HUAREAL
Efficient
Cutting Tools

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2022-2023 Comprehensive Catalogue HUAREAL

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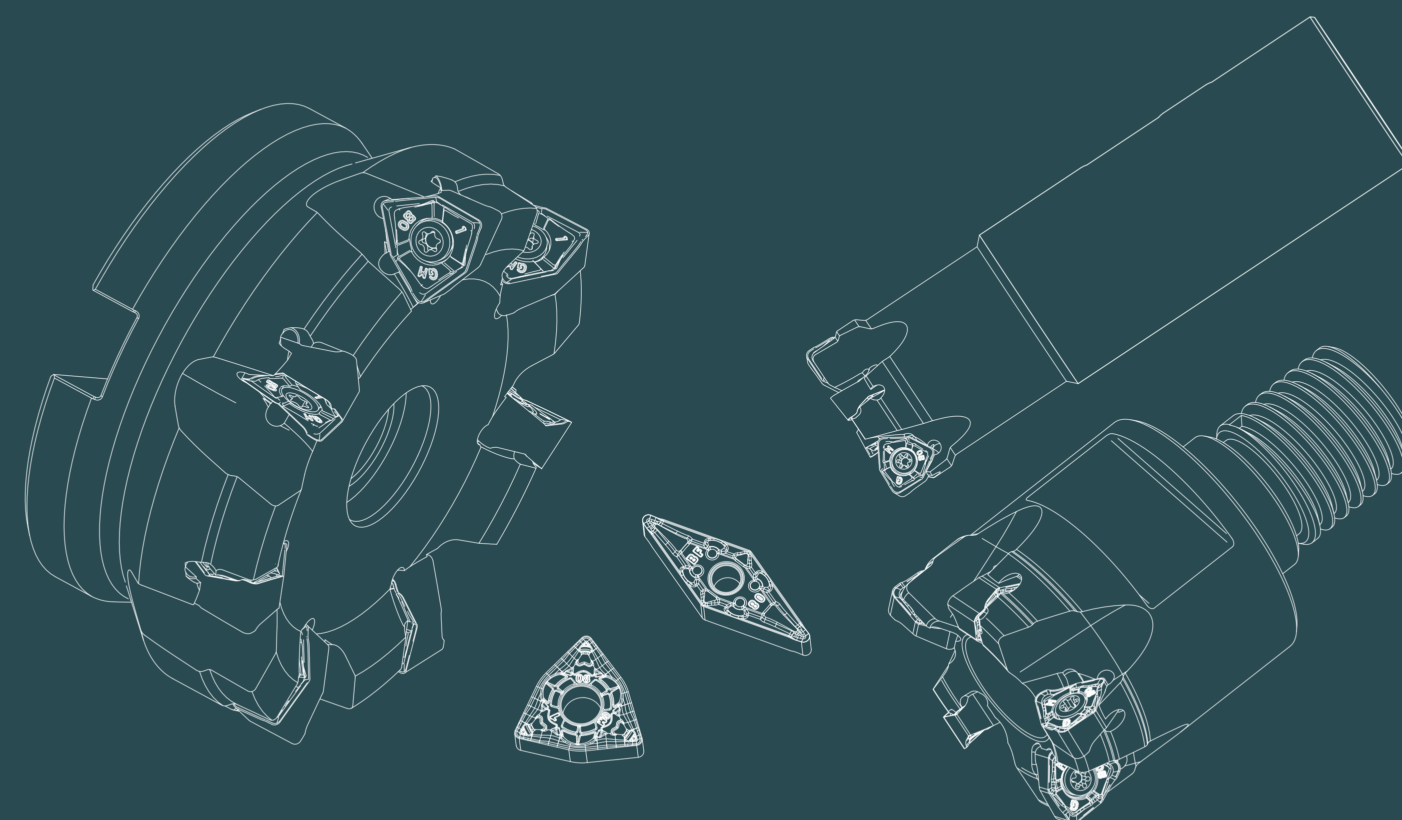
2022-2023 | HUAREAL CUTTING TOOLS

COMPREHENSIVE CATALOGUE



ZHUZHOU HUARUI PRECISION CUTTING TOOLS CO., LTD.


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

Content


HUAREAL
New
8225
GM
Steel turning inserts

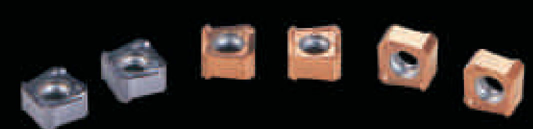

HUAREAL
C/SSM 190
Square shoulder milling tools

HUAREAL

New

CFM145

Face milling tools



HUAREAL

New

Solid carbide cutting tools

HUAREAL

Introduction

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

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

■Products in this catalogue may be attached with the following symbols:
Indexable inserts: ★ Recommended grade ☆ Available grade
Indexable cutting tools: ▲Running stock △Make-to-order
Solid carbide cutting tool: ●Running stock ○ Make-to-order
Application: ☀ Fit well ☼ Applicable

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

Overview of dimension codes according to ISO13399 Standard

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

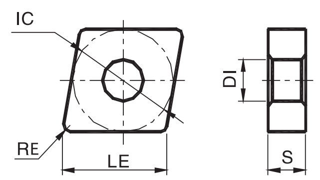
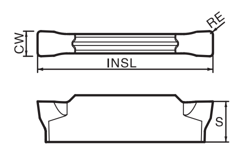
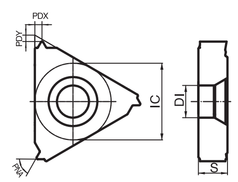
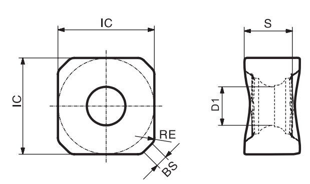
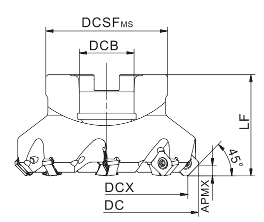
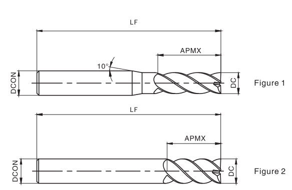
Overview of dimension codes according to ISO13399 Standard

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	Tool cutting edge angle – longitudinal fixed–range feed		PDY	Profile distance ey
KCH	Corner chamfer		PHD	Premachined hole diameter
PHDX	Premachined hole diameter maximum		TCT	Tolerance class tool
PL	Point length		TCTR	Tolerance class thread
PNA	Angle profile included		TD	Thread diameter
PRFRAD	Profile radius		TDZ	Thread diameter size
PRSPC	Profile specification		TFLA	Tap floating length ahead
PSIR	Tool lead angle		TFLB	Tap floating length behind
PSIRL	Cutting edge angle major left hand		TG	Tap gradient

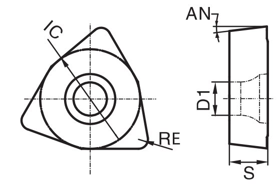
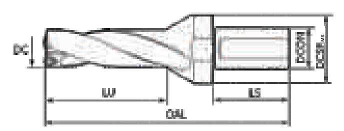
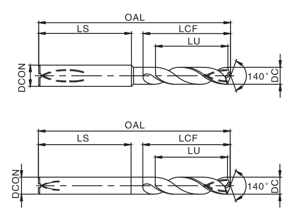
Overview of dimension codes according to ISO13399 Standard

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

Examples of basic dimension according to ISO13399 Standard

Tool type	Basic size marking form	Code	Definition
Turning insert		IC	Inscribed circle diameter
		LE	Cutting edge length
		S	Insert thickness
		D1	Insert hole diameter
		RE	Corner radius
Parting and grooving insert		INSL	Insert length
		CW	Insert width
		S	Insert thickness
		RE	Corner radius
Thread insert		IC	Inscribed circle diameter
		PDX	Profile distance ex
		PDY	Profile distance ey
		S	Insert thickness
		DI	Insert hole diameter
		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

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:

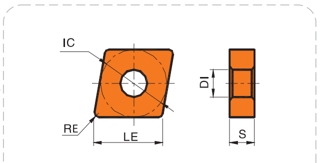
Steel | Stainless steel | Cast iron | Non-ferrous metal | Heat-resistant alloy, Titanium alloy

Instructions for insert specifications and models

Insert shape, angle

80° CN□□

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

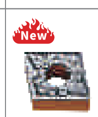


Dimensioned structure drawing of inserts with marking
LE: Length of cutting edge
IC: Inscribed circle
S: Thickness
DI: Hole diameter
RE: Nose radius

Insert machining type: Finishing,medium, roughing and heavy machining

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) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet 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	New 	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

Grade

Insert shape | Description | Dimension | Inventory | Grade infomation

A Turning

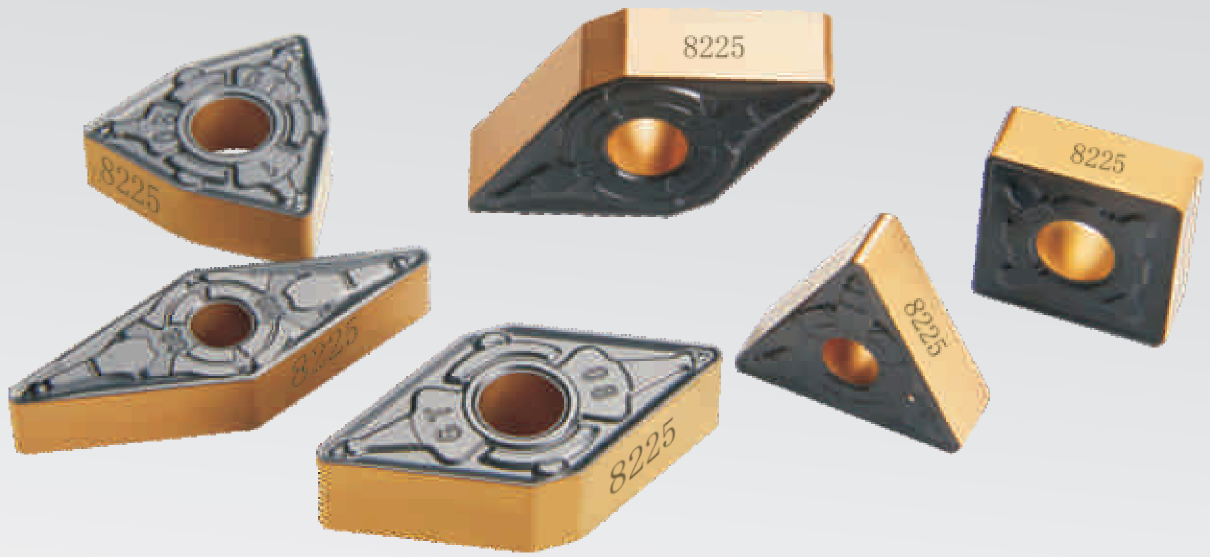
General turning

Parting and grooving

Threading

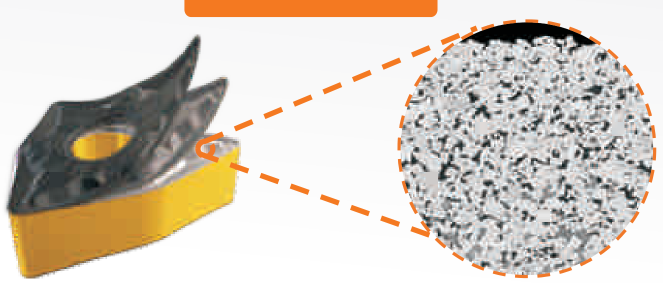
Steel turning

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



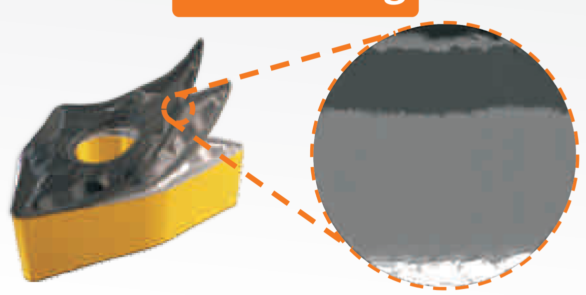
New grade HR8225

New substrate



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

New coating



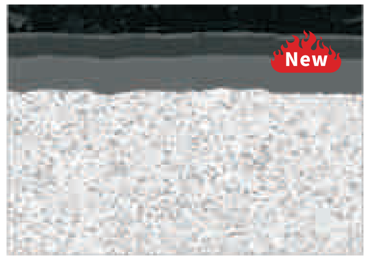
- High-strength directionally grown alumina is deposited on columnar fine-grained titanium carbonitride, forming a brand-new composite multilayer CVD coating;
- The smooth coating surface effectively reduces chip adhesion.

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

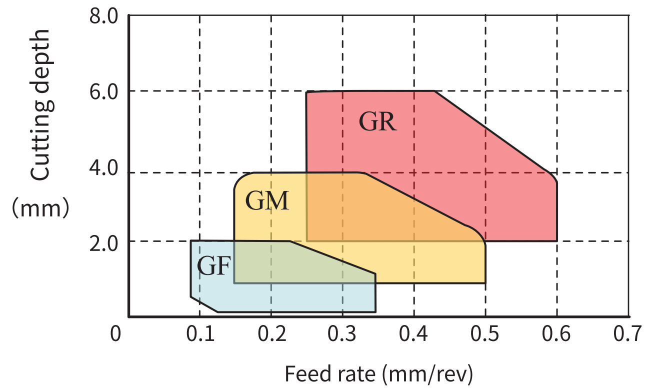
GM chipbreaker: Advanced balance of sharpness and high-strength creates applicability for multiple purposes, and provides efficient cutting and long service life.

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

HR8115



HR8225

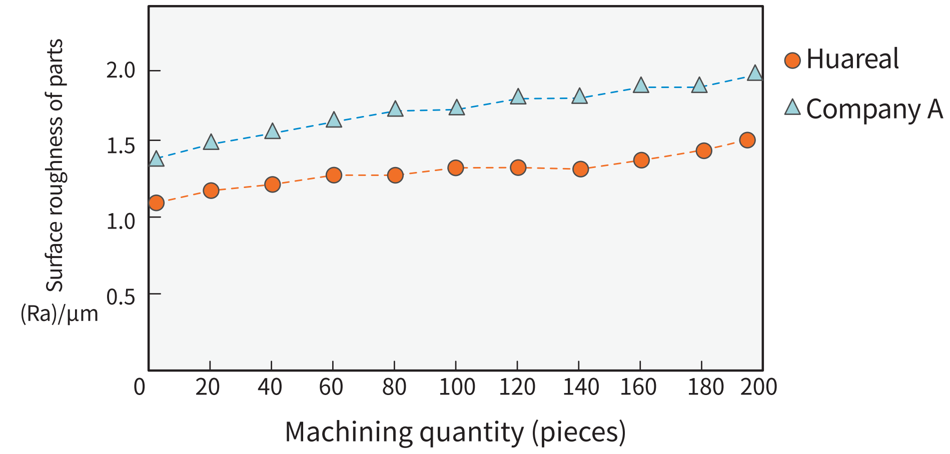


(Description: CNMG 120408-□□)

Cutting data

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

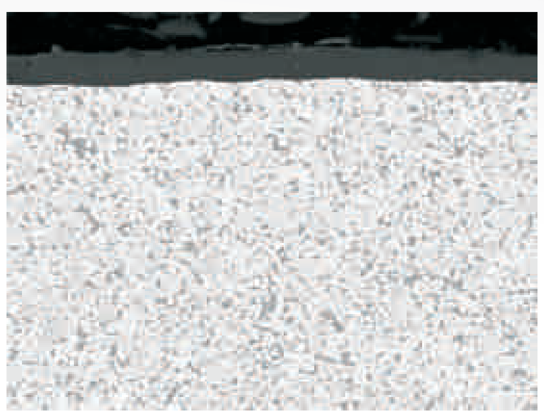
Workpiece name: Shaft parts
Workpiece material: 45# steel
Machining method: Wet external turing
Insert: DNMG150408-GF
HR8115
Machining parameters: v_c=338m/min, f_n=0.2mm/r, ap=0.4mm



Stainless steel turning

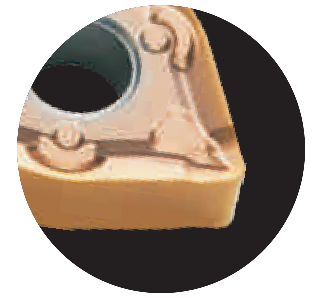
BF, BM, BR and other grooves can meet the requirements of stainless steel turning from finish machining to rough machining.

New grade for stainless steel turning HR7225



Structure of HR7225

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

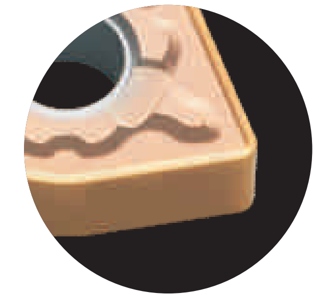


BF

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

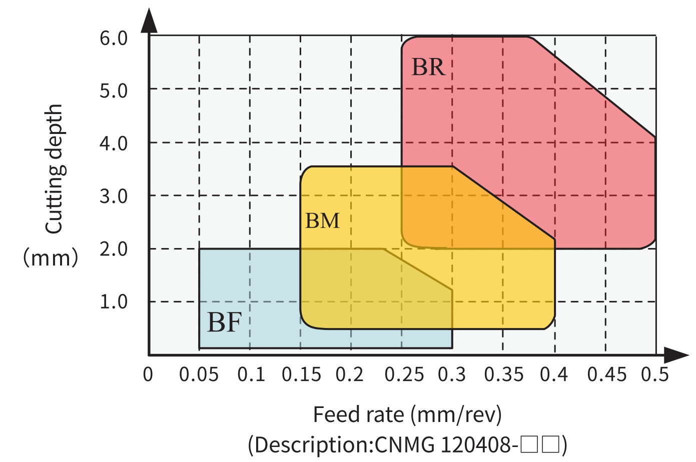
BM

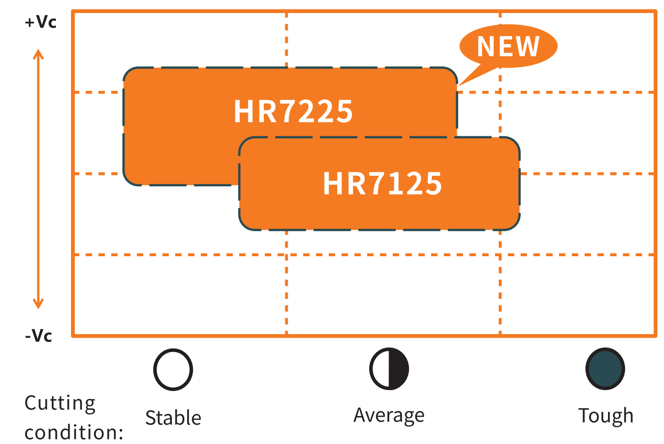
The edge micro-machining technology guarantees both sharpness and high strength, and thus meet the machining requirements of high efficiency and long service life of stainless steel.



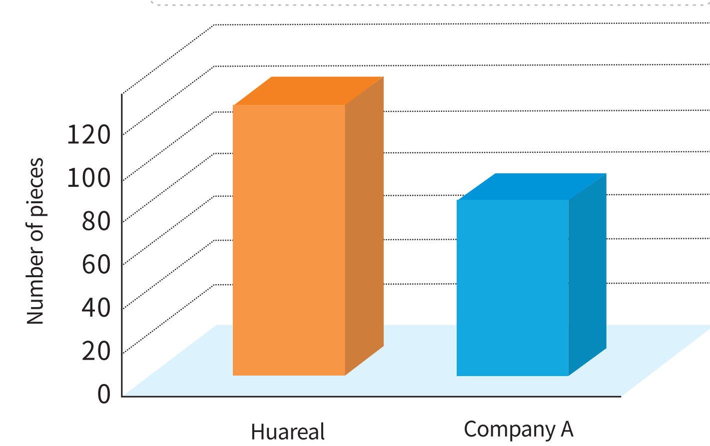
BR

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





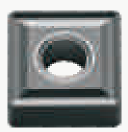
Workpiece material: SUS304
Machining method: wet external semi-finish turning
Insert: VNMG160408-BM HR7225
Machining parameters: vc=170m/min, fn=0.2mm/r, ap=1.2mm



Cutting data (HR7225)

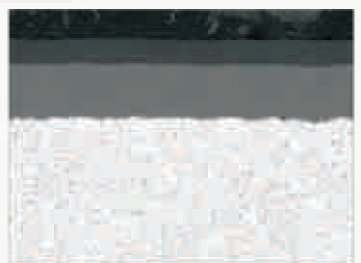
Chipbreaker	Cutting speed (m/min)	Feed rate (mm/r)	Cutting depth (mm)
BF	200 - 320	0.05 - 0.30	0.20 - 2.00
BM	150 - 240	0.15 - 0.40	0.50 - 3.50
BR	140 - 200	0.25 - 0.50	2.00 - 6.00

Cast iron turning



All-round chipbreaker: top choice for cast iron turning

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



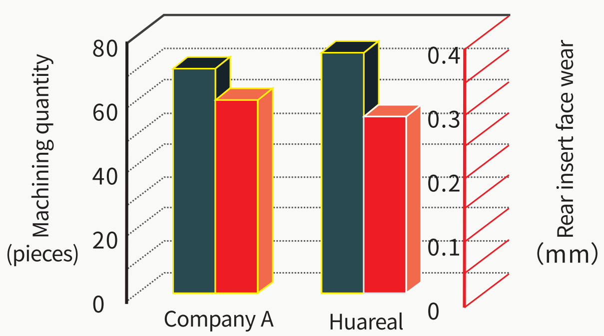
Structure of HR6115

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

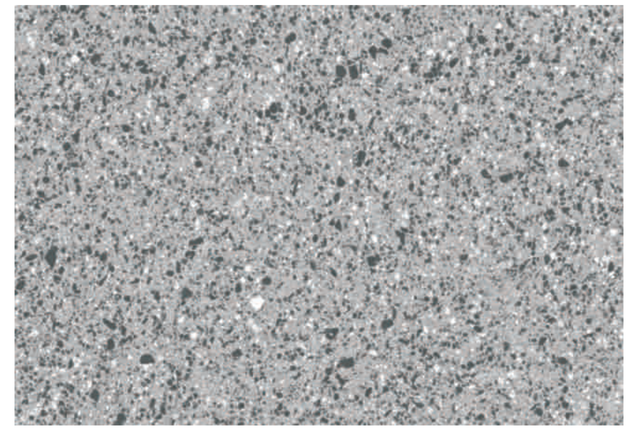


Cermet insert

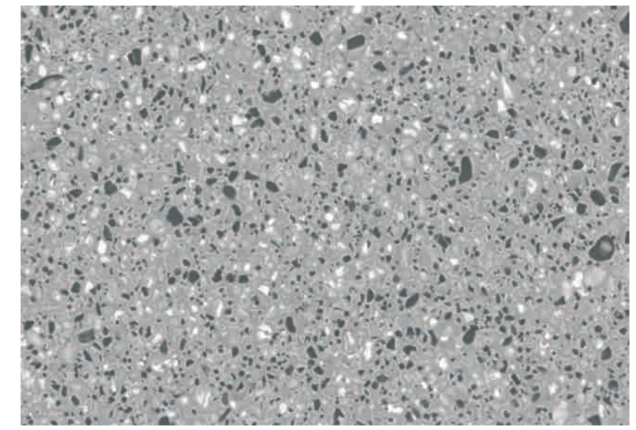
HRC10
HRC20

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

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



Structure of HRC10



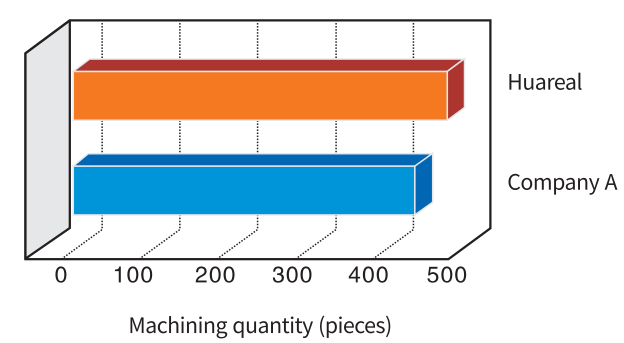
Structure of HRC20

Cutting data for cermet insert

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

Machining case of cermet insert

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



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

Grade code key

HR 8 2 25

① ② ③ ④

①Grade code

②Classification codes

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

③Number of grades in the same group

1—— 1st Gen

2—— 2nd Gen

3—— 3rd Gen

④ISO material classification number

05	10
15	20
25	30
35	40

Overview of general turning grades

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

A General turning
Parting and grooving
Threading
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Solid carbide drills

General turning inserts code key

Shape code

85° A	82° B	80° C
55° D	75° E	H
55° K	L	86° M
O	P	R
S	T	75° T
35° V	80° W	Others Z

Chipbreaker and clamping form

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°				

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)

m ΦD m ΦD S

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

Cutting edge length

Inscribed circle diameter (mm)	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			

Insert shape

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

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

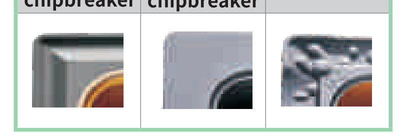
Code	Corner radius (mm)
00	No fillet
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
32	3.2
X	Others
Insert diameter Mo (Metric)	Round insert

Chipbreaker code

GF	GM	GR

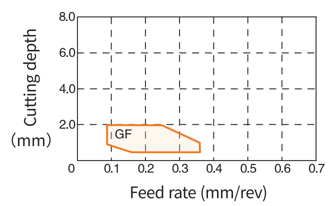
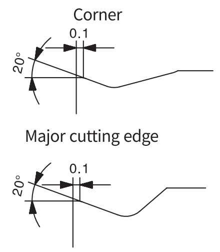
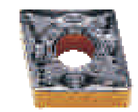
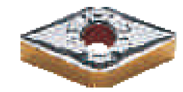
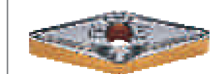
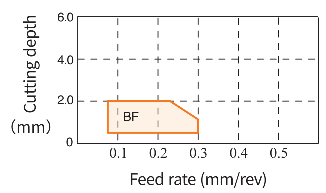
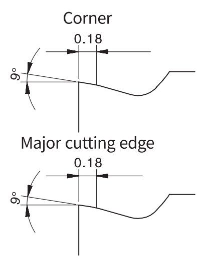
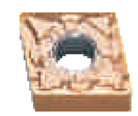
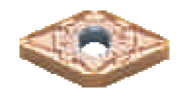
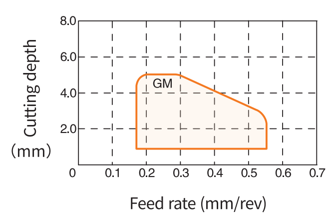
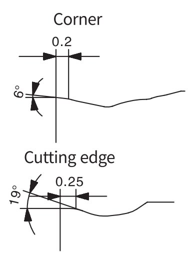
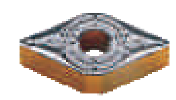
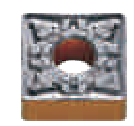
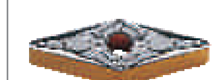
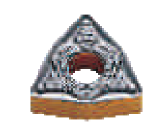
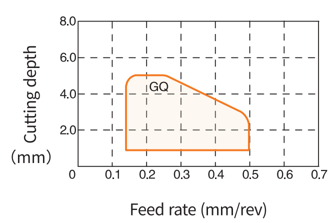
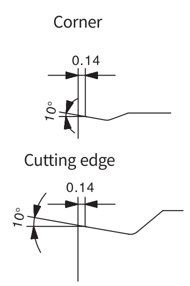
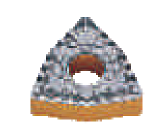
BF	BM	BR

All-round chipbreaker	Flat chipbreaker	GZ



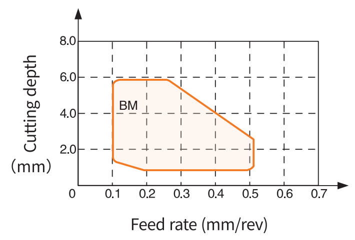
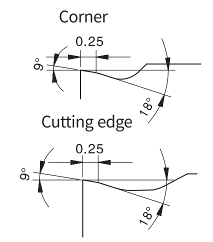
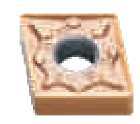
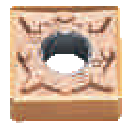
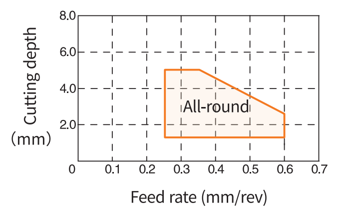
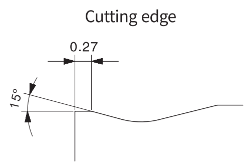
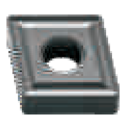
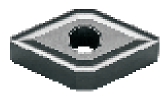
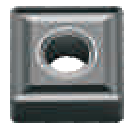
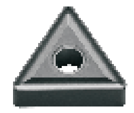
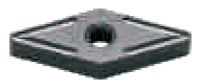
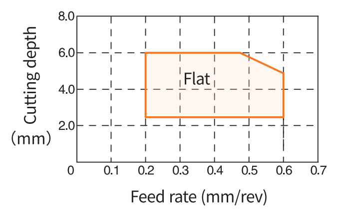
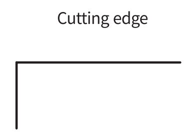
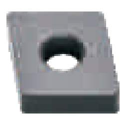
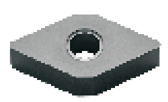
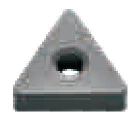
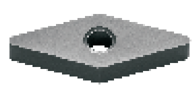
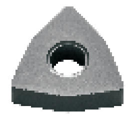
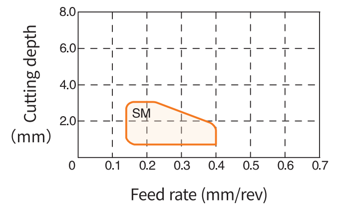
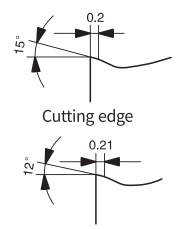
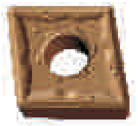
A
General turning
Parting and grooving
Threading
B
Indexable milling
Solid carbide end mills
C
Short hole drills
Solid carbide drills

Overview of general turning inserts

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

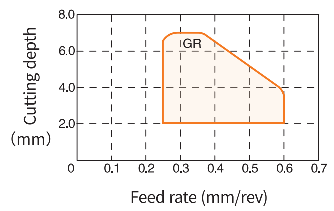
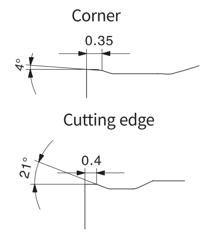
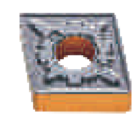
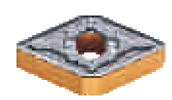
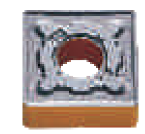
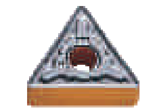
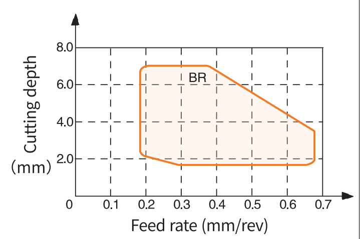
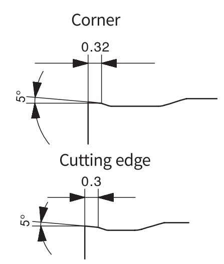
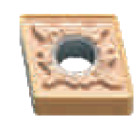
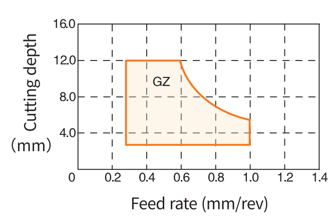
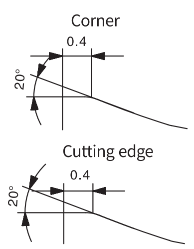
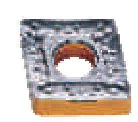
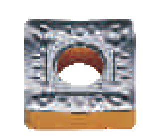
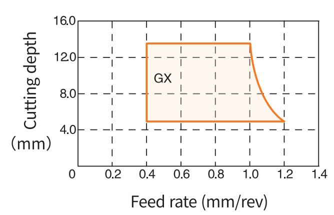
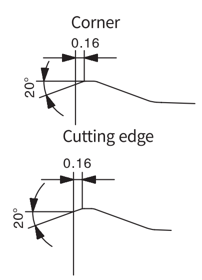
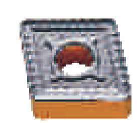
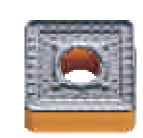
A General turning Parting and grooving Threading B Indexable milling Solid carbide end mills C Short hole drills Solid carbide drills

Overview of general turning inserts

Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		80° C-type	55° D-type	90° S-type	60° T-type	35° V-type	80° W-type
For semi-finishing	M	BM	**Recommended chipbreaker for semi-finishing of stainless steel** ◆ Sharp cutting edge, less cutting resistance, good chip disposal performance even at small cutting depth. ◆ The micro-passivated cutting edge reduces the formation of build-up edge.				 A19	 A24	 A26	 A29	 A32	 A34
		All-round	**General machining chipbreaker** ◆ Double-sided chipbreaker, especially suitable for K-type material machining. ◆ Recommended cutting parameters				 A20	 A24	 A27	 A30	 A32	 A35
		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.				 A20	 A25	 A27	 A30	 A33	 A35
		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.				 A21	 A25				 A35

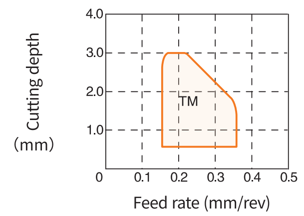
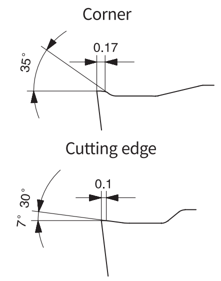
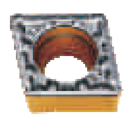
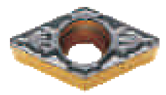
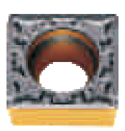
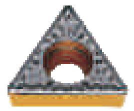
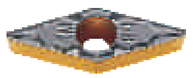
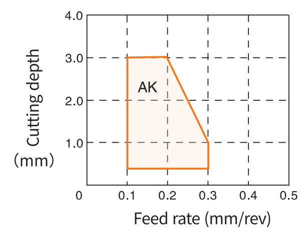
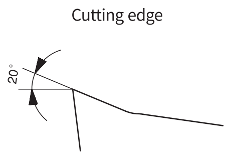
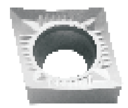
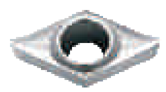
A General turning
Parting and grooving
Threading
B Indexable milling
Solid carbide end mills
C Short hole drills
Solid carbide drills

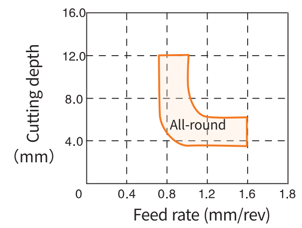
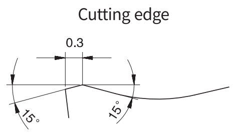
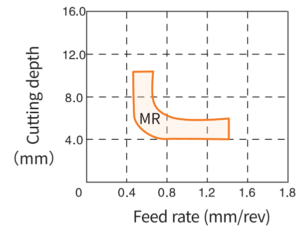
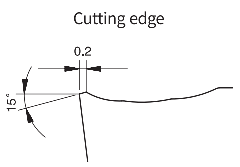
Overview of general turning inserts

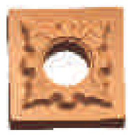
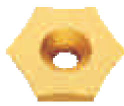
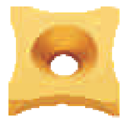
Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		80° C-type	55° D-type	90° S-type	60° T-type	35° V-type	80° W-type
For rough machining	M	GR	**Recommended chipbreaker for roughing of P-type material** ◆ Chipbreaking table with raised corner can effectively control 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.				 A21	 A25	 A27	 A30		 A35
		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.				 A21		 A28	 A31		 A35
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.				 A21		 A28			
		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.				 A22		 A28			

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

Overview of general turning inserts

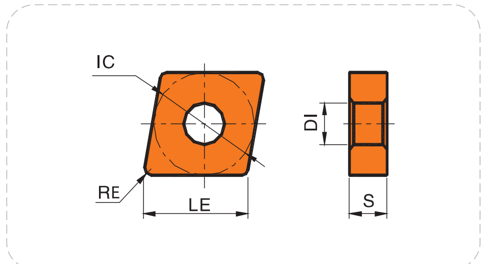
Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		80° C-type	55° D-type	90° S-type	60° T-type	35° V-type	80° W-type
For semi-finish machining	M	**TM**	**Genral chipbreaker for semi-finishing** ◆ It is suitable for internal or external semi-finishing of steel, stainless steel and cast iron.				 A38	 A39	 A40	 A41	 A42	
Aluminum alloy machining	G	**AK**	**Aluminum alloy machining chipbreaker** ◆ With a large rake angle and clearance angle, the cutting edge of the insert becomes sharper and therefore, cutting can be done in a faster and lighter pattern with effective chip breaking.				 A38	 A39		 A41	 A42	

Usage	Tolerance	Chipbreaker	Features	Chipbreaker diagram	Sectional view of chipbreaker		R–type
Profiling insert	M	All-round chipbreaker	◆ With high strength, the cutting edge secures high safety and is the first choice for rough profiling. ◆ It is suitable for train wheel turning.				 A43
		MR	◆ Large chip-breaking space prevents chip blockage during large cutting depth machining. ◆ The small pit group improves the chip machining performance during small cutting depth machining. ◆ It is suitable for train wheel turning.				 A43

Usage	Tolerance	Chipbreaker	90° S-type	Chipbreaker	90° S-type		Usage	Tolerance	Chipbreaker	120° H-type	90° S-type
Planer milling machining	M	HAF	 A36	HSF	 A36		Pipe-stripping machining	U	BG	 A37	 A37

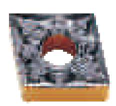
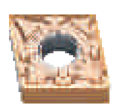
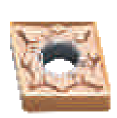
HUAREAL

80° CN□□



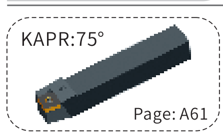
Working condition: ● Stable ◕ Average ⌗ Tough

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					●	◕								

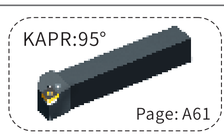
Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Finishing		CNMG120404-GF	12.9	12.7	4.76	5.16	0.4	★	☆	★											
		CNMG120408-GF	12.9	12.7	4.76	5.16	0.8	★	☆	★											
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	New 	CNMG120404-GM	12.9	12.7	4.76	5.16	0.4	★	☆	★											
		CNMG120408-GM	12.9	12.7	4.76	5.16	0.8	★	☆	★											
		CNMG120412-GM	12.9	12.7	4.76	5.16	1.2	★	☆	★											
		CNMG160608-GM	16.1	15.875	6.35	6.35	0.8	★	☆	★											
		CNMG160612-GM	16.1	15.875	6.35	6.35	1.2	★	☆	★											
		CNMG160616-GM	16.1	15.875	6.35	6.35	1.6	★	☆	★											
Semi-finishing		CNMG120404-BM	12.9	12.7	4.76	5.16	0.4							☆	★						
		CNMG120408-BM	12.9	12.7	4.76	5.16	0.8							☆	★						
		CNMG120412-BM	12.9	12.7	4.76	5.16	1.2							☆	★						

★ Recommended grade ☆ Available grade

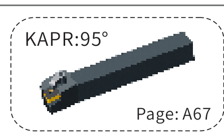
Applicable tools



PCBNR/L

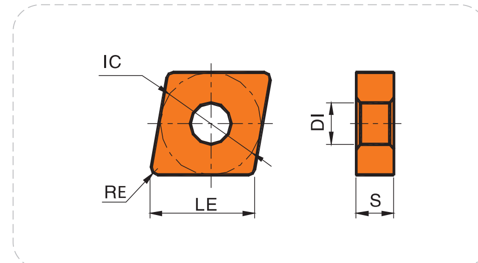


PCLNR/L



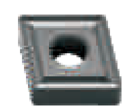
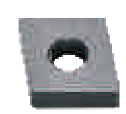
MCLNR/L

80° CN□□



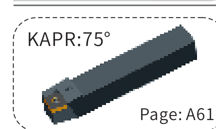
Working condition: ● Stable ◕ Average ⌗ Tough

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					●	◕								

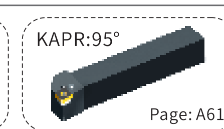
Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Cast iron machining		CNMG120404	12.9	12.7	4.76	5.16	0.4				★										
		CNMG120408	12.9	12.7	4.76	5.16	0.8				★										
		CNMG120412	12.9	12.7	4.76	5.16	1.2				★										
		CNMG120416	12.9	12.7	4.76	5.16	1.6				★										
		CNMG160608	16.1	15.875	6.35	6.35	0.8				★										
		CNMG160612	16.1	15.875	6.35	6.35	1.2				★										
		CNMG160616	16.1	15.875	6.35	6.35	1.6				★										
		CNMG190612	19.3	19.05	6.35	7.94	1.2				★										
		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

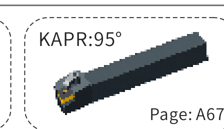
Applicable tools



PCBNR/L



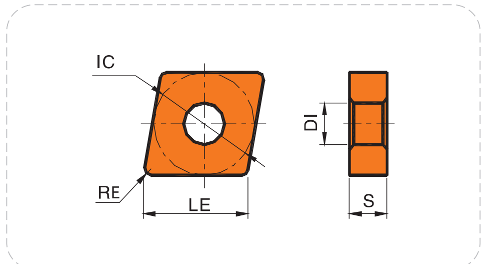
PCLNR/L



MCLNR/L

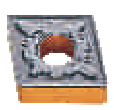
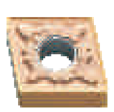
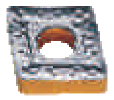
HUAREAL

80° CN□□



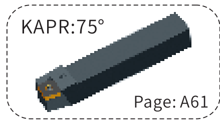
Working condition: ● Stable ◕ Average ⌗ Tough

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					●	◕								

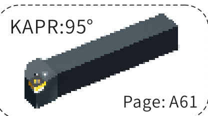
Machining type	Insert shape	Type	LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
			Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
Semi-finishing	New 	CNMG120404-SM	12.9	12.7	4.76	5.16	0.4					☆	★								
		CNMG120408-SM	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	☆	☆	★											
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							☆	★						
		CNMG190616-BR	19.3	19.05	6.35	7.94	1.6							☆	★						
Heavy machining	New 	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	25.19	25.4	9.525	9.12	2.4	★		★											
		CNMM250932-GZ	25.19	25.4	9.525	9.12	3.2	★		★											

★ Recommended grade ☆ Available grade

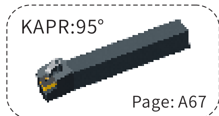
Applicable tools



PCBNR/L

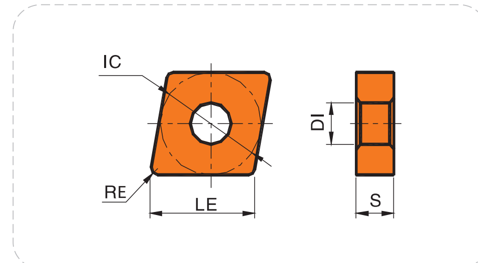


PCLNR/L



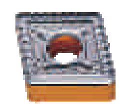
MCLNR/L

80° CN□□



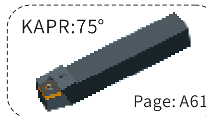
Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material		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					●	◕								

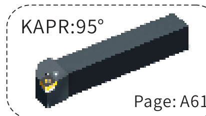
Machining type	Insert shape	Type	LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
			Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
Heavy machining	New 	CNMM190608-GX	19.3	19.05	6.35	7.94	0.8	★		★											
		CNMM190612-GX	19.3	19.05	6.35	7.94	1.2	★		★											
		CNMM190616-GX	19.3	19.05	6.35	7.94	1.6	★		★											
		CNMM190624-GX	19.3	19.05	6.35	7.94	2.4	★		★											
		CNMM250716-GX	25.19	25.4	7.94	9.12	1.6	★		★											
		CNMM250724-GX	25.19	25.4	7.94	9.12	2.4	★		★											
		CNMM250732-GX	25.19	25.4	7.94	9.12	3.2	★		★											
		CNMM250916-GX	25.19	25.4	9.525	9.12	1.6	★		★											
		CNMM250924-GX	25.19	25.4	9.525	9.12	2.4	★		★											
		CNMM250932-GX	25.19	25.4	9.525	9.12	3.2	★		★											

★ Recommended grade ☆ Available grade

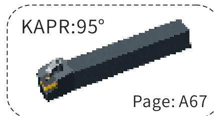
Applicable tools



PCBNR/L



PCLNR/L

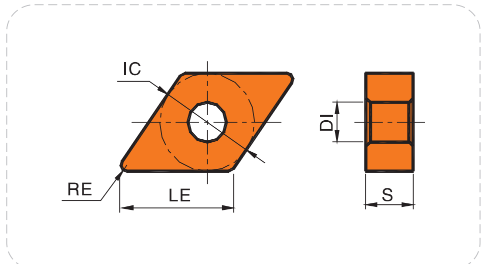


MCLNR/L

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

55°DN□□

Working condition: ● Stable ◕ Average ¤ Tough

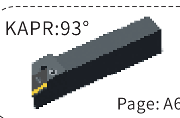


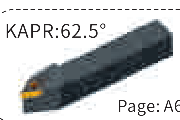
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ¤										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

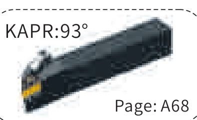
Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Finishing		DNMG150404-GF	15.5	12.7	4.76	5.16	0.4	★	☆	★											
		DNMG150408-GF	15.5	12.7	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	New 	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	★	☆	★											

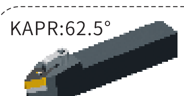
★ Recommended grade ☆ Available grade

Applicable tools


KAPR:93° Page: A62
PDJNR/L

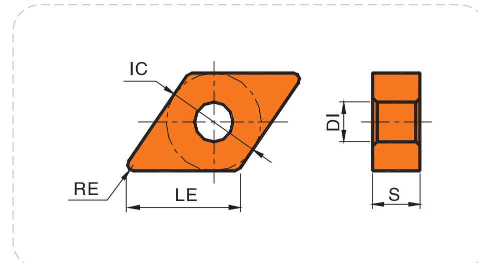

KAPR:62.5° Page: A62
PDNN


KAPR:93° Page: A68
MDJNR/L

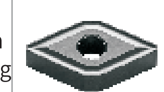

KAPR:62.5° Page: A69
MDPNN

55°DN□□

Working condition: ● Stable ◕ Average ¤ Tough

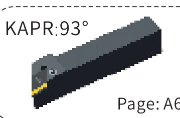


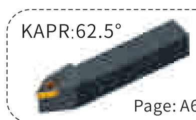
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ¤										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

