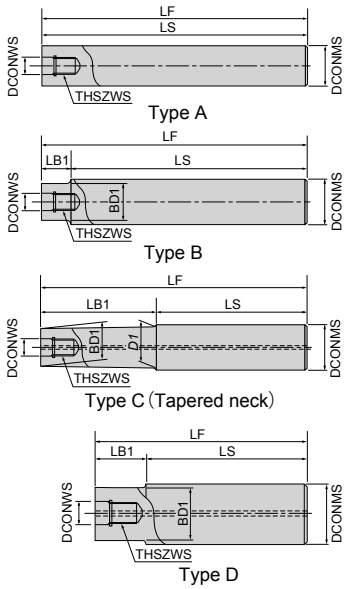
C type

Item code	Stock	Size (mm)								Type	Cutter body	With/ without air hole
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	*D1*			
ASC10-6.5-74-24Z	●	**6.5**	M6	74	24	50	9.3	10	–	A	ϕ10	○
ASC10-6.5-84-34Z	●			84	34	50						
ASC10-6.5-114-49Z	●			114	49	65						
ASC10-6.5-114-24Z	●				24	90						
ASC12-6.5-74-24Z	●	**6.5**	M6	74	24	50	11	12	11.5	B	ϕ10 ϕ12	○
ASC12-6.5-94-44Z	●			94	44	50						
ASC12-6.5-129-64Z	●			129	64	65						
ASC12-6.5-129-24Z	●				24	105						
ASC16-8.5-95-30Z	●	**8.5**	M8	95	30	65	14.5	16	15.5	B	ϕ16	○
ASC16-8.5-120-55Z	●			120	55	65						
ASC16-8.5-140-75Z	●			140	75	65						
ASC16-8.5-160-95Z	●			160	95	65						
ASC16-8.5-160-30Z	●			160	30	130						
ASC20-10.5-120-50Z	●	**10.5**	M10	120	50	70	18.5	20	19.5	B	ϕ20	○
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	B	ϕ20	○
ASC20-10.5-270-50Z	●			270		220						
ASC25-12.5-145-65	●	**12.5**	M12	145	65	80	23	25	–	C	ϕ25	○
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	–	C	ϕ25	○
ASC25-12.5-315-65	●			315		250						
ASC32-17-160-80	●	**17**	M16	160	80	80	28	32	–	C	ϕ32	○
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	–	C	ϕ32	○
ASC32-17-310-80	●			310		230						
ASC32-17-360-80	●			360		280						

【Note】Commercial milling chucks or shrink-fit holders can be used.

The Shanks for Modular Mill

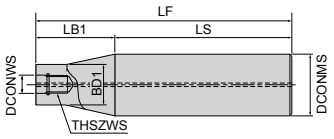
Steel Shank



Item code	Stock	Size (mm)								Shape	Cutter body
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	*D1*		
AS10-6.5-74-0	●	6.5	M6	74	—	74	—	10	—	A	ϕ10
AS12-6.5-84-4	●	6.5	M6	84	4	80	11	12	—	B	ϕ12
AS16-8.5-95-15	●	8.5	M8	95	15	80	14.5	16	15.5	C	ϕ16
AS20-10.5-100-20	●	10.5	M10	100	20	80	18	20	—	D	ϕ20
AS25-12.5-115-35	●	12.5	M12	115	35	80	23	25	—	D	ϕ25
AS32-17-110-30	●	17	M16	110	30	80	28	32	—	D	ϕ30 ϕ32

【Note】Commercial milling chucks can be used.

Steel Shank

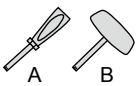


Item code	Stock	Size (mm)							Cutter body
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	
AS42-17-360-90	●	17	M16	360	90	270	28	42	ϕ30 ϕ32

【Note】Commercial milling chucks can be used.

Parts

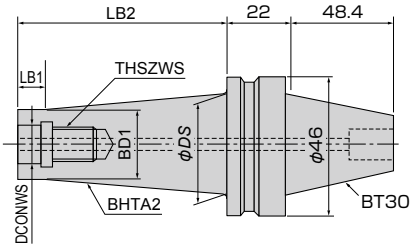
Numeric figure in a circle ◌.

Parts / Shape / Cutter Body	Clamp screw		Screw driver / Wrench		Screw anti-seizure agent
		Fastening torque (N・m)	 A B	Shape	
ABPF06S◌◌(W/WL◌◌)	581-140	0.5	104-T6	A	P-37
ABPF08S◌◌(L/W/WL/WL◌◌◌/WLT◌◌)	581-141	1.1	104-T8	A	
ABPF10S◌◌(L/W/WL/WL◌◌◌/WLT◌◌) ABPFM10(−M6H)	581-142	2.2	104-T10	A	
ABPF12S◌◌(L/W/WL/WL◌◌◌/WLT◌◌) ABPFM12(−M6H)	581-143	4.9	105-T20	B	
ABPF16S◌◌(L/W◌◌/WL◌◌◌/WE/WE◌◌◌/WLT◌◌◌) ABPFU16W220 ABPFM16(−M8H)	581-144	4.9			
ABPF20S◌◌(L/W◌◌/WL◌◌◌/WE/WE◌◌◌/WLT◌◌◌) ABPF20MT2 ABPFU20W270 ABPFM20(−M10H)	581-145	6.9	101-T25S	B	
ABPF25S◌◌(L/W◌◌/WL◌◌◌/WE/WE◌◌◌/WLT◌◌◌) ABPF25MT3 ABPFU25W300 ABPFM25(−M12H)	581-146	9.8	105-T30A	B	
ABPF30S◌◌(L/W◌◌/WL◌◌◌/WE/WE◌◌◌/WLT◌◌◌) ABPF30MT4 ABPFU30W300 ABPFM30(−M16H)	581-147	9.8			
ABPF32S◌◌(L/W◌◌◌/WL◌◌◌/WE◌◌◌) ABPF32MT4 ABPFM32	581-147	9.8			

【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.

Modular Mill Arbor

BT30

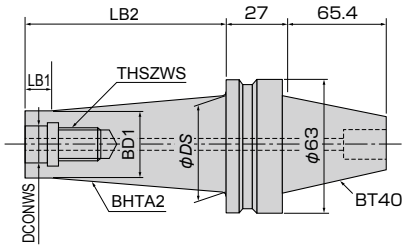


※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size (mm)						
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2
BT30-6.5-30-9.7		6.5	M6	9.7	25	30	5	17°
BT30-6.5-55-9.7						55	10	9.6°
BT30-6.5-85-9.7						80	10	6.2°
BT30-8.5-25-15		8.5	M8	15	30	25	5	20.6°
BT30-8.5-50-15						50	10	10.6°
BT30-8.5-75-15						75	10	6.6°
BT30-10.5-20-18		10.5	M10	18	35	20	5	29.5°
BT30-10.5-45-18						45	10	13.7°
BT30-10.5-70-18						70	10	8.1°
BT30-12.5-15-21		12.5	M12	21	40	15	5	32.3°
BT30-12.5-40-21						40	10	17.6°
BT30-12.5-65-21						65	10	9.8°
BT30-12.5-85-21						85	10	7.2°
BT30-17-10-28		17	M16	28	40	10	5	31°
BT30-17-35-28						35	10	13.5°
BT30-17-60-28						60	10	6.8°

【Note】If vibrations are a concern due to the processing conditions, adjust conditions by 1.reducing cutting depth (*a*p) or 2.reducing per-flute feed rate (*f*z).

