

HUAREAL
Efficient
Cutting Tools



Zhuzhou Huarui Precision Cutting Tools Co., Ltd.

Address: No.68 Chuangye 2nd RD., Lusong District, Zhuzhou, Hunan, P.R.China

Postal code: 412000

Tel.: 0731-28216690

Fax: 0731-22286653

Website: www.huareal.com.cn

2022-2023

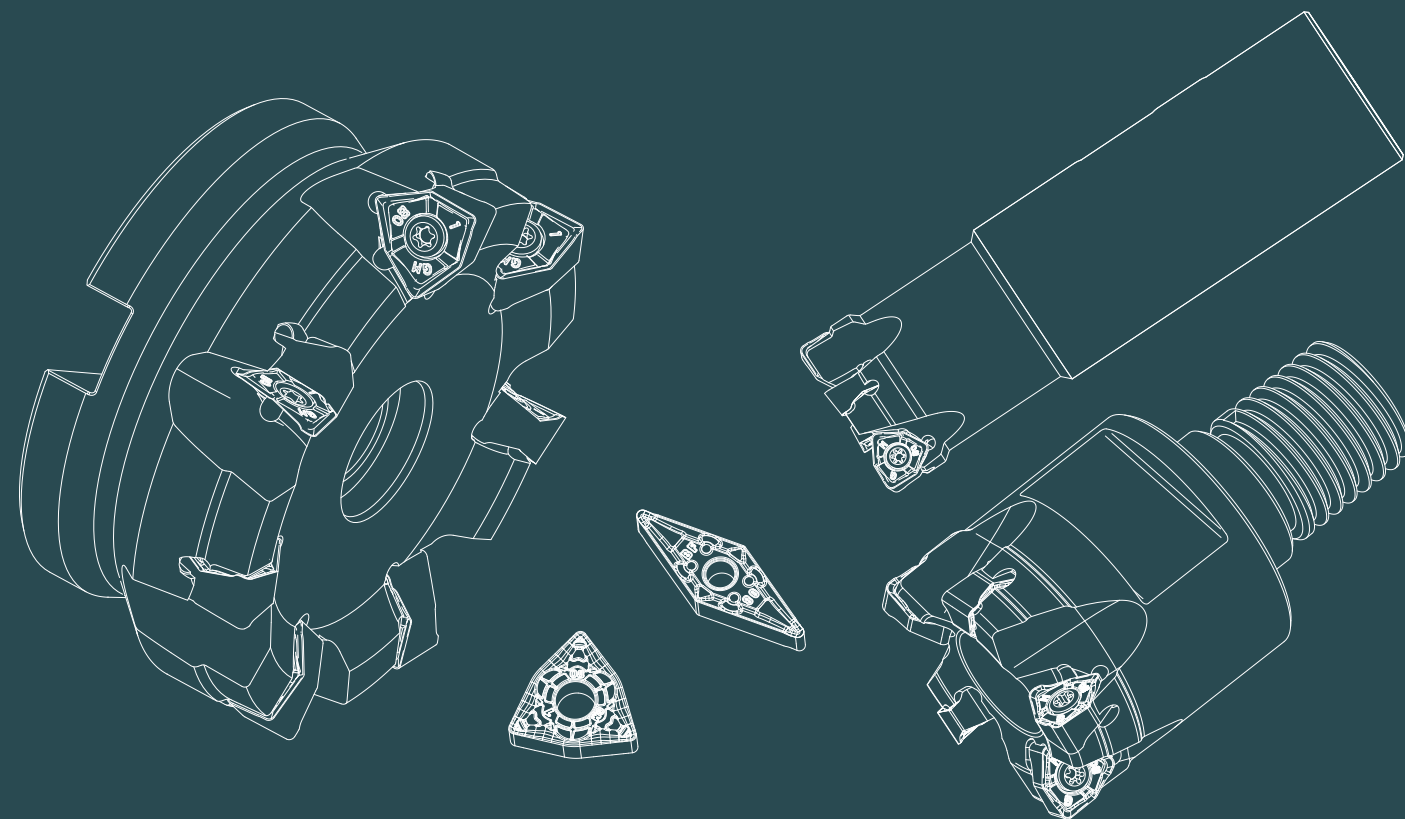
CATALOGUE

HUAREAL

HUAREAL

2022-2023 | HUAREAL CUTTING TOOLS

CATALOGUE



ZHUZHOU HUARUI PRECISION CUTTING TOOLS CO., LTD.

*Create a world-famous cutting tool brand and
become a prestigious enterprise.*



Content

A Turning

General turning	A1-A88
Parting and grooving	A89-A102
Threading	A103-A130

B Milling

Indexable milling	B1-B85
Solid carbide end mills	B86-B178

C Drilling

Indexable short hole drills	C1-C16
Solid carbide drills	C17-C60

D General technical information

General technical information	D1-D22
-------------------------------------	--------

HK HUAREAL

New

GM

Steel turning inserts

HK HUAREAL

C/SSM 190

Square shoulder milling tools



HK HUAREAL

New

CFM145

Face milling tools



HK HUAREAL

New

Solid carbide cutting tools



Introduction

■ This catalogue presents Huareal's major cutting products as of October 2021.

■ This catalogue mainly introduces turning tools, milling tools and drilling tools. Wherein:
Turning tools include general turning tool, parting and grooving tool and threading tool;
Milling tools include indexable milling tool and solid carbide end mill;
Drilling tools include indexable short hole drills and solid carbide drill.

■ Products in this catalogue may be attached with the following symbols:

- Indexable inserts: ★ Recommended grade ☆ Available grade
Indexable cutting tools: ▲ Running stock △ Make-to-order
Solid carbide cutting tool: ● Running stock ○ Make-to-order
Application: ☀ Fit well ✱ Applicable

■ Marking of product dimensions

The basic dimensions of products in this catalogue are marked according to the ISO13399 Standard, and the specific symbols and corresponding definitions are following attached. According to the ISO13399 Standard, customers can input cutting tool information into PLM, CAD, CAM, CNC, etc. without replacing data from different companies.
Huareal is actively engaged in providing "cutting tool data" based on the ISO13399 Standard.

Overview of dimension codes according to ISO13399 Standard

Parameter	Definition		Parameter	Definition
ADJLN	Adjust lower tolerance		CICTE	Cutting item count - limit position
ADJLX	Adjust upper tolerance		CICTP	Cutting item count - peripheral position
ADJRG	Adjust range		CICTS	Cutting item count - side position
ALP	Clearance angle axial		CICTSP	Cutting item count - cutter bar protection insert
AN	Clearance angle major		CICTT	Cutting item count - total amount
ANN	Clearance angle minor		CND	Coolant entry diameter
APMX	Maximum cutting depth		CNSC	Coolant entry style code
APMX_EFW	Maximum cutting depth – longitudinal fixed–range feed		CNT	Coolant entry thread size
APMX_FFW	Maximum cutting depth - side feed		COATING	Coating
AZ	Maximum depth of plug in milling		CP	Maximum coolant pressure
B	Shank width		CRKS	Connection retention knob thread size
BAWS	Body angle of workpiece side		CRNT	Coolant radial entry thread size
BAMS	Body angle of machine side		CTPT	Operation type
BBD	Balanced by design		CUTDIA	Workpiece parting diameter maximum
BBR	Balanced by rotational test		CW	Insert width
BCH	Corner chamfer length		CWN	Cutting width minimum
BD	Body diameter		CWTOLL	Insert width lower tolerance
BHTA	Half cone angle of the tool body		CWTOLU	Insert width upper tolerance
BN	Negative land width		CWX	Cutting width maximum
BS	Wiper edge length		CXSC	Coolant exit style
BSG	Basic standard group		CZC	Connection size code
BSR	Wiper edge radius		CZCMS	Connection size code machine side
CDX	Overhang maximum		CZCWS	Connection size code workpiece side
CEMR	Cutting edge main radius		D1	Fixing hole diameter
CF	Crest width		DAH	Diameter access hole
CHBA	Body chamfer angle		DAXIN	Axial groove inside diameter minimum
CHBL	Body chamfer length		DAXN	Face groove outside diameter minimum
CHW	Corner chamfer width		DAXX	Axial groove outside diameter maximum
CICT	Cutting item count		DBC	Bolt diameter
CICTBALL	Cutting item count - ball nose insert		DC	Cutting diameter
DCB	Bolt diameter		KRINS	Cutting edge angle major
DCBN	Connection bore diameter minimum		KWW	Keyway width
DCBX	Connection bore diameter maximum		L	Cutting edge length
DCF	Cutting diameter face contact		LAMS	Cutting inclination angle
DCIN	Cutting inside diameter		LB	Body length
DCN	Cutting diameter minimum		LCF	Length chip flute
DCON	Connection diameter		LCOX	Parting length maximum
DCON _{Ms}	Connection diameter machine side		LE	Cutting edge effective length
DCONWS	Connection diameter workpiece side		LF	Overall length
DCONNWS	Interface diameter minimum workpiece side		LFN	Functional length minimum

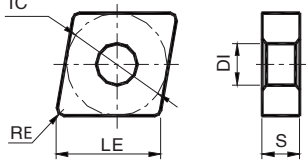
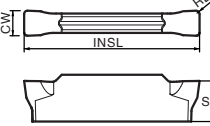
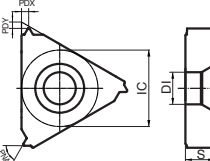
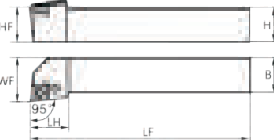
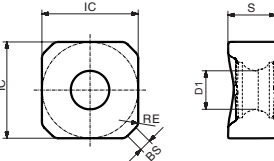
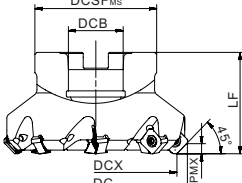
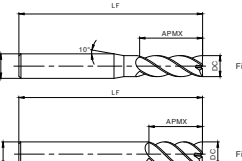
Overview of dimension codes according to ISO13399 Standard

Parameter	Definition		Parameter	Definition
DCONXWS	Interface diameter maximum workpiece side		LH	Cutting head length
DCPS	Data chip size		LPR	Protruding length
DCSFMS	Contact surface diameter machine side		LS	Shank length
DCSFWS	Contact surface diameter workpiece side		LSC	Clamping length
DCX	Cutting diameter maximum		LSCN	Clamping length minimum
DHUB	Hub diameter		LSCS	Distance to clamping starting point
DIX	Tool changer interference diameter maximum		LSCX	Clamping length maximum
DMIN	Machined hole diameter minimum		LSD	Dead shank length
DMM	Shank diameter		LU	Usable length (max. recommended)
DN	Neck diameter		LU_BFW	Usable length - back face milling
DRVCT	Number of drives		LUX	Usable length maximum
DSGN	Design		MHD	Mounting hole distance
EPSR	Insert inclined angle		MIID	Master insert identification
FHA	Helical angle		MIIDE	Master insert identification - limit position
FLGT	Flange thickness		MIIDS	Master insert identification - side position
FTDZ	Thread diameter size		MIIDC	Master insert identification - central position
GB	Negative land angle		MIIDP	Master insert identification - peripheral position
H	Shank height		MIIDI	Master insert identification - in-between position
HA	Theoretical thread height		MMCC	Order number of preset torque
HB	Thread height difference		MMCX	Cutting torque maximum
HBH	Bottom offset height of cutting head		NOF	Flute count
HC	Actual thread height		NT	Number of teeth
HF	Functional height		OAH	Overall height
HRY	Lowest point from reference plain		OAL	Overall length
HTB	Body height		OAW	Overall width
HTH	Height		OH	Recommended overhang
IC	Inscribed circle diameter		OHN	Overhang minimum
INSL	Insert length		OHX	Overhang maximum
INSUC	Insert usage code		ORDCODE	Order number
IZC	Insert size code		PCL	Length of peripheral cylindrical shank
KAPR	Cutting edge angle		PDX	Profile distance ex
KAPR_EFW	Tool cutting edge angle – longitudinal fixed–range feed		PDY	Profile distance ey
KCH	Corner chamfer		PHD	Premachined hole diameter
PHDX	Premachined hole diameter maximum		TCT	Tolerance class tool
PL	Point length		TCTR	Tolerance class thread
PNA	Angle profile included		TD	Thread diameter
PRFRAD	Profile radius		TDZ	Thread diameter size
PRSPC	Profile specification		TFLA	Tap floating length ahead
PSIR	Tool lead angle		TFLB	Tap floating length behind
PSIRL	Cutting edge angle major left hand		TG	Tap gradient

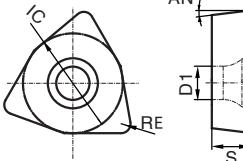
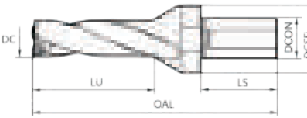
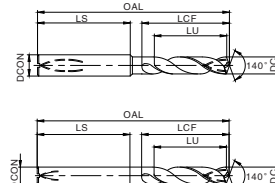
Overview of dimension codes according to ISO13399 Standard

Parameter	Definition		Parameter	Definition
PSIRR	Cutting edge angle major right hand		THBTP	Thread back taper characteristics
PSW	Premachined groove width		THCA	Thread spiral correction angle
RADH	Radial body height		THCHT	Threading chamfer type
RADW	Radial body width		THFT	Thread form
RAR	Clearance angle right hand		THFTS	Standard series thread profile
RE	Corner fillet radius		THL	Thread length
REEQ	Corner fillet radius equivalence		THUB	Hub thickness
REL	Corner fillet radius left hand		TP	Thread pitch
RER	Corner fillet radius right hand		TPI	Threads per inch
RETOLL	Corner radius lower tolerance		TPIN	Threads per inch minimum
RETOLU	Corner radius upper tolerance		TPIX	Threads per inch maximum
RGL	Regrind length		TPN	Thread pitch minimum
RMPX	Ramping angle maximum		TPT	Thread profile type
RPMX	Rotational speed maximum		TPX	Thread pitch maximum
S	Insert thickness		TRMAX	Tap range maximum
SDL	Step diameter length		TQ	Torque
SIG	Corner angle		TSYC	Tool style code
SPTL	Parting line		TTP	Thread type
SSC	Insert seat model		ULDR	Diameter ratio of machinable length
SSCE	Insert seat size code - limit position		VCX	Cutting speed maximum
SSCP	Insert seat size code - peripheral position		W1	Insert width
SSCS	Insert seat size code - side position		WB	Body width
STA	Step inclined angle		WF	Functional width
STDNO	Standard Number		WFCIRP	Width to reference point of cutting parts
SUBSTRATE	Tool substrate		WSC	Clamping width
TCDC	Tolerance class cutting diameter		WT	Weight
TCDCON	Interface diameter tolerance		ZADJ	Adjustable insert count
TCDMM	Shank diameter tolerance		ZEFF	Face effective cutting edge count
TCHA	Achievable hole tolerance		ZEFP	Peripheral effective cutting edge count (ZEFP)
TCHAL	Achievable hole lower tolerance		ZWX	Number of wiper edge inserts maximum
TCHAU	Achievable hole upper tolerance			

Examples of basic dimension according to ISO13399 Standard

Tool type	Basic size marking form	Code	Definition
Turning insert		IC	Inscribed circle diameter
		LE	Cutting edge length
		S	Insert thickness
		D1	Insert hole diameter
		RE	Corner radius
Parting and grooving insert		INSL	Insert length
		CW	Insert width
		S	Insert thickness
		RE	Corner radius
Thread insert		IC	Inscribed circle diameter
		PDX	Profile distance ex
		PDY	Profile distance ey
		S	Insert thickness
		DI	Insert hole diameter
Turning tool		H	Shank height
		B	Shank width
		LF	Overall length
		LH	Cutting head length
		HF	Functional height
		WF	Functional width
Indexable milling insert		IC	Inscribed circle diameter
		S	Insert thickness
		D1	Insert hole diameter
		BS	Wiper edge length
		RE	Corner radius
Indexable milling tool		DC	Cutting diameter
		DCB	Bolt diameter
		DCX	Cutting diameter maximum
		DCSFMS	Connection diameter machine side
		LF	Overall length
		APMX	Cutting depth maximum
Solid carbide end mill		DC	Cutting diameter
		DCON	Shank connection diameter
		LF	Overall length
		APMX	Cutting depth maximum
		ZEFP	Number of teeth

Examples of basic dimension according to ISO13399 Standard

Tool type	Basic size marking form	Code	Definition
Short hole drilling insert		IC	Inscribed circle diameter
		D1	Insert hole diameter
		S	Insert thickness
		RE	Corner radius
		AN	Clearance angle major
Short hole drilling tool		DC	Cutting diameter
		DCON	Shank connection diameter
		DCSFMS	Connection diameter machine side
		LS	Shank length
		LU	Usable length
Solid carbide drill		OAL	Overall length
		DC	Cutting diameter
		DCON	Shank connection diameter
		OAL	Overall length
		LCF	Length chip flute
		LS	Shank length
		LU	Usable length

Selection guidance of general turning insert

Description of turning insert overview

- i According to the order of shape:
- C - type → D - type → S - type → T - type → V - type → W - type → R - type
- ii According to the order of clearance angle:
- Negative insert
- Positive insert
- iii According to the order of machining type:
- Finishing → Medium → Roughing → Heavy machining

Instructions for insert specifications and models

Insert shape, angle

80° CN□□

Workpiece materials:

Steel

Stainless steel

Cast iron

Non-ferrous metal

Heat-resistant alloy, Titanium alloy

Cutting conditions:

Stable condition: continuously stable cutting

Average condition: for general cutting

Tough condition: strong intermittent or unstable condition

Working condition: ● Stable ● Average ■ Tough

Dimensioned structure drawing of inserts with marking

LE: Length of cutting edge

IC: Inscribed circle

S: Thickness

DI: Hole diameter

RE: Nose radius

Insert machining type:

Finishing, medium, roughing and heavy machining

Machining type	Insert shape	Type	Basic dimension (mm)						RE	CVD				PVD		Cemented carbide	Cermet
			LE	IC	S	DI	RE	HR115		HR125	HR225	HR315	HR715	HR725	HR525		
Finishing		CNMG120404-GF	12.9	12.7	4.76	5.16	0.4	★ ☆ ★									
		CNMG120408-GF	12.9	12.7	4.76	5.16	0.8	★ ☆ ★									
Finishing		CNMG120404-BF	12.9	12.7	4.76	5.16	0.4					☆ ★					
		CNMG120408-BF	12.9	12.7	4.76	5.16	0.8					☆ ★					
Semi-finishing		CNMG120404-GM	12.9	12.7	4.76	5.16	0.4	★ ☆ ★									
		CNMG120408-GM	12.9	12.7	4.76	5.16	0.8	★ ☆ ★									
		CNMG120412-GM	12.9	12.7	4.76	5.16	1.2	★ ☆ ★									
		CNMG160608-GM	16.1	15.875	6.35	6.35	0.8	★ ☆ ★									
		CNMG160612-GM	16.1	15.875	6.35	6.35	1.2	★ ☆ ★									
		CNMG160616-GM	16.1	15.875	6.35	6.35	1.6	★ ☆ ★									
Semi-finishing		CNMG120404-BM	12.9	12.7	4.76	5.16	0.4					☆ ★					
		CNMG120408-BM	12.9	12.7	4.76	5.16	0.8					☆ ★					
		CNMG120412-BM	12.9	12.7	4.76	5.16	1.2					☆ ★					

★ Recommended grade ☆ Available grade

Insert shape

Description

Dimension

Inventory

Grade information



General turning

- Turning grade overview..... A8
- Turning inserts code key..... A9-A10
- General turning inserts overview..... A11-A18
- General turning insert..... A19-A49
 - Cemented carbide turning insert..... A19-A43
 - Cermet turning insert..... A44-A49
- Application reference..... A50-A53
- General turning tools code key..... A55-A56
 - General external turning tools code key..... A55
 - General internal turning tools code key..... A56
- General turning tools overview..... A57-A60
- General turning tools..... A61-A82
 - External turning holders by P-type clamping..... A61-A66
 - External turning holders by M-type clamping..... A67-A75
 - External turning holders by S-type clamping..... A76-A82
- Technical information for general turning..... A83-A88

Parting and grooving

- Parting and grooving inserts code key..... A91
- Parting and grooving tools..... A92
- Parting and grooving inserts overview..... A93-A94
- Parting and grooving holders overview..... A95-A98
- Technical information for parting and grooving..... A99-A102

Threading

- Thread inserts code key..... A105
- Threading inserts..... A106
- Thread inserts overview..... A107-A120
- Thread tools overview..... A121-A122
- Technical information for threading..... A123-A130

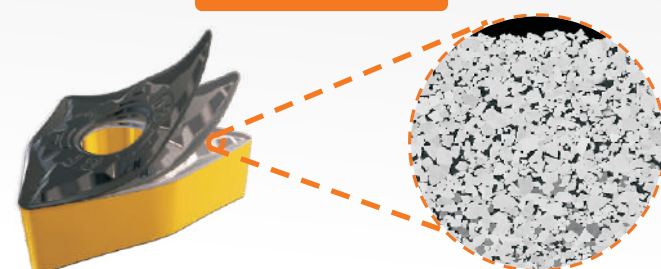
Steel turning

We offer a series of durable and efficient steel turning products, all of which can deliver good machining quality.



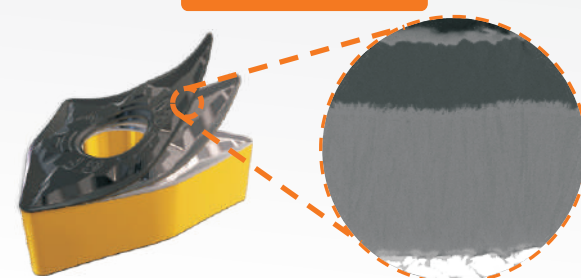
New grade **HR8225**

New substrate

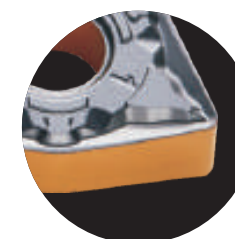


- Brand-new carbide substrate with high strength, outstanding wear resistance and reliable toughness;
- The strengthened bonding phase can effectively protect the substrate from high temperature plastic deformation;
- The functional gradient layer with high bonding phase ensure good anti-cracking performance;
- Well-distributed refined hard phase particles show both toughness and good wear resistance;
- The improved precision molding technique further improves the size accuracy.

New coating



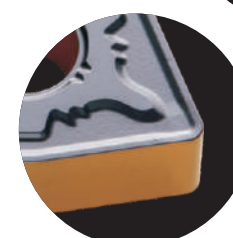
- High-strength directionally grown alumina is deposited on columnar fine-grained titanium carbonitride, forming a brand-new composite multilayer CVD coating;
- The smooth coating surface effectively reduces chip adhesion.



GF chipbreaker: Supported by a large rake angle design plus a cutting edge inclination, low cutting force and strong chip control ability, it is suitable for small cutting depth and finish machining.



GM chipbreaker: Advanced balance of sharpness and high-strength creates applicability for multiple purposes, and provides efficient cutting and long service life.



GR chipbreaker: With a wide chamfer and high-strength insert, it can achieve good chip control ability, reduce rake face damage and extend the service life.

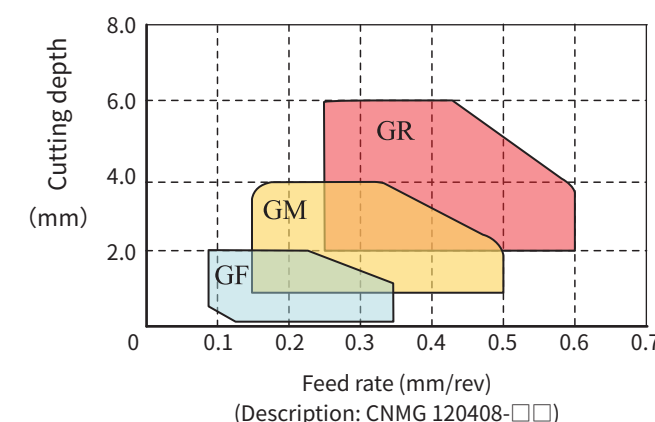


HR8115



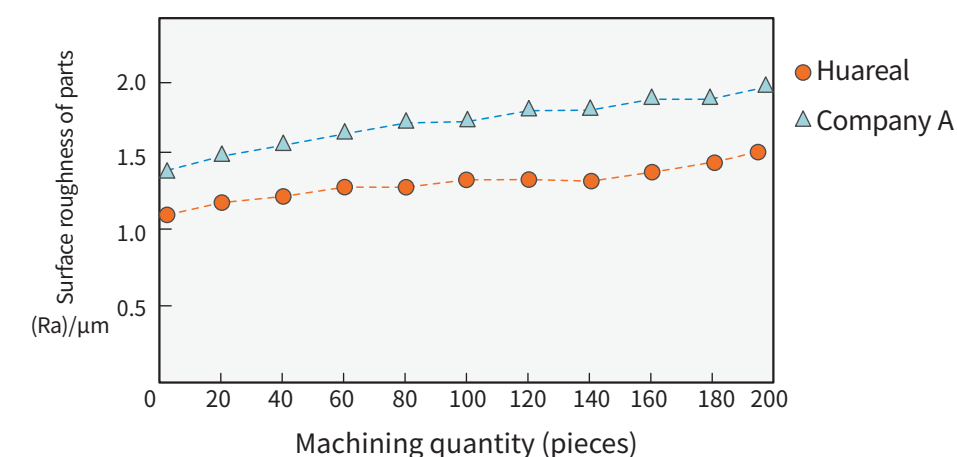
HR8225

Cutting data



Chipbreaker	Grade	Cutting speed(v_c) (mm/min)	Feed rate(f_n) (mm/r)	Cutting depth(a_p) (mm)
GF	HR8115	240-450	0.08-0.35	0.30-2.00
	HR8225	240-420		
GM	HR8115	200-420	0.15-0.50	1.00-4.00
	HR8225	200-400		
GR	HR8225	180-300	0.25-0.60	2.00-6.00

Workpiece name: Shaft parts
 Workpiece material: 45# steel
 Machining method: Wet external turning
 Insert: DNMG150408-GF
 HR8115
 Machining parameters: $v_c=338\text{m/min}$,
 $f_n=0.2\text{mm/r}$
 $a_p=0.4\text{mm}$



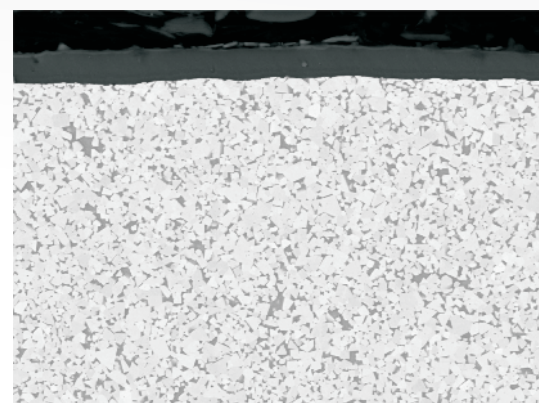
Stainless steel turning

BF, BM, BR and other grooves can meet the requirements of stainless steel turning from finish machining to rough machining.



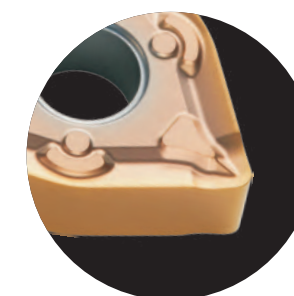
New grade for stainless steel turning

HR7225



Structure of HR7225

- The brand-new nano-gradient composite structure "**H²-Flex**" coating, strengthened by non-metal modified components, has ultra-high nano-hardness, good cohesion failure resistance and film-substrate adhesion.
- The well-distributed refined submicron hard phases and optimized bonding phase composition together improve the wear resistance and toughness of the substrate.



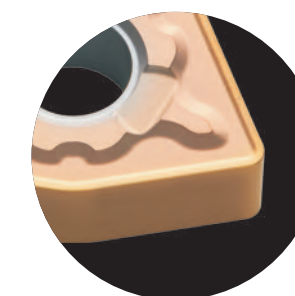
BF

With low cutting force and strong chip control ability, the edge is a good solution for small cutting depth and finish machining.



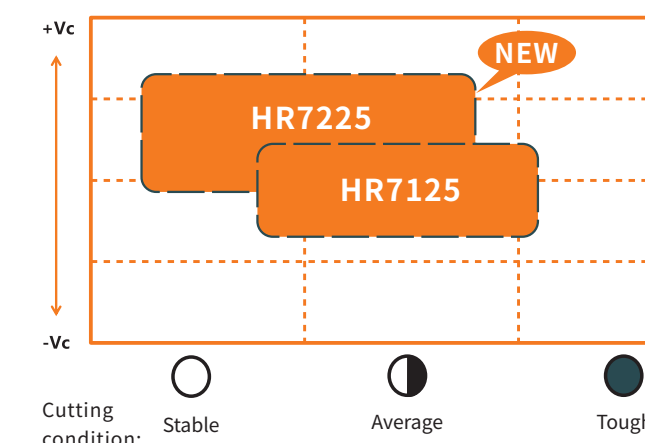
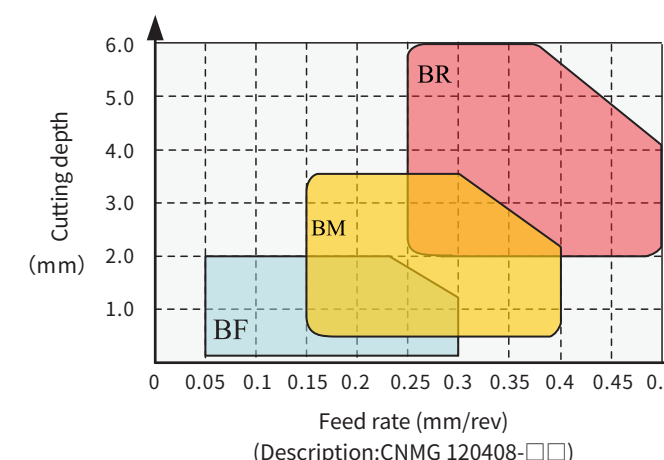
BM

The edge micro-machining technology guarantees both sharpness and high strength, and thus meet the machining requirements of high efficiency and long service life of stainless steel.

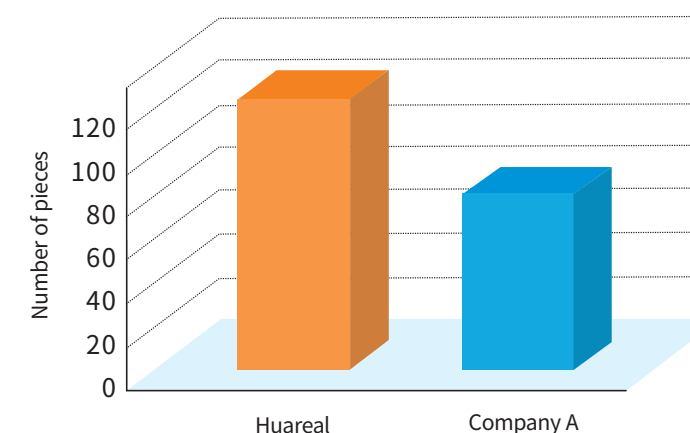


BR

Thanks to the optimized design of chip breaking convex plate with high strength insert, it is suitable for intermittent machining of stainless steel and light-load rough machining.



Workpiece material: SUS304
Machining method: wet external semi-finish turning
Insert: VNMG160408-BM HR7225
Machining parameters: $v_c=170\text{m/min}$,
 $f_n=0.2\text{mm/r}$, $a_p=1.2\text{mm}$



Cutting data (HR7225)

Chipbreaker	Cutting speed (m/min)	Feed rate (mm/r)	Cutting depth (mm)
BF	200	0.05	0.20
	320	0.30	2.00
BM	150	0.15	0.50
	240	0.40	3.50
BR	140	0.25	2.00
	200	0.50	6.00

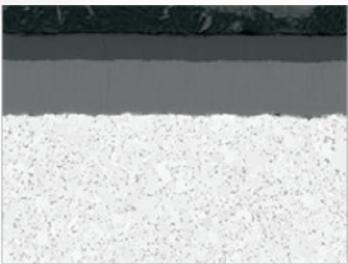
Cast iron turning



All-round chipbreaker: top choice for cast iron turning



Flat chipbreaker: applicable to cast iron turning under unstable working conditions



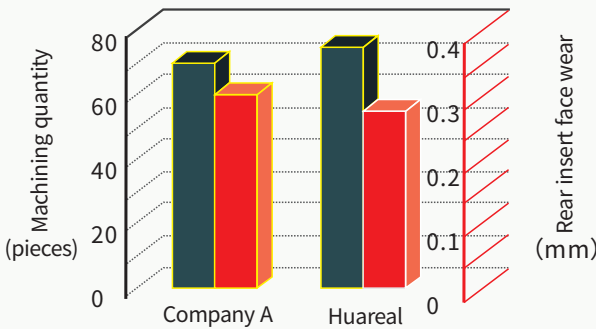
Structure of HR6115

Cutting data (HT300)

Chipbreaker Grade	All-round chipbreaker HR6115	All-round chipbreaker Flat chipbreaker HR6115	All-round chipbreaker Flat chipbreaker HR6115
Cutting speed (m/min)	250 --- 600	230 --- 550	200 --- 500
Feed rate (mm/r)	0.05 --- 0.20	0.10 --- 0.35	0.30 --- 0.50
Cutting depth (mm)	0.20 --- 1.50	1.00 --- 3.00	2.50 --- 5.00
Machining type	Finishing	Semi-finishing	Finishing

Cases of cast iron Material machining

Material of workpiece: ht250
Machining method: external turning
Insert: WNMG080412
All-round chipbreaker
Machining parameters:
vc=415m/min,
fn=0.25mm/r,
ap=1.2mm

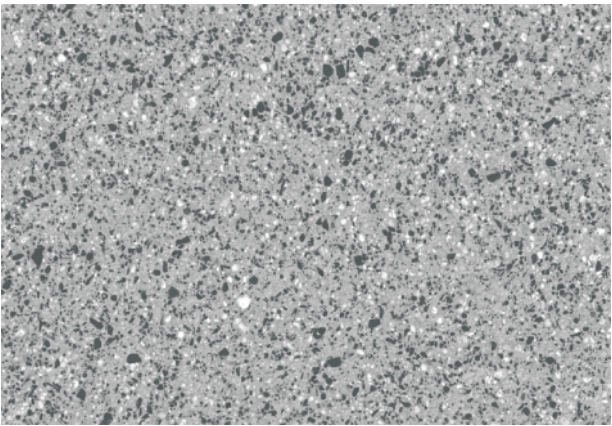


Cermet insert

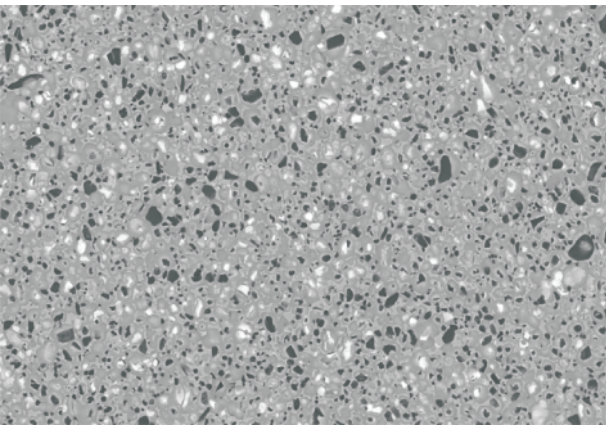


HRC10: It has excellent wear resistance, good chemical stability and solid adhesion resistance. Therefore, it is an appropriate solution for continuous high-speed turning of carbon steel, alloy steel, ductile iron, etc., with both high quality and high efficiency of finishing.

HRC20: With wide versatility, good wear resistance and collapse resistance, it is suitable for continuous and intermittent finishing and semi-finishing of carbon steel, alloy steel and ductile iron, providing both high surface quality and high machining efficiency.



Structure of HRC10

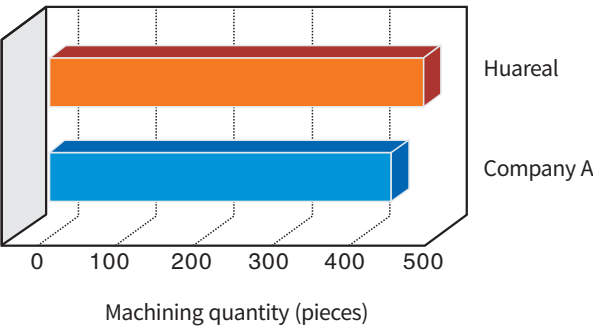


Structure of HRC20

Cutting data for cermet insert				
Grade	HRC10		HRC20	
	< 250HB	> 250HB	< 250HB	> 250HB
Cutting speed (m/min)	150 --- 300	150 --- 220	100 --- 250	100 --- 200
Feed rate (mm/r)	0.10 --- 0.30	0.05 --- 0.25	0.15 --- 0.35	0.10 --- 0.25
Cutting depth (mm)	0.20 --- 1.00	0.20 --- 0.80	0.40 --- 2.50	0.40 --- 2.00
Machining range	Finishing		Semi-finishing	

Machining case of cermet insert

Workpiece material: Gear shaft, 20MnTiB, 280-300HB
Machining method: Wet external and end face finish turning
Insert: WNMG080404HQ, HRC20
Machining parameters: vc=240m/min, fn=0.15-0.25mm/r, external circle ap=0.4mm, end face ap=0.25mm



Grade code key

HR

8

2

25

1

2

3

4

- ①Grade code
- ②Classification codes

Number	5	6	7	8	9
Classification of materials	General	Cast iron	Stainless steel	Steel	High-temp alloy

③Number of grades in the same group

- 1— 1st Gen
- 2— 2nd Gen
- 3— 3rd Gen

④ISO material classification number

05	10
15	20
25	30
35	40

Overview of general turning grades

Type	Material	ISO	CVD coating					PVD coating					Cemented carbide		Cermets		ISO
			New HR8115	HR8125	New HR8225	HR6115	HR9105	New HR7115	HR7125	New HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20	
P	Non-alloyed steel/Alloy steel	P01															P01
		P05															P05
		P10	HR8115												HRC10		P10
		P15		HR8125	HR8225				HR7125	HR7225	HR5125	HR5225				HRC20	P15
		P20															P20
		P25		HR8125	HR8225				HR7125	HR7225							P25
		P30															P30
		P35															P35
		P40															P40
		P45															P45
		P50															P50
M	Stainless steel	M05															M05
		M10						HR7115			HR5125	HR5225					M10
		M15							HR7125	HR7225							M15
		M20															M20
		M25															M25
		M30															M30
		M35															M35
		M40															M40
		M45															M45
		M50															M50
		M55															M55
K	Cast iron	K01															K01
		K05															K05
		K10															K10
		K15				HR6115											K15
		K20															K20
		K25															K25
		K30															K30
		K35															K35
		K40															K40
		K45															K45
		K50															K50
N	Aluminum/Aluminum alloy	S01											HRK10	HRK20			S01
		S05															S05
		S10															S10
		S15															S15
		S20															S20
		S25															S25
		S30															S30
		S40															S40
		S50															S50
S	High-temp alloy	N01					HR9105										N01
		N05															N05
		N10						HR7115									N10
		N15															N15
		N20							HR7125	HR7225							N20
		N25															N25
		N30															N30
		N40															N40

General turning

Parting and grooving

Threading

Indexable milling

Solid carbide end mills

Short hole drills

Overview of general turning inserts

Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		80° C-type	55° D-type	90° S-type	60° T-type	35° V-type	80° W-type
For finishing	M	GF	Recommended chipbreaker for finishing of P-type material ◆ Extra-large positive rake angle, less cutting resistance. ◆ Positive cutting inclination angle can well control chip flow direction. ◆ The two-stage chip breaking table ensures good chip breaking even at small cutting depth.									
			A19	A23	A26	A29	A32	A33				
		BF	Recommended chipbreaker for finishing of M-type material ◆ Sharp cutting edge, less cutting resistance. ◆ Good chip disposal performance even at small cutting depth.									
			A19	A23	A26	A29	A32	A34				
For semi-finishing	M	GM	Recommended chipbreaker for semi-finishing of P-type material ◆ Special edge design, ensuring both sharpness and strength. ◆ The curved front face with variable cutting edge width and rake angle ensures the smooth flow and good control of chips. ◆ With high versatility and wide cutting range, efficient and consistent machining is achieved.									
			A19	A23	A26	A29	A32	A34				
		GQ	Semi-finishing of P-type material ◆ It is suitable for finishing to semi-finishing of P-type material. ◆ Good chip removal performance with high versatility.									
									A29		A34	

Overview of general turning inserts

Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		80° C-type	55° D-type	90° S-type	60° T-type	35° V-type	80° W-type
For semi-finishing	M	BM	Recommended chipbreaker for semi-finishing of stainless steel ♦ Sharp cutting edge, less cutting resistance, good chip disposal performance even at small cutting depth. ♦ The micro-passivated cutting edge reduces the formation of build-up edge.									
		All-round	General machining chipbreaker ♦ Double-sided chipbreaker, especially suitable for K-type material machining. ♦ Recommended cutting parameters									
		Flat	Machining grooves for brittle materials and H-type materials ♦ With high structural strength and good fit to the cutter bar, it is more suitable for unstable cutting of cast iron.									
		SM	Semi-finish machining grooves for S-type material and titanium alloys ♦ Light and fast in cutting, the influence of work hardening and build-up edge on insert is effectively reduced.									

Overview of general turning inserts

Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		80° C-type	55° D-type	90° S-type	60° T-type	35° V-type	80° W-type
For rough machining	M	GR	Recommended chipbreaker for roughing of P-type material - Chipbreaking table with raised corner can effectively control the chip flow direction at small cutting depth; - With a large rake angle and wide chamfer, both insert strength and sharpness are ensured; - Double-sided groove is more cost-effective with good chip removal performance and enhanced versatility; - It is suitable for roughing and semi-finishing of light-load cutting.									
		BR	Recommended chipbreaker for roughing of M-type material - Even edge passivation; - Optimized chipbreaker convex plate; - With firm cutting chamfer and land, it is capable of intermittent and heavy finishing; - Large chip space enable it to achieve roughing and high feed finishing.									
For heavy machining	M	GZ	Heavy machining chipbreaker for P-type material - The unique chipbreaker convex plate design on the rake face reduces the chip contact area at large cutting depth and provides excellent chip control. - The sharp cutting edge can effectively reduce the cutting force.									
		GX	Heavy machining chipbreaker for P-type material - The variable chamfer design and special chipbreaker provide excellent chip control. - The strong cutting edge can bear great impact.									

Overview of general turning inserts

Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		80° C-type	55° D-type	90° S-type	60° T-type	35° V-type	80° W-type
For semi-finish machining	M	TM	Genral chipbreaker for semi-finishing ◆ It is suitable for internal or external semi-finishing of steel, stainless steel and cast iron.									
						A38	A39	A40	A41	A42		
Aluminum alloy machining	G	AK	Aluminum alloy machining chipbreaker ◆ With a large rake angle and clearance angle, the cutting edge of the insert becomes sharper and therefore, cutting can be done in a faster and lighter pattern with effective chip breaking.									
							A38	A39		A41	A42	
Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker	R-type						
Profiling insert	M	All-round chipbreaker	◆ With high strength, the cutting edge secures high safety and is the first choice for rough profiling. ◆ It is suitable for train wheel turning.									
		MR	◆ Large chip-breaking space prevents chip blockage during large cutting depth machining. ◆ The small pit group improves the chip machining performance during small cutting depth machining. ◆ It is suitable for train wheel turning.									
										A43		
Usage	Tolerance	Chipbreaker	90° S-type	Chipbreaker	90° S-type		Usage	Tolerance	Chipbreaker	120° H-type	90° S-type	
Planer milling machining	M	HAF		HSF			Pipe-stripping machining	U	BG			
			A36		A36					A37		A37

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

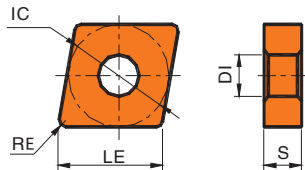
C

Short hole drills

Solid carbide drills

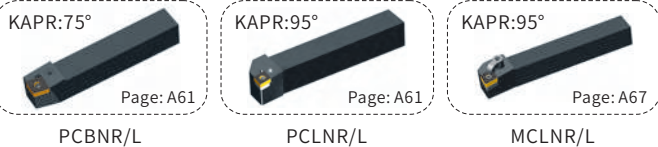
80° CN□□

Working condition: ● Stable ● Average ■ Tough

			Workpiece material		P Steel	●	●	●										●	●		
M Stainless steel							●	●													
K Cast iron					●	●															
N Non-ferrous metal															●	●					
S Heat-resistant alloy Titanium alloy									●	●											
Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermet			
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Finishing		CNMG120404-GF	12.9	12.7	4.76	5.16	0.4	★	☆	★											
		CNMG120408-GF	12.9	12.7	4.76	5.16	0.8	★	☆	★											
Finishing		CNMG120404-BF	12.9	12.7	4.76	5.16	0.4							☆	★						
		CNMG120408-BF	12.9	12.7	4.76	5.16	0.8							☆	★						
Semi-finishing		CNMG120404-GM	12.9	12.7	4.76	5.16	0.4	★	☆	★											
		CNMG120408-GM	12.9	12.7	4.76	5.16	0.8	★	☆	★											
		CNMG120412-GM	12.9	12.7	4.76	5.16	1.2	★	☆	★											
		CNMG160608-GM	16.1	15.875	6.35	6.35	0.8	★	☆	★											
		CNMG160612-GM	16.1	15.875	6.35	6.35	1.2	★	☆	★											
		CNMG160616-GM	16.1	15.875	6.35	6.35	1.6	★	☆	★											
Semi-finishing		CNMG120404-BM	12.9	12.7	4.76	5.16	0.4							☆	★						
		CNMG120408-BM	12.9	12.7	4.76	5.16	0.8							☆	★						
		CNMG120412-BM	12.9	12.7	4.76	5.16	1.2							☆	★						

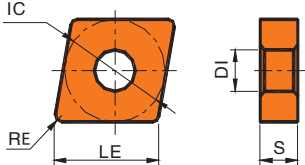
★ Recommended grade ☆ Available grade

Applicable tools



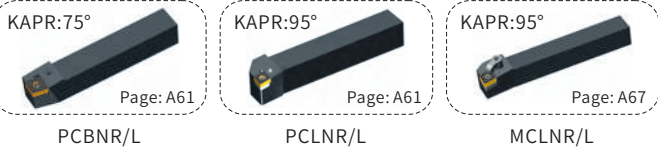
80° CN□□

Working condition: ● Stable ● Average ■ Tough

			Workpiece material		P Steel	●	●	●									●	●			
M Stainless steel								●	●												
K Cast iron					●	●															
N Non-ferrous metal															●	●					
S Heat-resistant alloy Titanium alloy						●	●														
Machining type	Insert shape	Type	Basic dimension (mm)					CVD			PVD				Cemented carbide		Cermet				
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Cast iron machining		CNMG120404	12.9	12.7	4.76	5.16	0.4				★										
		CNMG120408	12.9	12.7	4.76	5.16	0.8				★										
		CNMG120412	12.9	12.7	4.76	5.16	1.2				★										
		CNMG120416	12.9	12.7	4.76	5.16	1.6				★										
		CNMG160608	16.1	15.875	6.35	6.35	0.8				★										
		CNMG160612	16.1	15.875	6.35	6.35	1.2				★										
		CNMG160616	16.1	15.875	6.35	6.35	1.6				★										
		CNMG190612	19.3	19.05	6.35	7.94	1.2				★										
Cast iron machining		CNMG190616	19.3	19.05	6.35	7.94	1.6				★										
		CNMA120404	12.9	12.7	4.76	5.16	0.4				★										
		CNMA120408	12.9	12.7	4.76	5.16	0.8				★										
		CNMA120412	12.9	12.7	4.76	5.16	1.2				★										
		CNMA120416	12.9	12.7	4.76	5.16	1.6				★										
		CNMA160608	16.1	15.875	6.35	6.35	0.8				★										
		CNMA160612	16.1	15.875	6.35	6.35	1.2				★										
		CNMA160616	16.1	15.875	6.35	6.35	1.6				★										
		CNMA190612	19.3	19.05	6.35	7.94	1.2				★										
CNMA190616	19.3	19.05	6.35	7.94	1.6				★												

★ Recommended grade ☆ Available grade

Applicable tools



A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

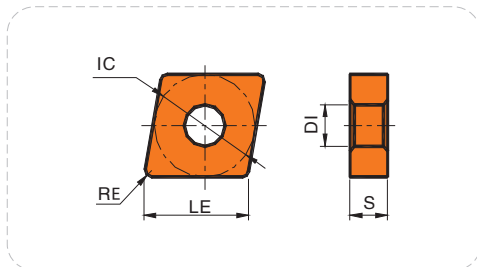
Solid carbide end mills

C

Short hole drills

Solid carbide drills

80° CN□□



						Working condition: ● Stable ● Average ■ Tough															
Workpiece material	Steel					●		●		■								●		●	
	Stainless steel											●		●							
	Cast iron							●		●											
	Non-ferrous metal															●		●			
	Heat-resistant alloy Titanium alloy							●		●											
Basic dimension (mm)						CVD			PVD				Cemented carbide		Cermet						
LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20			
12.9	12.7	4.76	5.16	0.4					☆	★											
12.9	12.7	4.76	5.16	0.8					☆	★											
12.9	12.7	4.76	5.16	1.2					☆	★											
12.9	12.7	4.76	5.16	0.8	☆	☆	★														
12.9	12.7	4.76	5.16	1.2	☆	☆	★														
19.3	19.05	6.35	7.94	0.8	☆	☆	★														
19.3	19.05	6.35	7.94	1.2	☆	☆	★														
12.9	12.7	4.76	5.16	0.8							☆	★									
12.9	12.7	4.76	5.16	1.2							☆	★									
19.3	19.05	6.35	7.94	1.6							☆	★									
19.3	19.05	6.35	7.94	0.8	★		★														
19.3	19.05	6.35	7.94	1.2	★		★														
19.3	19.05	6.35	7.94	1.6	★		★														
19.3	19.05	6.35	7.94	2.4	★		★														
25.19	25.4	9.525	9.12	2.4	★		★														
25.19	25.4	9.525	9.12	3.2	★		★														

★ Recommended grade ☆ Available grade

Applicable tools



PCBNR/L

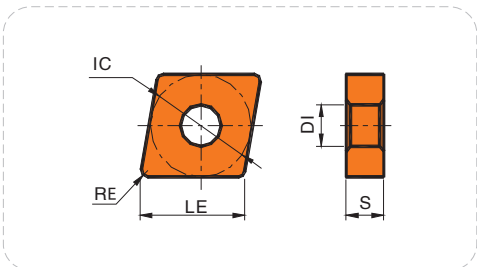


PCLNR/L



MCLNR/L

80° CN□□



							Working condition: ● Stable ● Average ■ Tough																
							Workpiece material																
							P	Steel				●	■	■				●	■	■			
							M	Stainless steel								●	●						
							K	Cast iron						●	●								
							N	Non-ferrous metal										●	■				
							S	Heat-resistant alloy Titanium alloy							●	■							
Machining type	Insert shape	Type	Basic dimension (mm)					CVD		PVD					Cemented carbide		Cermet						
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20		
Heavy machining		CNMM190608-GX	19.3	19.05	6.35	7.94	0.8	★	★														
		CNMM190612-GX	19.3	19.05	6.35	7.94	1.2	★	★														
		CNMM190616-GX	19.3	19.05	6.35	7.94	1.6	★	★														
		CNMM190624-GX	19.3	19.05	6.35	7.94	2.4	★	★														
		CNMM250716-GX	25.19	25.4	7.94	9.12	1.6	★	★														
		CNMM250724-GX	25.19	25.4	7.94	9.12	2.4	★	★														
		CNMM250732-GX	25.19	25.4	7.94	9.12	3.2	★	★														
		CNMM250916-GX	25.19	25.4	9.525	9.12	1.6	★	★														
		CNMM250924-GX	25.19	25.4	9.525	9.12	2.4	★	★														
		CNMM250932-GX	25.19	25.4	9.525	9.12	3.2	★	★														

★ Recommended grade ☆ Available grade

Applicable tools



PCBNR/L



PCLNR/L



MCLNR/L

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

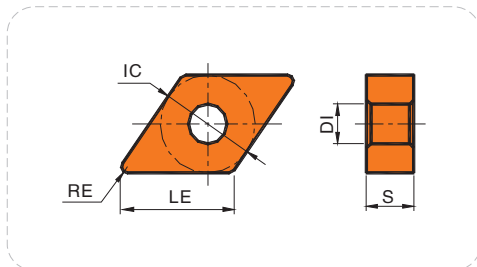
Solid carbide end mills

C

Short hole drills

Solid carbide drills

55°DN□□



Working condition: ● Stable ● Average ■ Tough

Workpiece material	 Steel	 Stainless steel	 Cast iron	 Non-ferrous metal	 Heat-resistant alloy Titanium alloy																	
Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermet							
LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20				
15.5	12.7	4.76	5.16	0.4	★	☆	★															
15.5	12.7	4.76	5.16	0.8	★	☆	★															
15.5	12.7	6.35	5.16	0.4	★	☆	★															
15.5	12.7	6.35	5.16	0.8	★	☆	★															
15.5	12.7	4.76	5.16	0.4							☆	★										
15.5	12.7	4.76	5.16	0.8							☆	★										
15.5	12.7	6.35	5.16	0.4							☆	★										
15.5	12.7	6.35	5.16	0.8							☆	★										
15.5	12.7	4.76	5.16	0.4	★	☆	★															
15.5	12.7	4.76	5.16	0.8	★	☆	★															
15.5	12.7	4.76	5.16	1.2	★	☆	★															
15.5	12.7	6.35	5.16	0.4	★	☆	★															
15.5	12.7	6.35	5.16	0.8	★	☆	★															
15.5	12.7	6.35	5.16	1.2	★	☆	★															

★ Recommended grade ☆ Available grade

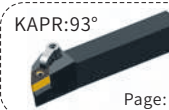
Applicable tools



PDJNR/L



PDNN

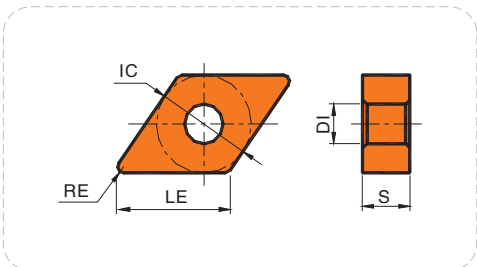


MDJNR/L



MDPNN

55°DN□□



Working condition: ● Stable ● Average ■ Tough

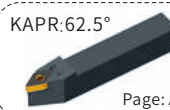
			Workpiece material																
			P Steel																
			M Stainless steel																
			K Cast iron																
			N Non-ferrous metal																
			S Heat-resistant alloy Titanium alloy																

★ Recommended grade ☆ Available grade

Applicable tools



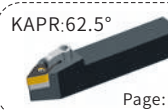
PDJNR/L



PDNN



MDJNR/L



MDPNN

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

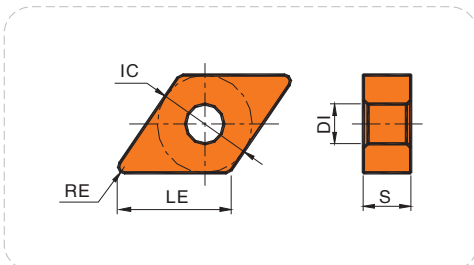
Solid carbide end mills

C

Short hole drills

Solid carbide drills

55°DN



		Working condition: ● Stable ● Average ■ Tough													
Machining type	Insert shape	Type	Basic dimension (mm)					CVD		PVD		Cemented carbide		Cermets	
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225
			HR5125	HR5225	HRK10	HRK20	HRC10	HRC20							
Cast iron machining		DNMA150404	15.5	12.7	4.76	5.16	0.4			★					
		DNMA150408	15.5	12.7	4.76	5.16	0.8			★					
		DNMA150412	15.5	12.7	4.76	5.16	1.2			★					
		DNMA150604	15.5	12.7	6.35	5.16	0.4			★					
		DNMA150608	15.5	12.7	6.35	5.16	0.8			★					
Semi-finishing		DNMA150612	15.5	12.7	6.35	5.16	1.2			★					
		DNMG150404-SM	15.5	12.7	6.35	5.16	0.4				☆	★			
		DNMG150608-SM	15.5	12.7	6.35	5.16	0.8				☆	★			
Rough machining		DNMG150612-SM	15.5	12.7	6.35	5.16	1.2				☆	★			
		DNMG150608-GR	15.5	12.7	6.35	5.16	0.8	☆	☆	★					
		DNMG150612-GR	15.5	12.7	6.35	5.16	1.2	☆	☆	★					

★ Recommended grade ☆ Available grade

Applicable tools



PDJNR/L



PDNN

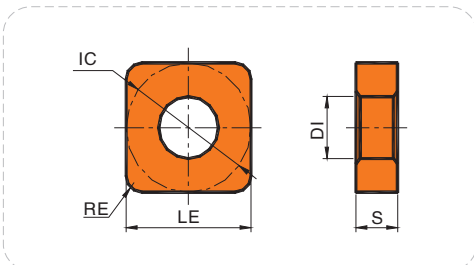


MDJNR/L



MDPNN

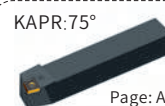
90°SN



		Working condition: ● Stable ● Average ■ Tough													
Machining type	Insert shape	Type	Basic dimension (mm)					CVD		PVD		Cemented carbide		Cermets	
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225
			HR5125	HR5225	HRK10	HRK20	HRC10	HRC20							
Finishing		SNMG120404-GF	12.7	12.7	4.76	5.16	0.4	★	☆	★					
		SNMG120408-GF	12.7	12.7	4.76	5.16	0.8	★	☆	★					
Finishing		SNMG120404-BF	12.7	12.7	4.76	5.16	0.4						☆	★	
		SNMG120408-BF	12.7	12.7	4.76	5.16	0.8						☆	★	
Semi-finishing		SNMG120404-GM	12.7	12.7	4.76	5.16	0.4	★	☆	★					
		SNMG120408-GM	12.7	12.7	4.76	5.16	0.8	★	☆	★					
		SNMG120412-GM	12.7	12.7	4.76	5.16	1.2	★	☆	★					
Semi-finishing		SNMG120404-BM	12.7	12.7	4.76	5.16	0.4						☆	★	
		SNMG120408-BM	12.7	12.7	4.76	5.16	0.8						☆	★	
		SNMG120412-BM	12.7	12.7	4.76	5.16	1.2						☆	★	

★ Recommended grade ☆ Available grade

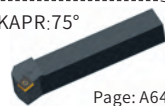
Applicable tools



PSBNR/L



PSDNN



PSKNR/L



MSBNR/L



MSKNR/L



MSDNN

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

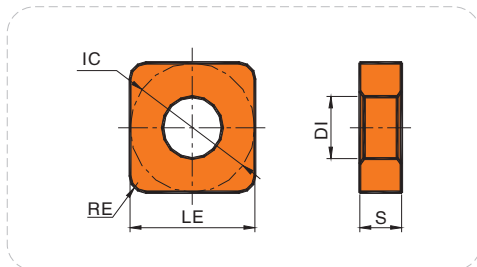
Solid carbide end mills

C

Short hole drills

Solid carbide drills

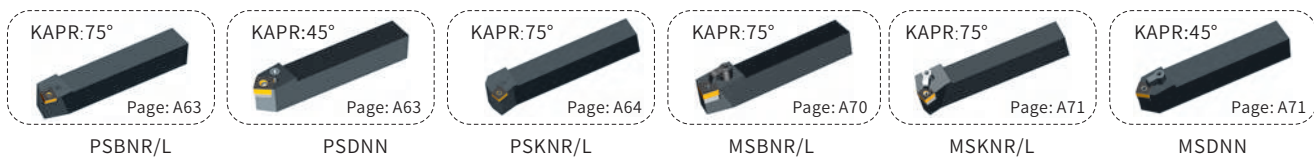
90°SN□□



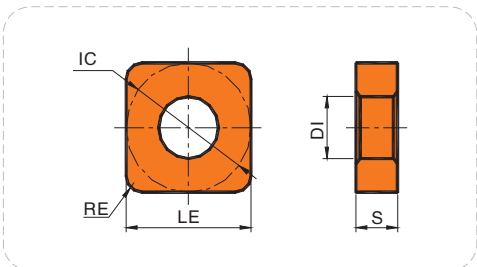
		Working condition: ● Stable ● Average ■ Tough																
Workpiece material	 Steel					●	●	■								●	■	
	 Stainless steel										●	●						
	 Cast iron								●	●								
	 Non-ferrous metal													●	●			
	 Heat-resistant alloy Titanium alloy									●	●							
Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermets			
LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
12.7	12.7	4.76	5.16	0.4				★										
12.7	12.7	4.76	5.16	0.8				★										
12.7	12.7	4.76	5.16	1.2				★										
15.875	15.875	6.35	6.35	0.8				★										
15.875	15.875	6.35	6.35	1.2				★										
15.875	15.875	6.35	6.35	1.6				★										
19.05	19.05	6.35	7.94	1.2				★										
19.05	19.05	6.35	7.94	1.6				★										
12.7	12.7	4.76	5.16	0.4				★										
12.7	12.7	4.76	5.16	0.8				★										
12.7	12.7	4.76	5.16	1.2				★										
15.875	15.875	6.35	6.35	0.8				★										
15.875	15.875	6.35	6.35	1.2				★										
15.875	15.875	6.35	6.35	1.6				★										
19.05	19.05	6.35	7.94	1.2				★										
19.05	19.05	6.35	7.94	1.6				★										
12.7	12.7	4.76	5.16	0.8	☆	☆	★											
12.7	12.7	4.76	5.16	1.2	☆	☆	★											
19.05	19.05	6.35	7.94	0.8	☆	☆	★											
19.05	19.05	6.35	7.94	1.2	☆	☆	★											
19.05	19.05	6.35	7.94	1.6	☆	☆	★											
★ Recommended grade ☆ Available grade																		

★ Recommended grade ☆ Available grade

Applicable tools



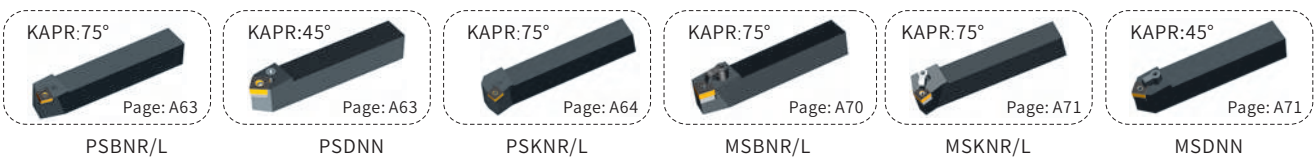
90°SN□□



								Working condition: ● Stable ● Average ■ Tough													
			Workpiece material	P Steel	● ● ■																
				M Stainless steel				● ●													
				K Cast iron		● ●															
				N Non-ferrous metal							● ●										
				S Heat-resistant alloy Titanium alloy		● ●															
Machining type	Insert shape	Type	Basic dimension (mm)					CVD		PVD				Cemented carbide		Cermets					
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Rough machining		SNMG120408-BR	12.7	12.7	4.76	5.16	0.8							☆ ★							
		SNMG120412-BR	12.7	12.7	4.76	5.16	1.2							☆ ★							
Heavy machining		SNMM190608-GZ	19.05	19.05	6.35	7.94	0.8	★	★												
		SNMM190612-GZ	19.05	19.05	6.35	7.94	1.2	★	★												
		SNMM190616-GZ	19.05	19.05	6.35	7.94	1.6	★	★												
		SNMM190624-GZ	19.05	19.05	6.35	7.94	2.4	★	★												
		SNMM250924-GZ	25.4	25.4	9.525	9.12	2.4	★	★												
		SNMM250932-GZ	25.4	25.4	9.525	9.12	3.2	★	★												
Heavy machining		SNMM190608-GX	19.05	19.05	6.35	7.94	0.8	★	★												
		SNMM190612-GX	19.05	19.05	6.35	7.94	1.2	★	★												
		SNMM190616-GX	19.05	19.05	6.35	7.94	1.6	★	★												
		SNMM190624-GX	19.05	19.05	6.35	7.94	2.4	★	★												
		SNMM250716-GX	25.4	25.4	7.94	9.12	1.6	★	★												
		SNMM250724-GX	25.4	25.4	7.94	9.12	2.4	★	★												
		SNMM250732-GX	25.4	25.4	7.94	9.12	3.2	★	★												
		SNMM250916-GX	25.4	25.4	9.525	9.12	1.6	★	★												
		SNMM250924-GX	25.4	25.4	9.525	9.12	2.4	★	★												
		SNMM250932-GX	25.4	25.4	9.525	9.12	3.2	★	★												
								★ Recommended grade ☆ Available grade													

★ Recommended grade ☆ Available grade

Applicable tools



A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

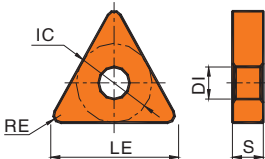
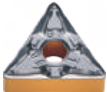
C

Short hole drills

Solid carbide drills

60°TN□□

Working condition: ● Stable ● Average ■ Tough

			Workpiece material																					
			P	Steel																				
			M	Stainless steel																				
			K	Cast iron																				
			N	Non-ferrous metal																				
			S	Heat-resistant alloy Titanium alloy																				
Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD				Cemented carbide	Cermet							
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20			
Finishing		TNMG160404-GF	16.5	9.525	4.76	3.81	0.4	★	☆	★														
		TNMG160408-GF	16.5	9.525	4.76	3.81	0.8	★	☆	★														
Finishing		TNMG160404-BF	16.5	9.525	4.76	3.81	0.4						☆	★										
		TNMG160408-BF	16.5	9.525	4.76	3.81	0.8						☆	★										
Semi-finishing		TNMG160404-GM	16.5	9.525	4.76	3.81	0.4	★	☆	★														
		TNMG160408-GM	16.5	9.525	4.76	3.81	0.8	★	☆	★														
		TNMG160412-GM	16.5	9.525	4.76	3.81	1.2	★	☆	★														
		TNMG220412-GM	22	12.7	4.76	5.16	1.2	★	☆	★														
Semi-finishing		TNMG160404-BM	16.5	9.525	4.76	3.81	0.4						☆	★										
		TNMG160408-BM	16.5	9.525	4.76	3.81	0.8						☆	★										
		TNMG160412-BM	16.5	9.525	4.76	3.81	1.2						☆	★										
Semi-finishing		TNMG160404-GQ	16.5	9.525	4.76	3.81	0.4	★		★														
		TNMG160408-GQ	16.5	9.525	4.76	3.81	0.8	★		★														
		TNMG160412-GQ	16.5	9.525	4.76	3.81	1.2	★		★														

★ Recommended grade ☆ Available grade

Applicable tools



60°TN□□

Working condition: ● Stable ● Average ■ Tough

			Workpiece material		P Steel		● ● ●										● ●	
				M Stainless steel								● ●						
				K Cast iron				● ●										
				N Non-ferrous metal										● ●				
				S Heat-resistant alloy Titanium alloy				● ●										

Machining type	Insert shape	Type	Basic dimension (mm)					CVD			PVD				Cemented carbide		Cermet				
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Cast iron machining		TNMG160404	16.5	9.525	4.76	3.81	0.4				★										
		TNMG160408	16.5	9.525	4.76	3.81	0.8				★										
		TNMG160212	16.5	9.525	4.76	3.81	1.2				★										
		TNMG220408	22	12.7	4.76	5.16	0.8				★										
		TNMG220412	22	12.7	4.76	5.16	1.2				★										
		TNMG220416	22	12.7	4.76	5.16	1.6				★										
Cast iron machining		TNMA160404	16.5	9.525	4.76	3.81	0.4				★										
		TNMA160408	16.5	9.525	4.76	3.81	0.8				★										
		TNMA160412	16.5	9.525	4.76	3.81	1.2				★										
		TNMA220408	22	12.7	4.76	5.16	0.8				★										
		TNMA220412	22	12.7	4.76	5.16	1.2				★										
		TNMA220416	22	12.7	4.76	5.16	1.6				★										
Rough machining		TNMG160408-GR	16.5	9.525	4.76	3.81	0.8	☆	☆	★											
		TNMG160412-GR	16.5	9.525	4.76	3.81	1.2	☆	☆	★											

★ Recommended grade ☆ Available grade

Applicable tools



A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

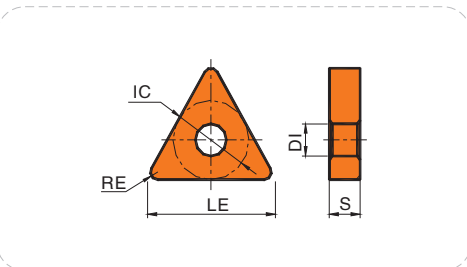
Solid carbide end mills

C

Short hole drills

Solid carbide drills

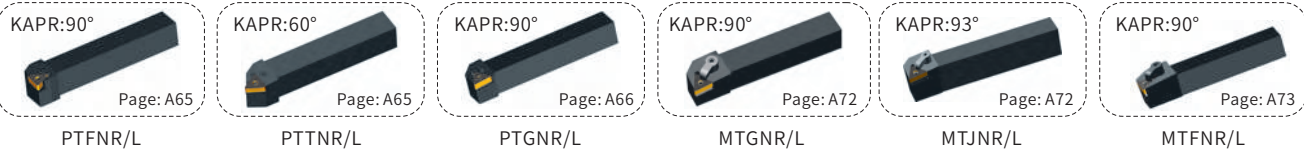
60°TN



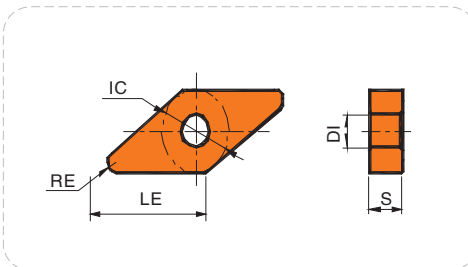
Machining type	Insert shape	Type	Basic dimension (mm)					CVD		PVD		Cemented carbide	Cermet								
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Rough machining		TNMG160408-BR	16.5	9.525	4.76	3.81	0.8							☆	★						
		TNMG160412-BR	16.5	9.525	4.76	3.81	1.2							☆	★						

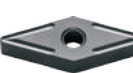
★ Recommended grade ☆ Available grade

Applicable tools



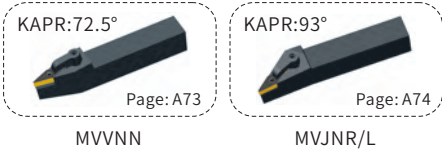
35°VN



Machining type	Insert shape	Type	Basic dimension (mm)					CVD			PVD				Cemented carbide	Cermet					
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Finishing		VNMG160404-GF	16.6	9.525	4.76	3.81	0.4	★	☆	★											
		VNMG160408-GF	16.6	9.525	4.76	3.81	0.8	★	☆	★											
Finishing		VNMG160404-BF	16.6	9.525	4.76	3.81	0.4						☆	★							
		VNMG160408-BF	16.6	9.525	4.76	3.81	0.8						☆	★							
Semi-finishing		VNMG160404-GM	16.6	9.525	4.76	3.81	0.4	★	☆	★											
		VNMG160408-GM	16.6	9.525	4.76	3.81	0.8	★	☆	★											
		VNMG160412-GM	16.6	9.525	4.76	3.81	1.2	★	☆	★											
Semi-finishing		VNMG160404-BM	16.6	9.525	4.76	3.81	0.4						☆	★							
		VNMG160408-BM	16.6	9.525	4.76	3.81	0.8						☆	★							
		VNMG160412-BM	16.6	9.525	4.76	3.81	1.2						☆	★							
Cast iron machining		VNMG160404	16.6	9.525	4.76	3.81	0.4				★										
		VNMG160408	16.6	9.525	4.76	3.81	0.8				★										

★ Recommended grade ☆ Available grade

Applicable tools



A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

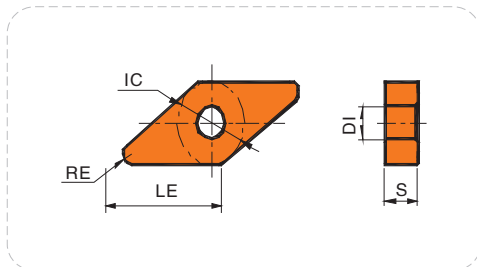
Solid carbide end mills

C

Short hole drills

Solid carbide drills

35°VN



Workpiece material		Working condition: ● Stable ● Average ■ Tough																	
Workpiece material	 Steel	●	●	■													●	●	
	 Stainless steel								●	●									
	 Cast iron					●	●												
	 Non-ferrous metal														●	●			
	 Heat-resistant alloy Titanium alloy								●	●									
Basic dimension (mm)						CVD				PVD				Cemented carbide		Cermert			
LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20	
16.6	9.525	4.76	3.81	0.4				★											
16.6	9.525	4.76	3.81	0.8				★											

★ Recommended grade ☆ Available grade

Applicable tools

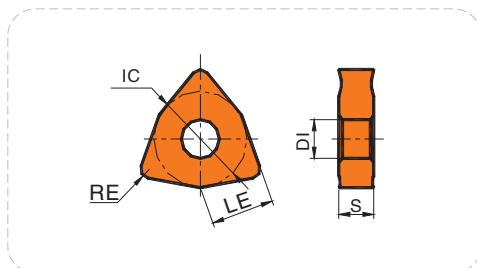


MVVNN



MVJNR/L

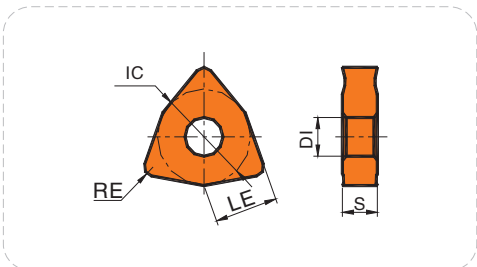
80°WN



Workpiece material		Working condition: ● Stable ● Average ■ Tough																						
		P Steel					M Stainless steel					K Cast iron					N Non-ferrous metal					S Heat-resistant alloy Titanium alloy		
Machining type	Insert shape	Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermet							
		LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20				
Finishing		8.7	12.7	4.76	5.16	0.4	★	☆	★															
		8.7	12.7	4.76	5.16	0.8	★	☆	★															

★ Recommended grade ☆ Available grade

80°WN



Workpiece material		Working condition: ● Stable ● Average ■ Tough																
		P Steel					● ● ■				● ●				● ●			
M Stainless steel									● ●									
K Cast iron					● ●													
N Non-ferrous metal											● ●							
S Heat-resistant alloy Titanium alloy					● ●													
Basic dimension (mm)					CVD			PVD				Cemented carbide		Cermert				
LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
8.7	12.7	4.76	5.16	0.2							☆	★						
8.7	12.7	4.76	5.16	0.4							☆	★						
8.7	12.7	4.76	5.16	0.8							☆	★						
8.7	12.7	4.76	5.16	0.4	★	☆	★											
8.7	12.7	4.76	5.16	0.8	★	☆	★											
8.7	12.7	4.76	5.16	1.2	★	☆	★											
8.7	12.7	4.76	5.16	0.4	★		★											
8.7	12.7	4.76	5.16	0.8	★		★											
8.7	12.7	4.76	5.16	1.2	★		★											
6.6	9.525	3.97	3.81	0.8							☆	★						
6.6	9.525	4.76	3.81	1.2							☆	★						
8.7	12.7	4.76	5.16	0.4							☆	★						
8.7	12.7	4.76	5.16	0.8							☆	★						
8.7	12.7	4.76	5.16	1.2							☆	★						

★ Recommended grade ☆ Available grade

Applicable tools



PVLNR/L



MWLNR/L

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

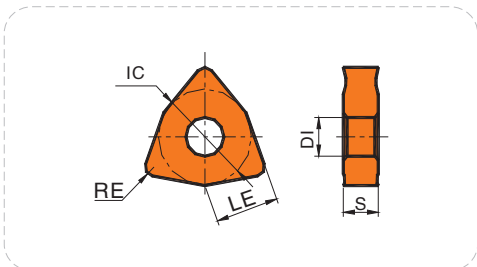
Solid carbide end mills

C

Short hole drills

Solid carbide drills

80°WN□□

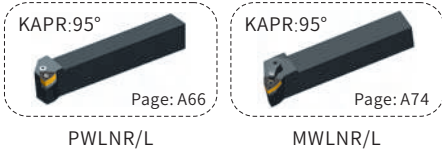


Working condition: ● Stable ● Average ■ Tough

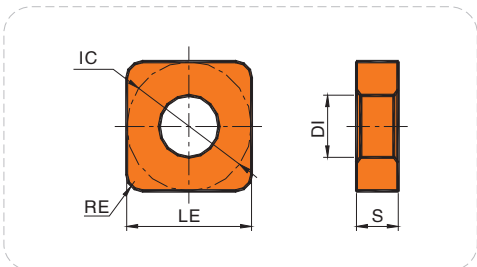
Workpiece material	P	Steel																
	M	Stainless steel																
	K	Cast iron																
	N	Non-ferrous metal																
	S	Heat-resistant alloy Titanium alloy																
Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermet			
LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
8.7	12.7	4.76	5.16	0.4				★										
8.7	12.7	4.76	5.16	0.8				★										
8.7	12.7	4.76	5.16	1.2				★										
6.6	9.525	4.76	3.81	0.4				★										
6.6	9.525	4.76	3.81	0.8				★										
8.7	12.7	4.76	5.16	0.4				★										
8.7	12.7	4.76	5.16	0.8				★										
8.7	12.7	4.76	5.16	1.2				★										
8.7	12.7	4.76	5.16	1.6				★										
8.7	12.7	4.76	5.16	0.4					☆	★								
8.7	12.7	4.76	5.16	0.8					☆	★								
8.7	12.7	4.76	5.16	1.2					☆	★								
8.7	12.7	4.76	5.16	0.8	☆	☆	★											
8.7	12.7	4.76	5.16	1.2	☆	☆	★											
8.7	12.7	4.76	5.16	0.8						☆	★							
8.7	12.7	4.76	5.16	1.2						☆	★							

★ Recommended grade ☆ Available grade

Applicable tools



Planer insert



Working condition: ● Stable ● Average ■ Tough

Workpiece material	 Steel					●	●	■									●	●
	 Stainless steel										●	●						
	 Cast iron							●	●									
	 Non-ferrous metal															●	●	
	 Heat-resistant alloy Titanium alloy										●	●						
Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermet			
LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
12.7	12.7	4.76	5.16	0.4							☆	★						
12.7	12.7	4.76	5.16	0.4							☆	★						

★ Recommended grade ☆ Available grade

Applicable tools



A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

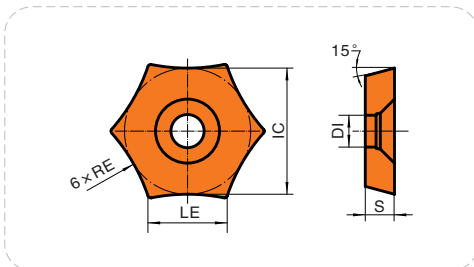
Solid carbide end mills

C

Short hole drills

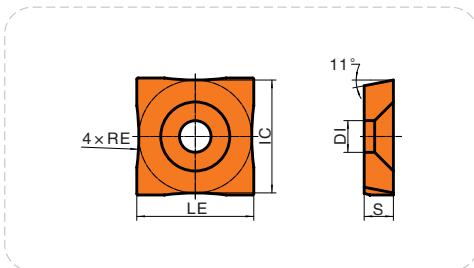
Solid carbide drills

Pipe-stripping insert



Machining type	Insert shape	Type	Basic dimension (mm)					Working condition: ● Stable ● Average ■ Tough									
			LE	IC	S	DI	RE	CVD				PVD				Cemented carbide	
								HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225
Pipe-stripping machining		HDUB250414-BG	12.663	20.58	4.76	5.16	14	★	☆	★							
		HDUB250417-BG	12.663	20.58	4.76	5.16	17	★	☆	★							
		HDUB250422-BG	12.663	20.58	4.76	5.16	22	★	☆	★							
		HDUB250430-BG	12.663	20.58	4.76	5.16	30	★	☆	★							
		HDUB250440-BG	12.663	20.58	4.76	5.16	40	★	☆	★							
		HDUB250450-BG	12.663	20.58	4.76	5.16	50	★	☆	★							

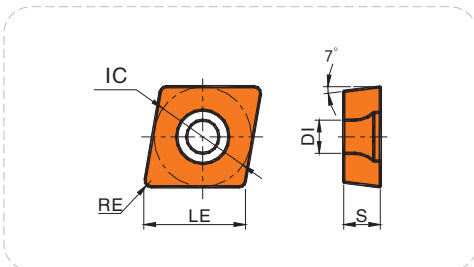
★ Recommended grade ☆ Available grade



Machining type	Insert shape	Type	Basic dimension (mm)					Working condition: ● Stable ● Average ■ Tough									
			LE	IC	S	DI	RE	CVD				PVD				Cemented carbide	
								HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225
Pipe-stripping machining		SPUB190409-BG	19.05	19.05	4.76	5.16	9.5	★	☆	★							
		SPUB190412-BG	19.05	19.05	4.76	5.16	12	★	☆	★							
		SPUB190415-BG	19.05	19.05	4.76	5.16	15	★	☆	★							
		SPUB190420-BG	19.05	19.05	4.76	5.16	20	★	☆	★							
		SPUB190425-BG	19.05	19.05	4.76	5.16	25	★	☆	★							
		SPUB190432-BG	19.05	19.05	4.76	5.16	32	★	☆	★							

★ Recommended grade ☆ Available grade

80°C □ □



Machining type	Insert shape	Type	Basic dimension (mm)					Working condition: ● Stable ● Average ■ Tough									
			LE	IC	S	DI	RE	CVD				PVD				Cemented carbide	
								HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225
Finishing		CCGT060202-AK	6.4	6.35	2.38	2.8	0.2										★ ☆
		CCGT060204-AK	6.4	6.35	2.38	2.8	0.4										★ ☆
		CCGT09T302-AK	9.7	9.525	3.97	4.4	0.2										★ ☆
		CCGT09T304-AK	9.7	9.525	3.97	4.4	0.4										★ ☆
		CCGT120404-AK	12.9	12.7	4.76	5.56	0.4										★ ☆
		CCGT120408-AK	12.9	12.7	4.76	5.56	0.8										★ ☆
Semi-finishing		CCMT060204-TM	6.4	6.35	2.38	2.8	0.4	★ ☆	★					☆	★		
		CCMT060208-TM	6.4	6.35	2.38	2.8	0.8	★ ☆	★					☆	★		
		CCMT09T304-TM	9.7	9.525	3.97	4.4	0.4	★ ☆	★					☆	★		
		CCMT09T308-TM	9.7	9.525	3.97	4.4	0.8	★ ☆	★					☆	★		
		CCMT120404-TM	12.9	12.7	4.76	5.56	0.4	★ ☆	★					☆	★		
		CCMT120408-TM	12.9	12.7	4.76	5.56	0.8	★ ☆	★					☆	★		

★ Recommended grade ☆ Available grade

Applicable tools



S □ □ -SCLCR/L

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

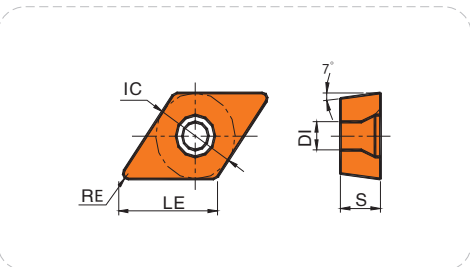
Solid carbide end mills

C

Short hole drills

Solid carbide drills

55°DC□□



Workpiece material		Working condition: ● Stable ● Average ■ Tough																				
		Steel					●		●		■								●		●	
		Stainless steel											●		●							
Cast iron							●		●													
Non-ferrous metal																	●		●			
Heat-resistant alloy Titanium alloy							●		●													
Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermet							
LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20				
7.8	6.35	2.38	2.8	0.2											★ ☆							
7.8	6.35	2.38	2.8	0.4											★ ☆							
11.6	9.525	3.97	4.4	0.2											★ ☆							
11.6	9.525	3.97	4.4	0.4											★ ☆							
7.8	6.35	2.38	2.8	0.4	★ ☆ ★					☆ ★												
7.8	6.35	2.38	2.8	0.8	★ ☆ ★					☆ ★												
11.6	9.525	3.97	4.4	0.4	★ ☆ ★					☆ ★												
11.6	9.525	3.97	4.4	0.8	★ ☆ ★					☆ ★												
11.6	9.525	3.97	4.4	1.2	★ ☆ ★					☆ ★												

★ Recommended grade ☆ Available grade

Applicable tools

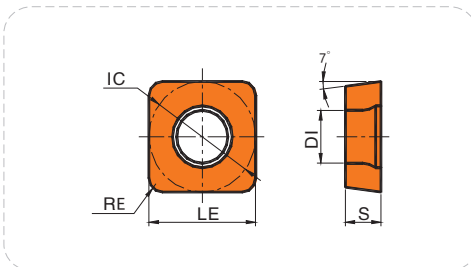


KAPR:107.5°
Page: A76
S□□-SDQCR/L



KAPR:93°
Page: A77
S□□-SDUCR/L

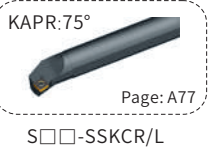
90°SC□□



Machining type		Insert shape	Type	Working condition: ● Stable ● Average ■ Tough																	
				Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermets		
									HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10
Semi-finishing			SCMT09T304-TM	9.525	9.525	3.97	4.4	0.4	★	☆	★				☆	★					
			SCMT09T308-TM	9.525	9.525	3.97	4.4	0.8	★	☆	★				☆	★					
			SCMT120404-TM	12.7	12.7	4.76	5.56	0.4	★	☆	★				☆	★					
			SCMT120408-TM	12.7	12.7	4.76	5.56	0.8	★	☆	★				☆	★					
			SCMT120412-TM	12.7	12.7	4.76	5.56	1.2	★	☆	★				☆	★					

★ Recommended grade ☆ Available grade

Applicable tools



KAPR:75°
Page: A77
S□□-SSKCR/L

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

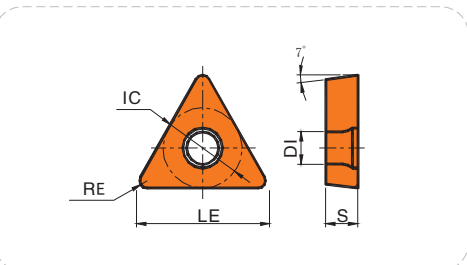
Solid carbide end mills

C

Short hole drills

Solid carbide drills

60°TC□□



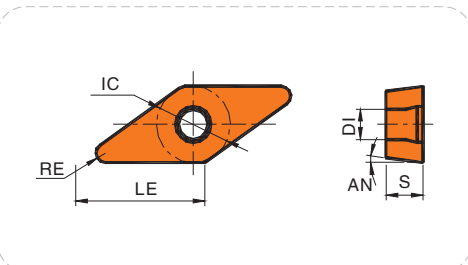
		Working condition: ● Stable ● Average ■ Tough															
Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD				Cemented carbide	Cermet
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR5125	HRK10	HRK20
Finishing		TCGT090204-AK	9.7	5.56	2.38	2.8	0.4									★	☆
		TCGT110204-AK	11.0	6.35	2.38	2.8	0.4									★	☆
		TCGT16T304-AK	16.5	9.525	3.97	4.4	0.4									★	☆
Semi-finishing		TCMT110204-TM	11.0	6.35	2.38	2.8	0.4	★	☆	★			☆	★			
		TCMT110208-TM	11.0	6.35	2.38	2.8	0.8	★	☆	★			☆	★			
		TCMT16T304-TM	16.5	9.525	3.97	4.4	0.4	★	☆	★			☆	★			
		TCMT16T308-TM	16.5	9.525	3.97	4.4	0.8	★	☆	★			☆	★			
		TCMT16T312-TM	16.5	9.525	3.97	4.4	1.2	★	☆	★			☆	★			

