HUAREAL
Efficient
Cutting tools

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2024-2025

Catalogue

HUAREAL

HUAREAL

2024-2025

HUAREAL CUTTING TOOLS
CATALOGUE

TURNING　MILLING　DRILLING

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

Content

TURNING

Solid carbide end mills

Precision small parts - turning

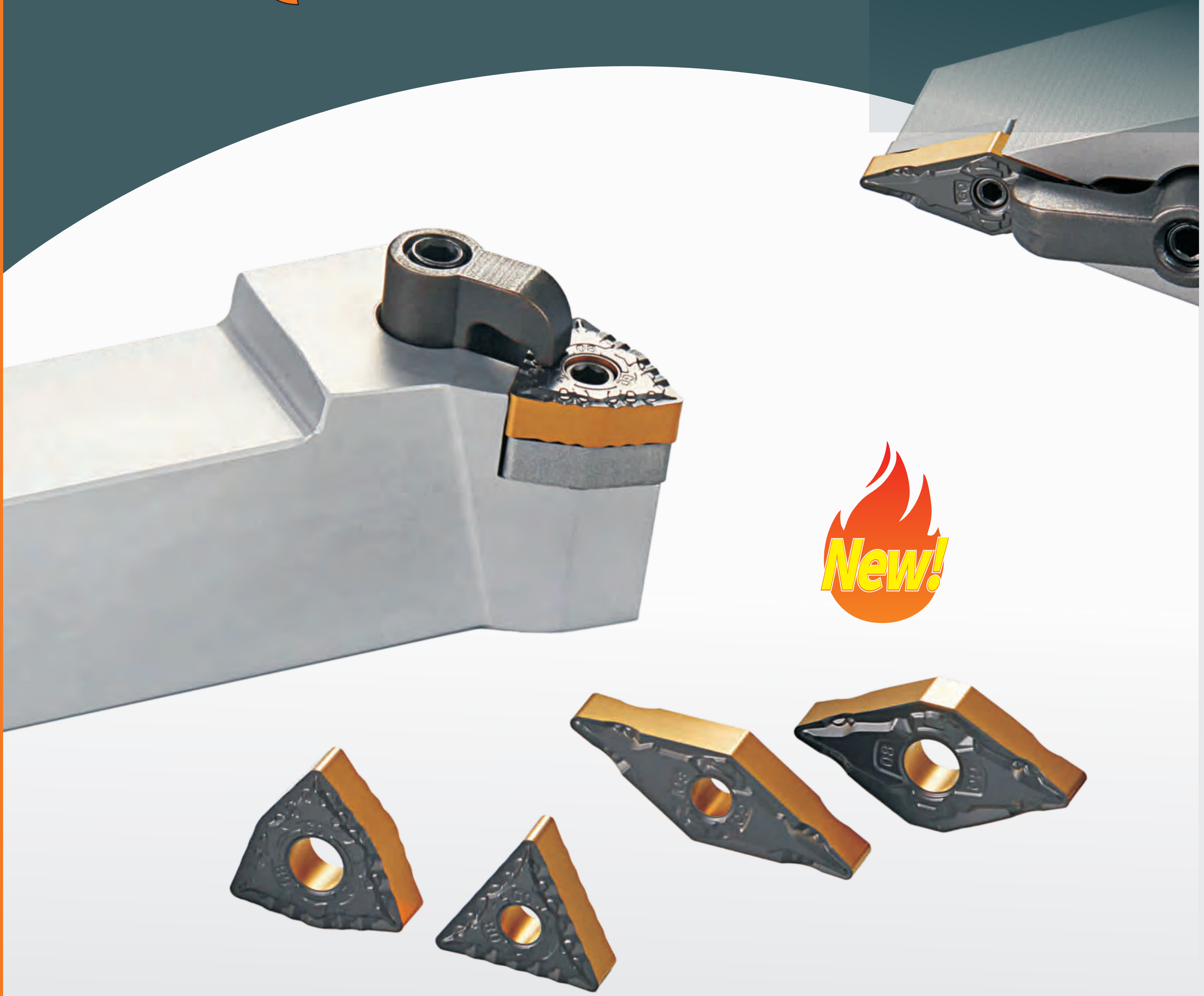
- Rich chipbreaker selection, with a variety of grades to meet the processing of different materials;
- Complete product models to meet high-precision external turning, parting, back turning, threading and other process requirements;
- Minimum Radius:0.03mm, which can achieve ultra-high precision turning requirements for small parts.

Cermet

- Cermet turning grade - **HRC10**: general machining grade, suitable for finishing and semi-finishing steel parts,It can not only cope with continuous high-speed processing, but also meet the stable processing under harsh conditions
- Coated cermet grade - **HR115C**: high temperature resistance is more excellent, suitable for wear resistance and pass The usability has higher processing requirements.

-GQ Steel turning - Chipbreaker

Apply for automation production line with chip breaking req



Steel turning

- The new generation of steel parts turning CVD grades HR8105, HR8115, HR8225, HR8135, using composite multi-layer coating technology, the blade high temperature resistance is further improved;
- G series chipbreaker, such as GF, GQ, GM, GR, are suitable for steel turning from finish to rough machining
- Better dimensional accuracy control, the consistency and indexable accuracy of D type and V type insert are greatly improved.

Heavy turning - Chipbreaker

-GX

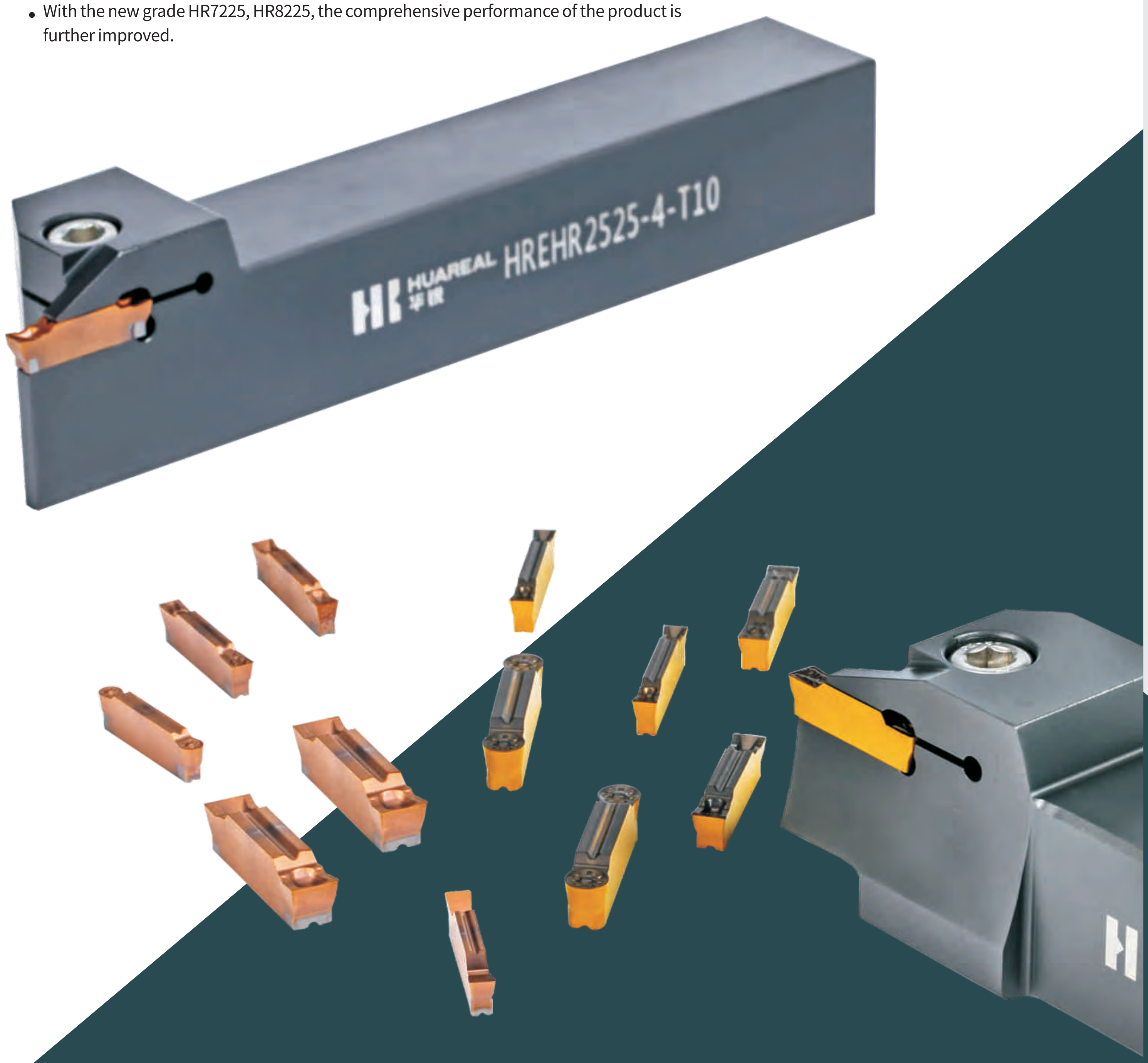
-GZ

Heavy turning

- GZ, GX chipbreaker structure, meet the requirements of chip control and chip breaking and strong impact conditions respectively
- Combined with the new grade HR8225 with a new carbide matrix and composite multilayer coating technology, the overall high temperature resistance of heavy turning insert is improved:

Parting & Grooving

- GT, CT, RM, chipbreaker, meet the parting, grooving and plunge turning, profile processing requirements respectively
- The product specifications and models are complete, and the width range of conventional products is 1.25 - 6mm, which can meet different processing requirements
- With the new grade HR7225, HR8225, the comprehensive performance of the product is further improved.

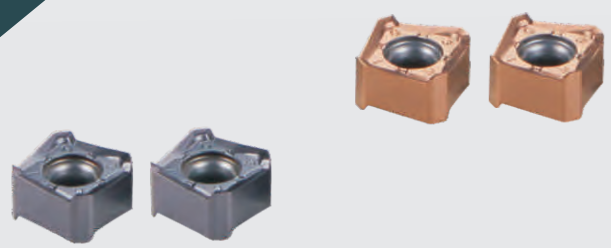


Threading

- With ISO, universal thread, Wyeth thread and other products, to meet the processing requirements of different industries;
- With press forming and grinding forming thread blades, to meet the requirements of better chip breaking control and higher precision processing respectively

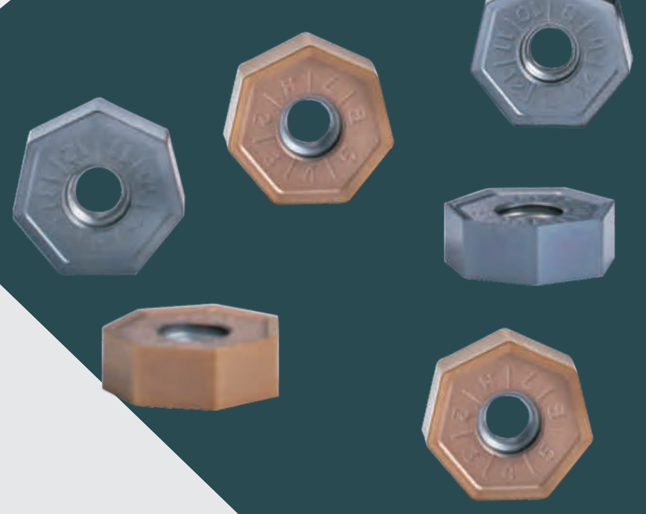
CFM145

General Face milling tools



Face milling

- With general, economic and other types of face milling tools: CFM145 & CFM745, to meet all kinds of face milling machining requirements
- Rich tool series and specifications, with single sided double-sided structure and different precision grade blade series, suitable for different processing requirements
- A variety of grade and chipbreaker selection, suitable for a variety of materials from finish to rough face milling.



CFM745

Economical face milling tools

C/SEM200

- LNKU0303 insert equipped with double-sided four-edge achieves, multi-tooth structure layout, which is both economical and efficient;
- Rod, disc, replaceable and other structural forms, to meet the face milling, cavity, groove, slope and other processing forms;
- Rich structure and grade system to meet the efficient processing needs of various materials.

Shallow hole drilling

- Unique groove design, balanced force, cutting resistance in the center edge and peripheral edge balanced distribution, drilling process stable
- Uniform change of chamfering and rake design, tool cutting ability is enhanced, cutting process light and smooth
- special edge treatment technology, effectively restrain the blade edge chip and crescent wear
- with a variety of coating grades, to meet the drilling requirements of different working conditions.

Introduction

■This catalogue presents Huareal's major cutting products as of October 2023.

■This catalogue mainly introduces turning tools, milling tools and drilling tools. Wherein:

Turning tools include general turning tool, precision small parts turning，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		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
DCONMS	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

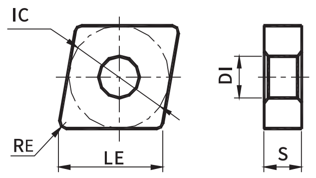
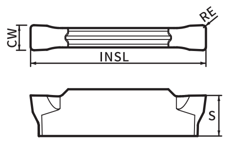
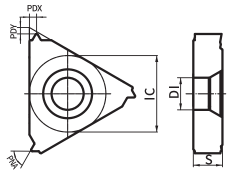
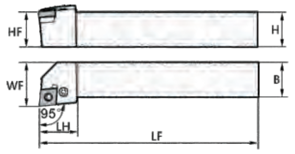
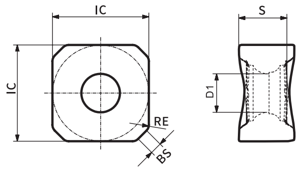
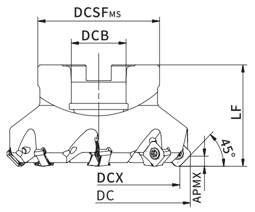
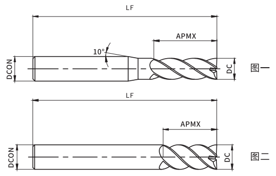
Overview of dimension codes according to ISO13399 Standard

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			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

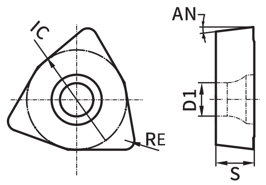
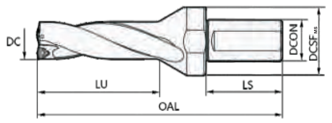
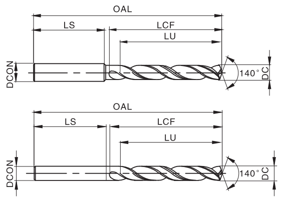
Overview of dimension codes according to ISO13399 Standard

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			

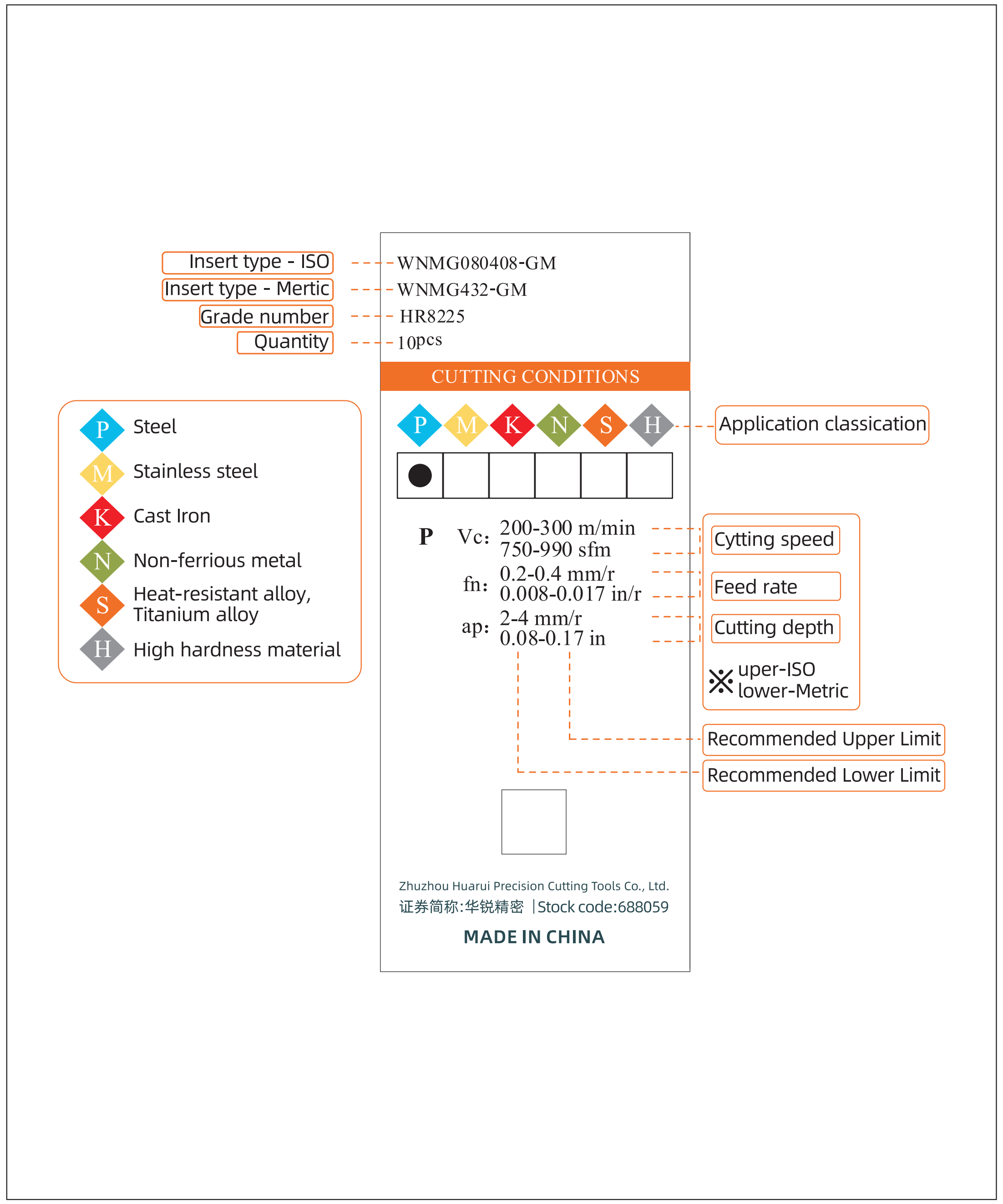
Examples of basic dimension according to ISO13399 Standard

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
		PNA	Angle profile
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
		OAL	Overall length
Solid carbide drill		DC	Cutting diameter
		DCON	Shank connection diameter
		OAL	Overall length
		LCF	Length chip flute
		LS	Shank length
		LU	Usable length

Sticker Sample



Insert type - ISO	WNMG080408-GM
Insert type - Mertic	WNMG432-GM
Grade number	HR8225
Quantity	10pcs

CUTTING CONDITIONS

P	M	K	N	S	H
●					

Application classication

P	Steel
M	Stainless steel
K	Cast Iron
N	Non-ferrious metal
S	Heat-resistant alloy, Titanium alloy
H	High hardness material

P

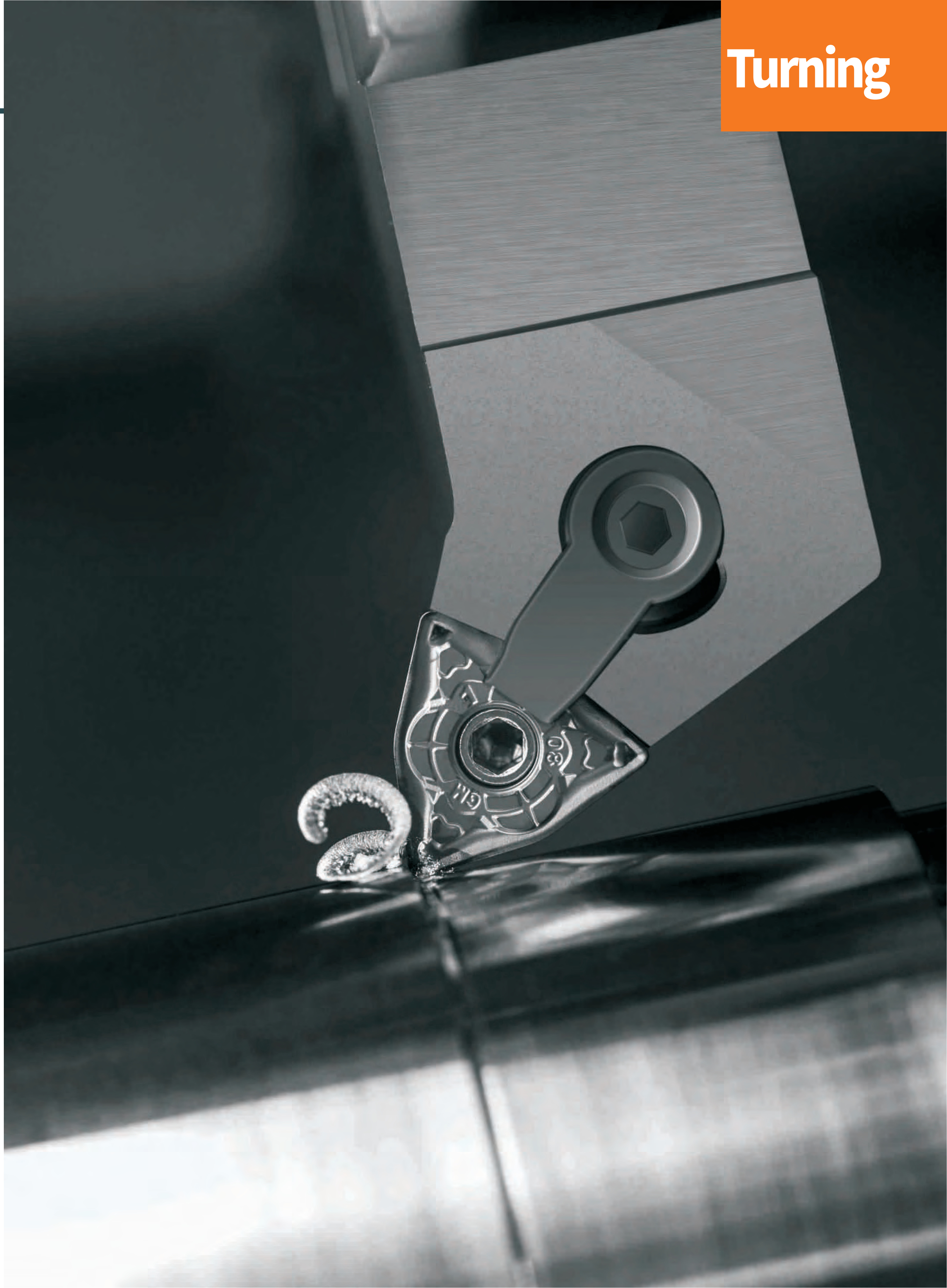
Vc:	200-300 m/min 750-990 sfm	Cytting speed
fn:	0.2-0.4 mm/r 0.008-0.017 in/r	Feed rate
ap:	2-4 mm/r 0.08-0.17 in	Cutting depth

※ uper-ISO
lower-Metric

Recommended Upper Limit

Recommended Lower Limit

Zhuzhou Huarui Precision Cutting Tools Co., Ltd.
证券简称:华锐精密 | Stock code:688059
MADE IN CHINA



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

Workpiece materials:

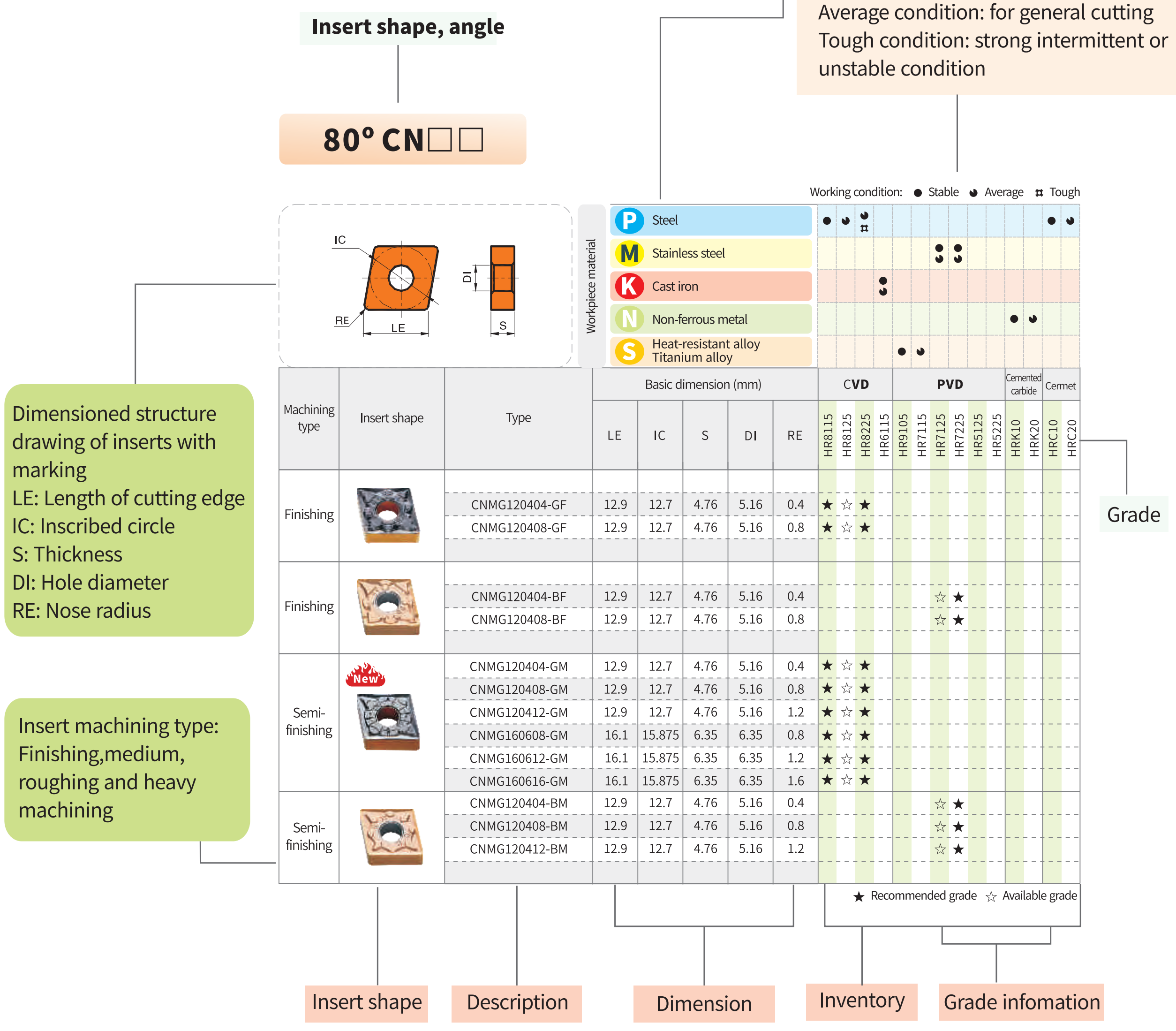
Steel	Stainless steel
Cast iron	Non-ferrous metal
Heat-resistant alloy, Titanium alloy	

Cutting conditions:
Stable condition: continuously stable cutting
Average condition: for general cutting
Tough condition: strong intermittent or unstable condition

Instructions for insert specifications and models

Insert shape, angle

80° CN□□



Working condition: ● Stable ◕ Average ⌘ Tough

Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
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

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

Grade

Insert shape

Description

Dimension

Inventory

Grade infomation

A

Turning

General turning

Precision small parts turning

Parting and grooving

Threading

Steel turning

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

HR8115

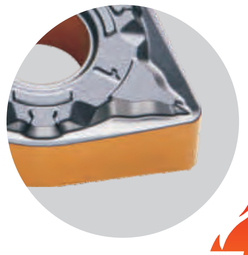
The new cemented carbide substrate composition has high strength, excellent wear resistance, and reliable toughness. The strengthened bonding phase effectively resists high-temperature plastic deformation of the substrate.

The combination of special coating post-treatment technology and a matrix with good resistance to thermoplastic deformation at the tip ensures excellent wear resistance.

HR8225

The functional gradient layer with high binder phase effectively restrain the crack formation of the coating, and the carbide matrix with uniformly refined hard phase distribution is paired with the new composite multi-layer CVD coating, which has high strength, excellent wear resistance and reliable toughness.

Improved precision pressing process, further improving dimensional accuracy.



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.

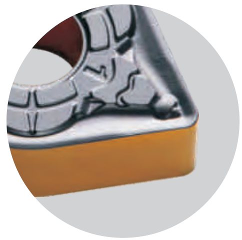
New!

GQ chipbreaker

Finishing & semi-finishing type, excellent chip control, especially suitable for the automatic line with chip control requirements, can obtain better surface quality.

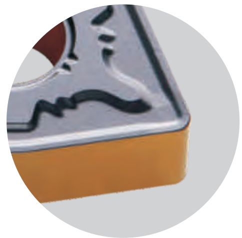
GM chipbreaker

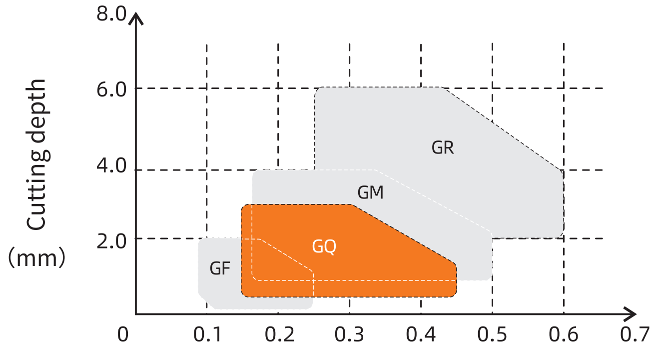
Advanced balance of sharpness and high-strength creates applicability for multiple purposes, and provides efficient cutting and long service life.



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.





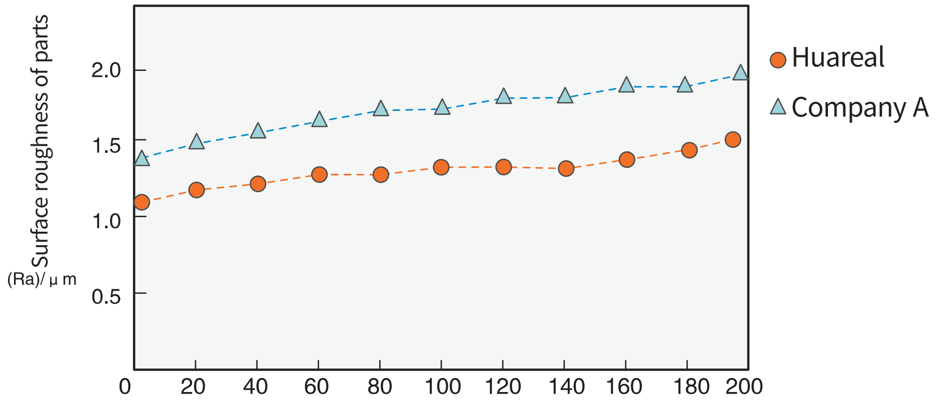
Feed rate (mm/rev)
(Description: CNMG 120408-☐☐)

Cutting data

Chipbreaker	Grade	Cutting speed(v_c) (mm/min)	Feed rate(fn) (mm/r)	Cutting depth(ap) (mm)
GF	HR8115 HR8225	240-420 220-380	0.08-0.35	0.30-2.00
GQ	HR8115 HR8225	200-400 200-360	0.15-0.45	0.50-3.00
GM	HR8115 HR8225	200-400 200-360	0.15-0.50	1.00-4.00
GR	HR8225	180-300	0.25-0.60	2.00-6.00

Workpiece name: Shaft parts
Workpiece material: 45# steel
Machining method: Wet external turing
Insert: DNMG150408-GF
HR8115

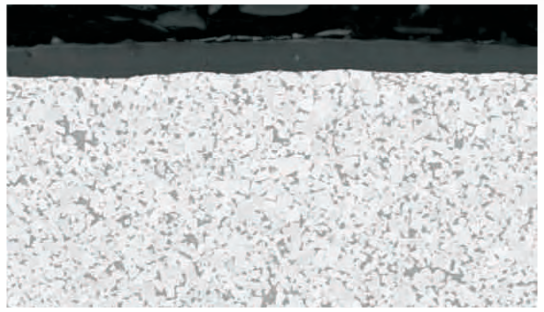
v_c=338m/min,
f_n=0.2mm/r
ap=0.4mm



Machining quantity (pieces)

Stainless steel turning

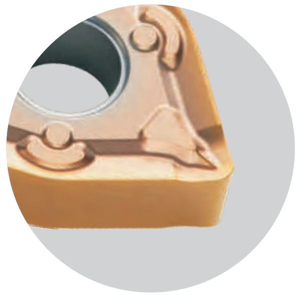
In response to the characteristics of stainless steel turning, BF, BM, BR chipbreaker series has constructed. Special grade HR7225, can effectively restrian the buld-up edge and notch wear during turning of stainless steel. It can meet the requirements of working conditions from finishing to roughing.



Structure of HR7225

HR7225

- The brand-new nano-gradient composite structure **"H^2-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.

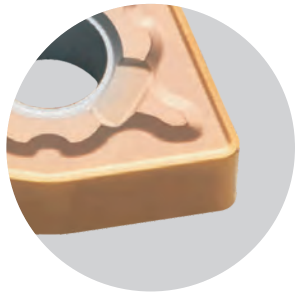


BF

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

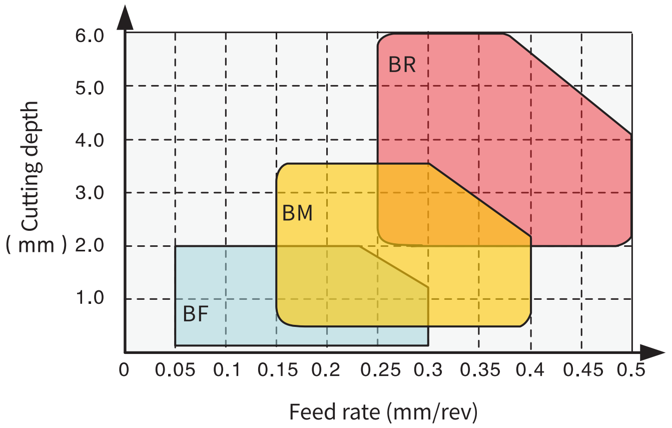
BM

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.

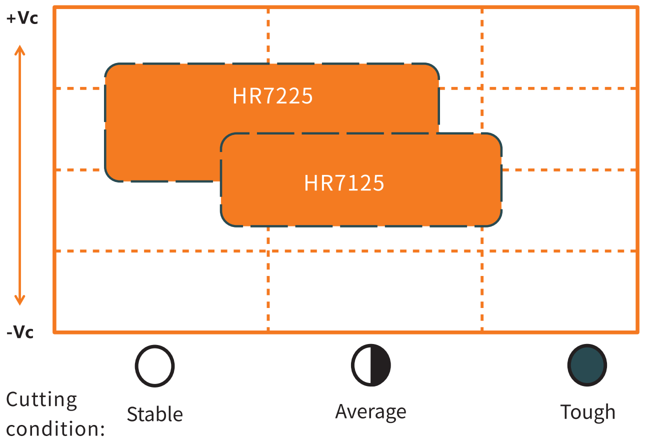


BR

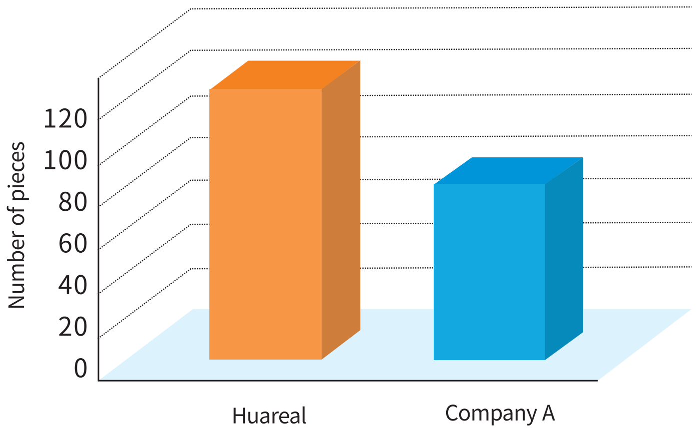
Thanks to the optimized design of chip breaking convex plate with high strength insert, it is suitable for intermittent machining of stainless steel and light-load rough machining.



(Description:CNMG 120408-□□)



Workpiece material: SUS304
Machining method: wet external semi-finish turning
Insert: VNMG160408-BM HR7225
Machining parameters: vc=170m/min,
fn=0.2mm/r, ap=1.2mm



Cutting data（HR7225）

Chipbreaker	Cutting speed (m/min)	Feed rate (mm/r)	Cutting depth (mm)
BF	120 ı 260	0.05 ı 0.30	0.20 ı 2.00
BM	100 ı 220	0.15 ı 0.40	0.50 ı 3.50
BR	80 ı 200	0.25 ı 0.50	2.00 ı 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

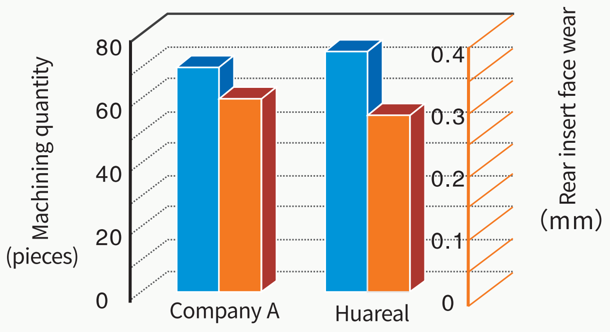
Structure of HR6115

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

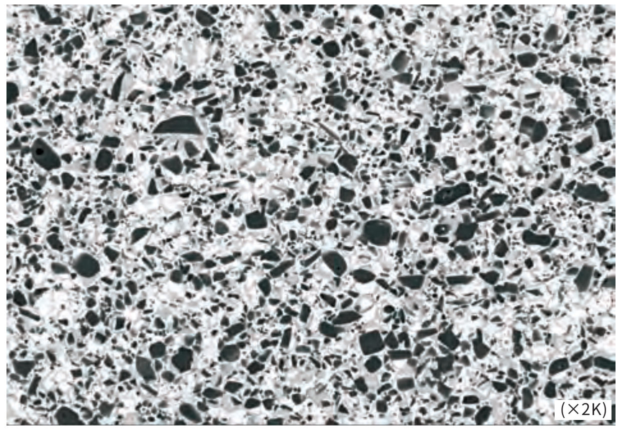
Material of workpiece: ht250
Machining method: external turning
Insert: WNMG080412
All-round chipbreaker
Machining parameters:
vc=415m/min,
fn=0.25mm/r,
ap=1.2mm



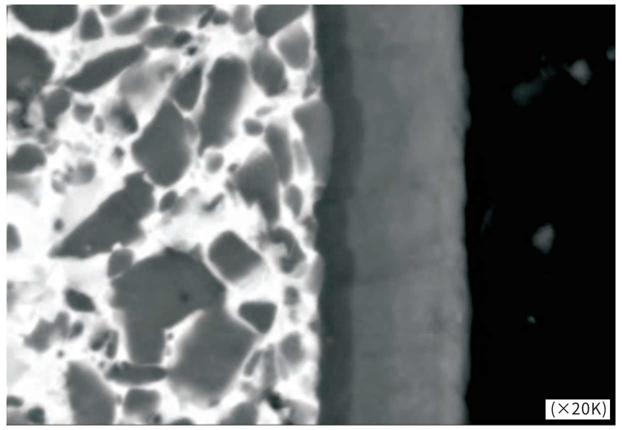
Cermet insert

HRC10: High nitrogen, high tungsten matrix material, and supplemented by reasonable tantalum and niobium composition, with excellent high temperature resistance; It's suitable for continuous and intermittent turning of carbon steel, alloy steel, ductile iron, etc.

HR115C: Excellent high temperature resistance, suitable for higher requirements for wear resistance and versatility of processing High surface quality and longer services life are achieved.



Structure of HRC10



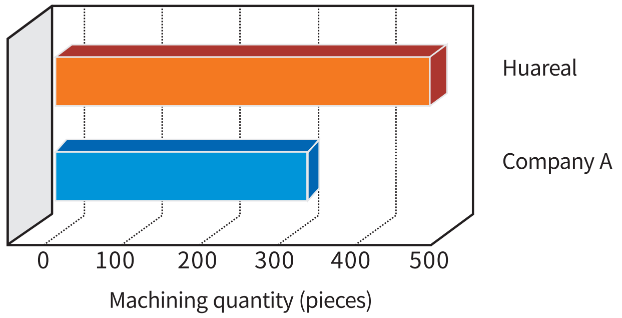
Structure of HRC20

Cutting data for cermet insert

Grade Material hardness	HRC10 < 250HB	HRC10 > 250HB	HR115C < 250HB	HR115C > 250HB
Cutting speed (m/min)	100 -200- 300	100 -150- 200	200 -300- 400	180 -260- 320
Feed rate (mm/r)	0.10 -0.20- 0.30	0.05 -0.15- 0.25	0.10 -0.20- 0.30	0.05 -0.15- 0.25
Cutting depth (mm)	0.20 -1.00- 2.00	0.20-0.50- 1.00	0.20 -1.00-2.00	0.20 -0.50- 1.00

Machining case of cermet insert

Workpiece material: Gear shaft, 20MnTiB, 280-300HB
Machining method: Wet external and end face finish turning
Insert: WNMG080404HQ, HRC10
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

1st —— Gen

2nd —— Gen

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		Cermet		ISO
			HR8105 新	HR8115	HR8125	HR8225	HR8135 新	HR6115	HR1135 新	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10 新	HR115C 新	
P	Non-alloyed steel/Alloy steel	P01	HR8105																	P01
		P05	🟦															HRC10	HR115C	P05
		P10	🟦	HR8115					HR1135									🟦	🟦	P10
		P15		🟦	HR8125	HR8225			🟦			HR7125	HR7225	HR5125	HR5225			🟦	🟦	P15
		P20		🟦	🟦	🟦						🟦	🟦	🟦	🟦				🟦	P20
		P25			🟦	🟦	HR8135					🟦	🟦	🟦	🟦				🟦	P25
		P30				🟦	🟦					🟦	🟦							P30
		P35					🟦													P35
		P40					🟦													P40
		P45																		P45
		P50																		P50
M	Stainless steel	M05									HR7115									M05
		M10							HR1135		🟨			HR5125	HR5225					M10
		M15							🟨		🟨	HR7125	HR7225	🟨	🟨					M15
		M20										🟨	🟨	🟨	🟨					M20
		M25										🟨	🟨							M25
		M30																		M30
		M35																		M35
		M40																		M40
		M45																		M45
K	Cast iron	K01																		K01
		K05																	HR115C	K05
		K10						HR6115											🟧	K10
		K15						🟧											🟧	K15
		K20						🟧												K20
		K25																		K25
		K30																		K30
		K35																		K35
		K40																		K40
		K45																		K45
		K50																		K50
N	Aluminum/Aluminum alloy	N01														HRK10				N01
		N05														🟩	HRK20			N05
		N10														🟩	🟩			N10
		N15														🟩	🟩			N15
		N20																		N20
		N25																		N25
		N30																		N30
		N40																		N40
S	High-temp alloy	S01								HR9105										S01
		S05								🟧										S05
		S10								🟧	HR7115									S10
		S15									🟧									S15
		S20									🟧	HR7125	HR7225							S20
		S25										🟧	🟧							S25
		S30										🟧	🟧							S30

Turning grade overview

Grade type	Grade	I S O	Color	Coating type	Coating Composition	Characteristics
Coated Carbide	HR8105	ISO P	Black & Yellow	CVD	$TiN+MT-TiCN+Al_2O_3$	• Suitable for steel turning under stabe working condition • Brand new coating combine with high red hardness carbide substrate shows outstanding wear resistance and plasticdeformation resistance
	HR8115	ISO P	Black & Yellow	CVD	$TiN+MT-TiCN+Al_2O_3$	• Suitable for light intermittent and continuous machining of steel • The proprietary substrate of gradient alloy structure formed by special sintering process, together with thick TiCN, thick Al_2O_3, and sophisticated coating posttreatment, greatly improves the wear resistance. It is suitable for finishing and semi-finishing of carbon steel and alloy steel
	HR8125	ISO P	Black & Yellow	CVD	$TiN+MT-TiCN+Al_2O_3$	• Suitable for intermittent machining and continuous machining of steel • It has adopted the strengthen binder phase which can effectively inhibit the high temperature plastic deformation of the substrate; The high binder phase content functional gradient layer effectively controlled the crack propagation of the coating;
	HR8225	ISO P	Black & Yellow	CVD	$TiN+MT-TiCN+Al_2O_3$	• Prefereed grade for steel truning; suitable for intermittent and continuous machining of steel,Strong universality • Brand new well-distributed refined hard phase substrate combine with composite multilayer CVD coating. outstanding wear resistance and toughness
	HR8135	ISO P	Black & Yellow	CVD	$TiN+MT-TiCN+Al_2O_3$	• Grade for steel turining of strong impact working condition • High toughness matrix composition, reinforced bonding phase, with excellent impact strength, suitable for turning under strong impact conditions.

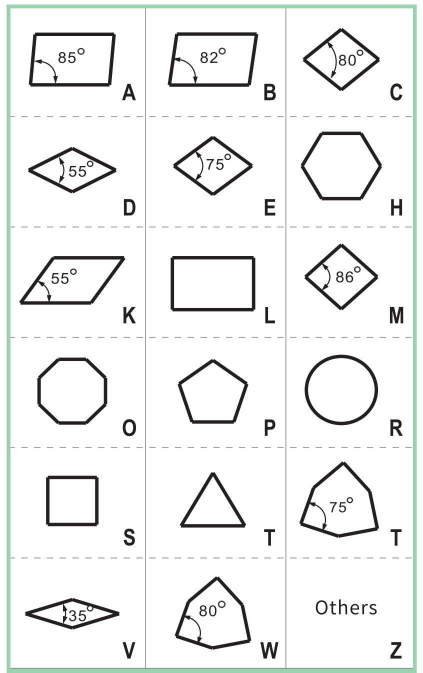
Grade type	Grade	I S O	Color	Coating type	Coating Composition	Characteristics
Coated Carbide	HR1135	ISO P、M	Bronze	PVD	AlTiSiN+TiSiN	• Precision small parts turning high wear resistance grade • The fine-grain cemented carbide matrix with the new nano-gradient composite structural coating has excellent wear resistance and build-up edge resistance, ensuring the stability of the insert life and the high quality of the machined surface.
	HR7125	ISO M	Ash black	PVD	AlTiN	• Universal grade for continuous and intermittent turning of stainless steel • Unique coating materials combined with new coating technology, the surface of the coated product is smooth, with low friction coefficient, high nano hardness, and excellent antioxidant performance.
	HR7225	ISO M	Bronze	PVD	AlTiSiN+TiSiN	• Preferred grade for stainless steel turning • The new non-metallic modified component reinforced nano-gradient composite structure "H2-Flex" coating, with uniformly refined submicron hard phase and optimized bonding phase composition, has excellent wear resistance and toughness.
	HR6115	ISO K	Black	CVD	TiN+MT-TiCN+Al2O3	• Preferred grade for cast iron turning • The thickened CVD black coating and special coating post-treatment have excellent wear resistance and toughness, suitable for turning various cast iron materials and can also be used for rough machining of high-strength steel.
	HR7115	ISO M、S	Bronze	PVD	AlTiSiN+TiSiN	• Preferred grade for high-temperature alloy and diffcult-to-cut material • The subfine grain carbide matrix combined with a new nano-gradient composite structure coating, special surface treatment technology, with excellent wear resistance, oxidation resistance and processing stability, suitable for turning of titanium alloys, superalloys, etc.

Turning grade overview

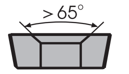
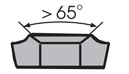
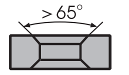
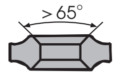
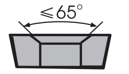
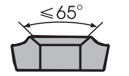
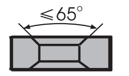
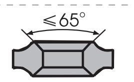
Grade type	Grade	I S O	Color	Coating type	Coating Composition	Characteristics
Coated Carbide	HR9105	ISO S	Gray	PVD	AlCrN	· Secondary grade for high-temperature alloy and diffcult-to-cut material · The high red hardness alloy matrix paired with ultra-high hardness nano coating has excellent high-temperature wear resistance and adhesive wear resistance.
	HR5125	ISO P、M	Ash black	PVD	AlTiN	· General grade for thread machining · The strong toughness alloy matrix paired with a high hardness nano coating, which has excellent bonding force and extremely high toughness and edge strength.
	HR5225	ISO P、M	Bronze	PVD	AlTiSiN+TiSiN	· High wear reistance grade for threading machining · The sub micro crystalline matrix phase is combined with the new nano-gradient composite structure coating, which has excellent anti build-up edge and anti chipping properties. Suitable for thread machining of steel and stainless steel

Grade type	Grade	I S O	Color	Coating type	Coating Composition	Characteristics
Cemented carbide	HRK10	ISO N	Silver Grey	Uncoated	/	· Preferred grade for aluminum alloy turning · Uncoated cemented carbide material, fine particle matrix material, uniform particle size, high bending strength and good wear resistance.
	HRK20	ISO N	Silver Grey	Uncoated	/	· General grade for aluminum alloy turning · Uncoated cemented carbide material, with excellent wear resistance and anti-chipping properties, also excellent versatility
Coated	HRC10	ISO P	Silver Grey	Uncoated	/	· Good consistancy, especially suitable for low carbon steel finishing turning, as well as the workpiece surface quality has high requirements of the working conditions. · Newly upgraded cermet grade, hard and compact surface with good chemical stability and adhesion resistance.Also great wear resistance and chipping resistance, insert consistancy, excellent machining surface quality.
Cermet Cermet	HR115C	ISO P	Bronze	PVD	AlTiSiN+TiSiN	· Better high temperature resistance sutiable for higher cutting speed working condition compared to cermet grades. · The coated cermet grade, with a new nano gradient composite structure coating, further improves the wear resistance, high temperature resistance, the unique transition layer treatment technology effectively improves the adhesion between the coating and the substrate, reduces the friction coefficient between the insert and workpiece.Insert services life and stability are outstanding

General turning inserts code key



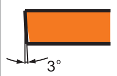
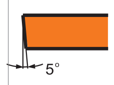
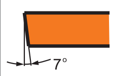
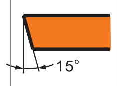
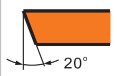
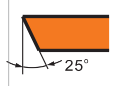
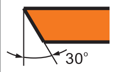
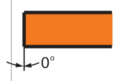
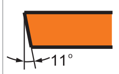
Shape code

Code	Hole	Chipbreaker	Insert section	Code	Hole	Chipbreaker	Insert section
B	Yes	N/A	 > 65°	N	N/A	N/A	
H	Yes	Single-sided	 > 65°	R	N/A	Single-sided	
C	Yes	N/A	 > 65°	F	N/A	Double-sided	
J	Yes	Double-sided	 > 65°	A	Yes	N/A	
W	Yes	N/A	 ≤65°	M	Yes	Single-sided	
T	Yes	Single-sided	 ≤65°	G	Yes	Double-sided	
Q	Yes	N/A	 ≤65°	X	---	---	special
U	Yes	Double-sided	 ≤65°				

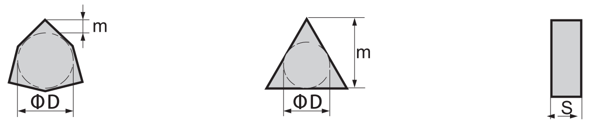
Chipbreaker and clamping form

C N M G

Major clearance angle

Code	Clearance angle	Code	Clearance angle
A	 3°	B	 5°
C	 7°	D	 15°
E	 20°	F	 25°
G	 30°	N	 0°
P	 11°	O	Others

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

◆ Tolerance requirements M-class (Distinguished by shape and inscribed circle size)

◆ Corner height (m) tolerance

Inscribed circle	Regular triangle	Square	80° rhombus	55° rhombus	35° rhombus	Circular
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	---
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	---
12.7	±0.13	±0.13	±0.13	±0.15	---	---
15.875	±0.15	±0.15	±0.15	±0.18	---	---
19.05	±0.15	±0.15	±0.15	±0.18	---	---
25.4	---	±0.18	---	---	---	---

◆ Inscribed circle (ΦD) tolerance

Inscribed circle	Regular triangle	Square	80° rhombus	55° rhombus	35° rhombus	Circular
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	---
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
12.7	±0.08	±0.08	±0.08	±0.08	---	±0.08
15.875	±0.10	±0.10	±0.10	±0.10	---	±0.10
19.05	±0.10	±0.10	±0.10	±0.10	---	±0.10
25.4	---	±0.13	---	---	---	±0.13

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	12	22	22	08	
12.00			12					
10.00			10					
9.525	09	11	09	09	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			

Cutting edge length

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

Insert thickness

12 04 08 - GM (ISO)

4 3 2 (inch)

Inscribed circle

Code	Inscribed circle diameter (mm)
2	6.35
3	9.525
4	12.7
5	15.875
6	19.05
8	25.4

Thickness

Code	Thickness (mm)
2	3.18
3	4.76
4	6.35
5	7.94
6	9.52

Corner radius

Code	Corner radius(mm)
0	0.2
1	0.4
2	0.8
3	1.2
4	1.6
5	2.0
6	2.4

Corner radius code

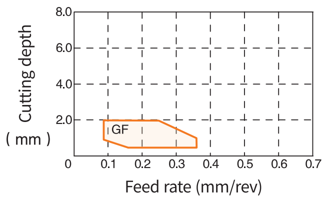
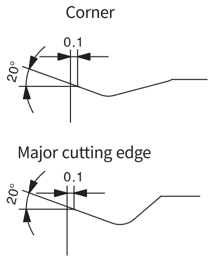
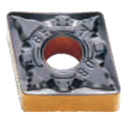
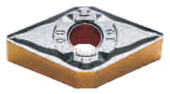
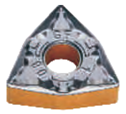
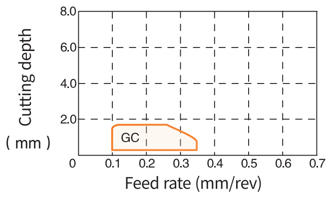
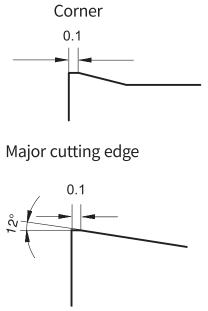
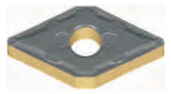
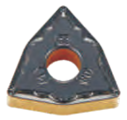
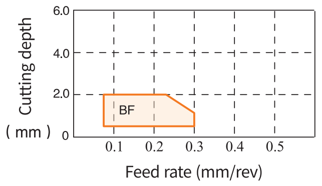
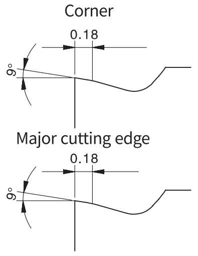
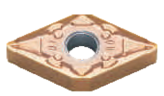
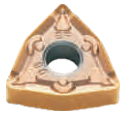
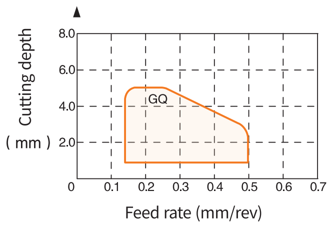
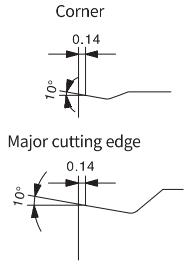
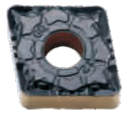
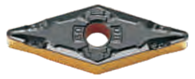
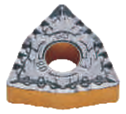
Code	Corner radius (mm)
00	No fillet
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
32	3.2
X	Others
Insert diameter Mo (Metric)	Round insert

Chipbreaker code

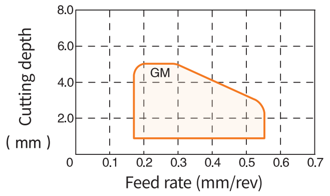
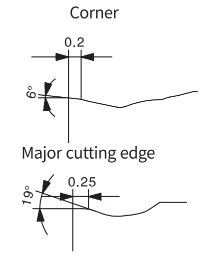
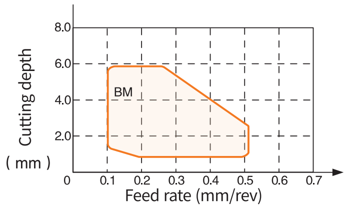
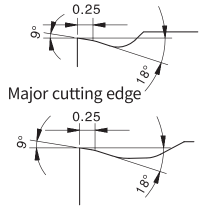
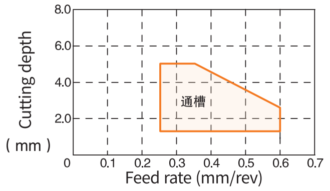
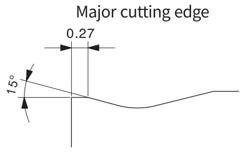
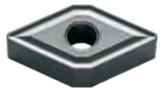
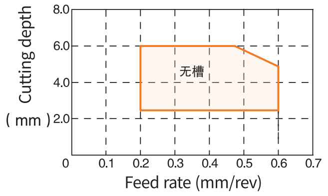
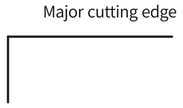
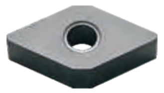
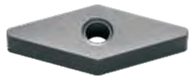
GF	GM	GR
		
BF	**BM**	**BR**
		
All-round chipbreaker	**Flat chipbreaker**	**GZ**
		

A
General turning
precision small parts turning
Parting and grooving
Threading
B
Indexable milling
Solid carbide end mills
C
Short hole drills
Solid carbide drills

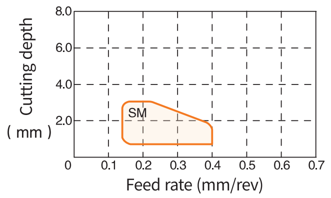
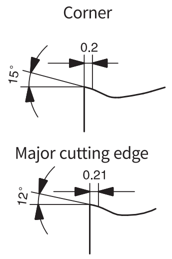
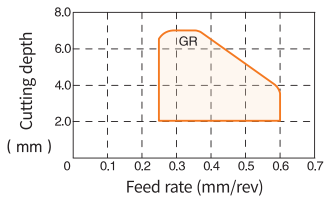
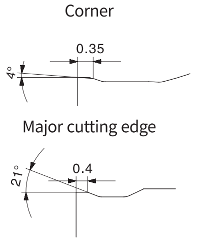
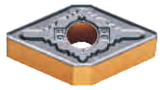
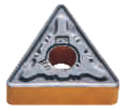
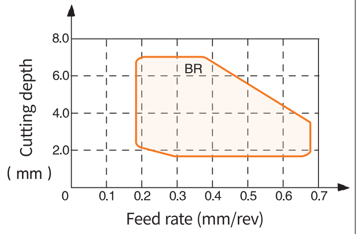
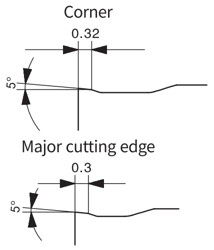
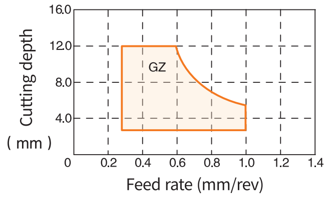
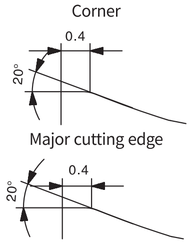
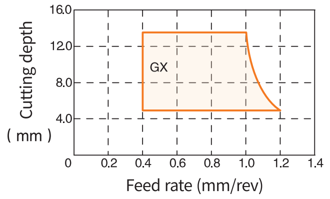
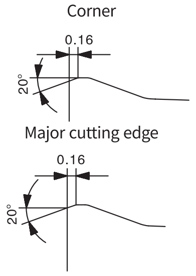
Overview of general turning inserts (Negative)

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.				 A25	 A29	 A32	 A35	 A38	 A40
		GC	**Recommended chipbreaker for finishingof P-type materaial** ◆ Btetter chip control performance, great machining surface quality ◆ Cutting edge with sharpness and strength. ◆ Especially suitable for wall lifting processing.					 A29		 A35	 A38	 A40
		BF	**Recommended chipbreaker for finishing of M-type material** ◆ Sharp cutting edge, less cutting resistance. ◆ Good chip disposal performance even at small cutting depth.				 A25	 A29	 A32	 A35	 A38	 A40
For semi-finishing	M	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.				 A25	 A29	 A32	 A35	 A38	 A40

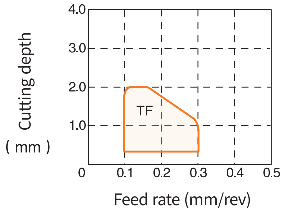
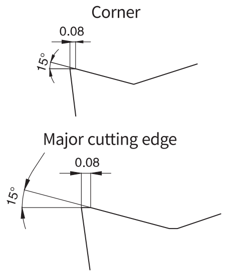
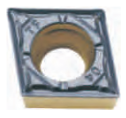
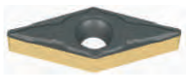
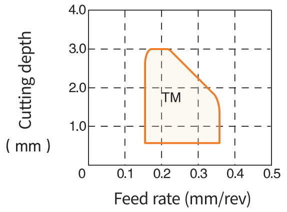
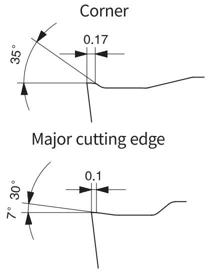
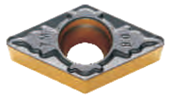
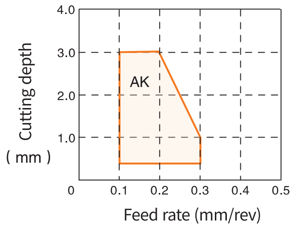
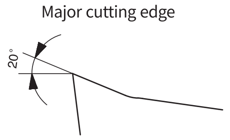
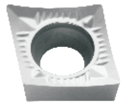
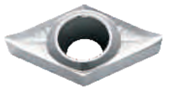
Overview of general turning inserts (Negative)

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	**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 and good control of chips. ◆ With high versatility and wide cutting range, efficient and consistent machining is achieved.				 A25	 A30	 A32	 A35	 A38	 A40
		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.				 A25	 A30	 A32	 A36	 A39	 A41
		All-round	**General machining chipbreaker** ◆ Double-sided chipbreaker, especially suitable for K-type material machining. ◆ Recommended cutting parameters				 A26	 A30	 A33	 A36	 A39	 A41
		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.				 A26	 A31	 A33	 A36	 A39	 A41

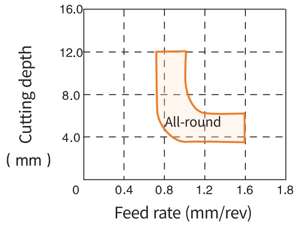
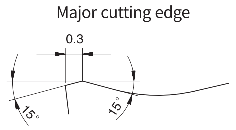
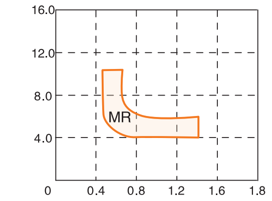
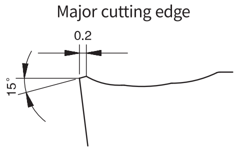
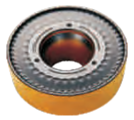
Overview of general turning inserts (Negative)

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	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.				 A27	 A31			 A39	 A42
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.				 A27	 A31	 A33	 A37		 A42
		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.				 A27		 A34	 A37		 A42
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.				 A27		 A34			
		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.				 A28		 A34			

Overview of general turning inserts（Postive）

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	TF	**General chipbreaker for finshing** ◆ Inclined cutting edge design ensures low cutting force, effectively reduce vibration, and ensure the machining surface quality ◆ Strong versatility and wide processing range. Inclination and chip control convex plate design can achieve excellent chip control performance.				 A43	 A44	 A45	 A46	 A47	
For semi-finishing	M	TM	**General chipbreaker for semi-finshing** ◆ It's suitable for internal or external semi-finishing of steel, stainless steel and cast iron				 A43	 A44	 A45	 A46	 A47	
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.				 A43	 A44		 A46	 A47	

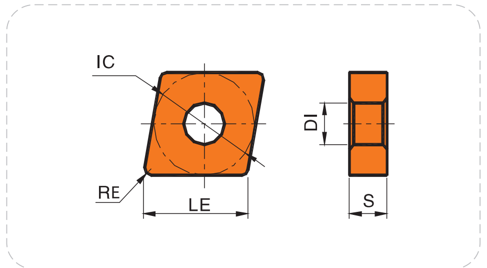
Overview of general turning inserts(Special type)

Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		R shape
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.				 A49
		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.				 A49

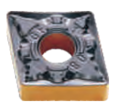
Usage	Tolerance	Chipbreaker	90° S-type	Chipbreaker	90° S-type		
Planer milling machining	M	**HAF**	 A50	**HSF**	 A50		

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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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	 New!	CNMG120408–GQ	12.9	12.7	4.76	5.16	0.8	☆	★	☆	★	☆												
		CNMG120412–GQ	12.9	12.7	4.76	5.16	1.2	☆	★	☆	★	☆												
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	☆	★	☆	★	☆												
		CNMG190608–GM	19.3	19.05	6.35	7.94	0.8	☆	★	☆	★	☆												
		CNMG190612–GM	19.3	19.05	6.35	7.94	1.2	☆	★	☆	★	☆												
		CNMG190616–GM	19.3	19.05	6.35	7.94	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


KAPR:75°
Page: A73
PCBNR/L


KAPR:95°
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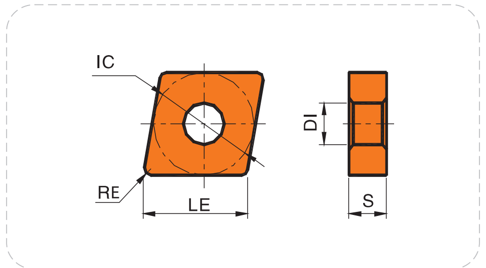
PCLNR/L


KAPR:95°
Page: A79
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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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						★											
		CNMG190616	19.3	19.05	6.35	7.94	1.6						★											
Cast iron machining		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


KAPR:75°
Page: A73
PCBNR/L


KAPR:95°
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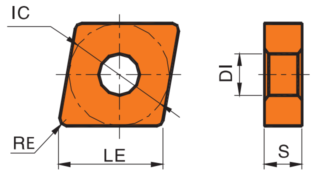
PCLNR/L


KAPR:95°
Page: A79
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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Semi-finishing	 New	CNMG120404–SM	12.9	12.7	4.76	5.16	0.4								☆	★								
		CNMG120408–SM	12.9	12.7	4.76	5.16	0.8								☆	★								
		CNMG120412–SM	12.9	12.7	4.76	5.16	1.2								☆	★								
Rough machining		CNMG120408–GR	12.9	12.7	4.76	5.16	0.8		★	☆	★	☆												
		CNMG120412–GR	12.9	12.7	4.76	5.16	1.2		★	☆	★	☆												
		CNMG190608–GR	19.3	19.05	6.35	7.94	0.8		★	☆	★	☆												
		CNMG190612–GR	19.3	19.05	6.35	7.94	1.2		★	☆	★	☆												
		CNMG190616–GR	19.3	19.05	6.35	7.94	1.6		★	☆	★	☆												
Rough machining		CNMG120408–BR	12.9	12.7	4.76	5.16	0.8										☆	★						
		CNMG120412–BR	12.9	12.7	4.76	5.16	1.2										☆	★						
		CNMG190612–BR	19.3	19.05	6.35	7.94	1.2										☆	★						
		CNMG190616–BR	19.3	19.05	6.35	7.94	1.6										☆	★						
Heavy machining		CNMM160616–GZ	16.1	15.875	6.35	6.35	1.6		★		★													
		CNMM190608–GZ	19.3	19.05	6.35	7.94	0.8		★		★													
		CNMM190612–GZ	19.3	19.05	6.35	7.94	1.2		★		★													
		CNMM190616–GZ	19.3	19.05	6.35	7.94	1.6		★		★													
		CNMM190624–GZ	19.3	19.05	6.35	7.94	2.4		★		★													
		CNMM250924–GZ	25.792	25.4	9.525	9.12	2.4		★		★													
		CNMM250932–GZ	25.792	25.4	9.525	9.12	3.2		★		★													

★ Recommended grade ☆ Available grade

Applicable tools

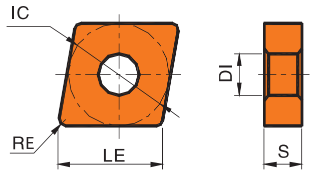

KAPR:75° Page: A73
PCBNR/L


KAPR:95° Page: A73
PCLNR/L


KAPR:95° Page: A79
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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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	25.792	25.4	7.94	9.12	1.6		★		★													
		CNMM250724–GX	25.792	25.4	7.94	9.12	2.4		★		★													
		CNMM250732–GX	25.792	25.4	7.94	9.12	3.2		★		★													
		CNMM250916–GX	25.792	25.4	9.525	9.12	1.6		★		★													
		CNMM250924–GX	25.792	25.4	9.525	9.12	2.4		★		★													
		CNMM250932–GX	25.792	25.4	9.525	9.12	3.2		★		★													

★ Recommended grade ☆ Available grade

Applicable tools


KAPR:75° Page: A73
PCBNR/L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PCLNR/L


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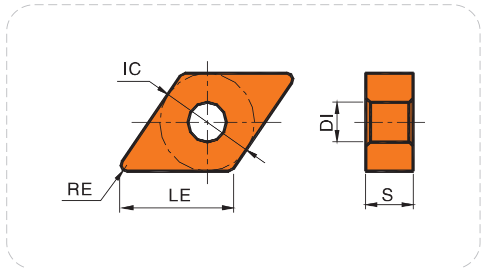
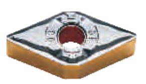
MCLNR/L

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					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing																								
		DNMG150404–GC	15.5	12.7	4.76	5.16	0.4	☆	★	☆	★	☆												
		DNMG150408–GC	15.5	12.7	4.76	5.16	0.8	☆	★	☆	★	☆												
Finishing		DNMG150404–GF	15.5	12.7	4.76	5.16	0.4	☆	★	☆	★	☆												
		DNMG150408–GF	15.5	12.7	4.76	5.16	0.8	☆	★	☆	★	☆												
		DNMG150604–GF	15.5	12.7	6.35	5.16	0.4	☆	★	☆	★	☆												
		DNMG150608–GF	15.5	12.7	6.35	5.16	0.8	☆	★	☆	★	☆												
Finishing		DNMG150404–BF	15.5	12.7	4.76	5.16	0.4										☆	★						
		DNMG150408–BF	15.5	12.7	4.76	5.16	0.8										☆	★						
		DNMG150604–BF	15.5	12.7	6.35	5.16	0.4										☆	★						
		DNMG150608–BF	15.5	12.7	6.35	5.16	0.8										☆	★						
Semi-finishing		DNMG150408–GQ	15.5	12.7	4.76	5.16	0.8	☆	★	☆	★	☆												
		DNMG150412–GQ	15.5	12.7	4.76	5.16	1.2	☆	★	☆	★	☆												
		DNMG150608–GQ	15.5	12.7	6.35	5.16	0.8	☆	★	☆	★	☆												
		DNMG150612–GQ	15.5	12.7	6.35	5.16	1.2	☆	★	☆	★	☆												

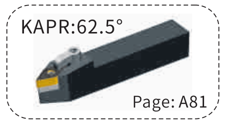
★ Recommended grade ☆ Available grade

Applicable tools

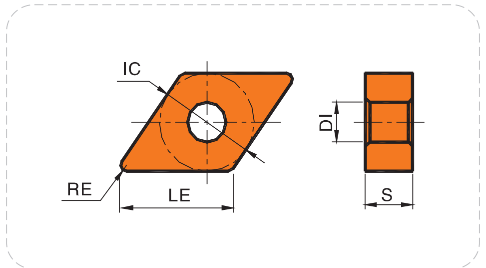

KAPR:93° Page: A74
PDJNR/L


KAPR:62.5° Page: A74
PDPNN


KAPR:93° Page: A80
MDJNR/L

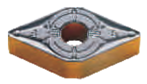
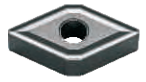

KAPR:62.5° Page: A81
MDPNN

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					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Semi-finishing		DNMG110412–GM	11.6	9.525	4.76	3.81	1.2	☆	★	☆	★	☆												
		DNMG150404–GM	15.5	12.7	4.76	5.16	0.4	☆	★	☆	★	☆												
		DNMG150408–GM	15.5	12.7	4.76	5.16	0.8	☆	★	☆	★	☆												
		DNMG150412–GM	15.5	12.7	4.76	5.16	1.2	☆	★	☆	★	☆												
		DNMG150604–GM	15.5	12.7	6.35	5.16	0.4	☆	★	☆	★	☆												
		DNMG150608–GM	15.5	12.7	6.35	5.16	0.8	☆	★	☆	★	☆												
		DNMG150612–GM	15.5	12.7	6.35	5.16	1.2	☆	★	☆	★	☆												
Semi-finishing		DNMG150404–BM	15.5	12.7	4.76	5.16	0.4										☆	★						
		DNMG150408–BM	15.5	12.7	4.76	5.16	0.8										☆	★						
		DNMG150412–BM	15.5	12.7	4.76	5.16	1.2										☆	★						
		DNMG150604–BM	15.5	12.7	6.35	5.16	0.4										☆	★						
		DNMG150608–BM	15.5	12.7	6.35	5.16	0.8										☆	★						
		DNMG150612–BM	15.5	12.7	6.35	5.16	1.2										☆	★						
Cast iron machining		DNMG150404	15.5	12.7	4.76	5.16	0.4						★											
		DNMG150408	15.5	12.7	4.76	5.16	0.8						★											
		DNMG150412	15.5	12.7	4.76	5.16	1.2						★											
		DNMG150604	15.5	12.7	6.35	5.16	0.4						★											
		DNMG150608	15.5	12.7	6.35	5.16	0.8						★											
		DNMG150612	15.5	12.7	6.35	5.16	1.2						★											

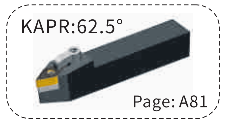
★ Recommended grade ☆ Available grade

Applicable tools

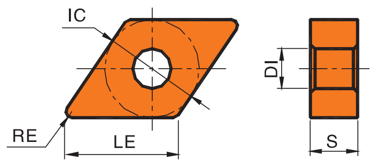

KAPR:93° Page: A74
PDJNR/L


KAPR:62.5° Page: A74
PDPNN


KAPR:93° Page: A80
MDJNR/L

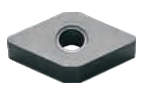

KAPR:62.5° Page: A81
MDPNN

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					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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						★											
		DNMA150612	15.5	12.7	6.35	5.16	1.2						★											
Semi-finishing	New! 	DNMG150404–SM	15.5	12.7	4.76	5.16	0.4								☆	★								
		DNMG150408–SM	15.5	12.7	4.76	5.16	0.8								☆	★								
		DNMG150412–SM	15.5	12.7	4.76	5.16	1.2								☆	★								
		DNMG150604–SM	15.5	12.7	6.35	5.16	0.4								☆	★								
		DNMG150608–SM	15.5	12.7	6.35	5.16	0.8								☆	★								
		DNMG150612–SM	15.5	12.7	6.35	5.16	1.2								☆	★								
Rough machining																								
		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

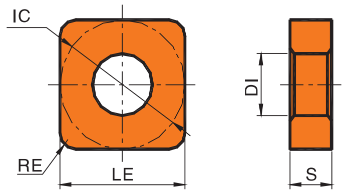

KAPR:93° Page: A74
PDJNR/L


KAPR:62.5° Page: A74
PDPNN


KAPR:93° Page: A80
MDJNR/L


KAPR:62.5° Page: A81
MDPNN

90°SN□□



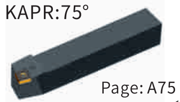
Working condition: ● Stable ◕ Average ⌘ Tough

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		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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	New! 																							
		SNMG120412–GQ	12.7	12.7	4.76	5.16	1.2	☆	★	☆	★	☆												
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	☆	★	☆	★	☆												
		SNMG190612–GM	19.05	19.05	6.35	7.94	1.2	☆	★	☆	★	☆												
		SNMG190616–GM	19.05	19.05	6.35	7.94	1.6	☆	★	☆	★	☆												
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


KAPR:75° Page: A75
PSBNR/L


KAPR:45° Page: A75
PSDNN

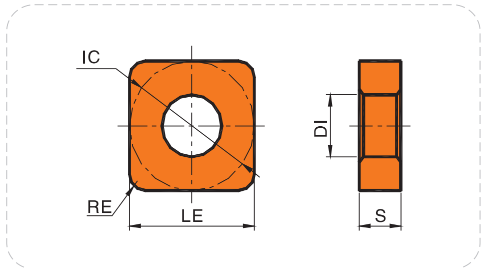

KAPR:75° Page: A76
PSKNR/L


KAPR:75° Page: A82
MSBNR/L


KAPR:75° Page: A83
MSKNR/L


KAPR:45° Page: A83
MSDNN

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		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Cast iron machining		SNMG120404	12.7	12.7	4.76	5.16	0.4						★											
		SNMG120408	12.7	12.7	4.76	5.16	0.8						★											
		SNMG120412	12.7	12.7	4.76	5.16	1.2						★											
		SNMG150608	15.875	15.875	6.35	6.35	0.8						★											
		SNMG150612	15.875	15.875	6.35	6.35	1.2						★											
		SNMG150616	15.875	15.875	6.35	6.35	1.6						★											
		SNMG190612	19.05	19.05	6.35	7.94	1.2						★											
		SNMG190616	19.05	19.05	6.35	7.94	1.6						★											
Cast iron machining		SNMA120404	12.7	12.7	4.76	5.16	0.4						★											
		SNMA120408	12.7	12.7	4.76	5.16	0.8						★											
		SNMA120412	12.7	12.7	4.76	5.16	1.2						★											
		SNMA150608	15.875	15.875	6.35	6.35	0.8						★											
		SNMA150612	15.875	15.875	6.35	6.35	1.2						★											
		SNMA150616	15.875	15.875	6.35	6.35	1.6						★											
		SNMA190612	19.05	19.05	6.35	7.94	1.2						★											
		SNMA190616	19.05	19.05	6.35	7.94	1.6						★											
Rough machining		SNMG120408–GR	12.7	12.7	4.76	5.16	0.8		★	☆	★	☆												
		SNMG120412–GR	12.7	12.7	4.76	5.16	1.2		★	☆	★	☆												
		SNMG190608–GR	19.05	19.05	6.35	7.94	0.8		★	☆	★	☆												
		SNMG190612–GR	19.05	19.05	6.35	7.94	1.2		★	☆	★	☆												
		SNMG190616–GR	19.05	19.05	6.35	7.94	1.6		★	☆	★	☆												

★ Recommended grade ☆ Available grade

Applicable tools

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PSBNR/L

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KAPR:75°

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PSKNR/L

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MSBNR/L

KAPR:75°

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MSKNR/L

KAPR:45°

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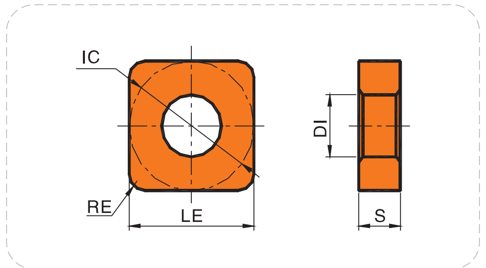
MSDNN

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		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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										☆	★						
		SNMG150612–BR	15.875	15.875	6.35	6.35	1.2										☆	★						
		SNMG190616–BR	19.05	19.05	6.35	7.94	1.6										☆	★						
Heavy machining		SNMM150612–GZ	15.875	15.875	6.35	6.35	1.2		★		★													
		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

Applicable tools

KAPR:75°

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PSBNR/L

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PSKNR/L

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MSBNR/L

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MSKNR/L

KAPR:45°

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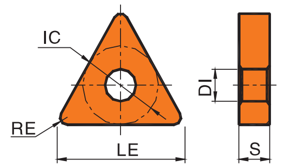
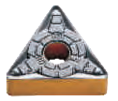
MSDNN

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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing	New! 	TNMG160404–GC	16.5	9.525	4.76	3.81	0.4	☆	★	☆	★	☆												
		TNMG160408–GC	16.5	9.525	4.76	3.81	0.8	☆	★	☆	★	☆												
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	New! 	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	☆	★	☆	★	☆												
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	☆	★	☆	★	☆												

★ Recommended grade ☆ Available grade

Applicable tools


KAPR:90° Page: A77
PTFNR/L


KAPR:60° Page: A77
PTTNR/L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PTGNR/L


KAPR:90° Page: A84
MTGNR/L


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MTJNR/L


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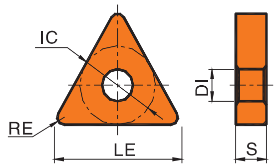
MTFNR/L

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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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										☆	★						
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						★											
Rough 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						★											

★ Recommended grade ☆ Available grade

Applicable tools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PTFNR/L


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PTTNR/L

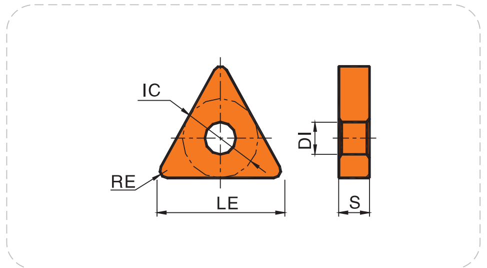

KAPR:90° Page: A78
PTGNR/L


KAPR:90° Page: A84
MTGNR/L


KAPR:93° Page: A84
MTJNR/L


KAPR:90° Page: A85
MTFNR/L

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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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		★	☆	★	☆												
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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PTTNR/L


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PTGNR/L


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MTGNR/L


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MTJNR/L


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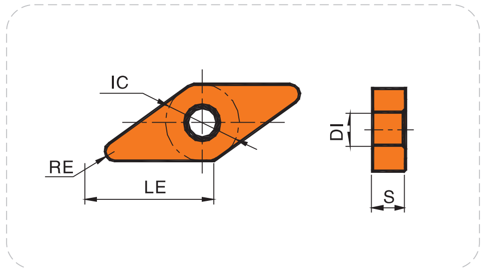
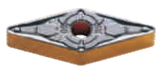
MTFNR/L

35°VN□□



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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing		VNMG160404–GC	16.6	9.525	4.76	3.81	0.4	☆	★	☆	★	☆												
		VNMG160408–GC	16.6	9.525	4.76	3.81	0.8	☆	★	☆	★	☆												
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–GQ	16.6	9.525	4.76	3.81	0.4	☆	★	☆	★	☆												
		VNMG160408–GQ	16.6	9.525	4.76	3.81	0.8	☆	★	☆	★	☆												
		VNMG160412–GQ	16.6	9.525	4.76	3.81	1.2	☆	★	☆	★	☆												
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	☆	★	☆	★	☆												

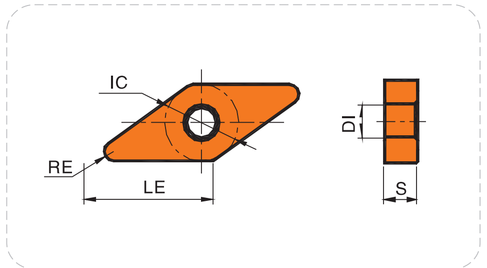
★ Recommended grade ☆ Available grade

Applicable tools


KAPR:72.5° Page: A85
MVVNN


KAPR:93° Page: A86
MVJNR/L

35°VN□□



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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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						★											
Cast iron machining																								
		VNMA160404	16.6	9.525	4.76	3.81	0.4						★											
		VNMA160408	16.6	9.525	4.76	3.81	0.8						★											
Semi-finishing	 New!																							
		VNMG160404–SM	16.6	9.525	4.76	3.81	0.4								☆	★								
		VNMG160408–SM	16.6	9.525	4.76	3.81	0.8								☆	★								

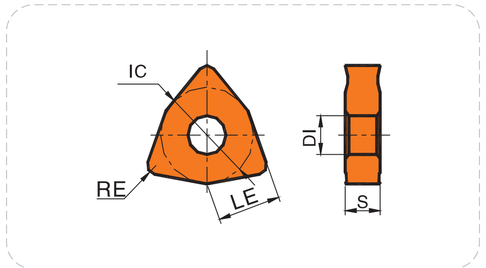
★ Recommended grade ☆ Available grade

Applicable tools

MVVNN

MVJNR/L

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					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing	 New!																							
		WNMG080404–GC	8.7	12.7	4.76	5.16	0.4	☆	★	☆	★	☆												
		WNMG080408–GC	8.7	12.7	4.76	5.16	0.8	☆	★	☆	★	☆												
Finishing																								
		WNMG080404–GF	8.7	12.7	4.76	5.16	0.4	☆	★	☆	★	☆												
		WNMG080408–GF	8.7	12.7	4.76	5.16	0.8	☆	★	☆	★	☆												
Finishing		WNMG080402–BF	8.7	12.7	4.76	5.16	0.2										☆	★						
		WNMG080404–BF	8.7	12.7	4.76	5.16	0.4										☆	★						
		WNMG080408–BF	8.7	12.7	4.76	5.16	0.8										☆	★						
Semi-finishing	 New!	WNMG080404–GQ	8.7	12.7	4.76	5.16	0.4	☆	★	☆	★	☆												
		WNMG080408–GQ	8.7	12.7	4.76	5.16	0.8	☆	★	☆	★	☆												
		WNMG080412–GQ	8.7	12.7	4.76	5.16	1.2	☆	★	☆	★	☆												
Semi-finishing		WNMG080404–GM	8.7	12.7	4.76	5.16	0.4	☆	★	☆	★	☆												
		WNMG080408–GM	8.7	12.7	4.76	5.16	0.8	☆	★	☆	★	☆												
		WNMG080412–GM	8.7	12.7	4.76	5.16	1.2	☆	★	☆	★	☆												

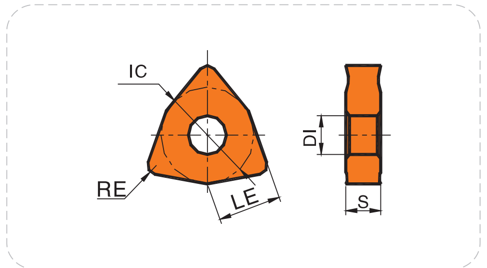
★ Recommended grade ☆ Available grade

Applicable tools

PWLNR/L

MWLNR/L

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					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Semi-finishing		WNMG06T312–BM	6.6	9.525	3.97	3.81	1.2										☆	★						
		WNMG060412–BM	6.6	9.525	4.76	3.81	1.2										☆	★						
		WNMG080404–BM	8.7	12.7	4.76	5.16	0.4										☆	★						
		WNMG080408–BM	8.7	12.7	4.76	5.16	0.8										☆	★						
		WNMG080412–BM	8.7	12.7	4.76	5.16	1.2										☆	★						
Cast iron machining		WNMG080404	8.7	12.7	4.76	5.16	0.4						★											
		WNMG080408	8.7	12.7	4.76	5.16	0.8						★											
		WNMG080412	8.7	12.7	4.76	5.16	1.2						★											
Cast iron machining		WNMA060404	6.6	9.525	4.76	3.81	0.4						★											
		WNMA060408	6.6	9.525	4.76	3.81	0.8						★											
		WNMA080404	8.7	12.7	4.76	5.16	0.4						★											
		WNMA080408	8.7	12.7	4.76	5.16	0.8						★											
		WNMA080412	8.7	12.7	4.76	5.16	1.2						★											
		WNMA080416	8.7	12.7	4.76	5.16	1.6						★											

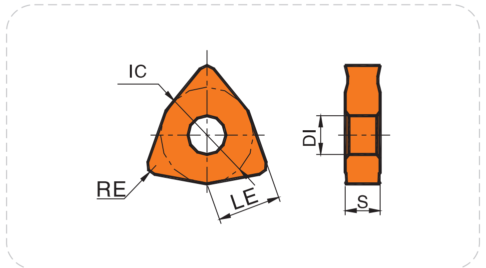
★ Recommended grade ☆ Available grade

Applicable tools

PWLNR/L

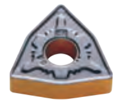
MWLNR/L

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					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Semi-finishing	 New!	WNMG080404–SM	8.7	12.7	4.76	5.16	0.4								☆	★								
		WNMG080408–SM	8.7	12.7	4.76	5.16	0.8								☆	★								
		WNMG080412–SM	8.7	12.7	4.76	5.16	1.2								☆	★								
Rough machining																								
		WNMG080408–GR	8.7	12.7	4.76	5.16	0.8		★	☆	★	☆												
		WNMG080412–GR	8.7	12.7	4.76	5.16	1.2		★	☆	★	☆												
Rough machining																								
		WNMG080408–BR	8.7	12.7	4.76	5.16	0.8										☆	★						
		WNMG080412–BR	8.7	12.7	4.76	5.16	1.2										☆	★						

★ Recommended grade ☆ Available grade

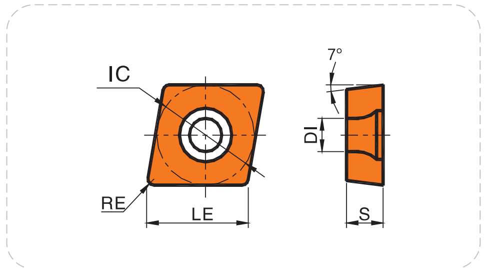
Applicable tools

PWLNR/L

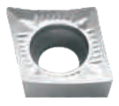
MWLNR/L

80°CC□□

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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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														★	☆		
		CCGT09T308–AK	9.7	9.525	3.97	4.4	0.8														★	☆		
		CCGT120404–AK	12.9	12.7	4.76	5.56	0.4														★	☆		
		CCGT120408–AK	12.9	12.7	4.76	5.56	0.8														★	☆		
Finishing	 New!	CCMT060204–TF	6.4	6.35	2.38	2.8	0.4		★	☆	★						☆	★						
		CCMT060208–TF	6.4	6.35	2.38	2.8	0.8		★	☆	★						☆	★						
		CCMT09T304–TF	9.7	9.525	3.97	4.4	0.4		★	☆	★						☆	★						
		CCMT09T308–TF	9.7	9.525	3.97	4.4	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		★	☆	★						☆	★						
		CCMT120412–TM	12.9	12.7	4.76	5.56	1.2		★	☆	★						☆	★						

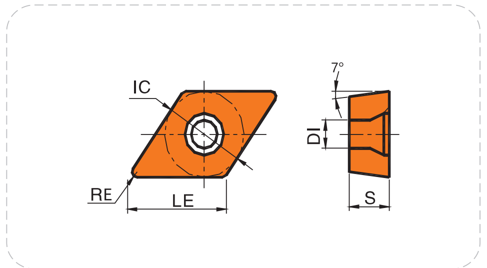
★ Recommended grade ☆ Available grade

Applicable tools

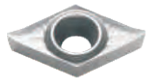
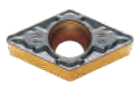
S□□-SCLCR/L

55°DC□□

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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing		DCGT070202–AK	7.8	6.35	2.38	2.8	0.2														★	☆		
		DCGT070204–AK	7.8	6.35	2.38	2.8	0.4														★	☆		
		DCGT11T302–AK	11.6	9.525	3.97	4.4	0.2														★	☆		
		DCGT11T304–AK	11.6	9.525	3.97	4.4	0.4														★	☆		
		DCGT11T308–AK	11.6	9.525	3.97	4.4	0.8														★	☆		
Finishing	 New!																							
		DCMT11T304–TF	11.6	9.525	3.97	4.4	0.4		★	☆	★						☆	★						
		DCMT11T308–TF	11.6	9.525	3.97	4.4	0.8		★	☆	★						☆	★						
Semi-finishing		DCMT070204–TM	7.8	6.35	2.38	2.8	0.4		★	☆	★						☆	★						
		DCMT070208–TM	7.8	6.35	2.38	2.8	0.8		★	☆	★						☆	★						
		DCMT11T304–TM	11.6	9.525	3.97	4.4	0.4		★	☆	★						☆	★						
		DCMT11T308–TM	11.6	9.525	3.97	4.4	0.8		★	☆	★						☆	★						
		DCMT11T312–TM	11.6	9.525	3.97	4.4	1.2		★	☆	★						☆	★						

★ Recommended grade ☆ Available grade

Applicable tools

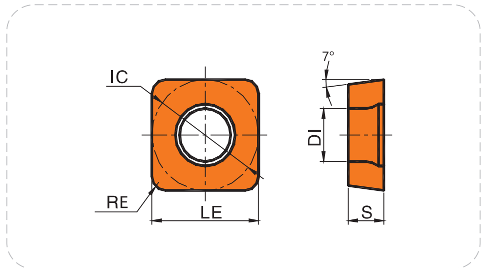
S□□-SDQCR/L

S□□-SDUCR/L

A
General turning
precision small parts turning
Parting and grooving
Threading
B
Indexable milling
Solid carbide end mills
C
Short hole drills
Solid carbide drills

90°SC□□

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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing	 New!																							
		SCMT120408–TF	12.7	12.7	4.76	5.56	0.8		★	☆	★						☆	★						
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		★	☆	★						☆	★						

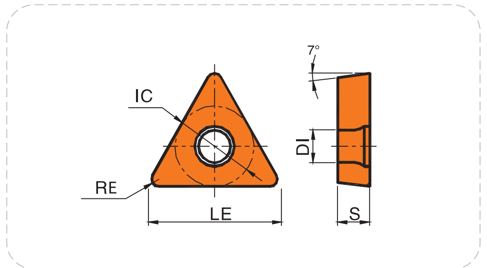
★ Recommended grade ☆ Available grade

Applicable tools

S□□-SSKCR/L

60°TC□□

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					●	◕								

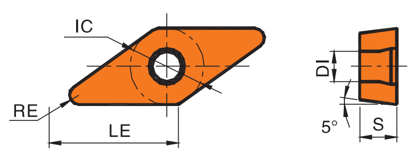
Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing		TCGT090204–AK	9.7	5.56	2.38	2.8	0.4														★	☆		
		TCGT110204–AK	11.0	6.35	2.38	2.8	0.4														★	☆		
		TCGT16T304–AK	16.5	9.525	3.97	4.4	0.4														★	☆		
Finishing	 New!																							
		TCMT110204–TF	11.0	6.35	2.38	2.8	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

S□□-STFCR/L

35°VB□□



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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing		VBGT160402–AK	16.5	9.525	4.76	4.4	0.2														★	☆		
		VBGT160404–AK	16.5	9.525	4.76	4.4	0.4														★	☆		
		VBGT160408–AK	16.5	9.525	4.76	4.4	0.8														★	☆		
Finishing	 New!																							
		VBMT160404–TF	16.5	9.525	4.76	4.4	0.4		★	☆	★						☆	★						
		VBMT160408–TF	16.5	9.525	4.76	4.4	0.8		★	☆	★						☆	★						
Semi-finishing		VBMT110304–TM	11.0	6.35	3.18	2.8	0.4		★	☆	★						☆	★						
		VBMT110308–TM	11.0	6.35	3.18	2.8	0.8		★	☆	★						☆	★						
		VBMT160404–TM	16.5	9.525	4.76	4.4	0.4		★	☆	★						☆	★						
		VBMT160408–TM	16.5	9.525	4.76	4.4	0.8		★	☆	★						☆	★						
		VBMT160412–TM	16.5	9.525	4.76	4.4	1.2		★	☆	★						☆	★						

★ Recommended grade ☆ Available grade

Applicable tools

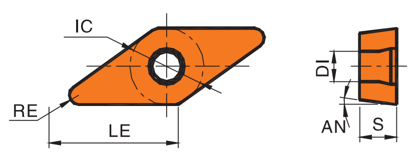

KAPR:107.5° Page: A90

S□□-SVQBR/L


KAPR:93° Page: A91

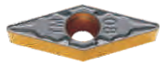
S□□-SVUBR/L

35°VC□□



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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Semi-finishing		VCGT110302–AK	11.0	6.35	3.18	2.8	0.2														★	☆		
		VCGT110304–AK	11.0	6.35	3.18	2.8	0.4														★	☆		
		VCGT160402–AK	16.5	9.525	4.76	4.4	0.2														★	☆		
		VCGT160404–AK	16.5	9.525	4.76	4.4	0.4														★	☆		
		VCGT160408–AK	16.5	9.525	4.76	4.4	0.8														★	☆		
Semi-finishing		VCMT110304–TM	11.0	6.35	3.18	2.8	0.4		★	☆	★						☆	★						
		VCMT110308–TM	11.0	6.35	3.18	2.8	0.8		★	☆	★						☆	★						
		VCMT160404–TM	16.5	9.525	4.76	4.4	0.4		★	☆	★						☆	★						
		VCMT160408–TM	16.5	9.525	4.76	4.4	0.8		★	☆	★						☆	★						
		VCMT160412–TM	16.5	9.525	4.76	4.4	1.2		★	☆	★						☆	★						

★ Recommended grade ☆ Available grade

Applicable tools


KAPR:107.5° Page: A91

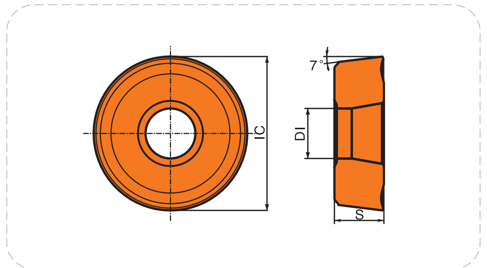
S□□-SVQCR/L


KAPR:93° Page: A92

S□□-SVUCR/L

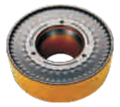
Profile turning insert

Working condition: ● Stable ◕ Average ⌘ Tough



Workpiece material

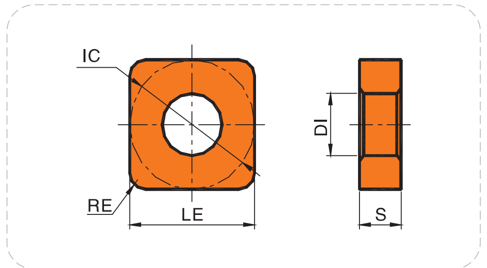
P Steel	●	◕	◕ ⌘										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)			CVD						PVD							Cemented carbide		Cermet	
			IC	S	DI	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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

Planer insert

Working condition: ● Stable ◕ Average ⌘ Tough



Workpiece material

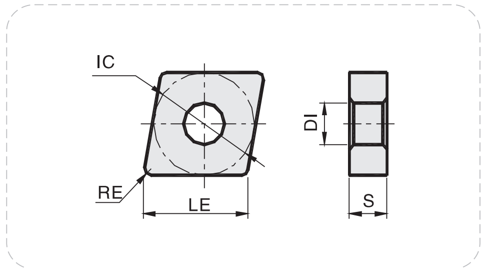
P Steel	●	◕	◕ ⌘										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Planer machining																								
		SNMG120404–HAF	12.7	12.7	4.76	5.16	0.4										★							
Planer machining																								
		SNMG120404–HSF	12.7	12.7	4.76	5.16	0.4										★							

★ Recommended grade ☆ Available grade

Cermet insert

Cermet insert

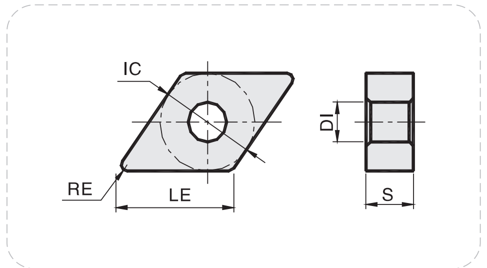


Working condition: ● Stable ◕ Average ⌘ Tough

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

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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

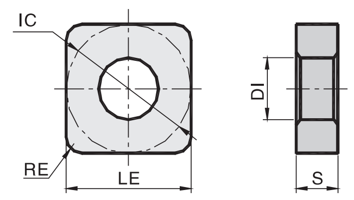
Workpiece material														
P Steel	●	◕	◕ ⌘										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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

Cermet insert

Working condition: ● Stable ◕ Average ⌗ Tough

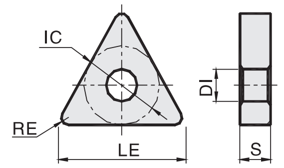


Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	◕	◕ ⌗													●	◕
M Stainless steel								● ◕		● ◕							
K Cast iron					● ◕												
N Non-ferrous metal													●	◕			
S Heat-resistant alloy Titanium alloy						●	◕										