BT40



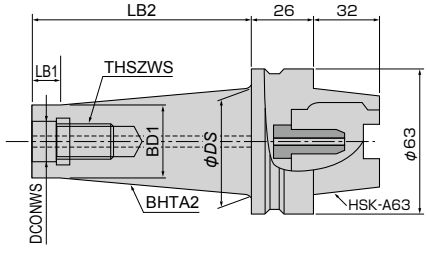
※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size (mm)						
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2
BT40-6.5-30-9.7		6.5	M6	9.7	25	30	5	17°
BT40-6.5-55-9.7						55	10	9.6°
BT40-6.5-80-9.7						80	10	6.2°
BT40-6.5-130-9.7						130	10	3.6°
BT40-8.5-25-15		8.5	M8	15	30	25	5	20.6°
BT40-8.5-50-15						50	10	10.6°
BT40-8.5-75-15						75	10	6.6°
BT40-8.5-125-15						125	10	3.7°
BT40-10.5-20-18		10.5	M10	18	35	20	5	29.5°
BT40-10.5-45-18						45	10	13.7°
BT40-10.5-70-18						70	10	8.1°
BT40-10.5-120-18						120	10	4.4°
BT40-12.5-15-21		12.5	M12	21	40	15	5	32.3°
BT40-12.5-40-21						40	10	17.6°
BT40-12.5-65-21						65	10	9.8°
BT40-12.5-115-21						115	10	5.2°
BT40-17-10-28		17	M16	28	48	10	5	45°
BT40-17-35-28						35	10	21.8°
BT40-17-60-28						60	10	11.3°
BT40-17-110-28						110	10	5.7°

【Note】If vibrations are a concern due to the processing conditions, adjust conditions by 1.reducing cutting depth (*a*p) or 2.reducing per-flute feed rate (*f*z).

HSK

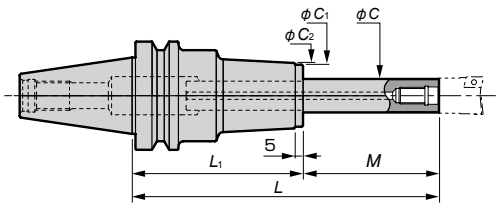
HSK Arbor
Modular Mill Type

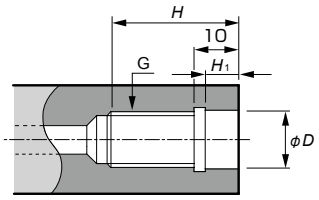


Item code	Stock	Size (mm)						
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2
HSK-A63-10.5-30-18	●	10.5	M10	18	20.8	30	–	3°
HSK-A63-10.5-70-18	●				25	70	10	3°
HSK-A63-10.5-70-18S					48	70	10	12°
HSK-A63-10.5-120-18	●				30.2	120	10	3°
HSK-A63-12.5-35-21	●	12.5	M12	21	24.3	35	–	3°
HSK-A63-12.5-65-21	●				27.5	65	10	3°
HSK-A63-12.5-65-21S					48	65	10	12°
HSK-A63-12.5-115-21	●				32.7	115	10	3°
HSK-A63-17-40-28	●	17	M16	28	31.8	40	–	3°
HSK-A63-17-60-28	●				33.9	60	10	3°
HSK-A63-17-60-28S					48	60	10	9.5°
HSK-A63-17-110-28	●				39.2	110	10	3°

● : Stocked items. No mark : Manufactured upon request only.

Red screw arbor





Dimensions for the Modular Mill mounting

■Caution

- Some of the indexable end mills cannot be attached to the RED screw arbor. Please check your indexable end mills for conformance to the dimensions, or please contact MOLDINO Tool Engineering, Ltd.
- Because cutting resistance is greater than the tool holder connection force associated with the machine spindle, please reduce the recommended cutting conditions by 50% for the RED screw arbors marked with ※. Otherwise, the tool holder shank may experience fretting corrosion or fall out of the machine spindle.