★ Recommended grade ☆ Available grade

Applicable tools



35°VB&VC□□



		Working condition: ● Stable ● Average ■ Tough															
Machining type	Insert shape	Type	Basic dimension (mm)							CVD				PVD			
			LE	IC	S	DI	RE	AN		HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR5125
Finishing		VBGT160402-AK	16.5	9.525	4.76	4.4	0.2	5.0									★
		VBGT160404-AK	16.5	9.525	4.76	4.4	0.4	5.0									★
		VBGT160408-AK	16.5	9.525	4.76	4.4	0.8	5.0									★
		VCGT110302-AK	11.0	6.35	3.18	2.8	0.2	7.0									★
		VCGT110304-AK	11.0	6.35	3.18	2.8	0.4	7.0									★
		VCGT160402-AK	16.5	9.525	4.76	4.4	0.2	7.0									★
		VCGT160404-AK	16.5	9.525	4.76	4.4	0.4	7.0									★
Semi-finishing		VCGT160408-AK	16.5	9.525	4.76	4.4	0.8	7.0									★
		VBMT110304-TM	11.0	6.35	3.18	2.8	0.4	5.0	★	☆	★				☆	★	
		VBMT110308-TM	11.0	6.35	3.18	2.8	0.8	5.0	★	☆	★				☆	★	
		VBMT160404-TM	16.5	9.525	4.76	4.4	0.4	5.0	★	☆	★				☆	★	
		VBMT160408-TM	16.5	9.525	4.76	4.4	0.8	5.0	★	☆	★				☆	★	
		VBMT160412-TM	16.5	9.525	4.76	4.4	1.2	5.0	★	☆	★				☆	★	
		VCMT110304-TM	11.0	6.35	3.18	2.8	0.4	7.0	★	☆	★				☆	★	
		VCMT110308-TM	11.0	6.35	3.18	2.8	0.8	7.0	★	☆	★				☆	★	
		VCMT160404-TM	16.5	9.525	4.76	4.4	0.4	7.0	★	☆	★				☆	★	
		VCMT160408-TM	16.5	9.525	4.76	4.4	0.8	7.0	★	☆	★				☆	★	
		VCMT160412-TM	16.5	9.525	4.76	4.4	1.2	7.0	★	☆	★				☆	★	

★ Recommended grade ☆ Available grade

Applicable tools



A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

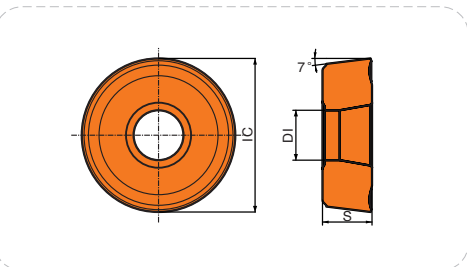
Solid carbide end mills

C

Short hole drills

Solid carbide drills

Profile turning insert



Machining type	Insert shape	Type	Basic dimension (mm)			CVD				PVD				Cemented carbide		Cermet	
			IC	S	DI	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20
Profiling		RCMX1003MO	10	3.18	3.6	★	☆	★									
		RCMX1204MO	12	4.76	4.4	★	☆	★									
		RCMX1606MO	16	6.35	5.5	★	☆	★									
		RCMX2006MO	20	6.35	6.5	★	☆	★									
		RCMX2507MO	25	7.94	7.2	★	☆	★									
		RCMX3209MO	32	9.525	9.5	★	☆	★									
Profiling		RCMX1606MO-MR	16	6.35	5.5	★	☆	★									
		RCMX2006MO-MR	20	6.35	6.5	★	☆	★									
		RCMX2507MO-MR	25	7.94	7.2	★	☆	★									

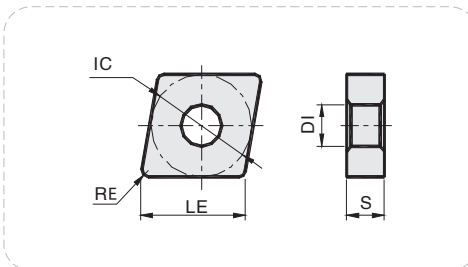
★ Recommended grade ☆ Available grade

Working condition: ● Stable ● Average ■ Tough

Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat-resistant alloy Titanium alloy

Cermet insert



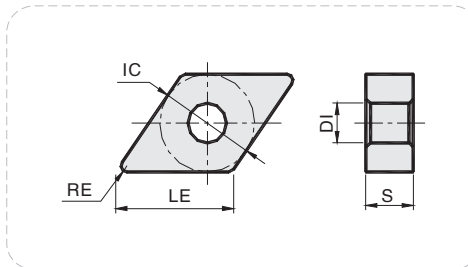
Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20
Finishing and semi-machining		CNMG120404HQ	12.9	12.7	4.76	5.16	0.4											★	★
		CNMG120408HQ	12.9	12.7	4.76	5.16	0.8											★	★

★ Recommended grade ☆ Available grade

Working condition: ● Stable ● Average ■ Tough

Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat-resistant alloy Titanium alloy



Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD				Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20
Finishing and semi-machining		DNMG150404HQ	15.5	12.7	4.76	5.16	0.4											★	★
		DNMG150408HQ	15.5	12.7	4.76	5.16	0.8											★	★

★ Recommended grade ☆ Available grade

Working condition: ● Stable ● Average ■ Tough

Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat-resistant alloy Titanium alloy

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

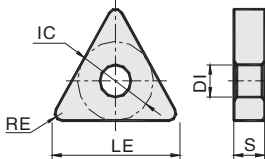
Solid carbide end mills

C

Short hole drills

Solid carbide drills

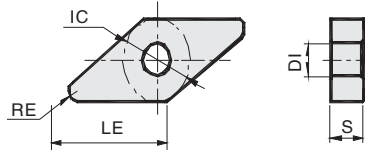
Cermet insert

		Workpiece material		P Steel		●	●	●								●	●				
M Stainless steel									●	●											
K Cast iron									●	●											
N Non-ferrous metal																●	●				
S Heat-resistant alloy Titanium alloy											●	●									
Machining type	Insert shape	Type	Basic dimension (mm)					CVD		PVD				Cemented carbide		Cermet					
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Finishing and semi-machining		TNMG160404HQ	16.5	9.525	4.76	3.81	0.4													★	★
		TNMG160408HQ	16.5	9.525	4.76	3.81	0.8													★	★

★ Recommended grade ☆ Available grade

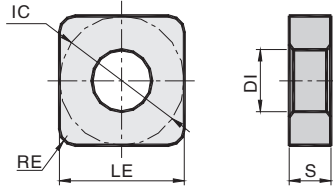
★ Recommended grade ☆ Available grade

Cermet insert

		Workpiece material		P Steel	●	●	■												●	●		
M Stainless steel										●	●											
K Cast iron																						
N Non-ferrous metal																			●	●		
S Heat-resistant alloy Titanium alloy																						
Machining type	Insert shape	Type	Basic dimension (mm)					CVD		PVD				Cemented carbide	Cermet							
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20	
Finishing and semi-machining		VNMG160404HQ	16.5	9.525	4.76	3.81	0.4													★	★	
		VNMG160408HQ	16.5	9.525	4.76	3.81	0.8														★	★

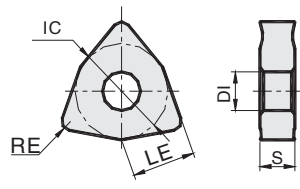
★ Recommended grade ☆ Available grade

★ Recommended grade ☆ Available grade

		Workpiece material	P Steel	●	●	●												●	●		
			M Stainless steel								●	●									
			K Cast iron								●	●									
			N Non-ferrous metal															●	●		
			S Heat-resistant alloy																		
			Titanium alloy																		
Machining type	Insert shape	Type	Basic dimension (mm)					CVD		PVD				Cemented carbide	Cermet						
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Finishing and semi-machining		SNMG120404HQ	12.7	12.7	4.76	5.16	0.4													★	★

★ Recommended grade ☆ Available grade

★ Recommended grade ☆ Available grade

		Workpiece material	P Steel	●	●	■													●	●	
			M Stainless steel									●	●								
			K Cast iron								●	●									
			N Non-ferrous metal															●	●		
			S Heat-resistant alloy Titanium alloy										●	●							
Machining type	Insert shape	Type	Basic dimension (mm)					CVD		PVD				Cemented carbide	Cermet						
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Finishing and semi-machining		WNMG080404HQ	8.7	12.7	4.76	5.16	0.4													★	★
		WNMG080408HQ	8.7	12.7	4.76	5.16	0.8														★

★ Recommended grade ☆ Available grade

★ Recommended grade ☆ Available grade

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

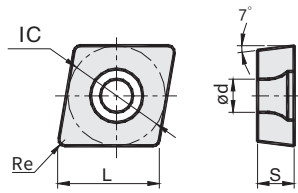
Solid carbide end mills

C

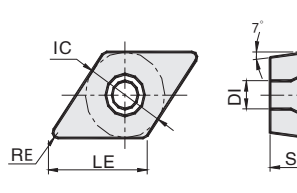
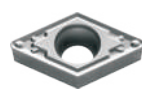
Short hole drills

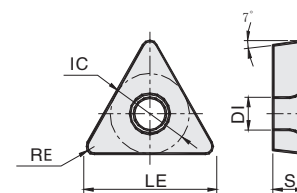
Solid carbide drills

Cermet insert

		Workpiece material P Steel M Stainless steel K Cast iron N Non-ferrous metal S Heat-resistant alloy Titanium alloy	● ● ■ ● ● ● ●																			
Machining type	Insert shape		Type	Basic dimension (mm)					CVD		PVD		Cemented carbide	Cermet								
				LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
																					★	★
																					★	★
Finishing and semi-machining		CCMT060204HQ	6.4	6.35	2.38	2.8	0.4														★	★
		CCMT09T304HQ	9.7	9.525	3.97	4.4	0.4														★	★
		CCMT09T308HQ	9.7	9.525	3.97	4.4	0.8														★	★
		CPMH090308HQ	9.7	9.525	3.18	4.4	0.8														★	★
★ Recommended grade ☆ Available grade																						

Cermet insert

		Working condition: ● Stable ● Average ■ Tough																		
Workpiece material P Steel M Stainless steel K Cast iron N Non-ferrous metal S Heat-resistant alloy Titanium alloy		● ● ■ ● ● ● ●																		
		Basic dimension (mm)					CVD		PVD		Cemented carbide	Cermet								
		LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
																			★ ★	★ ★
																			★ ★	★ ★
Finishing and semi-machining		DCMT070202HQ																	★ ★	★ ★
		DCMT070204HQ																	★ ★	★ ★
		DCMT070208HQ																	★ ★	★ ★
		DCMT11T302HQ																	★ ★	★ ★
		DCMT11T304HQ																	★ ★	★ ★
		DCMT11T308HQ																	★ ★	★ ★
★ Recommended grade ☆ Available grade																				

		Working condition: ● Stable ● Average ■ Tough																		
Workpiece material P Steel M Stainless steel K Cast iron N Non-ferrous metal S Heat-resistant alloy Titanium alloy		● ● ■ ● ● ● ●																		
		Basic dimension (mm)					CVD		PVD		Cemented carbide	Cermet								
		LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Machining type	Insert shape	Type																		
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10
Finishing and semi-machining		TCMT110204-PS	11.0	6.35	2.38	2.8	0.4												★	★
★ Recommended grade ☆ Available grade																				

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

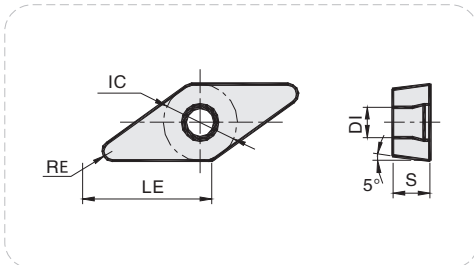
Solid carbide end mills

C

Short hole drills

Solid carbide drills

Cermet insert



Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD				Cemented carbide	Cermet				
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Finishing and semi-finishing		VBMT110304-HQ	11.0	6.35	3.18	2.8	0.4													★	★
		VBMT110308-HQ	11.0	6.35	3.18	2.8	0.8													★	★

★ Recommended grade ☆ Available grade

Working condition: ● Stable ● Average ■ Tough

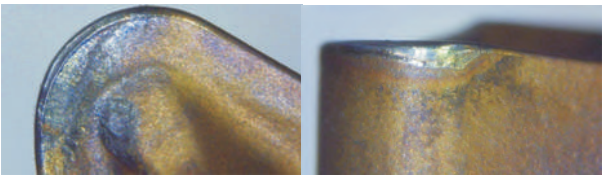
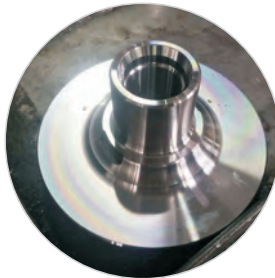
Workpiece material	Steel	Stainless steel	Cast iron	Non-ferrous metal	Heat-resistant alloy	Titanium alloy
P	●	●	■			
M				●	●	
K			●			
N				●	●	
S					●	●

Application - P-type material turning

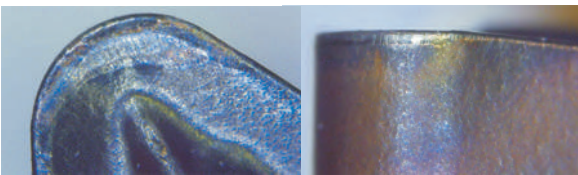
Flange plate

- Workpieces materials: 40Cr, quenching and tempering
- Machining method: Finishing of end face
- Insert: DNMG150408-GF HR8115
- Machining parameters: $V_c=338.5\text{m/min}$, $f_n=0.14\sim0.32\text{mm/r}$, $a_p=0.2\text{mm}$
- Cooling method: Water cooling

After machining 200 workpieces, Huareal products have less wear extent on rear insert face and better surface quality.



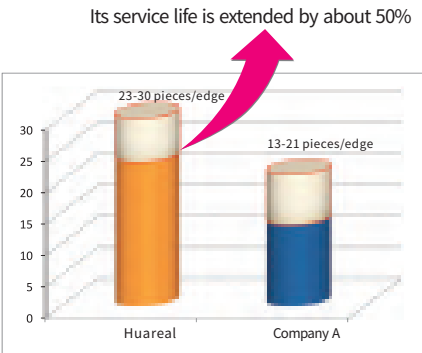
Company A



GF

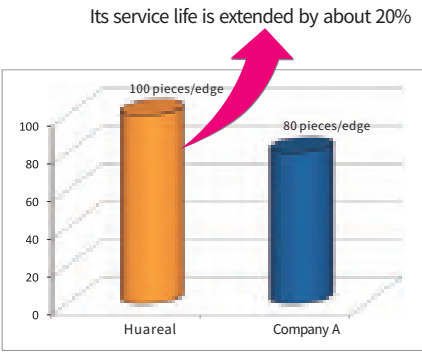
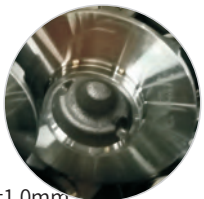
Hub unit

- Workpieces materials: 65Mn
- Machining method: Semi-finishing of end face
- Insert: WNMG080408-GF HR8115
- Machining parameters: $V_c=330\text{m/min}$, $f_n=0.3\text{mm/r}$, $a_p=0.8\text{mm}$
- Cooling method: Water cooling



Flange plate

- Workpieces materials: 65Mn
- Machining method: Rough turning of end face
- Insert: WNMG080412-GM HR8225
- Machining parameters: $V_c=260\text{m/min}$, $f_n=0.32\text{mm/r}$, $a_p=1.0\text{mm}$
- Cooling method: Water cooling



A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

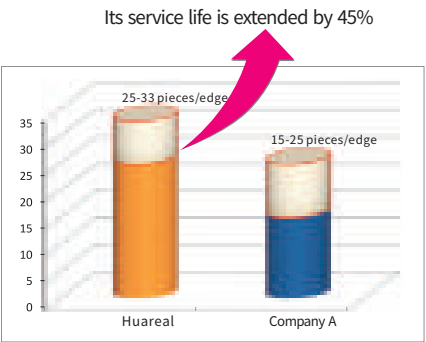
Short hole drills

Solid carbide drills

Application - P-type material turning

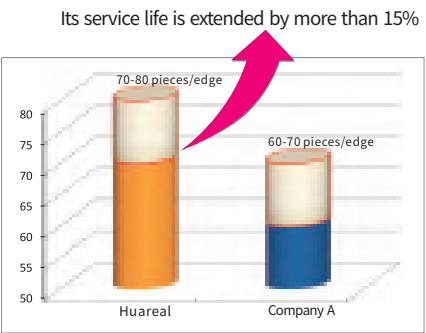
Flange machining

- Workpieces materials 45# steel
- Machining method Strong intermittent rough turning of end face
- Insert WNMG080408-GM HR8225
- Machining parameters $V_c=180\sim358\text{m/min}$, $f_n=0.275\text{mm/r}$, $a_p=1.3\sim3\text{mm}$
- Cooling method Water cooling



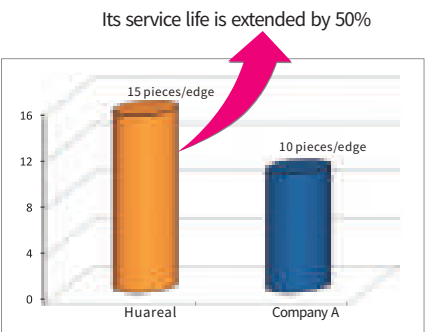
Flange plate

- Workpieces materials 55# steel
- Machining method External and end face turning
- Insert WNMG080408-GM HR8225
- Machining parameters $V_c=285.7\text{m/min}$, $f_n=0.27\text{mm/r}$, $a_p=0.6\text{mm}$
- Cooling method Water cooling



Tropid housing

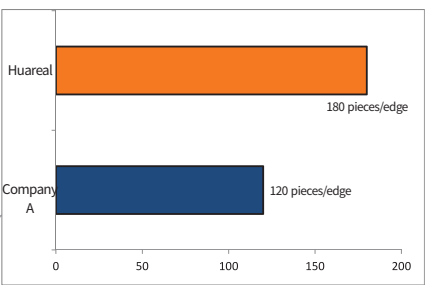
- Workpieces materials CF53
- Machining method Rough turning of axle neck and small axle
- Insert WNMG080412-GR HR8225
- Machining parameters $V_c=351\text{m/min}$, $f_n=0.45\text{mm/r}$, $a_p=2.0\text{mm}$
- Cooling method Water cooling



Machining case - stainless steel turning

Flange plate

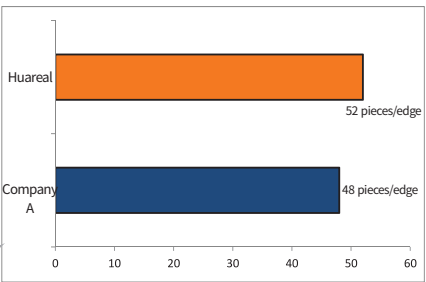
- Workpieces materials SUS304
- Machining method External and end face turning
- Insert VNMG160408-BF HR7225
- Machining parameters $V_c=171\sim180\text{m/min}$, $f_n=0.08\text{mm/r}$, $a_p=0.30\text{mm}$
- Cooling method Water cooling



With good machined surface quality, Huareal products' service life is extended by about 50%

Flange plate

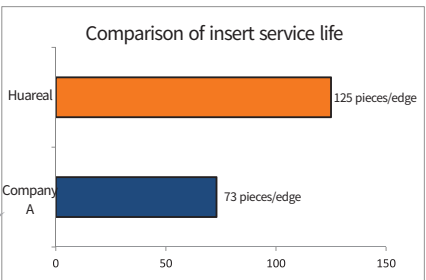
- Workpieces materials SUS304
- Machining method Continuous external and end face finishing
- Insert WNMG080408-BF HR7225
- Machining parameters $V_c=259\text{m/min}$, $f_n=0.15\text{mm/r}$, $a_p=0.50\text{mm}$
- Cooling method Water cooling



With good machined surface quality, Huareal products' service life is extended by about 50%

Flange plate

- Workpieces materials SUS304
- Machining method Semi-finishing of cone and end faces
- Insert WNMG080408-BM HR7225
- Machining parameters $V_c=150\sim243\text{m/min}$, $f_n=0.2\text{mm/r}$, $a_p=1.2\text{mm}$
- Cooling method Water cooling



With less groove wear, Huareal products' service life is extended by about 70%

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

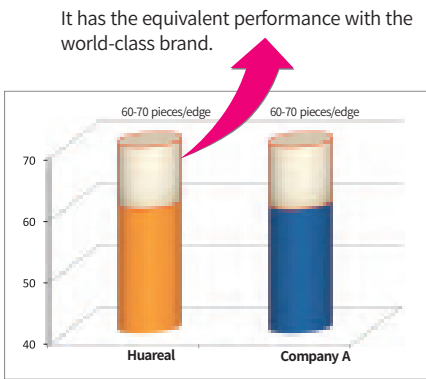
Short hole drills

Solid carbide drills

Machining case - cast iron turning

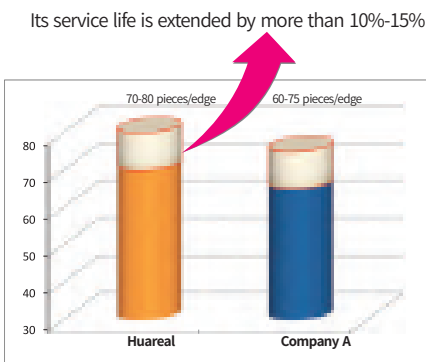
Compressor cylinder

- Workpieces materials HT250
- Machining method External and end face rough turning
- Insert WNMG080412 HR6115
- Machining parameters $V_c=415\text{m/min}$, $f_n=0.15\text{mm/r}$, $a_p=0.4\text{mm}$
- Cooling method Water cooling



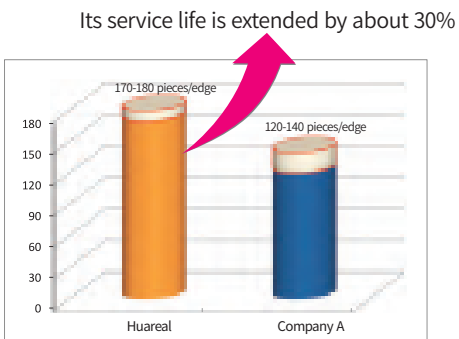
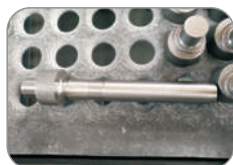
Compressor flange

- Workpieces materials HT250
- Machining method External and end face rough turning
- Insert WNMG080408 HR6115
- Machining parameters $V_c=563\text{m/min}$, $f_n=0.25\text{mm/r}$, $a_p=1\text{mm}$
- Cooling method Water cooling



Tripod housing

- Workpieces materials QT500
- Machining method External turning
- Insert WNMG080408 HR6115
- Machining parameters $V_c=190\text{m/min}$, $f_n=0.4\text{mm/r}$, $a_p=1\text{mm}$
- Cooling method Water cooling



General turning tool

- Code key of general turning tools A55-A56
 - Code key of general external turning tools A55
 - Code key of general internal turning tools A56
- Overview of general turning tools A57-A60
- General turning tools A61-A82
 - P-type clamping external turning tool A67-A66
 - M-type clamping external turning tool A67-A75
 - S-type clamping internal turning tool A76-A82

Code key of general external turning tools

P	C	L	N	R	25	25	M	12
①	②	③	④	⑤	⑥	⑦	⑧	⑨

① Clamping method		③ Cutting edge angle KAPR				④ Insert clearance angle	
Mark	Locking method	B	D	F	G	N	Negative style (0°)
M	Rigid clamping					⑤ Cutting direction	
P	Lever clamping						
② Insert shape						⑥ Corner height (mm)	
C	80° rhombus	J	K	L	P	8	08
D	55° rhombus					10	10
R	Circular					12	12
S	Square	S	T	V	R	16	16
T	Regular triangle					20	20
V	35° rhombus					25	25
W	Equilateral unequal hexagon					32	32
⑦ Width of tool holder (mm)		⑧ Tool length (mm)		⑨ Cutting edge length (mm)			
8	08	D	60	Inscribed circle of insert	Insert shape		
10	10	E	70		Square	Regular triangle	Circular
12	12	F	80		80° rhombus	55° rhombus	35° rhombus
16	16	H	100	6.00	--	--	06
20	20	K	125	6.35	--	11	--
25	25	M	150	7.94	--	13	--
32	32	P	170	8.00	--	--	08
		Q	180	9.525	09	16	--
		R	200	10.00	--	--	10
				12.00	--	--	12
				12.70	12	22	--
				15.875	15	27	--
				16.00	--	--	16
				19.05	19	--	19
				20.00	--	--	20
				25.00	--	--	25
				25.40	25	--	--
				32.00	-	-	32

Code key of general internal turning tools

S	16	M	-	S	C	L	C	R	09
①	②	③	④	⑤	⑥	⑦	⑧	⑨	

① Material of cutter bar		③ Shank length (mm)		⑥ Cutting edge angle KAPR			
Mark	Material	K	125	F	K	L	Q
S	Steel cutter bar	M	150				
		Q	180				
		R	200				
		S	250				
		T	300				
		U	350				
② Cutter bar diameter (mm)		④ Clamping method					
08	08	S	Screw clamp design				
10	10						
12	12						
16	16						
20	20						
25	25						
32	32						
⑤ Insert shape		⑦ Insert clearance angle		⑧ Cutting direction			
C	80° rhombus	C	7°	R	Right hand		
D	55° rhombus	P	11°	L	Left hand		
S	Square			N	Left and right hands		
T	Regular triangle						
V	35° rhombus						
		⑨ Cutting edge length (mm)					
		Inscribed circle of insert	Insert shape				
			Square	Regular triangle	80° rhombus	55° rhombus	35° rhombus
		5.556	--	09	--	--	--
		6.350	--	11	06	07	11
		9.525	09	16	09	11	--
		12.70	12	--	12	--	--

Overview of general turning tools (external machining)

Clamping method	Model	Cutting edge angle (KAPR)°	Turning method						Workpiece shape suitable for machining		Page
			External turning	End face turning	External and end face turning	Profiling	Profiling	Profiling	Short and thick	Long and thin	
P		75°									A61
		95°								A61	
		93°								A62	
		62.5°								A62	
		75°								A63	
		45°								A63	
		75°								A64	
		45°								A64	
		90°								A65	
		60°								A65	
		90°								A66	
		95°									A66
M		75°								A67	
		95°								A67	

☺ Recommended ☹ Available

Overview of general turning tools (external machining)

Clamping method	Model	Cutting edge angle (KAPR)°	Turning method						Workpiece shape suitable for machining		Page
			External turning	End face turning	External and end face turning	Profiling	Profiling	Profiling	Short and thick	Long and thin	
M		93°									A68
		62.5°									A69
		75°									A70
		75°									A70
		75°									A71
		45°									A71
		90°									A72
		93°									A72
		90°									A73
		72.5°									A73
		93°									A74
		95°									A74
		/									A75
		/									A75

☺ Recommended ☹ Available

Overview of general turning tools (internal machining)

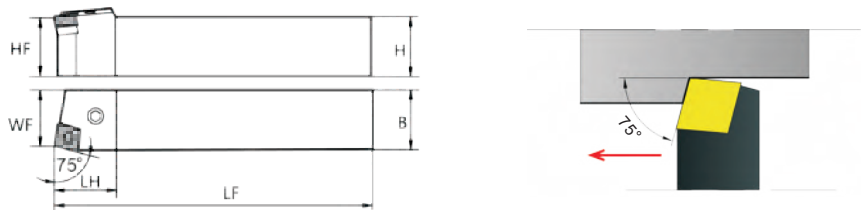
Model	Cutter bar shape	Cutting edge angle (KAPR) °	Shank diameter of cutter bar	Tool length	Machined workpiece diameter minimum	Page
S□□-SCLCR/L		95°	12	150	16	A76
			16	180	20	
			20	200	25	
			25	250	32	
S□□-SDQCR/L		107.5°	12	150	16	A76
			16	180	20	
			20	200	25	
			25	250	32	
S□□-SDUCR/L		93°	12	150	16	A77
			16	180	20	
			20	200	25	
S□□-SSKCR/L		75°	12	150	16	A77
			16	180	20	
			20	200	25	
			25	250	32	
S□□-STFCR/L		90°	16	180	20	A78
			20	200	25	
			25	250	32	
S□□-SVQBR/L		107.5°	20	200	27	A78
			25	250	35	
S□□-SVUBR/L		93°	25	250	35	A79
S□□-SVQCR/L		107.5°	16	180	22	A79
			25	250	35	
S□□-SVUCR/L		93°	20	200	28	A80
			25	250	35	
S□□-SCLPR/L		95°	12	150	16	A80
			16	180	20	
			20	200	25	
S□□-SDQPR/L		107.3°	12	150	16	A81
			16	180	20	
			20	200	25	

Overview of general turning tools (internal machining)

Model	Cutter bar shape	Cutting edge angle (KAPR) °	Shank diameter of cutter bar	Tool length	Machined workpiece diameter minimum	Page
S□□-SDUPR/L		93°	12	150	16	A81
			16	180	20	
S□□-STUPR/L		93°	12	180	16	A82
			16	180	20	

External turning tool

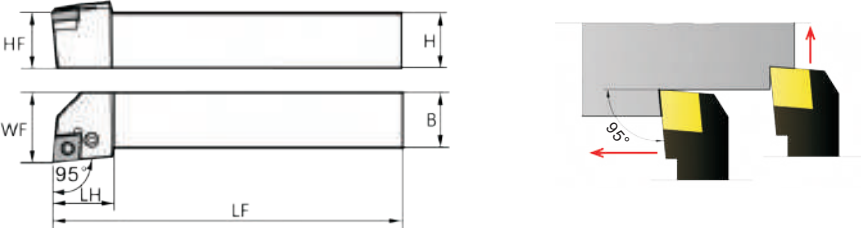
PCBNR/L
KAPR:75°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PCBNR/L	2020K12	△	△	20	20	125	27	20	17						
	2525M12	▲	▲	25	25	150	27	25	22	LLS0821	HC12WE	WR30L	GH4	DD4L	CN**1204
	3232P12	△	△	32	32	170	32	32	27						
	2525M16	▲	▲	25	25	150	38	25	22	LLS0825	HC16WE	WR30L	GH5	DD5L	CN**1606
	3232P16	△	△	32	32	170	38	32	27						
	3232P19	△	△	32	32	170	42	32	27	LLS1027	HC19WE	WR40L	GH6	DD6L	CN**1906

▲Running stock △Make-to-order

PCLNR/L
KAPR:95°

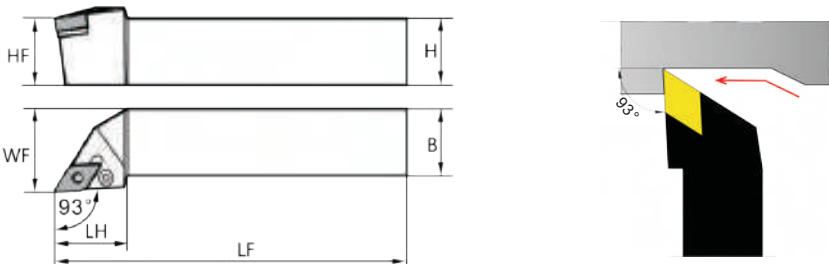


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PCLNR/L	2020K12	△	△	20	20	125	28	20	25						
	2525M12	▲	▲	25	25	150	32	25	32	LLS0821	HC12WE	WR30L	GH4	DD4L	CN**1204
	3232P12	△	△	32	32	170	32	32	40						
	2525M16	▲	▲	25	25	150	38	25	32	LLS0825	HC16WE	WR30L	GH5	DD5L	CN**1606
	3232P16	△	△	32	32	170	38	32	40						
	3232P19	△	△	32	32	170	42	32	40	LLS1027	HC19WE	WR40L	GH6	DD6L	CN**1906

▲Running stock △Make-to-order

External turning tool

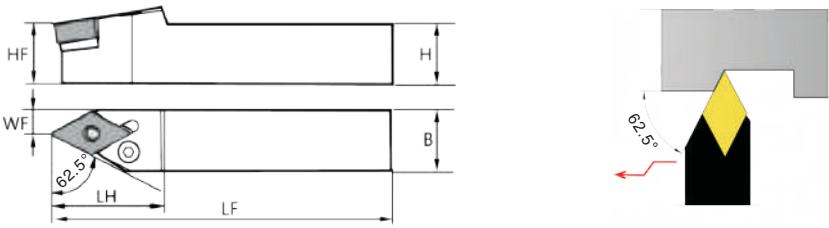
PDJNR/L
KAPR:93°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PDJNR/L	2020K11	△	△	20	20	125	25	20	25						
	2525M11	▲	▲	25	25	150	28	25	32	LLS0617	HD11WE	WR25L	GH3	DD3L	DN**1104
	2020K15	△	△	20	20	125	38	20	25						
	2525M15	▲	▲	25	25	150	38	25	32	LLS0821	HD15WE	WR30L	GH4B	DD4L	DN**1506
	3232P15	△	△	32	32	170	38	32	40						
	2020K15H	△	△	20	20	125	38	20	25						
	2525M15H	▲	▲	25	25	150	38	25	32	LLS0821	HD15WE	WR30L	GH4	DD4L	DN**1504
	3232P15H	△	△	32	32	170	38	32	40						

▲Running stock △Make-to-order

PDPNN
KAPR:62.5°

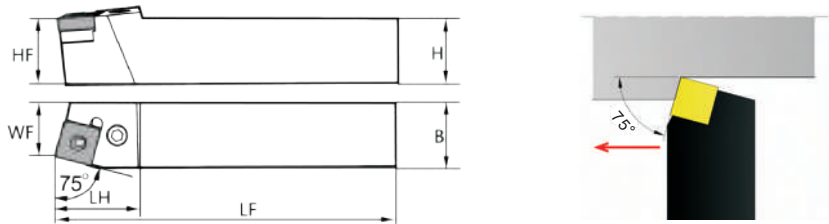


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
				H	B	LF	LH	HF	WF						
PDPNN	2020K15	▲		20	20	125	38	20	8						
	2525M15	▲		25	25	150	38	25	12.5	LLS0821	HD15WE	WR30L	GH4	DD4L	DN**1506
	3232P15	△		32	32	170	38	32	16						
	2020K15H	△		20	20	125	38	20	8						
	2525M15H	▲		25	25	150	38	25	12.5	LLS0821	HD15WE	WR30L	GH4	DD4L	DN**1504
	3232P15H	△		32	32	170	38	32	16						

▲Running stock △Make-to-order

External turning tool

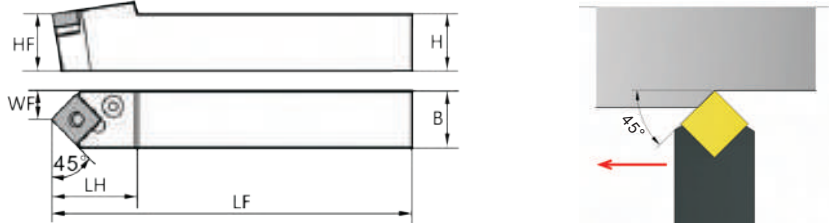
PSBNR/L
KAPR:75°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSBNR/L	2020K12	△	△	20	20	125	28	20	17						
	2525M12	▲	▲	25	25	150	28	25	22	LLS0821	HS12WE	WR30L	GH4	DD4L	SN**1204
	3232P12	△	△	32	32	170	32	32	27						
	2525M15	▲	▲	25	25	150	28	25	22	LLS0825	HS15WE	WR30L	GH5	DD5L	SN**1506
	3232P15	△	△	32	32	170	32	32	27						
	3232P19	△	△	32	32	170	32	32	27	LLS1027	HS19WE	WR40L	GH6	DD6L	SN**1906

▲Running stock △Make-to-order

PSDNN
KAPR:45°

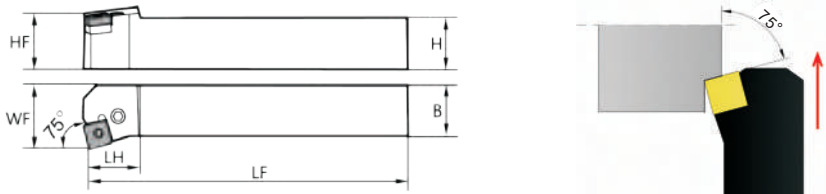


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSDNN	2020K12	△	△	20	20	125	30	20	10						
	2525M12	▲	▲	25	25	150	30	25	12.5	LLS0821	HS12WE	WR30L	GH4	DD4L	SN**1204
	3232P12	△	△	32	32	170	40	32	16						
	2525M15	▲	▲	25	25	150	40	25	12.5	LLS0825	HS15WE	WR30L	GH5	DD5L	SN**1506
	3232P15	△	△	32	32	170	40	32	16						
	3232P19	△	△	32	32	170	40	32	16	LLS1027	HS19WE	WR40L	GH6	DD6L	SN**1906

▲Running stock △Make-to-order

External turning tool

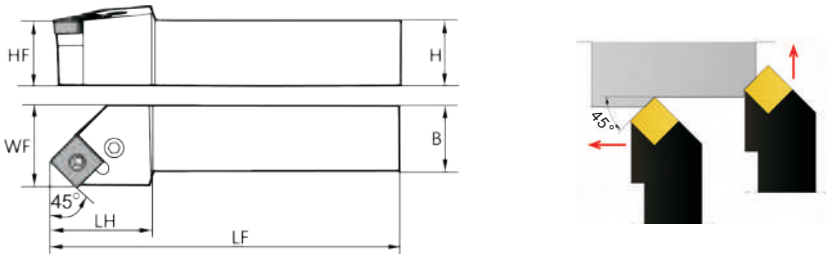
PSKNR/L
KAPR:75°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSKNR/L	2020K12	△	△	20	20	125	28	20	25						
	2525M12	▲	▲	25	25	150	28	25	32	LLS0821	HS12WE	WR30L	GH4	DD4L	SN**1204
	3232P12	△	△	32	32	170	32	32	40						
	2525M15	▲	▲	25	25	150	28	25	32	LLS0825	HS15WE	WR30L	GH5	DD5L	SN**1506
	3232P15	△	△	32	32	170	32	32	40						
	3232P19	△	△	32	32	170	32	32	40	LLS1027	HS19WE	WR40L	GH6	DD6L	SN**1906

▲Running stock △Make-to-order

PSSNR/L
KAPR:45°

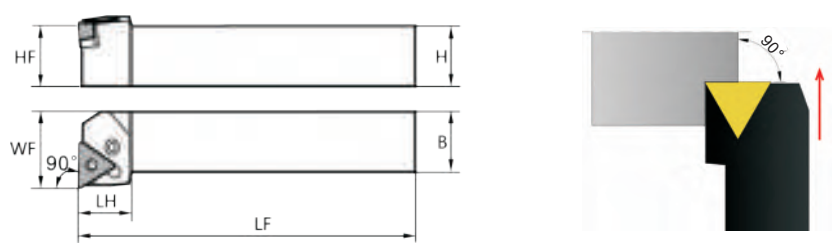


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSSNR/L	2020K12	△	△	20	20	125	28	20	25						
	2525M12	▲	▲	25	25	150	28	25	32	LLS0821	HS12E	WR30L	GH4	DD4L	SN**1204
	3232P12	△	△	32	32	170	32	32	40						
	2525M15	▲	▲	25	25	150	28	25	32	LLS0825	HS15WE	WR30L	GH5	DD5L	SN**1506
	3232P15	△	△	32	32	170	32	32	40						
	3232P19	△	△	32	32	170	32	32	40	LLS1027	HS19WE	WR40L	GH6	DD6L	SN**1906

▲Running stock △Make-to-order

External turning tool

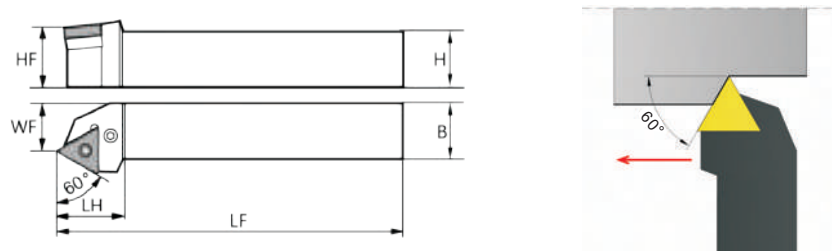
PTFNR/L
KAPR:90°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PTFNR/L	2020K16	△	△	20	20	125	23	20	25	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M16	▲	▲	25	25	150	23	25	32	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M22	△	△	25	25	150	28	25	32	LLS0821	HT22WE	WR30L	GH4	DD4L	TN**2204
	3232P22	▲	▲	32	32	170	28	32	40	LLS0821	HT22WE	WR30L	GH4	DD4L	TN**2204
	3232P27	△	△	32	32	170	34	32	40	LLS0825	HT27WE	WR30L	GH5	DD5L	TN**2706

▲Running stock △Make-to-order

PTTNR/L
KAPR:60°

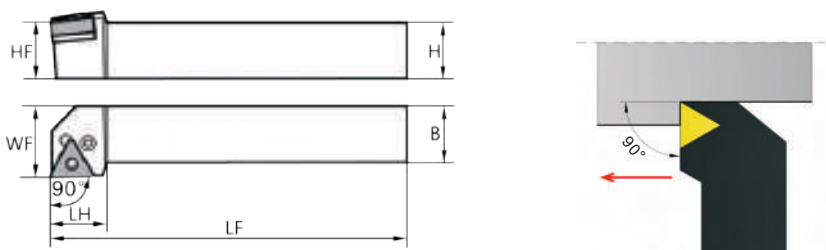


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PTTNR/L	2020K16	△	△	20	20	125	23	20	17	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M16	▲	▲	25	25	150	23	25	22	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M22	▲	▲	25	25	150	32	20	22	LLS0821	HT22WE	WR40L	GH4	DD4L	TN**2204

▲Running stock △Make-to-order

External turning tool

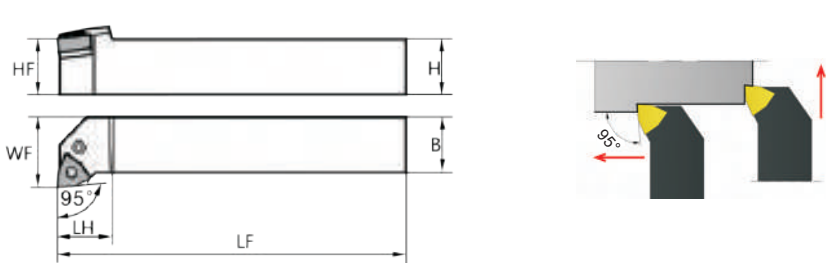
PTGNR/L
KAPR:90°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PTGNR/L	2020K16	△	△	20	20	125	23	20	25	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M16	▲	▲	25	25	150	23	25	32	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	3232P16	△	△	32	32	170	28	32	40	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M22	▲	▲	25	25	150	28	25	32	LLS0821	HT22WE	WR30L	GH4	DD4L	TN**2204
	3232P22	△	△	32	32	170	28	32	40	LLS0821	HT22WE	WR30L	GH4	DD4L	TN**2204
	3232P27	△	△	32	32	170	33	32	40	LLS0825	HT27WE	WR40L	GH5	DD5L	TN**2706
	3232P27	△	△	32	32	170	33	32	40	LLS0825	HT27WE	WR40L	GH5	DD5L	TN**2706

▲Running stock △Make-to-order

PWLNLR/L
KAPR:95°

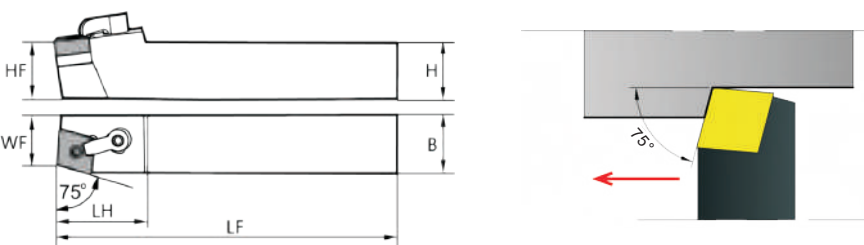


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PWLNLR/L	2020K06	△	△	20	20	125	23	20	25	LLS0617	HW06WE	WR25L	GH3	DD3L	WN**0604
	2525M06	▲	▲	25	25	150	23	25	32	LLS0617	HW06WE	WR25L	GH3	DD3L	WN**0604
	2020K08	△	△	20	20	125	28	20	25	LLS0821	HW08WE	WR30L	GH4	DD4L	WN**0804
	2525M08	▲	▲	25	25	150	28	25	32	LLS0821	HW08WE	WR30L	GH4	DD4L	WN**0804
	3232P08	△	△	32	32	170	28	32	40	LLS0821	HW08WE	WR30L	GH4	DD4L	WN**0804

▲Running stock △Make-to-order

External turning tool

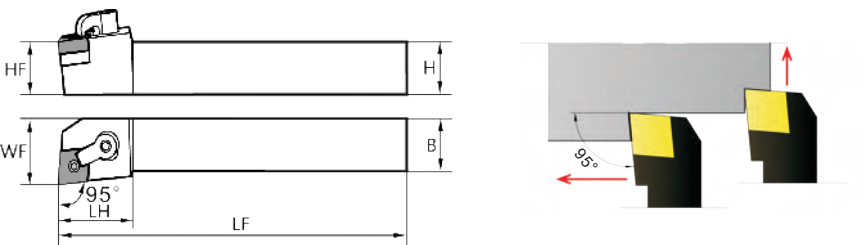
MCBNR/L
KAPR:75°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MCBNR/L	2020K12	△	△	20	20	125	35	20	17						
	2525M12	▲	▲	25	25	150	35	25	22						
	3232P12	△	△	32	32	170	35	32	27						
	2525M16	▲	▲	25	25	150	42	25	22						
	3232P16	△	△	32	32	170	42	32	27						
	3232P19	△	△	32	32	170	42	32	27						
										HM6×20	HC12WI	WR25L	HYD1	MP6×17	CN**1204
										HM6×25	HC16WI	WR30L	HYD2	MP8×21	CN**1606
										HM6×28		WR30L			
										HM8×35	HC19WI	WR40L	HYD5X	MP10×21	CN**1906

▲Running stock △Make-to-order

MCLNR/L
KAPR:95°

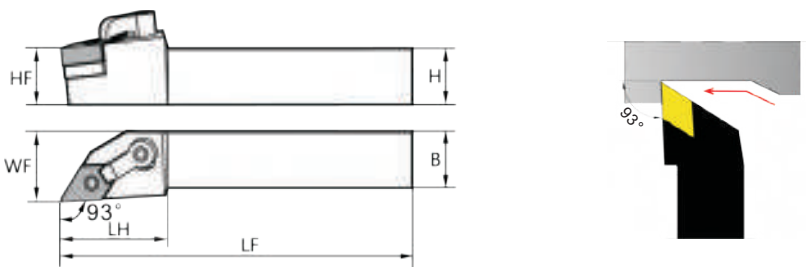


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MCLNR/L	2020K12	△	△	20	20	125	32	20	25	HM6×20		WR25L			
	2525M12	▲	▲	25	25	150	32	25	32	HM6×25		WR30L			
	3232P12	▲	▲	32	32	170	32	32	40	HM6×28					
	2525M16	△	△	25	25	150	38	25	32	HM6×25		WR30L			
	3232P16	△	△	32	32	170	38	32	40	HM6×28					
	3232P19	△	△	32	32	170	42	32	40	HM8×35		HC19WI			

▲Running stock △Make-to-order

External turning tool

MDJNR/L
KAPR:93°

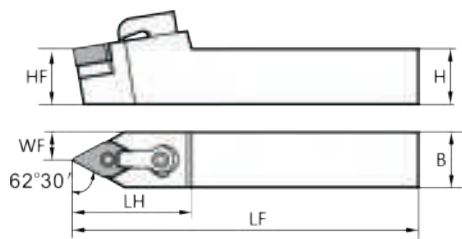


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MDJNR/L	2020K11	△	△	20	20	125	32	20	25	HM6×25	HD11WI	WR20L WR30L	HYD1	MP5×13	DN**1104
	2525M11	▲	▲	25	25	150	32	25	32						
	3232P11	△	△	32	32	170	32	32	40	HM6×28	HD15WI	WR25L WR30L	HYD2	MP6×19	DN**1506
	2020K15	△	△	20	20	125	38	20	25						
	2525M15	▲	▲	25	25	150	38	25	32	HM6×25					
	3232P15	△	△	32	32	170	38	32	40	HM6×28					
	2020K15H	△	△	20	20	125	38	20	25	HM6×20					
	2525M15H	▲	▲	25	25	150	38	25	32	HM6×25					
3232P15H	△	△	32	32	170	38	32	40	HM6×28						

▲Running stock △Make-to-order

External turning tool

MDPNN
KAPR:62.5°

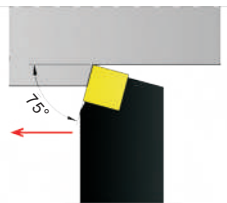
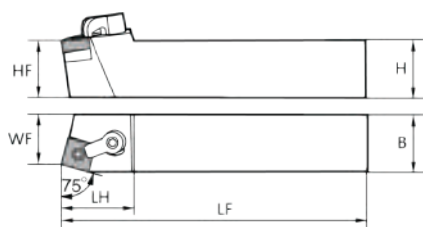


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MDPNN	2020K11	△	△	20	20	125	35	20	10	HM6×20	HD11WI	WR20L WR30L	HYD1	MP5×13	DN**1104
	2525M11	▲	▲	25	25	150	35	25	12.5	HM6×25					
	3232P11	△	△	32	32	170	42	32	16	HM6×28					
	2020K15	△	△	20	20	125	42	20	12.5	HM6×20					
	2525M15	▲	▲	25	25	150	42	25	12.5	HM6×25					
	3232P15	△	△	32	32	170	42	32	16	HM6×28					
	2020K15H	△	△	20	20	125	42	20	12.5	HM6×20					
	2525M15H	▲	▲	25	25	150	42	25	12.5	HM6×25					
3232R15H	△	△	32	32	200	42	32	16	HM6×28	HD15WI	WR25L WR30L	HYD2	MP6×17	DN**1504	

▲Running stock △Make-to-order

External turning tool

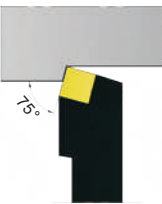
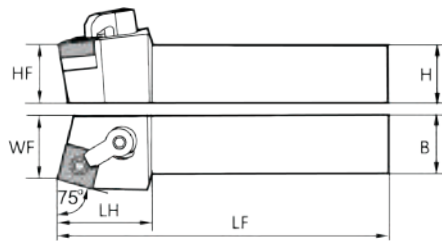
MSBNR/L
KAPR:75°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MSBNR/L	2020K12	△	△	20	20	125	32	20	17	HM6×20					
	2525M12	▲	▲	25	25	150	32	25	22	HM6×25	HS12WI	WR25L WR30L	HYD1	MP6×17	SN**1204
	3232P12	△	△	32	32	170	32	32	27	HM6×28					
	2525M15	▲	▲	25	25	150	38	25	22	HM6×25					
	3232P15	△	△	32	32	170	38	32	27	HM6×28	HS15WI	WR30L	HYD2	MP8×21	SN**1506
	3232P19	△	△	32	32	170	42	32	27	HM8×35	HS19WI	WR40L	HYD5X	MP10×21	SN**1906

▲Running stock △Make-to-order

MSRNR/L
KAPR:75°

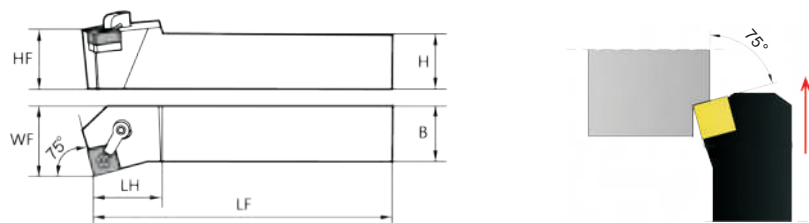


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MSRNR/L	2020K12	△	△	20	20	125	32	20	22	HM6×20		WR25L		MP6×17	
	2525M12	▲	▲	25	25	150	32	25	27	HM6V25		WR30L			
	3232P12	△	△	32	32	170	32	32	35	HM6×28		WR30L		MP8×21	
	2525M15	▲	▲	25	25	150	38	25	27	HM6×25					
	3232P15	△	△	32	32	170	38	32	35	HM6×28					
	3232P19	△	△	32	32	170	42	32	35	HM8×35	HS19WI	WR40L	HYD5X	MP10×21	SN**1906

▲Running stock △Make-to-order

External turning tool

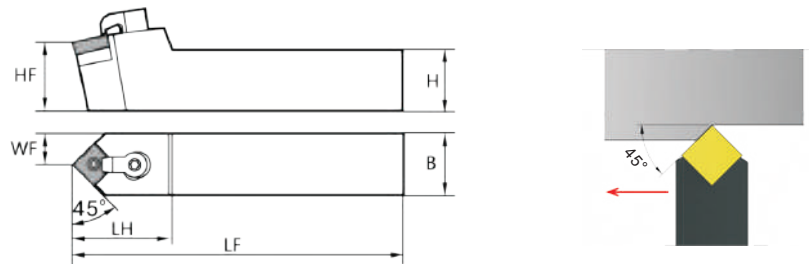
MSKNR/L
KAPR:75°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MSKNR/L	2020K12	△	△	20	20	125	32	20	25	HM6×20		WR25L WR30L	HYD1	MP6×17	SN**1204
	2525M12	▲	▲	25	25	150	32	25	32	HM6×25					
	3232P12	△	△	32	32	170	32	32	40	HM6×28		WR30L	HYD2	MP8×21	SN**1506
	2525M15	▲	▲	25	25	150	38	25	32	HM6×25					
	3232P15	△	△	32	32	170	38	32	40	HM6×28					
	3232P19	△	△	32	32	170	42	32	40	HM8×35		WR40L	HYD5X	MP10×21	SN**1906

▲Running stock △Make-to-order

MSDNN
KAPR:45°

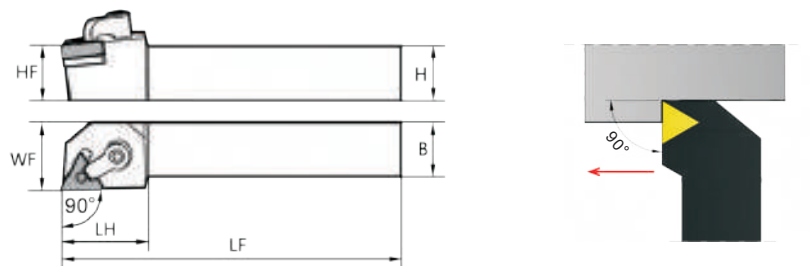


Model		Inventory	Basic dimension (mm)						Accessories					Matching insert
			Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
			H	B	LF	LH	HF	WF						
MSDNN	2020K12	△	20	20	125	35	20	10						
	2525M12	▲	25	25	150	35	25	12.5	HM6×25	HS12WI	WR25L WR30L	HYD1	MP6×17	SN**1204
	3232P12	△	32	32	170	42	32	16						
	2525M15	▲	25	25	150	42	25	12.5	HM6×28	HS15WI	WR30L	HYD2	MP8×21	SN**1506
	3232P15	△	32	32	170	42	32	16						

▲Running stock △Make-to-order

External turning tool

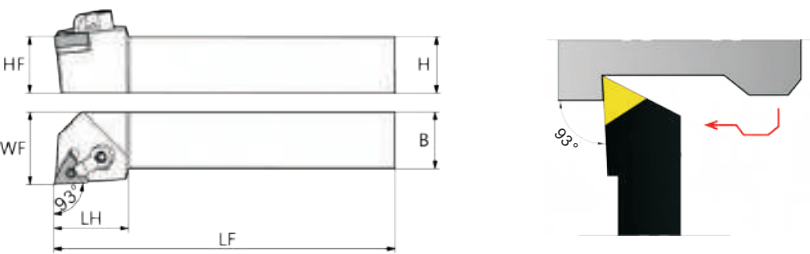
MTGNR/L
KAPR:90°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MTGNR/L	2020K16	△	△	20	20	125	32	20	25	HM6×25		WR20L		MP5×13	
	2525M16	▲	▲	25	25	150	32	25	32	HM6×25		WR30L			
	3232P16	△	△	32	32	170	32	32	40	HM6×28		WR25L		MP6×17	
	2525M22	▲	▲	25	25	150	38	25	32	HM6×25		WR30L			
	3232P22	△	△	32	32	170	38	32	40	HM6×28					

▲Running stock △Make-to-order

MTJNR/L
KAPR:93°

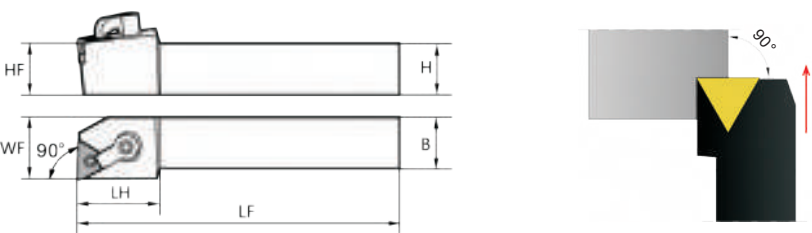


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MTJNR/L	2020K16	△	△	20	20	125	32	20	25	HM6×25 HM6×30					
	2525M16	▲	▲	25	25	150	32	25	32						
	3232P16	△	△	32	32	170	32	32	40						
	2525M22	▲	▲	25	25	150	38	25	32						
	3232P22	△	△	32	32	170	38	32	40						

▲Running stock △Make-to-order

External turning tool

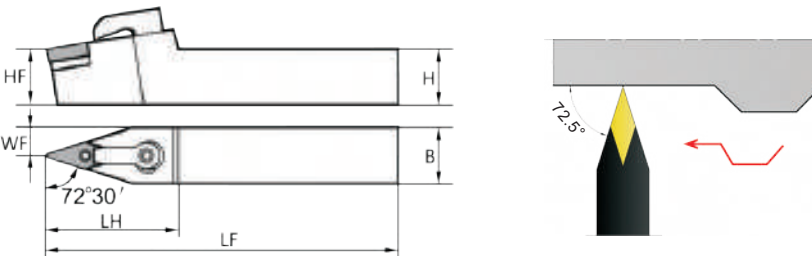
MTFNR/L
KAPR:90°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
	2020K16	△	△	20	20	125	32	20	25	HM6×25	HT16WI	WR20L WR30L	HYD1	MP5×13	TN**1604
	2525M16	▲	▲	25	25	150	32	25	32						
	3225P16	△	△	32	25	170	32	32	32	HM6×28					
	3232P16	△	△	32	32	170	32	32	40						
	2525M22	▲	▲	25	25	150	38	25	32	HM6×25	HT22WI	WR25L WR30L	HYD2	MP6×17	TN**2204
	3225P22	△	△	32	25	170	38	32	32	HM6×28					
3232P22	△	△	32	32	170	38	32	40							

▲Running stock △Make-to-order

MVVNN
KAPR:72.5°

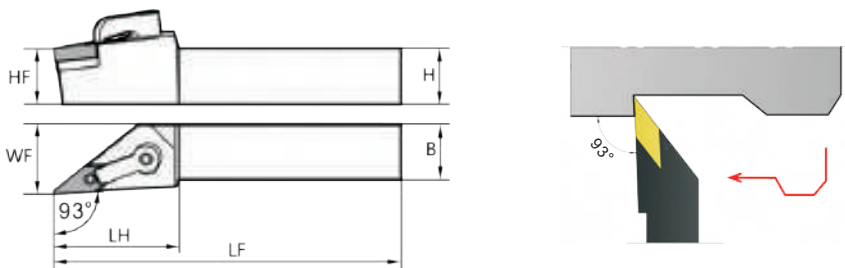


Model		Inventory	Basic dimension (mm)						Accessories					Matching insert
			Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
				H	B	LF	LH	HF	WF					
MVVNN	2020K16	△	20	20	125	45	20	10	HM6×25	HV16WI	WR20L	HYD3	MP5×13	VN**1604
	2525M16	▲	25	25	150	45	25	12.5	HM6×25					
	3232P16	△	32	32	170	45	32	16	HM6×28					

▲Running stock △Make-to-order

External turning tool

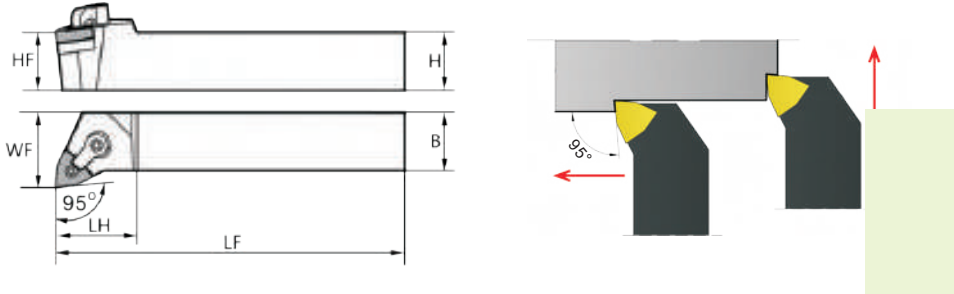
MVJNR/L
KAPR:93°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MVJNR/L	2020K16	△	△	20	20	125	45	20	25	HM6×25	HV16WI	WR20L MR30L	HYD3	MP5×13	VN**1604
	2525M16	▲	▲	25	25	150	45	25	32	HM6×25					
	3232P16	△	△	32	32	170	45	32	40	HM6×28					

▲Running stock △Make-to-order

MWLNR/L
KAPR:95°



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MWLNR/L	2020K06	△	△	20	20	125	28	20	25	HM5×20	HW06WI	WR20L	HYD0	MP5×13	WN**060
	2525M06	▲	▲	25	25	150	28	25	32	HM5×20	HW06WI	WR30L	HYD0	MP5×13	WN**060
	2020K08	△	△	20	20	125	32	20	25	HM6×20	HW08WI	WR25L WR30L	HYD1	MP6×17	WN**080
	2525M08	▲	▲	25	25	150	32	25	32	HM6×25					
	3232P08	△	△	32	32	170	32	32	40	HM6×28					

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

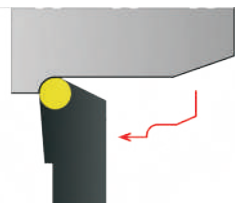
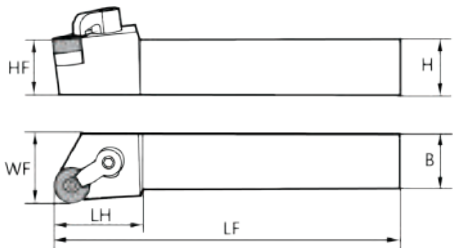
C

Short hole drills

Solid carbide drills

External turning tool

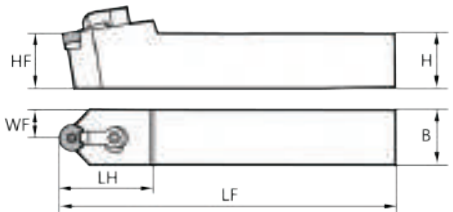
MRGNR/L



Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MRGNR/L	2525M12	△	△	25	25	150	45	25	32	HM6×25	HR12WI	WR25L	HYD1	MP6×17	RN**1204
	3232P12	▲	▲	32	32	170	45	32	40	HM6×28		WR30L			

▲Running stock △Make-to-order

MRDNN

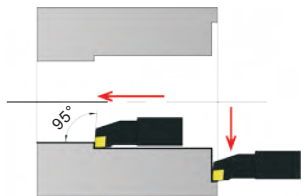
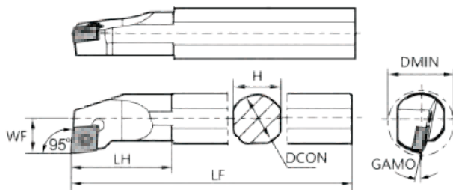


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MRDNN	2020K12	△	△	20	20	125	35	20	10	HM6×25					
	2525M12	▲	▲	25	25	150	35	25	12.5	HM6×30					
	3232P12	△	△	32	32	170	35	32	16						

▲Running stock △Make-to-order

Internal turning tool

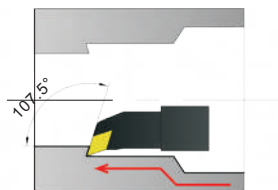
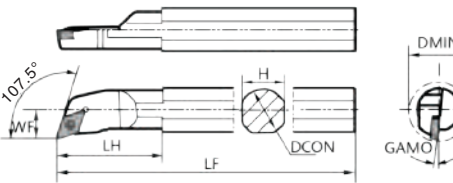
S□□-SCLCR/L
KAPR:95°



Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
				DMIN	DCON	H	LF	WF	Insert screw	Wrench	
		R	L								
	S12M-SCLCR/L06	△	△	16	12	11	150	7.5	M2.5×5.5	WR15	CC**0602
	S12M-SCLCR/L09	△	△	16	12	11	150	8	M3.5×8		CC**09T3
	S16Q-SCLCR/L09	△	△	20	16	15	180	10	M3.5×10		
	S20R-SCLCR/L09	▲	▲	25	20	19	200	12			
	S25S-SCLCR/L09	▲	▲	32	25	24	250	15.5	M4.0×11		CC**1204
	S20R-SCLCR/L12	▲	▲	25	20	19	200	12.5			
	S25S-SCLCR/L12	▲	▲	32	25	24	250	15.5			

▲Running stock △Make-to-order

S□□-SDQCR/L
KAPR:107.5°



Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
				DMIN	DCON	H	LF	WF	Insert screw	Wrench	
		R	L								
	S12M-SDQCR/L07	△	△	16	12	11	150	9	M2.5×6.5	WR07	DC**0702
	S16Q-SDQCR/L07	△	△	20	16	15	180	11			
	S20R-SDQCR/L11	▲	▲	25	20	19	200	13	M3.5×8		
	S25S-SDQCR/L11	▲	▲	32	25	24	250	17	M3.5×10	WR15	DC**11T3

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

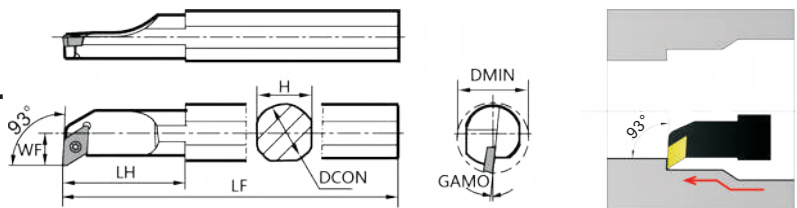
C

Short hole drills

Solid carbide drills

Internal turning tool

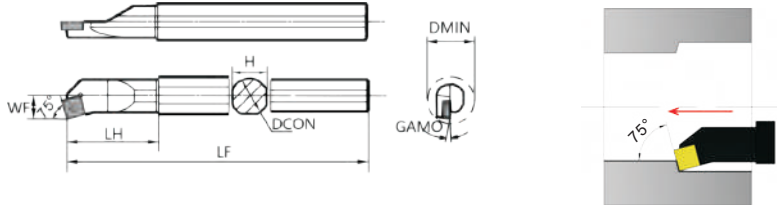
S□□-SDUCR/L
KAPR:93°



Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
	S12M-SDUCR/L07	△	△	16	12	11	150	9	M2.5×6.5	WR07	DC**0702
	S16Q-SDUCR/L07	△	△	20	16	15	180	11			
	S20R-SDUCR/L11	▲	▲	25	20	19	200	13	M3.5×8	WR15	DC**11T3

▲Running stock △Make-to-order

S□□-SSKCR/L
KAPR:75°

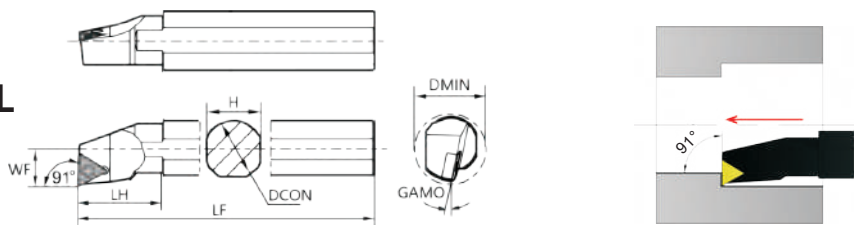


Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
	S12M-SSKCR/L09	△	△	16	12	11	150	9	M3.5×8	WR15	SC**09T3
	S16Q-SSKCR/L09	△	△	20	16	15	180	11			
	S20R-SSKCR/L09	▲	▲	25	20	19	200	13	M4×1	WR15	SC**1204
	S25S-SSKCR/L12	▲	▲	32	25	24	250	17			

▲Running stock △Make-to-order

Internal turning tool

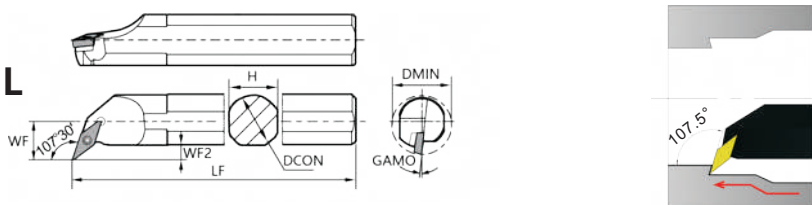
S□□-STFCR/L
KAPR:90°



Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
	S16Q-STFCR/L11	△	△	20	16	15	180	10	M2.5×6.5	WR07	TC**1102
	S20R-STFCR/L11	△	△	25	20	19	200	12			
	S25S-STFCR/L16	▲	▲	32	25	24	250	16	M3.5×10	WR15	TC**16T3

▲Running stock △Make-to-order

S□□-SVQBR/L
KAPR:107.5°



Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
	S20R-SVQBR/L16	▲	▲	27	20	19	200	14	M3.5×12	WR15	VB**1604
	S25S-SVQBR/L16	▲	▲	35	25	24	250	20			

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

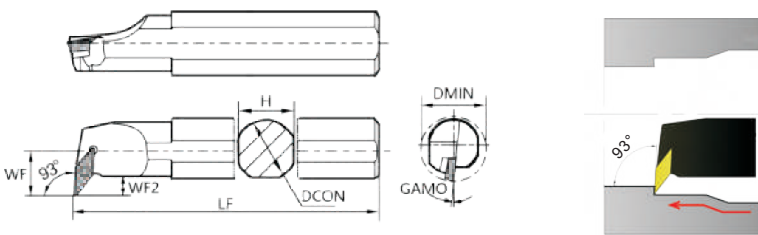
C

Short hole drills

Solid carbide drills

Internal turning tool

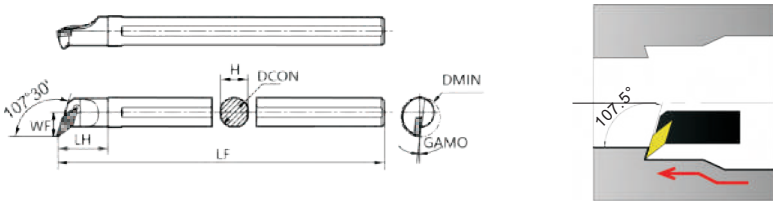
S□□-SVUBR/L
KAPR:93°



Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
	S25S-SVUBR/L16	▲	▲	35	25	24	250	20	M3.5×12	WR15	VB**1604

▲Running stock △Make-to-order

S□□-SVQCR/L
KAPR:107.5°

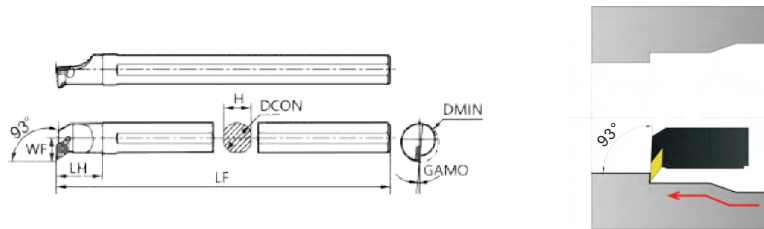


Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
	S16Q-SVQCR/L11	▲	▲	22	16	15	180	12	M2.5×6.5	WR07	VC**1103
	S25S-SVQCR/L16	▲	▲	35	25	24	250	20	M3.5×12	WR15	VC**1604

▲Running stock △Make-to-order

Internal turning tool

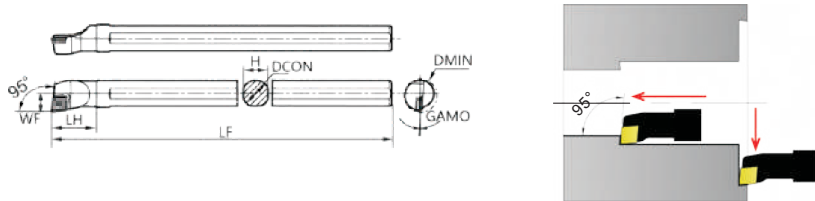
S□□-SVUCR/L
KAPR:93°



Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
	S20R-SVUCR/L11	▲	▲	28	20	19	200	14	M3.5×12	WR15	VC**1604
	S25S-SVUCR/L16	▲	▲	35	25	24	250	20			

▲Running stock △Make-to-order

S□□-SCLPR/L
KAPR:95°



Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	GAMO	Insert screw	Wrench	
	S12M-SCLPR/L06	△	△	16	12	11	150	8	-4°	M2.5×5.5	WR07	CP**0602
	S16Q-SCLPR/L09	△	△	20	16	15	180	10	-4°	M3.5×8	WR15	CP**09T3
	S20R-SCLPR/L09	▲	▲	25	20	18	200	13	-4°			

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

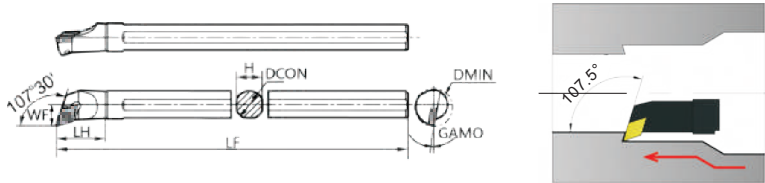
C

Short hole drills

Solid carbide drills

Internal turning tool

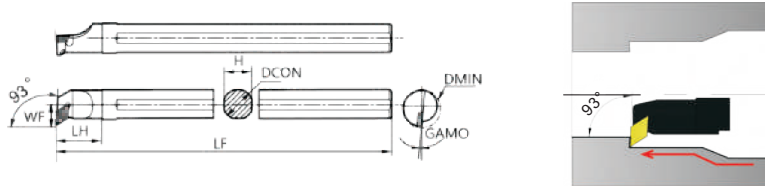
S□□-SDQPR/L
KAPR:107.5°



Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
				DMIN	DCON	H	LF	WF	GAMO	Insert screw	Wrench	
		R	L									
	S12M-SDQPR/L07	△	△	16	12	11	150	9	-8°	M2.5×5.5	WR07	DP**0702
	S16Q-SDQPR/L07	△	△	20	16	15	180	11	-6°	M2.5×6.5		
	S20R-SDQPR/L11	▲	▲	25	20	18	200	13	-6°	M3.5×8	WR15	DP**11T3

▲Running stock △Make-to-order

S□□-SDUPR/L
KAPR:93°

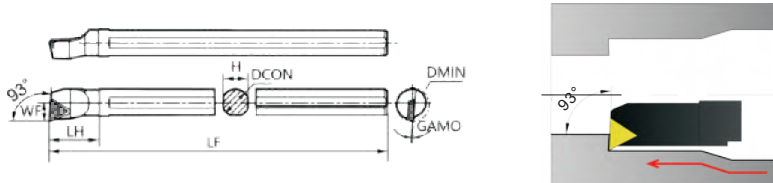


Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
				DMIN	DCON	H	LF	WF	GAMO	Insert screw	Wrench	
		R	L									
	S12M-SDUPR/L07	△	△	16	12	11	150	9	-8°	M2.5×5.5	WR07	DP**0702
	S16Q-SDUPR/L07	▲	▲	20	16	15	180	11	-6°	M2.5×6.5		

▲Running stock △Make-to-order

Internal turning tool

S□□-STUPR/L
KAPR:93°



Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
				DMIN	DCON	H	LF	WF	Insert screw	Wrench	
		R	L								
	S12Q-STUPR/L11	△	△	16	12	11.4	180	7.5	M2.5×6.5	WR07	TP**1103
	S16R-STUPR/L11	▲	▲	20	16	15	180	10			

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

Comparison table of general turning inserts in metric and British systems

C-type negative angle	ISO	Inch	D-type negative angle	ISO	Inch	S-type negative angle	ISO	Inch
CNMG	090304	321	DNMG	110404	331	SNMG	090304	321
	090308	322		110408	332		090308	322
	120404	431		110412	333		090312	323
	120408	432		150404	431		120404	431
	120412	433		150408	432		120408	432
	120416	434		150412	433		120412	433
	160608	542		150604	441		120416	434
	160612	543		150608	442		150608	542
	160616	544		150612	443		150612	543
	190608	642		150616	444		150616	544
	190612	643		190608	542		190412	633
	190616	644		190612	543		190424	636
	190624	646					190612	643
	250724	856					190616	644
	250732	858					250724	856
	250924	866					250732	858
	250932	868					250924	866
							250932	868

T-type negative angle	ISO	Inch	W-type negative angle	ISO	Inch	V-type negative angle	ISO	Inch
TNMG	110304	221	WNMG	06T304	3(2.5)1	VNMG	160404	331
	110308	222		06T308	3(2.5)2		160408	332
	160404	331		06T312	3(2.5)3		160412	333
	160408	332		060404	331			
	160412	333		060408	332			
	220404	431		060412	333			
	220408	432		080404	431			
	220412	433		080408	432			
	220416	434		080412	433			
	270608	542						
	270612	543						
	270616	544						

R-type negative angle	ISO	Inch
RNMG	0903MO	32
	1204MO	43

Comparison table of chipbreaker grooves of general turning

Material to be cut	Usage	Huareal	Sandvik	Kennametal	Iscar	Mitsubishi	Hitachi	Tungaloy	Kyocera	Sumitomo Electric	Taegutec	ZCC.CT
P	Finishing	GF	LC XF MF	PMFN CT	---- NF	SA SY SH	BE CE B BH	NM TS TSF	PP XQ CQ HQ	LU FE SU	FG FC	DF PF SF
	Semi-finishing	GM GQ	XM、QM PMC、PM SM、KM HM	P、MG MN MP1	GN RF、LF	MA MV MH MP	AH AE AY	TM TQ DM AM	HS、PS PQ、GS PT、PG	GU(UG) GE UX	ML MP MC PC MT	DM PM
	Roughing	GR	PR、XMR ---- KR	RP RN	M3P、NR ----	RP GH MAS MT	RE AR ----	TH S CH	HT GT PH ----	MU ME MX	RT ----	DR LR
	Heavy machining	GZ GX	QR HR、SR ---- MR	RM、MR RH ---- ----	NM TNM ---- R3P	HZ、HX HL、HH HXD HR HV HCS	TE、UE ---- H HX、HE	THS TRS 65 ---- TUS	PX All-round ---- ---- ----	HG HP HU HW HF	RX RH HT HD HY HZ	HDR HPR
	Positive style	TM	UM、PM MX、PR	MF MP	----	MV MP	JE	PM	HQ XQ GK	MU	MT PC	HM
	Finishing	BF	MF	FP、FS LF	----	LM SH	SE、MP	SS	MQ GU	SU EF	EA SF	EF
M	Semi-finishing	BM	MM、MMC SMR	MP	M3M、PP	MM	DE	SM	----	GU	ET	EM
	Roughing	BR	---- MR、MRR	UP ----	---- MR	ES、1M 2M、HL RM、GH HM	---- ----	S SH	---- TK	HM EM MU	VF SU	ER
	Positive style	TM	MM	MP	----	MW	----	PM	HQ GK	MU	----	EM
	Semi-finishing	All-round	KF	UN	GN	LK MA MK	V、VA	CM CF	All-round C	UZ	MT	All-round
K	Roughing	Flat Plate	KM、KR KRR	----	----	GK RK GH	Y、RE	Ch 33 All-round	ZS、GC	GZ(UX)	RT	----
N	Metals for non-ferrous metal machining	AK	----	MS	----	----		P	AH	AX	----	Flat
S	Finishing	----	SF、SGF	----	----	LS FJ	----	HRF	----	EF	----	NF NGF
	Semi-finishing	SM	SM、SMC	----	----	MS MJ	VI	HMM SA HRM	----	EG、EX	----	NM
H	Finishing	----	----	----	----	----		HP*	----	FV*	----	Flat
	Semi-finishing	----	----	----	----	----		----	----	GH	----	Flat

Recommended cutting parameters for general external turning

Machined workpiece materials					Product grade																								
ISO	Classification of materials			Hardness of Brinell (HB)	Tensile strength (N/mm ²)	HR8115		HR8125		HR8225		HR7125		HR7225		HR6115		HRK10		HRK20									
						Feed rate /(mm/r)																							
						0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.3	0.5	0.1	0.4	0.6	0.1	0.4	0.6
						Cutting speed /(m/min)																							
P	Non-alloyed steel	C≤0.25%	Annealing	125	428	500	360	280	450	330	260	430	340	260															
		0.25<C≤0.55%	Annealing	190	639	460	320	260	420	310	240	420	310	240															
		0.25<C≤0.55%	Quenching and tempering	210	708	420	280	220	380	270	220	380	280	200															
		C>0.55%	Annealing	190	639	420	280	220	380	270	220	380	280	200															
		C>0.55%	Quenching and tempering	300	1013	420	280	220	380	270	220	380	280	200															
		Short chip steel	Annealing	220	745	360	280	210	320	290	275	360	270	210															
	Low-alloyed steel	Annealing	175	591	420	350	300	400	330	280	400	330	280																
		Quenching and tempering	300	1013	280	220	180	260	200	160	260	200	160																
		Quenching and tempering	380	1282	200	150	140	100	85	65	180	150	120																
		Quenching and tempering	430	430	140	130		65	55		120	100																	
	High alloy steel and high alloy tool steel	Annealing	200	675	260	200	180	270	240	220	260	200	180																
		Quenching and tempering	300	1013	200	180	160	170	140	120	200	180	160																
		Quenching and tempering	400	1361	130	120		65	55		130	120																	
M	Stainless steel	Ferrite/martensite, annealing	200	675									250	220	210	190	170	150											
		Martensite, quenching and tempering	330	1114										130	110	100	90	80	60										
	Stainless steel	Austenite, quenching	200	675										200	160	130	210	170	150										
		Austenite, precipitation hardening stainless steel (PH stainless steel)	300	1013										160	130	70	170	150	90										
		Austenite- ferrite, duplex stainless steel	230	778										180	140	110	180	170	120										
K	Malleable cast iron	Ferrite	200	400													400	300	200										
		Pearlite	260	700														300	250	180									
	Grey cast iron	Low tensile strength	180	200														550	400	250									
		High tensile strength/austenite	245	350														240	180	120									
	Ductile iron	Ferrite	155	400														320	240	150									
		Pearlite	265	700														320	240	150									
	Compacted graphite iron GGV (CGI)			230	400													300	220	130									

Recommended cutting parameters for general external turning

Machined workpiece materials					Product grade																							
ISO	Classification of materials		Hardness of Brinell (HB)	Tensile strength (N/mm ²)	HR8115		HR8125		HR8225		HR7125		HR7225		HR6115		HRK10		HRK20									
					Feed rate /(mm/r)																							
					0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.3	0.5	0.1	0.4	0.6	0.1	0.4	0.6
					Cutting speed /(m/min)																							
N	Wrought aluminum alloy	Non-aging	30	—																								
		Ageable and aged	100	340																	650	600	300					
	Foundry aluminum alloy	≤ 12% silicon, non-aging	75	260																	700	450	300					
		≤ 12% silicon, ageable and aged	90	310																	500	300	200					
		> 12% silicon, non-aging	130	450																								
	Magnesium alloy		70	250																								
	Copper and copper alloys (bronze/brass)	Non-alloyed, electrolytic copper	100	340																	500	400	270					
		Brass, bronze, red brass	90	310																	400	300	250					
		Copper alloy, short chip	110	380																	280	200	130					
		Ampco alloy of high strength	300	1010																								
S	Iron-based alloy	Iron-based	Annealing	200	680																			90	70			
			Aged	280	940																			70	60			
		Nickel-based or cobalt-based	Annealing	250	840																			70	60			
			Aged	350	1180																			60	50			
			Annealing	320	1080																			50	40			
	Cobalt-based alloy	Pure titanium	200	680																								
		α and β phase alloys, aged	375	1260																			70	50	40			
		β phase alloy	410	1400																			40	35	30			
	Nickel-based alloy	1177	300	1010																								
	Titanium alloy	1262	300	1010																								
H	Hardened steel	Quenching and tempering	50HRC																									
		Quenching and tempering	55HRC																									
		Quenching and tempering	60HRC																									
	Hardened cast steel	Quenching and tempering	50HRC																									

Recommended cutting parameters for internal turning

(Positive style: standard machining diameter > φ10) [Cutting depth: radius value (radial cutting depth)]

ISO classification	Material to be cut	Hardness	Cutting field	Machining form	Recommended material	Corner (RE)	Lower limit - recommended value -upper limit		
							Speed Vc (m/min)	Cutting depth ap (mm)	Feed fn (mm/rev)
P	Low carbon steel Low carbon alloy Steel	HB ≤ 300	Precision finishing	Continuous Intermittent	HR8115 HR8225	0.4	250-300-350 120-170-220	0.05-0.3 -0.5 0.05-0.3 -0.5	0.03- 0.1- 0.15 0.03- 0.1- 0.15
			Finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	200-250-300 150-200-250	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Finishing - semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	150-200-250 100-150-200	0.5 -1.0 -2.0 0.5 -1.0 -1.5	0.1- 0.15- 0.25 0.1- 0.15- 0.2
			Semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	100-150-200 80- 120- 150	1.0 -1.5 -2.5 1.0 -1.5 -2.0	0.1- 0.15- 0.3 0.1- 0.15- 0.2
	Medium carbon steel Medium carbon alloy	HB ≤ 300	Precision finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	150-200-250 120-140-170	0.05-0.3 -0.5 0.05-0.3 -0.5	0.03- 0.1- 0.15 0.03- 0.1- 0.15
			Finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	150-200-250 120-180-200	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Finishing - semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	120-180-220 100-150-200	0.5 -1.0 -2.0 0.5 -1.0 -1.5	0.1- 0.15- 0.25 0.1- 0.15- 0.2
			Semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	100-150-200 80- 120- 150	1.0 -1.5 -2.5 1.0 -1.5 -2.0	0.1- 0.15- 0.3 0.1- 0.15- 0.2
	High carbon Alloy steel	HB ≤ 280	Precision finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	120-150-180 110-130-160	0.05-0.3 -0.5 0.05-0.3 -0.5	0.03- 0.1- 0.15 0.03- 0.1- 0.15
			Finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	120-150-180 100-120-150	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Finishing - semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	120-150-180 100-120-150	0.5 -1.0 -2.0 0.5 -1.0 -1.5	0.1- 0.15- 0.25 0.1- 0.15- 0.2
			Semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	100-120-150 80- 100- 120	1.0 -1.5 -2.5 1.0 -1.5 -2.0	0.1- 0.15- 0.3 0.1- 0.15- 0.2
M	Stainless steel (austenite)	HB ≤ 220	Finishing	Continuous Intermittent	HR7125 HR7225	0.4 0.8	120-150-180 100-120-150	0.2 -0.5 -0.8 0.2 -0.5 -0.8	0.05- 0.08- 0.1 0.05- 0.08- 0.1
			Semi-finishing	Continuous Intermittent	HR7125 HR7225	0.4 0.8	120-150-180 100-120-150	0.5 -1.0 -1.5 0.5 -1.0 -1.5	0.05- 0.1- 0.2 0.05- 0.1- 0.2
	Stainless steel (precipitation and hardening)	HB ≤ 300	Finishing	Continuous Intermittent	HR7125 HR7225	0.4 0.8	80- 100- 120 60- 80- 100	0.2 -0.7 -1.0 0.2 -0.7 -1.0	0.05- 0.1- 0.15 0.05- 0.1- 0.15
			Semi-finishing	Continuous Intermittent	HR7125 HR7225	0.4 0.8	80- 100- 120 60- 80- 100	0.5 -1.0 -1.5 0.5 -1.0 -1.5	0.05- 0.1- 0.2 0.05- 0.1- 0.2
K	Grey cast iron	HB ≤ 250	High speed finishing	Continuous Intermittent	HR6115	0.4 0.8	400-500-600 200-250-350	0.05-0.2 -0.5 0.2 -0.5 -1.0	0.05- 0.1- 0.15 0.05- 0.1- 0.15
			Finishing (with high luster)	Continuous Intermittent	HR6115	0.4 0.8	200-250-300 120-180-230	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Finishing	Continuous Intermittent	HR6115	0.4 0.8	150-180-200 100-150-180	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Semi-finishing	Continuous Intermittent	HR6115	0.4 0.8	100-150-200 80- 120- 150	0.5 -1.0 -2.0 0.5 -1.0 -2.0	0.1- 0.15- 0.2 0.05- 0.1- 0.15
	Ductile iron	HB ≤ 270	High speed finishing	Continuous Intermittent	HR6115	0.4 0.8	200-300-400 150-200-250	0.05-0.2 -0.5 0.2 -0.5 -1.0	0.03- 0.05- 0.1 0.05- 0.1- 0.15
			Finishing (with high luster)	Continuous Intermittent	HR6115	0.4 0.8	150-200-250 120-150-200	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Finishing	Continuous Intermittent	HR6115	0.4 0.8	120-150-180 100-120-150	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Semi-finishing	Continuous Intermittent	HR6115	0.4 0.8	100-120-150 80- 100- 120	0.5 -1.0 -2.0 0.5 -1.0 -2.0	0.05- 0.1- 0.2 0.05- 0.1- 0.15
N	Non-ferrous metal Copper - copper alloy Aluminum/ aluminum alloy (Si < 10%), etc.	HB ≤ 100	High speed finishing (Iridescence surface luster)	Continuous	HRK10 HRK20	0.4 0.8	200-400-1000	0.05-0.1-0.3	0.05-0.1-0.15
			Finishing	Continuous Intermittent	HRK10 HRK20	0.4 0.8	100-200-400 100-200-400	0.05-0.5 -1.0 0.05-0.5 -1.0	0.03- 0.1- 0.2 0.03- 0.1- 0.2
S	Titanium alloy	HB ≤ 400	Precision finishing (Iridescence surface luster)	Continuous Intermittent	HR9105 HR7115	0.4 0.8	100-120-150 70- 100- 120	0.05-0.1 -0.3 0.05-0.1 -0.3	0.03- 0.07- 0.1 0.03- 0.07- 0.1
			Finishing	Continuous Intermittent	HR9105 HR7115	0.4 0.8	30- 50- 70 30- 50- 70	0.05-0.5 -1.0 0.05-0.5 -1.0	0.03- 0.1- 0.2 0.03- 0.1- 0.2
	Heat-resistant alloy	HB ≤ 350	Finishing	Continuous Intermittent	HR9105 HR7115	0.4 0.8	10- 30- 50 10- 30- 50	0.05-0.5 -1.0 0.05-0.5 -1.0	0.03- 0.1- 0.2 0.03- 0.1- 0.2
			Finishing	Continuous Intermittent	HR9105 HR7115	0.4 0.8	40- 60- 80 40- 60- 80	0.1 -0.3 -0.5 0.1 -0.3 -0.5	0.03- 0.05- 0.1 0.03- 0.05- 0.1
H	Quenched steel High hardness material	40-50 HRC	Finishing	Continuous Intermittent	HRK10	0.4 0.8	60- 80- 100 30- 50- 70	0.05-0.3 -0.5 0.05-0.3 -0.5	0.05- 0.08- 0.1 0.05- 0.08- 0.1
		45-68 HRC	Finishing	Continuous Intermittent	HRK10	0.4 0.8	100-140-180 90- 120- 160	0.1 -0.2 -0.3 0.1 -0.2 -0.3	0.02- 0.07- 0.1 0.02- 0.07- 0.1
			Semi-finishing	Continuous	HRK10	0.4 0.8	60-80-100	0.3-0.7-1.0	0.03-01-0.15

Recommended cutting parameters for cermet brand

	Material name	Low carbon steel/ low carbon alloy steel	Middle carbon steel/ middle carbon alloy steel	High carbon alloy steel
	Hardness	< 150HB	< 250HB	< 350HB
HRC10	Vc/ (m/min)	150-200-300		150-170-220
	fn/ (mm/rev)	0.10~0.30		0.05~0.25
HRC20	Vc/ (m/min)	100-150-250		100-130-200
	fn/ (mm/rev)	0.15~0.35		0.10~0.25

Correction table of cutting parameters for S-type internal turning

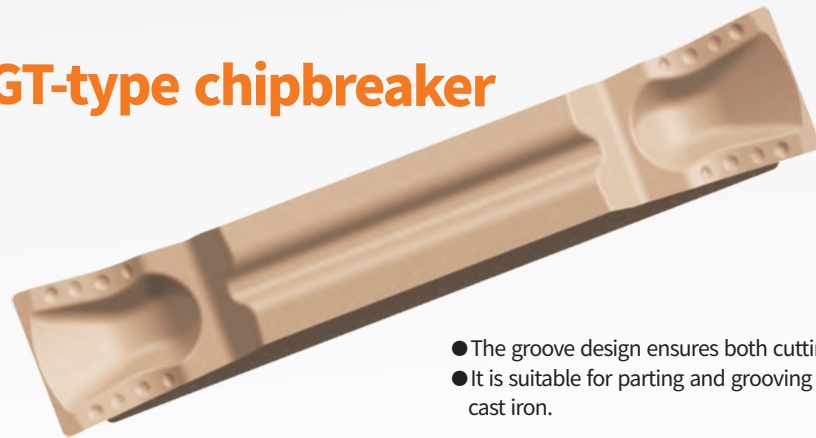
Workpiece material		Hardness	Machining form	L/D≤3		L/D=4		L/D=5		L/D=6	
				Feed (mm/rev)	Cutting depth (mm)	Feed (mm/rev)	Cutting depth (mm)	Feed (mm/rev)	Cutting depth (mm)	Feed (mm/rev)	Cutting depth (mm)
P	Carbon steel, alloy steel 45#、42CrMo	HB 180-280	Finishing	0.05-0.1-0.15	<0.2	0.05-0.1-0.15	<0.2				
			semi-finishing	0.15-0.25-0.35	<3.0	0.1-0.15-0.2	<1.5				
M	Stainless steel 1Cr18Ni9Ti 0Cr18Ni9	≤ HB220	Finishing	0.05-0.1-0.15	<0.2	0.05-0.1-0.15	<0.2				
			semi-finishing	0.15-0.2-0.25	<2.0	0.1-0.15-0.2	<1.0				
N	Aluminum alloy	---	Finishing	0.05-0.1-0.15	<0.2	0.05-0.1-0.15	<0.2	0.05-0.1-0.15	-0.15	0.05-0.1-0.15	<0.1
			semi-finishing	0.05-0.1-0.15	<2.0	0.05-0.1-0.15	<1.5	0.05-0.1-0.15	-1.0	0.05-0.1-0.15	<1.0

CT-type chipbreaker



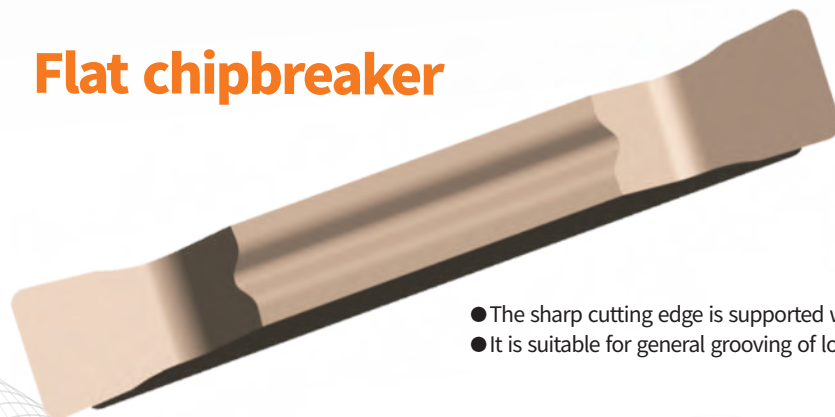
- The unique groove design ensures good chip control.
- It is suitable for external, internal and end face grooving as well as plunge turning.