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
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: A62
PDJNR/L

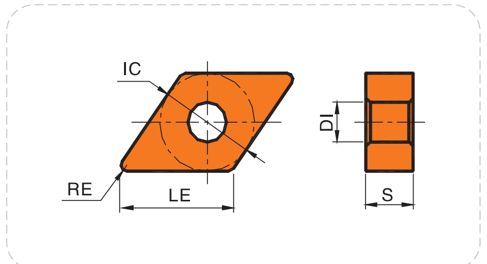

KAPR:62.5° Page: A62
PDNN


KAPR:93° Page: A68
MDJNR/L

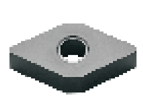
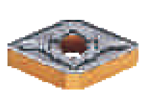

KAPR:62.5° Page: A69
MDPNN

55°DN□□

Working condition: ● Stable ◕ Average ⌗ Tough

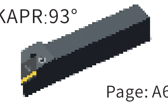


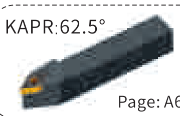
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

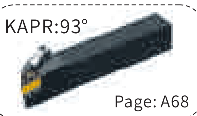
Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Cast iron machining		DNMA150404	15.5	12.7	4.76	5.16	0.4				★										
		DNMA150408	15.5	12.7	4.76	5.16	0.8				★										
		DNMA150412	15.5	12.7	4.76	5.16	1.2				★										
		DNMA150604	15.5	12.7	6.35	5.16	0.4				★										
		DNMA150608	15.5	12.7	6.35	5.16	0.8				★										
		DNMA150612	15.5	12.7	6.35	5.16	1.2				★										
Semi-finishing	New 	DNMG150404-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	☆	☆	★											

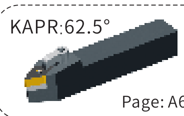
★ Recommended grade ☆ Available grade

Applicable tools


KAPR:93° Page: A62
PDJNR/L

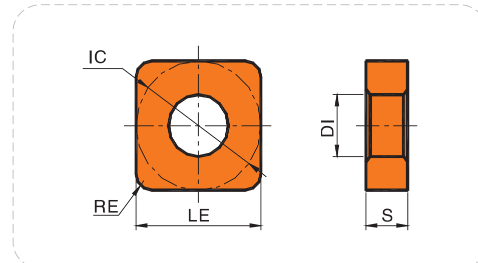

KAPR:62.5° Page: A62
PDNN


KAPR:93° Page: A68
MDJNR/L

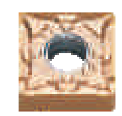
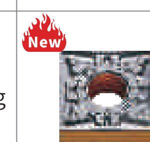
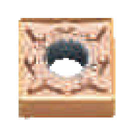

KAPR:62.5° Page: A69
MDPNN

90°SN□□

Working condition: ● Stable ◕ Average ⌗ Tough



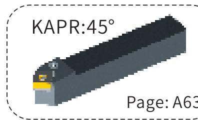
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

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

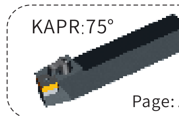
★ Recommended grade ☆ Available grade

Applicable tools


KAPR:75° Page: A63
PSBNR/L


KAPR:45° Page: A63
PSDNN


KAPR:75° Page: A64
PSKNR/L

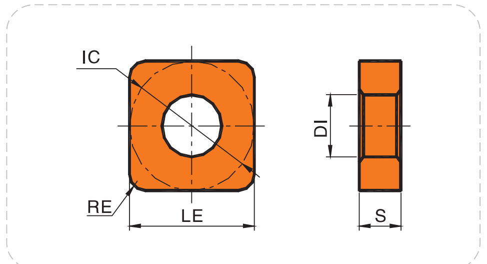

KAPR:75° Page: A70
MSBNR/L


KAPR:75° Page: A71
MSKNR/L


KAPR:45° Page: A71
MSDNN

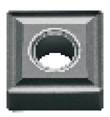
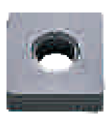
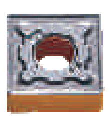
HUAREAL

90°SN□□



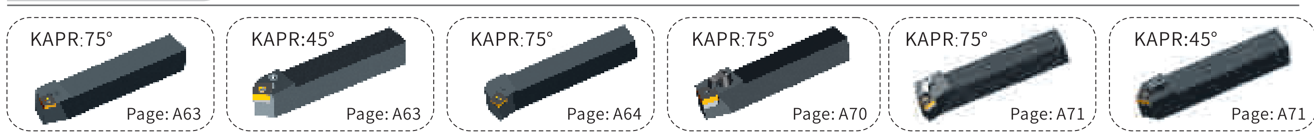
Working condition: ● Stable ◕ Average ⌗ Tough

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
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	☆	☆	★											

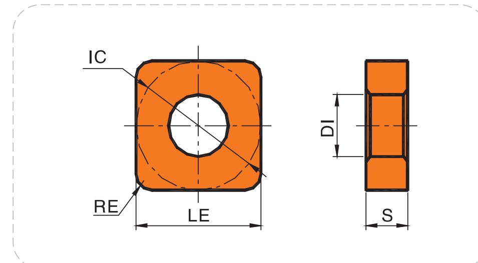
★ Recommended grade ☆ Available grade

Applicable tools



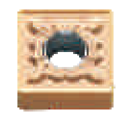
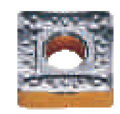
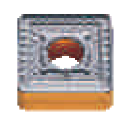
PSBNR/L | PSDNN | PSKNR/L | MSBNR/L | MSKNR/L | MSDNN

90°SN□□



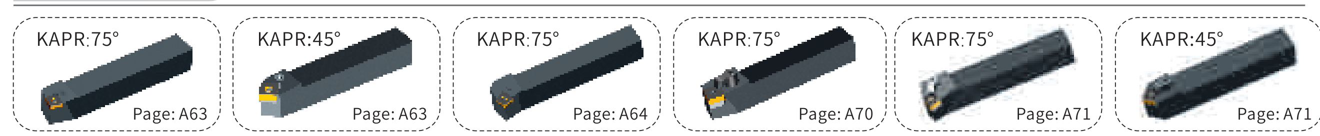
Working condition: ● Stable ◕ Average ⌗ Tough

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
Rough machining		SNMG120408-BR	12.7	12.7	4.76	5.16	0.8							☆	★						
		SNMG120412-BR	12.7	12.7	4.76	5.16	1.2							☆	★						
Heavy machining	New 	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	New 	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	★		★											

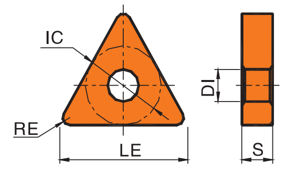
★ Recommended grade ☆ Available grade

Applicable tools



PSBNR/L | PSDNN | PSKNR/L | MSBNR/L | MSKNR/L | MSDNN

60°TN□□



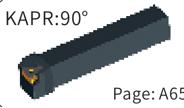
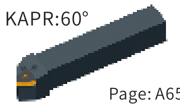
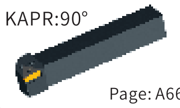
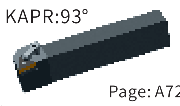
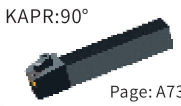
Working condition: ● Stable ◕ Average ⌗ Tough

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					●	◕								

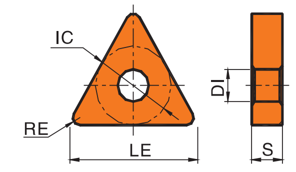
Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Finishing		TNMG160404-GF	16.5	9.525	4.76	3.81	0.4	★	☆	★											
		TNMG160408-GF	16.5	9.525	4.76	3.81	0.8	★	☆	★											
Finishing		TNMG160404-BF	16.5	9.525	4.76	3.81	0.4							☆	★						
		TNMG160408-BF	16.5	9.525	4.76	3.81	0.8							☆	★						
Semi-finishing	New 	TNMG160404-GM	16.5	9.525	4.76	3.81	0.4	★	☆	★											
		TNMG160408-GM	16.5	9.525	4.76	3.81	0.8	★	☆	★											
		TNMG160412-GM	16.5	9.525	4.76	3.81	1.2	★	☆	★											
		TNMG220412-GM	22	12.7	4.76	5.16	1.2	★	☆	★											
Semi-finishing		TNMG160404-BM	16.5	9.525	4.76	3.81	0.4							☆	★						
		TNMG160408-BM	16.5	9.525	4.76	3.81	0.8							☆	★						
		TNMG160412-BM	16.5	9.525	4.76	3.81	1.2							☆	★						
Semi-finishing	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	★		★											

★ Recommended grade ☆ Available grade

Applicable tools

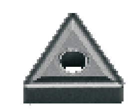
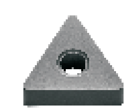
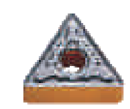
KAPR:90°	KAPR:60°	KAPR:90°	KAPR:90°	KAPR:93°	KAPR:90°
					
Page: A65	Page: A65	Page: A66	Page: A72	Page: A72	Page: A73
PTFNR/L	PTTNR/L	PTGNR/L	MTGNR/L	MTJNR/L	MTFNR/L

60°TN□□



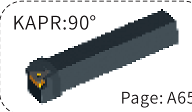
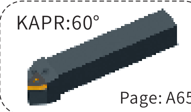
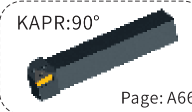
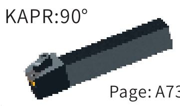
Working condition: ● Stable ◕ Average ⌗ Tough

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

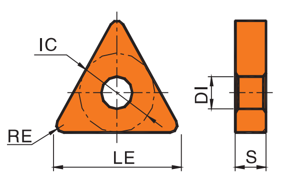
★ Recommended grade ☆ Available grade

Applicable tools

KAPR:90°	KAPR:60°	KAPR:90°	KAPR:90°	KAPR:93°	KAPR:90°
					
Page: A65	Page: A65	Page: A66	Page: A72	Page: A72	Page: A73
PTFNR/L	PTTNR/L	PTGNR/L	MTGNR/L	MTJNR/L	MTFNR/L

60°TN□□

Working condition: ● Stable ◕ Average ⌗ Tough

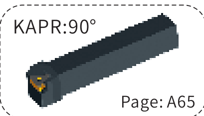


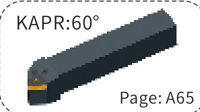
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

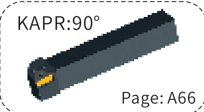
Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Rough machining		TNMG160408-BR	16.5	9.525	4.76	3.81	0.8							☆	★						
		TNMG160412-BR	16.5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

★ Recommended grade ☆ Available grade

Applicable tools

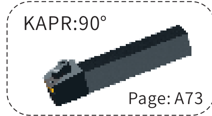

KAPR:90° Page: A65
PTFNR/L


KAPR:60° Page: A65
PTTNR/L


KAPR:90° Page: A66
PTGNR/L

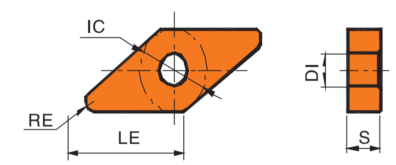

KAPR:90° Page: A72
MTGNR/L


KAPR:93° Page: A72
MTJNR/L

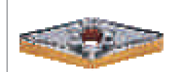
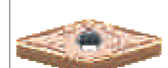

KAPR:90° Page: A73
MTFNR/L

35°VN□□

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		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	New 	VNMG160404-GM	16.6	9.525	4.76	3.81	0.4	★	☆	★											
		VNMG160408-GM	16.6	9.525	4.76	3.81	0.8	★	☆	★											
		VNMG160412-GM	16.6	9.525	4.76	3.81	1.2	★	☆	★											
Semi-finishing		VNMG160404-BM	16.6	9.525	4.76	3.81	0.4							☆	★						
		VNMG160408-BM	16.6	9.525	4.76	3.81	0.8							☆	★						
		VNMG160412-BM	16.6	9.525	4.76	3.81	1.2							☆	★						
Cast iron machining		VNMG160404	16.6	9.525	4.76	3.81	0.4				★										
		VNMG160408	16.6	9.525	4.76	3.81	0.8				★										

★ Recommended grade ☆ Available grade

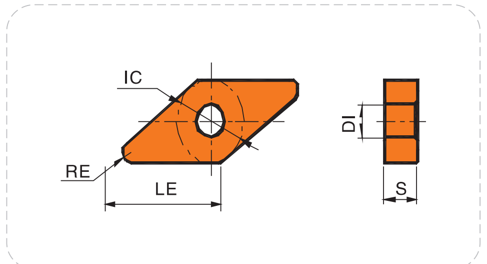
Applicable tools


KAPR:72.5° Page: A73
MVVNN

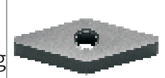

KAPR:93° Page: A74
MVJNR/L

35°VN□□

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) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
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				★										

★ Recommended grade ☆ Available grade

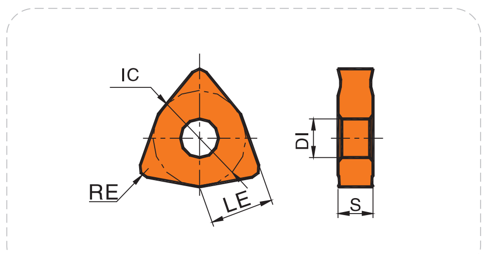
Applicable tools

MVVNN

MVJNR/L

80°WN□□

Working condition: ● Stable ◕ Average ⌗ Tough



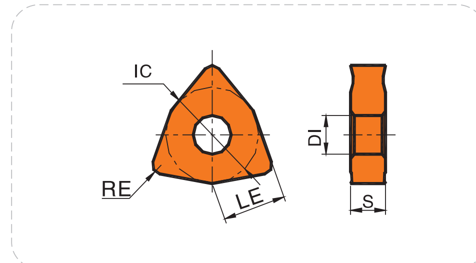
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
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	★	☆	★											

★ Recommended grade ☆ Available grade

80°WN□□

Working condition: ● Stable ◕ Average ⌗ Tough

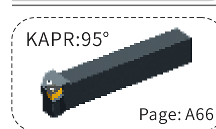


Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

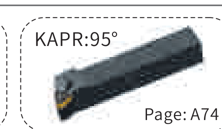
Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Finishing		WNMG080402-BF	8.7	12.7	4.76	5.16	0.2							☆	★						
		WNMG080404-BF	8.7	12.7	4.76	5.16	0.4							☆	★						
		WNMG080408-BF	8.7	12.7	4.76	5.16	0.8							☆	★						
Semi-finishing	New 	WNMG080404-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	★	☆	★											
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		WNMG06T312-BM	6.6	9.525	3.97	3.81	0.8							☆	★						
		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							☆	★						

★ Recommended grade ☆ Available grade

Applicable tools



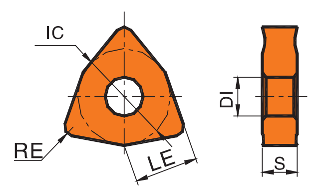
PWLNR/L



MWLNR/L

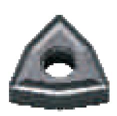
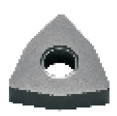
A General turning | Parting and grooving | Threading | B Indexable milling | Solid carbide end mills | C Short hole drills | Solid carbide drills

80°WN□□



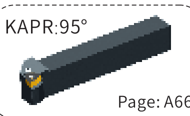
Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material	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) LE	IC	S	DI	RE	CVD HR8115	CVD HR8125	CVD HR8225	CVD HR6115	PVD HR9105	PVD HR7115	PVD HR7125	PVD HR7225	PVD HR5125	PVD HR5225	Cemented carbide HRK10	Cemented carbide HRK20	Cermet HRC10	Cermet HRC20
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				★										
Semi-finishing		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							☆	★						

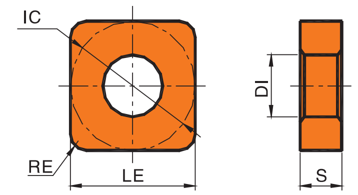
★ Recommended grade ☆ Available grade

Applicable tools


KAPR:95° Page: A66
PWLNR/L


KAPR:95° Page: A74
MWLNR/L

Planer insert



Working condition: ● Stable ◕ Average ⌗ Tough

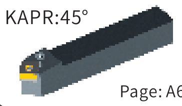
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕⌗										●	◕
M Stainless steel							●◕	●◕						
K Cast iron				●◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

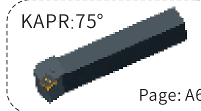
Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	CVD HR8125	CVD HR8225	CVD HR6115	PVD HR9105	PVD HR7115	PVD HR7125	PVD HR7225	PVD HR5125	PVD HR5225	Cemented carbide HRK10	Cemented carbide HRK20	Cermet HRC10	Cermet HRC20
Planer machining		SNMG120404-HAF	12.7	12.7	4.76	5.16	0.4							☆	★						
Planer machining		SNMG120404-HSF	12.7	12.7	4.76	5.16	0.4							☆	★						

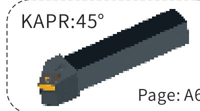
★ Recommended grade ☆ Available grade

Applicable tools


KAPR:75° Page: A63
PSBNR/L


KAPR:45° Page: A63
PSDNN

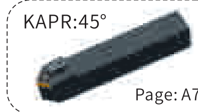

KAPR:75° Page: A64
PSKNR/L


KAPR:45° Page: A64
PSSNR/L

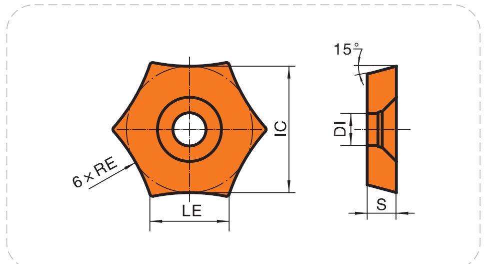

KAPR:75° Page: A70
MSBNR/L


KAPR:75° Page: A70
MSRNR/L


KAPR:75° Page: A71
MSKNR/L

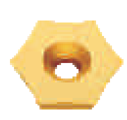

KAPR:45° Page: A71
MSDNN

Pipe-stripping insert

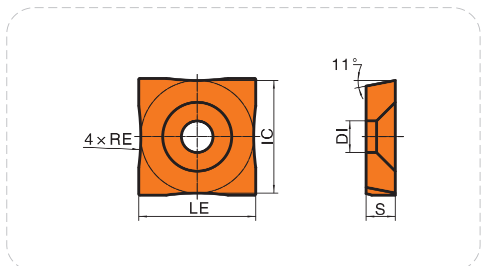


Working condition: ● Stable ◕ Average ⌗ Tough

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					●	◕								

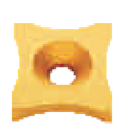
Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Pipe-stripping machining		HDUB250414-BG	12.663	20.58	4.76	5.16	14	★	☆	★											
		HDUB250417-BG	12.663	20.58	4.76	5.16	17	★	☆	★											
		HDUB250422-BG	12.663	20.58	4.76	5.16	22	★	☆	★											
		HDUB250430-BG	12.663	20.58	4.76	5.16	30	★	☆	★											
		HDUB250440-BG	12.663	20.58	4.76	5.16	40	★	☆	★											
		HDUB250450-BG	12.663	20.58	4.76	5.16	50	★	☆	★											

★ Recommended grade ☆ Available grade



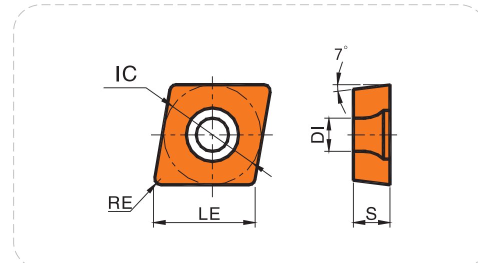
Working condition: ● Stable ◕ Average ⌗ Tough

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) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Pipe-stripping machining		SPUB190409–BG	19.05	19.05	4.76	5.16	9.5	★	☆	★											
		SPUB190412–BG	19.05	19.05	4.76	5.16	12	★	☆	★											
		SPUB190415–BG	19.05	19.05	4.76	5.16	15	★	☆	★											
		SPUB190420–BG	19.05	19.05	4.76	5.16	20	★	☆	★											
		SPUB190425–BG	19.05	19.05	4.76	5.16	25	★	☆	★											
		SPUB190432–BG	19.05	19.05	4.76	5.16	32	★	☆	★											

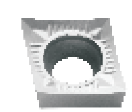
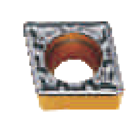
★ Recommended grade ☆ Available grade

80°CC□□



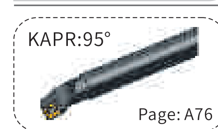
Working condition: ● Stable ◕ Average ⌗ Tough

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) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Finishing		CCGT060202-AK	6.4	6.35	2.38	2.8	0.2											★	☆		
		CCGT060204-AK	6.4	6.35	2.38	2.8	0.4											★	☆		
		CCGT09T302-AK	9.7	9.525	3.97	4.4	0.2											★	☆		
		CCGT09T304-AK	9.7	9.525	3.97	4.4	0.4											★	☆		
		CCGT120404-AK	12.9	12.7	4.76	5.56	0.4											★	☆		
		CCGT120408-AK	12.9	12.7	4.76	5.56	0.8											★	☆		
Semi-finishing		CCMT060204-TM	6.4	6.35	2.38	2.8	0.4	★	☆	★				☆	★						
		CCMT060208-TM	6.4	6.35	2.38	2.8	0.8	★	☆	★				☆	★						
		CCMT09T304-TM	9.7	9.525	3.97	4.4	0.4	★	☆	★				☆	★						
		CCMT09T308-TM	9.7	9.525	3.97	4.4	0.8	★	☆	★				☆	★						
		CCMT120404-TM	12.9	12.7	4.76	5.56	0.4	★	☆	★				☆	★						
		CCMT120408-TM	12.9	12.7	4.76	5.56	0.8	★	☆	★				☆	★						
		CCMT120412-TM	12.9	12.7	4.76	5.56	1.2	★	☆	★				☆	★						

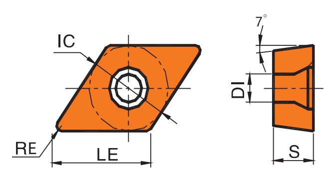
★ Recommended grade ☆ Available grade

Applicable tools



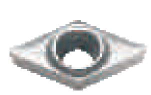
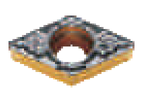
S□□-SCLCR/L

55°DC□□



Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material	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		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											★	☆		
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	★	☆	★				☆	★						

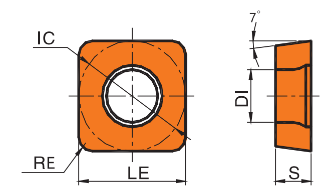
★ Recommended grade ☆ Available grade

Applicable tools

S□□-SDQCR/L

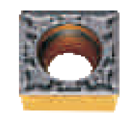
S□□-SDUCR/L

90°SC□□



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					●	◕								

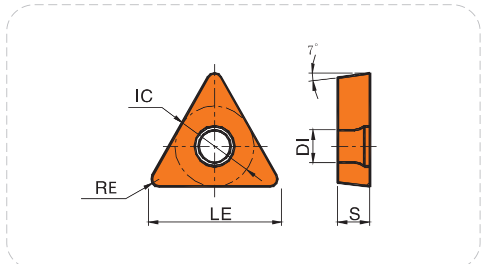
Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Semi-finishing		SCMT09T304-TM	9.525	9.525	3.97	4.4	0.4	★	☆	★				☆	★						
		SCMT09T308-TM	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

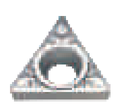
S□□-SSKCR/L

60°TC□□



Working condition: ● Stable ◕ Average ⌗ Tough

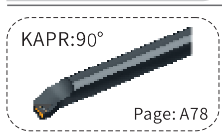
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	LE	IC	S	DI	RE	CVD HR8115	CVD HR8125	CVD HR8225	CVD HR6115	PVD HR9105	PVD HR7115	PVD HR7125	PVD HR7225	PVD HR5125	PVD HR5225	Cemented carbide HRK10	Cemented carbide HRK20	Cermet HRC10	Cermet HRC20
Finishing		TCGT090204-AK	9.7	5.56	2.38	2.8	0.4											★	☆		
		TCGT110204-AK	11.0	6.35	2.38	2.8	0.4											★	☆		
		TCGT16T304-AK	16.5	9.525	3.97	4.4	0.4											★	☆		
Semi-finishing		TCMT110204-TM	11.0	6.35	2.38	2.8	0.4	★	☆	★				☆	★						
		TCMT110208-TM	11.0	6.35	2.38	2.8	0.8	★	☆	★				☆	★						
		TCMT16T304-TM	16.5	9.525	3.97	4.4	0.4	★	☆	★				☆	★						
		TCMT16T308-TM	16.5	9.525	3.97	4.4	0.8	★	☆	★				☆	★						
		TCMT16T312-TM	16.5	9.525	3.97	4.4	1.2	★	☆	★				☆	★						

Basic dimension (mm)

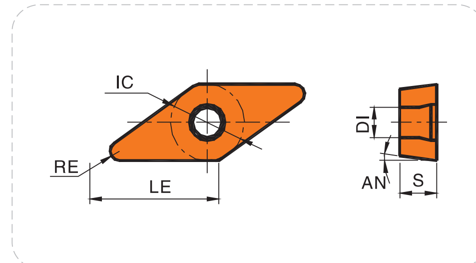
★ Recommended grade ☆ Available grade

Applicable tools



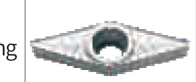
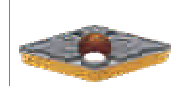
S□□-STFCR/L

35°VB&VC□□



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					●	◕								

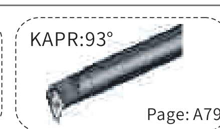
Machining type	Insert shape	Type	LE	IC	S	DI	RE	AN	CVD HR8115	CVD HR8125	CVD HR8225	CVD HR6115	PVD HR9105	PVD HR7115	PVD HR7125	PVD HR7225	PVD HR5125	PVD HR5225	Cemented carbide HRK10	Cemented carbide HRK20	Cermet HRC10	Cermet HRC20
Finishing		VBGT160402-AK	16.5	9.525	4.76	4.4	0.2	5.0											★	☆		
		VBGT160404-AK	16.5	9.525	4.76	4.4	0.4	5.0											★	☆		
		VBGT160408-AK	16.5	9.525	4.76	4.4	0.8	5.0											★	☆		
		VCGT110302-AK	11.0	6.35	3.18	2.8	0.2	7.0											★	☆		
		VCGT110304-AK	11.0	6.35	3.18	2.8	0.4	7.0											★	☆		
		VCGT160402-AK	16.5	9.525	4.76	4.4	0.2	7.0											★	☆		
		VCGT160404-AK	16.5	9.525	4.76	4.4	0.4	7.0											★	☆		
		VCGT160408-AK	16.5	9.525	4.76	4.4	0.8	7.0											★	☆		
Semi-finishing		VBMT110304-TM	11.0	6.35	3.18	2.8	0.4	5.0	★	☆	★				☆	★						
		VBMT110308-TM	11.0	6.35	3.18	2.8	0.8	5.0	★	☆	★				☆	★						
		VBMT160404-TM	16.5	9.525	4.76	4.4	0.4	5.0	★	☆	★				☆	★						
		VBMT160408-TM	16.5	9.525	4.76	4.4	0.8	5.0	★	☆	★				☆	★						
		VBMT160412-TM	16.5	9.525	4.76	4.4	1.2	5.0	★	☆	★				☆	★						
		VCMT110304-TM	11.0	6.35	3.18	2.8	0.4	7.0	★	☆	★				☆	★						
		VCMT110308-TM	11.0	6.35	3.18	2.8	0.8	7.0	★	☆	★				☆	★						
		VCMT160404-TM	16.5	9.525	4.76	4.4	0.4	7.0	★	☆	★				☆	★						
		VCMT160408-TM	16.5	9.525	4.76	4.4	0.8	7.0	★	☆	★				☆	★						
		VCMT160412-TM	16.5	9.525	4.76	4.4	1.2	7.0	★	☆	★				☆	★						

Basic dimension (mm)

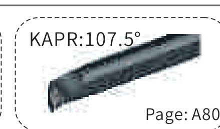
★ Recommended grade ☆ Available grade

Applicable tools

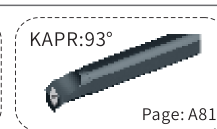
S□□-SVQCR/L



S□□-SVUCR/L



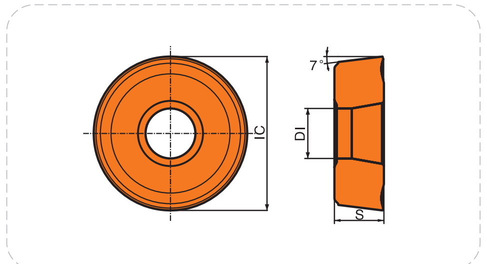
S□□-SVQBR/L



S□□-SVUBR/L

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

Profile turning insert



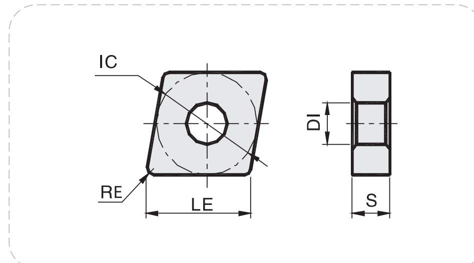
Working condition: ● Stable ◕ Average ⌗ Tough

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) IC	S	DI	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
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	★	☆	★											

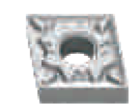
★ Recommended grade ☆ Available grade

Cermet insert

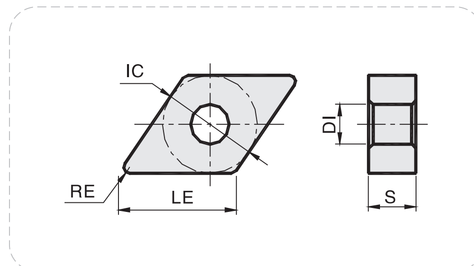


Working condition: ● Stable ◕ Average ⌗ Tough

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					●	◕								

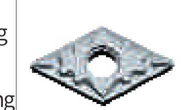
Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Finishing and semi-machining		CNMG120404HQ	12.9	12.7	4.76	5.16	0.4													★	★
		CNMG120408HQ	12.9	12.7	4.76	5.16	0.8													★	★

★ Recommended grade ☆ Available grade



Working condition: ● Stable ◕ Average ⌗ Tough

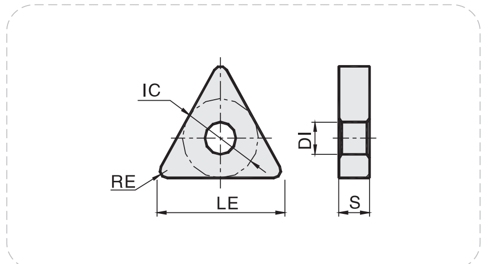
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Basic dimension (mm) LE	IC	S	DI	RE	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
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													★	★

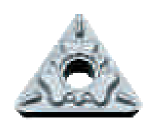
★ Recommended grade ☆ Available grade

Cermet insert

Working condition: ● Stable ◕ Average ⌗ Tough

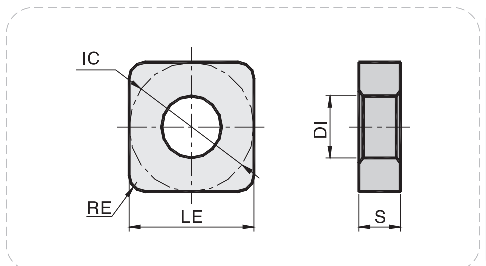


Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

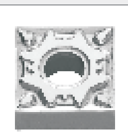
Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Finishing and semi-machining		TNMG160404HQ	16.5	9.525	4.76	3.81	0.4													★	★
		TNMG160408HQ	16.5	9.525	4.76	3.81	0.8													★	★

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



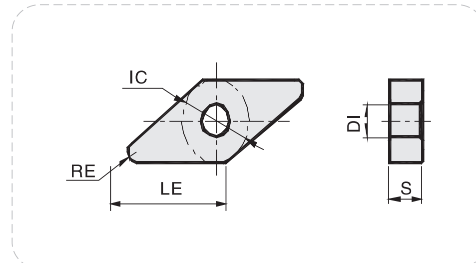
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

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 and semi-machining		SNMG120404HQ	12.7	12.7	4.76	5.16	0.4													★	★

★ Recommended grade ☆ Available grade

Cermet insert

Working condition: ● Stable ◕ Average ⌗ Tough

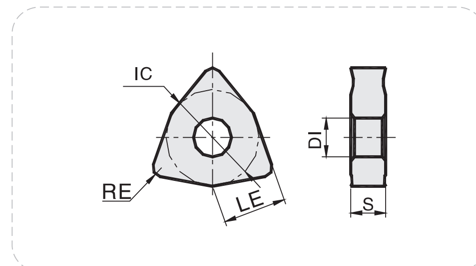


Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

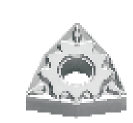
Machining type	Insert shape	Type	Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
			LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
Finishing and semi-machining		VNMG160404HQ	16.5	9.525	4.76	3.81	0.4													★	★
		VNMG160408HQ	16.5	9.525	4.76	3.81	0.8													★	★

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough

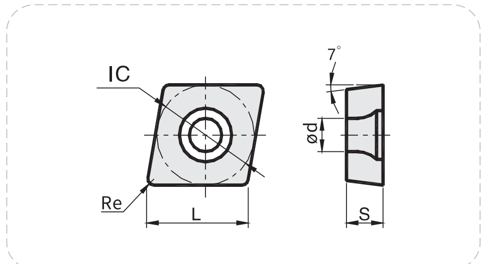


Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

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 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													★	★

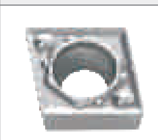
★ Recommended grade ☆ Available grade

Cermet insert



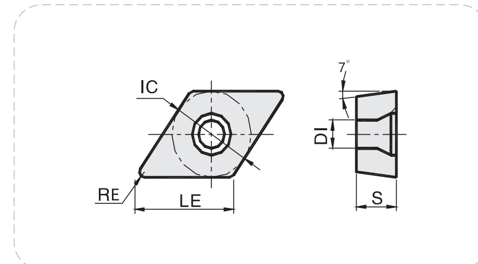
Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material	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	LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
			Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
Finishing and semi-machining		CCMT060204HQ	6.4	6.35	2.38	2.8	0.4													★	★
		CCMT09T304HQ	9.7	9.525	3.97	4.4	0.4													★	★
		CCMT09T308HQ	9.7	9.525	3.97	4.4	0.8													★	★
		CPMH090308HQ	9.7	9.525	3.18	4.4	0.8													★	★

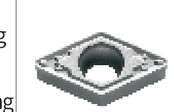
★ Recommended grade ☆ Available grade

Cermet insert

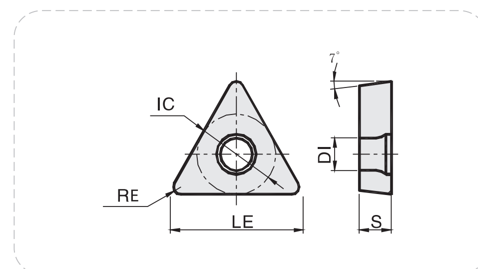


Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material	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	LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
			Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
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



Working condition: ● Stable ◕ Average ⌗ Tough

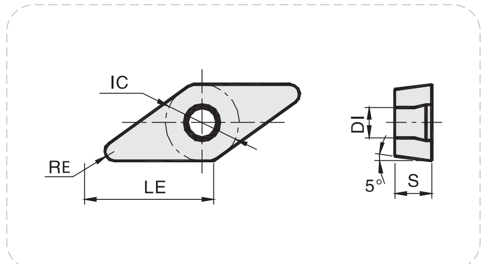
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	LE	IC	S	DI	RE	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
			Basic dimension (mm)					CVD				PVD						Cemented carbide		Cermet	
Finishing and semi-machining		TCMT110204-PS	11.0	6.35	2.38	2.8	0.4													★	★

★ Recommended grade ☆ Available grade

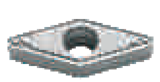
HUAREAL

Cermet insert



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 and semi-finishing		VBMT110304-HQ	11.0	6.35	3.18	2.8	0.4													★	★
		VBMT110308-HQ	11.0	6.35	3.18	2.8	0.8													★	★

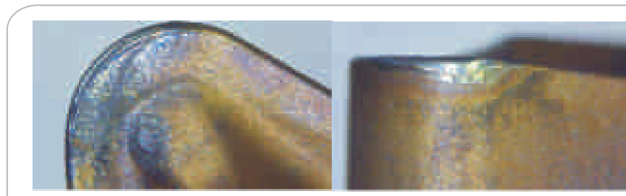
★ Recommended grade ☆ Available grade

Application - P-type material turning

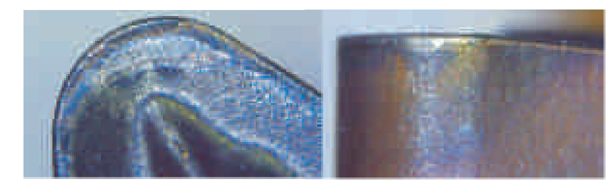
Flange plate

- Workpieces materials: 40Cr, quenching and tempering
- Machining method: Finishing of end face
- Insert: DNMG150408-GF HR8115
- Machining parameters: Vc=338.5m/min, f_n=0.14~0.32mm/r, ap=0.2mm
- Cooling method: Water cooling

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



Company A

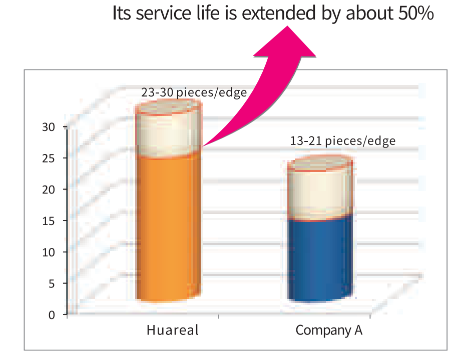


GF

Hub unit

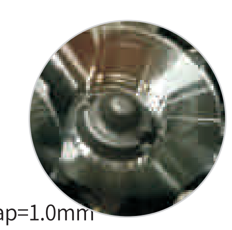
- Workpieces materials: 65Mn
- Machining method: Semi-finishing of end face
- Insert: WNMG080408-GF HR8115
- Machining parameters: Vc=330m/min, fn=0.3mm/r, ap=0.8mm
- Cooling method: Water cooling

Its service life is extended by about 50%

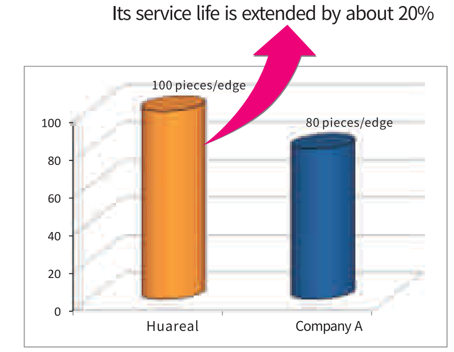


Flange plate

- Workpieces materials: 65Mn
- Machining method: Rough turning of end face
- Insert: WNMG080412-GM HR8225
- Machining parameters: Vc=260m/min, fn=0.32mm/r, ap=1.0mm
- Cooling method: Water cooling



Its service life is extended by about 20%



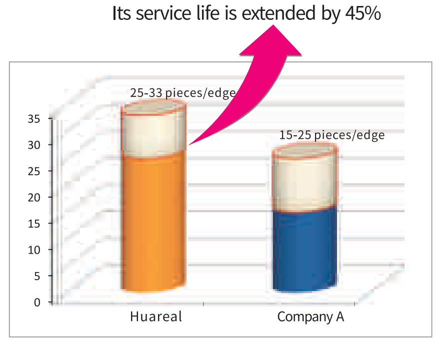
A General turning | Parting and grooving | Threading
B Indexable milling | Solid carbide end mills
C Short hole drills | Solid carbide drills

Application - P-type material turning

Flange machining

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

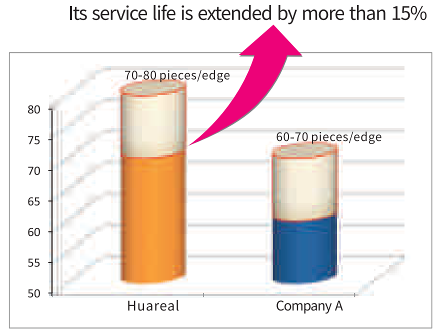
Its service life is extended by 45%



Flange plate

- Workpieces materials: 55# steel
- Machining method: External and end face turning
- Insert: WNMG080408-GM HR8225
- Machining parameters: Vc=285.7m/min, fn=0.27mm/r, ap=0.6mm
- Cooling method: Water cooling

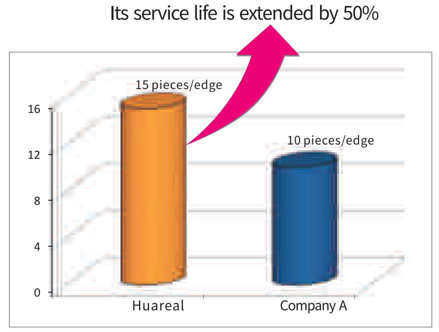
Its service life is extended by more than 15%



Tropid housing

- Workpieces materials: CF53
- Machining method: Rough turning of axle neck and small axle
- Insert: WNMG080412-GR HR8225
- Machining parameters: Vc=351m/min, fn=0.45mm/r, ap=2.0mm
- Cooling method: Water cooling

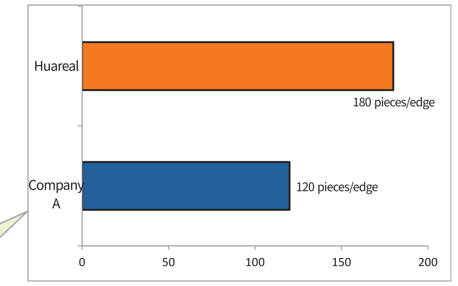
Its service life is extended by 50%



Machining case - stainless steel turning

Flange plate

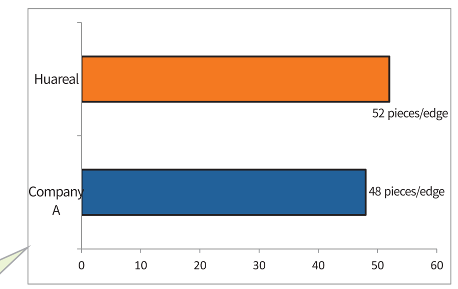
- Workpieces materials: SUS304
- Machining method: External and end face turning
- Insert: VNMG160408-BF HR7225
- Machining parameters: Vc=171~180m/min, fn=0.08mm/r, ap=0.30mm
- Cooling method: Water cooling



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

Flange plate

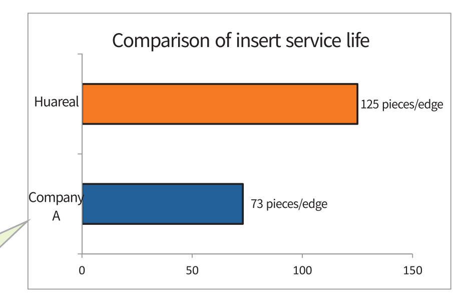
- Workpieces materials: SUS304
- Machining method: Continuous external and end face finishing
- Insert: WNMG080408-BF HR7225
- Machining parameters: Vc=259m/min, fn=0.15mm/r, ap=0.50mm
- Cooling method: Water cooling



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

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



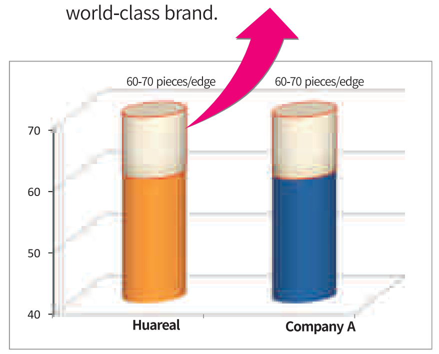
With less groove wear, Huareal products' service life is extended by about 70%

Machining case - cast iron turning

Compressor cylinder

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

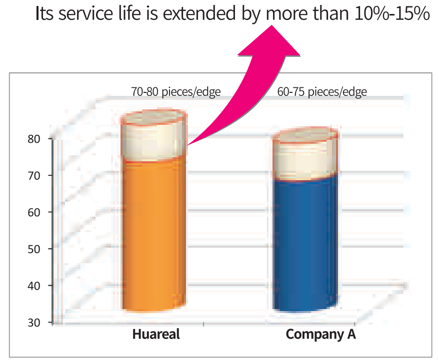
It has the equivalent performance with the world-class brand.