	Item Code	Stock	Size(mm) G	ϕD	H	H1	ϕC	L	M	L1	ϕC1	ϕC2	Weight (kg)	Rigidity value (μm) δ↓
BT40	BT40-RSG8-105-M25		M8	8.5	18	6.5	15	105	25	80	30	32	1.4	0.6
	BT40-RSG8-135-M25							135		110			1.8	0.7
	BT40-RSG8-165-M25							165		140			2.1	0.8
	BT40-RSG8-130-M50							130	50	80			1.4	1.5
	BT40-RSG8-160-M50							160		110			1.8	1.7
	BT40-RSG8-190-M50							190		140			2.1	1.8
	BT40-RSG8-155-M75							155	75	80			1.5	3.1
	BT40-RSG8-185-M75							185		110			1.9	3.4
	BT40-RSG8-215-M75							215		140			2.2	3.5
	BT40-RSG8-170-M90							170	90	140			1.5	4.5
	BT40-RSG8-200-M90							200		110			1.9	4.8
	BT40-RSG8-230-M90							230		140			2.2	4.9
	BT40-RSG8-185-M105							185	105	80			1.6	6.2
	BT40-RSG8-215-M105							215		110			2.0	6.7
	BT40-RSG8-245-M105							245		140			2.3	6.8
	BT40-RSG10-125-M25		M10	10.5	22	6.5	19	125	25	100	36	38	1.8	0.4
	BT40-RSG10-155-M25							155		130			2.2	0.5
	BT40-RSG10-185-M25							185		160			2.4	0.7
	BT40-RSG10-150-M50							150	50	100			1.9	0.8
	BT40-RSG10-180-M50							180		130			2.3	1.0
	BT40-RSG10-210-M50							210		160			2.5	1.2
	BT40-RSG10-175-M75							175	75	100			2.0	1.6
	BT40-RSG10-205-M75							205		130			2.4	1.8
	BT40-RSG10-235-M75							235		160			2.6	2.0
	BT40-RSG10-200-M100							200	100	100			2.0	2.7
	BT40-RSG10-230-M100							230		130			2.4	3.0
	BT40-RSG10-260-M100							260		160			2.6	3.3
	BT40-RSG10-220-M120							220	120	100			2.1	4.0
	BT40-RSG10-250-M120							250		130			2.5	4.3
	BT40-RSG10-280-M120							280		160			2.7	4.6
	BT40-RSG12-125-M25		M12	12.5	22	6	24	125	25	100	43	45	2.0	0.3
	BT40-RSG12-155-M25							155		130			2.4	0.4
	BT40-RSG12-185-M25							185		160			2.7	0.5
	BT40-RSG12-150-M50							150	50	100			2.1	0.5
	BT40-RSG12-180-M50							180		130			2.5	0.7
	BT40-RSG12-210-M50							210		160			2.8	0.9
	BT40-RSG12-175-M75							175	75	100			2.3	0.9
	BT40-RSG12-205-M75							205		130			2.7	1.1
	BT40-RSG12-235-M75							235		160			3.0	1.3
	BT40-RSG12-200-M100							200	100	100			2.4	1.4
	BT40-RSG12-230-M100							230		130			2.8	1.6
	BT40-RSG12-260-M100							260		160			3.1	1.9
BT40	BT40-RSG12-225-M125		M12	12.5	22	6	24	225	125	100	43	45	2.6	2.1
	BT40-RSG12-255-M125							255		130			3.0	2.4
	BT40-RSG12-285-M125							285		160			3.3	2.8
	BT40-RSG16-125-M25		M16	17	25	6	29	125	25	100	52	54	2.6	0.2
	BT40-RSG16-150-M50							150	50				2.8	0.3
	BT40-RSG16-175-M75							175	75				3.0	0.5
	BT40-RSG16-200-M100							200	100				3.2	0.8
	BT40-RSG16-225-M125 ※							225	125				3.4	1.2
BT50	BT50-RSG8-120-M25		M8	8.5	18	6.5	15	120	25	95	30	32	4.0	0.6
	BT50-RSG8-150-M25							150		125			4.3	0.7
	BT50-RSG8-180-M25							180		155			4.8	0.7
	BT50-RSG8-145-M50							145	50	95			4.0	1.5
	BT50-RSG8-175-M50							175		125			4.3	1.7
	BT50-RSG8-205-M50							205		155			4.8	1.7
	BT50-RSG8-170-M75							170	75	95			4.1	3.1
	BT50-RSG8-200-M75							200		125			4.4	3.4
	BT50-RSG8-230-M75							230		155			4.9	3.4
	BT50-RSG8-185-M90							185	90	155			4.9	4.4
	BT50-RSG8-215-M90							215		125			4.4	4.8
	BT50-RSG8-245-M90							245		155			4.9	4.8
	BT50-RSG8-200-M105							200	105	95			4.2	6.2
	BT50-RSG8-230-M105							230		125			4.5	6.6
	BT50-RSG8-260-M105							260		155			5.0	6.6
	BT50-RSG10-140-M25		M10	10.5	22	6.5	19	140	25	115	36	38	4.3	0.4
	BT50-RSG10-170-M25							170		145			4.6	0.5
	BT50-RSG10-200-M25							200		175			5.6	0.5
	BT50-RSG10-165-M50							165	50	115			4.4	0.8
	BT50-RSG10-195-M50							195		145			4.7	0.9
	BT50-RSG10-225-M50							225		175			5.7	1.0
	BT50-RSG10-190-M75							190	75	115			4.5	1.6
	BT50-RSG10-220-M75							220		145			4.8	1.7
	BT50-RSG10-250-M75							250		175			5.8	1.8
	BT50-RSG10-215-M100							215	100	115			4.5	2.7
	BT50-RSG10-245-M100							245		145			4.8	2.9
	BT50-RSG10-275-M100							275		175			5.8	2.9
	BT50-RSG10-235-M120							235	120	115			4.6	3.9
	BT50-RSG10-265-M120							265		145			4.9	4.2
	BT50-RSG10-295-M120							295		175			5.9	4.2
	BT50-RSG10-255-M140							255	140	115			4.7	5.5
	BT50-RSG10-285-M140							285		145			5.0	5.8
	BT50-RSG10-315-M140							315		175			6.0	5.8
	BT50-RSG12-140-M25		M12	12.5	22	6	24	140	25	115	43	45	4.6	0.2

No mark : Manufactured upon request only. Delivery time is about ten days after an order received.

Line Up

	Item Code	Stock	Size(mm) G	φD	H	H1	φC	L	M	L1	φC1	φC2	Weight (kg)	Rigidity value (μm) δ
BT50	BT50-RSG12-170-M25		M12	12.5	22	6	24	170	25	145	43	45	5.0	0.3
	BT50-RSG12-200-M25							200		175			5.8	0.4
	BT50-RSG12-165-M50							165	50	115			4.7	0.5
	BT50-RSG12-195-M50							195		145			5.1	0.6
	BT50-RSG12-225-M50							225		175			5.9	0.6
	BT50-RSG12-190-M75							190	75	115			4.9	0.8
	BT50-RSG12-220-M75							220		145			5.3	1.0
	BT50-RSG12-250-M75							250		175			6.1	1.0
	BT50-RSG12-215-M100							215	100	115			5.0	1.3
	BT50-RSG12-245-M100							245		145			5.4	1.5
	BT50-RSG12-275-M100							275		175			6.2	1.6
	BT50-RSG12-240-M125							240	125	115			5.2	2.1
	BT50-RSG12-270-M125							270		145			5.6	2.3
	BT50-RSG12-300-M125							300		175			6.4	2.4
	BT50-RSG12-265-M150							265	150	115			5.3	3.0
	BT50-RSG12-295-M150							295		145			5.7	3.3
	BT50-RSG12-325-M150							325		175			6.5	3.4
	BT50-RSG12-290-M175							290	175	115			5.5	4.2
	BT50-RSG12-320-M175							320		145			5.9	4.6
	BT50-RSG12-350-M175							350		175			6.7	4.6
	BT50-RSG16-140-M25		M16	17	25	6	29	140	25	115	52	54	4.8	0.2
	BT50-RSG16-170-M25							170		145			5.4	0.2
	BT50-RSG16-200-M25							200		175			6.6	0.2
	BT50-RSG16-165-M50							165	50	115			5.0	0.3
	BT50-RSG16-195-M50							195		145			5.6	0.4
	BT50-RSG16-225-M50							225		175			6.8	0.4
	BT50-RSG16-190-M75							190	75	115			5.3	0.5
	BT50-RSG16-220-M75							220		145			5.9	0.6
	BT50-RSG16-250-M75							250		175			7.0	0.6
	BT50-RSG16-215-M100							215	100	115			5.5	0.7
	BT50-RSG16-245-M100							245		145			6.1	0.9
	BT50-RSG16-275-M100							275		175			7.2	0.9
	BT50-RSG16-240-M125							240	125	115			5.7	1.1
	BT50-RSG16-270-M125							270		145			6.3	1.3
	BT50-RSG16-300-M125							300		175			7.4	1.3
	BT50-RSG16-265-M150							265	150	115			5.9	1.6
	BT50-RSG16-295-M150							295		145			6.5	1.8
	BT50-RSG16-325-M150							325		175			7.7	1.8
	BT50-RSG16-290-M175							290	175	115			6.1	2.2
	BT50-RSG16-320-M175							320		145			6.7	2.4
	BT50-RSG16-350-M175							350		175			7.9	2.5
	BT50-RSG16-315-M200							315	200	115			6.3	3.0
	BT50-RSG16-345-M200							345		145			6.9	3.2
	BT50-RSG16-375-M200							375		175			8.1	3.3
	BT50-RSG16-340-M225							340	225	115			6.5	3.9
	BT50-RSG16-370-M225							370		145			7.1	4.1
	BT50-RSG16-400-M225							400		175			8.3	4.2
A63	A63-RSG8-105-M25		M8	8.5	18	6.5	15	105	25	80	30	32	1.3	0.6
	A63-RSG8-135-M25							135		110			1.4	0.7
	A63-RSG8-165-M25							165		140			1.9	0.8
	A63-RSG8-130-M50							130	50	80			1.3	1.5