GT-type chipbreaker



- The groove design ensures both cutting edge strength and sharpness;
- It is suitable for parting and grooving of carbon steel, alloy steel and cast iron.

Flat chipbreaker

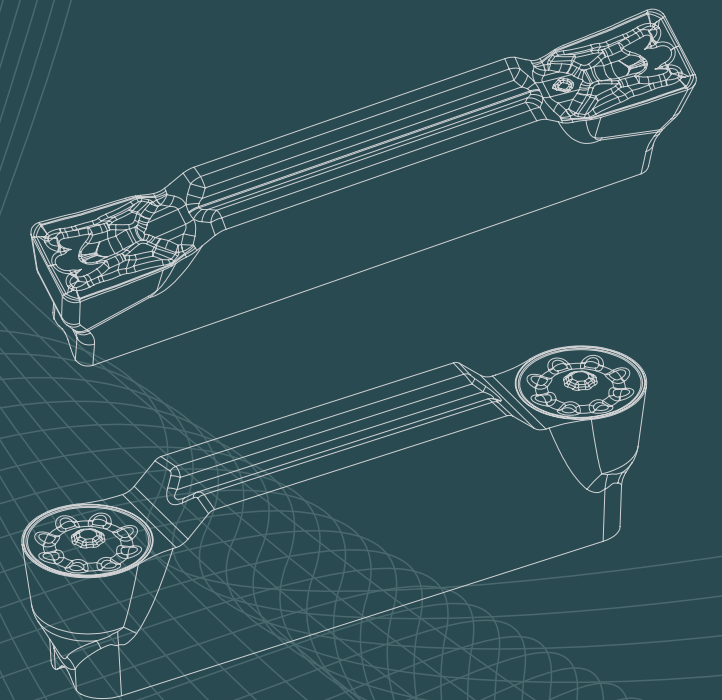


- The sharp cutting edge is supported with lower cutting resistance.
- It is suitable for general grooving of low hardness materials.



Parting and grooving

- ◆ Code key of parting and grooving inserts A91
- ◆ Overview of parting and grooving tools A92
- ◆ Parting and grooving inserts A93-A94
- ◆ Parting and grooving tools A95-A98
- ◆ Technical information for parting and grooving A99-A102



Code key of grooving inserts

QC

①

M

②

B

③

30

④

04

⑤

—

CT

⑥

① Insert type	
Code	Type
QD	Parting insert
QC	Grooving insert
QP	Profile insert

② Tolerance class	
Code	Standard
M	M— class tolerance
K	K— class tolerance
E	E— class tolerance

③ Cutting edge count	
Code	Number of cutting edges
A	Single insert
B	Double inserts
C	Triple inserts

④ Cutting edge width	
Code	Insert width (mm)
25	2.50
30	3.00
40	4.00
50	5.00
60	6.00
124	12.40

⑤ Corner radius	
Code	Corner radius (mm)
00	0.00
02	0.20
03	0.30
04	0.40
08	0.80

⑥ Chipbreaker groove	
Default	Flat
CT	CT-type groove
GT	GT-type groove
RM	RM-type groove
AK	AK-type groove

Overview of parting and grooving tools

Machining form	Diagram	Applicable tools	Applicable inserts	Features
External grooving and plunge turning		HREH□□	QCMB□□ QCKB□□ QPMB□□ QPEB□□	- The multi-purpose cutting tool is compatible with different inserts such as grooving, profile and parting inserts. - The insert can produce either pressing groove or grinding groove, which meet different machining requirements. - The maximum groove depth is 20mm. - With a profiling insert, it can be used to machines a variety of materials.
Parting		HREH□□	QCMB□□ QCKB□□	- With our parting inserts, it can be used to cut and process various materials. - Maximum parting diameter: 60mm.
End face grooving and plunge turning		HRFH**	QCMB□□ QCKB□□	- The multi-purpose cutting tool is compatible with different inserts such as grooving, profiling and parting inserts. - Groove depth: 10-20mm.
Internal grooving and turning		HRIV□□	QCMB□□ QCKB□□ QPMB□□	- The multi-purpose cutting tool is compatible with different inserts such as grooving, profile and parting inserts. - Minimum inscribed circle diameter for machining: 25mm. - Maximum groove depth: 6mm.
Relief groove machining		HREU□□	QCMB□□ QCKB□□ QPMB□□	- The 45°cutting tool structure shall complete a variety of forms of relief groove machining. - Maximum vertical depth of the relief groove: 3.3mm.

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

Parting and grooving insert

Working condition: ● Stable ● Average ■ Tough

P Steel	●	●	■											●	■
M Stainless steel								●	●						
K Cast iron				●	●										
N Non-ferrous metal														●	■
S Heat-resistant alloy Titanium alloy								●	●						

Machining type	Insert shape	Type	Basic dimension (mm)				CVD				PVD				Cemented carbide	Cermet				
			INSL	CW	S	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Parting and grooving		QCMB1502-GT	16.0	1.5	3.50	0.2	★		★	★			★	☆						
		QCMB2002-GT	16.0	2.0	3.55	0.2	★		★	★			★	☆						
		QCMB3002-GT	21.0	3.0	4.86	0.2	★		★	★			★	☆						
		QCMB4002-GT	21.0	4.0	4.86	0.2	★		★	★			★	☆						
		QCMB5003-GT	26.0	5.0	5.80	0.3	★		★	★			★	☆						
		QCMB6003-GT	26.0	6.0	5.90	0.3	★		★	★			★	☆						
Grooving		QCKB2002	16.0	2.0	3.55	0.2							★	☆						
		QCKB3004	21.0	3.0	4.86	0.4							★	☆						
		QCKB4004	21.0	4.0	4.86	0.4							★	☆						
		QCKB5008	26.0	5.0	5.80	0.8							★	☆						
Grooving and plunge turning		QCMB2002-CT	16.0	2.0	3.55	0.2	★		★	★			★	☆						
		QCMB2502-CT	18.5	2.5	3.90	0.2	★		★	★			★	☆						
		QCMB3004-CT	21.0	3.0	4.86	0.4	★		★	★			★	☆						
		QCMB4004-CT	21.0	4.0	4.86	0.4	★		★	★			★	☆						
		QCMB5008-CT	26.0	5.0	5.80	0.8	★		★	★			★	☆						

★ Recommended grade ☆ Available grade

Profile groove insert

Working condition: ● Stable ● Average ■ Tough

P Steel	●	●	■												●	●
M Stainless steel										●	●					
K Cast iron				●	●											
N Non-ferrous metal															●	●
S Heat-resistant alloy Titanium alloy										●	●					

Machining type	Insert shape	Type	Basic dimension (mm)				CVD				PVD				Cemented carbide	Cermet				
			INSL	CW	S	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Profile		QPMB2010-RM	16.0	2.0	3.5	1.0	★	★	★			★	☆							
		QPMB3015-RM	21.0	3.0	4.8	1.5	★	★	★			★	☆							
		QPMB4020-RM	21.0	4.0	4.8	2.0	★	★	★			★	☆							
		QPMB5025-RM	26.0	5.0	5.8	2.5	★	★	★			★	☆							
		QPMB6030-RM	26.0	6.0	5.9	3.0	★	★	★			★	☆							
Aluminum hub groove insert		QPEB8040-AK	30.0	8.0	8.365	4.0											★	★		

★ Recommended grade ☆ Available grade

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

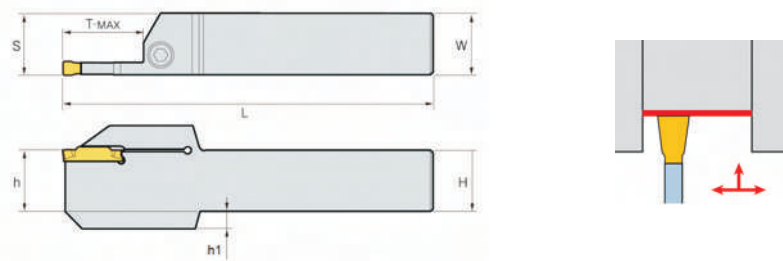
Solid carbide end mills

C

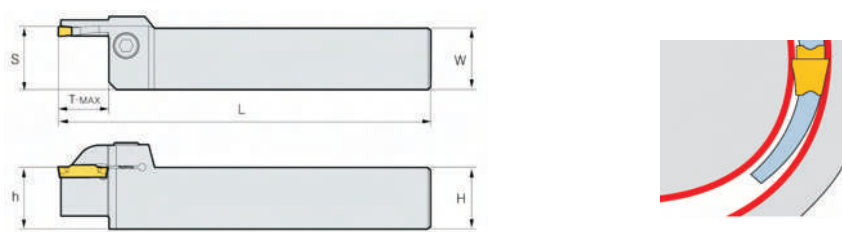
Short hole drills

Solid carbide drills

External grooving, parting and turning tools



90° end face grooving tool



Type		Basic dimension (mm)							Screw	Wrench	Applicable inserts
		Inventory	H=h	W	L	S	H1	T-MAX			
HREHR/L	1212-2-T08	△	12	12	100	12.2	/	8	HHA0512	WR40L	QCMB□□ QCKB□□ QPMB□□ QPEB□□
	1616-2-T08	△	16	16	100	16.2	/	8			
	2020-2-T08	▲	20	20	125	20.2	/	8			
	2525-2-T08	▲	25	25	150	25.2	/	8			
	1616-2-T12	△	16	16	100	16.2	/	12			
	2020-2-T12	△	20	20	125	20.2	/	12			
	2525-2-T12	▲	25	25	150	25.2	/	12			
	1616-2.5-T17	△	16	16	100	16.3	/	17			
	2020-2.5-T17	△	20	20	125	20.3	/	17			
	2525-2.5-T17	△	25	25	150	25.3	/	17			
	1616-3-T10	△	16	16	100	16.4	/	10			
	2020-3-T10	▲	20	20	125	20.4	/	10			
	2525-3-T10	▲	25	25	150	25.4	/	10			
	1616-3-T13	△	16	16	100	16.4	/	13			
	2020-3-T13	▲	20	20	125	20.4	/	13			
	2525-3-T13	▲	25	25	150	25.4	/	13			
	1616-3-T20	△	16	16	100	16.4	/	20			
	2020-3-T20	△	20	20	125	20.4	/	20			
	2525-3-T20	△	25	25	150	25.4	/	20			
	2020-4-T10	▲	20	20	125	20.4	/	10	HHA0616	WR50L	
	2525-4-T10	▲	25	25	150	25.4	/	10			
	3232-4-T10	△	32	32	150	32.4	/	10			
	2020-4-T15	△	20	20	125	20.4	/	15			
	2525-4-T15	△	25	25	150	25.4	/	15			
	2020-4-T20	△	20	20	125	20.4	/	20			
	2525-4-T20	△	25	25	150	25.4	/	20			
	3232-4-T20	△	32	32	170	32.4	/	20			

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

Type		Basic dimension (mm)						ΦD		Screw	Wrench	Applicable inserts
		Inventory	H=h	W	L	S	T-MAX	Min	Max			
HRFHR/L	325-34/50-T10	△	25	25	150	25.5	10	34	50	HHA0512	WR40L	QCMB□□ QCKB□□
	325-44/70-T15	▲	25	25	150	25.5	15	44	70			
	325-64/100-T15	△	25	25	150	25.5	15	64	100			
	425-40/60-T10	△	25	25	150	25.6	10	40	60	HHA0616	WR50L	
	425-44/70-T20	▲	25	25	150	25.6	20	44	70			
	425-84/92-T20	△	25	25	150	25.6	20	84	92			
	425-60/120-T20	▲	25	25	150	25.6	20	60	120			
	425-112/200-T20	△	25	25	150	25.6	20	112	200			
	525-190/220-T10	▲	25	25	150	25.6	10	190	200			
	625-170/190-T10	△	25	25	150	25.6	10	170	190			
625-190/220-T10	△	25	25	150	25.6	10	190	200				

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

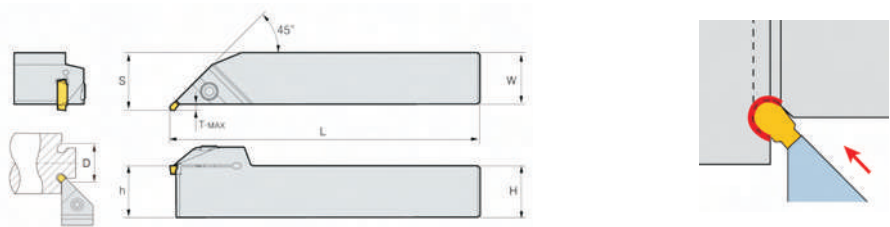
Solid carbide end mills

C

Short hole drills

Solid carbide drills

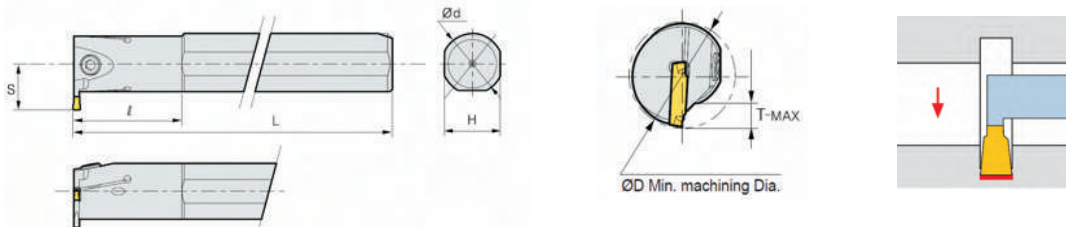
Relief groove tool



Type		Basic dimension (mm)							Screw	Wrench	Applicable inserts
		Inventory	H=h	W	L	S	ΦD Max	T-MAX			
HREUR/L	2020-3	△	20	20	125	23	40	2.8	HHA0512	WR40L	QCMB□□ QCKB□□ QPMB□□
	2525-3	▲	25	25	150	28	40	2.8			
	3232-3	△	32	32	170	35	40	2.8			
	2020-4	▲	20	20	125	23	40	2.8	HHA0616	WR50L	
	2525-4	▲	25	25	150	28	40	2.8			
	3232-4	△	32	32	170	35	40	2.8			
	2020-5	▲	20	20	125	23.5	50	3.3			
	3232-5	△	32	32	170	35.5	50	3.3			
	2020-6	▲	20	20	125	23.5	50	3.3			
	2525-6	▲	25	25	150	28.5	50	3.3			

▲Running stock △Make-to-order

Internal grooving and turning tools



Type		Basic dimension (mm)								Screw	Wrench	Applicable inserts
		Inventory	ΦD	Φd	L	ℓ	T-MAX	H	S			
HRIVR/L	2516-2	△	25	16	125	35	6.5	15	14	HHB0410	WR30L	QCMB□□ QCKB□□ QPMB□□
	2520-2	△	25	20	150	45	6.5	18	15.5	HHA0512	WR40L	
	3225-2	△	32	25	200	45	7	23	19	HHA0512	WR40L	
	2516-2.5	△	25	16	125	35	6.5	15	14	HHB0410	WR30L	
	2520-2.5	▲	25	20	150	45	6.5	18	15.5	HHA0512	WR40L	
	3225-2.5	△	32	25	200	45	7	23	19	HHA0512	WR40L	
	2520-3	▲	25	20	150	45	6.5	18	15.5	HHB0410	WR30L	
	3225-3	△	32	25	200	45	7	23	19	HHA0512	WR40L	
	4032-3	△	40	32	250	55	7.5	30	22.5	HHA0616	WR50L	
	2520-4	▲	25	20	150	45	6.5	18	15.5	HHB0410	WR30L	
	3225-4	△	32	25	200	45	7	23	19	HHA0512	WR40L	
	4032-4	△	40	32	250	55	7.5	30	22.5	BHA0616	WR50L	
	3225-5	△	32	25	200	45	7.5	23	19.5	HHA0512	WR40L	
	4032-5	△	40	32	250	55	8.5	30	23.5	BHA0616	WR50L	
	3225-6	▲	32	25	200	45	7.5	23	19.5	HHA0512	WR40L	
	4032-6	△	40	32	250	55	8.5	30	23.5	BHA0616	WR50L	

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

Cutting speed recommendations for parting and grooving

ISO	Classification of materials			Hardness of Brinell (HB)	Tensile strength (N/mm ²)	Cutting Speed Recommendations (m/min)												
						HR8225			HR7125			HR7225			HR6115			
						Feed (mm/rev)												
					0.1	0.3	0.5	0.1	0.3	0.5	0.1	0.3	0.5	0.1	0.3	0.5		
P	Non-alloyed steel	C≤0.25%	Annealing	125	428	280	200	130	260	180	120	260	180	120				
		0.25<C≤0.55%	Annealing	190	639	240	160	115	220	150	105	200	140	105				
		0.25<C≤0.55%	Quenching and tempering	210	708	130	115	100	120	110	100	120	110	100				
		C>0.55%	Annealing	190	639	145	130	115	130	120	110	130	120	110				
		C>0.55%	Quenching and tempering	300	1013	115	100	80	110	95	70	110	95	70				
		Short chip steel	Annealing	220	745	130	115	100	120	105	90	120	105	90				
	Low-alloyed steel	Annealing			175	591	280	200	130	170	135	120	170	135	120			
		Quenching and tempering			300	1013	115	100	80	105	90	70	105	90	70			
		Quenching and tempering			380	1282	170	90	70	160	80	60	160	80	60			
		Quenching and tempering			430	430												
	High-alloyed steel and high alloy tool steel	Annealing			200	675												
		Quenching and tempering			300	1013												
		Quenching and tempering			400	1361												
M	Stainless steel	Ferrite/martensite, annealing			200	675				200	150	105	200	150	105			
		Martensite, quenching and tempering			330	1114				150	115	70	150	115	70			
	Stainless steel	Austenite, quenching			200	675				165	135	105	185	155	125			
		Austenite, precipitation hardening stainless steel (PH stainless steel)			300	1013				155	120	80	165	135	95			
		Austenite- ferrite, duplex stainless steel			230	778				135	110	85	145	110	85			
K	Malleable cast iron	Ferrite			200	400									220	160	80	
		Pearlite			260	700									115	90	65	
	Grey cast iron	Low tensile strength			180	200									200	150	95	
		High tensile strength/austenite			245	350									185	140	95	
	Ductile iron	Ferrite			155	400									160	130	80	
		Pearlite			265	700									145	110	80	
	Compacted graphite iron GGV (CGI)				230	400										150	120	90

Notes: 1. Cutting parameters are suitable for wet cutting.
2. For internal and section machining, it is recommended to reduce the cutting speed by 30%-50% Precautions for Parting and Grooving:

Precautions for parting and grooving:

Parting

- When the insert gets close to the center of the workpiece, the feed rate should be reduced by 30% for longer tool service life and good surface quality.
- If allowed, the overhang should be minimized to ensure good stability.

External grooving and turning, profile turning

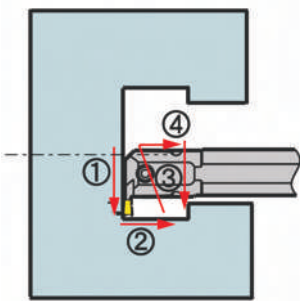
- Pass sequence: When cutting depth > 0.5mm, radial feed (the maximum cutting depth can reach 0.75 x insert width S) → radial return about 0.1mm → axial pass → oblique return → axial pass → radial machining to the required depth.

End face grooving and turning

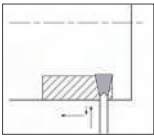
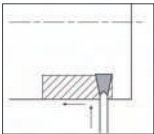
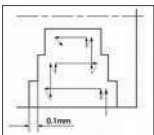
- Finish machining (multi-groove cutting)
Cutting inwards from the largest diameter, and the insert is slightly offset towards the central insert when returning the insert.
- Recess turning
Axial turning depth: ≤ 0.75 xS (insert width)
If the groove width is greater than the depth, recess turning is recommended.
If the groove depth is greater than the width, multi-recess cutting is recommended.
- Finish machining
Machine the bottom and outer diameter edge in a finished way, and then the inner diameter to the required size.

Internal grooving and turning

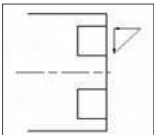
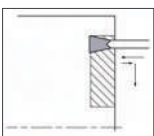
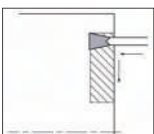
- Please follow the machining sequence as shown.
In order to facilitate cutting outflow, please always feed outward from the far end face side.



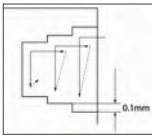
Precautions for external parting, grooving and turning

S/N	Machining subjects	Precautions	Diagram
1	Grooving first and then transverse turning	When roughing (groove depth > 0.5mm), please do not adopt transverse feed machining immediately after grooving. Instead, return the insert about 0.1mm before starting transverse feed machining.	
		When finishing (groove depth < 0.5mm), the corner is subjected to small force, and transverse feed machining can be carried out immediately after grooving.	
2	Groove width expanding machining	Please stagger them into step shape for machining.	
	Finishing	(1) When machining towards the center side without using a center fixing, please lower the feeding speed. (2) A cutting depth more than 0.5mm on one side can effectively improve chip disposal.	

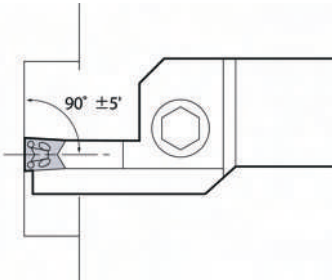
Precautions for end face grooving turning

S/N	Machining subjects	Precautions	Diagram
1	Precautions for cutter bar selection	(1) Choose the model that fits the groove width of the cut material. (2) Check the groove depth. (3) It is recommended to mount the cutter bar facing downwards (reversed).	
		Perform transverse feed machining from the outer section to the inner end face with good chip discharge.	
2	End face turning	When roughing (groove depth > 0.5mm), please do not feed transversely immediately after grooving. Instead, return the insert about 0.1mm before starting transverse feed machining.	
		When finishing (groove depth < 0.5mm), the corner is subjected to small force, and transverse feed machining can be carried out immediately after grooving. (No need to stop the knife)	

Precautions for end face grooving turning

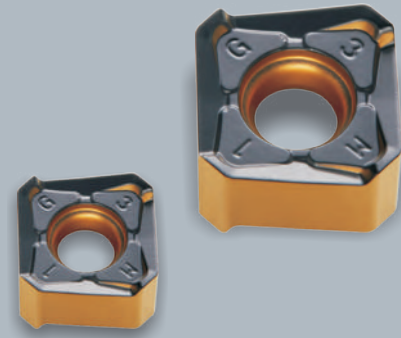
S/N	Machining subjects	Precautions	Diagram
3	End face groove expansion machining	During rough machining, please stagger them into step shape for machining.	
		Finish machining: When the cutting depth is set to 0.5mm or above on one side, the chip disposal performs well.	

FAQs of parting and grooving

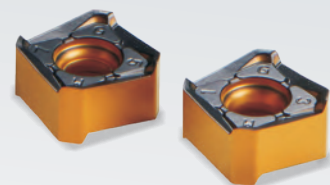
Condition	Countermeasures
There is white turbidity at the bottom of the end face	(1) Increase the cutting speed only in the finish machining. (2) When method 1 does not work, please readjust the parallelism of the insert and the corner. Correction method: Adjust the cutter bar to within $\pm 5^\circ$ tolerance of the perpendicularity between the cut-in angle and the material to be cut. 
When grooving, the tool gets entangled with chips.	(1) Install the cutter bar facing downwards (reversed). Please spray the coolant from the rear side of the insert to the corner. (2) When expanding the groove, please process it shallowly and extensively as a whole. (Deep recess machining cannot be done at the same time)
The insert collapses during the transverse feed machining.	Please replace the outside-inside machining by the inside-outside machining.
The recesses cannot be accessed vertically.	Please correct the parallelism of the corner Reduce the feeding speed.

CFM145

Face milling tool



New



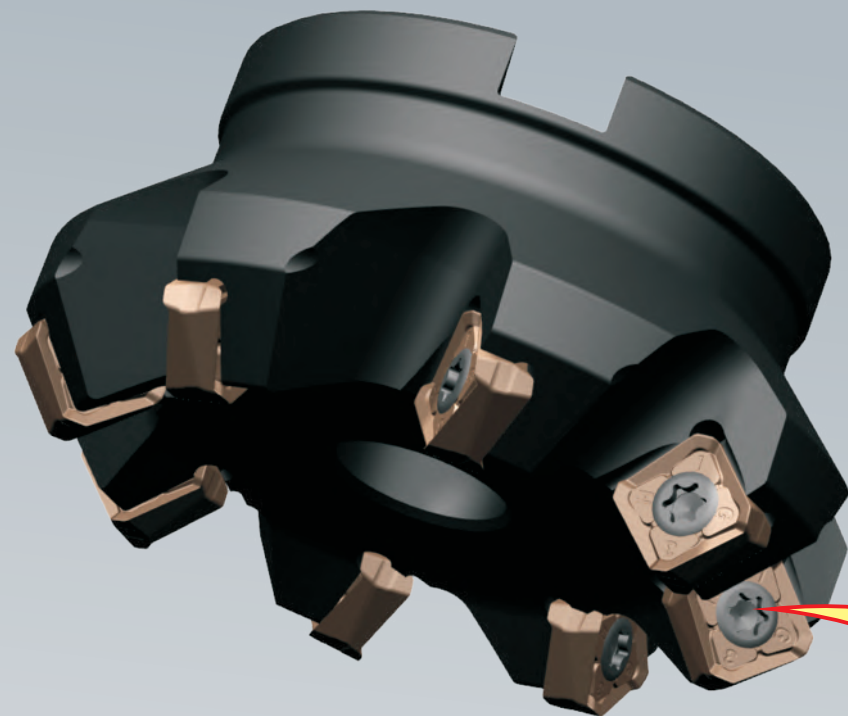
C/SSM190

Square shoulder milling tool



CFM345

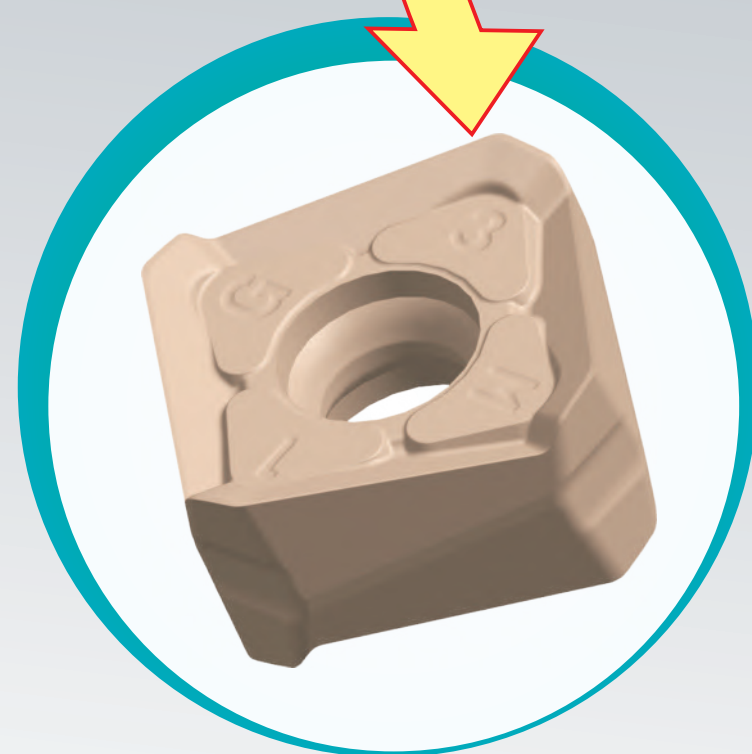
Load-bearing universal face milling tool



- Sparse teeth, dense teeth and ultra-dense teeth are optional to meet different working conditions and machining efficiency requirements.
- The wedge-shaped installation structure has a greater bearing capacity, safety and reliability.

New

- Its precise double-side slotted inserts are cost-effective. The main cutting edge has high strength and strong impact resistance.
- The cutting edge is sharp and can produce excellent surface machining quality.



C/SSM390

Square shoulder milling tool



New



Overview of indexable milling inserts

Type	Material	ISO	CVD coating	PVD coating					Carbide	Cermet	ISO
			HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20	
P	Non-alloyed steel/alloy steel	P01									P01
		P05									P05
		P10		HR5110							P10
		P15								HRC20	P15
		P20			HR5120						P20
		P25				HR5130					P25
		P30	HR8140				HR7130				P30
		P35						HR7140			P35
		P40									P40
		P45									P45
M	Stainless steel	P50									P50
		M05									M05
		M10		HR5110							M10
		M15			HR5120						M15
		M20				HR5130					M20
		M25									M25
		M30						HR7140			M30
		M35									M35
		M40									M40
		M45									M45
K	Cast iron	K01									K01
		K05									K05
		K10									K10
		K15									K15
		K20									K20
		K25			HR5120						K25
		K30									K30
		K35									K35
		K40	HR8140								K40
		K45									K45
N	Aluminum/aluminum alloy	K50									K50
		N01									N01
		N05							HRK10		N05
		N10									N10
		N15									N15
		N20									N20
		N25									N25
S	High-temp alloy	N30									N30
		S01									S01
		S05									S05
		S10									S10
		S15									S15
		S20									S20
		S25									S25
		S30									S30
		S40									S40

B Milling

Indexable milling

- ◆ Code key of indexable milling inserts----- B1-B2
- ◆ Code key of indexable milling tools ----- B3-B4
- ◆ Overview of indexable milling tools----- B5-B8
- ◆ Overview of indexable milling inserts----- B9-B10
- ◆ Details of indexable milling tools----- B11-B85
 - Face milling tool series----- B11-B25
 - Square shoulder milling tool series ----- B26-B49
 - Profile milling tool series ----- B50-B61
 - High feed milling tool series ----- B62-B65
 - Helical end milling cutter series ----- B66-B67
 - Heavy milling inserts----- B71-B85

Solid carbide end mills

- ◆ Selection guidance of solid carbide end mills----- B89
- ◆ Code key of solid carbide end mills----- B90
- ◆ Overview of solid carbide end mills----- B91
- ◆ Details and parameters recommendation ----- B92-B177
 - Of solid carbide end mills
 - Series B - basic end mills ----- B92-B127
 - Series P - high performance end mills----- B128-B169
 - Series X - special end mills ----- B170-B177
- ◆ Non-standard customization of solid carbide end mills ----- B178

Code key of indexable milling inserts

A

P

M

T

1

2

3

4

16

05

PD

E

R

-

FM

5

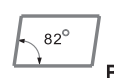
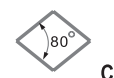
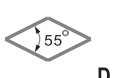
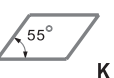
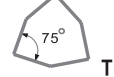
6

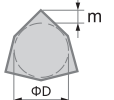
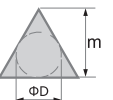
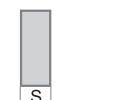
7

8

9

10

① Shape code			
			
			
			
			
			
		Others	Z

③ Tolerance (mm)			
			
Class	Corner height (m)	Inscribed circle (ΦD)	Thickness (S)
A	±0.005	±0.025	±0.025
F	±0.005	±0.013	±0.025
C	±0.013	±0.025	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J	±0.005	±0.05±0.13	±0.025
K	±0.013	±0.05±0.13	±0.025
L	±0.025	±0.05±0.13	±0.025
M	±0.08±0.18	±0.05±0.13	±0.13
N	±0.08±0.18	±0.05±0.13	±0.025
U	±0.13±0.38	±0.08±0.25	±0.13

◆ M-class tolerance requirements (distinguished by shape and inscribed circle size)
◆ Corner height (m) tolerance

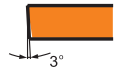
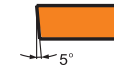
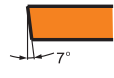
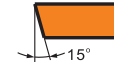
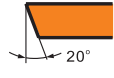
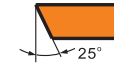
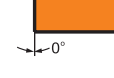
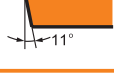
	Inscribed circle	Regular triangle	Square	80° Rhombus	55° Rhombus	35° Rhombus	Circular
A	6.35	±0.08	±0.08	±0.08	±0.11	±0.16	---
F	9.525	±0.08	±0.08	±0.08	±0.11	±0.16	---
C	12.7	±0.13	±0.13	±0.13	±0.15	---	---
H	15.875	±0.15	±0.15	±0.15	±0.18	---	---
E	19.05	±0.15	±0.15	±0.15	±0.18	---	---
G	25.4	---	±0.18	---	---	---	---

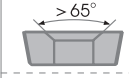
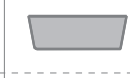
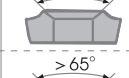
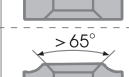
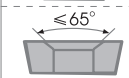
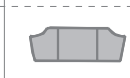
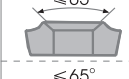
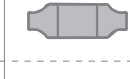
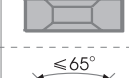
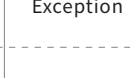
◆ Inscribed circle (ΦD) tolerance

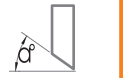
	Inscribed circle	Regular triangle	Square	80° Rhombus	55° Rhombus	35° Rhombus	Circular
A	6.35	±0.05	±0.05	±0.05	±0.05	±0.05	---
F	9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
C	12.7	±0.08	±0.08	±0.08	±0.08	---	±0.08
H	15.875	±0.10	±0.10	±0.10	±0.10	---	±0.10
E	19.05	±0.10	±0.10	±0.10	±0.10	---	±0.10
G	25.4	---	±0.13	---	---	---	±0.13

⑤ Cutting edge length								
Inscribed circle diameter (mm)	Insert shape							
	C	D	R	S	T	V	W	K
32.00			32					
31.75			31					
25.40			25	25				
25.00	25	25	25					
20.00			20					
19.05	19		19	19	33			
16.00		19	16					
15.875	16		15	15	27			
12.70	12	15	12	15	22	22	08	
12.00			12					
10.00			10					
9.525	09	11	09	19	16	16	06	16
8.00			08					
6.35	06	07			11	11		
6.00			06					
5.56					09			
5.50			05					
3.97					06			

⑥ Insert thickness	
	
Code	Thickness(mm)
12	12.70
10	11.11
T9	9.72
09	9.52
07	7.94
T6	6.75
06	6.35
T5	5.95
05	5.56
T4	4.96
04	4.76
T3	3.97
03	3.18
T2	2.58
02	2.38
T1	1.98
01	1.59
T0	0.99
00	0.79

② Cutting edge clearance angle major			
Code	Clearance angle	Code	Clearance angle
A		B	
C		D	
E		F	
G		N	
P		O	Others

④ Chipbreaker and clamping form							
Code	Hole	Chipbreaker	Sectional view	Code	Hole	Chipbreaker	Sectional view
B	Y	N/A		N	N/A	N/A	
H	Y	Single-sided		R	N/A	Single-sided	
C	Y	N/A		F	N/A	Double-sided	
J	Y	Double-sided		A	Y	N/A	
W	Y	N/A		M	Y	Single-sided	
T	Y	Single-sided		G	Y	Double-sided	
Q	Y	N/A		X	---	---	Exception
U	Y	Double-sided					

⑦ Wiper edge			
			
A	45°	A	3°
D	60°	B	5°
E	75°	C	7°
F	85°	D	15°
P	90°	E	20°
Z	Others	F	25°
		G	30°
		N	0°
		P	11°
		Z	Others

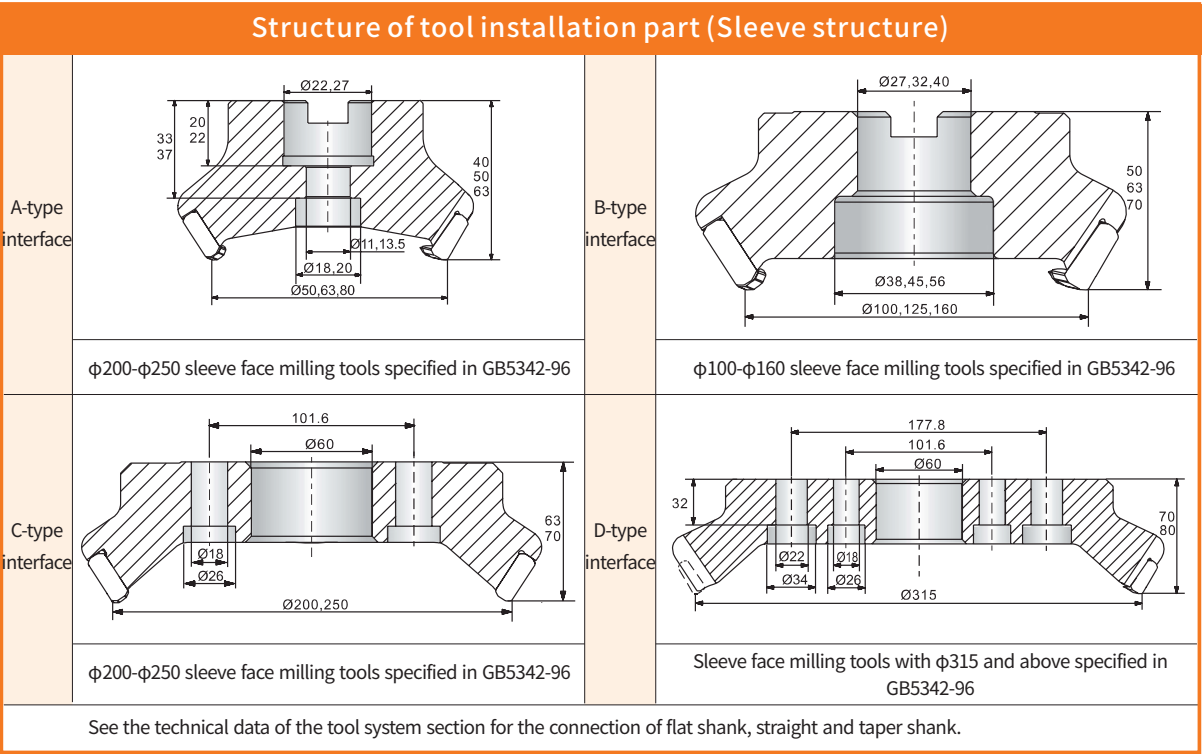
⑧ Cutting edge form			
			
			
			
			
			

⑨ Cutting direction	
Code	Direction
R	Right
L	Left
N	Two-way

⑩ Chipbreaker code

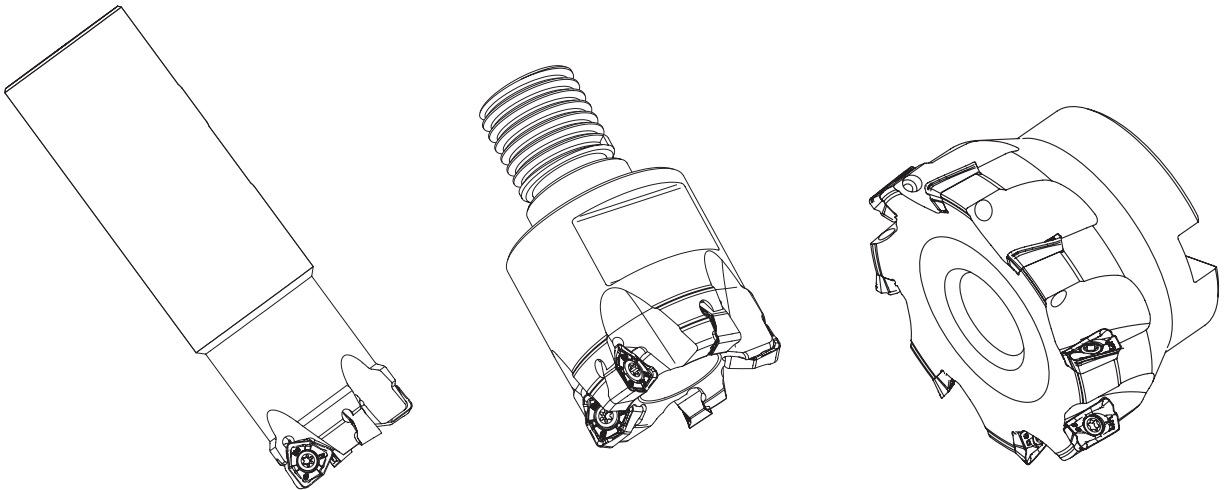
Code key of indexable milling tools

C	FM	1	45	L	-	063	A
①	②	③	④	⑤		⑥	⑦
① Tool type		③ Type		⑥ Outside diameter		⑦ Interface type	
C	Disc-type tools	1	Type 1	016	Ø 16mm	A	A-type interface
S	Rod-type tools	2	Type 2	020	Ø 20mm	B	B-type interface
		...	...	025	Ø 25mm	C	C-type interface
② Usage		④ Cutting edge angle		032	Ø 32mm	D	D-type interface
FM	Face milling	45	45°	040	Ø 40mm	G	Straight shank
TM	Slot milling	60	60°	050	Ø 50mm	X	Flat shank
SM	Square shoulder milling	75	75°	063	Ø 63mm	BT	BT taper shank
PM	Profile milling	90	90°	080	Ø 80mm	JT	JT taper shank
CM	Chamfer milling	00	Exception	100	Ø 100mm	MT	Morse taper shank
EM	High feed	⑤ Cutting direction		125	Ø 125mm	XPX	Compound shank
HM	Helical end milling	R	Default			HSK	Short taper shank
		L	Sinistral cutting				



Code key of indexable milling tools

22	I	05	L	-	S	N	10
⑧	⑨	⑩	⑪		⑫	⑬	⑭
⑧ Sizes of tool installation parts		⑨ Unit		⑩ Number of teeth		⑪ Length type	
16	Ø 16mm	Inch	I	02	Two teeth	Cutterhead style	Omit
22	Ø 22mm	Metric	Default	03	Three teeth	Shank style	Omit
27	Ø 27mm			04	Four teeth	S	Short
32	Ø 32mm			...	...	L	Long
40	Ø 40mm					XL	Lengthened
60	Ø 60mm						
⑫ Insert shape		⑬ Insert clearance angle		⑭ Cutting edge length			
A		A	3°	09	9mm		
H		B	5°	10	10mm		
L		C	7°	12	12mm		
O		D	15°	15	15mm		
R		E	20°	19	19mm		
S		F	25°	Others			
T		G	30°				
W		N	0°				
Others		P	11°				
		O	Others				



Overview of indexable milling tools

Machining form	Series/shape	Cutting edge angle	Applicable inserts	Insert shape	Usage and features	Page
Face milling tool	CFM143	KAPR=43°	OD□□		- Light and fast in cutting, it is cost-effective with unilateral octagonal inserts; - It is suitable for face milling P, M, K and other materials.	B11-B12
	CFM145	KAPR=45°	SNGX1005ANR-GM SNGX1005ANR-GE		- Supported by grinding level/precision molded level quadrilateral negative angle inserts, cutting can be finished in a light and fast manner; - Tools with either sparse or dense tooth structure are suitable for different working conditions and machining efficiency requirements. - It is suitable for face milling P, M, K and other materials and the first choice of general machining.	B13-B14
	CFM245	KAPR=45°	SEET13T3-GM SEMT13T3AGTN-FM		- Supported by grinding level/precision molded level quadrilateral 20° clearance angle inserts, the cutting force is decreased; - They are convenient to clamp with screwing down construction, thus suitable for light cutting.	B15-B16
	CFM345	KAPR=45°	SZMX1206ANR-GM		- It is equipped with self-developed new structured groove inserts, ensuring both high machining efficiency and long service life. - It is suitable for machining P, M, K and other materials and the first choice for roughing.	B17-B18
	CFM445	KAPR=45°	SEEN1203AFTN SEKR1203AFTN SEMR1203AFTN	 	- With 20° clearance angle cutting inserts, the milling tool is for multiple purposes and can finish cutting in a light and fast manner. - It is suitable for face milling of P, M, K and other materials.	B19-B20
	CFM645	KAPR=45°	HNMX0906ANSN-M		- Cost-effective face milling tool series - It has double-sided high strength hexagonal insert with 12 cutting edges.	B21-B22
	CFM745	KAPR=45°	XNGX0705ANN-R		- Cost-effective face milling tools series - It has double-sided heptagon insert with 14 cutting edges.	B23-B24

Overview of indexable milling tools

Machining form	Series/shape	Cutting edge angle	Applicable inserts	Insert shape	Usage and features	Page
Square shoulder milling tool	CSM188	KAPR=88°	SNGX1005ZNN-GM SNMX100512-GM		- Supported by grinding level/precision molded level quadrilateral negative angle inserts, the cutting process proceeds stably. - It is suitable for general face milling of P, M, K and other materials, being both cost-effective and multi-functional.	B26-B28
	CSM190	KAPR=90°	AOKT06□□ AOKT11□□ AOKT16□□		- High-precision shoulder milling tool series - It is a 90° shoulder milling tool with a helical edge design providing low cutting forces. - The tool is available in diameters φ11-φ80. - It is suitable for side milling, groove milling, Ramp Milling and other multifunctional machining of P-, M-, K- and S-type materials, and it is a preferred tool for shoulder milling.	B29-B32
	SSM190					
	KH					
	CSM290	KAPR=90°	APKT11□□ APKT16□□		- Square shoulder milling tool series with high performance. It is suitable for milling mild steel, stainless steel, titanium alloy, high-temp alloy, etc. - The tool is available in diameters φ16-φ80, with a 90° cutting edge angle structure. - It is suitable for shoulder milling, groove milling, Ramp Milling, face milling and other machining.	B34-B36
	SSM290					
	CSM390	KAPR=90°	ZNMU0403□□ ZNMU0806□□		- Cost-effective shoulder milling cutter series. It has 6 edges on both sides. - The tool's locating is stable. As a result, the cutting process is reliable. - There are rod-shaped, sleeve-type cutterhead and replaceable tools for option.	B37-B44
	SSM390					
	KH					

Overview of indexable milling tools

Machining form	Series/shape	Cutting edge angle	Applicable inserts	Insert shape	Usage and features	Page
Square shoulder milling tool	CSM590	KAPR=90°	APMT11□□		◎ Universal shoulder milling tool series ◎ It is suitable for shoulder milling, groove milling, Ramp Milling and face milling of P, K and N materials.	B45-B47
	SSM590		APGT11□□ APMT16□□ APGT16□□			
Profile milling tool	CPM100		RC□□		◎ It is suitable for machining P, M, K and other materials. ◎ It is of different diameters and can be used for machining planes, curved surfaces and cavities.	B50-B52
	SPM100					
	CPM200		RP□□		◎ It is suitable for machining P, M, K and other materials. ◎ It is of different diameters and can be used for machining planes, curved surfaces and cavities.	B53-B55
	SPM200					

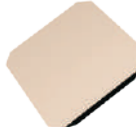
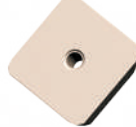
Overview of indexable milling tools

Machining form	Series/shape	Cutting edge angle	Applicable inserts	Insert shape	Usage and features	Page
Profile milling tool	CPM300		RD□□		◎ It is suitable for the machining of P, K materials and hardened materials. It is of different diameters and can be used for machining flat, curved surfaces and cavities.	B56-B58
	SPM300					
High-feed milling tool	CEM100		SD□□		◎ It is suitable for cavity milling and face milling of P, K and other materials, which can realize high Feed rate, and can also be used for insert milling. ◎ The tool is available in diameters Φ20-Φ160mm.	B62-B64
	SEM100					
Helical end mill	CHM190	KAPR=90°	SP12□□ AP15□□	 	◎ Large cutting depth milling tools are made of steel, alloy steel and cast iron. ◎ The tool is available in diameters Φ 63 mm and Φ 80 mm with BT and JT interface.	B66-B67

Overview of indexable milling inserts

Insert shape	Insert model	Page
	APMT1135PDER-HM	B47
	APMT1605PDER-HM	
	APGT1135PDFR-AK	B47
	APGT1604PDFR-AK	
	APKT113604PEER-FM	B36
	APKT1136PEER-FM	
	APKT113612PEER-FM	
	APKT113620PEER-FM	
	APKT1605PDER-FM	
	APKT160512PDER-FM	
	SPMT120408-MM	B67
	APMT150412-MM	
	SPHX120408T21	
	APHX1504	
	AOKT060202PEER-VM	B32
	AOKT060204PEER-VM	
	AOKT060208PEER-VM	
	AOKT113504PEER-VM	
	AOKT113508PEER-VM	
	AOKT113512PEER-VM	
	AOKT113516PEER-VM	
	AOKT160408PEER-VM	
	AOKT160412PEER-VM	
	AOKT160416PEER-VM	

Insert shape	Insert model	Page
	HNMX0906ANSN-M	B22
	ODKT0605ADN	B12
	ODMT060508-R	
	RCKT10T3MO-FM	B52
	RCKT1204MO-FM	
	RCKT1606MO-FM	
	RCKT2006MO-FM	
	RDMW0602MO	B58
	RDMW0802MO	
	RDMW10T3MO	
	RDMW1204MO	
	RDMW1605MO	
	RDKW10T3MO	B58
	RDKW1204MO	
	RDKW1604MO	
	RPMT08T2MO-HM	B55
	RPMT1003MO	
	RPMT1204MO-HM	

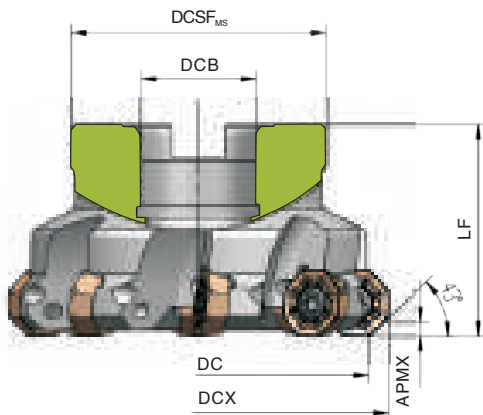
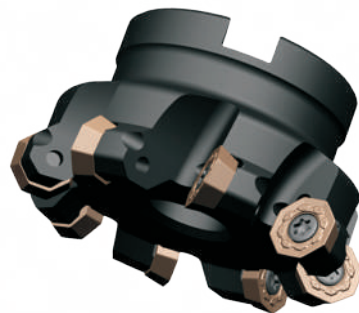
Insert shape	Insert model	Page
	RPKT10T3MO-MS	B55
	RPKT1204MO-MS	
	RPKT1606MO-MS	
	RPMT10T3MO-SM	B55
	RPMT1204MO-SM	
	RPMT1606MO-SM	
	SDMT1205ZTN-FM	B64
	SDMT1505ZTN-FM	
	SDMW1205ZTN	B64
	SDMW1505ZTN	
	SEET13T3-GM	B16
	SEMT13T3AGTN-FM	
	SEKR1203AFTN	B20
	SEMR1203AFTN	
	SEEN1203AFTN	B20
	SPKN1504EDTL	
	SPKN1504EDTR	

Insert shape	Insert model	Page
	SNGX1005ANR-GM	B14
	SNGX1005ZNN-GM	B28
	SNMX100512-GM	
	SZMX1206ANR-GM	B18
	XNGX0705ANN-R	B24
	ZNMU040308PNR-GM	B41
	ZNMU080608PNR-GM	
	ZNMU040308PNR-GL	B41
	ZNMU080608PNR-GL	

Face milling

CFM143 series

KAPR=43°

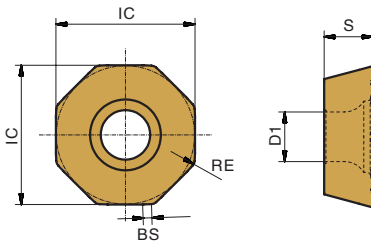


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench			
			DC	DCB	DCSF _{MS}	DCX	LF								
CFM143-040A1603-OD06	3	△	40	16	35	50	40	4	A	OD□□	M5×13	WR20S			
CFM143-050A2204-OD06	4	△	50	22	42	60	40	4							
CFM143-063A2205-OD06	5	▲	63	22	50	72	40	4							
CFM143-080A2206-OD06	6	▲	80	22	60	90	50	4							
CFM143-100B3207-OD06	7	▲	100	32	70	110	50	4	B						
CFM143-125B4008-OD06	8	▲	125	40	85	135	63	4							
CFM143-160C4010-OD06	10	△	160	40	100	170	63	4	C						
CFM143-200C6012-OD06	12	▲	200	60	175	210	63	4							

▲Running stock △Make-to-order

Applicable inserts

OD□□



Working condition: ● Stable ● Average ✱ Tough

Applicable inserts	Workpiece material	Working condition											
		Stable	Average	Tough	Stable	Average	Tough	Stable	Average	Tough	Stable	Average	Tough
Applicable inserts	P Steel	✱	●	●	✱	✱	✱	●					
	M Stainless steel		●	●	✱	✱	✱						
	K Cast iron	✱	●	●	✱								
	N Non-ferrous metal							●					
	S Heat-resistant alloy, titanium alloy												
Type	Basic dimension (mm)						APMX (mm)	CVD					
	IC	S	D1	BS	RE			HR8140	HR5110	HR5120	HR5130	HR7130	HR7140
ODKT0605ADN	15.875	5.56	5.5	1.2	0.8	4			✱	★	★		
ODMT060508-R	15.875	5.56	5.5	1.2	0.8	4			✱	★	★		

★ Recommended grade ✱ Available grade

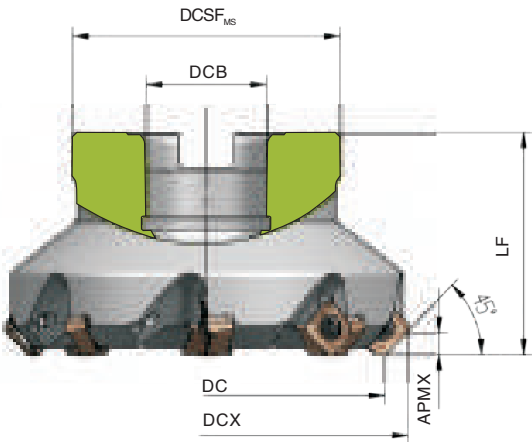
Recommended cutting parameters

Workpiece material	Hardness (HB)	Insert grade	Cutting data	
			Cutting speed v _c (m/min)	Feed rate f _z (mm/z)
P	Low-carbon steel, mild steel	HR5110	270(220-350)	0.3(0.1-0.5)
		HR5120	270(220-360)	
		HR5130	270(220-360)	
	High-carbon steel, alloy steel	HR5110	240(200-320)	0.2(0.1-0.4)
		HR5120	240(180-350)	
		HR5130	240(180-350)	
M	Alloy tool steel	HR5110	220(180-200)	0.15(0.1-0.3)
		HR5120	220(170-340)	
		HR5130	220(170-340)	
	Stainless steel	HR5110	230(180-300)	0.2(0.1-0.3)
		HR5120	150(120-250)	
		HR5130	150(120-250)	
K	Cast iron	HR5110	240(180-300)	0.2(0.1-0.4)
		HR5120	200(150-250)	
		HR5130	200(150-250)	

Face milling

CFM145 series

KAPR=45°

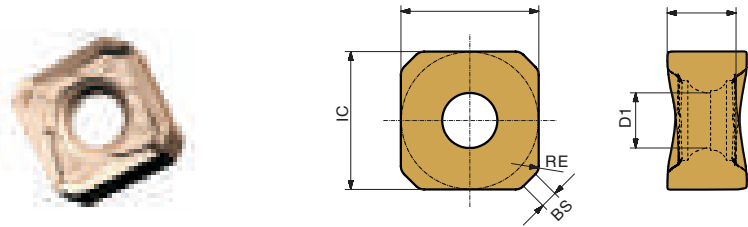


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench						
			DC	DCB	DCSF _{MS}	DCX	LF											
CFM145-050A2204-SN10	4	▲	50	22	42	60.5	40	4.7	A	SNGX□□	M3.5×10	WR15S						
CFM145-050A2205-SN10	5	△	50	22	42	60.5	40	4.7										
CFM145-063A2205-SN10	5	△	63	22	50	73.5	40	4.7										
CFM145-063A2206-SN10	6	▲	63	22	50	73.5	40	4.7										
CFM145-080A2706-SN10	6	△	80	27	60	90.5	50	4.7										
CFM145-080A2708-SN10	8	▲	80	27	60	90.5	50	4.7										
CFM145-100B3206-SN10	6	△	100	32	70	110.5	50	4.7	B				SNGX□□	M3.5×10	WR15S			
CFM145-100B3208-SN10	8	△	100	32	70	110.5	50	4.7										
CFM145-100B3205-SN10	10	▲	100	32	70	110.5	50	4.7										
CFM145-125B4008-SN10	8	△	125	40	85	135.5	63	4.7										
CFM145-125B4010-SN10	10	▲	125	40	85	135.5	63	4.7										
CFM145-125B4012-SN10	12	△	125	40	85	135.5	63	4.7										
CFM145-160C4008-SN10	8	△	160	40	100	170.5	63	4.7	C							SNGX□□	M3.5×10	WR15S
CFM145-160C4012-SN10	12	▲	160	40	100	170.5	63	4.7										
CFM145-160C4014-SN10	14	△	160	40	100	170.5	63	4.7										

▲Running stock △Make-to-order

Applicable inserts

SN□□



Working condition: ● Stable ● Average ✱ Tough

Applicable inserts	Workpiece material	 Steel												
		 Stainless steel												
		 Cast iron												
		 Non-ferrous metal												
		 Heat-resistant alloy, titanium alloy												
Type	Basic dimension (mm)					APMX (mm)	CVD	PVD					Cemented carbide	Cermets
	IC	S	D1	BS	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SNGX1005ANR-GM	10.0	5.0	4.0	1.2	0.8	4.7		☆	★	★				
SNGX1005ANR-GE	10.0	5.0	4.0	1.2	0.8	4.7		☆	★	★				

★ Recommended grade ☆ Available grade

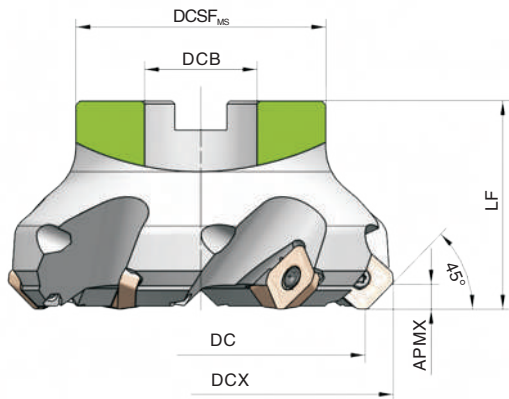
Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z (mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	270(220-350)	0.2(0.1-0.4)
			HR5120	270(220-350)	
			HR5130	270(220-350)	
	High-carbon steel, alloy steel	180-280	HR5110	260(200-320)	0.2(0.1-0.4)
			HR5120	260(200-320)	
			HR5130	260(200-320)	
	Alloy tool steel	280-350	HR5110	240(180-300)	0.2(0.1-0.4)
			HR5120	240(180-300)	
			HR5130	240(180-300)	
M	Stainless steel	≤270	HR5110	150(120-240)	0.2(0.1-0.4)
			HR5120	160(110-270)	
			HR5130	140(100-250)	
K	Cast iron	180-250	HR5110	270(150-300)	0.3(0.1-0.5)
			HR5120	200(150-250)	
			HR5130	200(150-250)	

Face milling

CFM245 series

KAPR=45°

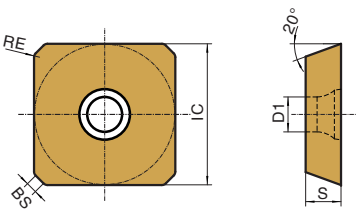


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench			
			DC	DCB	DCSF _{MS}	DCX	LF								
CFM245-050A2203-SE13	3	△	50	22	42	61	40	6	A	SEET□□	M3.5×10	WR15S			
CFM245-050A2204-SE13	4	▲	50	22	42	61	40	6							
CFM245-063A2204-SE13	4	△	63	22	50	74	40	6							
CFM245-063A2205-SE13	5	▲	63	22	50	74	40	6							
CFM245-080A2704-SE13	4	△	80	27	60	91	50	6							
CFM245-080A2706-SE13	6	▲	80	27	60	91	50	6							
CFM245-100B3205-SE13	5	△	100	32	70	107	50	6	B						
CFM245-100B3207-SE13	7	△	100	32	70	107	50	6							
CFM245-125B4006-SE13	6	▲	125	40	85	131	63	6							
CFM245-125B4008-SE13	8	△	125	40	85	136	63	6							
CFM245-160C4010-SE13	10	▲	160	40	100	170	63	6	C						
CFM245-160C4012-SE13	12	△	160	40	100	210	63	6							
CFM245-200C6014-SE13	14	▲	200	60	175	260	63	6							
CFM245-200C6018-SE13	18	△	200	60	175	325	70	6							

▲Running stock △Make-to-order

Applicable inserts

SE□□



Working condition: ● Stable ● Average ✱ Tough

Applicable inserts	Workpiece material	 Steel												
		 Stainless steel												
		 Cast iron												
		 Non-ferrous metal												
		 Heat-resistant alloy, titanium alloy												
Type	Basic dimension (mm)					APMX (mm)	CVD	PVD					Cemented carbide	Cermet
	IC	S	D1	BS	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SEET13T3-GM	13.4	3.97	4.1	1.4	1.5	6		☆	★	★				
SEMT13T3AGTN-FM	13.4	3.97	4.1	1.4	1.5	6		☆	★	★				

★ Recommended grade ☆ Available grade

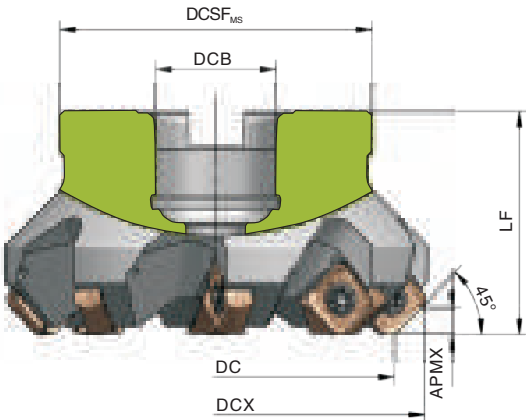
Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z (mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	270(220-350)	0.2(0.1-0.3)
			HR5120	270(200-360)	
			HR5130	230(170-350)	
	High-carbon steel, alloy steel	180-280	HR5110	240(200-320)	0.2(0.1-0.3)
			HR5120	240(180-350)	
			HR5130	220(180-350)	
	Alloy tool steel	280-350	HR5110	220(180-300)	0.2(0.1-0.3)
			HR5120	220(170-340)	
			HR5130	190(130-300)	
M	Stainless steel	≤270	HR5110	150(120-240)	0.2(0.1-0.3)
			HR5120	160(110-270)	
			HR5130	140(100-250)	
K	Cast iron	180-250	HR5110	240(180-300)	0.2(0.1-0.3)
			HR5120	200(150-250)	
			HR5130	200(150-250)	

Face milling

CFM345 series

KAPR=45°

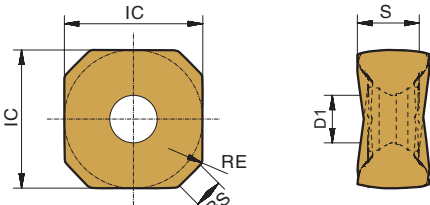


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench			
			DC	DCB	DCSF _{MS}	DCX	LF								
CFM345-050A2204-SZ12	4	△	50	22	42	63.7	40	6	A	SZMX□□	M4×10	WR15S			
CFM345-050A2205-SZ12	5	▲	50	22	42	63.7	40	6							
CFM345-063A2205-SZ12	5	△	63	22	50	76.7	40	6							
CFM345-063A2206-SZ12	6	▲	63	22	50	76.7	40	6							
CFM345-080A2706-SZ12	6	△	80	27	60	93.7	50	6							
CFM345-080A2708-SZ12	8	▲	80	27	60	93.7	50	6							
CFM345-100B3206-SZ12	6	△	100	32	70	113.7	50	6	B						
CFM345-100B3208-SZ12	8	△	100	32	70	113.7	50	6							
CFM345-100B3210-SZ12	10	▲	100	32	70	113.7	50	6							
CFM345-125B4008-SZ12	8	△	125	40	85	138.7	63	6							
CFM345-125B4010-SZ12	10	△	125	40	85	138.7	63	6							
CFM345-125B4012-SZ12	12	▲	125	40	85	138.7	63	6							
CFM345-160C4008-SZ12	8	△	160	40	100	173.7	63	6	C						
CFM345-160C4012-SZ12	12	△	160	40	100	173.7	63	6							
CFM345-160C4014-SZ12	14	▲	160	40	100	173.7	63	6							

▲Running stock △Make-to-order

Applicable inserts

SZMX □□



Working condition: ● Stable ● Average ✱ Tough

Applicable inserts	Workpiece material	Basic dimension (mm)						CVD						PVD		Cemented carbide	
		IC	S	D1	BS	RE	APMX (mm)	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20		
Applicable inserts	P Steel	✱	●	●	✱	✱	✱	●	●	●	●	●	●	●	●	●	●
	M Stainless steel		●	●	✱	✱	✱										
	K Cast iron	✱	●	●	✱	✱	✱										
	N Non-ferrous metal													●			
	S Heat-resistant alloy, titanium alloy																
Type	Basic dimension (mm)						APMX (mm)	CVD						PVD		Cemented carbide	
		IC	S	D1	BS	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20		
SZMX1206ANR-GM		13.4	6.0	4.6	1.4	0.8	6		☆	★	★						

★ Recommended grade ☆ Available grade

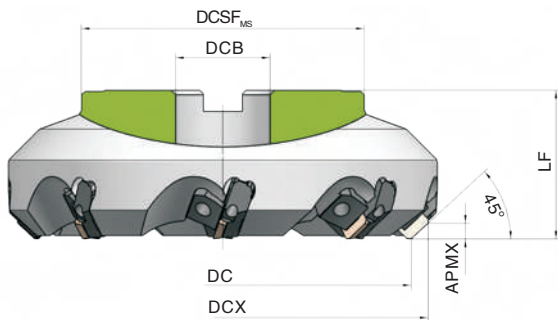
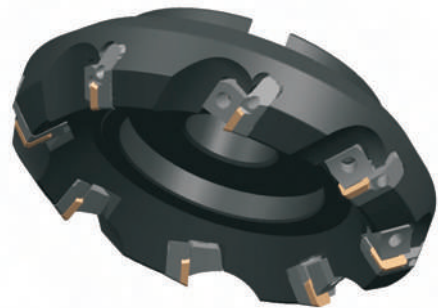
Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v _c (m/min)	Feed rate f _z (mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	270(220-350)	0.2(0.1-0.4)
			HR5120	270(220-350)	
			HR5130	270(220-350)	
	High-carbon steel, alloy steel	180-280	HR5110	260(200-320)	0.2(0.1-0.4)
			HR5120	260(200-320)	
			HR5130	260(200-320)	
	Alloy tool steel	280-350	HR5110	240(180-300)	0.2(0.1-0.4)
			HR5120	240(180-300)	
			HR5130	240(180-300)	
M	Stainless steel	≤270	HR5110	150(120-240)	0.2(0.1-0.4)
			HR5120	160(110-270)	
			HR5130	140(100-250)	
K	Cast iron	180-250	HR5110	270(150-300)	0.3(0.1-0.5)
			HR5120	200(150-250)	
			HR5130	200(150-250)	

Face milling

CFM445 series

KAPR=45°



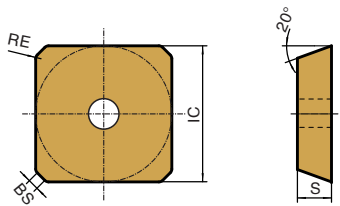
Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts
			DC	DCB	DCSF _{MS}	DCX	LF			
CFM445-080A2704-SE12	4	▲	80	27	60	103	50	5.5	A	SE□R1203□
CFM445-100B3205-SE12	5	▲	100	32	70	122	50	5.5	B	
CFM445-125B4006-SE12	6	▲	125	40	85	147	63	5.5	C	
CFM445-160C4008-SE12	8	▲	160	40	100	181	63	5.5		
CFM445-200C6010-SE12	10	▲	200	60	175	221	63	5.5		
CFM445-250C6012-SE12	12	△	250	60	210	270	63	5.5	D	
CFM445-315D6015-SE12	15	△	315	60	250	353	63	5.5		

▲Running stock △Make-to-order

Insert	Toolholder	Brale	Stud screw	Clamping screw	Wrench
SE□□12	HSERR/L	H05R/L	HM8×21	HOM5×15.4	HT20T HH40T

Applicable inserts

SE□□



Working condition: ● Stable ● Average ✱ Tough

Applicable inserts	Workpiece material	Working condition											
		Stable	Average	Tough	Stable	Average	Tough	Stable	Average	Tough	Stable	Average	Tough
Applicable inserts	P Steel	✱	●	●	✱	✱	✱	●					
	M Stainless steel		●	●	✱		✱						
	K Cast iron	✱	●	●	✱								
	N Non-ferrous metal							●					
	S Heat-resistant alloy, titanium alloy												
Type	Basic dimension (mm)						APMX (mm)	CVD					
	IC	S	D1	BS	RE			HR8140	HR5110	HR5120	HR5130	HR7130	HR7140
SEEN1203AFTN	12.7	3.18	2.5	1.2	0.8	5.5							
SEKR1203AFTN	12.7	3.18	2.5	1.3	1.6	5.5		☆	★	★			
SEMR1203AFTN	12.7	3.18	2.5	1.3	1.6	5.5		☆	★	★			

★ Recommended grade ☆ Available grade

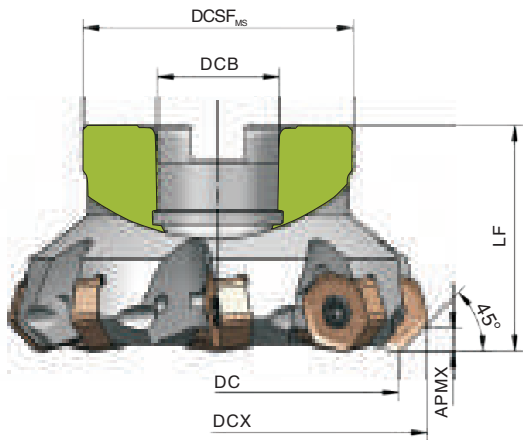
Recommended cutting parameters

Workpiece material	Hardness (HB)	Insert grade	Cutting data	
			Cutting speed v _c (m/min)	Feed rate f _z (mm/z)
P	Low-carbon steel, mild steel	HR5110	270(220-350)	0.3(0.1-0.5)
		HR5120	270(220-360)	
		HR5130	270(220-360)	
	High-carbon steel, alloy steel	HR5110	240(200-320)	0.15(0.1-0.4)
		HR5120	240(180-350)	
		HR5130	240(180-350)	
	Alloy tool steel	HR5110	220(180-200)	0.15(0.1-0.3)
		HR5120	220(170-340)	
		HR5130	220(170-340)	
M	Stainless steel	HR5110	230(180-300)	0.15(0.1-0.3)
		HR5120	150(120-250)	
		HR5130	150(120-250)	
K	Cast iron	HR5110	240(180-300)	0.2(0.1-0.4)
		HR5120	200(150-250)	
		HR5130	200(150-250)	

Face milling

CFM645 series

KAPR=45°

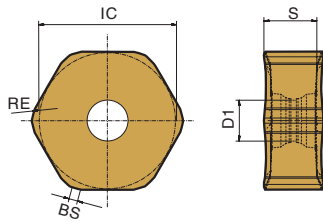


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	DCSF _{MS}	DCX	LF					
CFM645-050A1604-HN09	4	△	50	16	42	61.7	40	5	A	HNMX0906□□	M4×11	WR15S
CFM645-063A2206-HN09	6	▲	63	22	50	74.7	40	5				
CFM645-080A2706-HN09	6	△	80	27	60	91.7	50	5				
CFM645-080A2708-HN09	8	▲	80	27	60	91.7	50	5				
CFM645-100B3206-HN09	6	△	100	32	70	111.7	50	5	B			
CFM645-100B3208-HN09	8	▲	100	32	70	111.7	50	5				
CFM645-100B3210-HN09	10	△	100	32	70	111.7	50	5				
CFM645-125B4006-HN09	6	△	125	40	85	136.7	63	5				
CFM645-125B4008-HN09	8	▲	125	40	85	136.7	63	5				
CFM645-125B4010-HN09	10	△	125	40	85	136.7	63	5				
CFM645-125B4012-HN09	12	▲	125	40	85	136.7	63	5				
CFM645-160C4008-HN09	8	△	160	40	100	171.7	63	5				
CFM645-160C4012-HN09	12	▲	160	40	100	171.7	63	5				
CFM645-160C4014-HN09	14	△	160	40	100	171.7	63	5				
CFM645-200C6010-HN09	10	△	200	60	175	211.7	63	5				
CFM645-250C6014-HN09	14	▲	250	60	210	261.7	63	5				
CFM645-315D6016-HN09	16	△	315	60	250	326.7	80	5				

▲Running stock △Make-to-order

Applicable inserts

HNMX □□



Working condition: ● Stable ● Average ✱ Tough

Applicable inserts	Workpiece material	 Steel	 Stainless steel	 Cast iron	 Non-ferrous metal	 Heat-resistant alloy, titanium alloy								
Type	Basic dimension (mm)					APMX (mm)	CVD	PVD					Cemented carbide	Cermet
	IC	S	D1	BS	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
HNMX0906ANSN-M	16.5	6.34	4.9	1.0	1.2	5		☆	★	★				

★ Recommended grade ☆ Available grade

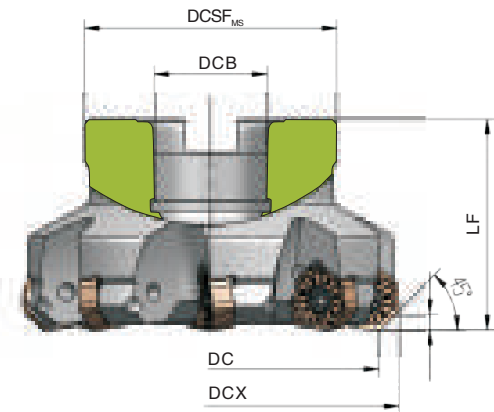
Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v _c (m/min)	Feed rate f _z (mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	270(220-350)	0.2(0.1-0.4)
			HR5120	270(220-350)	
			HR5130	270(220-350)	
	High-carbon steel, alloy steel	180-280	HR5110	260(200-320)	0.2(0.1-0.4)
			HR5120	260(200-320)	
			HR5130	260(200-320)	
	Alloy tool steel	280-350	HR5110	240(180-300)	0.2(0.1-0.4)
			HR5120	240(180-300)	
			HR5130	240(180-300)	
M	Stainless steel	≤270	HR5110	150(120-240)	0.2(0.1-0.4)
			HR5120	160(110-270)	
			HR5130	140(100-250)	
K	Cast iron	180-250	HR5110	270(150-300)	0.3(0.1-0.5)
			HR5120	200(150-250)	
			HR5130	200(150-250)	

Face milling

CFM745 series

KAPR=45°

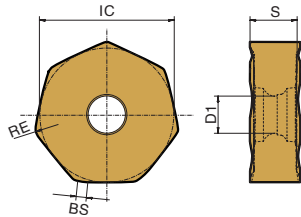


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench			
			DC	DCB	DCSF _{MS}	DCX	LF								
CFM745-040A1603-XN07	3	△	40	16	35	49.6	40	4.4	A	XMIX0705□□	M3.5×10	WR15S			
CFM745-050A2204-XN07	4	▲	50	22	42	59.6	40	4.4							
CFM745-050A2205-XN07	5	△	50	22	42	59.6	40	4.4							
CFM745-063A2205-XN07	5	▲	63	22	50	72.6	40	4.4							
CFM745-063A2206-XN07	6	△	63	22	50	72.6	40	4.4							
CFM745-080A2706-XN07	6	△	80	27	60	89.6	50	4.4							
CFM745-080A2707-XN07	7	▲	80	27	60	89.6	50	4.4	B						
CFM745-100B3207-XN07	7	△	100	32	70	109.6	50	4.4							
CFM745-100B3208-XN07	8	▲	100	32	70	109.6	50	4.4							
CFM745-125B4008-XN07	8	▲	125	40	85	134.6	63	4.4							
CFM745-125B4010-XN07	10	▲	125	40	85	134.6	63	4.4							
CFM745-160C4011-XN07	11	△	160	40	100	169.6	63	4.4					C		
CFM745-160C4012-XN07	12	▲	160	40	100	169.6	63	4.4							

▲Running stock △Make-to-order

Applicable inserts

XN □□



Working condition: ● Stable ● Average ☆ Tough

Applicable inserts	Workpiece material	Working condition											
		●	●	●	●	●	●	●	●	●	●		
Applicable inserts	P Steel	●	●	●	●	●	●	●	●	●	●		
	M Stainless steel	●	●	●	●	●	●	●	●	●	●		
	K Cast iron	●	●	●	●	●	●	●	●	●	●		
	N Non-ferrous metal	●	●	●	●	●	●	●	●	●	●		
	S Heat-resistant alloy, titanium alloy	●	●	●	●	●	●	●	●	●	●		
Type	Basic dimension (mm)						APMX (mm)	CVD					
	IC	S	D1	BS	RE			HR8140	HR5110	HR5120	HR5130	HR7130	HR7140
XNGX0705ANN-R	14.5	5.02	4.0	1.0	0.8	4.4		☆	★	★			

★ Recommended grade ☆ Available grade

Recommended cutting parameters

Workpiece material	Hardness (HB)	Insert grade	Cutting data	
			Cutting speed v_c (m/min)	Feed rate f_z (mm/z)
P	Low-carbon steel, mild steel	HR5110	270(220-350)	0.2(0.1-0.3)
		HR5120	270(200-360)	
		HR5130	230(170-350)	
	High-carbon steel, alloy steel	HR5110	240(200-320)	0.2(0.1-0.3)
		HR5120	240(180-350)	
		HR5130	220(180-350)	
M	Stainless steel	HR5110	220(180-300)	0.2(0.1-0.3)
		HR5120	220(170-340)	
		HR5130	190(130-300)	
K	Cast iron	HR5110	150(120-240)	0.2(0.1-0.3)
		HR5120	160(110-270)	
		HR5130	140(100-250)	
K	Cast iron	HR5110	240(180-300)	0.2(0.1-0.3)
		HR5120	200(150-250)	
		HR5130	200(150-250)	

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

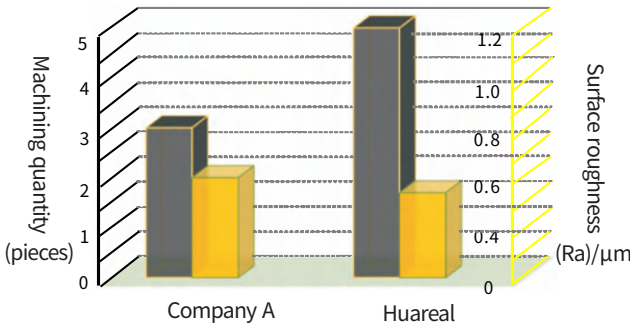
C

Short hole drills

Solid carbide drills

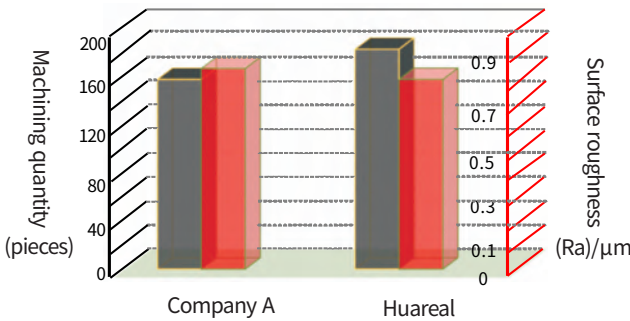
Machining cases

- Workpiece material: 1Cr18Ni9Ti
- Machining method: Face milling
- Cooling method: Water cooling
- Insert: SNGX1005ANR-GM, HR5120
- Cutting tools: CFM145-063A2206-SN10
- Machining parameters: $V_c=130\text{m/min}$, $f_z=0.15\text{mm/z}$, $a_p=1\text{mm}$