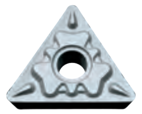
Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing and semi-machining		SNMG120404HQ	12.7	12.7	4.76	5.16	0.4																★	★

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



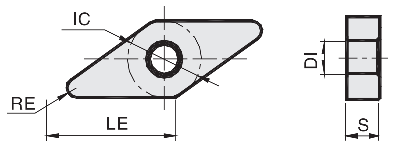
Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	◕	◕ ⌗													●	◕
M Stainless steel								● ◕		● ◕							
K Cast iron					● ◕												
N Non-ferrous metal													●	◕			
S Heat-resistant alloy Titanium alloy						●	◕										

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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

Cermet insert

Working condition: ● Stable ◕ Average ⌗ Tough

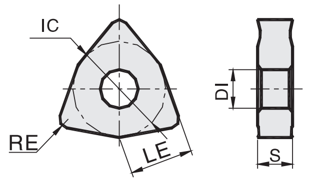


Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	◕	◕ ⌗													●	◕
M Stainless steel								● ◕		● ◕							
K Cast iron					● ◕												
N Non-ferrous metal													●	◕			
S Heat-resistant alloy Titanium alloy						●	◕										

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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

Working condition: ● Stable ◕ Average ⌗ Tough



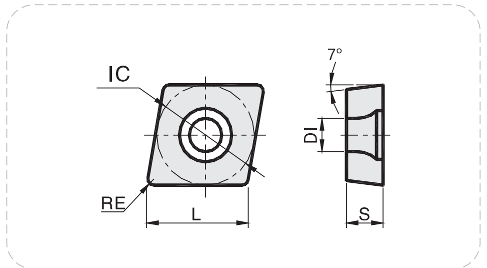
Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	◕	◕ ⌗													●	◕
M Stainless steel								● ◕		● ◕							
K Cast iron					● ◕												
N Non-ferrous metal													●	◕			
S Heat-resistant alloy Titanium alloy						●	◕										

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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

Cermet insert

Working condition: ● Stable ◕ Average ⌗ Tough

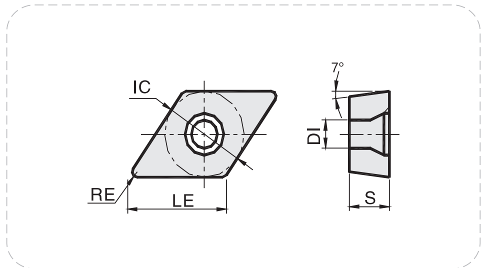


Workpiece material														
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

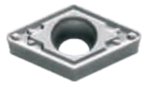
Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing and semi-machining		CCMT060204HQ	6.4	6.35	2.38	2.8	0.4																★	☆
		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

Working condition: ● Stable ◕ Average ⌗ Tough



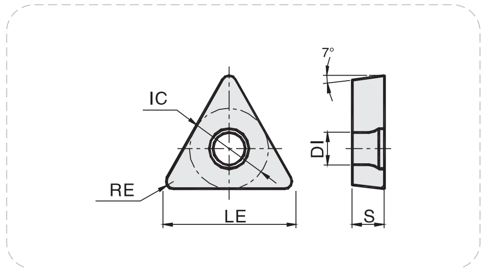
Workpiece material														
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing and semi-machining		DCMT070202HQ	7.8	6.35	2.38	2.8	0.2																★	☆
		DCMT070204HQ	7.8	6.35	2.38	2.8	0.4																★	☆
		DCMT070208HQ	7.8	6.35	2.38	2.8	0.8																★	☆
		DCMT11T302HQ	11.6	9.525	3.97	4.4	0.2																★	☆
		DCMT11T304HQ	11.6	9.525	3.97	4.4	0.4																★	☆
		DCMT11T308HQ	11.6	9.525	3.97	4.4	0.8																★	☆

★ Recommended grade ☆ Available grade

Cermet insert

Working condition: ● Stable ◕ Average ⌗ Tough

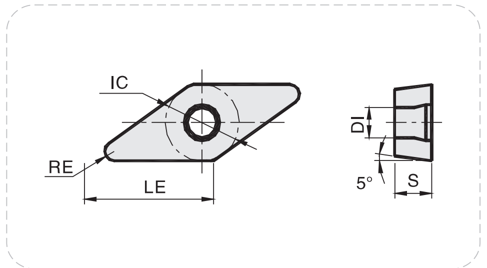


Workpiece material														
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing and semi-machining		TCMT110204HQ	11.0	6.35	2.38	2.8	0.4																★	☆

★ 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					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm)					CVD						PVD							Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Finishing and semi-machining		VBMT110304HQ	11.0	6.35	3.18	2.8	0.4																★	☆
		VBMT110308HQ	11.0	6.35	3.18	2.8	0.8																★	☆
		VBMT160404HQ	16.5	9.525	4.76	4.4	0.4																★	☆
		VBMT160408HQ	16.5	9.525	4.76	4.4	0.8																★	☆

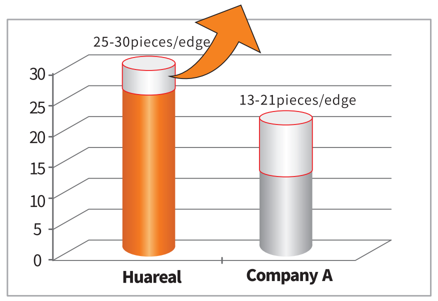
★ Recommended grade ☆ Available grade

Application - P-type material turning

Hub unit

Workpieces materials	65MN
Machining method	Semi-finishing of end face
Insert	WNMG080408-GF HR8115
Machining parameters	Vc=330m/min， fn=0.3mm/r，ap=0.8mm
Cooling method	Water cooling

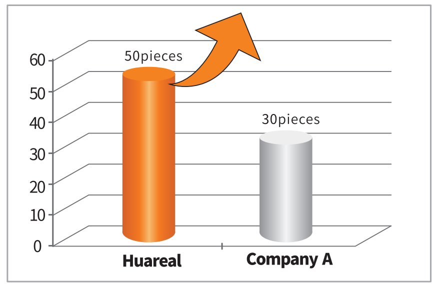
Its service life is extended by more than 50%



Bearing ring

Workpieces materials	55steel
Machining method	External and end face finishing
Insert	WNMG080408-GM HR8105
Machining parameters	v_c=200-310m/min，f_n=0.2-0.3mm/r，ap=1-1.5mm
Cooling method	Water cooling

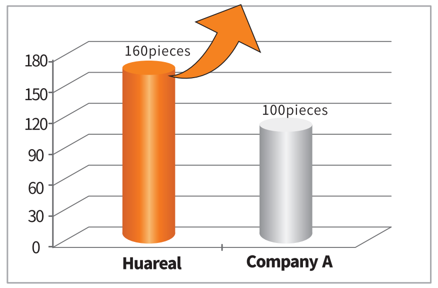
Its service life is extended by more than 67%



Hub unit

Workpieces materials	65MN
Machining method	Inner hole finishing turning
Insert	VNMG160408-GQ HR8105
Machining parameters	v_c=350m/min，f_n=0.18mm/r，ap=0.7mm
Cooling method	Water cooling

better chip breaking
Its service life is extended by more than 60%

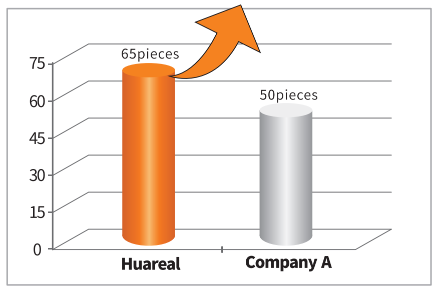


Application - P-type material turning

Gear shaft

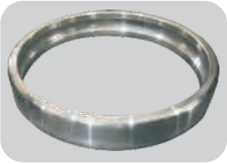
Workpieces materials	20CRMnTi
Machining method	external finishing turning
Insert	DNMG150408-GM HR8115
Machining parameters	v_c=316m/min，f_n=0.3mm/r，ap=0.7mm
Cooling method	Water cooling

lower viberation
Its service life is extended by more than 30%

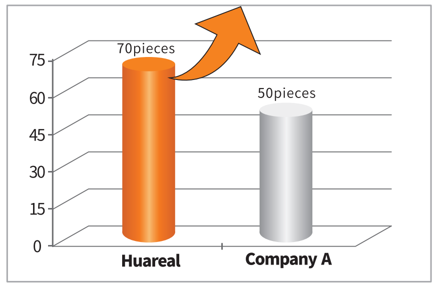


Bearing ring

Workpieces materials	GCR15
Machining method	External rough turning
Insert	WNMG080408-GQ HR8115
Machining parameters	v_c=335m/min，f_n=0.36mm/r，ap=1-2mm
Cooling method	Water cooling



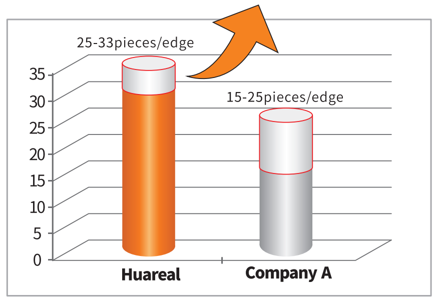
smooth chip removal
Its service life is extended by more than 40%



Flange machining

Workpieces materials	45#steel
Machining method	Strong intermittent rough turning of end face
Insert	WNMG080408-GM HR8225
Machining parameters	v_c=180~358m/min，f_n=0.275mm/r，ap=1.3-3mm
Cooling method	Water cooling

Its service life is extended by more than 66%

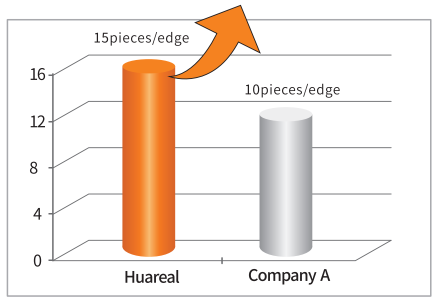


Application - P-type material turning

Tropid housing

Workpieces materials	CF53
Machining method	Rough turning on axle journal
Insert	WNMG080412-GR HR8225
Machining parameters	v_c=351m/min，f_n=0.45mm/r，ap=2.0mm
Cooling method	Water cooling

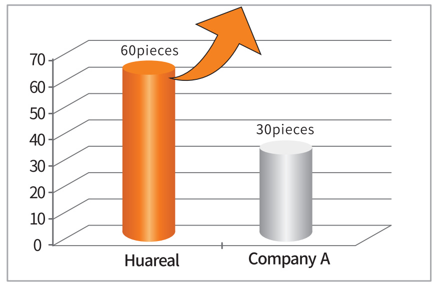
Its service life is extended by more than 50%



HUB unit

Workpieces materials	45steel
Machining method	Interrupted rough turning on end face
Insert	CNMG120412-GR HR8225
Machining parameters	v_c=160m/min，f_n=0.27mm/r，ap=1.2mm
Cooling method	Dry type

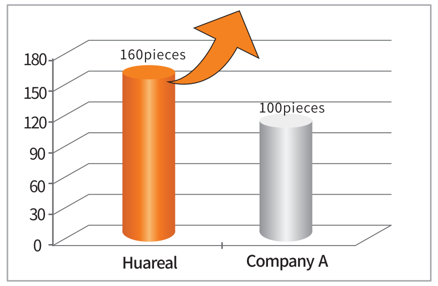
Its service life is extended by more than 100%



Tripod

Workpieces materials	20CrMnTiH
Machining method	Inner hole finishing
Insert	CCMT09T304-TF HR8115
Machining parameters	v_c=126m/min，f_n=0.12mm/r，ap=0.3mm
Cooling method	Water cooling

Light cutting force, its services life extended by 60%

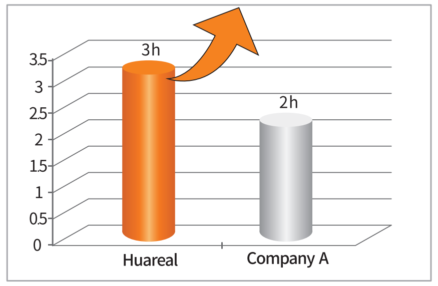


Application - P-type material turning

Flange

Workpieces materials	16Mn
Machining method	End face rough turning
Insert	CNMM190616-GZ HR8225
Machining parameters	v_c=80m/min，f_n=0.6mm/r，ap=10mm
Cooling method	Water cooling

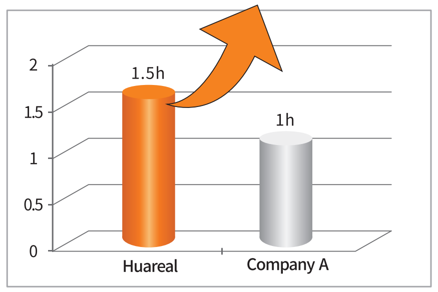
Its service life is extended by more than 50%



Flange

Workpieces materials	16Mn
Machining method	Internal rough turning
Insert	CNMM250924-GX HR8225
Machining parameters	v_c=62m/min，f_n=0.8mm/r，ap=12mm
Cooling method	Water cooling

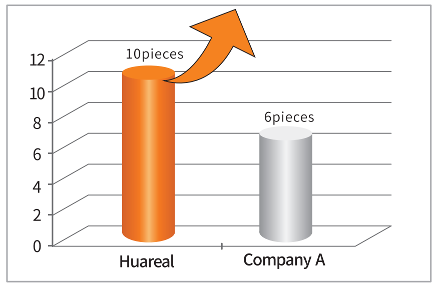
Its service life is extended by more than 50%



Train HUB

Workpieces materials	C level steel
Machining method	Profiling finish machining
Insert	RCMX1606MO-MR HR8115
Machining parameters	v_c=205m/min，f_n=0.68mm/r，ap=0.6mm
Cooling method	Water cooling

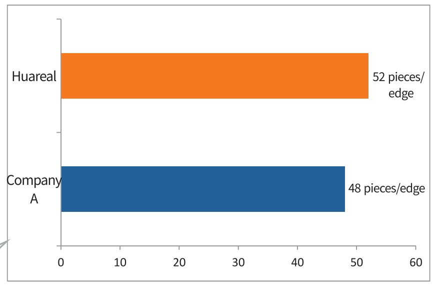
Its service life is extended by more than 67%



Machining case - stainless steel turning

Flange plate

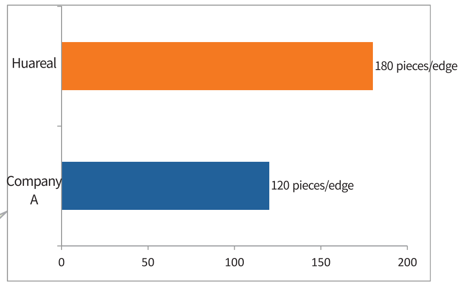
Workpieces materials	SUS304
Machining method	Continuous external and end face finishing
Insert	WNMG080408-BF HR7225
Machining parameters	Vc=259m/min，fn=0.15mm/r，ap=0.50mm
Cooling method	Water cooling



With good machined surface quality, Huareal products' service life is extended by about 8%

Flange plate

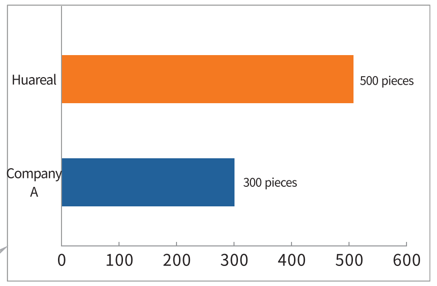
Workpieces materials	SUS304
Machining method	External and end face turning
Insert	VNMG160408-BF HR7225
Machining parameters	v_c=171~180m/min，f_n=0.08mm/r，ap=0.30mm
Cooling method	Water cooling



Huareal product with better surface quality, service life extanded by about 50%

lock cylinde

Workpieces materials	SUS304
Machining method	External turning
Insert	WNMG080408-BF HR7225
Machining parameters	v_c=36m/min，f_n=0.1mm/r，ap=0.08mm
Cooling method	Water cooling

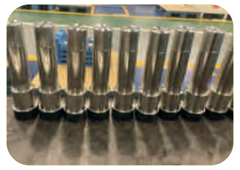


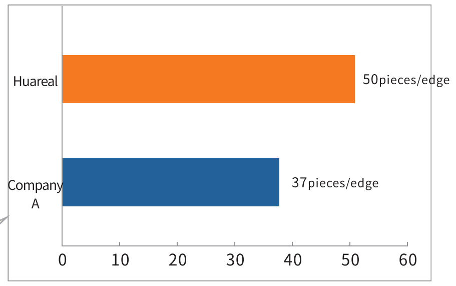
BF-type chipbreaker with great chip breaking perfomance,
and better surface quality

Machining case - stainless steel turning

Valve stem

Workpieces materials	A182 Stainless steel
Machining method	External turning
Insert	DNMG150608-BM HR7225
Machining parameters	v_c=98m/min，f_n=0.25mm/r，ap=2.5mm
Cooling method	Dry type

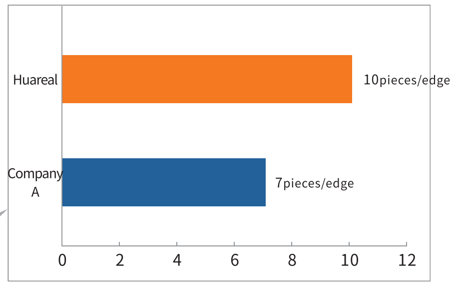




Huareal's product has good wear resistance, stable and without chipping

Ball Valve

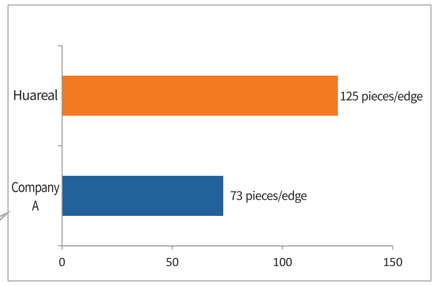
Workpieces materials	SUS304
Machining method	Rough turning on end face
Insert	WNMG080408-BM HR7225
Machining parameters	v_c=127m/min，f_n=0.25mm/r，ap=1mm
Cooling method	Water cooling



华锐产品寿命稳定且较长，安全性高

Flange plate

Workpieces materials	SUS304
Machining method	Semi-finishing of cone and end faces
Insert	WNMG080408-BM HR7225
Machining parameters	Vc=150~243m/min，fn=0.2mm/r，ap=1.2mm
Cooling method	Water cooling

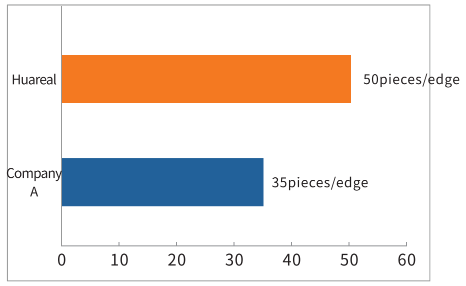


With less groove wear, Huareal products' service life is extended by about 70%

Machining case - cast iron turning

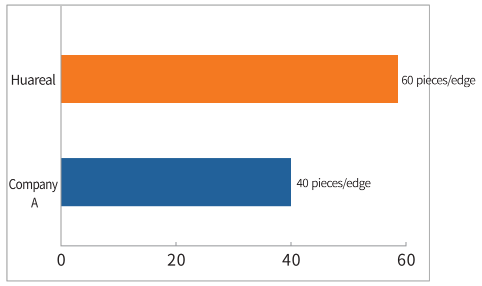
Turbo cover

- **Workpieces materials** QT600-3
- **Machining method** External interrupted finishing turning
- **Insert** WNMG080412 HR6115
- **Machining parameters** v_c=240m/min，f_n=0.28mm/r，ap=0.8mm
- **Cooling method** Dry type



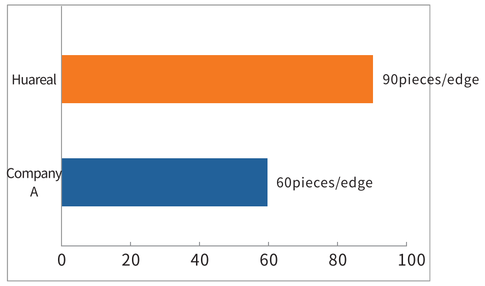
Compressor cylinder

- **Workpieces materials** HT250
- **Machining method** External and end face rough turning
- **Insert** WNMG080412 HR6115
- **Machining parameters** V_c=415m/min，f_n=0.15mm/r，ap=0.4mm
- **Cooling method** Water cooling



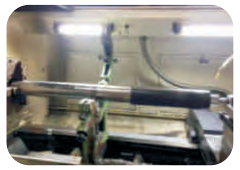
Compressor cylinder

- **Workpieces materials** HT250
- **Machining method** External and end face rough turning
- **Insert** WNMG080408 HR6115
- **Machining parameters** v_c=563m/min，f_n=0.25mm/r，ap=1mm
- **Cooling method** Water cooling

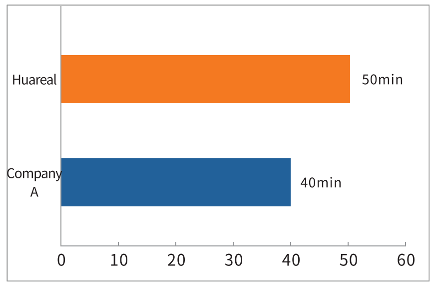


Machining case - High-Temp alloys turning

Valve steam

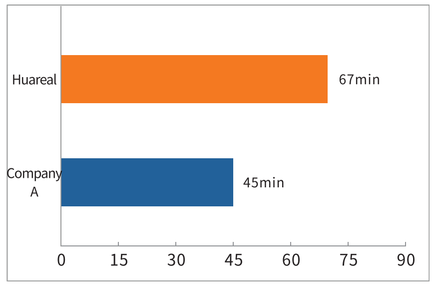


- **Workpieces materials** Gh901
- **Machining method** External rough turning
- **Insert** CNMG120408-SM HR7115
- **Machining parameters** v_c=46m/min，f_n=0.18mm/r，ap=3mm
- **Cooling method** Water cooling

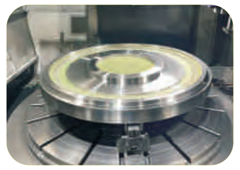


Turbine disk

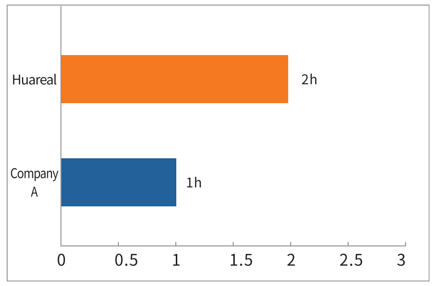
- **Workpieces materials** Gh4169
- **Machining method** Inner hole rough turning
- **Insert** DNMG150608-SM HR7115
- **Machining parameters** v_c=38m/min，f_n=0.15mm/r，ap=1mm
- **Cooling method** Water cooling



Turbine disk

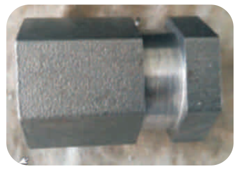


- **Workpieces materials** Gh4698
- **Machining method** End face finish turning
- **Insert** VNMG160408-SM HR7115
- **Machining parameters** v_c=48m/min，f_n=0.13mm/r，ap=0.5mm
- **Cooling method** Water cooling

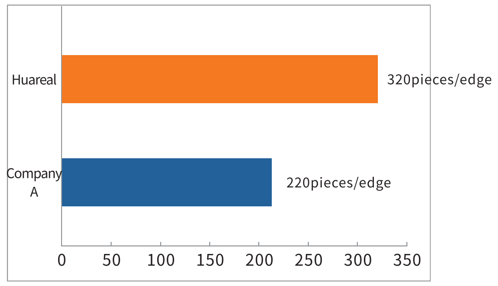


Machining case - Cermet turning

Hydraulic tube fitting

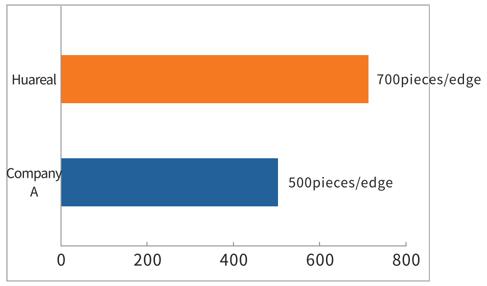


Workpieces materials	45Steel
Machining method	External turning
Insert	DNMG150404HQ HRC10
Machining parameters	v_c=200m/min，f_n=0.2mm/r，ap=0.4-2.5mm
Cooling method	Water cooling



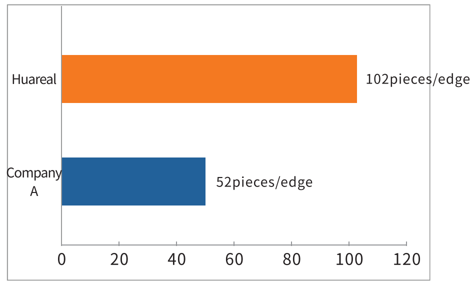
Joints

Workpieces materials	Q235
Machining method	External turning
Insert	TNMG160404HQ HRC10
Machining parameters	v_c=170m/min，f_n=0.1mm/r，ap=0.5-3mm
Cooling method	Water cooling



Axle head

Workpieces materials	42CrMo
Machining method	External turning
Insert	DCMT11T304HQ HRC10
Machining parameters	v_c=150m/min，f_n=0.25mm/r，ap=0.8mm
Cooling method	Water cooling



A Turning

General turning tool

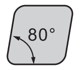
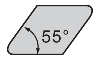
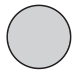
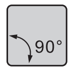
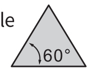
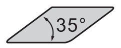
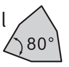
Code key of general external turning tools

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

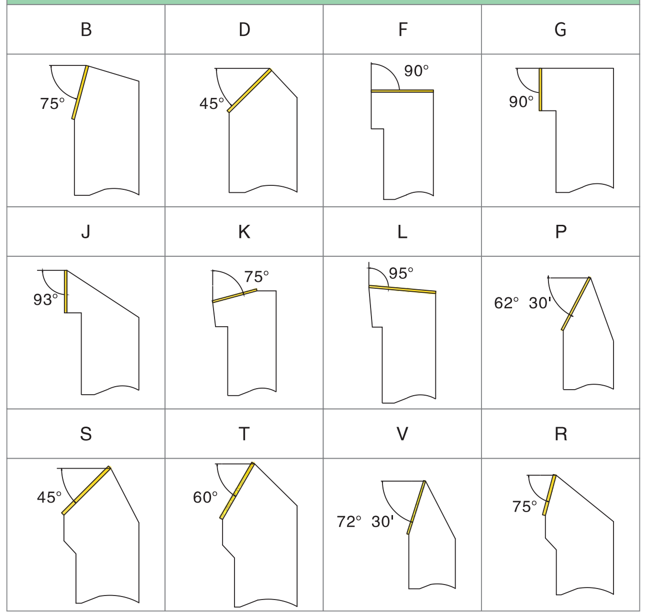
① Clamping method

Mark	Locking method
M	Rigid clamping
P	Lever clamping

②Insert shape

C	80° rhombus	
D	55° rhombus	
R	Circular	
S	Square	
T	Regular triangle	
V	35° rhombus	
W	Equilateral unequal hexagon	

③ Cutting edge angle KAPR



④ Insert clearance angle

N	Negative style (0°)

⑤Cutting direction

R	Right hand
L	Left hand
N	Left and right hands

⑥Corner height (mm)

8	08
10	10
12	12
16	16
20	20
25	25
32	32

⑦Width of tool holder (mm)

8	08
10	10
12	12
16	16
20	20
25	25
32	32

⑧ Tool length (mm)

D	60
E	70
F	80
H	100
K	125
M	150
P	170
Q	180
R	200

⑨Cutting edge length (mm)

Inscribed circle of insert	Insert shape					
	Square	Regular triangle	Circular	80°rhombus	55°rhombus	35°rhombus
6.00	--	--	06	--	--	--
6.35	--	11	--	06	07	11
7.94	--	13	--	--	--	--
8.00	--	--	08	--	--	--
9.525	09	16	--	09	11	16
10.00	--	--	10	--	--	--
12.00	--	--	12	--	--	--
12.70	12	22	--	12	15	--
15.875	15	27	--	16	--	--
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

Mark	Material
S	Steel cutter bar

② Cutter bar diameter (mm)

08	08
10	10
12	12
16	16
20	20
25	25
32	32

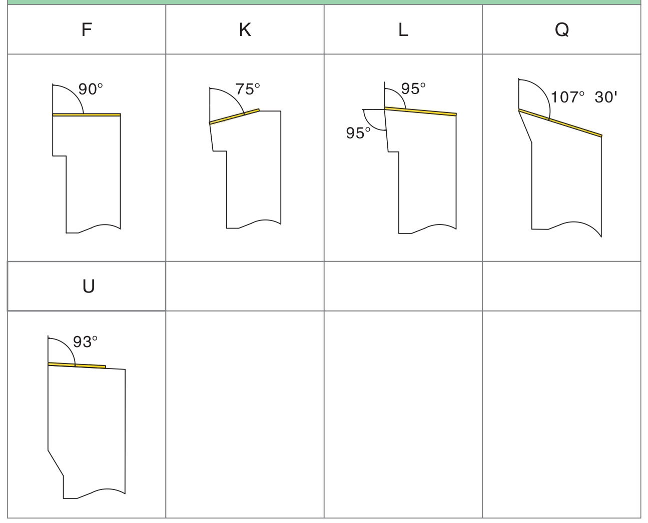
③ Shank length (mm)

K	125
M	150
Q	180
R	200
S	250
T	300
U	350

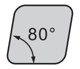
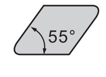
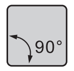
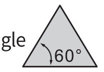
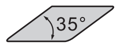
④ Clamping method

S	Screw clamp design

⑥ Cutting edge angle KAPR



⑤ Insert shape

C	80° rhombus	
D	55° rhombus	
S	Square	
T	Regular triangle	
V	35° rhombus	

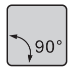
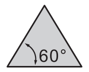
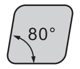
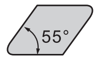
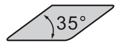
⑦ Insert clearance angle

C	7°
P	11°

⑧Cutting direction

R	Right hand
L	Left hand
N	Left and right hands

⑨Cutting 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	PCBNR/L 	75°	☺						☺		A73
	PCLNR/L 	95°			☺				☺		A73
	PDJNR/L 	93°					☺		☺	☹	A74
	PDPNN 	62.5°						☺	☺		A74
	PSBNR/L 	75°	☺						☺		A75
	PSDNN 	45°						☺	☺		A75
	PSKNR/L 	75°		☺					☺		A76
	PSSNR/L 	45°	☺						☺		A76
	PTFNR/L 	90°		☺					☺	☹	A77
	PTTNR/L 	60°	☺						☺		A77
	PTGNR/L 	90°	☺						☺		A78
	PWLNR/L 	95°			☺				☺	☹	A78
M	MCBNR/L 	75°	☺						☺		A79
	MCLNR/L 	95°			☺				☺		A79

☺ Recommanded ☹ 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	MDJNR/L 	93°					☺		☺		A80
	MDPNN 	62.5°						☺	☺		A81
	MSBNR/L 	75°	☺						☺	☹	A82
	MSRNR/L 	75°	☺						☺		A82
	MSKNR/L 	75°		☺					☺		A83
	MSDNN 	45°						☺	☺		A83
	MTGNR/L 	90°	☺						☺		A84
	MTJNR/L 	93°	☺						☺		A84
	MTFNR/L 	90°		☺					☺	☹	A85
	MVVNN 	72.5°						☺	☺		A85
	MVJNR/L 	93°					☺		☺		A86
	MWLNR/L 	95°			☺				☺	☹	A86
	MRGCR/L 	/				☺			☺		A87
	MRDCN 	/				☺			☺		A87

☺ Recommanded ☹ Available

Overview of general turning tools (internal machining)

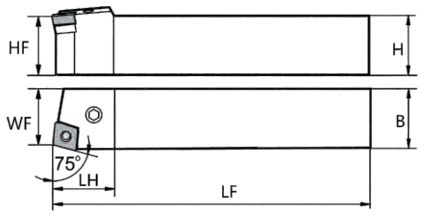
Model	Cutter bar shape	Cutting edge angle (KAPR) °	Shank diameter of cutter bar	Tool length	Machined workpiece diameter minimum	Page
S□□-SCLCR/L		95°	12	150	16	A88
			16	180	20	
			20	200	25	
			25	250	32	
S□□-SDQCR/L		107.5°	12	150	16	A88
			16	180	20	
			20	200	25	
			25	250	32	
S□□-SDUCR/L		93°	12	150	16	A89
			16	180	20	
			20	200	25	
S□□-SSKCR/L		75°	12	150	16	A89
			16	180	20	
			20	200	25	
			25	250	32	
S□□-STFCR/L		90°	16	180	20	A90
			20	200	25	
			25	250	32	
S□□-SVQBR/L		107.5°				A90
			20	200	27	
			25	250	35	
S□□-SVUBR/L		93°				A91
			25	250	35	
S□□-SVQCR/L		107.5°				A91
			16	180	22	
			25	250	35	
S□□-SVUCR/L		93°				A92
			20	200	28	
			25	250	35	
S□□-SCLPR/L		95°	12	150	16	A92
			16	180	20	
			20	200	25	
S□□-SDQPR/L		107.5°	12	150	16	A93
			16	180	20	
			20	200	25	

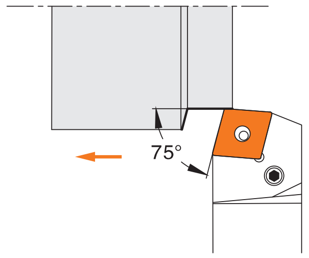
Overview of general turning tools (internal machining)

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	A93
			16	180	20	
S□□-STUPR/L		93°	12	180	16	A94
			16	180	20	

External turning tool

PCBNR/L
KAPR:75°

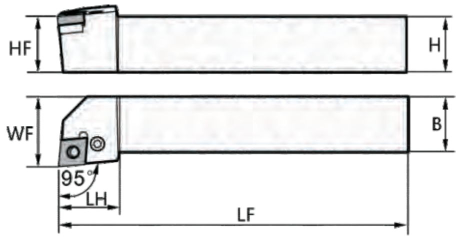


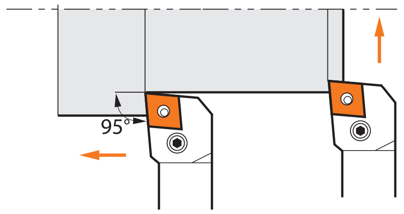


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PCBNR/L	2020K12	△	△	20	20	125	27	20	17	LLS0821	HC12WE	WR30L	GH4	DD4L	CN**1204
	2525M12	▲	▲	25	25	150	27	25	22						
	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°



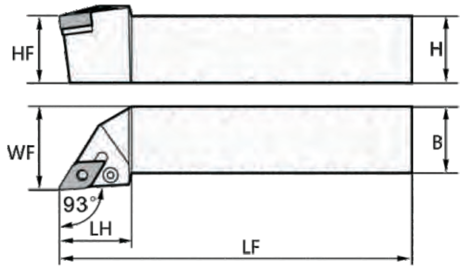


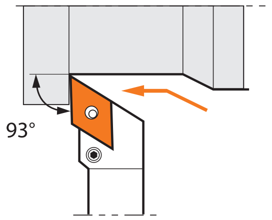
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PCLNR/L	2020K12	△	△	20	20	125	28	20	25	LLS0821	HC12WE	WR30L	GH4	DD4L	CN**1204
	2525M12	▲	▲	25	25	150	32	25	32						
	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°

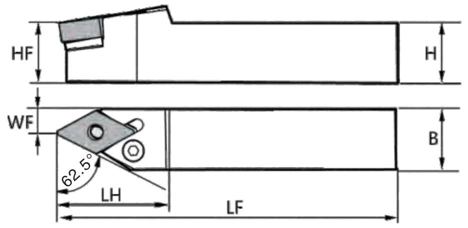


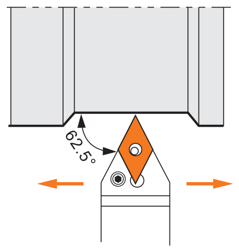


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PDJNR/L	2020K11	△	△	20	20	125	25	20	25	LLS0617	HD11WE	WR25L	GH3	DD3L	DN**1104
	2525M11	▲	▲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

▲Running stock △Make–to–order

PDPNN
KAPR:62.5°



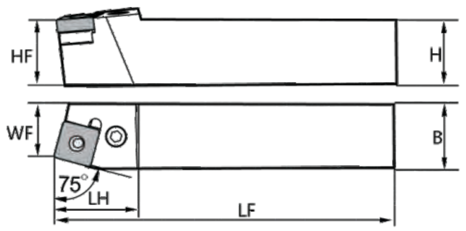


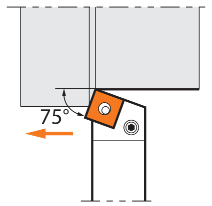
Model		Inventory	Basic dimension (mm)						Accessories					Matching insert
			Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
			H	B	LF	LH	HF	WF						
PDPNN	2020K15	▲	20	20	125	38	20	8	LLS0821	HD15WE	WR30L	GHB	DD4L	DN**1506
	2525M15	▲	25	25	150	38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

▲Running stock △Make–to–order

External turning tool

PSBNR/L
KAPR:75°

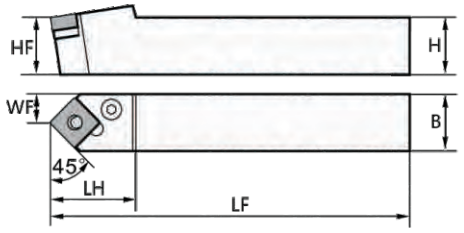


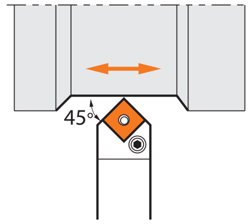


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSBNR/L	2020K12	△	△	20	20	125	28	20	17	LLS0821	HS12WE	WR30L	GH4	DD4L	SN**1204
	2525M12	▲	▲	25	25	150	28	25	22						
	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°



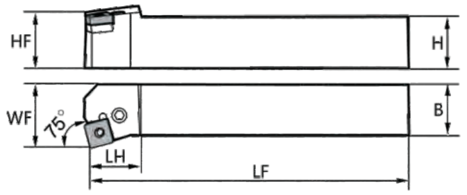


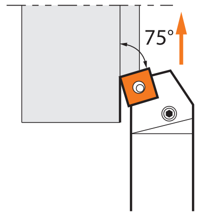
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSDNN	2020K12	△	△	20	20	125	30	20	10	LLS0821	HS12WE	WR30L	GH4	DD4L	SN**1204
	2525M12	▲	▲	25	25	150	30	25	12.5						
	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°

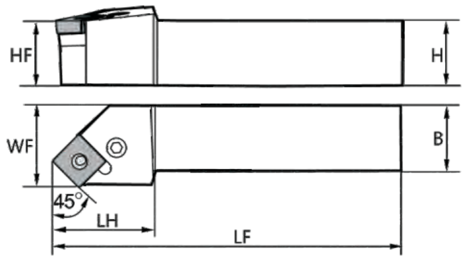


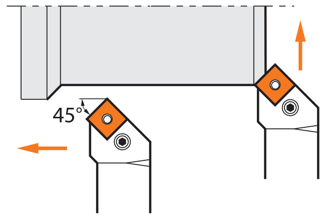


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSKNR/L	2020K12	△	△	20	20	125	28	20	25	LLS0821	HS12WE	WR30L	GH4	DD4L	SN**1204
	2525M12	▲	▲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





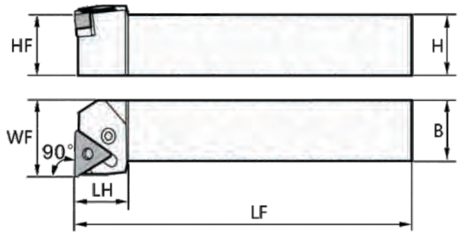
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSSNR/L	2020K12	△	△	20	20	125	28	20	25	LLS0821	HS12E	WR30L	GH4	DD4L	SN**1204
	2525M12	▲	▲	25	25	150	28	25	32						
	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

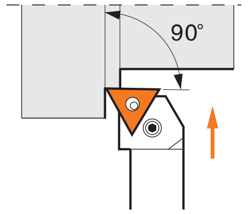
▲Running stock △Make–to–order

External turning tool

PTFNR/L

KAPR:90°



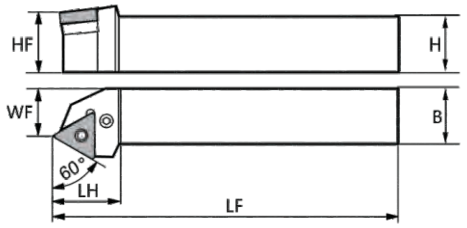


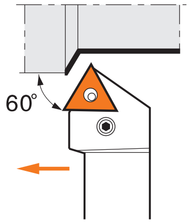
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PTFNR/L	2020K16	△	△	20	20	125	23	20	25	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M16	▲	▲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

▲Running stock △Make–to–order

PTTNR/L

KAPR:60°





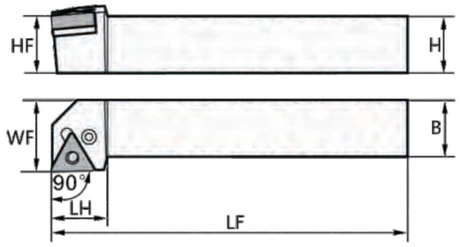
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PTTNR/L	2020K16	△	△	20	20	125	23	20	17	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M16	▲	▲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

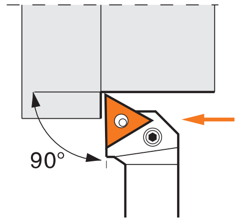
▲Running stock △Make–to–order

External turning tool

PTGNR/L

KAPR:90°



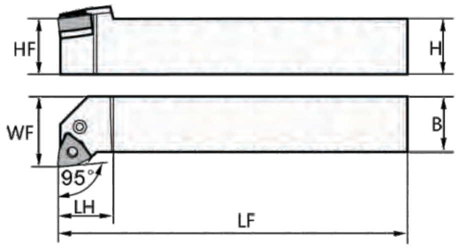


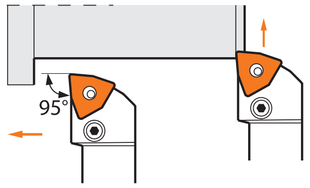
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PTGNR/L	2020K16	△	△	20	20	125	23	20	25	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M16	▲	▲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

▲Running stock △Make–to–order

PWLNR/L

KAPR:95°





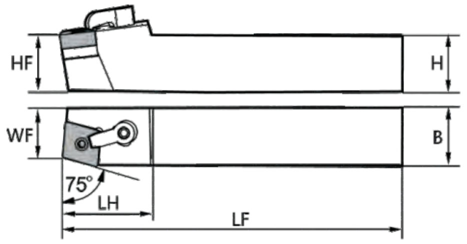
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PWLNR/L	2020K06	△	△	20	20	125	23	20	25	LLS0617	HW06WE	WR25L	GH3	DD3L	WN**0604
	2525M06	▲	▲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

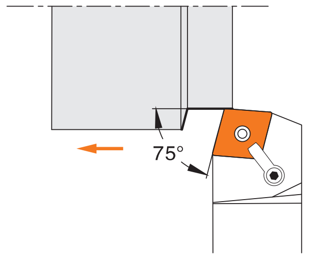
▲Running stock △Make–to–order

External turning tool

MCBNR/L

KAPR:75°



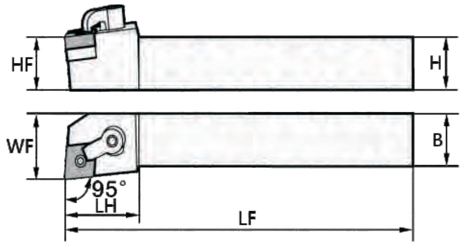


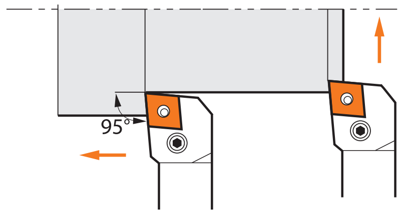
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MCBNR/L	2020K12	△	△	20	20	125	35	20	17	HM6 × 20	HC12WI	WR25L WR30L	HYD1	MP6 × 17	CN**1204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

▲Running stock △Make–to–order

MCLNR/L

KAPR:95°





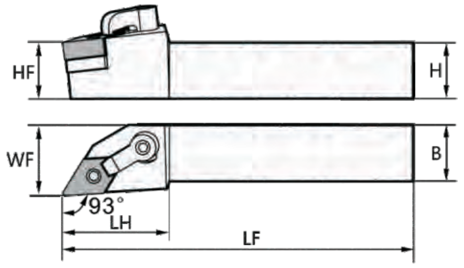
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MCLNR/L	2020K12	△	△	20	20	125	32	20	25	HM6 × 20	HC12WI	WR25L WR30L	HYD1	MP6 × 17	CN**1204
	2525M12	▲	▲	25	25	150	32	25	32	HM6 × 25					
	3232P12	▲	▲	32	32	170	32	32	40	HM6 × 28					
	2525M16	△	△	25	25	150	38	25	32	HM6 × 25	HC16WI	WR30L	HYD2	MP8 × 21	CN**1606
	3232P16	△	△	32	32	170	38	32	40	HM6 × 28					
	3232P19	△	△	32	32	170	42	32	40	HM8 × 35	HC19WI	WR40L	HYD5X	MP10 × 21	CN**1906

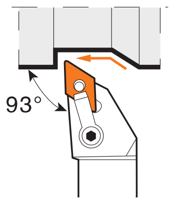
▲Running stock △Make–to–order

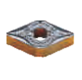
External turning tool

MDJNR/L

KAPR:93°





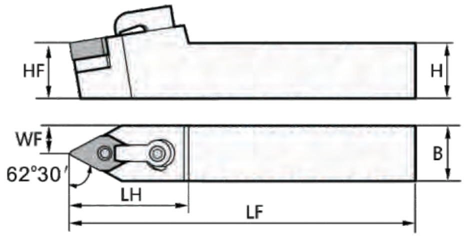
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MDJNR/L	2020K11	△	△	20	20	125	32	20	25	HM6 × 25	HD11WI	WR20L WR30L	HYD1	MP5 × 13	DN**1104
	2525M11	▲	▲	25	25	150	32	25	32						
	3232P11	△	△	32	32	170	32	32	40	HM6 × 28					
	2020K15	△	△	20	20	125	38	20	25		HD15WI	WR25L WR30L	HYD2	MP6 × 19	DN**1506
	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				MP6 × 17	DN**1504
	2525M15H	▲	▲	25	25	150	38	25	32	HM6 × 25					
	3232P15H	△	△	32	32	170	38	32	40	HM6 × 28					

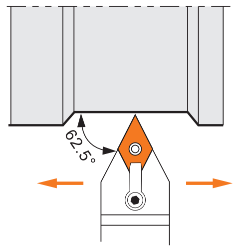
▲Running stock △Make–to–order

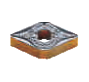
External turning tool

MDPNN

KAPR:62.5°





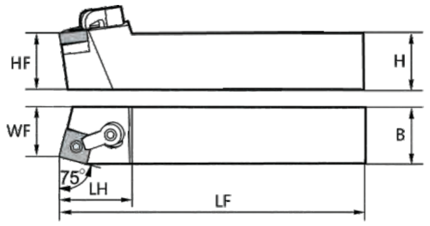
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
MDPNN	2020K11	△	△	20	20	125	35	20	10	HM6 × 20	HD11WI	WR20L WR30L	HYD1	MP5 × 13	DN**1104
	2525M11	▲	▲	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	HD15WI	WR25L WR30L	HYD2	MP6 × 19	DN**1506
	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				MP6 × 17	DN**1504
	2525M15H	▲	▲	25	25	150	42	25	12.5	HM6 × 25					
	3232R15H	△	△	32	32	200	42	32	16	HM6 × 28					

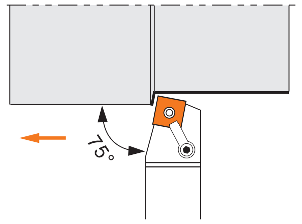
▲Running stock △Make–to–order

External turning tool

MSBNR/L

KAPR:75°



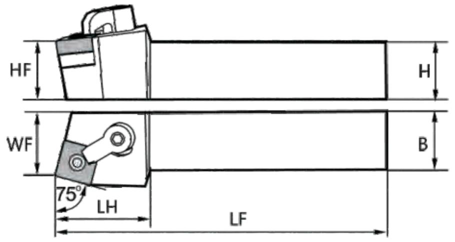


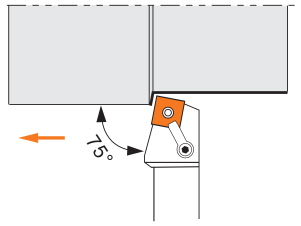
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
MSBNR/L	2020K12	△	△	20	20	125	32	20	17	HM6 × 20	HS12WI	WR25L WR30L	HYD1	MP6 × 17	SN**1204
	2525M12	▲	▲	25	25	150	32	25	22	HM6 × 25					
	3232P12	△	△	32	32	170	32	32	27	HM6 × 28					
	2525M15	▲	▲	25	25	150	38	25	22	HM6 × 25	HS15WI	WR30L	HYD2	MP8 × 21	SN**1506
	3232P15	△	△	32	32	170	38	32	27	HM6 × 28					
	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°





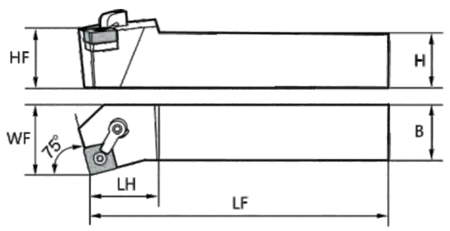
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
MSRNR/L	2020K12	△	△	20	20	125	32	20	22	HM6 × 20	HS12WI	WR25L WR30L	HYD1	MP6 × 17	SN**1204
	2525M12	▲	▲	25	25	150	32	25	27	HM6 × 25					
	3232P12	△	△	32	32	170	32	32	35	HM6 × 28					
	2525M15	▲	▲	25	25	150	38	25	27	HM6 × 25	HS15WI	WR30L	HYD2	MP8 × 21	SN**1506
	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

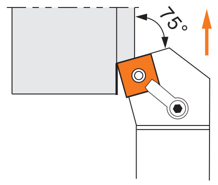
▲Running stock △Make–to–order

External turning tool

MSKNR/L

KAPR:75°



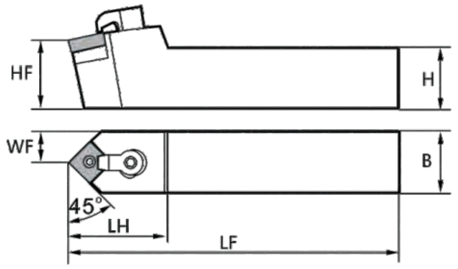


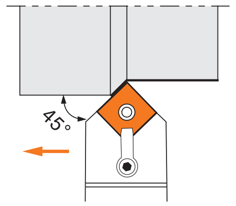
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
MSKNR/L	2020K12	△	△	20	20	125	32	20	25	HM6 × 20	HS12WI	WR25L WR30L	HYD1	MP6 × 17	SN**1204
	2525M12	▲	▲	25	25	150	32	25	32	HM6 × 25					
	3232P12	△	△	32	32	170	32	32	40	HM6 × 28					
	2525M15	▲	▲	25	25	150	38	25	32	HM6 × 25	HS15WI	WR30L	HYD2	MP8 × 21	SN**1506
	3232P15	△	△	32	32	170	38	32	40	HM6 × 28					
	3232P19	△	△	32	32	170	42	32	40	HM8 × 35	HS19WI	WR40L	HYD5X	MP10 × 21	SN**1906

▲Running stock △Make–to–order

MSDNN

KAPR:45°





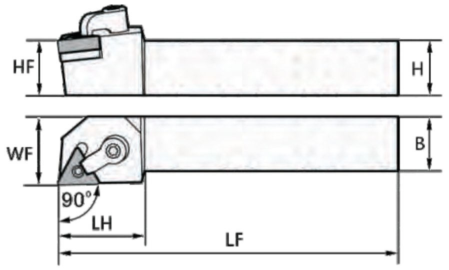
Model		Inventory	Basic dimension (mm)						Accessories					Matching insert
			Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
			H	B	LF	LH	HF	WF						
MSDNN	2020K12	△	20	20	125	35	20	10	HM6 × 25	HS12WI	WR25L WR30L	HYD1	MP6 × 17	SN**1204
	2525M12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

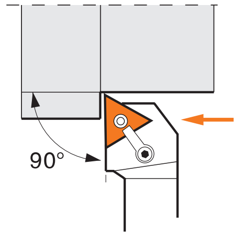
▲Running stock △Make–to–order

External turning tool

MTGNR/L

KAPR:90°



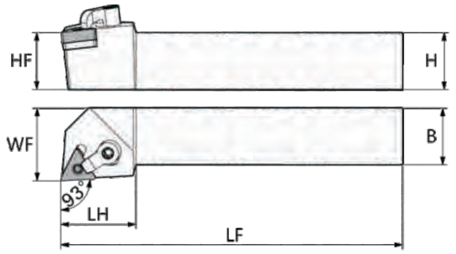


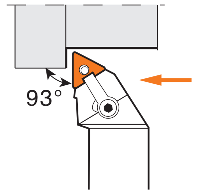
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MTGNR/L	2020K16	△	△	20	20	125	32	20	25	HM6 × 25	HT16WI	WR20L WR30L	HYD1	MP5 × 13	TN**1604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

▲Running stock △Make–to–order

MTJNR/L

KAPR:93°





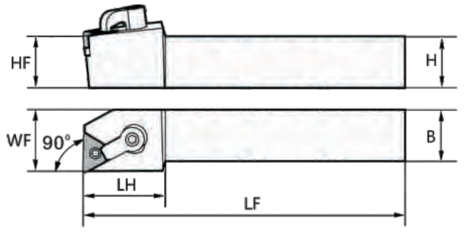
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MTJNR/L	2020K16	△	△	20	20	125	32	20	25	HM6 × 25	HT16WI	WR20L WR30L	HYD1	MP5 × 13	TN**1604
	2525M16	▲	▲	25	25	150	32	25	32	HM6 × 30					
	3232P16	△	△	32	32	170	32	32	40						
	2525M22	▲	▲	25	25	150	38	25	32		HT22WI	WR30L	HYD2	MP6 × 17	TN**2204
	3232P22	△	△	32	32	170	38	32	40						

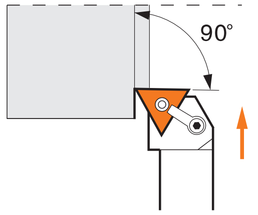
▲Running stock △Make–to–order

External turning tool

MTFNR/L

KAPR:90°



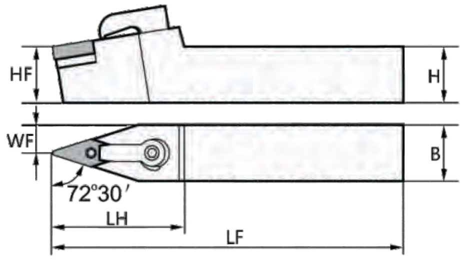


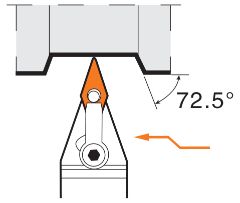
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MTFNR/L	2020K16	△	△	20	20	125	32	20	25	HM6 × 25	HT16WI	WR20L WR30L	HYD1	MP5 × 13	TN**1604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

▲Running stock △Make–to–order

MVVNN

KAPR:72.5°





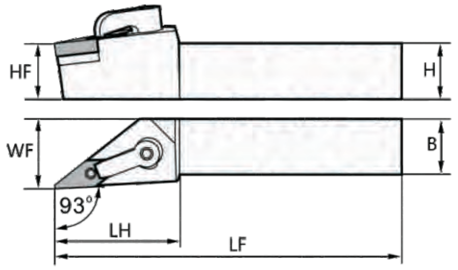
Model		Inventory	Basic dimension (mm)						Accessories					Matching insert
			Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
			H	B	LF	LH	HF	WF						
MVVNN	2020K16	△	20	20	125	45	20	10	HM6 × 25	HV16WI	WR20L WR30L	HYD3	MP5 × 13	VN**1604
	2525M16	▲	25	25	150	45	25	12.5						
	3232P16	△	32	32	170	45	32	16	HM6 × 28					

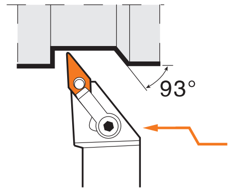
▲Running stock △Make–to–order

External turning tool

MVJNR/L

KAPR:93°



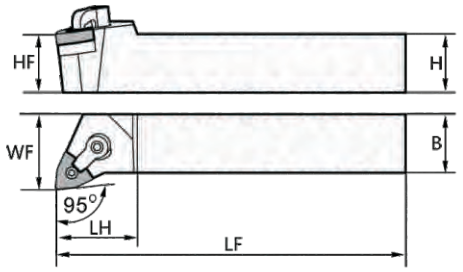


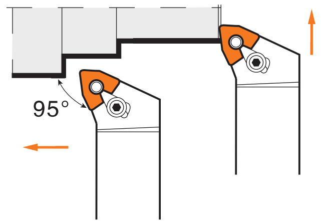
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MVJNR/L	2020K16	△	△	20	20	125	45	20	25	HM6 × 25	HV16WI	WR20L MR30L	HYD3	MP5 × 13	VN**1604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

▲Running stock △Make–to–order

MWLNR/L

KAPR:95°



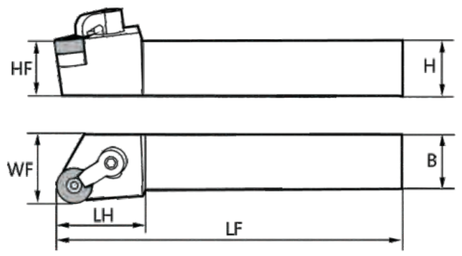


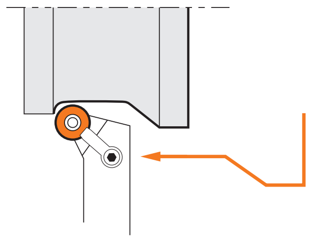
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MWLNR/L	2020K06	△	△	20	20	125	28	20	25	HM5 × 20	HW06WI	WR20L WR30L	HYD0	MP5 × 13	WN**0604
	2525M06	▲	▲	25	25	150	28	25	32						
	2020K08	△	△	20	20	125	32	20	25	HM6 × 20	HW08WI	WR25L WR30L	HYD1	MP6 × 17	WN**0804
	2525M08	▲	▲	25	25	150	32	25	32	HM6 × 25					
	3232P08	△	△	32	32	170	32	32	40	HM6 × 28					

▲Running stock △Make–to–order

External turning tool

MRGCR/L

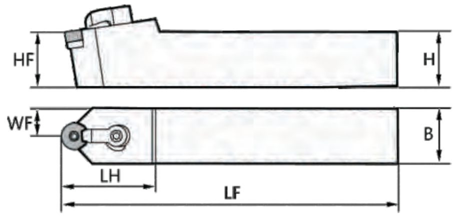


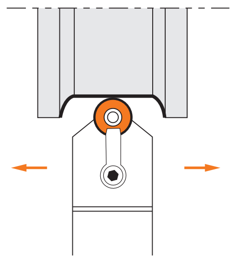


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MRGCR/L	2525M12	△	△	25	25	150	45	25	32	HM6 × 25	HR12WI	WR25L	HYD1	MP6 × 17	RC**1204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

▲Running stock　△Make–to–order

MRDCN





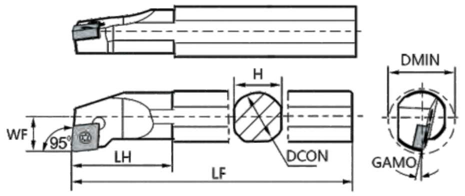
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MRDCN	2020K12	△	△	20	20	125	35	20	10	HM6 × 25	HR12WI	WR30L	HYD1	MP6 × 17	RC**1204
	2525M12	▲	▲	25	25	150	35	25	12.5	HM6 × 30					
	3232P12	△	△	32	32	170	35	32	16						

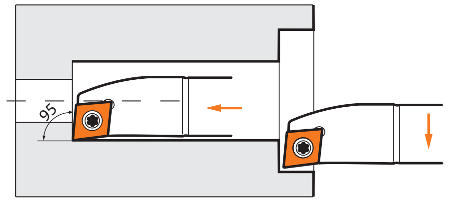
▲Running stock　△Make–to–order

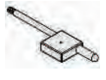
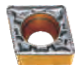
Internal turning tool

S□□-SCLCR/L

KAPR:95°



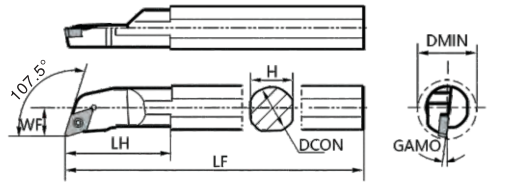


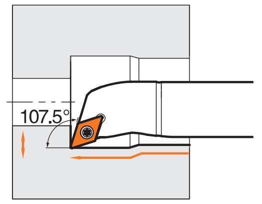
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
									Insert screw	Wrench	
		R	L	DMIN	DCON	H	LF	WF			
	S12M–SCLCR/L06	△	△	16	12	11	150	7.5	M2.5 × 5.5	WR15	CC**0602
	S12M–SCLCR/L09	△	△	16	12	11	150	8	M3.5 × 8		CC**09T3
	S16Q–SCLCR/L09	△	△	20	16	15	180	10			
	S20R–SCLCR/L09	▲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

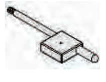
▲Running stock　△Make–to–order

S□□-SDQCR/L

KAPR:107.5°





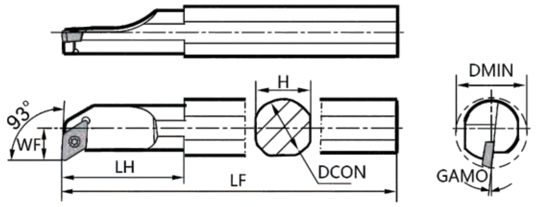
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
									Insert screw	Wrench	
		R	L	DMIN	DCON	H	LF	WF			
	S12M–SDQCR/L07	△	△	16	12	11	150	9	M2.5 × 6.5	WR07	DC**0702
	S16Q–SDQCR/L07	△	△	20	16	15	180	11			
	S20R–SDQCR/L11	▲	▲	25	20	19	200	13	M3.5 × 8	WR15	DC**11T3
	S25S–SDQCR/L11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

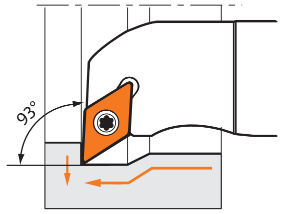
▲Running stock　△Make–to–order

Internal turning tool

S□□-SDUCR/L

KAPR:93°



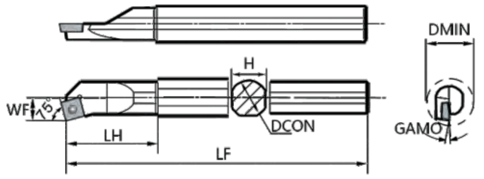


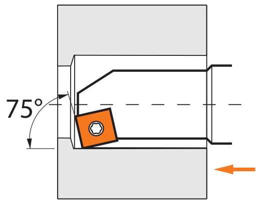
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	S12M–SDUCR/L07	△	△	16	12	11	150	9	M2.5×6.5	WR07	DC**0702
	S16Q–SDUCR/L07	△	△	20	16	15	180	11			
	S20R–SDUCR/L11	▲	▲	25	20	19	200	13	M3.5×8	WR15	DC**11T3

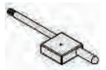
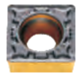
▲Running stock △Make–to–order

S□□-SSKCR/L

KAPR:75°





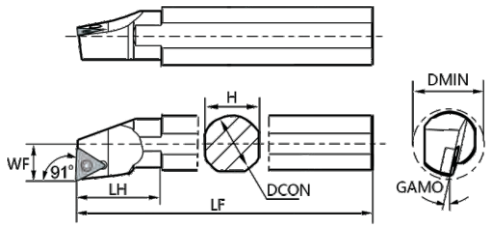
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	S12M– SSKCR/L09	△	△	16	12	11	150	9	M3.5×8	WR15	SC**09T3
	S16Q– SSKCR/L09	△	△	20	16	15	180	11			
	S20R– SSKCR/L09	▲	▲	25	20	19	200	13			
	S25S– SSKCR/L12	▲	▲	32	25	24	250	17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

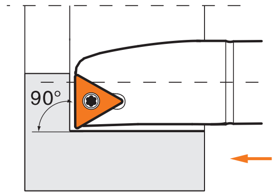
▲Running stock △Make–to–order

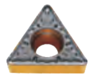
Internal turning tool

S□□-STFCR/L

KAPR:90°



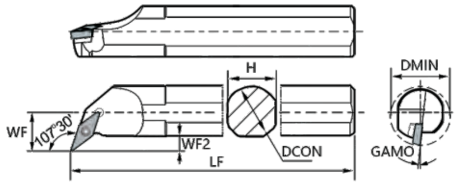


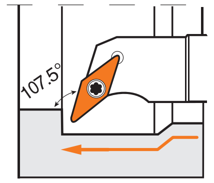
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	S16Q–STFCR/L11	△	△	20	16	15	180	10	M2.5×6.5	WR07	TC**1102
	S20R–STFCR/L11	△	△	25	20	19	200	12			
	S25S–STFCR/L16	▲	▲	32	25	24	250	16	M3.5×10	WR15	TC**16T3

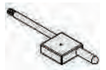
▲Running stock △Make–to–order

S□□-SVQBR/L

KAPR:107.5°





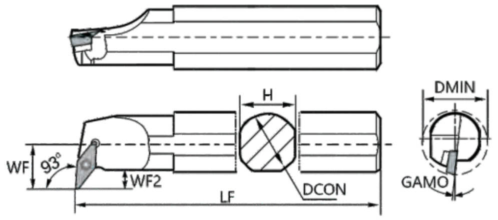
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
											
	S20R–SVQBR/L16	▲	▲	27	20	19	200	14	M3.5×12	WR15	VB**1604
	S25S–SVQBR/L16	▲	▲	35	25	24	250	20			

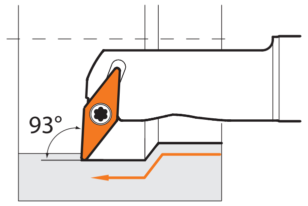
▲Running stock △Make–to–order

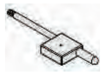
Internal turning tool

S□□-SVUBR/L

KAPR:93°



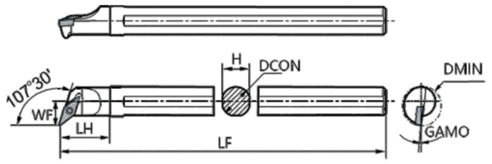


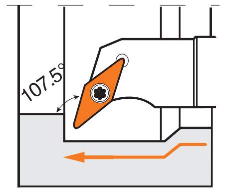
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	S25S– SVUBR/L16	▲	▲	35	25	24	250	20	M3.5 × 12	WR15	VB**1604

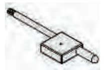
▲Running stock △Make–to–order

S□□-SVQCR/L

KAPR:107.5°





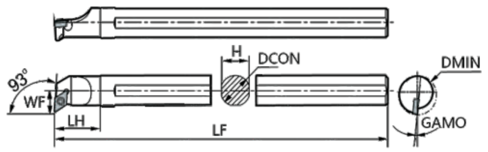
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	S16Q–SVQCR/L11	▲	▲	22	16	15	180	12	M2.5 × 6.5	WR07	VC**1103
	S25S–SVQCR/L16	▲	▲	35	25	24	250	20	M3.5 × 12	WR15	VC**1604

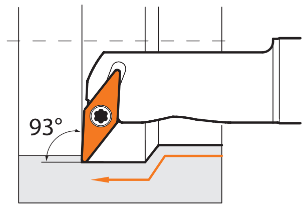
▲Running stock △Make–to–order

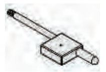
Internal turning tool

S□□-SVUCR/L

KAPR:93°



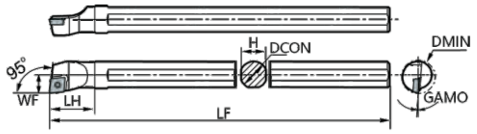


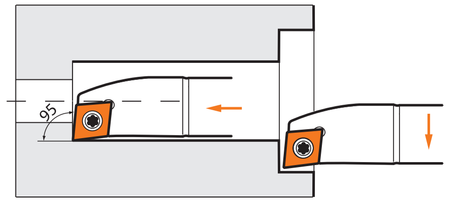
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	S20R–SVUCR/L11	▲	▲	28	20	19	200	14	M3.5 × 12	WR15	VC**1604
	S25S–SVUCR/L16	▲	▲	35	25	24	250	20			

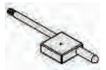
▲Running stock △Make–to–order

S□□-SCLPR/L

KAPR:95°





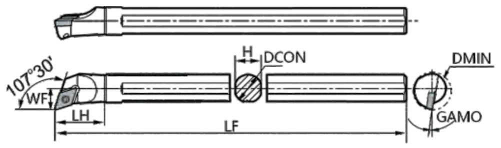
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	GAMO	Insert screw	Wrench	
												
	S12M–SCLPR/L06	△	△	16	12	11	150	8	–4°	M2.5 × 5.5	WR07	CP**0602
	S16Q–SCLPR/L09	△	△	20	16	15	180	10	–4°	M3.5 × 8	WR15	CP**09T3
	S20R–SCLPR/L09	▲	▲	25	20	18	200	13	–4°			

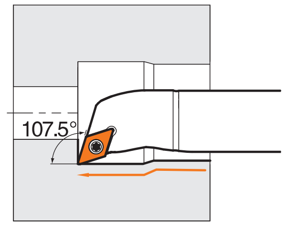
▲Running stock △Make–to–order

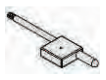
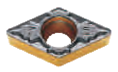
Internal turning tool

S□□-SDQPR/L

KAPR:107.5°



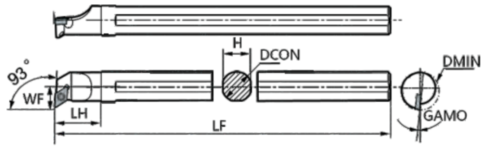


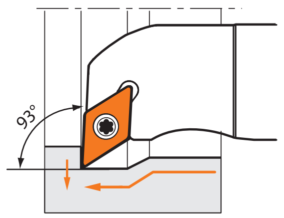
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	GAMO	Insert screw	Wrench	
												
	S12M–SDQPR/L07	△	△	16	12	11	150	9	–8°	M2.5×5.5	WR07	DP**0702
	S16Q–SDQPR/L07	△	△	20	16	15	180	11	–6°	M2.5×6.5		
	S20R–SDQPR/L11	▲	▲	25	20	18	200	13	–6°	M3.5×8	WR15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

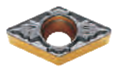
▲Running stock △Make–to–order

S□□-SDUPR/L

KAPR:93°





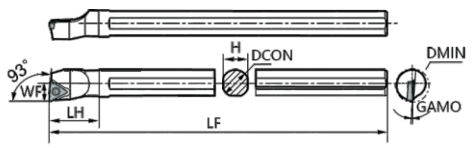
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	GAMO	Insert screw	Wrench	
												
	S12M–SDUPR/L07	△	△	16	12	11	150	9	–8°	M2.5×5.5	WR07	DP**0702
	S16Q–SDUPR/L07	▲	▲	20	16	15	180	11	–6°	M2.5×6.5		

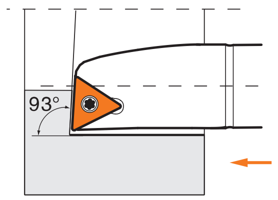
▲Running stock △Make–to–order

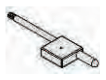
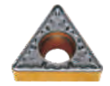
Internal turning tool

S□□-STUPR/L

KAPR:93°





Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	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

Comparison table of general turning inserts in metric and British systems（Negative）

C-type negative angle		
CNMG	090304	321
	090308	322
	120404	431
	120408	432
	120412	433
	120416	434
	160608	542
	160612	543
	160616	544
	190608	642
	190612	643
	190616	644
	190624	646
	250724	856
	250732	858
	250924	866
	250932	868

D-type negative angle		
DNMG	110404	331
	110408	332
	110412	333
	150404	431
	150408	432
	150412	433
	150604	441
	150608	442
	150612	443
	150616	444
	190608	542
	190612	543

S-type negative angle	ISO	Inch
SNMG	090304	321
	090308	322
	090312	323
	120404	431
	120408	432
	120412	433
	120416	434
	150608	542
	150612	543
	150616	544
	190412	633
	190424	636
	190612	643
	190616	644
	250724	856
	250732	858
	250924	866
	250932	868

T-type negative angle	ISO	Inch
TNMG	110304	221
	110308	222
	160404	331
	160408	332
	160412	333
	220404	431
	220408	432
	220412	433
	220416	434
	270608	542
	270612	543
	270616	544

W-type negative angle	ISO	Inch
WNMG	06T304	3(2.5)1
	06T308	3(2.5)2
	06T312	3(2.5)3
	060404	331
	060408	332
	060412	333
	080404	431
	080408	432
	080412	433

V-type negative angle	ISO	Inch
VNMG	160404	331
	160408	332
	160412	333

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

Comparison table of general turning inserts in metric and British systems（Positive）

C-shape postive	ISO	Inch
CCMT/ CCGT	060202	2(1.5)0
	060204	2(1.5)1
	060208	2(1.5)2
	09T302	3(2.5)0
	09T304	3(2.5)1
	09T308	3(2.5)2
	120404	431
	120408	432
	120412	433

D-shape postive	ISO	Inch
DCMT/ DCGT	070202	2(1.5)0
	070204	2(1.5)1
	070208	2(1.5)2
	11T302	3(2.5)0
	11T304	3(2.5)1
	11T308	3(2.5)2
	11T312	3(2.5)3

S-shape postive	ISO	Inch
SCMT	060204	2(1.5)1
	09T302	3(2.5)0
	09T304	3(2.5)1
	09T308	3(2.5) 2
	120404	431
	120408	432
	120412	433
	150404	531
	150408	532
	150412	533
	190408	632
	190412	633
	190416	634

T-shape postive	ISO	Inch
TCMT/ TCGT	06T102	1.2(1.2)0
	06T104	1.2(1.2)1
	06T108	1.2(1.2)2
	090202	1.8(1.5)0
	090204	1.8(1.5)1
	090208	1.8(1.5)2
	110202	2(1.5)0
	110204	2(1.5)1
	110208	2(1.5)2
	110302	220
	110304	221
	110308	222
	16T302	3(2.5)0
	16T304	3(2.5)1
	16T308	3(2.5)2
	16T312	3(2.5)3
	160400	330
	220408	432
	220412	433
	220416	434
	270408	532
	270412	533
	330612	643
	330616	644

V-shape postive	ISO	Inch
VBMT/ VBGT VCMT/ VCGT	110202	2(1.5)0
	110204	2(1.5)1
	110208	2(1.5)2
	110302	220
	110304	221
	110308	222
	160402	330
	160404	331
	160408	332
	160412	333

A
General turning
precision small parts turning
Parting and grooving
Threading
B
Indexable milling
Solid carbide end mills
C
Short hole drills
Solid carbide drills

Cutting speed recommendations for general external turning

Machined workpiece materials						Product grade																																			
ISO	Classification of materials			Hardness of Brinell (HB)	Tensile strength (N/mm^2)	HR8105			HR8115			HR8125			HR8225			HR8135			HR7125			HR7225			HR6115			HR9105			HR7115			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	0.3	0.5	0.1	0.4	0.6	0.1	0.3	0.5	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	420	360	270	400	320	240	380	260	210	400	310	230	250	170	40																					
		0.25<C≤0.55%	Annealing	190	639	370	270	210	350	260	200	280	200	150	320	240	190	200	135	10																					
		0.25<C≤0.55%	Quenching and tempering	210	708	280	220	70	270	210	160	200	60	135	250	200	160	50	125	90																					
		C>0.55%	Annealing	190	639	270	220	160	270	210	150	240	160	125	270	200	150	70	10	90																					
		C>0.55%	Quenching and tempering	300	1013	210	180	150	210	170	150	160	120	110	210	160	150	25	75	65																					
		Short chip steel	Annealing	220	745	400	310	250	380	280	210	360	220	75	360	270	210	220	45	15																					
	Low-alloyed steel	Annealing		175	591	350	260	220	320	220	80	240	75	35	290	210	80	200	65	50																					
		Quenching and tempering		300	1013	220	70	50	110	60	40	40	0	85	90	60	40	35	90	70																					
		Quenching and tempering		380	1282	60	20	0	200	50	20	0	70	55	180	50	20	90	65	45																					
		Quenching and tempering		430	430	90	70		20	0																															
	High alloy steel and high alloy tool steel	Annealing		200	675	330	230	50	300	220	50	210	45	85	260	200	180	180	50	85																					
		Quenching and tempering		300	1013	230	140	10	220	120	10	30	85	65	200	80	160	10	85	65																					
		Quenching and tempering		400	1361	80	70		130	20																															
M	Stainless steel	Ferrite/martensite, annealing		200	675																120	80	50	180	120	80				240	190	50	240	190	50						
		Martensite, quenching and tempering		330	1114																140	100	70	160	100	70				150	85		150	85							
	Stainless steel	Austenite, quenching		200	675																160	120	100	180	160	120				240	190	50	240	190	50						
		Austenite, precipitation hardening stainless steel (PH stainless steel)		300	1013																120	100	70	140	120	80				150	85		150	85							
		Austenite- ferrite, duplex stainless steel		230	778																140	110	80	160	120	90				170	145	100	170	145	100						
K	Malleable cast iron	Ferrite		200	400																						300														
		Pearlite		260	700																						270														
	Grey cast iron	Low tensile strength		180	200																						450	170	190												
		High tensile strength/austenite		245	350																						245	90	125												
	Ductile iron	Ferrite		155	400																						260	145	145												
		Pearlite		265	700																						190		125												
	Compacted graphite iron GGV (CGI)			230	400																																				

Cutting speed recommendations for general external turning

Machined workpiece materials						Product grade																																					
ISO	Classification of materials			Hardness of Brinell (HB)	Tensile strength (N/mm^2)	HR8105			HR8115			HR8125			HR8225			HR8135				HR7125			HR7225			HR6115			HR9105			HR7115			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	0.3	0.5	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																																750	600	300				
	Foundry aluminum alloy	⩽ 12% silicon, non-aging		75	260																																800	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																																						
		Brass, bronze, red brass		90	310																																600	400	270				
		Copper alloy, short chip		110	380																																400	300	250				
		Ampco alloy of high strength		300	1010																																280	200	130				
S	Iron-based alloy	Iron-based	Annealing	200	680																				90	60					100	75		90	65								
			Aged	280	940																				70	50					90	65		80	55								
		Nickel-based or cobalt-based	Annealing	250	840																				70	50					90	65		80	55								
			Aged	350	1180																				60	40					75	50		70	45								
			Annealing	320	1080																				50	30					65	35		60	30								
	Cobalt-based alloy	Pure titanium		200	680																										210	190	150	200	180	140							
		α and β phase alloys, aged		375	1260																				70	45					100	60	50	90	55	45							
		β phase alloy		410	1400																				40	35					65	40	35	55	35	30							
	Nickel-based alloy	1177		300	1010																																						
	Titanium alloy	1262		300	1010																					60																	

Cutting parameters recommendation 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	≤ 300HB	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	≤ 300HB	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	≤ 280HB	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)	≤ 220HB	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)	≤ 300HB	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	≤ 250HB	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	≤ 270HB	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.	≤ 100HB	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	≤ 400HB	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	≤ 350HB	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)	100–200–300		100–150–200
	fn/ (mm/rev)	0.10~0.30		0.05~0.25
HR115C	Vc/ (m/min)	200–300–400		180–260–320
	fn/ (mm/rev)	0.10~0.30		0.05~0.25

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

Cutting parameters recommendation for general turining chipbreaker (Negative)

Workpiece material	Hardness	Chipbreaker	Cutting range	Grade	Cuttingspeed (m/min)	Fn (mm/rev)	Ap (mm)
Mild steel (45#、A3etc)	≤180HB	GF	●	HR8105	250–420	0.08–0.36	0.30–2.00
			●	HR8115	230–400	0.08–0.36	0.30–2.00
			●	HR8125	215–360	0.08–0.36	0.30–2.00
			●	HR8225	225–380	0.08–0.36	0.30–2.00
			◕	HR8105	250–420	0.08–0.36	0.30–2.00
			◕	HR8115	230–400	0.08–0.31	0.30–2.00
			◕	HR8125	215–360	0.08–0.31	0.30–2.00
			◕	HR8225	225–380	0.08–0.31	0.30–2.00
		GC	●	HR8105	230–400	0.10–0.30	0.30–1.50
			●	HR8115	215–360	0.10–0.30	0.30–1.50
			●	HR8125	190–355	0.10–0.30	0.30–1.50
			●	HR8225	205–375	0.10–0.30	0.30–1.50
			◕	HR8105	230–400	0.10–0.25	0.30–1.50
			◕	HR8115	215–360	0.10–0.25	0.30–1.50
			◕	HR8125	190–355	0.10–0.25	0.30–1.50
			◕	HR8225	205–375	0.10–0.25	0.30–1.50
			⌘	HR8125	190–355	0.10–0.20	0.30–1.50
			⌘	HR8225	205–375	0.10–0.20	0.30–1.50
		GQ	●	HR8105	230–400	0.14–0.50	1.00–5.00
			●	HR8115	215–360	0.14–0.50	1.00–5.00
			●	HR8125	190–355	0.14–0.50	1.00–5.00
			●	HR8225	205–375	0.14–0.50	1.00–5.00
			◕	HR8105	230–400	0.14–0.45	1.00–5.00
			◕	HR8115	215–360	0.14–0.45	1.00–5.00
			◕	HR8125	190–355	0.14–0.45	1.00–5.00
			◕	HR8225	205–375	0.14–0.45	1.00–5.00
			⌘	HR8125	190–355	0.14–0.40	1.00–5.00
			⌘	HR8225	205–375	0.14–0.40	1.00–5.00
		GM	●	HR8105	230–400	0.16–0.55	1.00–5.00
			●	HR8115	215–360	0.16–0.55	1.00–5.00
			●	HR8125	190–355	0.16–0.55	1.00–5.00
			●	HR8225	205–375	0.16–0.55	1.00–5.00
			◕	HR8105	225–380	0.16–0.50	1.00–5.00
			◕	HR8115	200–380	0.16–0.50	1.00–5.00
			◕	HR8125	185–350	0.16–0.50	1.00–5.00
			◕	HR8225	195–360	0.16–0.50	1.00–5.00
			⌘	HR8125	185–320	0.16–0.45	1.00–5.00
			⌘	HR8225	195–360	0.16–0.45	1.00–5.00

● Stable　◕ Average　⌘ Tough

Workpiece material	Hardness	Chipbreaker	Cutting range	Grade	Cuttingspeed (m/min)	Fn (mm/rev)	Ap (mm)
Mild steel (45#、A3etc)	≤180HB	GR	●	HR8115	235–320	0.25–0.60	2.00–7.00
			●	HR8125	185–295	0.25–0.60	2.00–7.00
			●	HR8225	195–315	0.25–0.60	2.00–7.00
			◕	HR8115	235–320	0.25–0.55	2.00–7.00
			◕	HR8125	195–315	0.25–0.55	2.00–7.00
			◕	HR8225	185–295	0.25–0.55	2.00–7.00
			⌘	HR8115	235–320	0.25–0.50	2.00–7.00
			⌘	HR8125	185–295	0.25–0.50	2.00–7.00
			⌘	HR8225	195–315	0.25–0.50	2.00–7.00
		GZ	●	HR8105	120–255	0.25–1.00	3.00–12.00
			●	HR8115	100–200	0.25–1.00	3.00–12.00
			●	HR8125	100–180	0.25–1.00	3.00–12.00
			●	HR8225	100–195	0.25–1.00	3.00–12.00
			◕	HR8105	120–255	0.25–0.95	3.00–12.00
			◕	HR8115	100–200	0.25–0.95	3.00–12.00
			◕	HR8125	100–180	0.25–0.95	3.00–12.00
			◕	HR8225	100–195	0.25–0.95	3.00–12.00
			⌘	HR8115	60–180	0.25–0.90	3.00–12.00
			⌘	HR8125	60–180	0.25–0.90	3.00–12.00
			⌘	HR8225	60–180	0.25–0.90	3.00–12.00
		GX	●	HR8105	135–230	0.40–1.20	4.50–13.00
			●	HR8115	135–220	0.40–1.20	4.50–13.00
			●	HR8125	80–140	0.40–1.20	4.50–13.00
			●	HR8225	80–160	0.40–1.20	4.50–13.00
			◕	HR8105	120–220	0.40–1.15	4.50–13.00
			◕	HR8115	100–180	0.40–1.15	4.50–13.00
			◕	HR8125	100–160	0.40–1.15	4.50–13.00
			◕	HR8225	115–170	0.40–1.15	4.50–13.00
			⌘	HR8115	60–180	0.40–1.10	4.50–13.00
			⌘	HR8125	60–160	0.40–1.10	4.50–13.00
			⌘	HR8225	60–170	0.40–1.10	4.50–13.00
Carbon steel ,alloy steel (40Cr、42CrMo etc)	180-280HB	GF	●	HR8105	250–420	0.08–0.36	0.30–2.00
			●	HR8115	230–400	0.08–0.36	0.30–2.00
			●	HR8125	215–360	0.08–0.36	0.30–2.00
			●	HR8225	225–380	0.08–0.36	0.30–2.00
			◕	HR8105	250–420	0.08–0.36	0.30–2.00
			◕	HR8115	230–400	0.08–0.31	0.30–2.00
			◕	HR8125	215–360	0.08–0.31	0.30–2.00
			◕	HR8225	225–380	0.08–0.31	0.30–2.00

● Stable　◕ Average　⌘ Tough

Cutting parameters recommendation for general turining chipbreaker (Negative)

Workpiece material	Hardness	Chipbreaker	Cutting range	Grade	Cuttingspeed (m/min)	Fn (mm/rev)	Ap (mm)
Carbon steel, alloy steel (40Cr、42CrMo etc)	180-280HB	GC	●	HR8105	230–400	0.10–0.30	0.30–1.50
			●	HR8115	215–360	0.10–0.30	0.30–1.50
			●	HR8125	190–355	0.10–0.30	0.30–1.50
			●	HR8225	205–375	0.10–0.30	0.30–1.50
			◕	HR8105	230–400	0.10–0.25	0.30–1.50
			◕	HR8115	215–360	0.10–0.25	0.30–1.50
			◕	HR8125	190–355	0.10–0.25	0.30–1.50
			◕	HR8225	205–375	0.10–0.25	0.30–1.50
			⌗	HR8125	190–355	0.10–0.20	0.30–1.50
			⌗	HR8225	205–375	0.10–0.20	0.30–1.50
		GQ	●	HR8105	230–400	0.14–0.50	1.00–5.00
			●	HR8115	215–360	0.14–0.50	1.00–5.00
			●	HR8125	190–355	0.14–0.50	1.00–5.00
			●	HR8225	205–375	0.14–0.50	1.00–5.00
			◕	HR8105	230–400	0.14–0.45	1.00–5.00
			◕	HR8115	215–360	0.14–0.45	1.00–5.00
			◕	HR8125	190–355	0.14–0.45	1.00–5.00
			◕	HR8225	205–375	0.14–0.45	1.00–5.00
			⌗	HR8125	190–355	0.14–0.40	1.00–5.00
			⌗	HR8225	205–375	0.14–0.40	1.00–5.00
		GM	●	HR8105	230–400	0.16–0.55	1.00–5.00
			●	HR8115	215–360	0.16–0.55	1.00–5.00
			●	HR8125	190–355	0.16–0.55	1.00–5.00
			●	HR8225	205–375	0.16–0.55	1.00–5.00
			◕	HR8105	225–430	0.16–0.50	1.00–5.00
			◕	HR8115	200–405	0.16–0.50	1.00–5.00
			◕	HR8125	185–350	0.16–0.50	1.00–5.00
			◕	HR8225	195–360	0.16–0.50	1.00–5.00
			⌗	HR8125	185–350	0.16–0.45	1.00–5.00
			⌗	HR8225	195–360	0.16–0.45	1.00–5.00
		GR	●	HR8115	235–320	0.25–0.60	2.00–7.00
			●	HR8125	195–315	0.25–0.60	2.00–7.00
			●	HR8225	185–295	0.25–0.60	2.00–7.00
			◕	HR8115	235–320	0.25–0.55	2.00–7.00
			◕	HR8125	195–315	0.25–0.55	2.00–7.00
			◕	HR8225	185–295	0.25–0.55	2.00–7.00
			⌗	HR8115	235–320	0.25–0.50	2.00–7.00
			⌗	HR8125	195–315	0.25–0.50	2.00–7.00
			⌗	HR8225	185–295	0.25–0.50	2.00–7.00

● Stable ◕ Average ⌗ Tough

Workpiece material	Hardness	Chipbreaker	Cutting range	Grade	Cuttingspeed (m/min)	Fn (mm/rev)	Ap (mm)
Carbon steel, alloy steel (40Cr、42CrMo etc)	180-280HB	GZ	●	HR8105	120–255	0.25–1.00	3.00–12.00
			●	HR8115	100–200	0.25–1.00	3.00–12.00
			●	HR8125	100–180	0.25–1.00	3.00–12.00
			●	HR8225	100–195	0.25–1.00	3.00–12.00
			◕	HR8105	120–255	0.25–0.95	3.00–12.00
			◕	HR8115	100–200	0.25–0.95	3.00–12.00
			◕	HR8125	100–180	0.25–0.95	3.00–12.00
			◕	HR8225	100–195	0.25–0.95	3.00–12.00
			⌗	HR8115	60–180	0.25–0.90	3.00–12.00
			⌗	HR8125	60–180	0.25–0.90	3.00–12.00
			⌗	HR8225	60–180	0.25–0.90	3.00–12.00
		GX	●	HR8105	135–230	0.40–1.20	4.50–13.00
			●	HR8115	135–220	0.40–1.20	4.50–13.00
			●	HR8125	80–140	0.40–1.20	4.50–13.00
			●	HR8225	80–160	0.40–1.20	4.50–13.00
			◕	HR8105	120–220	0.40–1.15	4.50–13.00
			◕	HR8115	100–180	0.40–1.15	4.50–13.00
			◕	HR8125	100–160	0.40–1.15	4.50–13.00
			◕	HR8225	115–170	0.40–1.15	4.50–13.00
			⌗	HR8115	60–180	0.40–1.10	4.50–13.00
			⌗	HR8125	60–160	0.40–1.10	4.50–13.00
			⌗	HR8225	60–170	0.40–1.10	4.50–13.00
Carbon steel, alloy steel (quenching material, etc)	⩾280HB	GF	●	HR8105	230–400	0.10–0.40	0.30–2.00
			●	HR8115	210–380	0.10–0.40	0.30–2.00
			◕	HR8105	230–380	0.10–0.35	0.30–2.00
			◕	HR8115	210–360	0.10–0.35	0.30–2.00
		GC	●	HR8105	215–380	0.10–0.30	0.30–1.50
			●	HR8115	190–360	0.10–0.30	0.30–1.50
			◕	HR8105	215–400	0.10–0.25	0.30–1.50
			◕	HR8115	190–380	0.10–0.25	0.30–1.50
		GQ	●	HR8105	220–400	0.20–0.60	0.90–4.00
			●	HR8115	205–380	0.20–0.60	0.90–4.00
			◕	HR8105	220–380	0.20–0.55	0.90–4.00
			◕	HR8115	205–360	0.20–0.55	0.90–4.00
		GM	●	HR8105	220–400	0.20–0.55	1.00–4.00
			●	HR8115	205–380	0.20–0.55	1.00–4.00
			◕	HR8105	220–380	0.20–0.50	1.00–4.00
			◕	HR8115	205–360	0.20–0.50	1.00–4.00

● Stable ◕ Average ⌗ Tough

Cutting parameters recommendation for general turining chipbreaker (Negative)

Workpiece material	Hardness	Chipbreaker	Cutting range	Grade	Cuttingspeed (m/min)	Fn (mm/rev)	Ap (mm)
Carbon steel, alloy steel （quenching material, etc)	≥280HB	GR	●	HR8115	225–360	0.25–0.60	1.50–6.00
			◕	HR8225	225–340	0.25–0.55	1.50–6.00
		GZ	●	HR8115	120–245	0.50–1.26	3.00–11.00
			●	HR8225	100–190	0.50–1.26	3.00–11.00
			◕	HR8115	110–245	0.50–1.21	3.00–11.00
			◕	HR8225	90–190	0.50–1.21	3.00–11.00
		GX	●	HR8115	120–220	0.70–1.30	4.00–12.00
			●	HR8225	120–210	0.70–1.30	4.00–12.00
			◕	HR8115	80–220	0.70–1.25	4.00–12.00
			◕	HR8225	80–210	0.70–1.25	4.00–12.00
Austenitic stainless steel （SUS304、SUS316etc）	≤200HB	BF	●	HR7125	95–185	0.08–0.30	0.20–2.00
			●	HR7225	95–185	0.08–0.30	0.20–2.00
			◕	HR7125	95–185	0.08–0.25	0.20–2.00
			◕	HR7225	95–185	0.08–0.25	0.20–2.00
		BM	●	HR7125	90–170	0.10–0.52	1.00–5.80
			●	HR7225	90–170	0.10–0.52	1.00–5.80
			◕	HR7125	90–170	0.10–0.47	1.00–5.80
			◕	HR7225	90–170	0.10–0.47	1.00–5.80
			⌘	HR7125	90–170	0.10–0.42	1.00–5.80
			⌘	HR7225	90–170	0.10–0.42	1.00–5.80
		BR	●	HR7125	80–150	0.18–0.66	1.70–7.00
			●	HR7225	80–150	0.18–0.66	1.70–7.00
			◕	HR7125	80–150	0.18–0.61	1.70–7.00
			◕	HR7225	80–150	0.18–0.61	1.70–7.00
			⌘	HR7125	80–150	0.18–0.56	1.70–7.00
			⌘	HR7225	80–150	0.18–0.56	1.70–7.00
Martebsitic stainless steel （SUS431、SUS420etc）	>200HB	BF	●	HR7225	85–175	0.08–0.30	0.20–2.00
			◕	HR7225	85–175	0.08–0.25	0.20–2.00
		BM	●	HR7225	80–160	0.10–0.52	1.00–5.80
			◕	HR7225	80–160	0.10–0.47	1.00–5.80
			⌘	HR7225	80–160	0.10–0.42	1.00–5.80
		BR	●	HR7225	70–140	0.18–0.66	1.70–7.00
			◕	HR7225	70–140	0.18–0.61	1.70–7.00
			⌘	HR7225	70–140	0.18–0.56	1.70–7.00

● Stable ◕ Average ⌘ Tough

Workpiece material	Hardness	Chipbreaker	Cutting range	Grade	Cuttingspeed (m/min)	Fn (mm/rev)	Ap (mm)
Grey cast iron （HT200、Ht300etc）	≤350MPa	no	●	HR6115	155–285	0.20–0.60	2.50–6.00
			◕	HR6115	155–285	0.20–0.55	2.50–6.00
			⌘	HR6115	155–285	0.20–0.50	2.50–6.00
		All round	●	HR6115	165–300	0.25–0.60	1.60–5.00
			◕	HR6115	165–300	0.25–0.55	1.60–5.00
			⌘	HR6115	165–300	0.25–0.50	1.60–5.00
Nodular cast iron （QT400、Qt500etc）	≤450MPa	no	●	HR6115	145–270	0.20–0.60	2.50–6.00
			◕	HR6115	145–270	0.20–0.55	2.50–6.00
			⌘	HR6115	145–270	0.20–0.50	2.50–6.00
		All round	●	HR6115	155–285	0.25–0.60	1.60–5.00
			◕	HR6115	155–285	0.25–0.55	1.60–5.00
			⌘	HR6115	155–285	0.25–0.50	1.60–5.00
Heat-resistance alloy （Gh4169etc）	——	SM	●	HR7115	30–70	0.15–0.40	0.70–3.00
			●	HR9105	40–80	0.15–0.40	0.70–3.00
			◕	HR7115	30–70	0.15–0.35	0.70–3.00
			◕	HR9105	40–80	0.15–0.35	0.70–3.00
			⌘	HR7115	30–70	0.15–0.30	0.70–3.00
			⌘	HR9105	40–80	0.15–0.30	0.70–3.00

● Stable ◕ Average ⌘ Tough

A
General turning
precision small parts turning
Parting and grooving
Threading
B
Indexable milling
Solid carbide end mills
C
Short hole drills
Solid carbide drills

Cutting parameters recommendation for general turining chipbreaker (Positive)

Workpiece material	Hardness	Chipbreaker	Cutting range	Grade	Cuttingspeed (m/min)	Fn (mm/rev)	Ap (mm)
Mild steel (45#、A3etc)	≤180HB	TF	●	HR8105	250–425	0.10–0.30	0.30–2.00
			●	HR8115	230–355	0.10–0.30	0.30–2.00
			●	HR8125	225–320	0.10–0.30	0.30–2.00
			●	HR8225	220–310	0.10–0.30	0.30–2.00
			◕	HR8105	250–425	0.10–0.25	0.30–2.00
			◕	HR8115	230–355	0.10–0.25	0.30–2.00
			◕	HR8125	225–320	0.10–0.25	0.30–2.00
			◕	HR8225	220–310	0.10–0.25	0.30–2.00
		TM	●	HR8105	230–440	0.15–0.35	0.50–3.00
			●	HR8115	215–415	0.15–0.35	0.50–3.00
			●	HR8125	190–355	0.15–0.35	0.50–3.00
			●	HR8225	205–375	0.15–0.35	0.50–3.00
			◕	HR8105	225–430	0.15–0.30	0.50–3.00
			◕	HR8115	200–405	0.15–0.30	0.50–3.00
			◕	HR8125	185–350	0.15–0.30	0.50–3.00
			◕	HR8225	195–360	0.15–0.30	0.50–3.00
			⌘	HR8125	185–350	0.15–0.25	0.50–3.00
			⌘	HR8225	195–360	0.15–0.25	0.50–3.00
Carbon steel, alloy steel (40Cr、42CrMoetc)	180-280HB	TF	●	HR8105	250–480	0.10–0.30	0.30–2.00
			●	HR8115	230–440	0.10–0.30	0.30–2.00
			●	HR8125	215–415	0.10–0.30	0.30–2.00
			●	HR8225	225–410	0.10–0.30	0.30–2.00
			◕	HR8105	250–480	0.10–0.25	0.30–2.00
			◕	HR8115	230–440	0.10–0.25	0.30–2.00
			◕	HR8125	215–415	0.10–0.25	0.30–2.00
			◕	HR8225	225–410	0.10–0.25	0.30–2.00
		TM	●	HR8105	230–440	0.15–0.35	0.50–3.00
			●	HR8115	215–415	0.15–0.35	0.50–3.00
			●	HR8125	190–355	0.15–0.35	0.50–3.00
			●	HR8225	205–375	0.15–0.35	0.50–3.00
			◕	HR8105	225–430	0.15–0.30	0.50–3.00
			◕	HR8115	200–405	0.15–0.30	0.50–3.00
			◕	HR8125	185–350	0.15–0.30	0.50–3.00
			◕	HR8225	195–360	0.15–0.30	0.50–3.00
			⌘	HR8125	185–350	0.15–0.25	0.50–3.00
			⌘	HR8225	195–360	0.15–0.25	0.50–3.00