	Item Code	Stock	Size(mm) G	φD	H	H1	φC	L	M	L1	φC1	φC2	Weight (kg)	Rigidity value (μm) δ
A63	A63-RSG8-160-M50		M8	8.5	18	6.5	15	160	50	110	30	32	1.4	1.7
	A63-RSG8-190-M50							190		140			1.9	1.7
	A63-RSG8-155-M75							155	75	80			1.4	3.1
	A63-RSG8-185-M75							185		110			1.5	3.4
	A63-RSG8-215-M75							215		140			2.0	3.4
	A63-RSG8-170-M90							170	90	80			2.0	4.4
	A63-RSG8-200-M90							200		110			1.5	4.8
	A63-RSG8-230-M90							230		140			2.0	4.9
	A63-RSG8-185-M105							185	105	80			1.5	6.2
	A63-RSG8-215-M105							215		110			1.6	6.6
	A63-RSG8-245-M105							245		140			2.1	6.7
	A63-RSG10-125-M25		M10	10.5	22	6.5	19	125	25	100	36	38	1.6	0.4
	A63-RSG10-155-M25							155		130			1.9	0.5
	A63-RSG10-185-M25							185		160			2.3	0.6
	A63-RSG10-150-M50							150	50	100			1.7	0.8
	A63-RSG10-180-M50							180		130			2.0	1.0
	A63-RSG10-210-M50							210		160			2.4	1.2
	A63-RSG10-175-M75							175	75	100			1.8	1.6
	A63-RSG10-205-M75							205		130			2.1	1.8
	A63-RSG10-235-M75							235		160			2.5	2.0
	A63-RSG10-200-M100							200	100	100			1.8	2.7
	A63-RSG10-230-M100							230		130			2.1	2.9
	A63-RSG10-260-M100							260		160			2.5	3.2
	A63-RSG10-220-M120							220	120	100			1.9	4.0
	A63-RSG10-250-M120							250		130			2.2	4.2
	A63-RSG10-280-M120							280		160			2.6	4.5
	A63-RSG10-240-M140							240	140	100			2.0	5.6
	A63-RSG10-270-M140							270		130			2.3	5.9
	A63-RSG10-300-M140							300		160			2.7	6.2
	A63-RSG12-125-M25		M12	12.5	22	6	24	125	25	100	43	45	1.9	0.3
	A63-RSG12-155-M25							155		130			2.3	0.4
	A63-RSG12-185-M25							185		160			2.7	0.5
	A63-RSG12-150-M50							150	50	100			2.0	0.5
	A63-RSG12-180-M50							180		130			2.4	0.6
	A63-RSG12-210-M50							210		160			2.8	0.8
	A63-RSG12-175-M75							175	75	100			2.2	0.9
	A63-RSG12-205-M75							205		130			2.6	1.0
	A63-RSG12-235-M75							235		160			3.0	1.3
	A63-RSG12-200-M100							200	100	100			2.3	1.4
	A63-RSG12-230-M100							230		130			2.7	1.6
	A63-RSG12-260-M100							260		160			3.1	1.9
	A63-RSG12-225-M125							225	125	100			2.5	2.1
	A63-RSG12-255-M125							255		130			2.9	2.4
	A63-RSG12-285-M125							285		160			3.3	2.7
	A63-RSG12-250-M150							250	150	100			2.6	3.1
	A63-RSG12-280-M150							280		130			3.0	3.4
	A63-RSG12-310-M150							310		160			3.4	3.8
	A63-RSG16-140-M25		M16	17	25	6	29	140	25	115	52	54	2.8	0.2
	A63-RSG16-165-M50							165	50				3.2	0.4
	A63-RSG16-190-M75							190	75				3.6	0.6
	A63-RSG16-215-M100							215	100				2.8	0.9

No mark : Manufactured upon request only. Delivery time is about ten days after an order received.

	Item Code	Stock	Size(mm) G	φD	H	H1	φC	L	M	L1	φC1	φC2	Weight (kg)	Rigidity value (μm) δ
A63	A63-RSG16-240-M125 ※		M16	17	25	6	29	240	125	115	52	54	2.8	1.3
	A63-RSG16-265-M150 ※							265	150				3.2	1.9
	A63-RSG16-290-M175 ※							290	175				3.6	2.5
A100	A100-RSG8-120-M25		M8	8.5	18	6.5	15	120	25	95	30	32	2.6	0.6
	A100-RSG8-150-M25							150		125			2.9	0.8
	A100-RSG8-180-M25							180		155			3.4	0.8
	A100-RSG8-145-M50							145	50	95			2.6	1.5
	A100-RSG8-175-M50							175		125			2.9	1.7
	A100-RSG8-205-M50							205		155			3.4	1.7
	A100-RSG8-170-M75							170	75	95			2.7	3.1
	A100-RSG8-200-M75							200		125			3.0	3.4
	A100-RSG8-230-M75							230		155			3.5	3.4
	A100-RSG8-185-M90							185	90	95			2.7	4.5
	A100-RSG8-215-M90							215		125			3.0	4.9
	A100-RSG8-245-M90							245		155			3.5	4.8
	A100-RSG8-200-M105							200	105	95			2.8	6.3
	A100-RSG8-230-M105							230		125			3.1	6.7
	A100-RSG8-260-M105							260		155			3.6	6.6
	A100-RSG10-140-M25		M10	10.5	22	6.5	19	140	25	115	36	38	3.1	0.4
	A100-RSG10-170-M25							170		145			3.5	0.5
	A100-RSG10-200-M25							200		175			4.4	0.5
	A100-RSG10-165-M50							165	50	115			3.2	0.8
	A100-RSG10-195-M50							195		145			3.6	1.0
	A100-RSG10-225-M50							225		175			4.5	1.0
	A100-RSG10-190-M75							190	75	115			3.3	1.6
	A100-RSG10-220-M75							220		145			3.7	1.8
	A100-RSG10-250-M75							250		175			4.6	1.8
	A100-RSG10-215-M100							215	100	115			3.3	2.7
	A100-RSG10-245-M100							245		145			3.7	2.9
	A100-RSG10-275-M100							275		175			4.6	2.9
	A100-RSG10-235-M120							235	120	115			3.4	4.0
	A100-RSG10-265-M120							265		145			3.8	4.2
	A100-RSG10-295-M120							295		175			4.7	4.2
	A100-RSG10-255-M140							255	140	115			3.5	5.6
	A100-RSG10-285-M140							285		145			3.9	5.8
	A100-RSG10-315-M140							315		175			4.8	5.8
	A100-RSG12-140-M25		M12	12.5	22	6	24	140	25	115	43	45	3.4	0.3
	A100-RSG12-170-M25							170		145			3.7	0.4
	A100-RSG12-200-M25							200		175			4.7	0.4
	A100-RSG12-165-M50							165	50	115			3.5	0.5
	A100-RSG12-195-M50							195		145			3.8	0.6
	A100-RSG12-225-M50							225		175			4.8	0.6