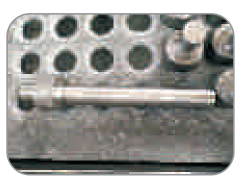
Compressor flange

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

Its service life is extended by more than 10%-15%

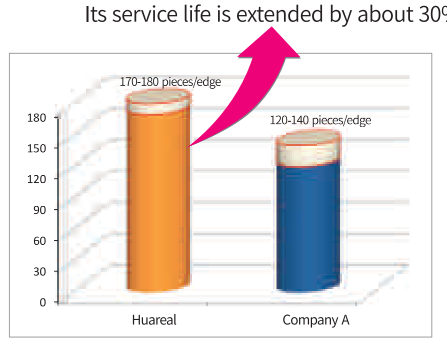


Tripod housing



- Workpieces materials QT500
- Machining method External turning
- Insert WNMG080408 HR6115
- Machining parameters Vc=190m/min，fn=0.4mm/r，ap=1mm
- Cooling method Water cooling

Its service life is extended by about 30%



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

② Insert shape

C	80° rhombus	80°
D	55° rhombus	55°
R	Circular	
S	Square	90°
T	Regular triangle	60°
V	35° rhombus	35°
W	Equilateral unequal hexagon	80°

③ Cutting edge angle KAPR

B	D	F	G
75°	45°	90°	90°
J	**K**	**L**	**P**
93°	75°	95°	62° 30'
S	**T**	**V**	**R**
45°	60°	72° 30'	75°

④ Insert clearance angle

N	Negative style (0°)

⑤ Cutting direction

R	Right hand
L	Left hand
N	Left and right hands

⑥ Corner height (mm)

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

⑦ Width 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

⑨ Cutting 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

⑤ Insert shape

C	80° rhombus	80°
D	55° rhombus	55°
S	Square	90°
T	Regular triangle	60°
V	35° rhombus	35°

⑥ Cutting edge angle KAPR

F	K	L	Q
90°	75°	95° 95°	107° 30'
U			
93°			

⑦ Insert clearance angle

C	7°
P	11°

⑧ Cutting direction

R	Right hand
L	Left hand
N	Left and right hands

⑨ Cutting edge length (mm)

Inscribed circle of insert	Insert shape				
	Square 90°	Regular triangle 60°	80° rhombus 80°	55° rhombus 55°	35° rhombus 35°
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: External turning	End face turning	External and end face turning	Profiling	Profiling	Profiling	Workpiece shape suitable for machining: Short and thick	Long and thin	Page
P	PCBNR/L	75°	🙂						🙂		A61
P	PCLNR/L	95°			🙂				🙂		A61
P	PDJNR/L	93°					🙂		🙂	🙁	A62
P	PDPNN	62.5°						🙂	🙂		A62
P	PSBNR/L	75°	🙂						🙂		A63
P	PSDNN	45°						🙂	🙂		A63
P	PSKNR/L	75°		🙂					🙂		A64
P	PSSNR/L	45°	🙂						🙂		A64
P	PTFNR/L	90°		🙂					🙂	🙁	A65
P	PTTNR/L	60°	🙂						🙂		A65
P	PTGNR/L	90°	🙂						🙂		A66
P	PWLNR/L	95°			🙂				🙂	🙁	A66
M	MCBNR/L	75°	🙂						🙂		A67
M	MCLNR/L	95°			🙂				🙂		A67

🙂 Recommended 🙁 Available

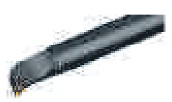
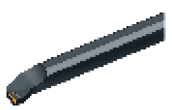
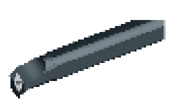
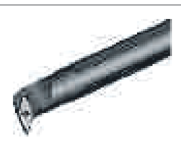
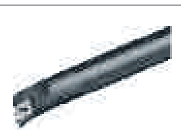
Overview of general turning tools (external machining)

Clamping method	Model	Cutting edge angle (KAPR)°	Turning method: External turning	End face turning	External and end face turning	Profiling	Profiling	Profiling	Workpiece shape suitable for machining: Short and thick	Long and thin	Page
M	MDJNR/L	93°					🙂		🙂		A68
M	MDPNN	62.5°						🙂	🙂		A69
M	MSBNR/L	75°	🙂						🙂	🙁	A70
M	MSRNR/L	75°	🙂						🙂		A70
M	MSKNR/L	75°		🙂					🙂		A71
M	MSDNN	45°						🙂	🙂		A71
M	MTGNR/L	90°	🙂						🙂		A72
M	MTJNR/L	93°	🙂						🙂		A72
M	MTFNR/L	90°		🙂					🙂	🙁	A73
M	MVVNN	72.5°						🙂	🙂		A73
M	MVJNR/L	93°					🙂		🙂		A74
M	MWLNR/L	95°			🙂				🙂	🙁	A74
M	MRGNR/L	/				🙂			🙂		A75
M	MRDNN	/				🙂			🙂		A75

🙂 Recommended 🙁 Available

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

Overview of general turning tools (internal machining)

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

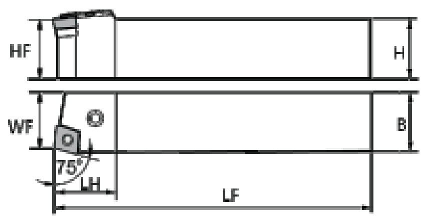
Overview of general turning tools (internal machining)

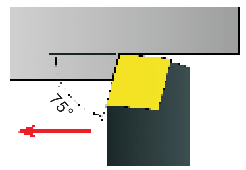
Model	Cutter bar shape	Cutting edge angle (KAPR) °	Shank diameter of cutter bar	Tool length	Machined workpiece diameter minimum	Page
S□□-SDUPR/L		93°	12	150	16	A81
			16	180	20	
S□□-STUPR/L		93°	12	180	16	A82
			16	180	20	

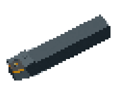
A General turning Parting and grooving Threading B Indexable milling Solid carbide end mills C Short hole drills Solid carbide drills

External turning tool

PCBNR/L
KAPR:75°

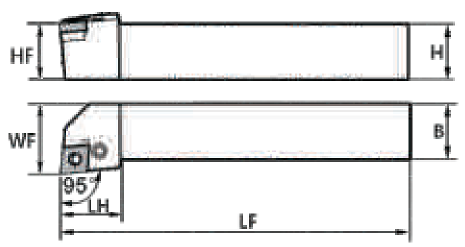


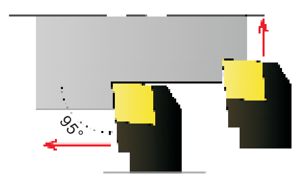


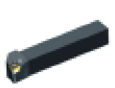
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PCBNR/L	2020K12	△	△	20	20	125	27	20	17	LLS0821	HC12WE	WR30L	GH4	DD4L	CN**1204
	2525M12	▲	▲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



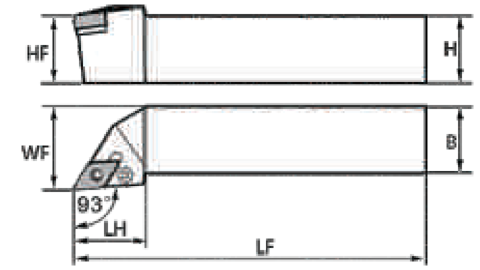


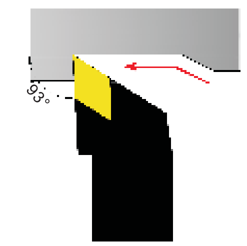
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PCLNR/L	2020K12	△	△	20	20	125	28	20	25	LLS0821	HC12WE	WR30L	GH4	DD4L	CN**1204
	2525M12	▲	▲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

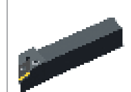
▲Running stock △Make-to-order

External turning tool

PDJNR/L
KAPR:93°

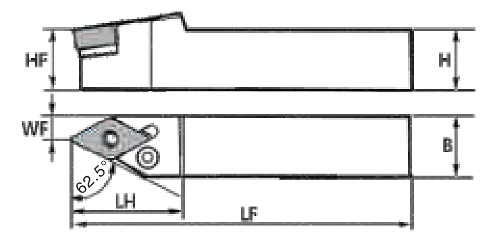


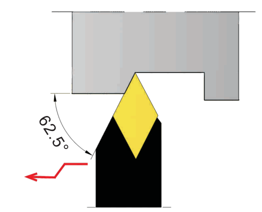


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PDJNR/L	2020K11	△	△	20	20	125	25	20	25	LLS0617	HD11WE	WR25L	GH3	DD3L	DN**1104
	2525M11	▲	▲	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°



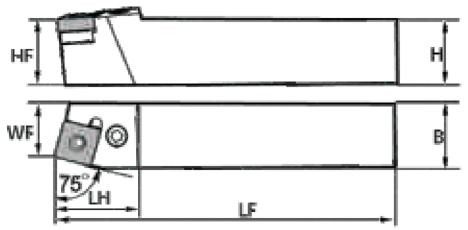


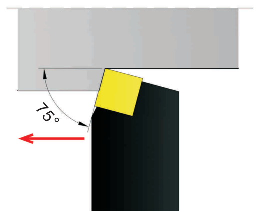
Model		Inventory	Basic dimension (mm)						Accessories					Matching insert
			Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
			H	B	LF	LH	HF	WF						
PDPNN	2020K15	▲	20	20	125	38	20	8	LLS0821	HD15WE	WR30L	GHB	DD4L	DN**1506
	2525M15	▲	25	25	150	38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

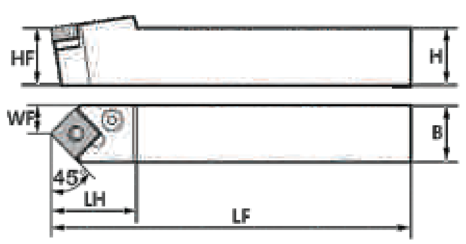


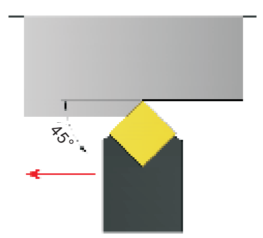


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSBNR/L	2020K12	△	△	20	20	125	28	20	17	LLS0821	HS12WE	WR30L	GH4	DD4L	SN**1204
	2525M12	▲	▲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



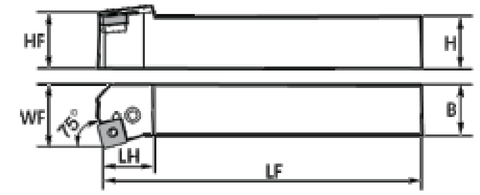


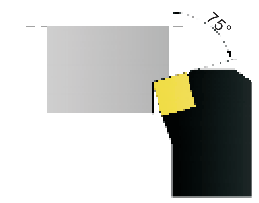
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSDNN	2020K12	△	△	20	20	125	30	20	10	LLS0821	HS12WE	WR30L	GH4	DD4L	SN**1204
	2525M12	▲	▲	25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

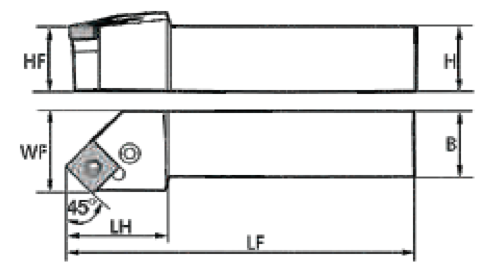


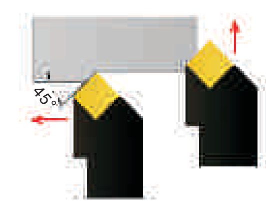


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSKNR/L	2020K12	△	△	20	20	125	28	20	25	LLS0821	HS12WE	WR30L	GH4	DD4L	SN**1204
	2525M12	▲	▲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



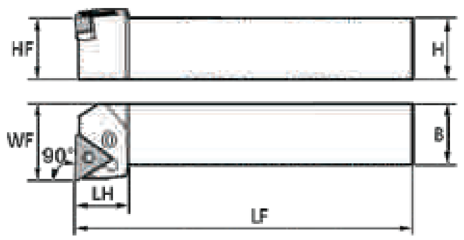


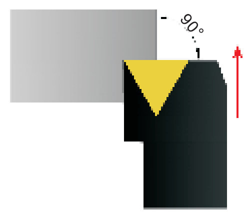
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Screw	Shim	Wrench	Lever	Stopper cushion	
		R	L	H	B	LF	LH	HF	WF						
PSSNR/L	2020K12	△	△	20	20	125	28	20	25	LLS0821	HS12E	WR30L	GH4	DD4L	SN**1204
	2525M12	▲	▲	25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

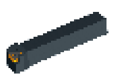
▲Running stock △Make-to-order

External turning tool

PTFNR/L
KAPR:90°

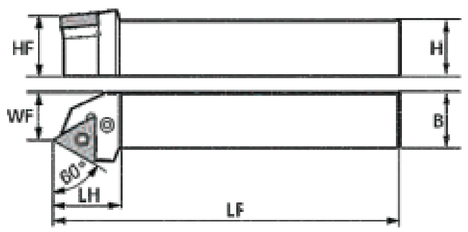


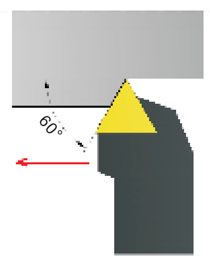


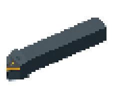
Model		Inventory R	Inventory L	Basic dimension (mm) Size of cutter square H	B	Length size LF	LH	Corner height HF	Head width WF	Accessories Screw	Shim	Wrench	Lever	Stopper cushion	Matching insert
PTFNR/L 	2020K16	△	△	20	20	125	23	20	25	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M16	▲	▲	25	25	150	23	25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



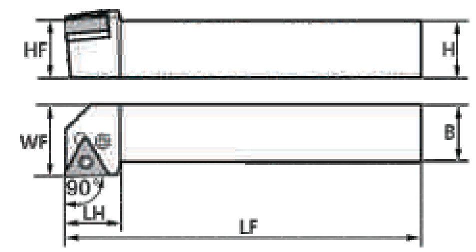


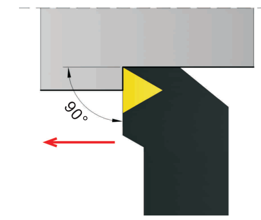
Model		Inventory R	Inventory L	Basic dimension (mm) Size of cutter square H	B	Length size LF	LH	Corner height HF	Head width WF	Accessories Screw	Shim	Wrench	Lever	Stopper cushion	Matching insert
PTTNR/L 	2020K16	△	△	20	20	125	23	20	17	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M16	▲	▲	25	25	150	23	25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

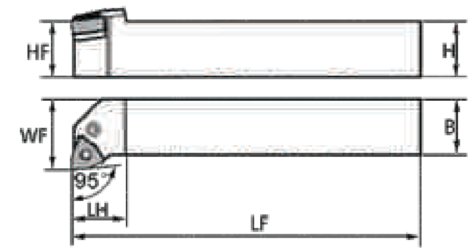


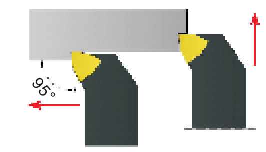


Model		Inventory R	Inventory L	Basic dimension (mm) Size of cutter square H	B	Length size LF	LH	Corner height HF	Head width WF	Accessories Screw	Shim	Wrench	Lever	Stopper cushion	Matching insert
PTGNR/L 	2020K16	△	△	20	20	125	23	20	25	LLS0617	HT16WE	WR25L	GH3	DD3L	TN**1604
	2525M16	▲	▲	25	25	150	23	25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



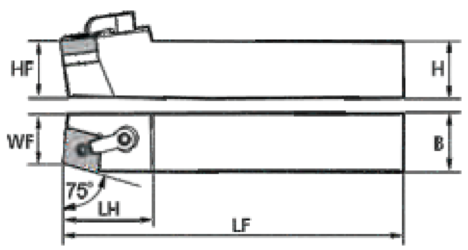


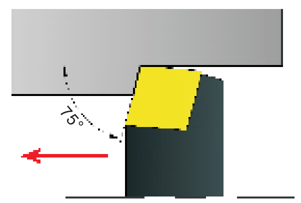
Model		Inventory R	Inventory L	Basic dimension (mm) Size of cutter square H	B	Length size LF	LH	Corner height HF	Head width WF	Accessories Screw	Shim	Wrench	Lever	Stopper cushion	Matching insert
PWLNR/L 	2020K06	△	△	20	20	125	23	20	25	LLS0617	HW06WE	WR25L	GH3	DD3L	WN**0604
	2525M06	▲	▲	25	25	150	23	25	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						

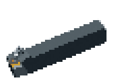
▲Running stock △Make-to-order

External turning tool

MCBNR/L
KAPR:75°

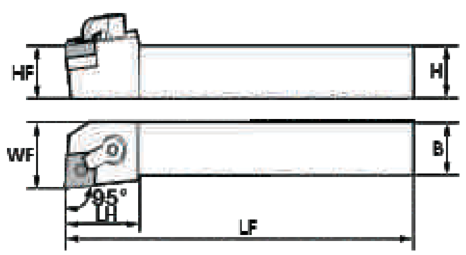


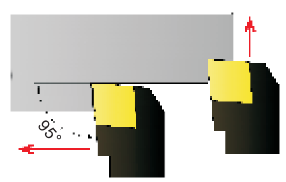


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MCBNR/L	2020K12	△	△	20	20	125	35	20	17						
	2525M12	▲	▲	25	25	150	35	25	22	HM6×20	HC12WI	WR25L	HYD1	MP6×17	CN**1204
	3232P12	△	△	32	32	170	35	32	27			WR30L			
	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°



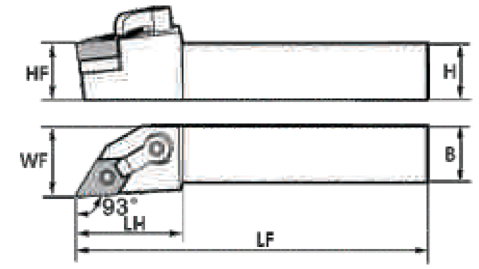


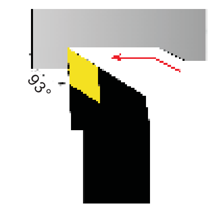
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MCLNR/L	2020K12	△	△	20	20	125	32	20	25	HM6×20		WR25L			
	2525M12	▲	▲	25	25	150	32	25	32	HM6×25	HC12WI		HYD1	MP6×17	CN**1204
	3232P12	▲	▲	32	32	170	32	32	40	HM6×28		WR30L			
	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

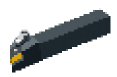
▲Running stock △Make-to-order

External turning tool

MDJNR/L
KAPR:93°





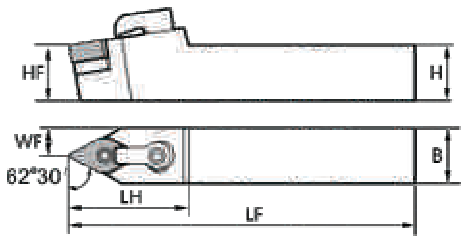
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MDJNR/L	2020K11	△	△	20	20	125	32	20	25	HM6×25		WR20L			
	2525M11	▲	▲	25	25	150	32	25	32		HD11WI	WR30L	HYD1	MP5×13	DN**1104
	3232P11	△	△	32	32	170	32	32	40	HM6×28					
	2020K15	△	△	20	20	125	38	20	25						
	2525M15	▲	▲	25	25	150	38	25	32	HM6×25				MP6×19	DN**1506
	3232P15	△	△	32	32	170	38	32	40	HM6×28	HD15WI	WR25L	HYD2		
	2020K15H	△	△	20	20	125	38	20	25	HM6×20		WR30L			
	2525M15H	▲	▲	25	25	150	38	25	32	HM6×25				MP6×17	DN**1504
	3232P15H	△	△	32	32	170	38	32	40	HM6×28					

▲Running stock △Make-to-order

External turning tool

MDPNN

KAPR:62.5°



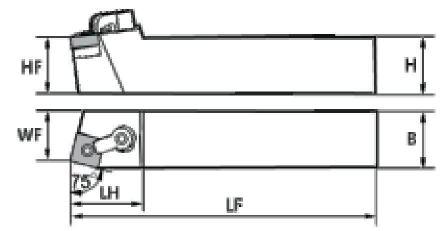
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MDPNN	2020K11	△	△	20	20	125	35	20	10	HM6×20	HD11WI	WR20L WR30L	HYD1	MP5×13	DN**1104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

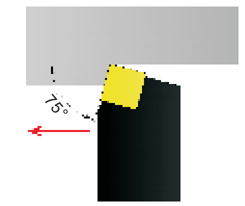
▲Running stock △Make-to-order

External turning tool

MSBNR/L

KAPR:75°



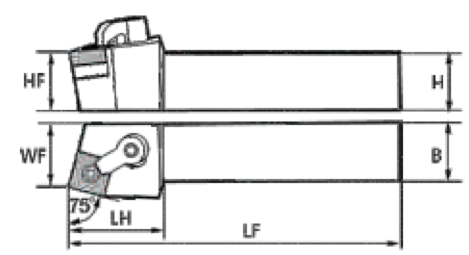


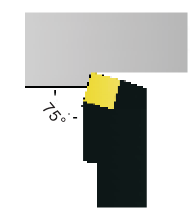
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MSBNR/L	2020K12	△	△	20	20	125	32	20	17	HM6×20	HS12WI	WR25L WR30L	HYD1	MP6×17	SN**1204
	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°



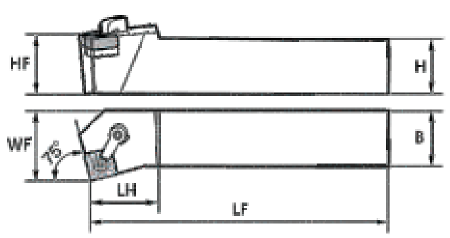


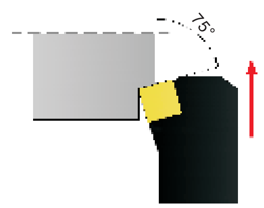
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MSRNR/L	2020K12	△	△	20	20	125	32	20	22	HM6×20	HS12WI	WR25L WR30L	HYD1	MP6×17	SN**1204
	2525M12	▲	▲	25	25	150	32	25	27	HM6V25					
	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°

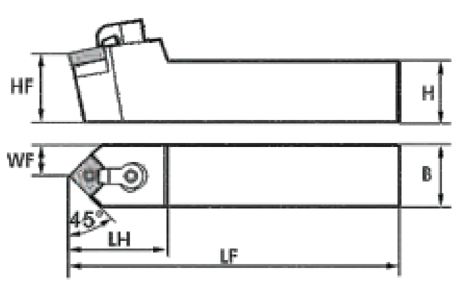


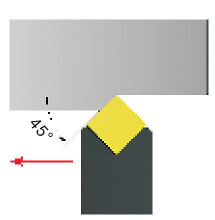


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MSKNR/L	2020K12	△	△	20	20	125	32	20	25	HM6×20	HS12WI	WR25L WR30L	HYD1	MP6×17	SN**1204
	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°



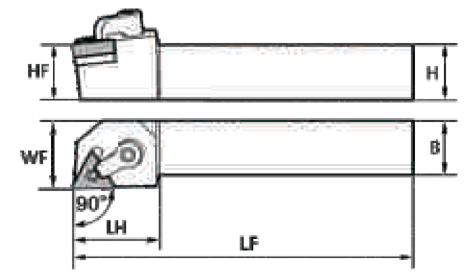


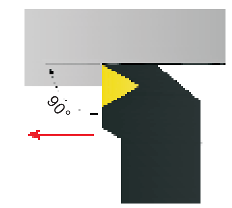
Model		Inventory	Basic dimension (mm)						Accessories					Matching insert
			Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
			H	B	LF	LH	HF	WF						
MSDNN	2020K12	△	20	20	125	35	20	10	HM6×25	HS12WI	WR25L WR30L	HYD1	MP6×17	SN**1204
	2525M12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

▲Running stock △Make-to-order

External turning tool

MTGNR/L
KAPR:90°

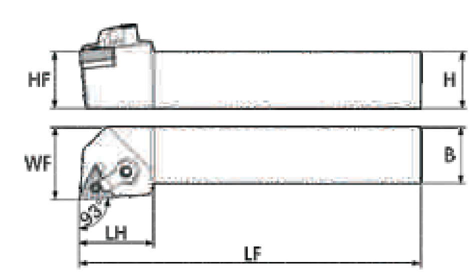


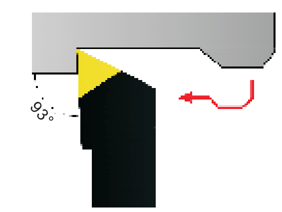


Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MTGNR/L	2020K16	△	△	20	20	125	32	20	25	HM6×25	HT16WI	WR20L WR30L	HYD1	MP5×13	TN**1604
	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°



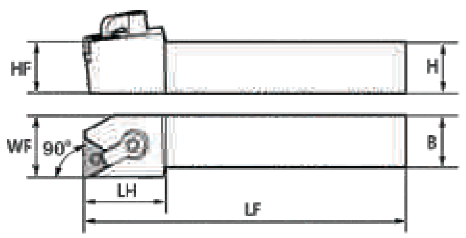


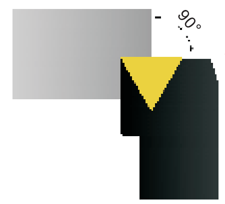
Model		Inventory		Basic dimension (mm)						Accessories					Matching insert
				Size of cutter square		Length size		Corner height	Head width	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	
		R	L	H	B	LF	LH	HF	WF						
MTJNR/L	2020K16	△	△	20	20	125	32	20	25	HM6×25	HT16WI	WR20L WR30L	HYD1	MP5×13	TN**1604
	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°

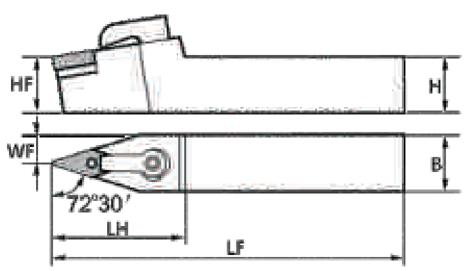


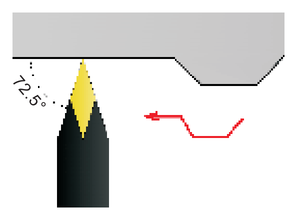


Model		Inventory R	Inventory L	Size of cutter square H	Size of cutter square B	Length size LF	Length size LH	Corner height HF	Head width WF	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	Matching insert
MTFNR/L	2020K16	△	△	20	20	125	32	20	25	HM6×25	HT16WI	WR20L WR30L	HYD1	MP5×13	TN**1604
	2525M16	▲	▲	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°



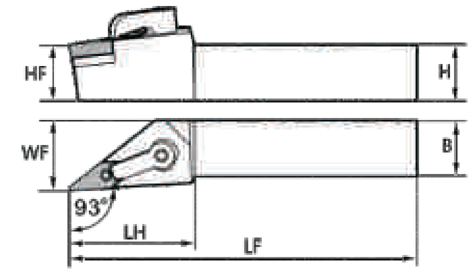


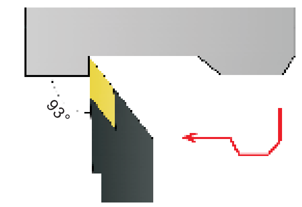
Model		Inventory	Size of cutter square H	Size of cutter square B	Length size LF	Length size LH	Corner height HF	Head width WF	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	Matching insert
MVVNN	2020K16	△	20	20	125	45	20	10	HM6×25	HV16WI	WR20L WR30L	HYD3	MP5×13	VN**1604
	2525M16	▲	25	25	150	45	25	12.5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

▲Running stock △Make-to-order

External turning tool

MVJNR/L
KAPR:93°

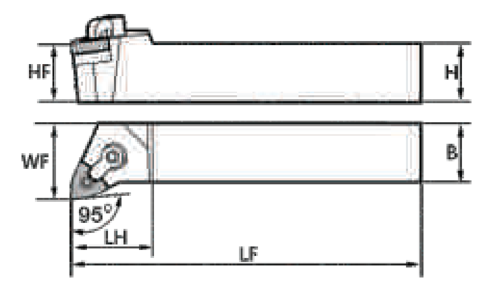


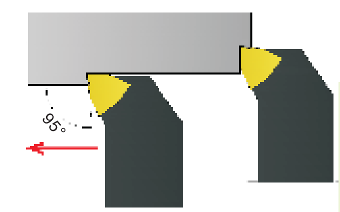


Model		Inventory R	Inventory L	Size of cutter square H	Size of cutter square B	Length size LF	Length size LH	Corner height HF	Head width WF	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	Matching insert
MVJNR/L	2020K16	△	△	20	20	125	45	20	25	HM6×25	HV16WI	WR20L MR30L	HYD3	MP5×13	VN**1604
	2525M16	▲	▲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

▲Running stock △Make-to-order

MWLNR/L
KAPR:95°



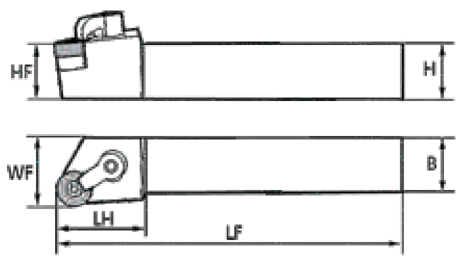


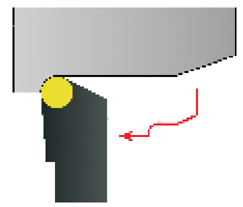
Model		Inventory R	Inventory L	Size of cutter square H	Size of cutter square B	Length size LF	Length size LH	Corner height HF	Head width WF	Stud screw	Shim	Wrench	Pressure plate	Pin bolt	Matching insert
MWLNR/L	2020K06	△	△	20	20	125	28	20	25	HM5×20	HW06WI	WR20L WR30L	HYD0	MP5×13	WN**0604
	2525M06	▲	▲	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

MRGNR/L

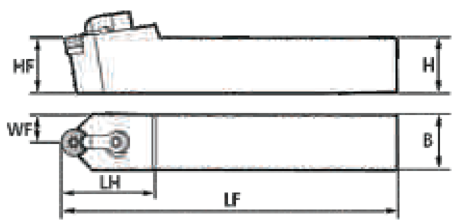


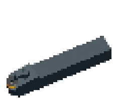


Model		Inventory R	Inventory L	Basic dimension (mm) Size of cutter square H	B	Length size LF	LH	Corner height HF	Head width WF	Accessories Stud screw	Shim	Wrench	Pressure plate	Pin bolt	Matching insert
MRGNR/L	2525M12	△	△	25	25	150	45	25	32	HM6×25	HR12WI	WR25L	HYD1	MP6×17	RN**1204
	3232P12	▲	▲	32	32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

▲Running stock △Make-to-order

MRDNN





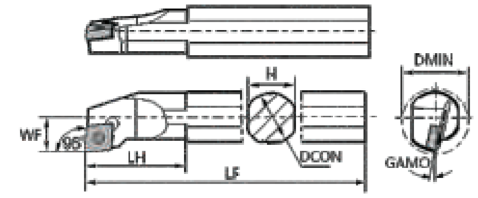
Model		Inventory R	Inventory L	Basic dimension (mm) Size of cutter square H	B	Length size LF	LH	Corner height HF	Head width WF	Accessories Stud screw	Shim	Wrench	Pressure plate	Pin bolt	Matching insert
MRDNN	2020K12	△	△	20	20	125	35	20	10	HM6×25	HR12WI	WR30L	HYD1	MP6×17	RN**1204
	2525M12	▲	▲	25	25	150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

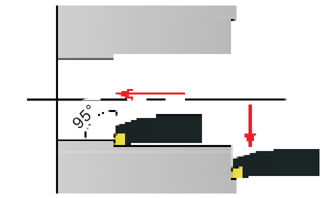
▲Running stock △Make-to-order

Internal turning tool

S□□-SCLCR/L

KAPR:95°



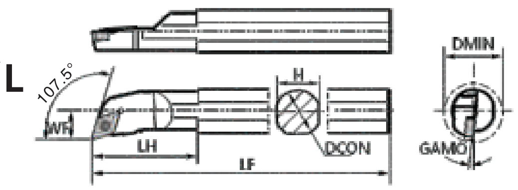


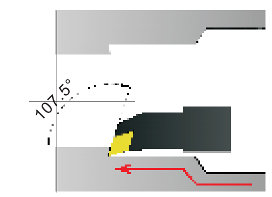
Model	Inventory R	Inventory L	Basic dimension (mm) DMIN	DCON	H	LF	WF	Accessories Insert screw	Wrench	Matching insert
S12M-SCLCR/L06	△	△	16	12	11	150	7.5	M2.5×5.5	WR15	CC**0602
S12M-SCLCR/L09	△	△	16	12	11	150	8	M3.5×8		CC**09T3
S16Q-SCLCR/L09	△	△	20	16	15	180	10			
S20R-SCLCR/L09	▲	▲	25	20	19	200	12	M3.5×10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



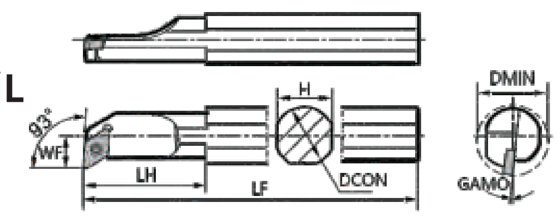


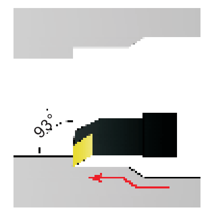
Model	Inventory R	Inventory L	Basic dimension (mm) DMIN	DCON	H	LF	WF	Accessories Insert screw	Wrench	Matching insert
S12M-SDQCR/L07	△	△	16	12	11	150	9	M2.5×6.5	WR07	DC**0702
S16Q-SDQCR/L07	△	△	20	16	15	180	11			
S20R-SDQCR/L11	▲	▲	25	20	19	200	13	M3.5×8	WR15	DC**11T3
S25S-SDQCR/L11	▲	▲	32	25	24	250	17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

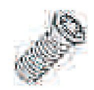
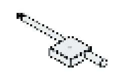
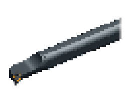
▲Running stock △Make-to-order

Internal turning tool

S□□-SDUCR/L
KAPR:93°

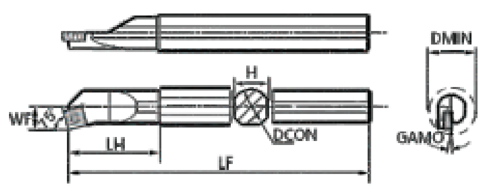


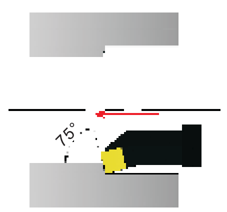


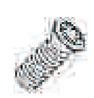
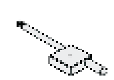
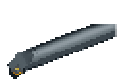
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	S12M-SDUCR/L07	△	△	16	12	11	150	9	M2.5×6.5	WR07	DC**0702
	S16Q-SDUCR/L07	△	△	20	16	15	180	11			
	S20R-SDUCR/L11	▲	▲	25	20	19	200	13	M3.5×8	WR15	DC**11T3

▲Running stock △Make-to-order

S□□-SSKCR/L
KAPR:75°



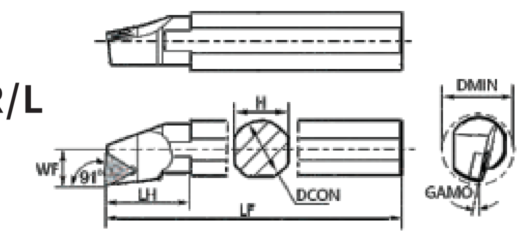


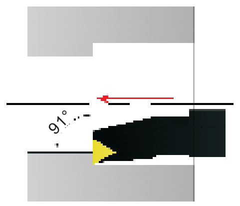
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	S12M- SSKCR/L09	△	△	16	12	11	150	9			
	S16Q- SSKCR/L09	△	△	20	16	15	180	11	M3.5×8	WR15	SC**09T3
	S20R- SSKCR/L09	▲	▲	25	20	19	200	13			
	S25S- SSKCR/L12	▲	▲	32	25	24	250	17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

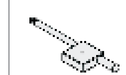
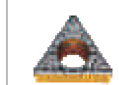
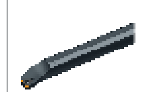
▲Running stock △Make-to-order

Internal turning tool

S□□-STFCR/L
KAPR:90°

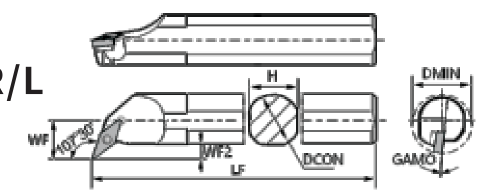


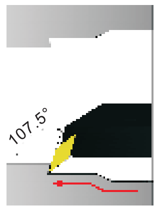


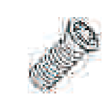
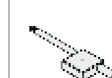
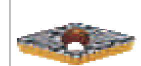
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
	S16Q-STFCR/L11	△	△	20	16	15	180	10	M2.5×6.5	WR07	TC**1102
	S20R-STFCR/L11	△	△	25	20	19	200	12			
	S25S-STFCR/L16	▲	▲	32	25	24	250	16	M3.5×10	WR15	TC**16T3

▲Running stock △Make-to-order

S□□-SVQBR/L
KAPR:107.5°





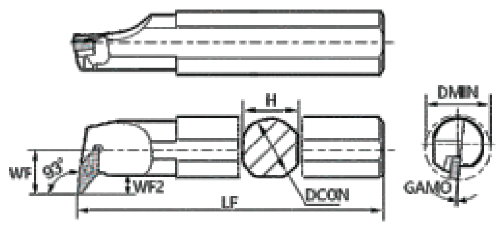
Model		Inventory		Basic dimension (mm)					Accessories		Matching insert
		R	L	DMIN	DCON	H	LF	WF	Insert screw	Wrench	
											
											
	S20R-SVQBR/L16	▲	▲	27	20	19	200	14	M3.5×12	WR15	VB**1604
	S25S-SVQBR/L16	▲	▲	35	25	24	250	20			

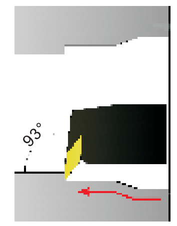
▲Running stock △Make-to-order

Internal turning tool

S□□-SVUBR/L

KAPR:93°



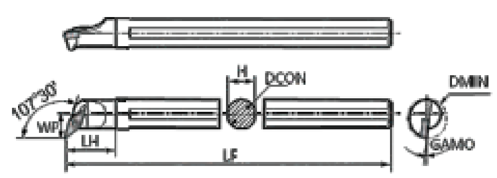


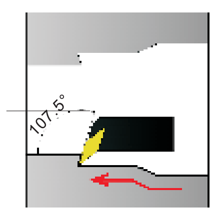
Model		Inventory R	Inventory L	DMIN	DCON	H	LF	WF	Accessories: Insert screw	Accessories: Wrench	Matching insert
	S25S- SVUBR/L16	▲	▲	35	25	24	250	20	M3.5×12	WR15	VB**1604

▲Running stock △Make-to-order

S□□-SVQCR/L

KAPR:107.5°





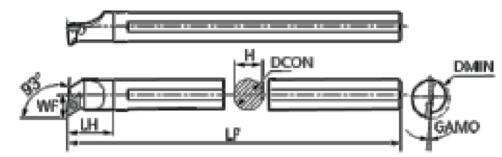
Model		Inventory R	Inventory L	DMIN	DCON	H	LF	WF	Accessories: Insert screw	Accessories: Wrench	Matching insert
	S16Q-SVQCR/L11	▲	▲	22	16	15	180	12	M2.5×6.5	WR07	VC**1103
	S25S-SVQCR/L16	▲	▲	35	25	24	250	20	M3.5×12	WR15	VC**1604

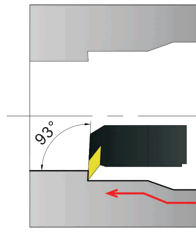
▲Running stock △Make-to-order

Internal turning tool

S□□-SVUCR/L

KAPR:93°



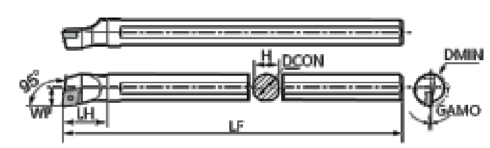


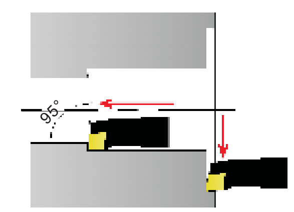
Model		Inventory R	Inventory L	DMIN	DCON	H	LF	WF	Accessories: Insert screw	Accessories: Wrench	Matching insert
	S20R-SVUCR/L11	▲	▲	28	20	19	200	14	M3.5×12	WR15	VC**1604
	S25S-SVUCR/L16	▲	▲	35	25	24	250	20			

▲Running stock △Make-to-order

S□□-SCLPR/L

KAPR:95°





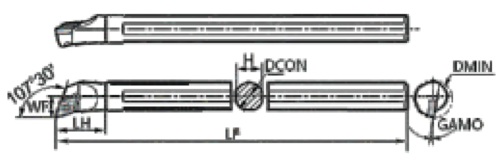
Model		Inventory R	Inventory L	DMIN	DCON	H	LF	WF	GAMO	Accessories: Insert screw	Accessories: Wrench	Matching insert
	S12M-SCLPR/L06	△	△	16	12	11	150	8	-4°	M2.5×5.5	WR07	CP**0602
	S16Q-SCLPR/L09	△	△	20	16	15	180	10	-4°	M3.5×8	WR15	CP**09T3
	S20R-SCLPR/L09	▲	▲	25	20	18	200	13	-4°			

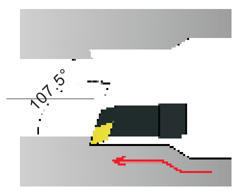
▲Running stock △Make-to-order

Internal turning tool

S□□-SDQPR/L

KAPR:107.5°



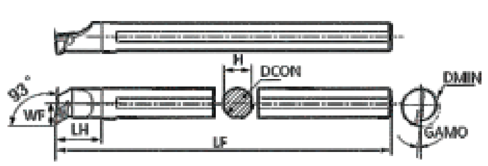


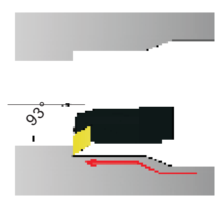
Model		Inventory R	Inventory L	DMIN	DCON	H	LF	WF	GAMO	Accessories: Insert screw	Accessories: Wrench	Matching insert
	S12M-SDQPR/L07	△	△	16	12	11	150	9	-8°	M2.5×5.5	WR07	DP**0702
	S16Q-SDQPR/L07	△	△	20	16	15	180	11	-6°	M2.5×6.5		
	S20R-SDQPR/L11	▲	▲	25	20	18	200	13	-6°	M3.5×8	WR15	DP**11T3

▲Running stock △Make-to-order

S□□-SDUPR/L

KAPR:93°





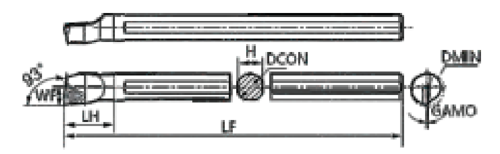
Model		Inventory R	Inventory L	DMIN	DCON	H	LF	WF	GAMO	Accessories: Insert screw	Accessories: Wrench	Matching insert
	S12M-SDUPR/L07	△	△	16	12	11	150	9	-8°	M2.5×5.5	WR07	DP**0702
	S16Q-SDUPR/L07	▲	▲	20	16	15	180	11	-6°	M2.5×6.5		

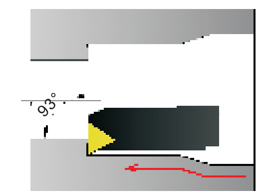
▲Running stock △Make-to-order

Internal turning tool

S□□-STUPR/L

KAPR:93°





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

▲Running stock △Make-to-order

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

HUAREAL

Comparison table of general turning inserts in metric and British systems

C-type negative angle	ISO	Inch
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	ISO	Inch
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 chipbreaker grooves of general turning

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

A General turning
Parting and grooving
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A General turning
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Threading
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Solid carbide drills

Recommended cutting parameters for general external turning

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

Recommended cutting parameters for general external turning

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

Recommended cutting parameters for internal turning

(Positive style: standard machining diameter ＞ ϕ10)

[Cutting depth: radius value (radial cutting depth)]

ISO classification	Material to be cut	Hardness	Cutting field	Machining form	Recommended material	Corner (RE)	Lower limit - recommended value -upper limit		
							Speed Vc (m/min)	Cutting depth ap (mm)	Feed fn (mm/rev)
P	Low carbon steel Low carbon alloy Steel	HB ≤ 300	Precision finishing	Continuous Intermittent	HR8115 HR8225	0.4	250- 300- 350 120- 170- 220	0.05-0.3 -0.5 0.05 -0.3 -0.5	0.03- 0.1- 0.15 0.03- 0.1- 0.15
			Finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	200- 250- 300 150- 200- 250	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Finishing - semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	150- 200- 250 100- 150- 200	0.5 -1.0 -2.0 0.5 -1.0 -1.5	0.1- 0.15- 0.25 0.1- 0 15- 0.2
			Semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	100- 150- 200 80- 120- 150	1.0 -1.5 -2.5 1.0 -1.5 -2.0	0.1- 0.15- 0.3 0.1- 0.15- 0.2
	Medium carbon steel Medium carbon alloy	HB ≤ 300	Precision finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	150- 200- 250 120- 140- 170	0.05-0.3 -0.5 0.05-0.3 -0.5	0.03- 0.1- 0.15 0.03- 0.1- 0.15
			Finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	150- 200- 250 120- 180- 200	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Finishing - semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	120- 180- 220 100- 150- 200	0.5 -1.0 -2.0 0.5 -1.0 -1.5	0.1- 0.15- 0.25 0.1- 0.15- 0.2
			Semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	100- 150- 200 80- 120- 150	1.0 -1.5 -2.5 1.0 -1.5 -2.0	0.1- 0.15- 0.3 0.1- 0.15 - 0.2
	High carbon Alloy steel	HB ≤ 280	Precision finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	120- 150- 180 110- 130- 160	0.05-0.3 -0.5 0.05-0.3 -0.5	0.03- 0.1- 0.15 0.03- 0.1- 0.15
			Finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	120- 150- 180 100- 120- 150	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1- 0.2 0.05- 0.1- 0.2
			Finishing - semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	120- 150- 180 100- 120- 150	0.5 -1.0 -2.0 0.5 -1.0 -1.5	0.1- 0.15- 0.25 0.1- 0.15- 0.2
			Semi-finishing	Continuous Intermittent	HR8115 HR8225	0.4 0.8	100- 120- 150 80- 100- 120	1.0 -1.5 -2.5 1.0 -1.5 -2.0	0.1- 0.15- 0.3 0.1- 0 15- 0.2
M	Stainless steel (austenite)	HB ≤ 220	Finishing	Continuous Intermittent	HR7125 HR7225	0.4 0.8	120- 150- 180 100- 120- 150	0.2 -0.5 -0.8 0.2 -0.5 -0.8	0.05 - 0.08- 0.1 0.05- 0.08 - 0.1
			Semi-finishing	Continuous Intermittent	HR7125 HR7225	0.4 0.8	120- 150- 180 100- 120- 150	0.5 -1.0 -1.5 0.5 -1.0 -1.5	0.05 - 0.1 - 0.2 0.05- 0.1 - 0.2
	Stainless steel (precipitation and hardening)	HB ≤ 300	Finishing	Continuous Intermittent	HR7125 HR7225	0.4 0.8	80- 100- 120 60- 80- 100	0.2 -0.7 -1.0 0.2 -0.7 -1.0	0.05- 0.1 - 0.15 0.05- 0.1 - 0.15
			Semi-finishing	Continuous Intermittent	HR7125 HR7225	0.4 0.8	80- 100- 120 60- 80- 100	0.5 -1.0 -1.5 0.5 -1.0 -1.5	0.05- 0.1 - 0.2 0.05- 0.1 - 0.2
K	Grey cast iron	HB ≤ 250	High speed finishing	Continuous Intermittent	HR6115	0.4 0.8	400- 500- 600 200- 250- 350	0.05-0.2 -0.5 0.2 -0.5 -1.0	0.05- 0.1 - 0.15 0.05- 0.1 - 0.15
			Finishing (with high luster)	Continuous Intermittent	HR6115	0.4 0.8	200- 250- 300 120- 180- 230	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1 - 0.2 0.05- 0.1 - 0.2
			Finishing	Continuous Intermittent	HR6115	0.4 0.8	150- 180- 200 100- 150- 180	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1 - 0.2 0.05- 0.1 - 0.2
			Semi-finishing	Continuous Intermittent	HR6115	0.4 0.8	100- 150- 200 80- 120- 150	0.5 -1.0 -2.0 0.5 -1.0 -2.0	0.1- 0.15- 0.2 0.05- 0.1 - 0.15
	Ductile iron	HB ≤ 270	High speed finishing	Continuous Intermittent	HR6115	0.4 0.8	200- 300- 400 150- 200- 250	0.05-0.2 -0.5 0.2 -0.5 -1.0	0.03- 0.05- 0.1 0.05- 0 1 - 0.15
			Finishing (with high luster)	Continuous Intermittent	HR6115	0.4 0.8	150- 200- 250 120- 150- 200	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1 - 0.2 0.05- 0.1- 0.2
			Finishing	Continuous Intermittent	HR6115	0.4 0.8	120- 150- 180 100- 120- 150	0.2 -0.5 -1.0 0.2 -0.5 -1.0	0.05- 0.1 - 0.2 0.05- 0.1 - 0.2
			Semi-finishing	Continuous Intermittent	HR6115	0.4 0.8	100- 120- 150 80- 100- 120	0.5 -1.0 -2.0 0.5 -1.0 -2.0	0.05- 0.1 - 0.2 0.05- 0.1 - 0.15
N	Non-ferrous metal Copper - copper alloy Aluminum/ aluminum alloy (Si ＜ 10%), etc.	HB ≤ 100	High speed finishing (Iridescence surface luster)	Continuous	HRK10 HRK20	0.4 0.8	200-400-1000	0.05-0.1-0.3	0.05-0.1-0.15
			Finishing	Continuous Intermittent	HRK10 HRK20	0.4 0.8	100- 200- 400 100- 200- 400	0.05 -0.5 -1.0 0.05 -0.5 -1.0	0.03- 0.1- 0.2 0.03- 0.1- 0.2
S	Titanium alloy	HB ≤ 400	Precision finishing (Iridescence surface luster)	Continuous Intermittent	HR9105 HR7115	0.4 0.8	100- 120- 150 70- 100- 120	0.05 -0.1 -0.3 0.05 -0.1 -0.3	0.03- 0.07- 0.1 0.03- 0.07- 0.1
			Finishing	Continuous Intermittent	HR9105 HR7115	0.4 0.8	30- 50- 70 30- 50- 70	0.05 -0.5 -1.0 0.05 -0.5 -1.0	0.03- 0.1- 0.2 0.03- 0.1- 0.2
	Heat-resistant alloy	HB ≤ 350	Finishing	Continuous Intermittent	HR9105 HR7115	0.4 0.8	10- 30- 50 10- 30- 50	0.05 -0.5 -1.0 0.05 -0.5 -1.0	0.03- 0.1- 0.2 0.03- 0.1- 0.2
			Finishing	Continuous Intermittent	HR9105 HR7115	0.4 0.8	40- 60- 80 40- 60- 80	0.1 -0.3 -0.5 0.1 -0.3 -0.5	0.03- 0.05- 0.1 0.03- 0.05- 0.1
H	Quenched steel High hardness material	40~50 HRC	Finishing	Continuous Intermittent	HRK10	0.4 0.8	60- 80- 100 30- 50- 70	0.05 -0.3 -0.5 0.05 -0.3 -0.5	0.05- 0.08- 0.1 0.05- 0.08- 0.1
		45~68 HRC	Finishing	Continuous Intermittent	HRK10	0.4 0.8	100- 140- 180 90- 120- 160	0.1 -0.2 -0.3 0.1 -0.2 -0.3	0.02- 0.07- 0.1 0.02- 0.07- 0.1
			Semi-finishing	Continuous	HRK10	0.4 0.8	60-80-100	0.3-0.7-1.0	0.03-01-0.15

Recommended cutting parameters for cermet brand

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

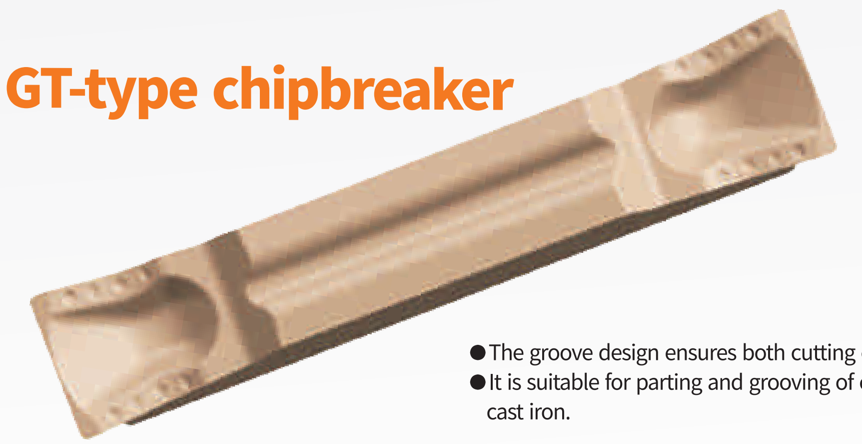
Correction table of cutting parameters for S-type internal turning

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

CT-type chipbreaker

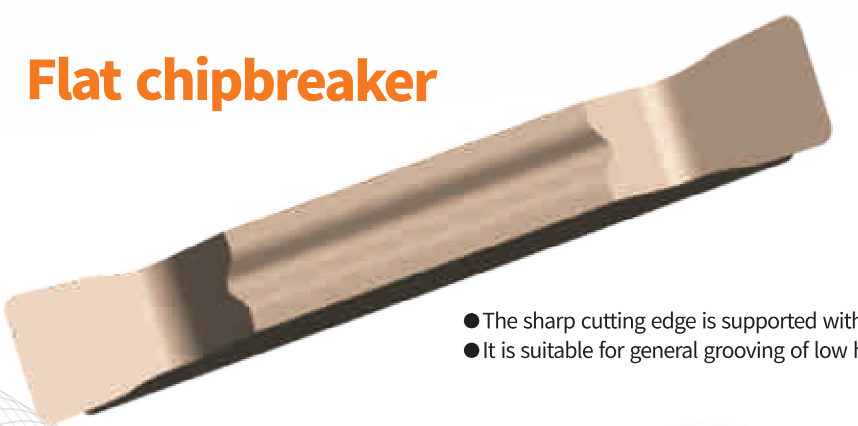
- The unique groove design ensures good chip control.
- It is suitable for external, internal and end face grooving as well as plunge turning.