● Stable ◕ Average ⌘ Tough

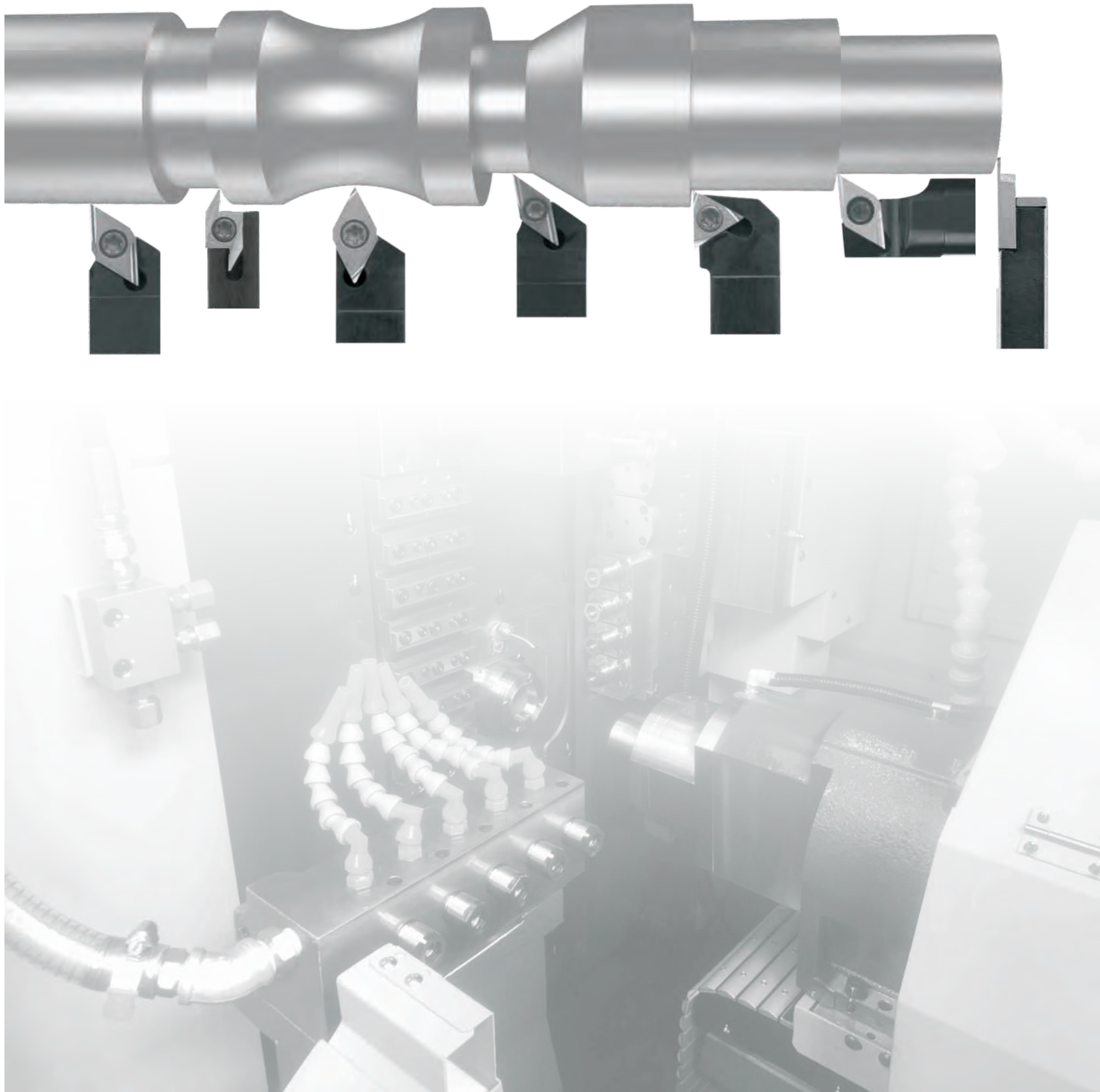
Workpiece material	Hardness	Chipbreaker	Cutting range	Grade	Cuttingspeed (m/min)	Fn (mm/rev)	Ap (mm)
Carbon steel, alloy steel (quenching material, etc)	≥280HB	TF	●	HR8115	230–460	0.10–0.30	0.30–2.00
			●	HR8225	210–420	0.10–0.30	0.30–2.00
			◕	HR8115	230–460	0.10–0.25	0.30–2.00
			◕	HR8225	210–420	0.10–0.25	0.30–2.00
		TM	●	HR8115	215–420	0.15–0.35	0.50–3.00
			●	HR8225	190–395	0.15–0.35	0.50–3.00
			◕	HR8115	215–420	0.15–0.30	0.50–3.00
			◕	HR8225	190–395	0.15–0.30	0.50–3.00
Austenitic stainless steel (SUS304、SUS316 etc)	≤200HB	TF	●	HR7125	95–185	0.10–0.30	0.30–2.00
			●	HR7225	95–185	0.10–0.30	0.30–2.00
			◕	HR7125	95–185	0.10–0.25	0.30–2.00
			◕	HR7225	95–185	0.10–0.25	0.30–2.00
		TM	●	HR7125	80–150	0.15–0.35	0.50–3.00
			●	HR7225	80–150	0.15–0.35	0.50–3.00
			◕	HR7125	80–150	0.15–0.30	0.50–3.00
			◕	HR7225	80–150	0.15–0.30	0.50–3.00
			⌘	HR7125	80–150	0.15–0.25	0.50–3.00
			⌘	HR7225	80–150	0.15–0.25	0.50–3.00
Martebsitic stainless steel (SUS431、SUS420 etc)	>200HB	TF	●	HR7125	85–175	0.10–0.30	0.30–2.00
			●	HR7225	85–175	0.10–0.30	0.30–2.00
			◕	HR7125	85–175	0.10–0.25	0.30–2.00
			◕	HR7225	85–175	0.10–0.25	0.30–2.00
		TM	●	HR7125	70–140	0.15–0.35	0.50–3.00
			●	HR7225	70–140	0.15–0.35	0.50–3.00
			◕	HR7125	70–140	0.15–0.30	0.50–3.00
			◕	HR7225	70–140	0.15–0.30	0.50–3.00
			⌘	HR7125	70–140	0.15–0.25	0.50–3.00
			⌘	HR7225	70–140	0.15–0.25	0.50–3.00
Non-ferrous metal (aluminum alloy)	——	AK	●	HRK10	300–700	0.10–0.30	0.50–3.00
			●	HRK20	300–700	0.10–0.30	0.50–3.00
			◕	HRK10	300–700	0.10–0.25	0.50–3.00
			◕	HRK20	300–700	0.10–0.25	0.50–3.00
			⌘	HRK10	300–700	0.10–0.20	0.50–3.00
			⌘	HRK20	300–700	0.10–0.20	0.50–3.00

● Stable ◕ Average ⌘ Tough

Precesion small parts turning

Comparison table of chipbreaker for general turning

ISO	application	Huareal	SANDVIK	KENNAMETAL	ISCAR	MITUSUBISHI	HITACHI	TUNGALOY	KYOCERA	SUMIYOMO	TAGUTEC	ZCC.CT
P	Finishing (Negative)	GF GC	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–finish (Negative)	GQ GM	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
	Tough machining (Negative)	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 (Negative)	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 ---- ---- ----	HG HP HU HW HF	RX RH HT HD HY HZ	HDR HPR
	Finishing (Positive)	TF	MM、XM VM	MF	SM、14	LM、SV	JQ	PS	MQ	GU	FC PC	HF
	Semi–finish (Positive)	TM	UM、PM MX、PR	MF MP	----	MV MP	JE	PM	HQ XQ GK	MU	MT PC	HM
M	Finishing (Negative)	BF	MF	FP、FS LF	----	LM SH	SE、MP	SS	MQ GU	SU EF	EA SF	EF
	Semi–finish (Negative)	BM	MM、MMC SMR	MP	M3M、PP	MM	DE	SM	----	GU	ET	EM
	Tough machining (Negative)	BR	---- MR、MRR	UP ----	---- MR	ES、1M 2M、HL RM、GH HM	---- ----	S SH	---- TK	HM EM MU	VF SU	ER
	Finishing (Positive)	TF	MM、XM VM	FP、FF	SM、14	LM、FM	MP	SS	CF、MQ CK	FC	FC PC	FF
	Semi–finish (Positive)	TM	MM	MP	----	MW	----	PM	HQ GK	MU	----	EM
K	Semi–finish (Negative)	All round	KF	UN	GN	LK MA MK	V、VA	CM CF	C	UZ	MT	All round
	Tough machining (Negative)	Flat	KM、KR KRR	----	----	GK RK GH	Y、RE	Ch 33 全周	ZS、GC	GZ(UX)	RT	----
N	Non–ferrous metal machining	AK	----	MS	----	----		P	AH	AX	----	no
S	Finishing (Negative)	----	SF、SGF	----	----	LS FJ	----	HRF	----	EF	----	NF NGF
	Semi–finish (Negative)	SM	SM、SMC	----	----	MS MJ	VI	HMM SA HRM	----	EG、EX	----	NM
H	Finishing	----	----	----	----	----		HP*	----	FV*	----	no
	Semi–finish	----	----	----	----	----		----	----	GH	----	no



Precision small parts turning

A

Turning

Precision small parts turning

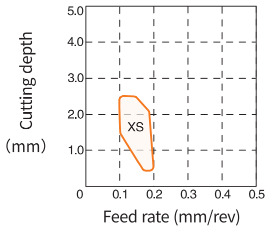
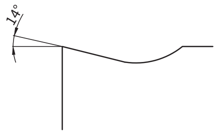
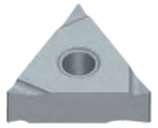
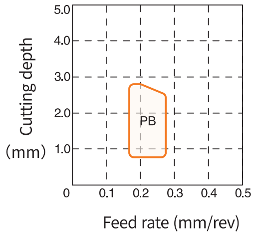
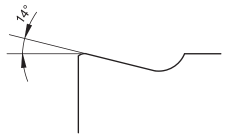
Precisoion small parts turning application

Type	Material	ISO	PVD		Cemented Carbide	Cermet	Coated Cermet	ISO
			HR1135	HR7125	HRK10	HRC10	HR115C	
P	Non–alloyed steel/Alloy steel	P05	HR1135			HRC10	HR115C	P05
		P15		HR7125				P15
		P25						P25
		P35						P35
M	Stainless steel	M05	HR1135					M05
		M15		HR7125				M15
		M25						M25
		M35						M35
K	Cast iron	K05						K05
		K15			HRK10			K15
		K25						K25
		K35						K35
N	Aluminum/ Aluminum alloy	N05			HRK10			N05
		N15						N15
		N25						N25
		N35						N35
S	High–temp alloy	S05						S05
		S15		HR7125				S15
		S25						S25
		S35						S35
H	Hardened steel	H05						H05
		H15	HR1135					H15
		H25						H25
		H35						H35

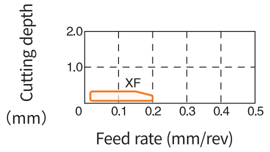
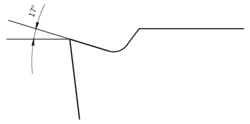
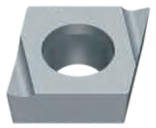
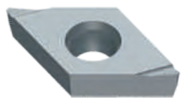
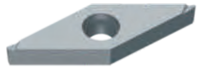
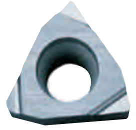
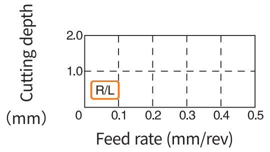
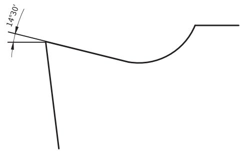
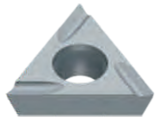
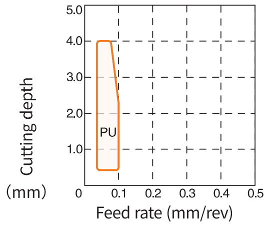
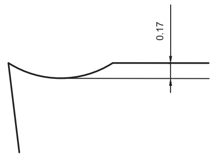
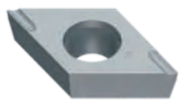
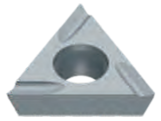
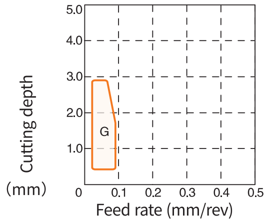
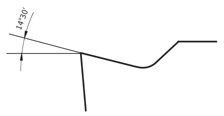
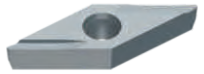
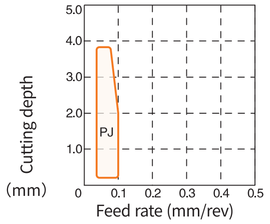
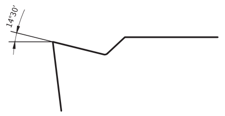
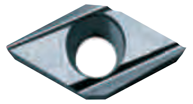
Precision small parts turning grade overview

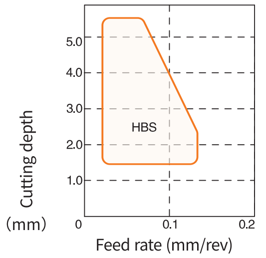
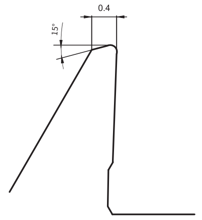
Grade	Type	Features	Application
HR1135	PVD coating Carbide	The fine-grain cemented carbide matrix with the new nano-gradient composite structural coating has excellent wear resistance and build-up edge resistance, ensuring the stability of the insert life and the high quality of the machined surface.	High wear resistance grade，suitable for high cutting speed turning of small part
HR7125	PVD coating Carbide	Unique coating materials combined with new coating technology，the surface of product is smooth, with low friction coefficient, high nano hardness, and excellent antioxidant performance.	Preferred grade for precision small part turning. Great versatility
HRC10	Cermet	Newly upgraded cermet grade, hard and compact surface with good chemical stability and adhesion resistance.Also great wear resistance and chipping resistance, insert consistancy, excellent machining surface quality.	Good consistancy, especially suitable for low carbon steel finishing turning, as well as the workpiece surface quality has high requirements
HR115C	Coated Cermet	The coated cermet grade, with a new nano gradient composite structure coating, further improves the wear resistance, high temperature resistance, the unique transition layer treatment technology effectively improves the adhesion between the coating and the substrate, reduces the friction coefficient between the insert and workpiece.Insert services life and stability are outstanding	Better high temperature resistance sutiable for higher cutting speed working condition compared to cermet grades.
HRK10	Carbide	Non-coated cemented carbide, fine matrix material, uniform particle size, high bending strength, good wear resistance, stable overall performance.	Preferred grade for turning on aluminum alloy

Precision small parts turning insert overview(Negative)

type	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
Negative	Ultra finishing	G	XS	◆ Sloped chipbreaker design, stable control of chip removal direction, ensure smooth cutting. ◆ Sharp cutting edge, can effectively reduce cutting force. Achieve excellent cutting results.							 A121		
	Finishing	G	PB	◆ Design of cutting inlcination angle can well control chip removal direction and reduce cutting force. ◆ The high strength of cutting corner makes it more suitable for machining with a feed rate of 0.15-0.25mm/r.							 A121		

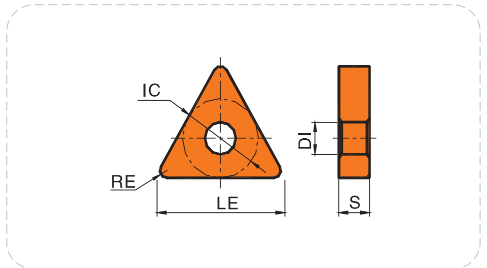
Precision small parts turning insert overview(Postive)

type	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
Postive insert	Ultra finishing	G	XF	◆ Inclined chipbreaker design, stable control of chip removal direction, ensure smooth cutting. ◆ Sharp cutting edge, can effectively reduce cutting force. Achieve a excellent cutting results.				A122	A125			A131	A132
			No code name	◆ Design of cutting inlcination angle can well control chip removal direction and reduce cutting force. ◆ Even cutting edge width design, sharp edge, machining workpiece surface quality is excellent.							A127		
	Finishing	G	PU	◆ The design of small groove width and small chip up-curl radius can meet the requirements of chip breaking under the condition of small cutting depth.				A124	A126		A128		
			PY	◆ The design of small groove width and small chip up-curl radius can meet the requirements of chip breaking under the condition of small cutting depth.								A131	
			PJ	◆ Can adapt to low feed rate and low cutting depth change, stable control cutting.					A125				

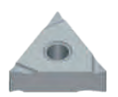
type	Usage	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		shape
Back turning	Back turning	HBS	◆ The specially designed insert shape meets the requirements of back turning machining during the small part machining. ◆ The special chipbreaker structure design can stably control the direction of chip removal and reduce cutting resistance.				A133

Negative insert

Working condition: ● Stable ◕ Average ⌘ Tough



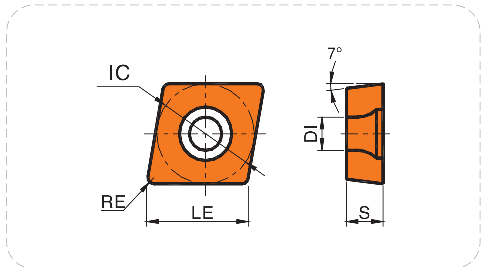
Workpiece material					
P Steel	●	● ◕		●	●
M Stainless steel	● ◕	● ◕			
K Cast iron					
N Non-ferrous metal			● ◕		
S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		TNGG160402R–XS	16.5	9.525	4.76	3.81	0.2	★	★		☆		STLN**–16 Page(A136)
		TNGG160402L–XS	16.5	9.525	4.76	3.81	0.2	★	★		☆		
		TNGG160404R–XS	16.5	9.525	4.76	3.81	0.4	★	★		☆		
		TNGG160404L–XS	16.5	9.525	4.76	3.81	0.4	★	★		☆		
		TNGG160408R–XS	16.5	9.525	4.76	3.81	0.8	★	★		☆		
		TNGG160408L–XS	16.5	9.525	4.76	3.81	0.8	★	★		☆		
Finishing		TNGG160402R–PB	16.5	9.525	4.76	3.81	0.2	★	★		☆		STLN**–16 Page(A136)
		TNGG160402L–PB	16.5	9.525	4.76	3.81	0.2	★	★		☆		
		TNGG160404R–PB	16.5	9.525	4.76	3.81	0.4	★	★		☆		
		TNGG160404L–PB	16.5	9.525	4.76	3.81	0.4	★	★		☆		
		TNGG160408R–PB	16.5	9.525	4.76	3.81	0.8	★	★		☆		
		TNGG160408L–PB	16.5	9.525	4.76	3.81	0.8	★	★		☆		

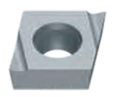
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌘ Tough



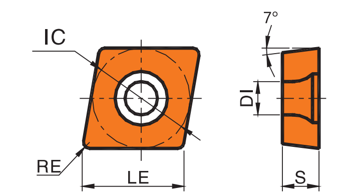
Workpiece material					
P Steel	●	● ◕		●	●
M Stainless steel	● ◕	● ◕			
K Cast iron					
N Non-ferrous metal			● ◕		
S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		CCGT0301005R–XF	3.6	3.5	1.4	1.9	0.05	★	★		☆		SCLC**–03 Page (A136) S–SCLC**–03 Page(A140)
		CCGT0301005L–XF	3.6	3.5	1.4	1.9	0.05	★	★		☆		
		CCGT030101R–XF	3.6	3.5	1.4	1.9	0.1	★	★		☆		
		CCGT030101L–XF	3.6	3.5	1.4	1.9	0.1	★	★		☆		
		CCGT030102R–XF	3.6	3.5	1.4	1.9	0.2	★	★		☆		
		CCGT030102L–XF	3.6	3.5	1.4	1.9	0.2	★	★		☆		
		CCGT030104R–XF	3.6	3.5	1.4	1.9	0.4	★	★		☆		
		CCGT030104L–XF	3.6	3.5	1.4	1.9	0.4	★	★		☆		
		CCGT0401005R–XF	4.4	4.3	1.8	2.3	0.05	★	★		☆		SCLC**–04 Page(A136) S–SCLC**–04 Page(A140)
		CCGT0401005L–XF	4.4	4.3	1.8	2.3	0.05	★	★		☆		
		CCGT040101R–XF	4.4	4.3	1.8	2.3	0.1	★	★		☆		
		CCGT040101L–XF	4.4	4.3	1.8	2.3	0.1	★	★		☆		
		CCGT040102R–XF	4.4	4.3	1.8	2.3	0.2	★	★		☆		
		CCGT040102L–XF	4.4	4.3	1.8	2.3	0.2	★	★		☆		
		CCGT040104R–XF	4.4	4.3	1.8	2.3	0.4	★	★		☆		
		CCGT040104L–XF	4.4	4.3	1.8	2.3	0.4	★	★		☆		
		CCGT060201R–XF	6.4	6.35	2.38	2.8	0.1	★	★		☆		SCLC**–06 Page(A136) S–SCLC**–06 Page(A140)
		CCGT060201L–XF	6.4	6.35	2.38	2.8	0.1	★	★		☆		
		CCGT060202R–XF	6.4	6.35	2.38	2.8	0.2	★	★		☆		
		CCGT060202L–XF	6.4	6.35	2.38	2.8	0.2	★	★		☆		
		CCGT060204R–XF	6.4	6.35	2.38	2.8	0.4	★	★		☆		
		CCGT060204L–XF	6.4	6.35	2.38	2.8	0.4	★	★		☆		

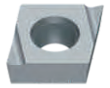
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌗ Tough



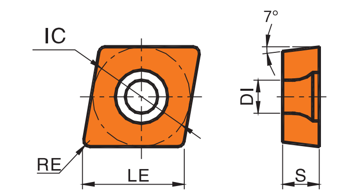
Workpiece material	HR1135	HR7125	HRK10	HRC10	HR115C
P Steel	●	● ◕		●	●
M Stainless steel	● ◕	● ◕			
K Cast iron					
N Non-ferrous metal			● ◕		
S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		CCGT09T301R–XF	9.7	9.525	3.97	4.4	0.1	★	★		☆		SCLC**–09 Page(A136) S–SCLC**–09 Page(A140)
		CCGT09T301L–XF	9.7	9.525	3.97	4.4	0.1	★	★		☆		
		CCGT09T302R–XF	9.7	9.525	3.97	4.4	0.2	★	★		☆		
		CCGT09T302L–XF	9.7	9.525	3.97	4.4	0.2	★	★		☆		
		CCGT09T304R–XF	9.7	9.525	3.97	4.4	0.4	★	★		☆		
		CCGT09T304L–XF	9.7	9.525	3.97	4.4	0.4	★	★		☆		

★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌗ Tough



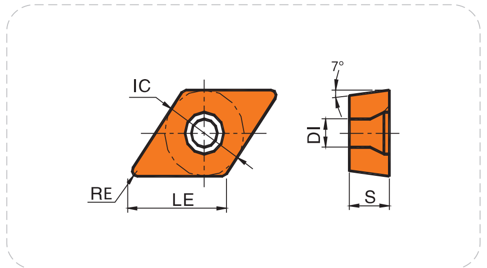
Workpiece material	HR1135	HR7125	HRK10	HRC10	HR115C
P Steel	●	● ◕		●	●
M Stainless steel	● ◕	● ◕			
K Cast iron					
N Non-ferrous metal			● ◕		
S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Finishing		CCGT0602005FR–PU	6.4	6.35	2.38	2.8	0.05	★	★		☆		SCLC**–06 Page(A136) S–SCLC**–06 Page(A140)
		CCGT0602005FL–PU	6.4	6.35	2.38	2.8	0.05	★	★		☆		
		CCGT060201FR–PU	6.4	6.35	2.38	2.8	0.1	★	★		☆		
		CCGT060201FL–PU	6.4	6.35	2.38	2.8	0.1	★	★		☆		
		CCGT060202FR–PU	6.4	6.35	2.38	2.8	0.2	★	★		☆		
		CCGT060202FL–PU	6.4	6.35	2.38	2.8	0.2	★	★		☆		
		CCGT060204FR–PU	6.4	6.35	2.38	2.8	0.4	★	★		☆		
		CCGT060204FL–PU	6.4	6.35	2.38	2.8	0.4	★	★		☆		
		CCGT09T3005FR–PU	9.7	9.525	3.97	4.4	0.05	★	★		☆		SCLC**–09 Page(A136) S–SCLC**–09 Page(A140)
		CCGT09T3005FL–PU	9.7	9.525	3.97	4.4	0.05	★	★		☆		
		CCGT09T301FR–PU	9.7	9.525	3.97	4.4	0.1	★	★		☆		
		CCGT09T301FL–PU	9.7	9.525	3.97	4.4	0.1	★	★		☆		
		CCGT09T302FR–PU	9.7	9.525	3.97	4.4	0.2	★	★		☆		
		CCGT09T302FL–PU	9.7	9.525	3.97	4.4	0.2	★	★		☆		
		CCGT09T304FR–PU	9.7	9.525	3.97	4.4	0.4	★	★		☆		
		CCGT09T304FL–PU	9.7	9.525	3.97	4.4	0.4	★	★		☆		
		CCGT060201R–PU	6.4	6.35	2.38	2.8	0.1	★	★		☆		SCLC**–06 Page(A136) S–SCLC**–06 Page(A140)
		CCGT060201L–PU	6.4	6.35	2.38	2.8	0.1	★	★		☆		
		CCGT060202R–PU	6.4	6.35	2.38	2.8	0.2	★	★		☆		
		CCGT060202L–PU	6.4	6.35	2.38	2.8	0.2	★	★		☆		
		CCGT060204R–PU	6.4	6.35	2.38	2.8	0.4	★	★		☆		
		CCGT060204L–PU	6.4	6.35	2.38	2.8	0.4	★	★		☆		
		CCGT09T301R–PU	9.7	9.525	3.97	4.4	0.1	★	★		☆		SCLC**–09 Page(A136) S–SCLC**–09 Page(A140)
		CCGT09T301L–PU	9.7	9.525	3.97	4.4	0.1	★	★		☆		
		CCGT09T302R–PU	9.7	9.525	3.97	4.4	0.2	★	★		☆		
		CCGT09T302L–PU	9.7	9.525	3.97	4.4	0.2	★	★		☆		
		CCGT09T304R–PU	9.7	9.525	3.97	4.4	0.4	★	★		☆		
		CCGT09T304L–PU	9.7	9.525	3.97	4.4	0.4	★	★		☆		

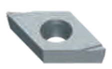
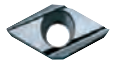
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌑ Tough



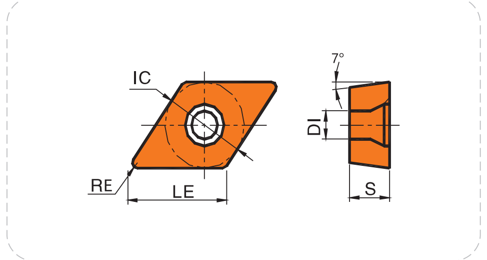
Workpiece material		HR1135	HR7125	HRK10	HRC10	HR115C
P	Steel	●	● ◕		●	●
M	Stainless steel	● ◕	● ◕			
K	Cast iron					
N	Non-ferrous metal			● ◕		
S	Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		DCGT0702005R–XF	7.8	6.35	2.38	2.8	0.05	★	★		☆		SDJC**–07 SDNC**–07 Page(A137) S–SDUC**–07 Page(A141)
		DCGT0702005L–XF	7.8	6.35	2.38	2.8	0.05	★	★		☆		
		DCGT070201R–XF	7.8	6.35	2.38	2.8	0.1	★	★		☆		
		DCGT070201L–XF	7.8	6.35	2.38	2.8	0.1	★	★		☆		
		DCGT070202R–XF	7.8	6.35	2.38	2.8	0.2	★	★		☆		
		DCGT070202L–XF	7.8	6.35	2.38	2.8	0.2	★	★		☆		
		DCGT070204R–XF	7.8	6.35	2.38	2.8	0.4	★	★		☆		
		DCGT070204L–XF	7.8	6.35	2.38	2.8	0.4	★	★		☆		
		DCGT11T3005R–XF	11.6	9.525	3.97	4.4	0.05	★	★		☆		SDJC**–11 SDNC**–11 Page(A137) S–SDUC**–11 Page(A141)
		DCGT11T3005L–XF	11.6	9.525	3.97	4.4	0.05	★	★		☆		
		DCGT11T301R–XF	11.6	9.525	3.97	4.4	0.1	★	★		☆		
		DCGT11T301L–XF	11.6	9.525	3.97	4.4	0.1	★	★		☆		
		DCGT11T302R–XF	11.6	9.525	3.97	4.4	0.2	★	★		☆		
		DCGT11T302L–XF	11.6	9.525	3.97	4.4	0.2	★	★		☆		
		DCGT11T304R–XF	11.6	9.525	3.97	4.4	0.4	★	★		☆		
		DCGT11T304L–XF	11.6	9.525	3.97	4.4	0.4	★	★		☆		
Finishing		DCGT11T301FR–PJ	11.6	9.525	3.97	4.4	0.1	★	★		☆		SDJC**–11 SDNC**–11 Page(A137) S–SDUC**–11 Page(A141)
		DCGT11T302FR–PJ	11.6	9.525	3.97	4.4	0.2	★	★		☆		
		DCGT11T304ER–PJ	11.6	9.525	3.97	4.4	0.4	★	★		☆		

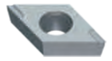
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌑ Tough



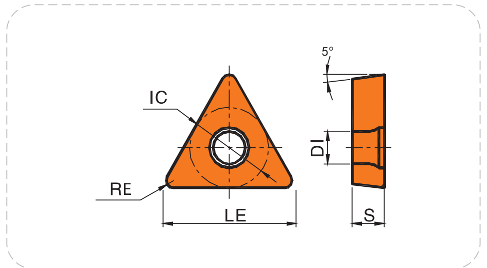
Workpiece material		HR1135	HR7125	HRK10	HRC10	HR115C
P	Steel	●	● ◕		●	●
M	Stainless steel	● ◕	● ◕			
K	Cast iron					
N	Non-ferrous metal			● ◕		
S	Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Finishing		DCGT0702005FR–PU	7.8	6.35	2.38	2.8	0.05	★	★		☆		SDJC**–07 SDNC**–07 Page(A137) S–SDUC**–07 Page(A141)
		DCGT0702005FL–PU	7.8	6.35	2.38	2.8	0.05	★	★		☆		
		DCGT070201FR–PU	7.8	6.35	2.38	2.8	0.1	★	★		☆		
		DCGT070201FL–PU	7.8	6.35	2.38	2.8	0.1	★	★		☆		
		DCGT070202FR–PU	7.8	6.35	2.38	2.8	0.2	★	★		☆		
		DCGT070202FL–PU	7.8	6.35	2.38	2.8	0.2	★	★		☆		
		DCGT070204FR–PU	7.8	6.35	2.38	2.8	0.4	★	★		☆		
		DCGT070204FL–PU	7.8	6.35	2.38	2.8	0.4	★	★		☆		
		DCGT11T3005FR–PU	11.6	9.525	3.97	4.4	0.05	★	★		☆		SDJC**–11 SDNC**–11 Page(A137) S–SDUC**–11 Page(A141)
		DCGT11T3005FL–PU	11.6	9.525	3.97	4.4	0.05	★	★		☆		
		DCGT11T301FR–PU	11.6	9.525	3.97	4.4	0.1	★	★		☆		
		DCGT11T301FL–PU	11.6	9.525	3.97	4.4	0.1	★	★		☆		
		DCGT11T302FR–PU	11.6	9.525	3.97	4.4	0.2	★	★		☆		
		DCGT11T302FL–PU	11.6	9.525	3.97	4.4	0.2	★	★		☆		
		DCGT11T304FR–PU	11.6	9.525	3.97	4.4	0.4	★	★		☆		
		DCGT11T304FL–PU	11.6	9.525	3.97	4.4	0.4	★	★		☆		
		DCGT070201R–PU	7.8	6.35	2.38	2.8	0.1	★	★		☆		SDJC**–07 SDNC**–07 Page(A137) S–SDUC**–07 Page(A141)
		DCGT070201L–PU	7.8	6.35	2.38	2.8	0.1	★	★		☆		
		DCGT070202R–PU	7.8	6.35	2.38	2.8	0.2	★	★		☆		
		DCGT070202L–PU	7.8	6.35	2.38	2.8	0.2	★	★		☆		
		DCGT070204R–PU	7.8	6.35	2.38	2.8	0.4	★	★		☆		
		DCGT070204L–PU	7.8	6.35	2.38	2.8	0.4	★	★		☆		
		DCGT11T301R–PU	11.6	9.525	3.97	4.4	0.1	★	★		☆		SDJC**–11 SDNC**–11 Page(A137) S–SDUC**–11 Page(A141)
		DCGT11T301L–PU	11.6	9.525	3.97	4.4	0.1	★	★		☆		
		DCGT11T302R–PU	11.6	9.525	3.97	4.4	0.2	★	★		☆		
		DCGT11T302L–PU	11.6	9.525	3.97	4.4	0.2	★	★		☆		
		DCGT11T304R–PU	11.6	9.525	3.97	4.4	0.4	★	★		☆		
		DCGT11T304L–PU	11.6	9.525	3.97	4.4	0.4	★	★		☆		

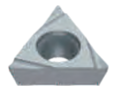
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌘ Tough



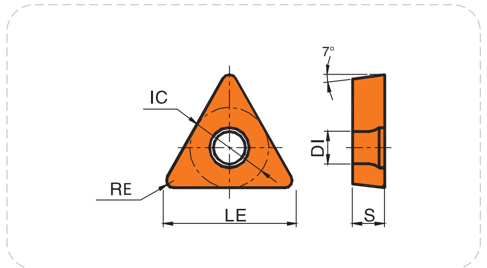
Workpiece material	HR1135	HR7125	HRK10	HRC10	HR115C
P Steel	●	● ◕		●	●
M Stainless steel	● ◕	● ◕			
K Cast iron					
N Non-ferrous metal			● ◕		
S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		TBGT060101R	6.9	3.97	1.59	2.3	0.1	★	★		☆		S–STLB**–06 Page(A142)
		TBGT060101L	6.9	3.97	1.59	2.3	0.1	★	★		☆		
		TBGT060102R	6.9	3.97	1.59	2.3	0.2	★	★		☆		
		TBGT060102L	6.9	3.97	1.59	2.3	0.2	★	★		☆		
		TBGT060104R	6.9	3.97	1.59	2.3	0.4	★	★		☆		
		TBGT060104L	6.9	3.97	1.59	2.3	0.4	★	★		☆		

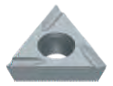
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌘ Tough



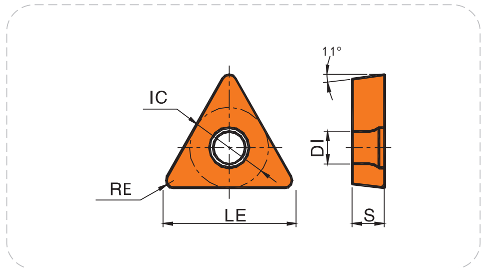
Workpiece material	HR1135	HR7125	HRK10	HRC10	HR115C
P Steel	●	● ◕		●	●
M Stainless steel	● ◕	● ◕			
K Cast iron					
N Non-ferrous metal			● ◕		
S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		TCGT080201R–PU	8.2	4.76	2.38	2.3	0.1	★	★		☆		STGC**–08 Page(A138)
		TCGT080201F–PU	8.2	4.76	2.38	2.3	0.1	★	★		☆		
		TCGT080202R–PU	8.2	4.76	2.38	2.3	0.2	★	★		☆		
		TCGT080202L–PU	8.2	4.76	2.38	2.3	0.2	★	★		☆		
		TCGT110201R–PU	11	6.35	2.38	2.8	0.1	★	★		☆		STGC**–11 Page(A138)
		TCGT110201L–PU	11	6.35	2.38	2.8	0.1	★	★		☆		
		TCGT110202R–PU	11	6.35	2.38	2.8	0.2	★	★		☆		
		TCGT110202L–PU	11	6.35	2.38	2.8	0.2	★	★		☆		
		TCGT110204R–PU	11	6.35	2.38	2.8	0.4	★	★		☆		
		TCGT110204L–PU	11	6.35	2.38	2.8	0.4	★	★		☆		
		TCGT0802005FR–PU	8.2	4.76	2.38	2.3	0.05	★	★		☆		STGC**–08 Page(A138)
		TCGT0802005FL–PU	8.2	4.76	2.38	2.3	0.05	★	★		☆		
		TCGT080201FR–PU	8.2	4.76	2.38	2.3	0.1	★	★		☆		
		TCGT080201FL–PU	8.2	4.76	2.38	2.3	0.1	★	★		☆		
		TCGT080202FR–PU	8.2	4.76	2.38	2.3	0.2	★	★		☆		
		TCGT080202FL–PU	8.2	4.76	2.38	2.3	0.2	★	★		☆		
		TCGT1102005FR–PU	11	6.35	2.38	2.8	0.05	★	★		☆		STGC**–11 Page(A138)
		TCGT1102005FL–PU	11	6.35	2.38	2.8	0.05	★	★		☆		
		TCGT110201FR–PU	11	6.35	2.38	2.8	0.1	★	★		☆		
		TCGT110201FL–PU	11	6.35	2.38	2.8	0.1	★	★		☆		
		TCGT110202FR–PU	11	6.35	2.38	2.8	0.2	★	★		☆		
		TCGT110202FL–PU	11	6.35	2.38	2.8	0.2	★	★		☆		
		TCGT110204FR–PU	11	6.35	2.38	2.8	0.4	★	★		☆		
		TCGT110204FL–PU	11	6.35	2.38	2.8	0.4	★	★		☆		

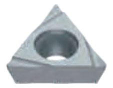
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌑ Tough



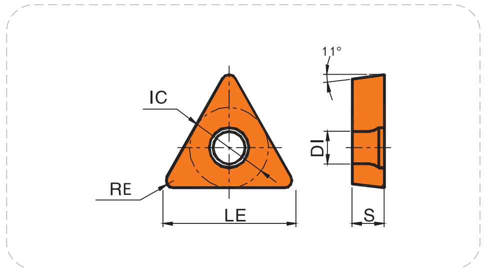
Workpiece material	HR1135	HR7125	HRK10	HRC10	HR115C
P Steel	●	● ◕		●	●
M Stainless steel	● ◕	● ◕			
K Cast iron					
N Non-ferrous metal			● ◕		
S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		TPGH080201R	8.2	4.76	2.38	2.3	0.1	★	★		☆		STGP**–08 Page(A138) S–STLP**–08 Page(A142)
		TPGH080201L	8.2	4.76	2.38	2.3	0.1	★	★		☆		
		TPGH080202R	8.2	4.76	2.38	2.3	0.2	★	★		☆		
		TPGH080202L	8.2	4.76	2.38	2.3	0.2	★	★		☆		
		TPGH080204R	8.2	4.76	2.38	2.3	0.4	★	★		☆		
		TPGH080204L	8.2	4.76	2.38	2.3	0.4	★	★		☆		
		TPGH090201R	9.6	5.56	2.38	3.2	0.1	★	★		☆		STGP**–09 Page(A138) S–STLP**–09 Page(A142)
		TPGH090201L	9.6	5.56	2.38	3.2	0.1	★	★		☆		
		TPGH090202R	9.6	5.56	2.38	3.2	0.2	★	★		☆		
		TPGH090202L	9.6	5.56	2.38	3.2	0.2	★	★		☆		
		TPGH090204R	9.6	5.56	2.38	3.2	0.4	★	★		☆		STGP**–11 Page(A138) S–STLP**–11 Page(A142)
		TPGH090204L	9.6	5.56	2.38	3.2	0.4	★	★		☆		
		TPGH110202R	11	6.35	2.38	2.8	0.2	★	★		☆		
		TPGH110202L	11	6.35	2.38	2.8	0.2	★	★		☆		
		TPGH110204R	11	6.35	2.38	2.8	0.4	★	★		☆		
		TPGH110204L	11	6.35	2.38	2.8	0.4	★	★		☆		
		TPGH110302R	11	6.35	3.18	3.3	0.2	★	★		☆		
		TPGH110302L	11	6.35	3.18	3.3	0.2	★	★		☆		
		TPGH110304R	11	6.35	3.18	3.3	0.4	★	★		☆		
		TPGH110304L	11	6.35	3.18	3.3	0.4	★	★		☆		
		TPGH110308R	11	6.35	3.18	3.3	0.8	★	★		☆		
		TPGH110308L	11	6.35	3.18	3.3	0.8	★	★		☆		

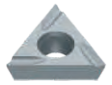
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌑ Tough



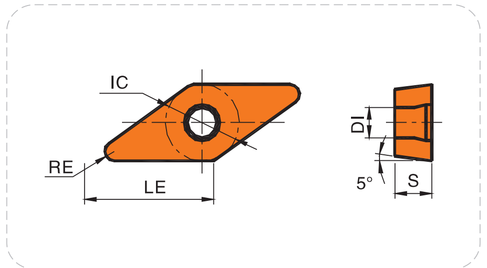
Workpiece material	HR1135	HR7125	HRK10	HRC10	HR115C
P Steel	●	● ◕		●	●
M Stainless steel	● ◕	● ◕			
K Cast iron					
N Non-ferrous metal			● ◕		
S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		TPGH0902005R–PU	9.6	5.56	2.38	2.8	0.05	★	★		☆		STGP**–09 Page(A138) S–STLP**–09 Page(A142)
		TPGH0902005L–PU	9.6	5.56	2.38	2.8	0.05	★	★		☆		
		TPGH090201R–PU	9.6	5.56	2.38	2.8	0.1	★	★		☆		
		TPGH090201L–PU	9.6	5.56	2.38	2.8	0.1	★	★		☆		
		TPGH090202R–PU	9.6	5.56	2.38	2.8	0.2	★	★		☆		
		TPGH090202L–PU	9.6	5.56	2.38	2.8	0.2	★	★		☆		
		TPGH1103005R–PU	11	6.35	3.18	3.3	0.05	★	★		☆		STGP**–11 Page(A138) S–STLP**–11 Page(A142)
		TPGH1103005L–PU	11	6.35	3.18	3.3	0.05	★	★		☆		
		TPGH110301R–PU	11	6.35	3.18	3.3	0.1	★	★		☆		
		TPGH110301L–PU	11	6.35	3.18	3.3	0.1	★	★		☆		
		TPGH110302R–PU	11	6.35	3.18	3.3	0.2	★	★		☆		
		TPGH110302L–PU	11	6.35	3.18	3.3	0.2	★	★		☆		
		TPGH110304R–PU	11	6.35	3.18	3.3	0.4	★	★		☆		
		TPGH110304L–PU	11	6.35	3.18	3.3	0.4	★	★		☆		

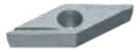
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌗ Tough



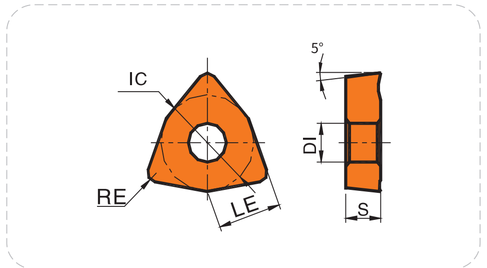
Workpiece material	HR1135	HR7125	HRK10	HRC10	HR115C
P Steel	●	● ◕		●	●
M Stainless steel	● ◕	● ◕			
K Cast iron					
N Non-ferrous metal			● ◕		
S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		VBGT1103005R–XF	11	6.35	3.18	2.8	0.05	★	★		☆		SVJB**–11 SVVB**–11 Page(A139)
		VBGT1103005L–XF	11	6.35	3.18	2.8	0.05	★	★		☆		
		VBGT110301R–XF	11	6.35	3.18	2.8	0.1	★	★		☆		
		VBGT110301L–XF	11	6.35	3.18	2.8	0.1	★	★		☆		
		VBGT110302R–XF	11	6.35	3.18	2.8	0.2	★	★		☆		
		VBGT110302L–XF	11	6.35	3.18	2.8	0.2	★	★		☆		
		VBGT110304R–XF	11	6.35	3.18	2.8	0.4	★	★		☆		
		VBGT110304L–XF	11	6.35	3.18	2.8	0.4	★	★		☆		
Finishing		VBGT1103005R–PY	11	6.35	3.18	2.8	0.05	★	★		☆		SVJB**–11 SVVB**–11 Page(A139)
		VBGT1103005L–PY	11	6.35	3.18	2.8	0.05	★	★		☆		
		VBGT110301R–PY	11	6.35	3.18	2.8	0.1	★	★		☆		
		VBGT110301L–PY	11	6.35	3.18	2.8	0.1	★	★		☆		
		VBGT110302R–PY	11	6.35	3.18	2.8	0.2	★	★		☆		
		VBGT110302L–PY	11	6.35	3.18	2.8	0.2	★	★		☆		
		VBGT110304R–PY	11	6.35	3.18	2.8	0.4	★	★		☆		
		VBGT110304L–PY	11	6.35	3.18	2.8	0.4	★	★		☆		
		VBGT160402R–PY	16.6	9.525	4.76	4.4	0.2	★	★		☆		SVJB**–16 SVVB**–16 Page(A139)
		VBGT160402L–PY	16.6	9.525	4.76	4.4	0.2	★	★		☆		
		VBGT160404R–PY	16.6	9.525	4.76	4.4	0.4	★	★		☆		
		VBGT160404L–PY	16.6	9.525	4.76	4.4	0.4	★	★		☆		
		VBGT160408R–PY	16.6	9.525	4.76	4.4	0.8	★	★		☆		
		VBGT160408L–PY	16.6	9.525	4.76	4.4	0.8	★	★		☆		

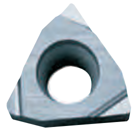
★ Recommended grade ☆ Available grade

Postive insert

Working condition: ● Stable ◕ Average ⌗ Tough



Workpiece material	HR1135	HR7125	HRK10	HRC10	HR115C
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)					PVD		Cemented carbide	Cermet		Applicable tool
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
Ultra finishing		WBGT060101L–XF	3.3	4	1.59	2.3	0.1	★	★		☆		S–SWUB**–06 Page(A143)
		WBGT060102L–XF	3.3	4	1.59	2.3	0.2	★	★		☆		
		WBGT060104L–XF	3.3	4	1.59	2.3	0.4	★	★		☆		

★ Recommended grade ☆ Available grade

Back turning insert code key

HBS	15	R	4	005
①	②	③	④	⑤

①Inser name	
HBS	Back turning inserts

②Insert length（mm)	
15	15.4

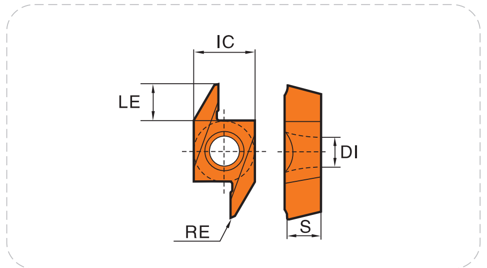
③Cutting direction	
R	dextral

④Thinkness	
4	4. 2

⑤Corner radius（mm)	
005	0.05

Back turning insert

Working condition: ● Stable ◕ Average ⌗ Tough



Workpiece material	HR1135	HR7125	HRK10	HRC10	HR115C
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)					PVD		Cemented carbide	Cermet	
			LE	IC	S	DI	RE	HR1135	HR7125	HRK10	HRC10	HR115C
Back turning		HBS15R4005	4.2	7	3.97	3.4	0.05	★	★		☆	
		HBS15R4015	4.2	7	3.97	3.4	0.15	★	★		☆	

★ Recommended grade ☆ Available grade

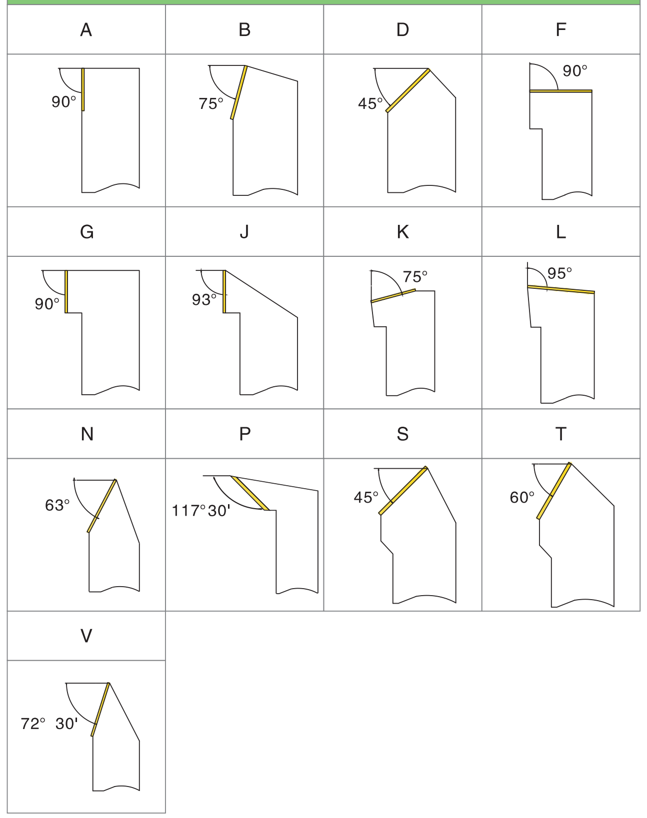
Cody key of external turning tools for precision small parts

S	C	L	C	R	12	12	JX	-	09
①	②	③	④	⑤	⑥	⑦	⑧		⑨

① Clamping method	
A	Backside calmping
C	Pressing calmping
P	Lever calmping
S	Screw calmping

②Insert shape	
C	80° rhombus
D	55° rhombus
S	Square
T	Regular triangle
V	35° rhombus

③ Cutting edge angle KAPR



④ Insert clearance angle	
B	5°Postive
C	7°Postive
N	0°Negative
P	11°Postive

⑤Cutting direction	
R	Right hand
L	Left hand
N	Left and right hands

⑥Corner height (mm)	
8	08
10	10
12	12
16	16
20	20
25	25

⑦Width of tool holder (mm)	
8	08
10	10
12	12
16	16
20	20
25	25

⑧ Tool length (mm)	
F	80
H	100
JX	120
K	125
M	150

⑨Cutting edge length (mm)

Inscribed circle of insert	Insert shape				
	Square	Regular triangle	80°rhombus	55°rhombus	35°rhombus
6.00	–	–	–	–	–
6.35	–	11	06	07	11
7.94	–	13	–	–	–
8.00	–	–	–	–	–
9.525	09	16	09	11	16
10.00	–	–	–	–	–
12.00	–	–	–	–	–
12.70	12	22	12	15	–

Cody key of internal turning tools for precision small parts

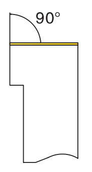
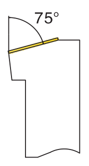
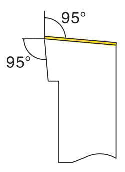
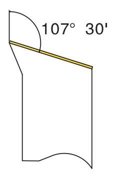
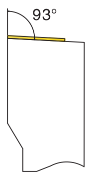
S	16	M	-	S	C	L	C	R	09
①	②	③		④	⑤	⑥	⑦	⑧	⑨

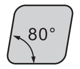
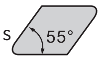
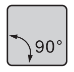
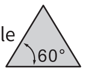
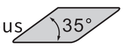
① Material of cutter bar	
S	Steel cutter bar

② Cutter bar diameter (mm)	
08	08
10	10
12	12
16	16
20	20
25	25
32	32

③ Shank length (mm)	
K	125
M	150
Q	180
R	200
S	250
T	300
U	350

④ Clamping method	
S	Screw clamp design

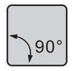
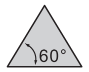
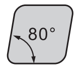
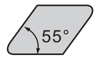
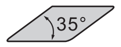
⑥ Cutting edge angle KAPR			
F	K	L	Q
			
U			
			

⑤ Insert shape		
C	80°Rhombus	
D	55°Rhombus	
S	Square	
T	Regular triangle	
V	35°Rhombus	

⑦ Insert clearance angle	
C	7°
P	11°

⑧Cutting direction	
R	Right hand
L	Left hand
N	Left and right hands

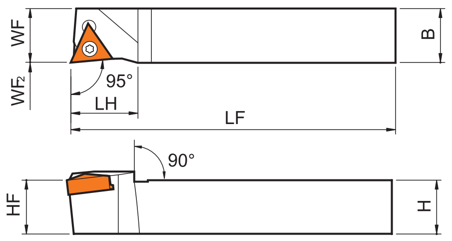
⑨Cutting edge length (mm)

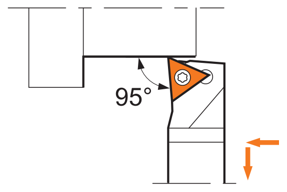
Inscribed circle of insert	Insert shape				
	Square 	Regular triangle 	80° Rhombus 	55° Rhombus 	35° Rhombus 
5.556	–	09	–	–	–
6.350	–	11	06	07	11
9.525	09	16	09	11	–
12.70	12	_	12	–	–

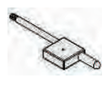
Precision small parts turning tools

STLN

KARP:95°



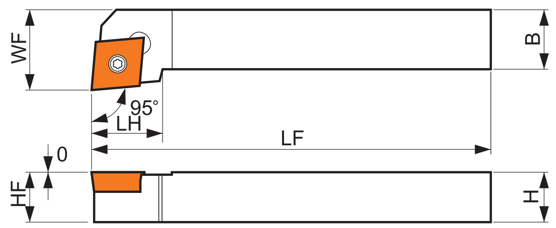


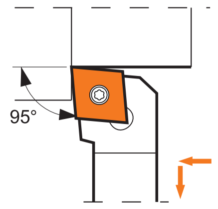
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
										Insert screw	Wrench	
		R	L	H	HF	B	LF	LH	WF			
STLNRL	1616JX–16	△	△	16	16	16	120	15	16	M4X10	WR15	TNGG16**
	2020JX–16	△	△	20	20	20	120	15	20			

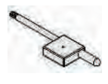
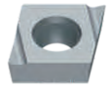
▲Running stock △Make-to-order

SCLCR/L

KARP:95°





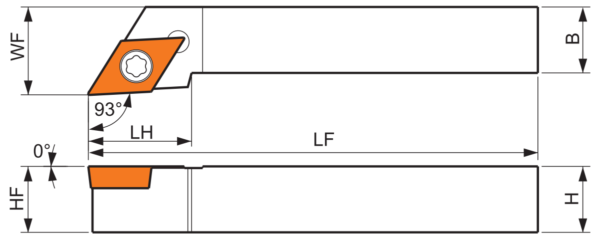
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
										Insert screw	Wrench	
		R	L	H	HF	B	LF	LH	WF			
SCLCR/L	1010F–06	△	△	10	10	10	80	9	12	M2.5X7	WR15	CCGT06**
	1010F–09	△	△	10	10	10	80	14	14	M4.0X8.5	WR15	CCGT09**
	1212H–09	▲	▲	12	12	12	100	14	16			
	1616H–09	△	△	16	16	16	100	15	20			
	2020K–09	△	△	20	20	20	125	22	25			
	2525M–09	△	△	25	25	25	150	22	32			

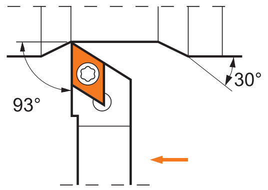
▲Running stock △Make-to-order

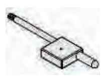
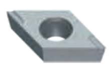
Precision small parts turning tools

SDJCR/L

KARP:93°



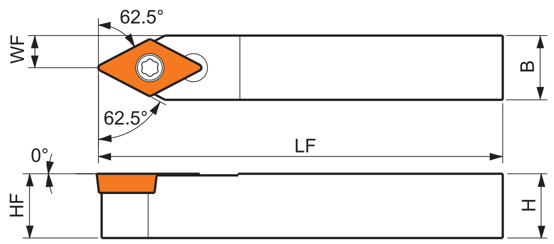


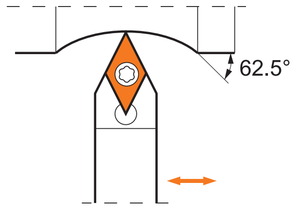
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
		R	L	H	HF	B	LF	LH	WF	Insert screw	Wrench	
												
SDJCR/L	1010F–07	△	△	10	10	10	80	12	12	M2.5X7	WR08	DCGT07**
	1010F–11	△	△	10	10	10	80	18	12	M4.0X8.5	WR15	DCGT11**
	1212H–11	▲	▲	12	12	12	100	18	16			
	1616H–11	△	△	16	16	16	100	18	20			
	2020K–11	△	△	20	20	20	125	18	25			
	2525M–11	△	△	25	25	25	150	23	32			

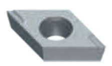
▲Running stock △Make-to-order

SDNCN

KARP:62.5°





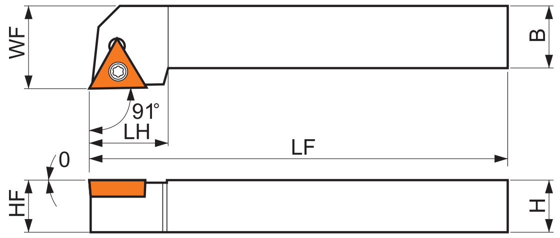
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	H	HF	B	LF	WF	Insert screw	Wrench	
											
SDNCN	1010JX–07	△	△	10	10	10	120	5	M2.5X7	WR8	DCGT07**
	1212JX–07	▲	▲	12	12	12	120	6			
	1010JX–11	△	△	10	10	10	120	5	M4.0X8.5	WR15	DCGT11**
	1212JX–11	▲	▲	12	12	12	120	6			
	1616JX–11	△	△	16	16	16	120	8			
	1010F–11	△	△	10	10	10	80	5			
	1212F–11	▲	▲	12	12	12	80	6			
	1616H–11	△	△	16	16	16	100	8			

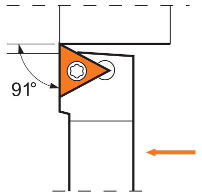
▲Running stock △Make-to-order

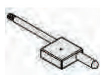
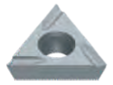
Precision small parts turning tools

STGC(P)

KARP:91°





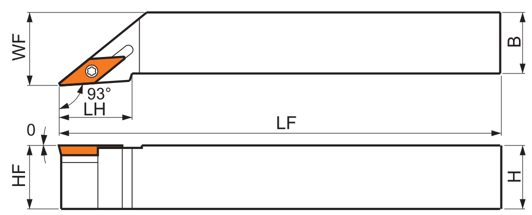
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
		R	L	H	HF	B	LF	LH	WF	Insert screw	Wrench	
												
STGCR/L	0808E–08	△	△	8	8	8	70	12	10	M2.0X5	WR6	TCGT08**
	1010F–08	△	△	10	10	10	80	12	12			
	1010F–11	△	△	10	10	10	80	15	14	M2.5X7	WR8	TCGT11**
	1212H–11	▲	▲	12	12	12	100	15	16			
	1616H–11	△	△	16	16	16	100	15	20			
	2020K–11	△	△	20	20	20	125	15	25			
	2525M–11	△	△	25	25	25	150	20	32			
STGPR/L	0808E–08	△	△	8	8	8	70	12	10	M2.0X5	WR6	TPGT08**
	1010F–09	△	△	10	10	10	80	12	12			TPGH09**
	1010F–11	△	△	10	10	10	80	15	14	M2.5X7	WR8	TPGT11**
	1212H–11	▲	▲	12	12	12	100	15	16			
	1616H–11	△	△	16	16	16	100	15	20			

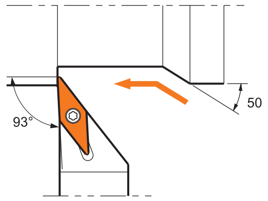
▲Running stock △Make-to-order

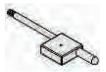
Precision small parts turning tools

SVJBR/L

KARP:93°



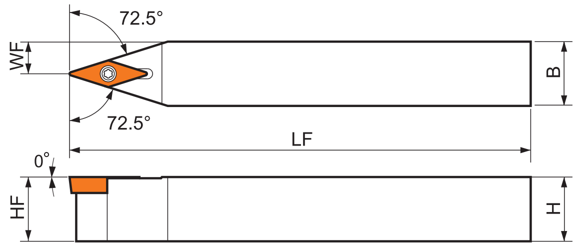


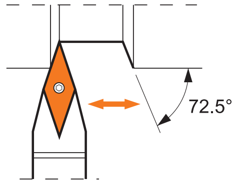
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
										Insert screw	Wrench	
		R	L	H	HF	B	LF	LH	WF			
SVJBR/L	2020K–11	△	△	20	20	20	125	30	10	M2.5X7	WR8	VBGT11**
	2525M–11	△	△	25	25	25	150	35	12.5			
	2020K–16	△	△	20	20	20	125	30	10	M4X12.5	WR15	VBGT16**
	2525M–16	△	△	25	25	25	150	30	12.5			

▲Running stock △Make-to-order

SVVBR/L

KARP:72.5°





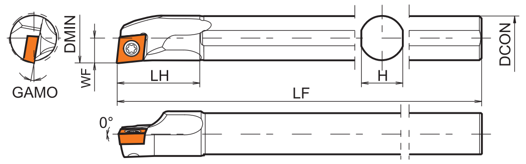
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
									Insert screw	Wrench	
		R	L	H	HF	B	LF	WF			
SVVBNL	1010JX–11	△	△	10	10	10	120	5	M2.5X7	WR8	VBGT11**
	1212JX–11	△	△	12	12	12	120	6			
	1616JX–11	△	△	16	16	16	120	8			
	1010F–11	△	△	10	10	10	80	5			
	1212F–11	△	△	12	12	12	85	6			
	1616H–11	△	△	16	16	16	100	8			
	2020K–11	△	△	20	20	20	125	10			
	2525M–11	△	△	25	25	25	150	12.5			
	2020K–16	△	△	20	20	20	125	10	M4X12.5	WR15	VBGT16**
	2525M–16	△	△	25	25	25	150	12.5			

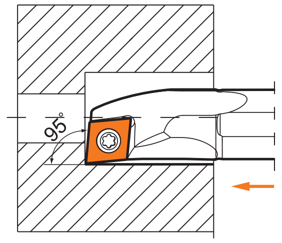
▲Running stock △Make-to-order

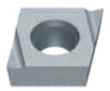
Precision small parts turning tools

S-SCLC

KARP:95°





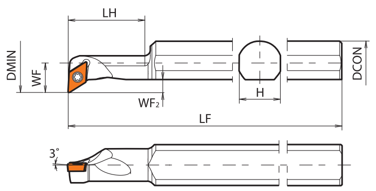
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
										Insert screw	Wrench	
		R	L	DMIN	DCON	H	LF	LH	WF			
S10–SCLCR/L	03–05AE	△	△	5	10	9	100	24	2.5	M1.6X3.5	WR6	CCGT03**
	03–06AE	△	△	6	10	9	100	28	3			
	04–07AE	△	△	7	10	9	100	32	3.5	M2.0X3.5	WR6	CCGT04**
	04–08AE	△	△	8	10	9	100	37	4			
	06–10AE	△	△	10	8	7	120	16	5	M2.5X4.5	WR8	CCGT06**
	06–12AE	▲	▲	12	10	9	140	20	6			
	06–14AE	△	△	14	12	11	150	24	7			
	09–18AE	△	△	18	16	15	180	30	9	M4.0X6.5	WR15	CCGT09**
	09–22AE	△	△	22	20	19	200	36	11			
	09–27AE	△	△	27	25	24	250	46	13.5			

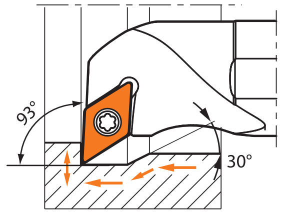
▲Running stock △Make-to-order

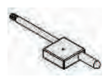
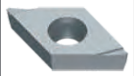
Precision small parts turning tools

S-SDUC-A

KARP:93°





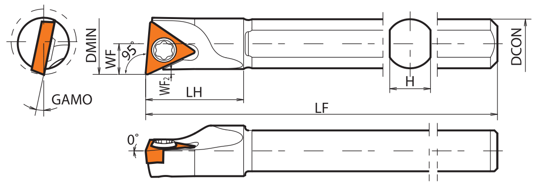
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	LH	WF	Insert screw	Wrench	
												
S10L–SDUC	07–14A	△	△	14	10	9	140	19	8.7	M2.5X6.0	WR8	DCGT07**
S16Q–SDUC	07–14A	△	△	14	16	15	180	28	10.8			
S12M–SDUC	07–16A	△	△	16	12	11	150	21	9.7			
S16Q–SDUC	07–20A	△	△	20	16	15	180	21	11.7			
S20R–SDUC	11–20A	△	△	20	20	19	200	48	15.6	M4.0X6.5	WR15	DCGT116**
S16Q–SDUC	11–23A	▲	▲	23	16	15	180	21	14.5			
S20R–SDUC	11–27A	△	△	27	20	19	200	23	16.5			
S25S–SDUC	11–32A	△	△	32	25	24	250	24	19			

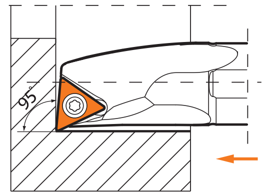
▲Running stock △Make-to-order

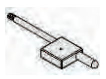
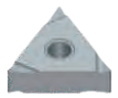
Precision small parts turning tools

S-STLB(P)

KARP:95°





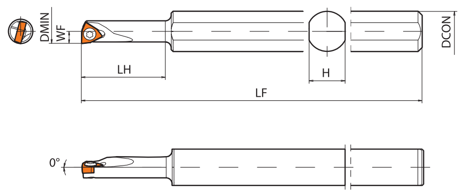
Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	LH	WF	Insert screw	Wrench	
												
S06H–STLB	06–08A	△	△	8	6	5	100	12	3.8	M2.0X3.5	WR6	TBGT06**
S08X–STLP	08–10A	△	△	10	8	7	120	16	5	M2.0X3.5	WR6	TPGH08**
	09–10A	△	△	10	8	7	120	16	5	M2.5X4.5	WR8	TPGH09**
S10L–STLP	09–12A	△	△	12	10	9	140	20	6.2			
	11–12A	△	△	12	10	9	140	20	6	M2.5X4.5	WR8	TPGH11**
S12M–STLP	11–14A	▲	▲	14	12	11	150	24	7.2			
	09–16A	△	△	16	12	11	150	24	8	M2.5X4.5	WR8	TPGH09**
S16Q–STLP	11–18A	△	△	18	16	15	180	30	9.2	M2.5X4.5	WR8	TPGH11**
S20R–STLP	11–22A	△	△	22	20	19	200	36	11.2			

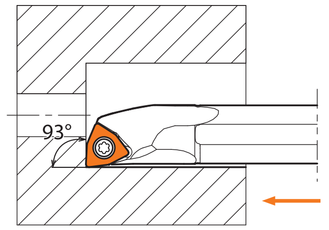
▲Running stock △Make-to-order

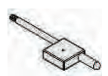
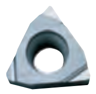
Precision small parts turning tools

S-SWUB

KARP:93°





Model		Inventory		Basic dimension (mm)						Accessories		Matching insert
										Insert screw	Wrench	
		R	L	DMIN	DCON	H	LF	LH	WF			
S10H–SWUBR/L	06–06A	△	△	6	10	9	100	21	3	M2.0X5	WR6	WBGT06**
	06–07A	△	△	7	10	9	100	25	3.5			

▲Running stock △Make-to-order

Shallow groove insert code key

TH	F	16	R	100	-	005	□□
①	②	③	④	⑤		⑥	⑦

①
T-shape shallow groove insert

②	
Insert type	
R	General (10°rake angle)
F	Sharp (20°rake angle)

③	
Inscribed circle diameter(mm)	
16	9.525
22	12.7

④	
Cutting direction	
R	righ hand
L	left hand

⑤	
Insert width(mm)	
100	1.0

⑥	
Corner ridus(mm)	
005	0.05

⑦	
Chipbreaker	
default	Straight type
R	Round type

Shallow groove tools code key

TH	R	25	25	R	22	-	M	25
①	②	③	④	⑤	⑥		⑦	⑧

①
Shallow groove machining tools

②	
Applicable insert	
R	General type
F	Sharp type

③	
Corner height(mm)	
25	25

④	
Cutter width(mm)	
25	25

⑤	
Cutting direction	
R	righ hand
L	left hand

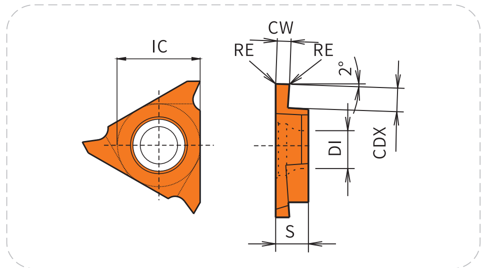
⑥	
Inscribed circle diameter(mm)	
16	9.525
22	12.7

⑦	
Shank length(mm)	
F	120
K	125
M	150

⑧	
Application(mm)	
default	General
15	Width of cut<2.5
25	2.5≤Width of cut<3.5
35	3.5≤Width of cut

THR16 series—General type

Working condition: ● Stable ◕ Average ⌘ Tough



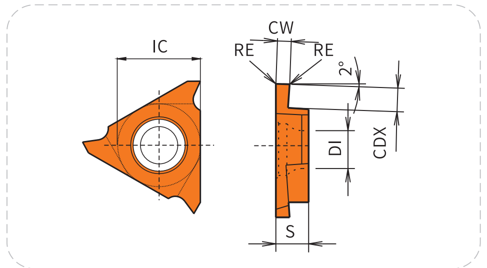
Workpiece material		HR1135	HR7125	HRK10	HRC10	HR115C
P	Steel	●	● ◕		●	●
M	Stainless steel	● ◕	● ◕			
K	Cast iron					
N	Non-ferrous metal			● ◕		
S	Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)						PVD		Cemented carbide	Cermet		Applicable tool
			IC	S	DI	CW	CDX	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
shallow groove machining		THR16R050–005	9.525	3.2	4.4	0.50	1.2	0.05	★	★				THR***R16–K THR***R16–M Page (A149)
		THR16R075–005	9.525	3.2	4.4	0.75	2.0	0.05	★	★				
		THR16R100–005	9.525	3.2	4.4	1.00	2.0	0.05	★	★				
		THR16R125–020	9.525	3.2	4.4	1.25	2.0	0.2	★	★				
		THR16R150–020	9.525	3.2	4.4	1.50	2.5	0.2	★	★				
		THR16R175–020	9.525	3.2	4.4	1.75	2.5	0.2	★	★				
		THR16R200–020	9.525	3.2	4.4	2.00	2.5	0.2	★	★				
		THR16R225–020	9.525	3.2	4.4	2.25	2.5	0.2	★	★				
		THR16R250–020	9.525	3.2	4.4	2.50	2.5	0.2	★	★				
		THR16R300–020	9.525	3.2	4.4	3.00	2.5	0.2	★	★				
		THR16L050–005	9.525	3.2	4.4	0.50	1.2	0.05	★	★				THR***L16–K THR***L16–M Page (A149)
		THR16L075–005	9.525	3.2	4.4	0.75	2.0	0.05	★	★				
		THR16L100–005	9.525	3.2	4.4	1.00	2.0	0.05	★	★				
		THR16L125–020	9.525	3.2	4.4	1.25	2.0	0.2	★	★				
		THR16L150–020	9.525	3.2	4.4	1.50	2.5	0.2	★	★				
		THR16L175–020	9.525	3.2	4.4	1.75	2.5	0.2	★	★				
		THR16L200–020	9.525	3.2	4.4	2.00	2.5	0.2	★	★				
		THR16L225–020	9.525	3.2	4.4	2.25	2.5	0.2	★	★				
		THR16L250–020	9.525	3.2	4.4	2.50	2.5	0.2	★	★				
		THR16L300–020	9.525	3.2	4.4	3.00	2.5	0.2	★	★				

Models not listed in the table, able to customize ★ Recommended grade ☆ Available grade

THR22 series—General type

Working condition: ● Stable ◕ Average ⌘ Tough



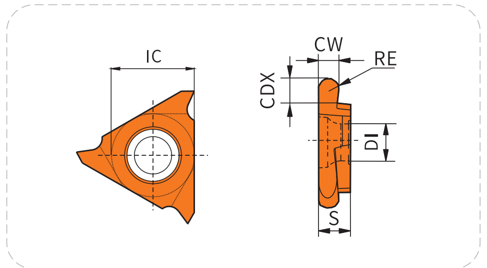
Workpiece material		HR1135	HR7125	HRK10	HRC10	HR115C
P	Steel	●	● ◕		●	●
M	Stainless steel	● ◕	● ◕			
K	Cast iron					
N	Non-ferrous metal			● ◕		
S	Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)						PVD		Cemented carbide	Cermet		Applicable tool
			IC	S	DI	CW	CDX	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
shallow groove machining		THR22R125–020	12.7	4.8	5.5	1.25	2.0	0.2	★	★				THR***R22–K15 THR***R22–M15 Page (A149)
		THR22R150–020	12.7	4.8	5.5	1.50	3.5	0.2	★	★				
		THR22R175–020	12.7	4.8	5.5	1.75	3.5	0.2	★	★				
		THR22R200–020	12.7	4.8	5.5	2.00	3.5	0.2	★	★				
		THR22R225–020	12.7	4.8	5.5	2.25	3.5	0.2	★	★				
		THR22R250–030	12.7	4.8	5.5	2.50	5.0	0.3	★	★				THR***R22–K25 THR***R22–M25 Page (A149)
		THR22R300–030	12.7	4.8	5.5	3.00	5.0	0.3	★	★				
		THR22R350–030	12.7	4.8	5.5	3.50	5.0	0.3	★	★				THR***R22–K35 THR***R22–M35 Page (A149)
		THR22R400–040	12.7	4.8	5.5	4.00	5.0	0.4	★	★				
		THR22R450–040	12.7	4.8	5.5	4.50	5.0	0.4	★	★				
		THR22L125–020	12.7	4.8	5.5	1.25	2.0	0.2	★	★				THR***L22–K15 THR***L22–M15 Page (A149)
		THR22L150–020	12.7	4.8	5.5	1.50	3.5	0.2	★	★				
		THR22L175–020	12.7	4.8	5.5	1.75	3.5	0.2	★	★				
		THR22L200–020	12.7	4.8	5.5	2.00	3.5	0.2	★	★				
		THR22L225–020	12.7	4.8	5.5	2.25	3.5	0.2	★	★				
		THR22L250–030	12.7	4.8	5.5	2.50	5.0	0.3	★	★				THR***L22–K25 THR***L22–M25 Page (A149)
		THR22L300–030	12.7	4.8	5.5	3.00	5.0	0.3	★	★				
		THR22L350–030	12.7	4.8	5.5	3.50	5.0	0.3	★	★				THR***L22–K35 THR***L22–M35 Page (A149)
		THR22L400–040	12.7	4.8	5.5	4.00	5.0	0.4	★	★				
		THR22L450–040	12.7	4.8	5.5	4.50	5.0	0.4	★	★				

Models not listed in the table, able to customize ★ Recommended grade ☆ Available grade

Profile series

Working condition: ● Stable ◔ Average ⌘ Tough



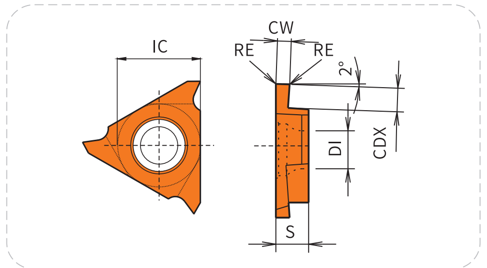
Workpiece material	P Steel	●	● ◔		●	●
	M Stainless steel	● ◔	● ◔			
	K Cast iron					
	N Non-ferrous metal			● ◔		
	S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)						PVD		Cemented carbide	Cermet		Applicable tool
			IC	S	DI	CW	CDX	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
shallow groove machining (profile)	 	THR16R200–100R	9.525	3.2	4.4	2.00	2.5	1.00	★	★				THR∗∗∗R16–K THR∗∗∗R16–M Page (A149)
		THR16R300–150R	9.525	3.2	4.4	3.00	2.5	1.50	★	★				
		THR16L200–100R	9.525	3.2	4.4	2.00	2.5	1.00	★	★				THR∗∗∗L16–K THR∗∗∗L16–M Page (A149)
		THR16L300–150R	9.525	3.2	4.4	3.00	2.5	1.50	★	★				
		THR22R100–050R	12.7	4.8	5.5	1.00	2.0	0.50	★	★				THR∗∗∗R22–K15 THR∗∗∗R22–M15 Page (A149)
		THR22R150–075R	12.7	4.8	5.5	1.50	3.5	0.75	★	★				
		THR22R200–100R	12.7	4.8	5.5	2.00	3.5	1.00	★	★				
		THR22R250–125R	12.7	4.8	5.5	2.50	4.0	1.25	★	★				THR∗∗∗R22–K25 THR∗∗∗R22–M25 Page (A149)
		THR22R300–150R	12.7	4.8	5.5	3.00	4.0	1.50	★	★				
		THR22R400–200R	12.7	4.8	5.5	4.00	5.0	2.00	★	★				THR∗∗∗R22–K35 THR∗∗∗R22–M35 Page (A149)
		THR22L100–050R	12.7	4.8	5.5	1.00	2.0	0.50	★	★				THR∗∗∗L22–K15 THR∗∗∗L22–M15 Page (A149)
		THR22L150–075R	12.7	4.8	5.5	1.50	3.5	0.75	★	★				
		THR22L200–100R	12.7	4.8	5.5	2.00	3.5	1.00	★	★				
		THR22L250–125R	12.7	4.8	5.5	2.50	4.0	1.25	★	★				THR∗∗∗L22–K25 THR∗∗∗L22–M25 Page (A149)
		THR22L300–150R	12.7	4.8	5.5	3.00	4.0	1.50	★	★				
		THR22L400–200R	12.7	4.8	5.5	4.00	5.0	2.00	★	★				THR∗∗∗L22–K35 THR∗∗∗L22–M35 Page (A149)

Models not listed in the table, able to customize ★ Recommended grade ☆ Available grade

THF16 Series - Sharp type

Working condition: ● Stable ◔ Average ⌘ Tough

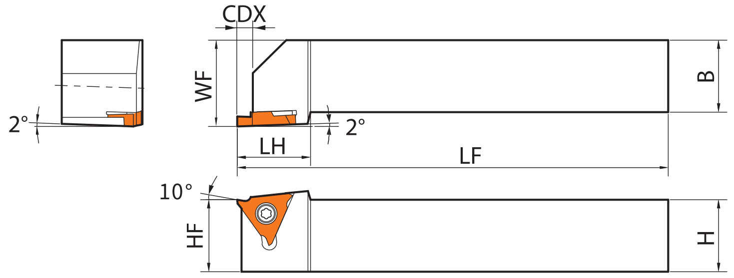


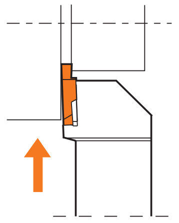
Workpiece material	P Steel	●	● ◔		●	●
	M Stainless steel	● ◔	● ◔			
	K Cast iron					
	N Non-ferrous metal			● ◔		
	S Heat-resistant alloy Titanium alloy	●	●			

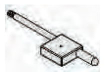
Machining type	Insert shape	Type	Basic dimension (mm)						PVD		Cemented carbide	Cermet		Applicable tool
			IC	S	DI	CW	CDX	RE	HR1135	HR7125	HRK10	HRC10	HR115C	
shallow groove machining		THF16R025–005	9.525	3.2	4.4	0.25	0.6	0.05	★	★				THF∗∗∗R16–F Page (A150)
		THF16R050–005	9.525	3.2	4.4	0.50	1.2	0.05	★	★				
		THF16R075–005	9.525	3.2	4.4	0.75	2.0	0.05	★	★				
		THF16R100–005	9.525	3.2	4.4	1.00	2.0	0.05	★	★				
		THF16R125–010	9.525	3.2	4.4	1.25	2.0	0.1	★	★				
		THF16R150–010	9.525	3.2	4.4	1.50	2.7	0.1	★	★				
		THF16R175–010	9.525	3.2	4.4	1.75	3.0	0.1	★	★				
		THF16R200–010	9.525	3.2	4.4	2.00	3.0	0.1	★	★				
		THF16R225–010	9.525	3.2	4.4	2.25	3.0	0.1	★	★				
		THF16R250–010	9.525	3.2	4.4	2.50	3.0	0.1	★	★				
		THF16R300–010	9.525	3.2	4.4	3.00	3.0	0.1	★	★				
		THF16L025–005	9.525	3.2	4.4	0.25	0.6	0.05	★	★				THF∗∗∗L16–F Page (A150)
		THF16L050–005	9.525	3.2	4.4	0.50	1.2	0.05	★	★				
		THF16L075–005	9.525	3.2	4.4	0.75	2.0	0.05	★	★				
		THF16L100–005	9.525	3.2	4.4	1.00	2.0	0.05	★	★				
		THF16L125–010	9.525	3.2	4.4	1.25	2.0	0.1	★	★				
		THF16L150–010	9.525	3.2	4.4	1.50	2.7	0.1	★	★				
		THF16L175–010	9.525	3.2	4.4	1.75	3.0	0.1	★	★				
		THF16L200–010	9.525	3.2	4.4	2.00	3.0	0.1	★	★				
		THF16L225–010	9.525	3.2	4.4	2.25	3.0	0.1	★	★				
		THF16L250–010	9.525	3.2	4.4	2.50	3.0	0.1	★	★				
		THF16L300–010	9.525	3.2	4.4	3.00	3.0	0.1	★	★				

Models not listed in the table, able to customize ★ Recommended grade ☆ Available grade

Shallow groove tools

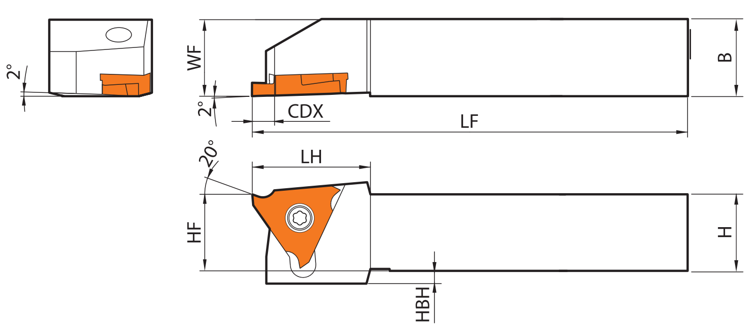


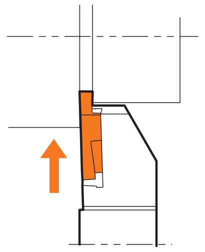


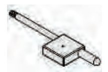
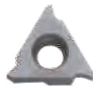
Model		Basic dimension (mm)								Screw	Wrench	Applicable insert
		Inventory	H	HF	B	LF	LH	WF	CDX			
THR	2020R16–K	▲	20	20	20	125	24	25	2.5	STH□16	WR8	THR16□□
	2020L16–K	△	20	20	20	125	24	25	2.5			
	2525R16–M	▲	25	25	25	150	24	30	2.5			
	2525L16–M	▲	25	25	25	150	24	30	2.5			
	2020R22–K15	▲	20	20	20	125	25.5	25	4	STH□22	WR15	THR22□□
	2020L22–K15	△	20	20	20	125	25.5	25	4			
	2525R22–M15	▲	25	25	25	150	25.5	30	4			
	2525L22–M15	△	25	25	25	150	25.5	30	4			
	2020R22–K25	▲	20	20	20	125	25.5	25	5.5			
	2020L22–K25	△	20	20	20	125	25.5	25	5.5			
	2525R22–M25	▲	25	25	25	150	25.5	30	5.5			
	2525L22–M25	△	25	25	25	150	25.5	30	5.5			
	2020R22–K35	▲	20	20	20	125	25.5	25	5.5			
	2020L22–K35	△	20	20	20	125	25.5	25	5.5			
	2525R22–M35	▲	25	25	25	150	25.5	30	5.5			
	2525L22–M35	△	25	25	25	150	25.5	30	5.5			

▲Running stock △Make-to-order

Shallow groove tools





Model		Basic dimension (mm)									Screw	Wrench	Applicable insert
		Inventory	H	HF	HBH	B	LF	LH	WF	CDX			
THF	1010R16–F	▲	10	10	4	10	120	18.5	10	3	STH□16	WR15	THF16□□
	1010L16–F	▲	10	10	4	10	120	18.5	10	3			
	1212R16–F	▲	12	12	2	12	120	18.5	12	3			
	1212L16–F	▲	12	12	2	12	120	18.5	12	3			
	1616R16–F	▲	16	16	–	16	120	18.5	16	3			
	1616L16–F	▲	16	16	–	16	120	18.5	16	3			
	2020R16–F	▲	20	20	–	20	120	18.5	20	3			
	2020L16–F	▲	20	20	–	20	120	18.5	20	3			

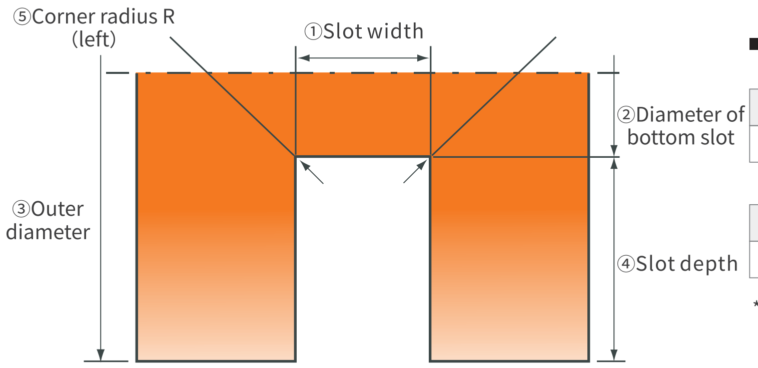
▲Running stock △Make-to-order

Shallow groove insert cutomization form

STEP 1

Chipbreaker type comfirmed

Type A



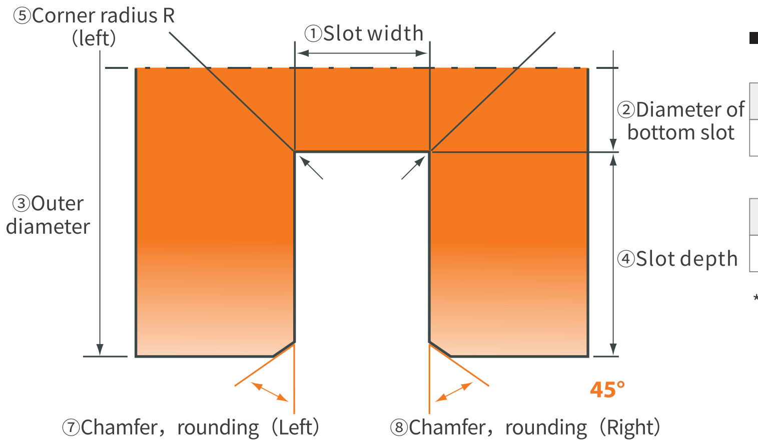
Customization form

Slot width/(mm)	⩽0.5	⩽1.25
Slot max/(mm)	⩽1.2	⩽2.0

Slot width/(mm)	⩽3	⩽4.5
Slot max/(mm)	⩽5.0	⩽5.0

*Corner radius could be accruate to 0.05mm

Type B



Customization form

Slot width/(mm)	⩽0.5	⩽1.25
Slot max/(mm)	⩽1.2	⩽2.0

Slot width/(mm)	⩽3	⩽4.5
Slot max/(mm)	⩽5.0	⩽5.0

*Corner radius could be accruate to 0.05mm

Shallow groove insert cutomization form

STEP 2

Fill in the form

1	Slot width	mm（tolerance：　）
2	Diameter of bottom slot	mm（tolerance：　）
3	Outer diameter	left：　（tolerance：　）
		right：　（tolerance：　）
4	Slot depth	left：
		right：
5	Corner radius	left：
		right：
6	Chamfer，rounding	left：　mm×45°
		right：　mm×45°

STEP 3

Fill in the form

workpiece		cooling type	
cutting parameter			
worn out standaard			
tool type		☐THF	☐THR
tool size		tool direction	

STEP 4

Fill in the form

Commpany name		Occupation	
Name		Cellphone	
Address			

Recommended cutting parameters for shallow groove insert

Workpieces	Recommended cutting parameters							
	Cutting speed（m/min）				(1)Feed under grooving machining（mm/rev） (2)Feed under plunge turning（mm/rev） (3) Ap under plunge turning（mm）			
	HR1135	HR7125	HRC10	HRK10	TH□□ 025-100	TH□□ 125-200	TH□□ 225-300	TH□□ 350-450
Carbon Steel	80-180	80-180	80-200		(1)0.03-0.08 (2)Not suggest (3)Not suggest	(1)0.04-0.09 (2) 0.04-0.09 (3)max 0.3	(1)0.05-0.12 (2) 0.05-0.09 (3)max 0.5	(1)0.05-0.12 (2) 0.05-0.1 (3)max 0.8
Alloy Steel	60-150	60-150	60-180		(1)0.03-0.07 (2)Not suggest (3)Not suggest	(1)0.04-0.09 (2) 0.04-0.09 (3)max 0.3	(1)0.05-0.1 (2) 0.05-0.09 (3)max 0.5	(1)0.05-0.1 (2) 0.05-0.1 (3)max 0.5
Stainless Steel	50-150	50-130			(1)0.03-0.07 (2)Not suggest (3)Not suggest	(1)0.04-0.08 (2) 0.04-0.08 (3)max 0.3	(1)0.05-0.09 (2) 0.05-0.09 (3)max 0.5	(1)0.05-0.1 (2) 0.05-0.1 (3)max 0.5
Cast iron				60-120	(1)0.03-0.08 (2)Not suggest (3)Not suggest	(1)0.04-0.09 (2) 0.04-0.09 (3)max 0.3	(1)0.05-0.1 (2) 0.05-0.1 (3)max 0.5	(1)0.05-0.12 (2) 0.05-0.1 (3)max 0.8
Aluminum alloy				150-400	(1)0.05-0.12 (2)Not suggest (3)Not suggest	(1)0.05-0.15 (2) 0.05-0.15 (3)max 0.5	(1)0.08-0.15 (2) 0.08-0.15 (3)max 0.8	(1)0.08-0.15 (2) 0.08-0.15 (3)max 0.8
Quenched steel, High hardness		60-120				(1)0.02-0.05 (2)Not suggest (3)Not suggest	(1)0.03-0.07 (2) 0.01-0.04 (3)max 0.1	

Notes:This table is about parameters of the external grooving machining. During internal grooving machining, the cutting speed and feed rate should be lower by about 10%.

Precision small parts parting & grooving insert code key

PTA 12 R 100 - S - 16 R
① ② ③ ④ ⑤ ⑥ ⑦

①	
Insert type	
PTA	parting & grooving insert

②	
APMX（mm）	
12	12
16	16

③	
Insert direction	
R	Dextral
L	Sinistral

④	
Cutting edge width（mm）	
100	1.0

⑤	
Chipbreaker type	
S	S type

⑥	
Cutting edge angle	
default	0°
16	16°

⑦	
Cutting edge inclined dirction	
R	Right
L	Left

Precision small parts parting & grooving tool code key

HRPTA 12 12 R - 12
① ② ③ ④ ⑤

①	
Tool type	
HRPTA	Precision small parts parting & grooving tool

②	
Corner hight（mm）	
12	12

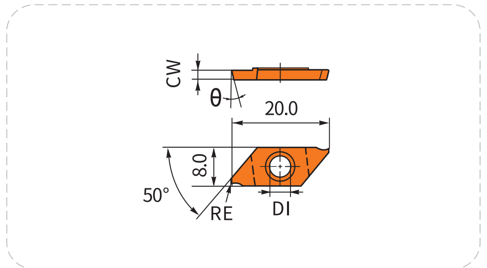
③	
Cutter width（mm）	
12	12

④	
Tool dirction	
R	Dextral
L	Sinistral

⑤	
Max Parting diameter（mm）	
12	12
16	16

PTA12 Series

Working condition: ● Stable ◕ Average ⌗ Tough



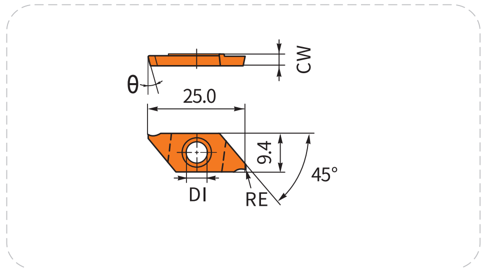
Workpiece material	P Steel	●	● ◕		●	●
	M Stainless steel	● ◕	● ◕			
	K Cast iron					
	N Non-ferrous metal			● ◕		
	S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			CW	θ	RE	DI	T-Max	HR1135	HR7125	HRK10	HRC10	HR115C	
Parting & grooving		PTA12R050–S	0.50	0°	0.05	4.6	2.5	★	★				HRPTA***R/L–12 Page (A157)
		PTA12R070–S	0.70	0°	0.05	4.6	4	★	★				
		PTA12R100–S	1.00	0°	0.05	4.6	6	★	★				
		PTA12R125–S	1.25	0°	0.05	4.6	6	★	★				
		PTA12R150–S	1.50	0°	0.05	4.6	6	★	★				
		PTA12R200–S	2.00	0°	0.05	4.6	6	★	★				
		PTA12L050–S	0.50	0°	0.05	4.6	2.5	★	★				
		PTA12L070–S	0.70	0°	0.05	4.6	4	★	★				
		PTA12L100–S	1.00	0°	0.05	4.6	6	★	★				
		PTA12L125–S	1.25	0°	0.05	4.6	6	★	★				
		PTA12L150–S	1.50	0°	0.05	4.6	6	★	★				
		PTA12L200–S	2.00	0°	0.05	4.6	6	★	★				
		PTA12R050–S–16R	0.50	16°	0.05	4.6	2.5	★	★				HRPTA***R/L–12 Page (A157)
		PTA12R070–S–16R	0.70	16°	0.05	4.6	4	★	★				
		PTA12R100–S–16R	1.00	16°	0.05	4.6	5.5	★	★				
		PTA12R125–S–16R	1.25	16°	0.05	4.6	5.5	★	★				
		PTA12R150–S–16R	1.50	16°	0.05	4.6	5.5	★	★				
		PTA12R200–S–16R	2.00	16°	0.05	4.6	5.5	★	★				
		PTA12L050–S–16R	0.50	16°	0.05	4.6	2.5	★	★				
		PTA12L070–S–16R	0.70	16°	0.05	4.6	4	★	★				
		PTA12L100–S–16R	1.00	16°	0.05	4.6	5.5	★	★				
		PTA12L125–S–16R	1.25	16°	0.05	4.6	5.5	★	★				
		PTA12L150–S–16R	1.50	16°	0.05	4.6	5.5	★	★				
		PTA12L200–S–16R	2.00	16°	0.05	4.6	5.5	★	★				

Models not listed in the table, able to customize ★ Recommended grade ☆Available grade

PTA16 Series

Working condition: ● Stable ◕ Average ⌗ Tough

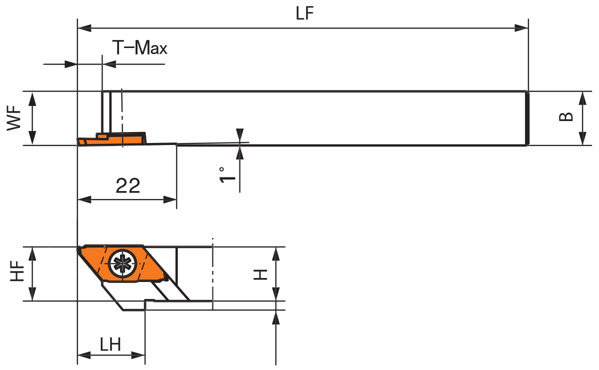


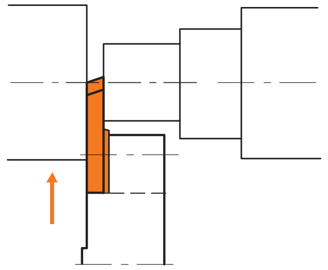
Workpiece material	P Steel	●	● ◕		●	●
	M Stainless steel	● ◕	● ◕			
	K Cast iron					
	N Non-ferrous metal			● ◕		
	S Heat-resistant alloy Titanium alloy	●	●			

Machining type	Insert shape	Type	Basic dimension (mm)					PVD		Cemented carbide	Cermet		Applicable tool
			CW	θ	RE	DI	T-Max	HR1135	HR7125	HRK10	HRC10	HR115C	
Parting & grooving		PTA16R150–S	1.50	0°	0.05	4.6	8	★	★				HRPTA***R/L–16 Page (A158)
		PTA16R200–S	2.00	0°	0.05	4.6	8	★	★				
		PTA16R300–S	3.00	0°	0.05	4.6	8	★	★				
		PTA16L150–S	1.50	0°	0.05	4.6	8	★	★				
		PTA16L200–S	2.00	0°	0.05	4.6	8	★	★				
		PTA16L300–S	3.00	0°	0.05	4.6	8	★	★				
		PTA16R150–S–16R	1.50	16°	0.05	4.6	8	★	★				HRPTA***R/L–16 Page (A158)
		PTA16R200–S–16R	2.00	16°	0.05	4.6	8	★	★				
		PTA16R300–S–16R	3.00	16°	0.05	4.6	8	★	★				
		PTA16L150–S–16R	1.50	16°	0.05	4.6	8	★	★				
		PTA16L200–S–16R	2.00	16°	0.05	4.6	8	★	★				
		PTA16L300–S–16R	3.00	16°	0.05	4.6	8	★	★				

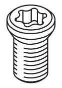
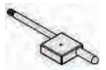
Models not listed in the table, able to customize ★ Recommended grade ☆Available grade

Precision small parts parting & grooving tools



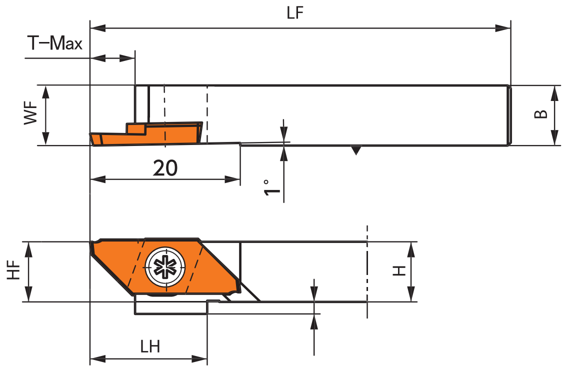


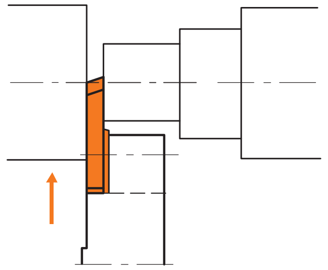
Max grooving diameterΦ12

Model		Basic dimension (mm)								Screw	Wrench	Applicable insert
		Inventory	H	HF	B	LF	LH	WF	T-Max			
HRPTA	1010R–12	▲	10	10	10	120	15	10	6	STH□16	WR8	PTA12□□
	1010L–12	△	10	10	10	120	15	10	6			
	1212R–12	▲	12	12	12	120	15	12	6			
	1212L–12	▲	12	12	12	120	15	12	6			
	1616R–12	▲	16	16	16	120	15	16	6			
	1616L–12	△	16	16	16	120	15	16	6			
	2020R–12	▲	20	20	20	120	15	20	6			
	2020L–12	△	20	20	20	120	15	20	6			

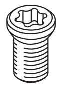
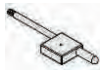
▲Running stock　△Make-to-order

Precision small parts parting & grooving tools





Max grooving diameterΦ16

Model		Basic dimension (mm)								Screw	Wrench	Applicable insert
		Inventory	H	HF	B	LF	LH	WF	T-Max			
HRPTA	1010R–16	▲	10	10	10	120	20	10	8	STH□16	WR8	PTA16□□
	1010L–16	△	10	10	10	120	20	10	8			
	1212R–16	▲	12	12	12	120	20	12	8			
	1212L–16	▲	12	12	12	120	20	12	8			
	1616R–16	▲	16	16	16	120	20	16	8			
	1616L–16	△	16	16	16	120	20	16	8			
	2020R–16	▲	20	20	20	120	20	20	8			
	2020L–16	△	20	20	20	120	20	20	8			

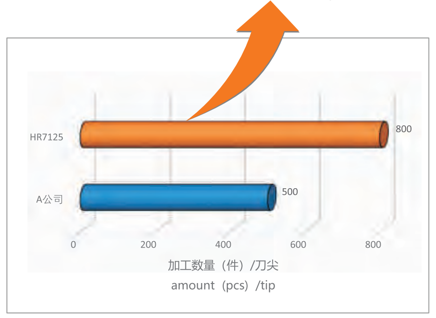
▲Running stock　△Make-to-order

Machining case-Cutting tools for precision and small works

Screw machining

Workpieces materials	S45C（25-28HRC）
Machining method	External turning, wet type
Insert	TNGG160402R-PF/HR115C
Machining parameters	Vc=160m/min，f=0.05mm/r，ap=1.5mm
Cooling method	Water cooling

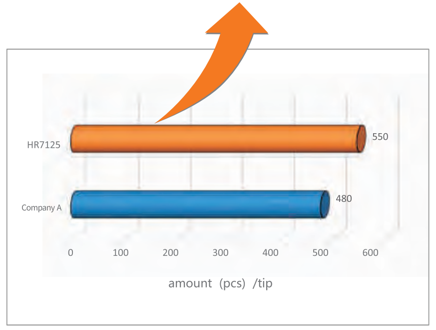
Its service life is extended by 60%



Grinding tool machining

Workpieces materials	S45C（25-28HRC）
Machining method	External turning, wet type
Insert	TNGG160402R-PF/HR115C
Machining parameters	Vc=160m/min，f=0.05mm/r，ap=1.5mm
Cooling method	Water cooling

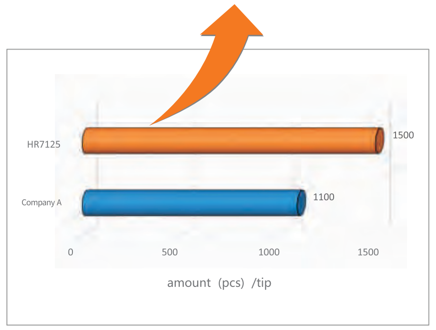
Its service life is extended by about 14%



Camera part machining

Workpieces materials	Stainless steel 303（20HRC）
Machining method	External turning, wet type
Insert	THR16R200-100R/HR7125
Machining parameters	Vc=100m/min，f=0.06mm/r，ap=1.8mm
Cooling method	Water cooling

Its service life is extended by 36%

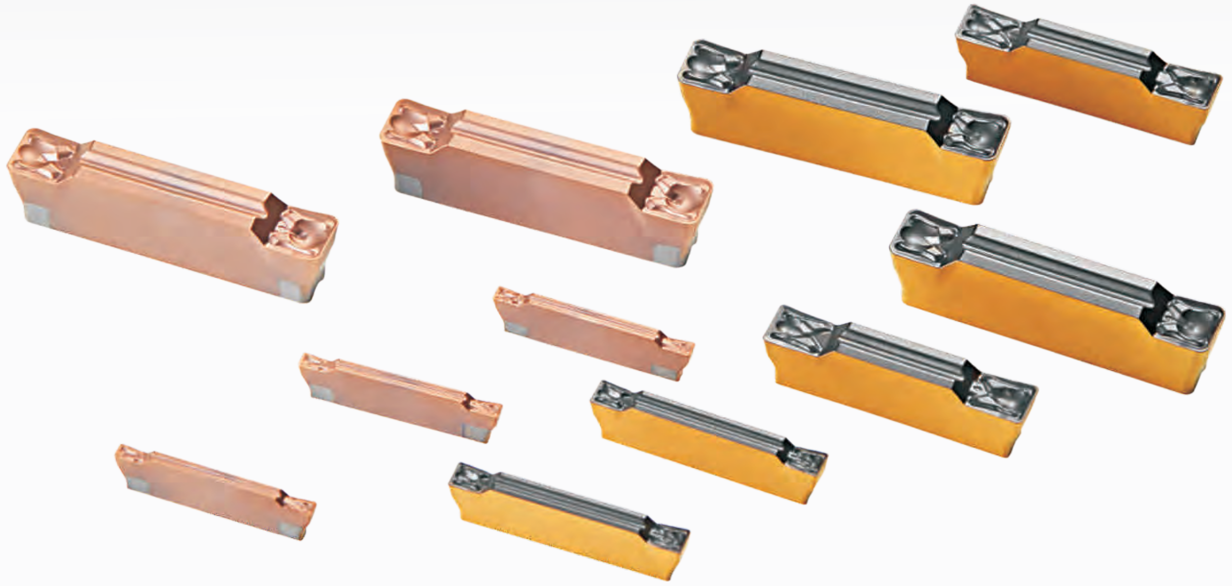


Parting and Grooving

CT Type chipbreaker

Grooving and plunge turning

Positioning slot optimized
Reduce the risk of abnormal insert breakage



GT Type chipbreaker

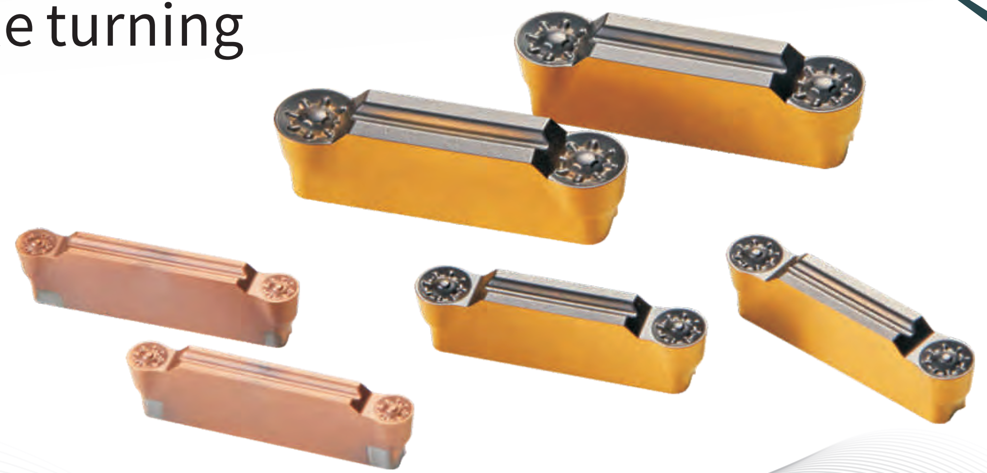
Parting and Grooving specialization

Meet the needs of high-feed grooving machining

All around chip control,meet the processing requirement of highersurface quality

RM-Type Chipbreaker

Profile turning



Non-Standard Customization

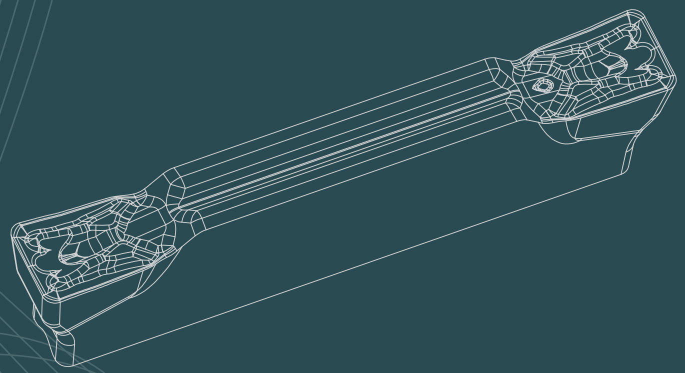
- Possess the ability to develope non-standardgrooving insert，and also able to customizefor different industry. Such as the aviation industry

- Targeted developement of chipbreaker structurebased on the characteristics of workpiece materialto meet the requirements of chip control， tool services life,etc

A

Turning

Parting and grooving



Code key of grooving inserts

QC M B 30 04 — CT
① ② ③ ④ ⑤ ⑥

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

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

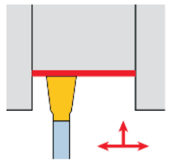
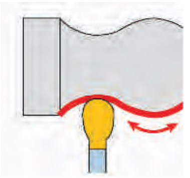
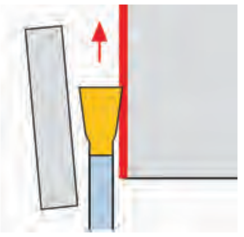
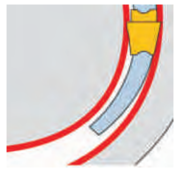
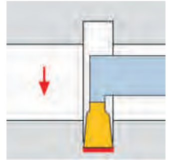
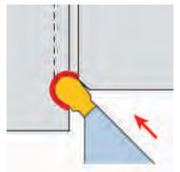
③Cutting edge count	
Code	Number of cutting edges
A	Single insert
B	Double inserts
C	Triple inserts

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

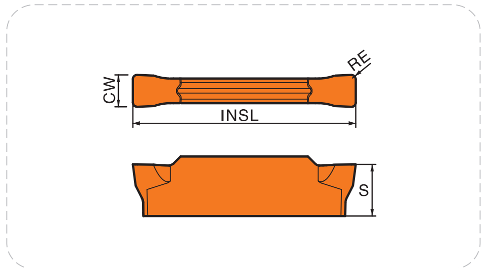
⑤ Corner radius	
Code	Corner radius (mm)
00	0.00
02	0.20
03	0.30
04	0.40
08	0.80

⑥Chipbreaker 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□□ QPMB□□	● 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□□	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.