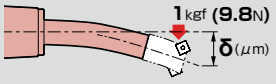
	Item Code	Stock	Size(mm) G	φD	H	H1	φC	L	M	L1	φC1	φC2	Weight (kg)	Rigidity value (μm) δ
A100	A100-RSG12-190-M75		M12	12.5	22	6	24	190	75	115	43	45	3.7	0.8
	A100-RSG12-220-M75							220		145			4.0	1.0
	A100-RSG12-250-M75							250		175			5.0	1.0
	A100-RSG12-215-M100							215	100	115			3.8	1.4
	A100-RSG12-245-M100							245		145			4.1	1.6
	A100-RSG12-275-M100							275		175			5.1	1.6
	A100-RSG12-240-M125							240	125	115			4.0	2.1
	A100-RSG12-270-M125							270		145			4.3	2.4
	A100-RSG12-300-M125							300		175			5.3	2.4
	A100-RSG12-265-M150							265	150	115			4.1	3.0
	A100-RSG12-295-M150							295		145			4.4	3.4
	A100-RSG12-325-M150							325		175			5.4	3.4
	A100-RSG12-290-M175							290	175	115			4.3	4.3
	A100-RSG12-320-M175							320		145			4.6	4.6
	A100-RSG12-350-M175							350		175			5.6	4.6
	A100-RSG16-140-M25		M16	17	25	6	29	140	25	115	52	54	4.0	0.2
	A100-RSG16-170-M25							170		145			4.5	0.2
	A100-RSG16-200-M25							200		175			5.7	0.2
	A100-RSG16-165-M50							165	50	115			4.2	0.3
	A100-RSG16-195-M50							195		145			4.7	0.4
	A100-RSG16-225-M50							225		175			5.9	0.4
	A100-RSG16-190-M75							190	75	115			4.5	0.5
	A100-RSG16-220-M75							220		145			5.0	0.6
	A100-RSG16-250-M75							250		175			6.1	0.6
	A100-RSG16-215-M100							215	100	115			4.7	0.8
	A100-RSG16-245-M100							245		145			5.2	0.9
	A100-RSG16-275-M100							275		175			6.3	0.9
	A100-RSG16-240-M125							240	125	115			4.9	1.1
	A100-RSG16-270-M125							270		145			5.4	1.3
	A100-RSG16-300-M125							300		175			6.5	1.3
	A100-RSG16-265-M150							265	150	115			5.1	1.6
	A100-RSG16-295-M150							295		145			5.6	1.8
	A100-RSG16-325-M150							325		175			6.7	1.8
	A100-RSG16-290-M175							290	175	115			5.3	2.2
	A100-RSG16-320-M175							320		145			5.8	2.4
	A100-RSG16-350-M175							350		175			7.0	2.5
	A100-RSG16-315-M200							315	200	115			5.5	3.0
	A100-RSG16-345-M200							345		145			6.0	3.2
	A100-RSG16-375-M200							375		175			7.2	3.3
	A100-RSG16-340-M225							340	225	115			5.7	3.9
	A100-RSG16-370-M225							370		145			6.3	4.2
	A100-RSG16-400-M225							400		175			7.4	4.2

■ Standard accessories ●Coolant duct(HSK)

■ Caution
- ●The Modular Mill is not a standard accessory.
- ●Pull stud is not a standard accessory.
- ●Please check your Modular Mills for conformance to the dimensions.

δ About the rigidity value

A rigidity value represents the amount of deflection for the entire holder and tool when a bending load of 1 kgf (9.8 N) is applied to the tip of the tool. The smaller the numerical value is, the higher the rigidity and the more accurate the machining.



Recommended Cutting Conditions

※ Red indicates primary recommended insert grades.

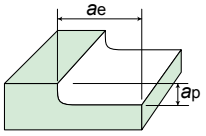
Work material	Recommended inserts grade		Cutting conditions	φ6			φ8			φ10			φ12		
				Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing
	High helix edge shape	Standard		General purpose	High-speed processing		General purpose	High-speed processing		General purpose	High-speed processing		General purpose	High-speed processing	
Carbon steels Alloy steels (30HRC or less)	※ PN08M PN15M TH303 ATH80D ATH10E	ACS05E (PCA12M PCA08M)	*n* (min^{-1})	8,490	16,450	16,450	6,370	12,340	12,340	5,100	9,240	11,150	4,250	7,170	10,080
			Vc (m/min)	160	310	310	160	310	310	160	290	350	160	270	380
			Vf (mm/min)	1,700	4,930	3,290	2,550	9,870	4,940	2,040	7,390	4,460	1,700	5,740	4,030
			fz (mm/t)	0.1	0.15	0.1	0.2	0.4	0.2	0.2	0.4	0.2	0.2	0.4	0.2
			ap (mm)	0.1	0.05	0.05	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
			ae (mm)	0.6	0.6	0.2	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
Carbon steels Alloy steels (30～45HRC)	PN08M PN15M TH303 ATH80D	ACS05E (PCA12M PCA08M)	*n* (min^{-1})	6,370	14,320	14,320	4,780	10,750	10,750	3,820	7,640	9,550	3,180	6,100	8,760
			Vc (m/min)	120	270	270	120	270	270	120	240	300	120	230	330
			Vf (mm/min)	1,270	4,300	2,860	1,910	8,600	4,300	1,530	6,110	3,820	1,270	4,880	3,500
			fz (mm/t)	0.1	0.15	0.1	0.2	0.4	0.2	0.2	0.4	0.2	0.2	0.4	0.2
			ap (mm)	0.1	0.05	0.05	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
			ae (mm)	0.6	0.6	0.2	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
Cast irons	ATH10E TH303 ATH80D PN08M PN15M	ACS05E (ATH80D PTH08M PCA12M PCA08M)	*n* (min^{-1})	8,490	16,450	16,450	6,370	12,340	12,340	5,090	9,240	11,150	4,240	7,170	10,080
			Vc (m/min)	160	310	310	160	310	310	160	290	350	160	270	380
			Vf (mm/min)	1,700	6,580	3,290	3,820	14,810	4,940	3,050	11,090	6,690	2,550	8,600	6,050
			fz (mm/t)	0.1	0.2	0.1	0.3	0.6	0.2	0.3	0.6	0.3	0.3	0.6	0.3
			ap (mm)	0.1	0.05	0.05	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
			ae (mm)	0.6	0.6	0.2	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
Graphite	HD7010 ATH10E	HD7010	*n* (min^{-1})	15,920	21,220	21,220	11,940	15,920	15,920	9,550	12,740	12,740	7,960	10,620	10,620
			Vc (m/min)	300	400	400	300	400	400	300	400	400	300	400	400
			Vf (mm/min)	3,180	6,370	4,240	4,780	9,550	6,370	3,820	7,640	5,100	3,190	6,370	4,240
			fz (mm/t)	0.1	0.15	0.1	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.3	0.2
			ap (mm)	0.3	0.15	0.15	0.4	0.2	0.2	0.5	0.3	0.2	0.6	0.4	0.2
			ae (mm)	0.6	0.6	0.2	0.8	0.8	0.25	1.0	0.8	0.25	1.2	0.9	0.3
Cast aluminum alloys AC4A, ADC12 etc	HD7010 PN08M	HD7010	*n* (min^{-1})	15,920	26,530	26,530	11,940	19,900	19,900	9,550	15,920	15,920	7,960	13,270	13,270
			Vc (m/min)	300	500	500	300	500	500	300	500	500	300	500	500
			Vf (mm/min)	3,180	10,610	5,310	4,780	15,920	7,960	3,820	12,740	6,370	3,190	10,620	5,310
			fz (mm/t)	0.1	0.2	0.1	0.2	0.4	0.2	0.2	0.4	0.2	0.2	0.4	0.2
			ap (mm)	0.3	0.15	0.15	0.4	0.2	0.2	0.5	0.3	0.2	0.6	0.4	0.2
			ae (mm)	0.6	0.6	0.2	0.8	0.8	0.25	1.0	0.8	0.25	1.2	0.9	0.3
Hardened steels 45～55HRC	TH303 ATH80D PN15M PN08M	ATH80D (PTH08M PCA12M PCA08M ACS05E)	*n* (min^{-1})	5,310	12,200	12,200	3,980	9,160	9,160	3,180	6,690	8,280	2,650	5,310	7,700
			Vc (m/min)	100	230	230	100	230	230	100	210	260	100	200	290
			Vf (mm/min)	850	2,440	2,440	800	3,660	3,660	640	2,680	3,310	530	2,120	3,080
			fz (mm/t)	0.08	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2
			ap (mm)	0.1	0.05	0.05	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
			ae (mm)	0.6	0.6	0.2	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
Hardened steels 55～62HRC	TH303 ATH80D	ATH80D (PTH08M)	*n* (min^{-1})	4,240	9,550	9,550	3,180	7,170	7,170	2,550	5,410	6,370	2,120	4,250	6,100
			Vc (m/min)	80	180	180	80	180	180	80	170	200	80	160	230
			Vf (mm/min)	680	1,910	1,910	640	2,870	2,870	510	2,160	2,550	420	1,700	2,440
			fz (mm/t)	0.08	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2
			ap (mm)	0.1	0.05	0.05	0.2	0.1	0.1	0.25	0.15	0.1	0.3	0.2	0.1
			ae (mm)	0.6	0.6	0.2	0.8	0.8	0.25	1	0.8	0.25	1.2	0.9	0.3
Maximum *fz* (mm/t)				＜0.2			＜0.8			＜0.8			＜0.8		
Maximum *ap* (mm)				＜3.0			＜4.0			＜5.0			＜6.0		