GT-type chipbreaker



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

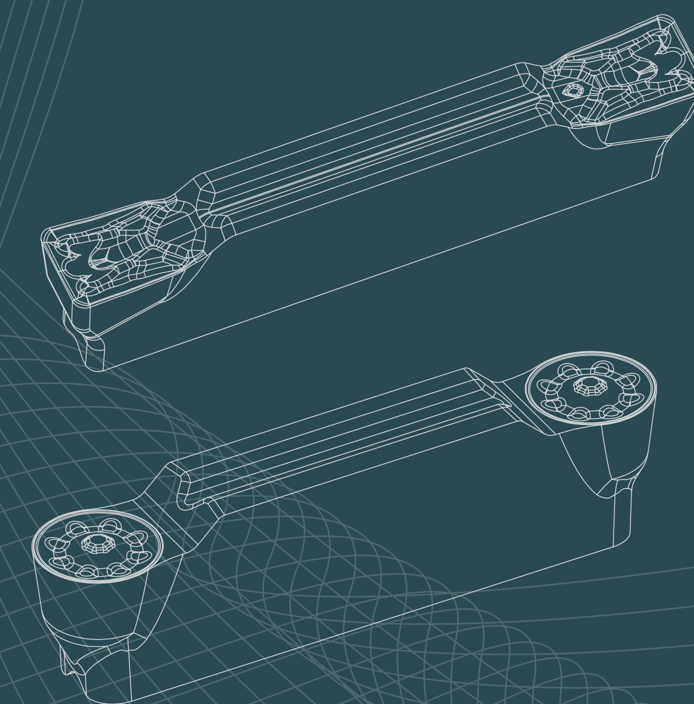
Flat chipbreaker



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

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

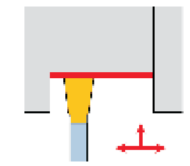
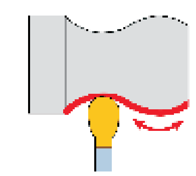
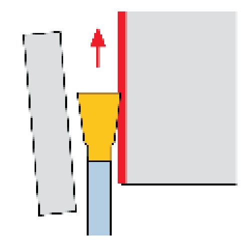
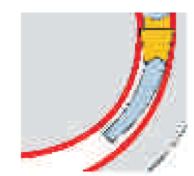
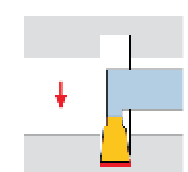
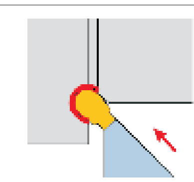
⑤ Corner radius

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

⑥Chipbreaker groove

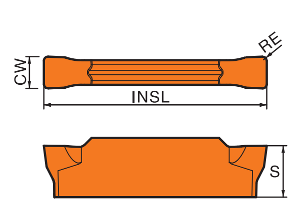
Default	Flat
CT	CT-type groove
GT	GT-type groove
RM	RM-type groove
AK	AK-type groove

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□□	• The multi-purpose cutting tool is compatible with different inserts such as grooving, profiling and parting inserts. • Groove depth: 10-20mm.
Internal grooving and turning		HRIV□□	QCMB□□ QCKB□□ QPMB□□	• The multi-purpose cutting tool is compatible with different inserts such as grooving, profile and parting inserts. • Minimum inscribed circle diameter for machining: 25mm. • Maximum groove depth: 6mm.
Relief groove machining		HREU□□	QCMB□□ QCKB□□ QPMB□□	• The 45°cutting tool structure shall complete a variety of forms of relief groove machining. • Maximum vertical depth of the relief groove: 3.3mm.

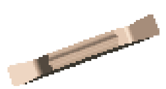
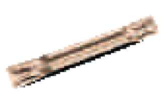
A General turning | Parting and grooving | Threading | B Indexable milling | Solid carbide end mills | C Short hole drills | Solid carbide drills

Parting and grooving insert



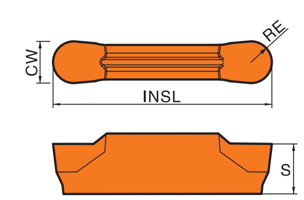
Working condition: ● Stable ◕ Average ⌗ Tough

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

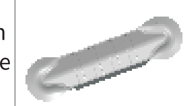
★ Recommended grade ☆ Available grade

Profile groove insert



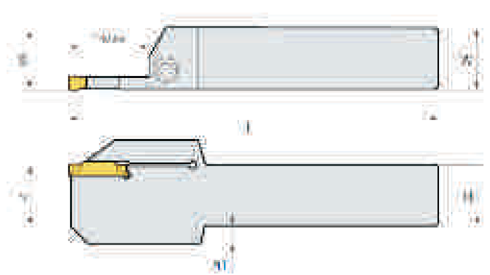
Working condition: ● Stable ◕ Average ⌗ Tough

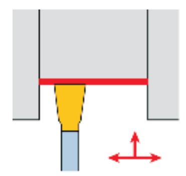
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

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

★ Recommended grade ☆ Available grade

External grooving, parting and turning tools

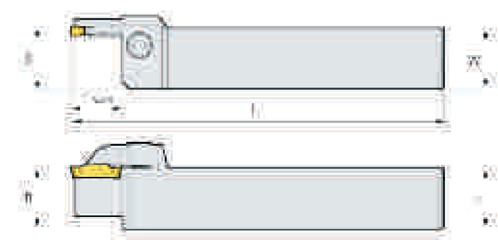


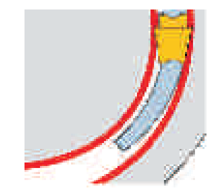


Type		Basic dimension (mm)							Screw	Wrench	Applicable inserts
		Inventory	H=h	W	L	S	H1	T-MAX			
HREHR/L	1212-2-T08	△	12	12	100	12.2	/	8	HHA0512	WR40L	QCMB□□ QCKB□□ QPMB□□ QPEB□□
	1616-2-T08	△	16	16	100	16.2	/	8			
	2020-2-T08	▲	20	20	125	20.2	/	8			
	2525-2-T08	▲	25	25	150	25.2	/	8			
	1616-2-T12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

▲Running stock △Make-to-order

90° end face grooving tool

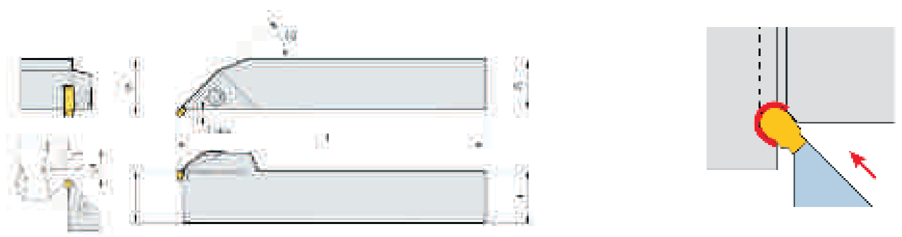




Type		Basic dimension (mm)						ΦD		Screw	Wrench	Applicable inserts
		Inventory	H=h	W	L	S	T-MAX	Min	Max			
HRFHR/L	325-34/50-T10	△	25	25	150	25.5	10	34	50	HHA0512	WR40L	QCMB□□ QCKB□□
	325-44/70-T15	▲	25	25	150	25.5	15	44	70			
	325-64/100-T15	△	25	25	150	25.5	15	64	100			
	425-40/60-T10	△	25	25	150	25.6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

▲Running stock △Make-to-order

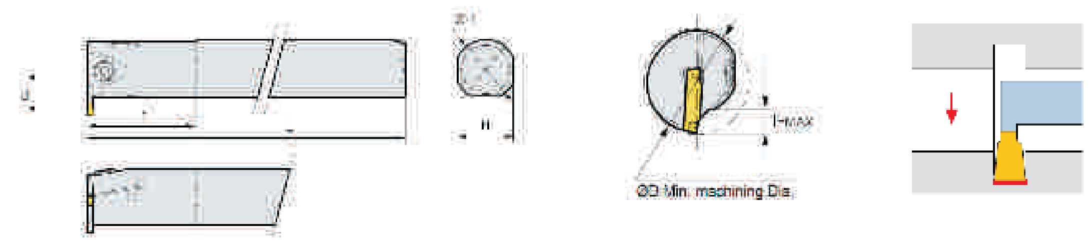
Relief groove tool



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

▲Running stock △Make-to-order

Internal grooving and turning tools



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

▲Running stock △Make-to-order

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

Cutting speed recommendations for parting and grooving

ISO	Classification of materials			Hardness of Brinell (HB)	Tensile strength (N/mm²)	Cutting Speed Recommendations (m/min)											
						HR8225			HR7125			HR7225			HR6115		
						Feed (mm/rev)											
						0.1	0.3	0.5	0.1	0.3	0.5	0.1	0.3	0.5	0.1	0.3	0.5
P	Non-alloyed steel	C≤0.25%	Annealing	125	428	280	200	130	260	180	120	260	180	120			
		0.25<C≤0.55%	Annealing	190	639	240	160	115	220	150	105	200	140	105			
		0.25<C≤0.55%	Quenching and tempering	210	708	130	115	100	120	110	100	120	110	100			
		C>0.55%	Annealing	190	639	145	130	115	130	120	110	130	120	110			
		C>0.55%	Quenching and tempering	300	1013	115	100	80	110	95	70	110	95	70			
		Short chip steel	Annealing	220	745	130	115	100	120	105	90	120	105	90			
	Low-alloyed steel	Annealing		175	591	280	200	130	170	135	120	170	135	120			
		Quenching and tempering		300	1013	115	100	80	105	90	70	105	90	70			
		Quenching and tempering		380	1282	170	90	70	160	80	60	160	80	60			
		Quenching and tempering		430	430												
	High-alloyed steel and high alloy tool steel	Annealing		200	675												
		Quenching and tempering		300	1013												
		Quenching and tempering		400	1361												
M	Stainless steel	Ferrite/martensite, annealing		200	675				200	150	105	200	150	105			
		Martensite, quenching and tempering		330	1114				150	115	70	150	115	70			
	Stainless steel	Austenite, quenching		200	675				165	135	105	185	155	125			
		Austenite, precipitation hardening stainless steel (PH stainless steel)		300	1013				155	120	80	165	135	95			
		Austenite- ferrite, duplex stainless steel		230	778				135	110	85	145	110	85			
K	Malleable cast iron	Ferrite		200	400										220	160	80
		Pearlite		260	700										115	90	65
	Grey cast iron	Low tensile strength		180	200										200	150	95
		High tensile strength/austenite		245	350										185	140	95
	Ductile iron	Ferrite		155	400										160	130	80
		Pearlite		265	700										145	110	80
	Compacted graphite iron GGV (CGI)			230	400										150	120	90

Notes: 1. Cutting parameters are suitable for wet cutting.

2. For internal and section machining, it is recommended to reduce the cutting speed by 30%-50% Precautions for Parting and Grooving:

Precautions for parting and grooving:

Parting

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

External grooving and turning, profile turning

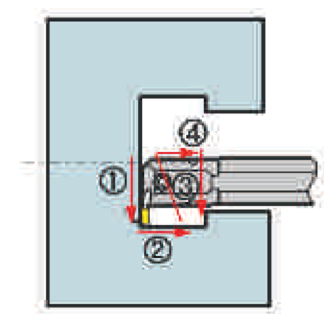
- Pass sequence: When cutting depth > 0.5mm, radial feed (the maximum cutting depth can reach 0.75 x insert width S) → radial return about 0.1mm → axial pass → oblique return → axial pass → radial machining to the required depth.

End face grooving and turning

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

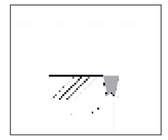
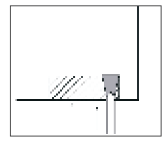
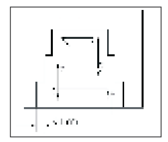
Internal grooving and turning

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

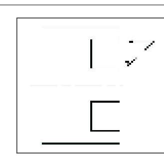
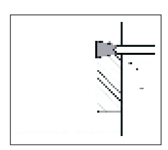
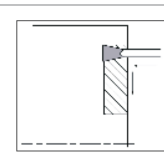


A General turning | Parting and grooving | Threading
B Indexable milling | Solid carbide end mills
C Short hole drills | Solid carbide drills

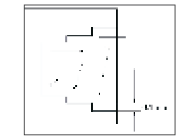
Precautions for external parting, grooving and turning

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.	

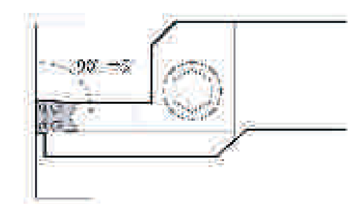
Precautions for end face grooving turning

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

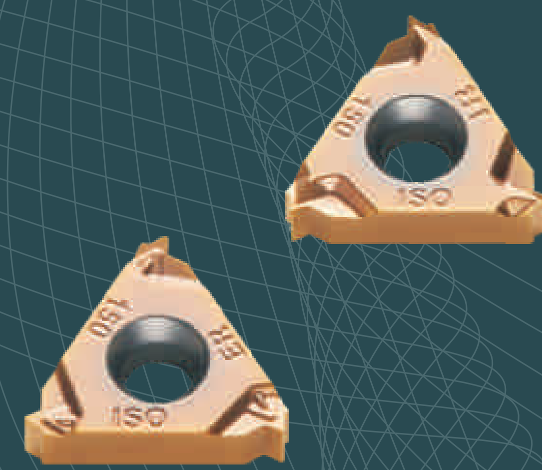
S/N	Machining subjects	Precautions	Diagram
3	End face groove expansion machining	During rough machining, please stagger them into step shape for machining.	
		Finish machining: When the cutting depth is set to 0.5mm or above on one side, the chip disposal performs well.	

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.

A Turning

Threading



A General 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

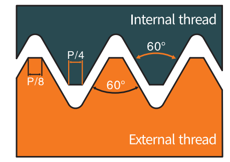
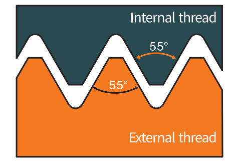
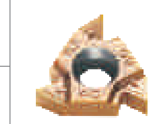
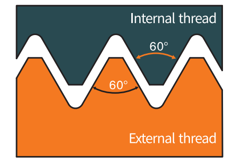
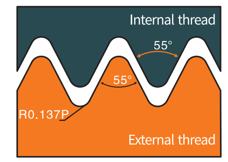
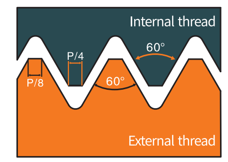
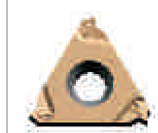
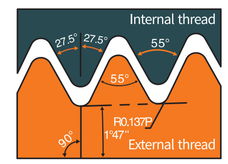
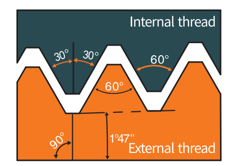
③ Cutting direction	
Code	Direction
R	Dextral
L	Sinistral

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

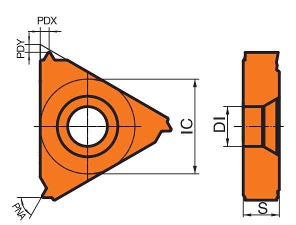
⑥Shaping method	
Code	Type
default	Molded groove
P	Grinding groove

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
General industry		Universal thread	55 ° universal pitch thread		0.5-5
			60 ° universal pitch thread		
General industry		Whitworth thread	W		8-28
Aerospace industry equipment		UN thread	UN		12-20
Pipe threads for gas, heating and tap water		BSPT	BSPT		11-28
For pipelines connection with gas and tap water faucets		NPT	NPT		8-27

ISO metric 60° thread (Molded)

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



Working condition: ● Stable ◕ Average ⌗ Tough

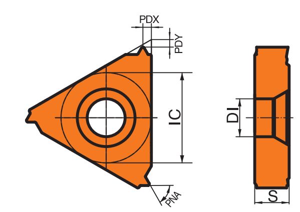
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
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°									☆	★				
		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	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					●	◕								

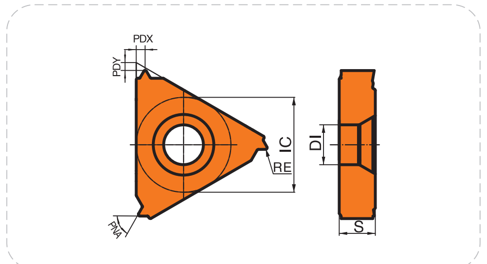
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Internal thread		11IR100ISO	1.00	6.35	0.7	0.7	3.05	3.2	60°									☆	★				
		11IR125ISO	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°									☆	★				
		11IR175ISO	1.75	6.35	1.2	0.9	3.05	3.2	60°									☆	★				
		11IR200ISO	2.00	6.35	1.3	0.9	3.05	3.2	60°									☆	★				
		11IR250ISO	2.50	6.35	1.5	1.0	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°									☆	★				
		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

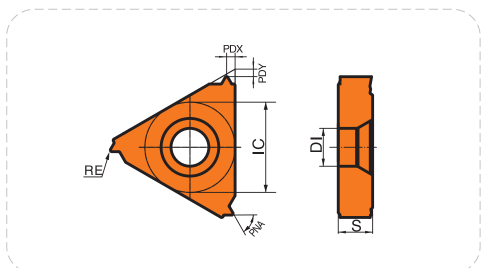


Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	IC	PDX	PDY	S	RE	DI	PNA	CVD HR8115	CVD HR8125	CVD HR8225	CVD HR6115	PVD HR9105	PVD HR7115	PVD HR7125	PVD HR7225	PVD HR5125	PVD HR5225	Cemented carbide HRK10	Cemented carbide HRK20	Cermet HRC10	Cermet HRC20
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°									☆	★				
		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	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					●	◕								

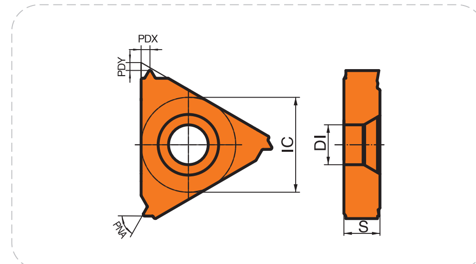
Machining type	Insert shape	Type	Pitch/ number of teeth	IC	PDX	PDY	S	RE	DI	PNA	CVD HR8115	CVD HR8125	CVD HR8225	CVD HR6115	PVD HR9105	PVD HR7115	PVD HR7125	PVD HR7225	PVD HR5125	PVD HR5225	Cemented carbide HRK10	Cemented carbide HRK20	Cermet HRC10	Cermet HRC20
Internal thread		11IRA55	0.5-1.5	6.350	0.9	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°									☆	★				
		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

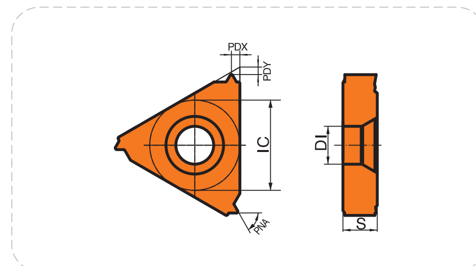


Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	IC	PDX	PDY	S	DI	PNA	CVD HR8115	CVD HR8125	CVD HR8225	CVD HR6115	PVD HR9105	PVD HR7115	PVD HR7125	PVD HR7225	PVD HR5125	PVD HR5225	Cemented carbide HRK10	Cemented carbide HRK20	Cermet HRC10	Cermet HRC20
External thread		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	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					●	◕								

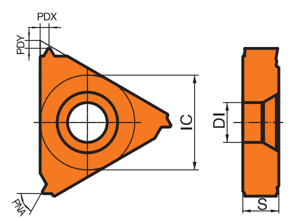
Machining type	Insert shape	Type	Pitch/ number of teeth	IC	PDX	PDY	S	DI	PNA	CVD HR8115	CVD HR8125	CVD HR8225	CVD HR6115	PVD HR9105	PVD HR7115	PVD HR7125	PVD HR7225	PVD HR5125	PVD HR5225	Cemented carbide HRK10	Cemented carbide HRK20	Cermet HRC10	Cermet HRC20
Internal thread		16IR11W	11	9.525	1.5	1.1	3.52	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

HUAREAL

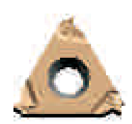
UN united thread (Molded)

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

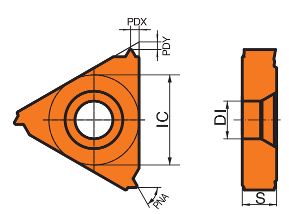


Working condition: ● Stable ◕ Average ⌗ Tough

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					●	◕								

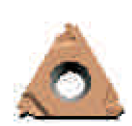
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
External thread		16ER12UN	12	9.525	1.4	1.1	3.52	4.0	60°									☆	★				
		16ER16UN	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

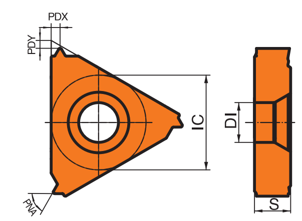
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Internal thread		16IR12UN	12	9.525	1.4	1.1	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

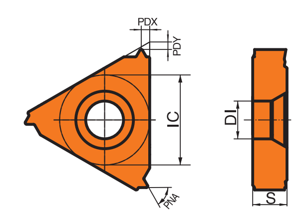


Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material	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	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
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	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					●	◕								

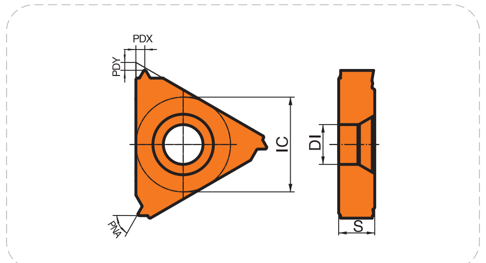
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Internal thread		16IR11BSPT	11	9.525	1.5	1.1	3.52	4.0	55°									☆	★				
		16IR14BSPT	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

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

NPT (Molded)

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

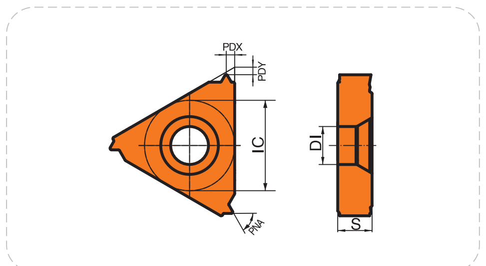


Working condition: ● Stable ◕ Average ⌗ Tough

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	Pitch/ number of teeth	Basic dimension (mm)						CVD				PVD						Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
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

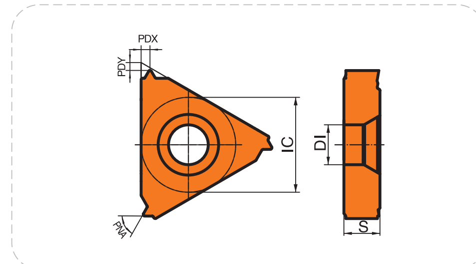
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD				PVD						Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
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

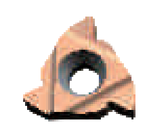
ISO metric 60° thread (Grinding)

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



Working condition: ● Stable ◕ Average ⌗ Tough

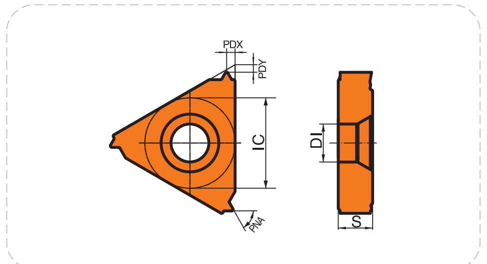
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm)						CVD				PVD						Cemented carbide		Cermet	
				IC	PDX	PDY	S	DI	PNA	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
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

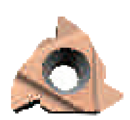
ISO metric 60° thread (Grinding)

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



Working condition: ● Stable ◕ Average ⌑ Tough

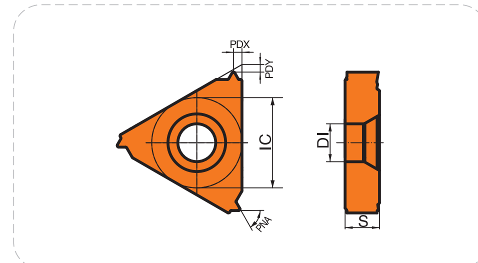
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌑										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
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

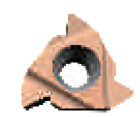
ISO metric 60° thread (Grinding)

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



Working condition: ● Stable ◕ Average ⌑ Tough

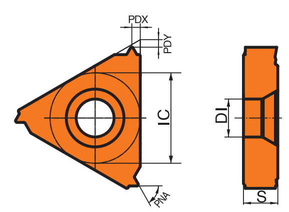
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌑										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
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

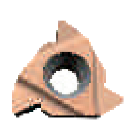
Whiteworth thread (Grinding)

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



Working condition: ● Stable ◕ Average ⌗ Tough

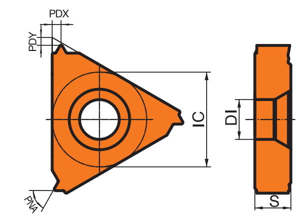
Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Internal thread		16IR8W-P	8	9.525	1.5	1.2	3.52	4.0	55°									☆	★				
		16IL8W-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°									☆	★				
		16IL9W-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°									☆	★				
		16IL10W-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°									☆	★				
		16IL11W-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°									☆	★				
		16IL12W-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°									☆	★				
		16IL14W-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°									☆	★				
		16IL16W-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°									☆	★				
		16IL18W-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°									☆	★				
		16IL19W-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°									☆	★				
		16IL20W-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°									☆	★				
		16IL26W-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°									☆	★				
		16IL28W-P	28	9.525	0.7	0.6	3.52	4.0	55°									☆	★				

★ Recommended grade ☆ Available grade

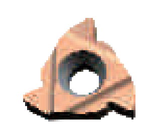
Whiteworth thread (Grinding)

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



Working condition: ● Stable ◕ Average ⌗ Tough

Workpiece material	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	Pitch/ number of teeth	IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Internal thread		16ER8W-P	8	9.525	1.5	1.2	3.52	4.0	55°									☆	★				
		16EL8W-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°									☆	★				
		16EL9W-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°									☆	★				
		16EL10W-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°									☆	★				
		16EL11W-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°									☆	★				
		16EL12W-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°									☆	★				
		16EL14W-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°									☆	★				
		16EL16W-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°									☆	★				
		16EL18W-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°									☆	★				
		16EL19W-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°									☆	★				
		16EL20W-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°									☆	★				
		16EL26W-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°									☆	★				
		16EL28W-P	28	9.525	0.7	0.6	3.52	4.0	55°									☆	★				

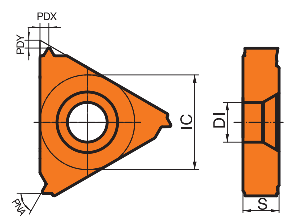
★ Recommended grade ☆ Available grade

HUAREAL

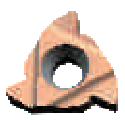
BSPT (Grinding)

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

Working condition: ● Stable ◕ Average ⌗ Tough

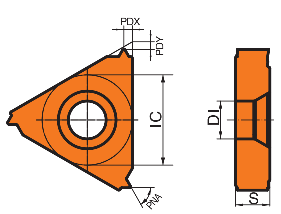


Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

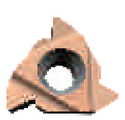
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
External thread		16ER11BSPT-P	11	9.525	1.5	1.1	3.52	4.0	55°									☆	★				
		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	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					●	◕								

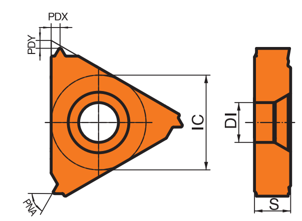
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
External thread		16IR11BSPT-P	11	9.525	1.5	1.1	3.52	4.0	55°									☆	★				
		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

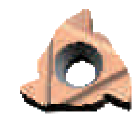
NPT (Grinding)

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

Working condition: ● Stable ◕ Average ⌗ Tough

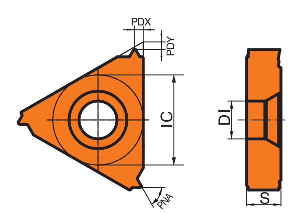


Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

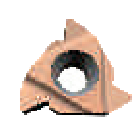
Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
External thread		16ER8NPT-P	8	9.525	1.8	1.3	3.52	4.0	60°									☆	★				
		16ER115NPT-P	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

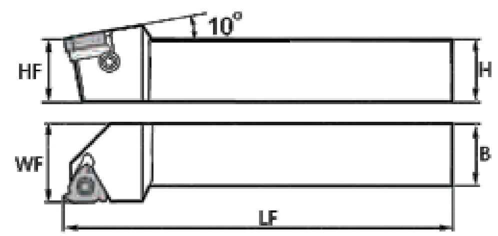


Workpiece material	HR8115	HR8125	HR8225	HR6115	HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	HRK10	HRK20	HRC10	HRC20
P Steel	●	◕	◕ ⌗										●	◕
M Stainless steel							● ◕	● ◕						
K Cast iron				● ◕										
N Non-ferrous metal											●	◕		
S Heat-resistant alloy Titanium alloy					●	◕								

Machining type	Insert shape	Type	Pitch/ number of teeth	Basic dimension (mm) IC	PDX	PDY	S	DI	PNA	CVD HR8115	HR8125	HR8225	HR6115	PVD HR9105	HR7115	HR7125	HR7225	HR5125	HR5225	Cemented carbide HRK10	HRK20	Cermet HRC10	HRC20
Internal thread		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

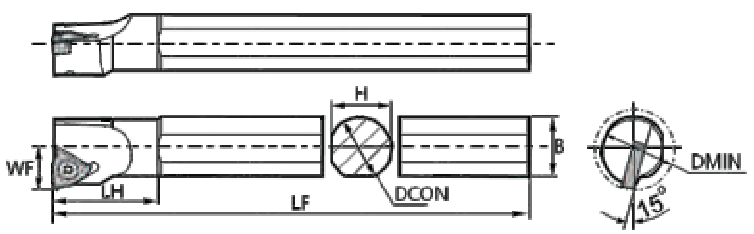
External threading tools



Type		Inventoty	H	HF	B	LF	WF	Insert screw	Shim	Insert shim screw	Wrench	Matching insert
			Basic dimension (mm)					Accessories				
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					

▲Running stock △Make-to-order

Internal threading tools



Type		Inventoty	DCON	LF	B	DMIN	WF	H	LH	Insert screw	Shim	Insert shim screw	Wrench	Matching insert
			Basic dimension (mm)							Accessories				
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					

▲Running stock △Make-to-order

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/mm²)	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	0.01	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

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

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

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	0.1	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

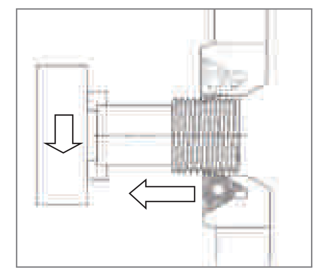
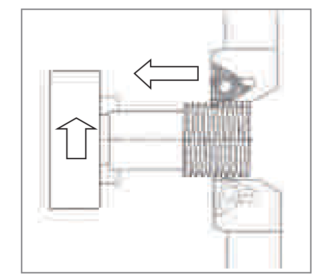
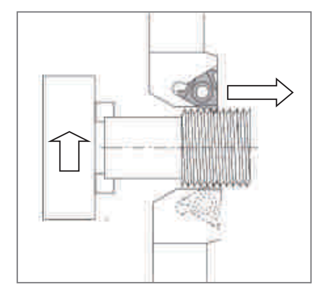
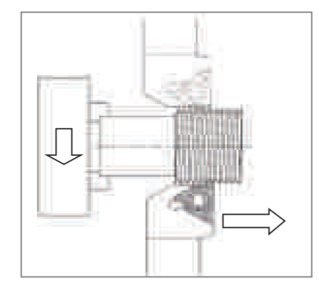
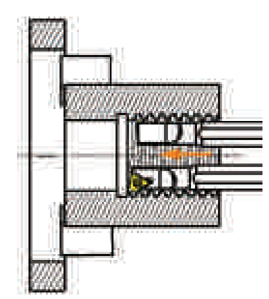
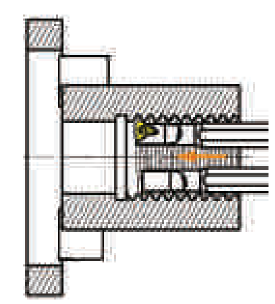
NPT - internal thread

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

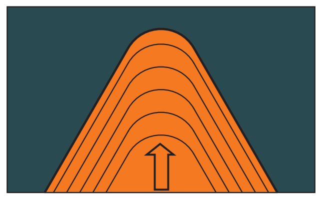
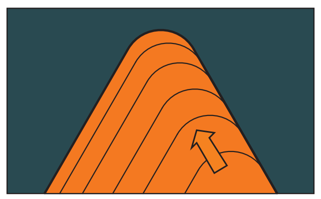
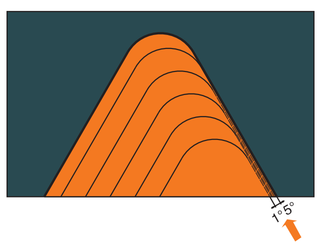
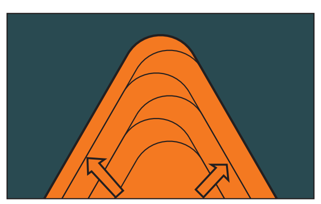
Features of thread insert

- 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.

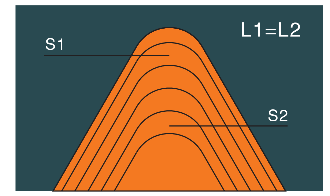
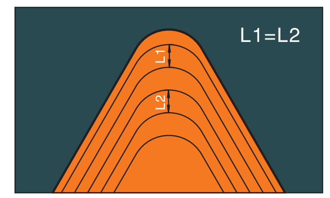
Machining type of thread tools

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

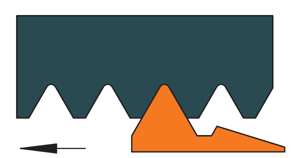
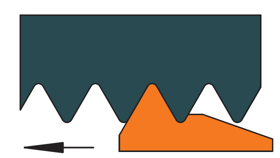
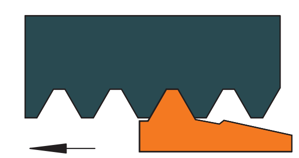
Threading (crosscutting) method

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

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

CFM145

Face milling tool

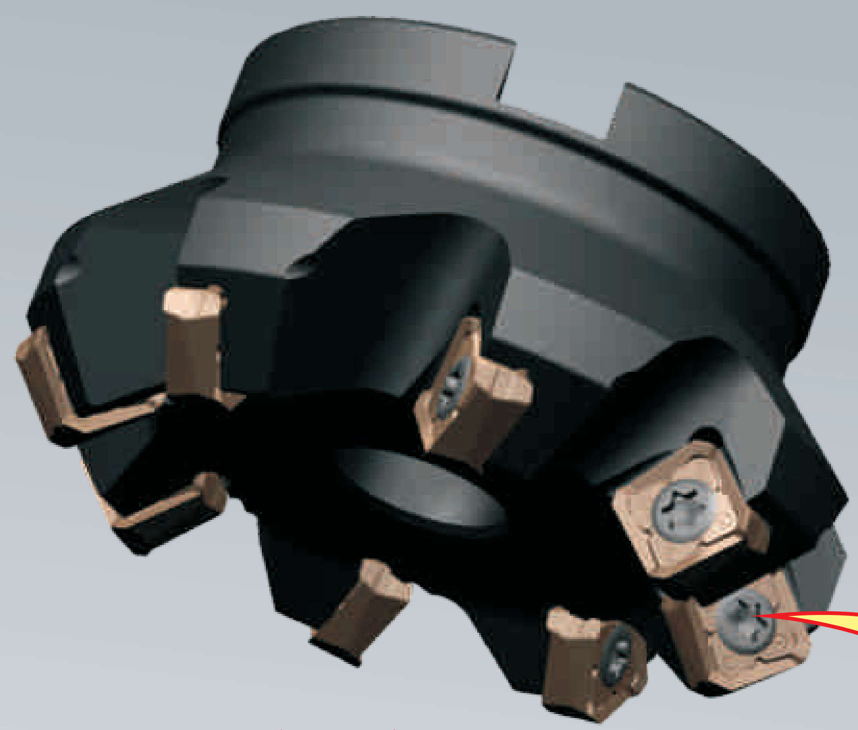
New

C/SSM190

Square shoulder milling tool

CFM345

Load-bearing universal face milling tool



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

New

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

C/SSM390

Square shoulder milling tool

New

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

Overview of indexable milling inserts

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

B Milling

Indexable milling

Solid carbide end mills

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

85° A	82° B	80° C
55° D	75° E	H
55° K	L	86° M
O	P	R
S	T	75° T
35° V	80° W	Others Z

③ Tolerance (mm)

m ΦD m ΦD S

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

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

Code key of indexable milling tools

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

① ② ③ ④ ⑤ ⑥ ⑦

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

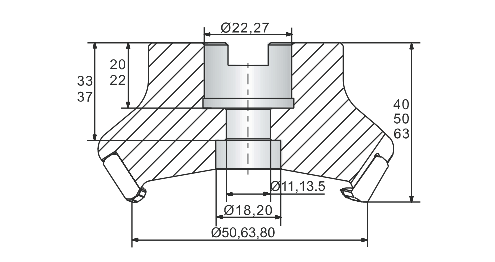
⑤ Cutting direction	
R	Default
L	Sinistral cutting

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

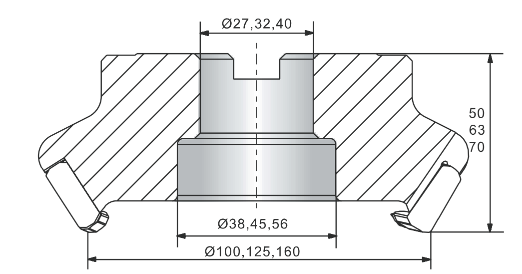
Structure of tool installation part (Sleeve structure)

A-type interface



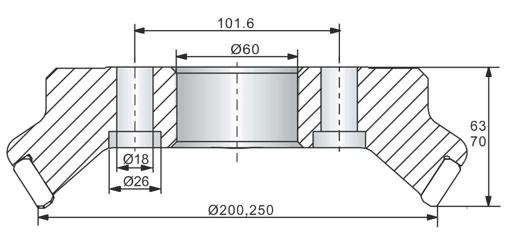
φ200-φ250 sleeve face milling tools specified in GB5342-96

B-type interface



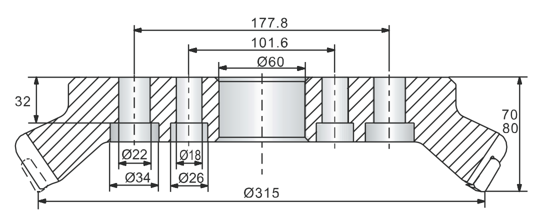
φ100-φ160 sleeve face milling tools specified in GB5342-96

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.

Code key of indexable milling tools

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

⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭

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

⑨ Unit	
Inch	I
Metric	Default

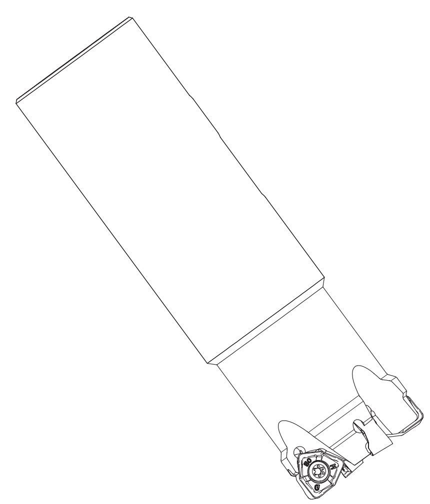
⑩ Number of teeth	
02	Two teeth
03	Three teeth
04	Four teeth
...	...