Parting and grooving insert



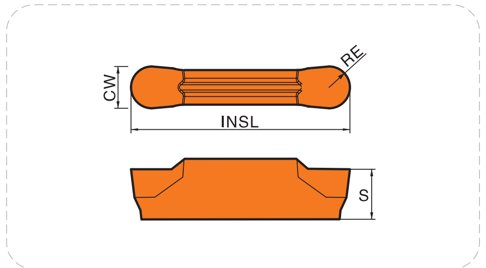
Working condition: ● Stable ◕ Average ⌑ Tough

Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
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	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Parting and grooving		QCMB1502–GT	16.0	1.5 ($^{+0.03}_{0}$)	3.50	0.2 (± 0.03)		☆		★		☆				☆	★						
		QCMB2002–GT	16.0	2.0 ($^{+0.03}_{0}$)	3.55	0.2 (± 0.03)		☆		★		☆				☆	★						
		QCMB2502–GT	18.5	2.5 ($^{+0.05}_{0}$)	3.90	0.2 (± 0.05)		☆		★		☆				☆	★						
		QCMB3002–GT	21.0	3.0 ($^{+0.05}_{0}$)	4.86	0.2 (± 0.05)		☆		★		☆				☆	★						
		QCMB4002–GT	21.0	4.0 ($^{+0.05}_{0}$)	4.86	0.2 (± 0.05)		☆		★		☆				☆	★						
		QCMB5003–GT	26.0	5.0 ($^{+0.05}_{0}$)	5.80	0.3 (± 0.05)		☆		★		☆				☆	★						
		QCMB6003–GT	26.0	6.0 ($^{+0.05}_{0}$)	5.90	0.3 (± 0.05)		☆		★		☆				☆	★						
Grooving		QCKB2002	16.0	2.0 (± 0.02)	3.55	0.2 (± 0.05)										☆	★						
		QCKB3004	21.0	3.0 (± 0.025)	4.86	0.4 (± 0.05)										☆	★						
		QCKB4004	21.0	4.0 (± 0.025)	4.86	0.4 (± 0.05)										☆	★						
		QCKB5008	26.0	5.0 (± 0.025)	5.80	0.8 (± 0.05)										☆	★						
Grooving and plunge turning		QCMB1502–CT	16.0	1.5 ($^{+0.03}_{0}$)	3.50	0.2 (± 0.03)		☆		★		☆				☆	★						
		QCMB2002–CT	16.0	2.0 ($^{+0.03}_{0}$)	3.55	0.2 (± 0.03)		☆		★		☆				☆	★						
		QCMB2502–CT	18.5	2.5 ($^{+0.05}_{0}$)	3.90	0.2 (± 0.05)		☆		★		☆				☆	★						
		QCMB3004–CT	21.0	3.0 ($^{+0.05}_{0}$)	4.86	0.4 (± 0.05)		☆		★		☆				☆	★						
		QCMB4004–CT	21.0	4.0 ($^{+0.05}_{0}$)	4.86	0.4 (± 0.05)		☆		★		☆				☆	★						
		QCMB5008–CT	26.0	5.0 ($^{+0.05}_{0}$)	5.80	0.8 (± 0.05)		☆		★		☆				☆	★						

★ Recommended grade ☆ Available grade

Profile groove insert



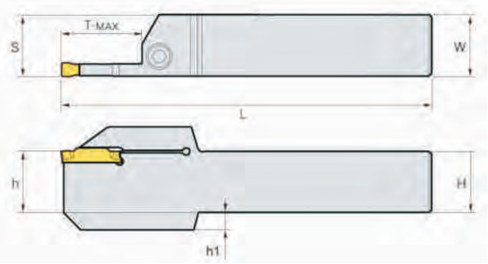
Working condition: ● Stable ◕ Average ⌑ Tough

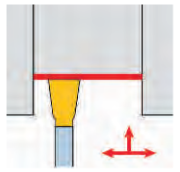
Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P	Steel	●	●	◕ ⌑	◕ ⌑	⌑		●			●						● ◕	● ◕
M	Stainless steel							●			● ◕	● ◕						
K	Cast iron						● ◕											
N	Non-ferrous metal														●	●		
S	Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Basic dimension (mm)				CVD						PVD							Cemented carbide		Cermet	
			INSL	CW	S	RE	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Profile		QPMB2010–RM	16.0	2.0 ($^{+0.05}_{0}$)	3.5	1.0 (± 0.05)		☆		★		☆				☆	★						
		QPMB3015–RM	21.0	3.0 ($^{+0.05}_{0}$)	4.8	1.5 (± 0.05)		☆		★		☆				☆	★						
		QPMB4020–RM	21.0	4.0 ($^{+0.05}_{0}$)	4.8	2.0 (± 0.05)		☆		★		☆				☆	★						
		QPMB5025–RM	26.0	5.0 ($^{+0.05}_{0}$)	5.8	2.5 (± 0.05)		☆		★		☆				☆	★						
		QPMB6030–RM	26.0	6.0 ($^{+0.05}_{0}$)	5.9	3.0 (± 0.05)		☆		★		☆				☆	★						
Aluminum hub groove insert																							
		QPEB8040–AK	30.0	8.0 (± 0.025)	8.365	4.0 (± 0.05)														★	★		

★ Recommended grade ☆ Available grade

External grooving, parting and turning tools

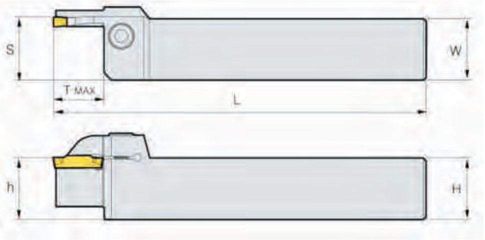


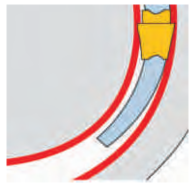


Type		Basic dimension (mm)							Screw	Wrench	Applicable inserts
		Inventory	H=h	W	L	S	H1	T-MAX			
HREHR/L	1616–1.5–T12	△	16	16	100	16.2	/	12	HHA0512	WR40L	QCMB15□□
	2020–1.5–T12	△	20	20	125	20.2	/	12			
	2525–1.5–T12	△	25	25	150	25.2	/	12			
	1212–2–T08	△	12	12	100	12.2	/	8	HHA0512	WR40L	QCMB20□□ QCKB20□□ QPMB20□□
	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	HHA0512	WR40L	QCMB25□□
	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	HHA0512	WR40L	QCMB30□□ QCKB30□□ QPMB30□□
	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	QCMB40□□ QCKB40□□ QPMB40□□
	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			
	2020–5–T15	△	20	20	150	20.5	/	15	HHA0616	WR50L	QCMB50□□ QCKB50□□ QPMB50□□
	2020–5–T23	△	20	20	150	20.5	/	23			
	2525–5–T15	▲	25	25	150	25.5	/	15			
	2525–5–T23	△	25	25	150	25.5	/	23			
	3232–5–T15	△	32	32	170	32.5	/	15			
	3232–5–T23	△	32	32	170	32.5	/	23			
	2525–6–T15	▲	25	25	150	25.6	/	15	HHA0616	WR50L	QCMB60□□ QPMB60□□
	2525–6–T23	△	25	25	150	25.6	/	23			
	3232–6–T15	△	32	32	170	32.6	/	15			
	3232–6–T23	△	32	32	170	32.6	/	23			

▲Running stock △Make-to-order

90° end face grooving tool

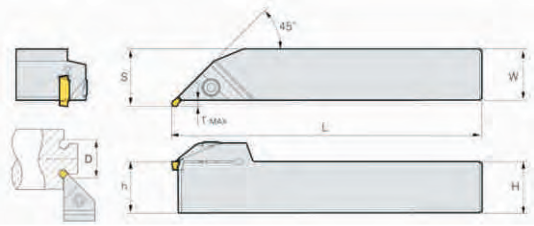


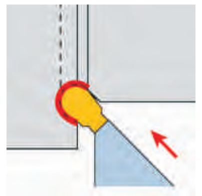


Type		Basic dimension (mm)						ΦD		Screw	Wrench	Applicable inserts
		Inventory	H=h	W	L	S	T-MAX	Min	Max			
HRFHR/L	325–34/50–T10	△	25	25	150	25.5	10	34	50	HHA0512	WR40L	QCMB30□□ QCKB30□□ QPMB30□□
	325–44/70–T15	▲	25	25	150	25.5	15	44	70			
	325–64/100–T15	△	25	25	150	25.5	15	64	100			
	425–40/60–T10	△	25	25	150	25.6	10	40	60	HHA0616	WR50L	QCMB40□□ QCKB40□□ QPMB40□□
	425–44/70–T15	▲	25	25	150	25.6	15	44	70			
	425–84/92–T15	△	25	25	150	25.6	15	84	92			
	425–60/120–T15	▲	25	25	150	25.6	15	60	120			
	425–112/200–T15	△	25	25	150	25.6	15	112	200			

▲Running stock △Make-to-order

Relief groove tool

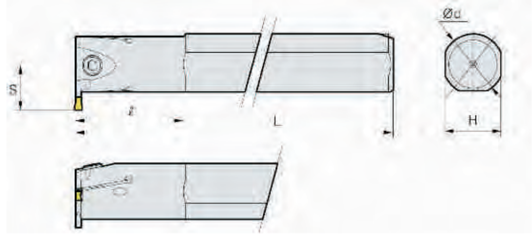


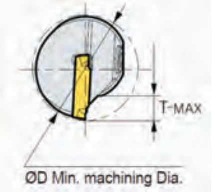


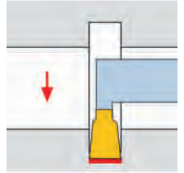
Type		Basic dimension (mm)							Screw	Wrench	Applicable inserts
		Inventory	H=h	W	L	S	ΦD Max	T-MAX			
HREUR/L	2020–3	△	20	20	125	23	40	2.8	HHA0512	WR40L	QPMB30□□
	2525–3	▲	25	25	150	28	40	2.8			
	3232–3	△	32	32	170	35	40	2.8			
	2020–4	▲	20	20	125	23	40	2.8	HHA0616	WR50L	QPMB40□□
	2525–4	▲	25	25	150	28	40	2.8			
	3232–4	△	32	32	170	35	40	2.8			
	2020–5	▲	20	20	125	23.5	50	3.3	HHA0616	WR50L	QPMB50□□
	3232–5	△	32	32	170	35.5	50	3.3			
	2020–6	△	20	20	125	23.5	50	3.3	HHA0616	WR50L	QPMB60□□
	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	2016–1.5	△	20	16	125	35	3.5	15	11.3	HHB0410	WR30L	QCMB15□□
	2520–1.5	△	25	20	150	45	3.5	18	13.1	HHA0512	WR40L	
	2925–1.5	△	29	25	200	45	3.5	23	16.2			
	2016–2	△	20	16	125	35	4.5	15	12.4	HHB0410	WR30L	QCMB20□□ QCKB20□□ QPMB20□□
	2520–2	▲	25	20	150	45	4.5	18	14.0	HHA0512	WR40L	
	2925–2	△	29	25	200	45	4.5	23	17.2			
	2016–2.5	▲	20	16	125	35	4.5	15	12.5	HHB0410	WR30L	QCMB25□□
	2520–2.5	△	25	20	150	45	4.5	18	15.1	HHA0512	WR40L	
	2925–2.5	△	29	25	200	45	4.5	23	18.2			
	2520–3	▲	25	20	150	45	5	18	15.6	HHA0512	WR40L	QCMB30□□ QCKB30□□ QPMB30□□
	3125–3	△	31	25	200	45	6	23	18.9			
	3732–3	△	37	32	250	65	6	30	21.5			
	2520–4	△	35	20	150	45	6	18	15.6	HHA0512	WR40L	QCMB40□□ QCKB40□□ QPMB40□□
	3125–4	△	31	25	200	45	6	23	18.9			
	3732–4	▲	37	32	250	65	6	30	21.5			
	3125–5	△	31	25	200	45	8	23	19.4	BHA0616	WR50L	QCMB50□□ QCKB50□□ QPMB50□□
	3732–5	△	37	32	250	65	8	30	21.5			
	3125–6	△	31	25	200	45	8	23	19.4			QCMB60□□ QPMB60□□
	3732–6	△	37	32	250	65	8	30	21.5			

▲Running stock △Make-to-order

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			HR7115			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	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													260	220	150
		High tensile strength/austenite		245	350													240	200	130
	Ductile iron	Ferrite		155	400													160	130	80
		Pearlite		265	700													145	110	80
	Compacted graphite iron GGV (CGI)			230	400													150	120	90
S	Cobalt-based alloy	Iron-based alloy	Annealing	200	680				60	50	40									
			Aged	280	940				60	50	40									
		Nickle-based or Cobalt-based	Annealing	250	840				50	40	30									
			Aged	350	1180				50	40	30									
			Casting	320	1080				50	40	30									
	Cobalt-based alloy	Titanium		200	680				200	160	120									
		α phase& β phase alloy，Aged		375	1260				80	60	40									
		β Phase alloy		410	1400				60	50	40									
	Nickel-based alloy	1177		300	1010				40	35	30									
	Titanium alloy	1262		300	1010				160	140	100									

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

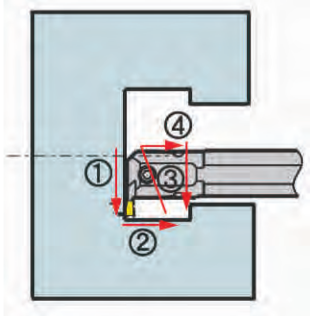
- Pass sequence: When cutting depth > 0.5mm, radial feed (the maximum cutting depth can reach 0.75 x insert width S) → radial return about 0.1mm → axial pass → oblique return → axial pass → radial machining to the required depth.

End face grooving and turning

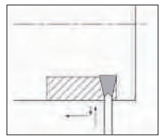
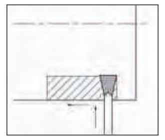
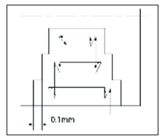
- Finish machining (multi-groove cutting)
  Cutting inwards from the largest diameter, and the insert is slightly offset towards the central insert when returning the insert.
- Recess turning
  Axial turning depth: ≦0.75 xS (insert width)
  If the groove width is greater than the depth, recess turning 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

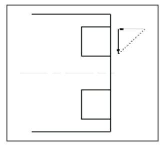
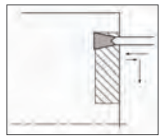
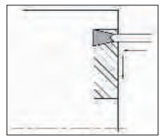
- Please follow the machining sequence as shown.
  In order to facilitate cutting outflow, please always feed outward from the far end face side.



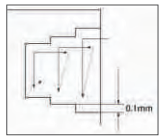
Precautions for external parting, grooving and turning

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.	

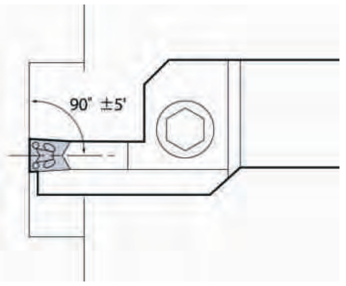
Precautions for end face grooving turning

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.	

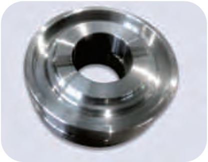
FAQs of parting and grooving

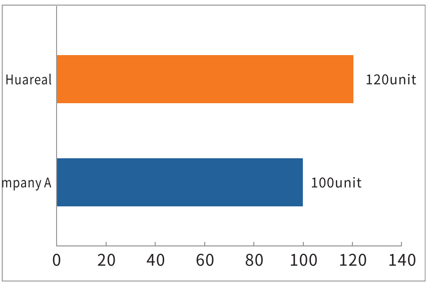
Condition	Countermeasures
There is white turbidity at the bottom of the end face	(1) Increase the cutting speed only in the finish machining. (2) When method 1 does not work, please readjust the parallelism of the insert and the corner. Correction method: Adjust the cutter bar to within ±5° tolerance 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.

Machining cases - Parting&Grooving

Gearbox unit

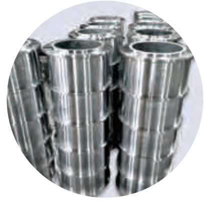
◉ Workpieces materials	40Cr 20-24HRC
◉ Machining method	End face grooving and plunge turning
◉ Insert	QCMB4004-CT HR8225
◉ Machining parameters	v_c=150m/min，f=0.12-0.15mm/r，ap=1-2mm
◉ Cooling method	Water cooling

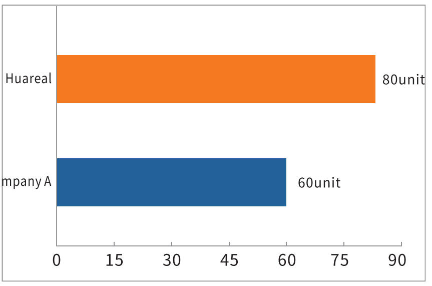




Gear part

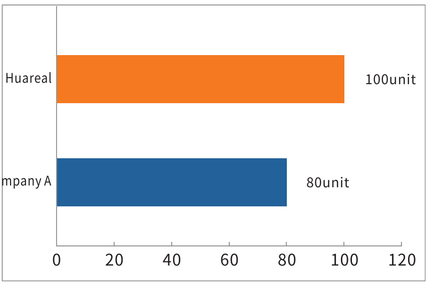
◉ Workpieces materials	20CrMoTi 150-210HB
◉ Machining method	End face grooving turning
◉ Insert	QCMB3004-CT HR8225
◉ Machining parameters	v_c=200m/min，f=0.17mm/r，ap=5mm
◉ Cooling method	Water cooling



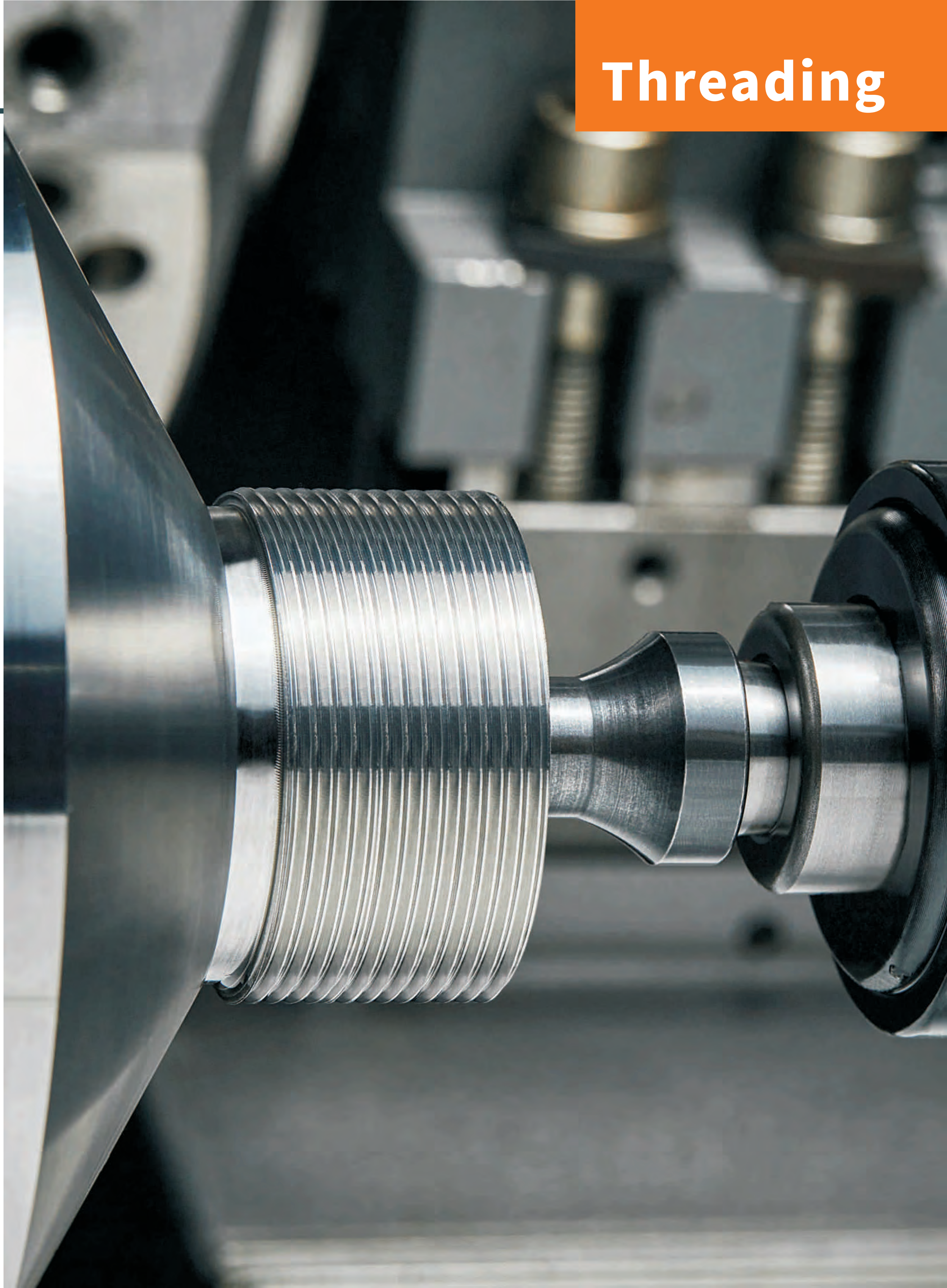


Gear shaft

◉ Workpieces materials	20CrMnTiH 160-180HB
◉ Machining method	External grooving turning
◉ Insert	QCMB4002-GT HR7225
◉ Machining parameters	v_c=120m/min，f=0.13mm/r，ap=6mm
◉ Cooling method	Water cooling

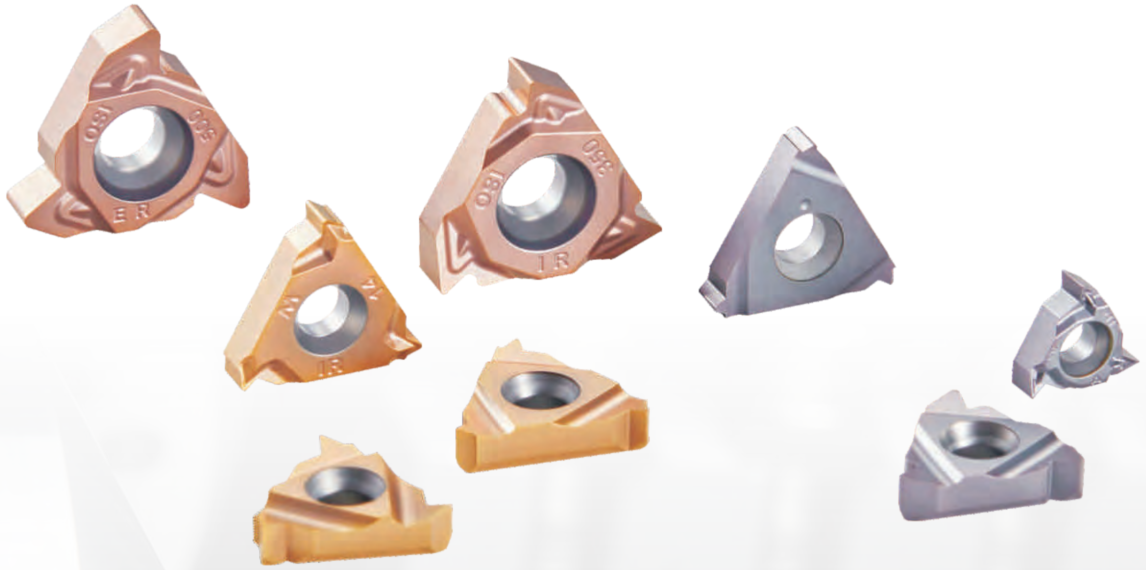


Threading



Thread insert New

A full range of grinding thread insert designed for higher precision threading turning



- We have a full range of products such as IS0,UN thread and whitworth thread,meeting theprocessing needs of different industries
- Equipped with pressed and ground thread inserts,meeting the requirements of better cutting controland higher precision machining,respectively
- Paired with a new grade HR8225,it can achieve efficiencyand long-lasting threading machining

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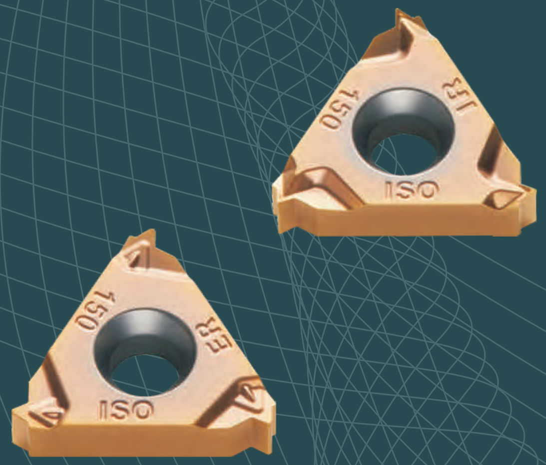
A

Turning

Thread turning



A
General turning
precision small parts turning
Parting and grooving
Threading
B
Indexable milling
Solid carbide end mills
C
Short hole drills
Solid carbide drills

Code key of thread inserts

16	E	R	150	ISO	—	P
①	②	③	④	⑤		⑥

① Insert size (inch)	
Code	Inscribed circle diameter
11	Φ6.35
16	Φ9.525
22	Φ12.70

② Cutting type	
Code	Type
E	External threading
I	Internal threading

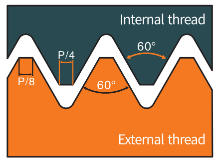
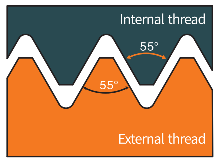
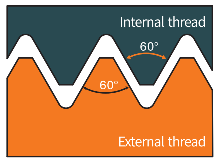
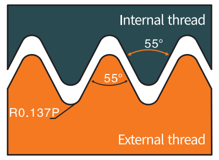
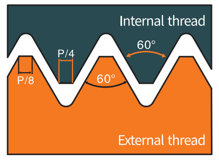
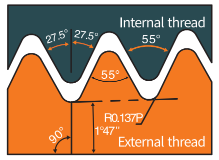
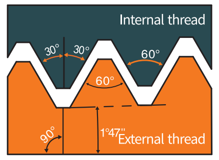
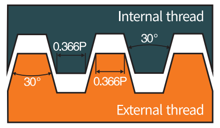
③ Cutting direction	
Code	Direction
R	Dextral
L	Sinistral

④Thread pitch		
Full form (indicated by pitch × 100)		
	mm	TPI
	0.35-9.0	72-2
V-profile (pitch indicated by letters)		
	mm	TPI
A	0.5-1.5	48-16
AG	0.5-3.0	48-8
G	1.75-3.0	14-8
N	3.5-5.0	7-5
Q	5.5-6.0	41/2-4

⑤Thread type	
Code	Type
ISO	ISO metric thread
UN	UN thread
W	Whitworth thread
BSPT	BSPT
NPT	NPT
TR	30°standard trapzoidal thread

⑥Shaping method	
Code	Type
default	Molded groove
P	Grinding groove

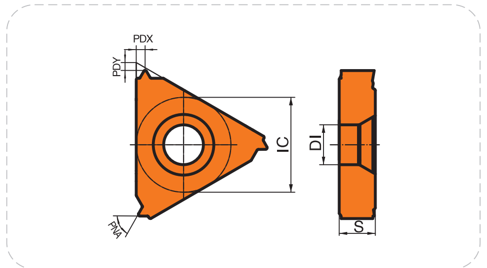
Overview of threading

Industry	Diagram	Thread type	Thread profile	Insert shape	pitch	number of teeth
General industry		ISO metric thread	ISO Metric 60° thread		1–6	4–25
General industry		Universal thread	55 ° universal pitch thread		0.5–5	5–51
			60 ° universal pitch thread			
General industry		Whitworth thread	W			8–28
Aerospace industry equipemt		UN thread	UN			5–28
Pipe thread for gas，heating and tap water		BSPT	BSPT			11–28
For Pipeline connected with gas and tap water faucets		NPT	NPT			8–27
Transimition & Transportation equipment		30°Standard trapezoidal thread	TR		1.5–6.0	

ISO metric 60° thread (Molded)

Standard: R262（DIN 13）
Tolerance class: 6g/6H

Working condition: ● Stable ◕ Average ⌗ Tough



Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P	Steel	●	●	◕ ⌗	◕ ⌗	⌗		●			●						● ◕	● ◕
M	Stainless steel							●			● ◕	● ◕						
K	Cast iron						● ◕											
N	Non-ferrous metal														●	●		
S	Heat-resistant alloy Titanium alloy								●	●								

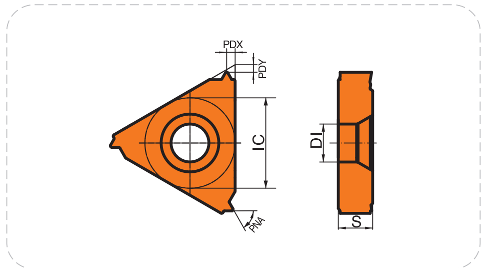
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER100ISO	1.00	9.525	0.7	0.7	3.52	4.0	60°												☆	★				
		16ER125ISO	1.25	9.525	0.9	0.8	3.52	4.0	60°												☆	★				
		16ER150ISO	1.50	9.525	1.0	0.8	3.52	4.0	60°												☆	★				
		16ER175ISO	1.75	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16ER200ISO	2.00	9.525	1.3	1.0	3.52	4.0	60°												☆	★				
		16ER250ISO	2.50	9.525	1.5	1.2	3.52	4.0	60°												☆	★				
		16ER300ISO	3.00	9.525	1.6	1.3	3.52	4.0	60°												☆	★				
		22ER350ISO	3.50	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22ER400ISO	4.00	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22ER450ISO	4.50	12.700	2.4	1.7	4.65	5.0	60°												☆	★				
		22ER500ISO	5.00	12.700	2.4	1.7	4.65	5.0	60°												☆	★				
		22ER550ISO	5.50	12.700	2.5	1.6	4.65	5.0	60°												☆	★				
		22ER600ISO	6.00	12.700	2.7	1.7	4.65	5.0	60°												☆	★				

★ Recommended grade ☆ Available grade

ISO metric 60° thread (Molded)

Standard: R262（DIN 13）
Tolerance class: 6g/6H

Working condition: ● Stable ◕ Average ⌗ Tough



Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P	Steel	●	●	◕ ⌗	◕ ⌗	⌗		●			●						● ◕	● ◕
M	Stainless steel							●			● ◕	● ◕						
K	Cast iron						● ◕											
N	Non-ferrous metal														●	●		
S	Heat-resistant alloy Titanium alloy								●	●								

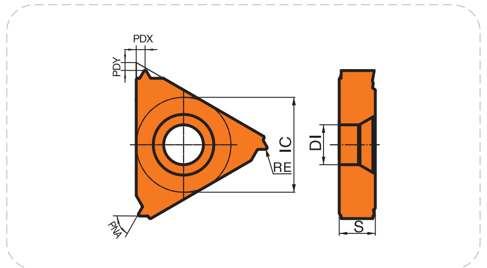
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		11IR100ISO	1.00	6.35	0.7	0.7	3.05	3.2	60°												☆	★				
		11IR125ISO	1.25	6.35	0.9	0.8	3.05	3.2	60°												☆	★				
		11IR150ISO	1.50	6.35	1.0	0.8	3.05	3.2	60°												☆	★				
		16IR100ISO	1.00	9.525	0.7	0.7	3.52	4.0	60°												☆	★				
		16IR125ISO	1.25	9.525	0.9	0.8	3.52	4.0	60°												☆	★				
		16IR150ISO	1.50	9.525	1.0	0.8	3.52	4.0	60°												☆	★				
		16IR175ISO	1.75	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16IR200ISO	2.00	9.525	1.3	1.0	3.52	4.0	60°												☆	★				
		16IR250ISO	5.50	9.525	1.5	1.1	3.52	4.0	60°												☆	★				
		16IR300ISO	3.00	9.525	1.5	1.1	3.52	4.0	60°												☆	★				
		22IR350ISO	3.50	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22IR400ISO	4.00	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22IR450ISO	4.50	12.700	2.4	1.6	4.65	5.0	60°												☆	★				
		22IR500ISO	5.00	12.700	2.4	1.6	4.65	5.0	60°												☆	★				
		22IR550ISO	5.50	12.700	2.5	1.6	4.65	5.0	60°												☆	★				
		22IR600ISO	6.00	12.700	2.5	1.8	4.65	5.0	60°												☆	★				

★ Recommended grade ☆ Available grade

Universal thread (Molded)

Standard: B.S.84:1956,DIN 259,ISO228/1:1982
Tolerance class: Medium, A-class

Working condition: ● Stable ◕ Average ⌗ Tough

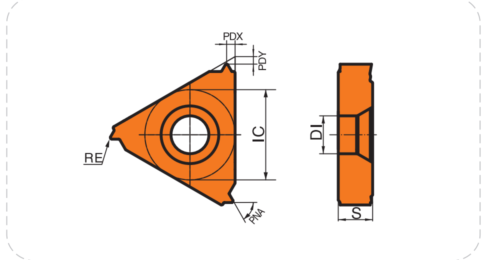


Workpiece material	P Steel	●	●	◕ ⌗	◕ ⌗	⌗		●			●						● ◕	● ◕
	M Stainless steel							●			● ◕	● ◕						
	K Cast iron						● ◕											
	N Non-ferrous metal														●	●		
	S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)							CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	RE	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ERA55	0.5–1.5	9.525	0.9	0.8	3.52	0.05	4.0	55°												☆	★				
		16ERG55	1.75–3.0	9.525	1.7	1.2	3.52	0.23	4.0	55°												☆	★				
		16ERAG55	0.5–3.0	9.525	1.7	1.2	3.52	0.06	4.0	55°												☆	★				
		22ERN55	3.5–5.0	12.700	2.5	1.7	4.65	0.51	5.0	55°												☆	★				
		16ERA60	0.5–1.5	9.525	0.9	0.8	3.52	0.06	4.0	60°												☆	★				
		16ERG60	1.75–3.0	9.525	1.7	1.2	3.52	0.18	4.0	60°												☆	★				
		16ERAG60	0.5–3.0	9.525	1.7	1.2	3.52	0.07	4.0	60°												☆	★				
		22ERN60	3.5–5.0	12.700	2.5	1.7	4.65	0.51	5.0	60°												☆	★				

★ 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								●	●								

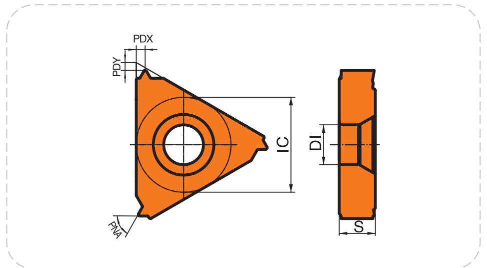
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)							CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	RE	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		11IRA55	0.5–1.5	6.350	0.9	0.8	3.05	0.05	3.2	55°												☆	★				
		16IRA55	0.5–1.5	9.525	0.9	0.8	3.52	0.05	4.0	55°												☆	★				
		16IRG55	1.75–3.0	9.525	1.7	1.2	3.52	0.21	4.0	55°												☆	★				
		16IRAG55	0.5–3.0	9.525	1.7	1.2	3.52	0.06	4.0	55°												☆	★				
		22IRN55	3.5–5.0	12.700	2.5	1.7	4.65	0.26	5.0	55°												☆	★				
		11IRA60	0.5–1.5	6.350	0.9	0.8	3.05	0.05	3.2	60°												☆	★				
		16IRA60	0.5–1.5	9.525	0.9	0.8	3.52	0.05	4.0	60°												☆	★				
		16IRG60	1.75–3.0	9.525	1.7	1.2	3.52	0.10	4.0	60°												☆	★				
		16IRAG60	0.5–3.0	9.525	1.7	1.2	3.52	0.08	4.0	60°												☆	★				
		22IRN60	3.5–5.0	12.700	2.5	1.7	4.65	0.26	5.0	60°												☆	★				

★ Recommended grade ☆ Available grade

Whiteworth thread (Molded)

Standard: B.S.84:1956,DIN 259,ISO228/1:1982
Tolerance class: Medium, A-class

Working condition: ● Stable ◕ Average ⌗ Tough

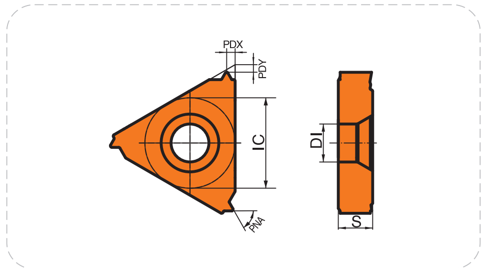


Workpiece material	P Steel	●	●	◕ ⌗	◕ ⌗	⌗		●			●						● ◕	● ◕
	M Stainless steel							●			● ◕	● ◕						
	K Cast iron						● ◕											
	N Non-ferrous metal														●	●		
	S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER8W	8	9.525	1.5	1.2	3.52	4.0	55°												☆	★				
		16ER11W	11	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16ER12W	12	9.525	1.4	1.1	3.52	4.0	55°												☆	★				
		16ER14W	14	9.525	1.2	1.0	3.52	4.0	55°												☆	★				
		16ER19W	19	9.525	1.0	0.8	3.52	4.0	55°												☆	★				

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



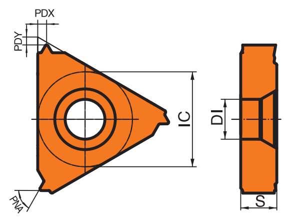
Workpiece material	P Steel	●	●	◕ ⌗	◕ ⌗	⌗		●			●						● ◕	● ◕
	M Stainless steel							●			● ◕	● ◕						
	K Cast iron						● ◕											
	N Non-ferrous metal														●	●		
	S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		16IR8W	8	9.525	1.5	1.2	3.52	4.0	55°												☆	★				
		16IR11W	11	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16IR12W	12	9.525	1.4	1.1	3.52	4.0	55°												☆	★				
		16IR14W	14	9.525	1.2	1.0	3.52	4.0	55°												☆	★				
		16IR19W	19	9.525	1.0	0.8	3.52	4.0	55°												☆	★				

★ Recommended grade ☆ Available grade

UN united thread (Molded)

Standard: ANSI B1.1:74
Tolerance class: 2A/2B

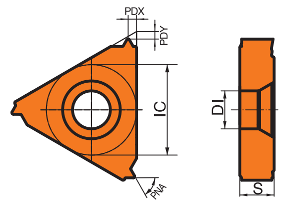


Working condition: ● Stable ◔ Average ¤ Tough

Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◔ ¤	◔ ¤	¤		●			●						● ◔	● ◔
M Stainless steel							●			● ◔	● ◔						
K Cast iron						● ◔											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

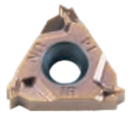
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER8UN	8	9.525	1.7	1.2	3.52	4.0	60°										☆	★						
		16ER12UN	12	9.525	1.4	1.1	3.52	4.0	60°										☆	★						
		16ER14UN	14	9.525	1.2	1.0	3.52	4.0	60°										☆	★						
		16ER16UN	16	9.525	1.1	0.9	3.52	4.0	60°										☆	★						
		16ER18UN	18	9.525	1.1	0.8	3.52	4.0	60°										☆	★						
		16ER20UN	20	9.525	1.1	0.8	3.52	4.0	60°										☆	★						

★ Recommended grade ☆ Available grade



Working condition: ● Stable ◔ Average ¤ Tough

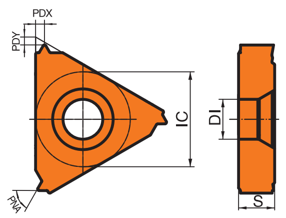
Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◔ ¤	◔ ¤	¤		●			●						● ◔	● ◔
M Stainless steel							●			● ◔	● ◔						
K Cast iron						● ◔											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		16IR8UN	8	9.525	1.7	1.2	3.52	4.0	60°										☆	★						
		16IR12UN	12	9.525	1.4	1.1	3.52	4.0	60°										☆	★						
		16IR14UN	14	9.525	1.2	1.0	3.52	4.0	60°										☆	★						
		16IR16UN	16	9.525	1.1	0.9	3.52	4.0	60°										☆	★						
		16IR18UN	18	9.525	1.1	0.8	3.52	4.0	60°										☆	★						
		16IR20UN	20	9.525	1.1	0.8	3.52	4.0	60°										☆	★						

★ Recommended grade ☆ Available grade

BSPT (Molded)

Standard: B.S.21:1985
Tolerance standard: BSPT

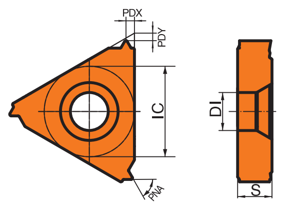


Working condition: ● Stable ◔ Average ¤ Tough

Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◔ ¤	◔ ¤	¤		●			●						● ◔	● ◔
M Stainless steel							●			● ◔	● ◔						
K Cast iron						● ◔											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER11BSPT	11	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16ER14BSPT	14	9.525	1.2	1.0	3.52	4.0	55°												☆	★				
		16ER19BSPT	19	9.525	0.9	0.8	3.52	4.0	55°												☆	★				

★ Recommended grade ☆ Available grade



Working condition: ● Stable ◔ Average ¤ Tough

Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◔ ¤	◔ ¤	¤		●			●						● ◔	● ◔
M Stainless steel							●			● ◔	● ◔						
K Cast iron						● ◔											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

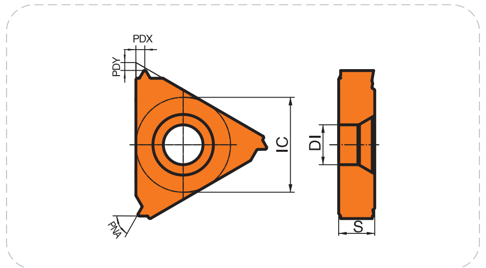
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		16IR11BSPT	11	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16IR14BSPT	14	9.525	1.2	1.0	3.52	4.0	55°												☆	★				
		16IR19BSPT	19	9.525	0.9	0.8	3.52	4.0	55°												☆	★				

★ Recommended grade ☆ Available grade

NPT (Molded)

Standard: USAS B2.1:1968
Tolerance standard: American Standard NPT Thread

Working condition: ● Stable ◕ Average ¤ Tough

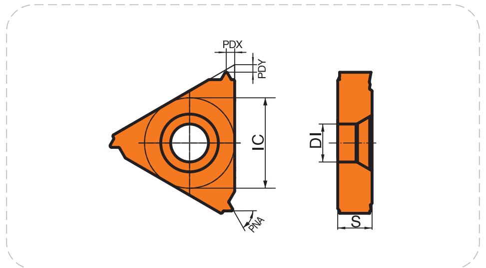


Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M Stainless steel							●			● ◕	● ◕						
K Cast iron						● ◕											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER115NPT	11.5	9.525	1.5	1.1	3.52	4.0	60°												☆	★				
		16ER14NPT	14.0	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16ER18NPT	18.0	9.525	1.0	0.8	3.52	4.0	60°												☆	★				

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ¤ Tough



Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M Stainless steel							●			● ◕	● ◕						
K Cast iron						● ◕											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

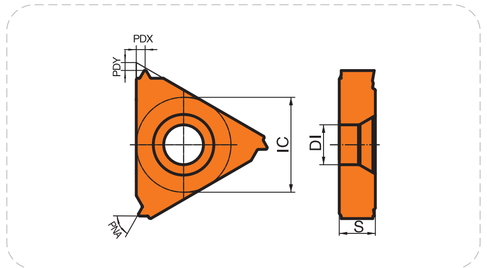
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		16IR115NPT	11.5	9.525	1.5	1.1	3.52	4.0	60°												☆	★				
		16IR14NPT	14.0	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16IR18NPT	18.0	9.525	1.0	0.8	3.52	4.0	60°												☆	★				

★ Recommended grade ☆ Available grade

ISO metric 60° thread (Grinding)

Standard: R262 (DIN 13)
Tolerance class: 6g/6H

Working condition: ● Stable ◕ Average ¤ Tough



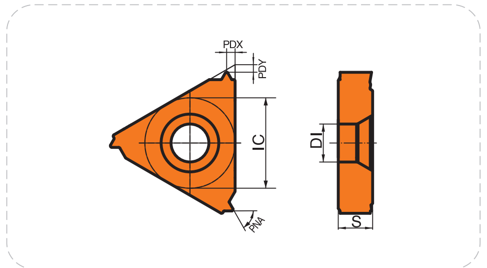
Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M Stainless steel							●			● ◕	● ◕						
K Cast iron						● ◕											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER100ISO–P	1.00	9.525	0.7	0.7	3.52	4.0	60°												☆	★				
		16EL100ISO–P	1.00	9.525	0.7	0.7	3.52	4.0	60°												☆	★				
		16ER125ISO–P	1.25	9.525	0.9	0.8	3.52	4.0	60°												☆	★				
		16EL125ISO–P	1.25	9.525	0.9	0.8	3.52	4.0	60°												☆	★				
		16ER150ISO–P	1.50	9.525	1.0	0.8	3.52	4.0	60°												☆	★				
		16EL150ISO–P	1.50	9.525	1.0	0.8	3.52	4.0	60°												☆	★				
		16ER175ISO–P	1.75	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16EL175ISO–P	1.75	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16ER200ISO–P	2.00	9.525	1.3	1.0	3.52	4.0	60°												☆	★				
		16EL200ISO–P	2.00	9.525	1.3	1.0	3.52	4.0	60°												☆	★				
		16ER250ISO–P	2.50	9.525	1.5	1.2	3.52	4.0	60°												☆	★				
		16EL250ISO–P	2.50	9.525	1.5	1.2	3.52	4.0	60°												☆	★				
		16ER300ISO–P	3.00	9.525	1.6	1.3	3.52	4.0	60°												☆	★				
		16EL300ISO–P	3.00	9.525	1.6	1.3	3.52	4.0	60°												☆	★				
		22ER350ISO–P	3.50	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22EL350ISO–P	3.50	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22ER400ISO–P	4.00	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22EL400ISO–P	4.00	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22ER450ISO–P	4.50	12.700	2.4	1.7	4.65	5.0	60°												☆	★				
		22EL450ISO–P	4.50	12.700	2.4	1.7	4.65	5.0	60°												☆	★				
		22ER500ISO–P	5.00	12.700	2.4	1.7	4.65	5.0	60°												☆	★				
		22EL500ISO–P	5.00	12.700	2.4	1.7	4.65	5.0	60°												☆	★				
		22ER550ISO–P	5.50	12.700	2.6	1.7	4.65	5.0	60°												☆	★				
		22EL550ISO–P	5.50	12.700	2.6	1.7	4.65	5.0	60°												☆	★				
		22ER600ISO–P	6.00	12.700	2.7	1.7	4.65	5.0	60°												☆	★				
		22EL600ISO–P	6.00	12.700	2.7	1.7	4.65	5.0	60°												☆	★				

★ Recommended grade ☆ Available grade

ISO metric 60° thread (Grinding)

Standard: R262（DIN 13）
Tolerance class: 6g/6H



Working condition: ● Stable ◔ Average ⌗ Tough

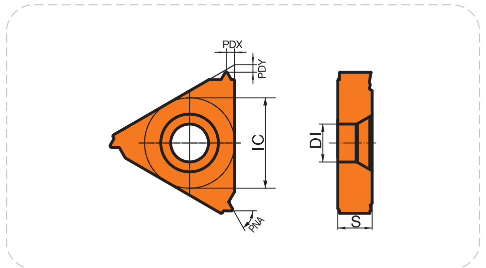
Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P	Steel	●	●	◔ ⌗	◔ ⌗	⌗		●			●						● ◔	● ◔
M	Stainless steel							●			● ◔	● ◔						
K	Cast iron						● ◔											
N	Non-ferrous metal														●	●		
S	Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		11IR100ISO–P	1.00	6.35	0.7	0.7	3.05	3.2	60°												☆	★				
		11IL100ISO–P	1.00	6.35	0.7	0.7	3.05	3.2	60°												☆	★				
		11IR125ISO–P	1.25	6.35	0.9	0.8	3.05	3.2	60°												☆	★				
		11IL125ISO–P	1.25	6.35	0.9	0.8	3.05	3.2	60°												☆	★				
		11IR150ISO–P	1.50	6.35	1.0	0.8	3.05	3.2	60°												☆	★				
		11IL150ISO–P	1.50	6.35	1.0	0.8	3.05	3.2	60°												☆	★				
		11IR175ISO–P	1.75	6.35	1.2	0.9	3.05	3.2	60°												☆	★				
		11IL175ISO–P	1.75	6.35	1.2	0.9	3.05	3.2	60°												☆	★				
		11IR200ISO–P	2.00	6.35	1.3	0.9	3.05	3.2	60°												☆	★				
		11IL200ISO–P	2.00	6.35	1.3	0.9	3.05	3.2	60°												☆	★				
		11IR250ISO–P	2.50	6.35	1.5	1.0	3.05	3.2	60°												☆	★				
		11IL250ISO–P	2.50	6.35	1.5	1.0	3.05	3.2	60°												☆	★				
		16IR100ISO–P	1.00	9.525	0.7	0.7	3.52	4.0	60°												☆	★				
		16IL100ISO–P	1.00	9.525	0.7	0.7	3.52	4.0	60°												☆	★				
		16IR125ISO–P	1.25	9.525	0.9	0.8	3.52	4.0	60°												☆	★				
		16IL125ISO–P	1.25	9.525	0.9	0.8	3.52	4.0	60°												☆	★				
		16IR150ISO–P	1.50	9.525	1.0	0.8	3.52	4.0	60°												☆	★				
		16IL150ISO–P	1.50	9.525	1.0	0.8	3.52	4.0	60°												☆	★				
		16IR175ISO–P	1.75	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16IL175ISO–P	1.75	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16IR200ISO–P	2.00	9.525	1.3	1.0	3.52	4.0	60°												☆	★				
		16IL200ISO–P	2.00	9.525	1.3	1.0	3.52	4.0	60°												☆	★				
		16IR250ISO–P	2.50	9.525	1.5	1.1	3.52	4.0	60°												☆	★				
		16IL250ISO–P	2.50	9.525	1.5	1.1	3.52	4.0	60°												☆	★				
		16IR300ISO–P	3.00	9.525	1.5	1.1	3.52	4.0	60°												☆	★				
		16IL300ISO–P	3.00	9.525	1.5	1.1	3.52	4.0	60°												☆	★				

★ Recommended grade ☆ Available grade

ISO metric 60° thread (Grinding)

Standard: R262（DIN 13）
Tolerance class: 6g/6H



Working condition: ● Stable ◔ Average ⌗ Tough

Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P	Steel	●	●	◔ ⌗	◔ ⌗	⌗		●			●						● ◔	● ◔
M	Stainless steel							●			● ◔	● ◔						
K	Cast iron						● ◔											
N	Non-ferrous metal														●	●		
S	Heat-resistant alloy Titanium alloy								●	●								

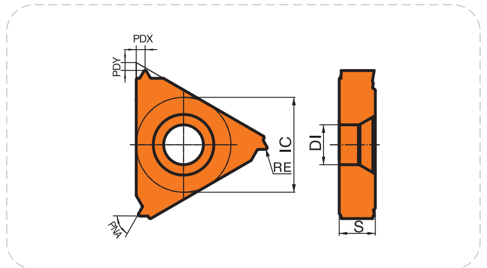
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		22IR350ISO–P	3.50	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22IL350ISO–P	3.50	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22IR400ISO–P	4.00	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22IL400ISO–P	4.00	12.700	2.3	1.6	4.65	5.0	60°												☆	★				
		22IR450ISO–P	4.50	12.700	2.4	1.6	4.65	5.0	60°												☆	★				
		22IL450ISO–P	4.50	12.700	2.4	1.6	4.65	5.0	60°												☆	★				
		22IR500ISO–P	5.00	12.700	2.4	1.6	4.65	5.0	60°												☆	★				
		22IL500ISO–P	5.00	12.700	2.4	1.6	4.65	5.0	60°												☆	★				
		22IR550ISO–P	5.50	12.700	2.5	1.7	4.65	5.0	60°												☆	★				
		22IL550ISO–P	5.50	12.700	2.5	1.7	4.65	5.0	60°												☆	★				
		22IR600ISO–P	6.00	12.700	2.5	1.8	4.65	5.0	60°												☆	★				
		22IL600ISO–P	6.00	12.700	2.5	1.8	4.65	5.0	60°												☆	★				

★ Recommended grade ☆ Available grade

Universal thread (Grinding)

Standard:B.S.84:1956,DIN 259,IS0228/1:1982
Tolerance class:Medium,A-class

Working condition: ● Stable ◕ Average ¤ Tough



Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
	P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
	M Stainless steel							●			● ◕	● ◕						
	K Cast iron						● ◕											
	N Non-ferrous metal														●	●		
	S Heat-resistant alloy Titanium alloy								●	●								

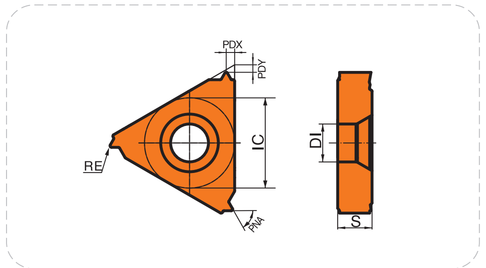
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)							CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	RE	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ERA55–P	0.5–1.5	9.525	0.9	0.8	3.52	0.05	4.0	55°												☆	★				
		16ELA55–P	0.5–1.5	9.525	0.9	0.8	3.52	0.05	4.0	55°												☆	★				
		16ERG55–P	1.75–3.0	9.525	1.7	1.2	3.52	0.23	4.0	55°												☆	★				
		16ELG55–P	1.75–3.0	9.525	1.7	1.2	3.52	0.23	4.0	55°												☆	★				
		16ERAG55–P	1.75–3.0	9.525	1.7	1.2	3.52	0.23	4.0	55°												☆	★				
		22ERN55–P	3.5–5.0	12.700	2.5	1.7	3.52	0.44	4.0	55°												☆	★				
		22ELN55–P	3.5–5.0	12.700	2.5	1.7	3.52	0.44	4.0	55°												☆	★				
		16ERA60–P	0.5–1.5	9.525	0.9	0.8	3.52	0.06	4.0	60°												☆	★				
		16ELA60–P	0.5–1.5	9.525	0.9	0.8	3.52	0.06	4.0	60°												☆	★				
		16ERG60–P	1.75–3.0	9.525	1.7	1.2	3.52	0.18	4.0	60°												☆	★				
		16ELG60–P	1.75–3.0	9.525	1.7	1.2	3.52	0.18	4.0	60°												☆	★				
		16ERAG60–P	0.5–3.0	9.525	1.7	1.2	3.52	0.07	4.0	60°												☆	★				
		16ELAG60–P	0.5–3.0	9.525	1.7	1.2	3.52	0.07	4.0	60°												☆	★				
		22ERN60–P	3.5–5.0	12.700	2.5	1.7	3.52	0.51	4.0	60°												☆	★				
		22ELN60–P	3.5–5.0	12.700	2.5	1.7	3.52	0.51	4.0	60°												☆	★				

★ Recommended grade ☆ Available grade

Universal thread (Grinding)

Standard:B.S.84:1956,DIN 259,IS0228/1:1982
Tolerance class:Medium,A-class

Working condition: ● Stable ◕ Average ¤ Tough



Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
	P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
	M Stainless steel							●			● ◕	● ◕						
	K Cast iron						● ◕											
	N Non-ferrous metal														●	●		
	S Heat-resistant alloy Titanium alloy								●	●								

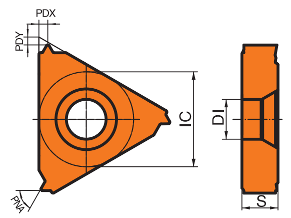
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)							CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	RE	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		16IRA55–P	0.5–1.5	9.525	0.9	0.8	3.52	0.05	4.0	55°												☆	★				
		16ILA55–P	0.5–1.5	9.525	0.9	0.8	3.52	0.05	4.0	55°												☆	★				
		16IRG55–P	1.75–3.0	9.525	1.7	1.2	3.52	0.21	4.0	55°												☆	★				
		16ILG55–P	1.75–3.0	9.525	1.7	1.2	3.52	0.21	4.0	55°												☆	★				
		16IRAG55–P	1.75–3.0	9.525	1.7	1.2	3.52	0.21	4.0	55°												☆	★				
		16IRN55–P	3.5–5.0	9.525	2.5	1.7	3.52	0.43	4.0	55°												☆	★				
		16ILN55–P	3.5–5.0	9.525	2.5	1.7	3.52	0.43	4.0	55°												☆	★				
		16IRA60–P	0.5–1.5	9.525	0.9	0.8	3.52	0.05	4.0	60°												☆	★				
		16ILA60–P	0.5–1.5	9.525	0.9	0.8	3.52	0.05	4.0	60°												☆	★				
		16IRG60–P	1.75–3.0	9.525	1.7	1.2	3.52	0.10	4.0	60°												☆	★				
		16ILG60–P	1.75–3.0	9.525	1.7	1.2	3.52	0.10	4.0	60°												☆	★				
		16IRAG60–P	0.5–3.0	9.525	1.7	1.2	3.52	0.08	4.0	60°												☆	★				
		16ILAG60–P	0.5–3.0	9.525	1.7	1.2	3.52	0.08	4.0	60°												☆	★				
		16IRN60–P	3.5–5.0	9.525	2.5	1.7	3.52	0.26	4.0	60°												☆	★				
		22ILN60–P	3.5–5.0	9.525	2.5	1.7	3.52	0.26	4.0	60°												☆	★				

★ Recommended grade ☆ Available grade

Whiteworth thread (Grinding)

Standard: B.S.84:1956,DIN 259,ISO228/1:1982
Tolerance class: Medium,A-class

Working condition: ● Stable ◕ Average ¤ Tough



Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M Stainless steel							●			● ◕	● ◕						
K Cast iron						● ◕											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

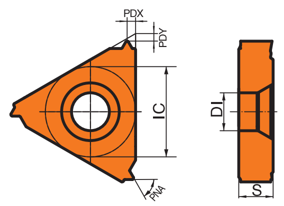
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER8W–P	8	9.525	1.5	1.2	3.52	4.0	55°												☆	★				
		16ER9W–P	9	9.525	1.7	1.2	3.52	4.0	55°												☆	★				
		16ER10W–P	10	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16ER11W–P	11	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16ER12W–P	12	9.525	1.4	1.1	3.52	4.0	55°												☆	★				
		16ER14W–P	14	9.525	1.2	1.0	3.52	4.0	55°												☆	★				
		16ER16W–P	16	9.525	1.1	0.9	3.52	4.0	55°												☆	★				
		16ER18W–P	18	9.525	1.0	0.8	3.52	4.0	55°												☆	★				
		16ER19W–P	19	9.525	1.0	0.8	3.52	4.0	55°												☆	★				
		16ER20W–P	20	9.525	0.9	0.8	3.52	4.0	55°												☆	★				
		16ER26W–P	26	9.525	0.8	0.7	3.52	4.0	55°												☆	★				
		16ER28W–P	28	9.525	0.7	0.6	3.52	4.0	55°												☆	★				

★ Recommended grade ☆ Available grade

Whiteworth thread (Grinding)

Standard: B.S.84:1956,DIN 259,ISO228/1:1982
Tolerance class: Medium,A-class

Working condition: ● Stable ◕ Average ¤ Tough



Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M Stainless steel							●			● ◕	● ◕						
K Cast iron						● ◕											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

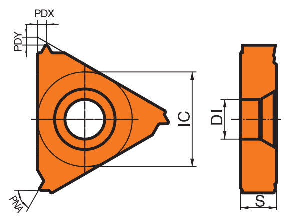
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		11IR14W–P	14	6.350	1.0	0.8	3.05	3.2	55°												☆	★				
		11IR19W–P	19	6.350	1.2	1.0	3.05	3.2	55°												☆	★				
		16IR8W–P	8	9.525	1.5	1.2	3.52	4.0	55°												☆	★				
		16IR9W–P	9	9.525	1.7	1.2	3.52	4.0	55°												☆	★				
		16IR10W–P	10	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16IR11W–P	11	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16IR12W–P	12	9.525	1.4	1.1	3.52	4.0	55°												☆	★				
		16IR14W–P	14	9.525	1.2	1.0	3.52	4.0	55°												☆	★				
		16IR16W–P	16	9.525	1.1	0.9	3.52	4.0	55°												☆	★				
		16IR18W–P	18	9.525	1.0	0.8	3.52	4.0	55°												☆	★				
		16IR19W–P	19	9.525	1.0	0.8	3.52	4.0	55°												☆	★				
		16IR20W–P	20	9.525	0.9	0.8	3.52	4.0	55°												☆	★				
		16IR26W–P	26	9.525	0.8	0.7	3.52	4.0	55°												☆	★				
		16IR28W–P	28	9.525	0.7	0.6	3.52	4.0	55°												☆	★				

★ Recommended grade ☆ Available grade

UN united thread (Gridning)

Standard：ANSI B1.1:74
Tolerance class：2A/2B

Working condition: ● Stable ◕ Average ¤ Tough

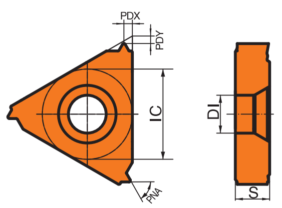


Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P	Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M	Stainless steel							●			● ◕	● ◕						
K	Cast iron						● ◕											
N	Non-ferrous metal														●	●		
S	Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER8UN–P	8	9.525	1.7	1.2	3.52	4.0	60°												☆	★				
		16ER12UN–P	12	9.525	1.4	1.1	3.52	4.0	60°												☆	★				
		16ER14UN–P	14	9.525	1.2	1.0	3.52	4.0	60°												☆	★				
		16ER16UN–P	16	9.525	1.1	0.9	3.52	4.0	60°												☆	★				
		16ER18UN–P	18	9.525	1.1	0.8	3.52	4.0	60°												☆	★				
		16ER20UN–P	20	9.525	1.1	0.8	3.52	4.0	60°												☆	★				

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ¤ Tough



Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P	Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M	Stainless steel							●			● ◕	● ◕						
K	Cast iron						● ◕											
N	Non-ferrous metal														●	●		
S	Heat-resistant alloy Titanium alloy								●	●								

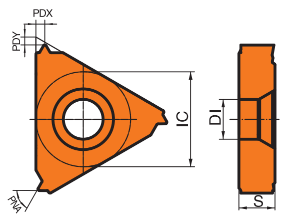
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		11IR14UN–P	14	6.35	1	0.8	3.05	3.2	60°												☆	★				
		11IR18UN–P	18	6.35	1	0.8	3.05	3.2	60°												☆	★				
		11IR20UN–P	20	6.35	1	0.8	3.05	3.2	60°												☆	★				
		16IR8UN–P	8	9.525	1.7	1.2	3.52	4.0	60°												☆	★				
		16IR12UN–P	12	9.525	1.4	1.1	3.52	4.0	60°												☆	★				
		16IR14UN–P	14	9.525	1.2	1.0	3.52	4.0	60°												☆	★				
		16IR16UN–P	16	9.525	1.1	0.9	3.52	4.0	60°												☆	★				
		16IR18UN–P	18	9.525	1.1	0.8	3.52	4.0	60°												☆	★				
		16IR20UN–P	20	9.525	1.1	0.8	3.52	4.0	60°												☆	★				

★ Recommended grade ☆ Available grade

BSPT (Grinding)

Standard：B.S.21:1985
Tolerance standard：BSPT

Working condition: ● Stable ◕ Average ¤ Tough

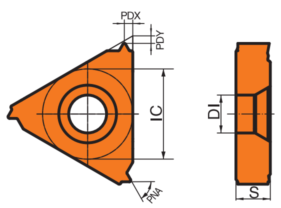


Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P	Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M	Stainless steel							●			● ◕	● ◕						
K	Cast iron						● ◕											
N	Non-ferrous metal														●	●		
S	Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER11BSPT–P	11	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16ER14BSPT–P	14	9.525	1.2	1.0	3.52	4.0	55°												☆	★				
		16ER19BSPT–P	19	9.525	0.9	0.8	3.52	4.0	55°												☆	★				
		16ER28BSPT–P	28	9.525	0.6	0.6	3.52	4.0	55°												☆	★				

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ¤ Tough



Workpiece material		HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P	Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M	Stainless steel							●			● ◕	● ◕						
K	Cast iron						● ◕											
N	Non-ferrous metal														●	●		
S	Heat-resistant alloy Titanium alloy								●	●								

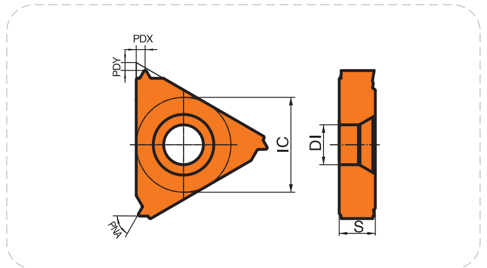
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		11IR14BSPT–P	14	6.35	1.2	0.8	3.05	3.2	55°												☆	★				
		11IR19BSPT–P	19	6.35	1.0	0.8	3.05	3.2	55°												☆	★				
		11IR28BSPT–P	28	6.35	0.8	0.6	3.05	3.2	55°												☆	★				
		16IR11BSPT–P	11	9.525	1.5	1.1	3.52	4.0	55°												☆	★				
		16IR14BSPT–P	14	9.525	1.2	1.0	3.52	4.0	55°												☆	★				
		16IR19BSPT–P	19	9.525	0.9	0.8	3.52	4.0	55°												☆	★				
		16IR28BSPT–P	28	9.525	0.6	0.6	3.52	4.0	55°												☆	★				

★ Recommended grade ☆ Available grade

NPT (Grinding)

Standard: USAS B2.1:1968
Tolerance standard NPT

Working condition: ● Stable ◕ Average ¤ Tough

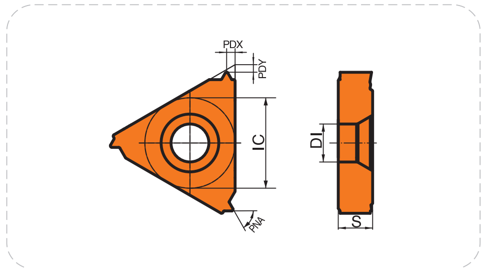


Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M Stainless steel							●			● ◕	● ◕						
K Cast iron						● ◕											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER8NPT–P	8	9.525	1.8	1.3	3.52	4.0	60°												☆	★				
		16ER115NPT–P	11.5	9.525	1.5	1.1	3.52	4.0	60°												☆	★				
		16ER14NPT–P	14	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16ER18NPT–P	18	9.525	1.0	0.8	3.52	4.0	60°												☆	★				
		16ER27NPT–P	27	9.525	0.8	0.7	3.52	4.0	60°												☆	★				

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ¤ Tough



Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M Stainless steel							●			● ◕	● ◕						
K Cast iron						● ◕											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

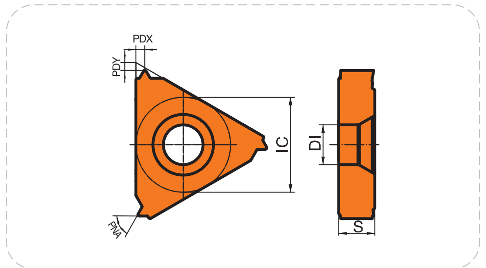
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		11IR14NPT–P	14	6.35	1.2	0.9	3.05	3.2	60°												☆	★				
		11IR18NPT–P	18	6.35	1.0	0.8	3.05	3.2	60°												☆	★				
		11IR27NPT–P	27	6.35	0.8	0.6	3.05	3.2	60°												☆	★				
		16IR8NPT–P	8	9.525	1.8	1.3	3.52	4.0	60°												☆	★				
		16IR115NPT–P	11.5	9.525	1.5	1.1	3.52	4.0	60°												☆	★				
		16IR14NPT–P	14	9.525	1.2	0.9	3.52	4.0	60°												☆	★				
		16IR18NPT–P	18	9.525	1.0	0.8	3.52	4.0	60°												☆	★				
		16IR27NPT–P	27	9.525	0.8	0.7	3.52	4.0	60°												☆	★				

★ Recommended grade ☆ Available grade

30°Standard trapezoidal thread

Standard: DIN103-2-1977
Tolerance standard 7e7H screw thread

Working condition: ● Stable ◕ Average ¤ Tough

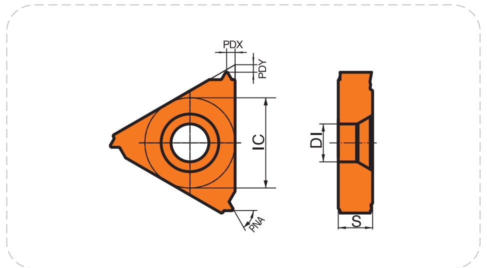


Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◕ ¤	◕ ¤	¤		●			●						● ◕	● ◕
M Stainless steel							●			● ◕	● ◕						
K Cast iron						● ◕											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
External thread		16ER150TR–P	1.50	9.53	0.80	0.70	3.52	4.00	30°												☆	★				
		16EL150TR–P	1.50	9.53	0.80	0.70	3.52	4.00	30°												☆	★				
		16ER200TR–P	2.00	9.53	1.30	1.10	3.52	4.00	30°												☆	★				
		16EL200TR–P	2.00	9.53	1.30	1.10	3.52	4.00	30°												☆	★				
		16ER300TR–P	3.00	9.53	1.30	1.10	3.52	4.00	30°												☆	★				
		16EL300TR–P	3.00	9.53	1.30	1.10	3.52	4.00	30°												☆	★				
		22ER400TR–P	4.00	12.70	2.30	1.80	4.65	5.00	30°												☆	★				
		22EL400TR–P	4.00	12.70	2.30	1.80	4.65	5.00	30°												☆	★				
		22ER500TR–P	5.00	12.70	2.30	1.80	4.65	5.00	30°												☆	★				
		22EL500TR–P	5.00	12.70	2.30	1.80	4.65	5.00	30°												☆	★				
		22ER600TR–P	6.00	12.70	2.30	1.90	4.65	5.00	30°												☆	★				
		22EL600TR–P	6.00	12.70	2.30	1.90	4.65	5.00	30°												☆	★				

★ Recommended grade ☆ Available grade

30°Standard trapezoidal thread



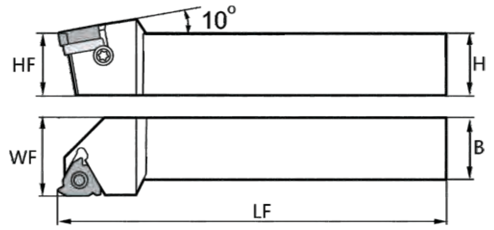
Working condition: ● Stable ◕ Average ⌑ Tough

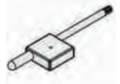
Workpiece material	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
P Steel	●	●	◕ ⌑	◕ ⌑	⌑		●			●						● ◕	● ◕
M Stainless steel							●			● ◕	● ◕						
K Cast iron						● ◕											
N Non-ferrous metal														●	●		
S Heat-resistant alloy Titanium alloy								●	●								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD						PVD							Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8105	HR8115	HR8125	HR8225	HR8135	HR6115	HR1135	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HR115C
Internal thread		16IR150TR–P	1.50	9.53	0.80	0.70	3.52	4.00	30°												☆	★				
		16IL150TR–P	1.50	9.53	0.80	0.70	3.52	4.00	30°												☆	★				
		16IR200TR–P	2.00	9.53	1.30	1.10	3.52	4.00	30°												☆	★				
		16IL200TR–P	2.00	9.53	1.30	1.10	3.52	4.00	30°												☆	★				
		16IR300TR–P	3.00	9.53	1.30	1.10	3.52	4.00	30°												☆	★				
		16IL300TR–P	3.00	9.53	1.30	1.10	3.52	4.00	30°												☆	★				
		22IR400TR–P	4.00	12.70	2.30	1.80	4.65	5.00	30°												☆	★				
		22IL400TR–P	4.00	12.70	2.30	1.80	4.65	5.00	30°												☆	★				
		22IR500TR–P	5.00	12.70	2.30	1.80	4.65	5.00	30°												☆	★				
		22IL500TR–P	5.00	12.70	2.30	1.80	4.65	5.00	30°												☆	★				
		22IR600TR–P	6.00	12.70	2.30	1.90	4.65	5.00	30°												☆	★				
		22IL600TR–P	6.00	12.70	2.30	1.90	4.65	5.00	30°												☆	★				

★ Recommended grade ☆ Available grade

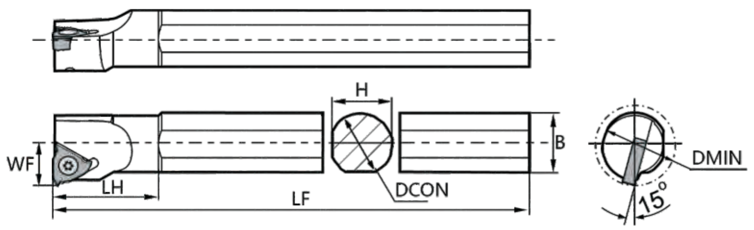
External threading tools

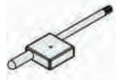


Type		Inventoty	Basic dimension (mm)					Accessories				
			H	HF	B	LF	WF	Insert screw	Shim	Insert shim screw	Wrench	Matching insert
												
SWR	2020K16	△	20	20	20	125	25	M3.5 × 12	HT16–□□M	HM4 × 8C	WR15	16□□
	2525M16	▲	25	25	25	150	32					
	3232P16	△	32	32	32	170	40					
	2525M22	▲	25	25	25	150	32	M5 × 17	HT22–□□M	HM5 × 8.5	WR20	22□□
	3232P22	△	32	32	32	170	40					
SWL	2020K16	△	20	20	20	125	25	M3.5 × 12	HT16–□□M	HM4 × 8C	WR15	16□□
	2525M16	▲	25	25	25	150	32					
	3232P16	△	32	32	32	170	40					
	2525M22	▲	25	25	25	150	32	M5 × 17	HT22–□□M	HM5 × 8.5	WR20	22□□
	3232P22	△	32	32	32	170	40					

★ Recommended grade ☆ Available grade

Internal threading tools



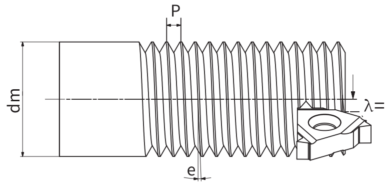
Type		Inventoty	Basic dimension (mm)							Accessories				
			DCON	LF	B	DMIN	WF	H	LH	Insert screw	Shim	Insert shim screw	Wrench	Matching insert
														
SWR	0016K11	△	16	125	16	12	10	15	20.9	M2.5×6.5	–	–	WR07	11□□
	0016M11	▲	16	150	15.5	16	10.5	15	25.9					
	0016M16	△	16	150	15.5	20	12	15	27	M3.5×8			WR15	16□□
	0020M16	△	20	150	19	25	14	18	28.7	M3.5×12	HT16–□□M	HM4×8		
	0020Q16	△	20	180	19	25	14	18	34					
	0025M16	▲	25	150	24	32	17	23	28.8					
	0032R16	△	32	200	31	40	22	30	30.9					
	0032S16	△	32	250	31	40	22	30	30.9					
	0020Q22	△	20	180	21.5	25	15	18	35	M5×10	–	–	WR20	22□□
	0025R22	▲	25	200	24	32	19	23	39	M5×17	HT22–□□M	HM4×8		
	0032S22	△	32	250	31	40	22	30	36.4					
SWL	0016K11	△	16	125	16	12	10	15	20.9	M2.5×6.5	–	–	WR07	11□□
	0016M11	▲	16	150	15.5	16	10.5	15	25.9					
	0016M16	△	16	150	15.5	20	12	15	27	M3.5×8			WR15	16□□
	0020M16	△	20	150	19	25	14	18	28.7	M3.5×12	HT16–□□M	HM4×8		
	0020Q16	△	20	180	19	25	14	18	34					
	0025M16	▲	25	150	24	32	17	23	28.8					
	0032R16	△	32	200	31	40	22	30	30.9					
	0032S16	△	32	250	31	40	22	30	30.9					
	0020Q22	△	20	180	21.5	25	15	18	35	M5×10	–	–	WR20	22□□
	0025R22	▲	25	200	24	32	19	23	39	M5×17	HT22–□□M	HM4×8		
	0032S22	△	32	250	31	40	22	30	36.4					

★ Recommended grade ☆ Available grade

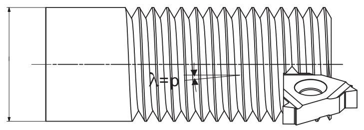
Selection of shim and helix angle

The helix angle is dependent on and related to the diameter and pitch of the thread. During thread turning, due to the influence of the helix Angle, it will cause the change of the cutting position of base surface, so that the rake angle and clerance shows different cutting factor. The larger the helix angle, the effect musch more obvious. Therefore, the influence of helix angle must be considered for better machining outcome.

e =Helix angle



λ =inclnation angle



Helix angle ＜ clearance angle of tools. Better switch shim, the different between helix angle and inclnationangle of shim adjust to 0°- 2°。

Spl：P=1.5、d2=24mm

Helix angle1.14°-（2°~0°）=inclnation angle（-0.86°~1.14°）apply standard 1° shim。

Specification table of shim

pitch	insert size	Inclination angle	Shim
0.5-3.0	16	0 1 2 3	HT16-00M HT16-01M HT16-02M HT16-03M
3.5-6.0	22	0 1 2 3	HT22-00M HT22-01M HT22-02M HT22-03M

Note: The standard of shim is 1°for threading tool
(MT16–01M 或 MT22–01M)

$$e= \arctan \frac{p}{d_2 \times \pi}$$

P= **pitch**

d_2= **diameter of thread**

The most common angle of inclination is 1°
Clearance calculation
Clearance calculation formula

$$\beta= \arctan(\tan\theta \times \tan\alpha)$$

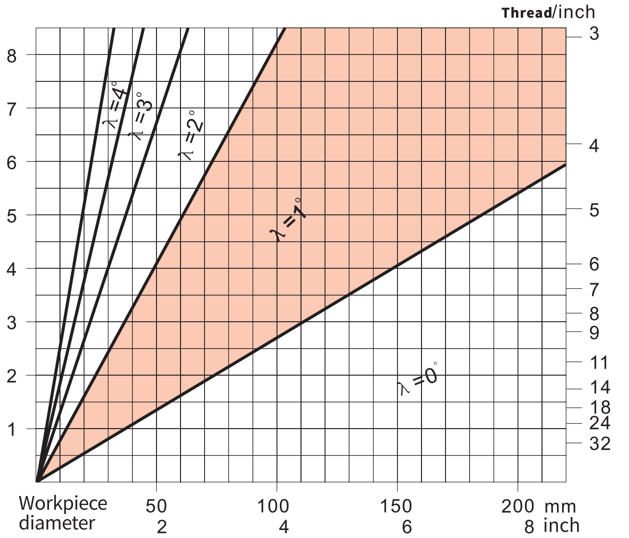
2θ=**thread tooth angle**

α= **Rake angle of tool. External thread 10°**，Internal thread 15°

The following table is used for specific values

thread tooth angle 2θ	β	
	internal thread	external thread
60°	5.8°	8.79°
55°	5.24°	7.94°
30°	2.7°	4.1°

Selection of shim



Cutting speed recommendations for threading

Workpiece materials						Application scope of Huareal turning grade (HR5225)	
ISO	Classification of materials			Hardness of Brinell (HB)	Tensile strength (N/mm^2)	Cutting speed Vc (m/min)	
						HR5125	HR5225
P	Non-alloyed steel	C≤0.25%	Annealing	125	428	160-180	168-185
		0.25<C≤0.55%	Annealing	190	639	150-160	155-165
		0.25<C≤0.55%	Quenching and tempering	210	708	145-155	155-165
		C>0.55%	Annealing	190	639	135-150	140-155
		C>0.55%	Quenching and tempering	300	1013	120-140	125-140
	Low-alloyed steel	Annealing		175	591	120-140	130-145
		Quenching and tempering		300	1013	90-110	95-115
		Quenching and tempering		380	1282	80-100	85-100
		Quenching and tempering		430	430	70-95	80-95
	High-alloyed steel	Annealing		200	675	90-120	98-125
		Quenching and tempering		300	1013	80-100	85-110
M	Stainless steel	Austenite		180	675	120-140	120-140
		Martensite/ferrite		200	778	140-180	145-180
K	Malleable cast iron	Ferrite		200	400	120-145	130-145
		Pearlite		260	700	80-115	85-120
	Grey cast iron	Low tensile strength		180	200	115-150	110-160
		High tensile strength/austenite		245	350	90-115	90-125
	Ductile iron	Ferrite		155	400	110-130	110-140
		Pearlite		265	700	90-115	95-120
N	Wrought aluminum alloy	Non-aging		60	—	1000-1400	1100-1500
		Aged		100	340	500-600	550-650
	Foundry aluminum alloy	Non-aging		75	260	450-500	450-550
		Aged		90	310	300-400	320-450
S	Nickel-based alloy	Nickel-based	Annealing	200	680	35-50	35-55
			Aged	280	940	25-35	25-40
		Nickel-based or cobalt-based	Annealing	250	840	20-30	22-35
			Aged	350	1180	10-25	10-30
			Casting	320	1080	10-20	10-25
	Titanium alloy	1262		300	1010	20-25	20-30
H	Hardened steel	Quenching and tempering		50HRC		60-70	60-75
		Quenching and tempering		55HRC		40-50	45-55
		Quenching and tempering		60HRC		30-40	30-48

Feed rate recommendation table

ISO Metric 60° external thread

Pitch (mm)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.50	0.31	0.10	0.08	0.07	0.06										
0.75	0.46	0.16	0.14	0.10	0.06										
1.00	0.61	0.18	0.15	0.12	0.10	0.06									
1.25	0.77	0.19	0.17	0.14	0.11	0.10	0.06								
1.50	0.92	0.22	0.21	0.17	0.14	0.12	0.06								
1.75	1.07	0.22	0.21	0.16	0.13	0.11	0.09	0.09	0.06						
2.00	1.23	0.24	0.23	0.17	0.16	0.14	0.12	0.11	0.06						
2.50	1.53	0.26	0.23	0.19	0.17	0.15	0.13	0.12	0.11	0.11	0.06				
3.00	1.84	0.27	0.25	0.20	0.18	0.16	0.14	0.13	0.12	0.12	0.11	0.10	0.06		
3.50	2.15	0.33	0.30	0.24	0.21	0.18	0.17	0.15	0.14	0.14	0.12	0.11	0.06		
4.00	2.45	0.34	0.31	0.24	0.22	0.19	0.17	0.16	0.14	0.14	0.13	0.12	0.12	0.11	0.06
4.50	2.76	0.38	0.34	0.28	0.24	0.22	0.20	0.18	0.16	0.16	0.15	0.14	0.13	0.12	0.06
5.00	3.07	0.42	0.38	0.32	0.27	0.24	0.22	0.20	0.18	0.18	0.17	0.16	0.15	0.12	0.06
5.50	3.35	0.43	0.40	0.38	0.36	0.32	0.28	0.24	0.20	0.16	0.16	0.15	0.14	0.12	0.06
6.00	3.82	0.44	0.42	0.40	0.38	0.34	0.30	0.30	0.28	0.25	0.18	0.17	0.16	0.12	0.06

ISO Metric 60° internal thread

Pitch (mm)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.50	0.29	0.09	0.07	0.07	0.06										
0.75	0.43	0.15	0.13	0.09	0.06										
1.00	0.58	0.17	0.15	0.11	0.09	0.06									
1.25	0.72	0.18	0.16	0.12	0.11	0.09	0.06								
1.50	0.87	0.21	0.20	0.16	0.13	0.11	0.06								
1.75	1.01	0.21	0.20	0.15	0.12	0.10	0.09	0.08	0.06						
2.00	1.15	0.24	0.22	0.18	0.14	0.12	0.10	0.09	0.06						
2.50	1.44	0.25	0.24	0.21	0.15	0.13	0.12	0.10	0.09	0.09	0.06				
3.00	1.73	0.26	0.25	0.22	0.17	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.06		
3.50	2.02	0.32	0.30	0.23	0.19	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.06		
4.00	2.31	0.33	0.31	0.24	0.22	0.18	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.10	0.06
4.50	2.60	0.36	0.33	0.28	0.24	0.21	0.19	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.06
5.00	2.89	0.41	0.38	0.32	0.27	0.24	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06
5.50	3.15	0.42	0.35	0.3	0.28	0.26	0.24	0.22	0.2	0.2	0.2	0.16	0.14	0.12	0.06
6.00	3.54	0.43	0.38	0.35	0.32	0.3	0.28	0.28	0.26	0.22	0.2	0.18	0.16	0.12	0.06

Feed rate recommendation table

Whitworth external thread

Pitch (number of teeth/inch)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
28	0.58	0.17	0.14	0.11	0.10	0.06									
26	0.63	0.18	0.15	0.13	0.11	0.06									
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06								
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06								
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06								
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06						
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06						
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06						
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06					
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06				
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06			
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06		
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06		
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06

Whitworth internal thread

Pitch (number of teeth/inch)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
28	0.58	0.17	0.14	0.11	0.10	0.06									
26	0.63	0.18	0.15	0.13	0.11	0.06									
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06								
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06								
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06								
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06						
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06						
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06						
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06					
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06				
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06			
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06		
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06		
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06

Feed rate recommendation table

UN external thread

Pitch (number of teeth/inch)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
28	0.58	0.17	0.14	0.11	0.10	0.06									
26	0.63	0.18	0.15	0.13	0.11	0.06									
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06								
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06								
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06								
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06						
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06						
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06						
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06					
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06				
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06			
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06		
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06		
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06

UN internal thread

Pitch (number of teeth/inch)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
28	0.58	0.17	0.14	0.11	0.10	0.06									
26	0.63	0.18	0.15	0.13	0.11	0.06									
20	0.81	0.20	0.18	0.14	0.12	0.11	0.06								
19	0.86	0.21	0.19	0.15	0.13	0.12	0.06								
18	0.90	0.25	0.19	0.15	0.13	0.12	0.06								
16	1.02	0.21	0.18	0.15	0.13	0.11	0.09	0.09	0.06						
14	1.16	0.23	0.21	0.17	0.14	0.12	0.12	0.11	0.06						
12	1.36	0.27	0.25	0.20	0.16	0.15	0.14	0.13	0.06						
11	1.48	0.27	0.24	0.20	0.17	0.15	0.14	0.13	0.12	0.06					
10	1.63	0.27	0.25	0.20	0.17	0.15	0.15	0.13	0.13	0.12	0.06				
9	1.81	0.28	0.26	0.21	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.06			
8	2.03	0.30	0.27	0.22	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.06		
7	2.32	0.34	0.32	0.26	0.22	0.20	0.18	0.17	0.16	0.15	0.14	0.12	0.06		
6	2.71	0.35	0.33	0.27	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.06
5	3.25	0.42	0.40	0.35	0.29	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.15	0.12	0.06

Feed rate recommendation table

BSPT - external thread

Pitch (number of teeth/inch)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
28	0.58	0.17	0.14	0.11	0.10	0.06									
19	0.86	0.22	0.19	0.15	0.12	0.12	0.06								
14	1.16	0.24	0.20	0.17	0.14	0.12	0.12	0.11	0.06						
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06					

BSPT - internal thread

Pitch (number of teeth/inch)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
19	0.86	0.22	0.19	0.15	0.12	0.12	0.06								
14	1.16	0.24	0.20	0.17	0.14	0.12	0.12	0.11	0.06						
11	1.48	0.25	0.23	0.21	0.18	0.16	0.14	0.13	0.12	0.06					

NPT - external thread

Pitch (number of teeth/inch)	Total cutting depth	Steps of machining														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
27	0.66	0.15	0.13	0.12	0.11	0.09	0.06									
18	1.01	0.20	0.16	0.14	0.13	0.12	0.11	0.09	0.06							
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06					
11.5	1.64	0.24	0.19	0.17	0.15	0.15	0.13	0.13	0.12	0.11	0.10	0.09	0.06			
8	2.42	0.33	0.28	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06

NPT - internal thread

Pitch (number of teeth/inch)	Total cutting depth	Steps of machining														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
27	0.66	0.15	0.13	0.12	0.11	0.09	0.06									
18	1.01	0.20	0.16	0.14	0.13	0.12	0.11	0.09	0.06							
14	1.33	0.23	0.19	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.06					
11.5	1.64	0.24	0.19	0.17	0.15	0.15	0.13	0.13	0.12	0.11	0.10	0.09	0.06			
8	2.42	0.33	0.28	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.06

Feed rate recommendation table

ISO 30°trapezoidal- external thread

Pitch (mm)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.5	0.91	0.23	0.21	0.17	0.13	0.11	0.06								
2	1.26	0.29	0.25	0.22	0.18	0.14	0.12	0.06							
3	1.77	0.32	0.31	0.25	0.20	0.18	0.17	0.15	0.13	0.06					
4	2. 26	0.33	0.32	0.25	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06		
5	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06
6	3.52	0.37	0.35	0.34	0.33	0.32	0.31	0.27	0.26	0.25	0.24	0.16	0.14	0.12	0.06

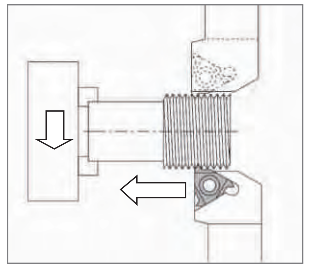
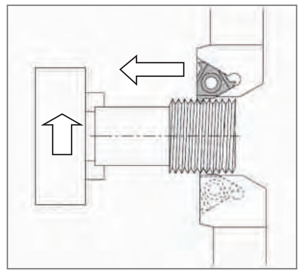
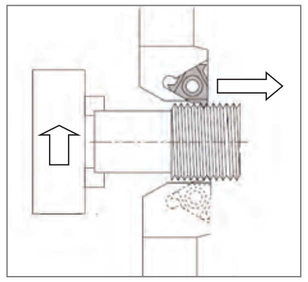
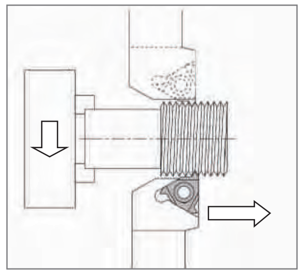
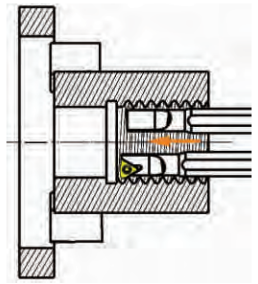
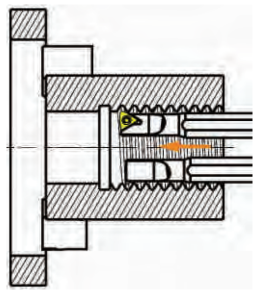
ISO 30°trapezoidal- internal thread

Pitch (mm)	Total cutting depth	Steps of machining													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.5	0.90	0.23	0.20	0.17	0.13	0.11	0.06								
2	1.25	0.29	0.25	0.21	0.18	0.14	0.12	0.06							
3	1.75	0.32	0.30	0.24	0.20	0.18	0.17	0.15	0.13	0.06					
4	2. 26	0.33	0.32	0.25	0.22	0.21	0.17	0.16	0.15	0.14	0.13	0.12	0.06		
5	2.75	0.35	0.32	0.26	0.24	0.22	0.21	0.19	0.19	0.17	0.15	0.14	0.13	0.12	0.06
6	3.52	0.37	0.35	0.34	0.33	0.32	0.31	0.27	0.26	0.25	0.24	0.16	0.14	0.12	0.06

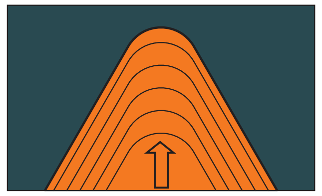
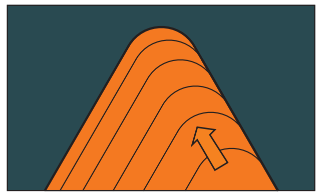
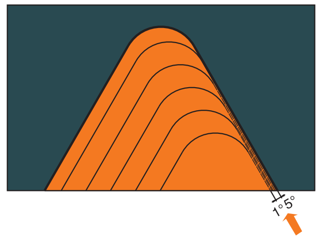
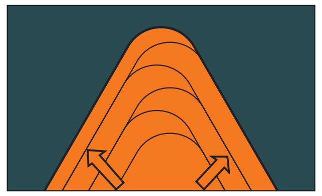
Features of thread insert

- ◆ Precision molded and sophistication grinded inserts are available.
- ◆ Strict size control ensures a smaller range of size fluctuations from insert to insert and aconsistent quality.
- ◆ The unique edge with small arc corners can realize more specialized and rationalized machining.
- ◆ The inserts are equipped with chipbreakers to improve chip handling capability during machining and provide excellent machining stability.
- ◆ HR5225 and HR5125 dedicated for thread turning can ensure that the insert can effectively resist plastic deformation and wear during threading.