【Note】 ①Use the appropriate coolant for the work material and machining shape.

②These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.

③Be sure to practice safety instructions and precautions such as wearing glasses and safety shoes, and placing safety covers when you use this tool. Because this tool can be broken during machining so failure to follow these instructions may cause personal injury.

④Never attempt to modify the carbide shank holder. In case of finish cut with overhang=3DC or more, please set cutting depth *a*p as below.
When DC=12mm or less, *a*p=0.2mm or less. When DC=16mm or more, *a*p=0.3mm or less.



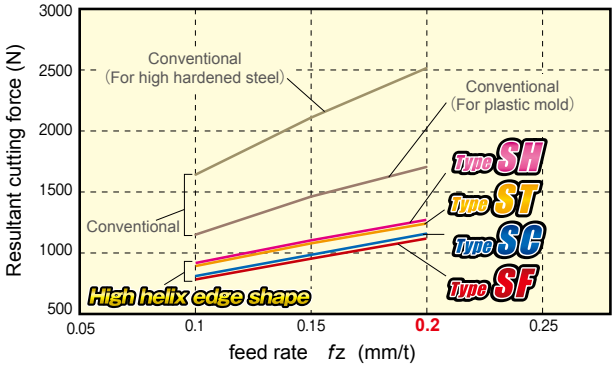
φ16			φ20			φ25			φ30			φ32			Work material
Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing	Semi Finishing		Finishing	
General purpose	High-speed processing		General purpose	High-speed processing		General purpose	High-speed processing		General purpose	High-speed processing		General purpose	High-speed processing		
3,180	4,180	9,950	2,550	3,340	9,080	2,040	2,680	8,030	1,700	2,230	7,640	1,590	2,090	7,170	Carbon steels Alloy steels (30HRC or less)
160	210	500	160	210	570	160	210	630	160	210	720	160	210	720	
1,590	4,180	5,970	1,280	3,340	7,260	1,020	2,680	8,030	850	2,230	9,170	800	2,090	8,600	
0.25	0.5	0.3	0.25	0.5	0.4	0.25	0.5	0.5	0.25	0.5	0.6	0.25	0.5	0.6	
0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1	1.6	1.1	0.1	
1.6	1.1	0.35	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.5	3.2	2.4	0.5	
2,390	2,990	7,560	1,910	2,550	6,690	1,530	2,040	5,990	1,270	1,700	5,730	1,190	1,590	5,370	Carbon steels Alloy steels (30～45HRC)
120	150	380	120	160	420	120	160	470	120	160	540	120	160	540	
1,200	2,990	4,540	960	2,550	5,350	770	2,040	5,990	640	1,700	6,880	600	1,590	6,440	
0.25	0.5	0.3	0.25	0.5	0.4	0.25	0.5	0.5	0.25	0.5	0.6	0.25	0.5	0.6	
0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1	1.6	1.1	0.1	
1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6	3.2	2.4	0.6	
3,180	4,180	9,950	2,550	3,340	9,080	2,040	2,680	8,030	1,700	2,230	7,640	1,590	2,090	7,170	Cast irons
160	210	500	160	210	570	160	210	630	160	210	720	160	210	720	
2,230	5,850	5,970	1,790	4,680	7,260	1,430	3,750	8,030	1,190	3,120	9,170	1,110	2,930	8,600	
0.35	0.7	0.3	0.35	0.7	0.4	0.35	0.7	0.5	0.35	0.7	0.6	0.35	0.7	0.6	
0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1	1.6	1.1	0.1	
1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6	3.2	2.4	0.6	
5,970	7,960	7,960	4,780	6,370	6,370	3,820	5,090	5,090	3,180	4,240	4,240				Graphite
300	400	400	300	400	400	300	400	400	300	400	400				
2,990	4,780	3,980	2,390	3,820	3,190	1,910	5,090	5,090	1,590	4,240	5,090				
0.25	0.3	0.25	0.25	0.3	0.25	0.25	0.5	0.5	0.25	0.5	0.6				
0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1				
1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6				
5,970	9,950	9,950	4,780	7,960	7,960	3,820	6,370	6,370	3,180	5,310	5,310				Cast aluminum alloys AC4A, ADC12 etc
300	500	500	300	500	500	300	500	500	300	500	500				
2,990	7,960	4,980	2,390	6,370	3,980	1,910	6,370	6,370	1,590	5,310	6,370				
0.25	0.4	0.25	0.25	0.4	0.25	0.25	0.5	0.5	0.25	0.5	0.6				
0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1				
1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6				
1,990	2,990	6,970	1,590	2,390	6,370	1,270	1,910	5,730	1,060	1,590	5,310	1,000	1,490	4,980	Hardened steels 45～55HRC
100	150	350	100	150	400	100	150	450	100	150	500	100	150	500	
480	1,440	4,180	380	1,150	5,100	310	920	5,730	250	760	6,370	240	720	5,980	
0.12	0.24	0.3	0.12	0.24	0.4	0.12	0.24	0.5	0.12	0.24	0.6	0.12	0.24	0.6	
0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1	1.6	1.1	0.1	
1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6	3.2	2.4	0.6	
1,590	2,390	5,570	1,270	1,910	5,100	1,020	1,530	4,590	850	1,270	4,240	800	1,190	3,980	Hardened steels 55～62HRC
80	120	280	80	120	320	80	120	360	80	120	400	80	120	400	
380	1,150	3,340	300	920	4,080	240	730	4,590	200	610	5,090	190	570	4,780	
0.12	0.24	0.3	0.12	0.24	0.4	0.12	0.24	0.5	0.12	0.24	0.6	0.12	0.24	0.6	
0.8	0.6	0.1	1	0.7	0.1	1.25	0.9	0.1	1.6	1.1	0.1	1.6	1.1	0.1	
1.6	1.1	0.3	2	1.5	0.4	2.5	1.8	0.5	3.2	2.4	0.6	3.2	2.4	0.6	
＜1.0			＜1.0			＜1.0			＜1.0			＜1.0			Maximum f_z (mm/t)
＜8.0			＜10.0			＜12.5			＜15.0			＜16.0			Maximum a_p (mm)

※If overhang length is 3DC or more, make adjustments to the table above according to the table at right.