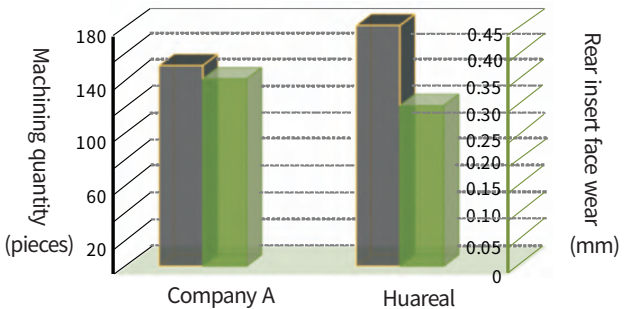
Machining cases

- Workpiece material: HT250
- Machining method: Face milling
- Cooling method: No cooling
- Insert: SZMX1206ANN-GM, HR5130
- Cutting tools: CFM345-063A2206-SZ12
- Machining parameters: $V_c=150\text{m/min}$, $f_z=0.2\text{mm/z}$, $a_p=3\text{mm}$



Machining cases

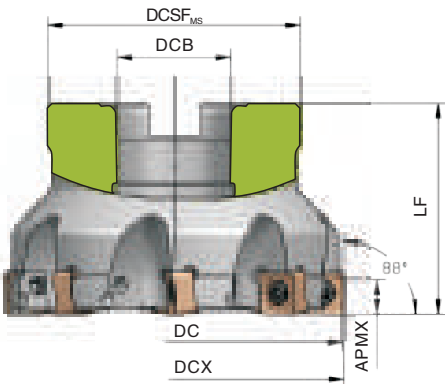
- Workpiece material: QT500
- Machining method: Face milling
- Cooling method: No cooling
- Insert: HNMX0906ANSN-M HR5110
- Cutting tools: CFM645-063A2206-HN09
- Machining parameters: $V_c=240\text{m/min}$, $f_z=0.15\text{mm/z}$, $a_p=2\text{mm}$



Square shoulder milling

CSM188 series

KAPR=88°



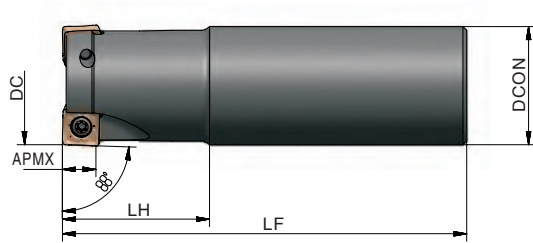
Tool specification and model	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench			
			DC	DCB	DCSF _{MS}	DCX	LF								
CSM188-050A2204-SN10	4	▲	50	22	42	50.7	40	8	A	SN□X1005□	M3.5×10	WR15S			
CSM188-050A2205-SN10	5	△	50	22	42	50.7	40	8							
CSM188-063A2205-SN10	5	△	63	22	50	63.7	40	8							
CSM188-063A2206-SN10	6	▲	63	22	50	63.7	40	8							
CSM188-080A2706-SN10	6	△	80	27	60	80.7	50	8							
CSM188-080A2708-SN10	8	▲	80	27	60	80.7	50	8							
CSM188-100B3206-SN10	6	△	100	32	70	100.7	50	8	B						
CSM188-100B3208-SN10	8	△	100	32	70	100.7	50	8							
CSM188-100B3211-SN10	11	▲	100	32	70	100.7	50	8							
CSM188-125B4008-SN10	8	△	125	40	85	125.7	63	8							
CSM188-125B4010-SN10	10	▲	125	40	85	125.7	63	8							
CSM188-125B4014-SN10	14	△	125	40	85	125.7	63	8							
CSM188-160C4008-SN10	8	△	160	40	100	160.7	63	8	C						
CSM188-160C4012-SN10	12	▲	160	40	100	160.7	63	8							
CSM188-160C4014-SN10	14	△	160	40	100	160.7	63	8							

▲Running stock △Make-to-order

Square shoulder milling

SFM188 series

KAPR=88°

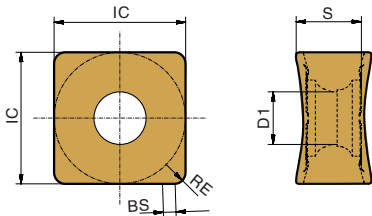


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM188-032G3202-SN10	2	▲	32	32	110	32.8	8	SN□X1005□	M3.5×10	WR15
SSM188-032G3203-SN10	3	△	32	32	110	32.8	8			
SSM188-040G3203-SN10	3	△	40	32	110	40.8	8			
SSM188-040G3204-SN10	4	△	40	32	110	40.8	8			

▲Running stock △Make-to-order

Applicable inserts

SN □□



Working condition: ● Stable ● Average ☆ Tough

Applicable inserts	Workpiece material	 Steel												
		 Stainless steel												
		 Cast iron												
		 Non-ferrous metal												
		 Heat-resistant alloy, titanium alloy												
Type	Basic dimension (mm)					APMX (mm)	CVD	PVD					Cemented carbide	Cermet
	IC	S	D1	BS	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SNGX1005ZNN-GM	10.0	5.0	4.0	1.0	0.8	8		☆	★	★				
SNMX100512-GM	10.0	5.0	4.0	\	1.2	8		☆	★	★				

★ Recommended grade ☆ Available grade

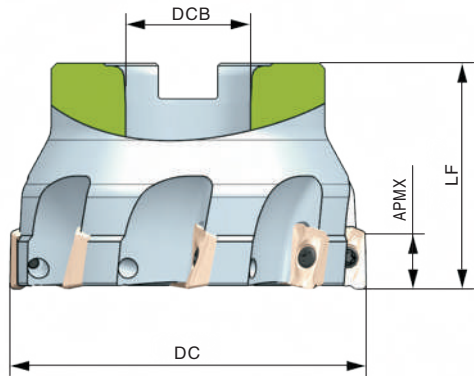
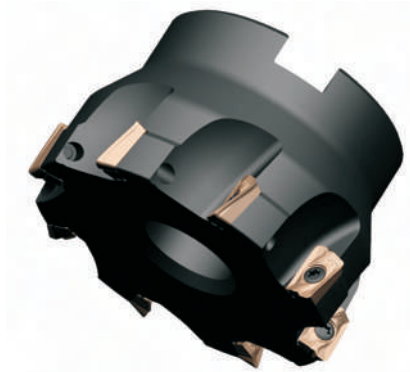
Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z (mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	270(220-350)	0.2(0.1-0.4)
			HR5120	270(220-350)	
			HR5130	270(220-350)	
	High-carbon steel, alloy steel	180-280	HR5110	260(200-320)	0.2(0.1-0.4)
			HR5120	260(200-320)	
			HR5130	260(200-320)	
	Alloy tool steel	280-350	HR5110	240(180-300)	0.2(0.1-0.4)
			HR5120	240(180-300)	
			HR5130	240(180-300)	
M	Stainless steel	≤270	HR5110	150(120-240)	0.2(0.1-0.4)
			HR5120	160(110-270)	
			HR5130	140(100-250)	
K	Cast iron	180-250	HR5110	270(150-300)	0.3(0.1-0.5)
			HR5120	200(150-250)	
			HR5130	200(150-250)	

Square shoulder milling

CSM190 series

KAPR=90°



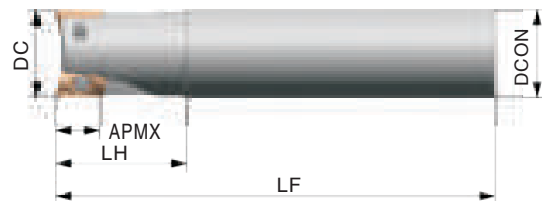
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	LF					
CSM190-040A1605-AO11	5	△	40	16	40	9.5	A	AOKT11□□	M2.5×6.5	WR08S
CSM190-050A2206-AO11	6	▲	50	22	50	9.5				
CSM190-063A2207-AO11	7	▲	63	22	63	9.5				
CSM190-050A2204-AO16	4	△	50	22	50	14.5		AOKT16□□	M4×8.4	WR15S
CSM190-063A2205-AO16	5	▲	63	22	63	14.5				
CSM190-080A2706-AO16	6	▲	80	27	80	14.5				

▲Running stock △Make-to-order

Square shoulder milling

SSM190 series

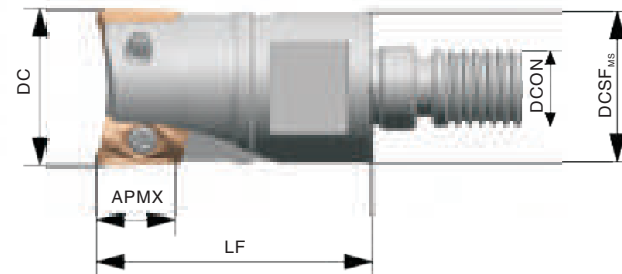
KAPR=90°



Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM190-016G1602-AO11	2	▲	16	16	130	40	9.5	AOKT11□□	M2.5×6.5	WR08
SSM190-016G1602L-AO11	2	△	16	16	160	40	9.5			
SSM190-017G1602-AO11	2	△	17	16	160	40	9.5			
SSM190-017G1602L-AO11	2	△	17	16	200	40	9.5			
SSM190-020G2002-AO11	2	▲	20	20	130	40	9.5			
SSM190-020G2002L-AO11	2	△	20	20	160	40	9.5			
SSM190-021G2002L-AO11	2	△	21	20	200	50	9.5			
SSM190-021G2002-AO11	2	△	21	20	160	50	9.5			
SSM190-025G2503-AO11	3	▲	25	25	120	50	9.5			
SSM190-025G2503L-AO11	3	△	25	25	160	50	9.5			
SSM190-025G2502-AO16	2	▲	25	25	160	50	14.5	AOKT16□□	M4×8.4	WR15
SSM190-025G2502L-AO16	2	△	25	25	200	50	14.5			
SSM190-026G2502-AO16	2	△	26	25	160	50	14.5			
SSM190-026G2502L-AO16	2	△	26	25	200	50	14.5			
SSM190-032G3202-AO16	2	▲	32	32	160	80	14.5			
SSM190-032G3202L-AO16	2	△	32	32	200	80	14.5			

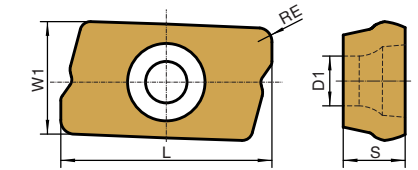
▲Running stock △Make-to-order

KH- series



Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCSF _{MS}	LF	DCON				
KH-1102-AOKT06-M05	2	△	11	9	18	5	6.0	AO06	M1.8×3.9	WR06
KH-1303-AOKT06-M06	3	△	13	10	18	6	6.0			
KH-1503-AOKT06-M08	3	▲	15	14	22	8	6.0			
KH-1704-AOKT06-M08	4	△	17	15	22	8	6.0			
KH-1702-AOKT11-M08	2	△	17	15	25	8	9.5	AO11	M2.5×6.5	WR08
KH-2102-AOKT11-M10	2	▲	21	19	30	10	9.5			
KH-2603-AOKT11-M12	3	△	26	24	35	12	9.5			
KH-3304-AOKT11-M16	4	△	33	30	40	16	9.5			

▲Running stock △Make-to-order

AO ☐ ☐

Working condition: ● Stable ● Average ⚙ Tough

Applicable inserts	Workpiece material	 Steel	      											
		 Stainless steel	   											
		 Cast iron	   											
		 Non-ferrous metal												
		 Heat-resistant alloy, titanium alloy												
Type	Basic dimension (mm)					APMX (mm)	CVD	PVD					Cemented carbide	Cermet
	IC	S	D1	BS	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
AOKT060202PEER-VM	7.61	4.20	2.38	2.10	0.20	6.0		☆	★	★			☆	
AOKT060204PEER-VM	7.61	4.20	2.38	2.10	0.40	6.0		☆	★	★			☆	
AOKT060208PEER-VM	7.61	4.20	2.38	2.10	0.80	6.0		☆	★	★			☆	
AOKT113504PEER-VM	11.75	6.42	3.50	2.80	0.40	9.5		☆	★	★			☆	
AOKT113508PEER-VM	11.75	6.42	3.50	2.80	0.80	9.5		☆	★	★			☆	
AOKT113512PEER-VM	11.75	6.42	3.50	2.80	1.20	9.5		☆	★	★			☆	
AOKT113516PEER-VM	11.75	6.42	3.50	2.80	1.60	9.5		☆	★	★			☆	
AOKT160408PEER-VM	17.65	9.64	4.76	4.40	0.80	14.5		☆	★	★			☆	
AOKT160412PEER-VM	17.65	9.64	4.76	4.40	1.20	14.5		☆	★	★			☆	
AOKT160416PEER-VM	17.65	9.64	4.76	4.40	1.60	14.5		☆	★	★			☆	

★ Recommended grade ☆ Available grade

▶▶ Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z (mm/z)
	Low-carbon steel, mild steel	≤ 180	HR5110	330(240-400)	0.2(0.1-0.3)
			HR5120	310(200-400)	
			HR5130	300(220-350)	
	High-carbon steel, alloy steel	180-280	HR5110	290(210-380)	0.2(0.1-0.3)
			HR5120	260(180-350)	
			HR5130	260(150-380)	
	Alloy tool steel	280-350	HR5110	290(180-350)	0.2(0.1-0.3)
			HR5120	260(160-330)	
			HR5130	220(150-280)	
	Stainless steel	≤ 270	HR5110	220(110-300)	0.2(0.1-0.3)
			HR5120	200(150-300)	
			HR5130	200(150-300)	
	Cast iron	180-250	HR5110	200(150-250)	0.2(0.1-0.3)
			HR5120	180(150-250)	
			HR5130	180(150-250)	

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

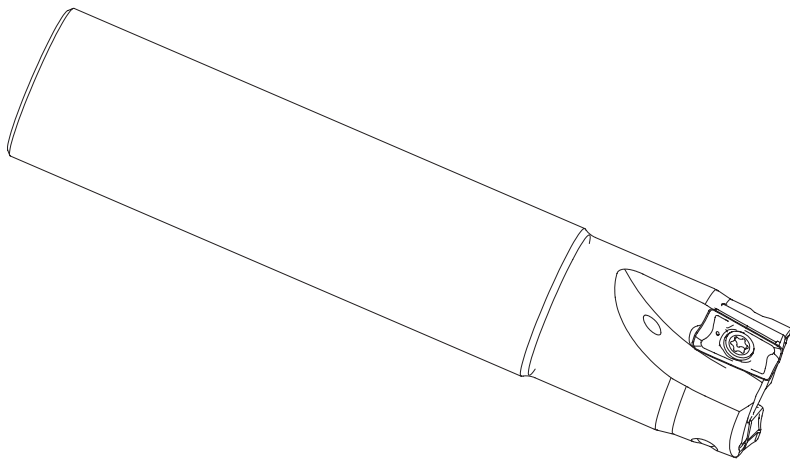
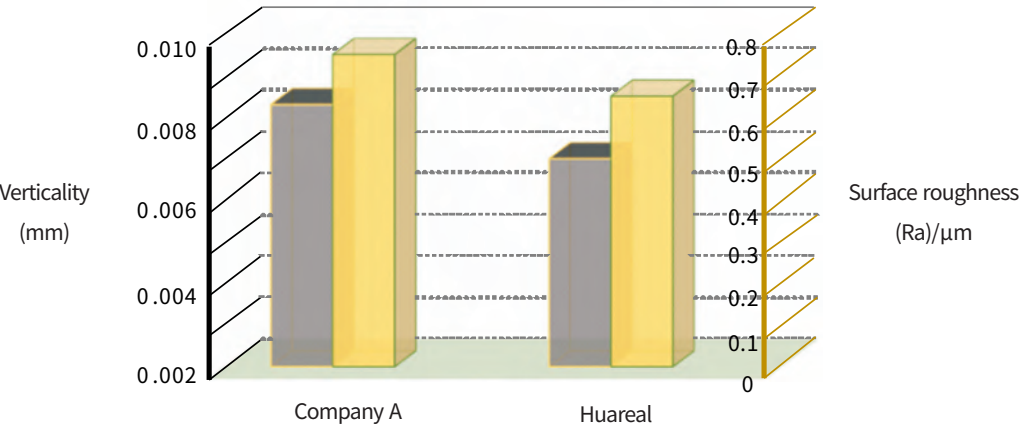
C

Short hole drills

Solid carbide drills

Machining cases

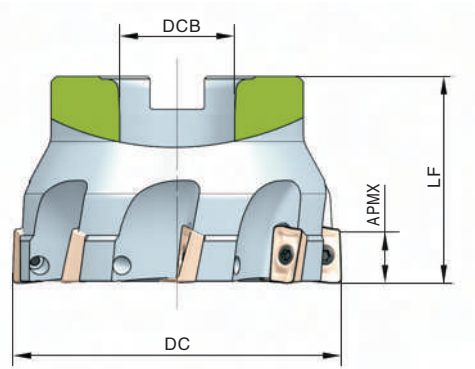
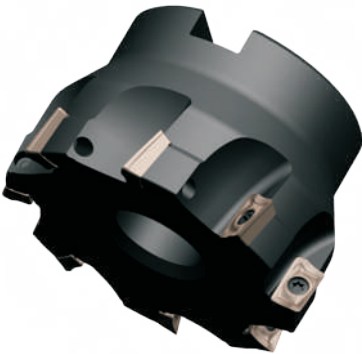
- Workpiece material: Mold material P20
- Machining method: Mold sidewall finish milling
- Insert: AOKT113508PEER-VM
- Cutting tools: SSM190-020G2002-AO11
- Machining parameters: $V_c=259\text{m/min}$, $f_z=0.25\text{mm/z}$, $a_e=0.12\text{mm}$, $a_p=1\text{mm}$



Square shoulder milling

CSM290 series

KAPR=90°



Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	LF					
CSM290-050A2206-AP11	6	▲	50	22	40	9.5	A	APKT11	M2.5×6.5	WR08S
CSM290-063A2207-AP11	7	▲	63	22	40	9.5				
CSM290-080A2708-AP11	8	▲	80	27	50	9.5				
CSM290-100B3210-AP11	10	△	100	32	50	9.5	B			
CSM290-050A2204-AP16	4	▲	50	22	40	14.5	A	APKT16	M4×8.4	WR15S
CSM290-063A2205-AP16	5	▲	63	22	40	14.5				
CSM290-080A2706-AP16	6	▲	80	27	50	14.5				
CSM290-100B3208-AP16	8	▲	100	32	50	14.5	B			
CSM290-125B4010-AP16	10	△	125	40	63	14.5				

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

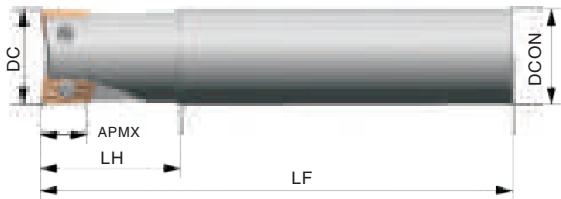
Short hole drills

Solid carbide drills

Square shoulder milling

SSM290 series

KAPR=90°

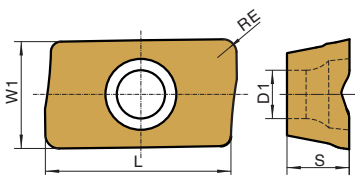


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM290-016G1602-AP11	2	△	16	16	130	40	9.5	APKT11	M2.5×6.5	WR08
SSM290-016G1602L-AP11	2	△	16	16	160	50	9.5			
SSM290-020G2002-AP11	2	△	20	20	130	40	9.5			
SSM290-020G2002L-AP11	2	△	20	20	160	50	9.5			
SSM290-025G2503-AP11	3	▲	25	25	130	40	9.5			
SSM290-025G2503L-AP11	3	△	25	25	160	50	9.5			
SSM290-032G3204-AP11	4	▲	32	32	130	40	9.5			
SSM290-032G3204L-AP11	4	△	32	32	160	50	9.5			
SSM290-025G2502-AP16	2	▲	25	25	160	50	14.5	APKT16	M4×8.4	WR15
SSM290-025G2502L-AP16	2	△	25	25	200	75	14.5			
SSM290-032G3202-AP16	2	▲	32	32	160	50	14.5			
SSM290-032G3202L-AP16	2	△	32	32	200	80	14.5			
SSM290-040G3204-AP16	4	△	40	32	160	50	14.5			
SSM290-040G3204L-AP16	4	△	40	32	200	80	14.5			

▲Running stock △Make-to-order

Applicable inserts

AP □ □



Working condition: ● Stable ● Average ✱ Tough

Applicable inserts	Workpiece material	 Steel														
		 Stainless steel														
		 Cast iron														
		 Non-ferrous metal														
		 Heat-resistant alloy , titanium alloy														
Type	Basic dimension (mm)						APMX (mm)	CVD	PVD						Cemented carbide	Cermets
	L	W1	S	D1	RE	HR8140		HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20		
APKT113604PEER-FM	11.30	6.25	3.60	2.80	0.40	9.5		☆	★	★						
APKT1136PEER-FM	11.30	6.25	3.60	2.80	0.80	9.5		☆	★	★						
APKT113612PEER-FM	11.30	6.25	3.60	2.80	1.20	9.5		☆	★	★						
APKT113620PEER-FM	11.30	6.25	3.60	2.80	2.00	9.5		☆	★	★						
APKT1605PDER-FM	17.42	9.33	5.20	4.50	0.80	14.5		☆	★	★						
APKT160512PDER-FM	17.42	9.33	5.20	4.50	1.20	14.5		☆	★	★						
APKT160520PDER-FM	17.42	9.33	5.20	4.50	2.00	14.5		☆	★	★						

★ Recommended grade ☆ Available grade

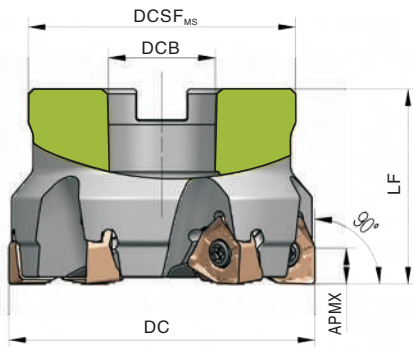
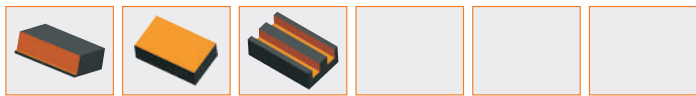
Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z (mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	320(240-400)	0.2(0.1-0.3)
			HR5120	320(200-400)	
			HR5130	300(220-350)	
	High-carbon steel, alloy steel	180-280	HR5110	280(210-380)	0.2(0.1-0.3)
			HR5120	280(180-350)	
			HR5130	260(150-380)	
	Alloy tool steel	280-350	HR5110	260(180-350)	0.2(0.1-0.3)
			HR5120	260(160-330)	
			HR5130	220(150-280)	
M	Stainless steel	≤270	HR5110	200(110-300)	0.2(0.1-0.3)
			HR5120	180(150-300)	
			HR5130	180(150-300)	
K	Cast iron	180-250	HR5110	180(150-250)	0.2(0.1-0.3)
			HR5120	200(150-250)	
			HR5130	200(150-250)	

Square shoulder milling

CSM390 series

KAPR=90°



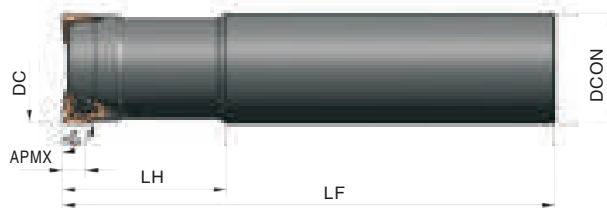
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Interface form	Applicable inserts	Screw	Wrench			
			DC	DCB	DCSF _{MS}	LF								
CSM390-040A1605-ZN04	5	△	40	16	35	40	4.2	A	ZNMU0403□□	M2.5×6.5	WR08S			
CSM390-040A1607-ZN04	7	△	40	16	35	40	4.2							
CSM390-050A2206-ZN04	6	△	50	22	42	40	4.2							
CSM390-050A2208-ZN04	8	△	50	22	42	40	4.2							
CSM390-063A2207-ZN04	7	△	63	22	50	40	4.2							
CSM390-063A2210-ZN04	10	△	63	22	50	40	4.2							
CSM390-040A1604-ZN08	4	△	40	16	35	40	7.3							
CSM390-050A2204-ZN08	4	▲	50	22	42	40	7.3							
CSM390-050A2205-ZN08	5	△	50	22	42	40	7.3							
CSM390-063A2205-ZN08	5	▲	63	22	50	40	7.3							
CSM390-063A2206-ZN08	6	△	63	22	50	40	7.3							
CSM390-080A2706-ZN08	6	▲	80	27	60	50	7.3							
CSM390-080A2707-ZN08	7	△	80	27	60	50	7.3							
CSM390-080A2709-ZN08	9	△	80	27	60	50	7.3							
CSM390-100A3207-ZN08	7	▲	100	32	70	50	7.3							
CSM390-100A3208-ZN08	8	△	100	32	70	50	7.3							
CSM390-100A3211-ZN08	11	△	100	32	70	50	7.3							
CSM390-125B4008-ZN08	8	▲	125	40	85	63	7.3	B	ZNMU0806□□	M4×8.4	WR15S			
CSM390-125B4011-ZN08	11	▲	125	40	85	63	7.3							
CSM390-125B4014-ZN08	14	△	125	40	85	63	7.3							
CSM390-160C4010-ZN08	10	△	160	40	100	63	7.3							
CSM390-160C4012-ZN08	12	▲	160	40	100	63	7.3	C				ZNMU0806□□	M4×8.4	WR15S
CSM390-160C4016-ZN08	16	△	160	40	100	63	7.3							
CSM390-200C6012-ZN08	12	△	200	60	175	63	7.3							
CSM390-200C6016-ZN08	16	△	200	60	175	63	7.3							
CSM390-250C6014-ZN08	14	△	250	60	210	63	7.3							
CSM390-250C6018-ZN08	18	△	250	60	210	63	7.3							

▲Running stock △Make-to-order

Square shoulder milling

SSM390 series

KAPR=90°



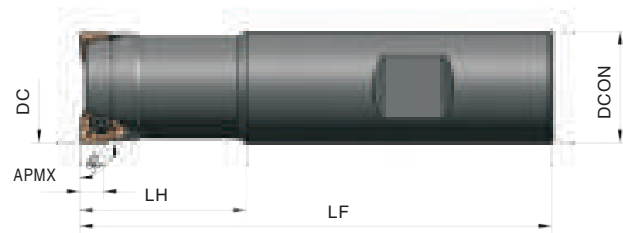
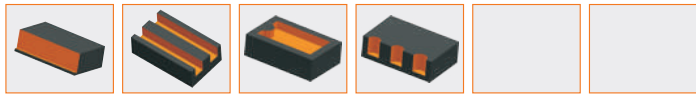
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM390-018G1602L-ZN04	2	△	18	16	150	30	4.2	ZNMU0403□□	M2.5×6.5	WR08
SSM390-020G2002L-ZN04	2	▲	20	20	150	30	4.2			
SSM390-020G2003L-ZN04	3	△	20	20	150	30	4.2			
SSM390-021G2002L-ZN04	2	▲	21	20	150	30	4.2			
SSM390-021G2003L-ZN04	3	△	21	20	150	30	4.2			
SSM390-025G2502L-ZN04	2	▲	25	25	170	30	4.2			
SSM390-025G2503L-ZN04	3	▲	25	25	170	30	4.2			
SSM390-025G2504L-ZN04	4	△	25	25	170	30	4.2			
SSM390-025G2505L-ZN04	5	△	25	25	170	30	4.2			
SSM390-026G2502L-ZN04	2	▲	26	25	170	30	4.2			
SSM390-026G2503L-ZN04	3	△	26	25	170	30	4.2			
SSM390-032G3202L-ZN04	2	▲	32	32	200	30	4.2			
SSM390-032G3203L-ZN04	3	▲	32	32	200	30	4.2			
SSM390-032G3204L-ZN04	4	△	32	32	200	30	4.2			
SSM390-032G3205L-ZN04	5	△	32	32	200	30	4.2			
SSM390-032G3206L-ZN04	6	△	32	32	200	30	4.2			
SSM390-035G3202L-ZN04	2	▲	35	32	200	30	4.2			
SSM390-035G3203L-ZN04	3	▲	35	32	200	30	4.2			
SSM390-035G3204L-ZN04	4	△	35	32	200	30	4.2			
SSM390-040G3204L-ZN04	4	△	40	32	200	30	4.2			
SSM390-040G3205L-ZN04	5	△	40	32	200	30	4.2			
SSM390-040G3206L-ZN04	6	△	40	32	200	30	4.2			

▲Running stock △Make-to-order

Square shoulder milling

SSM390 series

KAPR=90°



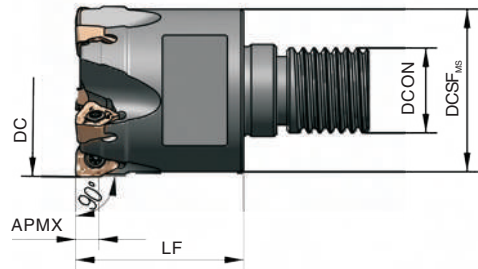
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM390-020X2002-ZN04	2	△	20	20	90	30	4.2	ZNMU0403□□	M2.5×6.5	WR08
SSM390-020X2003-ZN04	3	△	20	20	90	30	4.2			
SSM390-025X2502-ZN04	2	▲	25	25	100	30	4.2			
SSM390-025X2503-ZN04	3	▲	25	25	100	30	4.2			
SSM390-025X2504-ZN04	4	△	25	25	100	30	4.2			
SSM390-025X2505-ZN04	5	△	25	25	100	30	4.2			
SSM390-032X3202-ZN04	2	▲	32	32	110	30	4.2			
SSM390-032X3203-ZN04	3	▲	32	32	110	30	4.2			
SSM390-032X3204-ZN04	4	△	32	32	110	30	4.2			
SSM390-032X3205-ZN04	5	△	32	32	110	30	4.2			
SSM390-032X3206-ZN04	6	△	32	32	110	30	4.2			

▲Running stock △Make-to-order

Square shoulder milling

KH- series

KAPR=90°

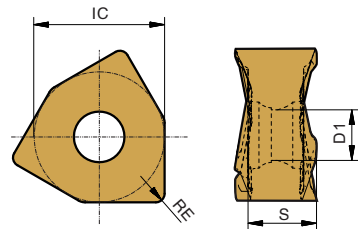


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCSF _{MS}	LF	DCON				
KH-2002-ZN04-M10	2	△	20	18	30	10	4.2	ZNMU0403□□	M2.5×6.5	WR08
KH-2003-ZN04-M10	3	△	20	18	30	10	4.2			
KH-2502-ZN04-M12	2	▲	25	23	30	12	4.2			
KH-2503-ZN04-M12	3	▲	25	23	30	12	4.2			
KH-2504-ZN04-M12	4	△	25	23	30	12	4.2			
KH-2505-ZN04-M12	5	△	25	23	30	12	4.2			
KH-3202-ZN04-M16	2	▲	32	30	40	16	4.2			
KH-3203-ZN04-M16	3	▲	32	30	40	16	4.2			
KH-3204-ZN04-M16	4	△	32	30	40	16	4.2			
KH-3205-ZN04-M16	5	△	32	30	40	16	4.2			
KH-3206-ZN04-M16	6	△	32	30	40	16	4.2			

▲Running stock △Make-to-order

Applicable inserts

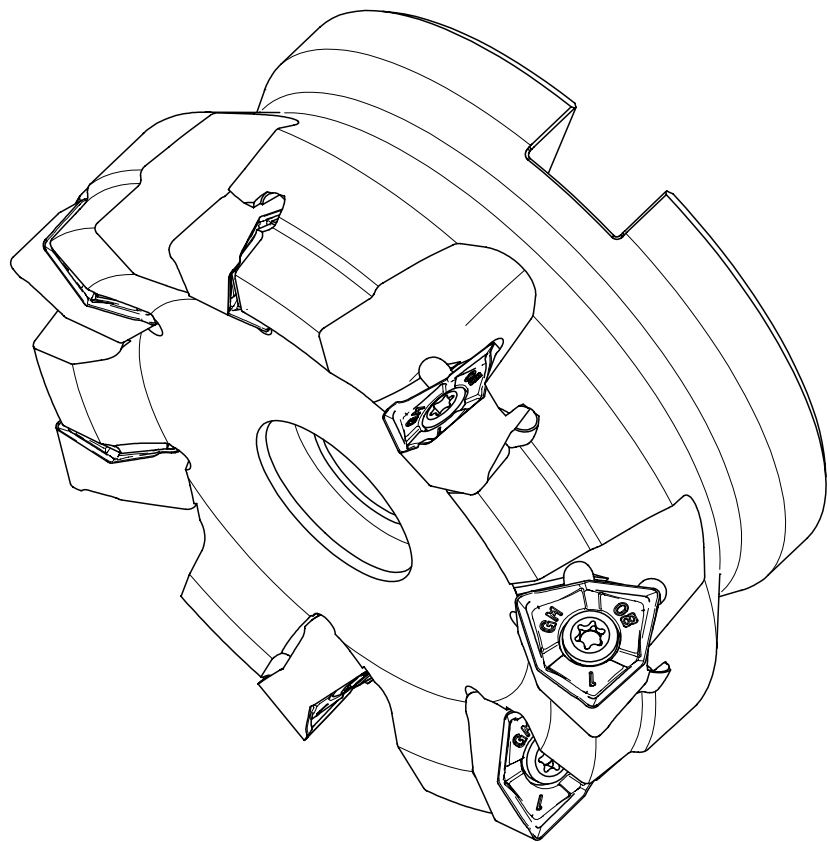
ZU□□



						Working condition: ● Stable ● Average ✖ Tough							
Applicable inserts	Workpiece material	P Steel	✖	●	●	✖	✖	✖	✖	✖	●		
		M Stainless steel		●	●	✖		✖					
		K Cast iron	✖	●	●	✖							
		N Non-ferrous metal							●				
		S Heat-resistant alloy, titanium alloy											
Type	Basic dimension (mm)				APMX (mm)	CVD	PVD					Cemented carbide	Cermet
	IC	S	D1	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
ZNMU040308PNR-GM	7.00	3.65	2.80	0.80	4.2		☆	★	★				
ZNMU080608PNR-GM	12.00	6.35	4.60	0.80	7.3		☆	★	★				
ZNMU040308PNR-GL	7.00	3.65	2.80	0.80	4.2		☆	★	★				
ZNMU080608PNR-GL	12.00	6.35	4.60	0.80	7.3		☆	★	★				
★ Recommended grade ☆ Available grade													

Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z (mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	310(240-400)	0.2(0.1-0.3)
			HR5120	300(200-400)	
			HR5130	300(220-350)	
	High-carbon steel, alloy steel	180-280	HR5110	270(210-380)	0.2(0.1-0.3)
			HR5120	270(180-350)	
			HR5130	250(150-380)	
M	Alloy tool steel	280-350	HR5110	250(180-350)	0.2(0.1-0.3)
			HR5120	250(160-330)	
			HR5130	210(150-280)	
	Stainless steel	≤270	HR5110	200(110-300)	0.2(0.1-0.3)
			HR5120	180(150-300)	
			HR5130	180(150-300)	
K	Cast iron	180-250	HR5110	180(150-250)	0.2(0.1-0.3)
			HR5120	200(150-250)	
			HR5130	200(150-250)	



A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

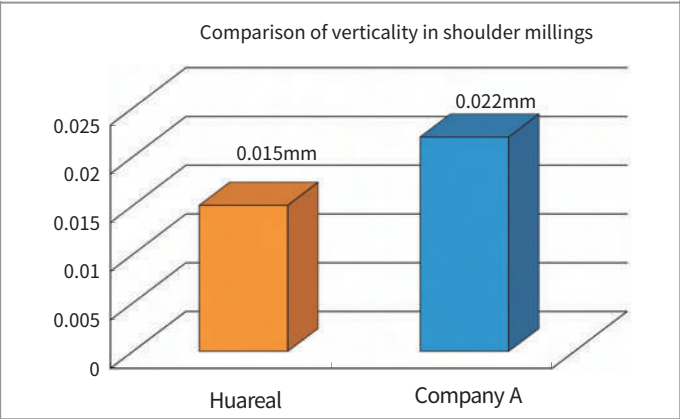
C

Short hole drills

Solid carbide drills

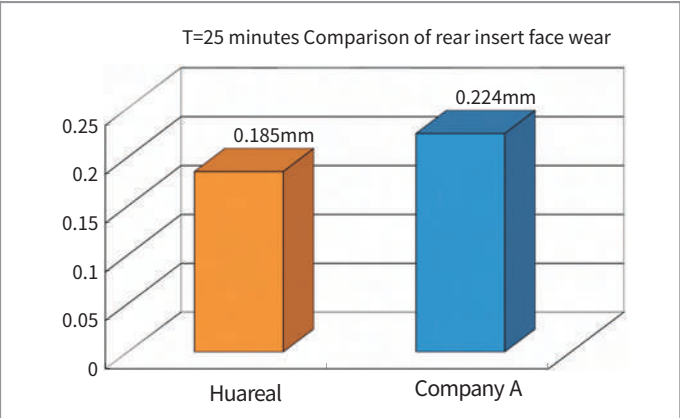
➤ Machining cases

- **Machining method** Square shoulder milling NAK80 (28-32HRC)
- **Workpiece material** ZNMU040308PNR-GM
- **Insert** SSM390-025G2502L-ZN04
- **Cutting tools**
- **Cutting parameter** $v_c=220\text{m/min}$, $f_z=0.2\text{mm/z}$, $a_p=4\text{mm}$, $a_e=0.5\text{mm}$
- **Cooling method** Air cooling



➤ Machining cases

- **Machining method** Face milling
- **Workpiece material** 45# steel (200-220HB)
- **Insert** ZNMU080608PNR-GM
- **Cutting tools** CSM390-080A2706-ZN08
- **Cutting parameter** $v_c=280\text{m/min}$, $f_z=0.2\text{mm/z}$, $a_p=1\text{mm}$, $a_e=65\text{mm}$
- **Cooling method** Air cooling



C/SSM390

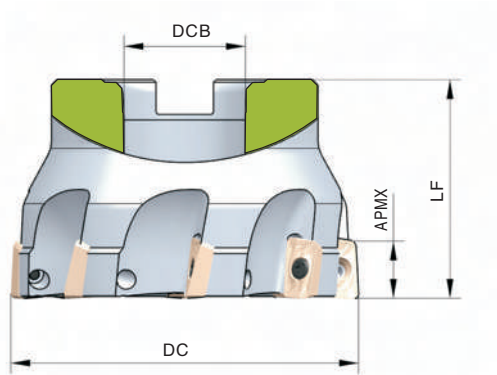
Square shoulder milling tool



Square shoulder milling

CSM590 series

KAPR=90°



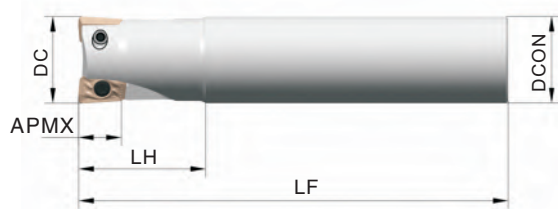
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	LF					
CSM590-050A2206-AP11	6	△	50	22	40	9.5	A	APMT11□□ APGT11□□	M2.5×6.5	WR08S
CSM590-063A2208-AP11	8	△	63	22	40	9.5				
CSM590-080A2708-AP11	8	▲	80	27	50	9.5				
CSM590-100B3210-AP11	10	△	100	32	50	9.5				
CSM590-050A2205-AP16	5	△	50	22	40	14.5				
CSM590-063A2206-AP16	6	▲	63	22	40	14.5	B	APMT16□□ APGT16□□	M4×10	WR15S
CSM590-080A2707-AP16	7	△	80	27	50	14.5				
CSM590-100B3208-AP16	8	△	100	32	50	14.5				
CSM590-125B4010-AP16	10	△	125	40	63	14.5				

▲Running stock △Make-to-order

Square shoulder milling

SSM590 series

KAPR=90°

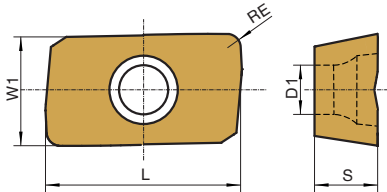


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM590-016G1602-AP11	2	△	16	16	130	40	9.5	APMT11□□ APGT11□□	M2.5×6.5	WR08
SSM590-016G1602L-AP11	2	△	16	16	160	50	9.5			
SSM590-020G2002-AP11	2	△	20	20	130	40	9.5			
SSM590-020G2002L-AP11	2	△	20	20	160	50	9.5			
SSM590-025G2503-AP11	3	▲	25	25	130	40	9.5			
SSM590-025G2503L-AP11	3	△	25	25	160	50	9.5			
SSM590-032G3204-AP11	4	▲	32	32	130	40	9.5			
SSM590-032G3204L-AP11	4	△	32	32	160	50	9.5			
SSM590-025G2502-AP16	2	▲	25	25	160	50	15	APMT16□□ APGT16□□	M4×10	WR15
SSM590-025G2502L-AP16	2	△	25	25	200	75	15			
SSM590-032G3202-AP16	2	▲	32	32	160	50	15			
SSM590-032G3202L-AP16	2	△	32	32	200	80	15			
SSM590-040G3204-AP16	4	△	40	32	160	50	15			
SSM590-040G3204L-AP16	4	△	40	32	200	80	15			

▲Running stock △Make-to-order

Applicable inserts

AP □ □



Working condition: ● Stable ● Average ✖ Tough

Applicable inserts	Workpiece material	 Steel												
		 Stainless steel												
		 Cast iron												
		 Non-ferrous metal												
		 Heat-resistant alloy, titanium alloy												
Type	Basic dimension (mm)					APMX (mm)	CVD	PVD					Cemented carbide	Cermec
	L	W1	S	D1	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
APMT1135PDER-HM	11.30	6.25	3.50	2.80	0.80	9.5			★	★				
APMT1605PDER-HM	17.25	9.25	5.22	4.40	0.80	14.5			★	★				
APGT1135PDFR-AK	11.30	6.25	3.50	2.80	0.80	9.5							★	
APGT1604PDFR-AK	17.25	9.25	4.76	4.40	0.80	14.5							★	

★ Recommended grade ☆ Available grade

Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z (mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	190(140-250)	0.2(0.04-0.15)
			HR5120	190(140-250)	
			HR5130	190(140-250)	
	High-carbon steel, alloy steel	180-280	HR5110	170(130-250)	0.2(0.04-0.15)
			HR5120	170(130-250)	
			HR5130	170(130-250)	
	Alloy tool steel	280-350	HR5110	150(110-240)	0.2(0.04-0.15)
			HR5120	150(110-240)	
			HR5130	150(110-240)	
M	Stainless steel	≤270	HR5110	120(80-190)	0.2(0.04-0.15)
			HR5120	120(80-190)	
			HR5130	120(80-190)	
K	Cast iron	180-250	HR5110	120(80-210)	0.2(0.04-0.15)
			HR5120	120(80-210)	
			HR5130	120(80-210)	

Machining cases

Mold sidewall finish milling

- Workpiece material 45# steel
- Machining method Sidewall finish milling
- Insert AOKT113508PEER-VM HR5130
- Cutting tools SSM190-025G2503L-AO11
- Machining parameters $V_c=220\text{m/min}$, $a_p=1.5\text{mm}$, $a_e=0.25\text{mm}$, $f_z=0.36\text{mm/z}$
- Machining quality Verticality of the workpiece $<0.012\text{mm}$, which meets the needs of customers and is a good replacement of imported products.



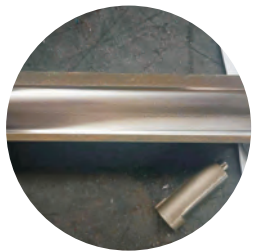
Cylinder side milling

- Workpiece material HT250
- Machining method Side milling machining
- Insert AOKT113508PEER-VM HR5130
- Cutting tools KH-2603-AOKT11-M12
- Machining parameters $V_c=285\text{m/min}$, $a_p=0.8\text{mm}$, $a_e=0.15\text{mm}$, $f_z=0.1\text{mm/z}$
- Machining quality Verticality of workpiece $<0.008\text{mm}$, a good replacement of high quality products of other brands .



Groove milling

- Workpiece material Cr15
- Machining method Groove milling
- Insert AOKT113508PEER-VM HR5120
- Cutting tools SSM190-020G2002-AO11
- Machining parameters $V_c=138\text{m/min}$, $a_p=0.12\text{mm}$, $a_e=5\text{mm}$, $f_z=0.25\text{mm/z}$
- Machining quality Compared with a competitor , parts machined by Huareal products have better surface quality (no burrs on the sidewall).



A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

Machining cases

Rough milling of bogies

- **Workpiece material** Cast steel
- **Insert** ZNMU080608PNR-GM HR5120
- **Cutting tools** CSM390-200C6012-ZN08
- **Machining parameters** N=300 rev/min, F=700 mm/min, ap=2~5 mm
- **Cooling method** No cooling
- **Service life** Huareal: 3 hours; A competitor: 2.5 hours
- **Machining quality** The workpiece processed by Huareal products has better surface quality and longer cutting life.



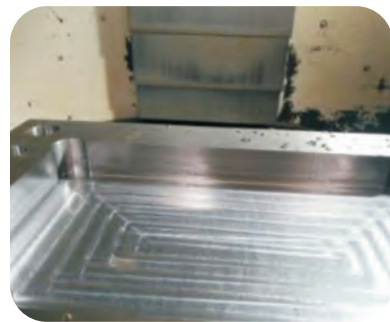
Face milling with leaf spring mounting

- **Workpiece material** 40CrMo (HB285-333)
- **Insert** ZNMU080608PNR-GM HR5120
- **Cutting tools** CSM390-063A2205-ZN08
- **Machining parameters** N=720 rev/min, F=540mm/min, ap=1.5-3mm
- **Cooling method** No cooling
- **Service life** Huareal: 27 pieces; A competitor: 12 pieces
- **Machining quality** The workpiece processed by Huareal products has better surface quality and longer cutting life. Thus, Huareal products are more cost-effective.



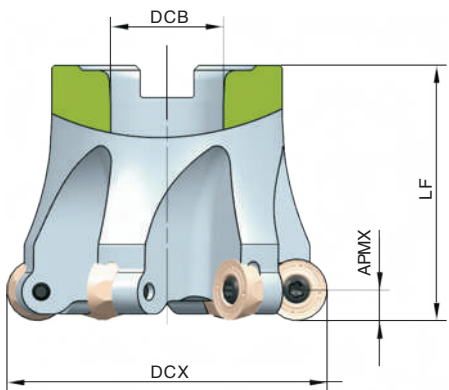
Clean-up machining of mold frame

- **Workpiece material** 45# steel
- **Insert** ZNMU040308PNR-GM HR5130
- **Cutting tools** SSM390-021G2002L-ZN04
- **Machining parameters** N=2750 rev/min, F=2500mm/min, ap=0.5mm, ae=0.5~21mm
- **Previous insert** APMT1135
- **Previous machining parameters** N=2750rev/min, F=2500mm/min, ap=0.3mm, ae=0.5~21mm
- **Service life** Hardstone: 3 hours; A competitor: 2 hours
- **Machining quality** Huareal products are light and fast-cutting, with higher machining efficiency, good surface quality and high cost-effectiveness.



Profile milling

CPM100 series



Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CPM100-063A2204-RC12	4	▲	63	22	50	6	A	RC12	M4×8.4	WR15S
CPM100-080B2705-RC16	5	▲	80	27	50	8	B	RC16	M5×13	WR20S
CPM100-100B3206-RC16	6	△	100	32	50	8		RC20	M6×16	WR20S
CPM100-125B4007-RC20	7	△	125	40	63	10				
CPM100-160B4008-RC20	8	△	160	40	63	10				

▲Running stock △Make-to-order

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

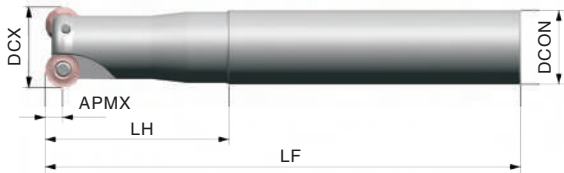
C

Short hole drills

Solid carbide drills

Profile milling

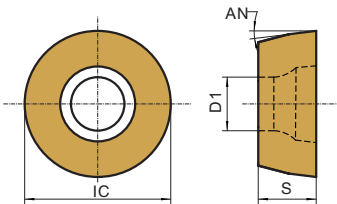
SPM100 series



Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCON	LF	LH				
SPM100-025G2502-RC10	2	▲	25	25	100	30	5	RC10	M4×8.4	WR15
SPM100-032G3202-RC10	2	▲	32	32	120	35	5			
SPM100-040G4003-RC12	3	△	40	40	120	40	6	RC12	M4×8.4	WR15

▲Running stock △Make-to-order

Applicable inserts
RC□□

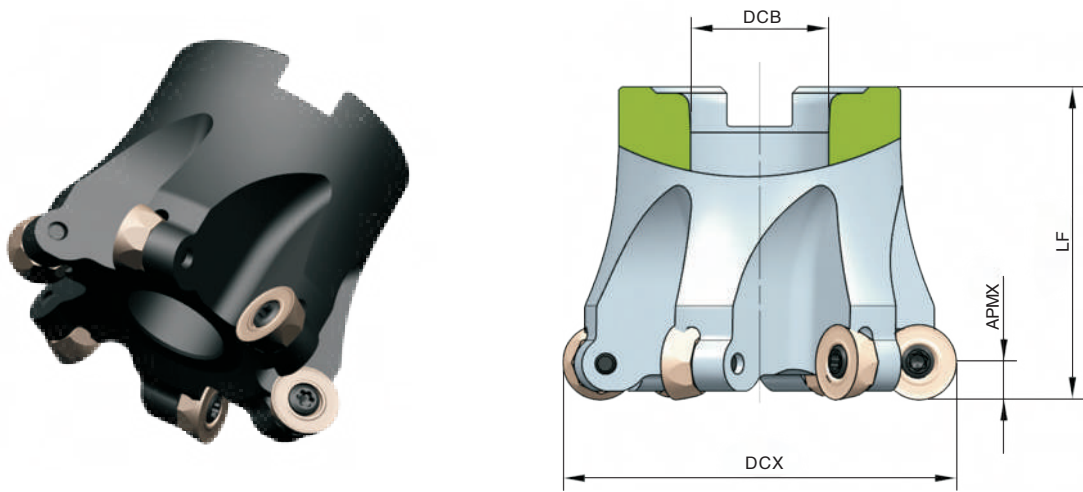


Applicable inserts						Working condition: ● Stable ● Average ✖ Tough									
						Workpiece material	P Steel	✖	●	●	✖	✖	✖		●
							M Stainless steel		●	●	✖		✖		
							K Cast iron	✖	●	●	✖				
							N Non-ferrous metal							●	
							S Heat-resistant alloy, titanium alloy								
Type	Basic dimension (mm)				APMX (mm)	CVD	PVD				Cemented carbide	Cermet			
	IC	S	D1	AN		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20		
RCKT10T3MO-FM	10.00	3.97	4.40	7°	5		☆	★	★						
RCKT1204MO-FM	12.00	4.76	4.40	7°	6		☆	★	★						
RCKT1606MO-FM	16.00	6.35	5.50	7°	8		☆	★	★						
RCKT2006MO-FM	20.00	6.35	6.55	7°	10		☆	★	★						
★ Recommended grade ☆ Available grade															

★ Recommended grade ☆ Available grade

Profile milling

CPM200 series

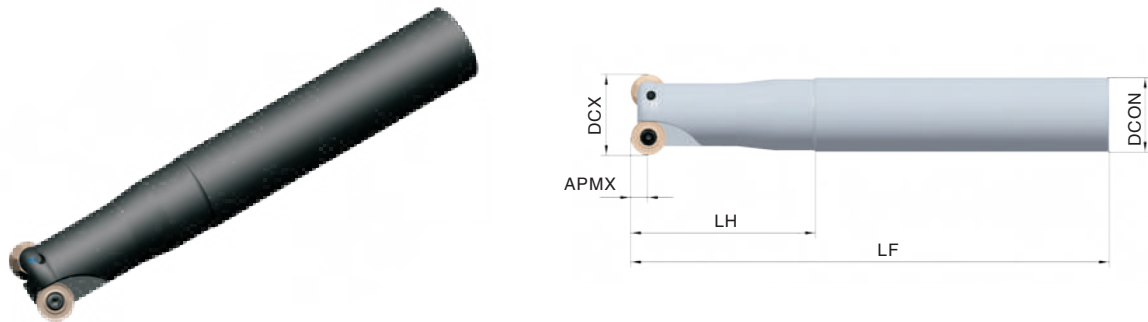


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CPM200-050A2203-RP12	3	△	50	22	40	6	A	RP12	M4×8.4	WR15S
CPM200-063A2204-RP12	4	▲	63	22	50	6				
CPM200-080B2706-RP12	6	▲	80	27	50	6	B	RP16	M5×13	WR20S
CPM200-063A2205-RP16	5	▲	63	22	40	8	A			
CPM200-080B2707-RP16	7	▲	80	27	50	8	B			
CPM200-100B3208-RP16	8	△	100	32	50	8				
CPM200-125B4010-RP16	10	△	125	40	63	8				

▲Running stock △Make-to-order

Profile milling

SPM200 series

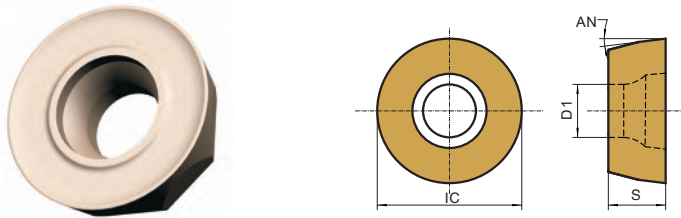


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCON	LF	L H				
SPM200-025G2502-RP08	2	▲	25	25	100	30	4	RP08	M3×7	WR09
SPM200-032G3202-RP08	2	▲	32	32	120	35	4			
SPM200-025G2502-RP10	2	▲	25	25	100	30	5	RP10	M4×8.4	WR15
SPM200-032G3202-RP10	2	▲	32	32	120	35	5			
SPM200-040G3203-RP12	3	△	40	32	120	40	6	RP12	M5×13	WR20

▲Running stock △Make-to-order

Applicable inserts

RP□□



						Working condition: ● Stable ● Average ⚙ Tough							
Applicable inserts	Workpiece material	P	Steel				⚙	●	●	⚙	⚙	⚙	●
		M	Stainless steel					●	●	⚙		⚙	
		K	Cast iron				⚙	●	●	⚙			
		N	Non-ferrous metal									●	
		S	Heat-resistant alloy, titanium alloy										
Type		Basic dimension (mm)				APMX (mm)	CVD	PVD				Cemented carbide	Cermet
		IC	S	D1	AN		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10
RPMT08T2MO-HM		8.00	2.78	3.40	11°	4			★	★			
RPMT1003MO		10.00	3.18	4.50	11°	5			★	★			
RPMT1204MO-HM		12.00	4.76	4.40	11°	6			★	★			
★ Recommended grade ☆ Available grade													

★ Recommended grade ☆ Available grade

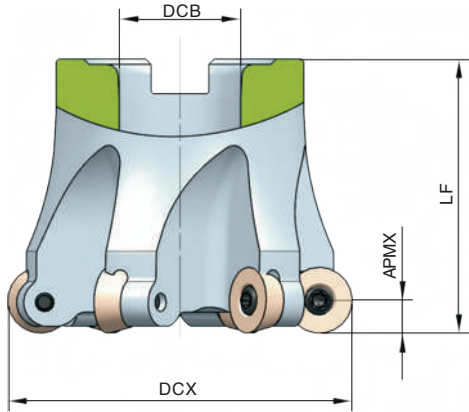
Turbine blade milling

Applicable inserts						Workpiece material	Working condition: ● Stable ● Average ⚙ Tough													
						P	Steel					⚙	●	●	⚙	⚙	⚙	⚙	●	
						M	Stainless steel						●	●	⚙		⚙	⚙		
						K	Cast iron					⚙	●	●	⚙					
						N	Non-ferrous metal												●	
						S	Heat-resistant alloy, titanium alloy													
Type		Basic dimension (mm)				APMX (mm)	CVD	PVD						Cemented carbide	Cermet					
		IC	S	D1	AN		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HR9140	HRK10	HRC20					
RPKT10T3MO-MS		10.00	3.97	3.40	11°	5						★	★							
RPKT1204MO-MS		12.00	4.76	4.40	11°	6						★	★							
RPKT1606MO-MS		16.00	6.35	5.50	11°	8	★					★	★							
RPMT10T3MO-SM		10.00	3.97	4.40	11°	5						★	★							
RPMT1204MO-SM		12.00	4.76	4.40	11°	6						★	★							
RPMT1606MO-SM		16.00	6.35	5.50	11°	8	★					★	★							
★ Recommended grade ☆ Available grade																				

★ Recommended grade ☆ Available grade

Profile milling

CPM300 series

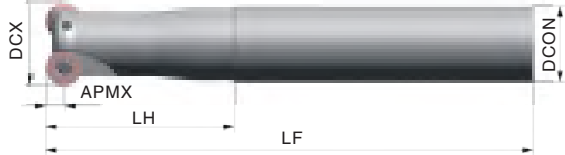


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CPM300-050A2203-RD12	3	△	50	22	40	6	A	RD12	M4×8.4	WR15S
CPM300-063A2204-RD12	4	▲	63	22	50	6	B	RD16	M5×13	WR20S
CPM300-080B2705-RD16	5	▲	80	27	50	8				
CPM300-100B3206-RD16	6	△	100	32	50	8				
CPM300-125B4008-RD16	8	△	125	40	63	8				
CPM300-160B4010-RD16	10	△	160	40	63	8				

▲Running stock △Make-to-order

Profile milling

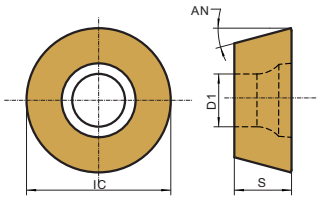
SPM300 series



Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCON	LF	LH				
SPM300-020G2002-RD06	2	△	20	20	100	30	3	RD06	M2.2×6.5	WR07
SPM300-020G2002-RD08	2	△	20	20	100	30	4	RD08	M3×7	WR09
SPM300-025G2502-RD10	2	▲	25	25	100	30	5	RD10	M4×8.4	WR15
SPM300-032G3202-RD10	2	▲	32	32	120	35	5			
SPM300-040G3203-RD12	3	△	40	32	120	40	6	RD12	M4×8.4	WR15

▲Running stock △Make-to-order

Applicable inserts
RD□□



Applicable inserts						Workpiece material	Working condition: ● Stable ● Average ▣ Tough									
							P	Steel	▣	●	●	▣	▣	▣	▣	●
							M	Stainless steel		●	●	▣		▣		
							K	Cast iron	▣	●	●	▣				
							N	Non-ferrous metal							●	
							S	Heat-resistant alloy, titanium alloy								
Type		Basic dimension (mm)				APMX (mm)	CVD	PVD						Cemented carbide	Cermets	
		IC	S	D1	AN		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20		
RDMW0602MO		6.00	2.38	2.50	15°	3		☆	★	★						
RDMW0802MO		8.00	2.38	3.40	15°	4		☆	★	★						
RDMW10T3MO		10.00	3.97	4.50	15°	5		☆	★	★						
RDMW1204MO		12.00	4.76	5.50	15°	6		☆	★	★						
RDMW1605MO		16.00	5.56	5.50	15°	8		☆	★	★						
RDKW10T3MO		10.00	3.97	4.50	15°	5		☆	★	★						
RDKW1204MO		12.00	4.76	4.40	15°	6		☆	★	★						
RDKW1604MO		16.00	4.76	5.50	15°	8		☆	★	★						

★ Recommended grade ☆ Available grade

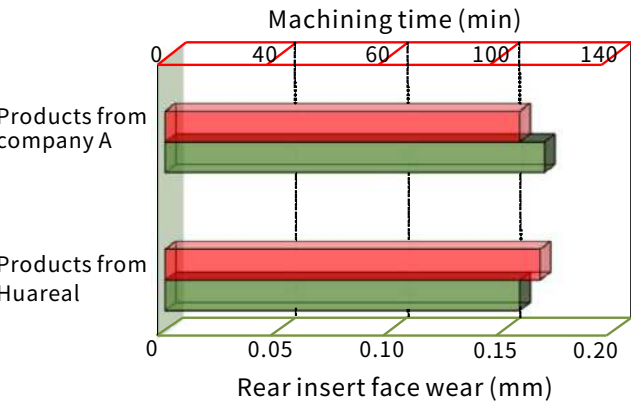
★ Recommended grade ☆ Available grade

Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	Tool specification		
					Ø20	Ø25	Ø32
P	Low-carbon steel, mild steel	≤180	HR5110	vc(m/min)	100-200	100-200	100-200
			HR5120	fz(mm/z)	0.2-0.3	0.25-0.35	0.25-0.35
			HR5130	ap(mm)	1.25	1.5	2
			HR5130	ae(mm)	1.25	1.5	2
	High-carbon steel, alloy steel	180-280	HR5110	vc(m/min)	80-180	80-180	80-180
			HR5120	fz(mm/z)	0.2-0.3	0.25-0.35	0.25-0.35
			HR5130	ap(mm)	1.25	1.5	2
			HR5130	ae(mm)	1.25	1.5	2
	Alloy tool steel	280-350	HR5110	vc(m/min)	60-150	60-150	60-150
			HR5120	fz(mm/z)	0.2-0.3	0.25-0.35	0.25-0.35
			HR5130	ap(mm)	1.25	1.5	2
			HR5130	ae(mm)	1.25	1.5	2
M	Stainless steel	≤180	HR5110	vc(m/min)	70-150	70-150	70-150
			HR5120	fz(mm/z)	0.1-0.25	0.2-0.3	0.2-0.3
			HR5130	ap(mm)	1	1.25	1.5
			HR5130	ae(mm)	1	1.25	1.5
K	Cast iron	180-250	HR5110	vc(m/min)	160-300	160-300	160-300
			HR5120	fz(mm/z)	0.25-0.35	0.3-0.4	0.3-0.4
			HR5130	ap(mm)	1.8	2	2.5
			HR5130	ae(mm)	1.8	2	2.5

Machining cases

Workpiece material NAK80(28-32HRC)
Machining method Face milling without coolant
Insert RCKT10T3M0-FM, HR5130
Cutting tools SPM100-025G2502-RC10
Machining parameters vc=150m/min, fz=0.35mm/z, ap=0.5mm



Technical data of application of profile milling tools

◆ Conversion factor for feed rate (based on the benchmark of cutting depth)

Model	Maximum cutting depth ap	Conversion factor for feed rate							
		ap/(mm)							
		0.5mm	1mm	1.5mm	2mm	2.5mm	3mm	4mm	5mm
R□□08□□	4	1.7	1.3	1.1	1(Benchmark)	0.9	0.8	0.7	0.7
R□□10□□	5	1.9	1.4	1.2	1	1(Benchmark)	0.9	0.8	0.7
R□□12□□	6	2.1	1.5	1.3	1.1	1	1(Benchmark)	0.9	0.8
R□□16□□	8	2.4	1.7	1.4	1.3	1.1	1.1	1(Benchmark)	0.9
R□□20□□	10	2.5	1.8	1.5	1.4	1.2	1.1	1	1(Benchmark)

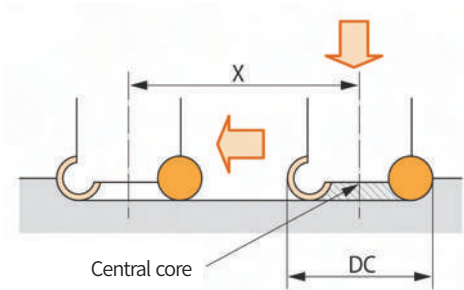
Calculation example:

The recommended feed rate for RCKT10T3M0-FM to process 45# steel is 0.2mm/r. When ap=1mm, the corresponding recommendation for feed rate is:
 $f=1.4 \times 0.2\text{mm/r} = 0.28\text{mm/r}$

◆ Recommended machining parameters for ramp milling, helical milling, drill-milling, etc.

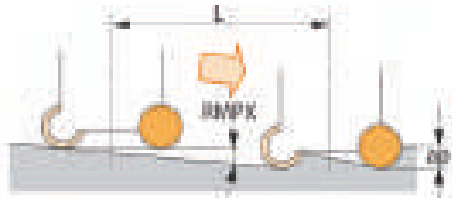
Tool specification			Ramp milling		Helical milling		Drill-milling	
Insert	Tool diameter (mm)	Cutting depth maximum (mm)	Ramping angle maximum	Cutting length (mm)	Machined hole diameter minimum (mm)	Machined hole diameter maximum (mm)	Machining depth maximum (mm)	Machining diameter minimum (mm)
R08	16	4	8°	28	20	30	0.7	9
	20		9°	25	26	38	1.4	13
	25		5°	45	36	48	1.4	18
R10	25	5	5°	28	33	48	0.6	16
	32		6°	47	47	62	1.9	23
	40		4°	71	63	78	1.9	31
R12	63	6	3°	95	109	124	1.9	54
	40		5°	68	59	78	2.4	29
	63		2°	171	105	124	2.4	52
	80		2°	171	139	158	2.4	69
R16	100	8	1°	171	179	198	2.4	89
	63		4°	114	97	124	3.4	48
	80		3°	152	131	158	3.4	65
	100		2°	229	171	198	3.4	85
	125		1°	458	221	248	3.4	110

◆ Precautions for drill-milling



- When transverse feed machining after drill-milling:
- ① The feed rate of the table should be reduced to that of half of the general horizontal machining until the central section is completely removed.
 - ② The cutting length minimum X for flattening the bottom is shown in the table above.

◆ Precautions for ramp milling



Please set the angle of machining below RMPX.
Set the feed rate below 70% of the standard.

◆ Precautions for helical machining

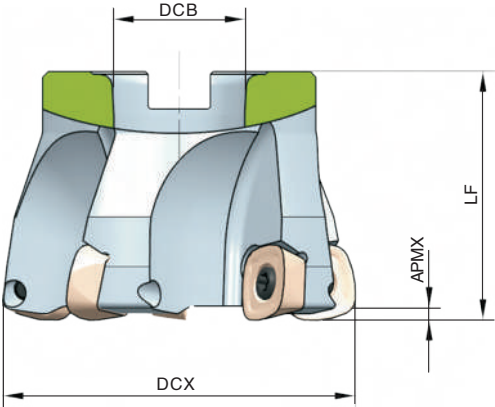
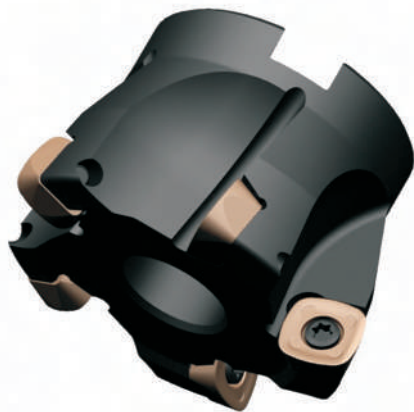
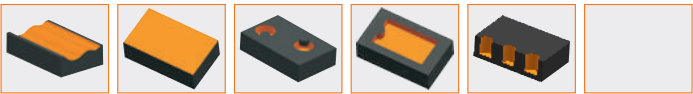
- ① Please set the feed rate per revolution of the helical machining below the cutting depth ap maximum.
- ② The axial angle created by the trajectory of the tool center should not exceed the inclination angle RMPX maximum for machining.
- ③ Set the feed rate below 70% of the standard.

◆ Recommended maximum cutting depth (ap) and applicable teeth number

Teeth number of cutterhead	R08	R10	R12	R16	R20
≤3	ap=2.0-4.0mm	ap=2.5-5.0 mm	ap=3.0-6.0 mm	ap=4.0-8.0 mm	ap=5.0-10.0 mm
>3	ap<2.0 mm	ap<2.5 mm	ap<6.0 mm	ap<4.0 mm	ap<5.0 mm

Millings with high feed

CEM100 series

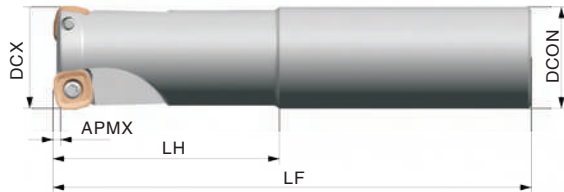


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CEM100-050A2204-SD12	4	△	50	22	40	2.3	A	SD12	M5×13	WR20S
CEM100-063A2705-SD12	5	▲	63	27	50	2.3				
CEM100-080A2706-SD12	6	▲	80	27	50	2.3		SD15	M5×13	WR20S
CEM100-063A2704-SD15	4	▲	63	27	50	2.9				
CEM100-080A3205-SD15	5	▲	80	32	50	2.9	B	SD15	M5×13	WR20S
CEM100-100B3206-SD15	6	△	100	32	50	2.9				

▲Running stock △Make-to-order

Millings with high feed

SEM100 series

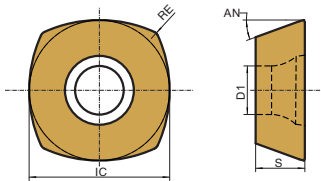


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCB	LF	LH				
SEM100-032G3202-SD12	2	▲	32	32	150	70	2.3	SD12	M4×13	WR20
SEM100-040G4003-SD12	3	△	40	40	150	70	2.3	SD12	M4×13	WR20
SEM100-040G4002-SD15	2	▲	40	40	200	70	2.9	SD15	M5×13	WR20

▲Running stock △Make-to-order

Applicable inserts

SD □□



Working condition: ● Stable ● Average ✱ Tough

Applicable inserts	Workpiece material	 Steel																	
		 Stainless steel																	
		 Cast iron																	
		 Non-ferrous metal																	
		 Heat-resistant alloy, titanium alloy																	
Type	Basic dimension (mm)					APMX (mm)	CVD	PVD					Cemented carbide	Cermet					
	IC	S	D1	AN	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20					
SDMT1205ZTN-FM	12.700	5.56	4.6	15°	3.00	2.3													
SDMT1505ZTN-FM	15.875	5.56	5.5	15°	0.80	2.9													
SDMW1205ZTN	12.700	5.56	4.6	15°	3.00	2.3													
SDMW1505ZTN	15.875	5.56	5.5	15°	0.80	2.9													

★ Recommended grade ☆ Available grade

Recommended cutting parameters

Workpiece material	Hardness (HB)	Insert grade	Cutting speed vc (m/min)	Ø20 / Ø25		Ø30 / Ø35		Ø40	
				Axial cutting depth (mm)	Feed rate per tooth (mm)	Axial cutting depth (mm)	Feed rate per tooth (mm)	Axial cutting depth (mm)	Feed rate per tooth (mm)
P	Low-carbon steel, mild steel	HR5110	200(120-220)	0.3-1.5	0.6-1.2	0.3-1.2	0.5-1.4	0.3-1.5	0.8-1.5
		HR5120	200(120-220)	0.3-1.5	0.6-1.2	0.3-1.2	0.5-1.4	0.3-1.5	0.8-1.5
		HR5130	200(120-220)	0.3-1.5	0.6-1.2	0.3-1.2	0.5-1.4	0.3-1.5	0.8-1.5
	High-carbon steel, alloy steel	HR5110	160(80-180)	0.2-1.2	0.6-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.6-1.5
		HR5120	160(80-180)	0.2-1.2	0.6-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.6-1.5
		HR5130	160(80-180)	0.2-1.2	0.6-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.6-1.5
	Alloy tool steel	HR5110	150(80-160)	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0
		HR5120	150(80-160)	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0
		HR5130	150(80-160)	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0
M	Stainless steel	HR5110	150(80-190)	0.3-1.0	0.6-1.0	0.3-1.2	0.6-1.2	0.3-1.2	0.5-1.6
		HR5120	150(80-190)	0.3-1.0	0.6-1.0	0.3-1.2	0.6-1.2	0.3-1.2	0.5-1.6
		HR5130	150(80-190)	0.3-1.0	0.6-1.0	0.3-1.2	0.6-1.2	0.3-1.2	0.5-1.6
K	Cast iron	HR5110	180(80-190)	0.3-1.0	0.5-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.8-1.6
		HR5120	180(80-190)	0.3-1.0	0.5-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.8-1.6
		HR5130	180(80-190)	0.3-1.0	0.5-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.8-1.6

Technical information of application of high feed milling tools

Ramp milling angle and cutting length

Type	Tool diameter mm	32	40	50	63	80	100
SD□□12□□	Maximum ramping angle (RMPX)	3.5°	2.8°	2.5°	1.7°	1°	
SD□□15□□	Maximum ramping angle (RMPX)		2.5°	2.2°	1.5°	0.8°	0.5°
	Cutting length (L)	ap/ tanRMPX					

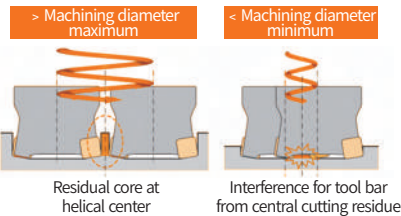


Please set the angle of ramping machining below RMPX.
Set the feed rate below 70% of the standard.

Figure Illustration of ramp milling

Precautions for helical machining

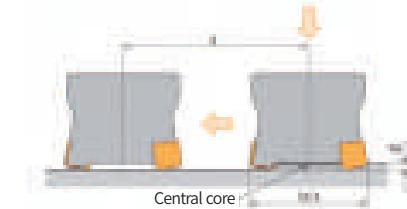
Please conduct helical machining within the range of maximum and minimum machining diameters.



Tool model	Machining diameter minimum	Machining diameter maximum
C/SEM100**12	2*DC-16	2*DC-2
C/SEM100**15	2*DC-26	2*DC-2

Notes: ① The sinking depth (h) per circle is lower than the longitudinal cutting depth maximum (APMX);
② Set the table feed below 50% of the recommended value.

Precautions for drill-milling



Tool model	Drilling depth maximum	Cutting length minimum for bottom flattening
C/SEM100**SD12	1.5mm	Tool diameterDc-16
C/SEM100**SD15	2mm	Tool diameterDc-25

Notes: When transverse feed machining after drilling:
① The feed rate should be reduced to that of half of the general horizontal machining until the core is completely removed.
② When drilling holes, set the axial feed rate per revolution below f=0.2 (mm/rev).

Sidewall drill-milling



Notes: The recommended feed of sidewall milling is below 0.2 mm/z.

Insert model	Crosscutting depth maximum (ae)
SD**12	10mm
SD**15	12mm

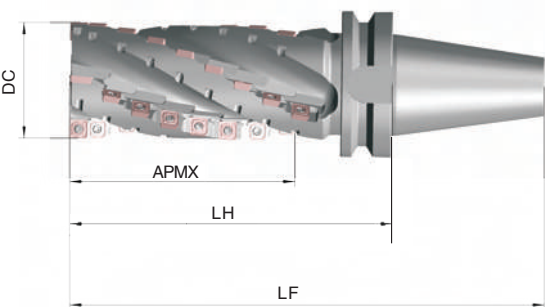
Setting approximate R angle--in writing program

Model	Cutting edge angle	Approximate R angle	Cutting residual amount (K/mm)	Inclination angle maximum during contour machining
C/SEM100**SD12	10°	3.0	0.85	90°
C/SEM100**SD15	10°	3.5	1.37	90°

Helical end milling

CHM190 series

KAPR=90°

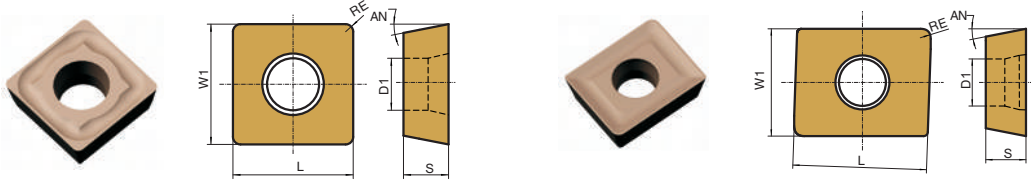


Tool specification	Number of slots	Inventory	Basic dimension (mm)			APMX (mm)	Applicable inserts	Screw	Wrench
			DC	LH	LF				
CHM190-063JT5004-SP12	4	▲	63	165	266.75	104	SP□□12 AP□□15	M5×13	WR20S
CHM190-063JT50L04-SP12	4	△	63	195	296.75	134			
CHM190-080JT5004-SP12	4	▲	80	165	266.75	104			
CHM190-080JT50L04-SP12	4	△	80	205	306.75	144			
CHM190-063BT5004-SP12	4	▲	63	165	266.75	104			
CHM190-063BT50L04-SP12	4	△	63	195	296.75	134			
CHM190-080BT5004-SP12	4	▲	80	165	266.75	104			
CHM190-080BT50L04-SP12	4	△	80	205	306.75	144			

▲Running stock △Make-to-order

Applicable inserts

SP □ □
AP □ □

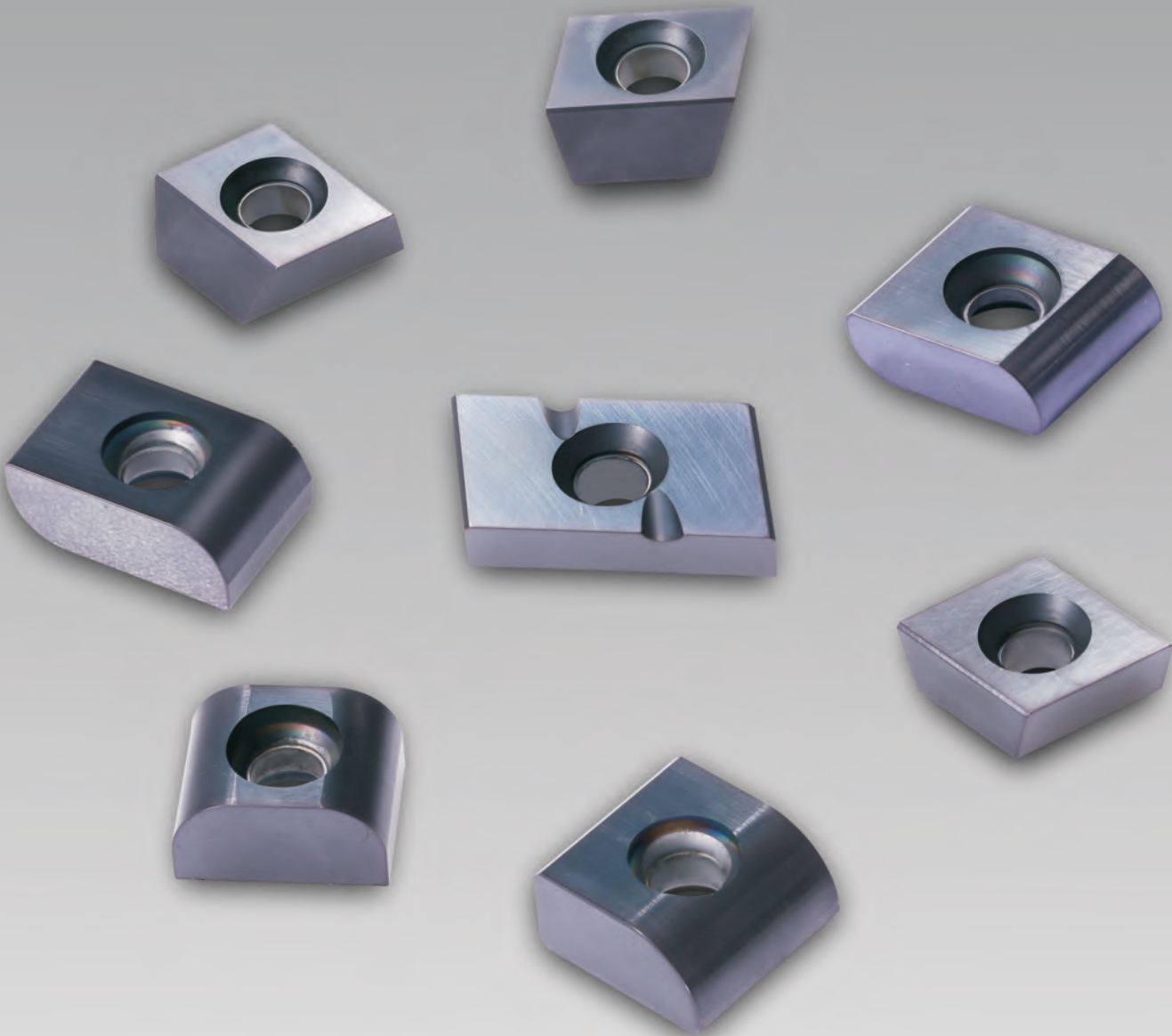


							Working condition: ● Stable ● Average ✖ Tough							
Applicable inserts	Workpiece material	 Steel												
		 Stainless steel												
		 Cast iron												
		 Non-ferrous metal												
		 Heat-resistant alloy, titanium alloy												
Type	Basic dimension (mm)					AN	CVD	PVD					Cemented carbide	Cermet
	L	W1	S	D1	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SPMT120408-MM	12.700	12.70	4.76	5.50	0.80	11°			★	★				
APMT150412-MM	15.865	12.69	4.76	5.56	1.20	11°			★	★				
SPHX120408T21	12.700	12.70	4.76	5.50	0.80	11°			★	★				
APHX1504	15.875	12.70	4.76	5.70	0.40	11°			★	★				

★ Recommended grade ☆ Available grade

Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v _c (m/min)	Feed rate f _z (mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	130(60-150)	0.25(0.1-0.35)
			HR5120	140(70-170)	0.3(0.15-0.4)
			HR5130	140(70-170)	0.3(0.15-0.4)
	High-carbon steel, alloy steel	180-280	HR5110	120(60-150)	0.2(0.1-0.35)
			HR5120	130(60-170)	0.25(0.15-0.35)
			HR5130	140(70-170)	0.25(0.15-0.35)
	Alloy tool steel	280-350	HR5110	100(60-150)	0.15(0.08-0.25)
			HR5120	110(70-170)	0.2(0.1-0.35)
			HR5130	120(70-170)	0.2(0.1-0.35)
M	Stainless steel	≤270	HR5110	140(110-200)	0.2(0.1-0.3)
			HR5120	120(100-200)	0.2(0.1-0.3)
			HR5130	120(100-200)	0.2(0.1-0.3)
K	Cast iron	180-250	HR5110	170(90-200)	0.2(0.1-0.35)
			HR5120	130(90-200)	0.25(0.15-0.35)
			HR5130	130(100-210)	0.25(0.15-0.35)



Code key of heavy milling inserts

L

N

E

H

15

①

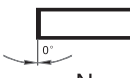
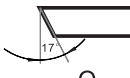
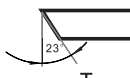
②

③

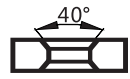
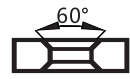
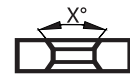
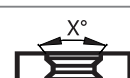
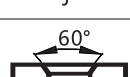
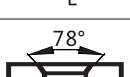
④

⑤

① Insert shape						
						Others Z
C	F	G	L	S	X	

② Clearance angle major			
			Others O
N	Q	T	

③ Tolerance class		
C: ± 0.013 ± 0.025	E: ± 0.025	R: Blank

④ Clamping form					
					Others (Special requirements such as different clamping forms or hole diameter) X
					
					
B	D	F	H	V	
J	L	N	R	Y	
S	U	W	P	Z	

⑤ Length


Integer of length

12

07

-

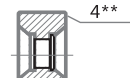
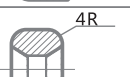
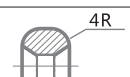
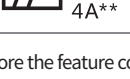
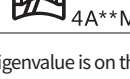
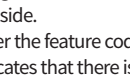
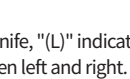
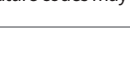
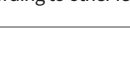
2R45

⑥

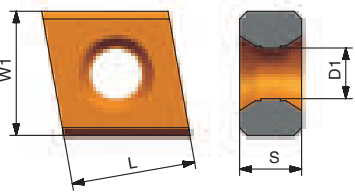
⑦

⑧

⑥ Width	⑦ Thickness	Corresponding sizes of the size codes of length, width and thickness												
  Integer of width	  Integer of thickness	Code	03	03A	04	05	05A	05B	06	06A	06B	06C	06D	06E
		Size	3.80	3.97	4.76	5.00	5.95	5.80	6.35	6.00	6.94	6.84	6.55	6.70
		Code	07	07A	07B	07C	07D	07E	07F	07G	08	08A	09	09A
		Size	7.94	7.05	7.15	7.24	7.35	7.60	7.50	7.82	8.50	8.00	9.52	
		Code	09B	10	11	11A	11B	11C	12	12A	12B	12C	13	13A
		Size	9.43	10.00	11.50	11.11	11.90	11.00	12.70	12.00	12.40	12.80	13.50	13.00
		Code	13B	13C	14	14A	14B	14C	15	15A	15B	15C	15D	15E
		Size	13.85	13.75	14.29	14.20	14.50	14.05	15.87	15.00	15.10	15.28	15.50	15.78
		Code	15F	15G	16	16A	16B	16C	17	17A	18	18A	18B	19
		Size	15.68	15.40	16.30	16.00	16.50	16.78	17.50	17.00	18.47	18.00	18.35	19.05
		Code	20	22	22A	23	25	26	28					
		Size	20.00	22.80	20.00	23.99	25.00	26.50	28.57					
Notes: Coding principle: Add zero before Single-digit integer and take the two-digit integer as code; for sizes that differ in decimal bits, letters A, B, C, etc. are added to distinguish them.														