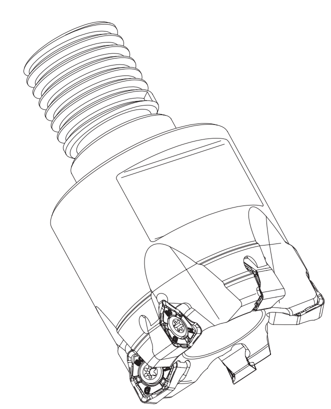
⑪ Length type	
Cutterhead style	Omit
Shank style	Omit
S	Short
L	Long
XL	Lengthened

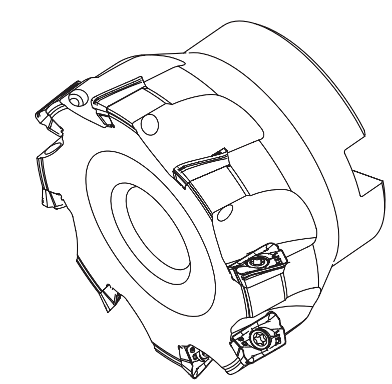
⑫ Insert shape	
A	85°
H	
L	
O	
R	
S	
T	
W	80°
Others	

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

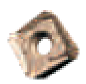
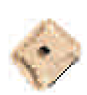
⑭ Cutting edge length	
09	9mm
10	10mm
12	12mm
15	15mm
19	19mm
Others	



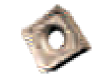
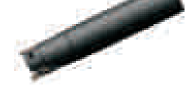




Overview of indexable milling tools

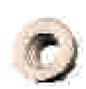
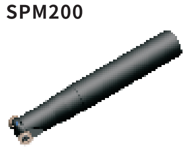
Machining form	Series/shape	Cutting edge angle	Applicable inserts	Insert shape	Usage and features	Page
Face milling tool	CFM143 	KAPR=43°	OD□□		◎ Light and fast in cutting, it is cost-effective with unilateral octagonal inserts; ◎ It is suitable for face milling P, M, K and other materials.	B11-B12
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

Overview of indexable milling tools

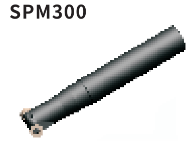
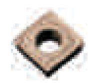
Machining form	Series/shape	Cutting edge angle	Applicable inserts	Insert shape	Usage and features	Page
Square shoulder milling tool	CSM188 	KAPR=88°	SNGX1005ZNN-GM SNMX100512-GM		◎ Supported by grinding level/precision molded level quadrilateral negative angle inserts, the cutting process proceeds stably.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

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

Overview of indexable milling tools

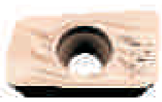
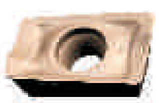
Machining form	Series/shape	Cutting edge angle	Applicable inserts	Insert shape	Usage and features	Page
Square shoulder milling tool	CSM590 	KAPR=90°	APMT11□□ APGT11□□ APMT16□□ APGT16□□		◎ Universal shoulder milling tool series ◎ It is suitable for shoulder milling, groove milling, Ramp Milling and face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

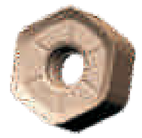
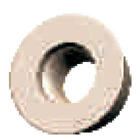
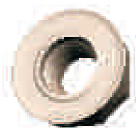
Overview of indexable milling tools

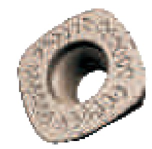
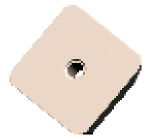
Machining form	Series/shape	Cutting edge angle	Applicable inserts	Insert shape	Usage and features	Page
Profile milling tool	CPM300 		RD□□		◎ It is suitable for the machining of P, K ◎ materials and hardened materials. It is of different diameters and can be used for machining flat, curved surfaces and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

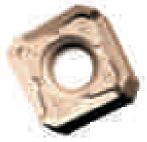
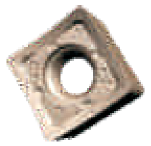
A General turning | Parting and grooving | Threading | B Indexable milling | Solid carbide end mills | C Short hole drills | Solid carbide drills

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	B36
 	SPMT120408-MM APMT150412-MM SPHX120408T21 APHX1504	B67
	AOKT060202PEER-VM AOKT060204PEER-VM AOKT060208PEER-VM AOKT113504PEER-VM AOKT113508PEER-VM AOKT113512PEER-VM AOKT113516PEER-VM AOKT160408PEER-VM AOKT160412PEER-VM AOKT160416PEER-VM	B32

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

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

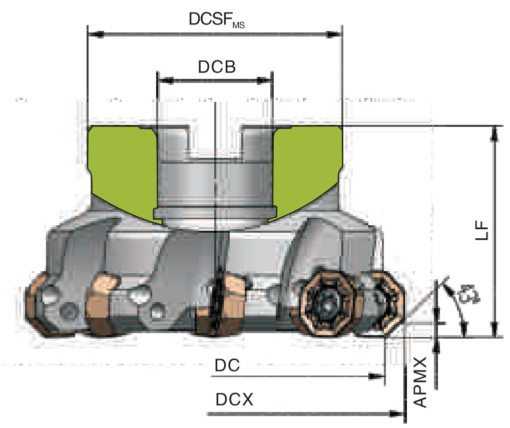
Insert shape	Insert model	Page
	SNGX1005ANR-GM	B14
	SNGX1005ANR-GE	B14
	SNGX1005ZNN-GM SNMX100512-GM	B28
	SZMX1206ANR-GM	B18
	XNGX0705ANN-R	B24
	ZNMU040308PNR-GM ZNMU080608PNR-GM	B41
	ZNMU040308PNR-GL ZNMU080608PNR-GL	B41

HUAREAL

Face milling

CFM143 series

KAPR=43°

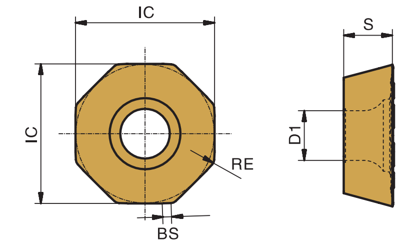


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	DCSF$_{MS}$	DCX	LF					
CFM143-040A1603-OD06	3	△	40	16	35	50	40	4	A	OD□□	M5×13	WR20S
CFM143-050A2204-OD06	4	△	50	22	42	60	40	4				
CFM143-063A2205-OD06	5	▲	63	22	50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

▲Running stock △Make-to-order

Applicable inserts

OD□□



Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts	Workpiece material						HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
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

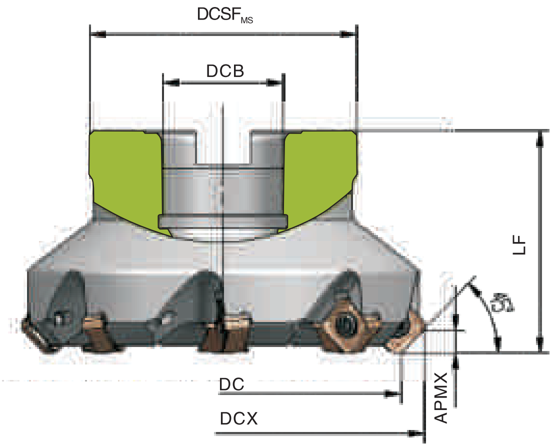
Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z(mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	270(220-350)	0.3(0.1-0.5)
			HR5120	270(220-360)	
			HR5130	270(220-360)	
	High-carbon steel, alloy steel	180-280	HR5110	240(200-320)	0.2(0.1-0.4)
			HR5120	240(180-350)	
			HR5130	240(180-350)	
	Alloy tool steel	280-350	HR5110	220(180-200)	0.15(0.1-0.3)
			HR5120	220(170-340)	
			HR5130	220(170-340)	
M	Stainless steel	≤270	HR5110	230(180-300)	0.2(0.1-0.3)
			HR5120	150(120-250)	
			HR5130	150(120-250)	
K	Cast iron	180-250	HR5110	240(180-300)	0.2(0.1-0.4)
			HR5120	200(150-250)	
			HR5130	200(150-250)	

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

Face milling

CFM145 series

KAPR=45°

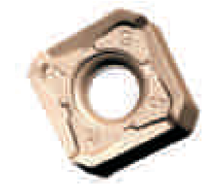


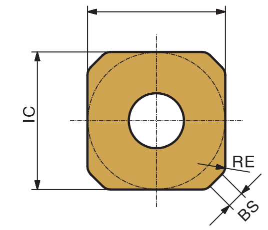
Tool specification	Number of edges	Inventory	Basic dimension (mm) DC	DCB	$DCSF_{MS}$	DCX	LF	APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
CFM145-050A2204-SN10	4	▲	50	22	42	60.5	40	4.7	A	SNGX□□	M3.5×10	WR15S
CFM145-050A2205-SN10	5	△	50	22	42	60.5	40	4.7	A	SNGX□□	M3.5×10	WR15S
CFM145-063A2205-SN10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

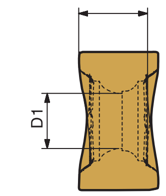
▲Running stock △Make-to-order

Applicable inserts

SN□□







Working condition: ● Stable ◕ Average ⌑ Tough

Applicable inserts – Workpiece material	HR8140 (CVD)	HR5110 (PVD)	HR5120 (PVD)	HR5130 (PVD)	HR7130 (PVD)	HR7140 (PVD)	HRK10 (Cemented carbide)	HRC20 (Cermet)
P Steel	⌑	●	◕	⌑	⌑	⌑		●
M Stainless steel		●	◕	⌑		⌑		
K Cast iron	⌑	●	◕	⌑				
N Non-ferrous metal							◕	
S Heat-resistant alloy，titanium alloy								

Type	Basic dimension (mm) IC	S	D1	BS	RE	APMX (mm)	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SNGX1005ANR-GM	10.0	5.0	4.0	1.2	0.8	4.7		☆	★	★				
SNGX1005ANR-GE	10.0	5.0	4.0	1.2	0.8	4.7		☆	★	★				

★ Recommended grade ☆ Available grade

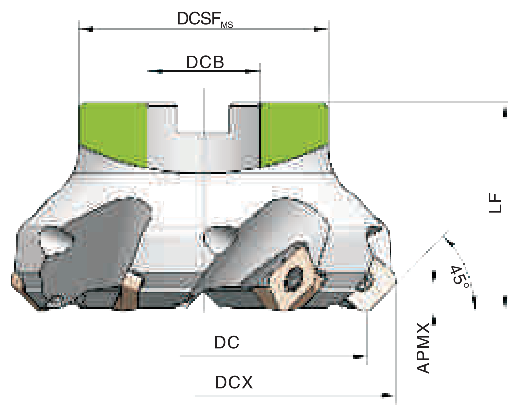
Recommended cutting parameters

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

Face milling

CFM245 series

KAPR=45°

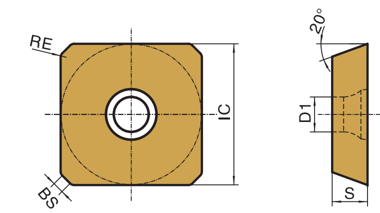


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	DCSF	DCX	LF					
CFM245-050A2203-SE13	3	△	50	22	42	61	40	6	A	SEET□□	M3.5×10	WR15S
CFM245-050A2204-SE13	4	▲	50	22	42	61	40	6	A			
CFM245-063A2204-SE13	4	△	63	22	50	74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

▲Running stock △Make-to-order

Applicable inserts

SE□□



Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts	Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SEET13T3-GM	13.4	3.97	4.1	1.4	1.5	6		☆	★	★				
SEMT13T3AGTN-FM	13.4	3.97	4.1	1.4	1.5	6		☆	★	★				

★ Recommended grade ☆ Available grade

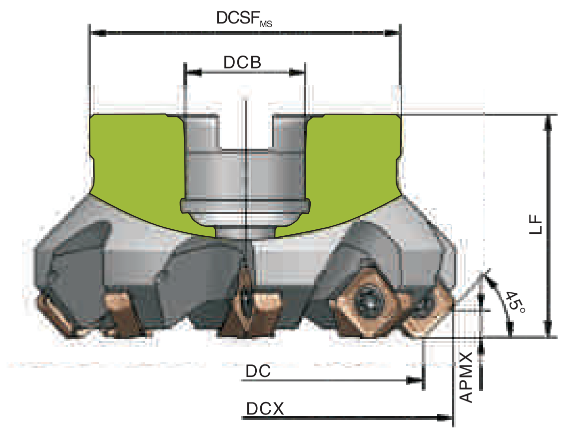
Recommended cutting parameters

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

Face milling

CFM345 series

KAPR=45°

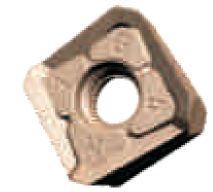


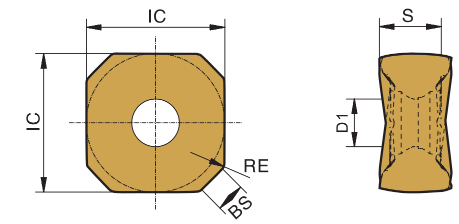
Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	DCSF$_{MS}$	DCX	LF					
CFM345-050A2204-SZ12	4	△	50	22	42	63.7	40	6	A	SZMX□□	M4×10	WR15S
CFM345-050A2205-SZ12	5	▲	50	22	42	63.7	40	6	A	SZMX□□	M4×10	WR15S
CFM345-063A2205-SZ12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

▲Running stock △Make-to-order

Applicable inserts

SZMX □□





Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts	Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SZMX1206ANR-GM	13.4	6.0	4.6	1.4	0.8	6		☆	★	★				

★ Recommended grade ☆ Available grade

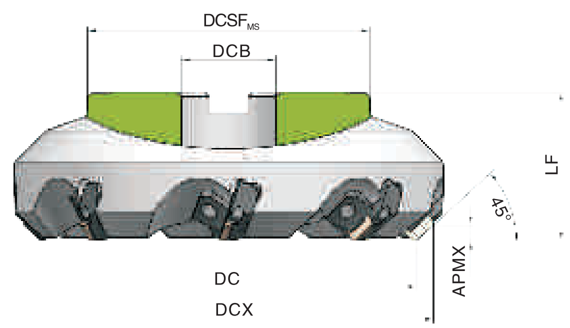
Recommended cutting parameters

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

Face milling

CFM445 series

KAPR=45°



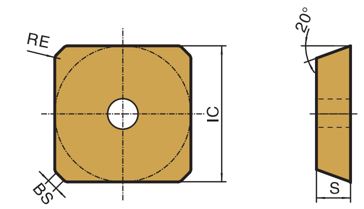
Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts
			DC	DCB	DCSF$_{MS}$	DCX	LF			
CFM445-080A2704-SE12	4	▲	80	27	60	103	50	5.5	A	SE□R1203□
CFM445-100B3205-SE12	5	▲	100	32	70	122	50	5.5	B	
CFM445-125B4006-SE12	6	▲	125	40	85	147	63	5.5		
CFM445-160C4008-SE12	8	▲	160	40	100	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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
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

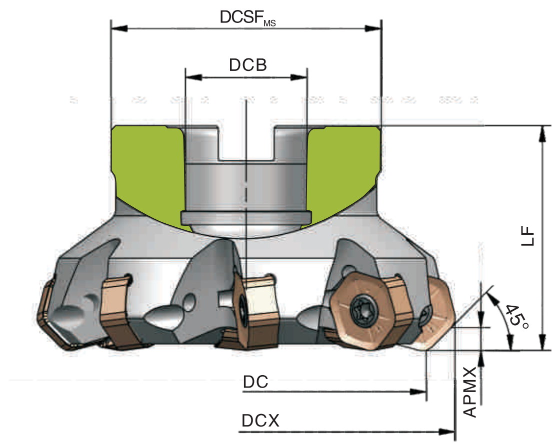
Recommended cutting parameters

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	HR5110	270(220-350)	0.3(0.1-0.5)
			HR5120	270(220-360)	
			HR5130	270(220-360)	
	High-carbon steel, alloy steel	180-280	HR5110	240(200-320)	0.15(0.1-0.4)
			HR5120	240(180-350)	
			HR5130	240(180-350)	
	Alloy tool steel	280-350	HR5110	220(180-200)	0.15(0.1-0.3)
			HR5120	220(170-340)	
			HR5130	220(170-340)	
M	Stainless steel	≤270	HR5110	230(180-300)	0.15(0.1-0.3)
			HR5120	150(120-250)	
			HR5130	150(120-250)	
K	Cast iron	180-250	HR5110	240(180-300)	0.2(0.1-0.4)
			HR5120	200(150-250)	
			HR5130	200(150-250)	

Face milling

CFM645 series

KAPR=45°

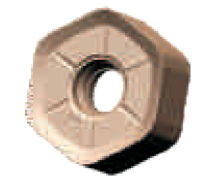


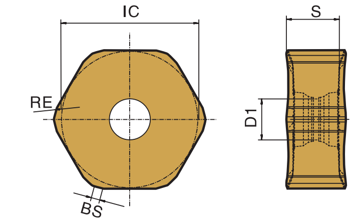
Tool specification	Number of edges	Inventory	Basic dimension (mm) DC	DCB	DCSF	DCX	LF	APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
CFM645-050A1604-HN09	4	△	50	16	42	61.7	40	5	A	HNMX0906□□	M4×11	WR15S
CFM645-063A2206-HN09	6	▲	63	22	50	74.7	40	5	A	HNMX0906□□	M4×11	WR15S
CFM645-080A2706-HN09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

▲Running stock △Make-to-order

Applicable inserts

HNMX□□





Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts (Workpiece material)	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy，titanium alloy								

Type	Basic dimension (mm) IC	S	D1	BS	RE	APMX (mm)	CVD HR8140	PVD HR5110	PVD HR5120	PVD HR5130	PVD HR7130	PVD HR7140	Cemented carbide HRK10	Cermet HRC20
HNMX0906ANSN-M	16.5	6.34	4.9	1.0	1.2	5		☆	★	★				

★ Recommended grade ☆ Available grade

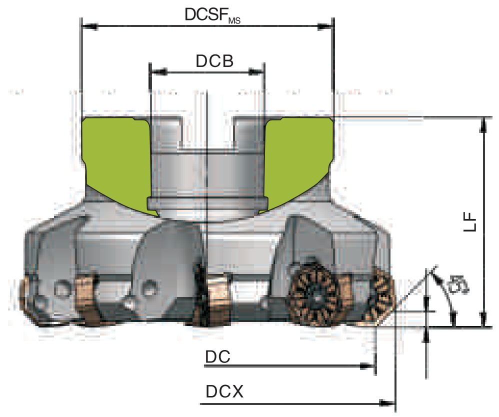
Recommended cutting parameters

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

Face milling

CFM745 series

KAPR=45°

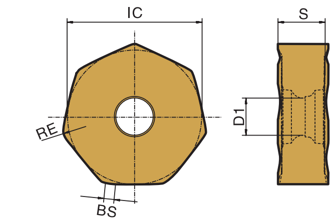


Tool specification	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	DCSF$_{MS}$	DCX	LF					
CFM745-040A1603-XN07	3	△	40	16	35	49.6	40	4.4	A	XMIX0705□□	M3.5×10	WR15S
CFM745-050A2204-XN07	4	▲	50	22	42	59.6	40	4.4	A	XMIX0705□□	M3.5×10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

▲Running stock △Make-to-order

Applicable inserts

XN □□



Working condition: ● Stable ◕ Average ⌘ Tough

Applicable inserts	Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
XNGX0705ANN-R	14.5	5.02	4.0	1.0	0.8	4.4		☆	★	★				

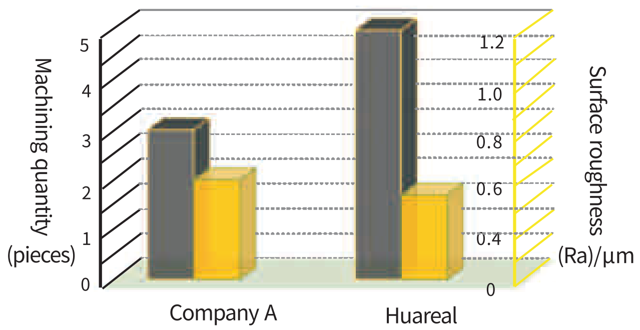
★ Recommended grade ☆ Available grade

Recommended cutting parameters

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

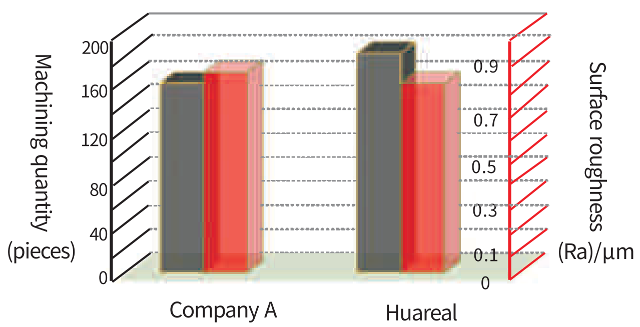
Machining cases

- **Workpiece material** 1Cr18Ni9Ti
- **Machining method** Face milling
- **Cooling method** Water cooling
- **Insert** SNGX1005ANR-GM，HR5120
- **Cutting tools** CFM145-063A2206-SN10
- **Machining parameters** Vc=130m/min, fz=0.15mm/z, ap=1mm



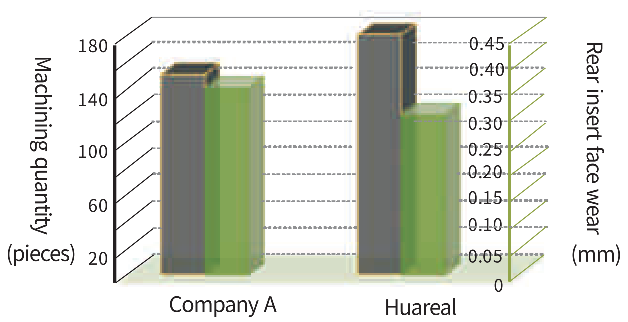
Machining cases

- **Workpiece material** HT250
- **Machining method** Face milling
- **Cooling method** No cooling
- **Insert** SZMX1206ANN-GM，HR5130
- **Cutting tools** CFM345-063A2206-SZ12
- **Machining parameters** Vc=150m/min, fz=0.2mm/z, ap=3mm



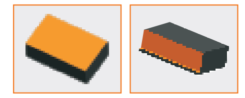
Machining cases

- **Workpiece material** QT500
- **Machining method** Face milling
- **Cooling method** No cooling
- **Insert** HNMX0906ANSN-M HR5110
- **Cutting tools** CFM645-063A2206-HN09
- **Machining parameters** Vc=240m/min, fz=0.15mm/z, ap=2mm

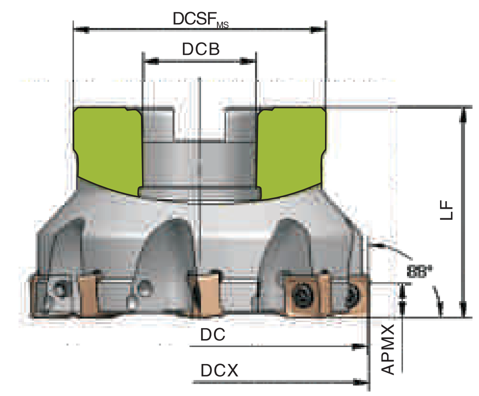


Square shoulder milling

CSM188 series



KAPR=88°

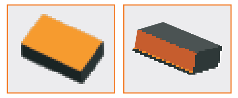


Tool specification and model	Number of edges	Inventory	Basic dimension (mm)					APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	$DCSF_{MS}$	DCX	LF					
CSM188-050A2204-SN10	4	▲	50	22	42	50.7	40	8	A	SN□X1005□	M3.5×10	WR15S
CSM188-050A2205-SN10	5	△	50	22	42	50.7	40	8				
CSM188-063A2205-SN10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

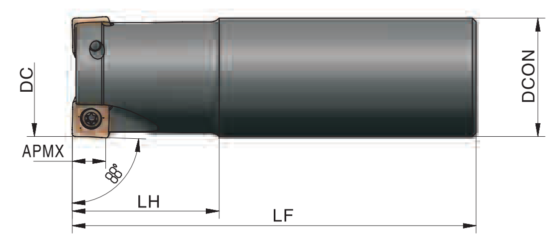
▲Running stock △Make-to-order

Square shoulder milling

SFM188 series



KAPR=88°

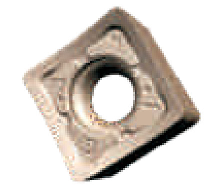


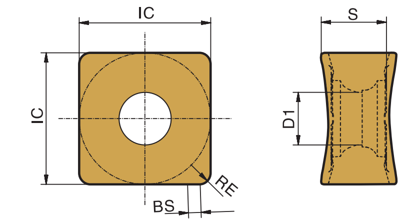
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM188-032G3202-SN10	2	▲	32	32	110	32.8	8	SN□X1005□	M3.5×10	WR15
SSM188-032G3203-SN10	3	△	32	32	110	32.8	8			
SSM188-040G3203-SN10	3	△	40	32	110	40.8	8			
SSM188-040G3204-SN10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

▲Running stock △Make-to-order

Applicable inserts

SN □□





Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts — Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SNGX1005ZNN-GM	10.0	5.0	4.0	1.0	0.8	8		☆	★	★				
SNMX100512-GM	10.0	5.0	4.0	\	1.2	8		☆	★	★				

★ Recommended grade ☆ Available grade

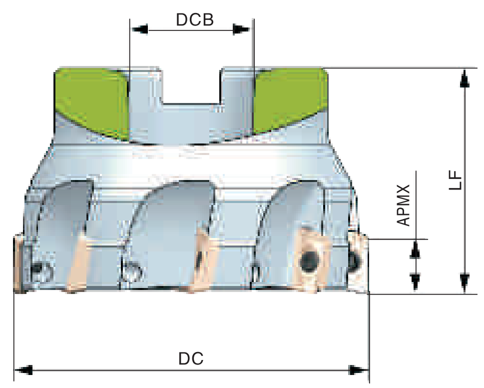
Recommended cutting parameters

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

Square shoulder milling

CSM190 series

KAPR=90°

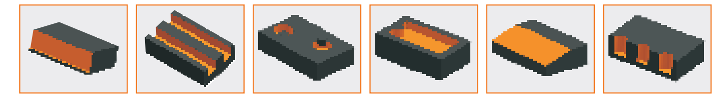


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	LF					
CSM190-040A1605-AO11	5	△	40	16	40	9.5	A	AOKT11□□	M2.5×6.5	WR08S
CSM190-050A2206-AO11	6	▲	50	22	50	9.5				
CSM190-063A2207-AO11	7	▲	63	22	63	9.5				
CSM190-050A2204-AO16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

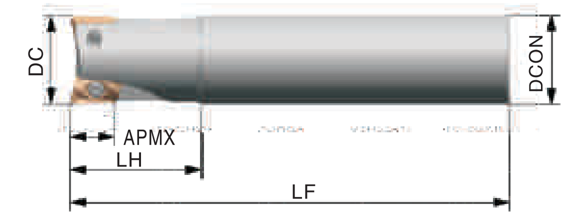
▲Running stock △Make-to-order

Square shoulder milling

SSM190 series



KAPR=90°



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

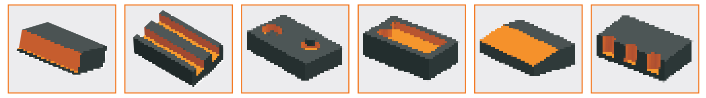
▲Running stock △Make-to-order

HUAREAL

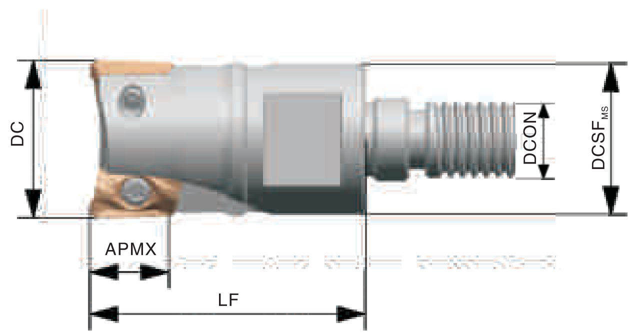
A General turning
Parting and grooving
Threading
B Indexable milling
Solid carbide end mills
C Short hole drills
Solid carbide drills

Square shoulder milling

KH- series



KAPR=90°

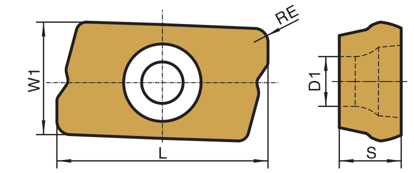


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCSF$_{MS}$	LF	DCON				
KH-1102-AOKT06-M05	2	△	11	9	18	5	6.0	AO06	M1.8×3.9	WR06
KH-1303-AOKT06-M06	3	△	13	10	18	6	6.0			
KH-1503-AOKT06-M08	3	▲	15	14	22	8	6.0			
KH-1704-AOKT06-M08	4	△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

▲Running stock △Make-to-order

Applicable inserts

AO □□



Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts — Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
AOKT060202PEER-VM	7.61	4.20	2.38	2.10	0.20	6.0		☆	★	★				☆
AOKT060204PEER-VM	7.61	4.20	2.38	2.10	0.40	6.0		☆	★	★				☆
AOKT060208PEER-VM	7.61	4.20	2.38	2.10	0.80	6.0		☆	★	★				☆
AOKT113504PEER-VM	11.75	6.42	3.50	2.80	0.40	9.5		☆	★	★				☆
AOKT113508PEER-VM	11.75	6.42	3.50	2.80	0.80	9.5		☆	★	★				☆
AOKT113512PEER-VM	11.75	6.42	3.50	2.80	1.20	9.5		☆	★	★				☆
AOKT113516PEER-VM	11.75	6.42	3.50	2.80	1.60	9.5		☆	★	★				☆
AOKT160408PEER-VM	17.65	9.64	4.76	4.40	0.80	14.5		☆	★	★				☆
AOKT160412PEER-VM	17.65	9.64	4.76	4.40	1.20	14.5		☆	★	★				☆
AOKT160416PEER-VM	17.65	9.64	4.76	4.40	1.60	14.5		☆	★	★				☆

★ Recommended grade ☆ Available grade

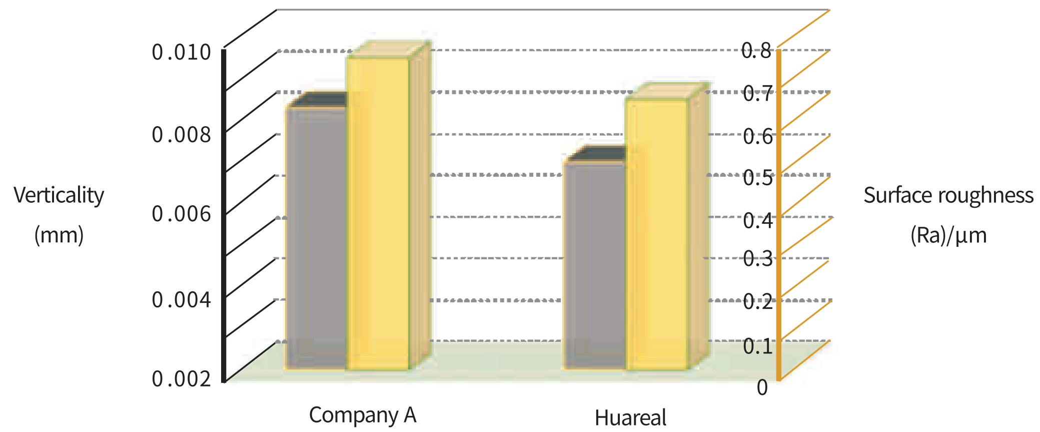
Recommended cutting parameters

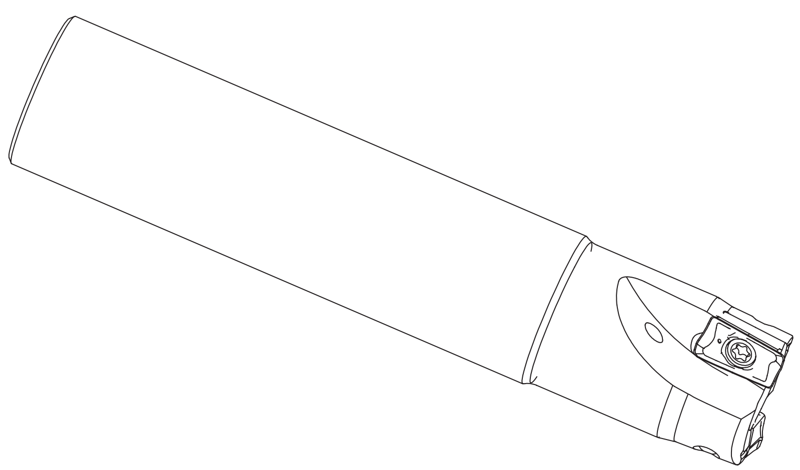
Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z(mm/z)
P	Low-carbon steel, mild steel	≤180	HR5110	330(240-400)	0.2(0.1-0.3)
			HR5120	310(200-400)	
			HR5130	300(220-350)	
	High-carbon steel, alloy steel	180-280	HR5110	290(210-380)	0.2(0.1-0.3)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

HUAREAL

Machining cases

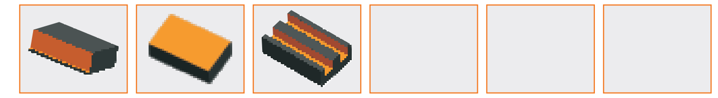
- **Workpiece material** Mold material P20
- **Machining method** Mold sidewall finish milling
- **Insert** AOKT113508PEER-VM
- **Cutting tools** SSM190-020G2002-AO11
- **Machining parameters** Vc=259m/min, fz=0.25mm/z, ae=0.12mm, ap=1mm





Square shoulder milling

CSM290 series



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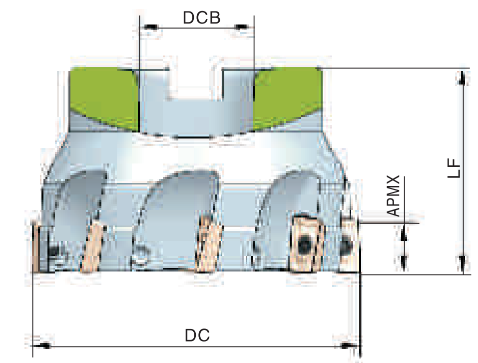
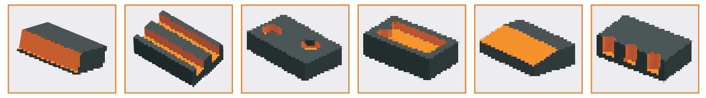


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	LF					
CSM290-050A2206-AP11	6	▲	50	22	40	9.5	A	APKT11	M2.5×6.5	WR08S
CSM290-063A2207-AP11	7	▲	63	22	40	9.5				
CSM290-080A2708-AP11	8	▲	80	27	50	9.5				
CSM290-100B3210-AP11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

▲Running stock △Make-to-order

Square shoulder milling

SSM290 series



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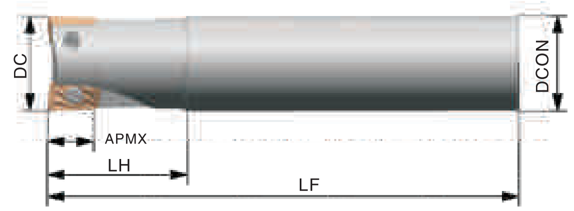
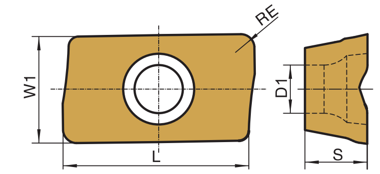


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM290-016G1602-AP11	2	△	16	16	130	40	9.5	APKT11	M2.5×6.5	WR08
SSM290-016G1602L-AP11	2	△	16	16	160	50	9.5			
SSM290-020G2002-AP11	2	△	20	20	130	40	9.5			
SSM290-020G2002L-AP11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

▲Running stock △Make-to-order

Applicable inserts

AP□□



Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts — Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
APKT113604PEER-FM	11.30	6.25	3.60	2.80	0.40	9.5		☆	★	★				
APKT1136PEER-FM	11.30	6.25	3.60	2.80	0.80	9.5		☆	★	★				
APKT113612PEER-FM	11.30	6.25	3.60	2.80	1.20	9.5		☆	★	★				
APKT113620PEER-FM	11.30	6.25	3.60	2.80	2.00	9.5		☆	★	★				
APKT1605PDER-FM	17.42	9.33	5.20	4.50	0.80	14.5		☆	★	★				
APKT160512PDER-FM	17.42	9.33	5.20	4.50	1.20	14.5		☆	★	★				
APKT160520PDER-FM	17.42	9.33	5.20	4.50	2.00	14.5		☆	★	★				

★ Recommended grade ☆ Available grade

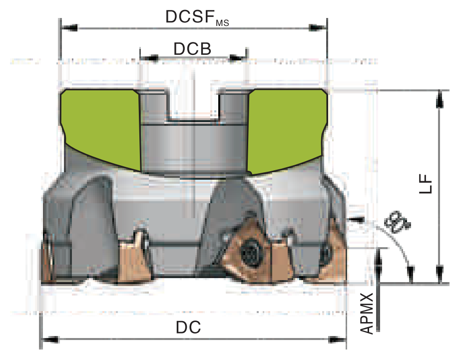
Recommended cutting parameters

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

Square shoulder milling

CSM390 series

KAPR=90°

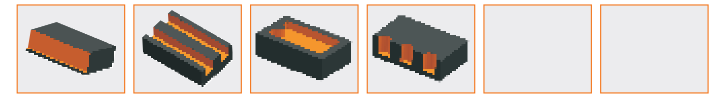


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	$DCSF_{MS}$	LF					
CSM390-040A1605-ZN04	5	△	40	16	35	40	4.2	A	ZNMU0403□□	M2.5×6.5	WR08S
CSM390-040A1607-ZN04	7	△	40	16	35	40	4.2				
CSM390-050A2206-ZN04	6	△	50	22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

▲Running stock △Make-to-order

Square shoulder milling

SSM390 series



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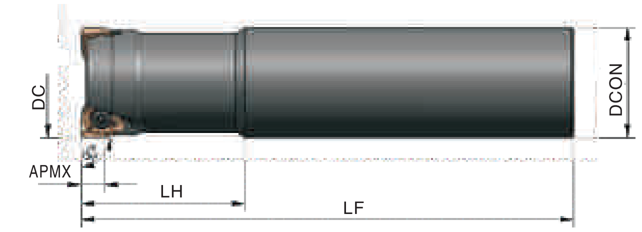


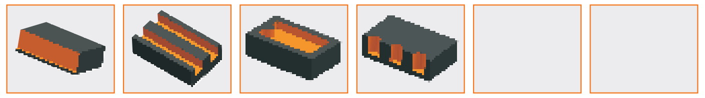
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM390-018G1602L-ZN04	2	△	18	16	150	30	4.2	ZNMU0403□□	M2.5×6.5	WR08
SSM390-020G2002L-ZN04	2	▲	20	20	150	30	4.2			
SSM390-020G2003L-ZN04	3	△	20	20	150	30	4.2			
SSM390-021G2002L-ZN04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

▲Running stock △Make-to-order

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

Square shoulder milling

SSM390 series



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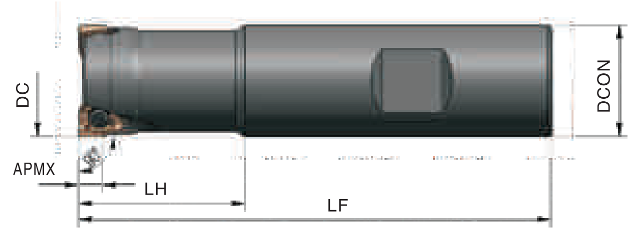
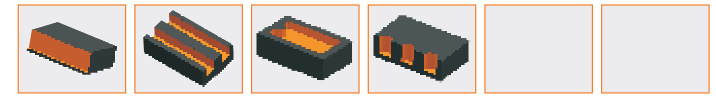


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM390-020X2002-ZN04	2	△	20	20	90	30	4.2	ZNMU0403□□	M2.5×6.5	WR08
SSM390-020X2003-ZN04	3	△	20	20	90	30	4.2			
SSM390-025X2502-ZN04	2	▲	25	25	100	30	4.2			
SSM390-025X2503-ZN04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

▲Running stock △Make-to-order

Square shoulder milling

KH- series



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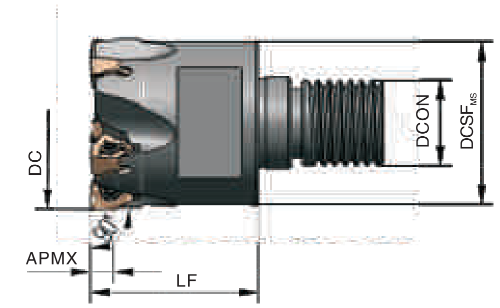


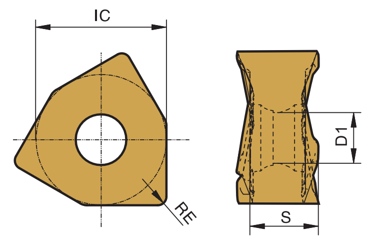
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	$DCSF_{MS}$	LF	DCON				
KH-2002-ZN04-M10	2	△	20	18	30	10	4.2	ZNMU0403□□	M2.5×6.5	WR08
KH-2003-ZN04-M10	3	△	20	18	30	10	4.2			
KH-2502-ZN04-M12	2	▲	25	23	30	12	4.2			
KH-2503-ZN04-M12	3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

▲Running stock △Make-to-order

HUAREAL

Applicable inserts

ZU□□



Working condition: ● Stable ◕ Average ⌗ Tough

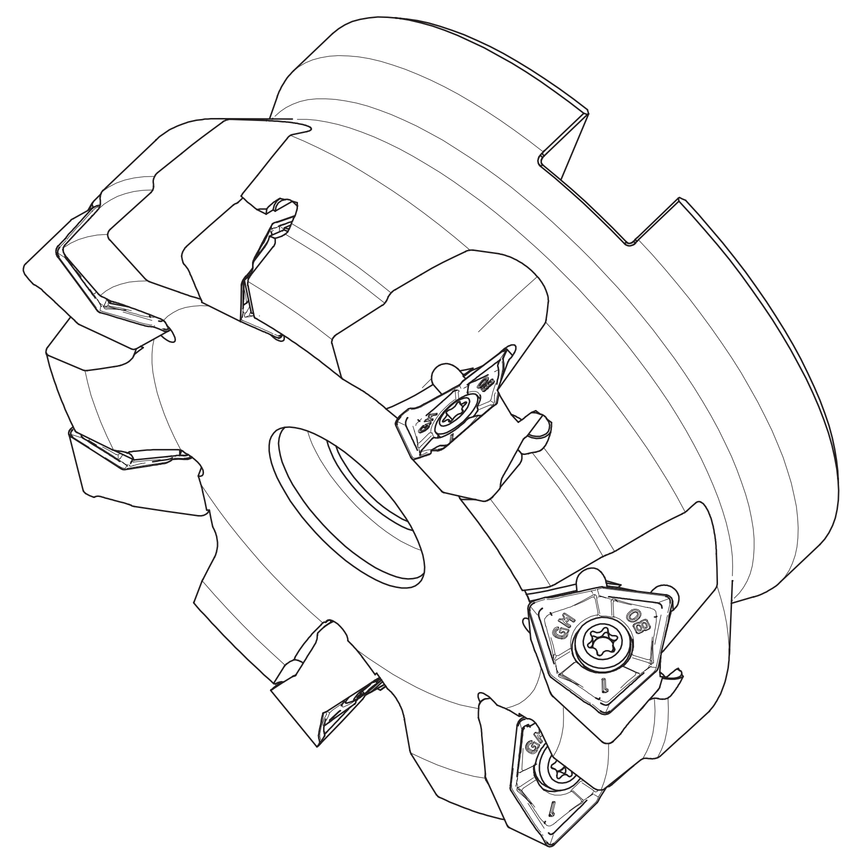
Applicable inserts	Workpiece material									
	P Steel	⌗	●	◕	⌗	⌗	⌗		●
	M Stainless steel		●	◕	⌗		⌗		
	K Cast iron	⌗	●	◕	⌗				
	N Non-ferrous metal							◕	
	S Heat-resistant alloy，titanium alloy								

Type	Basic dimension (mm)				APMX (mm)	CVD	PVD					Cemented carbide	Cermet
	IC	S	D1	RE		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
ZNMU040308PNR-GM	7.00	3.65	2.80	0.80	4.2		☆	★	★				
ZNMU080608PNR-GM	12.00	6.35	4.60	0.80	7.3		☆	★	★				
ZNMU040308PNR-GL	7.00	3.65	2.80	0.80	4.2		☆	★	★				
ZNMU080608PNR-GL	12.00	6.35	4.60	0.80	7.3		☆	★	★				

★ Recommended grade ☆ Available grade

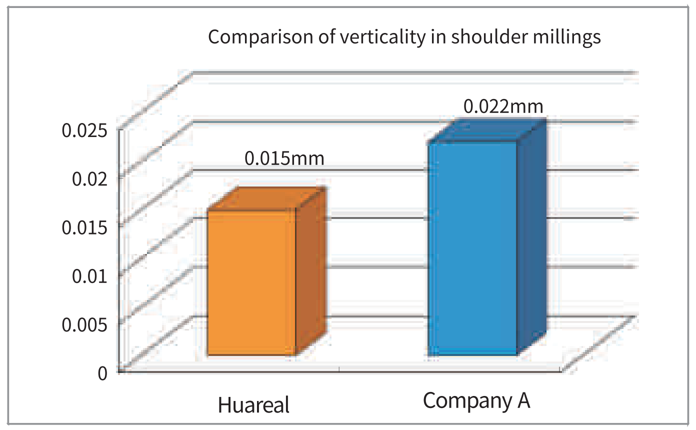
Recommended cutting parameters

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



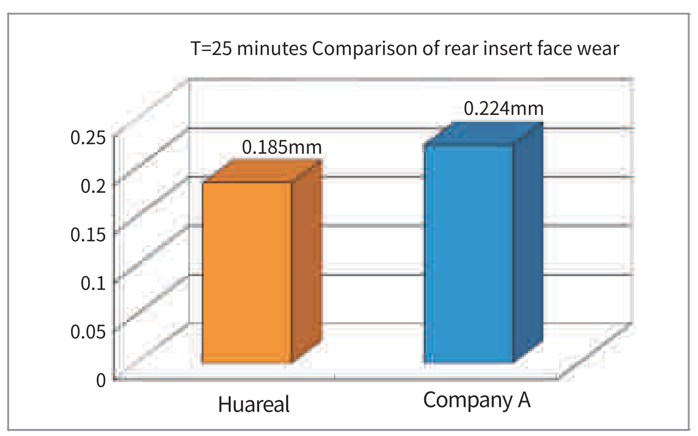
Machining cases

- **Machining method** Square shoulder milling NAK80（28-32HRC）
- **Workpiece material** ZNMU040308PNR-GM
- **Insert** SSM390-025G2502L-ZN04
- **Cutting tools** vc=220m/min，fz=0.2mm/z，ap=4mm，ae=0.5mm
- **Cutting parameter** Air cooling
- **Cooling method**



Machining cases

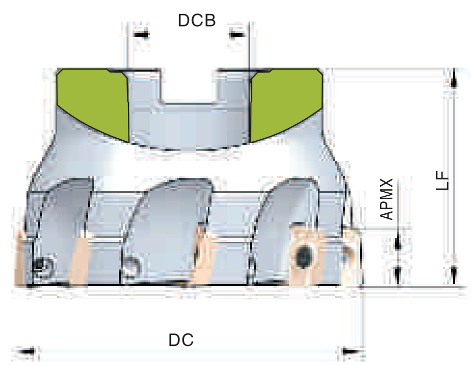
- **Machining method** Face milling
- **Workpiece material** 45# steel (200-220HB)
- **Insert** ZNMU080608PNR-GM
- **Cutting tools** CSM390-080A2706-ZN08
- **Cutting parameter** v_c=280m/min，f_z=0.2mm/z，ap=1mm，ae=65mm
- **Cooling method** Air cooling



Square shoulder milling

CSM590 series

KAPR=90°

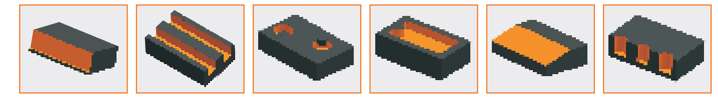


Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DC	DCB	LF					
CSM590-050A2206-AP11	6	△	50	22	40	9.5	A	APMT11□□ APGT11□□	M2.5×6.5	WR08S
CSM590-063A2208-AP11	8	△	63	22	40	9.5				
CSM590-080A2708-AP11	8	▲	80	27	50	9.5				
CSM590-100B3210-AP11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

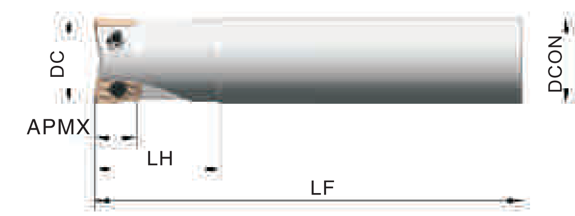
▲Running stock △Make-to-order

Square shoulder milling

SSM590 series



KAPR=90°



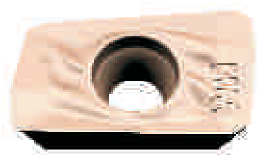
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DC	DCON	LF	LH				
SSM590-016G1602-AP11	2	△	16	16	130	40	9.5	APMT11□□ APGT11□□	M2.5×6.5	WR08
SSM590-016G1602L-AP11	2	△	16	16	160	50	9.5			
SSM590-020G2002-AP11	2	△	20	20	130	40	9.5			
SSM590-020G2002L-AP11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

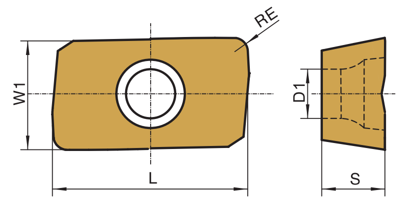
▲Running stock △Make-to-order

HUAREAL

Applicable inserts

AP□□





Working condition: ● Stable ◑ Average ⌗ Tough

Applicable inserts	Workpiece material						HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
APMT1135PDER-HM	11.30	6.25	3.50	2.80	0.80	9.5			★	★				
APMT1605PDER-HM	17.25	9.25	5.22	4.40	0.80	14.5			★	★				
APGT1135PDFR-AK	11.30	6.25	3.50	2.80	0.80	9.5							★	
APGT1604PDFR-AK	17.25	9.25	4.76	4.40	0.80	14.5							★	

★ Recommended grade ☆ Available grade

Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	
				Cutting speed v_c (m/min)	Feed rate f_z(mm/z)
P	Low-carbon steel, mild steel	≤180	Hr5110	190(140-250)	0.2(0.04-0.15)
			HR5120	190(140-250)	
			HR5130	190(140-250)	
	High-carbon steel, alloy steel	180-280	HR5110	170(130-250)	0.2(0.04-0.15)
			HR5120	170(130-250)	
			HR5130	170(130-250)	
	Alloy tool steel	280-350	HR5110	150(110-240)	0.2(0.04-0.15)
			HR5120	150(110-240)	
			HR5130	150(110-240)	
M	Stainless steel	≤270	HR5110	120(80-190)	0.2(0.04-0.15)
			HR5120	120(80-190)	
			HR5130	120(80-190)	
K	Cast iron	180-250	HR5110	120(80-210)	0.2(0.04-0.15)
			HR5120	120(80-210)	
			HR5130	120(80-210)	

Machining cases

Mold sidewall finish milling

- **Workpiece material** 45# steel
- **Machining method** Sidewall finish milling
- **Insert** AOKT113508PEER-VM HR5130
- **Cutting tools** SSM190-025G2503L-AO11
- **Machining parameters** Vc=220m/min，ap=1.5mm，ae=0.25mm，fz=0.36mm/z
- **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=285m/min, ap=0.8mm, ae=0.15mm, fz=0.1mm/z
- **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，ap=0.12mm，ae=5mm，fz=0.25mm/z
- **Machining quality** Compared with a competitor , parts machined by Huareal products have better surface quality (no burrs on the sidewall).