Overhang	v_c (m/min)	v_f (mm/min)
＜3DC	100%	100%
3DC～5DC	70%	70%
5DC～8DC	60%	60%
8DC～10DC	50%	50%

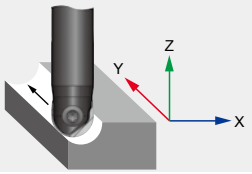
Cutting performance

01 Cutting force comparison between conventional edge shape and high helix one.



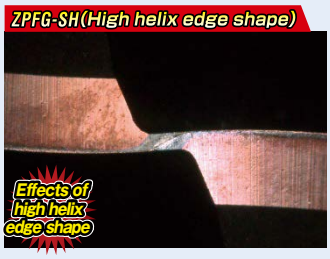
Cutting conditions

Work material : S50C (220HB)
Tool : Diameter ϕ30
v_c = 200m/min f_z=0.1, 0.15, 0.2mm/t
Axial depth of cut (a_p) =15mm
Radial depth of cut (a_e) =0.5mm



Type SH

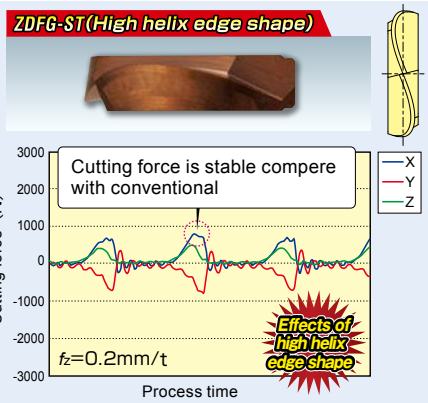
02 Strength comparison of tip chisel by heavy interrupted cutting test

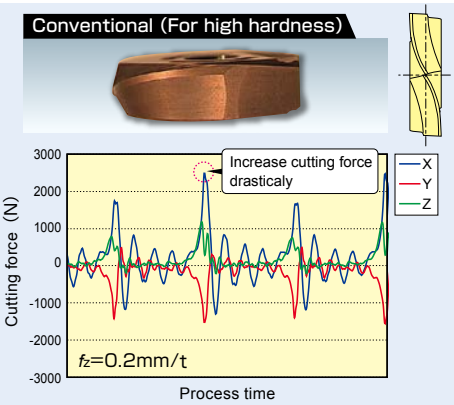


Cutting conditions

Work material : SKD11 (60HRC)
Tool : ABPFM25 (Diameter ϕ25)
Shank : ASC25-12.5-265-145 (Overhang : 183mm)
v_c = 314m/min (n=4,000min^{-1})
f_z=0.7mm/t (v_f=5,600mm/min)
Axial depth of cut (a_p)=0.5mm
Radial depth of cut (a_e)=1.0mm
Air

Type ST





Type SC

03 Comparison of performance with solid end mill and type SC

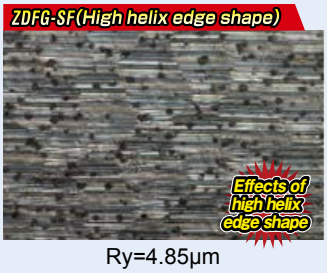
Improves chip discharge performance by high helix edge shape.
Good cutting surface on semi-finishing process.

Cutting conditions

Work material : S50C (220HB)
Tool : Diameter ϕ10
v_c = 200m/min (n=6,366min^{-1})
f_z=0.1mm/t (v_f=1,273mm/min)
Axial depth of cut (a_p)=0.5mm
Radial depth of cut (a_e)=2.0mm
Air

Type SF

04 Comparison of cutting surface with type SF and conventional

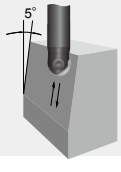


Ry=4.85μm

Ry=6.51μm

Cutting conditions

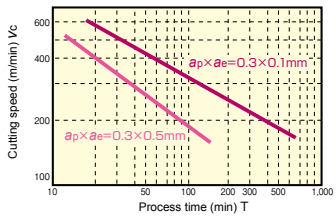
Work material : FCD700
Tool : ABPFM30 (Diameter ϕ30)
Shank : ASC32-17-260-140 (Overhang : 200mm)
Machine : Vertical type (BT50)
v_c=800m/min f_z=0.47mm/t
Radial depth of cut (a_e)=0.3mm
Pick feed (pf)=0.5mm
Cutting shape : 5° sloped surface



Field data

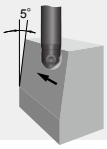
01 Vc-T chart for SKD11 (60HRC)

Type SH



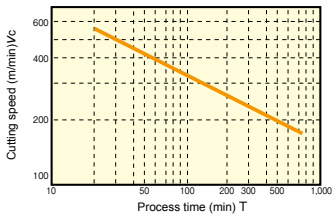
Cutting conditions

Work material : SKD11(60HRC)
Tool : ABPF25S25W100
Insert : ZPFG250-SH(TH303)
Overhang : 120mm
Feed rate : f_z=0.4mm/t
Radial depth of cut : a_p×a_e=0.3×0.1mm,
a_p×a_e=0.3×0.5mm
Machine : Vertical type(BT50)
Cutting shape : contouring cutting on the sloped face 5°
Air



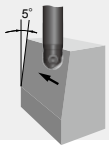
02 Vc-T chart for SKD11 (60HRC)

Type ST



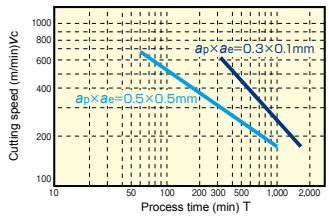
Cutting conditions

Work material : SKD11(60HRC)
Tool : ABPF30S32WL150
Insert : ZDFG300-ST (ATH80D)
Overhang : 150mm
Feed rate : f_z=0.3mm/t
Radial depth of cut : a_p×a_e=0.3×0.1mm
Machine : Vertical type(BT50)
Cutting shape : contouring cutting on the sloped face 5°
Air



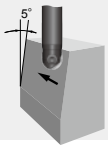
03 Vc-T chart for Pre-hardened steel (P21 40HRC)