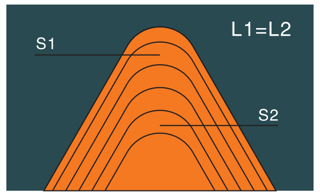
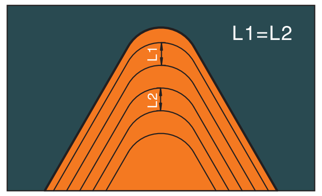
Machining type of thread tools

1. External threading with dextral thread	2. External threading with sinistral thread
	
	
3. Internal threading with dextral thread	4. Internal threading with sinistral thread
	

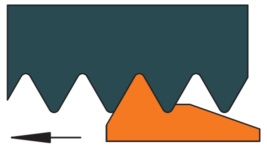
Threading (crosscutting) method

Graph	Machining method	Features	
		Advantage	Disadvantage
	Radial crosscutting (vertical feeding)	● Easiest to use (standard procedure for threading) ● High versatility (easy to change conditions such as cutting depth) ● Average wear on the rear insert face of the left and right cutting edges	● It is difficult to dispose chips. ● Vibrations tend to occur in the second half of machining (due to increased cutting edge contact length). ● It is not suitable for large pitch machining. ● There is a heavy load for the Corner radius (R) (because chips from both left and right sides will gather at the top)
	Tooth side feeding (One-way feeding)	● Relatively easy to use (standard procedure for threading) ● The cutting forces can be reduced. ● It is especially suitable for large pitch or materials prone to squeezing and cracking ● Its chip handling performance is excellent. (Because it can control chip discharge direction).	● The right rear insert face is badly worn (because the cutting depth on the right side is always zero). ● It is difficult to change the cutting depth (NC program is required).
 	Modified crosscutting of tooth side (One-way modified feeding)	● Its rear insert face wear can be effectively controlled. ● The cutting forces can be reduced. ● It is especially suitable for large pitch or materials prone to squeezing and cracking ● Its chip handling performance is excellent (because it can control chip discharge direction).	● It is difficult to program the machining (some machines can use standard methods directly) ● It is difficult to change the cutting depth (NC program is required).
	Alternating crosscutting (Staggered feeding)	● Average wear on the rear insert face of the left and right cutting edges (Due to the staggered use of cutting edge) ● The cutting forces can be reduced. ● It is especially suitable for large pitch or materials prone to squeezing and cracking	● It is difficult to program the machining (some machines can use standard methods directly) ● It is difficult to change the cutting depth (NC program is required). ● It is difficult to dispose chips (because they are discharged from both sides and may get tangled sometimes.)

Cutting depth of threading

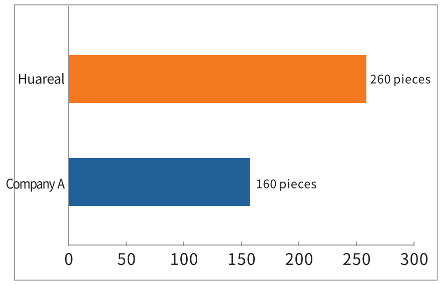
Machining method	Features	
	Advantage	Disadvantage
 Fixed cutting area	• Easy to use (standard procedure for threading) • It has good vibration resistance (to keep cutting force stable).	• The last chip is resistant to breaking (because the chip thickness becomes very thin). • The calculation of cutting depth when the number of machining steps is changed is slightly complicated.
 Fixed cutting depth	• It can reduce the load in the first half of the corner radius R. • It is easy to adjust the performance of chip handling (chip thickness can be set at will). • The calculation of cutting depth when the number of machining steps is changed is easy. • It maintains good chip handling performance through whole machining.	• Vibrations tend to occur in the second half of machining (cutting force rises) • Sometimes it is necessary to change the NC (it is more common for fixed areas).

Wiper edge

Without wiper edge	With wiper edge	With semi-wiper edge (trapezoidal thread only)
• One insert can machine different pitches. • The corner radius R is less than that of a wiper edge insert, resulting in a short tool service life. • Additional finishing is required.	• No burrs will appear on the thread teeth. • Different inserts are required for different pitches and shapes.	• No burrs will appear on the thread teeth. • Different inserts are required for different pitches and shapes. • Additional finishing is required.
 Feed direction	 Feed direction	 Feed direction

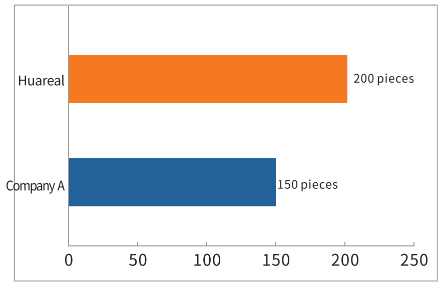
Application

Pipe fiiting



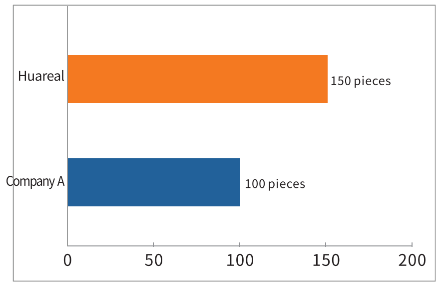
◉ Workpieces materials	SUS304
◉ Machining method	Internal threading
◉ Insert	16IR14W HR5225
◉ Machining parameters	v_c=78m/min
◉ Cooling method	Water cooling

Pipe joint



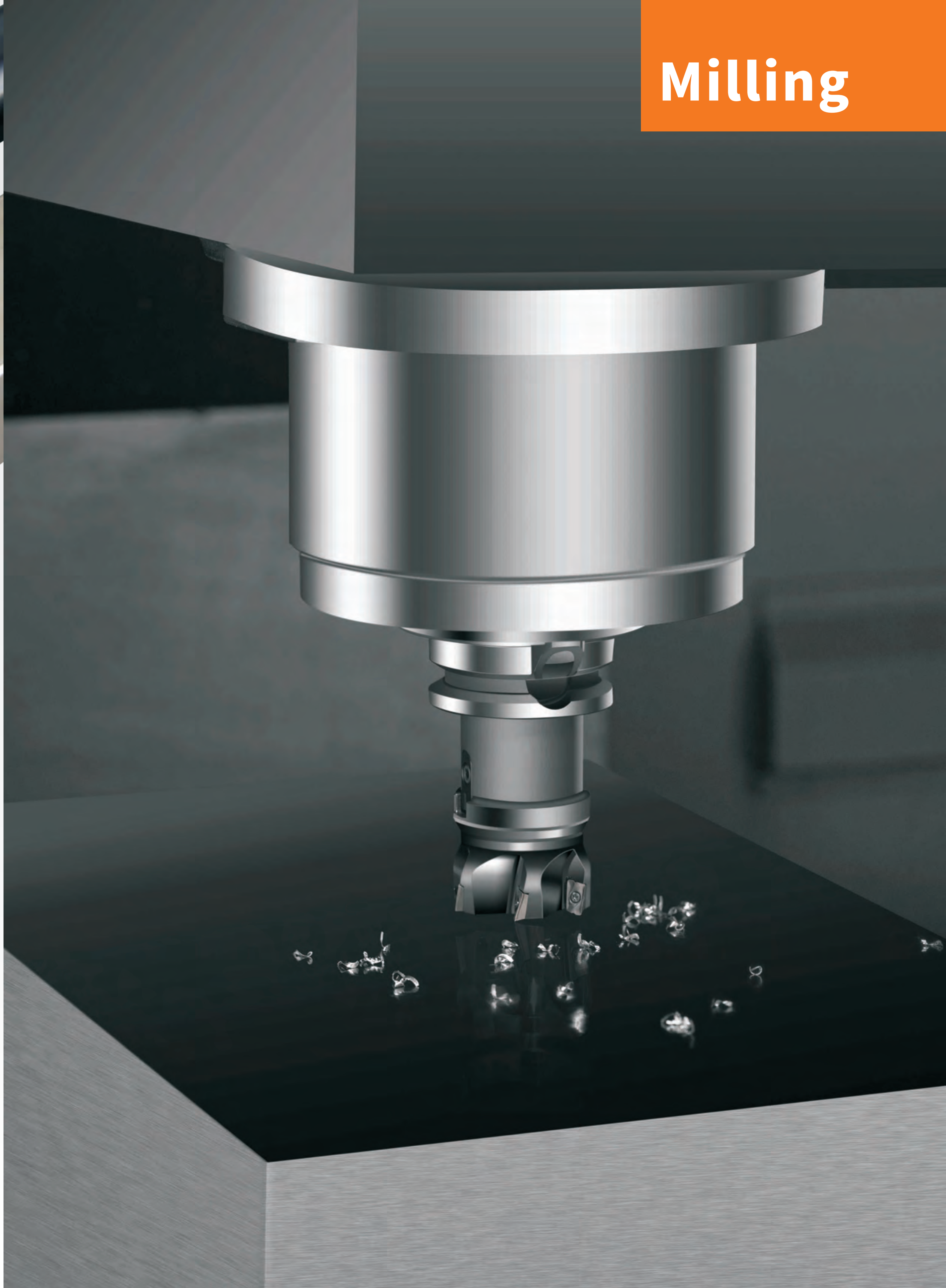
◉ Workpieces materials	SUS304
◉ Machining method	external threading
◉ Insert	16ER14W HR5225
◉ Machining parameters	v_c=80m/min
◉ Cooling method	Water cooling

Hydraulic Pipe Fitting



◉ Workpieces materials	45 steel
◉ Machining method	internal threading
◉ Insert	16ER300ISO HR5225
◉ Machining parameters	v_c=75m/min
◉ Cooling method	Water cooling

Milling



Cast Iron milling CVD grade

HR6130

Matching various type of milling inserts to meet various process requirements such as face milling and square shoulder milling

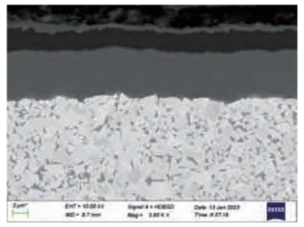
Cast Iron milling CVD grade With excellent wear resistance,it's suitable for milling of ISO K type material

- **Substrate**

  The substrate composed of medium particle carbide phase and high-strengthPost-treatment process binder phase, ensuring good strength

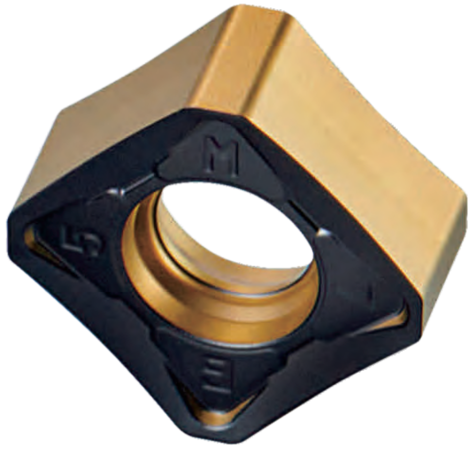
- **Coating**

  Adopting directional growth alumina deposition technologyto form high-strength composite CVD coating with excellent wear resistance



- **Post-treatment process**

  Special posttreatment process makes the inserts surface smoother and lower cutting temperature



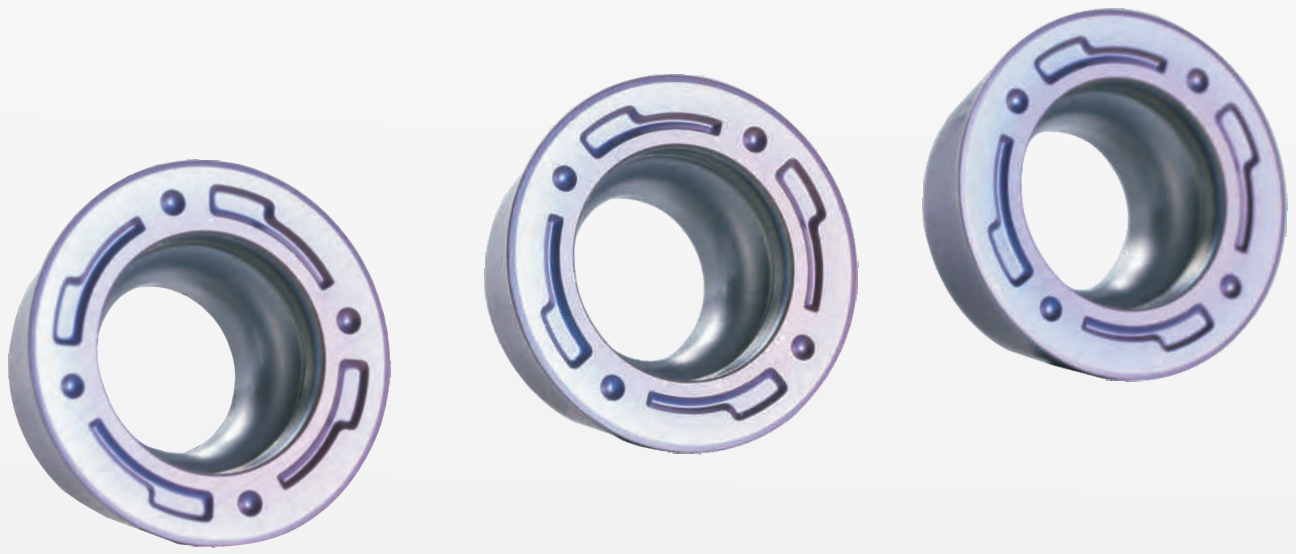
CVD

Special grade for milling of quenched steel

HR5210

Suitable for milling of high hardness matreial (50-65HRC)

New!



Specialize grade for milling of mild steel and stainless steel

HR530

Perfect solution for the safe machining and milling of mild steel and stainless steel

longer services life

Supported by new nano multi layer coating technology, wear resistance greatly improved

Improved productivity

Strong and tough substrate paired with a new coating process, allowing for higher cutting velocity and feed rates

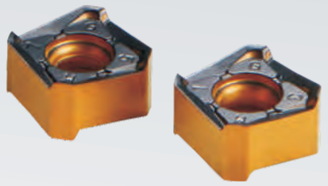
Reliable1 safety

With great film-susbstrate adhension,effectively reducing the risk of inserts damage

General type face milling tool

CFM145

Suitable for finishing and seim–finishing face milling



Bearing type face milling tool

CFM345

Suitable for rough nachining
and ligh-load machining

C/SSM190

Square shoulder milling tool

C/SSM390

Square shoulder milling tool

ISO

Overview of indexable milling inserts

Type	Material	ISO	CVD coating		PVD coating									Carbide	Cermet	ISO
			HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10	
P	Non-alloyed steel/alloy steel	P01														P01
		P05				HR5210										P05
		P10			HR5110											P10
		P15						HR5220							HRC10	P15
		P20					HR5120									P20
		P25							HR5130		HR7130					P25
		P30		HR8140						HR530			HR7240			P30
		P35										HR7140				P35
		P40														P40
		P45														P45
		P50														P50
M	Stainless steel	M05				HR5210										M05
		M10			HR5110											M10
		M15						HR5220								M15
		M20					HR5120									M20
		M25							HR5130							M25
		M30								HR530			HR7240			M30
		M35										HR7140				M35
		M40														M40
		M45														M45
K	Cast iron	K01														K01
		K05														K05
		K10				HR5210										K10
		K15			HR5110											K15
		K20						HR5220								K20
		K25	HR6130				HR5120									K25
		K30							HR5130							K30
		K35														K35
		K40														K40
		K45														K45
		K50														K50
N	Aluminum/aluminum alloy	N01														N01
		N05														N05
		N10												HRK10		N10
		N15														N15
		N20														N20
		N25														N25
		N30														N30
S	High-temp alloy	S01														S01
		S05														S05
		S10											HR7240			S10
		S15										HR7140				S15
		S20														S20
		S25														S25
		S30														S30
		S40														S40

B
Milling

Indexable milling

Solid carbide end mills

Code key of indexable milling inserts

C | FM | 1 | 45 | L | - | 063 | A

① ② ③ ④ ⑤ ⑥ ⑦

22 | I | 05 | L | - | S | N | 10

⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭

① Tool type	
C	Disc-type tools
S	Rod-type tools

② Usage	
FM	Face milling
TM	Slot milling
SM	Square shoulder milling
PM	Profile milling
CM	Chamfer milling
EM	High feed
HM	Helical end milling

③ Type	
1	Type 1
2	Type 2
…	…

④ Cutting edge angle	
45	45°
60	60°
75	75°
90	90°
00	Exception

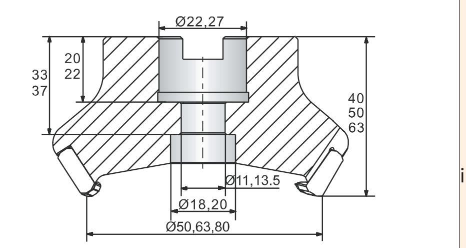
⑤ Cutting direction	
R	Default
L	Sinistral cutting

⑥ Outside diameter	
016	Ø 16mm
020	Ø 20mm
025	Ø 25mm
032	Ø 32mm
040	Ø 40mm
050	Ø 50mm
063	Ø 63mm
080	Ø 80mm
100	Ø 100mm
125	Ø 125mm

⑦ Interface type	
A	A-type interface
B	B-type interface
C	C-type interface
D	D-type interface
G	Straight shank
X	Flat shank
BT	BT taper shank
JT	JT taper shank
MT	Morse taper shank
XPX	Compound shank
HSK	Short taper shank

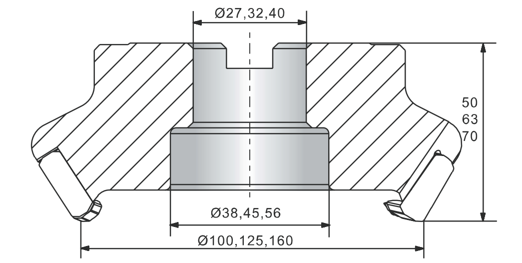
Structure of tool installation part (Sleeve structure)

A-type interface



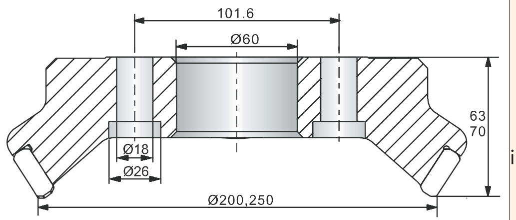
ϕ200-ϕ250 sleeve face milling tools specified in GB5342-96

B-type interface



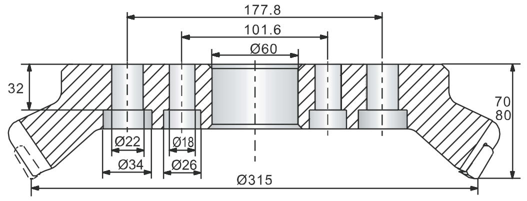
ϕ100-ϕ160 sleeve face milling tools specified in GB5342-96

C-type interface



ϕ200-ϕ250 sleeve face milling tools specified in GB5342-96

D-type interface



Sleeve face milling tools with ϕ315 and above specified in GB5342-96

See the technical data of the tool system section for the connection of flat shank, straight and taper shank.

⑧Sizes of tool installation parts	
16	Ø 16mm
22	Ø 22mm
27	Ø 27mm
32	Ø 32mm
40	Ø 40mm
60	Ø 60mm

⑨ Unit	
Inch	I
Metric	Default

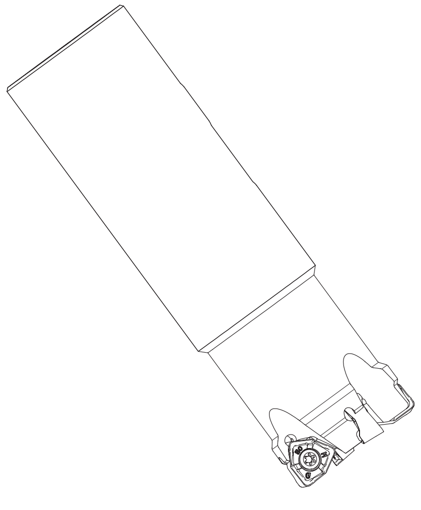
⑩Number of teeth	
02	Two teeth
03	Three teeth
04	Four teeth
…	…

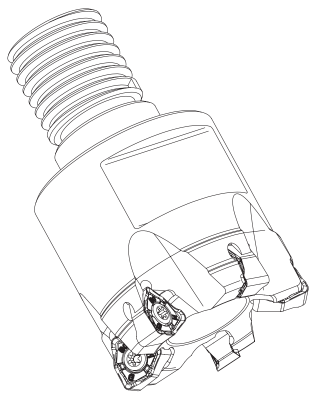
⑪Length type	
Cutterhead style	Omit
Shank style	Omit
S	Short
L	Long
XL	Lengthened

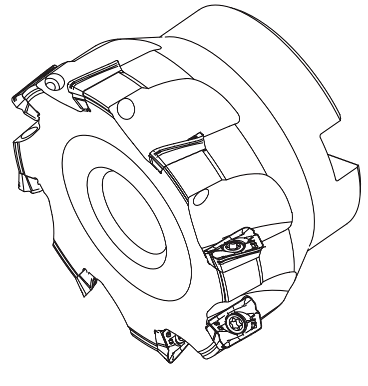
⑫ Insert shape	
A	▱ 85°
H	⬢
L	▬
O	⯃
R	●
S	■
T	▲
W	⬟ 80°
Others	

⑬ Insert clearance angle	
A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	Others

⑭ Cutting edge length	
09	9mm
10	10mm
12	12mm
15	15mm
19	19mm
Others	



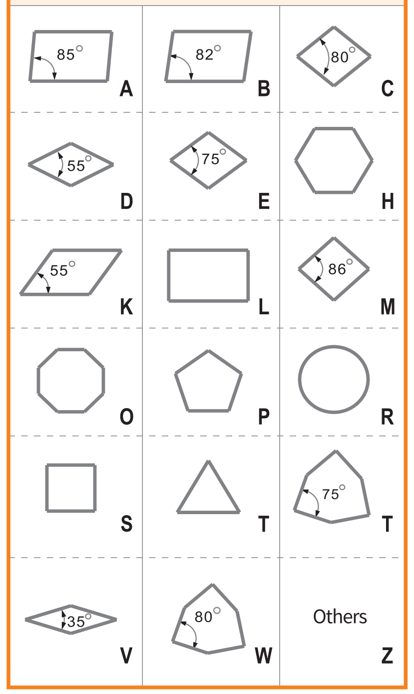




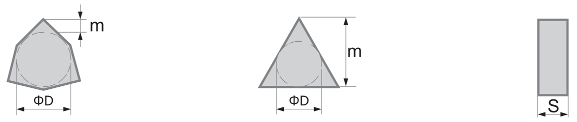
Code key of indexable milling inserts

A	P	M	T	16	05	PD	E	R	-	FM
①	②	③	④	⑤	⑥	⑦	⑧	⑨		⑩

① Shape code



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

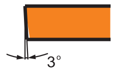
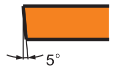
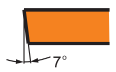
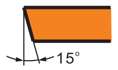
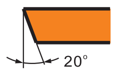
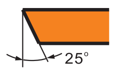
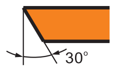
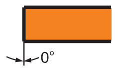
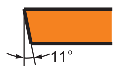
- M-class tolerance requirements (distinguished by shape and inscribed circle size)
- Corner height (m) tolerance

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

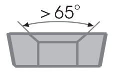
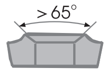
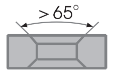
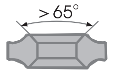
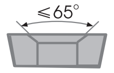
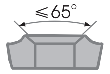
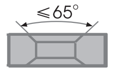
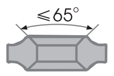
- Inscribed circle (ϕD) tolerance

Inscribed circle	Regular triangle	Square	80° Rhombus	55° Rhombus	35° Rhombus	Circular
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	---
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
12.7	±0.08	±0.08	±0.08	±0.08	---	±0.08
15.875	±0.10	±0.10	±0.10	±0.10	---	±0.10
19.05	±0.10	±0.10	±0.10	±0.10	---	±0.10
25.4	---	±0.13	---	---	---	±0.13

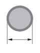
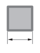
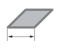
② Cutting edge clearance angle major

Code	Clearance angle	Code	Clearance angle
A	 3°	B	 5°
C	 7°	D	 15°
E	 20°	F	 25°
G	 30°	N	 0°
P	 11°	O	Others

④ Chipbreaker and clamping form

Code	Hole	Chipbreaker	Sectional view	Code	Hole	Chipbreaker	Sectional view
B	Y	N/A	 > 65°	N	N/A	N/A	
H	Y	Single-sided	 > 65°	R	N/A	Single-sided	
C	Y	N/A	 > 65°	F	N/A	Double-sided	
J	Y	Double-sided	 > 65°	A	Y	N/A	
W	Y	N/A	 ≤65°	M	Y	Single-sided	
T	Y	Single-sided	 ≤65°	G	Y	Double-sided	
Q	Y	N/A	 ≤65°	X	---	---	Exception
U	Y	Double-sided	 ≤65°				

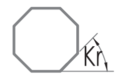
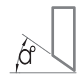
⑤ Cutting edge length

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			

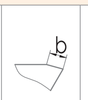
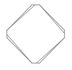
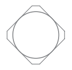
⑥ Insert thickness

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

⑦ Wiper edge

 Kr		 α°	
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

 F	 α°	 b	
	0-5°	0-0.10	K (or not marked)
 E	1-10°	1-0.15	
	2-15°	2-0.20	P
 T	3-20°	3-0.25	
	4-25°	4-0.30	W
 S	5-30°	5-0.35	
	1-10°	6-0.40	Q
	1-10°	7-0.45	

⑨ Cutting direction

Code	Direction
R	Right
L	Left
N	Two-way

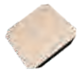
⑩ Chipbreaker code

Indexable milling insert overview

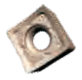
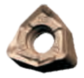
Grade type	Grade	ISO	Color	Coating type	Coating Composition	Characteristics
Coated Carbide	HR6130	ISO P ISO K	Black& Yellow	CVD	TiN+MT-TiCN+Al$_2$O3	Suitable for rough and semi-finishing milling of ISO P and ISO K. The use of high strength composite coating, taking into account the requirements of wear resistance and strength for milling machining. At the mean time, the new post-treatment process effectively improves the toughness of the insert.
	HR8140	ISO P	Black& Yellow	CVD	TiN+MT-TiCN+Al$_2$O3	Most apply for heavy milling of ISO P material The use of CVD thin coating design, taking into account the requirements of wear resistance and strength for milling machining. At the mean time, with excellent resistance to high temperature plastic deformation of the matrix, both high hardness and stable performance characteristics.
	HR5110	ISO P	Bronze	PVD	TiAlN+CrAlN +TiSiN	Suitable for milling of ISO H material (45-55HRC) Fine-grain cemented carbide matrix with a new nano gradient composite structure coating, the product surface is smooth, with small friction coefficient, the nano hardness is high, and the oxidation resistance is excellent.
	HR5210	ISO P ISO H	Rainbow color	PVD	AlTiN+TiSiN	Suitable for milling of ISO H materials (50-65HRC) The uniformly distributed ultrafine nanoparticles matrix combined with a wear-resistant coating, shows accountable thermal stability and oxidation resistance, greatly improve the red hardness of the coating, with the ability to withstand high cutting temperatures, and adapt to machining of high hardness materials.
	HR5120	ISO P ISO M ISO K	Bronze	PVD	TiAlN+CrAlN +TiSiN	Suitable for milling of ISO P, M, K materials, especially for machining of materials with hardness of 35-50 HRC: With excellent wear resistance and toughness and the latest multi-component nano coating,shows excellent high temperature hardness.
	HR5220	ISO P ISO M ISO K	Bronze	PVD	AlTiN+TiSiN	Suitable for milling of ISO P, M, K materials, especially for machining of materials with hardness of 40-45 HRC: Apply for AlTiN and TiSiN double-layer coating structure has good strength, toughness and wear resistance, reduces the extension of longitudinal cracks, and effectively improves the chipping resistance of the coating.

Grade type	Grade	ISO	Color	Coating type	Coating Composition	Characteristics
Coated Carbide	HR5130	ISO P ISO M	Gray	PVD	AlTiN	Suitable for milling of ISO P, M, materials, especially for machining of materials with hardness below 30 HRC: The special proportion of the matrix effectively improves the wear resistance and toughness and reduces the risk of breakage. Combined with the latest nano coatings, the overall performance is excellent in high feed milling.
	HR530	ISO P ISO M	Gray	PVD	AlTiN/AlCrN	Aiming for milling of mild steel and stainless steel. The new nano-multilayer composite coating technology greatly improves wear resistance. The toughness matrix with a new coating process, allowing higher cutting speed and feed, excellent film-matrix adhesion strength, effectively reduce the risk of insert breakge.
	HR7130	ISO P	Purple Gray	PVD	TiAlN	Generally used for heavy milling of ISO P material Adopting thick PVD coating design, with good wear resistance and impact resistance; high temperature resistance, high hardness and high stability.
	HR7140	ISO M ISO S	Gray	PVD	AlCrN	Suitabel for milling of stainless steel,Titannium alloy and high temperature alloy. Special microelement matrix, with good toughness and high temperature performance.
	HR7240	ISO M ISO S	Bronze	PVD	AlCrN	Suitable for milling of stainless steel, titanium alloy and high-temp alloy. The new composition and matrix structure design, high temperature resistance and toughness are taken into account, and its wear resistance is further improved.
Cermet	HRC10	ISO P	Bronze	PVD	TiAlSiN	Suitable for finshing and semi-finishing milling of ISO P material. With high thermal stability and wear resistance, excellent thermal shock resistance, the new high tungsten, high nitrogen fine particle matrix supplemented by high tantalum and niobium content, great high temperature resistance and collapse resistance perofrmance.

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□□0605		◎ 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.	B13–B14
	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.	B15–B16
	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.	B17–B18
	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.	B19–B20
	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.	B21–B22
	CFM645 	KAPR=45°	HNMX0906ANSN–M		◎ Cost-effective face milling tool series ◎ It has double-sided high strength hexagonal insert with 12 cutting edges.	B23–B24
	CFM745 	KAPR=45°	XN□□0705 XN□□0906		◎ Cost-effective face milling tools series ◎ It has double-sided heptagon insert with 14 cutting edges.	B25–B26

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.	B28–B30
	SSM188 					
	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.	B31–B35
	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.	B36–B38
	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.	B39–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□□ APGT11□□ APMT16□□ APGT16□□		◎ 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 					
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.	B52–B53
	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.	B54–B56
	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.	B57–B60
	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.	B65–B67
	SEM100 					
	CEM200 	/	LNKU□□		◎ 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 insert size is small, and tools with the same diameter can install more insert,resulting in higher productivity. ◎ The cutting tool have multiple selection, including rod shaped, disc shaped, and interchangeable structures.	B68–B71
	SEM200 					
	KH 					
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.	B76–B77

Overview of indexable milling inserts

Insert shape	Insert model	Page
	APMT1135PDER–HM APMT1605PDER–HM	B47
	APGT1135PDFR–AK APGT1604PDFR–AK	B47
	APKT113604PEER–FM APKT1136PEER–FM APKT113612PEER–FM APKT113620PEER–FM APKT1605PDER–FM APKT160512PDER–FM APKT160520PDER–FM	B38
	SPMT120408–MM APMT150412–MM SPHX120408T21 APHX1504	B77
	AOKT060202PEER–VM AOKT060204PEER–VM AOKT060208PEER–VM AOKT113504PEER–VM AOKT113508PEER–VM AOKT113512PEER–VM AOKT113516PEER–VM AOKT160408PEER–VM AOKT160412PEER–VM AOKT160416PEER–VM	B34

Insert shape	Insert model	Page
	HNMX0906ANSN–M	B24
	LNKU0303ZNR–MH LNKU0303ZNR–LH	B71
	ODKT0605ADN ODMT060508–R	B14
	RCKT10T3MO–FM RCKT1204MO–FM RCKT1606MO–FM RCKT2006MO–FM	B53
	RDMW0602MO RDMW0802MO RDMW10T3MO RDMW1204MO RDMW1605MO	B59
	RDKW10T3MO RDKW1204MO RDKW1604MO	B59
	RPMT08T2MO–HM RPMW1003MO RPMT1204MO–HM	B56

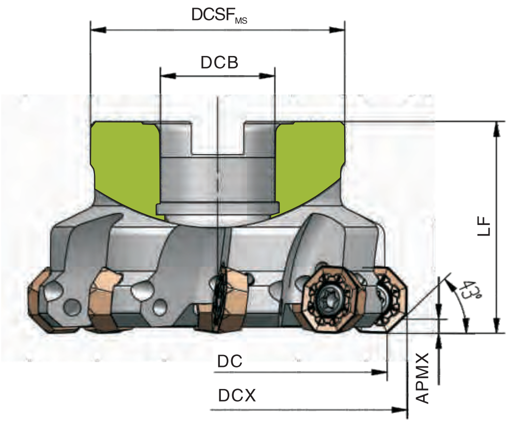
Insert shape	Insert model	Page
	RPKT10T3MO–MS RPKT1204MO–MS RPKT1606MO–MS	B56
	RPMT08T2MO–SM RPMT10T3MO–SM RPMT1204MO–SM RPMT1606MO–SM	B56
	SDMT1205ZTN–FM SDMT1505ZTN–FM	B67
	SDMW1205ZTN SDMW1505ZTN	B67
	SEET13T3–GM SEMT13T3AGTN–FM	B18
	SEKR1203AFTN SEMR1203AFTN	B22
	SEEN1203AFTN	B22
	SPKN1504EDTL SPKN1504EDTR	

Insert shape	Insert model	Page
	SNGX1005ANR–GM	B16
	SNGX1005ANR–GE	B16
	SNGX1005ZNN–GM SNMX100512–GM	B30
	SZMX1206ANR–GM	B20
	XNMX070508–M XNMX0705ANN–M XNGX0705ANN–R XNMX090612–M XNGX0906–W	B26
	ZNMU040308PNR–GM ZNMU080608PNR–GM ZNMU080608PNR–GL ZNMU080608PNR–GR ZNMU080616PNR–GR	B44

Face milling

CFM143 series

KAPR=43°

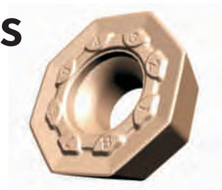


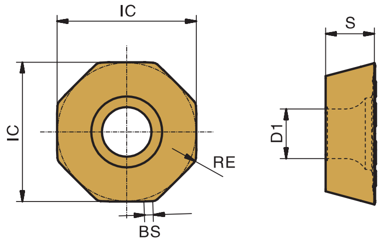
Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	$DCSF_{MS}$	DCX	LF					
CFM143–040A1603–OD06	3	△	40	16	35	50	40	4	A	OD□□	M50130	HTT20IP
CFM143–050A2204–OD06	4	△	50	22	47	60	40	4				
CFM143–063A2205–OD06	5	△	63	22	47	72	40	4				
CFM143–080A2706–OD06	6	▲	80	27	62	90	50	4				
CFM143–100A3207–OD06	7	▲	100	32	77	110	50	4				
CFM143–125B4008–OD06	8	△	125	40	90	135	63	4	B			
CFM143–160C4010–OD06	10	△	160	40	92	170	63	4	C			HAT20IP
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		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	BS	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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

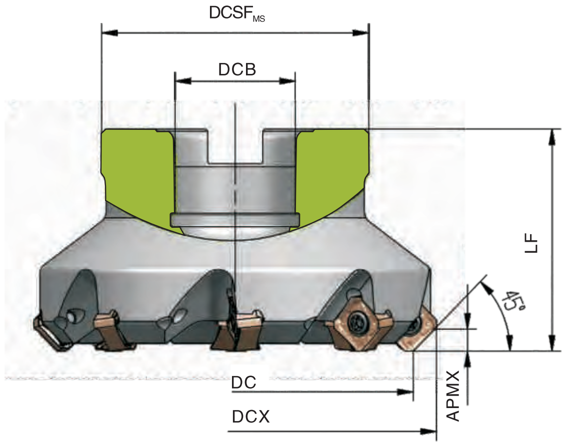
Recommended cutting parameters

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	≤180	HR5120	270(220–350)	0.3(0.1–0.5)
			HR5220	240(200–320)	
			HR5130	220(200–320)	
	High-carbon steel, alloy steel	180–280	HR5110	240(200–320)	0.2(0.1–0.4)
			HR5120	200(160–280)	
			HR5220	200(160–280)	
			HR5130	200(160–260)	
	Alloy tool steel	280–350	HR5110	220(170–340)	0.15(0.1–0.3)
			HR5210	200(150–280)	
			HR5120	180(150–250)	
			HR5220	180(150–250)	
M	Stainless steel	≤270	HR5120	180(120–240)	0.2(0.1–0.3)
			HR5130	150(120–180)	
K	Cast iron	180–250	HR6130	280(180–320)	0.2(0.1–0.4)
			HR5110	200(150–250)	
			HR5120	200(150–250)	

Face milling

CFM145 series

KAPR=45°

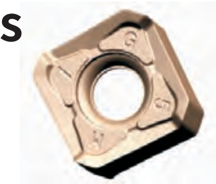


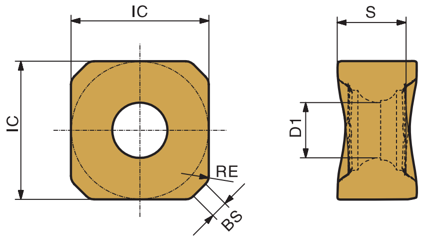
Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	DCSF$_{MS}$	DCX	LF					
CFM145-050A2204-SN10	4	▲	50	22	47	60.5	40	4.7	A	SNGX□□	M35100	HTT10IP
CFM145-050A2205-SN10	5	△	50	22	47	60.5	40	4.7				
CFM145-063A2205-SN10	5	△	63	22	47	73.5	40	4.7				
CFM145-063A2206-SN10	6	▲	63	22	47	73.5	40	4.7				
CFM145-080A2706-SN10	6	△	80	27	62	90.5	50	4.7				
CFM145-080A2708-SN10	8	▲	80	27	62	90.5	50	4.7				
CFM145-100A3206-SN10	6	△	100	32	77	110.5	50	4.7				
CFM145-100A3208-SN10	8	▲	100	32	77	110.5	50	4.7				
CFM145-100A3210-SN10	10	△	100	32	77	110.5	50	4.7				
CFM145-125B4008-SN10	8	△	125	40	90	135.5	63	4.7	B			
CFM145-125B4010-SN10	10	△	125	40	90	135.5	63	4.7				
CFM145-125B4012-SN10	12	△	125	40	90	135.5	63	4.7				
CFM145-160C4008-SN10	8	△	160	40	92	170.5	63	4.7	C			HAT10IP
CFM145-160C4012-SN10	12	▲	160	40	92	170.5	63	4.7				
CFM145-160C4014-SN10	14	△	160	40	92	170.5	63	4.7				

▲Running stock △Make-to-order

Applicable inserts

SN□□





Working condition: ● Stable ◕ Average ¤ Tough

Applicable inserts	Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	BS	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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

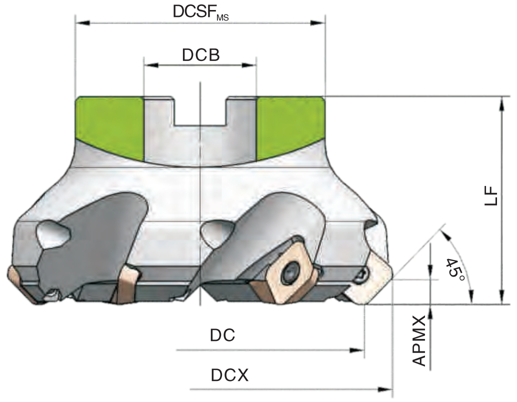
Recommended cutting parameters

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	HR5120	270(220-350)	0.3(0.1-0.5)
			HR5220	240(200-320)	
			HR5130	220(200-320)	
	High-carbon steel, alloy steel	180-280	HR5110	240(200-320)	0.2(0.1-0.4)
			HR5120	200(160-280)	
			HR5220	200(160-280)	
			HR5130	200(160-260)	
	Alloy tool steel	280-350	HR5110	220(170-340)	0.15(0.1-0.3)
			HR5210	200(150-280)	
			HR5120	180(150-250)	
			HR5220	180(150-250)	
M	**Stainless steel**	≤270	HR5120	180(120-240)	0.2(0.1-0.3)
			HR5130	150(120-180)	
K	**Cast iron**	180-250	HR6130	280(180-320)	0.2(0.1-0.4)
			HR5110	200(150-250)	
			HR5120	200(150-250)	

Face milling

CFM245series

KAPR=45°

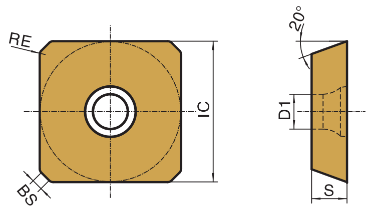


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	DCSF$_{MS}$	DCX	LF					
CFM245-050A2203-SE13	3	△	50	22	47	61	40	6	A	SEET□□	M35100	HTT10IP
CFM245-050A2204-SE13	4	△	50	22	47	61	40	6				
CFM245-063A2204-SE13	4	△	63	22	47	74	40	6				
CFM245-063A2205-SE13	5	▲	63	22	47	74	40	6				
CFM245-080A2704-SE13	4	△	80	27	62	91	50	6				
CFM245-080A2706-SE13	6	▲	80	27	62	91	50	6				
CFM245-100A3205-SE13	5	△	100	32	77	107	50	6				
CFM245-100A3207-SE13	7	△	100	32	77	111	50	6				
CFM245-125B4006-SE13	6	△	125	40	90	136	63	6	B			
CFM245-125B4008-SE13	8	△	125	40	90	136	63	6				
CFM245-160C4010-SE13	10	△	160	40	92	171	63	6	C			HAT10IP
CFM245-160C4012-SE13	12	△	160	40	92	171	63	6				
CFM245-200C6014-SE13	14	△	200	60	175	211	63	6				
CFM245-200C6018-SE13	18	△	200	60	175	211	63	6				

▲Running stock △Make-to-order

Applicable inserts

SE□□



Working condition: ● Stable ◕ Average ¤ Tough

Applicable inserts	Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	BS	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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

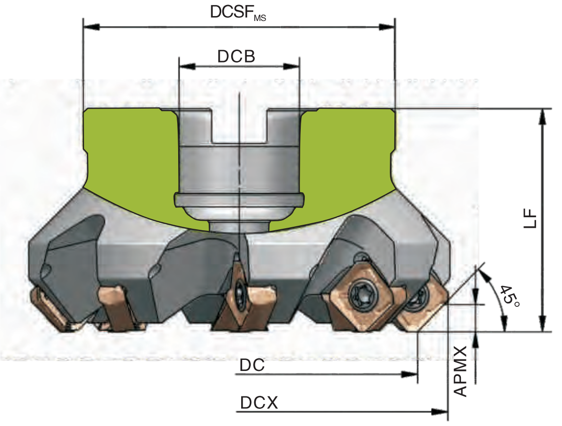
Recommended cutting parameters

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	HR5120	270(220–350)	0.3(0.1–0.5)
			HR5220	240(200–320)	
			HR5130	220(200–320)	
	High-carbon steel, alloy steel	180–280	HR5110	240(200–320)	0.2(0.1–0.4)
			HR5120	200(160–280)	
			HR5220	200(160–280)	
			HR5130	200(160–260)	
	Alloy tool steel	280–350	HR5110	220(170–340)	0.15(0.1–0.3)
			HR5210	200(150–280)	
			HR5120	180(150–250)	
			HR5220	180(150–250)	
M	**Stainless steel**	≤270	HR5120	180(120–240)	0.2(0.1–0.3)
			HR5130	150(120–180)	
K	**Cast iron**	180–250	HR6130	280(180–320)	0.2(0.1–0.4)
			HR5110	200(150–250)	
			HR5120	200(150–250)	

Face milling

CFM345series

KAPR=45°

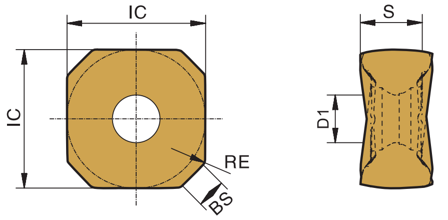


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	DCSF$_{MS}$	DCX	LF					
CFM345-050A2204-SZ12	4	▲	50	22	47	63.7	40	6	A	SZMX□□	M40100 M40110	HTT15IP
CFM345-050A2205-SZ12	5	△	50	22	47	63.7	40	6				
CFM345-063A2205-SZ12	5	▲	63	22	47	76.7	40	6				
CFM345-063A2206-SZ12	6	△	63	22	47	76.7	40	6				
CFM345-080A2706-SZ12	6	▲	80	27	62	93.7	50	6				
CFM345-080A2708-SZ12	8	△	80	27	62	93.7	50	6				
CFM345-100A3206-SZ12	6	△	100	32	77	113.7	50	6				
CFM345-100A3208-SZ12	8	△	100	32	77	113.7	50	6				
CFM345-100A3210-SZ12	10	▲	100	32	77	113.7	50	6				
CFM345-125B4008-SZ12	8	△	125	40	90	138.7	63	6	B			
CFM345-125B4010-SZ12	10	▲	125	40	90	138.7	63	6				
CFM345-125B4012-SZ12	12	△	125	40	90	138.7	63	6				
CFM345-160C4008-SZ12	8	△	160	40	92	173.7	63	6	C			HAT15IP
CFM345-160C4012-SZ12	12	▲	160	40	92	173.7	63	6				
CFM345-160C4014-SZ12	14	△	160	40	92	173.7	63	6				

▲Running stock △Make-to-order

Applicable inserts

SZMX □□



Working condition: ● Stable ◕ Average ⌘ Tough

Applicable inserts	Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	BS	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
SZMX1206ANR-GM	13.4	6.0	4.6	1.4	0.8	6	★		☆	☆	★	★	★						

★ Recommended grade ☆ Available grade

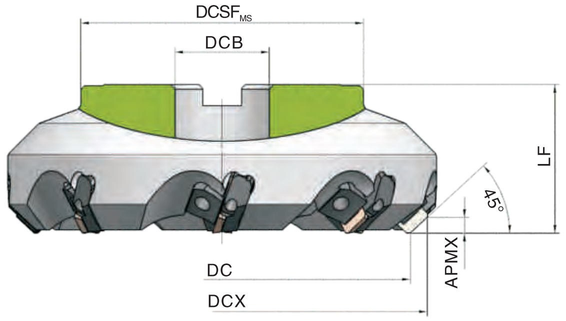
Recommended cutting parameters

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	HR5120	270(220–350)	0.3(0.1–0.5)
			HR5220	240(200–320)	
			HR5130	220(200–320)	
	High-carbon steel, alloy steel	180–280	HR5110	240(200–320)	0.2(0.1–0.4)
			HR5120	200(160–280)	
			HR5220	200(160–280)	
			HR5130	200(160–260)	
	Alloy tool steel	280–350	HR5110	220(170–340)	0.15(0.1–0.3)
			HR5210	200(150–280)	
			HR5120	180(150–250)	
			HR5220	180(150–250)	
M	**Stainless steel**	≤270	HR5120	180(120–240)	0.2(0.1–0.3)
			HR5130	150(120–180)	
K	**Cast iron**	180–250	HR6130	280(180–320)	0.2(0.1–0.4)
			HR5110	200(150–250)	
			HR5120	200(150–250)	

Face milling

CFM445series

KAPR=45°



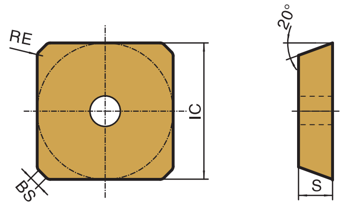
Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts
			DC	DCB	DCSF$_{MS}$	DCX	LF			
CFM445–080A2704–SE12	4	▲	80	27	62	103	50	5.5	A	SE□R1203□
CFM445–100A3205–SE12	5	▲	100	32	77	122	50	5.5		
CFM445–125B4006–SE12	6	△	125	40	90	147	63	5.5	B	
CFM445–160C4008–SE12	8	△	160	40	92	181	63	5.5	C	
CFM445–200C6010–SE12	10	△	200	60	175	221	63	5.5		
CFM445–250C6012–SE12	12	△	250	60	210	270	63	5.5		
CFM445–315D6015–SE12	15	△	315	60	250	353	63	5.5	D	

▲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		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	BS	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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

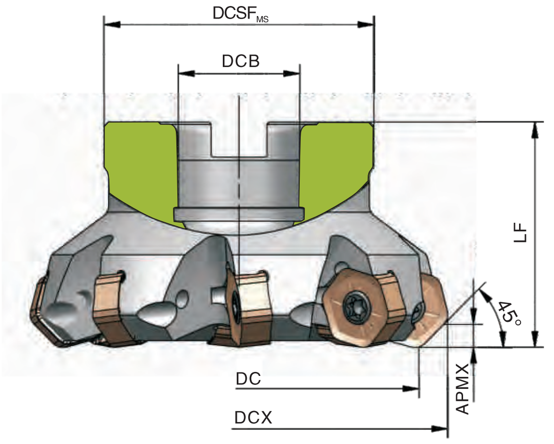
Recommended cutting parameters

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	≤180	HR5120	270(220–350)	0.3(0.1–0.5)
			HR5220	240(200–320)	
			HR5130	220(200–320)	
	High-carbon steel, alloy steel	180–280	HR5110	240(200–320)	0.2(0.1–0.4)
			HR5120	200(160–280)	
			HR5220	200(160–280)	
			HR5130	200(160–260)	
	Alloy tool steel	280–350	HR5110	220(170–340)	0.15(0.1–0.3)
			HR5210	200(150–280)	
			HR5120	180(150–250)	
			HR5220	180(150–250)	
M	Stainless steel	≤270	HR5120	180(120–240)	0.2(0.1–0.3)
			HR5130	150(120–180)	
K	Cast iron	180–250	HR6130	280(180–320)	0.2(0.1–0.4)
			HR5110	200(150–250)	
			HR5120	200(150–250)	

Face milling

CFM645series

KAPR=45°

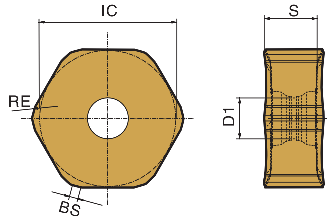


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	$DCSF_{MS}$	DCX	LF					
CFM645–050A2204–HN09	4	△	50	22	47	61.7	40	5	A	HNMX0906□□	M45110	HTT15IP
CFM645–063A2206–HN09	6	△	63	22	47	74.7	40	5				
CFM645–080A2706–HN09	6	△	80	27	62	91.7	50	5				
CFM645–080A2708–HN09	8	▲	80	27	62	91.7	50	5				
CFM645–100A3206–HN09	6	△	100	32	77	111.7	50	5				
CFM645–100A3208–HN09	8	▲	100	32	77	111.7	50	5				
CFM645–100A3210–HN09	10	△	100	32	77	111.7	50	5				
CFM645–125B4006–HN09	6	△	125	40	90	136.7	63	5	B			
CFM645–125B4008–HN09	8	△	125	40	90	136.7	63	5				
CFM645–125B4010–HN09	10	△	125	40	90	136.7	63	5				
CFM645–125B4012–HN09	12	△	125	40	90	136.7	63	5				
CFM645–160C4008–HN09	8	△	160	40	92	171.7	63	5	C			HAT15IP
CFM645–160C4012–HN09	12	▲	160	40	92	171.7	63	5				
CFM645–160C4014–HN09	14	△	160	40	92	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	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	BS	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
HNMX0906ANSN–M	16.5	6.34	4.9	1.0	1.2	5	★		☆	☆	★	★	★						
HNMX0906ANSN–R	16.5	6.34	4.9	1.0	1.2	5	★		☆	☆	★	★	★						

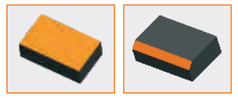
★ Recommended grade ☆ Available grade

Recommended cutting parameters

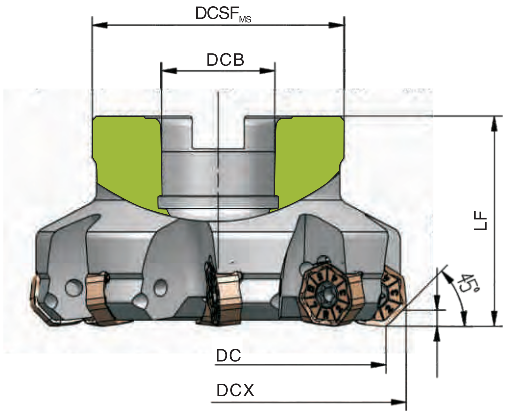
Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z(mm/z)
P	Low-carbon steel, mild steel	≤180	HR5120	270(220–350)	0.3(0.1–0.5)
			HR5220	240(200–320)	
			HR5130	220(200–320)	
	High-carbon steel, alloy steel	180–280	HR5110	240(200–320)	0.2(0.1–0.4)
			HR5120	200(160–280)	
			HR5220	200(160–280)	
			HR5130	200(160–260)	
	Alloy tool steel	280–350	HR5110	220(170–340)	0.15(0.1–0.3)
			HR5210	200(150–280)	
			HR5120	180(150–250)	
			HR5220	180(150–250)	
M	Stainless steel	≤270	HR5120	180(120–240)	0.2(0.1–0.3)
			HR5130	150(120–180)	
K	Cast iron	180–250	HR6130	280(180–320)	0.2(0.1–0.4)
			HR5110	200(150–250)	
			HR5120	200(150–250)	

Face milling

CFM745series



KAPR=45°

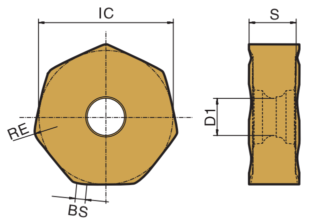


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	$DCSF_{MS}$	DCX	LF					
CFM745–040A1603–XN07	3	△	40	16	35	49.6	40	4.4	A	XN□X0705□□	M35120	HTT15IP
CFM745–050A2204–XN07	4	▲	50	22	47	59.6	40	4.4				
CFM745–050A2205–XN07	5	△	50	22	47	59.6	40	4.4				
CFM745–063A2205–XN07	5	▲	63	22	47	72.6	40	4.4				
CFM745–063A2206–XN07	6	△	63	22	47	72.6	40	4.4				
CFM745–080A2706–XN07	6	△	80	27	62	89.6	50	4.4				
CFM745–080A2707–XN07	7	▲	80	27	62	89.6	50	4.4				
CFM745–100A3207–XN07	7	▲	100	32	77	109.6	50	4.4				
CFM745–100A3208–XN07	8	△	100	32	77	109.6	50	4.4				
CFM745–125B4008–XN07	8	△	125	40	90	134.6	63	4.4	B			
CFM745–125B4010–XN07	10	△	125	40	90	134.6	63	4.4				
CFM745–160C4011–XN07	11	△	160	40	92	169.6	63	4.4	C			HAT15IP
CFM745–160C4012–XN07	12	△	160	40	92	169.6	63	4.4				
CFM745–063A2205–XN09	5	△	63	22	47	79	50	50	A	XN□X0906□□	M50130	HTT20IP
CFM745–080A2706–XN09	6	△	80	27	62	93	50	50				
CFM745–100A3207–XN09	7	△	100	32	77	113	50	50				
CFM745–100A3208–XN09	8	△	100	32	77	113	50	50				
CFM745–125B4008–XN09	8	△	125	40	90	138	63	63	B			
CFM745–125B4010–XN09	10	△	125	40	90	138	63	63				
CFM745–160C4009–XN09	9	△	160	40	92	173	63	63	C			HAT20IP
CFM745–160C4010–XN09	10	△	160	40	92	173	63	63				
CFM745–200C6012–XN09	12	△	200	60	175	213	63	63				

▲Running stock △Make-to-order

Applicable inserts

XN □□



Working condition: ● Stable ◕ Average ¤ Tough

Applicable inserts Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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	BS	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
XNMX070508–M	14.5	5.02	4.0	1.0	0.8	4.4	★		☆	☆	★	★	★			★			
XNMX0705ANN–M	14.5	5.02	4.0	1.0	0.8	4.4	★		☆	☆	★	★	★			★			
XNGX0705ANN–R	14.5	5.02	4.0	1.0	0.8	4.4	★		☆	☆	★	★	★						
XNMX090612–M	19.05	6.22	5.5	1.0	1.2	6.0	★		☆	☆	★	★	★						
XNGX0906–W	19.05	6.28	2.8	2.0	1.2	6.0	★				★								

★ Recommended grade ☆ Available grade

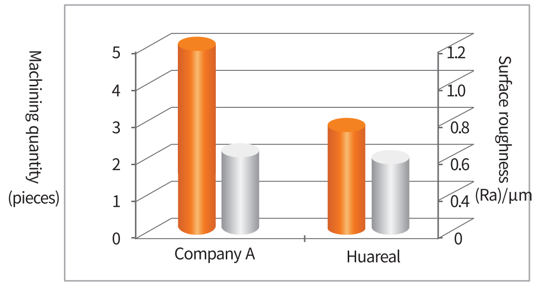
Recommended cutting parameters

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	HR5120	270(220–350)	0.3(0.1–0.5)
			HR5220	240(200–320)	
			HR5130	220(200–320)	
	High-carbon steel, alloy steel	180–280	HR5110	240(200–320)	0.2(0.1–0.4)
			HR5120	200(160–280)	
			HR5220	200(160–280)	
			HR5130	200(160–260)	
	Alloy tool steel	280–350	HR5110	220(170–340)	0.15(0.1–0.3)
			HR5210	200(150–280)	
			HR5120	180(150–250)	
			HR5220	180(150–250)	
M	Stainless steel	≤270	HR5120	180(120–240)	0.2(0.1–0.3)
			HR5130	150(120–180)	
K	Cast iron	180–250	HR6130	280(180–320)	0.2(0.1–0.4)
			HR5110	200(150–250)	
			HR5120	200(150–250)	

Machining cases

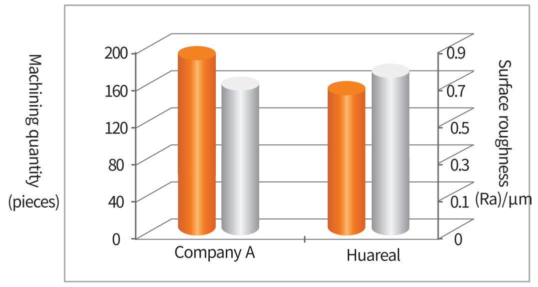
Machining cases

Machining method	Face milling
Workpiece material	1Cr18Ni9Ti 170-190HB
Insert	SNGX1005ANR-GM HR5120
Cutting tools	CFM145-063A2206-SN10
Cutting parameter	v_c=130m/min，f_z=0.15mm/z，ap=1mm
Cooling method	Water cooling



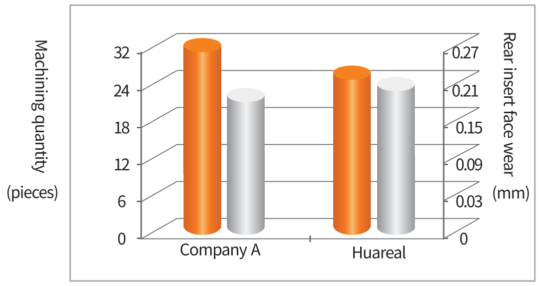
Machining cases

Machining method	Face milling
Workpiece material	HT250 200-220HB
Insert	SZMX1206ANN-GM HR6130
Cutting tools	CFM345-063A2206-SZ12
Cutting parameter	v_c=220m/min，f_z=0.2mm/z，ap=3mm
Cooling method	None



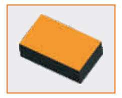
Machining cases

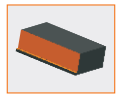
Machining method	Face milling
Workpiece material	1.4848(Exhaust pipe)
Insert	XNMX070508-M HR7140
Cutting tools	CFM745-080A2706-XN07
Cutting parameter	v_c=100m/min，f_z=0.18mm/z，ap=3-5mm
Cooling method	None



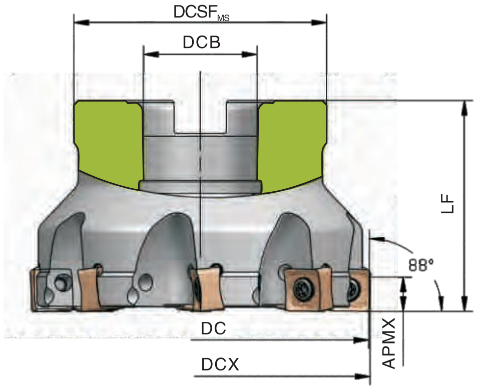
Square shoulder milling

CSM188 series





KAPR=88°



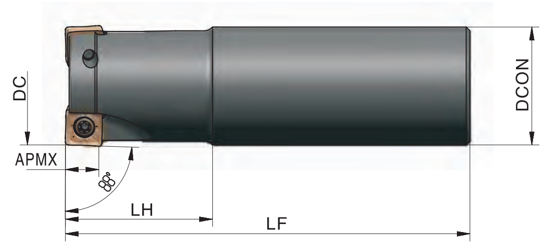
Tool specification and model	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	$DCSF_{MS}$	DCX	LF					
CSM188–050A2204–SN10	4	▲	50	22	47	50.7	40	8	A	SN□X1005□	M35100	HTT10IP
CSM188–050A2205–SN10	5	△	50	22	47	50.7	40	8				
CSM188–063A2205–SN10	5	▲	63	22	47	63.7	40	8				
CSM188–063A2206–SN10	6	△	63	22	47	63.7	40	8				
CSM188–080A2706–SN10	6	▲	80	27	62	80.7	50	8				
CSM188–080A2708–SN10	8	△	80	27	62	80.7	50	8				
CSM188–100A3206–SN10	6	△	100	32	77	100.7	50	8				
CSM188–100A3208–SN10	8	▲	100	32	77	100.7	50	8				
CSM188–100A3211–SN10	11	△	100	32	77	100.7	50	8				
CSM188–125B4008–SN10	8	△	125	40	90	125.7	63	8	B			
CSM188–125B4010–SN10	10	▲	125	40	90	125.7	63	8				
CSM188–125B4014–SN10	14	△	125	40	90	125.7	63	8				
CSM188–160C4008–SN10	8	△	160	40	92	160.7	63	8	C			HTA10IP
CSM188–160C4012–SN10	12	△	160	40	92	160.7	63	8				
CSM188–160C4014–SN10	14	△	160	40	92	160.7	63	8				

▲Running stock △Make-to-order

Square shoulder milling

SFM188 series

KAPR=88°

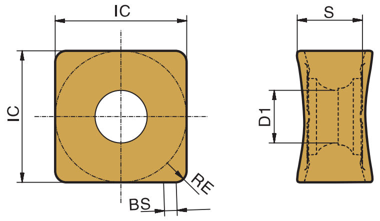


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM188–032G3202–SN10	2	▲	32	32	110	32.8	8	SN□X1005□	M35100	HTT10IP
SSM188–032G3203–SN10	3	△	32	32	110	32.8	8			
SSM188–040G3203–SN10	3	△	40	32	110	40.8	8			
SSM188–040G3204–SN10	4	△	40	32	110	40.8	8			

▲Running stock △Make-to-order

Applicable inserts

SN □□



Working condition: ● Stable ◕ Average ⌘ Tough

Applicable inserts	Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	BS	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
SNGX1005ZNN–GM	10.0	5.0	4.0	1.0	0.8	8	★		☆	☆	★	★	★						
SNMX100512–GM	10.0	5.0	4.0	\	1.2	8	★		☆	☆	★	★	★						

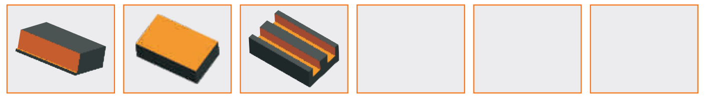
★ Recommended grade ☆ Available grade

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	HR5120	270(220–350)	0.3(0.1–0.5)
			HR5220	240(200–320)	
			HR5130	220(200–320)	
	High-carbon steel, alloy steel	180–280	HR5110	240(200–320)	0.2(0.1–0.4)
			HR5120	200(160–280)	
			HR5220	200(160–280)	
			HR5130	200(160–260)	
	Alloy tool steel	280–350	HR5110	220(170–340)	0.15(0.1–0.3)
			HR5210	200(150–280)	
			HR5120	180(150–250)	
			HR5220	180(150–250)	
M	Stainless steel	≤270	HR5120	180(120–240)	0.2(0.1–0.3)
			HR5130	150(120–180)	
K	Cast iron	180–250	HR6130	280(180–320)	0.2(0.1–0.4)
			HR5110	200(150–250)	
			HR5120	200(150–250)	

Square shoulder milling

CSM190 series



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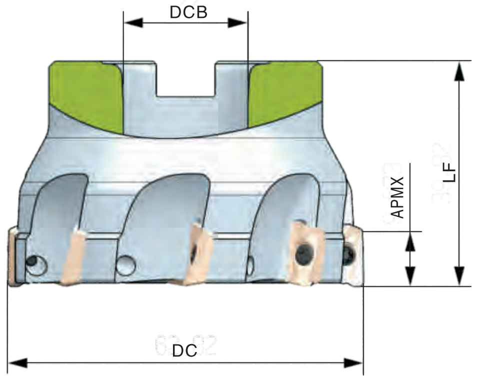
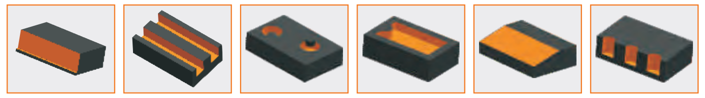


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	LF					
CSM190–040A1605–AO11	5	△	40	16	40	9.5	A	AOKT11□□	M25065	HFT08IP
CSM190–050A2206–AO11	6	▲	50	22	40	9.5				
CSM190–063A2207–AO11	7	▲	63	22	40	9.5				
CSM190–050A2204–AO16	4	△	50	22	40	14.5		AOKT16□□	M40100	HTT15IP
CSM190–063A2205–AO16	5	▲	63	22	40	14.5				
CSM190–080A2706–AO16	6	▲	80	27	50	14.5				

▲Running stock △Make-to-order

Square shoulder milling

SSM190 series



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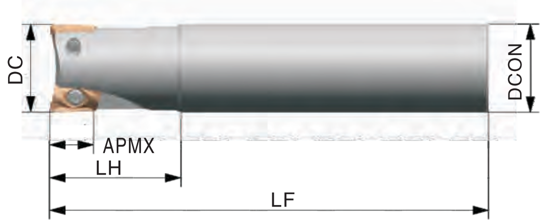
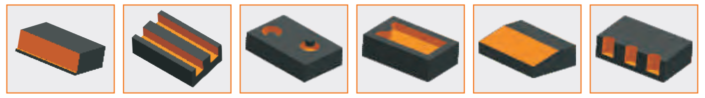


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM190–016G1602–AO11	2	▲	16	16	130	40	9.5	AOKT11□□	M25065	HFT08IP
SSM190–016G1602L–AO11	2	△	16	16	160	40	9.5			
SSM190–017G1602–AO11	2	▲	17	16	130	40	9.5			
SSM190–017G1602L–AO11	2	△	17	16	160	40	9.5			
SSM190–020G2002–AO11	2	▲	20	20	130	40	9.5			
SSM190–020G2002L–AO11		△	20	20	160	40	9.5			
SSM190–021G2002L–AO11	2	△	21	20	160	50	9.5			
SSM190–021G2002–AO11	2	▲	21	20	130	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□□	M40090	HTT15IP
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

Square shoulder milling

KH- series



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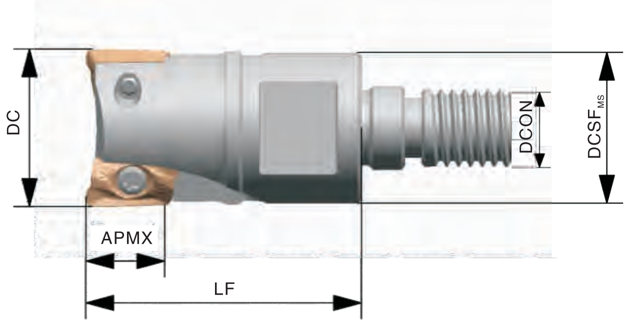
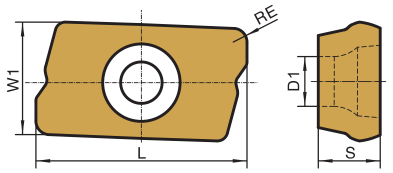


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCSF$_{MS}$	LF	DCON				
KH-1102-AOKT06-M05	2	△	11	9	18	5	4.5	AOKT06□□	M18036	HFT05IP
KH-1303-AOKT06-M06	3	△	13	11	18	6	4.5			
KH-1503-AOKT06-M08	3	△	15	14	22	8	4.5			
KH-1704-AOKT06-M08	4	△	17	14	22	8	4.5			
KH-1702-AOKT11-M08	2	△	17	14	25	8	9.5	AOKT11□□	M25065	HFT08IP
KH-2102-AOKT11-M10	2	△	21	18	30	10	9.5			
KH-2603-AOKT11-M12	3	△	26	23	35	12	9.5			
KH-3304-AOKT11-M16	4	△	33	29	40	16	9.5			

▲Running stock △Make-to-order

Applicable inserts

AO□□



Working condition: ● Stable ◔ Average ¤ Tough

Applicable inserts	Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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
	L	W1	S	D1	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
AOKT060202PEER-VM	7.61	4.20	2.38	2.10	0.20	4.5					★	★	★	☆					☆
AOKT060204PEER-VM	7.61	4.20	2.38	2.10	0.40	4.5					★	★	★	☆					☆
AOKT060208PEER-VM	7.61	4.20	2.38	2.10	0.80	4.5					★	★	★	☆					☆
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	★		☆	☆	★	★	★	☆					☆
AOKT1135120PEER-VM	11.75	6.42	3.50	2.80	2.00	9.5	★		☆	☆	★	★	★	☆					☆
AOKT113532PEER-VM	11.75	6.42	3.50	2.80	3.20	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	★		☆	☆	★	★	★	☆					☆

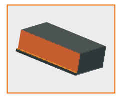
▲Running stock △Make-to-order

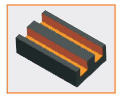
Recommended cutting parameters

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	⩽180HB	HR5120	280(220–340)	0.2(0.1–0.3)
			HR5130	180(120–250)	
			HR530	180(120–250)	
	High-carbon steel, alloy steel	180–280HB	HR5110	240(180–300)	0.2(0.1–0.3)
			HR5120	200(140–260)	
			HR5220	200(140–260)	
			HR5130	160(100–220)	
	Alloy tool steel	280–350HB	HR5110	220(140–280)	0.15(0.1–0.25)
			HR5210	160(100–220)	
			HR5120	160(100–220)	
			HR5220	120(80–180)	
M	Stainless steel	⩽270HB	HR5120	180(100–260)	0.2(0.1–0.3)
			HR5130	140(80–200)	
			HR530	140(80–200)	
K	Cast iron	180–250HB	HR6130	250(150–320)	0.2(0.1–0.3)
			HR5210	180(150–250)	
			HR5220	180(150–250)	
H	High hardness material	45–55HRC	HR5220	150(100–250)	0.2(0.1–0.3)
		⩾55HRC	HR5210	120(80–200)	

Square shoulder milling

CSM290 series





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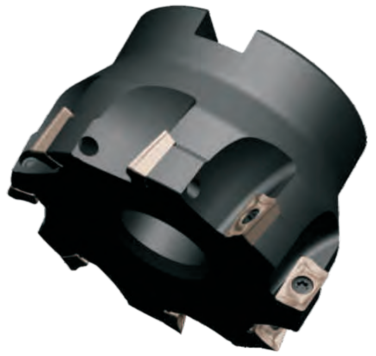
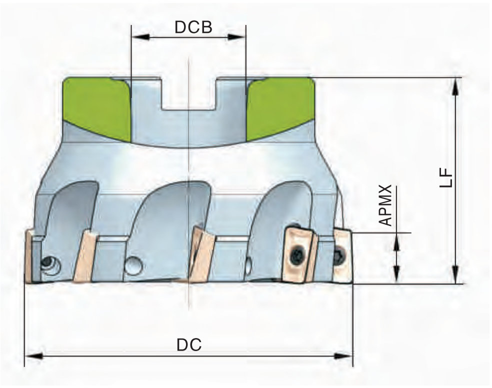


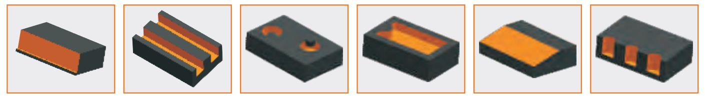


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	LF					
CSM290–050A2206–AP11	6	△	50	22	40	9.5	A	APKT11	M25065	HAT08IP HFT08IP
CSM290–063A2207–AP11	7	▲	63	22	40	9.5				
CSM290–080A2708–AP11	8	△	80	27	50	9.5				
CSM290–100B3210–AP11	10	△	100	32	50	9.5	B			
CSM290–050A2204–AP16	4	△	50	22	40	14.5	A	APKT16	M40100	HTT15IP
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

Square shoulder milling

SSM290 series



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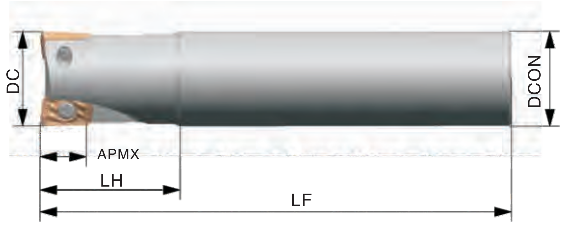


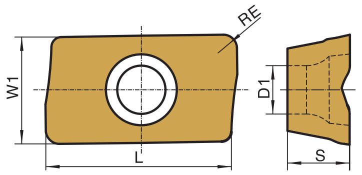
M2.5x6.5   HAT08IP

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	M25065	HFT08IP
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	M40090	HTT15IP
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		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	
	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
	L	W1	S	D1	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	
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	≤180HB	HR5120	280(220–340)	0.2(0.1–0.3)
			HR5130	180(120–250)	
			HR530	180(120–250)	
	High-carbon steel, alloy steel	180–280HB	HR5110	240(180–300)	0.2(0.1–0.3)
			HR5120	200(140–260)	
			HR5220	200(140–260)	
			HR5130	160(100–220)	
	Alloy tool steel	280–350HB	HR5110	220(140–280)	0.15(0.1–0.25)
			HR5210	160(100–220)	
			HR5120	160(100–220)	
			HR5220	120(80–180)	
M	Stainless steel	≤270HB	HR5120	180(100–260)	0.2(0.1–0.3)
			HR5130	140(80–200)	
			HR530	140(80–200)	
K	Cast iron	180–250HB	HR6130	250(150–320)	0.2(0.1–0.3)
			HR5210	180(150–250)	
			HR5220	180(150–250)	
H	**High hardness material**	45–55HRC	HR5220	150(100–250)	0.2(0.1–0.3)
		≥55HRC	HR5210	120(80–200)	

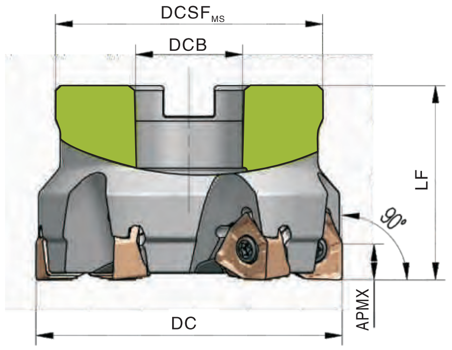
C/SSM390

Square shoulder milling tool

Square shoulder milling

CSM590 series

KAPR=90°



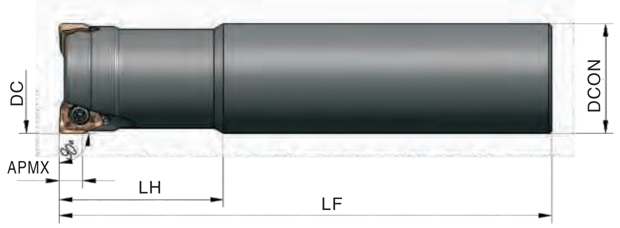
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	$DCSF_{MS}$	LF					
CSM390–040A1605–ZN04	5	△	40	16	35	40	4.2	A	ZNMU0403□□	M25065	HAT08IP
CSM390–040A1607–ZN04	7	△	40	16	35	40	4.2				
CSM390–050A2206–ZN04	6	△	50	22	47	40	4.2				
CSM390–050A2208–ZN04	8	△	50	22	47	40	4.2				
CSM390–063A2207–ZN04	7	△	63	22	47	40	4.2				
CSM390–063A2210–ZN04	10	△	63	22	47	40	4.2				
CSM390–050A2204–ZN08	4	▲	50	22	47	40	7.3		ZNMU0806□□	M40110	HTT15IP
CSM390–050A2205–ZN08	5	△	50	22	47	40	7.3				
CSM390–063A2205–ZN08	5	▲	63	22	47	40	7.3				
CSM390–063A2206–ZN08	6	△	63	22	47	40	7.3				
CSM390–080A2706–ZN08	6	▲	80	27	62	50	7.3				
CSM390–080A2707–ZN08	7	△	80	27	62	50	7.3				
CSM390–080A2709–ZN08	9	△	80	27	62	50	7.3				
CSM390–100A3207–ZN08	7	▲	100	32	77	50	7.3				
CSM390–100A3208–ZN08	8	△	100	32	77	50	7.3				
CSM390–100A3211–ZN08	11	△	100	32	77	50	7.3				
CSM390–125B4008–ZN08	8	▲	125	40	90	63	7.3	B			
CSM390–125B4011–ZN08	11	▲	125	40	90	63	7.3				
CSM390–125B4014–ZN08	14	△	125	40	90	63	7.3				
CSM390–160C4010–ZN08	10	△	160	40	92	63	7.3	C			HAT15IP
CSM390–160C4012–ZN08	12	▲	160	40	92	63	7.3				
CSM390–160C4016–ZN08	16	△	160	40	92	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

SSM390series

KAPR=90°



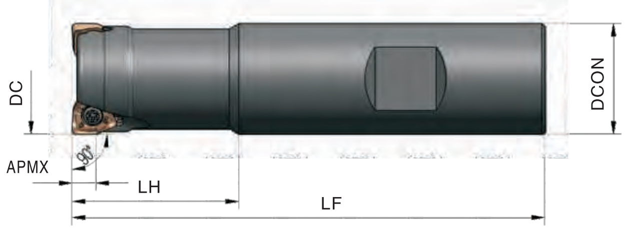
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM390–018G1602L–ZN04	2	△	18	16	150	30	4.2	ZNMU0403□□	M25065	HFT08IP
SSM390–020G2002L–ZN04	2	▲	20	20	150	30	4.2			
SSM390–020G2003L–ZN04	3	△	20	20	150	30	4.2			
SSM390–021G2002L–ZN04	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

SSM390series

KAPR=90°

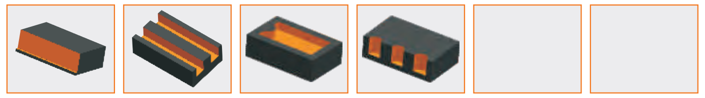


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM390–020X2002–ZN04	2	△	20	20	90	30	4.2	ZNMU0403□□	M25065	HFT08IP
SSM390–020X2003–ZN04	3	△	20	20	90	30	4.2			
SSM390–025X2502–ZN04	2	▲	25	25	100	30	4.2			
SSM390–025X2503–ZN04	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			

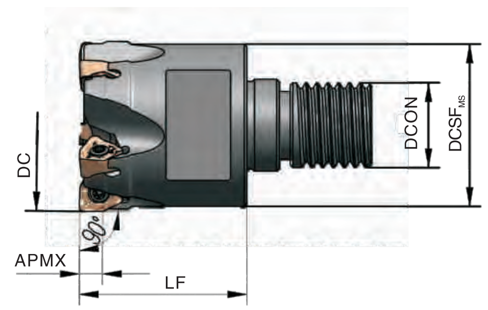
▲Running stock △Make-to-order

Square shoulder milling

KH-series



KAPR=90°

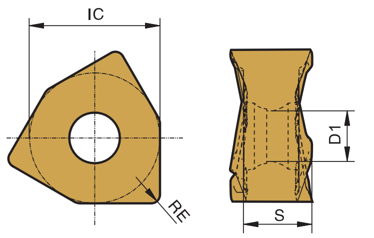


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCSF$_{MS}$	LF	DCON				
KH–2002–ZN04–M10	2	△	20	18	30	10	4.2	ZNMU0403□□	M25065	HFT08IP
KH–2003–ZN04–M10	3	△	20	18	30	10	4.2			
KH–2502–ZN04–M12	2	△	25	23	30	12	4.2			
KH–2503–ZN04–M12	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

ZN□□



Working condition: ● Stable ◕ Average ¤ Tough

Applicable inserts	Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
ZNMU040308PNR–GM	7.00	3.65	2.80	0.80	4.2	★		☆	☆	★	★	★	☆					☆
ZNMU080608PNR–GM	12.00	6.35	4.60	0.80	7.3	★		☆	☆	★	★	★	☆					☆
ZNMU080608PNR–GL	12.00	6.35	4.60	0.80	7.3	★		☆	☆	★	★	★	☆					☆
ZNMU080608PNR–GR	12.00	6.35	4.60	0.80	7.3	★		☆	☆	★	★	★	☆					☆
ZNMU080616PNR–GR	12.00	6.35	4.60	1.60	7.3	★		☆	☆	★	★	★	☆					☆

★ Recommended grade ☆ Available grade

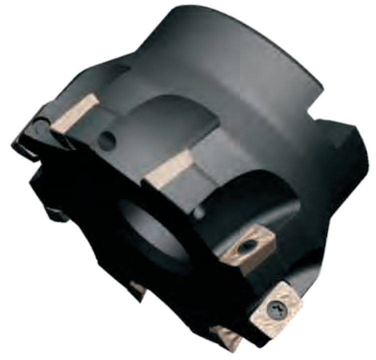
Recommended cutting parameters

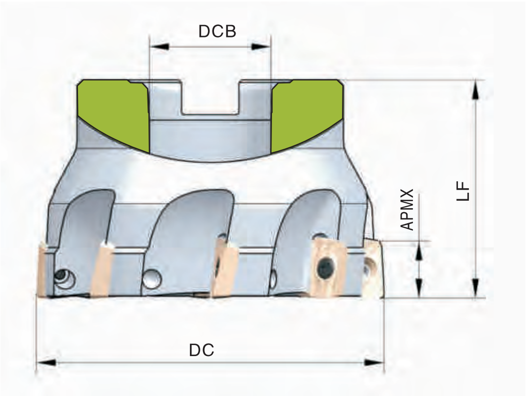
Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v$_c$ (m/min)	Feed rate f$_z$(mm/z)
P	Low-carbon steel, mild steel	≤180HB	HR5120	280(220–340)	0.2(0.1–0.3)
			HR5130	180(120–250)	
			HR530	180(120–250)	
	High-carbon steel, alloy steel	180–280HB	HR5110	240(180–300)	0.2(0.1–0.3)
			HR5120	200(140–260)	
			HR5220	200(140–260)	
			HR5130	160(100–220)	
	Alloy tool steel	280–350HB	HR5110	220(140–280)	0.15(0.1–0.25)
			HR5210	160(100–220)	
			HR5120	160(100–220)	
			HR5220	120(80–180)	
M	Stainless steel	≤270HB	HR5120	180(100–260)	0.2(0.1–0.3)
			HR5130	140(80–200)	
			HR530	140(80–200)	
K	Cast iron	180–250HB	HR6130	250(150–320)	0.2(0.1–0.3)
			HR5210	180(150–250)	
			HR5220	180(150–250)	
H	High hardness material	45–55HRC	HR5220	150(100–250)	0.2(0.1–0.3)
		≥55HRC	HR5210	120(80–200)	

Square shoulder milling

CSM590series

KAPR=90°



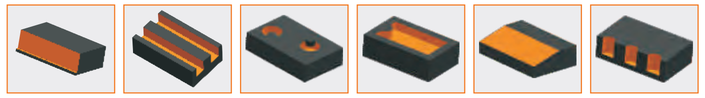


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	LF					
CSM590–050A2206–AP11	6	△	50	22	40	9.5	A	APMT11□□ APGT11□□	M25065	HAT08IP
CSM590–063A2208–AP11	8	△	63	22	40	9.5				
CSM590–080A2708–AP11	8	▲	80	27	50	9.5				
CSM590–100B3210–AP11	10	△	100	32	50	9.5				
CSM590–050A2205–AP16	5	△	50	22	40	14.5		APMT16□□ APGT16□□	M40100	HTT15IP
CSM590–063A2206–AP16	6	△	63	22	40	14.5				
CSM590–080A2707–AP16	7	△	80	27	50	14.5				
CSM590–100B3208–AP16	8	△	100	32	50	14.5	B			
CSM590–125B4010–AP16	10	△	125	40	63	14.5				

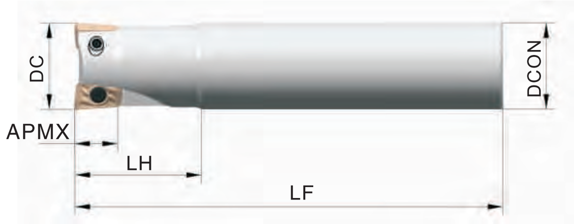
▲Running stock △Make-to-order

Square shoulder milling

SSM590series



KAPR=90°

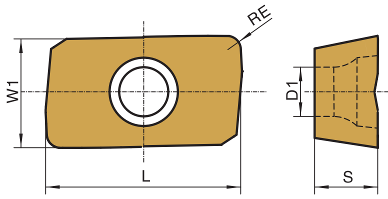


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM590–016G1602–AP11	2	△	16	16	130	40	9.5	APMT11□□ APGT11□□	M25065	HFT08IP
SSM590–016G1602L–AP11	2	△	16	16	160	50	9.5			
SSM590–020G2002–AP11	2	△	20	20	130	40	9.5			
SSM590–020G2002L–AP11	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□□	M40090	HFT15IP
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							HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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
	L	W1	S	D1	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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

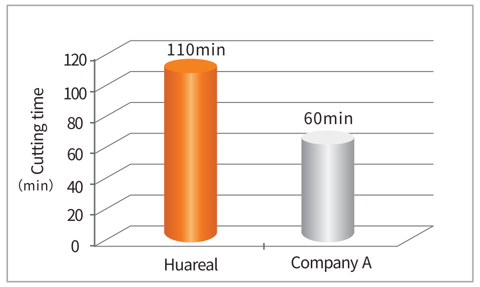
Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed vc (m/min)	Feed rate fz(mm/z)
P	Low-carbon steel, mild steel	≤180HB	HR5120	280(220–340)	0.2(0.1–0.3)
			HR5130	180(120–250)	
			HR530	180(120–250)	
	High-carbon steel, alloy steel	180–280HB	HR5110	240(180–300)	0.2(0.1–0.3)
			HR5120	200(140–260)	
			HR5220	200(140–260)	
			HR5130	160(100–220)	
	Alloy tool steel	280–350HB	HR5110	220(140–280)	0.15(0.1–0.25)
			HR5210	160(100–220)	
			HR5120	160(100–220)	
			HR5220	120(80–180)	
M	Stainless steel	≤270HB	HR5120	180(100–260)	0.2(0.1–0.3)
			HR5130	140(80–200)	
			HR530	140(80–200)	
K	Cast iron	180–250HB	HR6130	250(150–320)	0.2(0.1–0.3)
			HR5210	180(150–250)	
			HR5220	180(150–250)	
H	High hardness material	45–55HRC	HR5220	150(100–250)	0.2(0.1–0.3)
		≥55HRC	HR5210	120(80–200)	

Machining cases

Machining cases

Machining method	Square shoulder milling
Workpiece material	NAK80（28-32HRC)
Insert	AOKT1135PDER HR5120
Cutting tools	SSM190-025G2503-AO11
Cutting parameter	vc=220m/min，fz=0.2mm/z，ap=4mm，ae=0.5mm
Cooling method	Air cooling

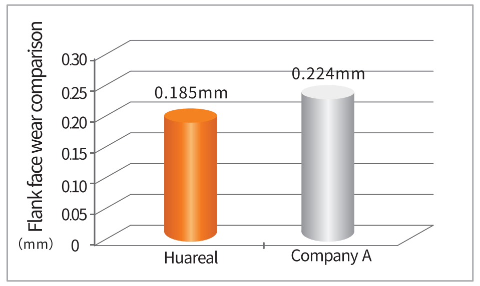
services life comparison



Machining cases

Machining method	Face milling
Workpiece material	45# Steel（200-220HB)
Insert	ZNMU080608PNR-GM
Cutting tools	CSM390-080A2706-ZN08
Cutting parameter	vc=280m/min，fz=0.2mm/z，ap=1mm，ae=65mm
Cooling method	Air cooling

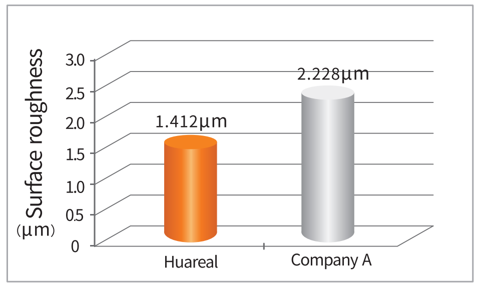
T=25min Flank face wear comparison



Machining cases

Workpiece material	Mold material
Machining method	Sidewall finish milling
Insert	AOKT113508PEER-VM
Cutting tools	SSM190-020G2002-AO11
Machining parameters	Vc=159m/min, fz=0.25mm/z, ae=0.12mm, ap=1mm

Surface Ra comparison



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	Vc=220m/min,fz=0.36mm/z,ap=1.5mm,ae=0.25mm
Machining quality	Verticality of the workpiece <0.012mm, 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	Vc=185m/min, fz=0.1mm/z,ap=0.8mm, ae=0.15mm
Machining quality	Verticality of workpiece <0.008mm, 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	Vc=138m/min,fz=0.25mm/z,ap=0.12mm,ae=5mm
Machining quality	Compared with a competitor , parts machined by Huareal products have better surface quality (no burrs on the sidewall).

Machining cases

Rough milling of bogies

Workpiece material	Cast steel
Insert	ZNMU080608PNR-GM HR5120
Cutting tools	CSM390-200C6012-ZN08
Machining parameters	Vc=188m/min, fz=0.2mm/z,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

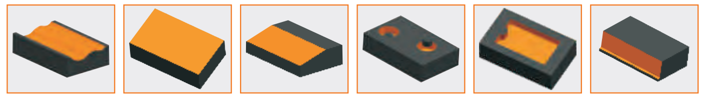
Workpiece material	40CrMo（285-333HB）
Insert	ZNMU080608PNR-GM HR5120
Cutting tools	CSM390-063A2205-ZN08
Machining parameters	Vc=142m/min, fz=0.15mm/z,ap=1.5-3mm
Cooling method	No cooling
Service life	Huareal: 27 pieces; A competitor: 12 pieces
Machining quality	The workpiece processed by Huareal products has better surface quality and longer cutting life. Thus, Huareal products are more cost-effective.

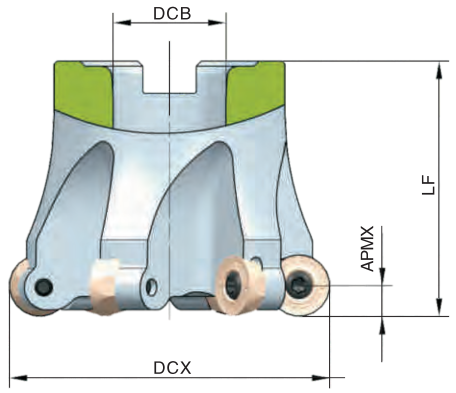
Clean-up machining of mold frame

Workpiece material	45# steel
Insert	ZNMU040308PNR-GM HR5130
Cutting tools	SSM390-021G2002L-ZN04
Previous machining parameters	Vc=173m/min, fz=0.25mm/z,ap=0.3mm,ae=0.5~21mm
Cooling method	APMT1135
Service life	N=2750rev/min，F=2500mm/min，ap=0.3mm，ae=0.5~21mm
Machining quality	Hardstone: 3 hours; A competitor: 2 hours
	Huareal products are light and fast-cutting, with higher machining efficiency, good surface quality and high cost-effectiveness.

Profile milling

CPM100 series



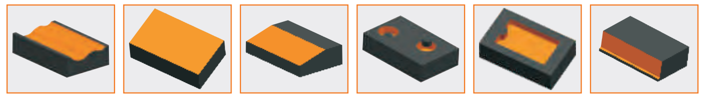


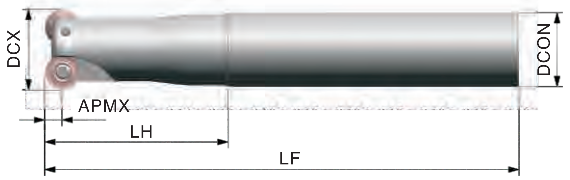
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CPM100–063A2204–RC12	4	△	63	22	40	6	A	RC□□12	M40100	HTT15IP
CPM100–080B2705–RC16	5	▲	80	27	50	8	B	RC□□16	M50130	HTT20IP
CPM100–100B3206–RC16	6	△	100	32	50	8				
CPM100–125B4007–RC20	7	△	125	40	63	10		RC□□20	M60160	HTT15IP HTT20IP
CPM100–160B4008–RC20	8	△	160	40	63	10				

▲Running stock △Make-to-order

Profile milling

SPM100 series



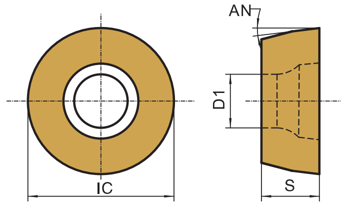


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCON	LF	LH				
SPM100–025G2502–RC10	2	▲	25	25	100	30	5	RC□□10	M40090	HTT15IP
SPM100–032G3203–RC10	3	▲	32	32	120	35	5			
SPM100–040G4003–RC12	3	△	40	40	120	40	6	RC□□12	M40090	HTT15IP

▲Running stock △Make-to-order

Applicable insert

RC□□



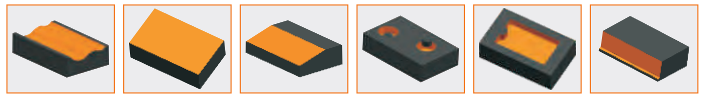
Working condition: ● Stable ◕ Average ⌗ Tough

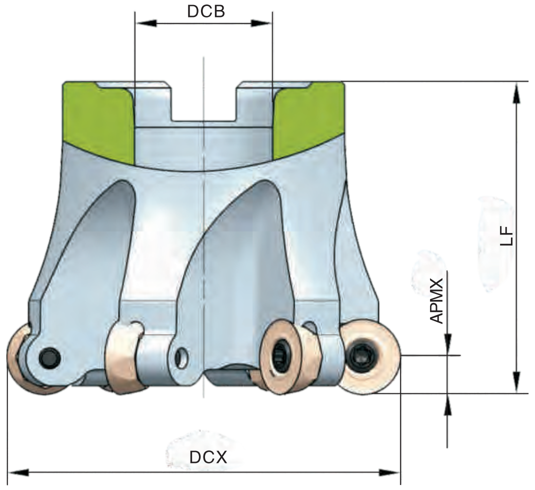
Type	Basic dimension (mm)				APMX (mm)	CVD		PVD									Cemented carbide	Cermet
	IC	S	D1	AN		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
Applicable inserts	Workpiece material	P	Steel			⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
		M	Stainless steel					●	●	◕	◕	⌗	◕		⌗	⌗		
		K	Cast iron			⌗	⌗	●	●	◕	◕	⌗						
		N	Non-ferrous metal														◕	
		S	Heat-resistant alloy，titanium alloy															
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

Profile milling

CPM200 series



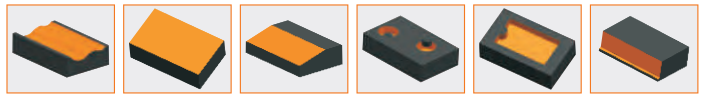


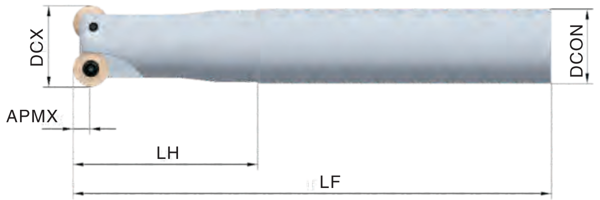
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CPM200–050A2204–RP12	4	△	50	22	40	6	A	RP□□12	M40100	HTT15IP
CPM200–063A2205–RP12	5	▲	63	22	40	6				
CPM200–080B2706–RP12	6	▲	80	27	50	6	B			
CPM200–063A2204–RP16	4	▲	63	22	40	8	A	RP□□16	M50130	HTT20IP
CPM200–080B2705–RP16	5	▲	80	27	50	8	B			
CPM200–100B3206–RP16	6	△	100	32	50	8				
CPM200–125B4007–RP16	7	△	125	40	63	8				

▲Running stock △Make-to-order

Profile milling

SPM200 series



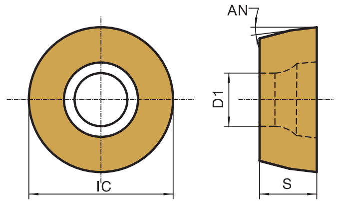


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCON	LF	LH				
SPM200–025G2503–RP08	3	▲	25	25	100	30	4	RP□□08	M30075	HFT09IP
SPM200–032G3204–RP08	4	▲	32	32	120	35	4			
SPM200–025G2502–RP10	2	▲	25	25	100	30	5	RP□□10(SM)	M40090	HTT15IP
SPM200–032G3203–RP10	3	▲	32	32	120	35	5	RP□□10(MS)	M40090	HTT15IP
SPM200–040G3203–RP12	3	△	40	32	120	40	6	RP□□12	M40090	HTT20IP

▲Running stock △Make-to-order

Applicable inserts

RP□□



Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts	Workpiece material		CVD		PVD									Cemented carbide	Cermet
			HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	P	Steel	⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
	M	Stainless steel			●	●	◕	◕	⌗	◕		⌗	⌗		
	K	Cast iron	⌗	⌗	●	●	◕	◕	⌗						
	N	Non-ferrous metal												◕	
	S	Heat-resistant alloy，titanium alloy													

Type	Basic dimension (mm)				APMX (mm)	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	IC	S	D1	AN														
RPMT08T2MO–HM	8.00	2.78	3.40	11°	4	☆		☆	★	★	★	★	☆					
RPMW1003MO	10.00	3.18	4.50	11°	5	☆		☆	★	★	★	★	☆					
RPMT1204MO–HM	12.00	4.76	4.40	11°	6	☆		☆	★	★	★	★	☆					

▲Running stock △Make-to-order

Turbine blade milling

Working condition: ● Stable ◕ Average ⌗ Tough

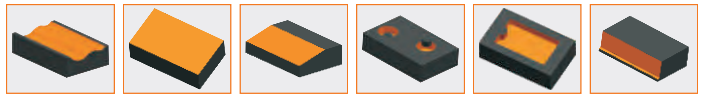
Applicable inserts	Workpiece material		CVD		PVD									Cemented carbide	Cermet
			HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	P	Steel	⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
	M	Stainless steel			●	●	◕	◕	⌗	◕		⌗	⌗		
	K	Cast iron	⌗	⌗	●	●	◕	◕	⌗						
	N	Non-ferrous metal												◕	
	S	Heat-resistant alloy，titanium alloy													

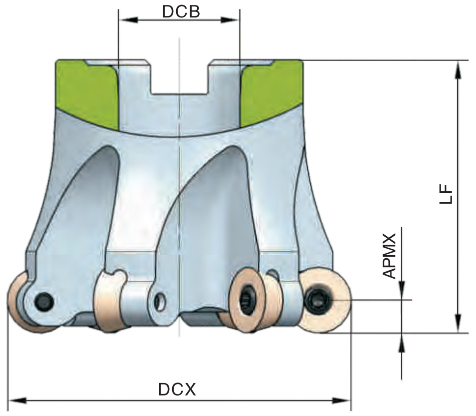
Type	Basic dimension (mm)				APMX (mm)	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	IC	S	D1	AN														
RPKT10T3MO–MS	10.00	3.97	3.40	11°	5										★	★		
RPKT1204MO–MS	12.00	4.76	4.40	11°	6										★	★		
RPKT1606MO–MS	16.00	6.35	5.50	11°	8		★								★	★		
RPMT08T2MO–SM	8.00	2.78	3.40	11°	4										★	★		
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		★								★	★		

▲Running stock △Make-to-order

Profile milling

CPM300 series



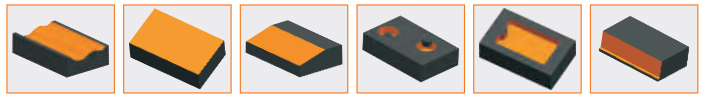


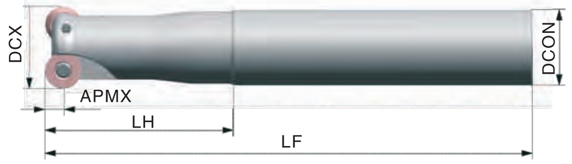
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CPM300–050A2204–RD12	4	△	50	22	40	6	A	RD□□12	M40100	HTT15IP
CPM300–063A2205–RD12	5	▲	63	22	40	6				
CPM300–080B2705–RD16	5	▲	80	27	50	8	B	RD□□16	M50130	HTT20IP HAT20IP
CPM300–100B3206–RD16	6	△	100	32	50	8				
CPM300–125B4007–RD16	7	△	125	40	63	8				
CPM300–160B4008–RD16	8	△	160	40	63	8				

▲Running stock △Make-to-order

Profile milling

SPM300 series



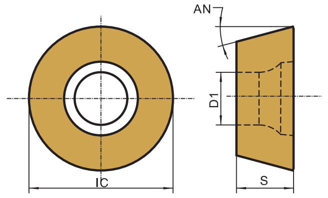


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCON	LF	LH				
SPM300–020G2003–RD06	3	△	20	20	100	30	3	RD□□06	M22065	HFT07IP
SPM300–020G2002–RD08	2	△	20	20	100	30	4	RD□□08	M30075	HFT09IP
SPM300–025G2502–RD10	2	▲	25	25	100	30	5	RD□□10	M40084	HFT15IP
SPM300–032G3203–RD10	3	▲	32	32	120	35	5			
SPM300–040G3203–RD12	3	△	40	32	120	40	6	RD□□12	M40090	HTT15IP

▲Running stock △Make-to-order

Applicable inserts

RD□□



Working condition: ● Stable ◕ Average ¤ Tough

Applicable inserts	Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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 cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	Tool specification		
					Ø20	Ø25	Ø32
P	Low-carbon steel, mild steel	≤180HB	HR5120 HR5220 HR5130 HR530	v_c(m/min)	100–200	100–200	100–200
				f_z(mm/z)	0.2–0.3	0.25–0.35	0.25–0.35
				ap(mm)	1.25	1.5	2
				ae(mm)	1.25	1.5	2
	High-carbon steel, alloy steel	180–280HB	HR5110 HR5210 HR5120 HR5220	v_c(m/min)	80–180	80–180	80–180
				f_z(mm/z)	0.2–0.3	0.25–0.35	0.25–0.35
				ap(mm)	1.25	1.5	2
				ae(mm)	1.25	1.5	2
	Alloy tool steel	280–350HB	HR5110 HR5210 HR5120 HR5220	v_c(m/min)	60–150	60–150	60–150
				f_z(mm/z)	0.2–0.3	0.25–0.35	0.25–0.35
				ap(mm)	1.25	1.5	2
				ae(mm)	1.25	1.5	2
M	Stainless steel	≤180HB	HR5120 HR5130 HR530	v_c(m/min)	70–150	70–150	70–150
				f_z(mm/z)	0.1–0.25	0.2–0.3	0.2–0.3
				ap(mm)	1	1.25	1.5
				ae(mm)	1	1.25	1.5
K	Cast iron	180–250HB	HR6130 HR5110 HR5120 HR5220	v_c(m/min)	160–300	160–300	160–300
				f_z(mm/z)	0.25–0.35	0.3–0.4	0.3–0.4
				ap(mm)	1.8	2	2.5
				ae(mm)	1.8	2	2.5
S	Heat-resistant alloy titanium alloy	≤400HB	HR7140 HR7240	v_c(m/min)	40–120	40–120	40–120
				f_z(mm/z)	0.25–0.35	0.3–0.5	0.3–0.5
				ap(mm)	0.3	0.5	0.8
				ae(mm)	1	1.25	1.5
H	High hardness stell	50–65HRC	HR6130 HR5110 HR5120 HR5220	v_c(m/min)	80–160	80–160	80–160
				f_z(mm/z)	0.2–0.5	0.3–0.6	0.4–0.8
				ap(mm)	0.2	0.3	0.5
				ae(mm)	1	1.25	1.5

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)							
		0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0
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:

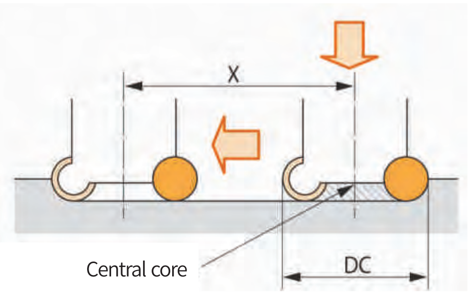
The recommended feed rate for RCKT10T3MO-FM to process 45# steel is 0.2mm/r. When ap=1mm, the corresponding recommendation for feed rate is:

f=1.4*0.2mm/r=0.28mm/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
	63		3°	95	109	124	1.9	54
R12	40	6	5°	68	59	78	2.4	29
	63		2°	171	105	124	2.4	52
	80		2°	171	139	158	2.4	69
	100		1°	171	179	198	2.4	89
R16	63	8	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

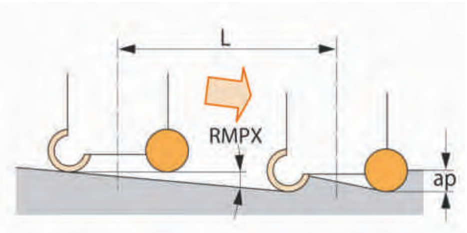


When transverse feed machining after drill-milling:

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.