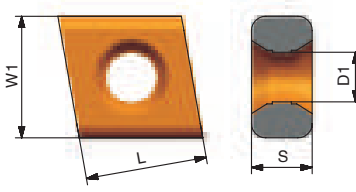
⑧ Eigenvalue or code		
		
		
		
		
		
		
* "(L)" before the feature codes means that the eigenvalue is on the length side, "(S)" means that the eigenvalue is on the thickness side, and no letter means that the eigenvalue is on the width (W) side. * "(R)" after the feature code indicates the right knife, "(L)" indicates the left knife, and no letter indicates that there is no distinction between left and right. * Other feature codes may also be compiled according to other features of products.		 Groove code

Heavy milling inserts

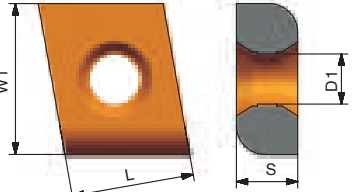
						Working condition: ● Stable ● Average ☒ Tough							
Workpiece material	P	Steel	☒	●	●	☒	☒	☒	●				
	M	Stainless steel		●	●	☒		☒					
	K	Cast iron	☒	●	●	☒							
	N	Non-ferrous metal						●					
	S	Heat-resistant alloy Titanium alloy											
Insert shape	Type	Basic dimension (mm)				CVD	PVD				Cemented carbide	Cermet	
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CNEF121206-405	12.7	12.70	6.35	5.4	☆				★			
	CNEF121206-408	12.7	12.70	6.35	5.4	☆				★			
	CNEL161406-408	16.3	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

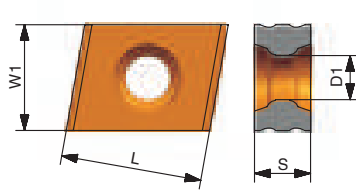
Heavy milling inserts

		Workpiece material		P Steel	☒	●	●	☒	☒	☒		●	
				M Stainless steel		●	●	☒		☒			
				K Cast iron	☒	●	●	☒					
				N Non-ferrous metal							●		
				S Heat-resistant alloy Titanium alloy									
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CNEF161406-4R10	16.3	14.29	6.35	5.4	☆				★			
	CNEF161406-4R15	16.3	14.29	6.35	5.4	☆				★			
	CNEF161406-4R30	16.3	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

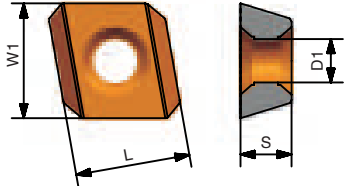
						Working condition: ● Stable ● Average ☒ Tough							
Workpiece material	P Steel	☒	●	●	☒	☒	☒	●					
	M Stainless steel		●	●	☒		☒						
	K Cast iron	☒	●	●	☒								
	N Non-ferrous metal							●					
	S Heat-resistant alloy Titanium alloy												
Insert shape	Type	Basic dimension (mm)				CVD	PVD				Cemented carbide	Cermet	
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CNEF161406-2R30	16.3	14.29	6.35	5.4	☆				★			
	CNEF161406-2R50	16.3	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

		Workpiece material		 Steel									
 Stainless steel													
 Cast iron													
 Non-ferrous metal													
 Heat-resistant alloy Titanium alloy													
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CNER16A12A06-L2M	16.00	12.00	6.35	5.4	☆				★			
	CNEF161406-L2M	16.30	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

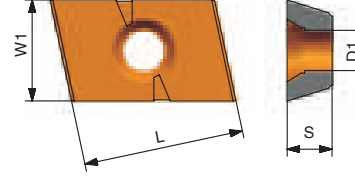
Heavy milling inserts

		Workpiece material		P Steel	▣	●	●	▣	▣	▣	▣	▣	●
				M Stainless steel		●	●	▣		▣			
				K Cast iron	▣	●	●	▣					
				N Non-ferrous metal							●		
				S Heat-resistant alloy Titanium alloy									
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermets
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CQEH141406--R02R	14.29	14.29	6.35	5.4	☆				★			
	CQER11A11A04-R01R	11.10	11.10	4.76	5.4	☆				★			

★ Recommended grade ☆ Available grade

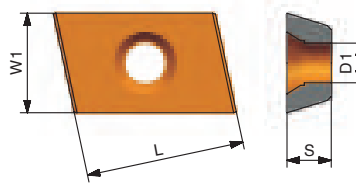
★ Recommended grade ☆ Available grade

Heavy milling inserts

		Working condition: ● Stable ● Average ▣ Tough															
Workpiece material		P	Steel	▣	●	●	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
		M	Stainless steel		●	●	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
		K	Cast iron	▣	●	●	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
		N	Non-ferrous metal												●		
		S	Heat-resistant alloy Titanium alloy														
Insert shape	Type	Basic dimension (mm)				CVD		PVD				Cemented carbide		Cermets			
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20				
	FQEW221406-R04R	22.8	14.29	6.35	5.4	☆				★							

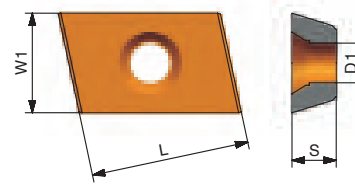
★ Recommended grade ☆ Available grade

★ Recommended grade ☆ Available grade

		Working condition: ● Stable ● Average ▣ Tough															
Workpiece material		P Steel		▣	●	●	▣	▣	▣		●						
		M Stainless steel			●	●	▣		▣								
		K Cast iron		▣	●	●	▣										
		N Non-ferrous metal								●							
		S Heat-resistant alloy Titanium alloy															
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet				
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20				
	FQES190906-2R30R	19.05	9.525	6.35	4.4	☆				★							
	FQES190906-2R40R	19.05	9.525	6.35	4.4	☆				★							
	FQES190906-2R45R	19.05	9.525	6.35	4.4	☆				★							
	FQES190906-2R50R	19.05	9.525	6.35	4.4	☆				★							

★ Recommended grade ☆ Available grade

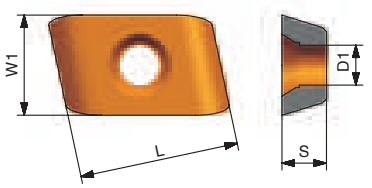
★ Recommended grade ☆ Available grade

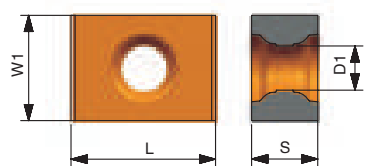
		Working condition: ● Stable ● Average ▣ Tough															
Workpiece material		P Steel	▣	●	●	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
		M Stainless steel		●	●	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
		K Cast iron	▣	●	●	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
		N Non-ferrous metal														●	
		S Heat-resistant alloy Titanium alloy															
Insert shape	Type	Basic dimension (mm)				CVD		PVD				Cemented carbide		Cermets			
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20				
	FQEP120904-210L	12.70	9.525	4.76	4.4	☆				★							
	FQEP120904-210R	12.70	9.525	4.76	4.4	☆				★							
	FQEP120904-2R05L	12.70	9.525	4.76	4.4	☆				★							

★ Recommended grade ☆ Available grade

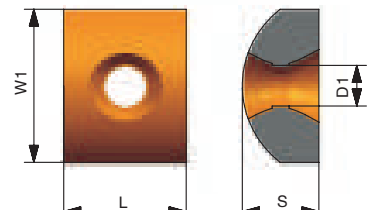
★ Recommended grade ☆ Available grade

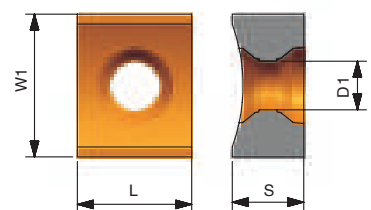
Heavy milling inserts

		Working condition: ● Stable ● Average ▣ Tough													
Workpiece material P Steel M Stainless steel K Cast iron N Non-ferrous metal S Heat-resistant alloy Titanium alloy		▣		●	●	▣	▣	▣	▣	●					
				●	●	▣		▣							
		▣		●	●	▣									
								●							
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet		
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20		
	FQES191906-4R XR	19.05	9.525	6.35	4.4	☆				★					
★ Recommended grade ☆ Available grade															

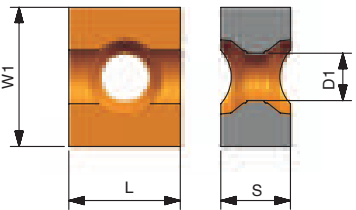
						Workpiece material	P Steel M Stainless steel K Cast iron N Non-ferrous metal S Heat-resistant alloy Titanium alloy	Working condition: ● Stable ● Average ▣ Tough									
Insert shape	Type	Basic dimension (mm)						CVD	PVD					Cemented carbide	Cermets		
		L	W1	S	D1			HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20		
	LNED150906-408	15.875	9.525	6.35	4.4	☆				★							
	LNER151207-404	15.875	12.70	7.94	5.5	☆				★							
	LNER151208B-408	15.875	12.70	7.82	5.5	☆				★							
	LNER151207-400	15.875	12.70	7.94	5.5	☆				★							
	LNER151207-408	15.875	12.70	7.94	5.5	☆				★							
	LNEF191206-405	19.05	12.70	12.70	5.4	☆				★							
	LNEL191207-400	19.05	12.70	7.94	5.4	☆				★							
	LNEL191406-402	19.05	14.29	6.35	5.4	☆				★							
	LNER191406-400	19.05	14.29	6.35	5.4	☆				★							
	LNER191406-405	19.05	14.29	6.35	5.4	☆				★							
	LNER191406-408	19.05	14.29	6.35	5.5	☆				★							
	LNER191406-410	19.05	14.29	6.35	5.4	☆				★							
LNER191407A-406	19.05	14.29	7.05	5.4	☆				★								
★ Recommended grade ☆ Available grade																	

Heavy milling inserts

		Workpiece material		P Steel	⌘	●	🌀	⌘	⌘	⌘	●		
				M Stainless steel		●	🌀	⌘		⌘			
				K Cast iron	⌘	●	🌀	⌘					
				N Non-ferrous metal						🌀			
				S Heat-resistant alloy Titanium alloy									
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK110	HRC20
	LNER151207-DR100	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR115	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR130	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR145	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR160	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR190	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR200	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR250	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR400	15.875	12.70	7.94	5.4	☆				★			
LNER151207-DR800	15.875	12.70	7.94	5.4	☆				★				
★ Recommended grade ☆ Available grade													

		Workpiece material P Steel M Stainless steel K Cast iron N Non-ferrous metal S Heat-resistant alloy Titanium alloy		Working condition: ● Stable ● Average ▣ Tough											
				▣	●	●	▣	▣	▣		●				
					●	●	▣		▣						
				▣	●	●	▣								
											●				
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet		
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20		
	LNER151207-NR100	15.875	12.70	7.94	5.4	☆				★					
	LNER151207-NR130	15.875	12.70	7.94	5.4	☆				★					
	LNER151207-NR140	15.875	12.70	7.94	5.4	☆				★					
	LNER151207-NR150	15.875	12.70	7.94	5.4	☆				★					
	LNER151207-NR190	15.875	12.70	7.94	5.4	☆				★					
	LNER151207-NR200	15.875	12.70	7.94	5.4	☆				★					
	LNER151207-NR800	15.875	12.70	7.94	5.4	☆				★					
LNER151207-NR3000	15.875	12.70	7.94	5.4	☆				★						
★ Recommended grade ☆ Available grade															

Heavy milling inserts



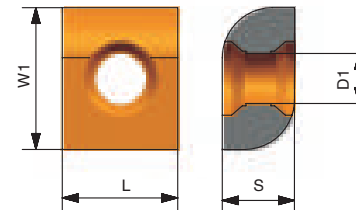
Workpiece material

P	Steel	✱	●	●	✱	✱	✱	●
M	Stainless steel		●	●	✱		✱	
K	Cast iron	✱	●	●	✱			
N	Non-ferrous metal							●
S	Heat-resistant alloy Titanium alloy							

Insert shape	Type	Basic dimension (mm)				CVD		PVD				Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNEN151207-2NR100	15.875	12.70	7.94	5.4	✱				★			
	LNEN151207-2NR130	15.875	12.70	7.94	5.4	✱				★			
	LNEN151207-2NR140	15.875	12.70	7.94	5.4	✱				★			
	LNEN151207-2NR190	15.875	12.70	7.94	5.4	✱				★			

★ Recommended grade ☆ Available grade

Heavy milling inserts



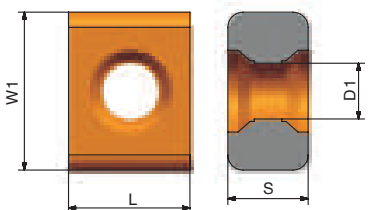
Workpiece material

P	Steel	✱	●	●	✱	✱	✱	●
M	Stainless steel		●	●	✱		✱	
K	Cast iron	✱	●	●	✱			
N	Non-ferrous metal							●
S	Heat-resistant alloy Titanium alloy							

Insert shape	Type	Basic dimension (mm)				CVD	PVD				Cemented carbide	Cermet	
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNEN151207-2R20	15.875	12.70	7.94	5.4	☆				★			
	LNEN151207-2R30	15.875	12.70	7.94	5.4	☆				★			
	LNEN151207-2R35	15.875	12.70	7.94	5.4	☆				★			
	LNEN151207-2R40	15.875	12.70	7.94	5.4	☆				★			
	LNEN151207-2R45	15.875	12.70	7.94	5.4	☆				★			
	LNEN151207-2R50	15.875	12.70	7.94	5.4	☆				★			
	LNEN151207A-2R50	15.875	12.70	7.05	5.4	☆				★			
	LNEN151207-2R55	15.875	12.70	7.94	5.4	☆				★			
	LNEN15C1207-2R50	15.28	12.70	7.94	5.4	☆				★			
	LNEN15F1207-2R50	15.68	12.70	7.94	5.4	☆				★			
	LNEN191406-2R30	19.05	14.29	6.35	5.4	☆				★			
	LNEN191406-2R35	19.05	14.29	6.35	5.4	☆				★			
	LNEN190906-2R50	19.05	9.525	6.35	5.4	☆				★			
	LNEN191407-2R60	19.05	14.29	7.94	5.4	☆				★			
	LNEN191406-2R30M22	19.05	14.29	6.35	5.4	☆				★			
	LNEN191406-2R46M15	19.05	14.29	6.35	5.4	☆				★			
	LNEN191407-2R60M15	19.05	14.29	7.94	5.4	☆				★			
	LNEN191407-2R70M20	19.05	14.29	7.94	5.4	☆				★			
	LNEN191408-2R70M20	19.05	14.29	8.50	5.4	☆				★			

★ Recommended grade ☆ Available grade

Heavy milling inserts



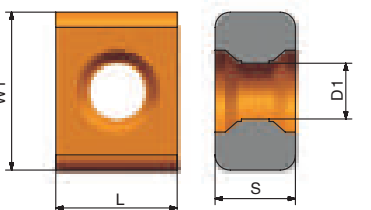
Working condition: ● Stable ● Average ▣ Tough

P	Steel	▣	●	●	▣	▣	▣	●
M	Stainless steel		●	●	▣		▣	
K	Cast iron	▣	●	●	▣			
N	Non-ferrous metal							●
S	Heat-resistant alloy Titanium alloy							

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNER151206-4R10	15.875	12.70	6.35	5.4	☆				★			
	LNER151206B-4R20	15.875	12.70	6.94	5.4	☆				★			
	LNER151207-4R10	15.875	12.70	7.94	5.5	☆				★			
	LNER151207-4R20	15.875	12.70	7.94	5.5	☆				★			
	LNER191406-4R02	19.05	14.29	6.35	5.4	☆				★			
	LNER191406-4R12	19.05	14.29	6.35	5.4	☆				★			
	LNER191406-4R20	19.05	14.29	6.35	5.4	☆				★			
	LNER191406-4R24	19.05	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

Heavy milling inserts

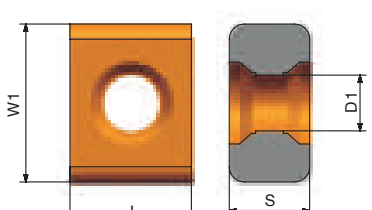


Working condition: ● Stable ● Average ▣ Tough

P	Steel	▣	●	●	▣	▣	▣	●
M	Stainless steel		●	●	▣		▣	
K	Cast iron	▣	●	●	▣			
N	Non-ferrous metal							●
S	Heat-resistant alloy Titanium alloy							

Insert shape	Type	Basic dimension (mm)				CVD	PVD			Cemented carbide	Cermet		
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNER150904-4R30H	15.875	9.525	4.76	4.4	☆				★			
	LNER151206-4R40H	15.875	12.70	6.35	5.4	☆				★			
	LNER151206-4R50H	15.875	12.70	6.35	5.4	☆				★			
	LNER151207-4R40H	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-4R50H	15.875	12.70	7.94	5.4	☆				★			

★ Recommended grade ☆ Available grade

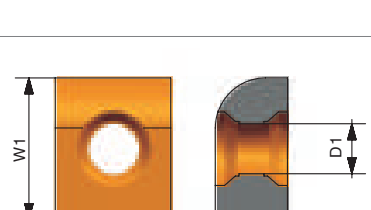


Working condition: ● Stable ● Average ▣ Tough

P	Steel	▣	●	●	▣	▣	▣	●
M	Stainless steel		●	●	▣		▣	
K	Cast iron	▣	●	●	▣			
N	Non-ferrous metal							●
S	Heat-resistant alloy Titanium alloy							

Insert shape	Type	Basic dimension (mm)				CVD		PVD			Cemented carbide	Cermet	
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNER151206-4R30	15.875	12.70	6.35	5.4	☆				★			
	LNER151206-4R40	15.875	12.70	6.35	5.4	☆				★			
	LNER151206-4R50	15.875	12.70	6.35	5.4	☆				★			
	LNER151206-4R55	15.875	12.70	6.35	5.4	☆				★			
	LNER151206-4R65	15.875	12.70	6.35	5.4	☆				★			
	LNER151207-4R40	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-4R50	15.875	12.70	7.94	5.4	☆				★			

★ Recommended grade ☆ Available grade



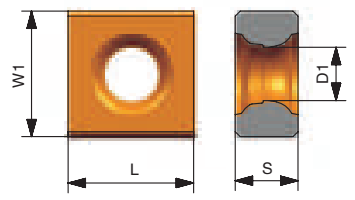
Working condition: ● Stable ● Average ▣ Tough

P	Steel	▣	●	●	▣	▣	▣		●
M	Stainless steel		●	●	▣		▣		
K	Cast iron	▣	●	●	▣				
N	Non-ferrous metal							●	
S	Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD		PVD			Cemented carbide	Cermet	
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNER151207-1R30M20	15.875	12.70	7.94	5.4	☆				★			

★ Recommended grade ☆ Available grade

Heavy milling inserts



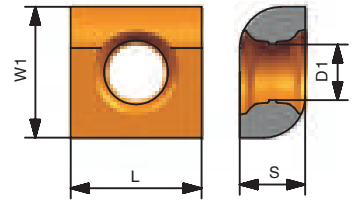
Workpiece material

P	Steel	✖	●	●	✖	✖	✖	●
M	Stainless steel		●	●	✖		✖	
K	Cast iron	✖	●	●	✖			
N	Non-ferrous metal							●
S	Heat-resistant alloy Titanium alloy							

Insert shape	Type	Basic dimension (mm)				CVD		PVD			Cemented carbide	Cermet	
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNED121206-408	12.70	12.70	6.35	5.5	☆				★			
	SNEN151507-400	15.875	15.875	7.94	5.4	☆				★			
	SNEN151507-408	15.875	15.875	7.94	5.4	☆				★			
	SNER151507-405	15.875	15.875	7.94	5.4	☆				★			

★ Recommended grade ☆ Available grade

Heavy milling inserts

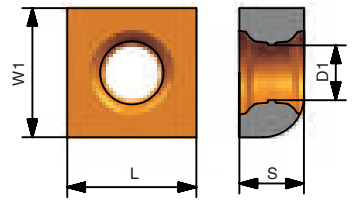


Workpiece material

P	Steel	✖	●	●	✖	✖	✖	●
M	Stainless steel		●	●	✖		✖	
K	Cast iron	✖	●	●	✖			
N	Non-ferrous metal							●
S	Heat-resistant alloy Titanium alloy							

Insert shape	Type	Basic dimension (mm)				CVD		PVD			Cemented carbide	Cermet	
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNEB151507-2R40	15.875	15.875	7.94	5.4	☆				★			
	SNEH151507-2R20	15.875	15.875	7.94	5.4	☆				★			
	SNEH151507-2R50	15.875	15.875	7.94	5.4	☆				★			

★ Recommended grade ☆ Available grade

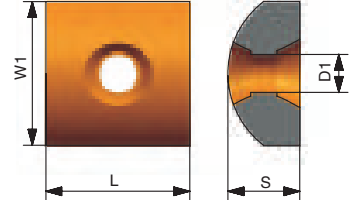


Workpiece material

P	Steel	✖	●	●	✖	✖	✖	●
M	Stainless steel		●	●	✖		✖	
K	Cast iron	✖	●	●	✖			
N	Non-ferrous metal							●
S	Heat-resistant alloy Titanium alloy							

Insert shape	Type	Basic dimension (mm)				CVD		PVD			Cemented carbide	Cermet	
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNER151507-1R70	15.875	15.875	7.94	5.4	☆				★			

★ Recommended grade ☆ Available grade



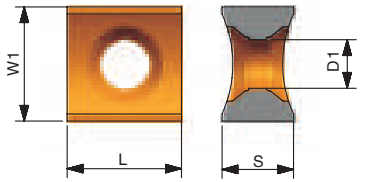
Workpiece material

P	Steel	✖	●	●	✖	✖	✖	●
M	Stainless steel		●	●	✖		✖	
K	Cast iron	✖	●	●	✖			
N	Non-ferrous metal							●
S	Heat-resistant alloy Titanium alloy							

Insert shape	Type	Basic dimension (mm)				CVD		PVD			Cemented carbide	Cermet	
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNEX121206-DR400	12.70	12.70	6.35	4.4	☆				★			
	SNEN151507-DR130	15.875	15.875	7.94	5.4	☆				★			
	SNEN151507G-DR140	15.875	15.875	7.82	5.4	☆				★			

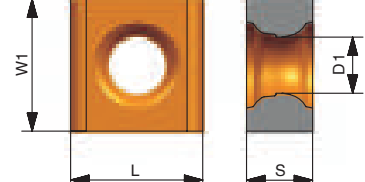
★ Recommended grade ☆ Available grade

Heavy milling inserts

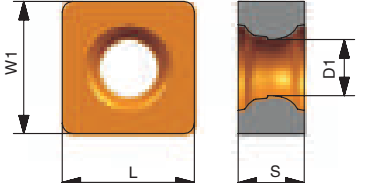
						Working condition: ● Stable ● Average ☒ Tough										
		Workpiece material				P Steel		☒	●	●	☒	☒	☒		●	
						M Stainless steel				●	●	☒		☒		
						K Cast iron		☒	●	●	☒					
						N Non-ferrous metal									●	
						S Heat-resistant alloy Titanium alloy										
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet			
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20			
	SNER121207-2NR80	12.70	12.70	7.94	5.4	☆				★						

★ Recommended grade ☆ Available grade

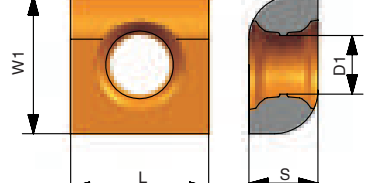
Heavy milling inserts

		Workpiece material		● Stable ● Average ☒ Tough									
P Steel				☒	●	☒	☒	☒	☒	●			
M Stainless steel					●	☒		☒					
K Cast iron				☒	●	☒							
N Non-ferrous metal									☒				
S Heat-resistant alloy Titanium alloy													
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNED121206-4R20	12.70	12.70	6.35	5.5	☆				★			
	SNEH151507-4R20	15.875	15.875	7.94	5.4	☆				★			
	SNER121206-4R25	12.70	12.70	6.35	4.4	☆				★			
	SNEY090904-4R30H	9.525	9.525	4.76	4.4	☆				★			

★ Recommended grade ☆ Available grade

						Working condition: ● Stable ● Average ☒ Tough							
Workpiece material PSteel MStainless steel KCast iron NNon-ferrous metal SHeat-resistant alloy Titanium alloy						☒	●	●	☒	☒	☒		●
							●	●	☒		☒		
						☒	●	●	☒				
												●	
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNED121206-S4R02	12.70	12.70	6.35	5.5								
	SNED121206-S4R08	12.70	12.70	6.35	5.5	☆				★			
	SNEY090904-S4R04	9.525	9.525	4.76	4.4								

★ Recommended grade ☆ Available grade

		Workpiece material			Steel								
					Stainless steel								
					Cast iron								
					Non-ferrous metal								
					Heat-resistant alloy Titanium alloy								
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNEN151507-2R20	15.875	15.875	7.94	5.4								
	SNEN151507-2R30	15.875	15.875	7.94	5.4								
	SNEN151507-2R40	15.875	15.875	7.94	5.4								
	SNEN151507-2R50	15.875	15.875	7.94	5.4								
	SNEN151507-2R60	15.875	15.875	7.94	5.4								

★ Recommended grade ☆ Available grade

A

General turning

Parting and grooving

Threading

B

Indexable milling

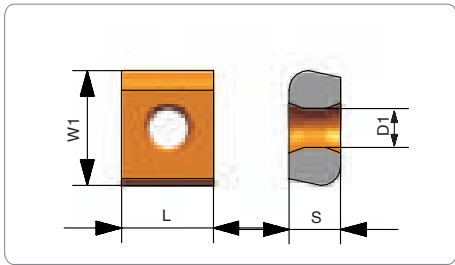
Solid carbide end mills

C

Short hole drills

Solid carbide drills

Heavy milling inserts



Workpiece material		Working condition: ● Stable ● Average ⚡ Tough											
		P Steel	M Stainless steel	K Cast iron	N Non-ferrous metal	S Heat-resistant alloy Titanium alloy							
		⚡	●	●	⚡	⚡	⚡	●	●	⚡	⚡	⚡	●
Insert shape	Type	Basic dimension (mm)				CVD		PVD				Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	ZNER12A1106-L2R15	12.00	11.50	6.35	4.4	☆				★			
	ZNER12B11C06-2R30	12.40	11.00	6.35	4.4	☆				★			
	ZNER13C11C06-2R30	13.75	11.00	6.35	4.4	☆				★			
	ZNER14A1206-2R25	14.20	12.70	6.35	4.4	☆				★			
	ZNER191408-2R50	19.05	14.29	8.50	5.4	☆				★			
	ZNEB151207B-2R40	15.875	12.70	7.14	5.4	☆				★			
	ZNEN151207-2R45	15.875	12.70	7.94	5.4	☆				★			
	ZNEN151208B-2R45	15.875	12.70	8.14	5.4	☆				★			
	ZNEN16A1408-2R50	16.00	14.00	8.50	5.4	☆				★			
	ZNEN16A1408-2R55	16.00	14.00	8.50	5.4	☆				★			
	ZNEJ151206-2R35	15.875	12.70	6.35	4.4	☆				★			

★ Recommended grade ☆ Available grade





B Milling

Solid carbide end mills

- ◆ Selection guidance of solid carbide end mills ----- B89
- ◆ Code key of solid carbide end mills ----- B90
- ◆ Overview of solid carbide end mills ----- B91
- ◆ Details and recommended parameters of solid carbide end mills ----- B92-B177
 - Series B - basic end mills ----- B92-B127
 - Series P - high performance end mills ----- B128-B169
 - Series X - special end mills ----- B170-B177
- ◆ Non-standard customization of solid carbide end mills ----- B178



Selection guidance of solid carbide end mills

Code key of solid carbide end mills

Product type

Machining form

Product specification drawing

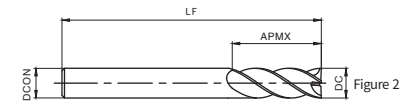
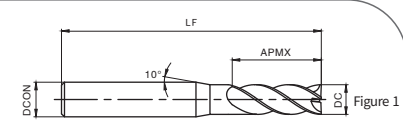
Series B - basic end mills

Three-flute flat end mill (short flute structure)

B3L...NG



Side machiningBottom machiningSlot milling



B Series

38°

DC≤12 0,-0.02
DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B3L0300NG	3.0	6	12	75	3	Figure 1	●
B3L0400NG	4.0	6	15	75	3	Figure 1	●
B3L0500NG	5.0	6	20	75	3	Figure 1	○
B3L0600NG	6.0	6	20	75	3	Figure 1	●
B3L0800NG	8.0	8	25	100	3	Figure 1	●
B3L1000NG	10.0	10	30	100	3	Figure 1	●
B3L1200NG	12.0	12	35	100	3	Figure 2	●
B3L1400NG	14.0	14	40	100	3	Figure 1	○
B3L1600NG	16.0	16	50	150	3	Figure 2	●
B3L2000NG	20.0	20	55	150	3	Figure 1	●

● Running stock ○ Make-to-order

Product outline drawing

Product specification

Basic size

Pattern

Inventory information

Helical angle, insert diameter tolerance, etc.

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54-60HRC	≥60HRC
✱	✱	✱	✱	✱			✱	✱	✱		

✱ Fit well ✱ Applicable

Range of workpiece materials

B

4

S

1000

R0500

B

L

G

①

②

③

④

⑤

⑥

⑦

⑧

① Product series		② Number of edges		③ Length	
B	Basic type	2	Two flutes	S	Short
P	High performance type	3	Three flutes	L	Long
X	Special type	4	Four flutes	E	Extra long
			...	P	Necking

④ Tool diameter		⑤ Corner radius		⑥ Tool type	
10 00	Φ 10mm	R05 00	R5.0mm	Default	Flat end
Default	Ball nose mill	Default	Flat end mill		Radius
				B	Ball nose
				W	Corrugated edge

⑦ Helical angle		⑧ Application fields	
L	Little helical angle	G	General
N	Normal helical angle	M	Stainless steel machining
H	Large helical angle	N	Aluminum alloy machining
O	Special helical angle	S	High-temp alloy and titanium alloy machining
		H	High hardness material machining

Overview of solid carbide end mills

Machining form	Shape	Number of teeth	Model	Size range	Workpiece material											
					P			M	K	N		S		H		
					Carbon steel	Alloy steel	High-alloyed steel and tool steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	High hardness steel		
													< 54HRC	54—60 HRC	> 60HRC	
Basic mill	Flat end	2	B2S···LG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			B2L···LG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
		3	B3S···NG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			B3L···NG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
		4	B4S···LG	Φ1—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			B4L···LG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			B4S···HG	Φ1—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			B4L···HG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
		6	B6S···HG	Φ6—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			B6L···HG	Φ6—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
	Radius	2	B2S···R···LG	Φ3—Φ12	☼	☼	☼	☼	☼			☼	☼	☼		
		4	B4S···R···LG	Φ3—Φ12	☼	☼	☼	☼	☼			☼	☼	☼		
	Ball nose	2	B2S···BLG	Φ1—Φ20	☼	☼	☼	☼	☼			☼	☼	☼	☼	
			B2L···BLG	Φ2—Φ20	☼	☼	☼	☼	☼			☼	☼	☼	☼	
		4	B4S···BLG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			B4L···BLG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
	Aluminum alloy mill	2	B2L···HN	Φ3—Φ20						☼	☼					
		3	B3L···HN	Φ3—Φ20						☼	☼					
High performance mill	Flat end	4	P4S···LG	Φ1—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			P4P···LG	Φ6—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			P4S···NG	Φ1—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			P4P···NG	Φ6—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			P4S···NS	Φ1—Φ20	☼	☼	☼	☼	☼			☼	☼			
			P4P···NS	Φ6—Φ20	☼	☼	☼	☼	☼			☼	☼			
			P4S···HH	Φ1—Φ20	☼	☼	☼	☼	☼					☼	☼	☼
			P4P···HH	Φ6—Φ20	☼	☼	☼		☼					☼	☼	☼
		4	P4S···R···LG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			P4P···R···LG	Φ6—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
	Radius	4	P4S···R···NG	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			P4P···R···NG	Φ6—Φ20	☼	☼	☼	☼	☼			☼	☼	☼		
			P4S···R···NS	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼			
			P4P···R···NS	Φ6—Φ20	☼	☼	☼	☼	☼			☼	☼			
			P4S···R···HH	Φ3—Φ20	☼	☼	☼		☼					☼	☼	☼
			P4P···R···HH	Φ6—Φ20	☼	☼	☼		☼					☼	☼	☼
		2	P2S···BLG	Φ1—Φ20	☼	☼	☼	☼	☼					☼		
			P2S···BLH	Φ1—Φ20	☼	☼	☼	☼	☼			☼	☼	☼	☼	☼
	Ball nose	2	P2P···BLG	Φ1—Φ20	☼	☼	☼	☼	☼			☼	☼	☼	☼	
			P2P···BLH	Φ1—Φ20	☼	☼	☼		☼					☼	☼	☼
		4	P4S···BNS	Φ3—Φ20	☼	☼	☼	☼	☼			☼	☼			
Special type	Flat end	3	X3S...WLN	Φ6—Φ20							☼					
		4	X4S...WNG	Φ6—Φ20	☼	☼	☼	☼	☼					☼		
			X4S...HG	Φ4—Φ20	☼	☼	☼	☼	☼			☼	☼	☼	☼	
	Radius	4	X4S...R...HG	Φ6—Φ20	☼	☼	☼	☼	☼			☼	☼	☼	☼	

☼ Fit well ☼ Applicable

Series B--Basic end mills

Two-flute flat end mill (short flute structure)

B2S...LG

Side machining Bottom machining Slot milling

B Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B2S0300LG	3.0	6	8	50	2	Figure 1	●
B2S0350LG	3.5	6	10	50	2	Figure 1	○
B2S0400LG	4.0	6	11	50	2	Figure 1	●
B2S0450LG	4.5	6	11	50	2	Figure 1	○
B2S0500LG	5.0	6	13	50	2	Figure 1	●
B2S0550LG	5.5	6	16	50	2	Figure 1	○
B2S0600LG	6.0	6	16	50	2	Figure 2	●
B2S0700LG	7.0	8	20	60	2	Figure 1	●
B2S0800LG	8.0	8	20	60	2	Figure 2	●
B2S0900LG	9.0	10	22	75	2	Figure 1	○
B2S1000LG	10.0	10	25	75	2	Figure 2	●
B2S1200LG	12.0	12	26	75	2	Figure 2	●
B2S1400LG	14.0	14	32	75	2	Figure 2	●
B2S1600LG	16.0	16	45	100	2	Figure 2	●
B2S1800LG	18.0	18	45	100	2	Figure 2	●
B2S2000LG	20.0	20	45	100	2	Figure 2	●

● Running stock ○ Make-to-order

P			M	K	N		S	H			
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54~60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B2S···LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	-	< 280	120	150	180
	Ductile iron	-	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	-	-	-
	Aluminum alloy	< 530	< 130	-	-	-
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	-	< 54HRC	90	120	150
	High hardness steel	-	54-60HRC	-	-	-
	High hardness steel	-	> 60 HRC	-	-	-

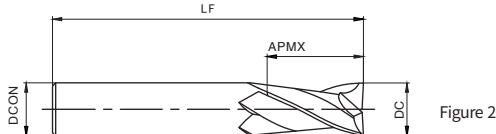
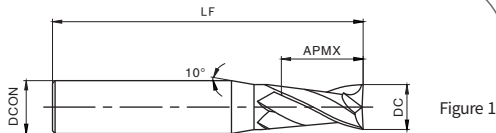
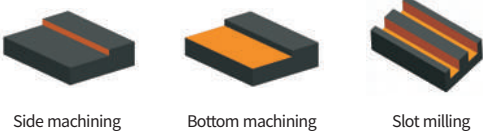
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	3.0	3.0	0.9	0.025	2.3	3.0
	3.5	3.5	1.1	0.025	2.6	3.5
	4.0	4.0	1.2	0.030	3.0	4.0
	4.5	4.5	1.4	0.035	3.4	4.5
	5.0	5.0	1.5	0.035	3.8	5.0
	5.5	5.5	1.7	0.040	4.0	5.5
	6.0	6.0	1.8	0.045	4.5	6.0
	7.0	7.0	2.1	0.050	5.3	7.0
	8.0	8.0	2.4	0.060	6.0	8.0
	9.0	9.0	2.7	0.065	6.7	9.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	14.0	14.0	4.2	0.100	10.5	14.0
	16.0	16.0	4.8	0.115	12.0	16.0
	18.0	18.0	5.4	0.130	13.5	18.0
	20.0	20.0	6.0	0.140	15.0	20.0

(1) This series of tools is a good solution for slot milling;
(2) Before slot milling, please reduce the cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the feed rate (feed rate) to 40%-60%.
(3) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
(5) The tool overhang is as short as possible without affecting the use.

Series B--Basic end mills

Two-flute flat end mill (long flute structure)

B2L···LG



B Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B2L0300LG	3.0	6	12	75	2	Figure 1	●
B2L0400LG	4.0	6	15	75	2	Figure 1	○
B2L0500LG	5.0	6	20	75	2	Figure 1	○
B2L0600LG	6.0	6	20	75	2	Figure 2	●
B2L0800LG	8.0	8	25	100	2	Figure 2	●
B2L1000LG	10.0	10	30	100	2	Figure 2	●
B2L1200LG	12.0	12	35	100	2	Figure 2	●
B2L1400LG	14.0	14	40	100	2	Figure 2	●
B2L1600LG	16.0	16	50	150	2	Figure 2	●
B2L2000LG	20.0	20	55	150	2	Figure 2	●

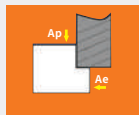
●Running stock ○Make-to-order

P			M	K	N		S	H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC
☼	☼	☼	☼	☼			☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--B2L···LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

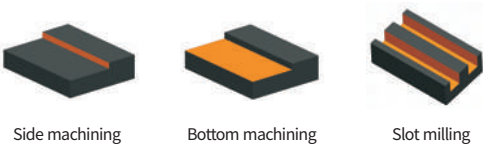
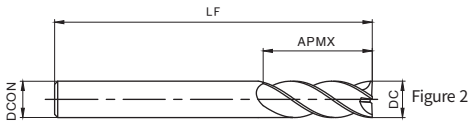
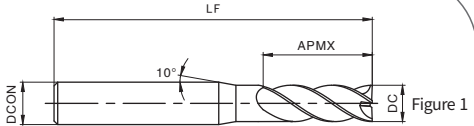
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
14.0	14.0	4.2	0.100	10.5	14.0	0.085
16.0	16.0	4.8	0.115	12.0	16.0	0.095
20.0	20.0	6.0	0.140	15.0	20.0	0.120

(1) This series of tools is a good solution for slot milling;
(2) Before slot milling, please reduce the cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the feed rate (feed rate) to 40%-60%.
(3) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and Feed rate of the above table should be lowered in the same proportion.
(5) The tool overhang is as short as possible without affecting the use.

Series B--Basic end mills

Three-flute flat end mill (short flute structure)

B3S···NG



B Series

 38°

DC≤12 0,-0.02
DC>12 0,-0.03

 45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B3S0300NG	3.0	6	8	50	3	Figure 1	●
B3S0350NG	3.5	6	10	50	3	Figure 1	○
B3S0400NG	4.0	6	11	50	3	Figure 1	●
B3S0450NG	4.5	6	11	50	3	Figure 1	○
B3S0500NG	5.0	6	13	50	3	Figure 1	●
B3S0550NG	5.5	6	16	50	3	Figure 1	○
B3S0600NG	6.0	6	16	50	3	Figure 2	●
B3S0700NG	7.0	8	20	60	3	Figure 1	○
B3S0800NG	8.0	8	20	60	3	Figure 2	●
B3S0900NG	9.0	10	22	75	3	Figure 1	○
B3S1000NG	10.0	10	25	75	3	Figure 2	●
B3S1200NG	12.0	12	30	75	3	Figure 2	●
B3S1400NG	14.0	14	32	75	3	Figure 2	●
B3S1600NG	16.0	16	45	100	3	Figure 2	●
B3S1800NG	18.0	18	45	100	3	Figure 2	●
B3S2000NG	20.0	20	45	100	3	Figure 2	●

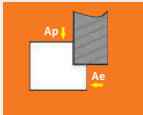
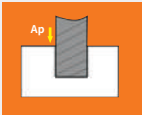
● Running stock ○ Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B3S···NG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
3.5	3.5	1.1	0.025	2.6	3.5	0.025
4.0	4.0	1.2	0.030	3.0	4.0	0.025
4.5	4.5	1.4	0.035	3.4	4.5	0.030
5.0	5.0	1.5	0.035	3.8	5.0	0.030
5.5	5.5	1.7	0.040	4.1	5.5	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
14.0	14.0	4.2	0.100	10.5	14.0	0.085
16.0	16.0	4.8	0.115	12.0	16.0	0.095
18.0	18.0	5.4	0.130	13.5	18.0	0.105
20.0	20.0	6.0	0.140	15.0	20.0	0.120

(1) Water-soluble cutting fluid is recommended during machining stainless steel.

(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.

(3) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.

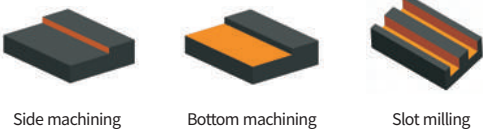
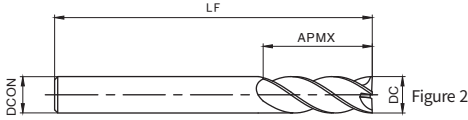
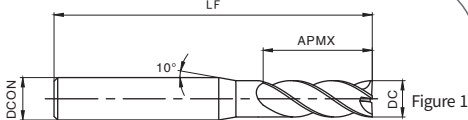
(4) The down milling is recommended for side milling.

(5) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table is lowered in the same proportion.

Series B--Basic end mills

Three-flute flat end mill (long flute structure)

B3L···NG



B Series

 38°

DC≤12 0,-0.02
DC>12 0,-0.03

 45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B3L0300NG	3.0	6	12	75	3	Figure 1	●
B3L0400NG	4.0	6	15	75	3	Figure 1	●
B3L0500NG	5.0	6	20	75	3	Figure 1	○
B3L0600NG	6.0	6	20	75	3	Figure 1	●
B3L0800NG	8.0	8	25	100	3	Figure 1	●
B3L1000NG	10.0	10	30	100	3	Figure 1	●
B3L1200NG	12.0	12	35	100	3	Figure 2	●
B3L1400NG	14.0	14	40	100	3	Figure 1	○
B3L1600NG	16.0	16	50	150	3	Figure 2	●
B3L2000NG	20.0	20	55	150	3	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B3L...NG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

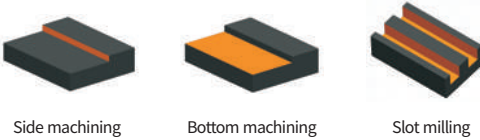
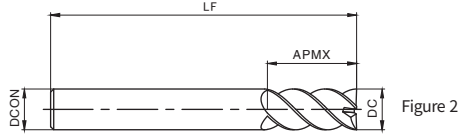
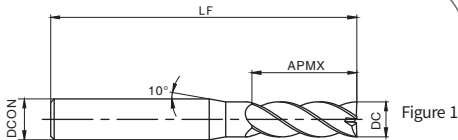
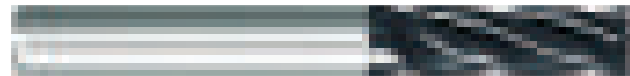
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	3.0	3.0	0.9	0.025	2.3	3.0
	4.0	4.0	1.2	0.030	3.0	4.0
	5.0	5.0	1.5	0.035	3.8	5.0
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	14.0	14.0	4.2	0.100	10.5	14.0
	16.0	16.0	4.8	0.115	12.0	16.0
	20.0	20.0	6.0	0.140	15.0	20.0

- (1) Water-soluble cutting fluid is recommended during machining stainless steel.
- (2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (3) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
- (4) The down milling is recommended for side milling.
- (5) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series B--Basic end mills

Four-flute flat end milling cutter (short flute structure, little helical angle)

B4S...LG



B Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B4S0100LG	1.0	6	3	50	4	Figure 1	●
B4S0150LG	1.5	6	4	50	4	Figure 1	○
B4S0200LG	2.0	6	6	50	4	Figure 1	●
B4S0250LG	2.5	6	8	50	4	Figure 1	○
B4S0300LG	3.0	6	8	50	4	Figure 1	●
B4S0350LG	3.5	6	10	50	4	Figure 1	○
B4S0400LG	4.0	6	11	50	4	Figure 1	●
B4S0450LG	4.5	6	11	50	4	Figure 1	○
B4S0500LG	5.0	6	13	50	4	Figure 1	●
B4S0550LG	5.5	6	16	50	4	Figure 1	○
B4S0600LG	6.0	6	16	50	4	Figure 2	●
B4S0700LG	7.0	8	20	60	4	Figure 1	○
B4S0800LG	8.0	8	20	60	4	Figure 2	●
B4S0900LG	9.0	10	22	75	4	Figure 1	○
B4S1000LG	10.0	10	25	75	4	Figure 2	●
B4S1100LG	11.0	12	26	75	4	Figure 1	●
B4S1200LG	12.0	12	30	75	4	Figure 2	●
B4S1400LG	14.0	14	32	75	4	Figure 2	●
B4S1600LG	16.0	16	45	100	4	Figure 2	●
B4S1800LG	18.0	18	45	100	4	Figure 2	●
B4S2000LG	20.0	20	45	100	4	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S	H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC
☼	☼	☼	☼	☼			☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--B4S···LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

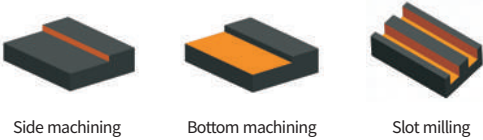
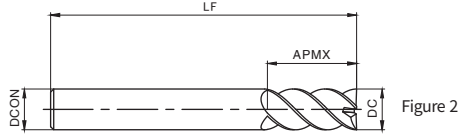
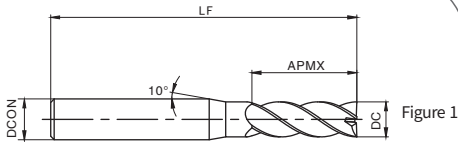
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	1.0	1.0	0.3	0.010	0.75	1.0
	1.5	1.5	0.5	0.015	1.13	1.5
	2.0	2.0	0.6	0.015	1.50	2.0
	2.5	2.5	0.8	0.020	1.88	2.5
	3.0	3.0	0.9	0.025	2.3	3.0
	3.5	3.5	1.1	0.025	2.6	3.5
	4.0	4.0	1.2	0.030	3.0	4.0
	4.5	4.5	1.4	0.035	3.4	4.5
	5.0	5.0	1.5	0.035	3.8	5.0
	5.5	5.5	1.7	0.040	4.1	5.5
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	11.0	11.0	3.3	0.080	8.0	11.0
	12.0	12.0	3.6	0.085	9.0	12.0
	14.0	14.0	4.2	0.100	10.5	14.0
	16.0	16.0	4.8	0.115	12.0	16.0
	18.0	18.0	5.4	0.130	13.5	18.0
	20.0	20.0	6.0	0.140	15.0	20.0

(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series B--Basic end mills

Four-flute flat end milling cutter (long flute structure, little helical angle)

B4L···LG



B Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B4L0300LG	3.0	6	12	75	4	Figure 1	●
B4L0400LG	4.0	6	15	75	4	Figure 1	○
B4L0500LG	5.0	6	20	75	4	Figure 1	●
B4L0600LG	6.0	6	20	75	4	Figure 2	●
B4L0800LG	8.0	8	25	100	4	Figure 2	●
B4L1000LG	10.0	10	30	100	4	Figure 2	●
B4L1200LG	12.0	12	35	100	4	Figure 2	●
B4L1400LG	14.0	14	40	100	4	Figure 2	○
B4L1600LG	16.0	16	50	150	4	Figure 2	●
B4L2000LG	20.0	20	55	150	4	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S	H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC
☼	☼	☼	☼	☼			☼	☼	☼	☼

☼ Fit well ☼ Applicable

Recommended cutting conditions--B4L···LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

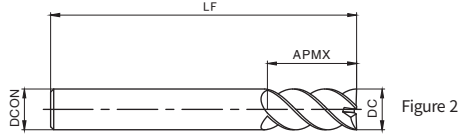
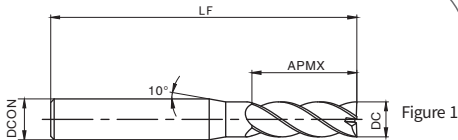
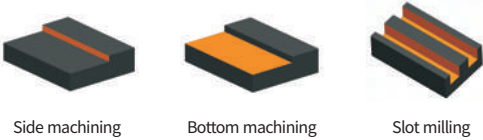
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	3.0	3.0	0.9	0.025	2.3	3.0
	4.0	4.0	1.2	0.030	3.0	4.0
	5.0	5.0	1.5	0.035	3.8	5.0
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	14.0	14.0	4.2	0.100	10.5	14.0
	16.0	16.0	4.8	0.115	12.0	16.0
	20.0	20.0	6.0	0.140	15.0	20.0

(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series B--Basic end mills

Four-flute flat end milling cutter (short flute structure, large helical angle)

B4S···HG



B Series

45°

DC≤12 0,-0.02
DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B4S0100HG	1.0	6	3	50	4	Figure 1	●
B4S0150HG	1.5	6	4	50	4	Figure 1	○
B4S0200HG	2.0	6	6	50	4	Figure 1	●
B4S0250HG	2.5	6	8	50	4	Figure 1	○
B4S0300HG	3.0	6	8	50	4	Figure 1	●
B4S0350HG	3.5	6	10	50	4	Figure 1	○
B4S0400HG	4.0	6	11	50	4	Figure 1	●
B4S0450HG	4.5	6	11	50	4	Figure 1	○
B4S0500HG	5.0	6	13	50	4	Figure 1	●
B4S0550HG	5.5	6	16	50	4	Figure 1	○
B4S0600HG	6.0	6	16	50	4	Figure 2	●
B4S0700HG	7.0	8	20	60	4	Figure 1	●
B4S0800HG	8.0	8	20	60	4	Figure 2	●
B4S0900HG	9.0	10	22	75	4	Figure 1	●
B4S1000HG	10.0	10	25	75	4	Figure 2	●
B4S1100HG	11.0	12	26	75	4	Figure 1	●
B4S1200HG	12.0	12	30	75	4	Figure 2	●
B4S1400HG	14.0	14	32	75	4	Figure 2	●
B4S1600HG	16.0	16	45	100	4	Figure 2	●
B4S1800HG	18.0	18	45	100	4	Figure 2	●
B4S2000HG	20.0	20	45	100	4	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B4S···HG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

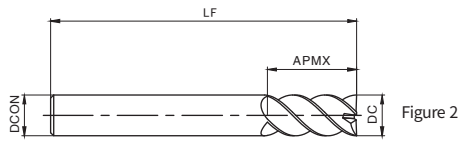
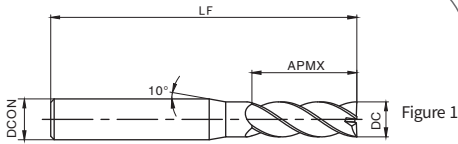
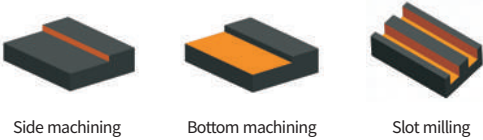
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	1.0	1.0	0.3	0.010	0.75	1.0
	1.5	1.5	0.5	0.015	1.13	1.5
	2.0	2.0	0.6	0.015	1.50	2.0
	2.5	2.5	0.8	0.020	1.88	2.5
	3.0	3.0	0.9	0.025	2.3	3.0
	3.5	3.5	1.1	0.025	2.6	3.5
	4.0	4.0	1.2	0.030	3.0	4.0
	4.5	4.5	1.4	0.035	3.4	4.5
	5.0	5.0	1.5	0.035	3.8	5.0
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	11.0	11.0	3.3	0.080	8.0	11.0
	12.0	12.0	3.6	0.085	9.0	12.0
	14.0	14.0	4.2	0.100	10.5	14.0
	16.0	16.0	4.8	0.115	12.0	16.0
	18.0	18.0	5.4	0.130	13.5	18.0
	20.0	20.0	6.0	0.140	15.0	20.0

(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series B--Basic end mills

Four-flute flat end milling cutter (long flute structure, large helical angle)

B4L···HG



B Series

45°

DC≤12 0,-0.02
DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B4L0300HG	3.0	6	12	75	4	Figure 1	●
B4L0400HG	4.0	6	15	75	4	Figure 1	●
B4L0500HG	5.0	6	20	75	4	Figure 1	●
B4L0600HG	6.0	6	20	75	4	Figure 2	●
B4L0800HG	8.0	8	25	100	4	Figure 2	●
B4L1000HG	10.0	10	30	100	4	Figure 2	●
B4L1200HG	12.0	12	35	100	4	Figure 2	●
B4L1400HG	14.0	14	40	100	4	Figure 2	●
B4L1600HG	16.0	16	50	150	4	Figure 2	●
B4L2000HG	20.0	20	55	150	4	Figure 2	●

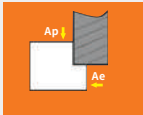
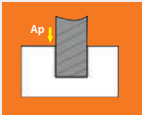
●Running stock ○Make-to-order

P			M	K	N		S	H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC
☼	☼	☼	☼	☼			☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--B4L...HG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

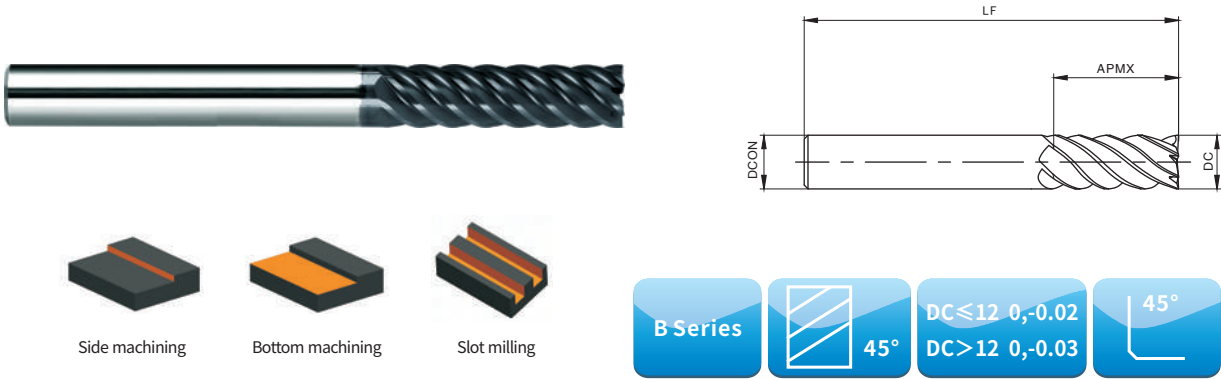
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	3.0	3.0	0.9	0.025	2.3	3.0
	4.0	4.0	1.2	0.030	3.0	4.0
	5.0	5.0	1.5	0.035	3.8	5.0
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	14.0	14.0	4.2	0.100	10.5	14.0
	16.0	16.0	4.8	0.115	12.0	16.0
	20.0	20.0	6.0	0.140	15.0	20.0

(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series B--Basic end mills

Six-flute flat end mill (short flute structure)

B6S...HG



Type	Basic dimension (mm)					Inventory
	DC	DCON	APMX	LF	ZEFP	
B6S0600HG	6.0	6	18	60	6	●
B6S0800HG	8.0	8	20	60	6	●
B6S1000HG	10.0	10	30	75	6	●
B6S1200HG	12.0	12	32	75	6	●
B6S1600HG	16.0	16	40	100	6	●
B6S2000HG	20.0	20	45	100	6	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B6S···HG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

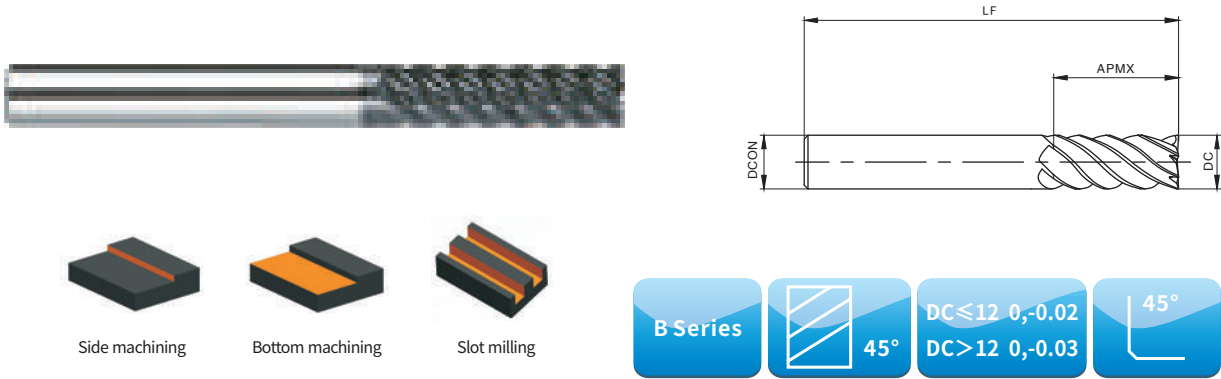
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter (mm)	ap (1xDc)	ae (0.05xDc)	fz (mm/z)			
6.0	6.0	0.3	0.020			
8.0	8.0	0.4	0.027			
10.0	10.0	0.5	0.033			
12.0	12.0	0.6	0.040			
16.0	16.0	0.8	0.053			
20.0	20.0	1.0	0.067			

- (1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (2) The down milling is recommended for side milling.
- (3) Use cutting fluid that is air-cooled or free of producing smoke.
- (4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of theabove table should be lowered in the same proportion.

Series B--Basic end mills

Six-flute flat end mill (long flute structure)

B6L···HG



Type	Basic dimension (mm)					Inventory
	DC	DCON	APMX	LF	ZEFP	
B6L0600HG	6.0	6	24	75	6	●
B6L0800HG	8.0	8	32	75	6	●
B6L1000HG	10.0	10	40	100	6	●
B6L1200HG	12.0	12	45	100	6	●
B6L1600HG	16.0	16	64	150	6	●
B6L2000HG	20.0	20	75	150	6	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B6L···HG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

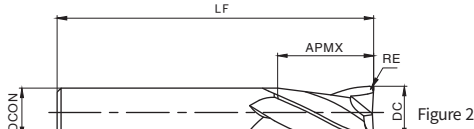
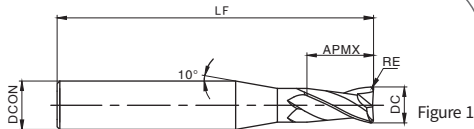
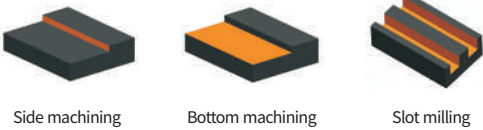
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter (mm)	ap (1xDc)	ae (0.05xDc)	fz (mm/z)			
6.0	6.0	0.3	0.025			
8.0	8.0	0.4	0.033			
10.0	10.0	0.5	0.042			
12.0	12.0	0.6	0.050			
16.0	16.0	0.8	0.067			
20.0	20.0	1.0	0.083			

- (1) Before slot milling, please reduce he cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the Feed rate (feed rate) to 40%-60%.
- (2) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
- (3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
- (4) The tool overhang is as short as possible without affecting the use.

Series B--Basic end mills

Two-flute R end mill (short flute structure)

B2S···R···LG



B Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

R±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B2S0300R00 20LG	3.0	6	8	50	0.2	2	Figure 1	●
B2S0300R00 30LG	3.0	6	8	50	0.3	2	Figure 1	○
B2S0300R00 50LG	3.0	6	8	50	0.5	2	Figure 1	●
B2S0400R00 20LG	4.0	6	11	50	0.2	2	Figure 1	●
B2S0400R00 30LG	4.0	6	11	50	0.3	2	Figure 1	○
B2S0400R00 50LG	4.0	6	11	50	0.5	2	Figure 1	●
B2S0400R01 00LG	4.0	6	11	50	1.0	2	Figure 1	●
B2S0500R00 30LG	5.0	6	13	50	0.3	2	Figure 1	○
B2S0500R00 50LG	5.0	6	13	50	0.5	2	Figure 1	●
B2S0500R01 00LG	5.0	6	13	50	1.0	2	Figure 1	●
B2S0600R00 30LG	6.0	6	16	50	0.3	2	Figure 2	○
B2S0600R00 50LG	6.0	6	16	50	0.5	2	Figure 2	●
B2S0600R01 00LG	6.0	6	16	50	1.0	2	Figure 2	●
B2S0800R00 30LG	8.0	8	20	60	0.3	2	Figure 2	○
B2S0800R00 50LG	8.0	8	20	60	0.5	2	Figure 2	●
B2S0800R01 00LG	8.0	8	20	60	1.0	2	Figure 2	●
B2S1000R00 50LG	10.0	10	25	75	0.5	2	Figure 2	●
B2S1000R01 00LG	10.0	10	25	75	1.0	2	Figure 2	●
B2S1000R01 50LG	10.0	10	25	75	1.5	2	Figure 2	●
B2S1000R02 00LG	10.0	10	25	75	2.0	2	Figure 2	●
B2S1200R00 50LG	12.0	12	30	75	0.5	2	Figure 2	●
B2S1200R01 00LG	12.0	12	30	75	1.0	2	Figure 2	●
B2S1200R01 50LG	12.0	12	30	75	1.5	2	Figure 2	●
B2S1200R02 00LG	12.0	12	30	75	2.0	2	Figure 2	●

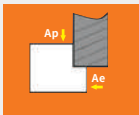
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B2S...R...LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

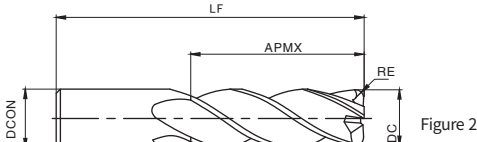
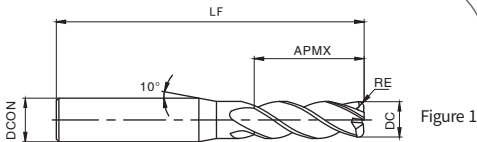
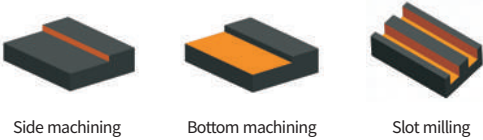
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	3.0	3.0	1.2	0.025	2.3	3.0
	4.0	4.0	1.6	0.030	3.0	4.0
	5.0	5.0	2.0	0.035	3.8	5.0
	6.0	6.0	2.4	0.045	4.5	6.0
	8.0	8.0	3.2	0.060	6.0	8.0
	10.0	10.0	4.0	0.070	7.5	10.0
	12.0	12.0	4.8	0.085	9.0	12.0

- (1) Before slot milling, please reduce he cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the Feed rate (feed rate) to 40%-60%.
- (2) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
- (3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
- (4) The tool overhang is as short as possible without affecting the use.

Series B--Basic end mills

Four-flute R end mill (short flute structure)

B4S...R...LG



B Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

r±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B4S0300R00 20LG	3.0	6	8	50	0.2	4	Figure 1	●
B4S0400R00 30LG	4.0	6	10	50	0.3	4	Figure 1	○
B4S0400R00 50LG	4.0	6	10	50	0.5	4	Figure 1	●
B4S0500R00 50LG	5.0	6	13	50	0.5	4	Figure 1	●
B4S0500R01 00LG	5.0	6	13	50	1.0	4	Figure 1	●
B4S0600R00 50LG	6.0	6	16	50	0.5	4	Figure 2	●
B4S0600R01 00LG	6.0	6	16	50	1.0	4	Figure 2	●
B4S0800R00 50LG	8.0	8	20	60	0.5	4	Figure 2	●
B4S0800R01 00LG	8.0	8	20	60	1.0	4	Figure 2	●
B4S1000R00 50LG	10.0	10	25	75	0.5	4	Figure 2	●
B4S1000R01 00LG	10.0	10	25	75	1.0	4	Figure 2	●
B4S1000R02 00LG	10.0	10	25	75	2.0	4	Figure 2	●
B4S1000R03 00LG	10.0	10	25	75	3.0	4	Figure 2	●
B4S1200R00 50LG	12.0	12	30	75	0.5	4	Figure 2	●
B4S1200R01 00LG	12.0	12	30	75	1.0	4	Figure 2	●
B4S1200R02 00LG	12.0	12	30	75	2.0	4	Figure 2	●
B4S1200R03 00LG	12.0	12	30	75	3.0	4	Figure 2	●

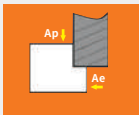
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B4S···R···LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

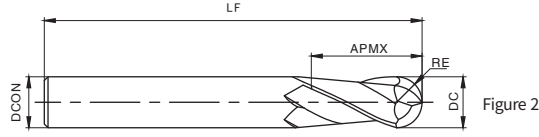
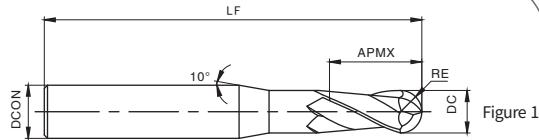
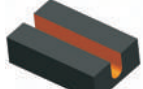
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	3.0	3.0	1.2	0.025	2.3	3.0
	4.0	4.0	1.6	0.030	3.0	4.0
	5.0	5.0	2.0	0.035	3.8	5.0
	6.0	6.0	2.4	0.045	4.5	6.0
	8.0	8.0	3.2	0.060	6.0	8.0
	10.0	10.0	4.0	0.070	7.5	10.0
	12.0	12.0	4.8	0.085	9.0	12.0

- (1) Before slot milling, please reduce he cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the Feed rate (feed rate) to 40%-60%.
- (2) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
- (3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
- (4) The tool overhang is as short as possible without affecting the use.

Series B--Basic end mills

Two-flute ball nose end mill (short flute structure)

B2S···BLG



B Series

 30°

DC≤12 0,-0.02
DC>12 0,-0.03

 R±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B2SR00 50BLG	1.0	6	2	50	0.5	2	Figure 1	●
B2SR00 75BLG	1.5	6	3	50	0.75	2	Figure 1	●
B2SR00 10BLG	2.0	6	4	50	1.00	2	Figure 1	●
B2SR01 25BLG	2.5	6	5	50	1.25	2	Figure 1	●
B2SR01 50BLG	3.0	6	6	50	1.5	2	Figure 1	●
B2SR01 75BLG	3.5	6	8	50	1.75	2	Figure 1	●
B2SR02 00BLG	4.0	6	8	50	2.0	2	Figure 1	●
B2SR02 50BLG	5.0	6	10	50	2.5	2	Figure 1	●
B2SR02 75BLG	5.5	6	12	50	2.75	2	Figure 1	●
B2SR03 00BLG	6.0	6	12	50	3.0	2	Figure 2	●
B2SR03 50BLG	7.0	8	14	60	3.5	2	Figure 1	●
B2SR04 00BLG	8.0	8	16	60	4.0	2	Figure 2	●
B2SR04 50BLG	9.0	10	18	75	4.5	2	Figure 1	●
B2SR05 00BLG	10.0	10	20	75	5.0	2	Figure 2	●
B2SR06 00BLG	12.0	12	24	75	6.0	2	Figure 2	●
B2SR07 00BLG	14.0	14	28	75	7.0	2	Figure 2	●
B2SR08 00BLG	16.0	16	32	100	8.0	2	Figure 2	●
B2SR10 00BLG	20.0	20	40	100	10.0	2	Figure 2	●

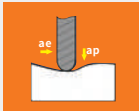
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--B2S...BLG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	—	—	—

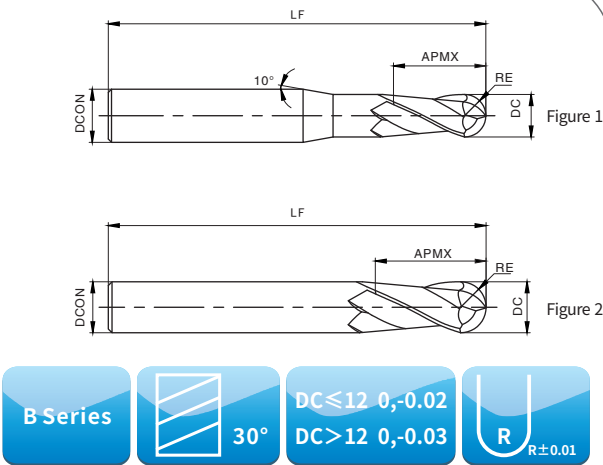
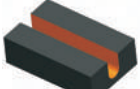
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.1xDc)	ae (0.1xDc)	fz (mm/z)			
1.0	0.1	0.1	0.020			
1.5	0.15	0.15	0.030			
2.0	0.2	0.2	0.040			
2.5	0.25	0.25	0.050			
3.0	0.3	0.3	0.060			
3.5	0.35	0.35	0.070			
4.0	0.4	0.4	0.080			
5.0	0.5	0.5	0.100			
5.5	0.55	0.55	0.110			
6.0	0.6	0.6	0.120			
7.0	0.7	0.7	0.140			
8.0	0.8	0.8	0.160			
9.0	0.9	0.9	0.180			
10.0	1.0	1.0	0.200			
12.0	1.2	1.2	0.240			
14.0	1.4	1.4	0.300			
16.0	1.6	1.6	0.360			
20.0	2.0	2.0	0.400			

(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
(4) The tool overhang is as short as possible without affecting the use.

Series B--Basic end mills

Two-flute ball nose end mill (long flute structure)

B2L...BLG



Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B2LR01 00BLG	2.0	6	4	75	1.0	2	Figure 1	●
B2LR01 25BLG	2.5	6	5	75	1.25	2	Figure 1	●
B2LR01 50BLG	3.0	6	6	75	1.5	2	Figure 1	●
B2LR01 75BLG	3.5	6	8	75	1.75	2	Figure 1	●
B2LR02 00BLG	4.0	6	8	75	2.0	2	Figure 1	●
B2LR02 50BLG	5.0	6	10	75	2.5	2	Figure 1	●
B2LR02 75BLG	5.5	6	12	75	2.75	2	Figure 1	●
B2LR03 00BLG	6.0	6	12	75	3.0	2	Figure 2	●
B2LR03 50BLG	7.0	8	14	75	3.5	2	Figure 1	●
B2LR04 00BLG	8.0	8	16	100	4.0	2	Figure 2	●
B2LR04 50BLG	9.0	10	18	100	4.5	2	Figure 1	●
B2LR05 00BLG	10.0	10	20	100	5.0	2	Figure 2	●
B2LR06 00BLG	12.0	12	24	100	6.0	2	Figure 2	●
B2LR07 00BLG	14.0	14	28	100	7.0	2	Figure 2	●
B2LR08 00BLG	16.0	16	32	150	8.0	2	Figure 2	●
B2LR10 00BLG	20.0	20	40	150	10.0	2	Figure 2	●

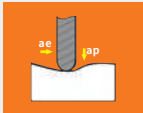
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--B2L···BLG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	—	—	—

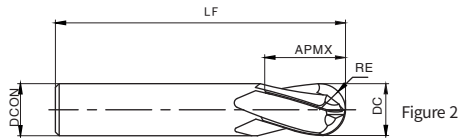
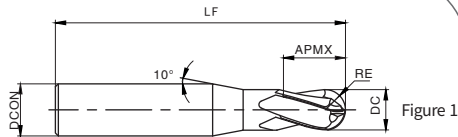
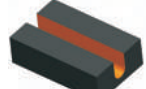
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.1xDc)	ae (0.1xDc)	fz (mm/z)			
2.0	0.2	0.2	0.040			
2.5	0.25	0.25	0.050			
3.0	0.3	0.3	0.060			
3.5	0.35	0.35	0.070			
4.0	0.4	0.4	0.080			
5.0	0.5	0.5	0.100			
5.5	0.55	0.55	0.110			
6.0	0.6	0.6	0.120			
7.0	0.7	0.7	0.140			
8.0	0.8	0.8	0.160			
9.0	0.9	0.9	0.180			
10.0	1.0	1.0	0.200			
12.0	1.2	1.2	0.240			
14.0	1.4	1.4	0.300			
16.0	1.6	1.6	0.360			
20.0	2.0	2.0	0.400			

(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
(4) The tool overhang is as short as possible without affecting the use.

Series B--Basic end mills

Four-flute ball nose end mill (short flute structure)

B4S···BLG



B Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

R±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B4SR01 50BLG	3.0	6	6	50	1.5	4	Figure 1	●
B4SR02 00BLG	4.0	6	8	50	2.0	4	Figure 1	○
B4SR02 50BLG	5.0	6	10	50	2.5	4	Figure 1	○
B4SR03 00BLG	6.0	6	12	50	3.0	4	Figure 2	●
B4SR04 00BLG	8.0	8	16	60	4.0	4	Figure 2	●
B4SR05 00BLG	10.0	10	20	75	5.0	4	Figure 2	●
B4SR06 00BLG	12.0	12	24	75	6.0	4	Figure 2	●
B4SR08 00BLG	16.0	16	32	100	8.0	4	Figure 2	●
B4SR10 00BLG	20.0	20	40	100	10.0	4	Figure 2	●

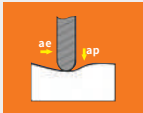
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B4S···BLG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

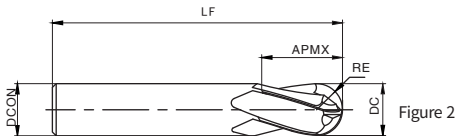
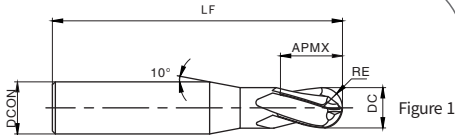
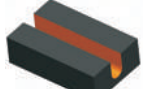
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.1xDc)	ae (0.1xDc)	fz (mm/z)			
3.0	0.3	0.3	0.060			
4.0	0.4	0.4	0.080			
5.0	0.5	0.5	0.100			
6.0	0.6	0.6	0.120			
8.0	0.8	0.8	0.160			
10.0	1.0	1.0	0.200			
12.0	1.2	1.2	0.240			
16.0	1.6	1.6	0.360			
20.0	2.0	2.0	0.400			

- (1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (2) Air cooling or spray cooling is recommended.
- (3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
- (4) The tool overhang is as short as possible without affecting the use.

Series B--Basic end mills

Four-flute ball nose end mill (long flute structure)

B4L···BLG



B Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

R±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B4LR01 50BLG	3.0	6	6	75	1.5	4	Figure 1	●
B4LR02 00BLG	4.0	6	8	75	2.0	4	Figure 1	○
B4LR02 50BLG	5.0	6	10	75	2.5	4	Figure 1	○
B4LR03 00BLG	6.0	6	12	75	3.0	4	Figure 2	●
B4LR04 00BLG	8.0	8	16	100	4.0	4	Figure 2	●
B4LR05 00BLG	10.0	10	20	100	5.0	4	Figure 2	●
B4LR06 00BLG	12.0	12	24	100	6.0	4	Figure 2	●
B4LR08 00BLG	16.0	16	32	150	8.0	4	Figure 2	●
B4LR10 00BLG	20.0	20	40	150	10.0	4	Figure 2	●

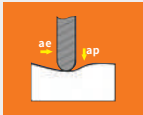
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--B4L···BLG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

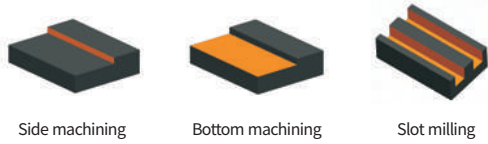
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.1xDc)	ae (0.1xDc)	fz (mm/z)			
3.0	0.3	0.3	0.060			
4.0	0.4	0.4	0.080			
5.0	0.5	0.5	0.010			
6.0	0.6	0.6	0.120			
8.0	0.8	0.8	0.160			
10.0	1.0	1.0	0.200			
12.0	1.2	1.2	0.240			
16.0	1.6	1.6	0.320			
20.0	2.0	2.0	0.400			

- (1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (2) Air cooling or spray cooling is recommended.
- (3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
- (4) The tool overhang is as short as possible without affecting the use.

Series B--Basic end mills

Two-flute flat end mill (aluminum alloy machining)

B2L···HN



B Series

55°

DC≤12 0,-0.02

DC>12 0,-0.03

90°

Figure 1

Figure 2

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B2L0300HN	3.0	6	12	60	2	Figure 1	●
B2L0400HN	4.0	6	16	60	2	Figure 1	○
B2L0500HN	5.0	6	20	60	2	Figure 1	○
B2L0600HN	6.0	6	25	75	2	Figure 2	●
B2L0800HN	8.0	8	32	75	2	Figure 2	●
B2L1000HN	10.0	10	45	100	2	Figure 2	●
B2L1200HN	12.0	12	45	100	2	Figure 2	●
B2L1600HN	16.0	16	65	150	2	Figure 2	●
B2L2000HN	20.0	20	75	150	2	Figure 2	●

●Running stock ○Make-to-order

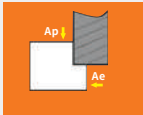
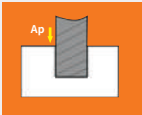
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
					☼	☼					

✱ Fit well

✱ Applicable

Recommended cutting conditions--B2L...HN

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	—	—	—
	Alloy steel	< 1200	< 350	—	—	—
	High-alloyed steel and tool steel	< 1400	< 380	—	—	—
M	Austenite and ferrite stainless steel	< 680	<220	—	—	—
	Martensite stainless steel	< 820	< 240	—	—	—
K	Gray cast iron	—	< 280	—	—	—
	Ductile iron	—	< 320	—	—	—
N	Non-ferrous alloy	< 250	< 110	120	160	350
	Aluminum alloy	< 530	< 130	150	200	300
S	High-temp alloy	< 3300	< 350	—	—	—
	Titanium alloy	<2100	< 400	—	—	—
H	High hardness steel	—	< 54HRC	—	—	—
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
	Diameter (mm)	ap (1.5xDc)	ae (0.1xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	3.0	4.5	0.3	0.030	2.3	3.0
	4.0	6.0	0.4	0.040	3.0	4.0
	5.0	7.5	0.5	0.050	3.8	5.0
	6.0	9.0	0.6	0.060	4.5	6.0
	8.0	12.0	0.8	0.080	6.0	8.0
	10.0	15.0	1.0	0.100	7.5	10.0
	12.0	18.0	1.2	0.120	9.0	12.0
	16.0	24.0	1.6	0.160	12.0	16.0
	20.0	30.0	2.0	0.200	15.0	20.0

(1) This series of tools is special for aluminum alloy machining;
(2) Before slot milling, please reduce the cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the feed rate (feed rate) to 40%-60%.

Series B--Basic end mills

Three-flute flat end milling cutter (aluminum alloy machining)

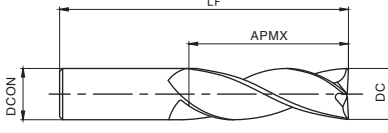
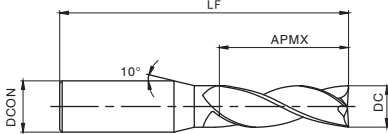
B3L...HN



Side machining

Bottom machining

Slot milling



B Series

 45°

DC≤12 0,-0.02

DC>12 0,-0.03

 90°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B3L0300HN	3.0	6	12	60	3	Figure 1	●
B3L0400HN	4.0	6	16	60	3	Figure 1	○
B3L0500HN	5.0	6	20	60	3	Figure 1	○
B3L0600HN	6.0	6	25	75	3	Figure 1	●
B3L0800HN	8.0	8	32	75	3	Figure 2	●
B3L1000HN	10.0	10	45	100	3	Figure 2	●
B3L1200HN	12.0	12	45	100	3	Figure 2	●
B3L1600HN	16.0	16	65	150	3	Figure 2	●
B3L2000HN	20.0	20	75	150	3	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
					☼	☼					

✱ Fit well ✱ Applicable

Recommended cutting conditions--B3L...HN

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	—	—	—
	Alloy steel	< 1200	< 350	—	—	—
	High-alloyed steel and tool steel	< 1400	< 380	—	—	—
M	Austenite and ferrite stainless steel	< 680	<220	—	—	—
	Martensite stainless steel	< 820	< 240	—	—	—
K	Gray cast iron	—	< 280	—	—	—
	Ductile iron	—	< 320	—	—	—
N	Non-ferrous alloy	< 250	< 110	120	160	350
	Aluminum alloy	< 530	< 130	150	200	300
S	High-temp alloy	< 3300	< 350	—	—	—
	Titanium alloy	<2100	< 400	—	—	—
H	High hardness steel	—	< 54HRC	—	—	—
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

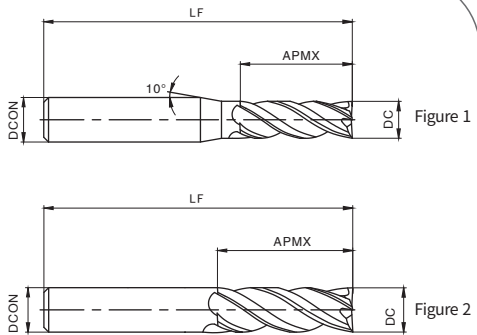
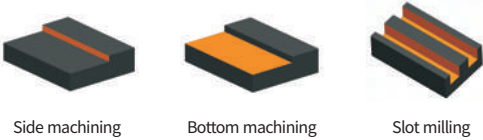
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1.5xDc)	ae (0.2xDc)	fz (mm/z)	ap (1xDc)	ae (1xDc)
	3.0	4.5	0.6	0.030	3.0	3.0
	4.0	6.0	0.8	0.040	4.0	4.0
	5.0	7.5	1.0	0.050	5.0	5.0
	6.0	9.0	1.2	0.060	6.0	6.0
	8.0	12.0	1.6	0.080	8.0	8.0
	10.0	15.0	2.0	0.100	10.0	10.0
	12.0	18.0	2.4	0.120	12.0	12.0
	16.0	24.0	3.2	0.160	16.0	16.0
	20.0	30.0	4.0	0.200	20.0	20.0

(1) This series of tools is dedicated for aluminum alloy machining;
(2) Before slot milling, please reduce the cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the feed rate (feed rate) to 40%-60%.

Series P--High performance end mills

Four-flute flat end mill (short flute structure)

P4S...LG



P Series

31°

28°

DC≤12 0,-0.02
DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
P4S0100LG	1.0	6	3	50	4	Figure 1	●
P4S0150LG	1.5	6	4	50	4	Figure 1	○
P4S0200LG	2.0	6	6	50	4	Figure 1	●
P4S0250LG	2.5	6	8	50	4	Figure 1	○
P4S0300LG	3.0	6	8	50	4	Figure 1	●
P4S0350LG	3.5	6	10	50	4	Figure 1	○
P4S0400LG	4.0	6	11	50	4	Figure 1	●
P4S0450LG	4.5	6	11	50	4	Figure 1	○
P4S0500LG	5.0	6	13	50	4	Figure 1	●
P4S0550LG	5.5	6	16	50	4	Figure 1	○
P4S0600LG	6.0	6	16	50	4	Figure 2	●
P4S0700LG	7.0	8	20	60	4	Figure 1	●
P4S0800LG	8.0	8	20	60	4	Figure 2	●
P4S0900LG	9.0	10	22	75	4	Figure 1	●
P4S1000LG	10.0	10	25	75	4	Figure 2	●
P4S1100LG	11.0	12	26	75	4	Figure 1	●
P4S1200LG	12.0	12	30	75	4	Figure 2	●
P4S1400LG	14.0	14	32	75	4	Figure 2	●
P4S1600LG	16.0	16	45	100	4	Figure 2	●
P4S1800LG	18.0	18	45	100	4	Figure 2	●
P4S2000LG	20.0	20	45	100	4	Figure 2	●

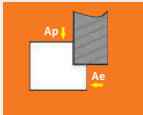
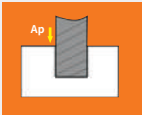
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4S...LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

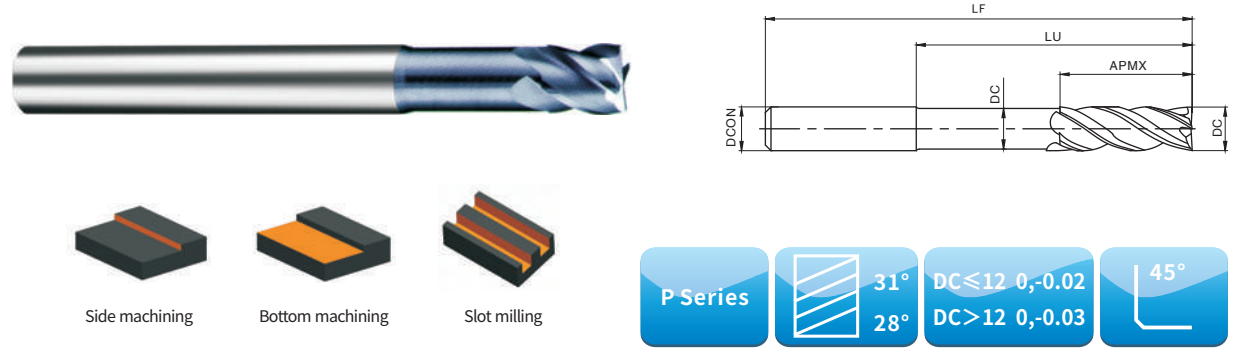
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	1.0	1.0	0.3	0.012	0.8	1.0
	1.5	1.5	0.5	0.015	1.1	1.5
	2.0	2.0	0.6	0.018	1.5	2.0
	2.5	2.5	0.8	0.020	1.9	2.5
	3.0	3.0	0.9	0.025	2.3	3.0
	3.5	3.5	1.1	0.025	2.6	3.5
	4.0	4.0	1.2	0.030	3.0	4.0
	4.5	4.5	1.4	0.035	3.4	4.5
	5.0	5.0	1.5	0.035	3.8	5.0
	5.5	5.5	1.7	0.035	4.1	5.5
	6.0	6.0	1.8	0.045	4.5	6.0
	7.0	7.0	2.1	0.050	5.3	7.0
	8.0	8.0	2.4	0.060	6.0	8.0
	9.0	9.0	2.7	0.065	6.8	9.0
	10.0	10.0	3.0	0.070	7.5	10.0
	11.0	11.0	3.3	0.075	8.3	11.0
	12.0	12.0	3.6	0.085	9.0	12.0
	14.0	14.0	4.2	0.100	10.5	14.0
	16.0	16.0	4.8	0.115	12.0	16.0
	18.0	18.0	5.4	0.130	13.5	18.0
	20.0	20.0	6.0	0.140	15.0	20.0

(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute flat end mill (necking structure)

P4P...LG



Type	Basic dimension (mm)							Inventory
	DC	DCON	APMX	LU	DN	LF	ZEFP	
P4P0600LG	6.0	6	9	30	5.8	75	4	●
P4P0800LG	8.0	8	12	40	7.8	100	4	●
P4P1000LG	10.0	10	15	50	9.6	100	4	●
P4P1200LG	12.0	12	18	50	11.5	100	4	●
P4P1600LG	16.0	16	24	50	15.5	150	4	●
P4P2000LG	20.0	20	30	60	19.5	150	4	●

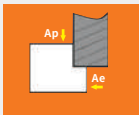
●Running stock ○Make-to-order

P			M	K	N		S	H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC
☼	☼	☼	☼	☼			☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4P...LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	16.0	16.0	4.8	0.115	12.0	16.0
	20.0	20.0	6.0	0.140	15.0	20.0

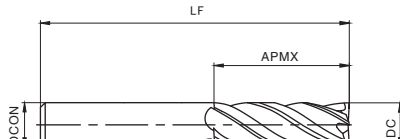
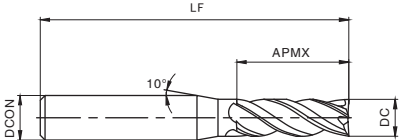
- (1) Water-soluble cutting fluid is recommended during machining stainless steel.
- (2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (3) The down milling is recommended for side milling.
- (4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

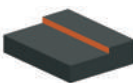
Series P--High performance end mills

Four-flute flat end mill (short flute structure)

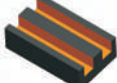
P4S...NG





Side machining

Bottom machining

Slot milling

P Series



38°
35°

DC≤12 0,-0.02

DC>12 0,-0.03



45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
P4S0100NG	1.0	6	3	50	4	Figure 1	●
P4S0150NG	1.5	6	4	50	4	Figure 1	○
P4S0200NG	2.0	6	6	50	4	Figure 1	●
P4S0250NG	2.5	6	8	50	4	Figure 1	○
P4S0300NG	3.0	6	8	50	4	Figure 1	●
P4S0350NG	3.5	6	10	50	4	Figure 1	○
P4S0400NG	4.0	6	11	50	4	Figure 1	●
P4S0450NG	4.5	6	11	50	4	Figure 1	○
P4S0500NG	5.0	6	13	50	4	Figure 1	●
P4S0550NG	5.5	6	16	50	4	Figure 1	○
P4S0600NG	6.0	6	16	50	4	Figure 2	●
P4S0700NG	7.0	8	20	60	4	Figure 1	●
P4S0800NG	8.0	8	20	60	4	Figure 2	●
P4S0900NG	9.0	10	22	75	4	Figure 1	●
P4S1000NG	10.0	10	25	75	4	Figure 2	●
P4S1100NG	11.0	12	26	75	4	Figure 1	●
P4S1200NG	12.0	12	30	75	4	Figure 2	●
P4S1400NG	14.0	14	32	75	4	Figure 2	●
P4S1600NG	16.0	16	45	100	4	Figure 2	●
P4S1800NG	18.0	18	45	100	4	Figure 2	●
P4S2000NG	20.0	20	45	100	4	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4S...NG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

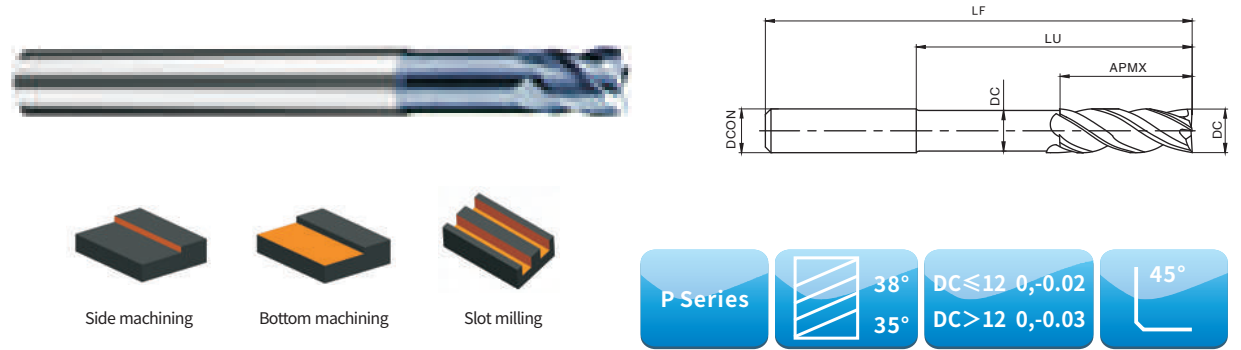
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	2.5	0.018
3.0	3.0	0.9	0.025	2.3	3.0	0.020
3.5	3.5	1.1	0.025	2.6	3.5	0.025
4.0	4.0	1.2	0.030	3.0	4.0	0.025
4.5	4.5	1.4	0.035	3.4	4.5	0.030
5.0	5.0	1.5	0.035	3.8	5.0	0.030
5.5	5.5	1.7	0.035	4.1	5.5	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
7.0	7.0	2.1	0.050	5.3	7.0	0.040
8.0	8.0	2.4	0.060	6.0	8.0	0.050
9.0	9.0	2.7	0.065	6.8	9.0	0.055
10.0	10.0	3.0	0.070	7.5	10.0	0.060
11.0	11.0	3.3	0.075	8.3	11.0	0.065
12.0	12.0	3.6	0.085	9.0	12.0	0.070
14.0	14.0	4.2	0.100	10.5	14.0	0.085
16.0	16.0	4.8	0.115	12.0	16.0	0.095
18.0	18.0	5.4	0.130	13.5	18.0	0.105
20.0	20.0	6.0	0.140	15.0	20.0	0.120

(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute flat end mill (necking structure)

P4P...NG



Type	Basic dimension (mm)							Inventory
	DC	DCON	APMX	LU	DN	LF	ZEFP	
P4P0600NG	6.0	6	9	30	5.8	75	4	●
P4P0800NG	8.0	8	12	40	7.8	100	4	●
P4P1000NG	10.0	10	15	50	9.6	100	4	●
P4P1200NG	12.0	12	18	50	11.5	100	4	●
P4P1600NG	16.0	16	24	50	15.5	150	4	●
P4P2000NG	20.0	20	30	60	19.5	150	4	●

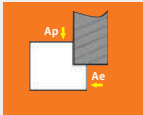
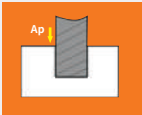
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4P...NG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

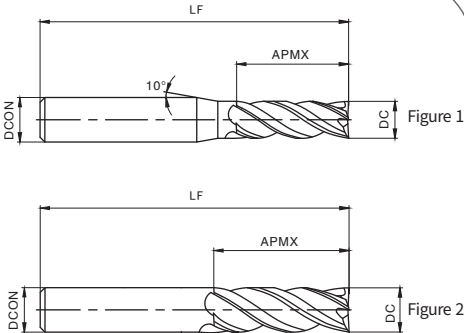
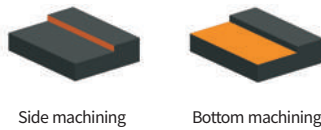
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	16.0	16.0	4.8	0.115	12.0	16.0
	20.0	20.0	6.0	0.140	15.0	20.0

- (1) Water-soluble cutting fluid is recommended during machining stainless steel.
- (2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (3) The down milling is recommended for side milling.
- (4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute flat end mill (short flute structure)

P4S...NS



P Series

41°

38°

DC≤12 0,-0.02

DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
P4S0100NS	1.0	6	3	50	4	Figure 1	●
P4S0150NS	1.5	6	4	50	4	Figure 1	○
P4S0200NS	2.0	6	6	50	4	Figure 1	●
P4S0250NS	2.5	6	8	50	4	Figure 1	○
P4S0300NS	3.0	6	8	50	4	Figure 1	●
P4S0350NS	3.5	6	10	50	4	Figure 1	○
P4S0400NS	4.0	6	11	50	4	Figure 1	●
P4S0450NS	4.5	6	11	50	4	Figure 1	○
P4S0500NS	5.0	6	13	50	4	Figure 1	●
P4S0550NS	5.5	6	16	50	4	Figure 1	○
P4S0600NS	6.0	6	16	50	4	Figure 2	●
P4S0700NS	7.0	8	20	60	4	Figure 1	●
P4S0800NS	8.0	8	20	60	4	Figure 2	●
P4S0900NS	9.0	10	22	75	4	Figure 1	●
P4S1000NS	10.0	10	25	75	4	Figure 2	●
P4S1100NS	11.0	12	26	75	4	Figure 1	●
P4S1200NS	12.0	12	30	75	4	Figure 2	●
P4S1400NS	14.0	14	32	75	4	Figure 2	●
P4S1600NS	16.0	16	45	100	4	Figure 2	●
P4S1800NS	18.0	18	45	100	4	Figure 2	●
P4S2000NS	20.0	20	45	100	4	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4S...NS

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	—	—	—
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
Diameter (mm)						
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	2.5	0.018
3.0	3.0	0.9	0.025	2.3	3.0	0.020
3.5	3.5	1.1	0.025	2.6	3.5	0.025
4.0	4.0	1.2	0.030	3.0	4.0	0.025
4.5	4.5	1.4	0.035	3.4	4.5	0.030
5.0	5.0	1.5	0.035	3.8	5.0	0.030
5.5	5.5	1.7	0.035	4.1	5.5	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
7.0	7.0	2.1	0.050	5.3	7.0	0.040
8.0	8.0	2.4	0.060	6.0	8.0	0.050
9.0	9.0	2.7	0.065	6.8	9.0	0.055
10.0	10.0	3.0	0.070	7.5	10.0	0.060
11.0	11.0	3.3	0.075	8.3	11.0	0.065
12.0	12.0	3.6	0.085	9.0	12.0	0.070
14.0	14.0	4.2	0.100	10.5	14.0	0.085
16.0	16.0	4.8	0.115	12.0	16.0	0.095
18.0	18.0	5.4	0.130	13.5	18.0	0.105
20.0	20.0	6.0	0.140	15.0	20.0	0.120

(1) Water-soluble cutting fluid is recommended during machining stainless steel.