HUAREAL

Machining cases

Rough milling of bogies

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

Face milling with leaf spring mounting

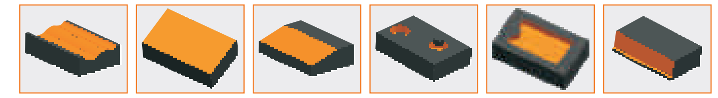
- **Workpiece material** 40CrMo（HB285-333)
- **Insert** ZNMU080608PNR-GM HR5120
- **Cutting tools** CSM390-063A2205-ZN08
- **Machining parameters** N=720 rev/min，F=540mm/min，ap=1.5-3mm
- **Cooling method** No cooling
- **Service life** Huareal: 27 pieces; A competitor: 12 pieces
- **Machining quality**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

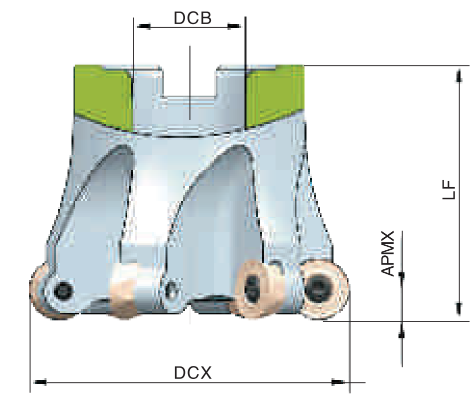
Clean-up machining of mold frame

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

Profile milling

CPM100 series





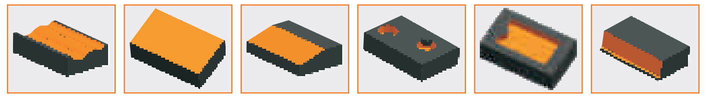
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CPM100-063A2204-RC12	4	▲	63	22	50	6	A	RC12	M4×8.4	WR15S
CPM100-080B2705-RC16	5	▲	80	27	50	8	B	RC16	M5×13	WR20S
CPM100-100B3206-RC16	6	△	100	32	50	8				
CPM100-125B4007-RC20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

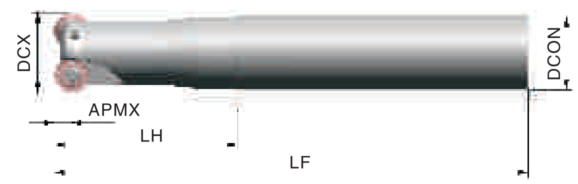
▲Running stock △Make-to-order

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

Profile milling

SPM100 series



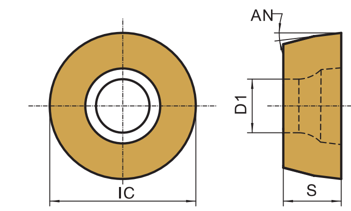


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCON	LF	LH				
SPM100-025G2502-RC10	2	▲	25	25	100	30	5	RC10	M4×8.4	WR15
SPM100-032G3202-RC10	2	▲	32	32	120	35	5			
SPM100-040G4003-RC12	3	△	40	40	120	40	6	RC12	M4×8.4	WR15

▲Running stock △Make-to-order

Applicable inserts

RC□□



Working condition: ● Stable ◕ Average ⌗ Tough

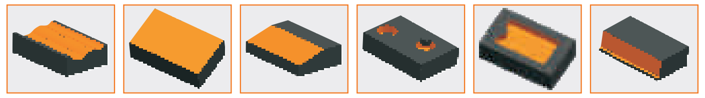
Applicable inserts	Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	P Steel	⌗	●	◕	⌗	⌗	⌗		●
	M Stainless steel		●	◕	⌗		⌗		
	K Cast iron	⌗	●	◕	⌗				
	N Non-ferrous metal							◕	
	S Heat-resistant alloy，titanium alloy								

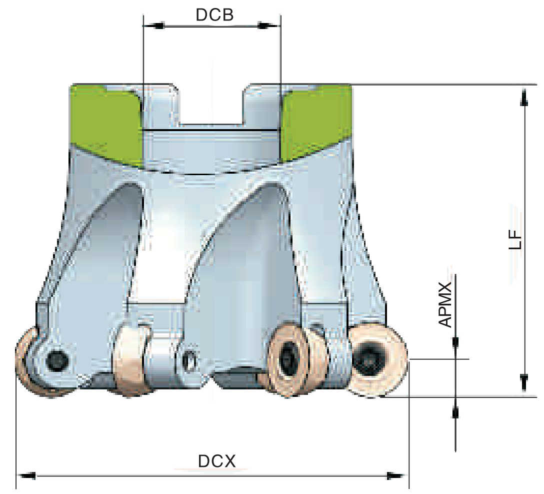
Type	Basic dimension (mm)				APMX (mm)	CVD	PVD					Cemented carbide	Cermet
	IC	S	D1	AN		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
RCKT10T3MO-FM	10.00	3.97	4.40	7°	5		☆	★	★				
RCKT1204MO-FM	12.00	4.76	4.40	7°	6		☆	★	★				
RCKT1606MO-FM	16.00	6.35	5.50	7°	8		☆	★	★				
RCKT2006MO-FM	20.00	6.35	6.55	7°	10		☆	★	★				

★ Recommended grade ☆ Available grade

Profile milling

CPM200 series



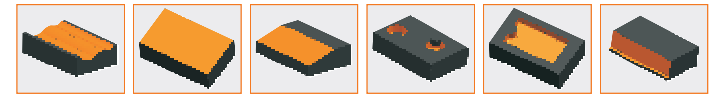


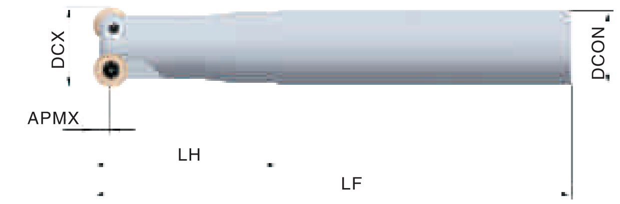
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CPM200-050A2203-RP12	3	△	50	22	40	6	A	RP12	M4×8.4	WR15S
CPM200-063A2204-RP12	4	▲	63	22	50	6				
CPM200-080B2706-RP12	6	▲	80	27	50	6	B			
CPM200-063A2205-RP16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

▲Running stock △Make-to-order

Profile milling

SPM200 series





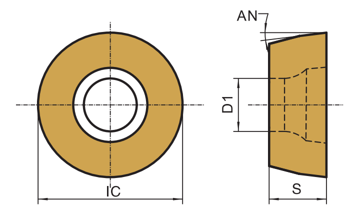
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCON	LF	L H				
SPM200-025G2502-RP08	2	▲	25	25	100	30	4	RP08	M3×7	WR09
SPM200-032G3202-RP08	2	▲	32	32	120	35	4			
SPM200-025G2502-RP10	2	▲	25	25	100	30	5	RP10	M4×8.4	WR15
SPM200-032G3202-RP10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

▲Running stock △Make-to-order

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

Applicable inserts

RP□□



Working condition: ● Stable ◑ Average ⌗ Tough

Applicable inserts	Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	P	Steel	⌗	●	◑	⌗	⌗	⌗		●
	M	Stainless steel		●	◑	⌗		⌗		
	K	Cast iron	⌗	●	◑	⌗				
	N	Non-ferrous metal							◑	
	S	Heat-resistant alloy，titanium alloy								

Type	Basic dimension (mm)				APMX (mm)	CVD	PVD					Cemented carbide	Cermet
	IC	S	D1	AN		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
RPMT08T2MO-HM	8.00	2.78	3.40	11°	4			★	★				
RPMT1003MO	10.00	3.18	4.50	11°	5			★	★				
RPMT1204MO-HM	12.00	4.76	4.40	11°	6			★	★				

★ Recommended grade ☆ Available grade

Turbine blade milling

Working condition: ● Stable ◑ Average ⌗ Tough

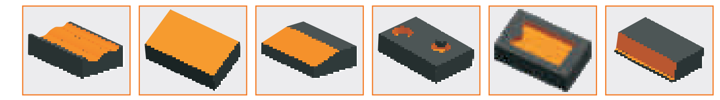
Applicable inserts	Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HR9140	HRK10	HRC20
	P	Steel	⌗	●	◑	⌗	⌗	⌗	⌗		●
	M	Stainless steel		●	◑	⌗		⌗	⌗		
	K	Cast iron	⌗	●	◑	⌗					
	N	Non-ferrous metal								◑	
	S	Heat-resistant alloy，titanium alloy									

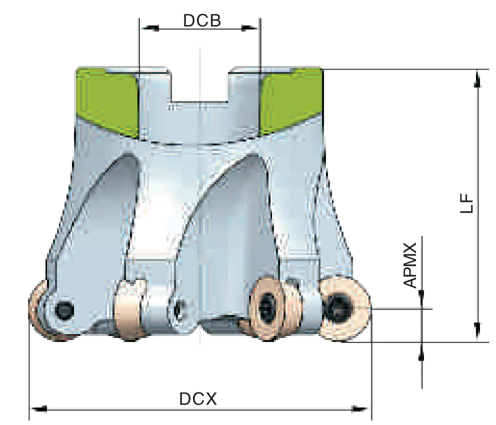
Type	Basic dimension (mm)				APMX (mm)	CVD	PVD						Cemented carbide	Cermet
	IC	S	D1	AN		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HR9140	HRK10	HRC20
RPKT10T3MO-MS	10.00	3.97	3.40	11°	5						★	★		
RPKT1204MO-MS	12.00	4.76	4.40	11°	6						★	★		
RPKT1606MO-MS	16.00	6.35	5.50	11°	8	★					★	★		
RPMT10T3MO-SM	10.00	3.97	4.40	11°	5						★	★		
RPMT1204MO-SM	12.00	4.76	4.40	11°	6						★	★		
RPMT1606MO-SM	16.00	6.35	5.50	11°	8	★					★	★		

★ Recommended grade ☆ Available grade

Profile milling

CPM300 series





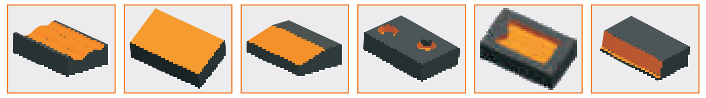
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CPM300-050A2203-RD12	3	△	50	22	40	6	A	RD12	M4×8.4	WR15S
CPM300-063A2204-RD12	4	▲	63	22	50	6				
CPM300-080B2705-RD16	5	▲	80	27	50	8	B	RD16	M5×13	WR20S
CPM300-100B3206-RD16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

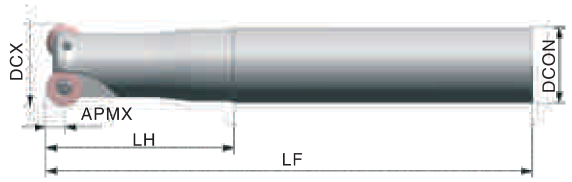
▲Running stock △Make-to-order

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

Profile milling

SPM300 series



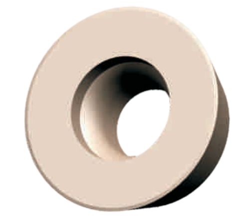


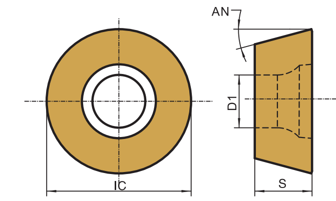
Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCON	LF	LH				
SPM300-020G2002-RD06	2	△	20	20	100	30	3	RD06	M2.2×6.5	WR07
SPM300-020G2002-RD08	2	△	20	20	100	30	4	RD08	M3×7	WR09
SPM300-025G2502-RD10	2	▲	25	25	100	30	5	RD10	M4×8.4	WR15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

▲Running stock △Make-to-order

Applicable inserts

RD□□





Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts	Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	P Steel	⌗	●	◕	⌗	⌗	⌗		●
	M Stainless steel		●	◕	⌗		⌗		
	K Cast iron	⌗	●	◕	⌗				
	N Non-ferrous metal							◕	
	S Heat-resistant alloy，titanium alloy								

Type	Basic dimension (mm)				APMX (mm)	CVD	PVD					Cemented carbide	Cermet
	IC	S	D1	AN		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
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		☆	★	★				

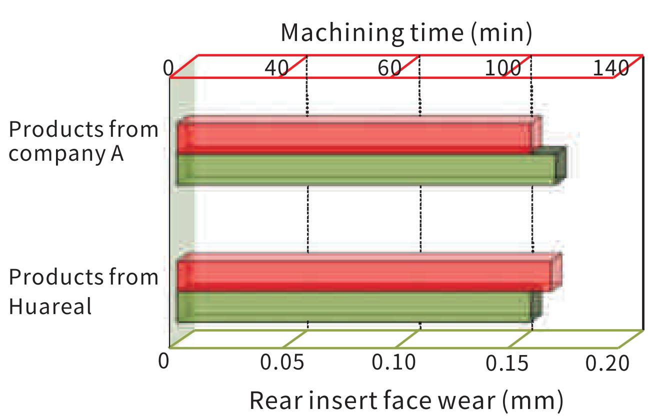
★ Recommended grade ☆ Available grade

Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting data	Tool specification		
					Ø20	Ø25	Ø32
P	Low-carbon steel, mild steel	≤180	HR5110 HR5120 HR5130	vc(m/min)	100-200	100-200	100-200
				fz(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	180-280	HR5110 HR5120 HR5130	vc(m/min)	80-180	80-180	80-180
				fz(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	280-350	HR5110 HR5120 HR5130	vc(m/min)	60-150	60-150	60-150
				fz(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	≤180	HR5110 HR5120 HR5130	vc(m/min)	70-150	70-150	70-150
				fz(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	180-250	HR5110 HR5120 HR5130	vc(m/min)	160-300	160-300	160-300
				fz(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

Machining cases

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



Technical data of application of profile milling tools

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

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

Calculation example:

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

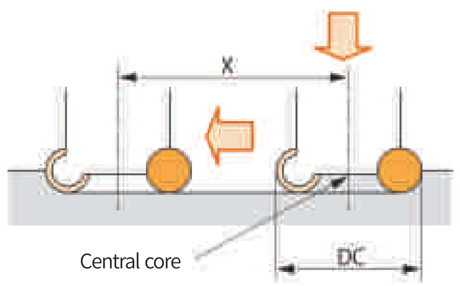
f=1.4*0.2mm/r=0.28mm/r

◆ 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

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

◆ Precautions for drill-milling

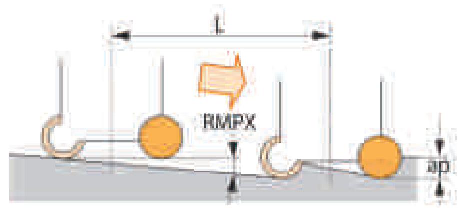


When transverse feed machining after drill-milling:

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.

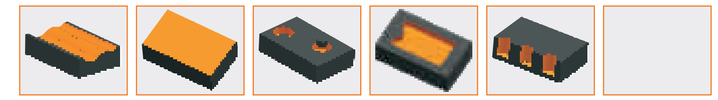
③ Set the feed rate below 70% of the standard.

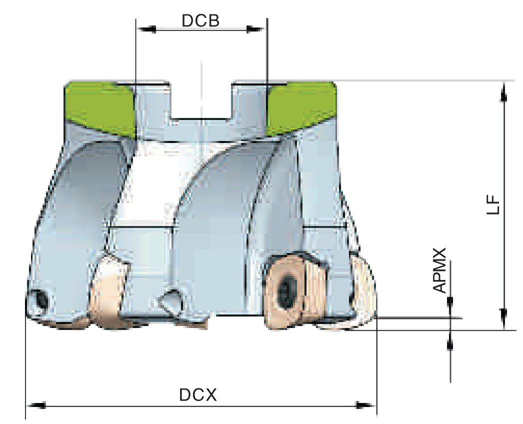
◆ Recommended maximum cutting depth (ap) and applicable teeth number

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

Millings with high feed

CEM100 series



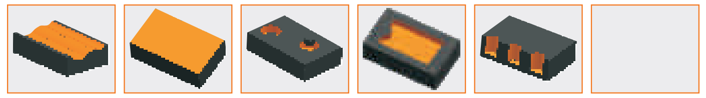


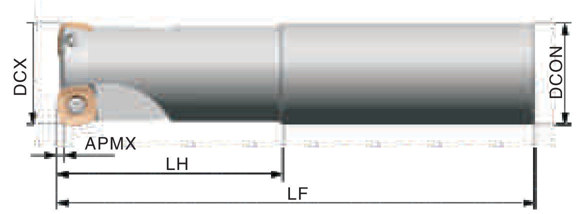
Tool specification	Number of edges	Inventory	Basic dimension (mm)			APMX (mm)	Interface form	Applicable inserts	Screw	Wrench
			DCX	DCB	LF					
CEM100-050A2204-SD12	4	△	50	22	40	2.3	A	SD12	M5×13	WR20S
CEM100-063A2705-SD12	5	▲	63	27	50	2.3				
CEM100-080A2706-SD12	6	▲	80	27	50	2.3				
CEM100-063A2704-SD15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

▲Running stock △Make-to-order

Millings with high feed

SEM100 series



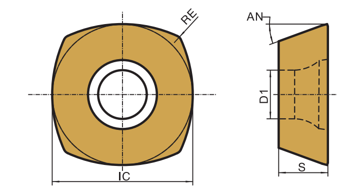


Tool specification	Number of edges	Inventory	Basic dimension (mm)				APMX (mm)	Applicable inserts	Screw	Wrench
			DCX	DCB	LF	LH				
SEM100-032G3202-SD12	2	▲	32	32	150	70	2.3	SD12	M4×13	WR20
SEM100-040G4003-SD12	3	△	40	40	150	70	2.3			
SEM100-040G4002-SD15	2	▲	40	40	200	70	2.9	SD15	M5×13	WR20

▲Running stock △Make-to-order

Applicable inserts

SD □□



Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts	Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SDMT1205ZTN-FM	12.700	5.56	4.6	15°	3.00	2.3		☆	★	★				
SDMT1505ZTN-FM	15.875	5.56	5.5	15°	0.80	2.9		☆	★	★				
SDMW1205ZTN	12.700	5.56	4.6	15°	3.00	2.3		☆	★	★				
SDMW1505ZTN	15.875	5.56	5.5	15°	0.80	2.9		☆	★	★				

★ Recommended grade ☆ Available grade

Recommended cutting parameters

Workpiece material		Hardness (HB)	Insert grade	Cutting speed vc (m/min)	Ø20 / Ø25		Ø30 / Ø35		Ø40	
					Axial cutting depth (mm)	Feed rate per tooth (mm)	Axial cutting depth (mm)	Feed rate per tooth (mm)	Axial cutting depth (mm)	Feed rate per tooth (mm)
P	Low-carbon steel, mild steel	≤180	HR5110	200(120-220)	0.3-1.5	0.6-1.2	0.3-1.2	0.5-1.4	0.3-1.5	0.8-1.5
			HR5120	200(120-220)	0.3-1.5	0.6-1.2	0.3-1.2	0.5-1.4	0.3-1.5	0.8-1.5
			HR5130	200(120-220)	0.3-1.5	0.6-1.2	0.3-1.2	0.5-1.4	0.3-1.5	0.8-1.5
	High-carbon steel, alloy steel	180–280	HR5110	160(80-180)	0.2-1.2	0.6-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.6-1.5
			HR5120	160(80-180)	0.2-1.2	0.6-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.6-1.5
			HR5130	160(80-180)	0.2-1.2	0.6-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.6-1.5
	Alloy tool steel	280–350	HR5110	150(80-160)	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0
			HR5120	150(80-160)	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0
			HR5130	150(80-160)	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0	0.2-1.0	0.5-1.0
M	Stainless steel	≤180	HR5110	150(80-190)	0.3-1.0	0.6-1.0	0.3-1.2	0.6-1.2	0.3-1.2	0.5-1.6
			HR5120	150(80-190)	0.3-1.0	0.6-1.0	0.3-1.2	0.6-1.2	0.3-1.2	0.5-1.6
			HR5130	150(80-190)	0.3-1.0	0.6-1.0	0.3-1.2	0.6-1.2	0.3-1.2	0.5-1.6
K	Cast iron	180–250	HR5110	180(80-190)	0.3-1.0	0.5-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.8-1.6
			HR5120	180(80-190)	0.3-1.0	0.5-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.8-1.6
			HR5130	180(80-190)	0.3-1.0	0.5-1.2	0.2-1.0	0.5-1.4	0.2-1.2	0.8-1.6

A General turning
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Solid carbide drills

HUAREAL

Technical information of application of high feed milling tools

◆ Ramp milling angle and cutting length

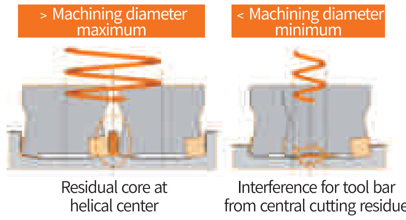
Type	Tool diameter mm	32	40	50	63	80	100
SD□□12□□	Maximum ramping angle (RMPX)	3.5°	2.8°	2.5°	1.7°	1°	
SD□□15□□	Maximum ramping angle (RMPX)		2.5°	2.2°	1.5°	0.8°	0.5°
	Cutting length (L)	ap/ tanRMPX					

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

Figure Illustration of ramp milling

◆ Precautions for helical machining

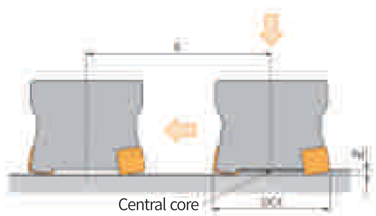
Please conduct helical machining within the range of maximum and minimum machining diameters.



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

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

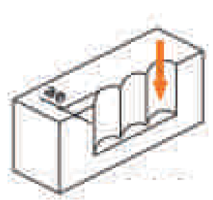
◆ Precautions for drill-milling



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

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

◆ Sidewall drill-milling



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

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

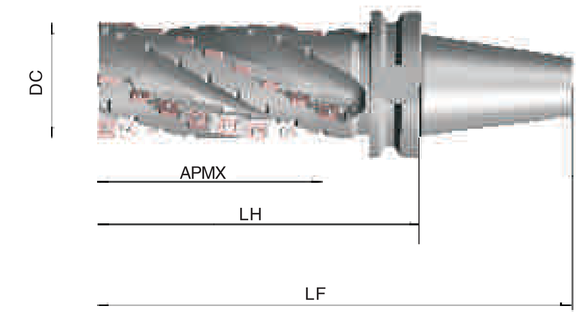
Setting approximate R angle--in writing program

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

Helical end milling

CHM190 series

KAPR=90°



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

▲Running stock △Make-to-order

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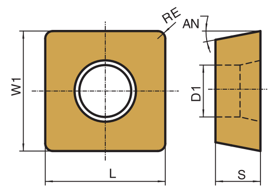
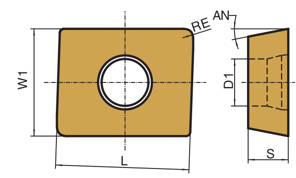
Applicable inserts

SP□□
AP□□

Working condition: ● Stable ◕ Average ⌗ Tough

Applicable inserts	Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	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		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
SPMT120408-MM	12.700	12.70	4.76	5.50	0.80	11°			★	★				
APMT150412-MM	15.865	12.69	4.76	5.56	1.20	11°			★	★				
SPHX120408T21	12.700	12.70	4.76	5.50	0.80	11°			★	★				
APHX1504	15.875	12.70	4.76	5.70	0.40	11°			★	★				

★ Recommended grade ☆ Available grade

Recommended cutting parameters

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

Code key of heavy milling inserts

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

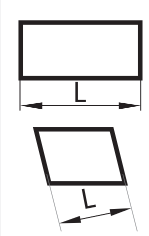
① Insert shape						
80° C	78° F	70° G	L	S	X	Others Z

② Clearance angle major			
0° N	17° Q	23° T	Others O

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

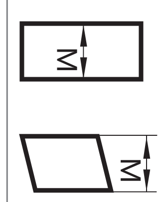
④ Clamping form					
40° B	60° D	78° F	82° H	X° V	Others (Special requirements such as different clamping forms or hole diameter) X
60° J	78° L	82° N	R R	X° Y	
60° S	78° U	82° W	R R P	X° Z	

⑤ Length



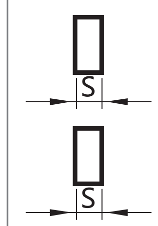
Integer of length

⑥ Width



Integer of width

⑦ Thickness



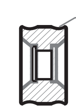
Integer of thickness

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	22A	23	25	26	28					
Size	20.00	22.80	20.00	23.99	25.00	26.50	28.57					

Notes: Coding principle: Add zero before Single-digit integer and take the two-digit integer as code; for sizes that differ in decimal bits, letters A, B, C, etc. are added to distinguish them.

⑧ Eigenvalue or code		
2R 2R**	4** 4**	DR DR**
4R 4R**	4R 4R**H	NR NR**
4A 4A**	4A 4A**M	2NR 2NR**

* "(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.

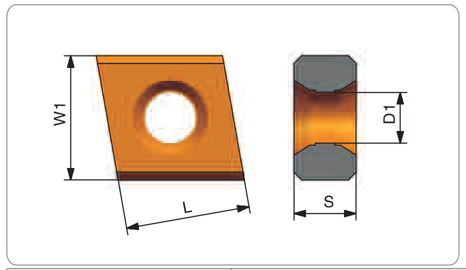


Groove code

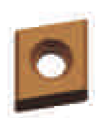
A General turning Parting and grooving Threading
B Indexable milling Solid carbide end mills
C Short hole drills Solid carbide drills

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

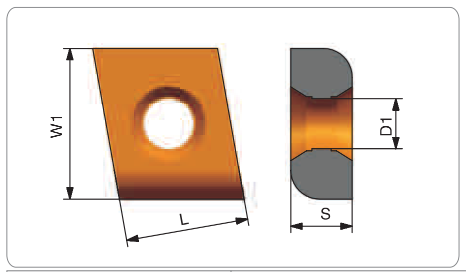


Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CNEF121206-405	12.7	12.70	6.35	5.4	☆				★			
	CNEF121206-408	12.7	12.70	6.35	5.4	☆				★			
	CNEL161406-408	16.3	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



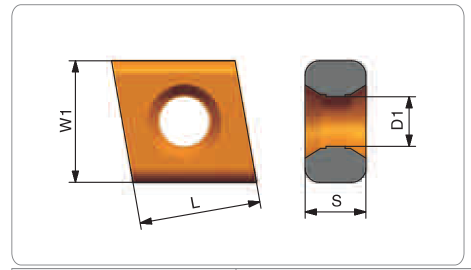
Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CNEF161406-2R30	16.3	14.29	6.35	5.4	☆				★			
	CNEF161406-2R50	16.3	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

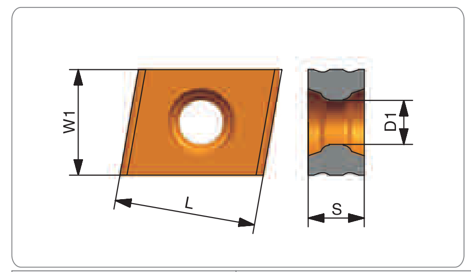


Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

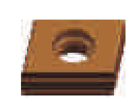
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CNEF161406-4R10	16.3	14.29	6.35	5.4	☆				★			
	CNEF161406-4R15	16.3	14.29	6.35	5.4	☆				★			
	CNEF161406-4R30	16.3	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

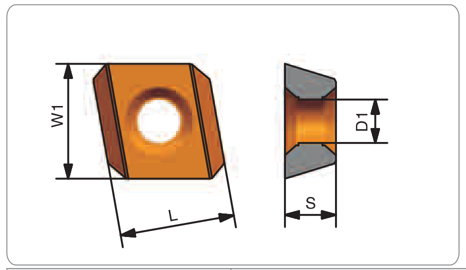
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CNER16A12A06-L2M	16.00	12.00	6.35	5.4	☆				★			
	CNEF161406-L2M	16.30	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

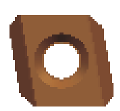
A General turning | Parting and grooving | Threading | B Indexable milling | Solid carbide end mills | C Short hole drills | Solid carbide drills

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

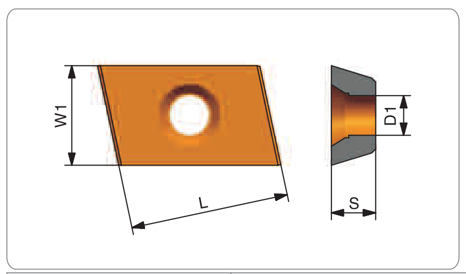


Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

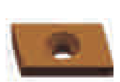
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	CQEH141406--R02R	14.29	14.29	6.35	5.4	☆				★			
	CQER11A11A04-R01R	11.10	11.10	4.76	5.4	☆				★			

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



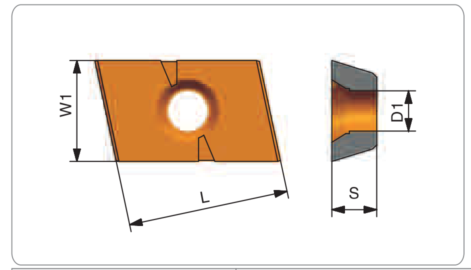
Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	FQES190906-2R30R	19.05	9.525	6.35	4.4	☆				★			
	FQES190906-2R40R	19.05	9.525	6.35	4.4	☆				★			
	FQES190906-2R45R	19.05	9.525	6.35	4.4	☆				★			
	FQES190906-2R50R	19.05	9.525	6.35	4.4	☆				★			

★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

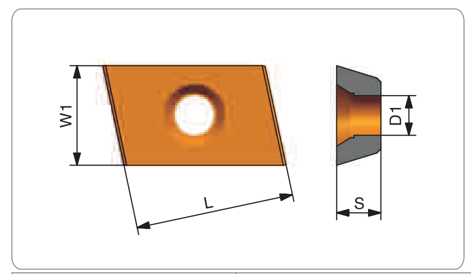


Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	FQEW221406-R04R	22.8	14.29	6.35	5.4	☆				★			

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



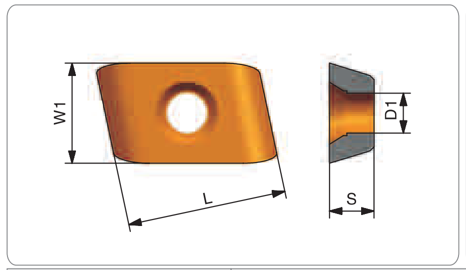
Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	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

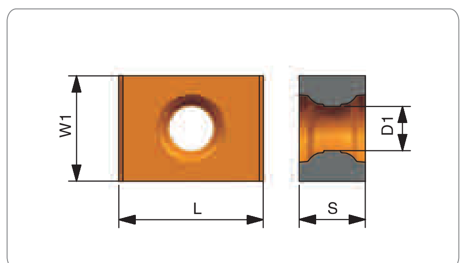


Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	FQES191906-4RXR	19.05	9.525	6.35	4.4	☆				★			

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



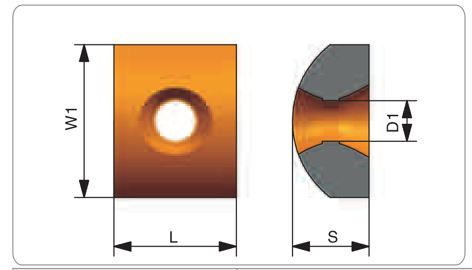
Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNED150906-408	15.875	9.525	6.35	4.4	☆				★			
	LNER151207-404	15.875	12.70	7.94	5.5	☆				★			
	LNER151208B-408	15.875	12.70	7.82	5.5	☆				★			
	LNER151207-400	15.875	12.70	7.94	5.5	☆				★			
	LNER151207-408	15.875	12.70	7.94	5.5	☆				★			
	LNEF191206-405	19.05	12.70	12.70	5.4	☆				★			
	LNEL191207-400	19.05	12.70	7.94	5.4	☆				★			
	LNEL191406-402	19.05	14.29	6.35	5.4	☆				★			
	LNER191406-400	19.05	14.29	6.35	5.4	☆				★			
	LNER191406-405	19.05	14.29	6.35	5.4	☆				★			
	LNER191406-408	19.05	14.29	6.35	5.5	☆				★			
	LNER191406-410	19.05	14.29	6.35	5.4	☆				★			
	LNER191407A-406	19.05	14.29	7.05	5.4	☆				★			

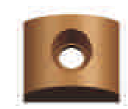
★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

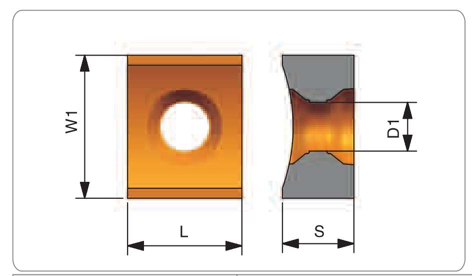


Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

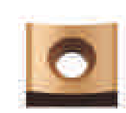
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNER151207-DR100	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR115	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR130	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-DR145	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	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

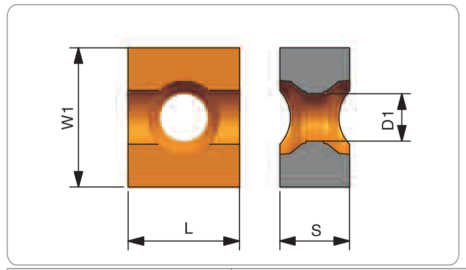
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNER151207-NR100	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-NR130	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-NR140	15.875	12.70	7.94	5.4	☆				★			
	LNER151207-NR150	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

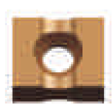
A General turning | Parting and grooving | Threading | B Indexable milling | Solid carbide end mills | C Short hole drills | Solid carbide drills

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough



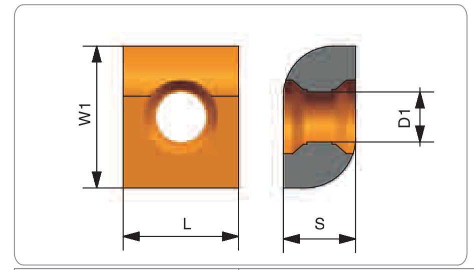
Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

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

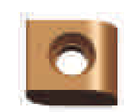
★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough



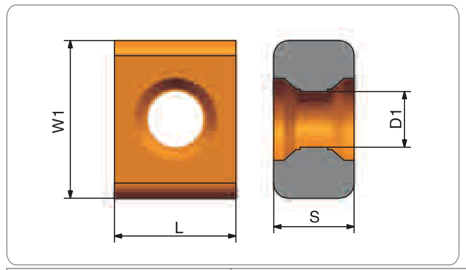
Workpiece material		HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P	Steel	⌗	●	◕	⌗	⌗	⌗		●
M	Stainless steel		●	◕	⌗		⌗		
K	Cast iron	⌗	●	◕	⌗				
N	Non-ferrous metal							◕	
S	Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	LNER151207-2R20	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	☆				★			

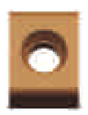
★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

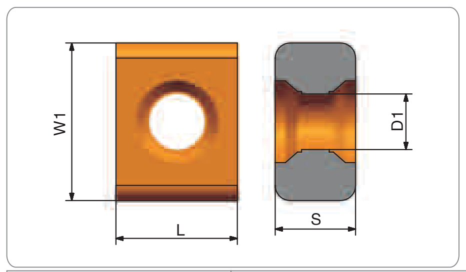


Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

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

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



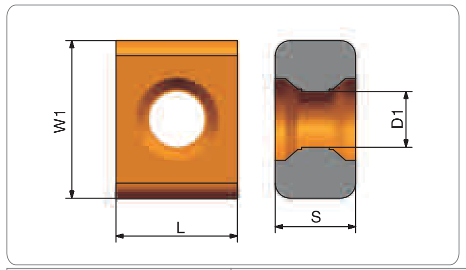
Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

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

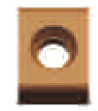
★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

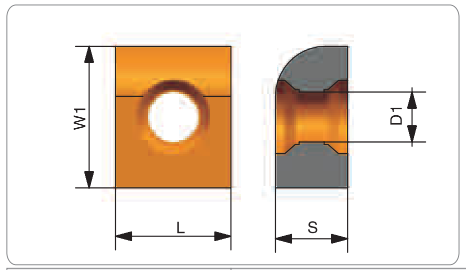


Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

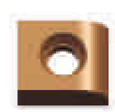
Insert shape	Type	Basic dimension (mm) L	W1	S	D1	CVD HR8140	PVD HR5110	HR5120	HR5130	HR7130	HR7140	Cemented carbide HRK10	Cermet HRC20
	LNER150904-4R30H	15.875	9.525	4.76	4.4	☆				★			
	LNER151206-4R40H	15.875	12.70	6.35	5.4	☆				★			
	LNER151206-4R50H	15.875	12.70	6.35	5.4	☆				★			
	LNER151207-4R40H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

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

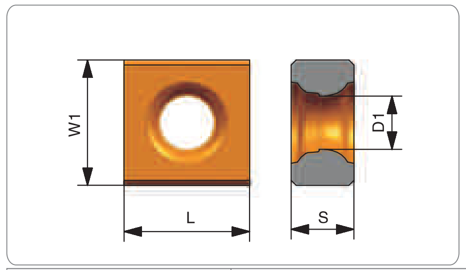
Insert shape	Type	Basic dimension (mm) L	W1	S	D1	CVD HR8140	PVD HR5110	HR5120	HR5130	HR7130	HR7140	Cemented carbide HRK10	Cermet HRC20
	LNER151207-1R30M20	15.875	12.70	7.94	5.4	☆				★			

★ Recommended grade ☆ Available grade

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

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

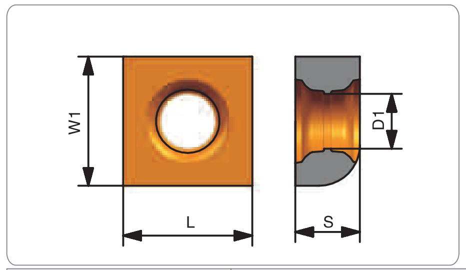


Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

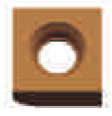
Insert shape	Type	Basic dimension (mm) L	W1	S	D1	CVD HR8140	PVD HR5110	HR5120	HR5130	HR7130	HR7140	Cemented carbide HRK10	Cermet HRC20
	SNED121206-408	12.70	12.70	6.35	5.5	☆				★			
	SNEN151507-400	15.875	15.875	7.94	5.4	☆				★			
	SNEN151507-408	15.875	15.875	7.94	5.4	☆				★			
	SNER151507-405	15.875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

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



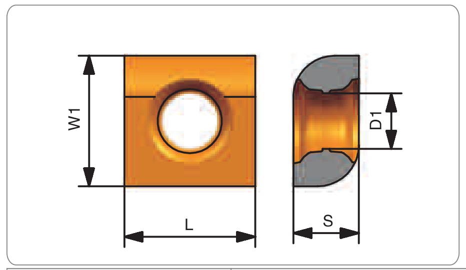
Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

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

★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

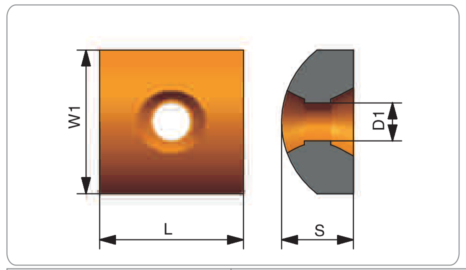


Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

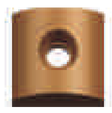
Insert shape	Type	Basic dimension (mm) L	W1	S	D1	CVD HR8140	PVD HR5110	HR5120	HR5130	HR7130	HR7140	Cemented carbide HRK10	Cermet HRC20
	SNEB151507-2R40	15.875	15.875	7.94	5.4	☆				★			
	SNEH151507-2R20	15.875	15.875	7.94	5.4	☆				★			
	SNEH151507-2R50	15.875	15.875	7.94	5.4	☆				★			

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



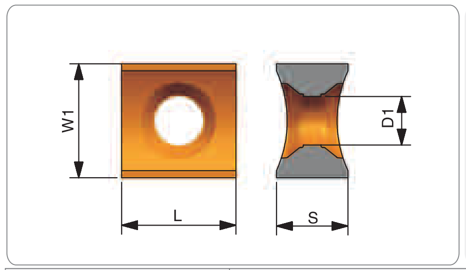
Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

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

★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

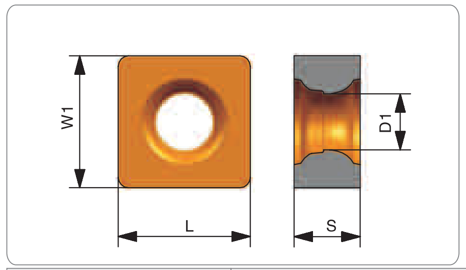


Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

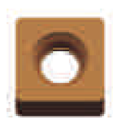
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNER121207-2NR80	12.70	12.70	7.94	5.4	☆				★			

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



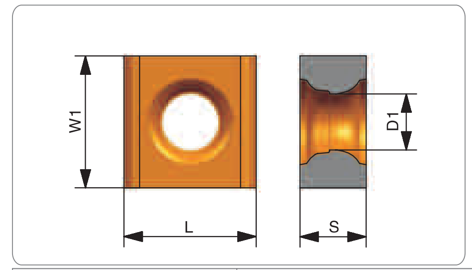
Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNED121206-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								

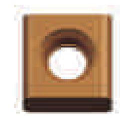
★ Recommended grade ☆ Available grade

Heavy milling inserts

Working condition: ● Stable ◕ Average ⌗ Tough

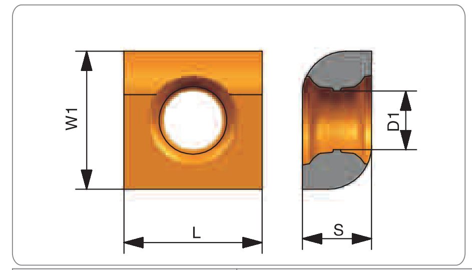


Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

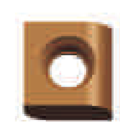
Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNED121206-4R20	12.70	12.70	6.35	5.5	☆				★			
	SNEH151507-4R20	15.875	15.875	7.94	5.4	☆				★			
	SNER121206-4R25	12.70	12.70	6.35	4.4	☆				★			
	SNEY090904-4R30H	9.525	9.525	4.76	4.4	☆				★			

★ Recommended grade ☆ Available grade

Working condition: ● Stable ◕ Average ⌗ Tough



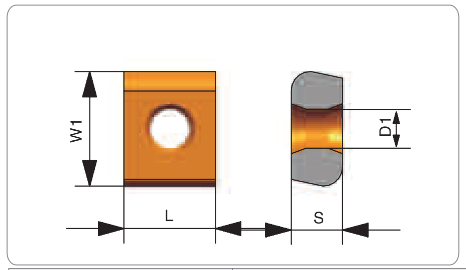
Workpiece material	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
P Steel	⌗	●	◕	⌗	⌗	⌗		●
M Stainless steel		●	◕	⌗		⌗		
K Cast iron	⌗	●	◕	⌗				
N Non-ferrous metal							◕	
S Heat-resistant alloy Titanium alloy								

Insert shape	Type	Basic dimension (mm)				CVD	PVD					Cemented carbide	Cermet
		L	W1	S	D1	HR8140	HR5110	HR5120	HR5130	HR7130	HR7140	HRK10	HRC20
	SNEN151507-2R20	15.875	15.875	7.94	5.4	☆				★			
	SNEN151507-2R30	15.875	15.875	7.94	5.4	☆				★			
	SNEN151507-2R40	15.875	15.875	7.94	5.4	☆				★			
	SNEN151507-2R50	15.875	15.875	7.94	5.4	☆				★			
	SNEN151507-2R60	15.875	15.875	7.94	5.4	☆				★			

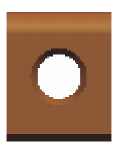
★ Recommended grade ☆ Available grade

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

Heavy milling inserts



Working condition: ● Stable ◕ Average ⌗ Tough

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

★ Recommended grade ☆ Available grade

B Milling

Solid carbide end mills

Selection guidance of solid carbide end mills

Product type

Machining form

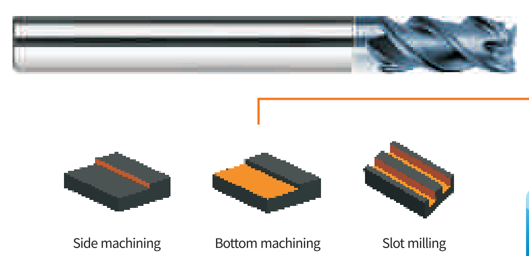
Product specification drawing

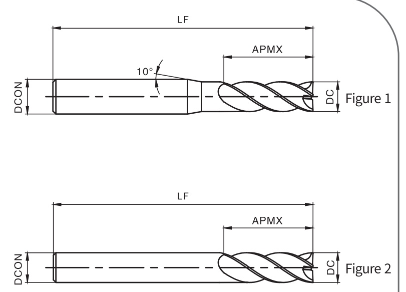
Series B - basic end mills

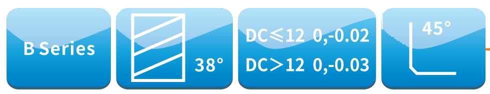
Three-flute flat end mill (short flute structure)

Product outline drawing

B3L···NG







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

●Running stock ○Make-to-order

Product specification

Basic size

Pattern

Inventory information

Helical angle, insert diameter tolerance, etc.