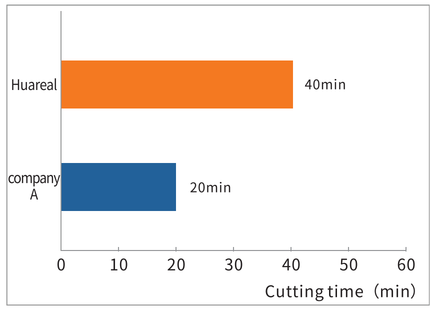
◆ Recommended maximum cutting depth (ap) and applicable teeth number

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

Machining cases

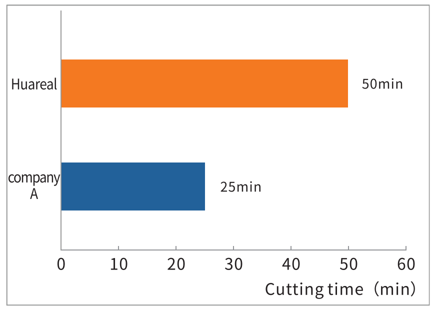
Mteal mold

Workpiece material	CR12MoV 60-63HRC
Cutting tools	RPMW1003MO HR5210
Insert	SPM200-025G25002-RP10
Machining method	profile machining
Machining parameters	Vc=140m/min，fz=0.45mm/z，ap=0.15mm，ae=22-25mm
Cooling method	Air cooling



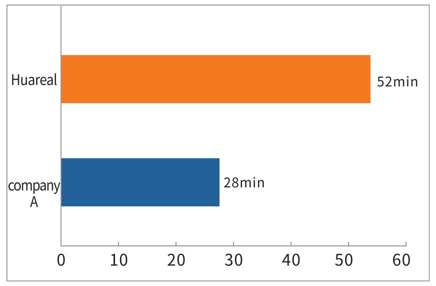
Axle mold

Workpiece material	42CrMoV 58～60HRC
Cutting tools	RPMW1003MO HR5210
Insert	SPM200-025G25002-RP10
Machining method	profile machining
Machining parameters	Vc=120m/min，fz=0.65mm/z，ap=0.3mm，ae=20mm
Cooling method	Air cooling



Metal mold

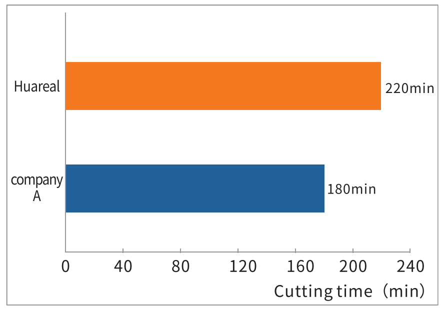
Workpiece material	42CrMoV 58～60HRC
Cutting tools	RDMW10T3MO HR5210
Insert	SPM300-025G2502-RD10
Machining method	Face milling
Machining parameters	Vc=120m/min，fz=0.5mm/z，ap=0.2mm，ae=10-15mm
Cooling method	Air cooling



Machining cases

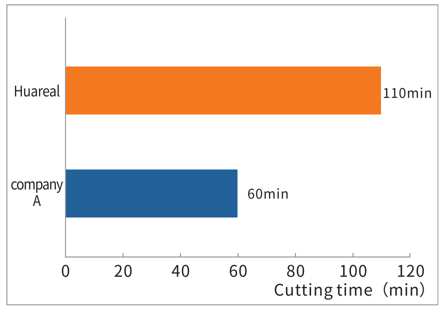
Metal mold

Workpiece material	P20 52HRC
Cutting tools	RPMW1003MO HR5210
Insert	SPM200-025G2502-RP10
Machining method	Profile milling
Machining parameters	Vc=118m/min，fz=0.45mm/z，ap=0.3mm
Cooling method	Air cooling



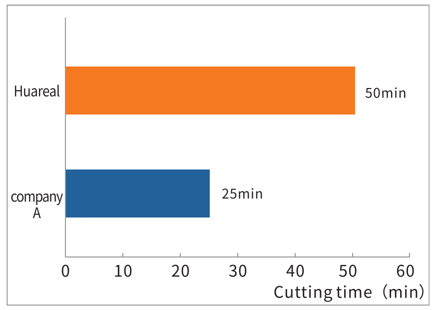
Injection mold

Workpiece material	718H 40～50HRC
Cutting tools	RPMW1003MO HR5220
Insert	SPM200-025G2502-PR10
Machining method	Side wall milling
Machining parameters	Vc=140m/min，fz=0.33mm/z，ae=0.1mm
Cooling method	Air cooling



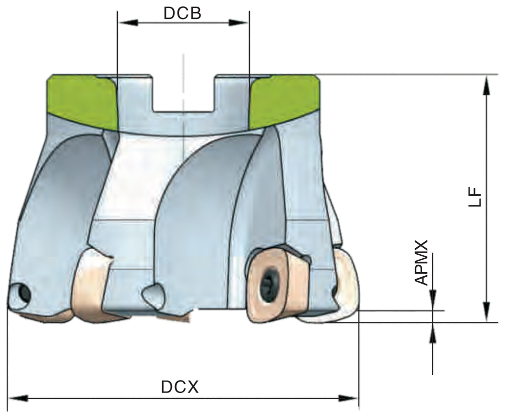
Blade

Workpiece material	05Cr17Ni** 380-450HB
Cutting tools	RPKT1204MO-MS HR7240
Insert	SPM200-040G3203-RP12
Machining method	Profile milling
Machining parameters	Vc=120m/min，fz=0.54mm/z，ap=1-2mm，ae=3-8mm
Cooling method	water cooling



Millings with high feed

CEM100 series

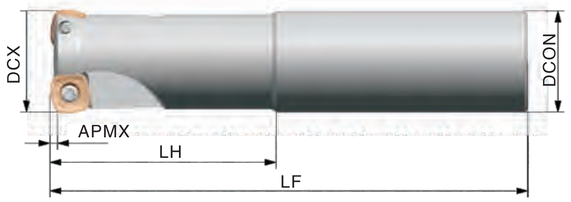


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CEM100–050A2204–SD12	4	△	50	22	40	2.3	A	SD□□12	M40100	HTT15IP
CEM100–063A2705–SD12	5	▲	63	27	40	2.3				
CEM100–080A2706–SD12	6	△	80	27	50	2.3				
CEM100–063A2704–SD15	4	▲	63	27	40	2.9		SD□□15	M50130	HTT20IP
CEM100–080A3205–SD15	5	△	80	32	50	2.9				
CEM100–100A3206–SD15	6	△	100	32	50	2.9				

▲Running stock △Make-to-order

Millings with high feed

SEM100 series

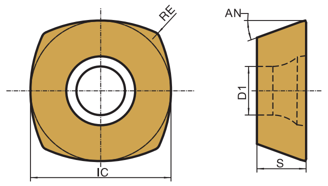


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCB	LF	LH				
SEM100–032G3202–SD12	2	▲	32	32	150	70	2.3	SD□□12	M40090	HTT15IP
SEM100–040G4003–SD12	3	△	40	40	150	70	2.3			
SEM100–040G4002–SD15	2	▲	40	40	200	70	2.9	SD□□15	M50130	HTT20IP

▲Running stock △Make-to-order

Applicable inserts

SD□□



Working condition: ● Stable ◕ Average ⌘ Tough

Applicable inserts	Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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	☆		☆	☆	★	★	★	☆					

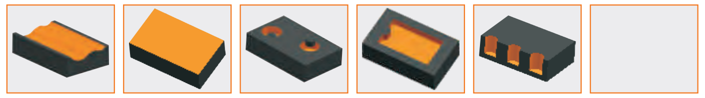
★ Recommended grade ☆ Available grade

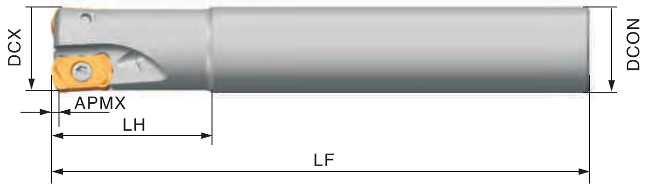
Recommended cutting parameters

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	≤180	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
			HR5220	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	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
			HR530	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
	High-carbon steel, alloy steel Alloy tool steel	180–350	HR5110	120(80–220)	0.1–0.5	0.3–0.7	0.1–0.5	0.4–0.8	0.15–0.6	0.5–1.0
			HR5120	120(80–220)	0.1–0.5	0.3–0.7	0.1–0.5	0.4–0.8	0.15–0.6	0.5–1.0
			HR5210	150(100–250)	0.2–0.8	0.3–0.8	0.2–1.0	0.4–1.0	0.2–1.0	0.5–1.0
			HR5220	150(100–250)	0.2–0.8	0.3–0.8	0.2–1.0	0.4–1.0	0.2–1.0	0.5–1.0
M	Stainless steel	≤180	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
			HR530	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
K	Cast iron	180–250	HR6130	250(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
			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
			HR5220	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

Millings with high feed

SEM200 series



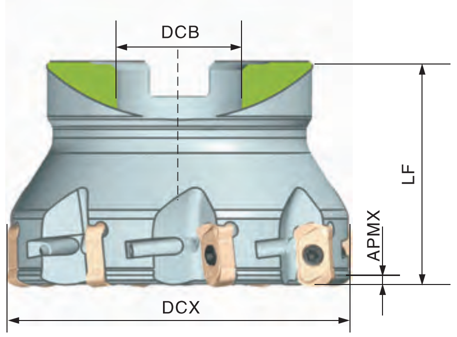


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCB	LF	LH				
SEM200–016G1602–LN03	2	▲	16	16	100	30	1.3	LNKU03□□	M25065	HFT8IP
SEM200–017G1602–LN03	2	△	17	16	100	30	1.3			
SEM200–020G2003–LN03	3	▲	20	20	130	50	1.3			
SEM200–021G2003–LN03	3	△	21	20	130	50	1.3			
SEM200–025G2504–LN03	4	▲	25	25	140	60	1.3			
SEM200–026G2504–LN03	4	△	26	25	140	60	1.3			
SEM200–032G3205–LN03	5	▲	32	32	150	70	1.3			
SEM200–033G3205–LN03	5	△	33	32	150	70	1.3			

▲Running stock △Make-to-order

Millings with high feed

CEM200 series



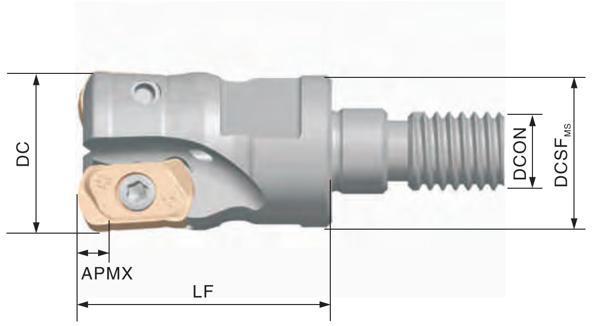
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CEM200–040A1606–LN03	6	△	40	16	40	1.3	A	LNKU03□□	M25065	HFT8IP
CEM200–050A2207–LN03	7	△	50	22	40	1.3				
CEM200–063A2208–LN03	8	▲	63	22	40	1.3				
CEM200–080A2709–LN03	9	▲	80	27	50	1.3				

▲Running stock △Make-to-order

Millings with high feed

KH- series

KAPR=90°

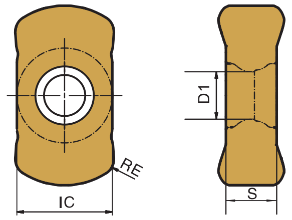


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCSFMS	LF	DCON				
KH–1602–LNKU03–M08	2	△	16	14	25	8	1.3	LNKU03□□	M25065	HFT8IP
KH–1702–LNKU03–M08	2	△	17	14	25	8	1.3			
KH–2003–LNKU03–M10	3	△	20	18	30	10	1.3			
KH–2103–LNKU03–M10	3	△	21	18	30	10	1.3			
KH–2504–LNKU03–M12	4	△	25	23	35	12	1.3			
KH–2604–LNKU03–M12	4	△	26	23	35	12	1.3			
KH–3205–LNKU03–M16	5	△	32	29	40	16	1.3			
KH–3305–LNKU03–M16	5	△	33	29	40	16	1.3			

▲Running stock △Make-to-order

Applicable inserts

LN□□



Working condition: ● Stable ◕ Average ¤ Tough

Applicable inserts	Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
LNKU0303ZNR–MH	6	3.67	3	0	1.2	1.3	☆		☆	☆	★	★	★	★					
LNKU0303ZNR–LH	6	3.67	3	0	1.2	1.3	☆		☆	☆	★	★	★	★					

▲Running stock △Make-to-order

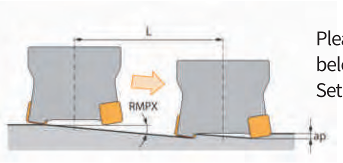
Recommended cutting parameters

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	≤180	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
			HR5220	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	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
			HR530	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
	High-carbon steel, alloy steel Alloy tool steel	180–350	HR5110	120(80–220)	0.1–0.5	0.3–0.7	0.1–0.5	0.4–0.8	0.15–0.6	0.5–1.0
			HR5120	120(80–220)	0.1–0.5	0.3–0.7	0.1–0.5	0.4–0.8	0.15–0.6	0.5–1.0
			HR5210	150(100–250)	0.2–0.8	0.3–0.8	0.2–1.0	0.4–1.0	0.2–1.0	0.5–1.0
			HR5220	150(100–250)	0.2–0.8	0.3–0.8	0.2–1.0	0.4–1.0	0.2–1.0	0.5–1.0
M	Stainless steel	≤180	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
			HR530	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
K	Cast iron	180–250	HR6130	250(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
			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
			HR5220	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 （C/SEM100）

◆ 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					

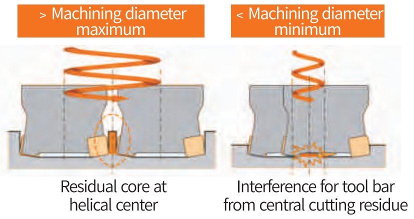


Please set the angle of ramping machining below RMPX.
Set the feed rate below 70% of the standard.

Figure Illustration of ramp milling

◆ Precautions for helical machining

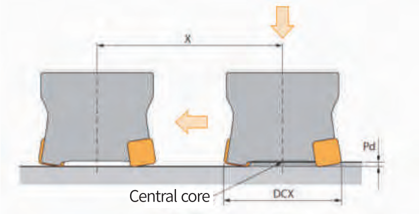
Please conduct helical machining within the range of maximum and minimum machining diameters.



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.

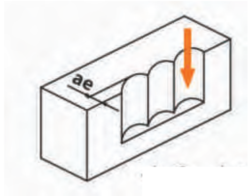
◆ Precautions for drill-milling



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



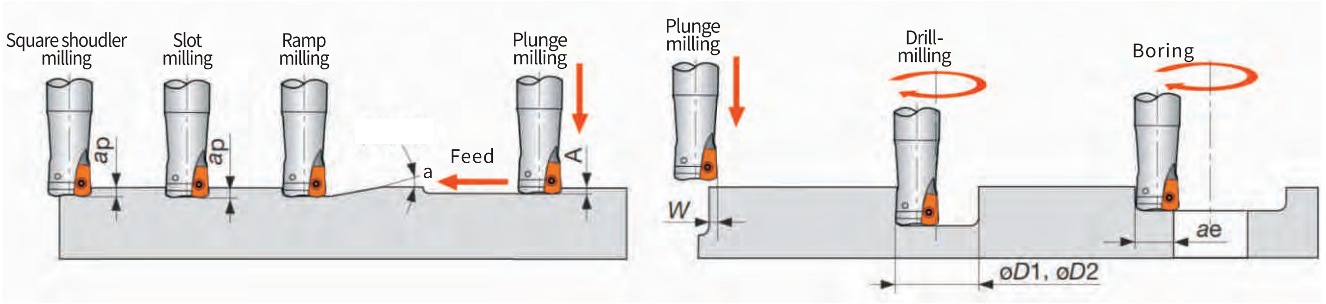
Notes: The recommended feed of sidewall milling is below 0.2 mm/z.

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°

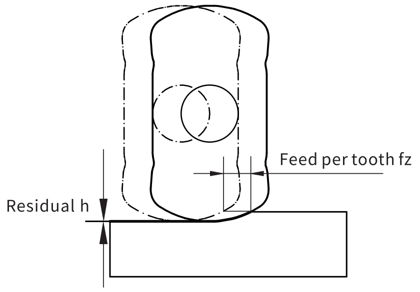
Technical information of application of high feed milling tools （C/SEM200）



Insert type	Tools diameter	D=16mm	D=20mm	D=25mm	D=32mm	D=40mm	D=50mm	D=63mm
LNKU0303	Max ramping angle a	1.7°	1.3°	0.9°	0.7°	0.5°	0.4°	0.3°
	Max depth of plunge milling A	0.3mm	0.3mm	0.3mm	0.3mm	0.3mm	0.3mm	0.3mm
	Max width of plunge milling W	3mm	3mm	3mm	3mm	3mm	3mm	3mm
	Min diamtetr of hole D1	23mm	31mm	41mm	54mm	70mm	90mm	105mm
	Max diameter of hol D2	30mm	38mm	48mm	62mm	78mm	98mm	113mm

◆ The formula of cutting length L base on max inclination angle L=max.ap/tan（a）

◆ Residual of face milling

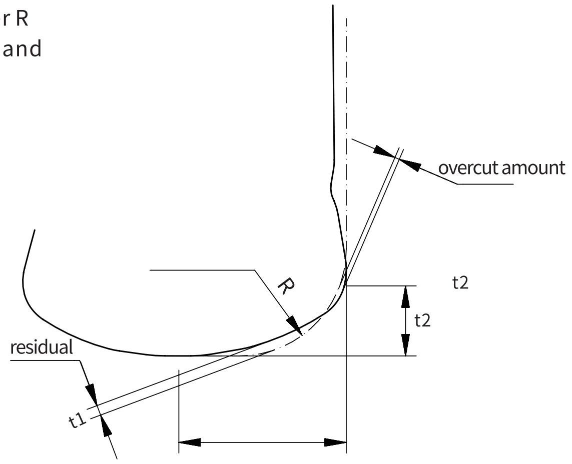


Insert type	Feed per toothfz (mm/z)	Residual h(mm)
LNU0303□□	0.5	0.014
	0.8	0.035
	1.0	0.055
	1.2	0.08
	1.5	0.125

◆ Tool geometry during programming

When programming, the corner radius should be set to R=1.5mm. If a larger R setting, overcut may occur. The table below shows the residual amount t1 and the overcut amount t2.

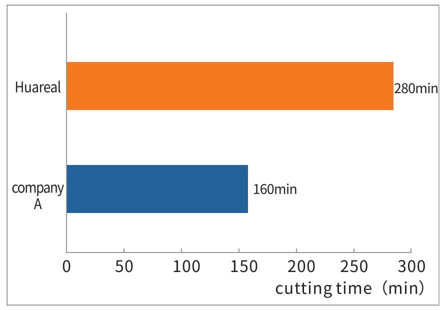
APMX	RE	Programming R seting	Residual t1	Overcut t2
1.0mm	1.2mm	1.0	0.045mm	
1.0mm	1.2mm	1.5	0.035	
1.0mm	1.2mm	2.0	0.2mm	0.1mm
1.0mm	1.2mm	2.5	0.08mm	0.29mm



Machining cases

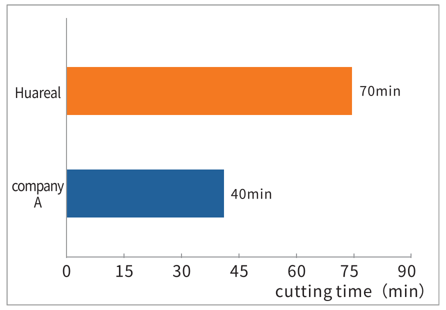
Knuckle mold

◉ **Workpiece material**	42CrMo 28-32HRC
◉ **Cutting tools**	SDMT1205ZTN-FM HR5130
◉ **Insert**	CEM100-080A2706-SD12
◉ **Machining method**	Face milling
◉ **Machining parameters**	Vc=200m/min，fz=1.0mm/z，ap=0.7mm，ae=57mm
◉ **Cooling method**	Air cooling



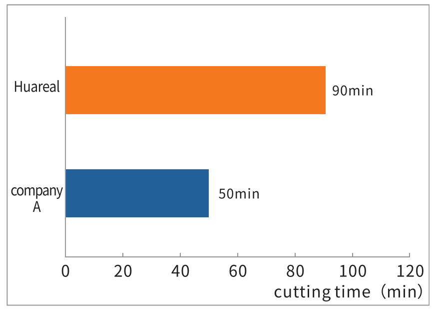
Mold

◉ **Workpiece material**	Ss41 40-45HRC
◉ **Cutting tools**	SDMT1205ZTN-FM HR5120
◉ **Insert**	CEM100-050A2204-SD12
◉ **Machining method**	Face milling
◉ **Machining parameters**	Vc=188m/min，fz=1.0mm/z，ap=0.8mm，ae=8-10mm
◉ **Cooling method**	Air cooling



Metal mold board

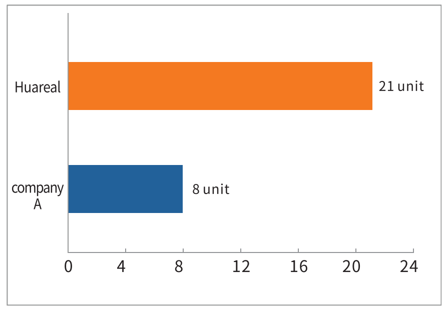
◉ **Workpiece material**	Cr12MoV 28HRC
◉ **Cutting tools**	LNKU0303ZNR-MH HR5120
◉ **Insert**	SEM200-026G2504-LN03
◉ **Machining method**	Face milling
◉ **Machining parameters**	Vc=163m/min，fz=0.55mm/z，ap=0.35mm，ae=20-25mm
◉ **Cooling method**	Air cooling



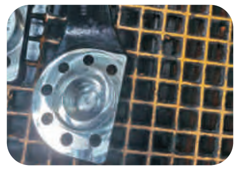
Machining cases

cylinder base

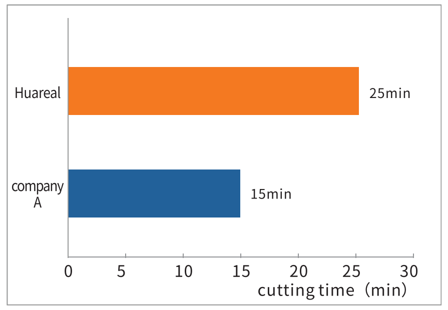
Workpiece material	45#Steel 180-200HB
Cutting tools	LNKU0303ZNR-MH HR530
Insert	CEM200-050A2207-LN03
Machining method	Face milling
Machining parameters	Vc=188m/min，fz=0.33mm/z，ap=0.5mm
Cooling method	water cooling



Steering knuckle

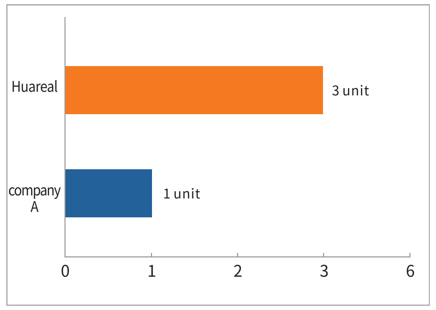


Workpiece material	42CrMo 26-28HRC
Cutting tools	LNKU0303ZNR-MH HR530
Insert	SEM200-017G1602-LN03
Machining method	Helical machining of inner hole
Machining parameters	Vc=150m/min，fz=0.65mm/z，ap=0.5mm
Cooling method	water cooling



Steel plate

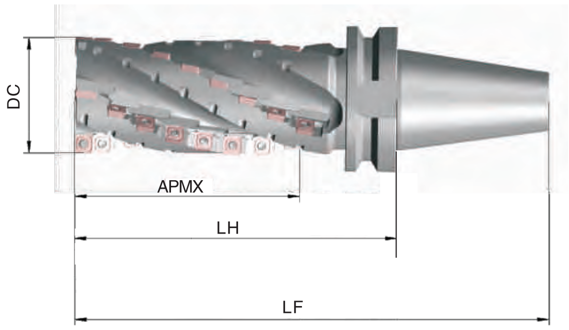
Workpiece material	SUS304 180-200HB
Cutting tools	LNKU0303ZNR-LH HR530
Insert	CEM200-063A2208-LN03
Machining method	Helical machining of inner hole
Machining parameters	Vc=125m/min，fz=0.55mm/z，ap=1mm，ae=63mm
Cooling method	water cooling



Helical end milling

CHM190 series

KAPR=90°

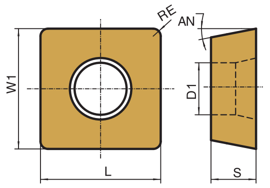


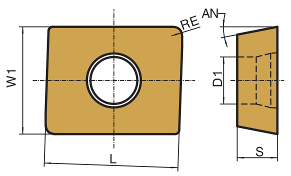
Tool specification	Number of slots	Inventory	Basic dimension (mm)			APMX (mm)	Applicable inserts	Screw	Wrench
			DC	LH	LF				
CHM190–063JT5004–SP12	4	△	63	165	266.75	104	SP□□12 AP□□15	M50130	HAT20IP
CHM190–063JT50L04–SP12	4	△	63	195	296.75	134			
CHM190–080JT5004–SP12	4	△	80	165	266.75	104			
CHM190–080JT50L04–SP12	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

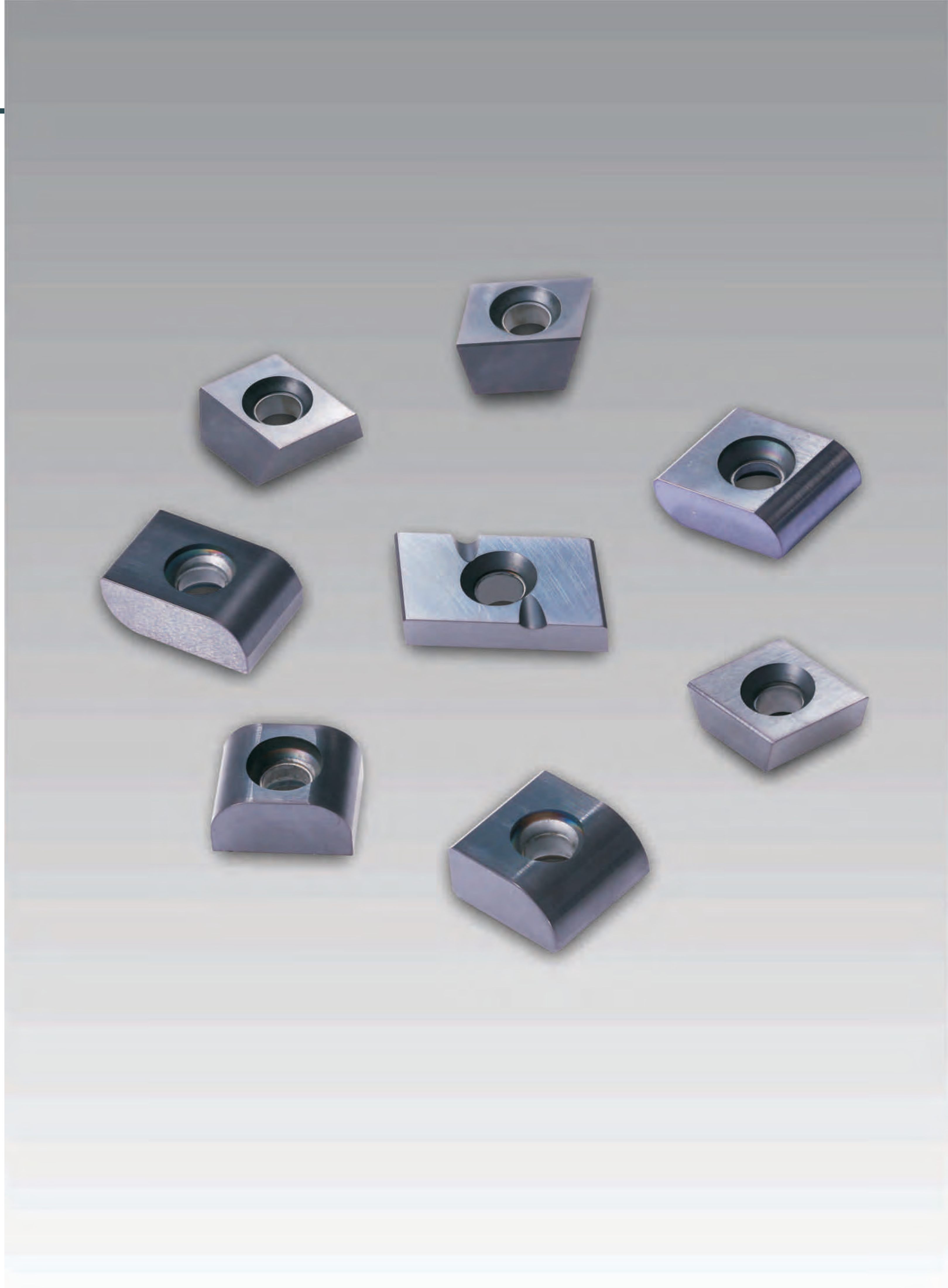
Applicable inserts	Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	P Steel	¤	¤	●	●	◕	◕	¤	◕	¤	¤	¤		
	M Stainless steel			●	●	◕	◕	¤	◕		¤	¤		
	K Cast iron	¤	¤	●	●	◕	◕	¤						
	N Non-ferrous metal												◕	
	S Heat-resistant alloy，titanium alloy													

Type	Basic dimension (mm)					AN	CVD		PVD									Cemented carbide	Cermet
	L	W1	S	D1	RE		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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

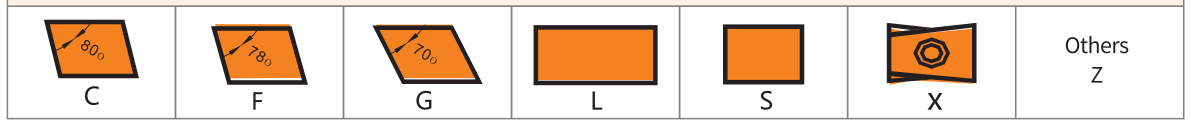
Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z(mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	130(60–150)	0.25(0.1–0.35)
			HR5120	140(70–170)	0.3(0.15–0.4)
			HR5130	140(70–170)	0.3(0.15–0.4)
	High-carbon steel, alloy steel	180–280	HR5110	120(60–150)	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)



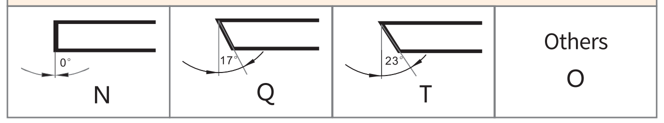
Code key of heavy milling inserts

L	N	E	H	15		12	07	-	2R45
①	②	③	④	⑤		⑥	⑦		⑧

① Insert shape



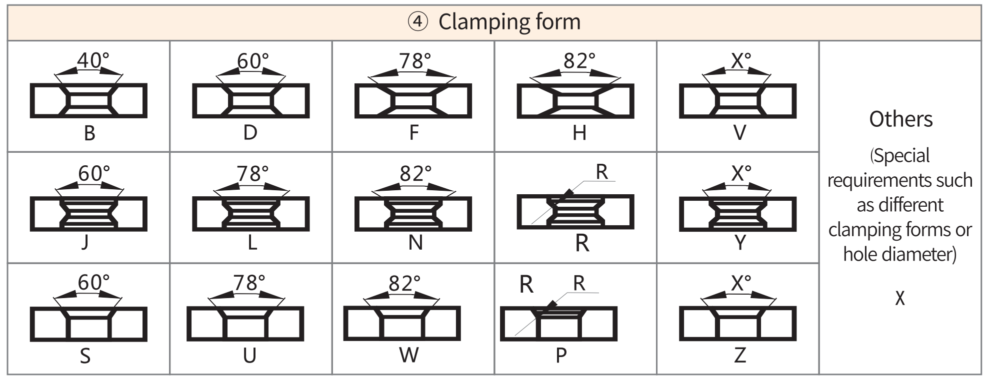
② Clearance angle major



③ Tolerance class

C:	E:	R:
± 0.013 ± 0.025	± 0.025	Blank

④ Clamping form

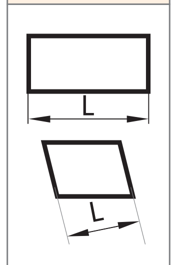


Others

(Special requirements such as different clamping forms or hole diameter)

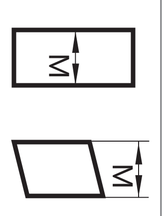
X

⑤ Length



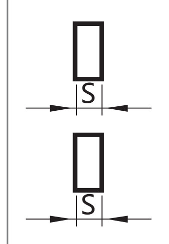
Integer of length

⑥ Width



Integer of width

⑦ Thickness



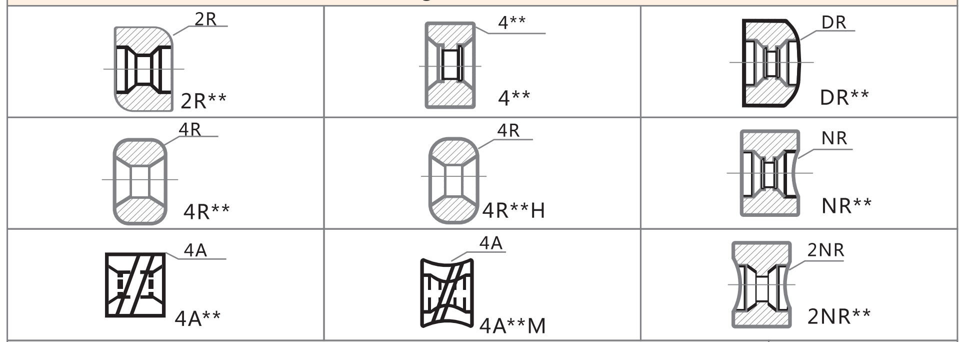
Integer of thickness

Corresponding sizes of the size codes of length, width and thickness

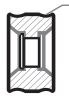
Code	03	03A	04	05	05A	05B	06	06A	06B	06C	06D	06E
Size	3.80	3.97	4.76	5.00	5.95	5.80	6.35	6.00	6.94	6.84	6.55	6.70
Code	07	07A	07B	07C	07D	07E	07F	07G	08	08A	09	09A
Size	7.94	7.05	7.15	7.24	7.35	7.60	7.50	7.82	8.50	8.00	9.52	
Code	09B	10	11	11A	11B	11C	12	12A	12B	12C	13	13A
Size	9.43	10.00	11.50	11.11	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	23	25	26	28						
Size	20.00	22.80	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



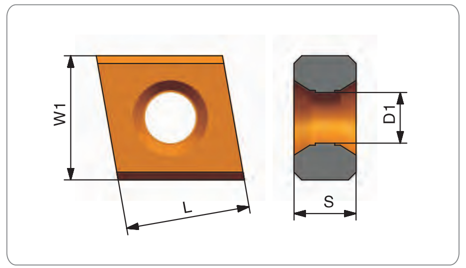
* "(L)" before the feature codes means that the eigenvalue is on the length side, "(S)" means that the eigenvalue is on the thickness side, and no letter means that the eigenvalue is on the width (W) side.
* "(R)" after the feature code indicates the right knife, "(L)" indicates the left knife, and no 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

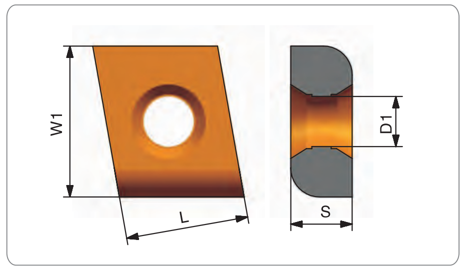


Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P	Steel	⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
M	Stainless steel			●	●	◕	◕	⌗	◕		⌗	⌗		
K	Cast iron	⌗	⌗	●	●	◕	◕	⌗						
N	Non-ferrous metal												◕	
S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Working condition: ● Stable ◕ Average ⌗ Tough



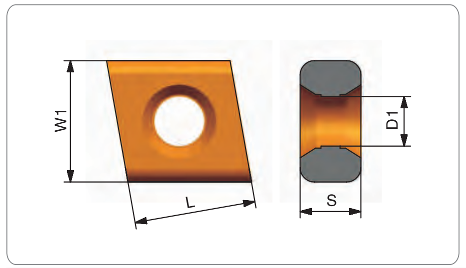
Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P	Steel	⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
M	Stainless steel			●	●	◕	◕	⌗	◕		⌗	⌗		
K	Cast iron	⌗	⌗	●	●	◕	◕	⌗						
N	Non-ferrous metal												◕	
S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	CNEF161406–2R30	16.3	14.29	6.35	5.4		☆							★				
	CNEF161406–2R50	16.3	14.29	6.35	5.4		☆							★				

★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

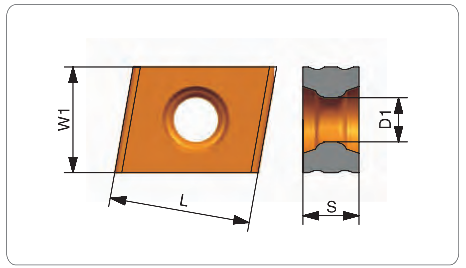


Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P	Steel	⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
M	Stainless steel			●	●	◕	◕	⌗	◕		⌗	⌗		
K	Cast iron	⌗	⌗	●	●	◕	◕	⌗						
N	Non-ferrous metal												◕	
S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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



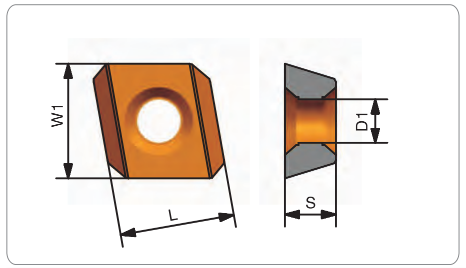
Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P	Steel	⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
M	Stainless steel			●	●	◕	◕	⌗	◕		⌗	⌗		
K	Cast iron	⌗	⌗	●	●	◕	◕	⌗						
N	Non-ferrous metal												◕	
S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Working condition: ● Stable ◕ Average ¤ Tough



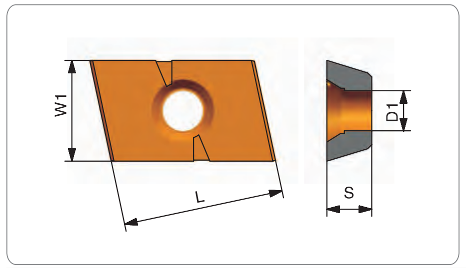
Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P Steel	¤	¤	●	●	◕	◕	¤	◕	¤	¤	¤		
M Stainless steel			●	●	◕	◕	¤	◕		¤	¤		
K Cast iron	¤	¤	●	●	◕	◕	¤						
N Non-ferrous metal												◕	
S Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	CQEH141406–-R02R	14.29	14.29	6.35	5.4		☆							★				
	CQER11A11A04–R01R	11.10	11.10	4.76	5.4		☆							★				

★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ¤ Tough

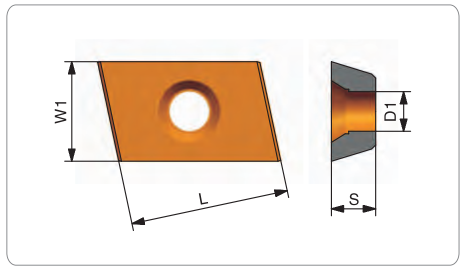


Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P Steel	¤	¤	●	●	◕	◕	¤	◕	¤	¤	¤		
M Stainless steel			●	●	◕	◕	¤	◕		¤	¤		
K Cast iron	¤	¤	●	●	◕	◕	¤						
N Non-ferrous metal												◕	
S Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	FQEW221406–R04R	22.8	14.29	6.35	5.4		☆							★				

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ¤ Tough

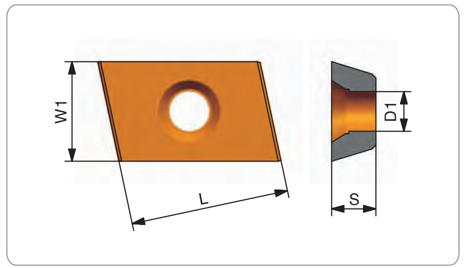


Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P Steel	¤	¤	●	●	◕	◕	¤	◕	¤	¤	¤		
M Stainless steel			●	●	◕	◕	¤	◕		¤	¤		
K Cast iron	¤	¤	●	●	◕	◕	¤						
N Non-ferrous metal												◕	
S Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Working condition: ● Stable ◕ Average ¤ Tough



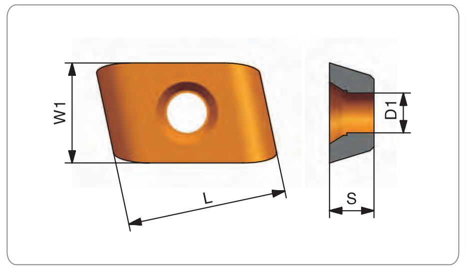
Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P Steel	¤	¤	●	●	◕	◕	¤	◕	¤	¤	¤		
M Stainless steel			●	●	◕	◕	¤	◕		¤	¤		
K Cast iron	¤	¤	●	●	◕	◕	¤						
N Non-ferrous metal												◕	
S Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌘ Tough

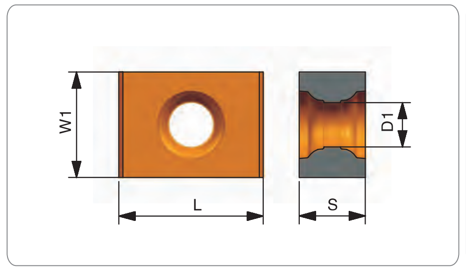


Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P Steel	⌘	⌘	●	●	◕	◕	⌘	◕	⌘	⌘	⌘		
M Stainless steel			●	●	◕	◕	⌘	◕		⌘	⌘		
K Cast iron	⌘	⌘	●	●	◕	◕	⌘						
N Non-ferrous metal												◕	
S Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	FQES190906-4RXR	19.05	9.525	6.35	4.4		☆							★				

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌘ Tough



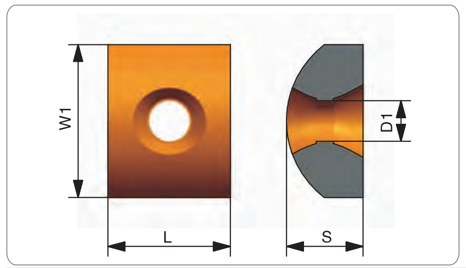
Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P Steel	⌘	⌘	●	●	◕	◕	⌘	◕	⌘	⌘	⌘		
M Stainless steel			●	●	◕	◕	⌘	◕		⌘	⌘		
K Cast iron	⌘	⌘	●	●	◕	◕	⌘						
N Non-ferrous metal												◕	
S Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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	7.94	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

Working condition: ● Stable ◕ Average ⌘ Tough

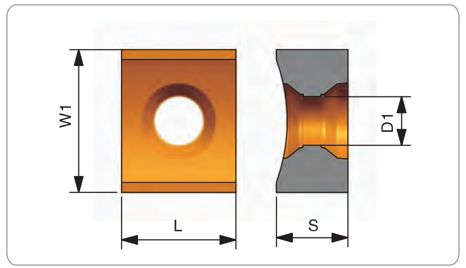


Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P Steel	⌘	⌘	●	●	◕	◕	⌘	◕	⌘	⌘	⌘		
M Stainless steel			●	●	◕	◕	⌘	◕		⌘	⌘		
K Cast iron	⌘	⌘	●	●	◕	◕	⌘						
N Non-ferrous metal												◕	
S Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Working condition: ● Stable ◕ Average ⌘ Tough



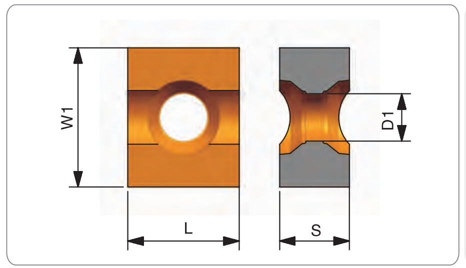
Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P Steel	⌘	⌘	●	●	◕	◕	⌘	◕	⌘	⌘	⌘		
M Stainless steel			●	●	◕	◕	⌘	◕		⌘	⌘		
K Cast iron	⌘	⌘	●	●	◕	◕	⌘						
N Non-ferrous metal												◕	
S Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Working condition: ● Stable ◕ Average ⌗ Tough



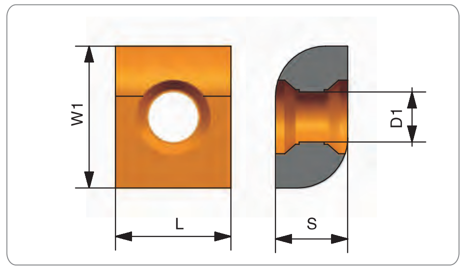
Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P	Steel	⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
M	Stainless steel			●	●	◕	◕	⌗	◕		⌗	⌗		
K	Cast iron	⌗	⌗	●	●	◕	◕	⌗						
N	Non-ferrous metal												◕	
S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Working condition: ● Stable ◕ Average ⌗ Tough

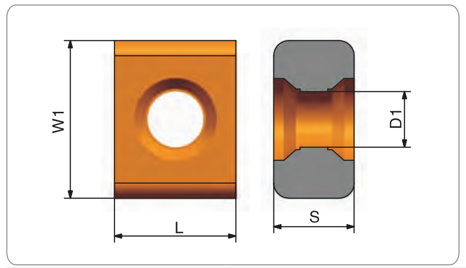


Workpiece material		HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P	Steel	⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
M	Stainless steel			●	●	◕	◕	⌗	◕		⌗	⌗		
K	Cast iron	⌗	⌗	●	●	◕	◕	⌗						
N	Non-ferrous metal												◕	
S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	LNER151207–2R20	15.875	12.70	7.94	5.4		☆							★				
	LNER151207–2R30	15.875	12.70	7.94	5.4		☆							★				
	LNER151207–2R35	15.875	12.70	7.94	5.4		☆							★				
	LNER151207–2R40	15.875	12.70	7.94	5.4		☆							★				
	LNER151207–2R45	15.875	12.70	7.94	5.4		☆							★				
	LNER151207–2R50	15.875	12.70	7.94	5.4		☆							★				
	LNER151207A–2R50	15.875	12.70	7.05	5.4		☆							★				
	LNER151207–2R55	15.875	12.70	7.94	5.4		☆							★				
	LNER15C1207–2R50	15.28	12.70	7.94	5.4		☆							★				
	LNER15F1207–2R50	15.68	12.70	7.94	5.4		☆							★				
	LNER191406–2R30	19.05	14.29	6.35	5.4		☆							★				
	LNER191406–2R35	19.05	14.29	6.35	5.4		☆							★				
	LNER190906–2R50	19.05	9.525	6.35	5.4		☆							★				
	LNER191407–2R60	19.05	14.29	7.94	5.4		☆							★				
	LNER191406–2R30M22	19.05	14.29	6.35	5.4		☆							★				
	LNER191406–2R46M15	19.05	14.29	6.35	5.4		☆							★				
	LNER191407–2R60M15	19.05	14.29	7.94	5.4		☆							★				
	LNER191407–2R70M20	19.05	14.29	7.94	5.4		☆							★				
	LNER191408–2R70M20	19.05	14.29	8.50	5.4		☆							★				

★ Recommended grade ☆ Available grade

Heavy milling inserts

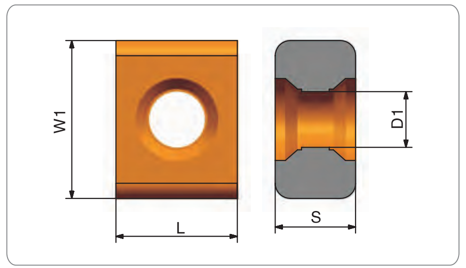


Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material	CVD		PVD									Cemented carbide	Cermet
	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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



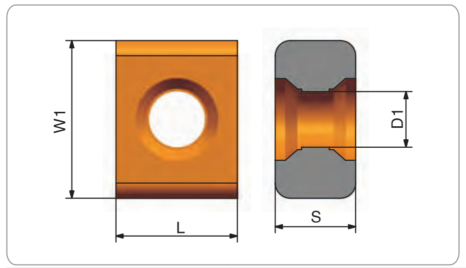
Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material	CVD		PVD									Cemented carbide	Cermet
	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Heavy milling inserts

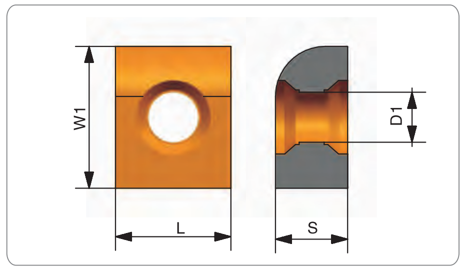


Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material	CVD		PVD									Cemented carbide	Cermet
	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

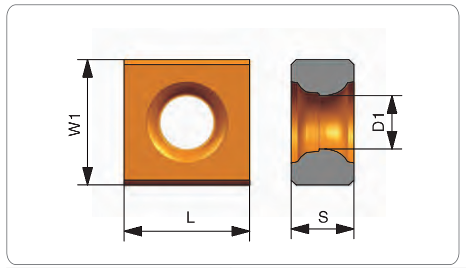
Workpiece material	CVD		PVD									Cemented carbide	Cermet
	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
P Steel	⌗	⌗	●	●	◕	◕	⌗	◕	⌗	⌗	⌗		
M Stainless steel			●	●	◕	◕	⌗	◕		⌗	⌗		
K Cast iron	⌗	⌗	●	●	◕	◕	⌗						
N Non-ferrous metal												◕	
S Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	LNER151207–1R30M20	15.875	12.70	7.94	5.4		☆							★				

★ Recommended grade ☆ Available grade

Heavy milling inserts

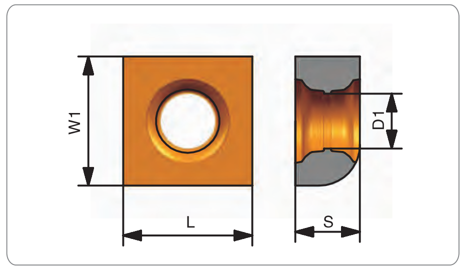
Working condition: ● Stable ◕ Average ¤ Tough



Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
Workpiece material	P Steel					¤	¤	●	●	◕	◕	¤	◕	¤	¤	¤		
	M Stainless steel							●	●	◕	◕	¤	◕		¤	¤		
	K Cast iron					¤	¤	●	●	◕	◕	¤						
	N Non-ferrous metal																◕	
	S Heat-resistant alloy Titanium alloy																	
	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

Working condition: ● Stable ◕ Average ¤ Tough

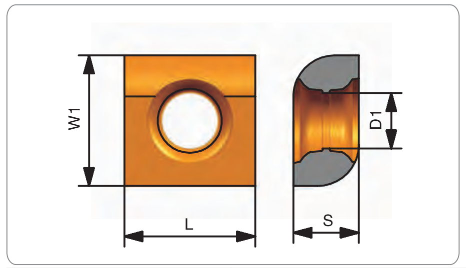


Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
Workpiece material	P Steel					¤	¤	●	●	◕	◕	¤	◕	¤	¤	¤		
	M Stainless steel							●	●	◕	◕	¤	◕		¤	¤		
	K Cast iron					¤	¤	●	●	◕	◕	¤						
	N Non-ferrous metal																◕	
	S Heat-resistant alloy Titanium alloy																	
																		
	SNER151507–1R70	15.875	15.875	7.94	5.4		☆							★				

★ Recommended grade ☆ Available grade

Heavy milling inserts

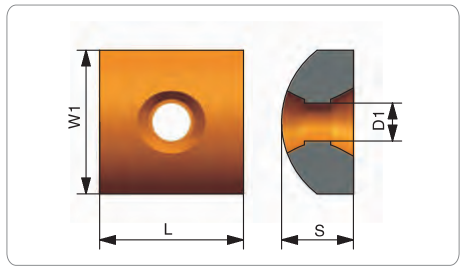
Working condition: ● Stable ◕ Average ¤ Tough



Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
Workpiece material	P Steel					¤	¤	●	●	◕	◕	¤	◕	¤	¤	¤		
	M Stainless steel							●	●	◕	◕	¤	◕		¤	¤		
	K Cast iron					¤	¤	●	●	◕	◕	¤						
	N Non-ferrous metal																◕	
	S Heat-resistant alloy Titanium alloy																	
	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

Working condition: ● Stable ◕ Average ¤ Tough

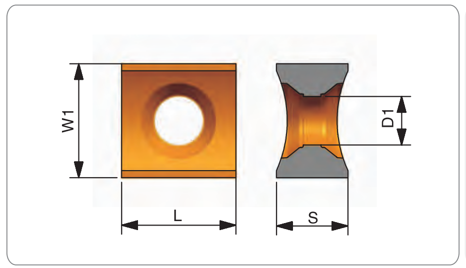


Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
Workpiece material	P Steel					¤	¤	●	●	◕	◕	¤	◕	¤	¤	¤		
	M Stainless steel							●	●	◕	◕	¤	◕		¤	¤		
	K Cast iron					¤	¤	●	●	◕	◕	¤						
	N Non-ferrous metal																◕	
	S Heat-resistant alloy Titanium alloy																	
	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

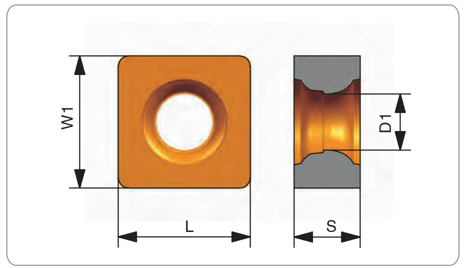


Workpiece material	P	Steel	⌘	⌘	●	●	◕	◕	⌘	◕	⌘	⌘	⌘		
	M	Stainless steel			●	●	◕	◕	⌘	◕		⌘	⌘		
	K	Cast iron	⌘	⌘	●	●	◕	◕	⌘						
	N	Non-ferrous metal												◕	
	S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
																		
	SNER121207–2NR80	12.70	12.70	7.94	5.4		☆							★				

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌘ Tough



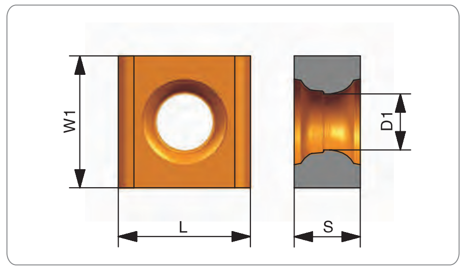
Workpiece material	P	Steel	⌘	⌘	●	●	◕	◕	⌘	◕	⌘	⌘	⌘		
	M	Stainless steel			●	●	◕	◕	⌘	◕		⌘	⌘		
	K	Cast iron	⌘	⌘	●	●	◕	◕	⌘						
	N	Non-ferrous metal												◕	
	S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌘ Tough

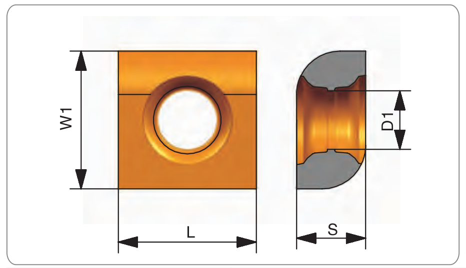


Workpiece material	P	Steel	⌘	⌘	●	●	◕	◕	⌘	◕	⌘	⌘	⌘		
	M	Stainless steel			●	●	◕	◕	⌘	◕		⌘	⌘		
	K	Cast iron	⌘	⌘	●	●	◕	◕	⌘						
	N	Non-ferrous metal												◕	
	S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

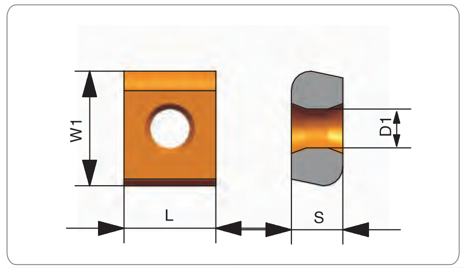


Workpiece material	P	Steel	⌘	⌘	●	●	◕	◕	⌘	◕	⌘	⌘	⌘		
	M	Stainless steel			●	●	◕	◕	⌘	◕		⌘	⌘		
	K	Cast iron	⌘	⌘	●	●	◕	◕	⌘						
	N	Non-ferrous metal												◕	
	S	Heat-resistant alloy Titanium alloy													

Insert shape	Type	Basic dimension (mm)				CVD		PVD									Cemented carbide	Cermet
		L	W1	S	D1	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Heavy milling inserts



Working condition: ● Stable ◕ Average ⌑ Tough

Workpiece material	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
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	HR6130	HR8140	HR5110	HR5210	HR5120	HR5220	HR5130	HR530	HR7130	HR7140	HR7240	HRK10	HRC10
	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

Series B -Basic end mills

Series P -High performance end mills

Series M - Mirco end mills

It's suitable for finish milling of precision small parts

Selection guidance of solid carbide end mills

Product type

Machining form

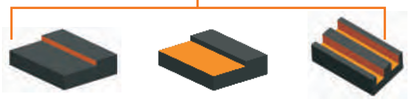
Product specification drawing

Series B - basic end mills

Three-flute flat end mill (short flute structure)

Product outline drawing

B2L···LG


Side machining Bottom machining Slot milling

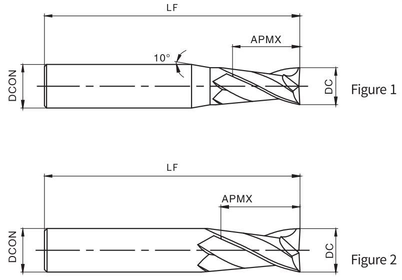


Figure 1

Figure 2

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–4	3.0	4	12	75	2	图一	●
B2L0400LG–4	4.0	4	15	75	2	图二	○
B2L0300LG	3.0	6	12	75	2	图一	○
B2L0400LG	4.0	6	15	75	2	图一	●
B2L0500LG	5.0	6	20	75	2	图一	●
B2L0600LG	6.0	6	20	75	2	图二	●
B2L0800LG	8.0	8	25	100	2	图二	●
B2L1000LG	10.0	10	30	100	2	图二	●
B2L1200LG	12.0	12	35	100	2	图二	●
B2L1400LG	14.0	14	40	100	2	图二	●
B2L1600LG	16.0	16	50	150	2	图二	●
B2L2000LG	20.0	20	55	150	2	图二	●

●Running stock ○Make-to-order

Pattern

Product specification

Basic size

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 Milling

Solid carbide end mills

Code key o fsolid carbide end mills

B	4	S	1000	R0500	B	L	G	-	4
①	②	③	④	⑤	⑥	⑦	⑧		⑨

① Product series	
M	Micro mills
B	Basic type
P	High performance type
X	Special type

② Number of edges	
2	Two flutes
3	Three flutes
4	Four flutes
…	

③ Length	
S	Short
L	Long
E	Extra long
P	Necking

④ Tool diameter	
10 00	Φ10mm
Default	Ball nose mill

⑤ Corner radius	
R05 00	R5.0mm
Default	Flat end mill

⑥ Tool type	
default	Flat end
	Radius
B	Ball nose
W	Corrugated edge

⑦ Helical angle	
L	Little helical angle
N	Normal helical angle
H	Large helical angle
O	Special helical angle

⑧ Application fields	
G	General
M	Stainless steel machining
N	Aluminum alloy machining
S	High-temp alloy and titanium alloy machining
H	High hardness material machining

⑨ shank diameter	
4	shank diameter 4mm

Overview of solide carbide end mills

Machining form	Shape	Number of teeth	Model	Size range	Workpiece material												page
					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	
Micro mills	flat end	2	M2S...LG	Φ0.3—Φ3	☀	☀	☀	☼	☀			☼	☼	☼			B106
			M2S...LH	Φ0.3—Φ3	☼	☼	☼		☀					☀	☀	☀	B108
	Ball nose	2	M2S...BLG	Φ0.3—Φ3	☀	☀	☀	☼	☀			☼	☼	☼			B110
			M2S...BLH	Φ0.3—Φ3	☼	☼	☼		☀					☀	☀	☀	B112
	Alluminum alloy mill	2	M2S...LN	Φ0.3—Φ3						☼	☀						B114
			M2S...BLN	Φ0.3—Φ3						☼	☀						B116
Basic mill	Flat end	2	B2S···LG	Φ3—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B118
			B2L···LG	Φ3—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B120
		3	B3S···NG	Φ3—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B122
			B3L···NG	Φ3—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B124
		4	B4S···LG	Φ1—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B126
			B4L···LG	Φ3—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B130
			B4S···HG	Φ1—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B132
			B4L···HG	Φ3—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B136
		6	B6S···HG	Φ6—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B138
			B6L···HG	Φ6—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B140
	Radius	2	B2S···R···LG	Φ3—Φ12	☀	☀	☀	☼	☀			☼	☼	☼			B142
		4	B4S···R···LG	Φ3—Φ12	☀	☀	☀	☼	☀			☼	☼	☼			B144
	Aluminum alloy mill	2	B2S···BLG	Φ1—Φ20	☀	☀	☀	☼	☀			☼	☼	☼	☼		B146
			B2L···BLG	Φ2—Φ20	☀	☀	☀	☼	☀			☼	☼	☼	☼		B148
		4	B4S···BLG	Φ3—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B150
			B4L···BLG	Φ3—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B152
	Ball nose	2	B2S···HN	Φ3—Φ20						☼	☀						B154
		3	B2L···HN	Φ3—Φ20						☼	☀						B156
		2	B3S···HN	Φ3—Φ20						☼	☀						B158
		3	B3L···HN	Φ3—Φ20						☼	☀						B160
		3	B2S···BLN	Φ2—Φ12						☼	☀						B162
High performance mill	Flat end	4	P4S···LG	Φ1—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B164
			P4P···LG	Φ6—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B166
			P4S···NG	Φ1—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B168
			P4P···NG	Φ6—Φ20	☀	☀	☀	☼	☀			☼	☼	☼			B170
			P4S···NS	Φ1—Φ20	☼	☼	☼	☀				☀	☀				B172
			P4P···NS	Φ6—Φ20	☼	☼	☼	☀				☀	☀				B174
			P4S···HH	Φ1—Φ20	☼	☼	☼										B176
			P4P···HH	Φ6—Φ20	☼	☼	☼										B178

☀ Fit well ☼ Applicable

Overview of solid carbide end mills

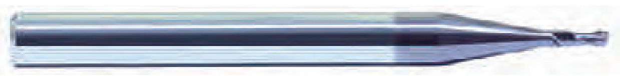
Machining form	Shape	Number of teeth	Model	Size range	Workpiece material: P Carbon steel	P Alloy steel	P High-alloyed steel and tool steel	M Stainless steel	K Cast iron	N Non-ferrous alloy	N Aluminum alloy	S High-temp alloy	S Titanium alloy	H High hardness steel < 54HRC	H High hardness steel 54--60 HRC	H High hardness steel > 60HRC	page
High performance mill	Radius	4	P4S···R···LG	Φ3—Φ20	☀	☀	☀	☼				☼	☼				B180
			P4P···R···LG	Φ6—Φ20	☀	☀	☀	☼				☼	☼				B182
			P4S···R···NG	Φ3—Φ20	☀	☀	☀	☼				☼	☼				B184
			P4P···R···NG	Φ6—Φ20	☀	☀	☀	☼				☼	☼				B186
			P4S···R···NS	Φ3—Φ20	☼	☼	☼	☀				☀	☀				B188
			P4P···R···NS	Φ6—Φ20	☼	☼	☼	☀				☀	☀				B190
			P4S···R···HH	Φ3—Φ20	☼	☼	☼		☼					☀	☀	☀	B192
			P4P···R···HH	Φ6—Φ20	☼	☼	☼		☼					☀	☀	☀	B194
	Ball nose	2	P2S···BLG	Φ1—Φ20	☀	☀	☀	☀	☀					☼			B196
			P2S···BLH	Φ1—Φ20	☼	☼	☼	☼	☼			☼	☼	☀	☀	☀	B198
			P2P···BLG	Φ1—Φ20	☀	☀	☀	☀	☀			☼	☼	☼	☼		B200
			P2P···BLH	Φ1—Φ20	☼	☼	☼		☼					☀	☀	☀	B202
		4	P4S···BNS	Φ3—Φ20	☼	☼	☼	☀				☀	☀				B204
Special type	Flat end	3	X3S...WLN	Φ6—Φ20							☀						B206
		4	X4S...WNG	Φ6—Φ20	☀	☀	☀	☼	☀					☼			B208
			X4S...HG	Φ4—Φ20	☀	☀	☀	☀	☀			☀	☀	☀	☀		B210
	Radius	4	X4S...R...HG	Φ6—Φ20	☀	☀	☀	☀	☀			☀	☀	☀	☀		B212

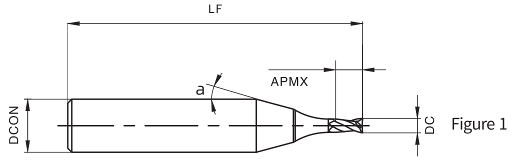
☀ Fit well ☼ Applicable

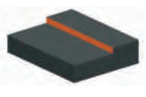
Series M - - Micro end mill

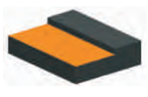
Two-flute flat end mill (General machining)

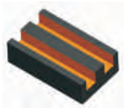
M2S···LG






Side machining


Bottom machining


Slot milling

M Series | 30° | DC≤1 0,–0.01
1<DC≤3 0,–0.015 | 90°

Type	Basic dimension (mm) DC	DCON	APMX	LF	a (°)	ZEFP	Pattern	Inventory
M2S0030LG	0.3	4	0.6	50	15	2	Figure 1	○
M2S0040LG	0.4	4	0.8	50	15	2	Figure 1	○
M2S0050LG	0.5	4	1.0	50	15	2	Figure 1	○
M2S0060LG	0.6	4	1.2	50	15	2	Figure 1	○
M2S0070LG	0.7	4	1.4	50	15	2	Figure 1	○
M2S0080LG	0.8	4	1.6	50	15	2	Figure 1	○
M2S0090LG	0.9	4	1.8	50	15	2	Figure 1	○
M2S0100LG	1.0	4	2.0	50	15	2	Figure 1	○
M2S0110LG	1.1	4	2.2	50	30	2	Figure 1	○
M2S0120LG	1.2	4	2.4	50	30	2	Figure 1	○
M2S0130LG	1.3	4	2.6	50	30	2	Figure 1	○
M2S0140LG	1.4	4	2.8	50	30	2	Figure 1	○
M2S0150LG	1.5	4	3.0	50	30	2	Figure 1	○
M2S0160LG	1.6	4	3.2	50	30	2	Figure 1	○
M2S0170LG	1.7	4	3.4	50	30	2	Figure 1	○
M2S0180LG	1.8	4	3.6	50	30	2	Figure 1	○
M2S0190LG	1.9	4	3.8	50	30	2	Figure 1	○
M2S0200LG	2.0	4	4.0	50	30	2	Figure 1	○
M2S0210LG	2.1	4	4.2	50	30	2	Figure 1	○
M2S0220LG	2.2	4	4.4	50	30	2	Figure 1	○
M2S0230LG	2.3	4	4.6	50	30	2	Figure 1	○
M2S0240LG	2.4	4	4.8	50	30	2	Figure 1	○
M2S0250LG	2.5	4	5.0	50	10	2	Figure 1	○
M2S0260LG	2.6	4	5.2	50	10	2	Figure 1	○
M2S0270LG	2.7	4	5.4	50	10	2	Figure 1	○
M2S0280LG	2.8	4	5.6	50	10	2	Figure 1	○
M2S0290LG	2.9	4	5.8	50	10	2	Figure 1	○
M2S0300LG	3.0	4	6.0	50	10	2	Figure 1	○

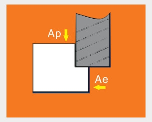
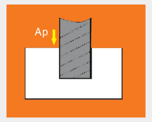
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions——M2S···LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	40	60	80
	Alloy steel	< 1200	< 350	30	50	70
	High-alloyed steel and tool steel	< 1400	< 380	30	50	70
M	Austenite and ferrite stainless steel	< 680	<220	30	45	60
	Martensite stainless steel	< 820	< 240	25	40	50
K	Gray cast iron	–	< 280	40	70	100
	Ductile iron	–	< 320	30	60	90
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	30	60	90
	High hardness steel	–	54–60HRC	20	40	60
	High hardness steel	–	> 60 HRC	–	–	–

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter （mm）	ap	ae	f_z (mm/r)	ap	ae	f_z (mm/r)
0.3≤Dc<1	–	–	–	0.05Dc	1Dc	0.002–0.008
1≤Dc≤3	–	–	–	0.15Dc	1Dc	0.006–0.03

(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 M - - Micro end mill

Two-flute flat end mill (high hardness machining)

M2S···LH

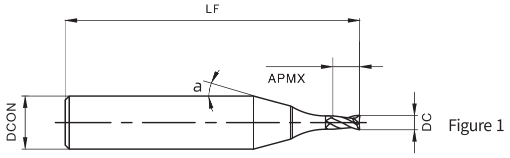
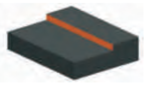
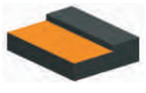
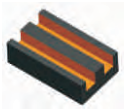


Figure 1


Side machining


Bottom machining


Slot milling

M Series | 30° | DC≤1 0,–0.01
1<DC≤3 0,–0.015 | 90°

Type	Basic dimension (mm)				a (°)	ZEFP	Pattern	Inventory
	DC	DCON	APMX	LF				
M2S0030LH	0.3	4	0.6	50	15	2	Figure 1	○
M2S0040LH	0.4	4	0.8	50	15	2	Figure 1	○
M2S0050LH	0.5	4	1.0	50	15	2	Figure 1	○
M2S0060LH	0.6	4	1.2	50	15	2	Figure 1	○
M2S0070LH	0.7	4	1.4	50	15	2	Figure 1	○
M2S0080LH	0.8	4	1.6	50	15	2	Figure 1	○
M2S0090LH	0.9	4	1.8	50	15	2	Figure 1	○
M2S0100LH	1.0	4	2.0	50	15	2	Figure 1	○
M2S0110LH	1.1	4	2.2	50	30	2	Figure 1	○
M2S0120LH	1.2	4	2.4	50	30	2	Figure 1	○
M2S0130LH	1.3	4	2.6	50	30	2	Figure 1	○
M2S0140LH	1.4	4	2.8	50	30	2	Figure 1	○
M2S0150LH	1.5	4	3.0	50	30	2	Figure 1	○
M2S0160LH	1.6	4	3.2	50	30	2	Figure 1	○
M2S0170LH	1.7	4	3.4	50	30	2	Figure 1	○
M2S0180LH	1.8	4	3.6	50	30	2	Figure 1	○
M2S0190LH	1.9	4	3.8	50	30	2	Figure 1	○
M2S0200LH	2.0	4	4.0	50	30	2	Figure 1	○
M2S0210LH	2.1	4	4.2	50	30	2	Figure 1	○
M2S0220LH	2.2	4	4.4	50	30	2	Figure 1	○
M2S0230LH	2.3	4	4.6	50	30	2	Figure 1	○
M2S0240LH	2.4	4	4.8	50	30	2	Figure 1	○
M2S0250LH	2.5	4	5.0	50	10	2	Figure 1	○
M2S0260LH	2.6	4	5.2	50	10	2	Figure 1	○
M2S0270LH	2.7	4	5.4	50	10	2	Figure 1	○
M2S0280LH	2.8	4	5.6	50	10	2	Figure 1	○
M2S0290LH	2.9	4	5.8	50	10	2	Figure 1	○
M2S0300LH	3.0	4	6.0	50	10	2	Figure 1	○

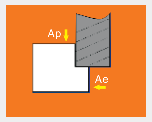
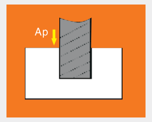
●Running stock ○Make-to-order

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

Recommended cutting conditions——M2S···LH

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	–	–	–
S	High-temp alloy	< 3300	< 350	–	–	–
	Titanium alloy	<2100	< 400	–	–	–
H	High hardness steel	–	< 54HRC	40	70	100
	High hardness steel	–	54–60HRC	30	55	80
	High hardness steel	–	> 60 HRC	20	40	60

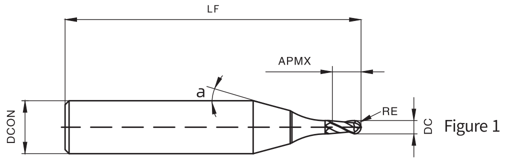
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap	ae	f_z (mm/r)	ap	ae	f_z (mm/r)
0.3≤Dc<1	–	–	–	0.01Dc	1Dc	0.0015–0.005
1≤Dc≤3	–	–	–	0.02Dc	1Dc	0.004–0.015

(1) The lower of cutting depth, the higher of feed and speed.
(2) Ocne the machine rigidity is poor,and with abnormal sound or viberation when processing.Decrease the cutting speed and feed as same ration.

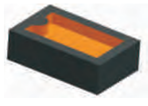
Series M - - Micro end mill

Two-flute ball nose end mill (general machining)

M2S···BLG




Profile milling


Cavity machining


slot machining

M Series
30°
DC≤1 0,–0.01
1<DC≤3 0,–0.015
R R±0.005

Type	Basic dimension (mm)					a (°)	ZEFP	Pattern	Inventory
	DC	DCON	APMX	LF	RE				
M2SR0015BLG	0.3	4	0.3	50	0.15	15	2	Figure 1	○
M2SR0020BLG	0.4	4	0.4	50	0.2	15	2	Figure 1	○
M2SR0025BLG	0.5	4	0.5	50	0.25	15	2	Figure 1	○
M2SR0030BLG	0.6	4	0.6	50	0.3	15	2	Figure 1	○
M2SR0035BLG	0.7	4	0.7	50	0.35	15	2	Figure 1	○
M2SR0040BLG	0.8	4	0.8	50	0.4	15	2	Figure 1	○
M2SR0045BLG	0.9	4	0.9	50	0.45	15	2	Figure 1	○
M2SR0050BLG	1.0	4	1.0	50	0.5	15	2	Figure 1	○
M2SR0060BLG	1.2	4	1.2	50	0.6	30	2	Figure 1	○
M2SR0070BLG	1.4	4	1.4	50	0.7	30	2	Figure 1	○
M2SR0075BLG	1.5	4	1.5	50	0.75	30	2	Figure 1	○
M2SR0080BLG	1.6	4	1.6	50	0.8	30	2	Figure 1	○
M2SR0090BLG	1.8	4	1.8	50	0.9	30	2	Figure 1	○
M2SR0100BLG	2.0	4	2.0	50	1.0	30	2	Figure 1	○
M2SR0125BLG	2.5	4	2.5	50	1.25	10	2	Figure 1	○
M2SR0150BLG	3.0	4	3.0	50	1.5	10	2	Figure 1	○

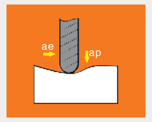
●Running stock ○Make-to-order

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

Recommended cutting conditions——M2S···BLG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	40	100	180
	Alloy steel	< 1200	< 350	30	90	160
	High-alloyed steel and tool steel	< 1400	< 380	30	80	120
M	Austenite and ferrite stainless steel	< 680	<220	50	75	100
	Martensite stainless steel	< 820	< 240	40	60	80
K	Gray cast iron	–	< 280	50	110	180
	Ductile iron	–	< 320	40	90	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	40	60	80
	High hardness steel	–	54–60HRC	20	40	60
	High hardness steel	–	> 60 HRC	–	–	–

Recommended Cutting Parameters						
Machining method	 Profile milling					
Diameter（mm）	ap	ae	fz			
Dc<1	0.025Dc	0.1Dc	0.015–0.025			
1≤Dc≤3	0.025Dc	0.1Dc	0.02–0.05			

(1) Air cooling or spray cooling is recommended.

(2) Ocne the machine rigidity is poor,and with abnormal sound or vibration when processing.Decrease the cutting speed and feed as same ration.

(3) Ensure the tool is as short as possible without interference.

Series M - - Micro end mill

Two-flute ball nose end mill （High hardness machining）

M2S···BLH

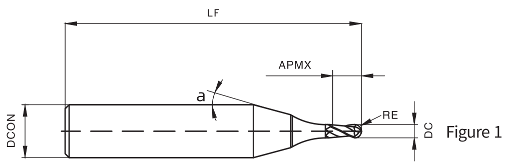
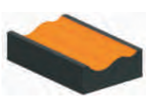
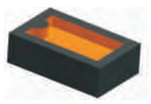
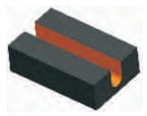


Figure 1


Profile milling


Cavity machining


slot machining

M Series
30°
DC≤1 0,–0.01
1<DC≤3 0,–0.015
R R±0.005

Type	Basic dimension (mm)					a (°)	ZEFP	Pattern	Inventory
	DC	DCON	APMX	LF	RE				
M2SR0015BLH	0.3	4	0.2	50	0.15	15	2	Figure 1	○
M2SR0020BLH	0.4	4	0.3	50	0.2	15	2	Figure 1	○
M2SR0025BLH	0.5	4	0.35	50	0.25	15	2	Figure 1	○
M2SR0030BLH	0.6	4	0.45	50	0.3	15	2	Figure 1	○
M2SR0035BLH	0.7	4	0.5	50	0.35	15	2	Figure 1	○
M2SR0040BLH	0.8	4	0.6	50	0.4	15	2	Figure 1	○
M2SR0045BLH	0.9	4	0.65	50	0.45	15	2	Figure 1	○
M2SR0050BLH	1.0	4	0.75	50	0.5	15	2	Figure 1	○
M2SR0060BLH	1.2	4	0.9	50	0.6	30	2	Figure 1	○
M2SR0070BLH	1.4	4	1.0	50	0.7	30	2	Figure 1	○
M2SR0075BLH	1.5	4	1.1	50	0.75	30	2	Figure 1	○
M2SR0080BLH	1.6	4	1.2	50	0.8	30	2	Figure 1	○
M2SR0090BLH	1.8	4	1.35	50	0.9	30	2	Figure 1	○
M2SR0100BLH	2.0	4	1.5	50	1.0	30	2	Figure 1	○
M2SR0125BLH	2.5	4	2.3	50	1.25	10	2	Figure 1	○
M2SR0150BLH	3.0	4	2.5	50	1.5	10	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
☼	☼	☼		☀					☀	☀	☀

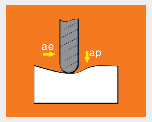
☀ Fit well ☼ Applicable

Recommended cutting conditions——M2S···BLH

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	–	–	–
S	High-temp alloy	< 3300	< 350	–	–	–
	Titanium alloy	<2100	< 400	–	–	–
H	High hardness steel	–	< 54HRC	40	70	100
	High hardness steel	–	54–60HRC	30	55	80
	High hardness steel	–	> 60 HRC	20	40	60

Recommended Cutting Parameters

Machining method	 Profile milling					
Diameter （mm）	ap	ae	fz			
Dc	0.05Dc	0.1Dc	0.004–0.03			

(1) Air cooling or spray cooling is recommended.

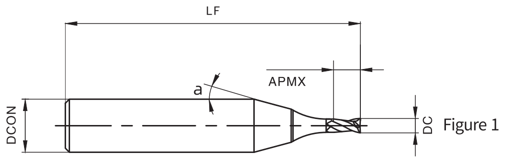
(2) Ocne the machine rigidity is poor,and with abnormal sound or viberation when processing.Decrease the cutting speed and feed as same ration.

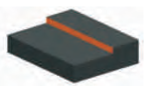
(3) Ensure the tool is as short as possible without interference.

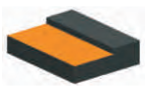
Series M - - Micro end mill

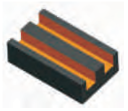
Two-flute flat end mill（aluminum alloy machining)

M2S···LN




Side machining


Bottom machining


Slot milling

M Series

30°

DC≤1 0,–0.01
1<DC≤3 0,–0.015

90°

Type	Basic dimension (mm)				a(°)	ZEFP	Pattern	Inventory
	DC	DCON	APMX	LF				
M2S0030LN	0.3	4	0.6	50	15	2	Figure 1	○
M2S0040LN	0.4	4	0.8	50	15	2	Figure 1	○
M2S0050LN	0.5	4	1.0	50	15	2	Figure 1	○
M2S0060LN	0.6	4	1.2	50	15	2	Figure 1	○
M2S0070LN	0.7	4	1.4	50	15	2	Figure 1	○
M2S0080LN	0.8	4	1.6	50	15	2	Figure 1	○
M2S0090LN	0.9	4	1.8	50	15	2	Figure 1	○
M2S0100LN	1.0	4	2.0	50	15	2	Figure 1	○
M2S0110LN	1.1	4	2.2	50	30	2	Figure 1	○
M2S0120LN	1.2	4	2.4	50	30	2	Figure 1	○
M2S0130LN	1.3	4	2.6	50	30	2	Figure 1	○
M2S0140LN	1.4	4	2.8	50	30	2	Figure 1	○
M2S0150LN	1.5	4	3.0	50	30	2	Figure 1	○
M2S0160LN	1.6	4	3.2	50	30	2	Figure 1	○
M2S0170LN	1.7	4	3.4	50	30	2	Figure 1	○
M2S0180LN	1.8	4	3.6	50	30	2	Figure 1	○
M2S0190LN	1.9	4	3.8	50	30	2	Figure 1	○
M2S0200LN	2.0	4	4.0	50	30	2	Figure 1	○
M2S0210LN	2.1	4	4.2	50	30	2	Figure 1	○
M2S0220LN	2.2	4	4.4	50	30	2	Figure 1	○
M2S0230LN	2.3	4	4.6	50	30	2	Figure 1	○
M2S0240LN	2.4	4	4.8	50	30	2	Figure 1	○
M2S0250LN	2.5	4	5.0	50	10	2	Figure 1	○
M2S0260LN	2.6	4	5.2	50	10	2	Figure 1	○
M2S0270LN	2.7	4	5.4	50	10	2	Figure 1	○
M2S0280LN	2.8	4	5.6	50	10	2	Figure 1	○
M2S0290LN	2.9	4	5.8	50	10	2	Figure 1	○
M2S0300LN	3.0	4	6.0	50	10	2	Figure 1	○

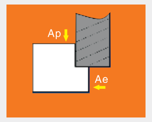
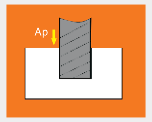
●Running stock ○Make-to-order

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

Recommended cutting conditions——M2S···LN

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	80	160	350
	Aluminum alloy	< 530	< 130	120	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	ae	fz (mm/r)	ap	ae	fz (mm/r)
Dc<1	–	–	–	0.03Dc	Dc	0.02–0.04
1≤Dc≤3	–	–	–	0.06Dc	Dc	0.04–0.12

（1）Water-soluable cutting fluid reuqired。

Series M - - Micro end mill

Two-flute ball nose end mill(aluminum alloy machining)

M2S···BLN

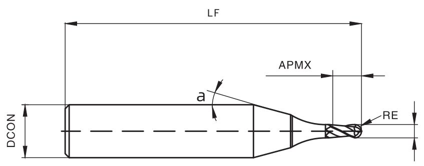
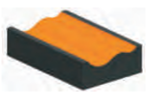
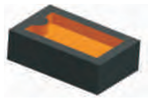


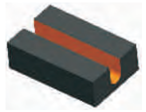
Figure 1



Profile milling



Cavity machining



slot machining

M Series

30°

DC≤1 0,–0.01
1<DC≤3 0,–0.015

R R±0.005

Type	Basic dimension (mm)					a (°)	ZEFP	Pattern	Inventory
	DC	DCON	APMX	LF	RE				
M2SR0015BLN	0.3	4	0.3	50	0.15	15	2	Figure 1	○
M2SR0020BLN	0.4	4	0.4	50	0.2	15	2	Figure 1	○
M2SR0025BLN	0.5	4	0.5	50	0.25	15	2	Figure 1	○
M2SR0030BLN	0.6	4	0.6	50	0.3	15	2	Figure 1	○
M2SR0035BLN	0.7	4	0.7	50	0.35	15	2	Figure 1	○
M2SR0040BLN	0.8	4	0.8	50	0.4	15	2	Figure 1	○
M2SR0045BLN	0.9	4	0.9	50	0.45	15	2	Figure 1	○
M2SR0050BLN	1.0	4	1.0	50	0.5	15	2	Figure 1	○
M2SR0060BLN	1.2	4	1.2	50	0.6	30	2	Figure 1	○
M2SR0070BLN	1.4	4	1.4	50	0.7	30	2	Figure 1	○
M2SR0075BLN	1.5	4	1.5	50	0.75	30	2	Figure 1	○
M2SR0080BLN	1.6	4	1.6	50	0.8	30	2	Figure 1	○
M2SR0090BLN	1.8	4	1.8	50	0.9	30	2	Figure 1	○
M2SR0100BLN	2.0	4	2.0	50	1.0	30	2	Figure 1	○
M2SR0125BLN	2.5	4	2.5	50	1.25	10	2	Figure 1	○
M2SR0150BLN	3.0	4	3.0	50	1.5	10	2	Figure 1	○

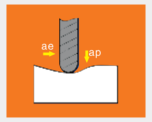
●Running stock ○Make-to-order

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

Recommended cutting conditions——M2S···BLN

Recommended Cutting Speed						
Workpiece material		Strength (N/mm^2)	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	80	160	350
	Aluminum alloy	< 530	< 130	120	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	–	–	–

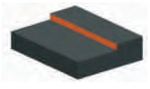
Recommended Cutting Parameters						
Machining method	 Profile milling					
Diameter （mm）	ap	ae	f_z (mm/r)			
Dc<1	0.01Dc	–	0.015–0.025			
1≤Dc≤3	0.02Dc	–	0.02–0.05			

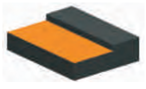
（1）Water-soluable cutting fluid reuqired。

Series B--Basic end mills

Two-flute flat end mill (short flute structure)

B2S···LG


Side machining


Bottom machining


Slot milling

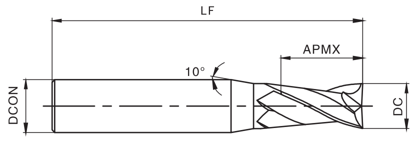


Figure 1

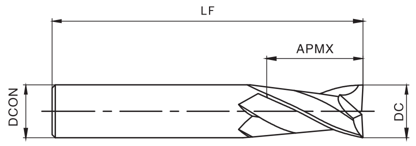


Figure 2

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–4	3.0	4	8	50	2	Figure 1	●
B2S0350LG–4	3.5	4	10	50	2	Figure 1	○
B2S0400LG–4	4.0	4	11	50	2	Figure 1	●
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 1	○
B2S0700LG	7.0	8	20	60	2	Figure 1	●
B2S0800LG	8.0	8	20	60	2	Figure 1	●
B2S0900LG	9.0	10	22	75	2	Figure 1	●
B2S1000LG	10.0	10	25	75	2	Figure 1	●
B2S1200LG	12.0	12	30	75	2	Figure 1	●
B2S1400LG	14.0	14	32	75	2	Figure 1	●
B2S1600LG	16.0	16	45	100	2	Figure 1	●
B2S1800LG	18.0	18	45	100	2	Figure 1	●
B2S2000LG	20.0	20	45	100	2	Figure 1	●

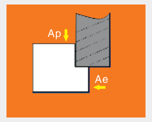
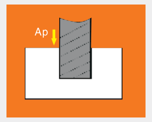
●Running stock ○Make-to-order

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

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 (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.02
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	0.03
5.0	5.0	1.5	0.035	3.8	5.0	0.03
5.5	5.5	1.7	0.040	4.0	5.5	0.035
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	0.04
8.0	8.0	2.4	0.060	6.0	8.0	0.05
9.0	9.0	2.7	0.065	6.7	9.0	0.055
10.0	10.0	3.0	0.070	7.5	10.0	0.06
12.0	12.0	3.6	0.085	9.0	12.0	0.07
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	0.12

(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

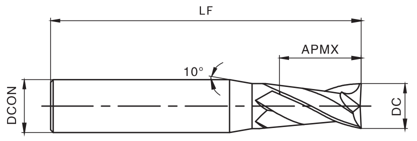


Figure 1

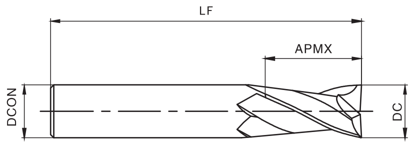
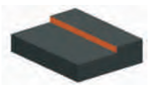
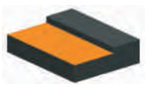
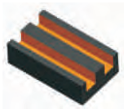


Figure 2


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		
B2L0300LG–4	3.0	4	12	75	2	Figure 1	●
B2L0400LG–4	4.0	4	15	75	2	Figure 2	○
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	●

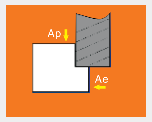
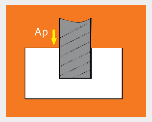
●Running stock ○Make-to-order

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	⩾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	–	–	–

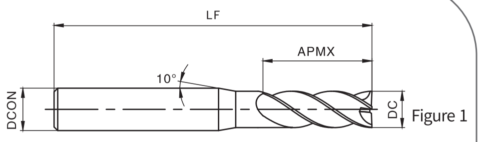
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter （mm）	ap（1xDc）	ae（0.3xDc）	fz（mm/z）	ap（0.75xDc）	ae（1xDc）	fz（mm/z）
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	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
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

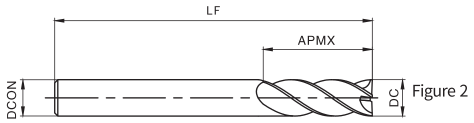
(1) This series of tools is a good solution for slot milling;
(2) Before slot milling, please reduce the cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the feed rate (feed rate) to 40%-60%.
(3) Before vertical feed machining, decrease the feed rate to below 1/3 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.