(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.

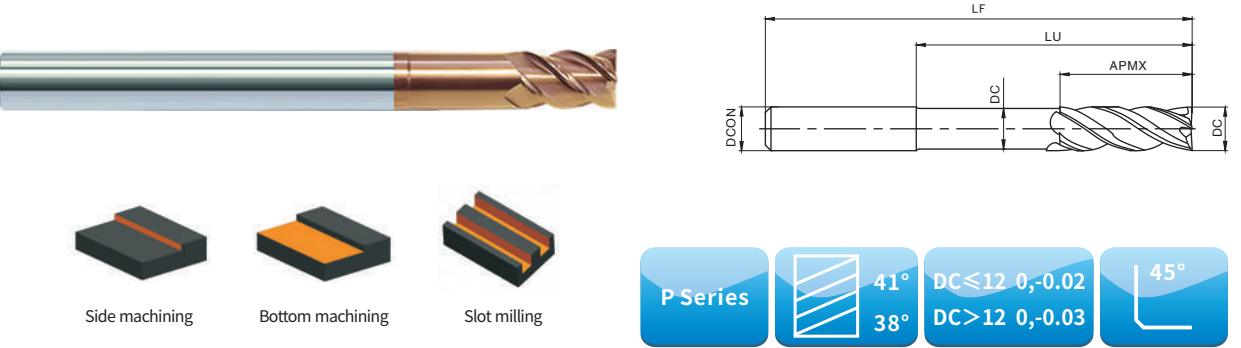
(3) The down milling is recommended for side milling.

(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute flat end mill (necking structure)

P4P...NS



Type	Basic dimension (mm)							Inventory
	DC	DCON	APMX	LU	DN	LF	ZEFP	
P4P0600NS	6.0	6	9	30	5.8	75	4	●
P4P0800NS	8.0	8	12	40	7.8	100	4	●
P4P1000NS	10.0	10	15	50	9.6	100	4	●
P4P1200NS	12.0	12	18	50	11.5	100	4	●
P4P1600NS	16.0	16	24	50	15.5	150	4	●
P4P2000NS	20.0	20	30	60	19.5	150	4	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4P...NS

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	—	—	—
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

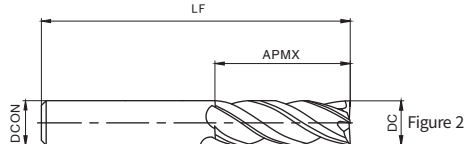
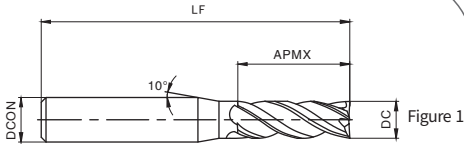
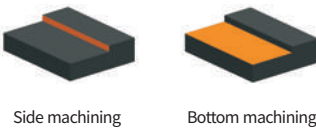
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	16.0	16.0	4.8	0.115	12.0	16.0
	20.0	20.0	6.0	0.140	15.0	20.0

- (1) Water-soluble cutting fluid is recommended during machining stainless steel.
- (2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (3) The down milling is recommended for side milling.
- (4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute flat end mill (short flute structure)

P4S...HH



P Series

45°

42°

DC≤12 0,-0.02
DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
P4S0100HH	1.0	6	3	50	4	Figure 1	●
P4S0150HH	1.5	6	4	50	4	Figure 1	○
P4S0200HH	2.0	6	6	50	4	Figure 1	●
P4S0250HH	2.5	6	8	50	4	Figure 1	○
P4S0300HH	3.0	6	8	50	4	Figure 1	●
P4S0350HH	3.5	6	10	50	4	Figure 1	○
P4S0400HH	4.0	6	11	50	4	Figure 1	●
P4S0450HH	4.5	6	11	50	4	Figure 1	○
P4S0500HH	5.0	6	13	50	4	Figure 1	●
P4S0550HH	5.5	6	16	50	4	Figure 1	○
P4S0600HH	6.0	6	16	50	4	Figure 2	●
P4S0700HH	7.0	8	20	60	4	Figure 1	●
P4S0800HH	8.0	8	20	60	4	Figure 2	●
P4S0900HH	9.0	10	22	75	4	Figure 1	●
P4S1000HH	10.0	10	25	75	4	Figure 2	●
P4S1100HH	11.0	12	26	75	4	Figure 1	●
P4S1200HH	12.0	12	30	75	4	Figure 2	●
P4S1400HH	14.0	14	32	75	4	Figure 2	●
P4S1600HH	16.0	16	45	100	4	Figure 2	●
P4S1800HH	18.0	18	45	100	4	Figure 2	●
P4S2000HH	20.0	20	45	100	4	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼		☼					☼	☼	☼

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4S...HH

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	—	—	—
	Martensite stainless steel	< 820	< 240	—	—	—
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	—	—	—
	Titanium alloy	<2100	< 400	—	—	—
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	60	70	80

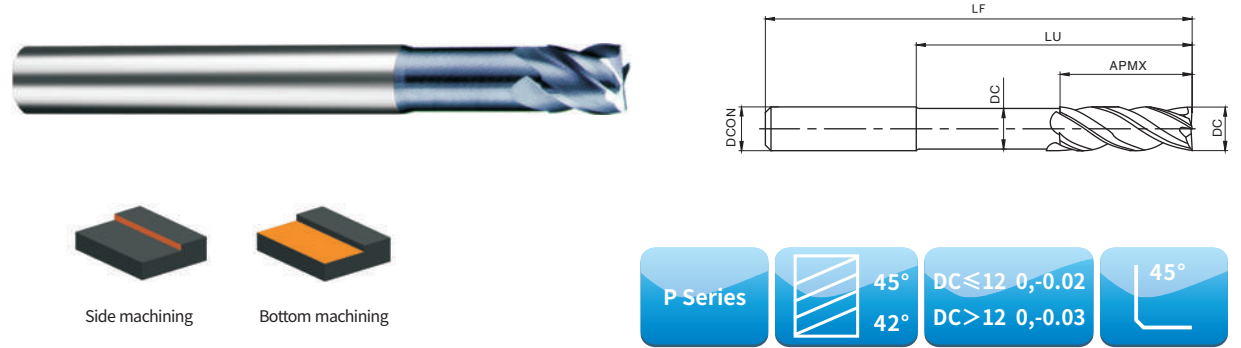
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
Diameter (mm)						
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	2.5	0.018
3.0	3.0	0.9	0.025	2.3	3.0	0.020
3.5	3.5	1.1	0.025	2.6	3.5	0.025
4.0	4.0	1.2	0.030	3.0	4.0	0.025
4.5	4.5	1.4	0.035	3.4	4.5	0.030
5.0	5.0	1.5	0.035	3.8	5.0	0.030
5.5	5.5	1.7	0.035	4.1	5.5	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
7.0	7.0	2.1	0.050	5.3	7.0	0.040
8.0	8.0	2.4	0.060	6.0	8.0	0.050
9.0	9.0	2.7	0.065	6.8	9.0	0.055
10.0	10.0	3.0	0.070	7.5	10.0	0.060
11.0	11.0	3.3	0.075	8.3	11.0	0.065
12.0	12.0	3.6	0.085	9.0	12.0	0.070
14.0	14.0	4.2	0.100	10.5	14.0	0.085
16.0	16.0	4.8	0.115	12.0	16.0	0.095
18.0	18.0	5.4	0.130	13.5	18.0	0.105
20.0	20.0	6.0	0.140	15.0	20.0	0.120

(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute flat end mill (necking structure)

P4P...HH



Type	Basic dimension (mm)							Inventory
	DC	DCON	APMX	LU	DN	LF	ZEFP	
P4P0600HH	6.0	6	9	30	5.8	75	4	●
P4P0800HH	8.0	8	12	40	7.8	100	4	●
P4P1000HH	10.0	10	15	50	9.6	100	4	●
P4P1200HH	12.0	12	18	50	11.5	100	4	●
P4P1600HH	16.0	16	24	50	15.5	150	4	●
P4P2000HH	20.0	20	30	60	19.5	150	4	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼		☼					☼	☼	☼

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4P...HH

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	—	—	—
	Martensite stainless steel	< 820	< 240	—	—	—
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	—	—	—
	Titanium alloy	<2100	< 400	—	—	—
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	60	70	80

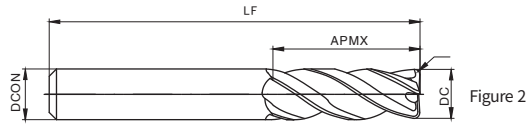
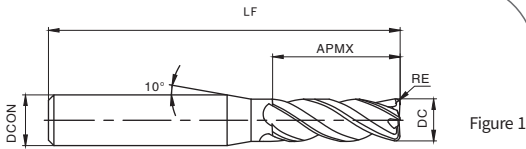
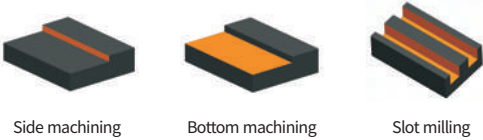
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	16.0	16.0	4.8	0.115	12.0	16.0
	20.0	20.0	6.0	0.140	15.0	20.0

(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute R end mill (short flute structure)

P4S...R...LG



P Series

31°

28°

DC≤12 0,-0.02
DC>12 0,-0.03

r±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
P4S0300R0020LG	3.0	6	8	50	0.2	4	Figure 1	●
P4S0400R0030LG	4.0	6	10	50	0.3	4	Figure 1	○
P4S0400R0050LG	4.0	6	10	50	0.5	4	Figure 1	●
P4S0500R0050LG	5.0	6	13	50	0.5	4	Figure 1	○
P4S0500R0100LG	5.0	6	13	50	1.0	4	Figure 1	○
P4S0600R0050LG	6.0	6	16	50	0.5	4	Figure 2	●
P4S0600R0100LG	6.0	6	16	50	1.0	4	Figure 2	●
P4S0800R0050LG	8.0	8	20	60	0.5	4	Figure 2	●
P4S0800R0100LG	8.0	8	20	60	1.0	4	Figure 2	●
P4S1000R0050LG	10.0	10	25	75	0.5	4	Figure 2	●
P4S1000R0100LG	10.0	10	25	75	1.0	4	Figure 2	●
P4S1000R0200LG	10.0	10	25	75	2.0	4	Figure 2	●
P4S1000R0300LG	10.0	10	25	75	3.0	4	Figure 2	●
P4S1200R0050LG	12.0	12	30	75	0.5	4	Figure 2	●
P4S1200R0100LG	12.0	12	30	75	1.0	4	Figure 2	●
P4S1200R0200LG	12.0	12	30	75	2.0	4	Figure 2	●
P4S1200R0300LG	12.0	12	30	75	3.0	4	Figure 2	●
P4S1600R0100LG	16.0	16	45	100	1.0	4	Figure 2	●
P4S1600R0200LG	16.0	16	45	100	2.0	4	Figure 2	●
P4S1600R0300LG	16.0	16	45	100	3.0	4	Figure 2	●
P4S2000R0100LG	20.0	20	45	100	1.0	4	Figure 2	●
P4S2000R0200LG	20.0	20	45	100	2.0	4	Figure 2	●
P4S2000R0300LG	20.0	20	45	100	3.0	4	Figure 2	●

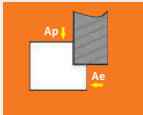
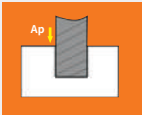
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4S...R...LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

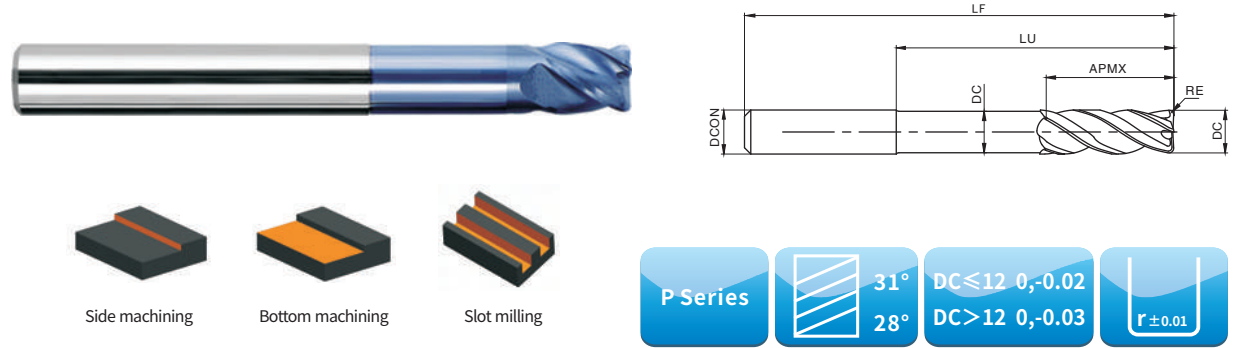
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0	16.0	4.8	0.115	12.0	16.0	0.095
20.0	20.0	6.0	0.140	15.0	20.0	0.120

- (1) Water-soluble cutting fluid is recommended during machining stainless steel.
- (2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (3) The down milling is recommended for side milling.
- (4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute R end milling cutter (necking structure)

P4P...R...LG



Type	Basic dimension (mm)								Inventory
	DC	DCON	APMX	LU	DN	LF	RE	ZEFP	
P4P0600R00 50LG	6.0	6	6	18	5.8	75	0.5	4	●
P4P0600R01 00LG	6.0	6	6	18	5.8	75	1.0	4	●
P4P0800R00 50LG	8.0	8	8	24	7.8	100	0.5	4	●
P4P0800R01 00LG	8.0	8	8	24	7.8	100	1.0	4	●
P4P1000R00 50LG	10.0	10	10	30	9.6	100	0.5	4	●
P4P1000R01 00LG	10.0	10	10	30	9.6	100	1.0	4	●
P4P1000R02 00LG	10.0	10	10	30	9.6	100	2.0	4	●
P4P1200R00 50LG	12.0	12	12	36	11.5	100	0.5	4	●
P4P1200R01 00LG	12.0	12	12	36	11.5	100	1.0	4	●
P4P1200R02 00LG	12.0	12	12	36	11.5	100	2.0	4	●
P4P1600R01 00LG	16.0	16	16	40	15.5	150	1.0	4	●
P4P1600R02 00LG	16.0	16	16	40	15.5	150	2.0	4	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4P...R...LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

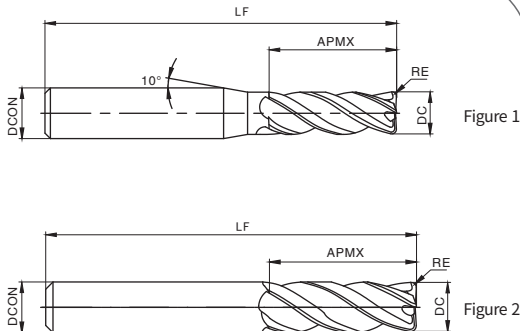
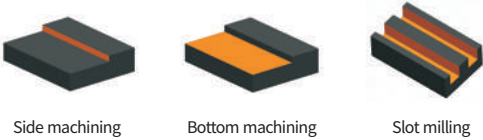
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	16.0	16.0	4.8	0.115	12.0	16.0

- (1) Water-soluble cutting fluid is recommended during machining stainless steel.
- (2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (3) The down milling is recommended for side milling.
- (4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute R end mill (short flute structure)

P4S...R...NG



P Series

38°

35°

DC≤12 0,-0.02

DC>12 0,-0.03

r±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
P4S0300R0020NG	3.0	6	8	50	0.2	4	Figure 1	●
P4S0400R0030NG	4.0	6	10	50	0.3	4	Figure 1	○
P4S0400R0050NG	4.0	6	10	50	0.5	4	Figure 1	○
P4S0500R0050NG	5.0	6	13	50	0.5	4	Figure 1	●
P4S0500R0100NG	5.0	6	13	50	1.0	4	Figure 1	●
P4S0600R0050NG	6.0	6	16	50	0.5	4	Figure 2	●
P4S0600R0100NG	6.0	6	16	50	1.0	4	Figure 2	●
P4S0800R0050NG	8.0	8	20	60	0.5	4	Figure 2	●
P4S0800R0100NG	8.0	8	20	60	1.0	4	Figure 2	●
P4S1000R0050NG	10.0	10	25	75	0.5	4	Figure 2	●
P4S1000R0100NG	10.0	10	25	75	1.0	4	Figure 2	●
P4S1000R0200NG	10.0	10	25	75	2.0	4	Figure 2	●
P4S1000R0300NG	10.0	10	25	75	3.0	4	Figure 2	●
P4S1200R0050NG	12.0	12	30	75	0.5	4	Figure 2	●
P4S1200R0100NG	12.0	12	30	75	1.0	4	Figure 2	●
P4S1200R0200NG	12.0	12	30	75	2.0	4	Figure 2	●
P4S1200R0300NG	12.0	12	30	75	3.0	4	Figure 2	●
P4S1600R0100NG	16.0	16	45	100	1.0	4	Figure 2	●
P4S1600R0200NG	16.0	16	45	100	2.0	4	Figure 2	●
P4S1600R0300NG	16.0	16	45	100	3.0	4	Figure 2	●
P4S2000R0100NG	20.0	20	45	100	1.0	4	Figure 2	●
P4S2000R0200NG	20.0	20	45	100	2.0	4	Figure 2	●
P4S2000R0300NG	20.0	20	45	100	3.0	4	Figure 2	●

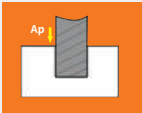
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4S...R...NG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0	16.0	4.8	0.115	12.0	16.0	0.095
20.0	20.0	6.0	0.140	15.0	20.0	0.120

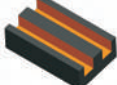
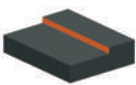
- (1) Water-soluble cutting fluid is recommended during machining stainless steel.
- (2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (3) The down milling is recommended for side milling.
- (4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

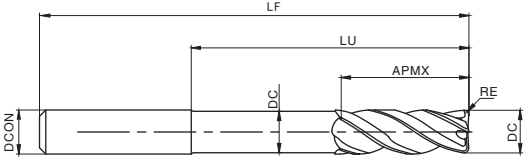
Series P--High performance end mills

Four-flute R end milling cutter (necking structure)

P4P...R...NG







P Series



DC≤12 0,-0.02

DC>12 0,-0.03

r±0.01

Type	Basic dimension (mm)								Inventory
	DC	DCON	APMX	LU	DN	LF	RE	ZEFP	
P4P0600R00 50NG	6.0	6	6	18	5.8	75	0.5	4	●
P4P0600R01 00NG	6.0	6	6	18	5.8	75	1.0	4	●
P4P0800R00 50NG	8.0	8	8	24	7.8	100	0.5	4	●
P4P0800R01 00NG	8.0	8	8	24	7.8	100	1.0	4	●
P4P1000R00 50NG	10.0	10	10	30	9.6	100	0.5	4	●
P4P1000R01 00NG	10.0	10	10	30	9.6	100	1.0	4	●
P4P1000R02 00NG	10.0	10	10	30	9.6	100	2.0	4	●
P4P1200R00 50NG	12.0	12	12	36	11.5	100	0.5	4	●
P4P1200R01 00NG	12.0	12	12	36	11.5	100	1.0	4	●
P4P1200R02 00NG	12.0	12	12	36	11.5	100	2.0	4	●
P4P1600R01 00NG	16.0	16	16	40	15.5	150	1.0	4	●
P4P1600R02 00NG	16.0	16	16	40	15.5	150	2.0	4	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4P...R...NG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

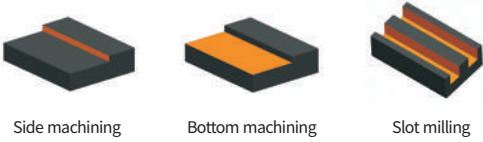
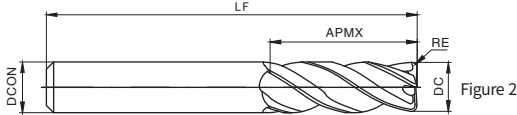
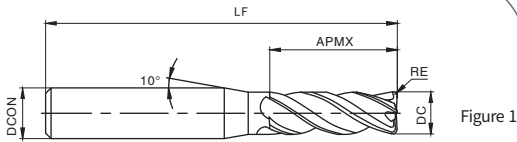
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	16.0	16.0	4.8	0.115	12.0	16.0

- (1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.

Series P--High performance end mills

Four-flute R end mill (short flute structure)

P4S...R...NS



P Series

41°

38°

DC≤12 0,-0.02

DC>12 0,-0.03

r ±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
P4S0300R00 20NS	3.0	6	8	50	0.2	4	Figure 1	●
P4S0400R00 30NS	4.0	6	10	50	0.3	4	Figure 1	●
P4S0400R00 50NS	4.0	6	10	50	0.5	4	Figure 1	●
P4S0500R00 50NS	5.0	6	13	50	0.5	4	Figure 1	●
P4S0500R01 00NS	5.0	6	13	50	1.0	4	Figure 1	●
P4S0600R00 50NS	6.0	6	16	50	0.5	4	Figure 2	●
P4S0600R01 00NS	6.0	6	16	50	1.0	4	Figure 2	●
P4S0800R00 50NS	8.0	8	20	60	0.5	4	Figure 2	●
P4S0800R01 00NS	8.0	8	20	60	1.0	4	Figure 2	●
P4S1000R00 50NS	10.0	10	25	75	0.5	4	Figure 2	●
P4S1000R01 00NS	10.0	10	25	75	1.0	4	Figure 2	●
P4S1000R02 00NS	10.0	10	25	75	2.0	4	Figure 2	●
P4S1000R03 00NS	10.0	10	25	75	3.0	4	Figure 2	●
P4S1200R00 50NS	12.0	12	30	75	0.5	4	Figure 2	●
P4S1200R01 00NS	12.0	12	30	75	1.0	4	Figure 2	●
P4S1200R02 00NS	12.0	12	30	75	2.0	4	Figure 2	●
P4S1200R03 00NS	12.0	12	30	75	3.0	4	Figure 2	●
P4S1600R01 00NS	16.0	16	45	100	1.0	4	Figure 2	●
P4S1600R02 00NS	16.0	16	45	100	2.0	4	Figure 2	●
P4S1600R03 00NS	16.0	16	45	100	3.0	4	Figure 2	●
P4S2000R01 00NS	20.0	20	45	100	1.0	4	Figure 2	●
P4S2000R02 00NS	20.0	20	45	100	2.0	4	Figure 2	●
P4S2000R03 00NS	20.0	20	45	100	3.0	4	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4S...R...NS

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	—	—	—
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	3.0	3.0	0.9	0.025	2.3	3.0
	4.0	4.0	1.2	0.030	3.0	4.0
	5.0	5.0	1.5	0.035	3.8	5.0
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	16.0	16.0	4.8	0.115	12.0	16.0
	20.0	20.0	6.0	0.140	15.0	20.0

(1) Before slot milling, please reduce he cutting speed (rotating speed) to 80% of the value indicated in the table above, and the feed rate (feed rate) to 60%-80%.

(2) Please use high-precision machines and cutter shanks, and water-soluble cutting fluids are recommended.

(3) The down milling is recommended.

Series P--High performance end mills

Four-flute R end mill (necking structure)

P4P...R...NS

P Series

41°

38°

DC≤12 0,-0.02

DC>12 0,-0.03

r±0.01

Type	Basic dimension (mm)								Inventory
	DC	DCON	APMX	LU	DN	LF	RE	ZEFP	
P4P0600R00 50NS	6.0	6	6	18	5.8	75	0.5	4	●
P4P0600R01 00NS	6.0	6	6	18	5.8	75	1.0	4	●
P4P0800R00 50NS	8.0	8	8	24	7.8	100	0.5	4	●
P4P0800R01 00NS	8.0	8	8	24	7.8	100	1.0	4	●
P4P1000R00 50NS	10.0	10	10	30	9.6	100	0.5	4	●
P4P1000R01 00NS	10.0	10	10	30	9.6	100	1.0	4	●
P4P1000R02 00NS	10.0	10	10	30	9.6	100	2.0	4	●
P4P1200R00 50NS	12.0	12	12	36	11.5	100	0.5	4	●
P4P1200R01 00NS	12.0	12	12	36	11.5	100	1.0	4	●
P4P1200R02 00NS	12.0	12	12	36	11.5	100	2.0	4	●
P4P1600R01 00NS	16.0	16	16	40	15.5	150	1.0	4	●
P4P1600R02 00NS	16.0	16	16	40	15.5	150	2.0	4	●

●Running stock ○Make-to-order

P			M	K	N		S	H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC
☼	☼	☼	☼	☼			☼	☼		≥60HRC

☼ Fit well ☼ Applicable

Recommended cutting conditions--P4P...R...NS

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	—	—	—
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

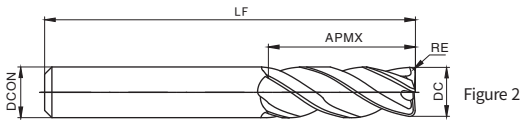
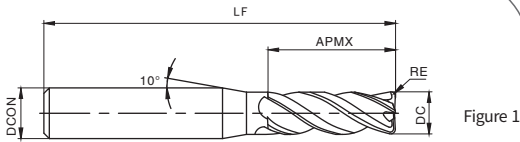
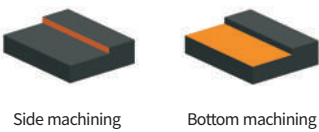
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
	Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)
	6.0	6.0	1.8	0.045	4.5	6.0
	8.0	8.0	2.4	0.060	6.0	8.0
	10.0	10.0	3.0	0.070	7.5	10.0
	12.0	12.0	3.6	0.085	9.0	12.0
	16.0	16.0	4.8	0.115	12.0	16.0

- (1) Before slot milling, please reduce he cutting speed (rotating speed) to 80% of the value indicated in the table above, and the feed rate (feed rate) to 60%-80%.
- (2) Please use high-precision machines and cutter shanks, and water-soluble cutting fluids are recommended.
- (3) The down milling is recommended.

Series P--High performance end mills

Four-flute R end mill (short flute structure)

P4S...R...HH



P Series

45°

42°

DC≤12 0,-0.02

DC>12 0,-0.03

45°

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
P4S0300R00 20HH	3.0	6	8	50	0.2	4	Figure 1	●
P4S0400R00 30HH	4.0	6	10	50	0.3	4	Figure 1	●
P4S0400R00 50HH	4.0	6	10	50	0.5	4	Figure 1	●
P4S0500R00 50HH	5.0	6	13	50	0.5	4	Figure 1	●
P4S0500R01 00HH	5.0	6	13	50	1.0	4	Figure 1	●
P4S0600R00 50HH	6.0	6	16	50	0.5	4	Figure 2	●
P4S0600R01 00HH	6.0	6	16	50	1.0	4	Figure 2	●
P4S0800R00 50HH	8.0	8	20	60	0.5	4	Figure 2	●
P4S0800R01 00HH	8.0	8	20	60	1.0	4	Figure 2	●
P4S1000R00 50HH	10.0	10	25	75	0.5	4	Figure 2	●
P4S1000R01 00HH	10.0	10	25	75	1.0	4	Figure 2	●
P4S1000R02 00HH	10.0	10	25	75	2.0	4	Figure 2	●
P4S1000R03 00HH	10.0	10	25	75	3.0	4	Figure 2	●
P4S1200R00 50HH	12.0	12	30	75	0.5	4	Figure 2	●
P4S1200R01 00HH	12.0	12	30	75	1.0	4	Figure 2	●
P4S1200R02 00HH	12.0	12	30	75	2.0	4	Figure 2	●
P4S1200R03 00HH	12.0	12	30	75	3.0	4	Figure 2	●
P4S1600R01 00HH	16.0	16	45	100	1.0	4	Figure 2	●
P4S1600R02 00HH	16.0	16	45	100	2.0	4	Figure 2	●
P4S1600R03 00HH	16.0	16	45	100	3.0	4	Figure 2	●
P4S2000R01 00HH	20.0	20	45	100	1.0	4	Figure 2	●
P4S2000R02 00HH	20.0	20	45	100	2.0	4	Figure 2	●
P4S2000R03 00HH	20.0	20	45	100	3.0	4	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼		☼					☼	☼	☼

✱ Fit well ✱ Applicable

Recommended cutting conditions--P4S...R...HH

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	—	—	—
	Martensite stainless steel	< 820	< 240	—	—	—
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	—	—	—
	Titanium alloy	<2100	< 400	—	—	—
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	60	70	80

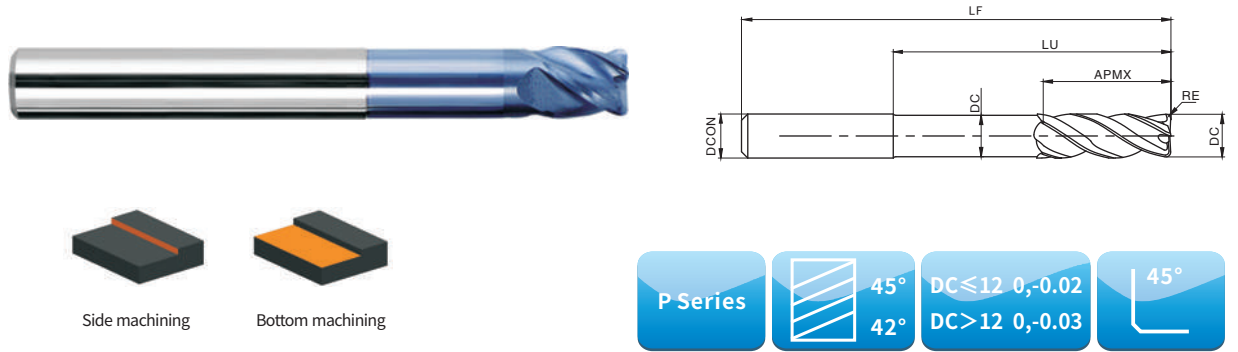
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)			
3.0	3.0	0.9	0.025			
4.0	4.0	1.2	0.030			
5.0	5.0	1.5	0.035			
6.0	6.0	1.8	0.045			
8.0	8.0	2.4	0.060			
10.0	10.0	3.0	0.070			
12.0	12.0	3.6	0.085			
16.0	16.0	4.8	0.115			
20.0	20.0	6.0	0.140			

- (1) Please use high precision machines and cutter shanks.
- (2) Use cutting fluid that is air-cooled or free of producing smoke.
- (3) If the rotating speed of machine is insufficient, decrease the feed rate in the same proportion.

Series P--High performance end mills

Four-flute R end mill (necking structure)

P4P...R...HH



Type	Basic dimension (mm)								Inventory
	DC	DCON	APMX	LU	DN	LF	RE	ZEFP	
P4P0600R00 50HH	6.0	6	6	18	5.8	75	0.5	4	●
P4P0600R01 00HH	6.0	6	6	18	5.8	75	1.0	4	●
P4P0800R00 50HH	8.0	8	8	24	7.8	100	0.5	4	●
P4P0800R01 00HH	8.0	8	8	24	7.8	100	1.0	4	●
P4P1000R00 50HH	10.0	10	10	30	9.6	100	0.5	4	●
P4P1000R01 00HH	10.0	10	10	30	9.6	100	1.0	4	●
P4P1000R02 00HH	10.0	10	10	30	9.6	100	2.0	4	●
P4P1200R00 50HH	12.0	12	12	36	11.5	100	0.5	4	●
P4P1200R01 00HH	12.0	12	12	36	11.5	100	1.0	4	●
P4P1200R02 00HH	12.0	12	12	36	11.5	100	2.0	4	●
P4P1600R01 00HH	16.0	16	16	40	15.5	150	1.0	4	●
P4P1600R02 00HH	16.0	16	16	40	15.5	150	2.0	4	●

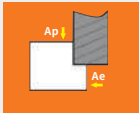
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼		☼					☼	☼	☼

✱ Fit well ✱ Applicable

Recommended cutting conditions--P4P...R...HH

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	—	—	—
	Martensite stainless steel	< 820	< 240	—	—	—
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	—	—	—
	Titanium alloy	<2100	< 400	—	—	—
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	60	70	80

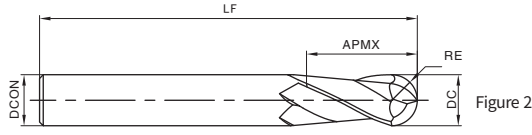
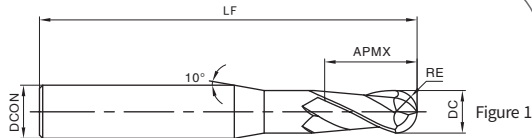
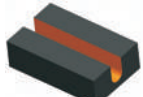
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)			
6.0	6.0	1.8	0.045			
8.0	8.0	2.4	0.060			
10.0	10.0	3.0	0.070			
12.0	12.0	3.6	0.085			
16.0	16.0	4.8	0.115			

- (1) Please use high precision machines and cutter shanks.
- (2) Use cutting fluid that is air-cooled or free of producing smoke.
- (3) If the rotating speed of machine is insufficient, decrease the feed rate in the same proportion.

Series P--High performance end mills

Two-flute ball nose end mill (short flute structure)

P2S...BLG



P Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

R±0.005

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
P2SR00 50BLG	1.0	6	2	50	0.5	2	Figure 1	●
P2SR00 75BLG	1.5	6	3	50	0.75	2	Figure 1	●
P2SR01 00BLG	2.0	6	4	50	1.0	2	Figure 1	●
P2SR01 25BLG	2.5	6	5	50	1.25	2	Figure 1	●
P2SR01 50BLG	3.0	6	6	50	1.5	2	Figure 1	●
P2SR01 75BLG	3.5	6	8	50	2.0	2	Figure 1	●
P2SR02 00BLG	4.0	6	8	50	2.0	2	Figure 1	●
P2SR02 50BLG	5.0	6	10	50	2.5	2	Figure 1	●
P2SR02 75BLG	5.5	6	12	50	2.75	2	Figure 1	●
P2SR03 00BLG	6.0	6	12	50	3.0	2	Figure 2	●
P2SR03 50BLG	7.0	8	14	60	3.5	2	Figure 1	●
P2SR04 00BLG	8.0	8	16	60	4.0	2	Figure 2	●
P2SR04 50BLG	9.0	10	18	75	4.5	2	Figure 1	●
P2SR05 00BLG	10.0	10	20	75	5.0	2	Figure 2	●
P2SR06 00BLG	12.0	12	24	75	6.0	2	Figure 2	●
P2SR07 00BLG	14.0	14	28	75	7.0	2	Figure 2	●
P2SR08 00BLG	16.0	16	32	100	8.0	2	Figure 2	●
P2SR10 00BLG	20.0	20	40	100	10.0	2	Figure 2	●

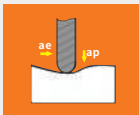
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--P2S...BLG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	—	—	—

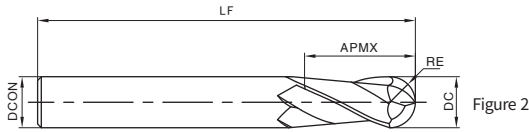
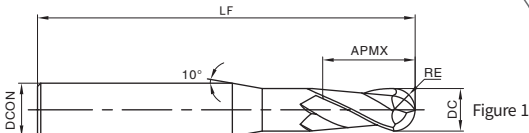
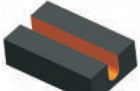
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.03xDc)	ae (0.03xDc)	fz (mm/z)			
1.0	0.03	0.03	0.012			
1.5	0.045	0.045	0.015			
2.0	0.06	0.06	0.018			
2.5	0.075	0.075	0.020			
3.0	0.09	0.09	0.025			
3.5	0.105	0.105	0.025			
4.0	0.12	0.12	0.030			
5.0	0.15	0.15	0.035			
5.5	0.165	0.165	0.035			
6.0	0.18	0.18	0.045			
7.0	0.21	0.21	0.050			
8.0	0.24	0.24	0.060			
9.0	0.27	0.27	0.065			
10.0	0.30	0.30	0.070			
12.0	0.36	0.36	0.085			
14.0	0.42	0.42	0.100			
16.0	0.48	0.48	0.115			
20.0	0.60	0.60	0.140			

(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
(4) The tool overhang is as short as possible without affecting the use.

Series P--High performance end mills

Two-flute ball nose end mill (short flute structure)

P2S...BLH



P Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

R ±0.005

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
P2SR0050BLH	1.0	6	2	50	0.5	2	Figure 1	●
P2SR0075BLH	1.5	6	3	50	0.75	2	Figure 1	●
P2SR0100BLH	2.0	6	4	50	1.0	2	Figure 1	●
P2SR0125BLH	2.5	6	5	50	1.25	2	Figure 1	●
P2SR0150BLH	3.0	6	6	50	1.5	2	Figure 1	●
P2SR0175BLH	3.5	6	8	50	2.0	2	Figure 1	●
P2SR0200BLH	4.0	6	8	50	2.0	2	Figure 1	●
P2SR0250BLH	5.0	6	10	50	2.5	2	Figure 1	●
P2SR0275BLH	5.5	6	12	50	2.75	2	Figure 1	●
P2SR0300BLH	6.0	6	12	50	3.0	2	Figure 2	●
P2SR0350BLH	7.0	8	14	60	3.5	2	Figure 1	●
P2SR0400BLH	8.0	8	16	60	4.0	2	Figure 2	●
P2SR0450BLH	9.0	10	18	75	4.5	2	Figure 1	●
P2SR0500BLH	10.0	10	20	75	5.0	2	Figure 2	●
P2SR0600BLH	12.0	12	24	75	6.0	2	Figure 2	●
P2SR0700BLH	14.0	14	28	75	7.0	2	Figure 2	●
P2SR0800BLH	16.0	16	32	100	8.0	2	Figure 2	●
P2SR1000BLH	20.0	20	40	100	10.0	2	Figure 2	●

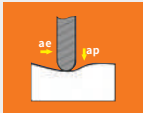
● Running stock ○ Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54—60HRC	≥60HRC
✱	✱	✱	✱	✱			✱	✱	✱	✱	✱

✱ Fit well ✱ Applicable

Recommended cutting conditions--P2S...BLH

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	60	70	80

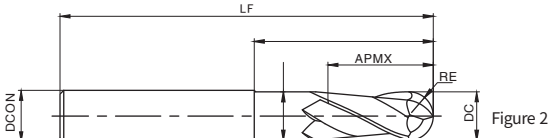
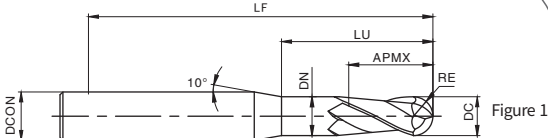
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.03xDc)	ae (0.03xDc)	fz (mm/z)			
1.0	0.03	0.03	0.012			
1.5	0.045	0.045	0.015			
2.0	0.06	0.06	0.018			
2.5	0.075	0.075	0.020			
3.0	0.09	0.09	0.025			
3.5	0.105	0.105	0.025			
4.0	0.12	0.12	0.030			
5.0	0.15	0.15	0.035			
5.5	0.165	0.165	0.035			
6.0	0.18	0.18	0.045			
7.0	0.21	0.21	0.050			
8.0	0.24	0.24	0.060			
9.0	0.27	0.27	0.065			
10.0	0.30	0.30	0.070			
12.0	0.36	0.36	0.085			
14.0	0.42	0.42	0.100			
16.0	0.48	0.48	0.115			
20.0	0.60	0.60	0.140			

(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
(4) The tool overhang is as short as possible without affecting the use.

Series P--High performance end mills

Two-flute ball nose end mill(necking structure)

P2P...BLG



P Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

R±0.005

Type	Basic dimension (mm)								Pattern	Inventory
	DC	DCON	APMX	LU	DN	LF	RE	ZEFP		
P2PR00 50BLG	1.0	6	1	2.5	0.95	75	0.5	2	Figure 1	●
P2PR00 75BLG	1.5	6	2	3	1.45	75	0.75	2	Figure 1	●
P2PR01 00BLG	2.0	6	2	4	1.95	75	1.0	2	Figure 1	●
P2PR01 50BLG	3.0	6	3	6	2.85	75	1.5	2	Figure 1	●
P2PR02 00BLG	4.0	6	4	8	3.85	75	2.0	2	Figure 1	●
P2PR02 50BLG	5.0	6	5	10	4.85	75	2.5	2	Figure 1	●
P2PR03 00BLG	6.0	6	6	12	5.8	75	3.0	2	Figure 2	●
P2PR04 00BLG	8.0	8	8	16	7.8	100	4.0	2	Figure 2	●
P2PR05 00BLG	10.0	10	10	20	9.6	100	5.0	2	Figure 2	●
P2PR06 00BLG	12.0	12	12	24	11.5	100	6.0	2	Figure 2	●
P2PR08 00BLG	16.0	16	16	32	15.5	150	8.0	2	Figure 2	●
P2PR10 00BLG	20.0	20	20	40	19.5	150	10.0	2	Figure 2	●

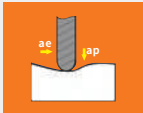
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--P2P...BLG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	—	—	—

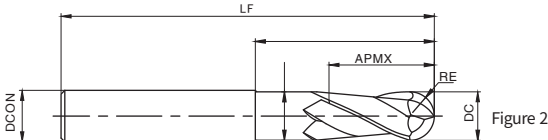
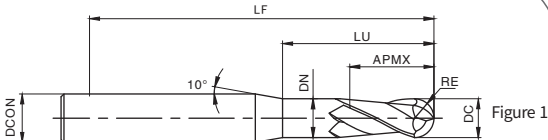
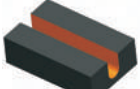
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.03xDc)	ae (0.03xDc)	fz (mm/z)			
1.0	0.03	0.03	0.012			
1.5	0.045	0.045	0.015			
2.0	0.06	0.06	0.018			
3.0	0.09	0.09	0.025			
4.0	0.12	0.12	0.030			
5.0	0.15	0.15	0.035			
6.0	0.18	0.18	0.045			
8.0	0.24	0.24	0.060			
10.0	0.3	0.3	0.070			
12.0	0.36	0.36	0.085			
16.0	0.48	0.48	0.115			
20.0	0.60	0.60	0.140			

(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
(4) The tool overhang is as short as possible without affecting the use.

Series P--High performance end mills

Two-flute ball nose end mill(necking structure)

P2P...BLH



P Series

30°

DC≤12 0,-0.02
DC>12 0,-0.03

R±0.005

Type	Basic dimension (mm)								Pattern	Inventory
	DC	DCON	APMX	LU	DN	LF	RE	ZEFP		
P2PR00 50BLH	1.0	6	1	2.5	0.95	75	0.5	2	Figure 1	●
P2PR00 75BLH	1.5	6	2	3	1.45	75	0.75	2	Figure 1	●
P2PR01 00BLH	2.0	6	2	4	1.95	75	1.0	2	Figure 1	●
P2PR01 50BLH	3.0	6	3	6	2.85	75	1.5	2	Figure 1	●
P2PR02 00BLH	4.0	6	4	8	3.85	75	2.0	2	Figure 1	●
P2PR02 50BLH	5.0	6	5	10	4.85	75	2.5	2	Figure 1	●
P2PR03 00BLH	6.0	6	6	12	5.8	75	3.0	2	Figure 2	●
P2PR04 00BLH	8.0	8	8	16	7.8	100	4.0	2	Figure 2	●
P2PR05 00BLH	10.0	10	10	20	9.6	100	5.0	2	Figure 2	●
P2PR06 00BLH	12.0	12	12	24	11.5	100	6.0	2	Figure 2	●
P2PR08 00BLH	16.0	16	16	32	15.5	150	8.0	2	Figure 2	●
P2PR10 00BLH	20.0	20	20	40	19.5	150	10.0	2	Figure 2	●

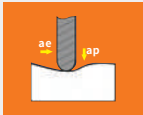
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼		☼					☼	☼	☼

✱ Fit well ✱ Applicable

Recommended cutting conditions--P2P...BLH

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	70	100	130
	High hardness steel	—	> 60 HRC	60	70	80

Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.03xDc)	ae (0.03xDc)	fz (mm/z)			
1.0	0.03	0.03	0.012			
1.5	0.045	0.045	0.015			
2.0	0.06	0.06	0.018			
3.0	0.09	0.09	0.025			
4.0	0.12	0.12	0.030			
5.0	0.15	0.15	0.035			
6.0	0.18	0.18	0.045			
8.0	0.24	0.24	0.060			
10.0	0.3	0.3	0.070			
12.0	0.36	0.36	0.085			
16.0	0.48	0.48	0.115			
20.0	0.60	0.60	0.140			

- (1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
- (2) Air cooling or spray cooling is recommended.
- (3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
- (4) The tool overhang is as short as possible without affecting the use.

Series P--High performance end mills

Four-flute ball nose end mill (short flute structure)

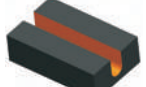
P4S...BNS



Profile machining



Cavity machining



Slot machining

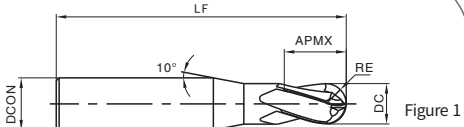


Figure 1

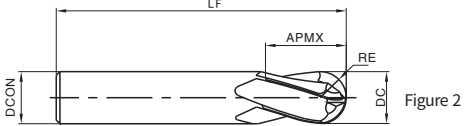


Figure 2

P Series



$DC \leq 12$
 $0,-0.02$
 $H > 10$

$R \pm 0.01$

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
P4SR01 50BNS	3.0	6	6	50	1.5	4	Figure 1	●
P4SR02 00BNS	4.0	6	8	50	2.0	4	Figure 1	●
P4SR02 50BNS	5.0	6	10	50	2.5	4	Figure 1	●
P4SR03 00BNS	6.0	6	12	50	3.0	4	Figure 2	●
P4SR04 00BNS	8.0	8	16	60	4.0	4	Figure 2	●
P4SR05 00BNS	10.0	10	20	75	5.0	4	Figure 2	●
P4SR06 00BNS	12.0	12	24	75	6.0	4	Figure 2	●
P4SR07 00BNS	14.0	14	28	75	7.0	4	Figure 2	●
P4SR08 00BNS	16.0	16	32	100	8.0	4	Figure 2	●
P4SR09 00BNS	18.0	18	36	100	9.0	4	Figure 2	●
P4SR10 00BNS	20.0	20	40	100	10.0	4	Figure 2	●

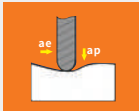
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

✱ Fit well ✱ Applicable

Recommended cutting conditions--P4S···BNS

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	—	< 54HRC	—	—	—
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

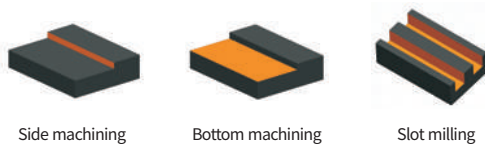
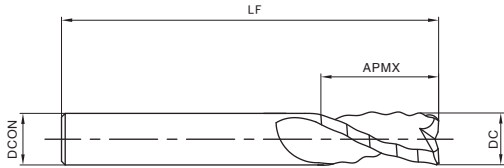
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.1xDc)	ae (0.1xDc)	fz (mm/z)			
3.0	0.3	0.3	0.025			
4.0	0.4	0.4	0.030			
5.0	0.5	0.5	0.035			
6.0	0.6	0.6	0.045			
8.0	0.8	0.8	0.060			
10.0	1.0	1.0	0.070			
12.0	1.2	1.2	0.085			
14.0	1.4	1.4	0.100			
16.0	1.6	1.6	0.115			
18.0	1.8	1.8	0.130			
20.0	2.0	2.0	0.140			

(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should be lowered in the same proportion.
(4) The tool overhang is as short as possible without affecting the use.

Series X--Special end mills

Three-flute corrugated edge flat end mill

X3S···WLN



X Series

30°

DC
DC:h10

45°

Type	Basic dimension (mm)					Inventory
	DC	DCON	APMX	LF	ZEFP	
X3S0600WLN	6.0	6	16	50	3	●
X3S0800WLN	8.0	8	20	60	3	●
X3S1000WLN	10.0	10	25	75	3	●
X3S1200WLN	12.0	12	30	75	3	●
X3S1600WLN	16.0	16	45	100	3	●
X3S2000WLN	20.0	20	45	100	3	●

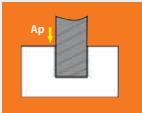
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
						☼					

☼ Fit well ☼ Applicable

Recommended cutting conditions--X3S...WLN

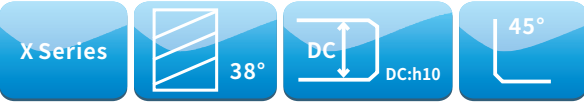
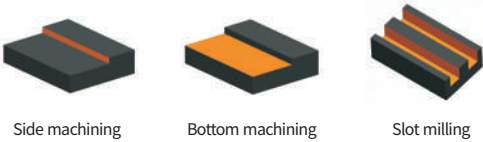
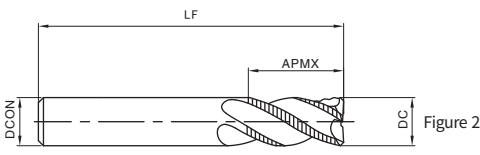
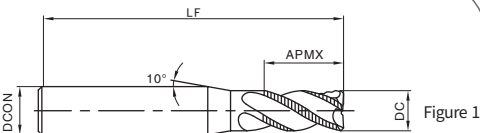
Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	—	—	—
	Alloy steel	< 1200	< 350	—	—	—
	High-alloyed steel and tool steel	< 1400	< 380	—	—	—
M	Austenite and ferrite stainless steel	< 680	<220	—	—	—
	Martensite stainless steel	< 820	< 240	—	—	—
K	Gray cast iron	—	< 280	—	—	—
	Ductile iron	—	< 320	—	—	—
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	150	200	300
S	High-temp alloy	< 3300	< 350	—	—	—
	Titanium alloy	<2100	< 400	—	—	—
H	High hardness steel	—	< 54HRC	—	—	—
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0	16.0	4.8	0.115	12.0	16.0	0.095
20.0	20.0	6.0	0.140	15.0	20.0	0.120

Series X--Special end mills

Four-flute corrugated edge flat end mill

X4S...WNG



Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
X4S0600WNG	6.0	6	16	50	4	Figure 2	●
X4S0700WNG	7.0	8	20	60	4	Figure 1	●
X4S0800WNG	8.0	8	20	60	4	Figure 2	●
X4S0900WNG	9.0	10	22	75	4	Figure 1	●
X4S1000WNG	10.0	10	25	75	4	Figure 2	●
X4S1100WNG	11.0	12	26	75	4	Figure 1	●
X4S1200WNG	12.0	12	30	75	4	Figure 2	●
X4S1600WNG	16.0	16	45	100	4	Figure 2	●
X4S2000WNG	20.0	20	45	100	4	Figure 2	●

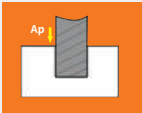
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼					☼		

☼ Fit well ☼ Applicable

Recommended cutting conditions--X4S···WNG

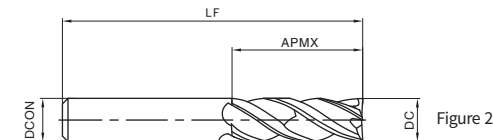
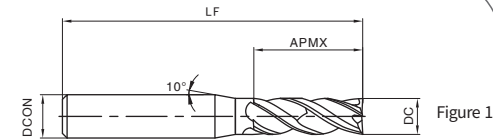
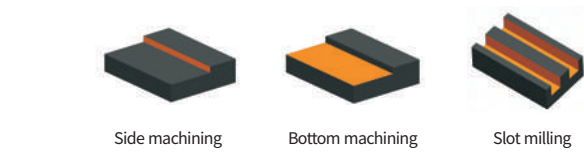
Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	—	< 280	120	150	180
	Ductile iron	—	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	—	—	—
	Aluminum alloy	< 530	< 130	—	—	—
S	High-temp alloy	< 3300	< 350	—	—	—
	Titanium alloy	<2100	< 400	—	—	—
H	High hardness steel	—	< 54HRC	90	120	150
	High hardness steel	—	54—60HRC	—	—	—
	High hardness steel	—	> 60 HRC	—	—	—

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
7.0	7.0	2.1	0.055	5.3	7.0	0.045
8.0	8.0	2.4	0.060	6.0	8.0	0.050
9.0	9.0	2.7	0.065	6.8	9.0	0.055
10.0	10.0	3.0	0.070	7.5	10.0	0.060
11.0	11.0	3.3	0.080	8.3	11.0	0.065
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0	16.0	4.8	0.115	12.0	16.0	0.095
20.0	20.0	6.0	0.140	15.0	20.0	0.120

Series X--Special end mills

Four-flute flat end mill

X4S···HG



X Series

45°

42°

DC≤12 0,-0.02

DC>12 0,-0.03

45°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
X4S0400HG	4.0	6	11	50	4	Figure 1	●
X4S0500HG	5.0	6	13	50	4	Figure 1	●
X4S0600HG	6.0	6	16	50	4	Figure 2	●
X4S0800HG	8.0	8	20	60	4	Figure 2	●
X4S1000HG	10.0	10	25	75	4	Figure 2	●
X4S1200HG	12.0	12	30	75	4	Figure 2	●
X4S1600HG	16.0	16	45	100	4	Figure 2	●
X4S2000HG	20.0	20	45	100	4	Figure 2	●

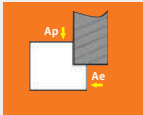
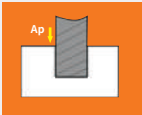
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--X4S···HG

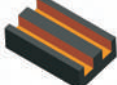
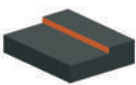
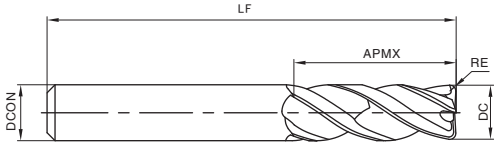
Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	–	< 280	120	150	180
	Ductile iron	–	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	–	–	–
	Aluminum alloy	< 530	< 130	–	–	–
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	–	< 54HRC	90	120	150
	High hardness steel	–	54–60HRC	70	100	130
	High hardness steel	–	> 60 HRC	–	–	–

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0	16.0	4.8	0.115	12.0	16.0	0.095
20.0	20.0	6.0	0.140	15.0	20.0	0.120

Series X--Special end mills

Four-flute R end mill

X4S···R···HG



X Series



45°
42°

DC≤12 0,-0.02

DC>12 0,-0.03



45°

Type	Basic dimension (mm)						Inventory
	DC	DCON	APMX	LF	RE	ZEFP	
X4S0600R0050HG	6.0	6	16	50	0.5	4	●
X4S0600R0100HG	6.0	6	16	50	1.0	4	●
X4S0800R0050HG	8.0	8	20	60	0.5	4	●
X4S0800R0100HG	8.0	8	20	60	1.0	4	●
X4S1000R0050HG	10.0	10	25	75	0.5	4	●
X4S1000R0100HG	10.0	10	25	75	1.0	4	●
X4S1000R0200HG	10.0	10	25	75	2.0	4	●
X4S1200R0050HG	12.0	12	30	75	0.5	4	●
X4S1200R0100HG	12.0	12	30	75	1.0	4	●
X4S1200R0200HG	12.0	12	30	75	2.0	4	●
X4S1600R0100HG	16.0	16	45	100	1.0	4	●
X4S1600R0200HG	16.0	16	45	100	2.0	4	●
X4S1600R0300HG	16.0	16	45	100	3.0	4	●
X4S2000R0100HG	20.0	20	45	100	1.0	4	●
X4S2000R0200HG	20.0	20	45	100	2.0	4	●
X4S2000R0300HG	20.0	20	45	100	3.0	4	●

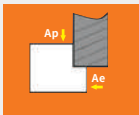
●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼	☼	☼	

☼ Fit well ☼ Applicable

Recommended cutting conditions--X4S···R···HG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite stainless steel	< 680	<220	80	110	140
	Martensite stainless steel	< 820	< 240	60	90	120
K	Gray cast iron	–	< 280	120	150	180
	Ductile iron	–	< 320	90	110	130
N	Non-ferrous alloy	< 250	< 110	–	–	–
	Aluminum alloy	< 530	< 130	–	–	–
S	High-temp alloy	< 3300	< 350	40	50	60
	Titanium alloy	<2100	< 400	60	70	80
H	High hardness steel	–	< 54HRC	90	120	150
	High hardness steel	–	54–60HRC	70	100	130
	High hardness steel	–	> 60 HRC	–	–	–

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
6.0	6.0	1.8	0.025	4.5	6.0	0.020
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0	16.0	4.8	0.115	12.0	16.0	0.095
20.0	20.0	6.0	0.140	15.0	20.0	0.120

Non-standard Customization of Solid Carbide End Mills

Customized tools: a good solution for process optimization and efficiency improvement

Client name:

No.68 Chuangye 2nd RD., Lusong District, Zhuzhou, Hunan, P.R.China

Fax:

Tel.: 0731-28216690
Fax: 0731-22286653
E-mail: zzhrhj@163.com
Postal code: 412000
Website: www.huareal.com.cn

Tool series

☐ Series B
Basic Type

☐ Series P
High Performance Type

☐ Series X
Special Type

☐ Others

Tool type

☐ Flat end mill

☐ Chamfered flat end mill

☐ Radius mill

☐ Ball nose mill

☐ Flat end taper mill

☐ Ball nose taper mill

☐ Others

Shank type

☐ Straight shank

☐ Shank with flat DIN 6535HB

☐ Straight shank DIN 6535HA

☐ Others

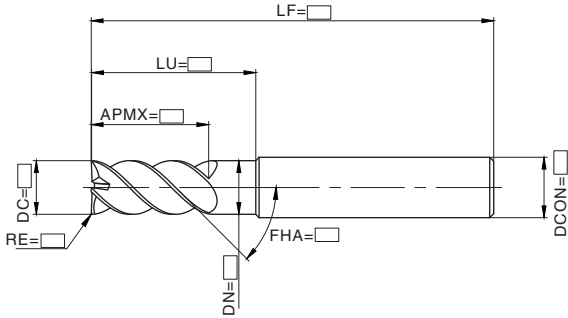
Diameter range (Φ3~Φ20mm)

Number of tool edges

The end edge is through the center (Yes/No)

Coated (Yes/No)

Tool information



Application

Type of machine

Internal coolant (Yes/No)

Cooling type

Machining method

Clamping form

Cutting speed (Vc)

Feed per revolution (Fz)

Cutting depth (Ap)

Cutting width (Ae)

Notes (Sketches or drawings of machined parts will be needed if the above workpiece types cannot be described in detail):

Order quantity: Pieces

Expected delivery date: MM DD YYYY

Date: Signature:

B177

B178



HD

Short hole drills series



BD

Solid carbide drill

Selection guidance of indexable short hole drilling tools

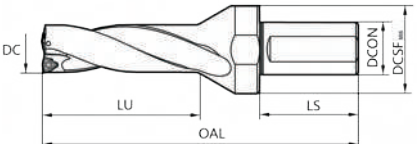
● Tool shape

● Tool type

Indexable short hole drilling

HD01 2D Series

Tool specification column
(including model, basic size, applicable inserts and accessories)



Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF _{MS}	LS	LU	OAL			
HD01-2D-440-S40	○	44	40	60	70	91	193	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-2D-450-S40	○	45	40	60	70	93	195			
HD01-2D-460-S40	○	46	40	60	70	95	197			
HD01-2D-470-S40	○	47	40	60	70	97	199			
HD01-2D-480-S40	○	48	40	70	70	99	201			
HD01-2D-490-S40	○	49	40	70	70	101	203			
HD01-2D-500-S40	○	50	40	70	70	103	205			

● Running stock ○ Make-to-order

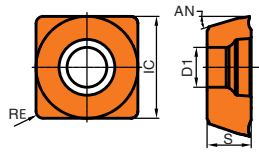


Indexable short hole drills

- ◆ Overview of drilling tools ----- C1
- ◆ Code key of indexable short hole drilling tools----- C2
- ◆ Code key of indexable short hole drilling inserts ----- C3-C4
- ◆ Indexable short hole drilling tools----- C5-C10
- ◆ Indexable short hole drilling inserts ----- C11
- ◆ Recommended cutting parameters for indexable short hole drilling tools----- C12
- ◆ Technical information of indexable short hole drilling tools ----- C14-C16

Selection guidance of indexable short hole drilling inserts

Indexable short hole drilling insert



Working condition: ● Stable ● Average ✱ Tough

Workpiece material	Insert shape	Type	Basic dimension (mm)					CVD			PVD				
			IC	S	RE	D1	AN	HR8115	HR8125	HR8225	HR5110	HR5120	HR5130	HR7125	HR7225
P Steel		SPMG050204DG-DX	5.00	2.38	0.4	2.25	14°	☆				☆	★		
M Stainless steel		SPMG060204DG-DX	6.00	2.38	0.4	2.61	14°	☆				☆	★		
K Cast iron		SPMG07T308DG-DX	7.94	3.97	0.8	2.85	15.5°	☆				☆	★		
N Non-ferrous metal		SPMG090408DG-DX	9.80	4.30	0.8	4.05	17.5°	☆				☆	★		
S Heat-resistant alloy Titanium alloy		SPMG110408DG-DX	11.50	4.80	0.8	4.50	16.5°	☆				☆	★		

★ Recommended grade ☆ Available grade

Insert specification column
(including model, basic size and grade)

Solid carbide drills

- ◆ Code key of solid carbide drills ----- C18
- ◆ Specification and parameters recommendation of solid carbide drills --- C19-C56
- ◆ Technical information of solid carbide drill----- C57-C58
- ◆ Non-standard customization of solid carbide drills----- C59
- ◆ Non-standard customization of solid carbide reamers----- C60



Overview of drilling tools

Tool type	Tool series	Size range (mm)	Tool shape	Cooling method	Applicable inserts	Workpiece material					
						P	M	K	N	S	H
Indexable short hole drill	HD01	Ø16-50		Internal cooling	WCMX□□	*	*	*		*	
	HD02	Ø16-42		Internal cooling	SPMG□□	*	*	*		*	
Solid carbide drill	BD03	Ø3-20		External cooling	/	*	*	*		*	
	BD03C	Ø3-20		Internal cooling	/	*	*	*		*	
	BD05	Ø3-20		External cooling	/	*	*	*		*	
	BD05C	Ø3-20		Internal cooling	/	*	*	*		*	
	BD08C	Ø3-20		Internal cooling	/	*	*	*		*	

* Fit well ✱ Applicable



Code key of indexable short hole drilling tools

HD **01** - **2D** - **150** - **S** **20**

① ② ③ ④ ⑤ ⑥

① Short hole drilling series		② Series number		③ Length-diameter ratio		④ Tool diameter	
		01	With WC insert	2D	Length-diameter ratio: 2	150	15mm
		02	With SP insert	3D	Length-diameter ratio: 3	200	20mm
				5D	Length-diameter ratio: 5	250	25mm
						...	...
⑤ Shank type		⑥ Sizes of tool installation parts					
S		20	20mm				
		25	25mm				
		...	...				

Code key of indexable short hole drilling inserts

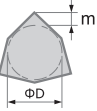
S P M G

① ② ③ ④

07 T3 08 R - DX

⑤ ⑥ ⑦ ⑧ ⑨

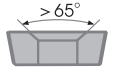
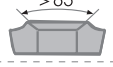
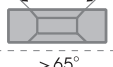
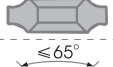
① Shape code	
S	
W	

③ Tolerance (mm)							
							
Class	Corner height (m)	Inscribed circle (ΦD)	Thickness (S)	Class	Corner height (m)	Inscribed circle (ΦD)	Thickness (S)
A	± 0.005	± 0.025	± 0.025	J	± 0.005	± 0.025	± 0.025
F	± 0.005	± 0.013	± 0.025	K	± 0.005	± 0.013	± 0.025
C	± 0.013	± 0.025	± 0.025	L	± 0.013	± 0.025	± 0.025
H	± 0.013	± 0.013	± 0.025	M	± 0.013	± 0.013	± 0.025
E	± 0.025	± 0.025	± 0.025	N	± 0.025	± 0.025	± 0.025
G	± 0.025	± 0.025	± 0.13	U	± 0.025	± 0.025	± 0.13

⑤ Cutting edge length		
Code	Insert shape	
	W	S
03	3.8	
04	4.3	
05	5.4	5.0
06	6.5	6.0
07		7.94
08	8.7	
09		9.8
11		11.5

⑥ Insert thickness			
			
Code	Thickness (mm)	Code	Thickness (mm)
00	0.79	05	5.96
T0	0.99	T5	5.95
01	1.59	06	6.35
T1	1.98	T6	6.75
02	2.38	07	7.94
T2	2.58	09	9.52
03	3.18	T9	11.11
T3	3.97	11	12.70
04	4.76	12	
T4	4.96		

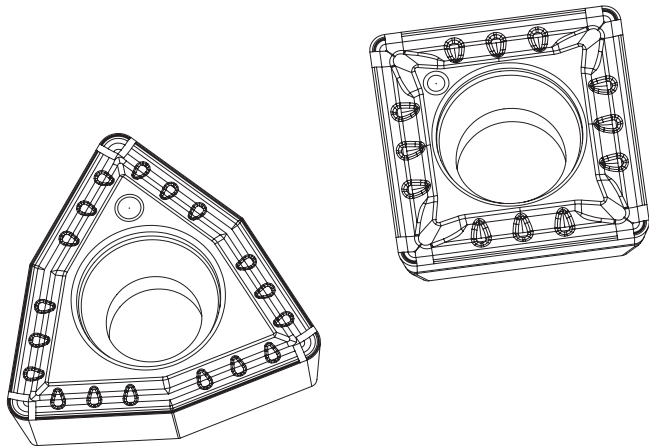
② Cutting edge clearance angle major			
Code	Clearance angle	Code	Clearance angle
A		B	
C		D	
E		F	
G		N	
P		O	Others

④ Chip breaker and clamping form							
Code	Hole	Chip breaker	Chip breaker	Code	Hole	Chip breaker	Chip breaker
B	Y	N/A		N	N/A	N/A	
H	Y	Single-sided		R	N/A	Single-sided	
C	Y	N/A		F	N/A	Double-sided	
J	Y	Double-sided		A	Y	N/A	
W	Y	N/A		M	Y	Single-sided	
T	Y	Single-sided		G	Y	Double-sided	
Q	Y	N/A		X	---	---	Exception
U	Y	Double-sided					

⑦ Corner radius	
Code	Description
04	0.4mm
08	0.8mm
12	1.2mm

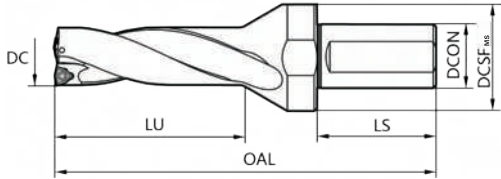
⑧ Cutting direction	
Code	Direction
R	Right
L	Left
N	Two-way

⑨ Chip breaker code	
---------------------	--



Indexable short hole drilling

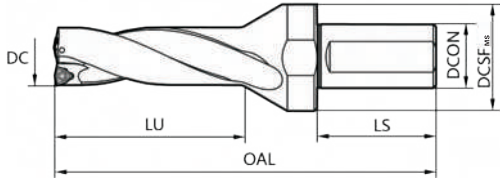
HD01 2D Series



Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF _{MS}	LS	LU	OAL			
HD01-2D-160-S25	●	16	25	32	56	35	106	WCMX030204-DX WCMX030208-DX	M2.5*6.5-60	WR07
HD01-2D-170-S25	○	17	25	32	56	37	108			
HD01-2D-180-S25	○	18	25	32	56	39	116			
HD01-2D-190-S25	○	19	25	32	56	41	119			
HD01-2D-200-S25	●	20	25	32	56	43	121	WCMX040204-DX WCMX040208-DX	M2.5*6.5T-60	WR08
HD01-2D-210-S25	○	21	25	45	56	45	125			
HD01-2D-220-S25	○	22	25	45	56	47	126			
HD01-2D-230-S25	○	23	25	45	56	49	128			
HD01-2D-240-S25	○	24	25	45	56	51	130	WCMX050308-DX		
HD01-2D-250-S25	●	25	25	45	56	53	132			
HD01-2D-260-S32	○	26	32	55	60	55	133			
HD01-2D-270-S32	○	27	32	55	60	57	135			
HD01-2D-280-S32	○	28	32	55	60	59	139	WCMX06T308-DX	M3.0*7.0-60	WR09
HD01-2D-290-S32	○	29	32	55	60	61	141			
HD01-2D-300-S32	●	30	32	55	60	63	143			
HD01-2D-310-S40	○	31	40	60	70	65	146			
HD01-2D-320-S40	○	32	40	60	70	67	147	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-2D-330-S40	○	33	40	60	70	69	150			
HD01-2D-340-S40	○	34	40	60	70	71	166			
HD01-2D-350-S40	○	35	40	60	70	73	168			
HD01-2D-360-S40	○	36	40	60	70	75	170	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-2D-370-S40	○	37	40	60	70	77	172			
HD01-2D-380-S40	○	38	40	60	70	79	174			
HD01-2D-390-S40	○	39	40	60	70	81	176			
HD01-2D-400-S40	●	40	40	60	70	83	178	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-2D-410-S40	○	41	40	60	70	85	180			
HD01-2D-420-S40	○	42	40	60	70	87	189			
HD01-2D-430-S40	○	43	40	60	70	89	191			

Indexable short hole drilling

HD01 2D Series

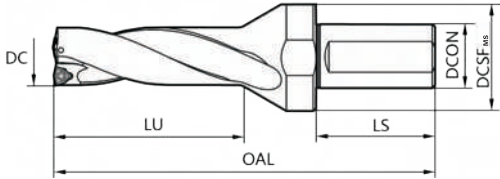


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF _{MS}	LS	LU	OAL			
HD01-2D-440-S40	○	44	40	60	70	91	193	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-2D-450-S40	○	45	40	60	70	93	195			
HD01-2D-460-S40	○	46	40	60	70	95	197			
HD01-2D-470-S40	○	47	40	60	70	97	199			
HD01-2D-480-S40	○	48	40	70	70	99	201			
HD01-2D-490-S40	○	49	40	70	70	101	203			
HD01-2D-500-S40	○	50	40	70	70	103	205			

●Running stock ○Make-to-order

Indexable short hole drilling

HD01 3D Series

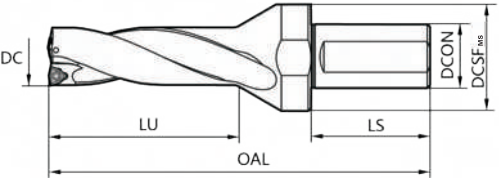


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF _{ms}	LS	LU	OAL			
HD01-3D-160-S25	●	16	25	32	56	52	129	WCMX030204-DX WCMX030208-DX	M2.5*6.5-60	WR07
HD01-3D-170-S25	○	17	25	32	56	55	133			
HD01-3D-180-S25	○	18	25	32	56	58	137			
HD01-3D-190-S25	○	19	25	32	56	61	140			
HD01-3D-200-S25	●	20	25	32	56	64	143	WCMX040204-DX WCMX040208-DX	M2.5*6.5T-60	WR08
HD01-3D-210-S25	○	21	25	45	56	67	153			
HD01-3D-220-S25	○	22	25	45	56	70	156			
HD01-3D-230-S25	○	23	25	45	56	73	159			
HD01-3D-240-S25	○	24	25	45	56	76	162	WCMX050308-DX		
HD01-3D-250-S25	●	25	25	45	56	79	165			
HD01-3D-260-S32	○	26	32	55	60	83	176			
HD01-3D-270-S32	○	27	32	55	60	86	180			
HD01-3D-280-S32	○	28	32	55	60	89	184	WCMX06T308-DX	M3.0*7.0-60	WR09
HD01-3D-290-S32	○	29	32	55	60	92	188			
HD01-3D-300-S32	●	30	32	55	60	95	192			
HD01-3D-310-S40	○	31	40	60	70	98	203			
HD01-3D-320-S40	○	32	40	60	70	101	206	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-3D-330-S40	○	33	40	60	70	104	209			
HD01-3D-340-S40	○	34	40	60	70	107	212			
HD01-3D-350-S40	○	35	40	60	70	110	215			
HD01-3D-360-S40	○	36	40	60	70	113	218	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-3D-370-S40	○	37	40	60	70	116	221			
HD01-3D-380-S40	○	38	40	60	70	119	225			
HD01-3D-390-S40	○	39	40	60	70	122	228			
HD01-3D-400-S40	●	40	40	60	70	125	231	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-3D-410-S40	○	41	40	60	70	128	234			
HD01-3D-420-S40	○	42	40	60	70	131	239			
HD01-3D-430-S40	○	43	40	60	70	134	242			

●Running stock ○Make-to-order

Indexable short hole drilling

HD01 3D Series

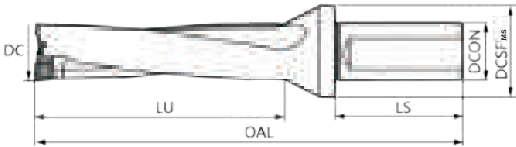


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF _{ms}	LS	LU	OAL			
HD01-3D-440-S40	○	44	40	60	70	137	245	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-3D-450-S40	○	45	40	60	70	140	248			
HD01-3D-460-S40	○	46	40	60	70	143	251			
HD01-3D-470-S40	○	47	40	60	70	146	253			
HD01-3D-480-S40	○	48	40	60	70	149	255			
HD01-3D-490-S40	○	49	40	60	70	152	257			
HD01-3D-500-S40	○	50	40	60	70	155	259			

●Running stock ○Make-to-order

Indexable short hole drilling

HD02 2D Series

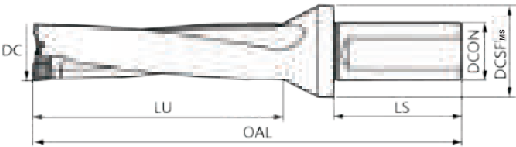


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF _{MS}	LS	LU	OAL			
HD02-2D-160-S20	●	16	20	25	50	35	102	SPMG050204-DX	M2.0*4.3-60	WR06
HD02-2D-170-S20	○	17	20	25	50	37	104	SPMG060204-DX	M2.2*5.5-60	WR07
HD02-2D-180-S25	○	18	25	32	56	39	113			
HD02-2D-190-S25	○	19	25	32	56	41	115			
HD02-2D-200-S25	●	20	25	32	56	43	117			
HD02-2D-210-S25	○	21	25	32	56	45	119			
HD02-2D-220-S25	○	22	25	32	56	47	121	SPMG07T308-DX	M2.5*6.5-60	WR07
HD02-2D-230-S25	○	23	25	32	56	49	123			
HD02-2D-240-S25	○	24	25	32	56	51	125			
HD02-2D-250-S25	●	25	25	32	56	53	127			
HD02-2D-260-S32	○	26	32	32	56	55	129			
HD02-2D-270-S32	○	27	32	32	56	57	131	SPMG090408-DX	M3.5*8.0-60	WR15
HD02-2D-280-S32	○	28	32	37	60	59	139			
HD02-2D-290-S32	○	29	32	37	60	61	141			
HD02-2D-300-S32	●	30	32	37	60	63	143			
HD02-2D-310-S40	○	40	32	37	60	65	145			
HD02-2D-320-S40	○	40	32	37	60	67	147	SPMG110408-DX	M4.0*10.0-60	WR15
HD02-2D-330-S40	○	40	32	37	60	69	149			
HD02-2D-340-S40	○	34	40	47	70	71	166			
HD02-2D-350-S40	○	35	40	47	70	73	168			
HD02-2D-360-S40	○	36	40	47	70	75	170			
HD02-2D-370-S40	○	37	40	47	70	77	172			
HD02-2D-380-S40	○	38	40	47	70	79	174			
HD02-2D-390-S40	○	39	40	47	70	81	176			
HD02-2D-400-S40	●	40	40	47	70	83	178			
HD02-2D-410-S40	○	41	40	47	70	85	180			

●Running stock ○Make-to-order

Indexable short hole drilling

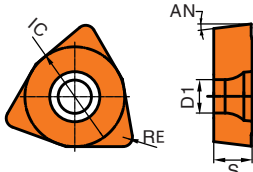
HD02 3D Series



Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF _{MS}	LS	LU	OAL			
HD02-3D-160-S20	●	16	20	25	50	51	117	SPMG050204DG-DX	M2.0*4.3-60	WR06
HD02-3D-170-S20	○	17	20	25	50	54	120	SPMG060204DG-DX	M2.2*5.5-60	WR07
HD02-3D-180-S25	○	18	25	32	56	57	131			
HD02-3D-190-S25	○	19	25	32	56	60	134			
HD02-3D-200-S25	●	20	25	32	56	63	137			
HD02-3D-210-S25	○	21	25	32	56	66	140			
HD02-3D-220-S25	○	22	25	32	56	69	143	SPMG07T308DG-DX	M2.5*6.5-60	WR07
HD02-3D-230-S25	○	23	25	32	56	72	147			
HD02-3D-240-S25	○	24	25	32	56	75	150			
HD02-3D-250-S25	●	25	25	32	56	78	153			
HD02-3D-260-S32	○	26	32	32	56	81	156			
HD02-3D-270-S32	○	27	32	32	56	84	160	SPMG090408DG-DX	M3.5*8.0-60	WR15
HD02-3D-280-S32	○	28	32	37	60	87	169			
HD02-3D-290-S32	○	29	32	37	60	90	172			
HD02-3D-300-S32	●	30	32	37	60	93	175			
HD02-3D-310-S40	○	31	40	37	60	96	178			
HD02-3D-320-S40	○	32	40	37	60	99	181	SPMG110408DG-DX	M4.0*10.0-60	WR15
HD02-3D-330-S40	○	33	40	37	60	102	184			
HD02-3D-340-S40	○	34	40	47	70	105	200			
HD02-3D-350-S40	○	35	40	47	70	108	203			
HD02-3D-360-S40	○	36	40	47	70	111	206			
HD02-3D-370-S40	○	37	40	47	70	114	209			
HD02-3D-380-S40	○	38	40	47	70	117	212			
HD02-3D-390-S40	○	39	40	47	70	120	215			
HD02-3D-400-S40	●	40	40	47	70	123	218			
HD02-3D-410-S40	○	41	40	47	70	126	221			

●Running stock ○Make-to-order

Indexable short hole drilling insert

		Workpiece material	P Steel	●	●	●●	●	●●	●					
			M Stainless steel				●	●●	●	●●	●●			
			K Cast iron				●	●●	●					
			N Non-ferrous metal											
			S Heat-resistant alloy Titanium alloy											
Insert shape	Type	Basic dimension (mm)					CVD			PVD				
		IC	S	RE	D1	AN	HR8115	HR8125	HR8225	HR5110	HR5120	HR5130	HR7125	HR7225
	WCMX030204-DX	5.56	2.38	0.4	2.55	7°	☆				☆	★		
	WCMX030208-DX	5.56	2.38	0.8	2.55	7°	☆				☆	★		
	WCMX040204-DX	6.35	2.38	0.4	2.80	7°	☆				☆	★		
	WCMX040208-DX	6.35	2.38	0.8	2.80	7°	☆				☆	★		
	WCMX050308-DX	7.94	3.18	0.8	3.20	7°	☆				☆	★		
	WCMX06T308-DX	9.525	3.97	0.8	3.70	7°	☆				☆	★		
	WCMX080412-DX	12.70	4.76	1.2	4.30	7°	☆				☆	★		

★ Recommended grade ☆ Available grade

		Workpiece material	P Steel	●	●	●●	●	●●	●					
			M Stainless steel				●	●●	●	●●	●●			
			K Cast iron				●	●●	●					
			N Non-ferrous metal											
			S Heat-resistant alloy Titanium alloy											
Insert shape	Type	Basic dimension (mm)					CVD			PVD				
		IC	S	RE	D1	AN	HR8115	HR8125	HR8225	HR5110	HR5120	HR5130	HR7125	HR7225
	SPMG050204-DX	5.00	2.38	0.4	2.25	14°	☆				☆	★		
	SPMG060204-DX	6.00	2.38	0.4	2.61	14°	☆				☆	★		
	SPMG07T308-DX	7.94	3.97	0.8	2.85	15.5°	☆				☆	★		
	SPMG090408-DX	9.80	4.30	0.8	4.05	17.5°	☆				☆	★		
	SPMG110408-DX	11.50	4.80	0.8	4.50	16.5°	☆				☆	★		

★ Recommended grade ☆ Available grade

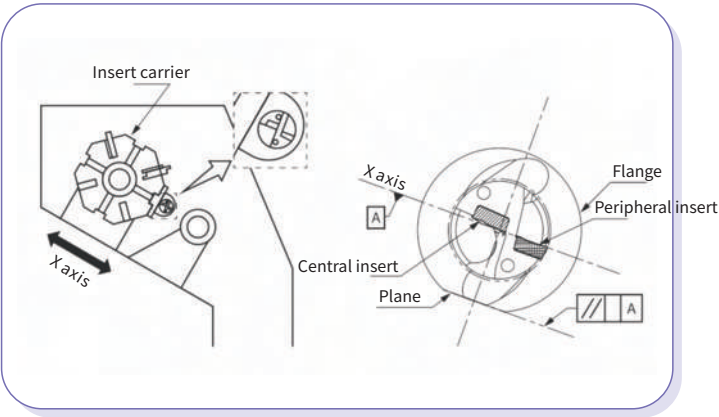
Recommended cutting parameters for indexable short hole drilling

ISO	Workpiece material		Brinell hardness	Cutting speed vc m/min	Feed rate fn (mm/r)				
					Diameter of drill bit (mm)				
					16-20	20-25	25-30	30-35	35-50
P	Non-alloyed steel	C ≤ 0.10%	125	70-200	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
		0.10 < C ≤ 0.25%	125	70-180	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
		0.25 < C ≤ 0.55%	150	70-150	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
		0.55 < C ≤ 0.80%	170	70-130	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
	High carbon Steel	Carbon tool steel	210	70-130	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
		Non-hardened	180	80-180	0.04-0.08	0.05-0.10	0.08-0.22	0.15-0.28	0.23-0.38
	Low-alloyed steel	Quenching and tempering	275	70-150	0.04-0.08	0.05-0.10	0.08-0.22	0.15-0.28	0.23-0.38
		Quenching and tempering	350	70-150	0.04-0.08	0.05-0.10	0.08-0.22	0.15-0.28	0.23-0.38
	High-alloyed steel	Annealing	200	55-110	0.04-0.08	0.05-0.10	0.08-0.22	0.15-0.28	0.23-0.38
		Quenching and tempering	325	55-110	0.04-0.08	0.05-0.10	0.08-0.22	0.15-0.28	0.23-0.38
M	Cast steel	Non-alloyed	180	55-110	0.04-0.08	0.05-0.09	0.07-0.20	0.16-0.27	0.22-0.36
		Low alloy (alloy composition < 5%)	200	55-110	0.04-0.08	0.05-0.09	0.07-0.20	0.16-0.27	0.22-0.36
	Stainless steel	Unquenched/ferrite/martensite	200	80-180	0.04-0.09	0.06-0.11	0.10-0.20	0.17-0.29	0.25-0.38
		Austenite, quenching	200	80-180	0.04-0.09	0.06-0.10	0.10-0.20	0.17-0.29	0.25-0.38
		Austenite, precipitation hardening stainless steel (PH stainless steel)	300	80-180	0.04-0.09	0.06-0.10	0.10-0.20	0.17-0.25	0.21-0.33
		Austenite- ferrite, duplex stainless steel	230	80-180	0.04-0.09	0.06-0.10	0.10-0.20	0.17-0.25	0.21-0.33
	Malleable cast iron	Ferrite	200	100-200	0.04-0.10	0.10-0.15	0.11-0.22	0.17-0.29	0.25-0.38
		Pearlite	260	100-200	0.04-0.10	0.10-0.15	0.11-0.22	0.17-0.29	0.25-0.38
	Grey cast iron	Low tensile strength	180	120-220	0.04-0.10	0.10-0.15	0.11-0.22	0.17-0.29	0.25-0.38
		High tensile strength/austenite	245	120-220	0.04-0.10	0.10-0.15	0.11-0.22	0.17-0.29	0.25-0.38
K	Ductile iron	Ferrite	155	100-200	0.04-0.10	0.10-0.15	0.11-0.22	0.17-0.29	0.25-0.38
		Pearlite	265	100-200	0.04-0.10	0.10-0.15	0.11-0.22	0.17-0.29	0.25-0.38
		GGV (CGI)	230						
	Wrought aluminum alloy	Non-aging	30	150-300	0.05-0.12	0.09-0.16	0.15-0.23	0.19-0.27	0.21-0.33
		Ageable and aged	100	150-300	0.05-0.12	0.09-0.16	0.15-0.23	0.19-0.27	0.21-0.33
		≤ 12% silicon, non-aging	75	150-300	0.05-0.12	0.09-0.16	0.15-0.23	0.19-0.27	0.21-0.33
		≤ 12% silicon, ageable and aged	90	150-300	0.05-0.12	0.09-0.16	0.15-0.23	0.19-0.27	0.21-0.33
	Foundry aluminum alloy	> 12% silicon, non-aging	130	150-300	0.05-0.12	0.09-0.16	0.15-0.23	0.19-0.27	0.21-0.33
N	Magnesium alloy		70						
	Copper and copper alloy (Bronze/ brass)	Non-alloyed, electrolytic copper	100	150-300	0.05-0.12	0.09-0.16	0.15-0.23	0.19-0.27	0.21-0.33
		Brass, bronze, red brass	90	150-300	0.05-0.12	0.09-0.16	0.15-0.23	0.19-0.27	0.21-0.33
		Copper alloy, short chip	110	150-300	0.05-0.12	0.09-0.16	0.15-0.23	0.19-0.27	0.21-0.33
		Ampco alloy of high strength	300	150-300	0.05-0.12	0.09-0.16	0.15-0.23	0.19-0.27	0.21-0.33
	Iron-based alloy	Iron-based	200	10-55	0.07-0.10	0.09-0.14	0.13-0.20	0.19-0.25	0.23-0.30
		Aged	280	10-55	0.07-0.10	0.09-0.14	0.13-0.20	0.19-0.25	0.23-0.30
S	Nickel-based or cobalt-based	Annealing	250	10-55	0.07-0.10	0.09-0.14	0.13-0.20	0.19-0.25	0.23-0.30
		Aged	350	10-55	0.07-0.10	0.09-0.14	0.13-0.20	0.19-0.25	0.23-0.30
		Casting	320	10-55	0.07-0.10	0.09-0.14	0.13-0.20	0.19-0.25	0.23-0.30
	Titanium alloy	Pure titanium	200	30-60	0.07-0.10	0.09-0.14	0.13-0.20	0.19-0.25	0.23-0.30
		α phase alloy	375	30-60	0.07-0.10	0.09-0.14	0.13-0.20	0.19-0.25	0.23-0.30
		α and β phase alloys, aged	375	30-60	0.07-0.10	0.09-0.14	0.13-0.20	0.19-0.25	0.23-0.30
		β phase alloy	410	30-60	0.07-0.10	0.09-0.14	0.13-0.20	0.19-0.25	0.23-0.30

Precautions for indexable short hole drilling

1 Precautions for short hole drilling in lathe

- I. The peripheral insert is mounted parallel to the X axis of the equipment.
- II. The peripheral insert should be mounted towards the operator. With upper and lower turrets on the lathe, if the drill bit needs to be mounted on the lower one, The peripheral insert should face towards the operator.