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

☀ Fit well ☼ Applicable

Range of workpiece materials

Code key of solid carbide end mills

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

① Product series	
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

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

Overview of solid carbide end mills

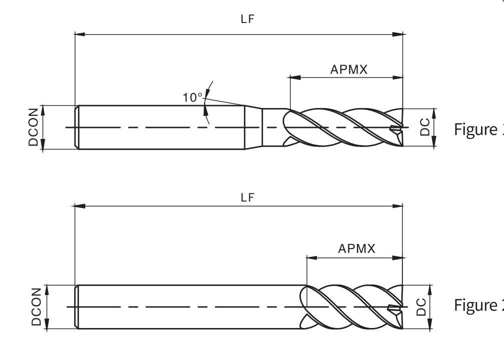
Machining form	Shape	Number of teeth	Model	Size range	P: Carbon steel	P: Alloy steel	P: High-alloyed steel and tool steel	M: Stainless steel	K: Cast iron	N: Non-ferrous alloy	N: Aluminum alloy	S: High-temp alloy	S: Titanium alloy	H: High hardness steel < 54HRC	H: High hardness steel 54--60 HRC	H: High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

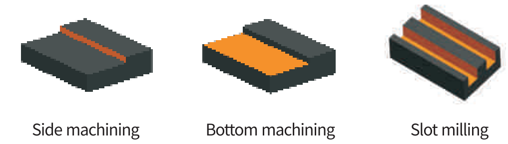
☀ Fit well ☼ Applicable

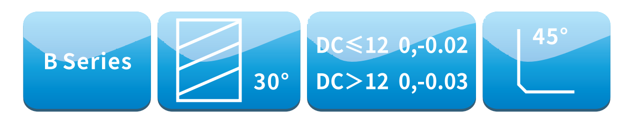
Series B--Basic end mills

Two-flute flat end mill (short flute structure)

B2S···LG







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

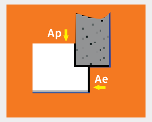
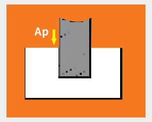
●Running stock ○Make-to-order

P: 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--B2S···LG

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

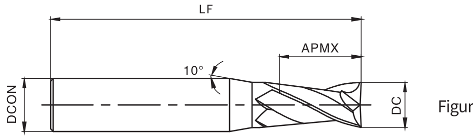
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.02
3.5	3.5	1.1	0.025	2.6	3.5	0.025
4.0	4.0	1.2	0.030	3.0	4.0	0.025
4.5	4.5	1.4	0.035	3.4	4.5	0.03
5.0	5.0	1.5	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

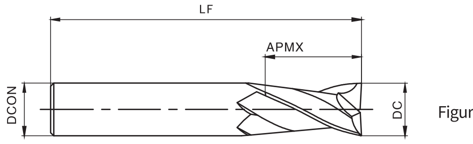
(1) This series of tools is a good solution for slot milling;
(2) Before slot milling, please reduce the cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the feed rate (feed rate) to 40%-60%.
(3) Before vertical feed machining, decrease the feed rate to below 1/3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

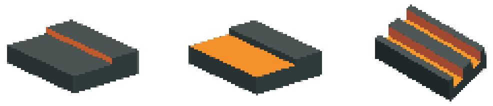
Series B--Basic end mills

Two-flute flat end mill (long flute structure)

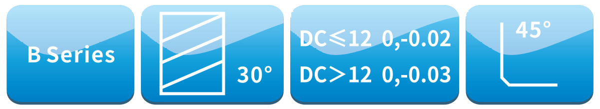
B2L···LG







Side machining Bottom machining Slot milling



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

●Running stock ○Make-to-order

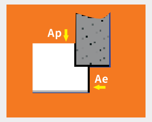
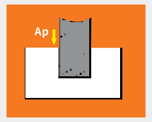
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☀	☀	☀	☼	☀			☼	☼	☼		

☀ Fit well ☼ Applicable

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

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	–	–	–

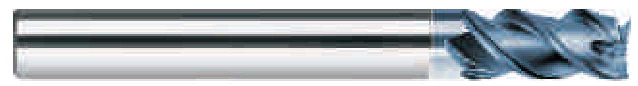
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0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



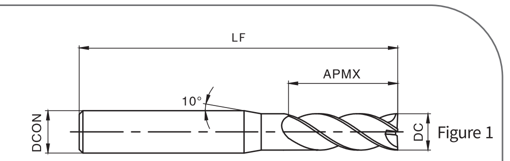


Figure 1

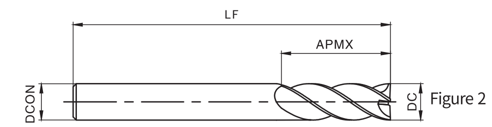
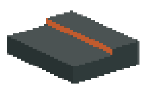
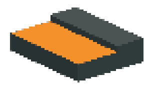
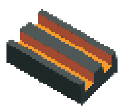
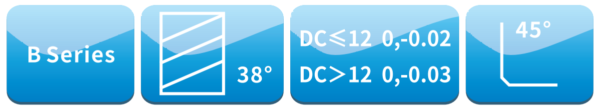


Figure 2


Side machining


Bottom machining


Slot milling



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

●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--B3S···NG

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

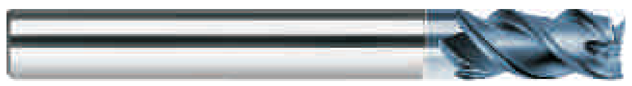
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
3.5	3.5	1.1	0.025	2.6	3.5	0.025
4.0	4.0	1.2	0.030	3.0	4.0	0.025
4.5	4.5	1.4	0.035	3.4	4.5	0.030
5.0	5.0	1.5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

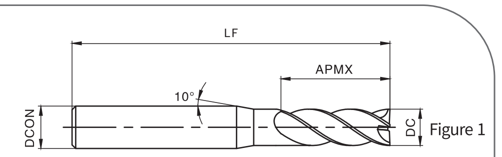
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
(4)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

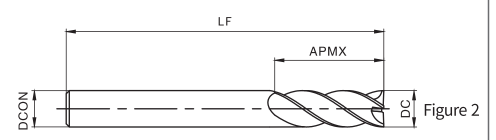
Series B--Basic end mills

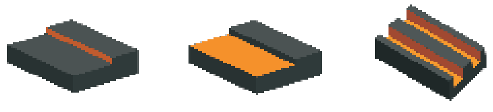
Three-flute flat end mill (long flute structure)

B3L···NG

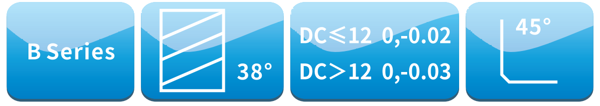








Side machining Bottom machining Slot milling



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

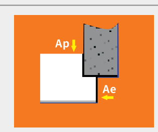
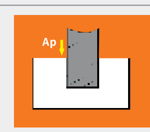
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--B3L···NG

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

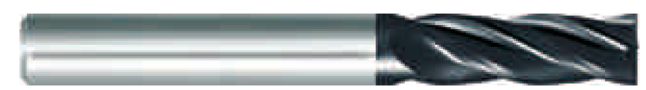
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0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

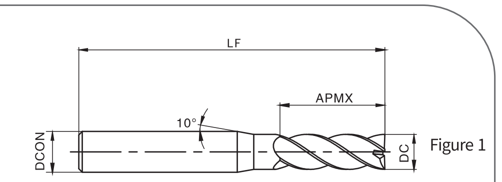
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
(4)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

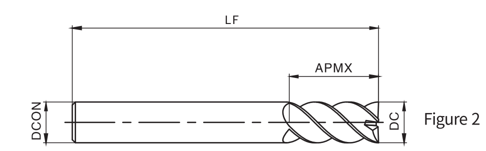
Series B--Basic end mills

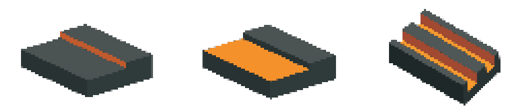
Four-flute flat end milling cutter (short flute structure, little helical angle)

B4S···LG

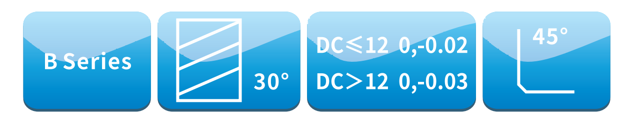








Side machining Bottom machining Slot milling



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

●Running stock ○Make-to-order

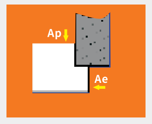
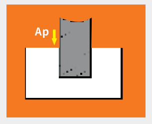
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54––60HRC	≥60HRC
☀	☀	☀	☼	☀			☼	☼	☼		

☀ Fit well ☼ Applicable

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

Recommended cutting conditions--B4S···LG

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

Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	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
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)

B4L···LG

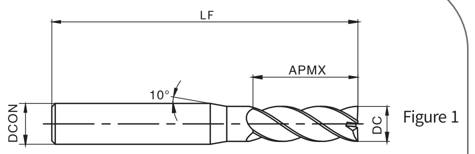


Figure 1

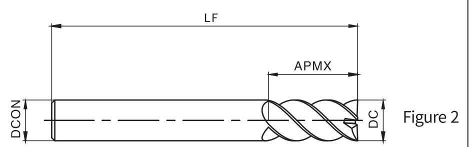
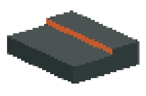
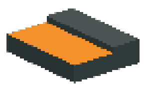
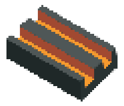
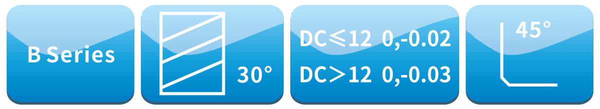


Figure 2


Side machining

Bottom machining

Slot milling



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

●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--B4L···LG

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

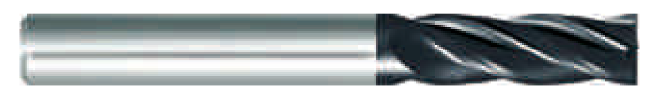
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4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



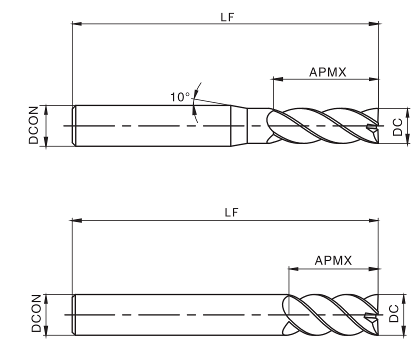
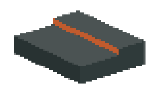
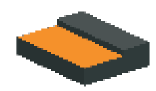
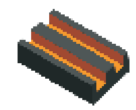


Figure 1
Figure 2


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

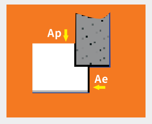
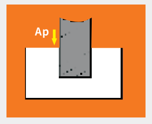
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--B4S···HG

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

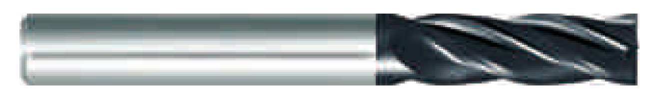
Recommended Cutting Parameters						
Machining method	Side milling 			Slot milling 		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
1.0	1.0	0.3	0.010	0.75	1.0	0.005
1.5	1.5	0.5	0.015	1.13	1.5	0.010
2.0	2.0	0.6	0.015	1.50	2.0	0.015
2.5	2.5	0.8	0.020	1.88	2.5	0.020
3.0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

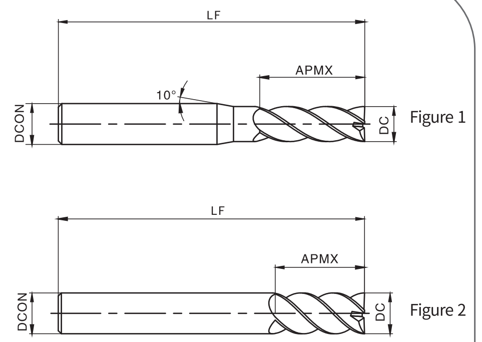
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

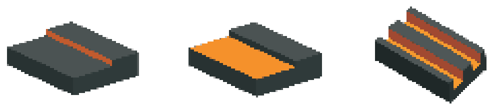
Series B--Basic end mills

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

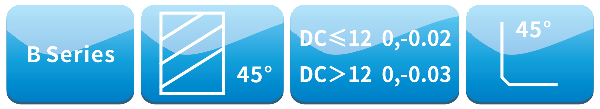
B4L···HG







Side machining Bottom machining Slot milling



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

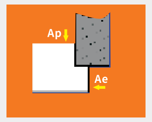
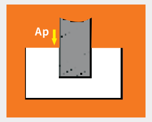
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--B4L···HG

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

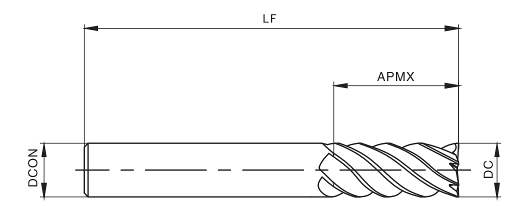
Recommended Cutting Parameters						
Machining method	Side milling 			Slot milling 		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.02
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.03
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	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

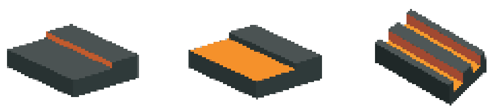
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

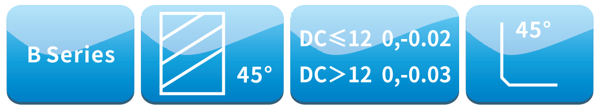
Six-flute flat end mill (short flute structure)

B6S···HG





Side machining　Bottom machining　Slot milling



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

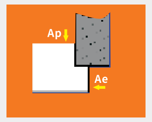
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54-–60HRC	≥60HRC
☀	☀	☀	☼	☀			☼	☼	☼		

☀ Fit well　☼ Applicable

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

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	–	–	–

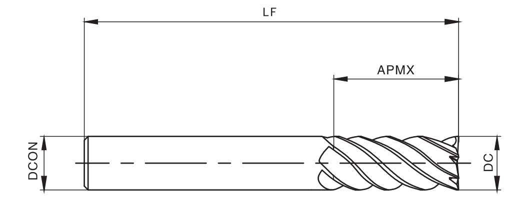
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter (mm)	ap (1xDc)	ae (0.05xDc)	fz (mm/z)			
6.0	6.0	0.3	0.020			
8.0	8.0	0.4	0.027			
10.0	10.0	0.5	0.033			
12.0	12.0	0.6	0.040			
16.0	16.0	0.8	0.053			
20.0	20.0	1.0	0.067			

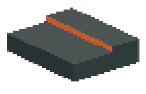
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) The down milling is recommended for side milling.
(3) Use cutting fluid that is air-cooled or free of producing smoke.
(4) With poor rigidity of the machine, if there is vibration or abnormal sound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

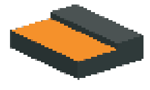
Series B--Basic end mills

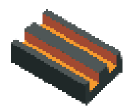
Six-flute flat end mill (long flute structure)

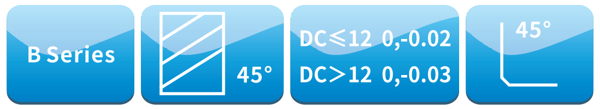
B6L···HG




Side machining


Bottom machining


Slot milling



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

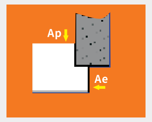
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☀	☀	☀	✲	☀			✲	✲	✲		

☀ Fit well ✲ Applicable

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

Recommended cutting conditions--B6L···HG

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

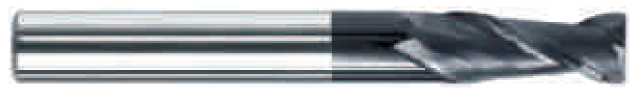
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter (mm)	ap (1xDc)	ae (0.05xDc)	fz (mm/z)			
6.0	6.0	0.3	0.025			
8.0	8.0	0.4	0.033			
10.0	10.0	0.5	0.042			
12.0	12.0	0.6	0.050			
16.0	16.0	0.8	0.067			
20.0	20.0	1.0	0.083			

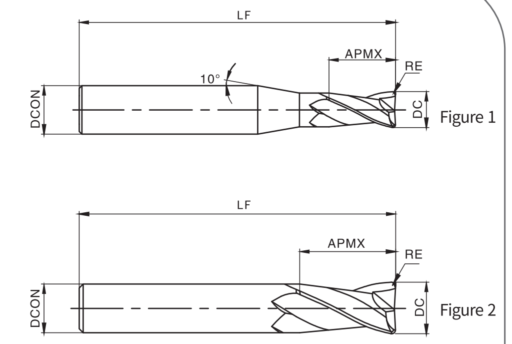
(1) Before slot milling, please reduce he cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the Feed rate (feed rate) to 40%-60%.
(2) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
(3) With poor rigidity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

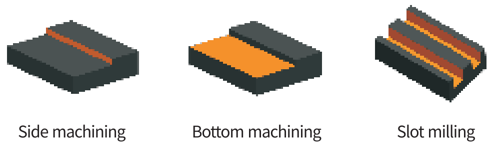
Series B--Basic end mills

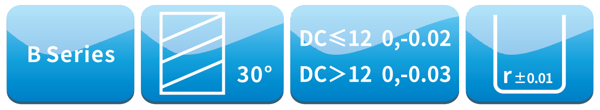
Two-flute R end mill (short flute structure)

B2S···R···LG









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

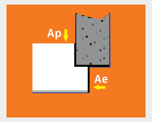
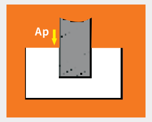
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--B2S···R···LG

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

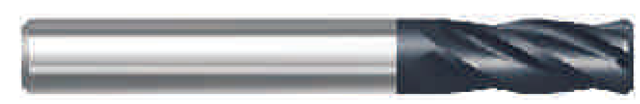
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	1.2	0.025	2.3	3.0	0.020
4.0	4.0	1.6	0.030	3.0	4.0	0.025
5.0	5.0	2.0	0.035	3.8	5.0	0.030
6.0	6.0	2.4	0.045	4.5	6.0	0.035
8.0	8.0	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

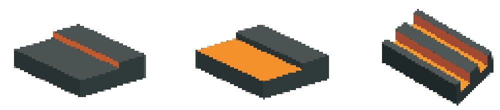
(1) Before slot milling, please reduce he cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the Feed rate (feed rate) to 40%-60%.
(2) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
(3) With poor rigidity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

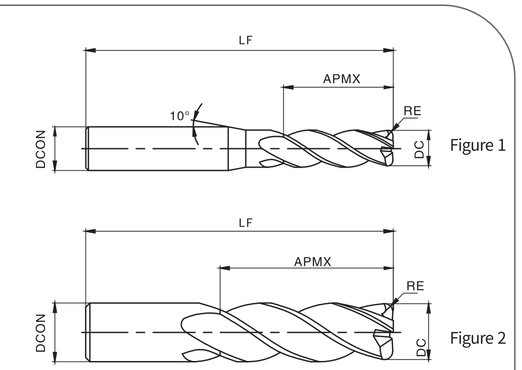
Four-flute R end mill (short flute structure)

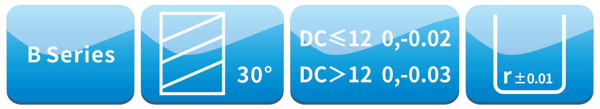
B4S···R···LG





Side machining Bottom machining Slot milling





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

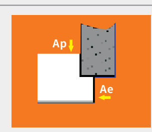
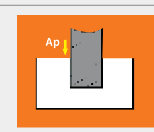
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

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

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

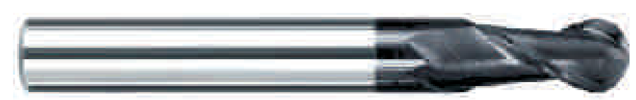
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	1.2	0.025	2.3	3.0	0.020
4.0	4.0	1.6	0.030	3.0	4.0	0.025
5.0	5.0	2.0	0.035	3.8	5.0	0.030
6.0	6.0	2.4	0.045	4.5	6.0	0.035
8.0	8.0	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

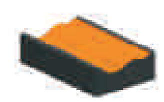
(1) Before slot milling, please reduce he cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the Feed rate (feed rate) to 40%-60%.
(2) Before vertical feed machining, decrease the feed rate to below 1/3 of the standard value in the above table.
(3) With poor rigidity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

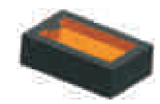
Two-flute ball nose end mill (short flute structure)

B2S···BLG

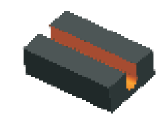




Profile machining



Cavity machining



Slot machining

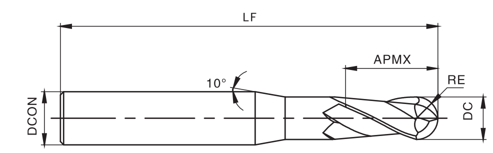


Figure 1

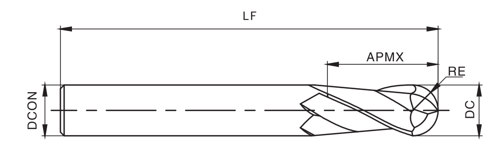
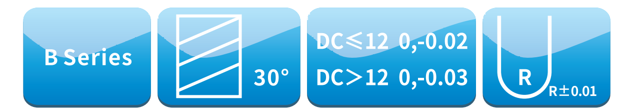


Figure 2



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

●Running stock ○Make-to-order

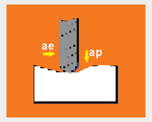
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54––60HRC	≥60HRC
☀	☀	☀	☼	☀			☼	☼	☼	☼	

☀ Fit well ☼ Applicable

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

Recommended cutting conditions--B2S···BLG

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

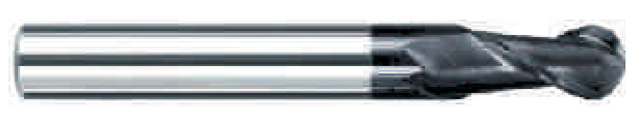
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.1xDc)	ae (0.1xDc)	fz (mm/z)			
1.0	0.1	0.1	0.020			
1.5	0.15	0.15	0.030			
2.0	0.2	0.2	0.040			
2.5	0.25	0.25	0.050			
3.0	0.3	0.3	0.060			
3.5	0.35	0.35	0.070			
4.0	0.4	0.4	0.080			
5.0	0.5	0.5	0.100	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

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

Series B--Basic end mills

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

B2L···BLG



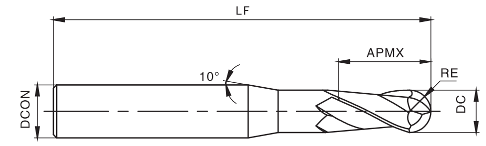


Figure 1

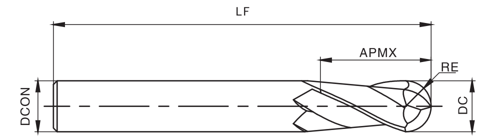
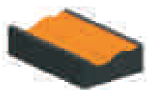
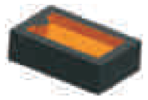
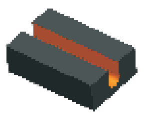
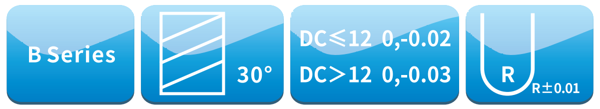


Figure 2


Profile machining


Cavity machining


Slot machining



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

●Running stock ○Make-to-order

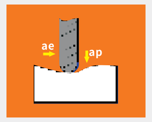
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54––60HRC	≥60HRC
☀	☀	☀	☼	☀			☼	☼	☼	☼	

☀ Fit well ☼ Applicable

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

Recommended cutting conditions--B2L···BLG

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

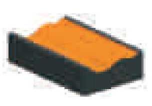
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.1xDc)	ae (0.1xDc)	fz (mm/z)			
2.0	0.2	0.2	0.040			
2.5	0.25	0.25	0.050			
3.0	0.3	0.3	0.060			
3.5	0.35	0.35	0.070			
4.0	0.4	0.4	0.080			
5.0	0.5	0.5	0.100			
5.5	0.55	0.55	0.110			
6.0	0.6	0.6	0.120	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

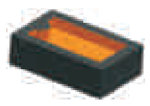
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

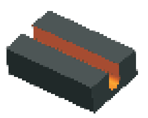
Series B--Basic end mills

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

B4S···BLG


Profile machining


Cavity machining


Slot machining

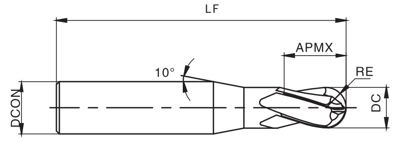


Figure 1

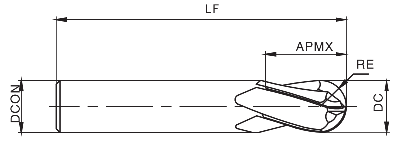


Figure 2

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		
B4SR01 50BLG	3.0	6	6	50	1.5	4	Figure 1	●
B4SR02 00BLG	4.0	6	8	50	2.0	4	Figure 1	○
B4SR02 50BLG	5.0	6	10	50	2.5	4	Figure 1	○
B4SR03 00BLG	6.0	6	12	50	3.0	4	Figure 2	●
B4SR04 00BLG	8.0	8	16	60	4.0	4	Figure 2	●
B4SR05 00BLG	10.0	10	20	75	5.0	4	Figure 2	●
B4SR06 00BLG	12.0	12	24	75	6.0	4	Figure 2	●
B4SR08 00BLG	16.0	16	32	100	8.0	4	Figure 2	●
B4SR10 00BLG	20.0	20	40	100	10.0	4	Figure 2	●

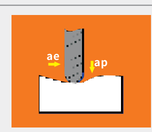
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--B4S···BLG

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

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

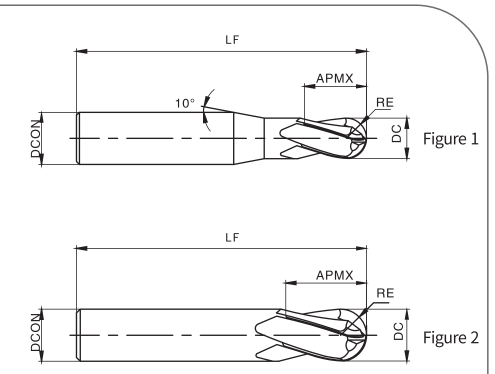
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

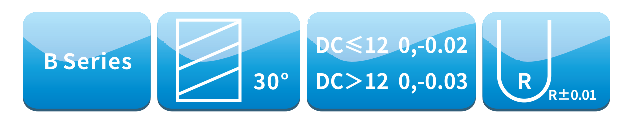
Series B--Basic end mills

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

B4L···BLG

Profile machining Cavity machining Slot machining





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

●Running stock ○Make-to-order

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

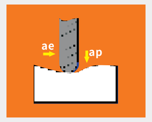
☀ Fit well ☼ Applicable

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

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

Recommended cutting conditions--B4L···BLG

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

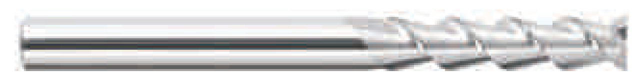
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.1xDc)	ae (0.1xDc)	fz (mm/z)			
3.0	0.3	0.3	0.060			
4.0	0.4	0.4	0.080			
5.0	0.5	0.5	0.010			
6.0	0.6	0.6	0.120			
8.0	0.8	0.8	0.160			
10.0	1.0	1.0	0.200			
12.0	1.2	1.2	0.240			
16.0	1.6	1.6	0.320			
20.0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

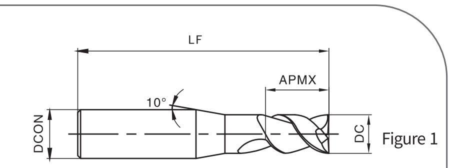
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

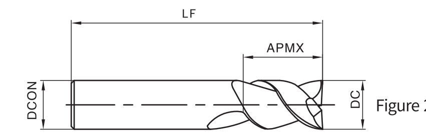
Series B--Basic end mills

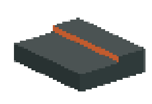
Two-flute flat end mill (aluminum alloy machining)

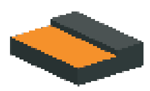
B2L···HN

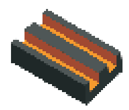


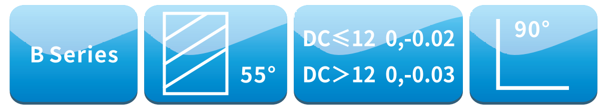





Side machining


Bottom machining


Slot milling



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

●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

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

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)
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

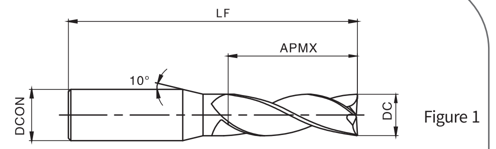


Figure 1

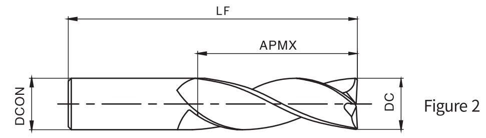
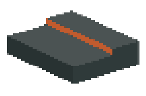
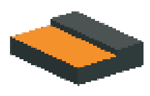
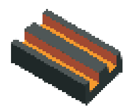
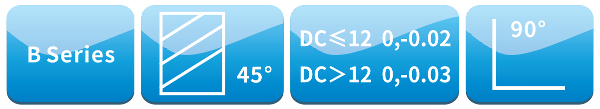


Figure 2


Side machining


Bottom machining


Slot milling



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

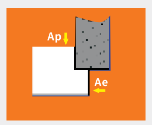
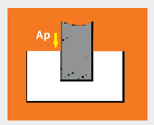
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--B3L···HN

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

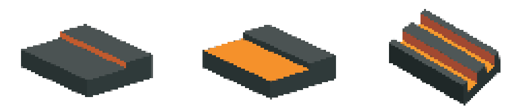
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1.5xDc)	ae (0.2xDc)	fz (mm/z)	ap (1xDc)	ae (1xDc)	fz (mm/z)
3.0	4.5	0.6	0.030	3.0	3.0	0.01
4.0	6.0	0.8	0.040	4.0	4.0	0.013
5.0	7.5	1.0	0.050	5.0	5.0	0.17
6.0	9.0	1.2	0.060	6.0	6.0	0.02
8.0	12.0	1.6	0.080	8.0	8.0	0.027
10.0	15.0	2.0	0.100	10.0	10.0	0.033
12.0	18.0	2.4	0.120	12.0	12.0	0.04
16.0	24.0	3.2	0.160	16.0	16.0	0.053
20.0	30.0	4.0	0.200	20.0	20.0	0.067

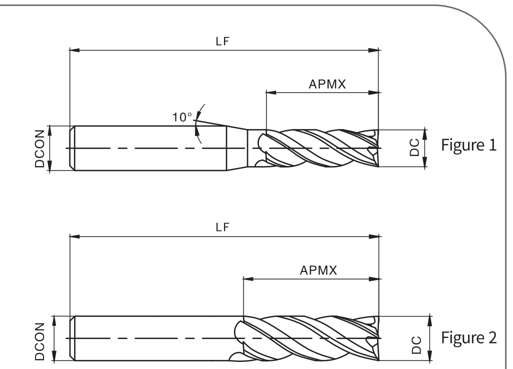
(1) This series of tools is dedicated for aluminum alloy machining;
(2) Before slot milling, please reduce the cutting speed (rotating speed) to 50%-70% of the value indicated in the table above, and the feed rate (feed rate) to 40%-60%.

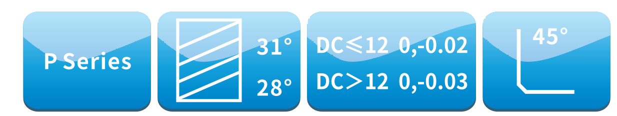
Series P--High performance end mills

Four-flute flat end mill (short flute structure)

P4S···LG







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

●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

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

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

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	–	–	–

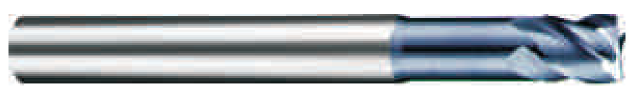
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xD$_c$)	ae (0.3xDc)	f$_z$ (mm/z)	ap (0.75xD$_c$)	ae (1xD$_c$)	f$_z$ (mm/z)
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	2.5	0.018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

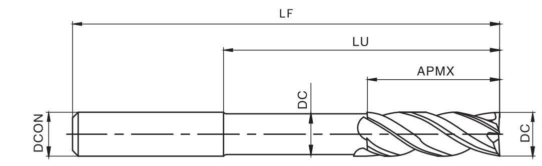
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

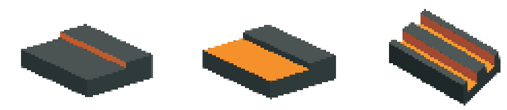
Series P--High performance end mills

Four-flute flat end mill (necking structure)

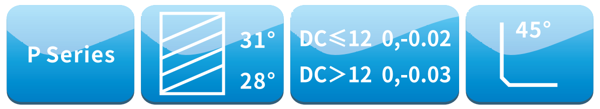
P4P···LG







Side machining Bottom machining Slot milling



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	●

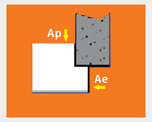
●Running stock ○Make-to-order

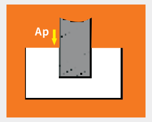
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54-–60HRC	≥60HRC
☀	☀	☀	✲	☀			✲	✲	☀		

☀ Fit well ✲ Applicable

Recommended cutting conditions--P4P···LG

Recommended Cutting Speed						
Workpiece material		Strength (N/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)
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

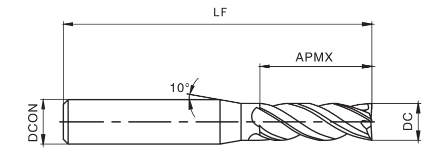


Figure 1

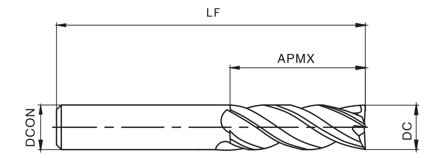
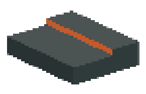
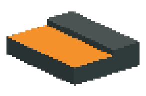


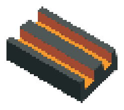
Figure 2



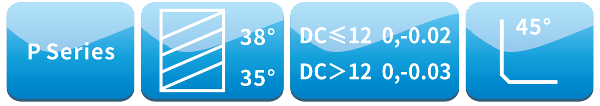
Side machining



Bottom machining



Slot milling



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

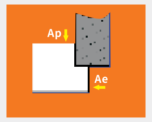
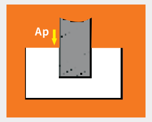
●Running stock ○Make-to-order

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

Fit well　Applicable

Recommended cutting conditions--P4S···NG

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

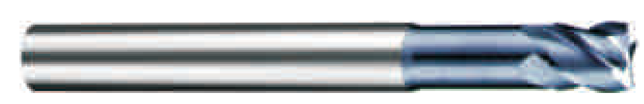
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	2.5	0.018
3.0	3.0	0.9	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

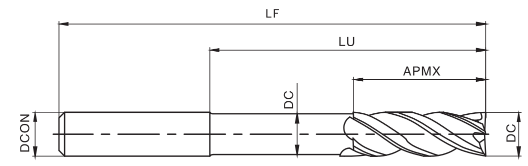
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

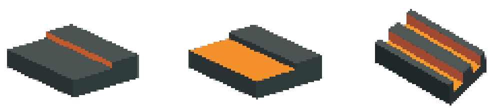
Series P--High performance end mills

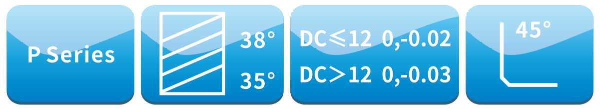
Four-flute flat end mill (necking structure)

P4P···NG






Side machining Bottom machining Slot milling



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

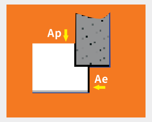
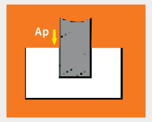
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54-–60HRC	≥60HRC
☀	☀	☀	✲	☀			✲	✲	☀		

☀ Fit well ✲ Applicable

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

Recommended cutting conditions--P4P···NG

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

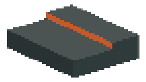
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0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

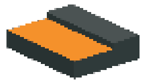
Series P--High performance end mills

Four-flute flat end mill (short flute structure)

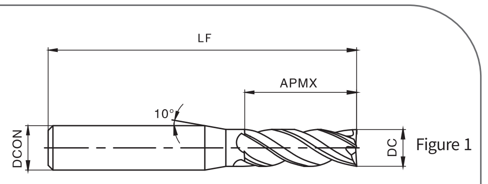
P4S···NS

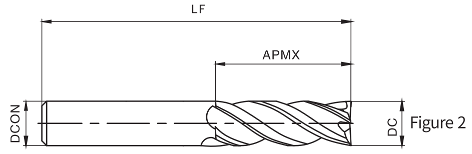


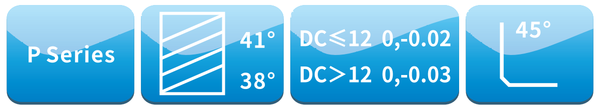
Side machining



Bottom machining







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

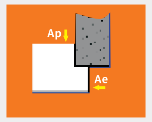
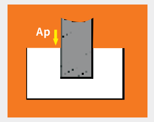
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P4S···NS

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

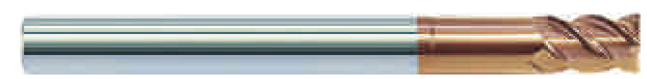
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	2.5	0.018
3.0	3.0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

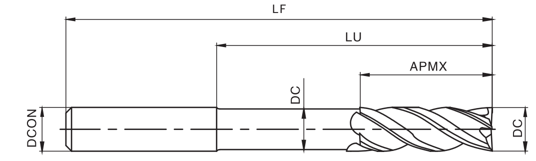
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

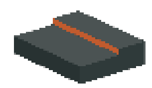
Series P--High performance end mills

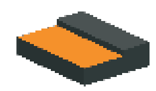
Four-flute flat end mill (necking structure)

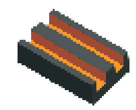
P4P···NS

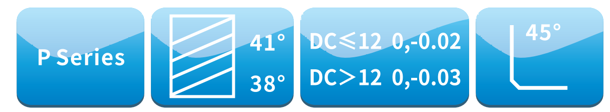





Side machining


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	●

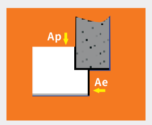
●Running stock ○Make-to-order

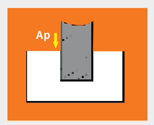
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54––60HRC	≥60HRC
☀	☀	☀	☀	☀			☀	☀			

☀ 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	–	–	–





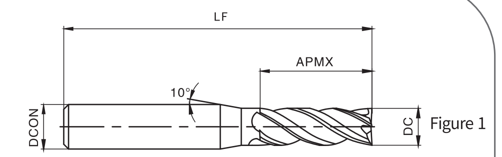
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0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

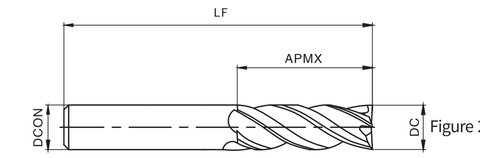
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

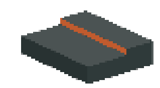
Series P--High performance end mills

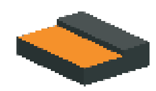
Four-flute flat end mill (short flute structure)

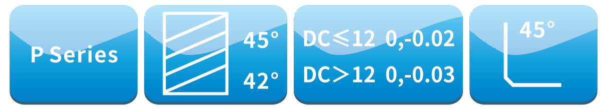
P4S···HH






Side machining


Bottom machining



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

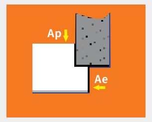
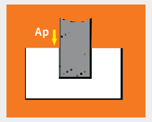
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P4S···HH

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

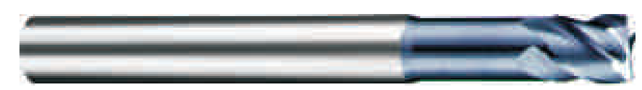
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
1.0	1.0	0.3	0.012	0.8	1.0	0.010
1.5	1.5	0.5	0.015	1.1	1.5	0.012
2.0	2.0	0.6	0.018	1.5	2.0	0.015
2.5	2.5	0.8	0.020	1.9	2.5	0.018
3.0	3.0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

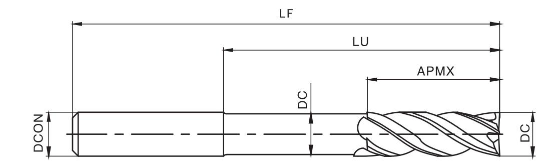
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

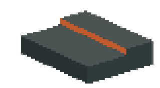
Series P--High performance end mills

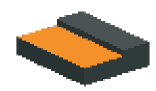
Four-flute flat end mill (necking structure)

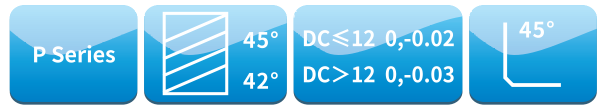
P4P···HH






Side machining


Bottom machining



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
✲	✲	✲		☀					☀	☀	☀

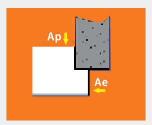
☀ Fit well ✲ Applicable

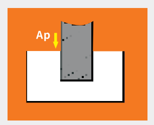
A General turning
Parting and grooving
Threading
B Indexable milling
Solid carbide end mills
C Short hole drills
Solid carbide drills

Recommended cutting conditions--P4P···HH

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

Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	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 R end mill (short flute structure)

P4S···R···LG

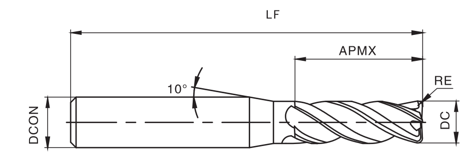


Figure 1

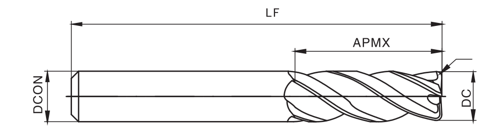
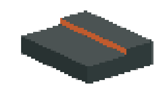
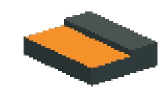
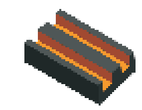
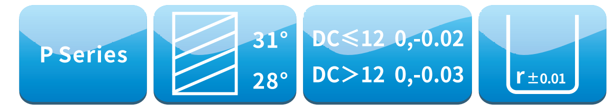


Figure 2


Side machining


Bottom machining


Slot milling



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

●Running stock ○Make-to-order

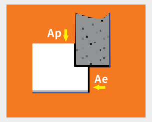
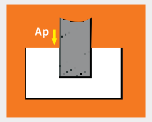
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54--60HRC	≥60HRC
☀	☀	☀	✲	☀			✲	✲	☀		

☀ Fit well ✲ Applicable

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

Recommended cutting conditions--P4S···R···LG

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

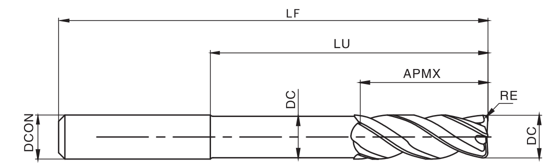
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0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

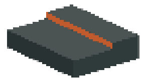
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

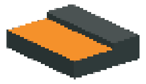
Series P--High performance end mills

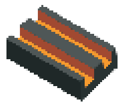
Four-flute R end milling cutter (necking structure)

P4P···R···LG




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	
P4P0600R00 50LG	6.0	6	6	18	5.8	75	0.5	4	●
P4P0600R01 00LG	6.0	6	6	18	5.8	75	1.0	4	●
P4P0800R00 50LG	8.0	8	8	24	7.8	100	0.5	4	●
P4P0800R01 00LG	8.0	8	8	24	7.8	100	1.0	4	●
P4P1000R00 50LG	10.0	10	10	30	9.6	100	0.5	4	●
P4P1000R01 00LG	10.0	10	10	30	9.6	100	1.0	4	●
P4P1000R02 00LG	10.0	10	10	30	9.6	100	2.0	4	●
P4P1200R00 50LG	12.0	12	12	36	11.5	100	0.5	4	●
P4P1200R01 00LG	12.0	12	12	36	11.5	100	1.0	4	●
P4P1200R02 00LG	12.0	12	12	36	11.5	100	2.0	4	●
P4P1600R01 00LG	16.0	16	16	40	15.5	150	1.0	4	●
P4P1600R02 00LG	16.0	16	16	40	15.5	150	2.0	4	●

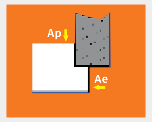
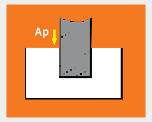
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P4P···R···LG

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

Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap ($1xD_c$)	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

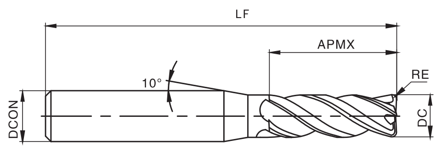


Figure 1

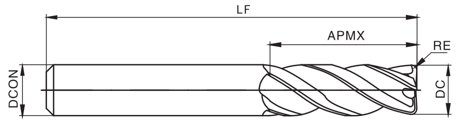
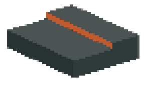
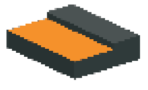


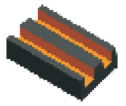
Figure 2



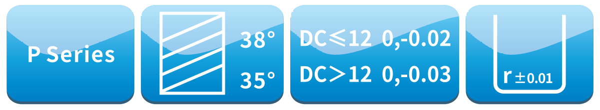
Side machining



Bottom machining



Slot milling



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

●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P4S···R···NG

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

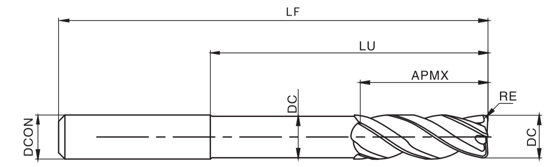
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4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

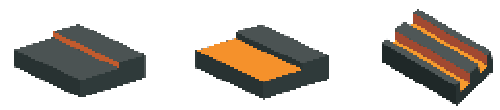
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

Series P--High performance end mills

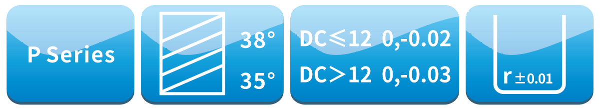
Four-flute R end milling cutter (necking structure)

P4P···R···NG





Side machining Bottom machining Slot milling



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

●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P4P···R···NG

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

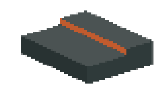
Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0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

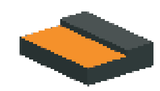
(1) Water-soluble cutting fluid is recommended during machining stainless steel.
(2) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(3) The down milling is recommended for side milling.
(4) With poor rigidity of the machine, if there is vibration or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

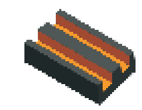
Series P--High performance end mills

Four-flute R end mill (short flute structure)

P4S···R···NS


Side machining


Bottom machining


Slot milling

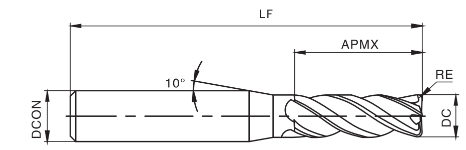


Figure 1

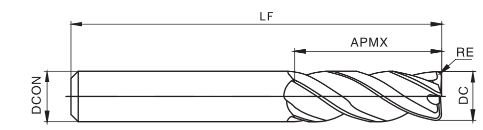
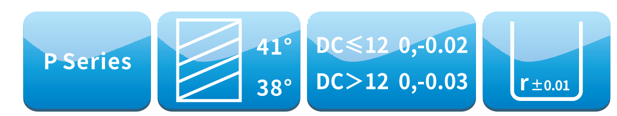


Figure 2



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

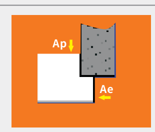
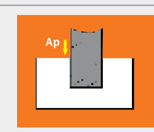
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P4S···R···NS

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

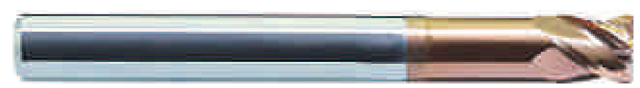
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
3.0	3.0	0.9	0.025	2.3	3.0	0.020
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0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

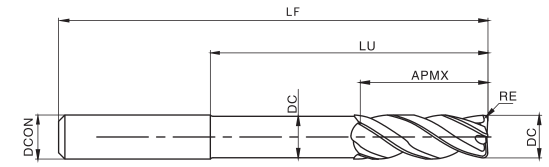
(1) Before slot milling, please reduce he cutting speed (rotating speed) to 80% of the value indicated in the table above, and the feed rate (feed rate) to 60%-80%.
(2) Please use high-precision machines and cutter shanks, and water-soluble cutting fluids are recommended.
(3) The down milling is recommended.