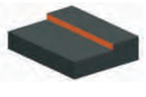
Series B--Basic end mills

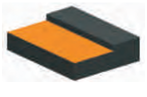
Three-flute flat end mill (short flute structure)

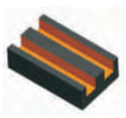
B3S···NG






Side machining


Bottom machining


Slot 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		
B3S0300NG–4	3.0	4	8	50	3	Figure 1	●
B3S0350NG–4	3.5	4	10	50	3	Figure 1	○
B3S0400NG–4	4.0	4	11	50	3	Figure 2	●
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	●

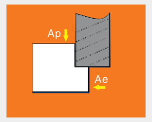
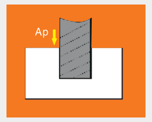
●Running stock ○Make-to-order

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 (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (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

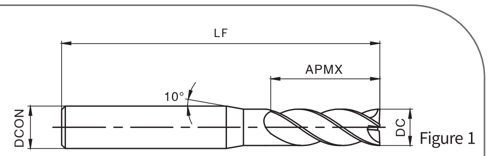


Figure 1

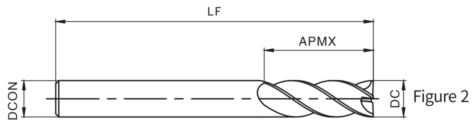
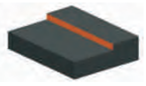
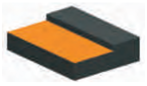
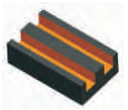


Figure 2


Side machining


Bottom machining


Slot 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–4	3.0	4	12	75	3	Figure 1	●
B3L0400NG–4	4.0	4	15	75	3	Figure 2	●
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 2	●
B3L0800NG	8.0	8	25	100	3	Figure 2	●
B3L1000NG	10.0	10	30	100	3	Figure 2	○
B3L1200NG	12.0	12	35	100	3	Figure 2	●
B3L1400NG	14.0	14	40	100	3	Figure 2	●
B3L1600NG	16.0	16	50	150	3	Figure 2	●
B3L2000NG	20.0	20	55	150	3	Figure 2	●

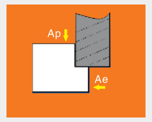
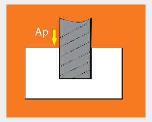
●Running stock ○Make-to-order

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···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 (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (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
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) 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

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

B4S···LG

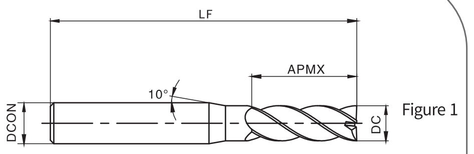


Figure 1

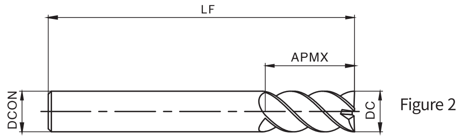
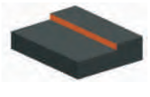
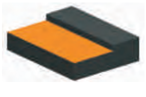
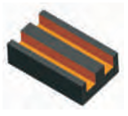


Figure 2


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		
B4S0100LG–4	1.0	4	3	50	4	Figure 1	●
B4S0150LG–4	1.5	4	4	50	4	Figure 1	○
B4S0200LG–4	2.0	4	6	50	4	Figure 1	●
B4S0250LG–4	2.5	4	8	50	4	Figure 1	●
B4S0300LG–4	3.0	4	8	50	4	Figure 1	●
B4S0350LG–4	3.5	4	10	50	4	Figure 1	●
B4S0400LG–4	4.0	4	11	50	4	Figure 2	●

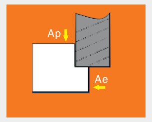
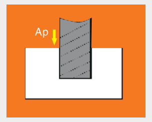
●Running stock ○Make-to-order

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···LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm^2)	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 (1xD_c)	ae (0.3xD_c)	f_z (mm/z)	ap (0.75xD_c)	ae (1xD_c)	f_z (mm/z)
1.0	1.0	0.3	0.010	0.75	1.0	0.005
1.5	1.5	0.5	0.015	1.13	1.5	0.010
2.0	2.0	0.6	0.015	1.50	2.0	0.015
2.5	2.5	0.8	0.020	1.88	2.5	0.020
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	0.035
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
11.0	11.0	3.3	0.080	8.0	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 B--Basic end mills

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

B4S···LG

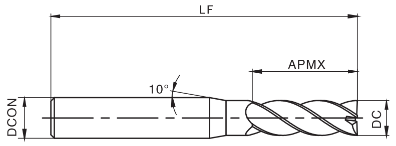


Figure 1

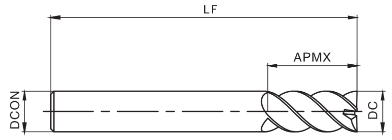
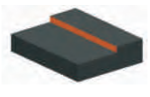
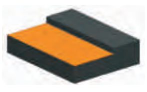
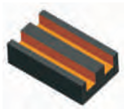


Figure 2


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		
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 2	○
B4S0800LG	8.0	8	20	60	4	Figure 2	●
B4S0900LG	9.0	10	22	75	4	Figure 2	○
B4S1000LG	10.0	10	25	75	4	Figure 2	●
B4S1100LG	11.0	12	26	75	4	Figure 2	●
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	●

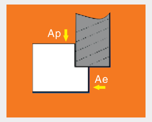
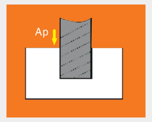
●Running stock ○Make-to-order

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	≥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 (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
1.0	1.0	0.3	0.010	0.75	1.0	0.005
1.5	1.5	0.5	0.015	1.13	1.5	0.010
2.0	2.0	0.6	0.015	1.50	2.0	0.015
2.5	2.5	0.8	0.020	1.88	2.5	0.020
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

(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

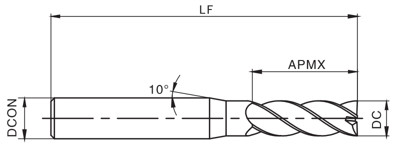


Figure 1

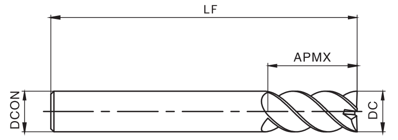
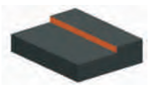
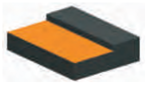
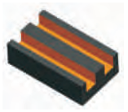


Figure 2


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		
B4L0300LG–4	3.0	4	12	75	4	Figure 1	●
B4L0400LG–4	4.0	4	15	75	4	Figure 2	○
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	●

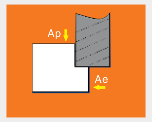
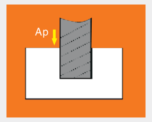
●Running stock ○Make-to-order

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	≥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 (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (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
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) 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

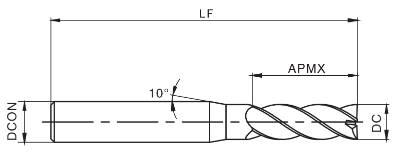


Figure 1

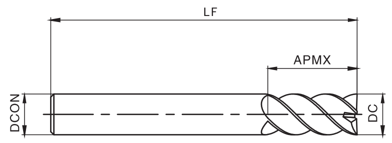
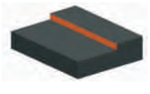
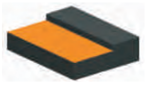
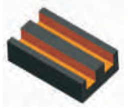


Figure 2


Side machining


Bottom machining


Slot milling

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–4	1.0	4	3	50	4	Figure 1	●
B4S0150HG–4	1.5	4	4	50	4	Figure 1	●
B4S0200HG–4	2.0	4	6	50	4	Figure 1	●
B4S0250HG–4	2.5	4	8	50	4	Figure 1	●
B4S0300HG–4	3.0	4	8	50	4	Figure 1	●
B4S0350HG–4	3.5	4	10	50	4	Figure 1	●
B4S0400HG–4	4.0	4	11	50	4	Figure 2	●

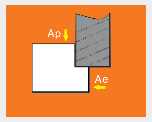
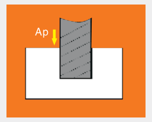
●Running stock ○Make-to-order

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/mm^2)	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	–	–	–

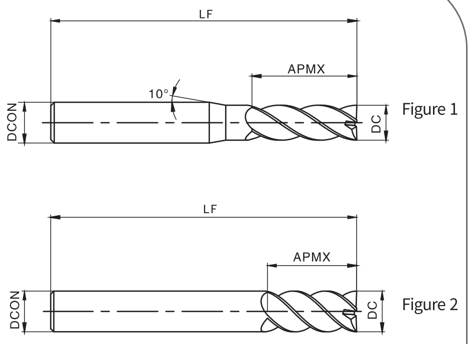
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xD_c)	ae (0.3xD_c)	f_z (mm/z)	ap (0.75xD_c)	ae (1xD_c)	f_z (mm/z)
1.0	1.0	0.3	0.010	0.75	1.0	0.005
1.5	1.5	0.5	0.015	1.13	1.5	0.010
2.0	2.0	0.6	0.015	1.50	2.0	0.015
2.5	2.5	0.8	0.020	1.88	2.5	0.020
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

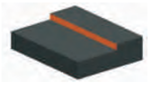
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

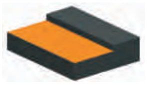
Series B--Basic end mills

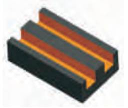
Four-flute flat end milling cutter (short flute structure, large helical angle)

B4S···HG




Side machining


Bottom machining


Slot milling

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

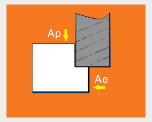
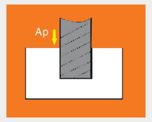
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☀	☀	☀	☼	☀			☼	☼	☼		

☀ Fit well ☼ Applicable

A
General turning
precision small parts turning
Parting and grooving
Threading
B
Indexable milling
Solid carbide end mills
C
Short hole drills
Solid carbide drills

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	–	–	–

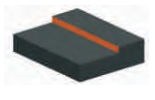
Recommended Cutting Parameters						
Machining method	 Ap Ae	Side milling		 Ap	Slot milling	
Diameter (mm)	ap（1xDc）	ae（0.3xDc）	fz（mm/z）	ap（0.75xDc）	ae（1xDc）	fz（mm/z）
1.0	1.0	0.3	0.010	0.75	1.0	0.005
1.5	1.5	0.5	0.015	1.13	1.5	0.010
2.0	2.0	0.6	0.015	1.50	2.0	0.015
2.5	2.5	0.8	0.020	1.88	2.5	0.020
3.0	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
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
11.0	11.0	3.3	0.080	8.0	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

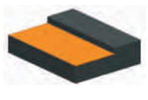
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

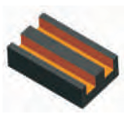
Series B--Basic end mills

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

B4L···HG


Side machining


Bottom machining


Slot milling

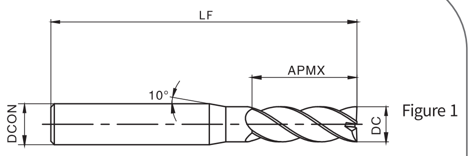


Figure 1

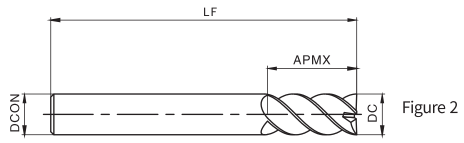


Figure 2

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–4	3.0	4	12	75	4	Figure 1	●
B4L0400HG–4	4.0	4	15	75	4	Figure 2	●
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	●

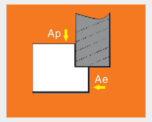
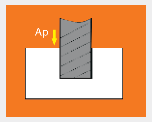
●Running stock ○Make-to-order

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	≥60HRC
☀	☀	☀	☼	☀			☼	☼	☼		

☀ Fit well ☼ Applicable

Recommended cutting conditions——B4L···HG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm^2)	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	–	–	–

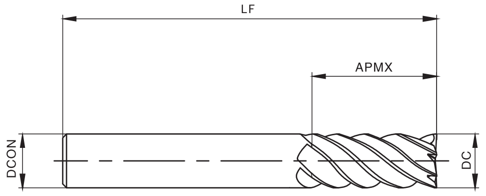
Recommended Cutting Parameters						
Machining method	 Ap Ae	Side milling		 Ap	Slot milling	
Diameter (mm)	ap (1xD_c)	ae (0.3xD_c)	f_z (mm/z)	ap (0.75xD_c)	ae (1xD_c)	f_z (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.02
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.03
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.05
10.0	10.0	3.0	0.070	7.5	10.0	0.06
12.0	12.0	3.6	0.085	9.0	12.0	0.07
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	0.12

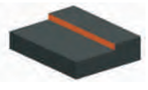
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

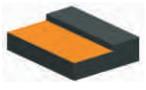
Series B--Basic end mills

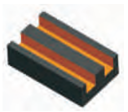
Six-flute flat end mill (short flute structure)

B6S···HG




Side machining


Bottom machining


Slot milling

B Series | 45° | DC≤12 0,–0.02 DC>12 0,–0.03 | 45°

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	●

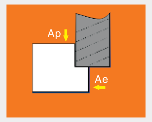
●Running stock ○Make-to-order

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	–	–	–

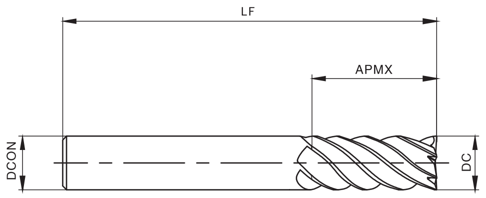
Recommended Cutting Parameters						
Machining method		Side milling				
Diameter （mm)	ap (1xDc)	ae (0.05xDc)	fz (mm/z)			
6.0	6.0	0.3	0.020			
8.0	8.0	0.4	0.027			
10.0	10.0	0.5	0.033			
12.0	12.0	0.6	0.040			
16.0	16.0	0.8	0.053			
20.0	20.0	1.0	0.067			

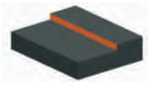
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) The down milling is recommended for side milling.
(3) Use cutting fluid that is air-cooled or free of producing smoke.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound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

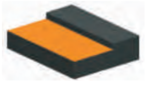
Series B--Basic end mills

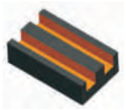
Six-flute flat end mill (long flute structure)

B6L···HG




Side machining


Bottom machining


Slot milling

B Series | 45° | DC≤12 0,–0.02 DC>12 0,–0.03 | 45°

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	●

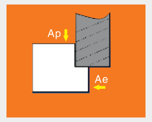
●Running stock ○Make-to-order

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/mm^2)	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	–	–	–

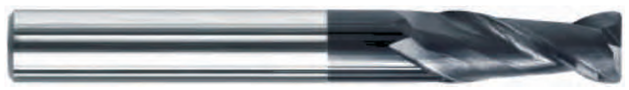
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter （mm）	ap (1xD$_c$)	ae (0.05xD$_c$)	f$_z$ (mm/z)			
6.0	6.0	0.3	0.025			
8.0	8.0	0.4	0.033			
10.0	10.0	0.5	0.042			
12.0	12.0	0.6	0.050			
16.0	16.0	0.8	0.067			
20.0	20.0	1.0	0.083			

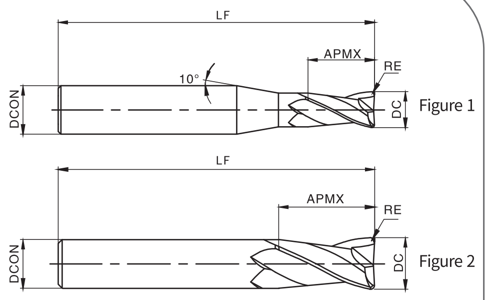
(1) Before slot milling, please reduce he cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the Feed rate (feed rate) to 40%-60%.
(2) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
(3) With poor rigidity 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.

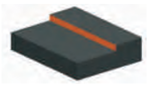
Series B--Basic end mills

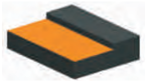
Two-flute R end mill (short flute structure)

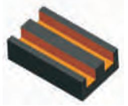
B2S···R···LG






Side machining


Bottom machining


Slot milling

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		
B2S0300R0020LG–4	3.0	4	8	50	0.2	2	Figure 1	●
B2S0300R0030LG–4	3.0	4	8	50	0.3	2	Figure 1	●
B2S0300R0050LG–4	3.0	4	8	50	0.5	2	Figure 1	●
B2S0400R0020LG–4	4.0	4	11	50	0.2	2	Figure 2	●
B2S0400R0030LG–4	4.0	4	11	50	0.3	2	Figure 2	●
B2S0400R0050LG–4	4.0	4	11	50	0.5	2	Figure 2	●
B2S0400R0100LG–4	4.0	4	11	50	1.0	2	Figure 2	●
B2S0300R0020LG	3.0	6	8	50	0.2	2	Figure 1	●
B2S0300R0030LG	3.0	6	8	50	0.3	2	Figure 1	○
B2S0300R0050LG	3.0	6	8	50	0.5	2	Figure 1	●
B2S0400R0020LG	4.0	6	11	50	0.2	2	Figure 1	●
B2S0400R0030LG	4.0	6	11	50	0.3	2	Figure 1	○
B2S0400R0050LG	4.0	6	11	50	0.5	2	Figure 1	●
B2S0400R0100LG	4.0	6	11	50	1.0	2	Figure 1	●
B2S0500R0030LG	5.0	6	13	50	0.3	2	Figure 1	○
B2S0500R0050LG	5.0	6	13	50	0.5	2	Figure 1	●
B2S0500R0100LG	5.0	6	13	50	1.0	2	Figure 1	●
B2S0600R0030LG	6.0	6	16	50	0.3	2	Figure 2	○
B2S0600R0050LG	6.0	6	16	50	0.5	2	Figure 2	●
B2S0600R0100LG	6.0	6	16	50	1.0	2	Figure 2	●
B2S0800R0030LG	8.0	8	20	60	0.3	2	Figure 2	○
B2S0800R0050LG	8.0	8	20	60	0.5	2	Figure 2	●
B2S0800R0100LG	8.0	8	20	60	1.0	2	Figure 2	●
B2S1000R0050LG	10.0	10	25	75	0.5	2	Figure 2	●
B2S1000R0100LG	10.0	10	25	75	1.0	2	Figure 2	●
B2S1000R0150LG	10.0	10	25	75	1.5	2	Figure 2	●
B2S1000R0200LG	10.0	10	25	75	2.0	2	Figure 2	●
B2S1200R0050LG	12.0	12	30	75	0.5	2	Figure 2	●
B2S1200R0100LG	12.0	12	30	75	1.0	2	Figure 2	●
B2S1200R0150LG	12.0	12	30	75	1.5	2	Figure 2	●
B2S1200R0200LG	12.0	12	30	75	2.0	2	Figure 2	●

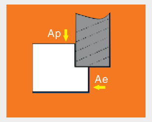
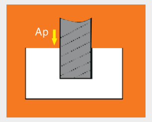
●Running stock ○Make-to-order

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	–	–	–

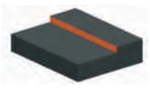
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
3.0	3.0	1.2	0.025	2.3	3.0	0.020
4.0	4.0	1.6	0.030	3.0	4.0	0.025
5.0	5.0	2.0	0.035	3.8	5.0	0.030
6.0	6.0	2.4	0.045	4.5	6.0	0.035
8.0	8.0	3.2	0.060	6.0	8.0	0.050
10.0	10.0	4.0	0.070	7.5	10.0	0.060
12.0	12.0	4.8	0.085	9.0	12.0	0.070

(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.

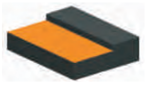
Series B--Basic end mills

Four-flute R end mill (short flute structure)

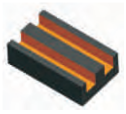
B4S···R···LG



Side machining



Bottom machining



Slot milling

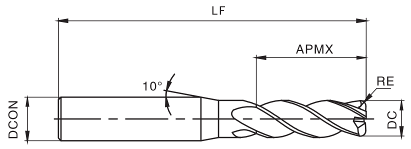


Figure 1

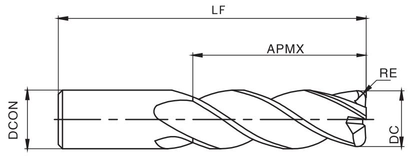


Figure 2

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		
B4S0300R0020LG–4	3.0	4	8	50	0.2	4	Figure 1	●
B4S0400R0030LG–4	4.0	4	10	50	0.3	4	Figure 2	○
B4S0400R0050LG–4	4.0	4	10	50	0.5	4	Figure 2	●
B4S0300R0020LG	3.0	6	8	50	0.2	4	Figure 1	●
B4S0400R0030LG	4.0	6	10	50	0.3	4	Figure 1	●
B4S0400R0050LG	4.0	6	10	50	0.5	4	Figure 1	●
B4S0500R0050LG	5.0	6	13	50	0.5	4	Figure 1	●
B4S0500R0100LG	5.0	6	13	50	1.0	4	Figure 1	●
B4S0600R0050LG	6.0	6	16	50	0.5	4	Figure 2	●
B4S0600R0100LG	6.0	6	16	50	1.0	4	Figure 2	●
B4S0800R0050LG	8.0	8	20	60	0.5	4	Figure 2	●
B4S0800R0100LG	8.0	8	20	60	1.0	4	Figure 2	●
B4S1000R0050LG	10.0	10	25	75	0.5	4	Figure 2	●
B4S1000R0100LG	10.0	10	25	75	1.0	4	Figure 2	●
B4S1000R0200LG	10.0	10	25	75	2.0	4	Figure 2	●
B4S1000R0300LG	10.0	10	25	75	3.0	4	Figure 2	●
B4S1200R0050LG	12.0	12	30	75	0.5	4	Figure 2	●
B4S1200R0100LG	12.0	12	30	75	1.0	4	Figure 2	●
B4S1200R0200LG	12.0	12	30	75	2.0	4	Figure 2	●
B4S1200R0300LG	12.0	12	30	75	3.0	4	Figure 2	●

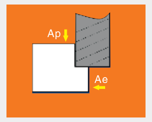
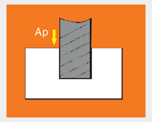
●Running stock ○Make-to-order

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	–	–	–

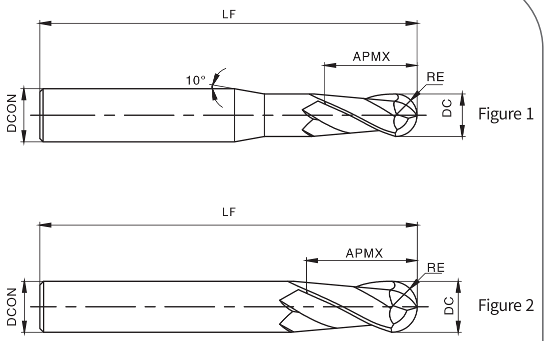
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
3.0	3.0	1.2	0.025	2.3	3.0	0.020
4.0	4.0	1.6	0.030	3.0	4.0	0.025
5.0	5.0	2.0	0.035	3.8	5.0	0.030
6.0	6.0	2.4	0.045	4.5	6.0	0.035
8.0	8.0	3.2	0.060	6.0	8.0	0.050
10.0	10.0	4.0	0.070	7.5	10.0	0.060
12.0	12.0	4.8	0.085	9.0	12.0	0.070

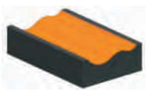
(1) Before slot milling, please reduce he cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the Feed rate (feed rate) to 40%-60%.
(2) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
(3) With poor rigidity 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.

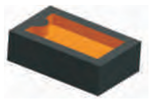
Series B--Basic end mills

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

B2S···BLG




Profile milling


Cavity machining


slot machining

B Series
30°
DC≤12 0,–0.02
DC>12 0,–0.03
R R±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B2SR0050BLG–4	1.0	4	2	50	0.5	2	Figure 1	●
B2SR0075BLG–4	1.5	4	3	50	0.75	2	Figure 1	●
B2SR0100BLG–4	2.0	4	4	50	1.0	2	Figure 1	●
B2SR0125BLG–4	2.5	4	5	50	1.25	2	Figure 1	●
B2SR0150BLG–4	3.0	4	6	50	1.5	2	Figure 1	●
B2SR0175BLG–4	3.5	4	8	50	1.75	2	Figure 1	●
B2SR0200BLG–4	4.0	4	8	50	2.0	2	Figure 2	●
B2SR0050BLG	1.0	6	2	50	0.5	2	Figure 1	●
B2SR0075BLG	1.5	6	3	50	0.75	2	Figure 1	●
B2SR0100BLG	2.0	6	4	50	1.0	2	Figure 1	●
B2SR0125BLG	2.5	6	5	50	1.25	2	Figure 1	●
B2SR0150BLG	3.0	6	6	50	1.5	2	Figure 1	●
B2SR0175BLG	3.5	6	8	50	1.75	2	Figure 1	●
B2SR0200BLG	4.0	6	8	50	2.0	2	Figure 1	●
B2SR0250BLG	5.0	6	10	50	2.5	2	Figure 1	●
B2SR0275BLG	5.5	6	12	50	2.75	2	Figure 1	●
B2SR0300BLG	6.0	6	12	50	3.0	2	Figure 2	●
B2SR0350BLG	7.0	8	14	60	3.5	2	Figure 1	●
B2SR0400BLG	8.0	8	16	60	4.0	2	Figure 2	●
B2SR0450BLG	9.0	10	18	75	4.5	2	Figure 1	●
B2SR0500BLG	10.0	10	20	75	5.0	2	Figure 2	●
B2SR0600BLG	12.0	12	24	75	6.0	2	Figure 2	●
B2SR0700BLG	14.0	14	28	75	7.0	2	Figure 2	●
B2SR0800BLG	16.0	16	32	100	8.0	2	Figure 2	●
B2SR1000BLG	20.0	20	40	100	10.0	2	Figure 2	●

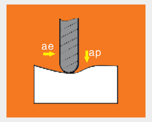
●Running stock ○Make-to-order

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	–	–	–

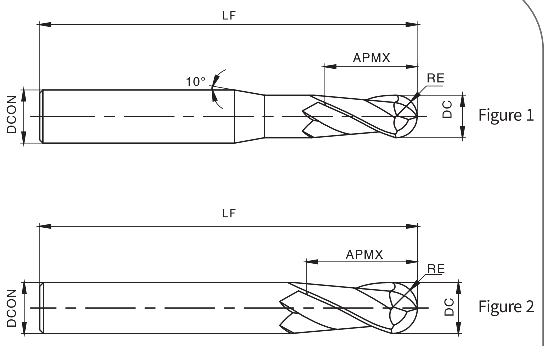
Recommended Cutting Parameters						
Machining method	 Profile milling					
Diameter (mm)	ap (0.1xD꜀)	ae (0.1xD꜀)	f₂ (mm/z)			
1.0	0.1	0.1	0.020			
1.5	0.15	0.15	0.030			
2.0	0.2	0.2	0.040			
2.5	0.25	0.25	0.050			
3.0	0.3	0.3	0.060			
3.5	0.35	0.35	0.070			
4.0	0.4	0.4	0.080			
5.0	0.5	0.5	0.100			
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			

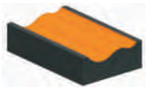
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

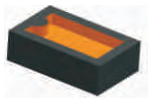
Series B--Basic end mills

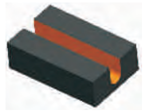
Two-flute ball nose end mill (long flute structure)

B2L···BLG




Profile milling


Cavity machining


slot machining

B Series | 30° | DC≤12 0,–0.02 DC>12 0,–0.03 | R R±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B2LR0100BLG–4	2.0	4	4	75	1.0	2	Figure 1	●
B2LR0125BLG–4	2.5	4	5	75	1.25	2	Figure 1	●
B2LR0150BLG–4	3.0	4	6	75	1.5	2	Figure 1	●
B2LR0175BLG–4	3.5	4	8	75	1.75	2	Figure 1	●
B2LR0200BLG–4	4.0	4	8	75	2.0	2	Figure 2	●
B2LR0100BLG	2.0	6	4	75	1.0	2	Figure 1	●
B2LR0125BLG	2.5	6	5	75	1.25	2	Figure 1	●
B2LR0150BLG	3.0	6	6	75	1.5	2	Figure 1	●
B2LR0175BLG	3.5	6	8	75	1.75	2	Figure 1	●
B2LR0200BLG	4.0	6	8	75	2.0	2	Figure 1	●
B2LR0250BLG	5.0	6	10	75	2.5	2	Figure 1	●
B2LR0275BLG	5.5	6	12	75	2.75	2	Figure 1	●
B2LR0300BLG	6.0	6	12	75	3.0	2	Figure 2	●
B2LR0350BLG	7.0	8	14	75	3.5	2	Figure 1	●
B2LR0400BLG	8.0	8	16	100	4.0	2	Figure 2	●
B2LR0450BLG	9.0	10	18	100	4.5	2	Figure 1	●
B2LR0500BLG	10.0	10	20	100	5.0	2	Figure 2	●
B2LR0600BLG	12.0	12	24	100	6.0	2	Figure 2	●
B2LR0700BLG	14.0	14	28	100	7.0	2	Figure 2	●
B2LR0800BLG	16.0	16	32	150	8.0	2	Figure 2	●
B2LR1000BLG	20.0	20	40	150	10.0	2	Figure 2	●

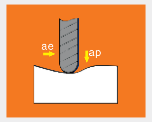
●Running stock ○Make-to-order

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 milling				
Diameter (mm)	ap (0.1xD꜀)	ae (0.1xD꜀)	f꜀ (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

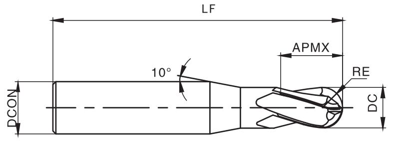


Figure 1

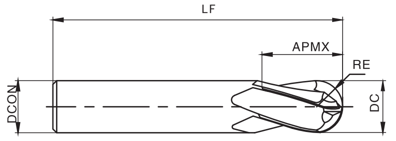
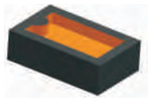
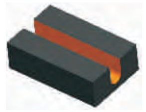


Figure 2


Profile milling


Cavity machining


slot machining

B Series | 30° | DC≤12 0,–0.02 DC>12 0,–0.03 | R R±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B4SR0150BLG–4	3.0	4	6	50	1.5	4	Figure 1	●
B4SR0200BLG–4	4.0	4	8	50	2.0	4	Figure 2	○
B4SR0150BLG	3.0	6	6	50	1.5	4	Figure 1	○
B4SR0200BLG	4.0	6	8	50	2.0	4	Figure 1	●
B4SR0250BLG	5.0	6	10	50	2.5	4	Figure 1	●
B4SR0300BLG	6.0	6	12	50	3.0	4	Figure 2	●
B4SR0400BLG	8.0	8	16	60	4.0	4	Figure 2	●
B4SR0500BLG	10.0	10	20	75	5.0	4	Figure 2	●
B4SR0600BLG	12.0	12	24	75	6.0	4	Figure 2	●
B4SR0800BLG	16.0	16	32	100	8.0	4	Figure 2	●
B4SR1000BLG	20.0	20	40	100	10.0	4	Figure 2	●

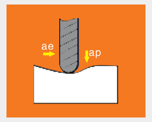
●Running stock ○Make-to-order

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	–	–	–

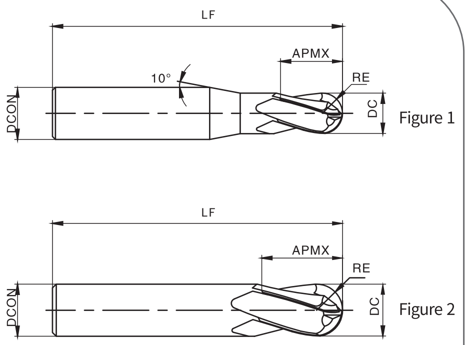
Recommended Cutting Parameters						
Machining method	 Profile milling					
Diameter （mm）	ap（0.1xDc）	ae（0.1xDc）	fz（mm/z）			
3.0	0.3	0.3	0.060			
4.0	0.4	0.4	0.080			
5.0	0.5	0.5	0.100			
6.0	0.6	0.6	0.120			
8.0	0.8	0.8	0.160			
10.0	1.0	1.0	0.200			
12.0	1.2	1.2	0.240			
16.0	1.6	1.6	0.360			
20.0	2.0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

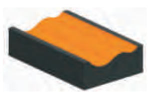
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

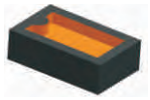
Series B--Basic end mills

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

B4L···BLG




Profile milling


Cavity machining


slot machining

B Series
30°
DC≤12 0,–0.02
DC>12 0,–0.03
R R±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B4LR0150BLG–4	3.0	4	6	75	1.5	4	Figure 1	●
B4LR0200BLG–4	4.0	4	8	75	2.0	4	Figure 2	○
B4LR0150BLG	3.0	6	6	75	1.5	4	Figure 1	○
B4LR0200BLG	4.0	6	8	75	2.0	4	Figure 1	●
B4LR0250BLG	5.0	6	10	75	2.5	4	Figure 1	●
B4LR0300BLG	6.0	6	12	75	3.0	4	Figure 2	●
B4LR0400BLG	8.0	8	16	100	4.0	4	Figure 2	●
B4LR0500BLG	10.0	10	20	100	5.0	4	Figure 2	●
B4LR0600BLG	12.0	12	24	100	6.0	4	Figure 2	●
B4LR0800BLG	16.0	16	32	150	8.0	4	Figure 2	●
B4LR1000BLG	20.0	20	40	150	10.0	4	Figure 2	●

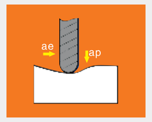
●Running stock ○Make-to-order

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 milling					
Diameter (mm)	ap (0.1xD_c)	ae (0.1xD_c)	f_z (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)

B2S···HN

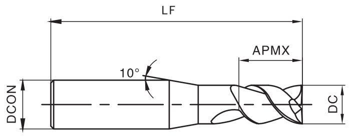


Figure 1

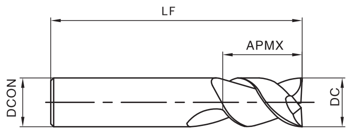
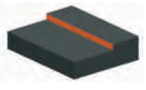
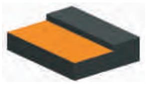
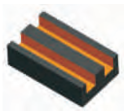


Figure 2


Side machining


Bottom machining


Slot milling

B Series | 55° | DC≤12 0,–0.02 DC>12 0,–0.03 | 90°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B2S0100HN–4	1.0	4	3	50	2	Figure 1	●
B2S0150HN–4	1.5	4	4	50	2	Figure 1	●
B2S0200HN–4	2.0	4	6	50	2	Figure 1	●
B2S0250HN–4	2.5	4	7	50	2	Figure 1	●
B2S0300HN–4	3.0	4	9	50	2	Figure 1	●
B2S0400HN–4	4.0	4	12	50	2	Figure 2	●
B2S0300HN	3.0	6	9	50	2	Figure 1	●
B2S0400HN	4.0	6	12	50	2	Figure 1	○
B2S0500HN	5.0	6	15	50	2	Figure 1	○
B2S0600HN	6.0	6	18	60	2	Figure 2	●
B2S0800HN	8.0	8	20	60	2	Figure 2	●
B2S1000HN	10.0	10	30	75	2	Figure 2	●
B2S1200HN	12.0	12	32	75	2	Figure 2	●
B2S1600HN	16.0	16	45	100	2	Figure 2	●
B2S2000HN	20.0	20	45	100	2	Figure 2	●

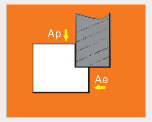
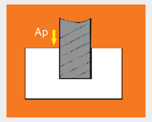
●Running stock ○Make-to-order

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···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 (1.5xD$_c$)	ae (0.1xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
1.0	1.5	0.1	0.010	0.75	1.0	0.003
1.5	2.25	0.15	0.015	1.2	1.5	0.004
2.0	3.0	0.3	0.020	1.5	2.0	0.006
2.5	3.75	0.25	0.025	1.9	2.5	0.008
3.0	4.5	0.3	0.030	2.3	3.0	0.010
4.0	6.0	0.4	0.040	3.0	4.0	0.013
5.0	7.5	0.5	0.050	3.8	5.0	0.017
6.0	9.0	0.6	0.060	4.5	6.0	0.020
8.0	12.0	0.8	0.080	6.0	8.0	0.027
10.0	15.0	1.0	0.100	7.5	10.0	0.033
12.0	18.0	1.2	0.120	9.0	12.0	0.040
16.0	24.0	1.6	0.160	12.0	16.0	0.053
20.0	30.0	2.0	0.200	15.0	20.0	0.067

(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

Two-flute flat end mill (aluminum alloy machining)

B2L···HN

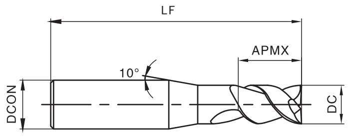


Figure 1

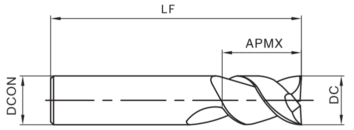
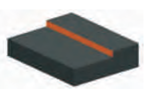
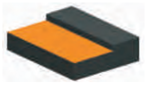
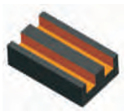


Figure 2


Side machining


Bottom machining


Slot milling

B Series | 55° | DC≤12 0,–0.02 DC>12 0,–0.03 | 90°

Type	Basic dimension (mm)					Pattern	Inventory
	DC	DCON	APMX	LF	ZEFP		
B2L0300HN–4	3.0	4	12	60	2	Figure 1	●
B2L0400HN–4	4.0	4	16	60	2	Figure 2	○
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	●

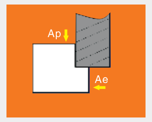
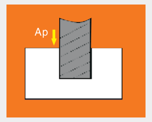
●Running stock ○Make-to-order

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	–	–	–

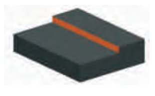
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1.5xDc)	ae (0.1xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
1.0	1.5	0.1	0.010	0.75	1.0	0.003
1.5	2.25	0.15	0.015	1.2	1.5	0.004
2.0	3.0	0.3	0.020	1.5	2.0	0.006
2.5	3.75	0.25	0.025	1.9	2.5	0.008
3.0	4.5	0.3	0.030	2.3	3.0	0.010
4.0	6.0	0.4	0.040	3.0	4.0	0.013
5.0	7.5	0.5	0.050	3.8	5.0	0.017
6.0	9.0	0.6	0.060	4.5	6.0	0.020
8.0	12.0	0.8	0.080	6.0	8.0	0.027
10.0	15.0	1.0	0.100	7.5	10.0	0.033
12.0	18.0	1.2	0.120	9.0	12.0	0.040
16.0	24.0	1.6	0.160	12.0	16.0	0.053
20.0	30.0	2.0	0.200	15.0	20.0	0.067

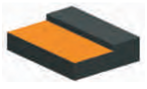
(1) This series of tools is special for aluminum alloy machining;
(2) Before slot milling, please reduce the cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the feed rate (feed rate) to 40%-60%.

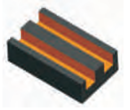
Series B--Basic end mills

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

B3S···HN


Side machining


Bottom machining


Slot milling

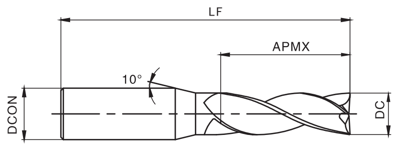


Figure 1

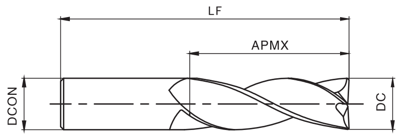


Figure 2

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		
B3S0100HN–4	1.0	4	3	50	3	Figure 1	●
B3S0150HN–4	1.5	4	4	50	3	Figure 1	●
B3S0200HN–4	2.0	4	6	50	3	Figure 1	●
B3S0250HN–4	2.5	4	7	50	3	Figure 1	●
B3S0300HN–4	3.0	4	9	50	3	Figure 1	●
B3S0400HN–4	4.0	4	12	50	3	Figure 2	●
B3S0300HN	3.0	6	9	50	3	Figure 1	●
B3S0400HN	4.0	6	12	50	3	Figure 1	○
B3S0500HN	5.0	6	15	50	3	Figure 1	○
B3S0600HN	6.0	6	18	60	3	Figure 2	●
B3S0800HN	8.0	8	20	60	3	Figure 2	●
B3S1000HN	10.0	10	30	75	3	Figure 2	●
B3S1200HN	12.0	12	32	75	3	Figure 2	●
B3S1600HN	16.0	16	45	100	3	Figure 2	●
B3S2000HN	20.0	20	45	100	3	Figure 2	●

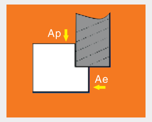
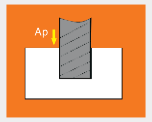
●Running stock ○Make-to-order

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···HN

Recommended Cutting Speed						
Workpiece material		Strength (N/mm^2)	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 (1.5xD$_c$)	ae (0.1xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
3.0	4.5	0.3	0.030	2.3	3.0	0.010
4.0	6.0	0.4	0.040	3.0	4.0	0.013
5.0	7.5	0.5	0.050	3.8	5.0	0.017
6.0	9.0	0.6	0.060	4.5	6.0	0.020
8.0	12.0	0.8	0.080	6.0	8.0	0.027
10.0	15.0	1.0	0.100	7.5	10.0	0.033
12.0	18.0	1.2	0.120	9.0	12.0	0.040
16.0	24.0	1.6	0.160	12.0	16.0	0.053
20.0	30.0	2.0	0.200	15.0	20.0	0.067

(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

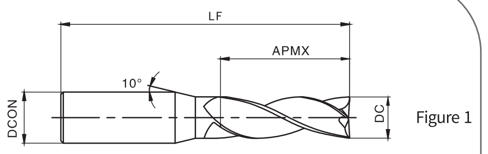


Figure 1

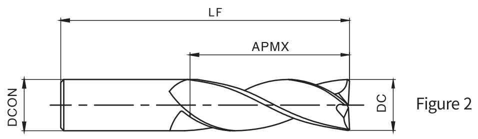
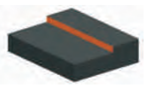
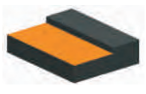
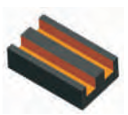


Figure 2


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–4	3.0	4	12	60	3	Figure 1	●
B3L0400HN–4	4.0	4	16	60	3	Figure 2	○
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 2	●
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	●

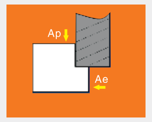
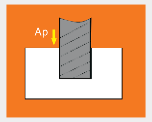
●Running stock ○Make-to-order

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 (0.1xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	4.5	0.3	0.030	2.3	3.0	0.010
4.0	6.0	0.4	0.040	3.0	4.0	0.013
5.0	7.5	0.5	0.050	3.8	5.0	0.017
6.0	9.0	0.6	0.060	4.5	6.0	0.020
8.0	12.0	0.8	0.080	6.0	8.0	0.027
10.0	15.0	1.0	0.100	7.5	10.0	0.033
12.0	18.0	1.2	0.120	9.0	12.0	0.040
16.0	24.0	1.6	0.160	12.0	16.0	0.053
20.0	30.0	2.0	0.200	15.0	20.0	0.067

(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

Two-flute ball nose end mill (aluminum alloy machining)

B2S···BLN

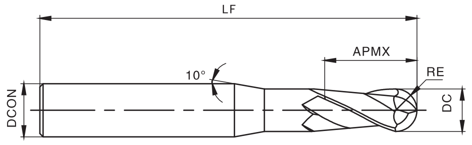


Figure 1

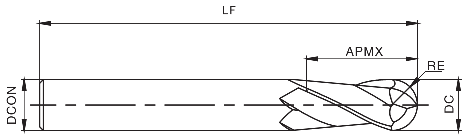
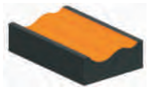
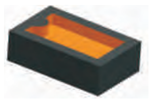


Figure 2


Profile milling


Cavity machining


slot machining

B Series | 30° | DC≤12 0,–0.02 DC>12 0,–0.03 | R R±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
B2SR0100BLN	2.0	6	4	60	1.0	2	Figure 1	●
B2SR0150BLN	3.0	6	6	60	1.5	2	Figure 2	○
B2SR0200BLN	4.0	6	8	60	2.0	2	Figure 1	○
B2SR0250BLN	5.0	6	10	60	2.5	2	Figure 1	●
B2SR0300BLN	6.0	6	12	60	3.0	2	Figure 1	●
B2SR0400BLN	8.0	8	16	75	4.0	2	Figure 1	●
B2SR0500BLN	10.0	10	20	75	5.0	2	Figure 1	●
B2SR0600BLN	12.0	12	24	75	6.0	2	Figure 1	●

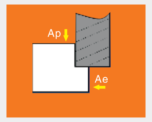
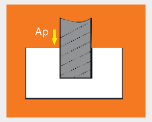
●Running stock ○Make-to-order

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

Recommended cutting conditions——B2S···BLN

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 (0.1xD$_c$)	ae (0.1xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
2.0	0.2	0.2	0.040	1.5	2.0	0.010
3.0	0.3	0.3	0.060	2.3	3.0	0.010
4.0	0.4	0.4	0.080	3.0	4.0	0.013
5.0	0.5	0.5	0.100	3.8	5.0	0.017
6.0	0.6	0.6	0.120	4.5	6.0	0.020
8.0	0.8	0.8	0.160	6.0	8.0	0.027
10.0	1.0	1.0	0.200	7.5	10.0	0.033
12.0	1.2	1.2	0.240	9.0	12.0	0.040

(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 flat end mill (short flute structure)

P4S···LG

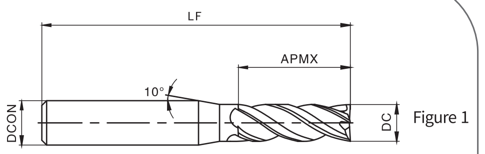


Figure 1

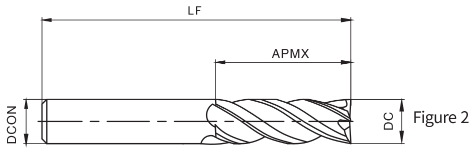
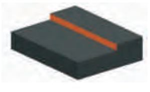
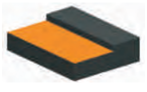
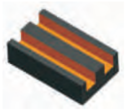


Figure 2


Side machining


Bottom machining


Slot milling

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–4	1.0	4	3	50	4	Figure 1	●
P4S0150LG–4	1.5	4	4	50	4	Figure 1	○
P4S0200LG–4	2.0	4	6	50	4	Figure 1	●
P4S0250LG–4	2.5	4	8	50	4	Figure 1	○
P4S0300LG–4	3.0	4	8	50	4	Figure 1	●
P4S0350LG–4	3.5	4	10	50	4	Figure 1	○
P4S0400LG–4	4.0	4	11	50	4	Figure 2	●
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	50	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	●

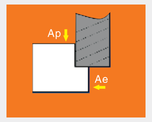
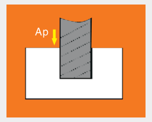
●Running stock ○Make-to-order

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	–	–	–

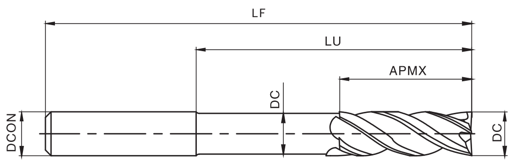
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	2.5	0.018
3.0	3.0	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

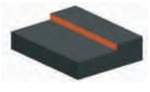
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

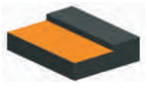
Series P--High performance end mills

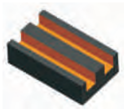
Four-flute flat end mill (necking structure)

P4P···LG




Side machining


Bottom machining


Slot milling

P Series

31°
28°

DC≤12 0,–0.02
DC>12 0,–0.03

45°

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	●

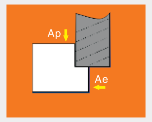
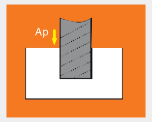
●Running stock ○Make-to-order

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	≥60HRC
☀	☀	☀	☼	☀			☼	☼	☀		

☀ Fit well ☼ Applicable

Recommended cutting conditions——P4P···LG

Recommended Cutting Speed						
Workpiece material		Strength (N/mm^2)	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	–	–	–

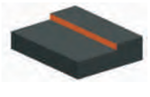
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter （mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	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

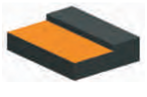
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

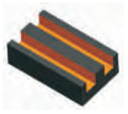
Series P--High performance end mills

Four-flute flat end mill (short flute structure)

P4S···NG


Side machining


Bottom machining


Slot milling

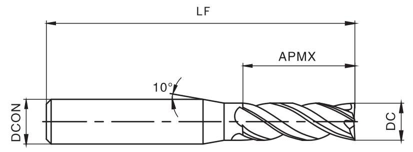


Figure 1

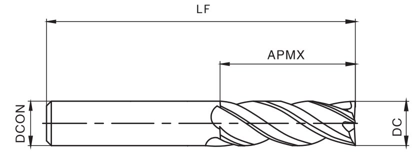


Figure 2

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–4	1.0	4	3	50	4	Figure 1	●
P4S0150NG–4	1.5	4	4	50	4	Figure 1	○
P4S0200NG–4	2.0	4	6	50	4	Figure 1	●
P4S0250NG–4	2.5	4	8	50	4	Figure 1	○
P4S0300NG–4	3.0	4	8	50	4	Figure 1	●
P4S0350NG–4	3.5	4	10	50	4	Figure 1	○
P4S0400NG–4	4.0	4	11	50	4	Figure 2	●
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	●

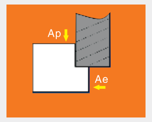
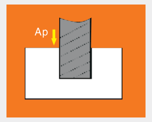
●Running stock ○Make-to-order

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/mm^2)	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	–	–	–

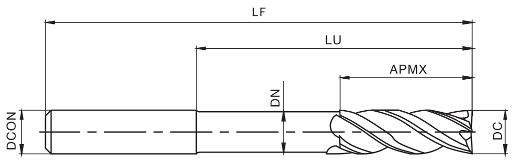
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	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

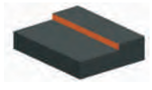
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

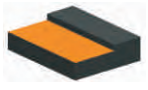
Series P--High performance end mills

Four-flute flat end mill (necking structure)

P4P···NG




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)							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	●

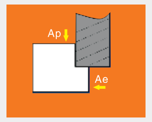
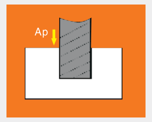
●Running stock ○Make-to-order

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	–	–	–

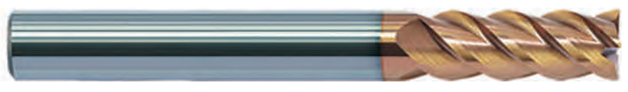
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	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

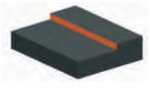
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

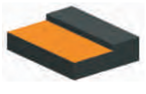
Four-flute flat end mill (short flute structure)

P4S···NS

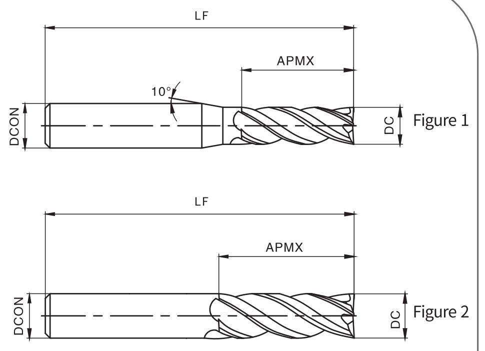




Side machining



Bottom machining



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–4	1.0	4	3	50	4	Figure 1	●
P4S0150NS–4	1.5	4	4	50	4	Figure 1	○
P4S0200NS–4	2.0	4	6	50	4	Figure 1	●
P4S0250NS–4	2.5	4	8	50	4	Figure 1	○
P4S0300NS–4	3.0	4	8	50	4	Figure 1	●
P4S0350NS–4	3.5	4	10	50	4	Figure 1	○
P4S0400NS–4	4.0	4	11	50	4	Figure 2	●
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	50	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	●

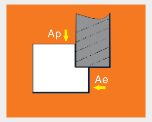
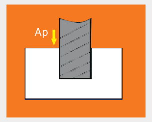
●Running stock ○Make-to-order

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	–	–	–

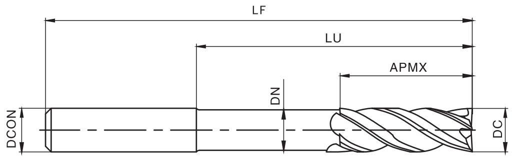
Recommended Cutting Parameters						
Machining method	 Ap Ae Side milling			 Ap Slot milling		
Diameter (mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	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

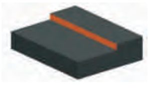
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

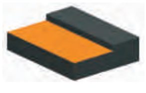
Series P--High performance end mills

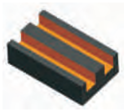
Four-flute flat end mill (necking structure)

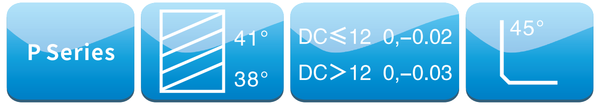
P4P···NS




Side machining


Bottom machining


Slot milling



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	●

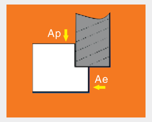
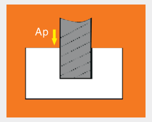
●Running stock ○Make-to-order

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)	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

(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

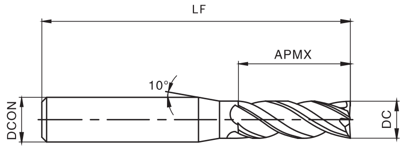


Figure 1

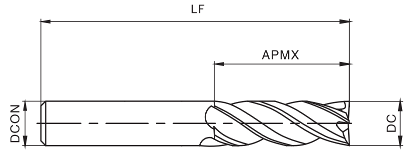
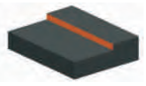
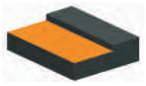


Figure 2



Side machining



Bottom machining

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–4	1.0	4	3	50	4	Figure 1	●
P4S0150HH–4	1.5	4	4	50	4	Figure 1	○
P4S0200HH–4	2.0	4	6	50	4	Figure 1	●
P4S0250HH–4	2.5	4	8	50	4	Figure 1	○
P4S0300HH–4	3.0	4	8	50	4	Figure 1	●
P4S0350HH–4	3.5	4	10	50	4	Figure 1	○
P4S0400HH–4	4.0	4	11	50	4	Figure 2	●
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	50	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	●

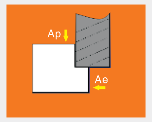
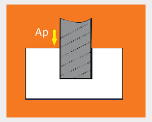
●Running stock ○Make-to-order

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

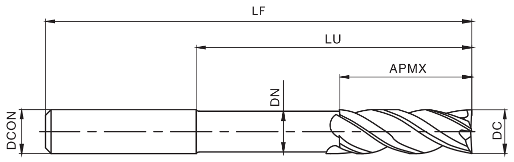
Recommended Cutting Parameters						
Machining method	 Ap Ae Side milling			 Ap Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	2.5	0.018
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

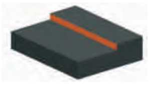
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

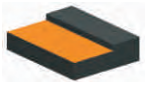
Series P--High performance end mills

Four-flute flat end mill (necking structure)

P4P···HH




Side machining


Bottom machining

P Series | 45° 42° | DC≤12 0,–0.02 DC>12 0,–0.03 | 45°

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	●

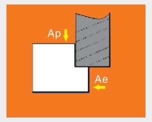
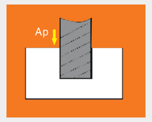
●Running stock ○Make-to-order

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/mm^2)	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	 Ap Ae	Side milling		 Ap	Slot milling	
Diameter (mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (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

(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

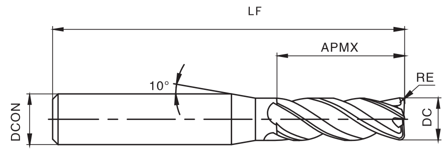


Figure 1

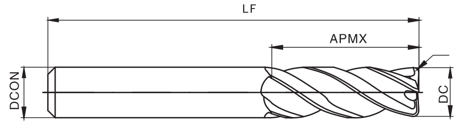
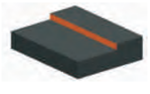
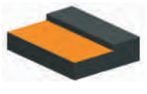


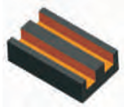
Figure 2



Side machining



Bottom machining



Slot milling

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–4	3.0	4	8	50	0.2	4	Figure 1	●
P4S0400R0030LG–4	4.0	4	10	50	0.3	4	Figure 2	●
P4S0400R0050LG–4	4.0	4	10	50	0.5	4	Figure 2	●
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	●

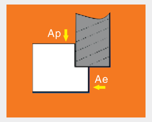
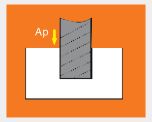
●Running stock ○Make-to-order

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	–	–	–

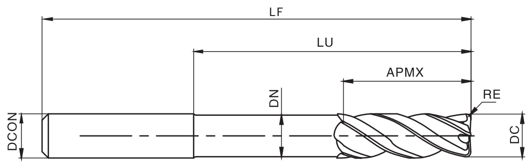
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter （mm）	ap（1xD_c）	ae（0.3xD_c）	f_z（mm/z）	ap（0.75xD_c）	ae（1xD_c）	f_z（mm/z）
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	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

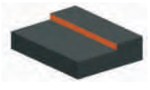
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

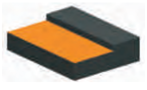
Series P--High performance end mills

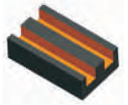
Four-flute R end milling cutter (necking structure)

P4P···R···LG




Side machining


Bottom machining


Slot milling

P Series
31°
28°
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	
P4P0600R0050LG	6.0	6	6	18	5.8	75	0.5	4	●
P4P0600R0100LG	6.0	6	6	18	5.8	75	1.0	4	●
P4P0800R0050LG	8.0	8	8	24	7.8	100	0.5	4	●
P4P0800R0100LG	8.0	8	8	24	7.8	100	1.0	4	●
P4P1000R0050LG	10.0	10	10	30	9.6	100	0.5	4	●
P4P1000R0100LG	10.0	10	10	30	9.6	100	1.0	4	●
P4P1000R0200LG	10.0	10	10	30	9.6	100	2.0	4	●
P4P1200R0050LG	12.0	12	12	36	11.5	100	0.5	4	●
P4P1200R0100LG	12.0	12	12	36	11.5	100	1.0	4	●
P4P1200R0200LG	12.0	12	12	36	11.5	100	2.0	4	●
P4P1600R0100LG	16.0	16	16	40	15.5	150	1.0	4	●
P4P1600R0200LG	16.0	16	16	40	15.5	150	2.0	4	●

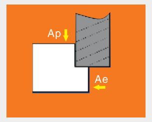
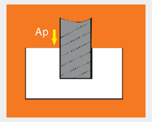
●Running stock ○Make-to-order

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/mm^2)	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	 Ap Ae	Side milling		 Ap	Slot milling	
Diameter （mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (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

(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

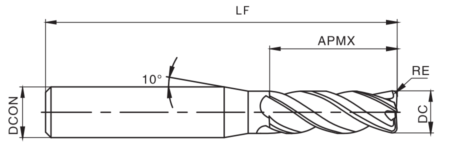


Figure 1

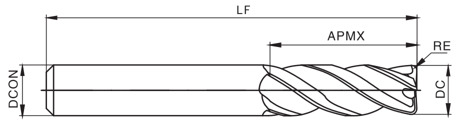
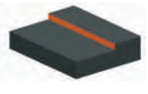
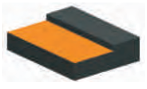
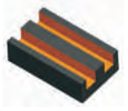


Figure 2


Side machining


Bottom machining


Slot milling

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–4	3.0	4	8	50	0.2	4	Figure 1	●
P4S0400R0030NG–4	4.0	4	10	50	0.3	4	Figure 2	●
P4S0400R0050NG–4	4.0	4	10	50	0.5	4	Figure 2	●
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	●

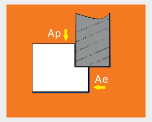
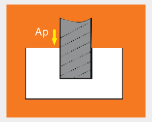
●Running stock ○Make-to-order

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/mm^2)	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	–	–	–

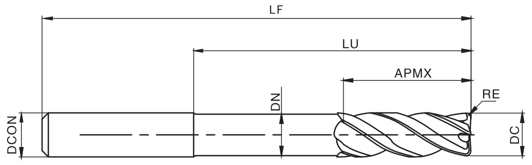
Recommended Cutting Parameters						
Machining method	 Ap Ae Side milling			 Ap Slot milling		
Diameter （mm）	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	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

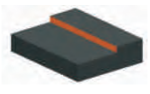
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

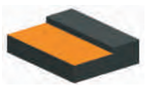
Series P--High performance end mills

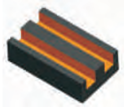
Four-flute R end milling cutter (necking structure)

P4P···R···NG




Side machining


Bottom machining


Slot milling

P Series

38°
35°

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	
P4P0600R0050NG	6.0	6	6	18	5.8	75	0.5	4	●
P4P0600R0100NG	6.0	6	6	18	5.8	75	1.0	4	●
P4P0800R0050NG	8.0	8	8	24	7.8	100	0.5	4	●
P4P0800R0100NG	8.0	8	8	24	7.8	100	1.0	4	●
P4P1000R0050NG	10.0	10	10	30	9.6	100	0.5	4	●
P4P1000R0100NG	10.0	10	10	30	9.6	100	1.0	4	●
P4P1000R0200NG	10.0	10	10	30	9.6	100	2.0	4	●
P4P1200R0050NG	12.0	12	12	36	11.5	100	0.5	4	●
P4P1200R0100NG	12.0	12	12	36	11.5	100	1.0	4	●
P4P1200R0200NG	12.0	12	12	36	11.5	100	2.0	4	●
P4P1600R0100NG	16.0	16	16	40	15.5	150	1.0	4	●
P4P1600R0200NG	16.0	16	16	40	15.5	150	2.0	4	●

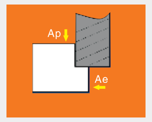
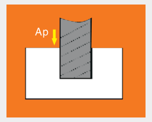
●Running stock ○Make-to-order

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	–	–	–

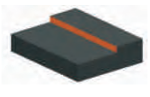
Recommended Cutting Parameters						
Machining method	 Ap Ae Side milling			 Ap Slot milling		
Diameter (mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0	16.0	4.8	0.115	12.0	16.0	0.095

(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.

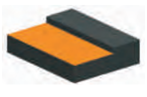
Series P--High performance end mills

Four-flute R end mill (short flute structure)

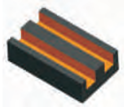
P4S···R···NS



Side machining



Bottom machining



Slot milling

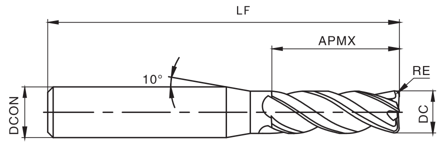


Figure 1

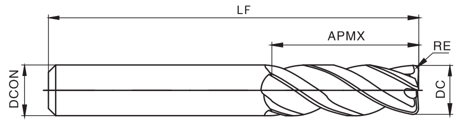


Figure 2

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		
P4S0300R0020NS–4	3.0	4	8	50	0.2	4	Figure 1	●
P4S0400R0030NS–4	4.0	4	10	50	0.3	4	Figure 2	●
P4S0400R0050NS–4	4.0	4	10	50	0.5	4	Figure 2	●
P4S0300R0020NS	3.0	6	8	50	0.2	4	Figure 1	●
P4S0400R0030NS	4.0	6	10	50	0.3	4	Figure 1	●
P4S0400R0050NS	4.0	6	10	50	0.5	4	Figure 1	●
P4S0500R0050NS	5.0	6	13	50	0.5	4	Figure 1	●
P4S0500R0100NS	5.0	6	13	50	1.0	4	Figure 1	●
P4S0600R0050NS	6.0	6	16	50	0.5	4	Figure 2	●
P4S0600R0100NS	6.0	6	16	50	1.0	4	Figure 2	●
P4S0800R0050NS	8.0	8	20	60	0.5	4	Figure 2	●
P4S0800R0100NS	8.0	8	20	60	1.0	4	Figure 2	●
P4S1000R0050NS	10.0	10	25	75	0.5	4	Figure 2	●
P4S1000R0100NS	10.0	10	25	75	1.0	4	Figure 2	●
P4S1000R0200NS	10.0	10	25	75	2.0	4	Figure 2	●
P4S1000R0300NS	10.0	10	25	75	3.0	4	Figure 2	●
P4S1200R0050NS	12.0	12	30	75	0.5	4	Figure 2	●
P4S1200R0100NS	12.0	12	30	75	1.0	4	Figure 2	●
P4S1200R0200NS	12.0	12	30	75	2.0	4	Figure 2	●
P4S1200R0300NS	12.0	12	30	75	3.0	4	Figure 2	●
P4S1600R0100NS	16.0	16	45	100	1.0	4	Figure 2	●
P4S1600R0200NS	16.0	16	45	100	2.0	4	Figure 2	●
P4S1600R0300NS	16.0	16	45	100	3.0	4	Figure 2	●
P4S2000R0100NS	20.0	20	45	100	1.0	4	Figure 2	●
P4S2000R0200NS	20.0	20	45	100	2.0	4	Figure 2	●
P4S2000R0300NS	20.0	20	45	100	3.0	4	Figure 2	●

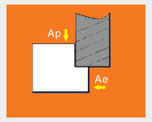
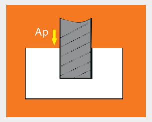
●Running stock ○Make-to-order

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	–	–	–

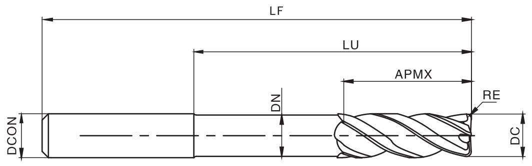
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	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

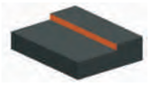
(1) Before slot milling, please reduce he cutting speed (rotating speed) to 80% of the value indicated in the table above, and the feed rate (feed rate) to 60%-80%.
(2) Please use high-precision machines and cutter shanks, and water-soluble cutting fluids are recommended.
(3) The down milling is recommended.

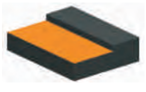
Series P--High performance end mills

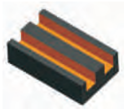
Four-flute R end mill (necking structure)

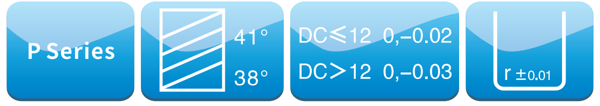
P4P···R···NS




Side machining


Bottom machining


Slot milling



Type	Basic dimension (mm)								Inventory
	DC	DCON	APMX	LU	DN	LF	RE	ZEFP	
P4P0600R0050NS	6.0	6	6	18	5.8	75	0.5	4	●
P4P0600R0100NS	6.0	6	6	18	5.8	75	1.0	4	●
P4P0800R0050NS	8.0	8	8	24	7.8	100	0.5	4	●
P4P0800R0100NS	8.0	8	8	24	7.8	100	1.0	4	●
P4P1000R0050NS	10.0	10	10	30	9.6	100	0.5	4	●
P4P1000R0100NS	10.0	10	10	30	9.6	100	1.0	4	●
P4P1000R0200NS	10.0	10	10	30	9.6	100	2.0	4	●
P4P1200R0050NS	12.0	12	12	36	11.5	100	0.5	4	●
P4P1200R0100NS	12.0	12	12	36	11.5	100	1.0	4	●
P4P1200R0200NS	12.0	12	12	36	11.5	100	2.0	4	●
P4P1600R0100NS	16.0	16	16	40	15.5	150	1.0	4	●
P4P1600R0200NS	16.0	16	16	40	15.5	150	2.0	4	●

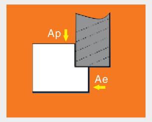
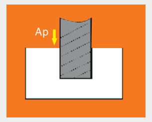
●Running stock ○Make-to-order

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/mm^2)	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	–	–	–

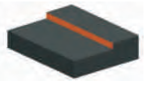
Recommended Cutting Parameters						
Machining method	 Ap Ae	Side milling		 Ap	Slot milling	
Diameter （mm)	ap (1xD$_c$)	ae (0.3xD$_c$)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0	16.0	4.8	0.115	12.0	16.0	0.095

(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.

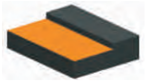
Series P--High performance end mills

Four-flute R end mill (short flute structure)

P4S···R···HH



Side machining



Bottom machining

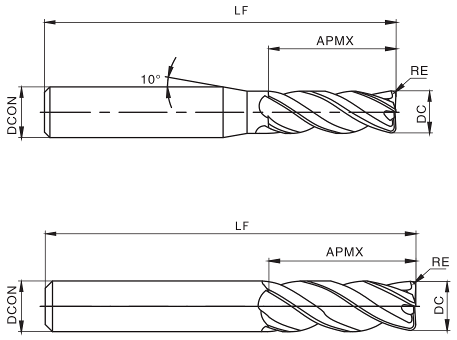


Figure 1

Figure 2

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		
P4S0300R0020HH–4	3.0	4	8	50	0.2	4	Figure 1	●
P4S0400R0030HH–4	4.0	4	10	50	0.3	4	Figure 2	●
P4S0400R0050HH–4	4.0	4	10	50	0.5	4	Figure 2	●
P4S0300R0020HH	3.0	6	8	50	0.2	4	Figure 1	●
P4S0400R0030HH	4.0	6	10	50	0.3	4	Figure 1	●
P4S0400R0050HH	4.0	6	10	50	0.5	4	Figure 1	●
P4S0500R0050HH	5.0	6	13	50	0.5	4	Figure 1	●
P4S0500R0100HH	5.0	6	13	50	1.0	4	Figure 1	●
P4S0600R0050HH	6.0	6	16	50	0.5	4	Figure 2	●
P4S0600R0100HH	6.0	6	16	50	1.0	4	Figure 2	●
P4S0800R0050HH	8.0	8	20	60	0.5	4	Figure 2	●
P4S0800R0100HH	8.0	8	20	60	1.0	4	Figure 2	●
P4S1000R0050HH	10.0	10	25	75	0.5	4	Figure 2	●
P4S1000R0100HH	10.0	10	25	75	1.0	4	Figure 2	●
P4S1000R0200HH	10.0	10	25	75	2.0	4	Figure 2	●
P4S1000R0300HH	10.0	10	25	75	3.0	4	Figure 2	●
P4S1200R0050HH	12.0	12	30	75	0.5	4	Figure 2	●
P4S1200R0100HH	12.0	12	30	75	1.0	4	Figure 2	●
P4S1200R0200HH	12.0	12	30	75	2.0	4	Figure 2	●
P4S1200R0300HH	12.0	12	30	75	3.0	4	Figure 2	●
P4S1600R0100HH	16.0	16	45	100	1.0	4	Figure 2	●
P4S1600R0200HH	16.0	16	45	100	2.0	4	Figure 2	●
P4S1600R0300HH	16.0	16	45	100	3.0	4	Figure 2	●
P4S2000R0100HH	20.0	20	45	100	1.0	4	Figure 2	●
P4S2000R0200HH	20.0	20	45	100	2.0	4	Figure 2	●
P4S2000R0300HH	20.0	20	45	100	3.0	4	Figure 2	●

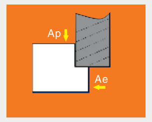
●Running stock ○Make-to-order

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

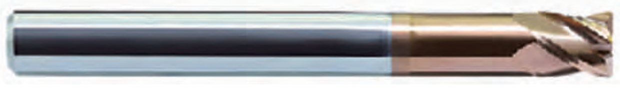
Recommended Cutting Parameters						
Machining method		Side milling				
Diameter （mm）	ap（1xDc）	ae（0.3xDc）	fz（mm/z）			
3.0	3.0	0.9	0.025			
4.0	4.0	1.2	0.030			
5.0	5.0	1.5	0.035			
6.0	6.0	1.8	0.045			
8.0	8.0	2.4	0.060			
10.0	10.0	3.0	0.070			
12.0	12.0	3.6	0.085			
16.0	16.0	4.8	0.115			
20.0	20.0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

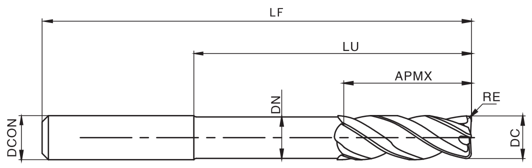
(1) Please use high precision machines and cutter shanks.
(2) Use cutting fluid that is air-cooled or free of producing smoke.
(3) If the rotating speed of machine is insufficient, decrease the feed rate in the same proportion.

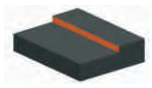
Series P--High performance end mills

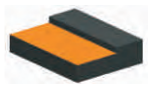
Four-flute R end mill (necking structure)

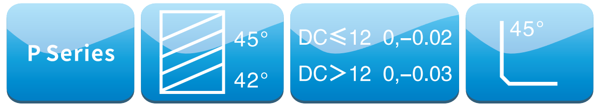
P4P···R···HH






Side machining


Bottom machining



Type	Basic dimension (mm)								Inventory
	DC	DCON	APMX	LU	DN	LF	RE	ZEFP	
P4P0600R0050HH	6.0	6	6	18	5.8	75	0.5	4	●
P4P0600R0100HH	6.0	6	6	18	5.8	75	1.0	4	●
P4P0800R0050HH	8.0	8	8	24	7.8	100	0.5	4	●
P4P0800R0100HH	8.0	8	8	24	7.8	100	1.0	4	●
P4P1000R0050HH	10.0	10	10	30	9.6	100	0.52	4	●
P4P1000R0100HH	10.0	10	10	30	9.6	100	1.0	4	●
P4P1000R0200HH	10.0	10	10	30	9.6	100	2.0	4	●
P4P1200R0050HH	12.0	12	12	36	11.5	100	0.5	4	●
P4P1200R0100HH	12.0	12	12	36	11.5	100	1.0	4	●
P4P1200R0200HH	12.0	12	12	36	11.5	100	2.0	4	●
P4P1600R0100HH	16.0	16	16	40	15.5	150	1.0	4	●
P4P1600R0200HH	16.0	16	16	40	15.5	150	2.0	4	●

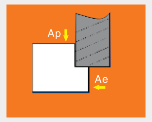
●Running stock ○Make-to-order

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

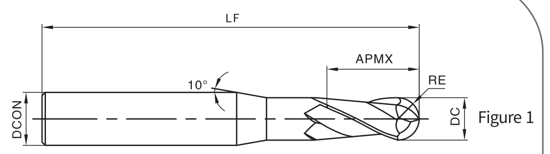


Figure 1

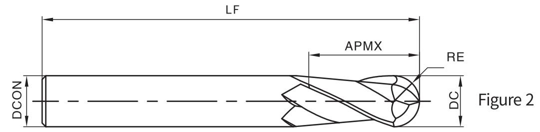
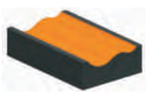
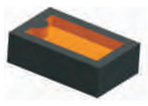


Figure 2


Profile machining


Cavity machining


Slot machining

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		
P2SR0050BLG–4	1.0	4	2	50	0.5	2	Figure 1	●
P2SR0075BLG–4	1.5	4	3	50	0.75	2	Figure 1	●
P2SR0100BLG–4	2.0	4	4	50	1.0	2	Figure 1	●
P2SR0125BLG–4	2.5	4	5	50	1.25	2	Figure 1	●
P2SR0150BLG–4	3.0	4	6	50	1.5	2	Figure 1	●
P2SR0175BLG–4	3.5	4	8	50	1.75	2	Figure 1	●
P2SR0200BLG–4	4.0	4	8	50	2.0	2	Figure 2	●
P2SR0050BLG	1.0	6	2	50	0.5	2	Figure 1	●
P2SR0075BLG	1.5	6	3	50	0.75	2	Figure 1	●
P2SR0100BLG	2.0	6	4	50	1.0	2	Figure 1	●
P2SR0125BLG	2.5	6	5	50	1.25	2	Figure 1	●
P2SR0150BLG	3.0	6	6	50	1.5	2	Figure 1	●
P2SR0175BLG	3.5	6	8	50	1.75	2	Figure 1	●
P2SR0200BLG	4.0	6	8	50	2.0	2	Figure 1	●
P2SR0250BLG	5.0	6	10	50	2.5	2	Figure 1	●
P2SR0275BLG	5.5	6	12	50	2.75	2	Figure 1	●
P2SR0300BLG	6.0	6	12	50	3.0	2	Figure 2	●
P2SR0350BLG	7.0	8	14	60	3.5	2	Figure 1	●
P2SR0400BLG	8.0	8	16	60	4.0	2	Figure 2	●
P2SR0450BLG	9.0	10	18	75	4.5	2	Figure 1	●
P2SR0500BLG	10.0	10	20	75	5.0	2	Figure 2	●
P2SR0600BLG	12.0	12	24	75	6.0	2	Figure 2	●
P2SR0700BLG	14.0	14	28	75	7.0	2	Figure 2	●
P2SR0800BLG	16.0	16	32	100	8.0	2	Figure 2	●
P2SR1000BLG	20.0	20	40	100	10.0	2	Figure 2	●

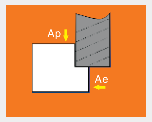
●Running stock ○Make-to-order

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/mm^2)	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	–	–	–

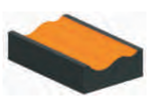
Recommended Cutting Parameters						
Machining method		Side milling				
Diameter （mm）	ap (0.03xD$_c$)	ae (0.03xD$_c$)	f$_z$ (mm/z)			
1.0	0.03	0.03	0.012			
1.5	0.045	0.045	0.015			
2.0	0.06	0.06	0.018			
2.5	0.075	0.075	0.020			
3.0	0.09	0.09	0.025			
3.5	0.105	0.105	0.025			
4.0	0.12	0.12	0.030			
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.

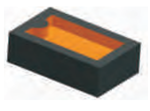
Series P--High performance end mills

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

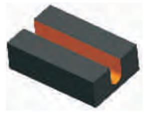
P2S···BLH



Profile machining



Cavity machining



Slot machining

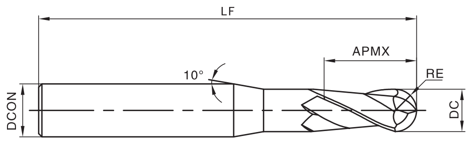


Figure 1

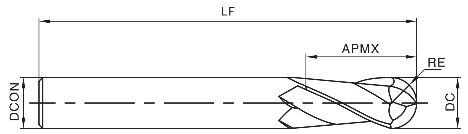
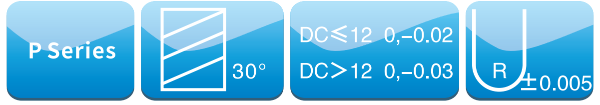


Figure 2



Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
P2SR0050BLH–4	1.0	4	2	50	0.5	2	Figure 1	●
P2SR0075BLH–4	1.5	4	3	50	0.75	2	Figure 1	●
P2SR0100BLH–4	2.0	4	4	50	1.0	2	Figure 1	●
P2SR0125BLH–4	2.5	4	5	50	1.25	2	Figure 1	●
P2SR0150BLH–4	3.0	4	6	50	1.5	2	Figure 1	●
P2SR0175BLH–4	3.5	4	8	50	1.75	2	Figure 1	●
P2SR0200BLH–4	4.0	4	8	50	2.0	2	Figure 2	●
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	●

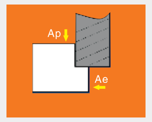
●Running stock ○Make-to-order

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

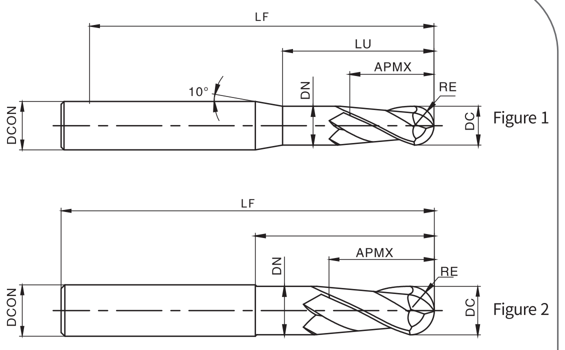
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter （mm）	ap (0.03xDc)	ae (0.03xDc)	fz (mm/z)			
1.0	0.03	0.03	0.012			
1.5	0.045	0.045	0.015			
2.0	0.06	0.06	0.018			
2.5	0.075	0.075	0.020			
3.0	0.09	0.09	0.025			
3.5	0.105	0.105	0.025			
4.0	0.12	0.12	0.030			
5.0	0.15	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			

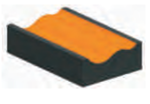
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

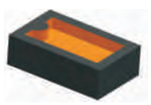
Series P--High performance end mills

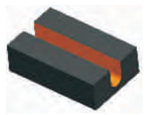
Two-flute ball nose end mill(necking structure)

P2P···BLG




Profile machining


Cavity machining


Slot machining

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		
P2PR0050BLG–4	1.0	4	1	2.5	0.95	75	0.5	2	Figure 1	●
P2PR0075BLG–4	1.5	4	2	3	1.45	75	0.75	2	Figure 1	●
P2PR0100BLG–4	2.0	4	2	4	1.95	75	1.0	2	Figure 1	●
P2PR0150BLG–4	3.0	4	3	6	2.85	75	1.5	2	Figure 1	●
P2PR0200BLG–4	4.0	4	4	8	3.85	75	2.0	2	Figure 2	●
P2PR0050BLG	1.0	6	1	2.5	0.95	75	0.5	2	Figure 1	●
P2PR0075BLG	1.5	6	2	3	1.45	75	0.75	2	Figure 1	●
P2PR0100BLG	2.0	6	2	4	1.95	75	1.0	2	Figure 1	●
P2PR0150BLG	3.0	6	3	6	2.85	75	1.5	2	Figure 1	●
P2PR0200BLG	4.0	6	4	8	3.85	75	2.0	2	Figure 1	●
P2PR0250BLG	5.0	6	5	10	4.85	75	2.5	2	Figure 1	●
P2PR0300BLG	6.0	6	6	12	5.8	75	3.0	2	Figure 2	●
P2PR0400BLG	8.0	8	8	16	7.8	100	4.0	2	Figure 2	●
P2PR0500BLG	10.0	10	10	20	9.6	100	5.0	2	Figure 2	●
P2PR0600BLG	12.0	12	12	24	11.5	100	6.0	2	Figure 2	●
P2PR0800BLG	16.0	16	16	32	15.5	150	8.0	2	Figure 2	●
P2PR1000BLG	20.0	20	20	40	19.5	150	10.0	2	Figure 2	●

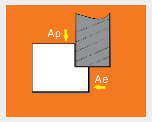
●Running stock ○Make-to-order

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	 Side milling					
Diameter （mm）	ap (0.03xD꜀)	ae (0.03xD꜀)	f_z (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

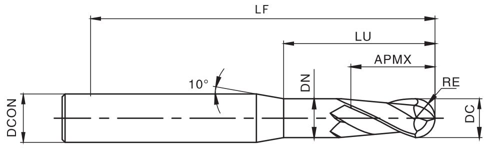


Figure 1

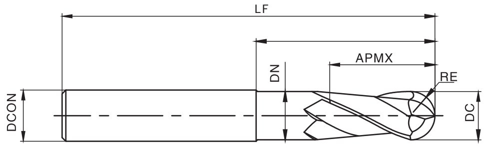
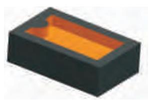
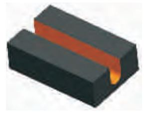


Figure 2


Profile machining


Cavity machining


Slot machining

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		
P2PR0050BLH–4	1.0	4	1	2.5	0.95	75	0.5	2	Figure 1	●
P2PR0075BLH–4	1.5	4	2	3	1.45	75	0.75	2	Figure 1	●
P2PR0100BLH–4	2.0	4	2	4	1.95	75	1.0	2	Figure 1	●
P2PR0150BLH–4	3.0	4	3	6	2.85	75	1.5	2	Figure 1	●
P2PR0200BLH–4	4.0	4	4	8	3.85	75	2.0	2	Figure 2	●
P2PR0050BLH	1.0	6	1	2.5	0.95	75	0.5	2	Figure 1	●
P2PR0075BLH	1.5	6	2	3	1.45	75	0.75	2	Figure 1	●
P2PR0100BLH	2.0	6	2	4	1.95	75	1.0	2	Figure 1	●
P2PR0150BLH	3.0	6	3	6	2.85	75	1.5	2	Figure 1	●
P2PR0200BLH	4.0	6	4	8	3.85	75	2.0	2	Figure 1	●
P2PR0250BLH	5.0	6	5	10	4.85	75	2.5	2	Figure 1	●
P2PR0300BLH	6.0	6	6	12	5.8	75	3.0	2	Figure 2	●
P2PR0400BLH	8.0	8	8	16	7.8	100	4.0	2	Figure 2	●
P2PR0500BLH	10.0	10	10	20	9.6	100	5.0	2	Figure 2	●
P2PR0600BLH	12.0	12	12	24	11.5	100	6.0	2	Figure 2	●
P2PR0800BLH	16.0	16	16	32	15.5	150	8.0	2	Figure 2	●
P2PR1000BLH	20.0	20	20	40	19.5	150	10.0	2	Figure 2	●

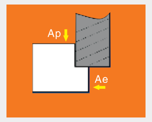
●Running stock ○Make-to-order

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	 Ap Ae Side milling					
Diameter （mm）	ap (0.03xD꜀)	ae (0.03xD꜀)	f_z (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

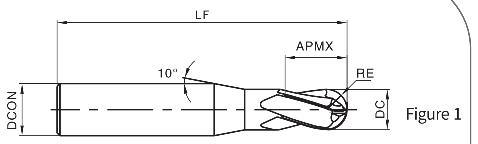


Figure 1

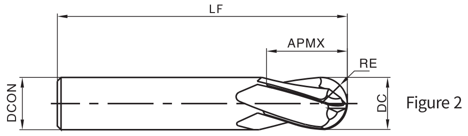
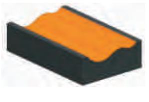
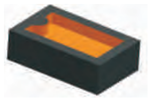
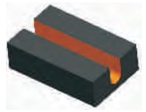


Figure 2


Profile machining


Cavity machining


Slot machining

P Series
41° 38°
DC≤12 0,–0.02 H>10
R ±0.01

Type	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	APMX	LF	RE	ZEFP		
P4SR0150BNS–4	3.0	4	6	50	1.5	4	Figure 1	●
P4SR0200BNS–4	4.0	4	8	50	2.0	4	Figure 2	●
P4SR0150BNS	3.0	6	6	50	1.5	4	Figure 1	●
P4SR0200BNS	4.0	6	8	50	2.0	4	Figure 1	●
P4SR0250BNS	5.0	6	10	50	2.5	4	Figure 1	●
P4SR0300BNS	6.0	6	12	50	3.0	4	Figure 2	●
P4SR0400BNS	8.0	8	16	60	4.0	4	Figure 2	●
P4SR0500BNS	10.0	10	20	75	5.0	4	Figure 2	●
P4SR0600BNS	12.0	12	24	75	6.0	4	Figure 2	●
P4SR0700BNS	14.0	14	28	75	7.0	4	Figure 2	●
P4SR0800BNS	16.0	16	32	100	8.0	4	Figure 2	●
P4SR0900BNS	18.0	18	36	100	9.0	4	Figure 2	●
P4SR1000BNS	20.0	20	40	100	10.0	4	Figure 2	●

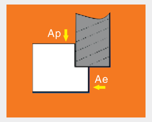
●Running stock ○Make-to-order

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/mm^2)	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	–	–	–

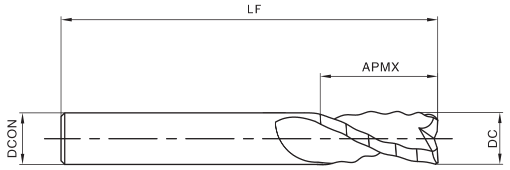
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter （mm）	ap ($0.1xD_c$)	ae ($0.1xD_c$)	f_z (mm/z)			
3.0	0.3	0.3	0.025			
4.0	0.4	0.4	0.030			
5.0	0.5	0.5	0.035			
6.0	0.6	0.6	0.045			
8.0	0.8	0.8	0.060			
10.0	1.0	1.0	0.070			
12.0	1.2	1.2	0.085			
14.0	1.4	1.4	0.100		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

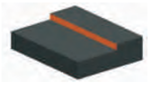
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

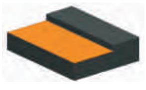
Series X--Special end mills

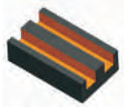
Three-flute corrugated edge flat end mill

X3S···WLN




Side machining


Bottom machining


Slot milling

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	●

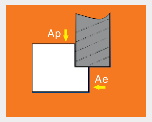
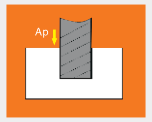
●Running stock ○Make-to-order

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

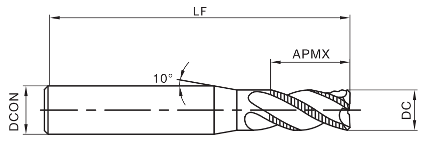


Figure 1

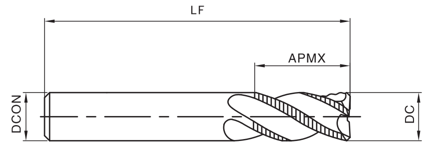
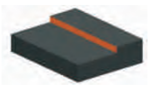
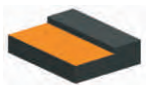


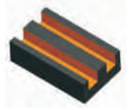
Figure 2



Side machining



Bottom machining



Slot milling

X Series　38°　DC DC:h10　45°

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	●

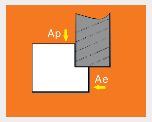
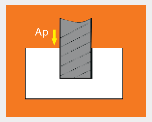
●Running stock　○Make-to-order

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

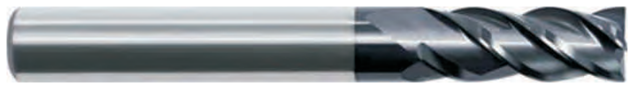
Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite 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	–	–	–

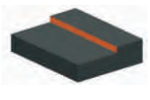
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter （mm）	ap（1xDc）	ae（0.3xDc）	fz（mm/z）	ap（0.75xDc）	ae（1xDc）	fz（mm/z）
6.0	6.0	1.8	0.045	4.5	6.0	0.035
7.0	7.0	2.1	0.055	5.3	7.0	0.045
8.0	8.0	2.4	0.060	6.0	8.0	0.050
9.0	9.0	2.7	0.065	6.8	9.0	0.055
10.0	10.0	3.0	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

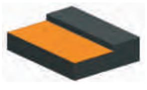
Series X--Special end mills

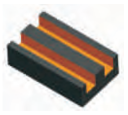
Four-flute flat end mill

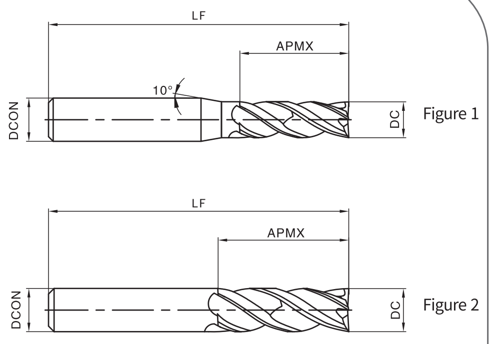
X4S···HG




Side machining


Bottom machining


Slot milling



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	●

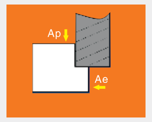
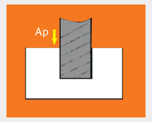
●Running stock ○Make-to-order

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

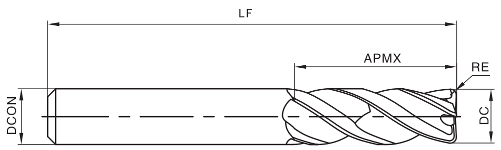
Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
	Alloy steel	< 1200	< 350	150	175	200
	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite 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	–	–	–

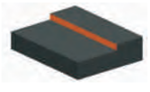
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter （mm）	ap (1xD_c)	ae (0.3xD_c)	f_z (mm/z)	ap (0.75xD_c)	ae (1xD_c)	f_z (mm/z)
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	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

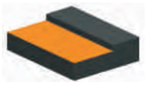
Series X--Special end mills

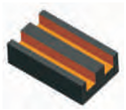
Four-flute R end mill

X4S···R···HG




Side machining


Bottom machining


Slot milling

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	●

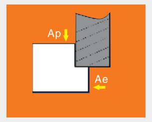
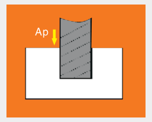
●Running stock ○Make-to-order

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

HUAREAL

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

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Tel.:	E-mail: zzhrhj@163.com Postal code: 412000
E-MAIL:	Website: www.huareal.com.cn

Tool series

☐ Series B Basic Type ☐ Series P High Performance Type ☐ Series X Special Type ☐ Others

Tool type

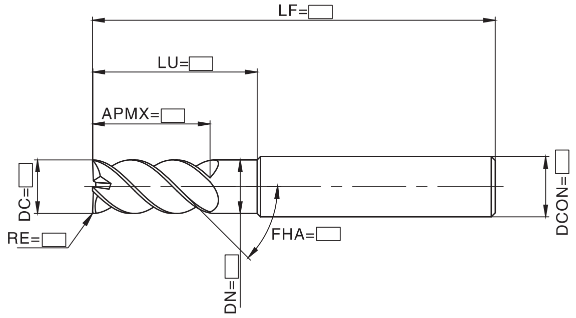
☐ Flat end mill ☐ Chamfered flat end mill ☐ Radius mill ☐ Ball nose mill
☐ Flat end taper mill ☐ Ball nose taper mill ☐ Others

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)	
Cutting direction	
Reference order number	

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):

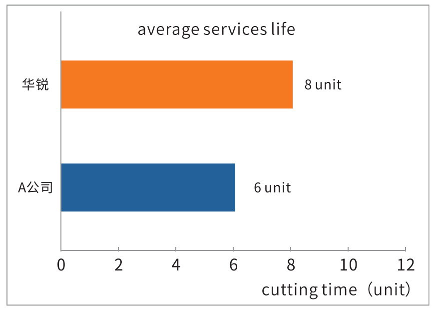
Order quantity: Pieces Expected delivery date: MM DD YYYY

Date: Signature:

Machining cases

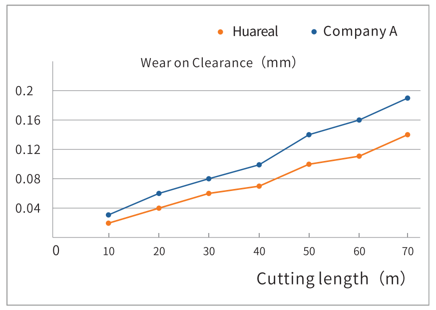
Metal mold

Workpiece material	H13mold steel(HRC48)
Cutting tools	P2SR0300BLH
Machining method	profile milling
Machining parameters	Vc=150m/min fz=0.06mm/z ap=0.1mm ae=0.1mm
Cooling method	Air cooling



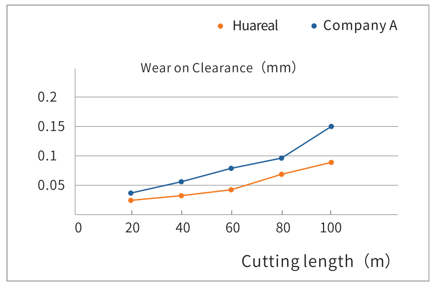
Injection mold

Workpiece material	quench steel（HRC58)
Cutting tools	P4S0600R0100HH
Machining method	cavity milling
Machining parameters	Vc=130m/min fz=0.05mm/z ap=0.4mm ae=2mm
Cooling method	Air cooling



Metal mold

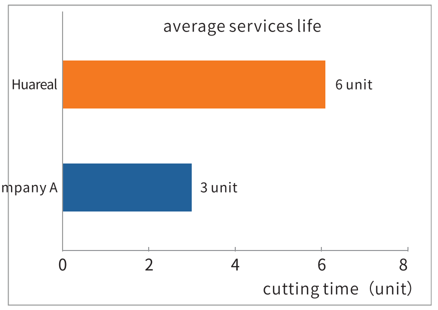
Workpiece material	H13（HRC55)
Cutting tools	P4S1000HH
Machining method	Side milling
Machining parameters	Vc=120m/min fz=0.05mm/z ap=0.3mm ae=3mm
Cooling method	Air cooling



Machining cases

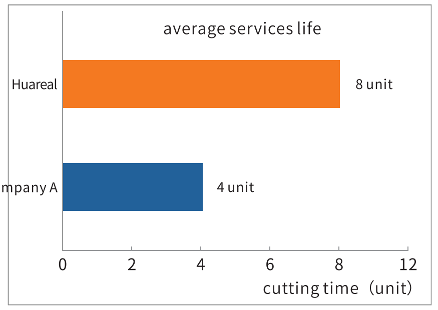
Metal mold

Workpiece material	3003
Cutting tools	B3L0600HN
Machining method	side milling
Machining parameters	Vc=120m/min f=0.05mm/z ap=6mm ae=1.8mm
Cooling method	Air cooling



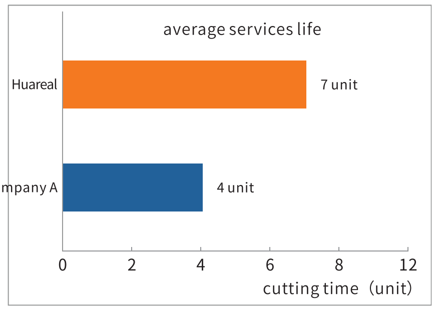
Injection mold

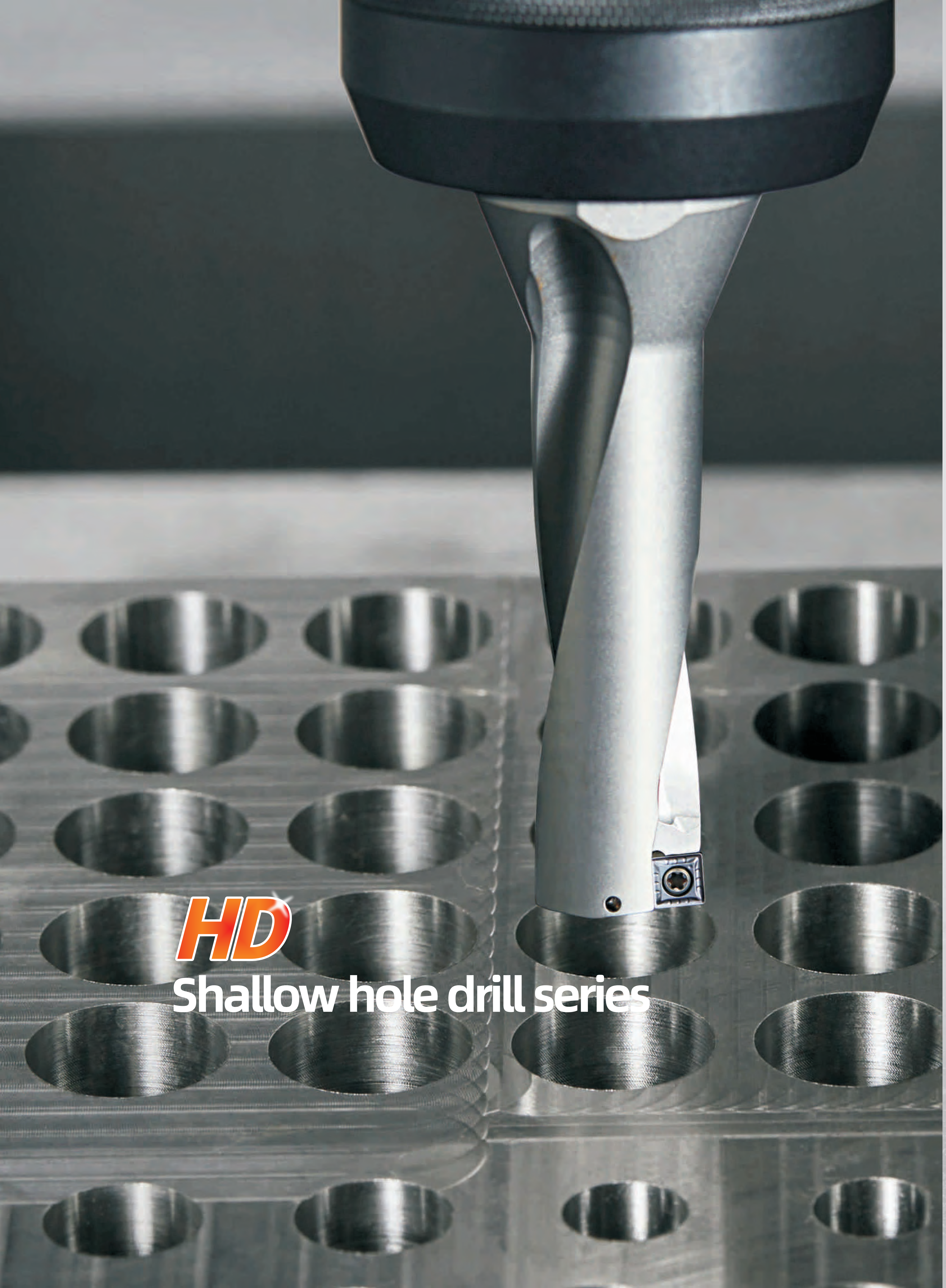
Workpiece material	NVK80(HRC35)
Cutting tools	P4SR0600BLG
Machining method	profile milling
Machining parameters	Vc=188m/min fz=0.075mm/z ap=0.3mm ae=0.3mm
Cooling method	Air cooling



Pressing mold

Workpiece material	P20（HRC32)
Cutting tools	P2SR0300BLG
Machining method	profile milling
Machining parameters	Vc=200m/min fz=0.06mm/z ap=0.15mm ae=0.15mm
Cooling method	Air cooling





HD
Shallow hole drill series

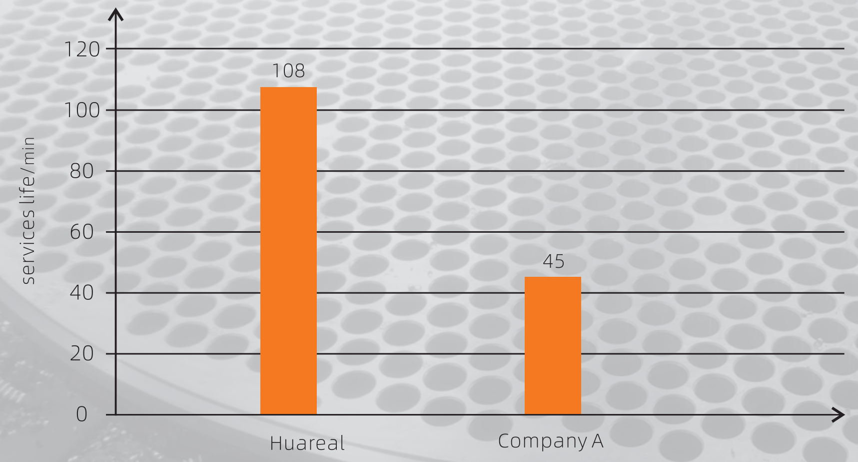
Short-hole drills-
Dx type chipbreaker

- Unique groove design,balanced force distribution.Cutting resistance is uniformly distributed around cnetral and perophreal cutting edge.Resulting stable drilling process.
- Uniformly variable chamfer and rake angle design,ensures great stability during drilling. Driling process is light and fast.
- Special cutting edge treatment effectivly suppresses formation of bulid-up edge and crater wear
- Matching with various coating grades,suitable for requirement of drilling under different working condition

High precision and extended services life

Machining case

Worpieces	Tube plate
Materail	S316
Machining method	drilling
Customer demand	great chip breaking, better cost-effectivness
inserts	HR5130/SPMG060204-DX
Cutting parameter	n=1300r/min(vc=100m/min) F=130mm/min(fn=0.1mm/r)
Test result	better chip breaking, improved hole size accuracy,less wear,distingushied cost-effectiveness



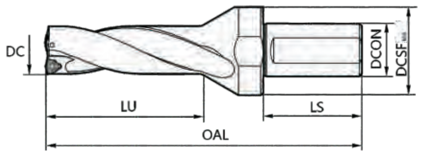
Tool shape

Tool type

Indexable short hole drilling

HD01 2D Series

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



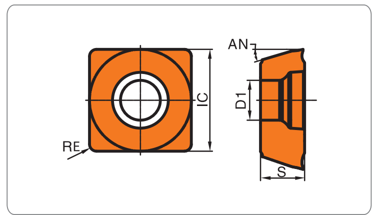
<table>
<tr><th rowspan="2">Tool model</th><th rowspan="2">Inventory</th><th colspan="6">Basic dimension (mm)</th><th rowspan="2">Applicable inserts</th><th>Screw</th><th>Wrench</th></tr>
<tr><th>DC</th><th>DCON</th><th>DCSF_{MS}</th><th>LS</th><th>LU</th><th>OAL</th><th></th><th></th></tr>
<tr><td>HD01-2D-440-S40</td><td>○</td><td>44</td><td>40</td><td>60</td><td>70</td><td>91</td><td>193</td><td>WCMX080412-DX</td><td>M40110</td><td>HTT15IP</td></tr>
<tr><td>HD01-2D-450-S40</td><td>○</td><td>45</td><td>40</td><td>60</td><td>70</td><td>93</td><td>195</td><td></td><td></td><td></td></tr>
<tr><td>HD01-2D-460-S40</td><td>○</td><td>46</td><td>40</td><td>60</td><td>70</td><td>95</td><td>197</td><td></td><td></td><td></td></tr>
<tr><td>HD01-2D-470-S40</td><td>○</td><td>47</td><td>40</td><td>60</td><td>70</td><td>97</td><td>199</td><td></td><td></td><td></td></tr>
<tr><td>HD01-2D-480-S40</td><td>○</td><td>48</td><td>40</td><td>70</td><td>70</td><td>99</td><td>201</td><td></td><td></td><td></td></tr>
<tr><td>HD01-2D-490-S40</td><td>○</td><td>49</td><td>40</td><td>70</td><td>70</td><td>101</td><td>203</td><td></td><td></td><td></td></tr>
<tr><td>HD01-2D-500-S40</td><td>○</td><td>50</td><td>40</td><td>70</td><td>70</td><td>103</td><td>205</td><td></td><td></td><td></td></tr>
</table>

●Running stock ○Make-to-order

Selection guidance of indexable short hole drilling inserts

Indexable short hole drilling insert

Working condition: ● Stable ◕ Average ⌗ Tough



Workpiece material		HR8115	HR8125	HR8225	HR5110	HR5120	HR5130	HR712	HR7225
P	Steel	●	◕	●◕	●	●◕	◕		
M	Stainless steel				●	●◕	◕	●◕	●◕
K	Cast iron				●	●◕	◕		
N	Non-ferrous metal								
S	Heat-resistant alloy Titanium alloy								

<table>
<tr><th rowspan="2">Insert shape</th><th rowspan="2">Type</th><th colspan="5">Basic dimension (mm)</th><th colspan="3">CVD</th><th colspan="5">PVD</th></tr>
<tr><th>IC</th><th>S</th><th>RE</th><th>D1</th><th>AN</th><th>HR8115</th><th>HR8125</th><th>HR8225</th><th>HR5110</th><th>HR5120</th><th>HR5130</th><th>HR712</th><th>HR7225</th></tr>
<tr><td></td><td>SPMG050204-DX</td><td>5.00</td><td>2.38</td><td>0.4</td><td>2.25</td><td>14°</td><td>☆</td><td></td><td></td><td></td><td>☆</td><td>★</td><td></td><td></td></tr>
<tr><td></td><td>SPMG060204-DX</td><td>6.00</td><td>2.38</td><td>0.4</td><td>2.61</td><td>14°</td><td>☆</td><td></td><td></td><td></td><td>☆</td><td>★</td><td></td><td></td></tr>
<tr><td></td><td>SPMG07T308-DX</td><td>7.94</td><td>3.97</td><td>0.8</td><td>2.85</td><td>15.5°</td><td>☆</td><td></td><td></td><td></td><td>☆</td><td>★</td><td></td><td></td></tr>
<tr><td></td><td>SPMG090408-DX</td><td>9.80</td><td>4.30</td><td>0.8</td><td>4.05</td><td>17.5°</td><td>☆</td><td></td><td></td><td></td><td>☆</td><td>★</td><td></td><td></td></tr>
<tr><td></td><td>SPMG110408-DX</td><td>11.50</td><td>4.80</td><td>0.8</td><td>4.50</td><td>16.5°</td><td>☆</td><td></td><td></td><td></td><td>☆</td><td>★</td><td></td><td></td></tr>
</table>

★ Recommended grade ☆ Available grade

Insert shape

Insert type

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

C Drilling

Indexable short hole drills

Solid carbide drills

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	页码
Indexable short hole drill	HD01	Ø16–50		Internal cooling	WCMX□□	☀	☀	☼		☼		C5
	HD02	Ø16–42		Internal cooling	SPMG□□	☀	☀	☼		☼		C9
BD Series Solid carbide drill	BD03	Ø3–20		External cooling	/	☀	☀	☼		☼		C21
	BD03C	Ø3–20		Internal cooling	/	☀	☀	☼		☼		C29
	BD05	Ø3–20		External cooling	/	☀	☀	☼		☼		C37
	BD05C	Ø3–20		Internal cooling	/	☀	☀	☼		☼		C45
	BD08C	Ø3–20		Internal cooling	/	☀	☀	☼		☼		C53

☀Fit well ☼Applicable

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	页码
XD Series Solid carbide drills	XD12C	Ø3–20		Internal cooling	/	☀	☀	☼		☼		C59
	XD20C	Ø3–14		Internal cooling	/	☀	☀	☼		☼		C64
	XD30C	Ø3–10		Internal cooling	/	☀	☀	☼		☼		C69

☀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	
01	With WC insert
02	With SP insert

③ Length-diameter ratio	
2D	Length-diameter ratio: 2
3D	Length-diameter ratio: 3
5D	Length-diameter ratio: 5

④ Tool diameter	
150	15mm
200	20mm
250	25mm
...	...