2 Adjustment method of center height:

The center height of the central insert is about 0.05 mm lower than the center (design state). If the turntable is staggered from the spindle center, the center may be too high or the core may be too low. It is very important to check the center height of the inner insert in order to stabilize the machining.

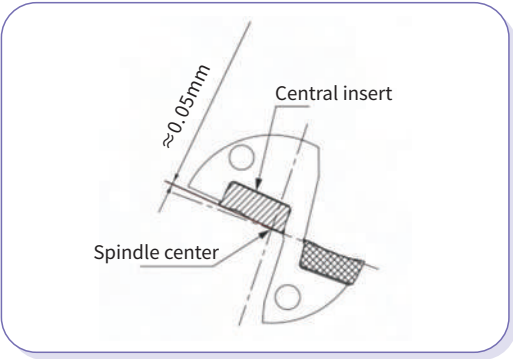


Figure 2
Illustration of center height of the drill bit inner insert

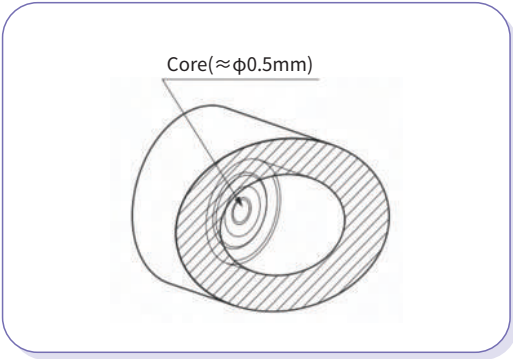


Figure 3
Illustration of core residues in blind hole drilling

I. How to check center height of inner cutter insert:

Check whether the center height setting of the central insert is proper by the cores remaining in the center of the inner end face of the blind hole. If the diameter of residual cores is about 0.5mm, the center height is correct. If there is no core residue at all or the diameter is over 1mm, the center height needs to be adjusted.

- The blind holes used for checking is machined by a feed rate below 0.1 mm/rev and a depth of about 10mm.
- If there is no core residue at all (or it is very small), it is necessary to adjust the center height because the parts around the drill bit center of the inner cutter insert are prone to collapse.

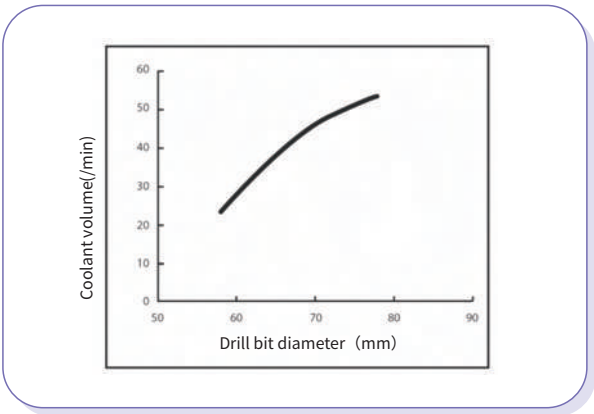
► Short hole drilling and recommended countermeasures

1 Countermeasures to drill hole diameter changes

If the hole diameter gradually shrinks or increases toward the bottom, it is often caused by cutting blockage. It is suggested to adjust the cutting parameters, such as increasing cutting speed and reducing feed rate. If the overall hole diameter is too small, it may be caused by plastic deformation of materials. It is recommended to replace a short hole drilling tool with a long one.

2 Can external cooling be used for short hole drilling?

Given the large amount of chips in short hole drilling, external cooling is not recommended considering the machining efficiency. Meanwhile, the cutting pressure of internal cooling should be ensured for longer tool life and better machining performance.



Recommended relationship between drill bit diameter and coolant volume

3 Chip entanglement is highly possible in the cutting process.

When the material to be cut is sticky and the chip is long, the combination of low speed + large feed or high speed + small feed may be used to solve the problem. If chip entanglement is highly possible from the entrance to 10mm while the cutting is stable after 10mm, the entry machining parameters may be adjusted or segmented cutting can be adopted.

- At a low speed + large feed, thicker chips are produced, which are easy to break and control.
- At a high speed + small feed, thinner chips are produced, and the chip flow direction could be controlled by centrifugal force.
- 1-10mm can be processed by segment cutting, which can be followed by continuous machining.

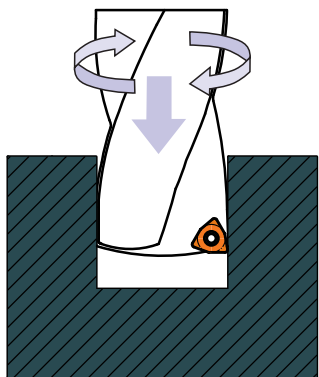
4 There is tool vibration in the cutting process.

Tool vibration may be caused by insufficient feed per revolution during the cutting process. The cutting parameters are adjusted as follows:

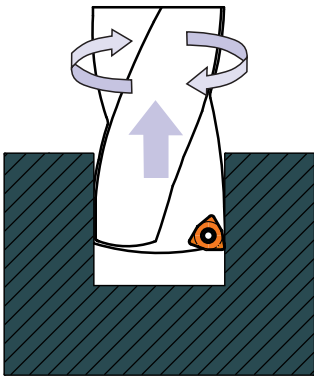
- Increase the feed rate if it is too small.
- If the feed rate is below $f=0.06\text{mm/rev}$, please increase it to $f=0.08-0.12\text{mm/rev}$.
- If the over fast cutting speed causes cutter vibration, decrease to about $V_c=100-150\text{m/rev}$.
- If there are obvious burrs at the drill or the workpiece clamping rigidity is poor, decrease the feed rate to $f=0.07-0.08\text{ mm/rev}$.

5 There are obvious scratches on the surface of the machined hole

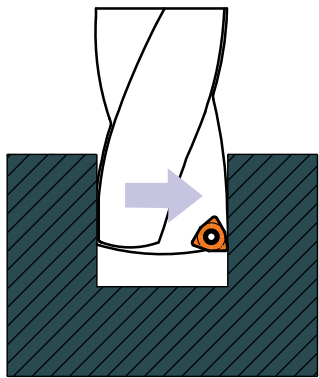
Please change the cutting parameters or optimize the way of returning the insert.



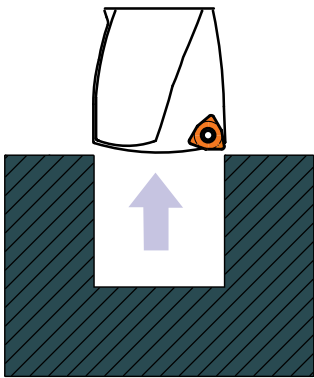
① Rotate to return the insert



② After machining, retract 0.5mm and then return the insert



③ Return the insert eccentrically



④ Return the insert directly

Drilling means and measures of drill bits

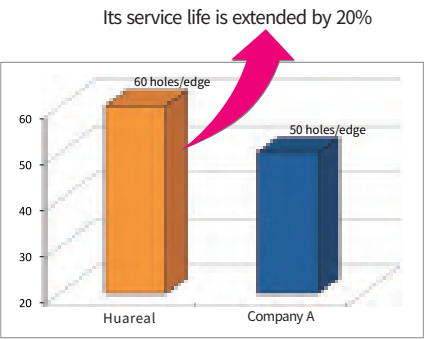
Drilling bit is a key factor for successful drilling. One way to ensure good quality of the hole is to ensure that the drilling surface of the workpiece is perpendicular to the central axis of the drill bit. In addition, the indexable short hole drilling may also be used to process convex, concave, inclined and irregular drilling surfaces by adjusting the feed rate.

Workpiece surface	Solutions
	The normal feed rate can be adopted for convex surface, because its machining conditions are relatively good, and the drilling core can contact the workpiece first as expected.
	The surface of the drilling part is inclined, so the cutting edge is subjected to uneven load, which will cause premature wear of the cutting edge. If the angle of the inclined surface exceeds 2°, decrease the feed rate to 1/3 of the recommended value.
	Usually, the drill bit axis deviates from the center when drilling into a concave surface, for which the feed rate is reduced to 1/3 of the recommended value.
	When drilling an asymmetric curved surface, the drill bit may deviate from the center. So its feed rate should be smaller than that of drilling a concave surface.
	A danger of insert collapse may occur when drilling into irregular surfaces, so the feed rate must be reduced at the beginning of drilling. This may also occur when the drill bit drills through the material, so the feed must also be reduced.

Application

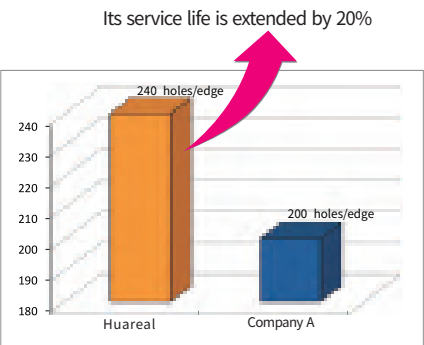
Coupler drilling

- Workpiece material 40CrMo
- Machining method External cooling drilling
- Insert WCMX0080412-DX HR5130
- Tool type HD01-3D-440-S40
- Machining parameters Vc=76.3m/min, f=0.133mm/r



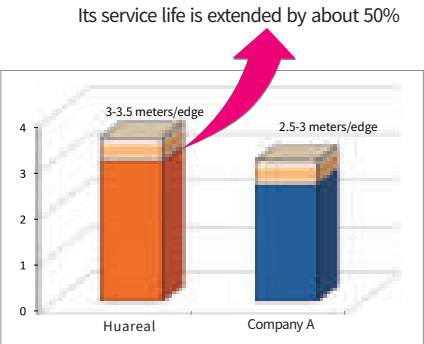
Flange drilling

- Workpiece material Stainless steel SUS304
- Machining method Drill hole D=14.5mm,Depth= 25mm
- Insert SPMG050204-DX HR5130
- Tool type HD02-2D-170-S20
- Machining parameters Vc=159.4m/min, f=0.034mm/r (Ra≤1.6um)



Condenser tube sheet drilling

- Workpiece material Stainless steel 304
- Machining method Internal cooling drilling D23.5
- Insert SPMG07T308-DX HR5130
- Tool type HD02-3D-250-S25
- Machining parameters Vc=140m/min, fn=0.10mm/r



Selection guidance of solid carbide drills

● Tool outline drawing

● Tool type

● Product specification drawing

● Helical angle, coating, insert diameter tolerance, etc.

BD03 Series



BD Series

3 × D

m7

140°

h6

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03A1650	16.50	18.00	123	73	48	45.2	Figure 1	●
BD03A1690	16.90	18.00	123	73	48	44.6	Figure 1	○
BD03A1700	17.00	18.00	123	73	48	44.4	Figure 1	●
BD03A1750	17.50	18.00	123	73	48	43.6	Figure 1	●
BD03A1755	17.55	18.00	123	73	48	43.5	Figure 1	○
BD03A1790	17.90	18.00	123	73	48	42.9	Figure 1	○
BD03A1800	18.00	18.00	123	73	48	42.7	Figure 2	●
BD03A1830	18.30	20.00	131	79	50	48.2	Figure 1	○
BD03A1850	18.50	20.00	131	79	50	47.9	Figure 1	●
BD03A1890	18.90	20.00	131	79	50	47.2	Figure 1	○
BD03A1900	19.00	20.00	131	79	50	47.0	Figure 1	●
BD03A1930	19.30	20.00	131	79	50	46.5	Figure 1	○
BD03A1950	19.50	20.00	131	79	50	46.2	Figure 1	●
BD03A1955	19.55	20.00	131	79	50	46.1	Figure 1	○
BD03A1990	19.90	20.00	131	79	50	45.5	Figure 1	○
BD03A2000	20.00	20.00	131	79	50	45.4	Figure 2	●

● Running stock ○ Make-to-order

● Product order number

● Basic dimension

● Pattern

● Inventory

P			M	K	N		S	H			
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
✱	✱	✱	✱	✱			✱	✱			

✱ Fit well ✱ Applicable

● Range of workpiece materials

Code key of solid carbide drilling tools

BD

03

C

A

1000

① Product series

BD	Cost-effective
----	----------------

② Length series (length-diameter ratio)

03	3 × D Series
05	5 × D Series
08	8 × D Series

③ Cooling method

C	Internal cooling
Default	External cooling

④ Shank form

A	Straight shank (DIN 6535HA)
B	Whistle notch shank (DIN 6535HE)

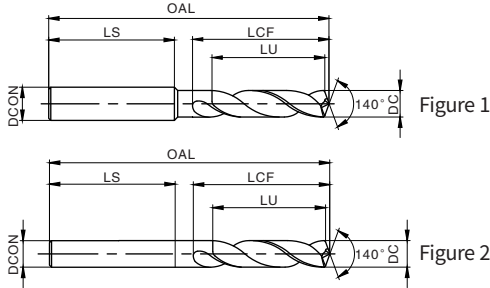
⑤ Diameter

0300	3mm
0600	6mm
1000	10mm
1200	12mm
1600	16mm
2000	20mm



Solid carbide drill

BD03 Series



BD Series

3 × D

m7

140°

h6

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03A0300	3.00	6.00	62	20	36	15.0	Figure 1	●
BD03A0310	3.10	6.00	62	20	36	14.8	Figure 1	●
BD03A0317	3.17	6.00	62	20	36	14.7	Figure 1	○
BD03A0320	3.20	6.00	62	20	36	14.6	Figure 1	●
BD03A0325	3.25	6.00	62	20	36	14.5	Figure 1	○
BD03A0330	3.30	6.00	62	20	36	14.4	Figure 1	●
BD03A0340	3.40	6.00	62	20	36	14.3	Figure 1	●
BD03A0350	3.50	6.00	62	20	36	14.1	Figure 1	●
BD03A0357	3.57	6.00	62	20	36	14.0	Figure 1	○
BD03A0360	3.60	6.00	62	20	36	13.9	Figure 1	●
BD03A0370	3.70	6.00	62	20	36	13.8	Figure 1	●
BD03A0380	3.80	6.00	66	24	36	17.6	Figure 1	●
BD03A0390	3.90	6.00	66	24	36	17.4	Figure 1	●
BD03A0397	3.97	6.00	66	24	36	17.3	Figure 1	○
BD03A0400	4.00	6.00	66	24	36	17.3	Figure 1	●
BD03A0410	4.10	6.00	66	24	36	17.1	Figure 1	●
BD03A0420	4.20	6.00	66	24	36	16.9	Figure 1	●
BD03A0430	4.30	6.00	66	24	36	16.8	Figure 1	●
BD03A0437	4.37	6.00	66	24	36	16.6	Figure 1	○
BD03A0440	4.40	6.00	66	24	36	16.6	Figure 1	●
BD03A0445	4.45	6.00	66	24	36	16.5	Figure 1	○
BD03A0450	4.50	6.00	66	24	36	16.4	Figure 1	●
BD03A0460	4.60	6.00	66	24	36	16.3	Figure 1	●
BD03A0465	4.65	6.00	66	24	36	16.2	Figure 1	○
BD03A0470	4.70	6.00	66	24	36	16.1	Figure 1	●
BD03A0476	4.76	6.00	66	28	36	20.0	Figure 1	○
BD03A0480	4.80	6.00	66	28	36	19.9	Figure 1	●
BD03A0490	4.90	6.00	66	28	36	19.8	Figure 1	●

●Running stock ○Make-to-order

BD03 Series

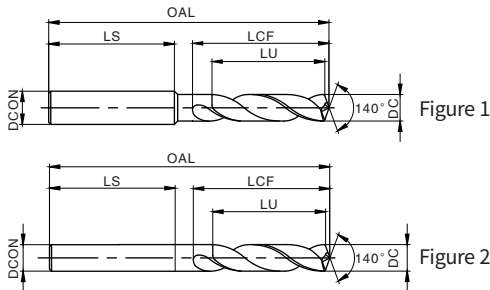
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03A0500	5.00	6.00	66	28	36	19.6	Figure 1	●
BD03A0510	5.10	6.00	66	28	36	19.4	Figure 1	●
BD03A0516	5.16	6.00	66	28	36	19.3	Figure 1	○
BD03A0520	5.20	6.00	66	28	36	19.3	Figure 1	●
BD03A0530	5.30	6.00	66	28	36	19.1	Figure 1	●
BD03A0540	5.40	6.00	66	28	36	18.9	Figure 1	●
BD03A0550	5.50	6.00	66	28	36	18.7	Figure 1	●
BD03A0555	5.55	6.00	66	28	36	18.7	Figure 1	○
BD03A0556	5.56	6.00	66	28	36	18.6	Figure 1	●
BD03A0560	5.60	6.00	66	28	36	18.6	Figure 1	●
BD03A0565	5.65	6.00	66	28	36	18.5	Figure 1	●
BD03A0570	5.70	6.00	66	28	36	18.4	Figure 1	●
BD03A0575	5.75	6.00	66	28	36	18.3	Figure 1	○
BD03A0580	5.80	6.00	66	28	36	18.2	Figure 1	●
BD03A0590	5.90	6.00	66	28	36	18.1	Figure 1	●
BD03A0595	5.95	6.00	66	28	36	18.0	Figure 1	○
BD03A0600	6.00	6.00	66	28	36	17.9	Figure 2	●
BD03A0610	6.10	8.00	79	34	36	23.7	Figure 1	●
BD03A0620	6.20	8.00	79	34	36	23.6	Figure 1	●
BD03A0630	6.30	8.00	79	34	36	23.4	Figure 1	●
BD03A0635	6.35	8.00	79	34	36	23.3	Figure 1	○
BD03A0640	6.40	8.00	79	34	36	23.2	Figure 1	●
BD03A0650	6.50	8.00	79	34	36	23.1	Figure 1	●
BD03A0660	6.60	8.00	79	34	36	22.9	Figure 1	●
BD03A0670	6.70	8.00	79	34	36	22.7	Figure 1	●
BD03A0675	6.75	8.00	79	34	36	22.6	Figure 1	○
BD03A0680	6.80	8.00	79	34	36	22.6	Figure 1	●
BD03A0690	6.90	8.00	79	34	36	22.4	Figure 1	●
BD03A0700	7.00	8.00	79	34	36	22.2	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD03 Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03A0710	7.10	8.00	79	41	36	29.1	Figure 1	●
BD03A0714	7.14	8.00	79	41	36	29.0	Figure 1	○
BD03A0720	7.20	8.00	79	41	36	28.9	Figure 1	●
BD03A0730	7.30	8.00	79	41	36	28.7	Figure 1	●
BD03A0740	7.40	8.00	79	41	36	28.6	Figure 1	●
BD03A0745	7.45	8.00	79	41	36	28.5	Figure 1	○
BD03A0750	7.50	8.00	79	41	36	28.4	Figure 1	●
BD03A0754	7.54	8.00	79	41	36	28.3	Figure 1	○
BD03A0760	7.60	8.00	79	41	36	28.2	Figure 1	●
BD03A0765	7.65	8.00	79	41	36	28.1	Figure 1	○
BD03A0770	7.70	8.00	79	41	36	28.0	Figure 1	●
BD03A0780	7.80	8.00	79	41	36	27.9	Figure 1	●
BD03A0790	7.90	8.00	79	41	36	27.7	Figure 1	●
BD03A0794	7.94	8.00	79	41	36	27.6	Figure 1	○
BD03A0800	8.00	8.00	79	41	36	27.5	Figure 2	●
BD03A0810	8.10	10.00	89	47	40	33.4	Figure 1	●
BD03A0820	8.20	10.00	89	47	40	33.2	Figure 1	●
BD03A0830	8.30	10.00	89	47	40	33.0	Figure 1	●
BD03A0833	8.33	10.00	89	47	40	33.0	Figure 1	○
BD03A0840	8.40	10.00	89	47	40	32.9	Figure 1	●
BD03A0850	8.50	10.00	89	47	40	32.7	Figure 1	●
BD03A0855	8.55	10.00	89	47	40	32.6	Figure 1	○
BD03A0860	8.60	10.00	89	47	40	32.5	Figure 1	●
BD03A0870	8.70	10.00	89	47	40	32.4	Figure 1	●
BD03A0873	8.73	10.00	89	47	40	32.3	Figure 1	○
BD03A0880	8.80	10.00	89	47	40	32.2	Figure 1	●
BD03A0890	8.90	10.00	89	47	40	32.0	Figure 1	●
BD03A0900	9.00	10.00	89	47	40	31.9	Figure 1	●

●Running stock ○Make-to-order

BD03 Series

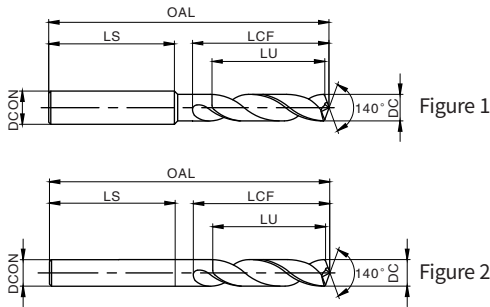
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03A0905	9.05	10.00	89	47	40	31.8	Figure 1	○
BD03A0910	9.10	10.00	89	47	40	31.7	Figure 1	●
BD03A0913	9.13	10.00	89	47	40	31.6	Figure 1	○
BD03A0920	9.20	10.00	89	47	40	31.5	Figure 1	●
BD03A0925	9.25	10.00	89	47	40	31.4	Figure 1	○
BD03A0930	9.30	10.00	89	47	40	31.4	Figure 1	●
BD03A0940	9.40	10.00	89	47	40	31.2	Figure 1	●
BD03A0950	9.50	10.00	89	47	40	31.0	Figure 1	●
BD03A0952	9.52	10.00	89	47	40	31.0	Figure 1	○
BD03A0955	9.55	10.00	89	47	40	30.9	Figure 1	○
BD03A0960	9.60	10.00	89	47	40	30.9	Figure 1	●
BD03A0970	9.70	10.00	89	47	40	30.7	Figure 1	●
BD03A0980	9.80	10.00	89	47	40	30.5	Figure 1	●
BD03A0990	9.90	10.00	89	47	40	30.3	Figure 1	●
BD03A0992	9.92	10.00	89	47	40	30.3	Figure 1	○
BD03A1000	10.00	10.00	89	47	40	30.2	Figure 2	●
BD03A1010	10.10	12.00	102	55	45	38.0	Figure 1	●
BD03A1020	10.20	12.00	102	55	45	37.8	Figure 1	●
BD03A1030	10.30	12.00	102	55	45	37.7	Figure 1	●
BD03A1032	10.32	12.00	102	55	45	37.6	Figure 1	○
BD03A1040	10.40	12.00	102	55	45	37.5	Figure 1	●
BD03A1050	10.50	12.00	102	55	45	37.3	Figure 1	●
BD03A1060	10.60	12.00	102	55	45	37.2	Figure 1	●
BD03A1070	10.70	12.00	102	55	45	37.0	Figure 1	●
BD03A1072	10.72	12.00	102	55	45	37.0	Figure 1	○
BD03A1080	10.80	12.00	102	55	45	36.8	Figure 1	●
BD03A1090	10.90	12.00	102	55	45	36.7	Figure 1	●
BD03A1100	11.00	12.00	102	55	45	36.5	Figure 1	●
BD03A1110	11.10	12.00	102	55	45	36.3	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54~60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD03 Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03A1111	11.11	12.00	102	55	45	36.3	Figure 1	●
BD03A1120	11.20	12.00	102	55	45	36.2	Figure 1	●
BD03A1130	11.30	12.00	102	55	45	36.0	Figure 1	●
BD03A1140	11.40	12.00	102	55	45	35.8	Figure 1	●
BD03A1150	11.50	12.00	102	55	45	35.7	Figure 1	●
BD03A1151	11.51	12.00	102	55	45	35.6	Figure 1	○
BD03A1155	11.55	12.00	102	55	45	35.6	Figure 1	○
BD03A1160	11.60	12.00	102	55	45	35.5	Figure 1	●
BD03A1170	11.70	12.00	102	55	45	35.3	Figure 1	●
BD03A1180	11.80	12.00	102	55	45	35.2	Figure 1	●
BD03A1190	11.90	12.00	102	55	45	35.0	Figure 1	●
BD03A1191	11.91	12.00	102	55	45	35.0	Figure 1	○
BD03A1200	12.00	12.00	102	55	45	34.8	Figure 2	●
BD03A1210	12.10	14.00	107	60	45	39.6	Figure 1	○
BD03A1220	12.20	14.00	107	60	45	39.5	Figure 1	○
BD03A1230	12.30	14.00	107	60	45	39.3	Figure 1	○
BD03A1240	12.40	14.00	107	60	45	39.1	Figure 1	○
BD03A1250	12.50	14.00	107	60	45	39.0	Figure 1	●
BD03A1260	12.60	14.00	107	60	45	38.8	Figure 1	○
BD03A1270	12.70	14.00	107	60	45	38.6	Figure 1	○
BD03A1280	12.80	14.00	107	60	45	38.5	Figure 1	○
BD03A1290	12.90	14.00	107	60	45	38.3	Figure 1	○
BD03A1300	13.00	14.00	107	60	45	38.1	Figure 1	●
BD03A1310	13.10	14.00	107	60	45	38.0	Figure 1	○
BD03A1320	13.20	14.00	107	60	45	37.8	Figure 1	○
BD03A1330	13.30	14.00	107	60	45	37.6	Figure 1	○
BD03A1340	13.40	14.00	107	60	45	37.5	Figure 1	○
BD03A1350	13.50	14.00	107	60	45	37.3	Figure 1	●

●Running stock ○Make-to-order

BD03 Series

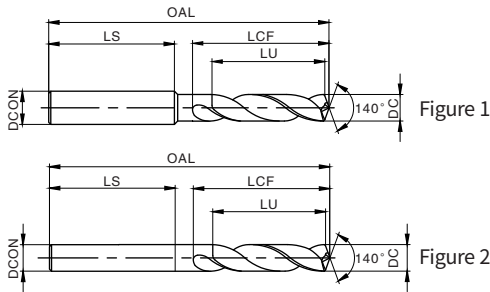
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03A1355	13.55	14.00	107	60	45	37.2	Figure 1	○
BD03A1360	13.60	14.00	107	60	45	37.1	Figure 1	○
BD03A1370	13.70	14.00	107	60	45	37.0	Figure 1	○
BD03A1380	13.80	14.00	107	60	45	36.8	Figure 1	○
BD03A1390	13.90	14.00	107	60	45	36.6	Figure 1	○
BD03A1400	14.00	14.00	107	60	45	36.5	Figure 2	●
BD03A1410	14.10	16.00	115	65	48	41.3	Figure 1	○
BD03A1420	14.20	16.00	115	65	48	41.1	Figure 1	○
BD03A1429	14.29	16.00	115	65	48	41.0	Figure 1	○
BD03A1430	14.30	16.00	115	65	48	40.9	Figure 1	○
BD03A1440	14.40	16.00	115	65	48	40.8	Figure 1	○
BD03A1450	14.50	16.00	115	65	48	40.6	Figure 1	●
BD03A1460	14.60	16.00	115	65	48	40.4	Figure 1	○
BD03A1470	14.70	16.00	115	65	48	40.3	Figure 1	○
BD03A1480	14.80	16.00	115	65	48	40.1	Figure 1	○
BD03A1490	14.90	16.00	115	65	48	39.9	Figure 1	○
BD03A1500	15.00	16.00	115	65	48	39.8	Figure 1	●
BD03A1510	15.10	16.00	115	65	48	39.6	Figure 1	○
BD03A1520	15.20	16.00	115	65	48	39.4	Figure 1	○
BD03A1530	15.30	16.00	115	65	48	39.3	Figure 1	○
BD03A1540	15.40	16.00	115	65	48	39.1	Figure 1	○
BD03A1550	15.50	16.00	115	65	48	38.9	Figure 1	●
BD03A1555	15.55	16.00	115	65	48	38.8	Figure 1	○
BD03A1560	15.60	16.00	115	65	48	38.8	Figure 1	○
BD03A1570	15.70	16.00	115	65	48	38.6	Figure 1	○
BD03A1580	15.80	16.00	115	65	48	38.4	Figure 1	○
BD03A1587	15.87	16.00	115	65	48	38.3	Figure 1	○
BD03A1590	15.90	16.00	115	65	48	38.3	Figure 1	○
BD03A1600	16.00	16.00	115	65	48	38.1	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD03 Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03A1650	16.50	18.00	123	73	48	45.2	Figure 1	●
BD03A1690	16.90	18.00	123	73	48	44.6	Figure 1	○
BD03A1700	17.00	18.00	123	73	48	44.4	Figure 1	●
BD03A1750	17.50	18.00	123	73	48	43.6	Figure 1	●
BD03A1755	17.55	18.00	123	73	48	43.5	Figure 1	○
BD03A1790	17.90	18.00	123	73	48	42.9	Figure 1	○
BD03A1800	18.00	18.00	123	73	48	42.7	Figure 2	●
BD03A1830	18.30	20.00	131	79	50	48.2	Figure 1	○
BD03A1850	18.50	20.00	131	79	50	47.9	Figure 1	●
BD03A1890	18.90	20.00	131	79	50	47.2	Figure 1	○
BD03A1900	19.00	20.00	131	79	50	47.0	Figure 1	●
BD03A1930	19.30	20.00	131	79	50	46.5	Figure 1	○
BD03A1950	19.50	20.00	131	79	50	46.2	Figure 1	●
BD03A1955	19.55	20.00	131	79	50	46.1	Figure 1	○
BD03A1990	19.90	20.00	131	79	50	45.5	Figure 1	○
BD03A2000	20.00	20.00	131	79	50	45.4	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54~60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

Cutting speed recommendations - BD03 Series

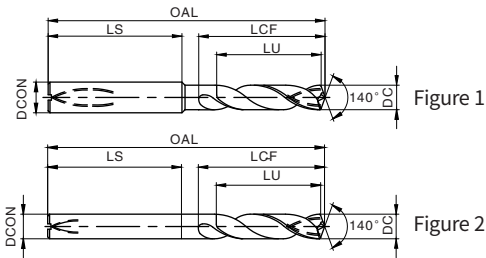
Workpiece material		Strength (N/mm ²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum /min	Optimal /opt	Maximum /max
P	Carbon steel	< 600	< 230	80	90	100
	Alloy steel	< 1200	< 350	60	70	80
	High-alloyed steel and tool steel	< 1400	< 380	50	60	70
M	Austenite and ferrite stainless steel	< 680	<220	30	40	50
	Martensite stainless steel	< 820	< 240	30	40	50
K	Gray cast iron	-	< 280	160	180	200
	Ductile iron	-	< 320	120	140	160
N	Non-ferrous alloy	< 250	< 110	-	-	-
	Aluminum alloy	< 530	< 130	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	< 3300	< 350	15	25	35
	Titanium alloy	<2100	< 400	20	30	40
H	High hardness steel	-	< 54HRC	-	-	-
	High hardness steel	-	52-60HRC	-	-	-
	High hardness steel	-	> 60 HRC	-	-	-

Recommended feed rate - BD03 Series

Workpiece material		Feed per revolution mm/r									
		Φ2~Φ2.5	Φ2.5~Φ3	Φ3~Φ4	Φ4~Φ5	Φ5~Φ6	Φ6~Φ8	Φ8~Φ10	Φ10~Φ12	Φ12~Φ16	Φ16~Φ20
P	Carbon steel	0.100	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500
	Alloy steel	0.080	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.400
	High-alloyed steel and tool steel	0.063	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.315
M	Austenite and ferrite stainless steel	0.050	0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.250
	Martensite stainless steel	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
K	Gray cast iron	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500	0.630	0.630
	Ductile iron	0.125	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.630
N	Non-ferrous alloy	-	-	-	-	-	-	-	-	-	-
	Aluminum alloy	-	-	-	-	-	-	-	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	0.050	0.063	0.080	0.080	0.080	0.125	0.160	0.160	0.200	0.250
	Titanium alloy	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
H	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-

Solid carbide drill

BD03C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03CA0300	3.00	6.00	62	20	36	15.0	Figure 1	●
BD03CA0310	3.10	6.00	62	20	36	14.8	Figure 1	●
BD03CA0317	3.17	6.00	62	20	36	14.7	Figure 1	○
BD03CA0320	3.20	6.00	62	20	36	14.6	Figure 1	●
BD03CA0325	3.25	6.00	62	20	36	14.5	Figure 1	○
BD03CA0330	3.30	6.00	62	20	36	14.4	Figure 1	●
BD03CA0340	3.40	6.00	62	20	36	14.3	Figure 1	●
BD03CA0350	3.50	6.00	62	20	36	14.1	Figure 1	●
BD03CA0357	3.57	6.00	62	20	36	14.0	Figure 1	○
BD03CA0360	3.60	6.00	62	20	36	13.9	Figure 1	●
BD03CA0370	3.70	6.00	62	20	36	13.8	Figure 1	●
BD03CA0380	3.80	6.00	66	24	36	17.6	Figure 1	●
BD03CA0390	3.90	6.00	66	24	36	17.4	Figure 1	●
BD03CA0397	3.97	6.00	66	24	36	17.3	Figure 1	○
BD03CA0400	4.00	6.00	66	24	36	17.3	Figure 1	●
BD03CA0410	4.10	6.00	66	24	36	17.1	Figure 1	●
BD03CA0420	4.20	6.00	66	24	36	16.9	Figure 1	●
BD03CA0430	4.30	6.00	66	24	36	16.8	Figure 1	●
BD03CA0437	4.37	6.00	66	24	36	16.6	Figure 1	○
BD03CA0440	4.40	6.00	66	24	36	16.6	Figure 1	●
BD03CA0445	4.45	6.00	66	24	36	16.5	Figure 1	○
BD03CA0450	4.50	6.00	66	24	36	16.4	Figure 1	●
BD03CA0460	4.60	6.00	66	24	36	16.3	Figure 1	●
BD03CA0465	4.65	6.00	66	24	36	16.2	Figure 1	○
BD03CA0470	4.70	6.00	66	24	36	16.1	Figure 1	●
BD03CA0476	4.76	6.00	66	28	36	20.0	Figure 1	○
BD03CA0480	4.80	6.00	66	28	36	19.9	Figure 1	●
BD03CA0490	4.90	6.00	66	28	36	19.8	Figure 1	●

●Running stock ○Make-to-order

BD03C Series

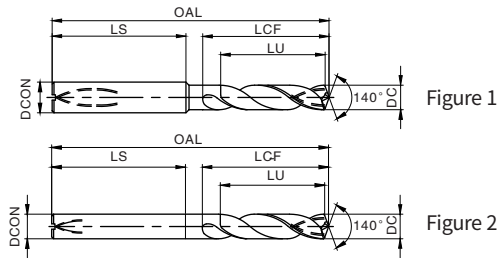
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03CA0500	5.00	6.00	66	28	36	19.6	Figure 1	●
BD03CA0510	5.10	6.00	66	28	36	19.4	Figure 1	●
BD03CA0516	5.16	6.00	66	28	36	19.3	Figure 1	○
BD03CA0520	5.20	6.00	66	28	36	19.3	Figure 1	●
BD03CA0530	5.30	6.00	66	28	36	19.1	Figure 1	●
BD03CA0540	5.40	6.00	66	28	36	18.9	Figure 1	●
BD03CA0550	5.50	6.00	66	28	36	18.7	Figure 1	●
BD03CA0555	5.55	6.00	66	28	36	18.7	Figure 1	○
BD03CA0556	5.56	6.00	66	28	36	18.6	Figure 1	●
BD03CA0560	5.60	6.00	66	28	36	18.6	Figure 1	●
BD03CA0565	5.65	6.00	66	28	36	18.5	Figure 1	●
BD03CA0570	5.70	6.00	66	28	36	18.4	Figure 1	●
BD03CA0575	5.75	6.00	66	28	36	18.3	Figure 1	○
BD03CA0580	5.80	6.00	66	28	36	18.2	Figure 1	●
BD03CA0590	5.90	6.00	66	28	36	18.1	Figure 1	●
BD03CA0595	5.95	6.00	66	28	36	18.0	Figure 1	○
BD03CA0600	6.00	6.00	66	28	36	17.9	Figure 2	●
BD03CA0610	6.10	8.00	79	34	36	23.7	Figure 1	●
BD03CA0620	6.20	8.00	79	34	36	23.6	Figure 1	●
BD03CA0630	6.30	8.00	79	34	36	23.4	Figure 1	●
BD03CA0635	6.35	8.00	79	34	36	23.3	Figure 1	○
BD03CA0640	6.40	8.00	79	34	36	23.2	Figure 1	●
BD03CA0650	6.50	8.00	79	34	36	23.1	Figure 1	●
BD03CA0660	6.60	8.00	79	34	36	22.9	Figure 1	●
BD03CA0670	6.70	8.00	79	34	36	22.7	Figure 1	●
BD03CA0675	6.75	8.00	79	34	36	22.6	Figure 1	○
BD03CA0680	6.80	8.00	79	34	36	22.6	Figure 1	●
BD03CA0690	6.90	8.00	79	34	36	22.4	Figure 1	●
BD03CA0700	7.00	8.00	79	34	36	22.2	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD03C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03CA0710	7.10	8.00	79	41	36	29.1	Figure 1	●
BD03CA0714	7.14	8.00	79	41	36	29.0	Figure 1	○
BD03CA0720	7.20	8.00	79	41	36	28.9	Figure 1	●
BD03CA0730	7.30	8.00	79	41	36	28.7	Figure 1	●
BD03CA0740	7.40	8.00	79	41	36	28.6	Figure 1	●
BD03CA0745	7.45	8.00	79	41	36	28.5	Figure 1	○
BD03CA0750	7.50	8.00	79	41	36	28.4	Figure 1	●
BD03CA0754	7.54	8.00	79	41	36	28.3	Figure 1	○
BD03CA0760	7.60	8.00	79	41	36	28.2	Figure 1	●
BD03CA0765	7.65	8.00	79	41	36	28.1	Figure 1	○
BD03CA0770	7.70	8.00	79	41	36	28.0	Figure 1	●
BD03CA0780	7.80	8.00	79	41	36	27.9	Figure 1	●
BD03CA0790	7.90	8.00	79	41	36	27.7	Figure 1	●
BD03CA0794	7.94	8.00	79	41	36	27.6	Figure 1	○
BD03CA0800	8.00	8.00	79	41	36	27.5	Figure 2	●
BD03CA0810	8.10	10.00	89	47	40	33.4	Figure 1	●
BD03CA0820	8.20	10.00	89	47	40	33.2	Figure 1	●
BD03CA0830	8.30	10.00	89	47	40	33.0	Figure 1	●
BD03CA0833	8.33	10.00	89	47	40	33.0	Figure 1	○
BD03CA0840	8.40	10.00	89	47	40	32.9	Figure 1	●
BD03CA0850	8.50	10.00	89	47	40	32.7	Figure 1	●
BD03CA0855	8.55	10.00	89	47	40	32.6	Figure 1	○
BD03CA0860	8.60	10.00	89	47	40	32.5	Figure 1	●
BD03CA0870	8.70	10.00	89	47	40	32.4	Figure 1	●
BD03CA0873	8.73	10.00	89	47	40	32.3	Figure 1	○
BD03CA0880	8.80	10.00	89	47	40	32.2	Figure 1	●
BD03CA0890	8.90	10.00	89	47	40	32.0	Figure 1	●
BD03CA0900	9.00	10.00	89	47	40	31.9	Figure 1	●

●Running stock ○Make-to-order

BD03C Series

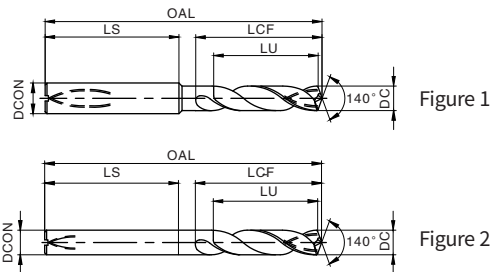
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03CA0905	9.05	10.00	89	47	40	31.8	Figure 1	○
BD03CA0910	9.10	10.00	89	47	40	31.7	Figure 1	●
BD03CA0913	9.13	10.00	89	47	40	31.6	Figure 1	○
BD03CA0920	9.20	10.00	89	47	40	31.5	Figure 1	●
BD03CA0925	9.25	10.00	89	47	40	31.4	Figure 1	○
BD03CA0930	9.30	10.00	89	47	40	31.4	Figure 1	●
BD03CA0940	9.40	10.00	89	47	40	31.2	Figure 1	●
BD03CA0950	9.50	10.00	89	47	40	31.0	Figure 1	●
BD03CA0952	9.52	10.00	89	47	40	31.0	Figure 1	○
BD03CA0955	9.55	10.00	89	47	40	30.9	Figure 1	○
BD03CA0960	9.60	10.00	89	47	40	30.9	Figure 1	●
BD03CA0970	9.70	10.00	89	47	40	30.7	Figure 1	●
BD03CA0980	9.80	10.00	89	47	40	30.5	Figure 1	●
BD03CA0990	9.90	10.00	89	47	40	30.3	Figure 1	●
BD03CA0992	9.92	10.00	89	47	40	30.3	Figure 1	○
BD03CA1000	10.00	10.00	89	47	40	30.2	Figure 2	●
BD03CA1010	10.10	12.00	102	55	45	38.0	Figure 1	●
BD03CA1020	10.20	12.00	102	55	45	37.8	Figure 1	●
BD03CA1030	10.30	12.00	102	55	45	37.7	Figure 1	●
BD03CA1032	10.32	12.00	102	55	45	37.6	Figure 1	○
BD03CA1040	10.40	12.00	102	55	45	37.5	Figure 1	●
BD03CA1050	10.50	12.00	102	55	45	37.3	Figure 1	●
BD03CA1060	10.60	12.00	102	55	45	37.2	Figure 1	●
BD03CA1070	10.70	12.00	102	55	45	37.0	Figure 1	●
BD03CA1072	10.72	12.00	102	55	45	37.0	Figure 1	○
BD03CA1080	10.80	12.00	102	55	45	36.8	Figure 1	●
BD03CA1090	10.90	12.00	102	55	45	36.7	Figure 1	●
BD03CA1100	11.00	12.00	102	55	45	36.5	Figure 1	●
BD03CA1110	11.10	12.00	102	55	45	36.3	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD03C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03CA1111	11.11	12.00	102	55	45	36.3	Figure 1	●
BD03CA1120	11.20	12.00	102	55	45	36.2	Figure 1	●
BD03CA1130	11.30	12.00	102	55	45	36.0	Figure 1	●
BD03CA1140	11.40	12.00	102	55	45	35.8	Figure 1	●
BD03CA1150	11.50	12.00	102	55	45	35.7	Figure 1	●
BD03CA1151	11.51	12.00	102	55	45	35.6	Figure 1	○
BD03CA1155	11.55	12.00	102	55	45	35.6	Figure 1	○
BD03CA1160	11.60	12.00	102	55	45	35.5	Figure 1	●
BD03CA1170	11.70	12.00	102	55	45	35.3	Figure 1	●
BD03CA1180	11.80	12.00	102	55	45	35.2	Figure 1	●
BD03CA1190	11.90	12.00	102	55	45	35.0	Figure 1	●
BD03CA1191	11.91	12.00	102	55	45	35.0	Figure 1	○
BD03CA1200	12.00	12.00	102	55	45	34.8	Figure 2	●
BD03CA1210	12.10	14.00	107	60	45	39.6	Figure 1	○
BD03CA1220	12.20	14.00	107	60	45	39.5	Figure 1	○
BD03CA1230	12.30	14.00	107	60	45	39.3	Figure 1	○
BD03CA1240	12.40	14.00	107	60	45	39.1	Figure 1	○
BD03CA1250	12.50	14.00	107	60	45	39.0	Figure 1	●
BD03CA1260	12.60	14.00	107	60	45	38.8	Figure 1	○
BD03CA1270	12.70	14.00	107	60	45	38.6	Figure 1	○
BD03CA1280	12.80	14.00	107	60	45	38.5	Figure 1	○
BD03CA1290	12.90	14.00	107	60	45	38.3	Figure 1	○
BD03CA1300	13.00	14.00	107	60	45	38.1	Figure 1	●
BD03CA1310	13.10	14.00	107	60	45	38.0	Figure 1	○
BD03CA1320	13.20	14.00	107	60	45	37.8	Figure 1	○
BD03CA1330	13.30	14.00	107	60	45	37.6	Figure 1	○
BD03CA1340	13.40	14.00	107	60	45	37.5	Figure 1	○
BD03CA1350	13.50	14.00	107	60	45	37.3	Figure 1	●

●Running stock ○Make-to-order

BD03C Series

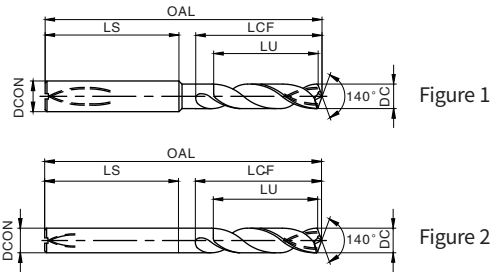
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03CA1355	13.55	14.00	107	60	45	37.2	Figure 1	○
BD03CA1360	13.60	14.00	107	60	45	37.1	Figure 1	○
BD03CA1370	13.70	14.00	107	60	45	37.0	Figure 1	○
BD03CA1380	13.80	14.00	107	60	45	36.8	Figure 1	○
BD03CA1390	13.90	14.00	107	60	45	36.6	Figure 1	○
BD03CA1400	14.00	14.00	107	60	45	36.5	Figure 2	●
BD03CA1410	14.10	16.00	115	65	48	41.3	Figure 1	○
BD03CA1420	14.20	16.00	115	65	48	41.1	Figure 1	○
BD03CA1429	14.29	16.00	115	65	48	41.0	Figure 1	○
BD03CA1430	14.30	16.00	115	65	48	40.9	Figure 1	○
BD03CA1440	14.40	16.00	115	65	48	40.8	Figure 1	○
BD03CA1450	14.50	16.00	115	65	48	40.6	Figure 1	●
BD03CA1460	14.60	16.00	115	65	48	40.4	Figure 1	○
BD03CA1470	14.70	16.00	115	65	48	40.3	Figure 1	○
BD03CA1480	14.80	16.00	115	65	48	40.1	Figure 1	○
BD03CA1490	14.90	16.00	115	65	48	39.9	Figure 1	○
BD03CA1500	15.00	16.00	115	65	48	39.8	Figure 1	●
BD03CA1510	15.10	16.00	115	65	48	39.6	Figure 1	○
BD03CA1520	15.20	16.00	115	65	48	39.4	Figure 1	○
BD03CA1530	15.30	16.00	115	65	48	39.3	Figure 1	○
BD03CA1540	15.40	16.00	115	65	48	39.1	Figure 1	○
BD03CA1550	15.50	16.00	115	65	48	38.9	Figure 1	●
BD03CA1555	15.55	16.00	115	65	48	38.8	Figure 1	○
BD03CA1560	15.60	16.00	115	65	48	38.8	Figure 1	○
BD03CA1570	15.70	16.00	115	65	48	38.6	Figure 1	○
BD03CA1580	15.80	16.00	115	65	48	38.4	Figure 1	○
BD03CA1587	15.87	16.00	115	65	48	38.3	Figure 1	○
BD03CA1590	15.90	16.00	115	65	48	38.3	Figure 1	○
BD03CA1600	16.00	16.00	115	65	48	38.1	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD03C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD03CA1650	16.50	18.00	123	73	48	45.2	Figure 1	●
BD03CA1690	16.90	18.00	123	73	48	44.6	Figure 1	○
BD03CA1700	17.00	18.00	123	73	48	44.4	Figure 1	●
BD03CA1750	17.50	18.00	123	73	48	43.6	Figure 1	●
BD03CA1755	17.55	18.00	123	73	48	43.5	Figure 1	○
BD03CA1790	17.90	18.00	123	73	48	42.9	Figure 1	○
BD03CA1800	18.00	18.00	123	73	48	42.7	Figure 2	●
BD03CA1830	18.30	20.00	131	79	50	48.2	Figure 1	○
BD03CA1850	18.50	20.00	131	79	50	47.9	Figure 1	●
BD03CA1890	18.90	20.00	131	79	50	47.2	Figure 1	○
BD03CA1900	19.00	20.00	131	79	50	47.0	Figure 1	●
BD03CA1930	19.30	20.00	131	79	50	46.5	Figure 1	○
BD03CA1950	19.50	20.00	131	79	50	46.2	Figure 1	●
BD03CA1955	19.55	20.00	131	79	50	46.1	Figure 1	○
BD03CA1990	19.90	20.00	131	79	50	45.5	Figure 1	○
BD03CA2000	20.00	20.00	131	79	50	45.4	Figure 2	●

● Running stock ○ Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54~60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

Cutting speed recommendations - BD03C Series

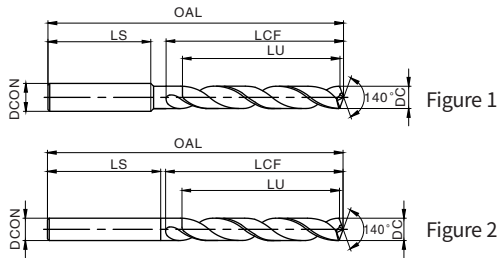
Workpiece material		Strength (N/mm ²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum /min	Optimal /opt	Maximum /max
P	Carbon steel	< 600	< 230	100	110	120
	Alloy steel	< 1200	< 350	80	90	100
	High-alloyed steel and tool steel	< 1400	< 380	60	70	80
M	Austenite and ferrite stainless steel	< 680	< 220	40	50	60
	Martensite stainless steel	< 820	< 240	40	50	60
K	Gray cast iron	-	< 280	180	200	220
	Ductile iron	-	< 320	140	160	180
N	Non-ferrous alloy	< 250	< 110	-	-	-
	Aluminum alloy	< 530	< 130	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	< 3300	< 350	20	30	40
	Titanium alloy	< 2100	< 400	30	40	50
H	High hardness steel	-	< 54HRC	-	-	-
	High hardness steel	-	52-60HRC	-	-	-
	High hardness steel	-	> 60 HRC	-	-	-

Recommended feed rate - BD03C Series

Workpiece material		Feed per revolution mm/r									
		Φ2~Φ2.5	Φ2.5~Φ3	Φ3~Φ4	Φ4~Φ5	Φ5~Φ6	Φ6~Φ8	Φ8~Φ10	Φ10~Φ12	Φ12~Φ16	Φ16~Φ20
P	Carbon steel	0.100	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500
	Alloy steel	0.080	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.400
	High-alloyed steel and tool steel	0.063	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.315
M	Austenite and ferrite stainless steel	0.050	0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.250
	Martensite stainless steel	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
K	Gray cast iron	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500	0.630	0.630
	Ductile iron	0.125	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.630
N	Non-ferrous alloy	-	-	-	-	-	-	-	-	-	-
	Aluminum alloy	-	-	-	-	-	-	-	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	0.050	0.063	0.080	0.080	0.080	0.125	0.160	0.160	0.200	0.250
	Titanium alloy	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
H	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-

Solid carbide drill

BD05 Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05A0300	3.00	6.00	66	28	36	23.0	Figure 1	●
BD05A0310	3.10	6.00	66	28	36	22.8	Figure 1	●
BD05A0317	3.17	6.00	66	28	36	22.7	Figure 1	○
BD05A0320	3.20	6.00	66	28	36	22.6	Figure 1	●
BD05A0325	3.25	6.00	66	28	36	22.5	Figure 1	○
BD05A0330	3.30	6.00	66	28	36	22.4	Figure 1	●
BD05A0340	3.40	6.00	66	28	36	22.3	Figure 1	●
BD05A0350	3.50	6.00	66	28	36	22.1	Figure 1	●
BD05A0357	3.57	6.00	66	28	36	22.0	Figure 1	○
BD05A0360	3.60	6.00	66	28	36	21.9	Figure 1	●
BD05A0370	3.70	6.00	66	28	36	21.8	Figure 1	●
BD05A0380	3.80	6.00	74	36	36	29.6	Figure 1	●
BD05A0390	3.90	6.00	74	36	36	29.4	Figure 1	●
BD05A0397	3.97	6.00	74	36	36	29.3	Figure 1	○
BD05A0400	4.00	6.00	74	36	36	29.3	Figure 1	●
BD05A0410	4.10	6.00	74	36	36	29.1	Figure 1	●
BD05A0420	4.20	6.00	74	36	36	28.9	Figure 1	●
BD05A0430	4.30	6.00	74	36	36	28.8	Figure 1	●
BD05A0437	4.37	6.00	74	36	36	28.6	Figure 1	○
BD05A0440	4.40	6.00	74	36	36	28.6	Figure 1	●
BD05A0450	4.50	6.00	74	36	36	28.4	Figure 1	○
BD05A0460	4.60	6.00	74	36	36	28.3	Figure 1	●
BD05A0465	4.65	6.00	74	36	36	28.2	Figure 1	●
BD05A0470	4.70	6.00	74	36	36	28.1	Figure 1	○
BD05A0476	4.76	6.00	82	44	36	36.0	Figure 1	●
BD05A0480	4.80	6.00	82	44	36	35.9	Figure 1	○
BD05A0490	4.90	6.00	82	44	36	35.8	Figure 1	●
BD05A0500	5.00	6.00	82	44	36	35.6	Figure 1	●

●Running stock ○Make-to-order

BD05 Series

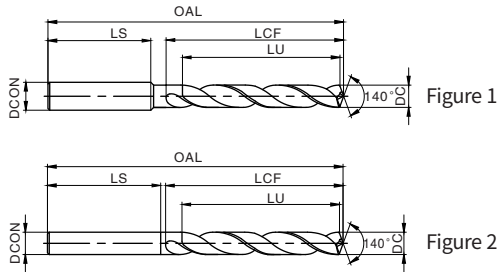
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05A0510	5.10	6.00	82	44	36	35.4	Figure 1	●
BD05A0516	5.16	6.00	82	44	36	35.3	Figure 1	●
BD05A0520	5.20	6.00	82	44	36	35.3	Figure 1	○
BD05A0530	5.30	6.00	82	44	36	35.1	Figure 1	●
BD05A0540	5.40	6.00	82	44	36	34.9	Figure 1	●
BD05A0550	5.50	6.00	82	44	36	34.7	Figure 1	●
BD05A0555	5.55	6.00	82	44	36	34.7	Figure 1	●
BD05A0560	5.60	6.00	82	44	36	34.6	Figure 1	○
BD05A0570	5.70	6.00	82	44	36	34.4	Figure 1	●
BD05A0580	5.80	6.00	82	44	36	34.2	Figure 1	●
BD05A0590	5.90	6.00	82	44	36	34.1	Figure 1	●
BD05A0595	5.95	6.00	82	44	36	34.0	Figure 1	●
BD05A0600	6.00	6.00	82	44	36	33.9	Figure 2	○
BD05A0610	6.10	8.00	91	53	36	42.7	Figure 1	●
BD05A0620	6.20	8.00	91	53	36	42.6	Figure 1	●
BD05A0630	6.30	8.00	91	53	36	42.4	Figure 1	○
BD05A0635	6.35	8.00	91	53	36	42.3	Figure 1	●
BD05A0640	6.40	8.00	91	53	36	42.2	Figure 1	●
BD05A0650	6.50	8.00	91	53	36	42.1	Figure 1	●
BD05A0653	6.53	8.00	91	53	36	42.0	Figure 1	●
BD05A0660	6.60	8.00	91	53	36	41.9	Figure 1	○
BD05A0670	6.70	8.00	91	53	36	41.7	Figure 1	●
BD05A0675	6.75	8.00	91	53	36	41.6	Figure 1	●
BD05A0680	6.80	8.00	91	53	36	41.6	Figure 1	●
BD05A0690	6.90	8.00	91	53	36	41.4	Figure 1	●
BD05A0700	7.00	8.00	91	53	36	41.2	Figure 1	○
BD05A0710	7.10	8.00	91	53	36	41.1	Figure 1	●
BD05A0714	7.14	8.00	91	53	36	41.0	Figure 1	●
BD05A0720	7.20	8.00	91	53	36	40.9	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD05 Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05A0730	7.30	8.00	91	53	36	40.7	Figure 1	●
BD05A0740	7.40	8.00	91	53	36	40.6	Figure 1	○
BD05A0750	7.50	8.00	91	53	36	40.4	Figure 1	●
BD05A0754	7.54	8.00	91	53	36	40.3	Figure 1	●
BD05A0760	7.60	8.00	91	53	36	40.2	Figure 1	●
BD05A0770	7.70	8.00	91	53	36	40.0	Figure 1	○
BD05A0780	7.80	8.00	91	53	36	39.9	Figure 1	●
BD05A0790	7.90	8.00	91	53	36	39.7	Figure 1	○
BD05A0794	7.94	8.00	91	53	36	39.6	Figure 1	●
BD05A0800	8.00	8.00	91	53	36	39.5	Figure 2	○
BD05A0810	8.10	10.00	103	61	40	47.4	Figure 1	●
BD05A0820	8.20	10.00	103	61	40	47.2	Figure 1	●
BD05A0830	8.30	10.00	103	61	40	47.0	Figure 1	●
BD05A0833	8.33	10.00	103	61	40	47.0	Figure 1	○
BD05A0840	8.40	10.00	103	61	40	46.9	Figure 1	●
BD05A0850	8.50	10.00	103	61	40	46.7	Figure 1	●
BD05A0860	8.60	10.00	103	61	40	46.5	Figure 1	●
BD05A0870	8.70	10.00	103	61	40	46.4	Figure 1	●
BD05A0873	8.73	10.00	103	61	40	46.3	Figure 1	○
BD05A0880	8.80	10.00	103	61	40	46.2	Figure 1	●
BD05A0890	8.90	10.00	103	61	40	46.0	Figure 1	●
BD05A0900	9.00	10.00	103	61	40	45.9	Figure 1	○
BD05A0910	9.10	10.00	103	61	40	45.7	Figure 1	●
BD05A0913	9.13	10.00	103	61	40	45.6	Figure 1	●
BD05A0920	9.20	10.00	103	61	40	45.5	Figure 1	○
BD05A0925	9.25	10.00	103	61	40	45.4	Figure 1	●
BD05A0930	9.30	10.00	103	61	40	45.4	Figure 1	●
BD05A0940	9.40	10.00	103	61	40	45.2	Figure 1	●

●Running stock ○Make-to-order

BD05 Series

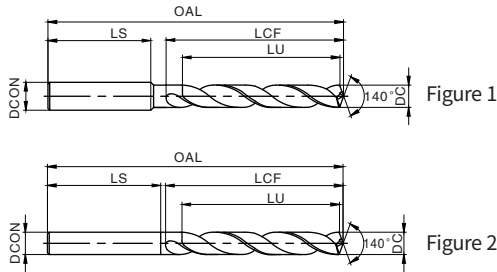
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05A0950	9.50	10.00	103	61	40	45.0	Figure 1	○
BD05A0952	9.52	10.00	103	61	40	45.0	Figure 1	●
BD05A0960	9.60	10.00	103	61	40	44.9	Figure 1	○
BD05A0970	9.70	10.00	103	61	40	44.7	Figure 1	●
BD05A0980	9.80	10.00	103	61	40	44.5	Figure 1	○
BD05A0990	9.90	10.00	103	61	40	44.3	Figure 1	●
BD05A0992	9.92	10.00	103	61	40	44.3	Figure 1	●
BD05A1000	10.00	10.00	103	61	40	44.2	Figure 2	●
BD05A1010	10.10	12.00	118	71	45	54.0	Figure 1	○
BD05A1020	10.20	12.00	118	71	45	53.8	Figure 1	○
BD05A1030	10.30	12.00	118	71	45	53.7	Figure 1	●
BD05A1032	10.32	12.00	118	71	45	53.6	Figure 1	●
BD05A1040	10.40	12.00	118	71	45	53.5	Figure 1	●
BD05A1050	10.50	12.00	118	71	45	53.3	Figure 1	●
BD05A1060	10.60	12.00	118	71	45	53.2	Figure 1	○
BD05A1070	10.70	12.00	118	71	45	53.0	Figure 1	●
BD05A1072	10.72	12.00	118	71	45	53.0	Figure 1	●
BD05A1080	10.80	12.00	118	71	45	52.8	Figure 1	●
BD05A1090	10.90	12.00	118	71	45	52.7	Figure 1	●
BD05A1100	11.00	12.00	118	71	45	52.5	Figure 1	○
BD05A1110	11.10	12.00	118	71	45	52.3	Figure 1	●
BD05A1111	11.11	12.00	118	71	45	52.3	Figure 1	●
BD05A1120	11.20	12.00	118	71	45	52.2	Figure 1	●
BD05A1130	11.30	12.00	118	71	45	52.0	Figure 1	●
BD05A1140	11.40	12.00	118	71	45	51.8	Figure 1	○
BD05A1150	11.50	12.00	118	71	45	51.7	Figure 1	●
BD05A1160	11.60	12.00	118	71	45	51.5	Figure 1	●
BD05A1170	11.70	12.00	118	71	45	51.3	Figure 1	●
BD05A1180	11.80	12.00	118	71	45	51.2	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD05 Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05A1190	11.90	12.00	118	71	45	51.0	Figure 1	●
BD05A1191	11.91	12.00	118	71	45	51.0	Figure 1	●
BD05A1200	12.00	12.00	118	71	45	50.8	Figure 2	●
BD05A1210	12.10	14.00	124	77	45	56.6	Figure 1	●
BD05A1220	12.20	14.00	124	77	45	56.5	Figure 1	●
BD05A1230	12.30	14.00	124	77	45	56.3	Figure 1	○
BD05A1240	12.40	14.00	124	77	45	56.1	Figure 1	○
BD05A1250	12.50	14.00	124	77	45	56.0	Figure 1	●
BD05A1260	12.60	14.00	124	77	45	55.8	Figure 1	●
BD05A1270	12.70	14.00	124	77	45	55.6	Figure 1	●
BD05A1280	12.80	14.00	124	77	45	55.5	Figure 1	●
BD05A1290	12.90	14.00	124	77	45	55.3	Figure 1	○
BD05A1300	13.00	14.00	124	77	45	55.1	Figure 1	●
BD05A1310	13.10	14.00	124	77	45	55.0	Figure 1	○
BD05A1320	13.20	14.00	124	77	45	54.8	Figure 1	○
BD05A1330	13.30	14.00	124	77	45	54.6	Figure 1	○
BD05A1340	13.40	14.00	124	77	45	54.5	Figure 1	○
BD05A1350	13.50	14.00	124	77	45	54.3	Figure 1	●
BD05A1370	13.70	14.00	124	77	45	54.0	Figure 1	○
BD05A1380	13.80	14.00	124	77	45	53.8	Figure 1	○
BD05A1390	13.90	14.00	124	77	45	53.6	Figure 1	○
BD05A1400	14.00	14.00	124	77	45	53.5	Figure 2	○
BD05A1410	14.10	16.00	133	83	48	59.3	Figure 1	●
BD05A1420	14.20	16.00	133	83	48	59.1	Figure 1	○
BD05A1429	14.29	16.00	133	83	48	59.0	Figure 1	○
BD05A1430	14.30	16.00	133	83	48	58.9	Figure 1	○
BD05A1440	14.40	16.00	133	83	48	58.8	Figure 1	○
BD05A1450	14.50	16.00	133	83	48	58.6	Figure 1	●

●Running stock ○Make-to-order

BD05 Series

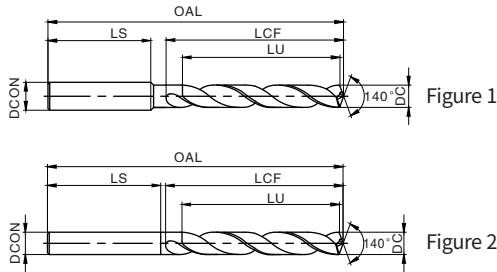
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05A1460	14.60	16.00	133	83	48	58.4	Figure 1	○
BD05A1470	14.70	16.00	133	83	48	58.3	Figure 1	○
BD05A1480	14.80	16.00	133	83	48	58.1	Figure 1	○
BD05A1490	14.90	16.00	133	83	48	57.9	Figure 1	○
BD05A1500	15.00	16.00	133	83	48	57.8	Figure 1	○
BD05A1510	15.10	16.00	133	83	48	57.6	Figure 1	●
BD05A1520	15.20	16.00	133	83	48	57.4	Figure 1	○
BD05A1530	15.30	16.00	133	83	48	57.3	Figure 1	○
BD05A1540	15.40	16.00	133	83	48	57.1	Figure 1	○
BD05A1550	15.50	16.00	133	83	48	56.9	Figure 1	○
BD05A1560	15.60	16.00	133	83	48	56.8	Figure 1	○
BD05A1570	15.70	16.00	133	83	48	56.6	Figure 1	●
BD05A1580	15.80	16.00	133	83	48	56.4	Figure 1	○
BD05A1587	15.87	16.00	133	83	48	56.3	Figure 1	○
BD05A1590	15.90	16.00	133	83	48	56.3	Figure 1	○
BD05A1600	16.00	16.00	133	83	48	56.1	Figure 2	○
BD05A1608	16.08	18.00	143	93	48	66.0	Figure 1	●
BD05A1650	16.50	18.00	143	93	48	65.2	Figure 1	○
BD05A1667	16.67	18.00	143	93	48	65.0	Figure 1	○
BD05A1670	16.70	18.00	143	93	48	64.9	Figure 1	○
BD05A1690	16.90	18.00	143	93	48	64.6	Figure 1	○
BD05A1700	17.00	18.00	143	93	48	64.4	Figure 1	●
BD05A1750	17.50	18.00	143	93	48	63.6	Figure 1	○
BD05A1770	17.70	18.00	143	93	48	63.2	Figure 1	○
BD05A1786	17.86	18.00	143	93	48	63.0	Figure 1	○
BD05A1800	18.00	18.00	143	93	48	62.7	Figure 2	○
BD05A1850	18.50	20.00	153	101	50	69.9	Figure 1	○
BD05A1870	18.70	20.00	153	101	50	69.5	Figure 1	○
BD05A1890	18.90	20.00	153	101	50	69.2	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD05 Series



BD Series

5 × D

m7

140°

h6

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05A1900	19.00	20.00	153	101	50	69.0	Figure 1	●
BD05A1905	19.05	20.00	153	101	50	69.0	Figure 1	○
BD05A1916	19.16	20.00	153	101	50	68.8	Figure 1	○
BD05A1925	19.25	20.00	153	101	50	68.6	Figure 1	○
BD05A1930	19.30	20.00	153	101	50	68.5	Figure 1	○
BD05A1945	19.45	20.00	153	101	50	68.3	Figure 1	○
BD05A1950	19.50	20.00	153	101	50	68.2	Figure 1	●
BD05A1970	19.70	20.00	153	101	50	67.9	Figure 1	○
BD05A1984	19.84	20.00	153	101	50	67.6	Figure 1	○
BD05A2000	20.00	20.00	153	101	50	67.4	Figure 2	●

●Running stock ○Make-to-order

Cutting speed recommendations - BD05 Series

Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum /min	Optimal /opt	Maximum /max
P	Carbon steel	< 600	< 230	80	90	100
	Alloy steel	< 1200	< 350	60	70	80
	High-alloyed steel and tool steel	< 1400	< 380	50	60	70
M	Austenite and ferrite stainless steel	< 680	<220	30	40	50
	Martensite stainless steel	< 820	< 240	30	40	50
K	Gray cast iron	-	< 280	160	180	200
	Ductile iron	-	< 320	120	140	160
N	Non-ferrous alloy	< 250	< 110	-	-	-
	Aluminum alloy	< 530	< 130	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	< 3300	< 350	15	25	35
	Titanium alloy	<2100	< 400	20	30	40
H	High hardness steel	-	< 54HRC	-	-	-
	High hardness steel	-	52-60HRC	-	-	-
	High hardness steel	-	> 60 HRC	-	-	-

Recommended feed rate - BD05 Series

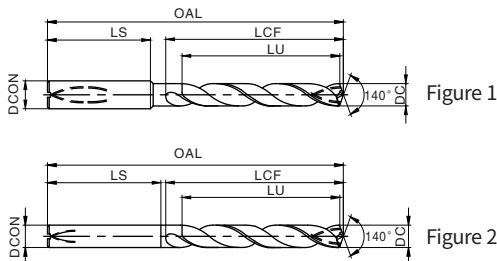
Workpiece material		Feed per revolution mm/r									
		Φ2~ Φ2.5	Φ2.5 ~Φ3	Φ3 ~Φ4	Φ4 ~Φ5	Φ5 ~Φ6	Φ6 ~Φ8	Φ8 ~Φ10	Φ10 ~Φ12	Φ12 ~Φ16	Φ16 ~Φ20
P	Carbon steel	0.100	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500
	Alloy steel	0.080	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.400
	High-alloyed steel and tool steel	0.063	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.315
M	Austenite and ferrite stainless steel	0.050	0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.250
	Martensite stainless steel	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
K	Gray cast iron	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500	0.630	0.630
	Ductile iron	0.125	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.630
N	Non-ferrous alloy	-	-	-	-	-	-	-	-	-	-
	Aluminum alloy	-	-	-	-	-	-	-	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	0.050	0.063	0.080	0.080	0.080	0.125	0.160	0.160	0.200	0.250
	Titanium alloy	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
H	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54~60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

Solid carbide drill

BD05C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05CA0300	3.00	6.00	66	28	36	23.0	Figure 1	●
BD05CA0310	3.10	6.00	66	28	36	22.8	Figure 1	●
BD05CA0317	3.17	6.00	66	28	36	22.7	Figure 1	○
BD05CA0320	3.20	6.00	66	28	36	22.6	Figure 1	●
BD05CA0325	3.25	6.00	66	28	36	22.5	Figure 1	○
BD05CA0330	3.30	6.00	66	28	36	22.4	Figure 1	●
BD05CA0340	3.40	6.00	66	28	36	22.3	Figure 1	●
BD05CA0350	3.50	6.00	66	28	36	22.1	Figure 1	●
BD05CA0357	3.57	6.00	66	28	36	22.0	Figure 1	○
BD05CA0360	3.60	6.00	66	28	36	21.9	Figure 1	●
BD05CA0370	3.70	6.00	66	28	36	21.8	Figure 1	●
BD05CA0380	3.80	6.00	74	36	36	29.6	Figure 1	●
BD05CA0390	3.90	6.00	74	36	36	29.4	Figure 1	●
BD05CA0397	3.97	6.00	74	36	36	29.3	Figure 1	○
BD05CA0400	4.00	6.00	74	36	36	29.3	Figure 1	●
BD05CA0410	4.10	6.00	74	36	36	29.1	Figure 1	●
BD05CA0420	4.20	6.00	74	36	36	28.9	Figure 1	●
BD05CA0430	4.30	6.00	74	36	36	28.8	Figure 1	●
BD05CA0437	4.37	6.00	74	36	36	28.6	Figure 1	○
BD05CA0440	4.40	6.00	74	36	36	28.6	Figure 1	●
BD05CA0450	4.50	6.00	74	36	36	28.4	Figure 1	○
BD05CA0460	4.60	6.00	74	36	36	28.3	Figure 1	●
BD05CA0465	4.65	6.00	74	36	36	28.2	Figure 1	●
BD05CA0470	4.70	6.00	74	36	36	28.1	Figure 1	○
BD05CA0476	4.76	6.00	82	44	36	36.0	Figure 1	●
BD05CA0480	4.80	6.00	82	44	36	35.9	Figure 1	○
BD05CA0490	4.90	6.00	82	44	36	35.8	Figure 1	●
BD05CA0500	5.00	6.00	82	44	36	35.6	Figure 1	●

●Running stock ○Make-to-order

BD05C Series

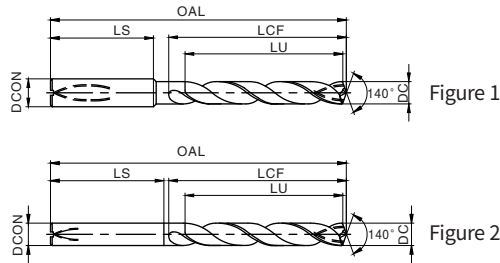
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05CA0510	5.10	6.00	82	44	36	35.4	Figure 1	●
BD05CA0516	5.16	6.00	82	44	36	35.3	Figure 1	●
BD05CA0520	5.20	6.00	82	44	36	35.3	Figure 1	○
BD05CA0530	5.30	6.00	82	44	36	35.1	Figure 1	●
BD05CA0540	5.40	6.00	82	44	36	34.9	Figure 1	●
BD05CA0550	5.50	6.00	82	44	36	34.7	Figure 1	●
BD05CA0555	5.55	6.00	82	44	36	34.7	Figure 1	●
BD05CA0560	5.60	6.00	82	44	36	34.6	Figure 1	○
BD05CA0570	5.70	6.00	82	44	36	34.4	Figure 1	●
BD05CA0580	5.80	6.00	82	44	36	34.2	Figure 1	●
BD05CA0590	5.90	6.00	82	44	36	34.1	Figure 1	●
BD05CA0595	5.95	6.00	82	44	36	34.0	Figure 1	●
BD05CA0600	6.00	6.00	82	44	36	33.9	Figure 2	○
BD05CA0610	6.10	8.00	91	53	36	42.7	Figure 1	●
BD05CA0620	6.20	8.00	91	53	36	42.6	Figure 1	●
BD05CA0630	6.30	8.00	91	53	36	42.4	Figure 1	○
BD05CA0635	6.35	8.00	91	53	36	42.3	Figure 1	●
BD05CA0640	6.40	8.00	91	53	36	42.2	Figure 1	●
BD05CA0650	6.50	8.00	91	53	36	42.1	Figure 1	●
BD05CA0653	6.53	8.00	91	53	36	42.0	Figure 1	●
BD05CA0660	6.60	8.00	91	53	36	41.9	Figure 1	○
BD05CA0670	6.70	8.00	91	53	36	41.7	Figure 1	●
BD05CA0675	6.75	8.00	91	53	36	41.6	Figure 1	●
BD05CA0680	6.80	8.00	91	53	36	41.6	Figure 1	●
BD05CA0690	6.90	8.00	91	53	36	41.4	Figure 1	●
BD05CA0700	7.00	8.00	91	53	36	41.2	Figure 1	○
BD05CA0710	7.10	8.00	91	53	36	41.1	Figure 1	●
BD05CA0714	7.14	8.00	91	53	36	41.0	Figure 1	●
BD05CA0720	7.20	8.00	91	53	36	40.9	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD05C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05CA0730	7.30	8.00	91	53	36	40.7	Figure 1	●
BD05CA0740	7.40	8.00	91	53	36	40.6	Figure 1	○
BD05CA0750	7.50	8.00	91	53	36	40.4	Figure 1	●
BD05CA0754	7.54	8.00	91	53	36	40.3	Figure 1	●
BD05CA0760	7.60	8.00	91	53	36	40.2	Figure 1	●
BD05CA0770	7.70	8.00	91	53	36	40.0	Figure 1	○
BD05CA0780	7.80	8.00	91	53	36	39.9	Figure 1	●
BD05CA0790	7.90	8.00	91	53	36	39.7	Figure 1	○
BD05CA0794	7.94	8.00	91	53	36	39.6	Figure 1	●
BD05CA0800	8.00	8.00	91	53	36	39.5	Figure 2	○
BD05CA0810	8.10	10.00	103	61	40	47.4	Figure 1	●
BD05CA0820	8.20	10.00	103	61	40	47.2	Figure 1	●
BD05CA0830	8.30	10.00	103	61	40	47.0	Figure 1	●
BD05CA0833	8.33	10.00	103	61	40	47.0	Figure 1	○
BD05CA0840	8.40	10.00	103	61	40	46.9	Figure 1	●
BD05CA0850	8.50	10.00	103	61	40	46.7	Figure 1	●
BD05CA0860	8.60	10.00	103	61	40	46.5	Figure 1	●
BD05CA0870	8.70	10.00	103	61	40	46.4	Figure 1	●
BD05CA0873	8.73	10.00	103	61	40	46.3	Figure 1	○
BD05CA0880	8.80	10.00	103	61	40	46.2	Figure 1	●
BD05CA0890	8.90	10.00	103	61	40	46.0	Figure 1	●
BD05CA0900	9.00	10.00	103	61	40	45.9	Figure 1	○
BD05CA0910	9.10	10.00	103	61	40	45.7	Figure 1	●
BD05CA0913	9.13	10.00	103	61	40	45.6	Figure 1	●
BD05CA0920	9.20	10.00	103	61	40	45.5	Figure 1	○
BD05CA0925	9.25	10.00	103	61	40	45.4	Figure 1	●
BD05CA0930	9.30	10.00	103	61	40	45.4	Figure 1	●
BD05CA0940	9.40	10.00	103	61	40	45.2	Figure 1	●

●Running stock ○Make-to-order

BD05C Series

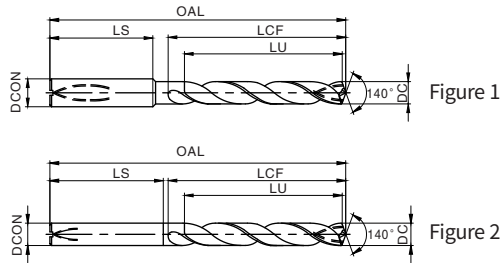
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05CA0950	9.50	10.00	103	61	40	45.0	Figure 1	○
BD05CA0952	9.52	10.00	103	61	40	45.0	Figure 1	●
BD05CA0960	9.60	10.00	103	61	40	44.9	Figure 1	○
BD05CA0970	9.70	10.00	103	61	40	44.7	Figure 1	●
BD05CA0980	9.80	10.00	103	61	40	44.5	Figure 1	○
BD05CA0990	9.90	10.00	103	61	40	44.3	Figure 1	●
BD05CA0992	9.92	10.00	103	61	40	44.3	Figure 1	●
BD05CA1000	10.00	10.00	103	61	40	44.2	Figure 2	●
BD05CA1010	10.10	12.00	118	71	45	54.0	Figure 1	○
BD05CA1020	10.20	12.00	118	71	45	53.8	Figure 1	○
BD05CA1030	10.30	12.00	118	71	45	53.7	Figure 1	●
BD05CA1032	10.32	12.00	118	71	45	53.6	Figure 1	●
BD05CA1040	10.40	12.00	118	71	45	53.5	Figure 1	●
BD05CA1050	10.50	12.00	118	71	45	53.3	Figure 1	●
BD05CA1060	10.60	12.00	118	71	45	53.2	Figure 1	○
BD05CA1070	10.70	12.00	118	71	45	53.0	Figure 1	●
BD05CA1072	10.72	12.00	118	71	45	53.0	Figure 1	●
BD05CA1080	10.80	12.00	118	71	45	52.8	Figure 1	●
BD05CA1090	10.90	12.00	118	71	45	52.7	Figure 1	●
BD05CA1100	11.00	12.00	118	71	45	52.5	Figure 1	○
BD05CA1110	11.10	12.00	118	71	45	52.3	Figure 1	●
BD05CA1111	11.11	12.00	118	71	45	52.3	Figure 1	●
BD05CA1120	11.20	12.00	118	71	45	52.2	Figure 1	●
BD05CA1130	11.30	12.00	118	71	45	52.0	Figure 1	●
BD05CA1140	11.40	12.00	118	71	45	51.8	Figure 1	○
BD05CA1150	11.50	12.00	118	71	45	51.7	Figure 1	●
BD05CA1160	11.60	12.00	118	71	45	51.5	Figure 1	●
BD05CA1170	11.70	12.00	118	71	45	51.3	Figure 1	●
BD05CA1180	11.80	12.00	118	71	45	51.2	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD05C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05CA1190	11.90	12.00	118	71	45	51.0	Figure 1	●
BD05CA1191	11.91	12.00	118	71	45	51.0	Figure 1	●
BD05CA1200	12.00	12.00	118	71	45	50.8	Figure 2	●
BD05CA1210	12.10	14.00	124	77	45	56.6	Figure 1	●
BD05CA1220	12.20	14.00	124	77	45	56.5	Figure 1	●
BD05CA1230	12.30	14.00	124	77	45	56.3	Figure 1	○
BD05CA1240	12.40	14.00	124	77	45	56.1	Figure 1	○
BD05CA1250	12.50	14.00	124	77	45	56.0	Figure 1	●
BD05CA1260	12.60	14.00	124	77	45	55.8	Figure 1	●
BD05CA1270	12.70	14.00	124	77	45	55.6	Figure 1	●
BD05CA1280	12.80	14.00	124	77	45	55.5	Figure 1	●
BD05CA1290	12.90	14.00	124	77	45	55.3	Figure 1	○
BD05CA1300	13.00	14.00	124	77	45	55.1	Figure 1	●
BD05CA1310	13.10	14.00	124	77	45	55.0	Figure 1	○
BD05CA1320	13.20	14.00	124	77	45	54.8	Figure 1	○
BD05CA1330	13.30	14.00	124	77	45	54.6	Figure 1	○
BD05CA1340	13.40	14.00	124	77	45	54.5	Figure 1	○
BD05CA1350	13.50	14.00	124	77	45	54.3	Figure 1	●
BD05CA1370	13.70	14.00	124	77	45	54.0	Figure 1	○
BD05CA1380	13.80	14.00	124	77	45	53.8	Figure 1	○
BD05CA1390	13.90	14.00	124	77	45	53.6	Figure 1	○
BD05CA1400	14.00	14.00	124	77	45	53.5	Figure 2	○
BD05CA1410	14.10	16.00	133	83	48	59.3	Figure 1	●
BD05CA1420	14.20	16.00	133	83	48	59.1	Figure 1	○
BD05CA1429	14.29	16.00	133	83	48	59.0	Figure 1	○
BD05CA1430	14.30	16.00	133	83	48	58.9	Figure 1	○
BD05CA1440	14.40	16.00	133	83	48	58.8	Figure 1	○
BD05CA1450	14.50	16.00	133	83	48	58.6	Figure 1	●