Type SC



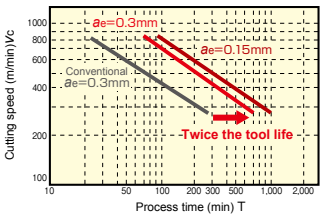
Cutting conditions

Work material : P21 (40HRC)
Tool : ABPFM20
Shank : ASC20-10.5-120-50Z
Insert : ZDFG200-SC (PN08M)
Overhang : 100mm
Feed rate : f_z=0.3mm/t
Radial depth of cut : a_p×a_e=0.3×0.1mm, a_p×a_e=0.5×0.5mm
Machine : Vertical type(BT50)
Cutting shape : contouring cutting on the sloped face 5°
Air



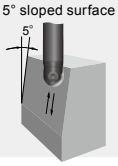
04 Vc-T chart for FCD700

Type SF



Cutting conditions

Work material : FCD700
V_c=Variable
Feed rate : f_z=0.47mm/t
Machine : Vertical type(BT50)
Tool : ABPFM30 (Diameter ϕ30)
Shank : ASC32-17-260-140
(Overhang : 200mm)
Insert : ZDFG300-SF (ATH10E)
Radial depth of cut (a_e)=0.15, 0.3mm
Pick feed (pf)=0.5mm
Cutting shape : 5° sloped surface
Air

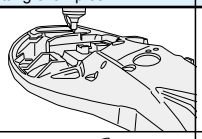
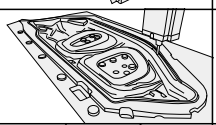
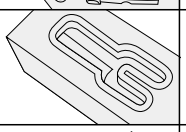
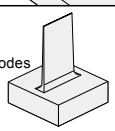
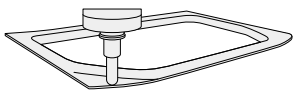
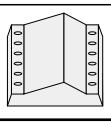


Comparative table of the conventional and new items.

Numeric figure comes in a circle ◌.

Conventional		Diameter		High helix edge shape inserts	
Item Code	Grade			Item Code	Grade
ZPFG◌◌◌	PTH08M	(ϕ8 ~ 30)	➡	ZDFG◌◌◌-ST	ATH80D
ZPFG◌◌◌	PCA08M		➡	ZDFG◌◌◌-SC	PN08M
ZPFG◌◌◌	PCA12M		➡	ZDFG◌◌◌-ST	PN15M
ZPFG◌◌◌-GH	ATH80D	(ϕ8 ~ 30)	➡	ZPFG◌◌◌-SH	TH303
ZPFG◌◌◌-GF	ACS05E		➡	ZDFG◌◌◌-SC	PN08M
ZPFG◌◌◌-GF	HD7010	(ϕ6 ~ 20)	➡	ZDFG◌◌◌-SF	HD7010
ZDFG◌◌◌-WH	ATH80D	(ϕ6 ~ 30)	➡	ZDFG◌◌◌-ST	ATH80D
ZDFG◌◌◌-WF	ACS05E	(ϕ6 ~ 30)	➡	ZDFG◌◌◌-SC	PN08M
	ACS05E	(ϕ16 ~ 30)	➡	ZDFG◌◌◌-SF	ATH10E

Field Data

Cutting examples	Cutting Conditions	Result
Frame hard steels (surface 55~60HRC) 	Tool : ABPF25S25W100 Work material : Frame hard steels(surface 55~60HRC) Insert : ZDFG250-ST(ATH80D) Machine : Gate type M/C(BT50) Cutting speed : V_c = 393m/min Revolution : n = 5,000min^{-1} Feed rate : V_f = 5,200mm/min Feed rate : f_z=0.52mm/t Depth of cut : a_p =0.1mm Pick feed : a_e =0.5mm Coolant : Dry	Still nomal wear even after 11 hours process. Improves the surface roughness than conventional.
Plastic mold (S50C) 	Tool : ABPF20S20WL100 Work material : S50C Insert : ZDFG200-SC(PN08M) Machine : Horizontal type M/C(BT50) Cutting speed : V_c = 251m/min Revolution : n = 4,000min^{-1} Feed rate : V_f = 2,000mm/min Feed rate : f_z=0.25mm/t Depth of cut : a_p =0.1mm Pick feed : a_e =0.4mm Coolant : Dry	Still nomal wear even after 15 hours process. Improves the surface roughness than conventional.
Press die (as FCD700) 	Tool : ABPF30S32W120 Work material : Material equivalent to FCD700 Insert : ZDFG300-SF(ATH10E) Machine : Gate type M/C(BT50) Cutting speed : V_c = 510m/min Revolution : n = 5,400min^{-1} Feed rate : V_f = 4,500mm/min Feed rate : f_z=0.42mm/t Depth of cut : a_p =0.2mm Pick feed : a_e =0.5mm Coolant : Dry	Finished surface is fine. Re-grinding is possible by nomal wear after process.
Forging die 	Tool : ABPF12S12W Work material : SKD61(45HRC) Insert : ZDFG120-ST (PN15M) Machine : Vertical type M/C(BT50) Cutting speed : V_c = 94m/min Revolution : n = 2,500min^{-1} Feed rate : V_f = 800mm/min Feed rate : f_z=0.16mm/t Depth of cut : a_p =0.3~0.5mm Pick feed : a_e =0.5mm Coolant : Dry	Nomal wear after overhang cutting (60mm L/D:5)
Machining of graphite electrodes 	Tool : ABPF10S10WL Work material : Graphite Insert : ZDFG100-SF(HD7010) Machine : Vertical type M/C(BT40) Cutting speed : V_c = 251m/min Revolution : n = 8,000min^{-1} Feed rate : V_f = 600mm/min Feed rate : f_z=0.038mm/t Depth of cut(Rough): a_p =3mm (Finishing): a_p =0.3mm Pick feed(Rough) : a_e =4mm (Finishing): a_e =0.1mm Coolant : Dry	Even for tool projection of 75mm (L/D: 7.5), roughing was stable resulting in good finished surface accuracy.
Ductile cast iron and frame hard steels 	Tool : ABPF30S32WL150 Work material : Ductile cast iron and frame hard steels(55HRC) Insert : ZPFG300-SH (TH303) Machine : Gate type M/C(BT50) Cutting speed : V_c = 471m/min Revolution : n = 5,000min^{-1} Feed rate : V_f = 5,000mm/min Feed rate : f_z=0.5mm/t Depth of cut : a_p =0.2mm Pick feed : a_e =2mm Coolant : Air	SH (TH 303) performed well with steady wear even in semi-finishing which conventional tool life was unstable. Finishing accuracy of next process was also stabilized.
SKD11(60HRC) 	Tool : ABPF30S32W120 Work material : SKD11(60HRC) Insert : ZPFG300-SH (TH303) Machine : Vertical type M/C(BT50) Cutting speed : V_c = 377m/min Revolution : n = 4,000min^{-1} Feed rate : V_f = 3,000mm/min Feed rate : f_z=0.38mm/t Depth of cut : a_p =0.2mm Pick feed : a_e =0.6mm Coolant : Dry	SH (TH303) stabilized tool life and could increase efficiency even in semi-finishing which conventional tool had to reduce cutting conditions. Finishing surface roughness is also good.

MOLDINO

The Edge To Innovation

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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