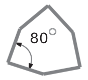
⑤ Shank type	
S	Shank with flat

⑥ Sizes of tool installation parts	
20	20mm
25	25mm
...	...

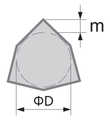
Code key of indexable short hole drilling inserts

S	P	M	G	07	T3	08	R	-	DX
①	②	③	④	⑤	⑥	⑦	⑧		⑨

① Shape code

S	
W	

③ Tolerance (mm)

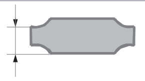


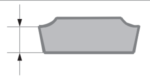
Class	Corner height (m)	Inscribed circle (ϕD)	Thickness (S)	Class	Corner height (m)	Inscribed circle (ϕD)	Thickness (S)
A	±0.005	± 0.025	± 0.025	J	±0.005	± 0.025	± 0.025
F	±0.005	± 0.013	± 0.025	K	±0.005	± 0.013	± 0.025
C	±0.013	± 0.025	± 0.025	L	±0.013	± 0.025	± 0.025
H	±0.013	± 0.013	± 0.025	M	±0.013	± 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

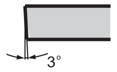
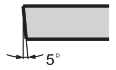
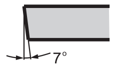
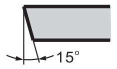
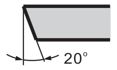
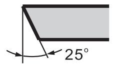
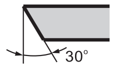
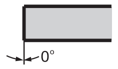
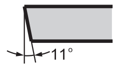
⑥ Insert thickness



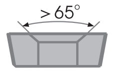
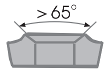
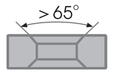
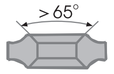
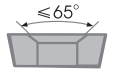
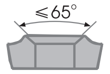
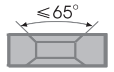
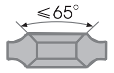


Code	Thickness (mm)	Code	Thickness (mm)
00	0.79	05	5.96
T0	0.99	T5	5.95
01	1.59	06	6.35
T1	1.98	T6	6.75
02	2.38	07	7.94
T2	2.58	09	9.52
03	3.18	T9	11.11
T3	3.97	11	12.70
04	4.76	12	
T4	4.96		

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

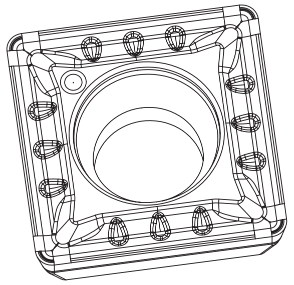
Code	Description
04	0.4mm
08	0.8mm
12	1.2mm

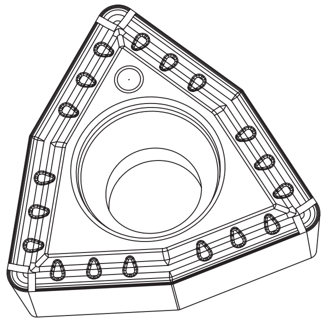
⑧ Cutting direction

Code	Direction
R	Right
L	Left
N	Two-way

⑨ Chip breaker code

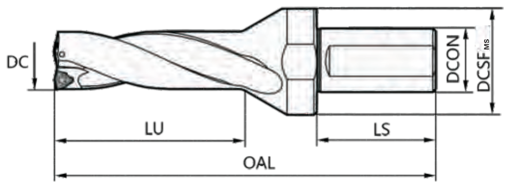
Code	Geometry
DX	Dx Geometry





Indexable short hole drilling

HD01 2D Series

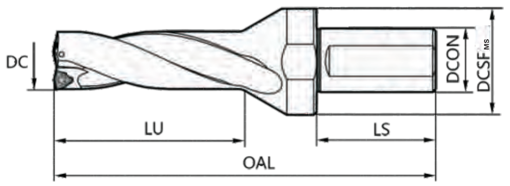


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF$_{MS}$	LS	LU	OAL			
HD01–2D–160–S25	●	16	25	32	56	35	106	WCMX030204–DX WCMX030208–DX	M25065	HFT08IP
HD01–2D–170–S25	○	17	25	32	56	37	108			
HD01–2D–180–S25	○	18	25	32	56	39	116			
HD01–2D–190–S25	○	19	25	32	56	41	119			
HD01–2D–200–S25	●	20	25	32	56	43	121			
HD01–2D–210–S25	○	21	25	45	56	45	125	WCMX040204–DX WCMX040208–DX	M25065	HFT08IP
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			
HD01–2D–250–S25	●	25	25	45	56	53	132	WCMX050308–DX	M30070	HFT09IP
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			
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	WCMX06T308–DX	M35084	HTT10IP
HD01–2D–320–S40	○	32	40	60	70	67	147			
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			
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	M40110	HTT15IP
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			

●Running stock ○Make-to-order

Indexable short hole drilling

HD01 2D Series

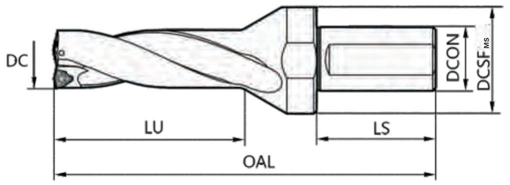


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF$_{MS}$	LS	LU	OAL			
HD01–2D–440–S40	○	44	40	60	70	91	193	WCMX080412–DX	M40110	HTT15IP
HD01–2D–450–S40	○	45	40	60	70	93	195			
HD01–2D–460–S40	○	46	40	60	70	95	197			
HD01–2D–470–S40	○	47	40	60	70	97	199			
HD01–2D–480–S40	○	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 3DSeries

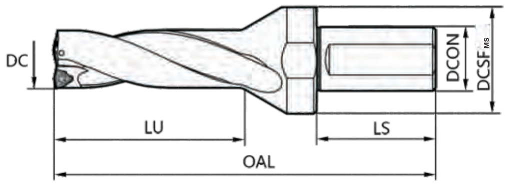


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	$DCSF_{MS}$	LS	LU	OAL			
HD01–3D–160–S25	●	16	25	32	56	52	129	WCMX030204–DX WCMX030208–DX	M25065	HFT08IP
HD01–3D–170–S25	○	17	25	32	56	55	133			
HD01–3D–180–S25	○	18	25	32	56	58	137			
HD01–3D–190–S25	○	19	25	32	56	61	140			
HD01–3D–200–S25	●	20	25	32	56	64	143			
HD01–3D–210–S25	○	21	25	45	56	67	153	WCMX040204–DX WCMX040208–DX	M25065	HFT08IP
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			
HD01–3D–250–S25	●	25	25	45	56	79	165	WCMX050308–DX	M30070	HFT09IP
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			
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	WCMX06T308–DX	M35084	HTT10IP
HD01–3D–320–S40	○	32	40	60	70	101	206			
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			
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	M40110	HTT15IP
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 3DSeries

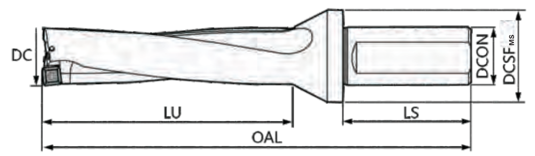


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	$DCSF_{MS}$	LS	LU	OAL			
HD01–3D–440–S40	○	44	40	60	70	137	245	WCMX080412–DX	M40110	HTT15IP
HD01–3D–450–S40	○	45	40	60	70	140	248			
HD01–3D–460–S40	○	46	40	60	70	143	251			
HD01–3D–470–S40	○	47	40	60	70	146	253			
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

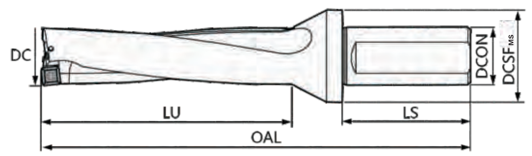


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF$_{MS}$	LS	LU	OAL			
HD02–2D–160–S20	●	16	20	25	50	35	102	SPMG050204–DX	M20043	HFT06IP
HD02–2D–170–S20	○	17	20	25	50	37	104	SPMG060204–DX	M22055	HFT07IP
HD02–2D–180–S25	○	18	25	32	56	39	113			
HD02–2D–190–S25	○	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	M25074	HFT07IP
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			
HD02–2D–280–S32	○	28	32	37	60	59	139	SPMG090408–DX	M35084	HTT10IP
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			
HD02–2D–330–S40	○	40	32	37	60	69	149			
HD02–2D–340–S40	○	34	40	47	70	71	166	SPMG110408–DX	M40110	HTT15IP
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

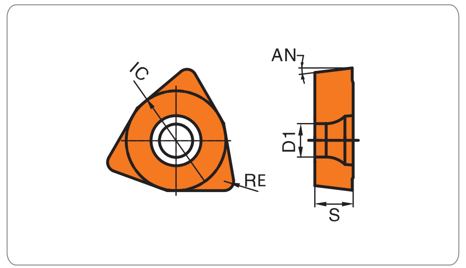


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF$_{MS}$	LS	LU	OAL			
HD02–3D–160–S20	●	16	20	25	50	51	117	SPMG050204DG–DX	M20043	HFT06IP
HD02–3D–170–S20	○	17	20	25	50	54	120	SPMG060204DG–DX	M22055	HFT07IP
HD02–3D–180–S25	○	18	25	32	56	57	131			
HD02–3D–190–S25	○	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	M25074	HFT07IP
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			
HD02–3D–280–S32	○	28	32	37	60	87	169	SPMG090408DG–DX	M35084	HTT10IP
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			
HD02–3D–330–S40	○	33	40	37	60	102	184			
HD02–3D–340–S40	○	34	40	47	70	105	200	SPMG110408DG–DX	M40110	HTT15IP
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			

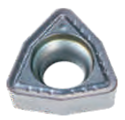
●Running stock ○Make-to-order

Indexable short hole drilling insert

Working condition: ● Stable ◕ Average ⌗ Tough

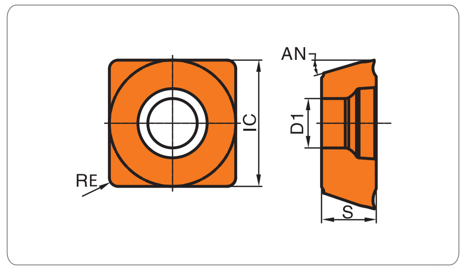


Workpiece material	HR8115	HR8125	HR8225	HR5110	HR5120	HR5130	HR7125	HR7225
P Steel	●	◕	●◕	●	●◕	◕		
M Stainless steel				●	●◕	◕	●◕	●◕
K Cast iron				●	●◕	◕		
N Non-ferrous metal								
S Heat-resistant alloy Titanium alloy								

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

Working condition: ● Stable ◕ Average ⌗ Tough



Workpiece material	HR8115	HR8125	HR8225	HR5110	HR5120	HR5130	HR7125	HR7225
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	Feed rate fn (mm/r)					
					Cutting speed vc m/min	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
	Low-alloyed steel	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
		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
	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
M	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
K	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
	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
	Compacted graphite iron	GGV (CGI)		230						
N	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
	Foundry aluminum alloy	≤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
		> 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
	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
S	Iron-based alloy	Iron-based	Annealing	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
		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

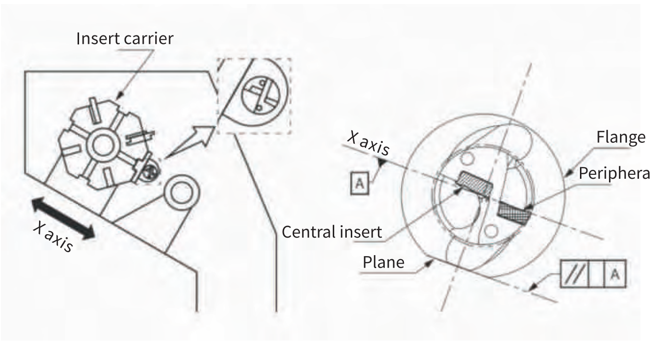
Technical information of indexable short hole drilling tools

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.

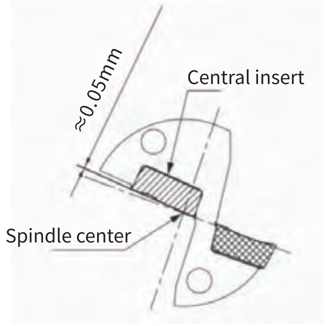


Figure 2
Illustration of center height of the drill bit inner insert

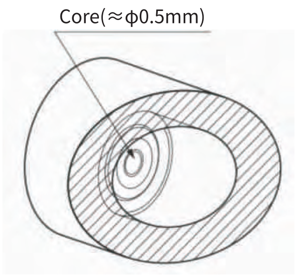


Figure 3
Illustration of core residues in blind hole drilling

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.

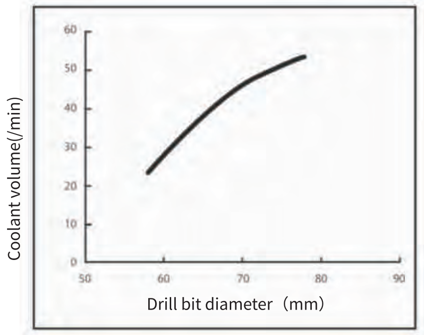
Short hole drilling and recommended countermeasures

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.

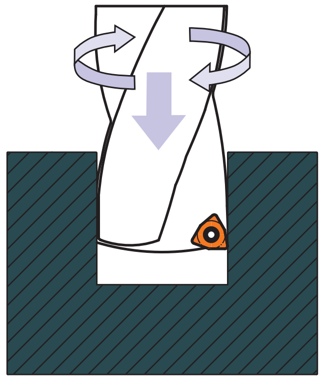
If the feed rate is below f=0.06mm/rev, please increase it to f=0.08-0.12mm/rev.

If the over fast cutting speed causes cutter vibration, decrease to about Vc=100-150m/rev.

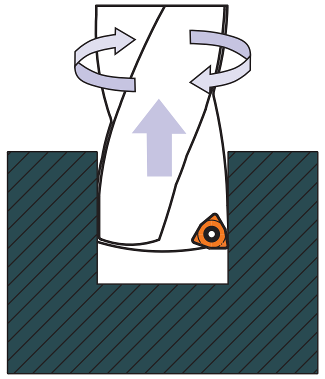
If there are obvious burrs at the drill or the workpiece clamping rigidity is poor, decrease the feed rate to f=0.07-0.08 mm/rev.

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

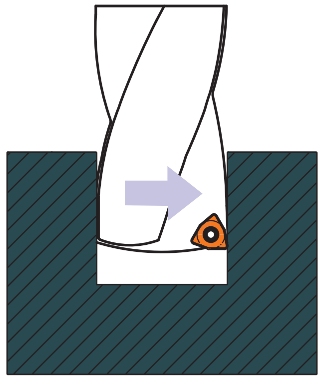
Please change the cutting parameters or optimize the way of returning the insert.



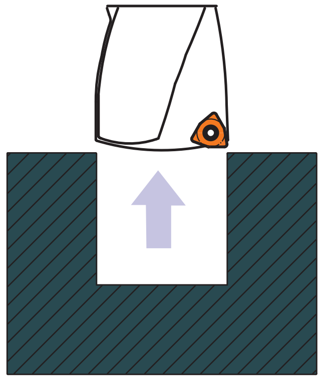
① Rotate to return the insert



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



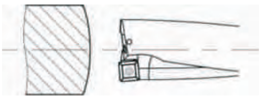
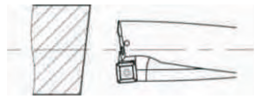
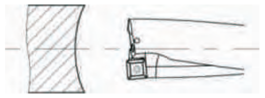
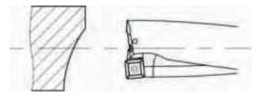
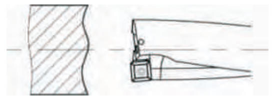
③ Return the insert eccentrically



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.

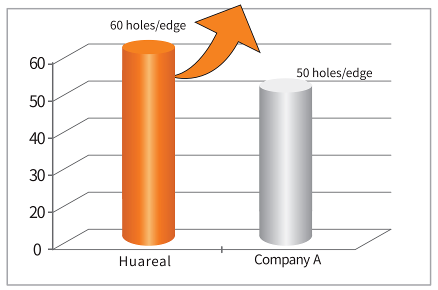
Workpiece surface	Solutions
	The normal feed rate can be adopted for convex surface, because its machining conditions are relatively good, and the drilling core can contact the workpiece first as expected.
	The surface of the drilling part is inclined, so the cutting edge is subjected to uneven load, 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	Drilling
Insert	WCMX0080412-DX HR5130
Tool type	HD01-3D-440-S40
Machining parameters	Vc=76.3m/min，f=0.133mm/r

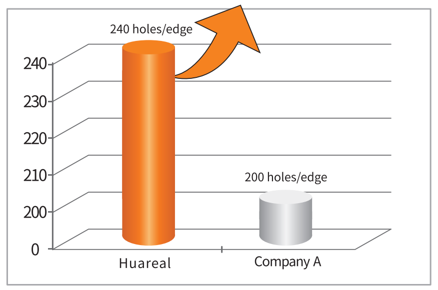
Its service life is extended by 20%



Flange drilling

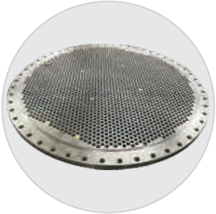
Workpiece material	Stainless steelSUS304
Machining method	Drilling
Insert	SPMG050204-DX HR5130
Tool type	HD02-2D-170-S20
Machining parameters	Vc=159.4m/min，f=0.034mm/r（Ra≤1.6um）

Its service life is extended by 20%

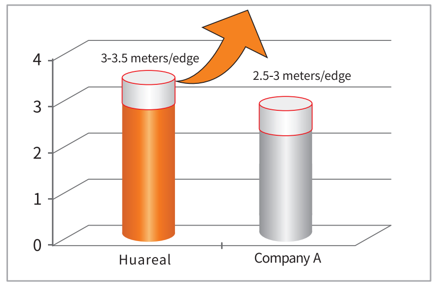


Condenser tube sheet drilling

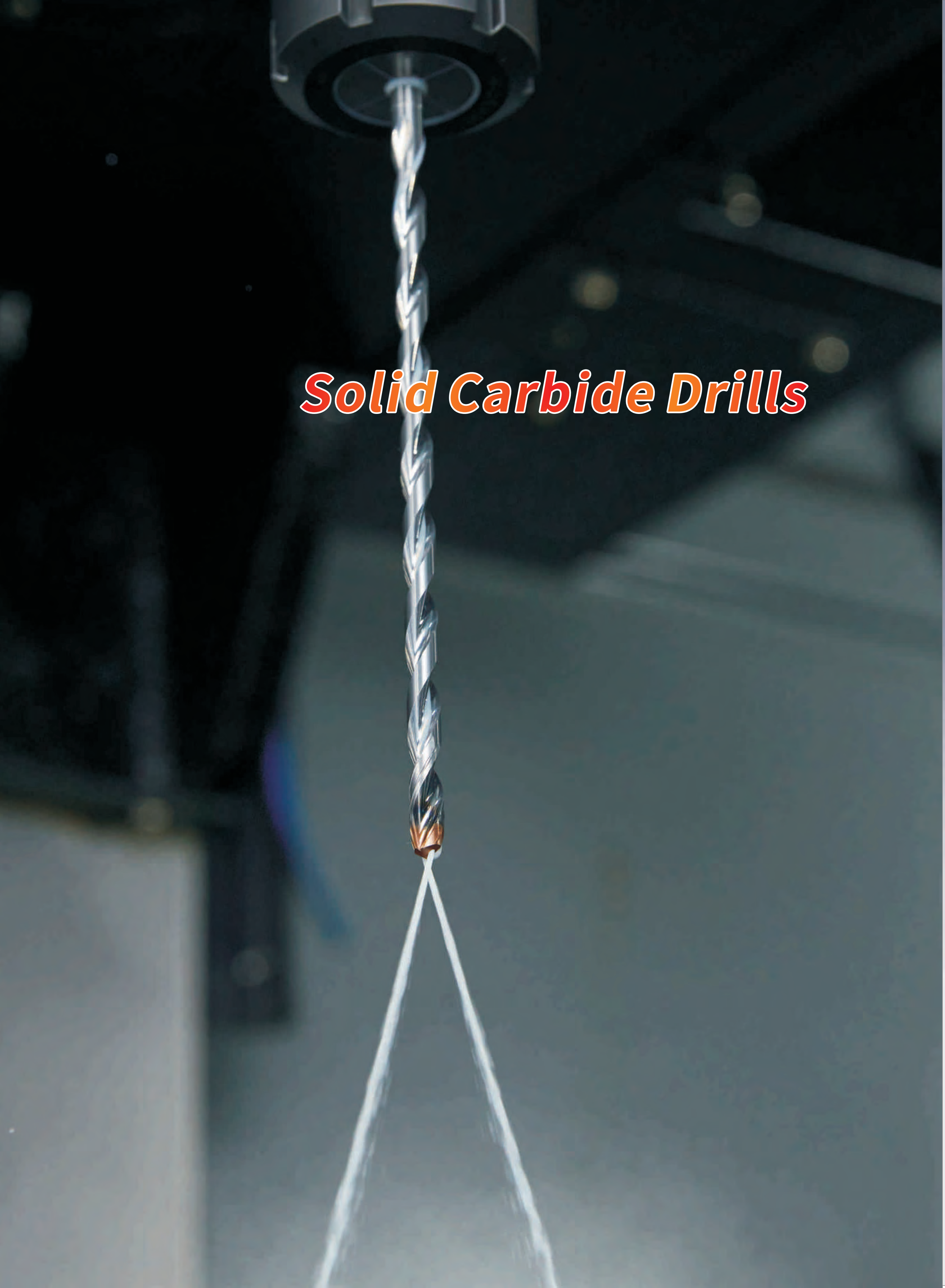
Workpiece material	304 Stainless steel
Machining method	Drilling
Insert	SPMG07T308-DX HR5130
Tool type	HD02-3D-250-S25
Machining parameters	Vc=140m/min，fn=0.10mm/r



Its service life is extended by 20%



Solid Carbide Drills



Solid carbide drills - hole machining tools

- Unique flute design, with great rigidity and chip removal perofmance, besides great surface quality
- Strong versatility, in a wide cutting speed and feed range, can be good machining performance with high safety.
- The product specifications and models are complete, including conventional 3D, 5D, 8D standard series and standard deep hole 12D, 20D, 30D drilling series, to meet the different machining requirements.

Selection guidance of solid carbide drills

Tool outline drawing

Tool type

BD03 Series

Product specification drawing

Helical angle, coating,
insert diameter tolerance, etc.

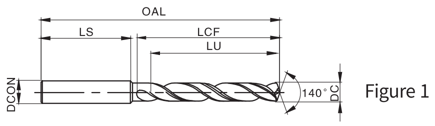


Figure 1

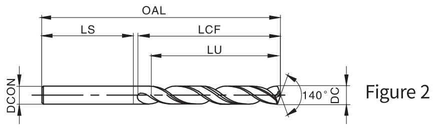


Figure 2

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	②	③	④	⑤

① Product series	
BD	Cost-effective
XD	Deep hole type

② Length series (length-diameter ratio)	
03	3×D Series
05	5×D Series
08	8×D Series
12	12×D Series
20	20×D Series
30	30×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

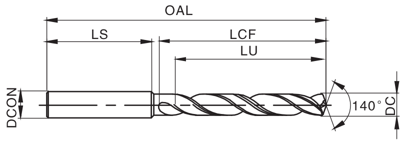


Figure 1

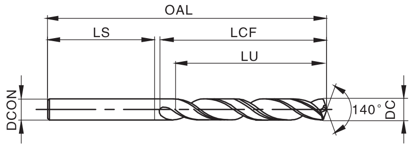


Figure 2

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

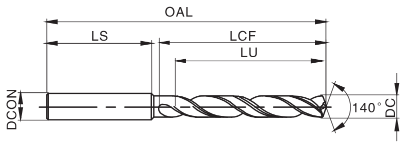


Figure 1

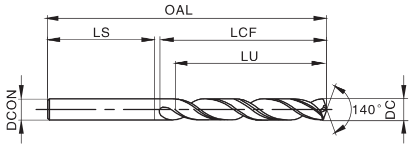


Figure 2

BD Series | 3×D | m7 | 140° | h6

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

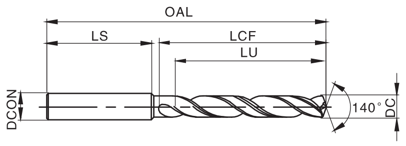


Figure 1

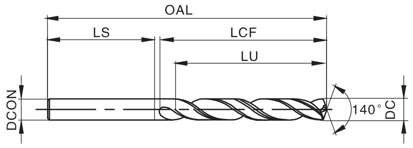


Figure 2

BD Series | 3×D | m7 | 140° | h6

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

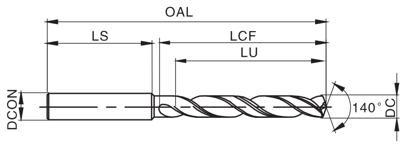


Figure 1

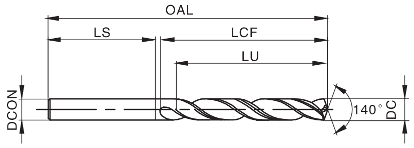


Figure 2

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

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/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 - BD03 Series

Feed per revolution mm/r											
Workpiece material		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

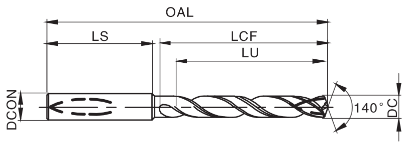


Figure 1

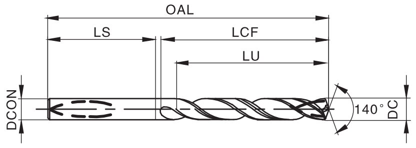


Figure 2

BD Series | 3×D | m7 | 140° | h6

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

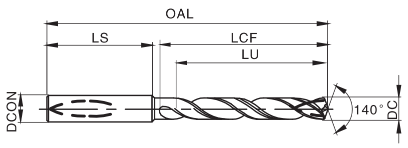


Figure 1

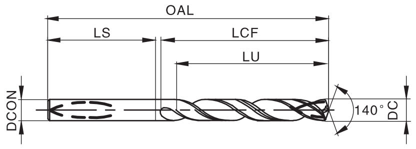


Figure 2

BD Series | 3×D | m7 | 140° | h6

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

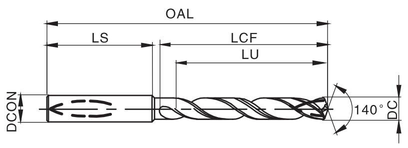


Figure 1

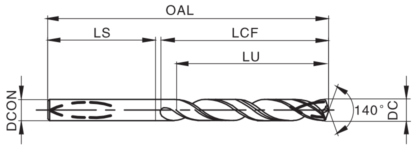


Figure 2

BD Series | 3×D | m7 | 140° | h6

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

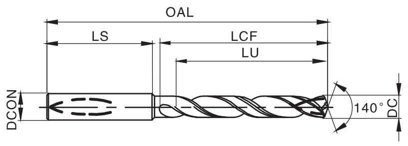


Figure 1

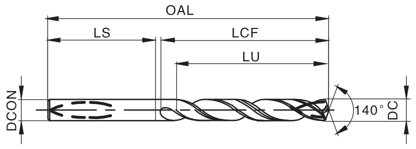


Figure 2

BD Series | 3×D | m7 | 140° | h6

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

Feed per revolution mm/r											
Workpiece material		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

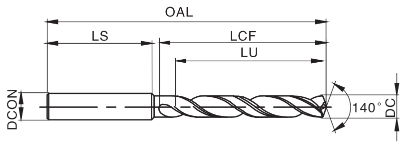


Figure 1

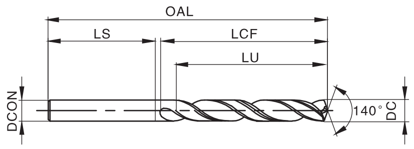


Figure 2

BD Series | 5×D | m7 | 140° | h6

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

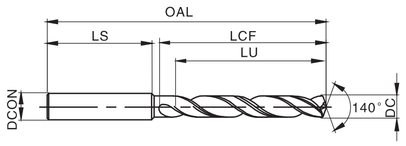


Figure 1

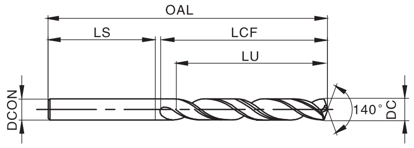


Figure 2

BD Series 5×D m7 140° h6

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

A General turning
precision small parts turning
Parting and grooving
Threading
B Indexable milling
Solid carbide end mills
C Short hole drills
Solid carbide drills

BD05 Series

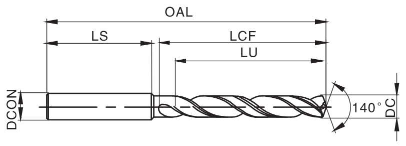


Figure 1

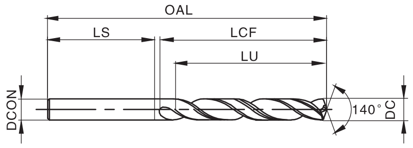


Figure 2

BD Series 5×D m7 140° h6

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

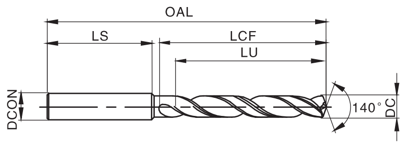


Figure 1

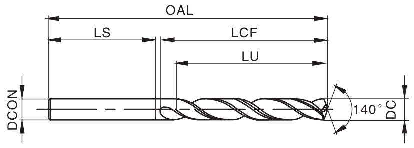


Figure 2

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

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 - 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	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 - BD05C Series

Feed per revolution mm/r											
Workpiece material		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

BD05C Series

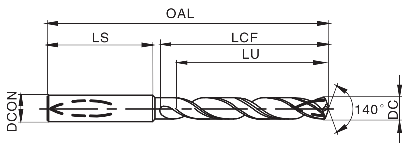


Figure 1

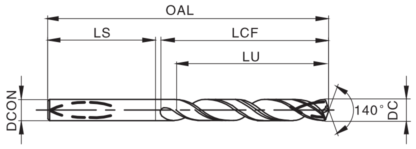


Figure 2

BD Series | 5×D | m7 | 140° | h6

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

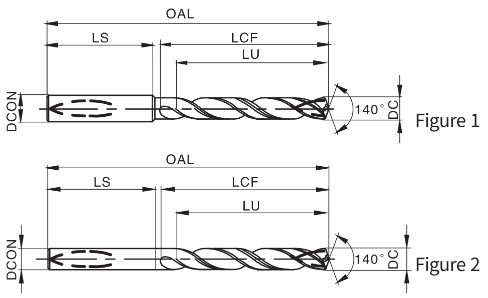
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05CA0510	5.10	6.00	82	44	36	35.4	Figure 1	●
BD05CA0516	5.16	6.00	82	44	36	35.3	Figure 1	●
BD05CA0520	5.20	6.00	82	44	36	35.3	Figure 1	○
BD05CA0530	5.30	6.00	82	44	36	35.1	Figure 1	●
BD05CA0540	5.40	6.00	82	44	36	34.9	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



BD Series | 5×D | m7 | 140° | h6

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

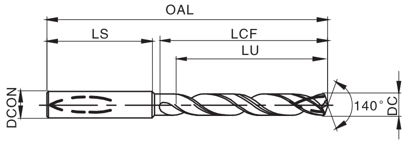


Figure 1

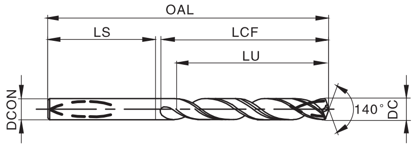


Figure 2

BD Series | 5×D | m7 | 140° | h6

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

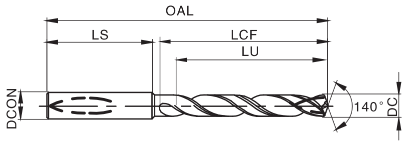


Figure 1

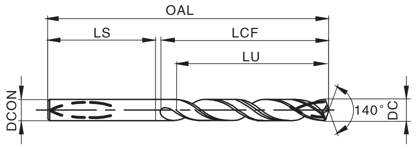


Figure 2

BD Series | 5×D | m7 | 140° | h6

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

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 - 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	–	–	–	–	–	–	–	–	–	–

Solid carbide drill

BD08C Series

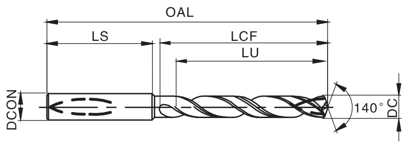


Figure 1

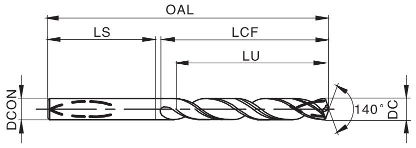


Figure 2

BD Series | 8×D | m7 | 140° | h6

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

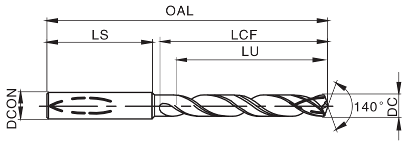


Figure 1

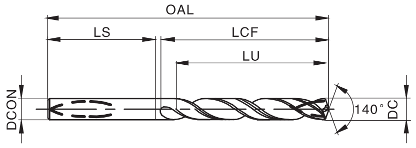


Figure 2

BD Series | 8×D | m7 | 140° | h6

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

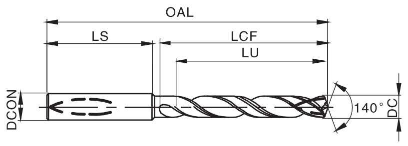


Figure 1

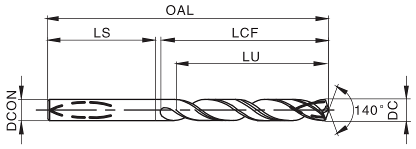


Figure 2

BD Series | 8×D | m7 | 140° | h6

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

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 - BD08C 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 - BD08C Series

Feed per revolution mm/r											
Workpiece material		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

XD12C Series

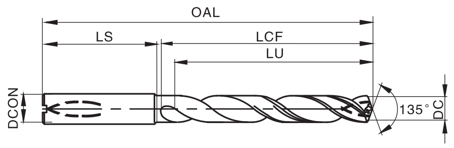


Figure 1

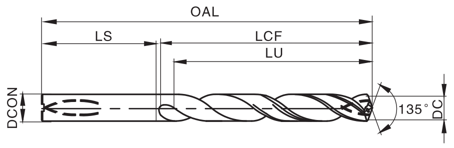


Figure 2

XD Series | 12×D | h7 | 135° | h5

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD12CA0300	3.00	6	90	50	36	40	Figure 1	●
XD12CA0310	3.10	6	90	50	36	40	Figure 1	○
XD12CA0320	3.20	6	90	50	36	40	Figure 1	○
XD12CA0330	3.30	6	90	50	36	40	Figure 1	○
XD12CA0340	3.40	6	90	50	36	40	Figure 1	○
XD12CA0350	3.50	6	90	50	36	40	Figure 2	○
XD12CA0360	3.60	6	90	50	36	40	Figure 1	○
XD12CA0370	3.70	6	90	50	36	46	Figure 1	○
XD12CA0380	3.80	6	90	50	36	46	Figure 1	○
XD12CA0390	3.90	6	90	50	36	46	Figure 1	○
XD12CA0400	4.00	6	102	64	36	56	Figure 1	●
XD12CA0410	4.10	6	102	64	36	56	Figure 1	○
XD12CA0420	4.20	6	102	64	36	56	Figure 1	○
XD12CA0430	4.30	6	102	64	36	56	Figure 1	○
XD12CA0440	4.40	6	102	64	36	56	Figure 1	○
XD12CA0450	4.50	6	102	64	36	56	Figure 1	●
XD12CA0460	4.60	6	102	64	36	56	Figure 1	○
XD12CA0470	4.70	6	102	64	36	56	Figure 1	○
XD12CA0480	4.80	6	102	64	36	56	Figure 1	○
XD12CA0490	4.90	6	102	64	36	56	Figure 1	○
XD12CA0500	5.00	6	116	78	36	72	Figure 1	●
XD12CA0510	5.10	6	116	78	36	72	Figure 1	○
XD12CA0520	5.20	6	116	78	36	72	Figure 1	○
XD12CA0530	5.30	6	116	78	36	72	Figure 1	○
XD12CA0540	5.40	6	116	78	36	72	Figure 1	○
XD12CA0550	5.50	6	116	78	36	72	Figure 1	●
XD12CA0560	5.60	6	116	78	36	72	Figure 1	○
XD12CA0570	5.70	6	116	78	36	72	Figure 2	○

●Running stock ○Make-to-order

XD12C Series

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD12CA0580	5.80	6	116	78	36	72	Figure 1	○
XD12CA0590	5.90	6	116	78	36	72	Figure 1	○
XD12CA0600	6.00	6	116	78	36	72	Figure 1	●
XD12CA0610	6.10	8	131	93	36	84	Figure 1	○
XD12CA0620	6.20	8	131	93	36	84	Figure 1	○
XD12CA0630	6.30	8	131	93	36	84	Figure 1	○
XD12CA0640	6.40	8	131	93	36	84	Figure 1	○
XD12CA0650	6.50	8	131	93	36	84	Figure 1	●
XD12CA0660	6.60	8	131	93	36	84	Figure 1	○
XD12CA0670	6.70	8	131	93	36	84	Figure 1	○
XD12CA0680	6.80	8	131	93	36	84	Figure 1	○
XD12CA0690	6.90	8	131	93	36	84	Figure 1	○
XD12CA0700	7.00	8	131	93	36	84	Figure 2	●
XD12CA0710	7.10	8	146	108	36	96	Figure 1	○
XD12CA0720	7.20	8	146	108	36	96	Figure 1	○
XD12CA0730	7.30	8	146	108	36	96	Figure 1	○
XD12CA0740	7.40	8	146	108	36	96	Figure 1	○
XD12CA0750	7.50	8	146	108	36	96	Figure 1	●
XD12CA0760	7.60	8	146	108	36	96	Figure 1	○
XD12CA0770	7.70	8	146	108	36	96	Figure 1	○
XD12CA0780	7.80	8	146	108	36	96	Figure 2	○
XD12CA0790	7.90	8	146	108	36	96	Figure 1	○
XD12CA0800	8.00	8	146	108	36	96	Figure 1	●
XD12CA0810	8.10	10	162	120	40	108	Figure 1	○
XD12CA0820	8.20	10	162	120	40	108	Figure 1	○
XD12CA0830	8.30	10	162	120	40	108	Figure 1	○
XD12CA0840	8.40	10	162	120	40	108	Figure 1	○
XD12CA0850	8.50	10	162	120	40	108	Figure 1	●
XD12CA0860	8.60	10	162	120	40	108	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

XD12C Series

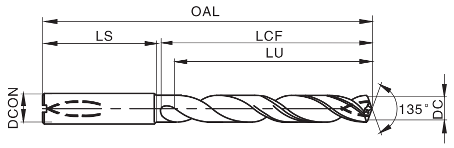


Figure 1

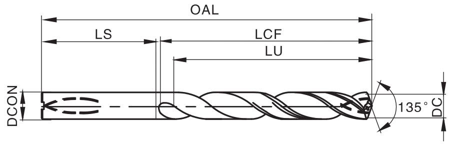


Figure 2

XD Series | 12×D | h7 | 135° | h5

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD12CA0870	8.70	10	162	120	40	108	Figure 1	○
XD12CA0880	8.80	10	162	120	40	108	Figure 1	○
XD12CA0890	8.90	10	162	120	40	108	Figure 1	○
XD12CA0900	9.00	10	162	120	40	108	Figure 1	●
XD12CA0910	9.10	10	174	132	40	120	Figure 1	○
XD12CA0920	9.20	10	174	132	40	120	Figure 2	○
XD12CA0930	9.30	10	174	132	40	120	Figure 1	○
XD12CA0940	9.40	10	174	132	40	120	Figure 1	○
XD12CA0950	9.50	10	174	132	40	120	Figure 1	●
XD12CA0960	9.60	10	174	132	40	120	Figure 1	○
XD12CA0970	9.70	10	174	132	40	120	Figure 1	○
XD12CA0980	9.80	10	174	132	40	120	Figure 1	○
XD12CA0990	9.90	10	174	132	40	120	Figure 1	○
XD12CA1000	10.00	10	174	132	40	120	Figure 1	●
XD12CA1010	10.10	12	204	156	45	144	Figure 1	○
XD12CA1020	10.20	12	204	156	45	144	Figure 1	○
XD12CA1030	10.30	12	204	156	45	144	Figure 1	○
XD12CA1040	10.40	12	204	156	45	144	Figure 1	○
XD12CA1050	10.50	12	204	156	45	144	Figure 1	●
XD12CA1060	10.60	12	204	156	45	144	Figure 1	○
XD12CA1070	10.70	12	204	156	45	144	Figure 1	○
XD12CA1080	10.80	12	204	156	45	144	Figure 1	○
XD12CA1090	10.90	12	204	156	45	144	Figure 1	○
XD12CA1100	11.00	12	204	156	45	144	Figure 1	●
XD12CA1110	11.10	12	204	156	45	144	Figure 1	○
XD12CA1120	11.20	12	204	156	45	144	Figure 1	○
XD12CA1130	11.30	12	204	156	45	144	Figure 1	○
XD12CA1140	11.40	12	204	156	45	144	Figure 2	○

●Running stock ○Make-to-order

XD12C Series

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD12CA1150	11.50	12	204	156	45	144	Figure 1	●
XD12CA1160	11.60	12	204	156	45	144	Figure 1	○
XD12CA1170	11.70	12	204	156	45	144	Figure 1	○
XD12CA1180	11.80	12	204	156	45	144	Figure 1	○
XD12CA1190	11.90	12	204	156	45	144	Figure 1	○
XD12CA1200	12.00	12	204	156	45	144	Figure 1	●
XD12CA1250	12.50	14	230	182	45	168	Figure 1	●
XD12CA1270	12.70	14	230	182	45	168	Figure 1	○
XD12CA1280	12.80	14	230	182	45	168	Figure 1	○
XD12CA1300	13.00	14	230	182	45	168	Figure 1	○
XD12CA1350	13.50	14	230	182	45	168	Figure 1	●
XD12CA1400	14.00	14	230	182	45	168	Figure 1	●
XD12CA1450	14.50	16	260	208	48	194	Figure 2	○
XD12CA1500	15.00	16	260	208	48	194	Figure 1	○
XD12CA1550	15.50	16	260	208	48	194	Figure 1	○
XD12CA1600	16.00	16	260	208	48	194	Figure 1	○
XD12CA1650	16.50	18	286	234	48	218	Figure 1	○
XD12CA1700	17.00	18	286	234	48	218	Figure 1	○
XD12CA1750	17.50	18	286	234	48	218	Figure 1	○
XD12CA1800	18.00	18	286	234	48	218	Figure 1	○
XD12CA1850	18.50	20	310	258	48	240	Figure 2	○
XD12CA1900	19.00	20	310	258	48	240	Figure 1	○
XD12CA1950	19.50	20	310	258	48	240	Figure 1	○
XD12CA2000	20.00	20	310	258	48	240	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

Cutting speed recommendations - XD12C Series

Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum /min	Optimal /opt	Maximum /max
P	Carbon steel	< 600	< 230	60	90	120
	Alloy steel	< 1200	< 350	60	80	120
	High-alloyed steel and tool steel	< 1400	< 380	50	70	80
M	Austenite and ferrite stainless steel	< 680	<220	40	60	80
	Martensite stainless steel	< 820	< 240	40	50	80
K	Gray cast iron	–	< 280	80	120	150
	Ductile iron	–	< 320	60	90	120
N	Non-ferrous alloy	< 250	< 110	100	140	180
	Aluminum alloy	< 530	< 130	100	140	180
S	Iron-based, nickel-based and cobalt-based high-temp alloy	< 3300	< 350	–	–	–
	Titanium alloy	<2100	< 400	–	–	–
H	High hardness steel	–	< 54HRC	–	–	–
	High hardness steel	–	52–60HRC	–	–	–
	High hardness steel	–	> 60 HRC	–	–	–

Recommended feed rate - XD12C Series

Feed per revolution mm/r												
Workpiece material		Φ3	Φ4	Φ5	Φ6	Φ8	Φ10	Φ12	Φ14	Φ16	Φ18	Φ20
P	Carbon steel	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28	0.20–0.3	0.22–0.32	0.25–0.35
	Alloy steel	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28	0.20–0.3	0.22–0.32	0.25–0.35
	High-alloyed steel and tool steel	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28	0.20–0.3	0.22–0.32	0.25–0.35
M	Austenite and ferrite stainless steel	0.03–0.07	0.04–0.08	0.05–0.1	0.06–0.12	0.08–0.16	0.1–0.18	0.12–0.2	0.13–0.22	0.14–0.25	0.15–0.28	0.16–0.3
	Martensite stainless steel	0.03–0.07	0.04–0.08	0.05–0.1	0.06–0.12	0.08–0.16	0.1–0.18	0.12–0.2	0.13–0.22	0.14–0.25	0.15–0.28	0.16–0.3
K	Gray cast iron	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28	0.20–0.30	0.22–0.32	0.25–0.35
	Ductile iron	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28	0.20–0.30	0.22–0.32	0.25–0.35
N	Non-ferrous alloy	0.09–0.12	0.1–0.15	0.1–0.15	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.25	0.18–0.28	0.25–0.36	0.28–0.38	0.30–0.40
	Aluminum alloy	0.09–0.12	0.1–0.15	0.1–0.15	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.25	0.18–0.28	0.25–0.36	0.28–0.38	0.30–0.40
S	Iron-based, nickel-based and cobalt-based high-temp alloy	–	–	–	–	–	–	–	–	–	–	–
	Titanium alloy	–	–	–	–	–	–	–	–	–	–	–
H	High hardness steel	–	–	–	–	–	–	–	–	–	–	–
	High hardness steel	–	–	–	–	–	–	–	–	–	–	–
	High hardness steel	–	–	–	–	–	–	–	–	–	–	–

Solid carbide drill

XD20C Series

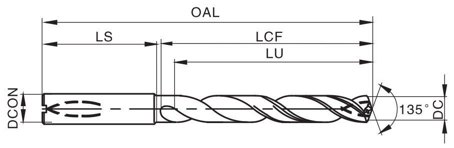


Figure 1

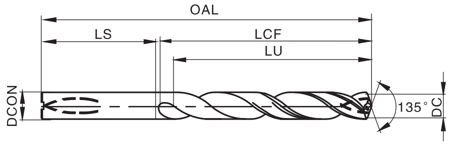


Figure 2

XD系列 20×D h7 135° h5

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD20CA0300	3.0	6	110	70	36	62	Figure 1	○
XD20CA0310	3.1	6	123	83	36	72	Figure 1	○
XD20CA0320	3.2	6	123	83	36	72	Figure 1	○
XD20CA0330	3.3	6	123	83	36	72	Figure 1	○
XD20CA0340	3.4	6	123	83	36	72	Figure 1	○
XD20CA0350	3.5	6	123	83	36	72	Figure 2	○
XD20CA0360	3.6	6	136	96	36	84	Figure 1	○
XD20CA0370	3.7	6	136	96	36	84	Figure 1	○
XD20CA0380	3.8	6	136	96	36	84	Figure 1	○
XD20CA0390	3.9	6	136	96	36	84	Figure 1	○
XD20CA0400	4.0	6	136	96	36	84	Figure 1	○
XD20CA0410	4.1	6	148	108	36	96	Figure 1	○
XD20CA0420	4.2	6	148	108	36	96	Figure 1	○
XD20CA0430	4.3	6	148	108	36	96	Figure 1	○
XD20CA0440	4.4	6	148	108	36	96	Figure 1	○
XD20CA0450	4.5	6	148	108	36	96	Figure 1	○
XD20CA0460	4.6	6	158	118	36	106	Figure 1	○
XD20CA0470	4.7	6	158	118	36	106	Figure 1	○
XD20CA0480	4.8	6	158	118	36	106	Figure 1	○
XD20CA0490	4.9	6	158	118	36	106	Figure 1	○
XD20CA0500	5.0	6	158	118	36	106	Figure 1	○
XD20CA0510	5.1	6	168	128	36	116	Figure 1	○
XD20CA0520	5.2	6	168	128	36	116	Figure 1	○
XD20CA0530	5.3	6	168	128	36	116	Figure 1	○
XD20CA0540	5.4	6	168	128	36	116	Figure 1	○
XD20CA0550	5.5	6	168	128	36	116	Figure 1	○
XD20CA0560	5.6	6	180	140	36	126	Figure 1	○
XD20CA0570	5.7	6	180	140	36	126	Figure 2	○

●Running stock ○Make-to-order

XD20C Series

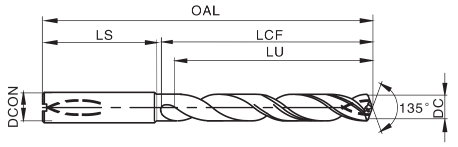


Figure 1

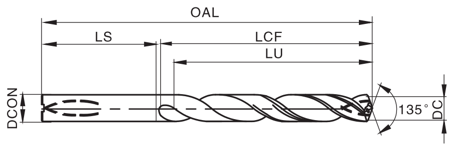


Figure 2

XD系列 20×D h7 135° h5

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD20CA0580	5.8	6	180	140	36	126	Figure 1	○
XD20CA0590	5.9	6	180	140	36	126	Figure 1	○
XD20CA0600	6.0	6	180	140	36	126	Figure 1	○
XD20CA0610	6.1	8	192	150	36	132	Figure 1	○
XD20CA0620	6.2	8	192	150	36	132	Figure 1	○
XD20CA0630	6.3	8	192	150	36	132	Figure 2	○
XD20CA0640	6.4	8	192	150	36	132	Figure 1	○
XD20CA0650	6.5	8	192	150	36	132	Figure 1	○
XD20CA0660	6.6	8	202	162	36	144	Figure 1	○
XD20CA0670	6.7	8	202	162	36	144	Figure 1	○
XD20CA0680	6.8	8	202	162	36	144	Figure 1	○
XD20CA0690	6.9	8	202	162	36	144	Figure 1	○
XD20CA0700	7.0	8	202	162	36	144	Figure 1	○
XD20CA0710	7.1	8	213	173	36	155	Figure 1	○
XD20CA0720	7.2	8	213	173	36	155	Figure 1	○
XD20CA0730	7.3	8	213	173	36	155	Figure 1	○
XD20CA0740	7.4	8	213	173	36	155	Figure 1	○
XD20CA0750	7.5	8	213	173	36	155	Figure 1	○
XD20CA0760	7.6	8	223	183	36	165	Figure 1	○
XD20CA0770	7.7	8	223	183	36	165	Figure 1	○
XD20CA0780	7.8	8	223	183	36	165	Figure 1	○
XD20CA0790	7.9	8	223	183	36	165	Figure 1	○
XD20CA0800	8.0	8	223	183	36	165	Figure 1	○
XD20CA0810	8.1	10	239	195	40	176	Figure 1	○
XD20CA0820	8.2	10	239	195	40	176	Figure 1	○
XD20CA0830	8.3	10	239	195	40	176	Figure 1	○
XD20CA0840	8.4	10	239	195	40	176	Figure 1	○
XD20CA0850	8.5	10	239	195	40	176	Figure 2	○

●Running stock ○Make-to-order

XD20C Series

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD20CA0860	8.6	10	249	205	40	186	Figure 2	○
XD20CA0870	8.7	10	249	205	40	186	Figure 1	○
XD20CA0880	8.8	10	249	205	40	186	Figure 1	○
XD20CA0890	8.9	10	249	205	40	186	Figure 1	○
XD20CA0900	9.0	10	249	205	40	186	Figure 1	○
XD20CA0910	9.1	10	262	218	40	196	Figure 1	○
XD20CA0920	9.2	10	262	218	40	196	Figure 2	○
XD20CA0930	9.3	10	262	218	40	196	Figure 1	○
XD20CA0940	9.4	10	262	218	40	196	Figure 1	○
XD20CA0950	9.5	10	262	218	40	196	Figure 1	○
XD20CA0960	9.6	10	272	228	40	206	Figure 1	○
XD20CA0970	9.7	10	272	228	40	206	Figure 1	○
XD20CA0980	9.8	10	272	228	40	206	Figure 1	○
XD20CA0990	9.9	10	272	228	40	206	Figure 1	○
XD20CA1000	10.0	10	272	228	40	206	Figure 1	○
XD20CA1010	10.1	12	292	242	45	220	Figure 1	○
XD20CA1020	10.2	12	292	242	45	220	Figure 1	○
XD20CA1030	10.3	12	292	242	45	220	Figure 1	○
XD20CA1040	10.4	12	292	242	45	220	Figure 1	○
XD20CA1050	10.5	12	292	242	45	220	Figure 1	○
XD20CA1060	10.6	12	300	250	45	228	Figure 1	○
XD20CA1070	10.7	12	300	250	45	228	Figure 1	○
XD20CA1080	10.8	12	300	250	45	228	Figure 1	○
XD20CA1090	10.9	12	300	250	45	228	Figure 1	○
XD20CA1100	11.0	12	300	250	45	228	Figure 1	○
XD20CA1110	11.1	12	315	265	45	240	Figure 1	○
XD20CA1120	11.2	12	315	265	45	240	Figure 1	○
XD20CA1130	11.3	12	315	265	45	240	Figure 1	○
XD20CA1140	11.4	12	315	265	45	240	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

XD20C Series

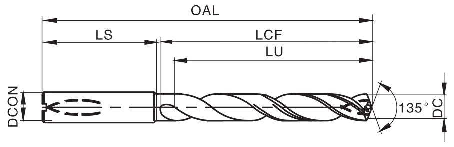


Figure 1

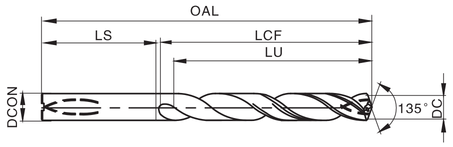


Figure 2

XD系列 20×D h7 135° h5

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD20CA1150	11.5	12	315	265	45	240	Figure 1	○
XD20CA1160	11.6	12	325	275	45	250	Figure 1	○
XD20CA1170	11.7	12	325	275	45	250	Figure 1	○
XD20CA1180	11.8	12	325	275	45	250	Figure 1	○
XD20CA1190	11.9	12	325	275	45	250	Figure 1	○
XD20CA1200	12.0	12	325	275	45	250	Figure 1	○
XD20CA1250	12.5	14	323	275	45	250	Figure 1	○
XD20CA1300	13.0	14	338	290	45	265	Figure 1	○
XD20CA1350	13.5	14	338	290	45	265	Figure 1	○
XD20CA1400	14.0	14	367	318	45	290	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

Cutting speed recommendations - XD20C 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	50	70	80
	Alloy steel	< 1200	< 350	50	60	80
	High-alloyed steel and tool steel	< 1400	< 380	40	50	60
M	Austenite and ferrite stainless steel	< 680	<220	40	50	60
	Martensite stainless steel	< 820	< 240	40	50	60
K	Gray cast iron	–	< 280	50	60	80
	Ductile iron	–	< 320	60	70	80
N	Non-ferrous alloy	< 250	< 110	100	140	180
	Aluminum alloy	< 530	< 130	100	150	180
S	Iron-based, nickel-based and cobalt-based high-temp alloy	< 3300	< 350	–	–	–
	Titanium alloy	<2100	< 400	–	–	–
H	High hardness steel	–	< 54HRC	–	–	–
	High hardness steel	–	52–60HRC	–	–	–
	High hardness steel	–	> 60 HRC	–	–	–

Recommended feed rate - XD20C Series

Feed per revolution mm/r									
Workpiece material		Φ3	Φ4	Φ5	Φ6	Φ8	Φ10	Φ12	Φ14
P	Carbon steel	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28
	Alloy steel	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28
	High-alloyed steel and tool steel	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28
M	Austenite and ferrite stainless steel	0.03–0.07	0.04–0.08	0.05–0.1	0.06–0.12	0.08–0.16	0.1–0.18	0.12–0.2	0.13–0.22
	Martensite stainless steel	0.03–0.07	0.04–0.08	0.05–0.1	0.06–0.12	0.08–0.16	0.1–0.18	0.12–0.2	0.13–0.22
K	Gray cast iron	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28
	Ductile iron	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.24	0.18–0.28
N	Non-ferrous alloy	0.09–0.12	0.1–0.15	0.1–0.15	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.25	0.18–0.28
	Aluminum alloy	0.09–0.12	0.1–0.15	0.1–0.15	0.11–0.16	0.13–0.19	0.14–0.22	0.16–0.25	0.18–0.28
S	Iron-based, nickel-based and cobalt-based high-temp alloy	–	–	–	–	–	–	–	–
	Titanium alloy	–	–	–	–	–	–	–	–
H	High hardness steel	–	–	–	–	–	–	–	–
	High hardness steel	–	–	–	–	–	–	–	–
	High hardness steel	–	–	–	–	–	–	–	–

Solid carbide drill

XD30C Series

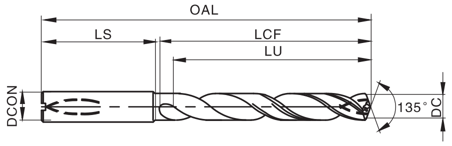


Figure 1

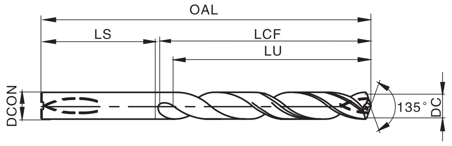


Figure 2

XD系列 | 30×D | h7 | 135° | h5

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD30CA0300	3.0	6	140	100	36	92	Figure 1	○
XD30CA0310	3.1	6	160	120	36	108	Figure 1	○
XD30CA0320	3.2	6	160	120	36	108	Figure 1	○
XD30CA0330	3.3	6	160	120	36	108	Figure 1	○
XD30CA0340	3.4	6	160	120	36	108	Figure 1	○
XD30CA0350	3.5	6	160	120	36	108	Figure 2	○
XD30CA0360	3.6	6	176	136	36	124	Figure 1	○
XD30CA0370	3.7	6	176	136	36	124	Figure 1	○
XD30CA0380	3.8	6	176	136	36	124	Figure 1	○
XD30CA0390	3.9	6	176	136	36	124	Figure 1	○
XD30CA0400	4.0	6	176	136	36	124	Figure 1	○
XD30CA0410	4.1	6	192	152	36	140	Figure 1	○
XD30CA0420	4.2	6	192	152	36	140	Figure 1	○
XD30CA0430	4.3	6	192	152	36	140	Figure 1	○
XD30CA0440	4.4	6	192	152	36	140	Figure 1	○
XD30CA0450	4.5	6	192	152	36	140	Figure 1	○
XD30CA0460	4.6	6	208	168	36	156	Figure 1	○
XD30CA0470	4.7	6	208	168	36	156	Figure 1	○
XD30CA0480	4.8	6	208	168	36	156	Figure 1	○
XD30CA0490	4.9	6	208	168	36	156	Figure 1	○
XD30CA0500	5.0	6	208	168	36	156	Figure 1	○
XD30CA0510	5.1	6	228	188	36	170	Figure 1	○
XD30CA0520	5.2	6	228	188	36	170	Figure 1	○
XD30CA0530	5.3	6	228	188	36	170	Figure 1	○
XD30CA0540	5.4	6	228	188	36	170	Figure 1	○
XD30CA0550	5.5	6	228	188	36	170	Figure 1	○
XD30CA0560	5.6	6	240	200	36	182	Figure 1	○
XD30CA0570	5.7	6	240	200	36	182	Figure 2	○

● Running stock ○ Make-to-order

XD30C Series

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD30CA0580	5.8	6	240	200	36	182	Figure 1	○
XD30CA0590	5.9	6	240	200	36	182	Figure 1	○
XD30CA0600	6.0	6	240	200	36	182	Figure 1	○
XD30CA0610	6.1	8	260	220	36	202	Figure 1	○
XD30CA0620	6.2	8	260	220	36	202	Figure 1	○
XD30CA0630	6.3	8	260	220	36	202	Figure 1	○
XD30CA0640	6.4	8	260	220	36	202	Figure 1	○
XD30CA0650	6.5	8	260	220	36	202	Figure 1	○
XD30CA0660	6.6	8	272	232	36	214	Figure 1	○
XD30CA0670	6.7	8	272	232	36	214	Figure 1	○
XD30CA0680	6.8	8	272	232	36	214	Figure 1	○
XD30CA0690	6.9	8	272	232	36	214	Figure 1	○
XD30CA0700	7.0	8	272	232	36	214	Figure 2	○
XD30CA0710	7.1	8	290	250	36	232	Figure 1	○
XD30CA0720	7.2	8	290	250	36	232	Figure 1	○
XD30CA0730	7.3	8	290	250	36	232	Figure 1	○
XD30CA0740	7.4	8	290	250	36	232	Figure 1	○
XD30CA0750	7.5	8	290	250	36	232	Figure 1	○
XD30CA0760	7.6	8	305	265	36	246	Figure 1	○
XD30CA0770	7.7	8	305	265	36	246	Figure 1	○
XD30CA0780	7.8	8	305	265	36	246	Figure 2	○
XD30CA0790	7.9	8	305	265	36	246	Figure 1	○
XD30CA0800	8.0	8	305	265	36	246	Figure 1	○
XD30CA0810	8.1	10	330	285	40	265	Figure 1	○
XD30CA0820	8.2	10	330	285	40	265	Figure 1	○
XD30CA0830	8.3	10	330	285	40	265	Figure 1	○
XD30CA0840	8.4	10	330	285	40	265	Figure 1	○
XD30CA0850	8.5	10	330	285	40	265	Figure 1	○
XD30CA0860	8.6	10	340	295	40	275	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

XD30C Series

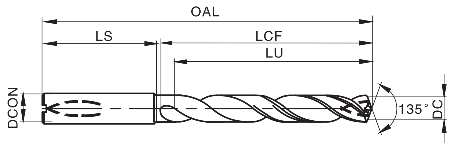


Figure 1

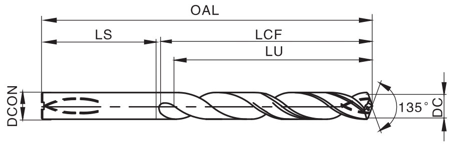


Figure 2

XD系列 30×D h7 135° h5

Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
XD30CA0870	8.7	10	340	295	40	275	Figure 1	○
XD30CA0880	8.8	10	340	295	40	275	Figure 1	○
XD30CA0890	8.9	10	340	295	40	275	Figure 1	○
XD30CA0900	9.0	10	340	295	40	275	Figure 1	○
XD30CA0910	9.1	10	360	315	40	292	Figure 1	○
XD30CA0920	9.2	10	360	315	40	292	Figure 2	○
XD30CA0930	9.3	10	360	315	40	292	Figure 1	○
XD30CA0940	9.4	10	360	315	40	292	Figure 1	○
XD30CA0950	9.5	10	360	315	40	292	Figure 1	○
XD30CA0960	9.6	10	372	328	40	305	Figure 1	○
XD30CA0970	9.7	10	372	328	40	305	Figure 1	○
XD30CA0980	9.8	10	372	328	40	305	Figure 1	○
XD30CA0990	9.9	10	372	328	40	305	Figure 1	○
XD30CA1000	10.0	10	372	328	40	305	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

Cutting speed recommendations - XD30C 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	50	70	80
	Alloy steel	< 1200	< 350	50	60	80
	High-alloyed steel and tool steel	< 1400	< 380	40	50	60
M	Austenite and ferrite stainless steel	< 680	<220	40	50	60
	Martensite stainless steel	< 820	< 240	40	50	60
K	Gray cast iron	–	< 280	50	60	80
	Ductile iron	–	< 320	60	70	80
N	Non-ferrous alloy	< 250	< 110	100	140	180
	Aluminum alloy	< 530	< 130	100	150	180
S	Iron-based, nickel-based and cobalt-based high-temp alloy	< 3300	< 350	–	–	–
	Titanium alloy	<2100	< 400	–	–	–
H	High hardness steel	–	< 54HRC	–	–	–
	High hardness steel	–	52–60HRC	–	–	–
	High hardness steel	–	> 60 HRC	–	–	–

Recommended feed rate - XD30C Series

Feed per revolution mm/r							
Workpiece material		Φ3	Φ4	Φ5	Φ6	Φ8	Φ10
P	Carbon steel	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22
	Alloy steel	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22
	High-alloyed steel and tool steel	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22
M	Austenite and ferrite stainless steel	0.03–0.07	0.04–0.08	0.05–0.1	0.06–0.12	0.08–0.16	0.1–0.18
	Martensite stainless steel	0.03–0.07	0.04–0.08	0.05–0.1	0.06–0.12	0.08–0.16	0.1–0.18
K	Gray cast iron	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22
	Ductile iron	0.06–0.1	0.08–0.12	0.1–0.14	0.11–0.16	0.13–0.19	0.14–0.22
N	Non-ferrous alloy	0.09–0.12	0.1–0.15	0.1–0.15	0.11–0.16	0.13–0.19	0.14–0.22
	Aluminum alloy	0.09–0.12	0.1–0.15	0.1–0.15	0.11–0.16	0.13–0.19	0.14–0.22
S	Iron-based, nickel-based and cobalt-based high-temp alloy	–	–	–	–	–	–
	Titanium alloy	–	–	–	–	–	–
H	High hardness steel	–	–	–	–	–	–
	High hardness steel	–	–	–	–	–	–
	High hardness steel	–	–	–	–	–	–

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

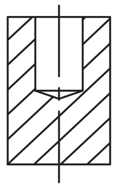
HUAREAL

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

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

Information of the machined hole

Blind hole



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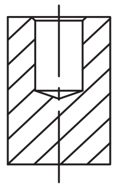
Orifice chamfering of the blind hole



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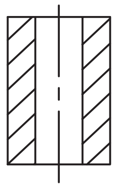
Through-hole



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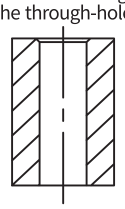
Orifice chamfering of the through-hole



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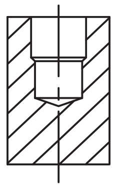
Step hole



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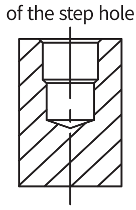
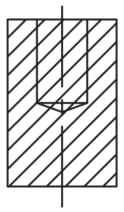
Orifice chamfering of the step hole



☐

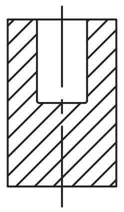
Process condition

☐ Solid drilling



☐ Prepared hole

Size of prepared hole:



Workpiece information

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

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

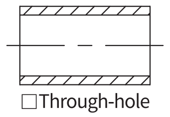
HUAREAL

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

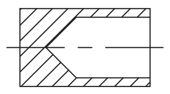
Client name: Fax: Tel.: E-MAIL:	No.68 Chuangye 2nd RD., Lusong District, Zhuzhou, Hunan, P.R.China Tel.: 0731-28216690 Fax: 0731-22286653 E-mail: zzhrhj@163.com Postal code: 412000 Website: www.huareal.com.cn

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

☐ Ductile iron

☐ Aluminum alloy

☐ Silicoaluminum Si<10%

☐ Silicoaluminum Si⩾10%

Grade of machined material:

Tensile strength= N/mm^2

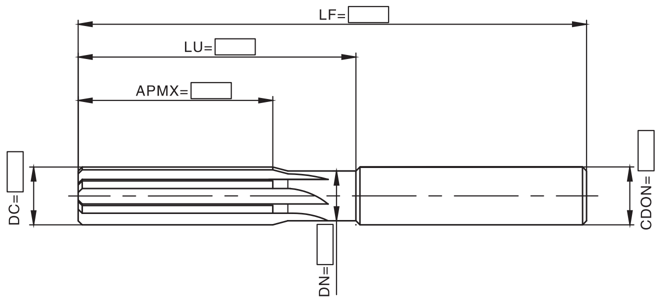
Hardness (HRC/HB)=

Tool information

Tool rotation direction	Cooling requirements
☐ Dextral rotation	☐ Internal cooling
☐ Straight Fluted	☐ External cooling
☐ Sinistral rotation	

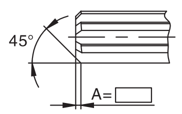
Coating

☐ Yes ☐ No



Cutting edge angle type

☐



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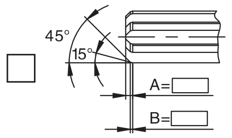

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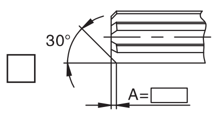

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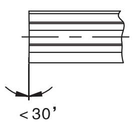


Note:

Order quantity: Piece

Expected delivery date: MM/ DD/ YYYY

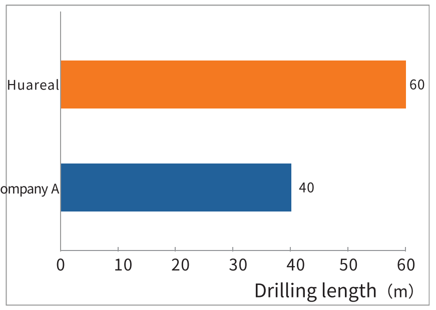
Date:

Signature:

Application

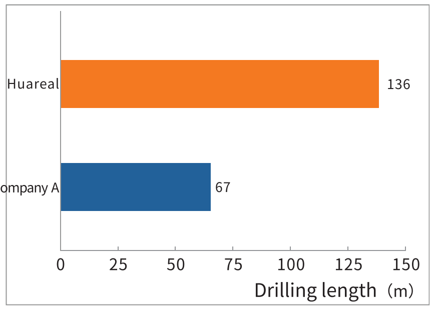
Aerospca turbine disk

Workpiece	Nickel base high-temp alloy
Cutting tools	XD12CA0450
Machining method	drilling
Cutting parameter	vc=100m/min,F=0.18mm/r,ap= 35mm
Colling method	water cooling (internal)



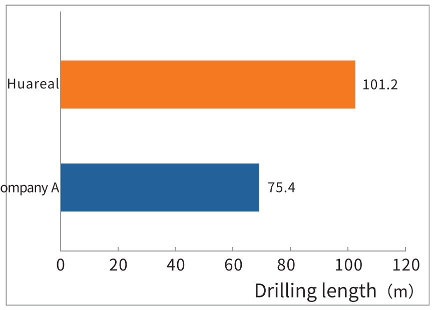
Cylinder cover

Workpiece	Ductile iron（163~255HB)
Cutting tools	BD03CA0870
Machining method	drilling
Cutting parameter	Vc=130m/min,Fz=0.2mm/tooth,ap= 20mm
Colling method	water cooling (internal)



Turbo shell

Workpiece	gray iron（130~220HB)
Cutting tools	BD03CA0750
Machining method	drilling
Cutting parameter	Vc=150m/min Fz=0.25mm/tooth ap= 15.7mm
Colling method	water cooling (internal)



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, AI, 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.
Damage and scattering can be caused by shaking or vibration of the tools with eccentric rotating or poor balance when rotary machining.	Please use the tools within the restricted rotating speed range.
	Check the balance performance of the machine regularly.
Drilling with very small tools can easily cause the tool to break, splash and fail to be taken out.	Reduce the tool vibration and process at a suitable running speed.
	Please wear protective glasses, suits and gloves.
Increased wear of machine and cutting tools as well as other harms can be caused beyond the specified purposes.	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
	Non-alloyed steel									
P	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	A204Gr.A	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)

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
	Low-alloyed steel									
P	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	–	–	–	–	–
	高合金钢									
	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
								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									
P	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

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
	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
M	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

A
General turning
precision small parts turning
Parting and grooving
Threading
B
Indexable milling
Solid carbide end mills
C
Short hole drills
Solid carbide drills

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			
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

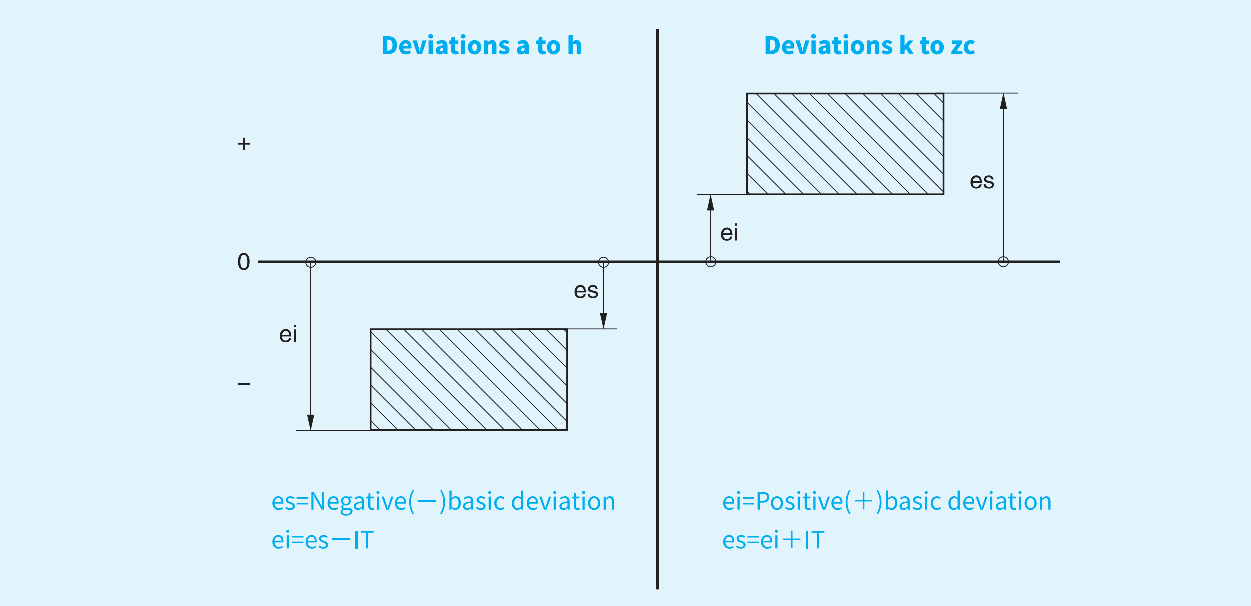
1) Generally value in ( ) is not used in the table.
2) Brales of Rockwell hardness A, C and D are made of diamond.
3) This table is excerpted from the JIS Steel Standard (1980).

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	μ m											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.

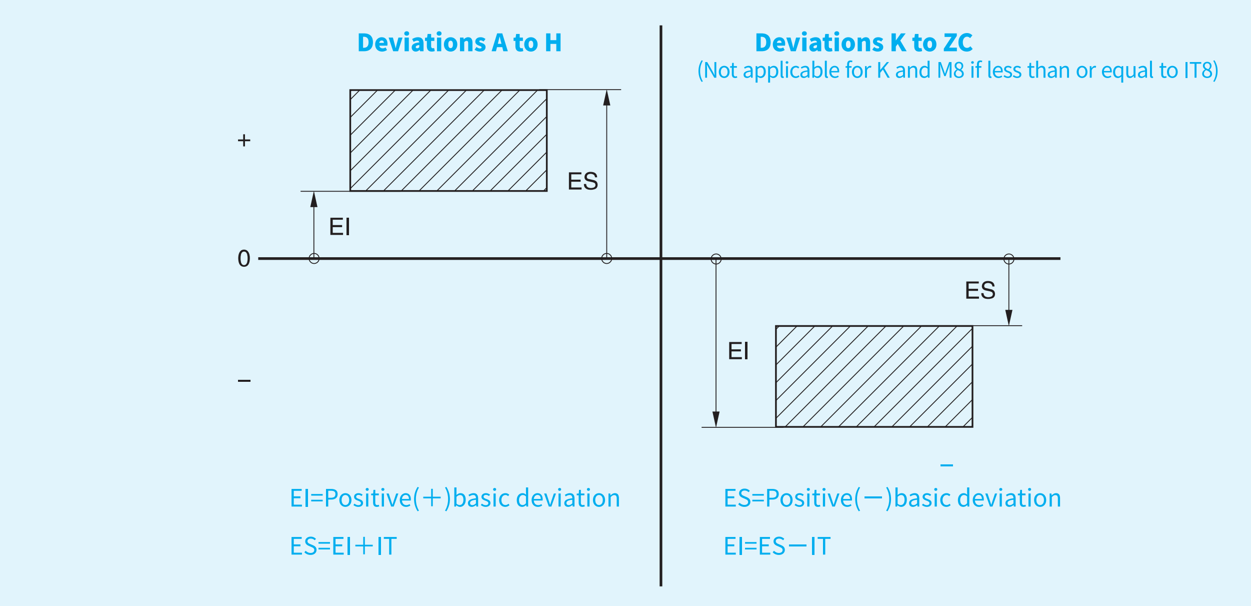
The lower deviation (ei) and upper deviation (es) of the shaft can be obtained from the basic deviation and standard tolerance (IT) of the shaft.



es=Negative(−)basic deviation
ei=es−IT

ei=Positive(+)basic deviation
es=ei+IT

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.



EI=Positive(+)basic deviation
ES=EI+IT

ES=Positive(−)basic deviation
EI=ES−IT

For example:

for a hole with diameter of φ3 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 10φm, so the upper deviation ES=EI+IT=10φm.

Therefore, the fit dimension of this hole is $\phi 3^{+0.01}_{0}$ mm.

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	Deviation=±(ITn/2), in which ITn is the IT value
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									
180	200	–660	–340	–240		–170	–100		–50		–15	0	
200	225	–740	–380	–260									
225	250	–820	–420	–280									
250	280	–920	–480	–300		–190	–110		–56		–17	0	
280	315	–1050	–540	–330									
315	355	–1200	–600	–360		–210	–125		–62		–18	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	
560	630												
630	710					–290	–160		–80		–24	0	
710	800												
800	900					–320	–170		–86		–26	0	
900	1000												
1000	1120					–350	–195		–98		–28	0	
1120	1250												
1250	1400					–390	–220		–110		–30	0	
1400	1600												
1600	1800					–430	–240		–120		–32	0	
1800	2000												
2000	2240					–480	–260		–130		–34	0	
2240	2500												
2500	2800					–520	–290		–145		–38	0	
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.

Basic deviation value of the shaft

µm

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	+274
										+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
−11	−18		+3	0	+15	+27	+43	+63	+92	+122	+170	+202	+248	+300	+365	+470	+620	+800
								+65	+100	+134	+190	+228	+280	+340	+415	+535	+700	+900
								+68	+108	+146	+210	+252	+310	+380	+465	+600	+780	+1000
−13	−21		+4	0	+17	+31	+50	+77	+122	+166	+236	+284	+350	+425	+520	+670	+880	+1150
								+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							

Basic deviation value of the hole

Basic dimension mm		Basic deviation value																					
		Lower deviation EI												Upper deviation ES									
		All standard tolerance classes												IT6	IT7	IT8	≤IT8	>IT8	≤IT8	>IT8	≤IT8	>IT8	≤IT7
>	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=±(ITₙ/2), in which ITₙ 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		+145	+85		+43		+14	0		+18	+26	+41	−3+Δ		−15+Δ	−15	−27+Δ	0	
140	160	+520	+280	+210																			
160	180	+580	+310	+230																			
180	200	+660	+340	+240		+170	+100		+50		+15	0		+22	+30	+47	−4+Δ		−17+Δ	−17	−31+Δ	0	
200	225	+740	+380	+260																			
225	260	+820	+420	+280																			
260	280	+920	+480	+300		+190	+110		+56		+17	0		+25	+36	+55	−4+Δ		−20+Δ	−20	−34+Δ	0	
280	315	+1050	+540	+330																			
315	355	+1200	+600	+360		+210	+125		+62		+18	0		+29	+39	+60	−4+Δ		−21+Δ	−21	−37+Δ	0	
355	400	+1350	+680	+400																			
400	450	+1500	+760	+440		+230	+135		+68		+20	0		+33	+43	+66	−5+Δ		−23+Δ	−23	−40+Δ	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=±[(ITn-1)/2] if the ITn value is odd from JS7 to JS11 in the tolerance zone.
3. The desired Δvalue 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 of the hole

µm

Basic deviation value												Δ value					
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 milling	**P**	P10	HR5225 HR1135	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 IC830 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	
		M40	HR5125 HR7125	GC2035		IC830 IC928	MP7035	AH645		AC6040M AC1030U AC530U	TT8020 TT8080 TT9020 TT9080	

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 milling	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		
	S	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

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 milling	P	P10	HR5110 HR5210	GC1010 GC1025 GC1030	KC5010M KC515M	IC807 IC903		AH120 AH725	PR830 PR1025 PR1225	ACP2500 ACP200	TT2510 TT7080	YBG252
		P20	HR5120 HR5220 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 HR530 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
	M	M10	HR5110 HR5120 HR5220	GC1010 GC1030	KC515M SP4019 SP6519	IC807 IC808 IC903 IC907 IC908		AH725	PR1025 PR1225	ACU2500 ACM100 ACK300 ACP300		YBG252
		M20	HR5110 HR5120 HR5220 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 HR530	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

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 milling	K	K10	HR5120 HR5220	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	HR5130		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	HR8105 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 HR8135	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	HR8225 HR8135	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

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	K	K01		GC3210	KCK05B KCK05	IC5005	MC5005 UC5105	T5105	CA310 CA4010 CA4505 CA5505	AC4010K AC405K	TT7005	YBD052
		K10	HR6115	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 AC425K AC8025P	TT7015 TT7025	YBD152 YBD252
		K30	HR6115	GC3225	KCP05B KCPK05 KCP10B KCP25B KCK20B		UE6110	T5125	CA320			

Comparison table of CVD turning grades

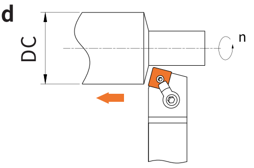
Type	Classification codes		HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MiTSUBiSHi	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
	IOS classification	Groups of materials										
CVD milling	P	P10		GC4220 GC4230 GC3040	KC930M KC935P	IC4100 IC520M IC4050 DT7150 IC5400				ACP2000 ACP100	TT7515	
		P20	HR6130	GC4220 GC4230 GC3040	SC6525 SP6519		F7030 MC7020	T3225		ACP2000 ACP100	TT7515	YBC301 YBC251
		P30	HR6130 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	HR6130	GC3220 K20W	KCK15 SC3025 MP91M	IC5100 DT7150 IC4010 IC4050 IC4100	MC5020	T1215	CA420M	ACK200 ACK200	TT7515	YBD252
		K30	HR6130 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	HRC10		KT1120	IC20N	NX1010	NS520	TN610	T110A T1000A		
		P20	HRC10	CT5015	KT1120 KT175	IC20N IC75T	NX2525	NS520 NS9530	TN610 TN60	T1200A T1500A	CT3000	YNG151 YNG151C
		P30	HRC10	CT5015	KT125	IC20N IC75T IC30N	NX2525 NX3035	NS9530 NS530 NS730	TN620 TN90	T1200A T1500A	CT3000	
		P40				IC75T IC30N	NX3035 NX4545	NS740		T250A		

Formulas for turning

- **Cutting speed**



$$Vc = \frac{\pi * Dc * n}{1000} (m/min)$$

Vc :Cutting speed(m/min) π: ≈ 3.14

Dc:Workpiece diameter(mm) n:Spindle speed~(rev/min)

- **Feed rate**

$$Vf = f * n\ (mm/min)$$

Vf :Feed rate (mm/min) f :Feed pre revolutio(mm/rev)

n: Spindle speed~(rev/min)

- **Chip thickness**

$$h = f * sinkr\ (mm)$$

h :Chip thickness (mm) f:Feed pre revolutio(mm/rev)

- **Chip width**

$$b = \frac{ap}{sinkr} (m/min)$$

b :Chip width (mm) ap :Cutting depth (mm)

- **Chip cross section**

$$A = h * b = ap * f\ (mm^2)$$

A :Chip cross section (mm^2) ap :Cutting depth (mm)

f :Feed pre revolutio (mm/rev)

- **Cutting force**

$$Fc = Kc * ap * f\ (N)$$

Fc :Cutting force (N) Kc :Specific cutting force (N/mm^2)

ap :Cutting depth(mm) f:Feed pre revolutio(mm/rev)

- **Cutting power**

$$Pmot = \frac{Kc * Vc * ap * f}{60000 * \eta} (KW)$$

Pmot:Cutting power (KW) Kc:Specific cutting force(N/mm^2)

Vc:Cutting speed (m/min) ap:Cutting depth(mm)

f:Feed pre revolutio(mm/rev) η: Efficient of machine

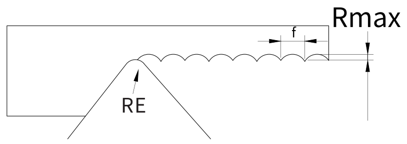
- **Metal removal rate**

$$Q = ap * f * Vc\ (cm^3/min)$$

Q:Metal removal rate (cm^3/min) ap:Cutting depth(mm)

f :Feed pre revolutio(mm/rev) Vc:Cutting speed (m/min)

- **Roughness profile depth**

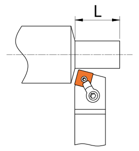


$$Rmax = \frac{f^2}{8 * RE} * 1000\ (um)$$

Rmax: Roughness profile depth (um)

f:Feed pre revolutio(mm/rev) **RE:**Corner radius of insert(mm)

- **Machining time**



$$Tc = \frac{L}{f * n} (min)$$

Tc: Machining time f:Feed pre revolutio(mm/rev)

n: Spindle speed(rev/min) L:Machined length (mm)

Formulas for milling

- **Cutting Speed**

$$Vc = \frac{\pi * Dc * n}{1000}\ (m/min)$$

Vc :Cutting speed (m/min)   π: ≈3.14
Dc:Cutter diameter (mm)   n: Spindle speed(rev/min)

- **Spindle Speed**

$$n = \frac{1000 * Vc}{\pi * Dc}\ (rev/min)$$

Vc :Cutting speed(m/min)   π: ≈3.14
Dc:Cutter diameter (mm)   n: Spindle speed(rev/min)

- **Feed Rate**

$$Vf = fz * n * Z\ (mm/min)$$

Vf:Feed rate (mm/min)   fz :Feed per tooth(mm/z)
n: Spindle speed(rev/min)   Z :Number of tooth

- **Feed Per Tooth**

$$fz = \frac{Vf}{n * Z}\ (mm/z)$$

fz :Feed per tooth (mm/z)   Vf :Feed rate (mm/min)
n: Spindle speed(rev/min)   Z :Number of tooth

- **Feed per revolution**

$$f = \frac{Vf}{n}\ (mm/rev)$$

f :Feed per revolution(mm/rev)   Vf :Feed rate (mm/min)
n: Spindle speed(rev/min)

- **Cutting Time**

$$Tc = \frac{L}{Vf}\ (min)$$

Tc :Cutting time (min)   L :Length of cut (mm)
Vf :Feed rate (mm/min)

- **Horse Power**

$$Hp = \frac{Pmot}{0.75}$$

Hp :Horse power   Pmot:Cutting power(KW)

- **Power Requirement**

$$Pmot = \frac{ap * ae * Vf * Kc}{6 * 10^7 * \eta}\ (KW)$$

Pmot: Cutting power (KW)   ap: Cutting depth   ae: Cutting width
Kc: Sepecific cutting force(N/mm^2) η: Machine efficiency rate (0.7-0.95)

- **Medium Chip Thickness**

$$hm = \frac{114.7 * fz * sink * (ae/Dc)}{\psi s}\ (mm)$$

hm: Medium chip thickness   fz :Feed per tooth(mm/z) ae: Cutting width
Dc :Cutter diameter (mm)   ψs :Engagement angle

- **Feed Force**

Where cutter is positioned centrally

$$\psi s = 2 * \arcsin\left(\frac{ae}{Dc}\right)\ [°]$$

Where cutter is positioned eccentrically

$$\psi s = 90° + \arcsin\frac{ae-(Dc/2)}{(Dc/2)}\ [°]$$

ψs :Engagement angle
ae: Cutting width   Dc :Cutter diameter (mm)

- **Metal Removal Rate**

$$Q = \frac{ap * ae * Vf}{1000}\ (cm^3/min)$$

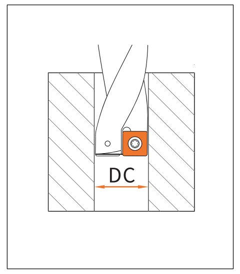
Q: Metal removal rate (cm^3/min)   ap: Cutting depth   ae: Cutting width
Vf :Feed rate (mm/min)

Formulas for drilling

- **Cutting speed**

$$Vc = \frac{\pi * Dc * n}{1000}\ (m/min)$$

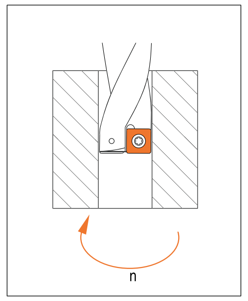
Vc :Cutting speed(m/min)   π: ≈3.14
Dc :Cutter diameter (mm)   n: Spindle speed(rev/min)



- **Spindle speed**

$$n = \frac{1000 * Vc}{\pi * Dc}\ (rev/min)$$

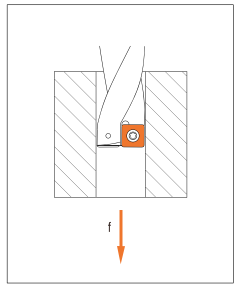
Vc :Cutting speed(m/min)   π: ≈3.14
Dc :Cutter diameter (mm)   n: Spindle speed(rev/min)



- **Feed rate**

$$Vf = fz * n * Z\ (mm/min)$$

Vf:Feed rate (mm/min)   fz:Feed per tooth(mm/z)
n: Spindle speed(rev/min)   Z :Number of tooth



- **Feed per revolution**

$$fz = \frac{Vf}{n * Z}\ (mm/z)$$

fz:Feed per tooth(mm/z)   Vf:Feed rate (mm/min)
n: Spindle speed(rev/min)   Z :Number of tooth

- **Feed per revolution**

$$f = \frac{Vf}{n}\ (mm/rev)$$

f:Feed per revolution (mm/rev)   Vf :Feed rate (mm/min)
n: Spindle speed(rev/min)

- **Metal removal rate**

$$Q = \frac{Vf * \pi * Dc^2}{4 * 1000}\ (cm^3/min)$$

Q: Metal removal rate (cm^3/min)   Vf:Feed rate (mm/min)
π: ≈3.14   Dc :Drilling tool diameter (mm)

- **Horse power**

$$Hp = \frac{Pmot}{0.75}$$

Hp :Horse power   Pmot: Cutting power (KW)

- **Power requirment**

$$Pmot = \frac{Q * Kc}{60000 * \eta}\ (KW)$$

Pmot: Cutting power (KW)   Q: Metal removal rate (cm^3/min)
Kc: Sepecific cutting force(N/mm^2) η: Machine efficiency rate (0.7-0.95)

- **Torque**

$$Mc = \frac{Dc^2 * Kc * f}{8000}\ (N*m)$$

Mc: Torque   Dc :Drilling tool diameter (mm)
Kc: Sepecific cutting force(N/mm^2)   f:Feed per revolution(mm/rev)

- **Feed force**

$$Ff = 0.63 * \frac{f * Dc * Kc}{2}\ (N)$$

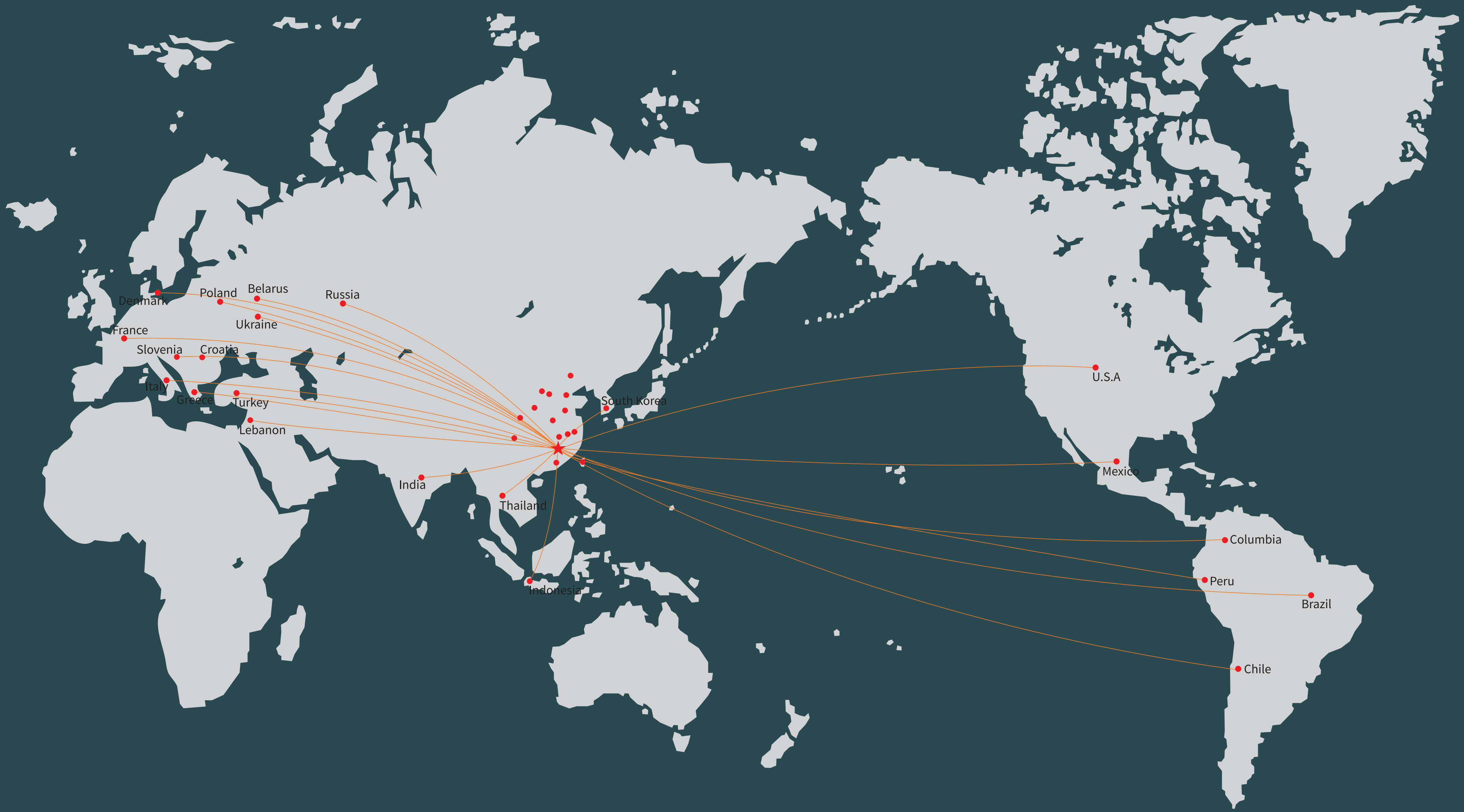
Ff: Feed force   f :Feed per revolution (mm/rev)
Dc :Drilling tool diameter(mm)   Kc: Sepecific cutting force(N/mm^2)

- **Chip thickness**

$$h = fz * sink\ (mm)$$

h:Chip thickness (mm)   fz :Feed pre revolution(mm/rev)

HUAREAL


Denmark
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Turkey
Lebanon
India
Thailand
Indonesia
South Korea
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