●Running stock ○Make-to-order

BD05C Series

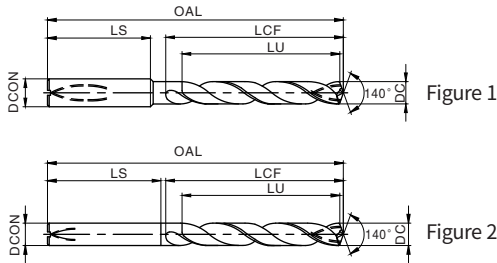
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05CA1460	14.60	16.00	133	83	48	58.4	Figure 1	○
BD05CA1470	14.70	16.00	133	83	48	58.3	Figure 1	○
BD05CA1480	14.80	16.00	133	83	48	58.1	Figure 1	○
BD05CA1490	14.90	16.00	133	83	48	57.9	Figure 1	○
BD05CA1500	15.00	16.00	133	83	48	57.8	Figure 1	○
BD05CA1510	15.10	16.00	133	83	48	57.6	Figure 1	●
BD05CA1520	15.20	16.00	133	83	48	57.4	Figure 1	○
BD05CA1530	15.30	16.00	133	83	48	57.3	Figure 1	○
BD05CA1540	15.40	16.00	133	83	48	57.1	Figure 1	○
BD05CA1550	15.50	16.00	133	83	48	56.9	Figure 1	○
BD05CA1560	15.60	16.00	133	83	48	56.8	Figure 1	○
BD05CA1570	15.70	16.00	133	83	48	56.6	Figure 1	●
BD05CA1580	15.80	16.00	133	83	48	56.4	Figure 1	○
BD05CA1587	15.87	16.00	133	83	48	56.3	Figure 1	○
BD05CA1590	15.90	16.00	133	83	48	56.3	Figure 1	○
BD05CA1600	16.00	16.00	133	83	48	56.1	Figure 2	○
BD05CA1608	16.08	18.00	143	93	48	66.0	Figure 1	●
BD05CA1650	16.50	18.00	143	93	48	65.2	Figure 1	○
BD05CA1667	16.67	18.00	143	93	48	65.0	Figure 1	○
BD05CA1670	16.70	18.00	143	93	48	64.9	Figure 1	○
BD05CA1690	16.90	18.00	143	93	48	64.6	Figure 1	○
BD05CA1700	17.00	18.00	143	93	48	64.4	Figure 1	●
BD05CA1750	17.50	18.00	143	93	48	63.6	Figure 1	○
BD05CA1770	17.70	18.00	143	93	48	63.2	Figure 1	○
BD05CA1786	17.86	18.00	143	93	48	63.0	Figure 1	○
BD05CA1800	18.00	18.00	143	93	48	62.7	Figure 2	○
BD05CA1850	18.50	20.00	153	101	50	69.9	Figure 1	○
BD05CA1870	18.70	20.00	153	101	50	69.5	Figure 1	○
BD05CA1890	18.90	20.00	153	101	50	69.2	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54~60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD05C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05CA1900	19.00	20.00	153	101	50	69.0	Figure 1	●
BD05CA1905	19.05	20.00	153	101	50	69.0	Figure 1	○
BD05CA1916	19.16	20.00	153	101	50	68.8	Figure 1	○
BD05CA1925	19.25	20.00	153	101	50	68.6	Figure 1	○
BD05CA1930	19.30	20.00	153	101	50	68.5	Figure 1	○
BD05CA1945	19.45	20.00	153	101	50	68.3	Figure 1	○
BD05CA1950	19.50	20.00	153	101	50	68.2	Figure 1	●
BD05CA1970	19.70	20.00	153	101	50	67.9	Figure 1	○
BD05CA1984	19.84	20.00	153	101	50	67.6	Figure 1	○
BD05CA2000	20.00	20.00	153	101	50	67.4	Figure 2	●

●Running stock ○Make-to-order

Cutting speed recommendations - BD05C Series

Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum /min	Optimal /opt	Maximum /max
P	Carbon steel	< 600	< 230	100	110	120
	Alloy steel	< 1200	< 350	80	90	100
	High-alloyed steel and tool steel	< 1400	< 380	60	70	80
M	Austenite and ferrite stainless steel	< 680	<220	40	50	60
	Martensite stainless steel	< 820	< 240	40	50	60
K	Gray cast iron	-	< 280	180	200	220
	Ductile iron	-	< 320	140	160	180
N	Non-ferrous alloy	< 250	< 110	-	-	-
	Aluminum alloy	< 530	< 130	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	< 3300	< 350	20	30	40
	Titanium alloy	<2100	< 400	30	40	50
H	High hardness steel	-	< 54HRC	-	-	-
	High hardness steel	-	52-60HRC	-	-	-
	High hardness steel	-	> 60 HRC	-	-	-

Recommended feed rate - BD05C Series

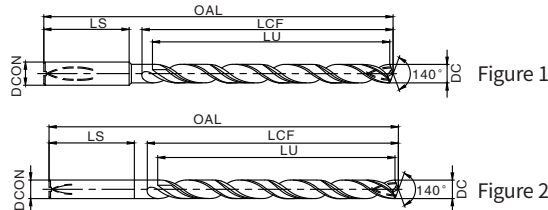
Workpiece material		Feed per revolution mm/r									
		Φ2~ Φ2.5	Φ2.5 ~Φ3	Φ3 ~Φ4	Φ4 ~Φ5	Φ5 ~Φ6	Φ6 ~Φ8	Φ8 ~Φ10	Φ10 ~Φ12	Φ12 ~Φ16	Φ16 ~Φ20
P	Carbon steel	0.100	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500
	Alloy steel	0.080	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.400
	High-alloyed steel and tool steel	0.063	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.315
M	Austenite and ferrite stainless steel	0.050	0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.250
	Martensite stainless steel	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
K	Gray cast iron	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500	0.630	0.630
	Ductile iron	0.125	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.630
N	Non-ferrous alloy	-	-	-	-	-	-	-	-	-	-
	Aluminum alloy	-	-	-	-	-	-	-	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	0.050	0.063	0.080	0.080	0.080	0.125	0.160	0.160	0.200	0.250
	Titanium alloy	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
H	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54~60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

Solid carbide drill

BD08C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD08CA0300	3.00	6.00	70	30	36	25.0	Figure 1	●
BD08CA0310	3.10	6.00	70	30	36	24.8	Figure 1	●
BD08CA0317	3.17	6.00	70	30	36	24.7	Figure 1	○
BD08CA0320	3.20	6.00	70	30	36	24.6	Figure 1	●
BD08CA0325	3.25	6.00	70	30	36	24.5	Figure 1	○
BD08CA0330	3.30	6.00	70	30	36	24.4	Figure 1	●
BD08CA0340	3.40	6.00	75	35.5	36	29.8	Figure 1	●
BD08CA0350	3.50	6.00	75	35.5	36	29.6	Figure 1	●
BD08CA0357	3.57	6.00	75	35.5	36	29.5	Figure 1	○
BD08CA0360	3.60	6.00	75	35.5	36	29.4	Figure 1	●
BD08CA0370	3.70	6.00	75	35.5	36	29.3	Figure 1	●
BD08CA0380	3.80	6.00	75	37.5	36	31.1	Figure 1	●
BD08CA0390	3.90	6.00	75	37.5	36	30.9	Figure 1	●
BD08CA0397	3.97	6.00	75	37.5	36	30.8	Figure 1	○
BD08CA0400	4.00	6.00	75	37.5	36	30.8	Figure 1	●
BD08CA0410	4.10	6.00	75	37.5	36	30.6	Figure 1	●
BD08CA0420	4.20	6.00	75	37.5	36	30.4	Figure 1	●
BD08CA0430	4.30	6.00	85	45	36	37.8	Figure 1	●
BD08CA0437	4.37	6.00	85	45	36	37.6	Figure 1	○
BD08CA0440	4.40	6.00	85	45	36	37.6	Figure 1	●
BD08CA0450	4.50	6.00	85	45	36	37.4	Figure 1	○
BD08CA0460	4.60	6.00	85	45	36	37.3	Figure 1	●
BD08CA0465	4.65	6.00	85	45	36	37.2	Figure 1	●
BD08CA0470	4.70	6.00	85	45	36	37.1	Figure 1	○
BD08CA0476	4.76	6.00	90	50	36	42.0	Figure 1	●
BD08CA0480	4.80	6.00	90	50	36	41.9	Figure 1	○
BD08CA0490	4.90	6.00	90	50	36	41.8	Figure 1	●
BD08CA0500	5.00	6.00	90	50	36	41.6	Figure 1	●

●Running stock ○Make-to-order

BD08C Series

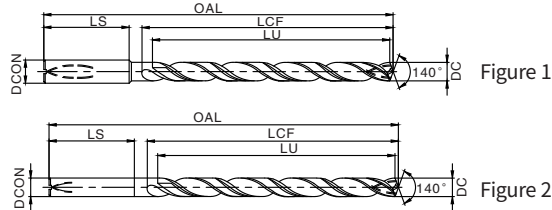
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD08CA0510	5.10	6.00	90	50	36	41.4	Figure 1	●
BD08CA0516	5.16	6.00	90	50	36	41.3	Figure 1	●
BD08CA0520	5.20	6.00	90	50	36	41.3	Figure 1	○
BD08CA0530	5.30	6.00	90	50	36	41.1	Figure 1	●
BD08CA0540	5.40	6.00	97	57	36	47.9	Figure 1	●
BD08CA0550	5.50	6.00	97	57	36	47.7	Figure 1	●
BD08CA0556	5.56	6.00	97	57	36	47.6	Figure 1	●
BD08CA0570	5.70	6.00	97	57	36	47.4	Figure 1	○
BD08CA0580	5.80	6.00	97	57	36	47.2	Figure 1	●
BD08CA0590	5.90	6.00	97	57	36	47.1	Figure 1	●
BD08CA0595	5.95	6.00	97	57	36	47.0	Figure 1	●
BD08CA0600	6.00	6.00	97	57	36	46.9	Figure 2	●
BD08CA0620	6.20	8.00	106	66	36	55.6	Figure 1	○
BD08CA0630	6.30	8.00	106	66	36	55.4	Figure 1	●
BD08CA0635	6.35	8.00	106	66	36	55.3	Figure 1	●
BD08CA0650	6.50	8.00	106	66	36	55.1	Figure 1	○
BD08CA0653	6.53	8.00	106	66	36	55.0	Figure 1	●
BD08CA0660	6.60	8.00	106	66	36	54.9	Figure 1	●
BD08CA0670	6.70	8.00	106	66	36	54.7	Figure 1	●
BD08CA0675	6.75	8.00	106	66	36	54.6	Figure 1	●
BD08CA0680	6.80	8.00	106	66	36	54.6	Figure 1	○
BD08CA0690	6.90	8.00	116	76	36	64.4	Figure 1	●
BD08CA0700	7.00	8.00	116	76	36	64.2	Figure 1	●
BD08CA0710	7.10	8.00	116	76	36	64.1	Figure 1	●
BD08CA0714	7.14	8.00	116	76	36	64.0	Figure 1	●
BD08CA0720	7.20	8.00	116	76	36	63.9	Figure 1	○
BD08CA0730	7.30	8.00	116	76	36	63.7	Figure 1	●
BD08CA0740	7.40	8.00	116	76	36	63.6	Figure 1	●
BD08CA0750	7.50	8.00	116	76	36	63.4	Figure 1	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD08C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD08CA0754	7.54	8.00	116	76	36	63.3	Figure 1	●
BD08CA0760	7.60	8.00	116	76	36	63.2	Figure 1	○
BD08CA0770	7.70	8.00	116	76	36	63.0	Figure 1	●
BD08CA0780	7.80	8.00	116	76	36	62.9	Figure 1	●
BD08CA0794	7.94	8.00	116	76	36	62.6	Figure 1	●
BD08CA0800	8.00	8.00	116	76	36	62.5	Figure 2	○
BD08CA0810	8.10	10.00	131	87	40	73.4	Figure 1	●
BD08CA0820	8.20	10.00	131	87	40	73.2	Figure 1	○
BD08CA0833	8.33	10.00	131	87	40	73.0	Figure 1	●
BD08CA0840	8.40	10.00	131	87	40	72.9	Figure 1	○
BD08CA0850	8.50	10.00	131	87	40	72.7	Figure 1	●
BD08CA0860	8.60	10.00	131	87	40	72.5	Figure 1	●
BD08CA0870	8.70	10.00	131	87	40	72.4	Figure 1	●
BD08CA0873	8.73	10.00	131	87	40	72.3	Figure 1	○
BD08CA0880	8.80	10.00	131	87	40	72.2	Figure 1	●
BD08CA0900	9.00	10.00	131	87	40	71.9	Figure 1	●
BD08CA0910	9.10	10.00	139	95	40	79.7	Figure 1	●
BD08CA0913	9.13	10.00	139	95	40	79.6	Figure 1	●
BD08CA0920	9.20	10.00	139	95	40	79.5	Figure 1	○
BD08CA0930	9.30	10.00	139	95	40	79.4	Figure 1	●
BD08CA0940	9.40	10.00	139	95	40	79.2	Figure 1	●
BD08CA0950	9.50	10.00	139	95	40	79.0	Figure 1	○
BD08CA0952	9.52	10.00	139	95	40	79.0	Figure 1	●
BD08CA0970	9.70	10.00	139	95	40	78.7	Figure 1	●
BD08CA0980	9.80	10.00	139	95	40	78.5	Figure 1	○
BD08CA0990	9.90	10.00	139	95	40	78.3	Figure 1	●
BD08CA0992	9.92	10.00	139	95	40	78.3	Figure 1	●
BD08CA1000	10.00	10.00	139	95	40	78.2	Figure 2	●

●Running stock ○Make-to-order

BD08C Series

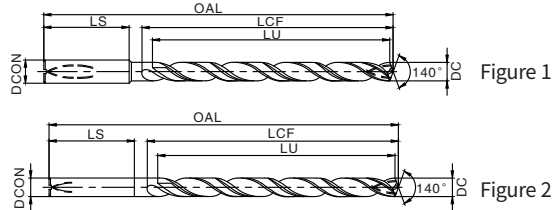
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD08CA1020	10.20	12.00	155	106	45	88.8	Figure 1	○
BD08CA1030	10.30	12.00	155	106	45	88.7	Figure 1	●
BD08CA1032	10.32	12.00	155	106	45	88.6	Figure 1	○
BD08CA1050	10.50	12.00	155	106	45	88.3	Figure 1	●
BD08CA1072	10.72	12.00	155	106	45	88.0	Figure 1	○
BD08CA1080	10.80	12.00	155	106	45	87.8	Figure 1	●
BD08CA1100	11.00	12.00	155	106	45	87.5	Figure 1	●
BD08CA1111	11.11	12.00	155	106	45	87.3	Figure 1	●
BD08CA1120	11.20	12.00	163	114	45	95.2	Figure 1	○
BD08CA1150	11.50	12.00	163	114	45	94.7	Figure 1	○
BD08CA1180	11.80	12.00	163	114	45	94.2	Figure 1	●
BD08CA1191	11.91	12.00	163	114	45	94.0	Figure 1	●
BD08CA1200	12.00	12.00	163	114	45	93.8	Figure 2	●
BD08CA1210	12.10	14.00	182	133	45	112.6	Figure 1	●
BD08CA1220	12.20	14.00	182	133	45	112.5	Figure 1	○
BD08CA1230	12.30	14.00	182	133	45	112.3	Figure 1	●
BD08CA1250	12.50	14.00	182	133	45	112.0	Figure 1	●
BD08CA1270	12.70	14.00	182	133	45	111.6	Figure 1	●
BD08CA1300	13.00	14.00	182	133	45	111.1	Figure 1	●
BD08CA1350	13.50	14.00	182	133	45	110.3	Figure 1	○
BD08CA1400	14.00	14.00	182	133	45	109.5	Figure 2	●
BD08CA1410	14.10	16.00	204	152	48	128.3	Figure 1	●
BD08CA1420	14.20	16.00	204	152	48	128.1	Figure 1	●
BD08CA1429	14.29	16.00	204	152	48	128.0	Figure 1	●
BD08CA1450	14.50	16.00	204	152	48	127.6	Figure 1	○
BD08CA1500	15.00	16.00	204	152	48	126.8	Figure 1	●
BD08CA1550	15.50	16.00	204	152	48	125.9	Figure 1	●
BD08CA1587	15.87	16.00	204	152	48	125.3	Figure 1	●
BD08CA1600	16.00	16.00	204	152	48	125.1	Figure 2	●

●Running stock ○Make-to-order

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

BD08C Series



Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD08CA1650	16.50	18.00	223	171	48	143.2	Figure 1	●
BD08CA1667	16.67	18.00	223	171	48	143.0	Figure 1	○
BD08CA1700	17.00	18.00	223	171	48	142.4	Figure 1	○
BD08CA1750	17.50	18.00	223	171	48	141.6	Figure 1	○
BD08CA1800	18.00	18.00	223	171	48	140.7	Figure 2	○
BD08CA1850	18.50	20.00	244	190	50	158.9	Figure 1	○
BD08CA1900	19.00	20.00	244	190	50	158.0	Figure 1	●
BD08CA1905	19.05	20.00	244	190	50	158.0	Figure 1	○
BD08CA1950	19.50	20.00	244	190	50	157.2	Figure 1	○
BD08CA2000	20.00	20.00	244	190	50	156.4	Figure 2	●

●Running stock ○Make-to-order

Cutting speed recommendations - BD08C Series

Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum /min	Optimal /opt	Maximum /max
P	Carbon steel	< 600	< 230	100	110	120
	Alloy steel	< 1200	< 350	80	90	100
	High-alloyed steel and tool steel	< 1400	< 380	60	70	80
M	Austenite and ferrite stainless steel	< 680	<220	40	50	60
	Martensite stainless steel	< 820	< 240	40	50	60
K	Gray cast iron	-	< 280	180	200	220
	Ductile iron	-	< 320	140	160	180
N	Non-ferrous alloy	< 250	< 110	-	-	-
	Aluminum alloy	< 530	< 130	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	< 3300	< 350	20	30	40
	Titanium alloy	<2100	< 400	30	40	50
H	High hardness steel	-	< 54HRC	-	-	-
	High hardness steel	-	52-60HRC	-	-	-
	High hardness steel	-	> 60 HRC	-	-	-

Recommended feed rate - BD08C Series

Workpiece material		Feed per revolution mm/r									
		Φ2~ Φ2.5	Φ2.5 ~Φ3	Φ3 ~Φ4	Φ4 ~Φ5	Φ5 ~Φ6	Φ6 ~Φ8	Φ8 ~Φ10	Φ10 ~Φ12	Φ12 ~Φ16	Φ16 ~Φ20
P	Carbon steel	0.100	0.125	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500
	Alloy steel	0.080	0.100	0.125	0.125	0.160	0.200	0.250	0.250	0.315	0.400
	High-alloyed steel and tool steel	0.063	0.080	0.100	0.100	0.125	0.160	0.200	0.200	0.250	0.315
M	Austenite and ferrite stainless steel	0.050	0.063	0.080	0.080	0.100	0.125	0.160	0.160	0.200	0.250
	Martensite stainless steel	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
K	Gray cast iron	0.160	0.160	0.200	0.250	0.315	0.315	0.400	0.500	0.630	0.630
	Ductile iron	0.125	0.160	0.200	0.200	0.250	0.315	0.400	0.400	0.500	0.630
N	Non-ferrous alloy	-	-	-	-	-	-	-	-	-	-
	Aluminum alloy	-	-	-	-	-	-	-	-	-	-
S	Iron-based, nickel-based and cobalt-based high-temp alloy	0.050	0.063	0.080	0.080	0.080	0.125	0.160	0.160	0.200	0.250
	Titanium alloy	0.040	0.050	0.063	0.063	0.080	0.100	0.125	0.125	0.160	0.200
H	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-
	High hardness steel	-	-	-	-	-	-	-	-	-	-

P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54~60HRC	≥60HRC
☼	☼	☼	☼	☼			☼	☼			

☼ Fit well ☼ Applicable

Technical information of solid carbide drills

FAQs of hole drilling

	Phenomenon	Causes	Solutions
Hole	Oversize holes	Poor clamping Large run-out around spindle	Select the holder and chuck with high precision Check and adjust after clamping drill
		Asymmetric point angle Large run-out of the drill bit Chisel edge is off center	Regrind the tool Check the accuracy after regrinding
	Low position accuracy	Asymmetric point angle Large run-out of the drill bit Chisel edge is off center Excessive margin abrasion	Select the holder and chuck with high precision Check and adjust after clamping drill
		Poor clamping Large run-out around the spindle Poor workpiece clamping	Select the holder and chuck with high precision Check and adjust after clamping drill
		Excessive feed rate	Reduce the feed rate
		Insufficient supply of cutting fluid	Change the cutting fluid supply method to increase the flow rate
	Irregular hole size	Low re-positioning accuracy of spindle Poor clamping Large run-out around the spindle	Increase the re-positioning accuracy of the machine tool Select the holder and chuck with high precision Check and adjust after clamping drill
		The machined surface is not perpendicular to the feed direction	Adjust the machined surface to be perpendicular to the feed direction
		The center does not align with the axis (lathe)	Carefully adjust it before machining
	Poor linearity Poor perpendicularity	Excessive wear of the tool	Regrind the tool
		Poor accuracy of the center hole	Improve the position accuracy of the center hole
		Asymmetric point angle Large run-out of the drill bit Chisel edge is off-center	Regrind the tool Check the accuracy after regrinding
		Poor rigidity of the drill bit	Improve the drill bit rigidity
		Uneven workpiece surface The center does not align with the axis (lathe)	Adjust the panel to be horizontal or premachine the horizontal plane with center hole

	Phenomenon	Causes	Solutions
Hole	Poor roundness	Asymmetric point angle Large run-out of the drill bit Chisel edge is off-center	Regrind the tool Check the accuracy after grinding
		Poor clamping Large run-out around the spindle Poor workpiece clamping	Select the holder and chuck with high precision Check and adjust after clamping drill
		Too large clearance angle	Regrind the cutting edge
		Poor rigidity of the drill bit	Improve the drill bit rigidity
	Poor surface quality of the machined workpiece	Improper regrinding	Regrind and correct
		Insufficient cutting fluid supply or mismatched model	Change the cutting fluid supply method to increase the flow rate Use the cutting oil with good lubricity
		Poor clamping Large run-out around the spindle	Select the holder and chuck with high precision Calibrating spindle
		Feed rate is too high	Reduce the feed rate
		Excessive wear of the cutting edge Excessive build-up on margin	Regrind the cutting edge Use coated drill bit
		Chip jamming	Reselect a drill bit (chip-hold groove type, helical angle, etc.) Reselect the machining method (Adjust the feed rate, e.g. using step-by-step method)
	Poor cylindricity	Asymmetric point angle Large run-out of the drill bit Chisel edge off-center Excessive abrasion on cutting edge	Regrind the tool Check the accuracy after grinding
		Feed rate is too low	Increase the feed rate

Non-standard customization of solid carbide drills



Customized tools: a good solution for process optimization and efficiency improvement

Client name:		No.68 Chuangye 2nd RD., Lusong District, Zhuzhou, Hunan, P.R.China	
Fax:		Tel.: 0731-28216690	
Tel.:		Fax: 0731-22286653	
E-MAIL:		E-mail: zzhrhj@163.com	
		Postal code: 412000	
		Website: www.huareal.com.cn	

Information of the machined hole

Blind hole

Orifice chamfering of the blind hole

Through-hole

Orifice chamfering of the through-hole

Step hole

Orifice chamfering of the step hole

Process condition

☐ Solid drilling

☐ Prepared hole

Size of prepared hole:

Workpiece information

Workpiece material:	Hardness (HRC/HB):	Sketches or drawings of machined parts will be needed if the above workpiece types cannot be described in detail.
Hole diameter:	Hole tolerance:	
Hole depth:	Roughness:	

Tool type

☐ Twist drill ☐ Straight fluted drill ☐ Step twist drill ☐ Step straight fluted drill ☐ Three-flute drill ☐ Others

Shank Type

☐ Straight shank ☐ Straight shank (DIN 6535HA) ☐ Shank with flat (DIN 6535HB) ☐ Others

Machine Tool Information

Name:Model:

☐ Horizontal machining center ☐ Vertical machining center ☐ Drilling machine ☐ Special machine ☐ Others

Chuck type: ☐ Hydraulic pressure ☐ Thermal expansion ☐ Spring ☐ Side-pressure type ☐ Others

Cooling method: ☐ Internal cooling ☐ External cooling

Sketch of Components or Machining Parts:

Current tool manufacturer:

Tool model:

Tool machining rotating speed:

Tool machining feed:

Order quantity: Piece

Expected delivery date: MM/DD/YYYY

Date:Signature:

Non-standard customization of solid carbide reamers



Customized tools: a good solution for process optimization and efficiency improvement

Client name:		No.68 Chuangye 2nd RD., Lusong District, Zhuzhou, Hunan, P.R.China	
Fax:		Tel.: 0731-28216690	
Tel.:		Fax: 0731-22286653	
E-MAIL:		E-mail: zzhrhj@163.com	
		Postal code: 412000	
		Website: www.huareal.com.cn	

Information of the machined hole

Shape of machined hole:

☐ Through-hole

☐ Blind hole

Size of machined hole (mm):

Tolerance of machined hole:

Depth of machined hole (mm)

Workpiece information

☐ Grey cast iron

Grade of machined material:

☐ Ductile iron

Tensile strength= N/mm²

☐ Aluminum alloy

Hardness (HRC/HB)=

☐ Silicoaluminum Si<10%

☐ Silicoaluminum Si≥10%

Tool information

Tool rotation direction

☐ Dextral rotation

☐ Straight Fluted

☐ Sinistral rotation

Cooling requirements

☐ Internal cooling

☐ External cooling

Coating

☐ Yes ☐ No

LU=

LF=

APMX=

DC=

DN=

CDON=

Cutting edge angle type

45°

45°

30°

<30°

Note:

Order quantity: Piece

Expected delivery date: MM/DD/YYYY

Date:Signature:

Safety standard for carbide

1. Safety responsibility

Before using products of Zhuzhou Huarui Precision Cutting Tools Co.,Ltd., the operators should accept necessary safety training, and carefully read the safety precautions on the product packaging. The company does not hold any legal liability for any adverse consequences caused by the failure to use and operate in accordance with the relevant requirements.

2. Basic features of carbide tools

Carbide tool is a mixture wet grinded by W, Co, Ti, Ta, Nb, Si, Al, C, N, O and their compounds, which will be finally formed by pressing, sintering, and a series of subsequent mechanical machining and fabrication. carbide is an ideal tool for most metal and high-strength non-metal materials machining with its high chemical stability, strength and wear resistance.

3. Precautions for Using Carbide Tools

- 1) Carbide materials are relatively brittle due to their high hardness. brittle crack and damage caused by excessive force or stress on some specific parts may cause damage to the sharp edge of carbide tools.
- 2) Operators should wear labor protection appliance such as protective suits and glasses to protect themselves from chips and slices inevitably produced by the sharp edge of carbide tools during cutting and machining.
- 3) With tungsten carbide and cobalt, etc. as main components, carbide is of high density and should be handled with care.
- 4) Carbide tools are stored in a dry and non-corrosive environment.
- 5) As the thermal expansion coefficient of carbide is different from that of steel, it is welded at an appropriate temperature to avoid welding cracks caused by stress concentration.
- 6) The wet cutting coolants is selected correctly for the service life of machine and cutting tools.
- 7) Please stop using the tools with cracks during machining.
- 8) Non-professionals please do not repair and grind the carbide tools with passivated edge and reduced strength caused by long-term use.
- 9) Please recycle and store the worn and replaced carbide tools to prevent misuse.

Possible safety problems and protective measures in using cutting tools

Possible Safety Problems	Protective Measures
Casualty can be caused by clothes, gloves, long hair, etc. twisting into high-speed equipment during rotary cutting.	Please do not wear gloves during rotary cutting.
	Please hide your long hair in the working cap.
	Caution to prevent clothes and other items from contacting any rotating parts.
Injury can be caused by attachments flying out due to the cutting tool damage caused by improper use.	Read this catalogue and the Safety Standards before using.
	Please wear protective glasses and protective suits.
Human injury can be caused by direct contact with the sharp edge of the tools.	Please wear labor protection appliances such as gloves when handling cutting tools.
Scratches and scalds can be caused by chips produced during cutting.	Remove chips in time by cleaning tools.
	Please wear protective glasses, suits and gloves.
Scratches are likely to be caused by defects, such as burrs, on the machined workpieces.	Do not touch defects such as burrs on any machined workpieces.
	Please wear protective appliances such as protective suits and gloves
Tool damage and machined workpiece spatter can be caused by cutting without tight clamping.	The workpieces must be clamped tightly.
	Please wear protective glasses, suits and gloves.
Injury can be caused by tools falling off and flying out due to cutting without clamping the insert or its attachments tightly.	Make sure that the inserts and other attachments have been fastened properly with appropriate tools before machining.
Injury can be caused by high-speed chips when cutting at high speed.	Use safety hood, protective screen, outer cover, etc.
	Please wear protective glasses, suits and gloves.
Injury can be caused by the insert or its attachments falling off and flying out due to inertial centrifugal force at high speed.	Please use the tools according to the recommended purposes.
	Please wear protective glasses and protective suits.
Scratches to hand can be caused by direct touching on the sharp edge of milling tools.	Please wear labor protection appliances such as gloves when contacting cutting tools.
Injury to operators can be caused by tool damage and spatter due to any dramatical increase of cutting resistance caused by excessive wear and severe impact.	Replace any worn tools in time.
	Please wear protective glasses and protective suits.
Fire and explosion can be caused by sparks and high-temperature chips produced during cutting.	Remove inflammables and explosives from the processing workshop.
	Prepare fire extinguishers.
Tool damage can be caused by intense vibration of high-speed machine tools due to the poor balance of clamps and other attachments.	Check the equipment for looseness or abnormal sound before cutting.
	Please wear protective glasses and protective suits.
Damage and spatter of inserts or tools can be caused by excessive fastening using auxiliary tools such as screw pin or pressure plate.	Do not tighten excessively by auxiliary tools such as casing.
	Please use the tools within the restricted rotating speed range.
Damage and scattering can be caused by shaking or vibration of the tools with eccentric rotating or poor balance when rotary machining.	Check the balance performance of the machine regularly.
	Reduce the tool vibration and process at a suitable running speed.
Drilling with very small tools can easily cause the tool to break, splash and fail to be taken out.	Please wear protective glasses, suits and gloves.
	Please follow the instructions and regulations.
Note: Incidents caused by any modification or diversion of cutting tools without the permission of our company will be at your own risk.	

Comparison table of cutting materials

Country Region	Europe		Germany		UK		Sweden	The United States	France	Italy	Spain	Japan
Standard	DIN	EN	W.-nr		BS	EN	SS	AISI	AFNOR	UNI	UNE	JIS
P	Non-alloyed steel											
	S235JR G2		1.0038		4360 40 C	-	1311	A570.36	E 24-2 Ne	-	-	STKM 12A;C
	S235J2 G3		1.0116		4360 40 B	-	1312	A573-81 65	E 24-U	Fe37-3	-	-
	C15		1.0401		080M15	-	1350	1015	CC12	C15C16	F.111	-
	C22		1.0402		050A20	2C/2D	1450	1020	CC20	C20C21	F.112	-
	C15E		1.1141		080M15	32C	1370	1015	XC12	C16	C15K	S15C
	C25E		1.1158		-	-	-	1025	-	-	-	S25C
	S380N		1.89		4360 55 E	-	2145	A572-60	-	FeE390KG	-	-
	17MnV7		1.087		4360 55 E	-	2142	A572-60	NFA 35-501 E 36	-	-	-
	55Si7		1.0904		250A53	45	2085	9255	55S7	55Si8	56Si7	-
	-		-		-	-	2090	9255	55S7	-	-	-
	C35		1.0501		060A35	-	1550	1035	CC35	C35	F.113	-
	C45		1.0503		080M46	-	1650	1045	CC45	C45	F.114	-
	40Mn4		1.1157		150M36	15	-	1039	35M5	-	-	-
	36Mn5		1.1167		-	-	2120	1335	40M5	-	36Mn5	SMn438(H)
	28Mn6		1.117		150M28	14A	-	1330	20M5	C28Mn	-	SCMn1
	C35G		1.1183		060A35	-	1572	1035	XC38TS	C36	-	S35C
	C45E		1.1191		080M46	-	1672	1045	XC42	C45	C45K	S45C
	C53G		1.1213		060A52	-	1674	1050	XC48TS	C53	-	S50C
	C55		1.0535		070M55	-	1655	1055	-	C55	-	-
	C55E		1.1203		070M55	-	-	1055	XC55	C50	C55K	S55C
	S275J2G3		1.0144		4360 43C	-	1412	A573-81	E 28-3	-	-	SM 400A;B;C
	S355J2G3+C2		1.057		4360 50B	-	2132	-	E36-3	Fe52BFN/Fe52CFN	-	SM490A;B;C;YA;YB
	S355J2G3		1.0841		150 M 19	-	2172	5120	20 MC 5	Fe52	F-431	-
	C60E		1.0601		080A62	43D	-	1060	CC55	C60	-	-
	C60E		1.1221		080A62	43D	1678	1060	XC60	C60	-	S58C
	C101E		1.1274		060 A 96	-	1870	1095	XC 100	-	F-5117	-
	C101u		1.1545		BW 1A	-	1880	W 1	Y105	C36KU	F-5118	SK 3
	C105W1		-		BW2	-	2900	W210	Y120	C120KU	F.515	SUP4
	S340 MGC		1.0961		-	-	-	9262	60SC7	60SiCr8	60SiCr8	-
	11SMn30		1.0715		230M07	-	1912	1213	S250	CF9SMn28	11SMn28	SUM22
	11SMnPb30		1.0718		-	-	1914	12L13	S250Pb	CF9SMnPb28	11SMnPb28	SUM22L
	10SPb20		1.0722		-	-	-	-	10PbF2	CF10SPb20	10SPb20	-
	11SMn37		1.0736		240M07	1B	-	1215	S 300	CF9SMn36	12SMn35	-
	11SMnPb37		1.0737		-	-	1926	12L14	S300Pb	CF9SMnPb36	12SMnP35	-
	35S20		1.0726		212M36	8M	1957	1140	35MF4	-	F210G	-
	GC16E		1.1142		030A04	1A	1325	1115	-	-	-	-
	Low-alloyed steel											
	16Mo3		1.5415		1501-240	-	2912	A204GrA	15D3	16Mo3KW	16Mo3	-
	14Ni6		1.5622		-	-	-	A350LF5	16N6	14Ni6	15Ni6	-
	21NiCrMo2		1.6523		805M20	362	2506	8620	20NCD2	20NiCrMo2	20NiCrMo2	SNCM220(H)
	17CrNiMo6		1.6587		820A16	-	-	-	18NCD6	-	14NiCrMo13	-
	15Cr3		1.7015		523M15	-	-	5015	12C3	-	-	SCr415(H)
	55Cr3		1.7176		527A60	48	-	5155	55C3	-	-	SUP9(A)
	15CrMo5		1.7262		-	-	2216	-	12CD4	-	12CrMo4	SCM415(H)

Country Region	Europe		Germany		UK		Sweden	The United States	France	Italy	Spain	Japan
Standard	DIN	EN	W.-nr		BS	EN	SS	AISI	AFNOR	UNI	UNE	JIS
P	Low-alloyed steel											
	13CrMo4-5		1.7335		1501-620Gr27	-	-	A182 F11;F12	15CD3.5	14CrMo4 5	14CrMo45	-
									15CD4.5			
	10CrMo9 10		1.738		1501-622 Gr.31;45	-	2218	A182 F.22	12CD9, 10	12CrMo9, 10	TU.H	-
	14MoV6 3		1.7715		1503-660-440	-	-	-	-	-	13MoCrV6	-
	50CoMo4		1.7228		823M30	33	2512	-	-	653M31	-	-
	14NiCr10		1.5732		-	-	-	3415	14NC11	16NiCr11	15NiCr11	SNC415(H)
	14NiCr14		1.6582		655M13; A12	36A	-	3415;3310	12NC15	-	-	SNC815(H)
	16MnCr5		1.7131		(527M20)	-	2511	5115	16MC5	16MnCr5	16MnCr5	-
	34CrMo4		1.722		708A37	19B	2234	4137;4135	35CD4	35CrMo4	34CrMo4	SCM432;SCCRM3
	41CrMo4		1.7223		708M40	19A	2244	4140;4142	42CD4TS	41CrMo4	42CrMo4	SCM 440
	42CrMo4		1.7225		708M40	19A	2244	4140	42CD4	42CrMo4	42CrMo4	SCM440(H)
	14NiCrMo134		1.6657		832M13	36C	-	-	-	15NiCrMo13	14NiCrMo131	-
	31CrMo12		1.8515		722 M 24	-	2240	-	30 CD 12	30CrMo12	F-1712	-
	39CrMoV13 9		1.8523		897M39	40C	-	-	-	36CrMoV12	-	-
	41CrS4		1.7039		524A14	-	2092	L1	-	105WCR 5	-	-
	50NiCr13		1.2721		-	-	2550	L6	55NCV6	-	F-528	-
	45WCrV7		1.2542		BS1	-	2710	S1	-	45WCrV8KU	45WCrSi8	-
	36CrNiMo4		1.6511		816M40	110	-	9840	40NCD3	38NiCrMo4(KB)	35NiCrMo4	-
	34CrNiMo6		1.3505		817M40	24	2541	4340	35NCD6	35NiCrMo6(KB)	-	-
	34Cr4		1.7033		530A32	18B	-	5132	32C4	34Cr4(KB)	35Cr4	SCr430(H)
	41Cr4		1.7035		530A40	18	-	5140	42C4	41Cr4	42Cr4	SCr440(H)
	32CrMo12		1.7361		722M24	40B	2240	-	30CD12	32CrMo12	F.124.A	-
	51CrV4		1.8159		735A50	47	2230	6150	50CV4	50CrV4	51CrV4	SUP10
	41CrAlMo7		1.8509		905M39	41B	2940	-	40CAD6, 12	41CrAlMo7	41CrAlMo7	-
	100Cr6		1.5752		534A99	31	2258	52100	100C6	100Cr6	F.131	SUJ2
	105WCr6		1.2419		-	-	2140	-	105WC13	10WCr6	105WCr5	SKS31
	-		-		-	-	-	-	-	107WCr5KU	-	SKS2, SKS3
	-		1.2714		-	-	-	L6	55NCDV7	-	F.520.S	SKT4
	100Cr6		1.2067		BL3	-	-	L3	Y100C6	-	100Cr6	-
	16MnCr5		1.7139		-	-	2127	-	-	-	-	-
	16Mo5		1.5423		1503-245-420	-	-	4520	-	16Mo5	16Mo5	-
	40NiCrMo8-4		1.6562		311-Type 7	-	-	8740	-	40NiCrMo2(KB)	40NiCrMo2	SNCM240
	42Cr4		1.7045		-	-	2245	5140	-	-	42Cr4	SCr440
	31NiCrMo14		1.5755		830 M 31	-	2534	-	-	-	F-1270	-
	36NiCr6		1.571		640A35	111A	-	3135	35NC6	-	-	SNC236
	22Mo4		1.5419		605A32	-	2108	8620	-	-	F520.S	-
	25CrMo4		1.7218		1717CDS110	-	2225	4130	25CD4	25CrMo4(KB)	AM26CrMo4	SCM420;SCM430
	-		-		-	-	2223	-	-	-	-	-
	High-alloyed steel											
	X210Cr12		1.208		BD3	-	-	D3	Z200C12	X210Cr13KU	X210Cr12	SKD1
										X250Cr12KU		
	X43Cr13		1.2083		-	-	2314	-	-	-	-	-
	X40CrMoV5 1		1.2344		BH13	-	2242	H13	Z40CDV5	X35CrMoV05KU	X40CrMoV5	SKD61

Comparison table of cutting materials

Country Region	Europe		Germany		UK		Sweden	The United States	France	Italy	Spain	Japan
Standard	DIN	EN	W.-nr		BS	EN	SS	AISI	AFNOR	UNI	UNE	JIS
P	Low-alloyed steel											
										X40CrMoV511KU		
	X100CrMoV5 1		1.2363		BA2	-	2260	A2	Z100CDV5	X100CrMoV51KU	X100CrMoV5	SKD12
	X210CrW12		1.2436		-	-	2312	-	-	X215CrW12 1KU	X210CrW12	SKD2
	X30WCrV9 3		1.2581		BH21	-	-	H21	Z30WCV9	X28W09KU	X30WCrV9	SKD5
										X30WCrV9 3KU		
	X165CrMoV 12		1.2601		-	-	2310	-	-	X165CrMoW12KU	X160CrMoV12	-
	X155CrMoV12-1		1.2379		-	-	2736	HNv3	-	-	-	-
	X8Ni9		1.5662		1501-509;510	-	-	ASTM A353	-	X10Ni9	XBNI09	-
	12Ni19		1.568		-	-	-	2515	Z18N5	-	-	-
	S6-5-2		1.3343		4959BA2	-	2715	D3	Z40CSD10	15NiCrMo13	-	SUH3
	-		-		BM 2	-	2722	M 2	Z85WDCV	HS 6-5-2-2	F-5603.	SKH 51
	HS 6-5-2-5		1.3243		BM 35	-	2723	M 35	6-5-2-5	HS 6-5-2-5	F-5613	SKH 55
	HS 2-9-2		1.3348		-	-	2782	M 7	-	HS 2-9-2	F-5607	-
	G-X120Mn12		1.3401		Z120M12	-	2183	L3	Z120M12	XG120Mn12	X120Mn12	SCMnH/1
	Ferrite/martensite stainless steel											
	X10CrAl13		1.4724		403S17	-	-	405	Z10C13	X10CrAl12	F.311	SUS405
	X10CrAl18		1.4742		430S15	60	-	430	Z10CAS18	X8Cr17	F.3113	SUS430
	X10CrAl2-4		1.4762		-	-	2322	446	Z10CAS24	X16Cr26	-	SUH446
	X1CrMoTi18-2		1.4521		-	-	2326	S44400	-	-	-	-
	X6Cr13		1.4		403S17	-	2301	403	Z6C13	X6Cr13	F.3110	SUS403
	X7Cr14		1.4001		-	-	-	-	-	-	F.8401	-
	X10Cr13		1.4006		410S21	56A	2302	410	Z10C14	X12Cr13	F.3401	SUS410
	X6Cr17		1.4016		430S15	960	2320	430	Z8C17	X8Cr17	F3113	SUS430
	X6CrAl13		1.4002		405S17	-	-	405	Z8CA12	X6CrAl13	-	-
	X20Cr13		1.4021		420S37	-	2303	420	Z20C13	X20Cr13	-	-
	X6CrMo17-1		1.4113		434S17	-	2325	434	Z8CD17.01	X8CrMo17	-	SUS434
	X45CrS9-3-1		1.4718		401S45	52	-	HW3	Z45CS9	X45GrSi8	F322	SUH1
	X85CrMoV18-2		1.4748		443S65	59	-	HNv6	Z80CSN20.02	X80CrSiNi20	F.320B	SUH4
	X20CrMoV12-1		1.4922		-	-	2317	-	-	X20CrMoNi 12 01	-	-
	X12CrS13		1.4005		416 S 21	-	2380	416	Z11CF1	X12 CrS 13	F-3411	SUS 416
	X46Cr13		1.4034		420S45	56D	2304	-	Z40CM	X40Cr14	F.3405	SUS420J2
	X19CrNi17-2		1.4057		431S29	57	2321	431	Z15CNI6.02	X16CrNi16	F.3427	SUS431
	X5CrNiCuNb16-4 X4		1.4542 1.4548		-	-	-	630	Z7CNU17-04	-	-	-
	CrNiMo16-5		1.4418		-	-	2387	-	Z6CND16-04-01	-	-	-
	X14CrMoS17		1.4104		-	-	2383	430F	Z10CF17	X10CrS17	F.3117	SUS430F

Country Region	Europe		Germany		UK		Sweden	The United States	France	Italy	Spain	Japan
Standard	DIN	EN	W.-nr		BS	EN	SS	AISI	AFNOR	UNI	UNE	JIS
M	Austenite stainless steel											
	X3CrNiMo13-4		1.4313		425C11	-	2385	CA6-NM	Z4CND13.4M	(G)X6CrNi304	-	SCS5
									Z38C13M			
	X53CrMnNiN21-9		1.4871		349S54	-	-	EV8	Z52CMN21.09	X53CrMnNiN21 9	-	SUH35, SUH36
	X2CrNiN18-10		1.4311		304S62	-	2371	304LN	Z2CN18.10	-	-	SUS304LN
	X2CrNiMoN17-13-3		1.4429		-	-	2375	316LN	Z2CND17.13	-	-	SUS316LN
	X2CrNiMo17-12-2		1.4435		316S13	-	2348	316L	Z2CND17-12	X2CrNiMo1712	-	-
	X2CrNiMo18-14-3		1.4404		316S13	-	2353	316L	Z2CND17.12	X2CrNiMo17 12	-	SCS16, SUS316L
	X3CrNiMo17-3-3		1.4436		316S33	-	2343 2347	316	Z6CND18-12-03	X8CrNiMo1713	-	-
	X2CrNiMo18-15-4		1.4438		317S12	-	2367	317L	Z2CND19.15	X2CrNiMo18 16	-	SUS317L
	X6CrNiNb18-10		1.455		347S17	58F	2338	347	Z6CNNb18.10	X6CrNiNb18 11	F.3552 F.3524	SUS347
	X6CrNiMoTi17-12-2		1.4571		320S17	58J	2350	316Ti	Z6NDT17.12	X6CrNiMoTi17 12	F.3535	-
	X10CrNiMoNb 18-12		1.4583		-	-	-	318	Z6CNDNb17 13B	X6CrNiMoNb17 13	-	-
	X15CrNiSi20-12		1.4828		309S24	-	-	309	Z15CNS20.12	-	-	SUS303
	X2CrNiMoN17-11-2		1.4406		301S21	58C	2370	308	Z1NCDU25.20	-	F.8414	SCS17
	X1CrNiMoCuN20-18-7		1.4547		-	-	2378	S31254	Z1CNDU20-18-06AZ	-	-	-
	X9CrNi18-8		1.431		-	-	2331	301	Z12CN17.07	X12CrNi17 07	F.3517	SUS301
	X7CrNiAl17-7		1.4568 1.4504		316S111	-	-	17-7PH	Z8CNA17-07	X2CrNiMo1712	-	-
	X2CrNi19-11		1.4306		304S11	-	2352	304L	Z2CN18-10	X2CrNi18 11	-	-
					304S12							
	-		-		304S31	58E	2332 2333	304	Z6CN18.09	X5CrNi18 10	F.3504 F.3541	SUS304
	X5CrNi18-10		1.4301		304S15	58E	2332	304	Z6CN18.09	X5CrNi18 10	F.3551	SUS304
	X5CrNiMo17-2-2		1.4401		316S16	58J	2347	316	Z6CND17.11	X5CrNiMo17 12	F.3543	SUS316
	X6CrNiTi18-10		1.4541		321S12	58B	2337	321	Z6CNT18.10	X10CrNiS 18.09	F.3553 F.3523	SUS321
	X8CrNiS18-9		1.4305		303S21	58M	2346	303	Z10CNF 18.09	X6CrNiTi18 11	F.3508	SUS303
	High quality austenite (Ni>20%) stainless steel											
	G-X40NiCrSi36-18		1.4865		330C11	-	-	-	-	XG50NiCr39 19	-	SCH15
	X1NiCrMoCu25-20-5		1.4539		-	-	2562	UNS V 0890A	Z2 NCDU25-20	-	-	-
	X8CrNi25-21		1.4845		310S24	-	2361	310S	Z12CN25 20	X6CrNi25 20	F.331	SUH310
	X12NiCrSi36 16		1.4864		-	-	-	330	Z12NCS35.16	F-3313	-	SUH330
	X1NiCrMoCu31-27-4		1.4563		-	-	2584	NO8028	Z1NCDU31-27-03	-	-	-
	Duplex (austenite/ferrite) stainless steel											
	X2CrNiN23-4		1.4362		-	-	2376	S31500	-	-	-	-
	X8CrNiMo27-5		-		-	-	2324	S32900	-	-	-	-
	X2CrNiN23-4		-		-	-	2327	S32304	Z2CN23-04AZ	-	-	-
	-		-		-	-	2328	-	-	-	-	-
	X2CrNiMoN22-53		-		-	-	2377	S31803	Z2CND22-05-03	-	-	-

Comparison table of hardness

● Conversion value approximate to brinell hardness of steel

Brinell hardness 3000kgf HB	Rockwell hardness				Vickers hardness 50kgf HV	Shore hardness HS	Tensile strength (Gpa)
	A	B	C	D			
	Scale	Scale	Scale	Scale			
	60kgf	100kgf	150kgf	100kgf			
	brale	1/10in	brale	brale			
	Brale	Ball	Brale	Brale			
	HRA	HRB	HRC	HRD			
—	85.6	—	68.0	76.9	940	97	—
—	85.3	—	67.5	76.5	920	96	—
—	85.0	—	67.0	76.1	900	95	—
767	84.7	—	66.4	75.7	880	93	—
757	84.4	—	65.9	75.3	860	92	—
745	84.1	—	65.3	74.8	840	91	—
733	83.8	—	64.7	74.3	820	90	—
722	83.4	—	64.0	73.8	800	88	—
712	—	—	—	—	—	—	—
710	83.0	—	63.3	73.3	780	87	—
698	82.6	—	62.5	72.6	760	86	—
684	82.2	—	61.8	72.1	740		—
682	82.2	—	61.7	72.0	737	84	—
670	81.8	—	61.0	71.5	720	83	—
656	81.3	—	60.1	70.8	700	—	—
653	81.2	—	60.0	70.7	697	81	—
647	81.1	—	59.7	70.5	690	—	—
638	80.8	—	59.2	70.1	680	80	—
630	80.6	—	58.8	69.8	670	—	—
627	80.5	—	58.7	69.7	667	79	—
601	79.8	—	57.3	68.7	640	77	—
578	79.1	—	56.0	67.7	615	75	—
555	78.4	—	54.7	66.7	591	73	2.06
534	77.8	—	53.5	65.8	569	71	1.98
514	76.9	—	52.1	64.7	547	70	1.89
495	76.3	—	51.0	63.8	528	68	1.82
477	75.6	—	49.6	62.7	508	66	1.73
461	74.9	—	48.5	61.7	491	65	1.67
444	74.2	—	47.1	60.8	472	63	1.59
429	73.4	—	45.7	59.7	455	61	1.51
415	72.8	—	44.5	58.8	440	59	1.46
401	72.0	—	43.1	57.8	425	58	1.39
388	71.4	—	41.8	56.8	410	56	1.33
375	70.6	—	40.4	55.7	396	54	1.26
363	70.0	—	39.1	54.6	383	52	1.22
352	69.3	(110.0)	37.9	53.8	372	51	1.18
341	68.7	(109.0)	36.6	52.8	360	50	1.13
331	68.1	(108.5)	35.5	51.9	350	48	1.10

● Conversion value approximate to brinell hardness of steel

Brinell hardness 3000kgf HB	Rockwell hardness				Vickers hardness 50kgf HV	Shore hardness HS	Tensile strength (Gpa)
	A	B	C	D			
	Scale	Scale	Scale	Scale			
	60kgf	100kgf	150kgf	100kgf			
	brale	1/10in	brale	brale			
	Brale	Ball	Brale	Brale			
	HRA	HRB	HRC	HRD			
321	67.5	(108.0)	34.3	50.1	339	47	1.06
311	66.9	(107.5)	33.1	50.0	328	46	1.03
302	66.3	(107.0)	32.1	49.3	319	45	1.01
293	65.7	(106.0)	30.8	48.3	309	43	0.97
285	65.3	(105.5)	29.9	47.6	301	—	0.95
277	64.6	(104.5)	28.8	46.7	292	41	0.92
269	64.1	(104.0)	27.6	45.9	284	40	0.89
262	63.6	(103.0)	26.6	45.0	276	39	0.87
255	63.0	(102.0)	25.4	44.2	269	38	0.84
248	62.5	(101.0)	24.2	43.2	261	37	0.82
241	61.8	(100.0)	22.8	42.0	253	36	0.80
235	61.4	99.0	21.7	41.4	247	35	0.78
229	60.8	98.2	20.5	40.5	241	34	0.76
223	—	97.3	(18.8)	—	234	—	—
217	—	96.4	(17.5)	—	228	33	0.73
212	—	95.5	(16.0)	—	222	—	0.71
207	—	94.6	(15.2)	—	218	32	0.69
201	—	93.8	(13.8)	—	212	31	0.68
197	—	92.8	(12.7)	—	207	30	0.66
192	—	91.9	(11.5)	—	202	29	0.64
187	—	90.7	(10.0)	—	196	—	0.62
183	—	90.0	(9.0)	—	192	28	0.62
179	—	89.0	(8.0)	—	188	27	0.60
174	—	87.8	(6.4)	—	182	—	0.59
170	—	86.8	(5.4)	—	178	26	0.57
167	—	86.0	(4.4)	—	175	—	0.56
163	—	85.0	(3.3)	—	171	25	0.55
156	—	82.9	(0.9)	—	163	—	0.52
149	—	80.8	—	—	156	23	0.50
143	—	78.7	—	—	150	22	0.49
137	—	76.4	—	—	143	21	0.46
131	—	74.0	—	—	137	—	0.45
126	—	72.0	—	—	132	20	0.43
121	—	69.8	—	—	127	19	0.41
116	—	67.6	—	—	122	18	0.40
111	—	65.7	—	—	117	15	0.38

1) Generally value in () is not used in the table.
2) Brales of Rockwell hardness A, C and D are made of diamond.
3) This table is excerpted from the JIS Steel Standard (1980).

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

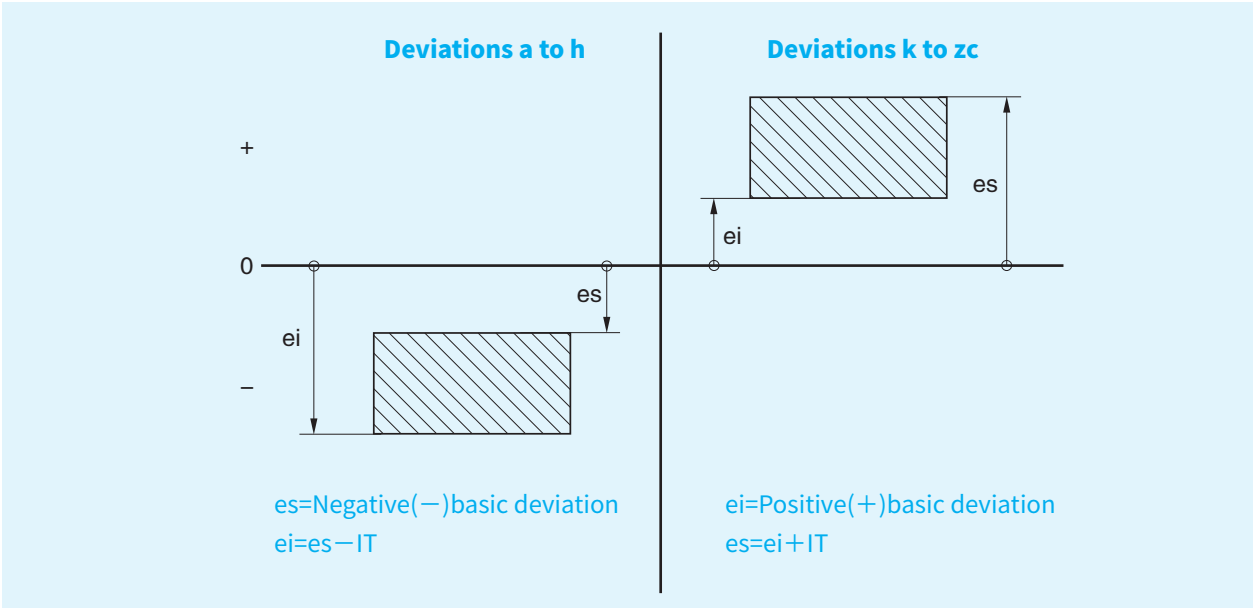
Short hole drills

Solid carbide drills

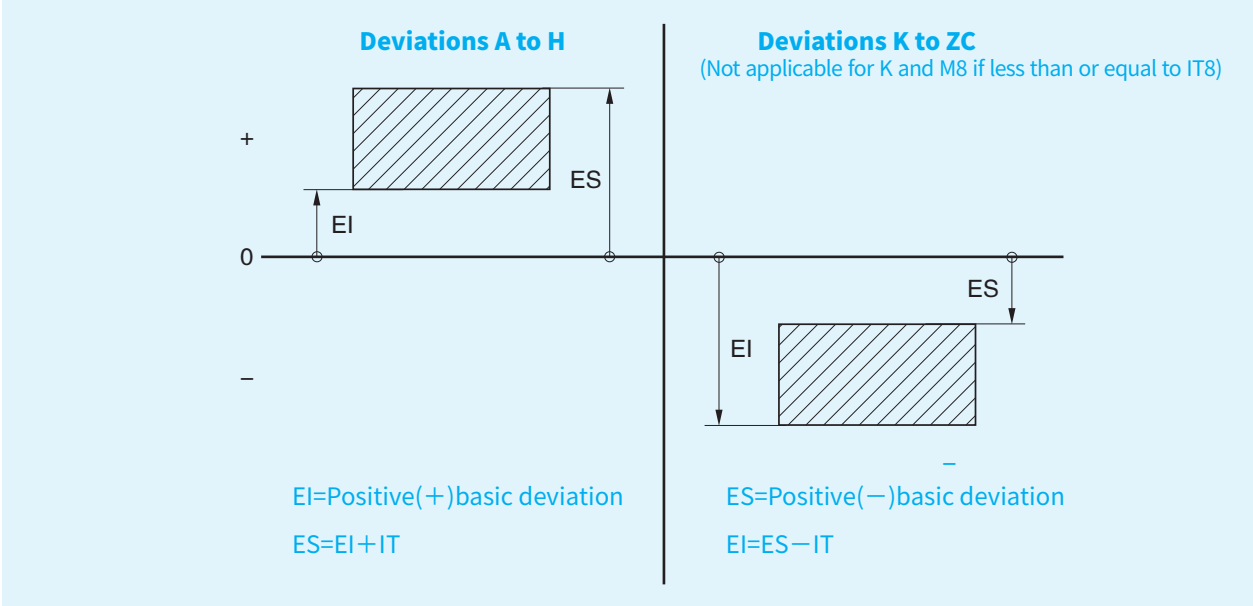
Fit dimension tolerance

Basic dimension mm		Standard tolerance class																		
		IT1	IT2	IT3	IT4	IT5	IT6	IT7	IT8	IT9	IT10	IT11	IT12	IT13	IT14	IT15	IT16	IT17	IT18	
>	To	μm											mm							
---	3	0.8	1.2	2	3	4	6	10	14	25	40	60	0.1	0.14	0.25	0.4	0.6	1	1.4	
3	6	1	1.5	2.5	4	5	8	12	18	30	48	75	0.12	0.18	0.3	0.48	0.75	1.2	1.8	
6	10	1	1.5	2.5	4	6	9	15	22	36	58	90	0.15	0.22	0.36	0.58	0.9	1.5	2.2	
10	18	1.2	2	3	5	8	11	18	27	43	70	110	0.18	0.27	0.43	0.7	1.1	1.8	2.7	
18	30	1.5	2.5	4	6	9	13	21	33	52	84	130	0.21	0.33	0.52	0.84	1.3	2.1	3.3	
30	50	1.5	2.5	4	7	11	16	25	39	62	100	160	0.25	0.39	0.62	1	1.6	2.5	3.9	
50	80	2	3	5	8	13	19	30	46	74	120	190	0.3	0.46	0.74	1.2	1.9	3	4.6	
80	120	2.5	4	6	10	15	22	35	54	87	140	220	0.35	0.54	0.87	1.4	2.2	3.5	5.4	
120	180	3.5	5	8	12	18	25	40	63	100	160	250	0.4	0.63	1	1.6	2.5	4	6.3	
180	250	4.5	7	10	14	20	29	46	72	115	185	290	0.46	0.72	1.15	1.85	2.9	4.6	7.2	
250	315	6	8	12	16	23	32	52	81	130	210	320	0.52	0.81	1.3	2.1	3.2	5.2	8.1	
315	400	7	9	13	18	25	36	57	89	140	230	360	0.57	0.89	1.4	2.3	3.6	5.7	8.9	
400	500	8	10	15	20	27	40	63	97	155	250	400	0.63	0.97	1.55	2.5	4	6.3	9.7	
500	630	9	11	16	22	32	44	70	110	175	280	440	0.7	1.1	1.75	2.8	4.4	7	11	
630	800	10	13	18	25	36	50	80	125	200	320	500	0.8	1.25	2	3.2	5	8	12.5	
800	1000	11	15	21	28	40	56	90	140	230	360	560	0.9	1.4	2.3	3.6	5.6	9	14	
1000	1250	13	18	24	33	47	66	105	165	260	420	660	1.05	1.65	2.6	4.2	6.6	10.5	16.5	
1250	1600	15	21	29	39	55	78	125	195	310	500	780	1.25	1.95	3.1	5	7.8	12.5	19.5	
1600	2000	18	25	35	46	65	92	150	230	370	600	920	1.5	2.3	3.7	6	9.2	15	23	
2000	2500	22	30	41	55	78	110	175	280	440	700	1100	1.75	2.8	4.4	7	11	17.5	28	
2500	3150	26	36	50	68	96	135	210	330	540	860	1350	2.1	3.3	5.4	8.6	13.5	21	33	
Notice																				
1. Standard tolerance values from IT1 to IT5 with basic sizes greater than 500mm are on trial.																				
2. IT4 to IT18 is not applicable if the basic size is less than or equal to 1mm.																				

The lower deviation (ei) and upper deviation (es) of the shaft can be obtained from the basic deviation and standard tolerance (IT) of the shaft.



The lower deviation (EI) and upper deviation (ES) of the hole can be obtained from the basic deviation and standard tolerance (IT) of the hole.



For example:
for a hole with diameter of $\phi 3$ and tolerance class of H7, it can be found from the Value Table of Hole Basic Deviation that the lower deviation (EI) of tolerance class H within this size range is 0, while the corresponding standard tolerance (IT) of class 7 is 10 μ m, so the upper deviation $ES = EI + IT = 10\mu\text{m}$.
Therefore, the fit dimension of this hole is $\phi 3^{+0.01}_0 \text{ mm}$.

A

General turning

Parting and grooving

Threading

B

Indexable milling

Solid carbide end mills

C

Short hole drills

Solid carbide drills

General technical information

Basic deviation value of the shaft

Basic dimension mm		Basic deviation value											
		Upper deviation es											
		All standard tolerance classes											
>	To	a	b	c	cd	d	e	ef	f	fg	g	h	js
---	3	-270	-140	-60	-34	-20	-14	-10	-6	-4	-2	0	
3	6	-270	-140	-70	-46	-30	-20	-14	-10	-6	-4	0	
6	10	-280	-150	-80	-56	-40	-25	-18	-13	-8	-5	0	
10	14	-290	-150	-95		-50	-32		-16		-6	0	
14	18												
18	24	-300	-160	-110		-65	-40		-20		-7	0	
24	30												
30	40	-310	-170	-120		-80	-50		-25		-9	0	
40	50	-320	-180	-130									
50	65	-340	-190	-140		-100	-60		-30		-10	0	
65	80	-360	-200	-150									
80	100	-380	-220	-170		-120	-72		-36		-12	0	
100	120	-410	-240	-180									
120	140	-460	-260	-200		-145	-85		-43		-14	0	
140	160	-520	-280	-210									
160	180	-580	-310	-230		-170	-100		-50		-15	0	
180	200	-660	-340	-240									
200	225	-740	-380	-260		-190	-110		-56		-17	0	
225	250	-820	-420	-280									
250	280	-920	-480	-300		-210	-125		-62		-18	0	
280	315	-1050	-540	-330									
315	355	-1200	-600	-360		-230	-135		-68		-20	0	
355	400	-1350	-680	-400									
400	450	-1500	-760	-440		-260	-145		-76		-22	0	
450	500	-1650	-840	-480									
500	560					-290	-160		-80		-24	0	
560	630												
630	710					-320	-170		-86		-26	0	
710	800												
800	900					-350	-195		-98		-28	0	
900	1000												
1000	1120					-390	-220		-110		-30	0	
1120	1250												
1250	1400					-430	-240		-120		-32	0	
1400	1600												
1600	1800					-480	-260		-130		-34	0	
1800	2000												
2000	2240					-520	-290		-145		-38	0	
2240	2500												
2500	2800												
2800	3150												

Notes:
1. The basic deviations a and b are not applicable if the basic size is less than or equal to 1mm.
2. Deviation=±[(IT_n-1)/2] if the IT_n value is odd from js7 to js11 in the tolerance zone.

Deviation=±(IT_n/2), in which IT_n is the IT value

Basic deviation value																			
Lower deviation ei																			
IT5 & IT6	IT7	IT8	IT4 & IT7	≤IT3 >IT7	All standard tolerance classes														
j			k		m	n	p	r	s	t	u	v	x	y	z	zn	zb	zc	
-2	-4	-6	0	0	+2	+4	+6	+10	+14		+18		+20		+26	+32	+40	+60	
-2	-4		+1	0	+4	+8	+12	+15	+19		+23		+28		+35	+42	+50	+80	
-2	-5		+1	0	+6	+10	+15	+19	+23		+28		+34		+42	+52	+67	+97	
-3	-6		+1	0	+7	+12	+18	+23	+28		+33		+40		+50	+64	+90	+130	
												+39	+45		+60	+77	+108	+150	
-4	-8		+2	0	+8	+15	+22	+28	+35		+41	+47	+54	+63	+73	+98	+136	+188	
										+41	+48	+55	+64	+75	+88	+118	+160	+218	
-5	-10		+2	0	+9	+17	+26	+34	+43		+48	+60	+68	+80	+94	+112	+148	+200	
										+54	+70	+81	+97	+114	+136	+180	+242	+325	
-7	-12		+2	0	+11	+20	+32	+41	+53	+66	+87	+102	+122	+144	+172	+226	+300	+405	
								+43	+59	+75	+102	+120	+146	+174	+210	+274	+360	+480	
-9	-15		+3	0	+13	+23	+37	+51	+71	+91	+124	+146	+178	+214	+258	+335	+445	+585	
								+54	+79	+104	+144	+172	+210	+254	+310	+400	+525	+690	
								+63	+92	+122	+170	+202	+248	+300	+365	+470	+620	+800	
-11	-18		+3	0	+15	+27	+43	+65	+100	+134	+190	+228	+280	+340	+415	+535	+700	+900	
								+68	+108	+146	+210	+252	+310	+380	+465	+600	+780	+1000	
								+77	+122	+166	+236	+284	+350	+425	+520	+670	+880	+1150	
-13	-21		+4	0	+17	+31	+50	+80	+130	+180	+258	+310	+385	+470	+575	+740	+960	+1250	
								+84	+140	+196	+284	+340	+425	+520	+640	+820	+1050	+1350	
-16	-26		+4	0	+20	+34	+56	+94	+158	+218	+315	+385	+475	+580	+710	+920	+1200	+1550	
								+98	+170	+240	+350	+425	+525	+650	+790	+1000	+1300	+1700	
-18	-28		+4	0	+21	+37	+62	+108	+190	+268	+390	+475	+590	+730	+900	+1150	+1500	+1900	
								+114	+208	+294	+435	+530	+660	+820	+1000	+1300	+1650	+2100	
-20	-32		+5	0	+23	+40	+68	+126	+232	+330	+490	+595	+740	+920	+1100	+1450	+1850	+2400	
								+132	+252	+360	+540	+660	+820	+1000	+1250	+1600	+2100	+2600	
			0	0	+26	+44	+78	+150	+280	+400	+600								
								+155	+310	+450	+660								
			0	0	+30	+50	+88	+175	+340	+500	+740								
								+185	+380	+560	+840								
			0	0	+34	+56	+100	+210	+430	+620	+940								
								+220	+470	+680	+1050								
			0	0	+40	+66	+120	+250	+520	+780	+1150								
								+260	+580	+840	+1300								
			0	0	+48	+78	+140	+300	+640	+960	+1450								
								+330	+720	+1050	+1600								
			0	0	+58	+92	+170	+370	+820	+1200	+1850								
								+400	+920	+1350	+2000								
			0	0	+68	+110	+195	+440	+1000	+1500	+2300								
								+460	+1100	+1650	+2500								
			0	0	+76	+135	+240	+550	+1250	+1900	+2900								
								+580	+1400	+2100	+3200								

General technical information

Basic deviation value of the hole

Basic dimension mm		Basic deviation value																					
		Lower deviation EI												Upper deviation ES									
														All standard tolerance classes									
>	To	A	B	C	CD	D	E	EF	F	FG	G	H	JS	J			K		M		N		P To ZC
---	3	+270	+140	+60	+34	+20	+14	+10	+6	+4	+2	0	Deviation=±(IT _n /Z), in which IT _n is the IT value	+2	+4	+6	0	0	-2	-2	-4	-4	Add a Δ value to the corresponding value greater than IT7
3	6	+270	+140	+70	+46	+30	+20	+14	+10	+6	+4	0		+5	+6	+10	-1+Δ		-4+Δ	-4	-8+Δ	0	
6	10	+280	+150	+80	+56	+40	+25	+18	+13	+8	+5	0		+5	+8	+12	-1+Δ		-6+Δ	-6	-10+Δ	0	
10	14	+290	+150	+95		+50	+32		+16		+6	0		+6	+10	+15	-1+Δ		-7+Δ	-7	-12+Δ	0	
14	18																						
18	24	+300	+160	+110		+65	+40		+20		+7	0		+8	+12	+20	-2+Δ		-8+Δ	-8	-15+Δ	0	
24	30																						
30	40	+310	+170	+120		+80	+50		+25		+9	0		+10	+14	+24	-2+Δ		-9+Δ	-9	-17+Δ	0	
40	50	+320	+180	+130																			
50	65	+340	+190	+140		+100	+60		+30		+10	0		+13	+18	+28	-2+Δ		-11+Δ	-11	-20+Δ	0	
65	80	+360	+200	+150																			
80	100	+380	+220	+170		+120	+72		+36		+12	0		+16	+22	+34	-3+Δ		-13+Δ	-13	-23+Δ	0	
100	120	+410	+240	+180																			
120	140	+460	+260	+200								0		+18	+26	+41	-3+Δ		-15+Δ	-15	-27+Δ	0	
140	160	+520	+280	+210																			
160	180	+580	+310	+230								0		+22	+30	+47	-4+Δ		-17+Δ	-17	-31+Δ	0	
180	200	+660	+340	+240																			
200	225	+740	+380	+260		+170	+100		+50		+15	0		+25	+36	+55	-4+Δ		-20+Δ	-20	-34+Δ	0	
225	260	+820	+420	+280																			
260	280	+920	+480	+300		+190	+110		+56		+17	0		+29	+39	+60	-4+Δ		-21+Δ	-21	-37+Δ	0	
280	315	+1050	+540	+330																			
315	355	+1200	+600	+360		+210	+125		+62		+18	0		+33	+43	+66	-5+Δ		-23+Δ	-23	-40+Δ	0	
355	400	+1350	+680	+400																			
400	450	+1500	+760	+440		+230	+135		+68		+20	0											
450	500	+1650	+840	+480																			
500	560					+260	+145		+76		+22	0					0		-26		-44		
560	630																						
630	710					+290	+160		+80		+24	0						0		-30		-50	
710	800																						
800	900					+320	+170		+86		+26	0					0		-34		-56		
900	1000																						
1000	1120					+350	+195		+98		+28	0					0		-40		-66		
1120	1250																						
1250	1400					+390	+220		+110		+30	0					0		-48		-78		
1400	1600																						
1600	1800					+430	+240		+120		+32	0					0		-58		-92		
1800	2000																						
2000	2240					+480	+260		+130		+34	0					0		-68		-110		
2240	2500																						
2500	2800					+520	+290		+145		+38	0					0		-76		-135		
2800	3150																						

Notes:
1. The basic deviation A and B as well as N which is greater than IT8 are not applicable if the basic size is less than or equal to 1mm.
2. Deviation=±[(IT_n-1)/2] if the IT_n value is odd from JS7 to JS11 in the tolerance zone.
3. The desired Δ value can be selected from the right side of the table for K, M, N which is less than or equal to IT8, and P to ZC which is less than or equal to IT7.
For example: K7 in segment 18-30mm: Δ=8 μm, so ES=-2+8=+6 μm
S6 in segment 18-30mm: Δ=4 μm, so ES=-35+4=-31 μm
4) An exceptional circumstance: M5 in segment 250 - 315mm, ES=-9 μm (instead of -11 μm).

Basic deviation value												Δvalue					
Upper deviation ES																	
Standard tolerance class > IT7												All standard tolerance classes					
P	R	S	T	U	V	X	Y	Z	ZA	ZB	ZC	IT3	IT4	IT5	IT6	IT7	IT8
-6	-10	-14		-18		-20		-26	-32	-40	-60	0	0	0	0	0	0
-12	-15	-19		-23		-28		-35	-42	-50	-80	1	1.5	1	3	4	6
-15	-19	-23		-28		-34		-42	-52	-67	-97	1	1.5	2	3	6	7
-18	-23	-28		-33		-40		-50	-64	-90	-130	1	2	3	3	7	9
					-39	-45		-60	-77	-108	-150						
-22	-28	-35		-41	-47	-54	-63	-73	-98	-136	-188	1.5	2	3	4	8	12
			-41	-48	-55	-64	-75	-88	-118	-160	-218						
-26	-34	-43	-48	-60	-68	-80	-94	-112	-148	-200	-274	1.5	3	4	5	9	14
			-54	-70	-81	-97	-114	-136	-180	-242	-325						
-32	-41	-53	-66	-87	-102	-122	-144	-172	-226	-300	-405	2	3	5	6	11	16
	-43	-59	-75	-102	-120	-146	-174	-210	-274	-360	-480						
-37	-51	-71	-91	-124	-146	-178	-214	-258	-335	-445	-585	2	4	5	7	13	19
	-54	-79	-104	-144	-172	-210	-254	-310	-400	-525	-690						
-43	-63	-92	-122	-170	-202	-248	-300	-365	-470	-620	-800	3	4	6	7	15	23
	-65	-100	-134	-190	-228	-280	-340	-415	-535	-700	-900						
	-68	-108	-146	-210	-252	-310	-380	-465	-600	-780	-1000						
-50	-77	-122	-166	-236	-284	-350	-425	-520	-670	-880	-1150	3	4	6	9	17	26
	-80	-130	-180	-258	-310	-385	-470	-575	-740	-960	-1250						
	-84	-140	-196	-284	-340	-425	-520	-640	-820	-1050	-1350						
-56	-94	-158	-218	-315	-385	-475	-580	-710	-920	-1200	-1550	4	4	7	9	20	29
	-98	-170	-240	-350	-425	-525	-650	-790	-1000	-1300	-1700						
-62	-108	-190	-268	-390	-475	-590	-730	-900	-1150	-1500	-1900	4	5	7	11	21	32
	-114	-208	-294	-435	-530	-660	-820	-1000	-1300	-1650	-2100						
-68	-126	-232	-330	-490	-595	-740	-920	-1100	-1450	-1850	-2400	5	5	7	13	23	34
	-132	-252	-360	-540	-660	-820	-1000	-1250	-1600	-2100	-2600						
-78	-150	-280	-400	-600													
	-155	-310	-450	-660													
-88	-175	-340	-500	-740													
	-185	-380	-560	-840													
100	-210 -220	-430 -470	-620 -680	-940 -1050													
-120	-250 -260	-520 -580	-780 -840	-1150 -1300													
-140	-300 -330	-640 -720	-960 -1050	-1450 -1600													
-170	-370	-820	-1200	-1850													
	-400	-920	-1350	-2000													
-195	-440 -460	-1000 -1100	-1500 -1650	-2300 -2500													
-240	-550 -580	-1250 -1400	-1900 -2100	-2900 -3200													

Comparison table of PVD turning grades

Type	Classification codes		HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
	IOS classification	Groups of materials										
PVD turning	P	P10	HR5225 HR7225	GC1025 GC1125	KCS10 KCU10 KC5010	IC807	VP10MF MS6015	AH710	PR930 PR1005 PR1025 PR1115 PR1215 PR1425 PR1225	AC1030U ACZ150 AC5025S AC520U		YBG102
		P20	HR5125 HR5225 HR7125 HR7225	GC1025 GC1125	KCS10 KCU10 KCU25 KC5010 KC5025	IC807 IC808 IC810	VP10RT VP20RT VP15TF VP20MF	AH120 AH725 AH730 SH725 SH730 J740	PR930 PR1025 PR1115 PR1215 PR1225 PR1625	AC1030U AC5025S AC520U AC530U	TT9020 TT9030	YBG202
		P30	HR5125 HR5225 HR7125 HR7225	GC1025 GC1125	KCU25 KC5025	IC328 IC330 IC830 IC928	VP10RT VP20RT VP15TF VP20MF	AH725 AH7025 AH730 SH725 SH730 GH730 GH330 J740	PR1025 PR1225 PR1535	AC1030U AC530U	TT8020 TT8080 TT9030	YBG202
		P40	HR5125 HR7125	GC1025		IC830		AH120 AH725 AH645		AC1030U	TT8020 TT8080 TT9080	
M		M10	HR9105 HR7115	GC1115 GC1125	KCS10 KCU10 KC5010	IC807 IC808 IC907 IC908	VP10MF MS6015	AH8005 AH630	PR1025 PR1215 PR1225	AC515S AC5025S AC510U AC520U ACZ150	TT5080	YBG202 YBG205
		M20	HR5125 HR5225 HR7115 HR7125 HR7225	GC1115 GC1125 GC2035	KCS10 KCU10 KCU25 KC5010 KC5025	IC330 IC806 IC808 IC908 IC330 IC806 IC808 IC830 IC908 IC928	VP10RT VP20RT VP15TF VP20MF	AH8015 AH630 AH120 AH7025 AH725 SH725 SH730	PR930 PR1025 PR1125 PR1215 PR1425 PR1225 PR1515	AC5015S AC5025S AC1030U AC520U	TT5080 TT9080	YBG202 YBG205
		M30	HR5125 HR5225 HR7125 HR7225	GC1125 GC2035	KCU25 KC5025	IC328 IC330 IC830 IC840 IC882	VP10RT VP20RT VP15TF VP20MF MP7035	AH645 AH120 AH725 SH725 SH730 J740	PR1125 PR1535	AC5025S AC6040M AC1030U AC520U AC530U	TT8020 TT8080 TT9020 TT9080	
			HR5125 HR7125	GC2035		IC830 IC928	MP7035	AH645		AC6040M AC1030U AC530U	TT8020 TT8080 TT9020 TT9080	

Type	Classification codes		HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
	IOS classification	Groups of materials										
PVD turning	K	K10		GC3330 GC3220 K20W K20D K20M K15W	KCS10 KCU10 KC5010	IC810		GH110 AH110	PR905 PR1215	AC1030U AC510U ACZ150		
		K20		GC3330 GC3220 GC3040 K20W K20D GC4230 K20M K15W	KCS10 KCU10 KCU25 KC5010 KC5025		VP10RT VP20RT VP15TF	AH120 AH725 AH730 SH725 SH730 J740	PR905 PR1215	AC1030U AC5025S AC520U AC530U		
		K30		GC3330 GC3040 K20W GC4240 GC4230		IC830 IC908 IC910 IC928	VP10RT VP20RT VP15TF	AH725 AH7025 AH730 SH725 SH730 GH730 GH330 J740		AC1030U AC530U		
		S01				IC804 IC806	MP9005 VP05RT	AH8005 AH905			PR005S	YBG102
		S10	HR9105 HR7115	GC1105 GC1005 GC1025	KC5010 KC5510 KCU10 KCS10	IC807 IC808 IC907 IC908	MP9005 MP9015 VP10RT	AH8015 AH905 SH730 AH110	PR005S PR015S	AC510U AC5015S	TT9080 TT9030	YBG102 YBG105 YBG202 YBG103
		S20	HR7115	GC1025 GC1125	KC5025 KC5525 KCU25	IC806 IC808 IC908	MP9015 MT9015 VP20RT MP9025	AH8015 AH120 AH725	PR015S PR1535	AC510U AC520U AC5025S	TT8080 TT8020	YBG212 YBG105 YBS103
		S30	HR7225	GC1125		IC3028	MP9025	AH725	PR1535	AC520U		YBG212
	S											

Comparison table of PVD milling grades

Type	Classification codes		HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
	IOS classification	Groups of materials										
P	P	P10	HR5110 HR5120	GC1010 GC1025 GC1030	KC5010M KC515M	IC807 IC903		AH120 AH725	PR830 PR1025 PR1225	ACP2500 ACP200	TT2510 TT7080	YBG252
		P20	HR5110 HR5120 HR5130	GC1025 GC1030 GC2030	KC522M KC525M KCSM30 SP6519	IC807 IC808 IC810 IC380 IC330	MP6120 VP15TF	AH120 AH725 AH3135 AH9030 AH3225 AH9130	PR1525 PR830 PR1025 PR1225 PR1230	ACP3000 ACU2500 ACP200 ACP300	TT2510 TT7080 TT8020 TT9030 TT9080	YBG202 YBG205 YBG9320 YBG252
		P30	HR5120 HR5130 HR7130	GC1030 GC1010 GC2030	KC525M KC530 KC725M KC735M KCPM40 KCSM30 X400	IC328 IC330 IC380 IC830 IC928	MP6120 VP15TF MP6130 VP30RT	AH120 AH725 AH3135 AH130 AH3225 AH9130	PR1230 PR1535	ACP3000 ACU2500 ACP200 ACP300	TT8020 TT8080 TT9030 TT9080	YBG302
		P40	HR7130	GC1030 GC2030	KC725M KC735M KCPM40	IC830	VP30RT	AH120 AH725 AH645		ACP3000 ACU2500 ACP300	TT8020 TT8080 TT9030 TT9080	YBG302
		M10	HR5110 HR5120	GC1010 GC1030	KC515M SP4019 SP6519	IC807 IC808 IC903 IC907 IC908		AH725	PR1025 PR1225	ACU2500 ACM100 ACK300 ACP300		YBG252
M	M	M20	HR5110 HR5120 HR5130	GC1030 GC1040 GC2030 S30T	KC522M KC525M SP4019 SP6519 X700	IC330 IC808 IC830 IC840 IC882 IC908 IC928	VP15TF MP7130 MP7030 VP20RT	AH725 AH3135 AH130 AH6030 AH3225 AH9130	PR1525 PR1025 PR1225	ACU2500 ACK300 ACP300	TT9030 TT9080	YBG202 YBG205 YBG9320 YBG252
		M30	HR5120 HR5130	GC1040 S30T GC2030	KC522M KC525M KC725M KC735M KCPM40 KCSM30 KCSM40 SC6525 X700	IC328 IC330 IC830 IC840 IC882	VP15TF MP7130 MP7030 VP20RT MP7140	AH3135 AH130 AH9130	PR1535	TT8020 TT8080 TT9030 TT9080	TT8020 TT8080 TT9020 TT9080	YBG302
		M40	HR7130		KC725M KCPM40 KCSM40	IC830 IC928	MP7140 VP30RT	AH140		TT8020 TT8080 TT9030 TT9080	TT8020 TT8080 TT9020 TT9080	YBG302

Type	Classification codes		HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
	IOS classification	Groups of materials										
K	K	K10		GC1010 GC1020	KC514M KC515M KCK20 SP4019	IC810	MP8010	AH110 GH120	PR510 PR905 PR1210	ACK3000 ACU2500	TT6080	YBG102 YBG252
		K20	HR5120	GC1020	KC514M KC520M KC524M KCK20 SP6519	IC808 IC810 IC83	VP15TF VP20RT	AH120 AH9030 AH9130	PR905 PR1210	ACK3000 ACU2500 ACK300	TT6080	YBG152
		K30			KC522M KC524M SP6519	IC830 IC810 IC908 IC910 IC928 IC950	VP15TF VP20RT	AH120		ACK3000 ACU2500 ACK300		

Comparison table of CVD turning grades

Type	Classification codes		HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
	IOS classification	Groups of materials										
CVD turning	P	P01	HR8115	GC4305 GC4315	KCP05B KCPK05 KCK05B KCK15B	IC8005 IC8150 IC428	UE6105	T9205 T9105	CA510 CA5505	AC8015P AC810P	TT8105	
		P10	HR8115	GC4305 GC4415 GC4325	KCP05B KCPK05 KCP10B KCK15B KCK20B	IC5100 IC8150 IC8250 IC9015	UE6105 MC6015 UE6110 MY5015	T9205 T9105 T9215 T9115	CA510 CA515 CA5505 CA5515	AC8015P AC810P	TT8105 TT8115	YBC151 YBC152
		P20	HR8125 HR8225	GC4225 GC4325 GC4425	KCP10B KCP25B KCM15B	IC8150 IC8250 IC8350 IC9015	MC6015 UE6110 MC6025 UE6020 MY5015	T9215 T9115 T9225 T9125	CA025P CA525 CA5515 CA5525 CR9025	AC8025P AC820P	TT5100 TT8125	YBC251 YBC252
		P30	HR8225	GC4315 GC4325 GC4335 GC2025	KCP25B KCP30B KCM15B	IC8350 IC8025	MC6025 UE6020 MC6035 UE6035 UH6400	T9225 T9125 T9235 T9135 T6130	CA025P CA525 CA5525 CA530 CA5535 CA9025	AC8035P AC830P AC6030M AC630M	TT8125 T5100	YBC252 YBC351 YBC352
		P40		GC4325 GC4335	KCP30B KCP40B KCM25B KCM35B	IC8350 IC8025	MC6035 UE6035 UH6400		CA530 CA5535	AC8035P AC830P AC6030M AC630M	TT8135 TT7100	YBC351 YBC352
	M	M10		GC2015 GC1515	KCM15B	IC6015 IC8025 IC8150 IC8250 IC5820	MC7015 US7020	T9235 T9135 T6130	CA6515	AC6020M AC610M	TT9215	
		M20		GC2015 GC2025 GC2020	KCP30B KCP40B KCM15B KCM25B	IC6015 IC6025 IC8320	MC7015 US7020 MC7025	T9215 T9115	CA6525	AC6020M AC6030M AC610M AC630M	TT9225	YBM151 YBM153
		M30		GC2025 GC2020	KCP40B KCM25B KCM35B	IC6025	MC7025 US735	T6120 T9215 T9115		AC6030M AC630M AC8035P AC830P	TT9235	YBM151 YBM251
		M40			KCM35B KCM35		US735	T6130		AC6030M AC630M	TT9235	YB253

Type	Classification codes		HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
	IOS classification	Groups of materials										
CVD turning	K	K01		GC3210	KCK05B KCK05	IC5005	MC5005 UC5105	T5105	CA310 CA4010 CA4505 CA5505	AC4010K AC405K	TT7005	YBD052
		K10		GC3210	KCK05B KCK05 KCK15B KCK15	IC5005 IC5010 IC5100	MC5015 UC5115 MY5015	T5105 T515 T5115 T9215	CA310 CA315 CA4010 CA4115 CA4505 CA4515 CA5505	AC4010K AC4015K AC405K AC415K	TT7015	YBD102
		K20	HR6115	GC3210 GC3225	KCK15B KCK15 KCK20B KCK20	IC5010 IC8150	MC5015 UC5115 UE6110 MY5115	T515 T5115 T5125 T9215	CA315 CA320 CA4115 CA4120 CA4515	AC4015K AC415K AC420K AC405K AC425K AC8025P	TT7015 TT7025	YBD152 YBD252
		K30	HR6115	GC3225	KCP05B KCPK05 KCP10B KCP25B KCK20B		UE6110	T5125	CA320			

Comparison table of CVD turning grades

Type	Classification codes		HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
	IOS classification	Groups of materials										
P		P10		GC4220 GC4230 GC3040	KC930M KC935P	IC4100 IC520M IC4050 DT7150 IC5400				ACP2000 ACP100	TT7515	
		P20		GC4220 GC4230 GC3040	SC6525 SP6519		F7030 MC7020	T3225		ACP2000 ACP100	TT7515	YBC301 YBC251
		P30	HR8140	GC4230 GC3040 GC2040 M30B	MP91M SC6525 KCPK30 X500		F7030 MC7020	T3130 T3225		ACP2000 ACP100	TT7800	YBM351
		P40	HR8140	GC4240 GC4230 GC3040 GC2040 M30B	KCPK30 X500						TT7800	YBC302
M		M10								ACM200		
		M20		GC2040 GC4230	SC6525		F7030 MC7020	T3225	CA6535	ACM200		YBM251 YBM253
		M30		GC2040 GC4230 GC4240 M30B S40T	SC6525 X500	IC5820	F7030 MC7020	T3225 T3130		ACM200	TT7800	YBM302
		M40		GC2040 M30B S40T GC4240	X500					ACM200	TT7800	
K		K10			SC3025 KCK15	IC5100	MC5020	T1215 T1115		ACK2000 ACK100 ACK200	TT7515	YBD151
		K20		GC3220 K20W	KCK15 SC3025 MP91M	IC5100 DT7150 IC4010 IC4050 IC4100	MC5020	T1215	CA420M	ACK200 ACK200	TT7515	YBD252
		K30	HR8140	GC3040	MP91M KCPK30 SC6525							YBD252

Comparison table of cermet grades

Type	Classification codes		HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
	IOS classification	Groups of materials										
Cermet	P	P10			KT1120	IC20N	NX1010	NS520	TN610	T110A T1000A		
		P20	HRC20	CT5015	KT1120 KT175	IC20N IC75T	NX2525	NS520 NS9530	TN610 TN60	T1200A T1500A	CT3000	YNG151 YNG151C
		P30	HRC20	CT5015	KT125	IC20N IC75T IC30N	NX2525 NX3035	NS9530 NS530 NS730	TN620 TN90	T1200A T1500A	CT3000	
		P40				IC75T IC30N	NX3035 NX4545	NS740		T250A		