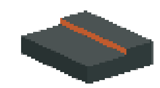
Series P--High performance end mills

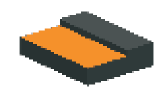
Four-flute R end mill (necking structure)

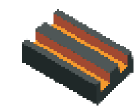
P4P···R···NS

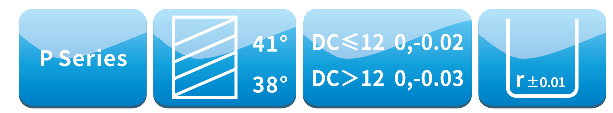





Side machining


Bottom machining


Slot milling



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

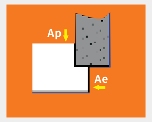
●Running stock ○Make-to-order

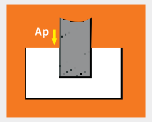
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54––60HRC	≥60HRC
☀	☀	☀	☀	☀			☀	☀			

☀ Fit well ☼ Applicable

Recommended cutting conditions--P4P···R···NS

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





Recommended Cutting Parameters						
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	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

(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

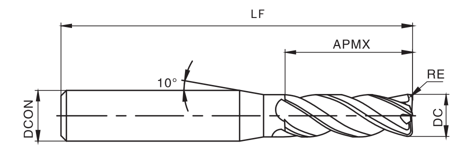


Figure 1

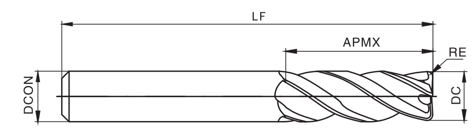
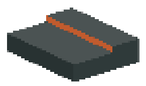
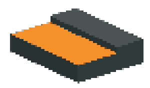
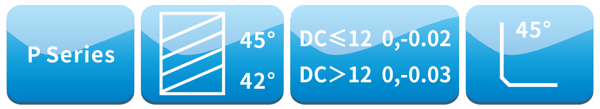


Figure 2


Side machining


Bottom machining



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

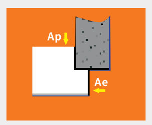
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P4S···R···HH

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

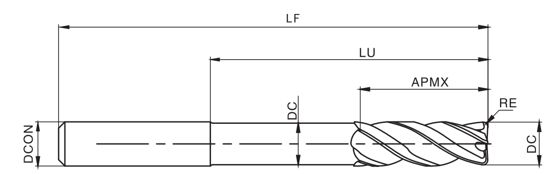
Recommended Cutting Parameters						
Machining method	 Side milling					
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)			
3.0	3.0	0.9	0.025			
4.0	4.0	1.2	0.030			
5.0	5.0	1.5	0.035			
6.0	6.0	1.8	0.045			
8.0	8.0	2.4	0.060			
10.0	10.0	3.0	0.070			
12.0	12.0	3.6	0.085			
16.0	16.0	4.8	0.115			
20.0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

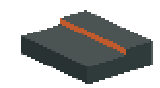
(1) Please use high precision machines and cutter shanks.
(2) Use cutting fluid that is air-cooled or free of producing smoke.
(3) If the rotating speed of machine is insufficient, decrease the feed rate in the same proportion.

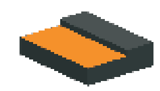
Series P--High performance end mills

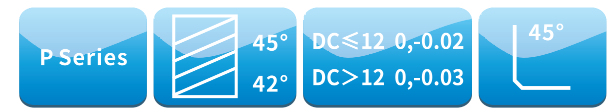
Four-flute R end mill (necking structure)

P4P···R···HH




Side machining


Bottom machining



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

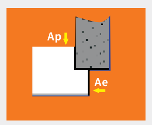
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P4P···R···HH

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



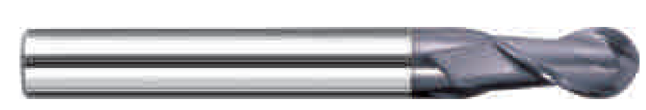
Recommended Cutting Parameters						
Machining method		Side milling				
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)			
6.0	6.0	1.8	0.045			
8.0	8.0	2.4	0.060			
10.0	10.0	3.0	0.070			
12.0	12.0	3.6	0.085			
16.0	16.0	4.8	0.115			

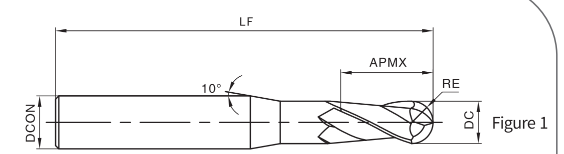
(1) Please use high precision machines and cutter shanks.
(2) Use cutting fluid that is air-cooled or free of producing smoke.
(3) If the rotating speed of machine is insufficient, decrease the feed rate in the same proportion.

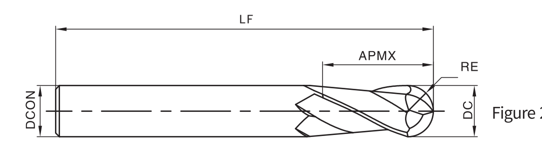
Series P--High performance end mills

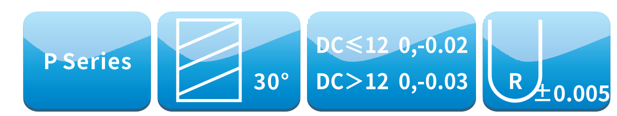
Two-flute ball nose end mill (short flute structure)

P2S···BLG









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

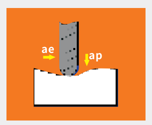
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P2S···BLG

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

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

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

Series P--High performance end mills

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

P2S···BLH

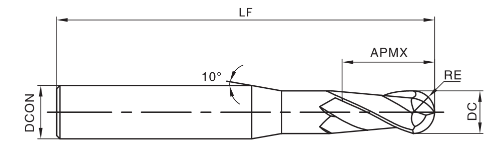


Figure 1

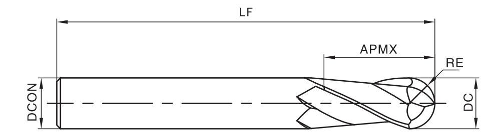
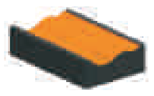
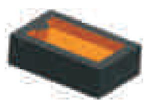
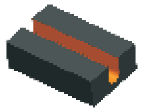


Figure 2


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

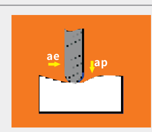
●Running stock ○Make-to-order

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

☀ Fit well ✲ Applicable

Recommended cutting conditions--P2S···BLH

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

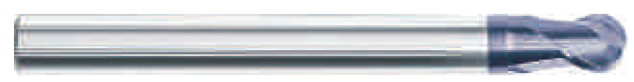
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.03xDc)	ae (0.03xDc)	fz (mm/z)			
1.0	0.03	0.03	0.012			
1.5	0.045	0.045	0.015			
2.0	0.06	0.06	0.018			
2.5	0.075	0.075	0.020			
3.0	0.09	0.09	0.025			
3.5	0.105	0.105	0.025			
4.0	0.12	0.12	0.030			
5.0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

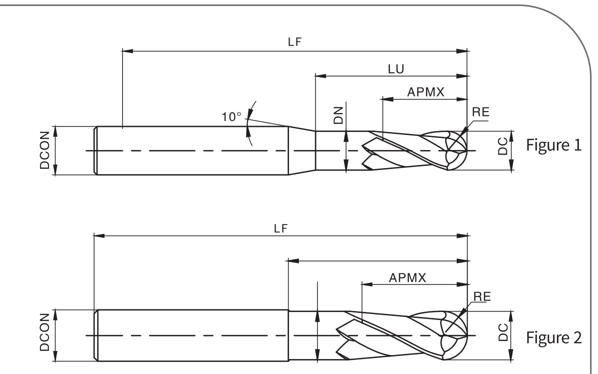
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

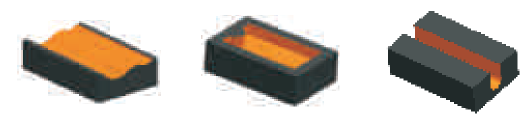
Series P--High performance end mills

Two-flute ball nose end mill(necking structure)

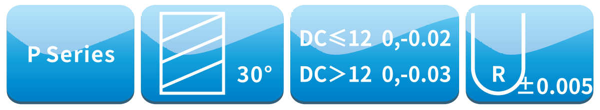
P2P···BLG







Profile machining Cavity machining Slot machining



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

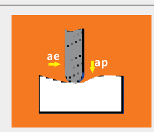
●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

Recommended cutting conditions--P2P···BLG

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

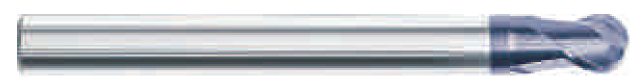
Recommended Cutting Parameters						
Machining method	 Profile machining					
Diameter (mm)	ap (0.03xDc)	ae (0.03xDc)	fz (mm/z)			
1.0	0.03	0.03	0.012			
1.5	0.045	0.045	0.015			
2.0	0.06	0.06	0.018			
3.0	0.09	0.09	0.025			
4.0	0.12	0.12	0.030			
5.0	0.15	0.15	0.035			
6.0	0.18	0.18	0.045			
8.0	0.24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

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

Series P--High performance end mills

Two-flute ball nose end mill(necking structure)

P2P···BLH



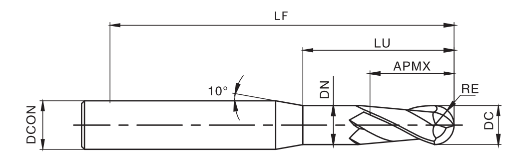


Figure 1

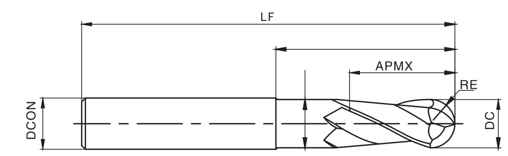
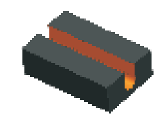
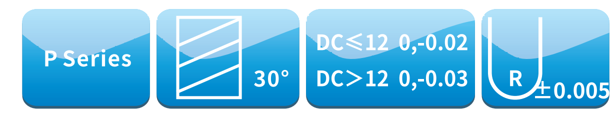


Figure 2


Profile machining


Cavity machining


Slot machining



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

●Running stock ○Make-to-order

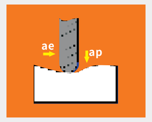
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–-60HRC	≥60HRC
☼	☼	☼		☼					☀	☀	☀

☀ Fit well ☼ Applicable

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

Recommended cutting conditions--P2P···BLH

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



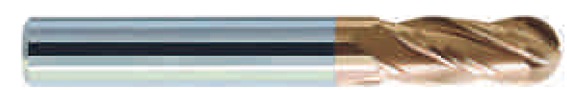
Recommended Cutting Parameters						
Machining method	Profile machining					
Diameter (mm)	ap (0.03xDc)	ae (0.03xDc)	fz (mm/z)			
1.0	0.03	0.03	0.012			
1.5	0.045	0.045	0.015			
2.0	0.06	0.06	0.018			
3.0	0.09	0.09	0.025			
4.0	0.12	0.12	0.030			
5.0	0.15	0.15	0.035			
6.0	0.18	0.18	0.045			
8.0	0.24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

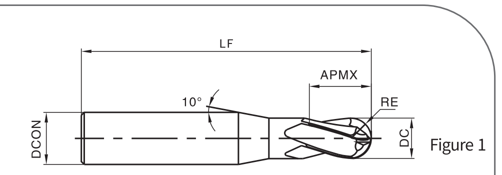
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

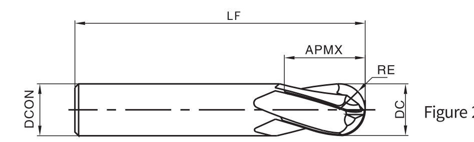
Series P--High performance end mills

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

P4S···BNS

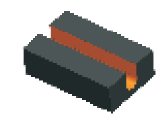


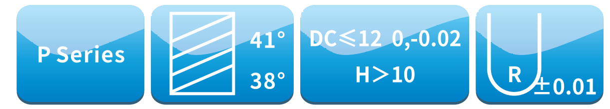





Profile machining


Cavity machining


Slot machining



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

●Running stock ○Make-to-order

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

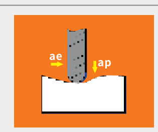
☀ Fit well ☼ Applicable

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

HUAREAL

Recommended cutting conditions--P4S···BNS

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



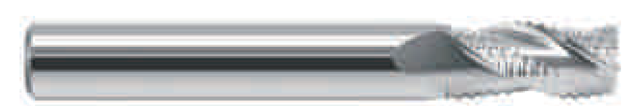
Recommended Cutting Parameters						
Machining method	Profile machining					
Diameter (mm)	ap (0.1xDc)	ae (0.1xDc)	fz (mm/z)			
3.0	0.3	0.3	0.025			
4.0	0.4	0.4	0.030			
5.0	0.5	0.5	0.035			
6.0	0.6	0.6	0.045			
8.0	0.8	0.8	0.060			
10.0	1.0	1.0	0.070			
12.0	1.2	1.2	0.085			
14.0	1.4	1.4	0.100			
16.0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

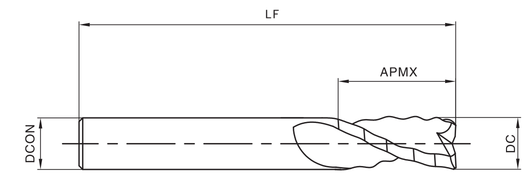
(1) If the cutting depth is reduced, the rotating speed and feed rate may be increased appropriately.
(2) Air cooling or spray cooling is recommended.
(3) With poor rigidity of the machine, if there is vibration or abnormal sound during machining, the cutting speed and feed rate of the above table should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

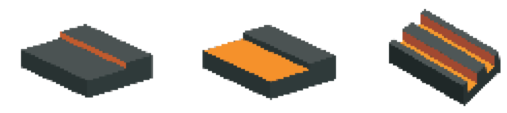
Series X--Special end mills

Three-flute corrugated edge flat end mill

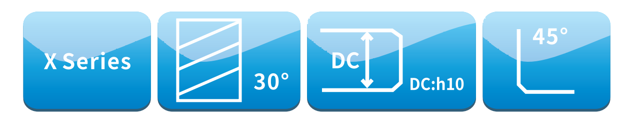
X3S···WLN







Side machining   Bottom machining   Slot milling



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

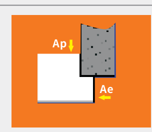
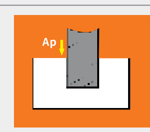
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–60HRC	≥60HRC
						☀					

☀ Fit well ☼ Applicable

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

Recommended cutting conditions--X3S···WLN

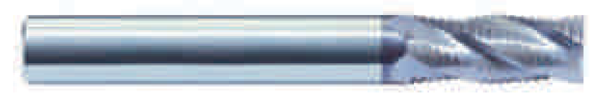
Recommended Cutting Speed						
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	–	–	–
	Alloy steel	< 1200	< 350	–	–	–
	High-alloyed steel and tool steel	< 1400	< 380	–	–	–
M	Austenite and ferrite stainless steel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

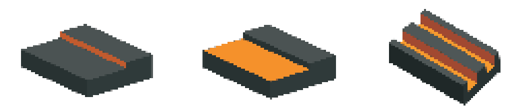
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0	3.0	0.070	7.5	10.0	0.060
12.0	12.0	3.6	0.085	9.0	12.0	0.070
16.0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

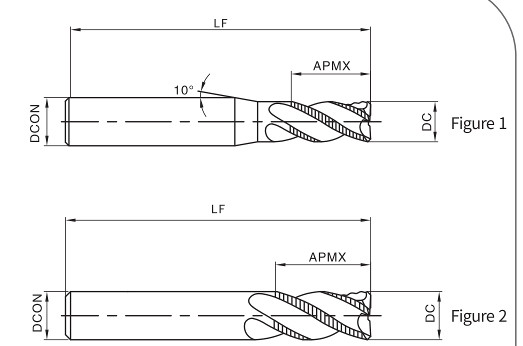
Series X--Special end mills

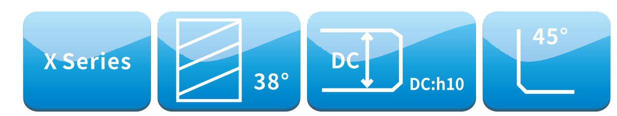
Four-flute corrugated edge flat end mill

X4S···WNG









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

●Running stock ○Make-to-order

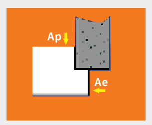
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54–-60HRC	≥60HRC
☀	☀	☀	☼	☀					☼		

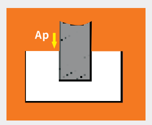
☀ Fit well ☼ Applicable

Recommended cutting conditions--X4S···WNG

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



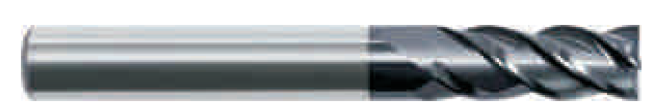


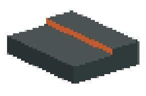
Machining method	Side milling			Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
6.0	6.0	1.8	0.045	4.5	6.0	0.035
7.0	7.0	2.1	0.055	5.3	7.0	0.045
8.0	8.0	2.4	0.060	6.0	8.0	0.050
9.0	9.0	2.7	0.065	6.8	9.0	0.055
10.0	10.0	3.0	0.070	7.5	10.0	0.060
11.0	11.0	3.3	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

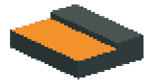
Series X--Special end mills

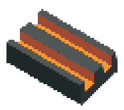
Four-flute flat end mill

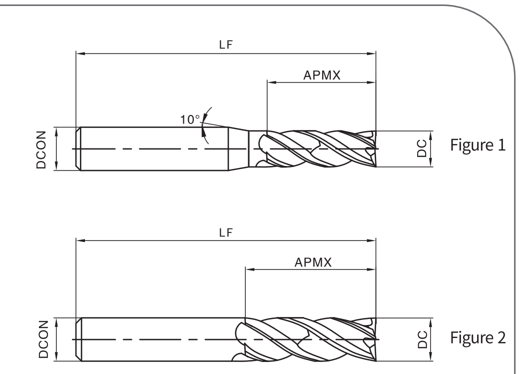
X4S···HG

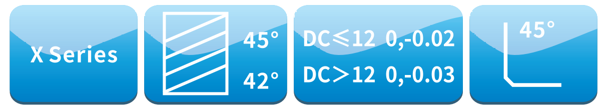



Side machining


Bottom machining


Slot milling





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

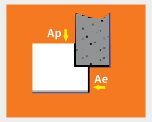
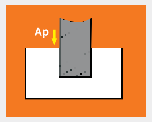
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54––60HRC	≥60HRC
☀	☀	☀	☀	☀			☀	☀	☀	☀	

☀ Fit well ☼ Applicable

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

Recommended cutting conditions--X4S···HG

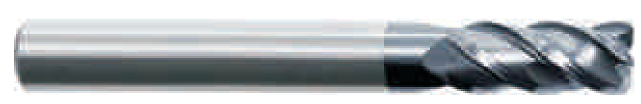
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Recommended Cutting Speed — Cutting speed (m/min)		
				Minimum	Recommendation	Maximum
P	Carbon steel	< 600	< 230	180	210	240
P	Alloy steel	< 1200	< 350	150	175	200
P	High-alloyed steel and tool steel	< 1400	< 380	100	120	140
M	Austenite and ferrite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

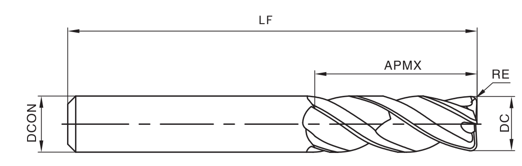
Recommended Cutting Parameters						
Machining method	 Side milling			 Slot milling		
Diameter (mm)	ap (1xDc)	ae (0.3xDc)	fz (mm/z)	ap (0.75xDc)	ae (1xDc)	fz (mm/z)
4.0	4.0	1.2	0.030	3.0	4.0	0.025
5.0	5.0	1.5	0.035	3.8	5.0	0.030
6.0	6.0	1.8	0.045	4.5	6.0	0.035
8.0	8.0	2.4	0.060	6.0	8.0	0.050
10.0	10.0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

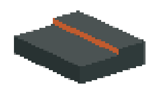
Series X--Special end mills

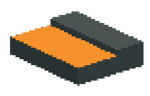
Four-flute R end mill

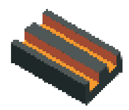
X4S···R···HG

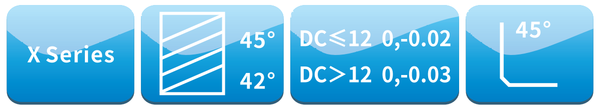





Side machining


Bottom machining


Slot milling



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

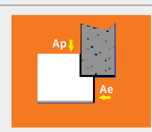
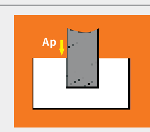
P			M	K	N		S		H		
Carbon steel	Alloy steel	High-alloyed steel	Stainless steel	Cast iron	Non-ferrous alloy	Aluminum alloy	High-temp alloy	Titanium alloy	<54HRC	54––60HRC	≥60HRC
☀	☀	☀	☀	☀			☀	☀	☀	☀	

☀ Fit well ☼ Applicable

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

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

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

Tool series

☐ Series B Basic Type ☐ Series P High Performance Type ☐ Series X Special Type ☐ Others

Tool type

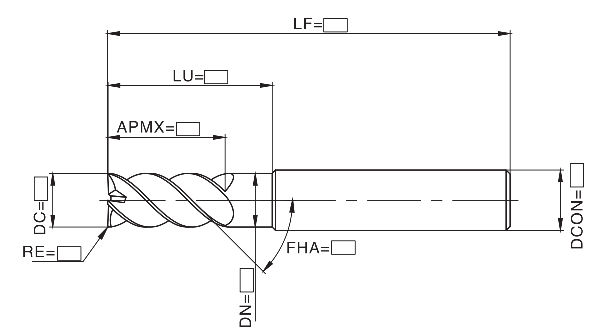
☐ Flat end mill ☐ Chamfered flat end mill ☐ Radius mill ☐ Ball nose mill
☐ Flat end taper mill ☐ Ball nose taper mill ☐ Others

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:


HD
Short hole drills series


BD
Solid carbide drill

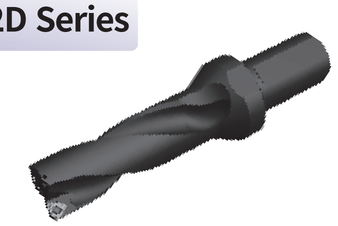
A General turning
Parting and grooving
Threading
B Indexable milling
Solid carbide end mills
C Short hole drills
Solid carbide drills

Selection guidance of indexable short hole drilling tools

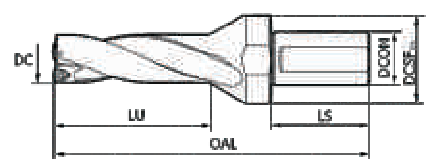
- Tool shape
- Tool type

Indexable short hole drilling

HD01 2D Series



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

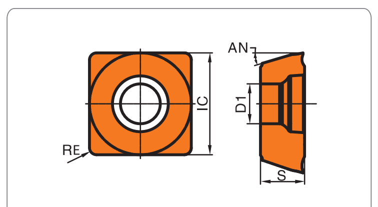


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	DCSF	LS	LU	OAL			
HD01-2D-440-S40	○	44	40	60	70	91	193	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-2D-450-S40	○	45	40	60	70	93	195			
HD01-2D-460-S40	○	46	40	60	70	95	197			
HD01-2D-470-S40	○	47	40	60	70	97	199			
HD01-2D-480-S40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

●Running stock ○Make-to-order

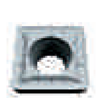
Selection guidance of indexable short hole drilling inserts

Indexable short hole drilling insert



Working condition: ● Stable ◕ Average ⌑ Tough

Workpiece material	HR8115	HR8125	HR8225	HR5110	HR5120	HR5130	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
	SPMG050204DG-DX	5.00	2.38	0.4	2.25	14°	☆				☆	★		
	SPMG060204DG-DX	6.00	2.38	0.4	2.61	14°	☆				☆	★		
	SPMG07T308DG-DX	7.94	3.97	0.8	2.85	15.5°	☆				☆	★		
	SPMG090408DG-DX	9.80	4.30	0.8	4.05	17.5°	☆				☆	★		
	SPMG110408DG-DX	11.50	4.80	0.8	4.50	16.5°	☆				☆	★		

★ Recommended grade ☆ Available grade

- Insert shape
- Insert type

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

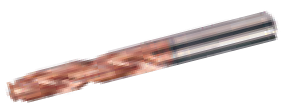
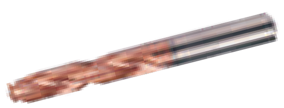
C Drilling

Indexable short hole drills

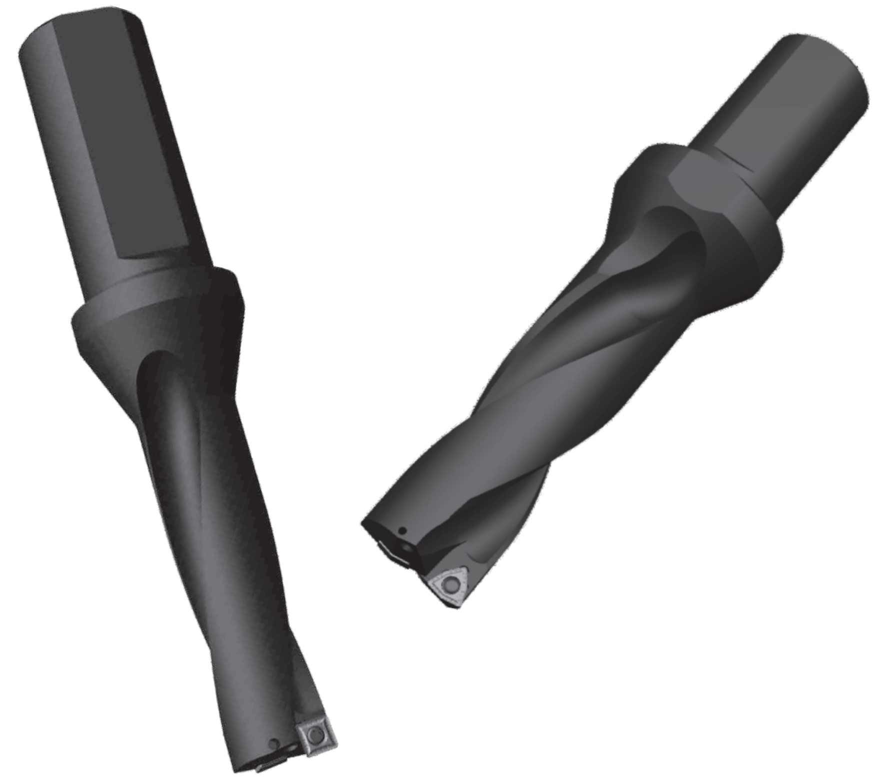
Solid carbide drills

A General turning
Parting and grooving
Threading
B Indexable milling
Solid carbide end mills
C 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
Indexable short hole drill	HD01	Ø16-50		Internal cooling	WCMX□□	☀	☀	☼		☼	
	HD02	Ø16-42		Internal cooling	SPMG□□	☀	☀	☼		☼	
Solid carbide drill	BD03	Ø3-20		External cooling	/	☀	☀	☼		☼	
	BD03C	Ø3-20		Internal cooling	/	☀	☀	☼		☼	
	BD05	Ø3-20		External cooling	/	☀	☀	☼		☼	
	BD05C	Ø3-20		Internal cooling	/	☀	☀	☼		☼	
	BD08C	Ø3-20		Internal cooling	/	☀	☀	☼		☼	

☀ Fit well ☼ Applicable



Code key of indexable short hole drilling tools

HD 01 - 2D - 150 - S 20

① ② ③ ④ ⑤ ⑥

① Short hole drilling series

② Series number	
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
...	...

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

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	(square)
W	80°

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

④ Chip breaker and clamping form

Code	Hole	Chip breaker	Chip breaker	Code	Hole	Chip breaker	Chip breaker
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°				

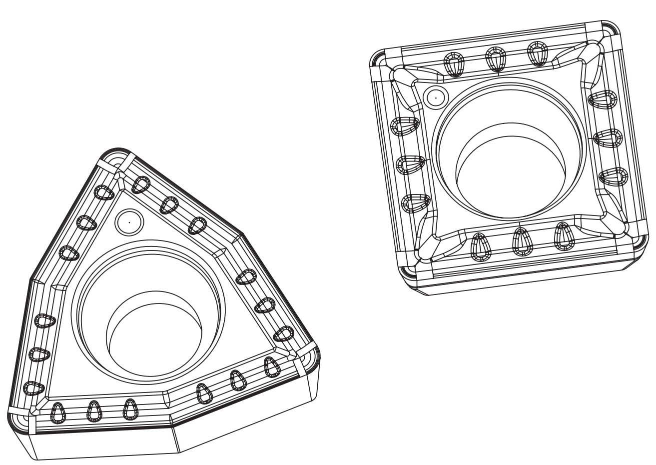
⑦ Corner radius

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



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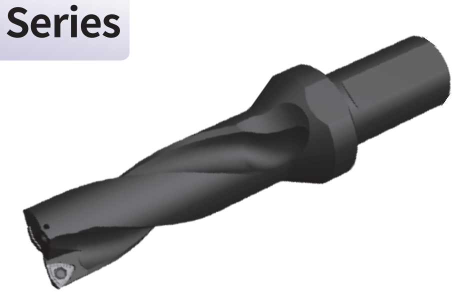
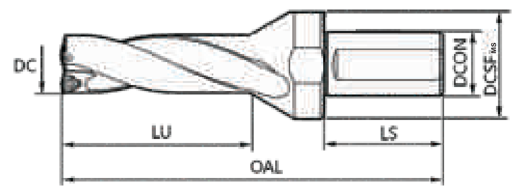
Indexable short hole drilling

HD01 2D Series



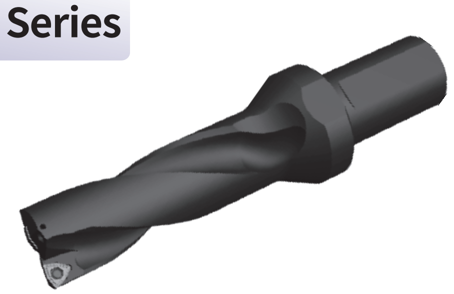


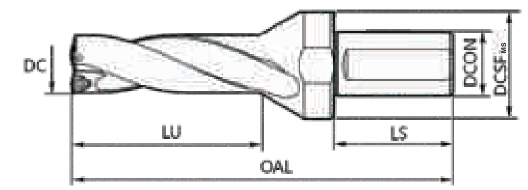
Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	$DCSF_{MS}$	LS	LU	OAL			
HD01-2D-160-S25	●	16	25	32	56	35	106	WCMX030204-DX WCMX030208-DX	M2.5*6.5-60	WR07
HD01-2D-170-S25	○	17	25	32	56	37	108			
HD01-2D-180-S25	○	18	25	32	56	39	116			
HD01-2D-190-S25	○	19	25	32	56	41	119			
HD01-2D-200-S25	●	20	25	32	56	43	121			
HD01-2D-210-S25	○	21	25	45	56	45	125	WCMX040204-DX WCMX040208-DX	M2.5*6.5T-60	WR08
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			
HD01-2D-260-S32	○	26	32	55	60	55	133	WCMX050308-DX	M3.0*7.0-60	WR09
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		
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			
HD01-2D-410-S40	○	41	40	60	70	85	180			
HD01-2D-420-S40	○	42	40	60	70	87	189	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-2D-430-S40	○	43	40	60	70	89	191			

●Running stock ○Make-to-order

Indexable short hole drilling

HD01 2D Series



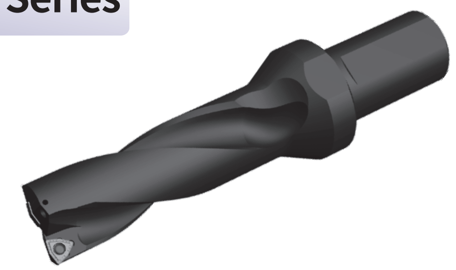


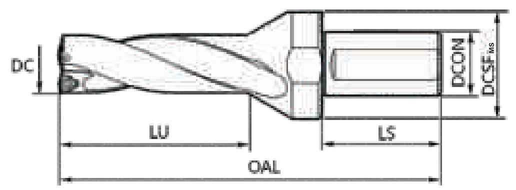
Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	$DCSF_{MS}$	LS	LU	OAL			
HD01-2D-440-S40	○	44	40	60	70	91	193	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-2D-450-S40	○	45	40	60	70	93	195			
HD01-2D-460-S40	○	46	40	60	70	95	197			
HD01-2D-470-S40	○	47	40	60	70	97	199	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

●Running stock ○Make-to-order

Indexable short hole drilling

HD01 3D Series



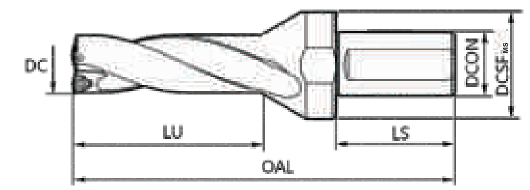


Tool model	Inventory	DC	DCON	DCSF$_{MS}$	LS	LU	OAL	Applicable inserts	Screw	Wrench
		Basic dimension (mm)								
HD01-3D-160-S25	●	16	25	32	56	52	129	WCMX030204-DX WCMX030208-DX	M2.5*6.5-60	WR07
HD01-3D-170-S25	○	17	25	32	56	55	133			
HD01-3D-180-S25	○	18	25	32	56	58	137			
HD01-3D-190-S25	○	19	25	32	56	61	140			
HD01-3D-200-S25	●	20	25	32	56	64	143			
HD01-3D-210-S25	○	21	25	45	56	67	153	WCMX040204-DX WCMX040208-DX	M2.5*6.5T-60	WR08
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			
HD01-3D-260-S32	○	26	32	55	60	83	176	WCMX050308-DX	M3.0*7.0-60	WR09
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		
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			
HD01-3D-410-S40	○	41	40	60	70	128	234			
HD01-3D-420-S40	○	42	40	60	70	131	239	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-3D-430-S40	○	43	40	60	70	134	242			

●Running stock ○Make-to-order

Indexable short hole drilling

HD01 3D Series

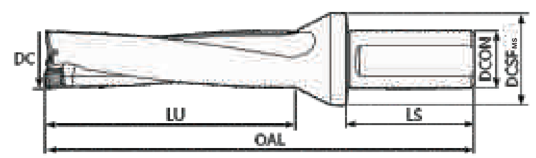


Tool model	Inventory	DC	DCON	DCSF$_{MS}$	LS	LU	OAL	Applicable inserts	Screw	Wrench
		Basic dimension (mm)								
HD01-3D-440-S40	○	44	40	60	70	137	245	WCMX080412-DX	M3.5*10.4-60	WR15
HD01-3D-450-S40	○	45	40	60	70	140	248			
HD01-3D-460-S40	○	46	40	60	70	143	251			
HD01-3D-470-S40	○	47	40	60	70	146	253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

●Running stock ○Make-to-order

Indexable short hole drilling

HD02 2D Series

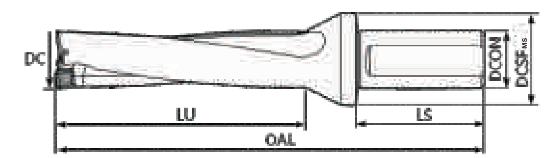


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	$DCSF_{MS}$	LS	LU	OAL			
HD02-2D-160-S20	●	16	20	25	50	35	102	SPMG050204-DX	M2.0*4.3-60	WR06
HD02-2D-170-S20	○	17	20	25	50	37	104	SPMG060204-DX	M2.2*5.5-60	WR07
HD02-2D-180-S25	○	18	25	32	56	39	113			
HD02-2D-190-S25	○	19	25	32	56	41	115			
HD02-2D-200-S25	●	20	25	32	56	43	117			
HD02-2D-210-S25	○	21	25	32	56	45	119			
HD02-2D-220-S25	○	22	25	32	56	47	121	SPMG07T308-DX	M2.5*6.5-60	WR07
HD02-2D-230-S25	○	23	25	32	56	49	123			
HD02-2D-240-S25	○	24	25	32	56	51	125			
HD02-2D-250-S25	●	25	25	32	56	53	127			
HD02-2D-260-S32	○	26	32	32	56	55	129			
HD02-2D-270-S32	○	27	32	32	56	57	131			
HD02-2D-280-S32	○	28	32	37	60	59	139	SPMG090408-DX	M3.5*8.0-60	WR15
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	M4.0*10-60	WR15
HD02-2D-350-S40	○	35	40	47	70	73	168			
HD02-2D-360-S40	○	36	40	47	70	75	170			
HD02-2D-370-S40	○	37	40	47	70	77	172			
HD02-2D-380-S40	○	38	40	47	70	79	174			
HD02-2D-390-S40	○	39	40	47	70	81	176			
HD02-2D-400-S40	●	40	40	47	70	83	178			
HD02-2D-410-S40	○	41	40	47	70	85	180			

●Running stock ○Make-to-order

Indexable short hole drilling

HD02 3D Series

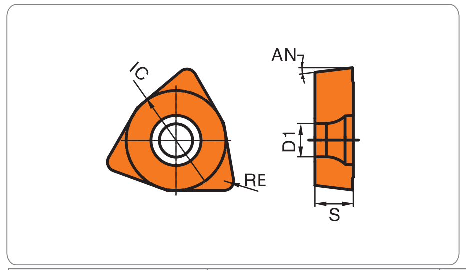


Tool model	Inventory	Basic dimension (mm)						Applicable inserts	Screw	Wrench
		DC	DCON	$DCSF_{MS}$	LS	LU	OAL			
HD02-3D-160-S20	●	16	20	25	50	51	117	SPMG050204DG-DX	M2.0*4.3-60	WR06
HD02-3D-170-S20	○	17	20	25	50	54	120	SPMG060204DG-DX	M2.2*5.5-60	WR07
HD02-3D-180-S25	○	18	25	32	56	57	131			
HD02-3D-190-S25	○	19	25	32	56	60	134			
HD02-3D-200-S25	●	20	25	32	56	63	137			
HD02-3D-210-S25	○	21	25	32	56	66	140			
HD02-3D-220-S25	○	22	25	32	56	69	143	SPMG07T308DG-DX	M2.5*6.5-60	WR07
HD02-3D-230-S25	○	23	25	32	56	72	147			
HD02-3D-240-S25	○	24	25	32	56	75	150			
HD02-3D-250-S25	●	25	25	32	56	78	153			
HD02-3D-260-S32	○	26	32	32	56	81	156			
HD02-3D-270-S32	○	27	32	32	56	84	160			
HD02-3D-280-S32	○	28	32	37	60	87	169	SPMG090408DG-DX	M3.5*8.0-60	WR15
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	M4.0*10.0-60	WR15
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

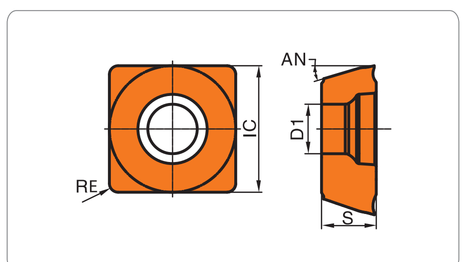


Workpiece material	HR8115	HR8125	HR8225	HR5110	HR5120	HR5130	HR7125	HR7225
P Steel	●	◕	●◕	●	●◕	◕		
M Stainless steel				●	●◕	◕	●◕	●◕
K Cast iron				●	●◕	◕		
N Non-ferrous metal								
S Heat-resistant alloy Titanium alloy								

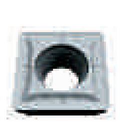
Insert shape	Type	Basic dimension (mm)					CVD			PVD				
		IC	S	RE	D1	AN	HR8115	HR8125	HR8225	HR5110	HR5120	HR5130	HR7125	HR7225
	WCMX030204-DX	5.56	2.38	0.4	2.55	7°	☆				☆	★		
	WCMX030208-DX	5.56	2.38	0.8	2.55	7°	☆				☆	★		
	WCMX040204-DX	6.35	2.38	0.4	2.80	7°	☆				☆	★		
	WCMX040208-DX	6.35	2.38	0.8	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

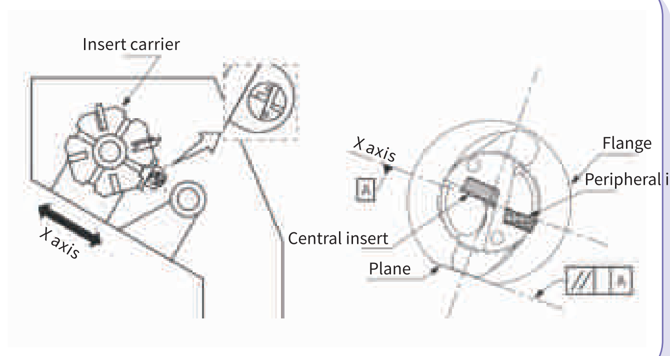
ISO	Workpiece material			Brinell hardness	Cutting speed vc m/min	Feed rate fn (mm/r) Diameter of drill bit (mm) 16-20	20-25	25-30	30-35	35-50
P	Non-alloyed steel	C≤0.10%		125	70-200	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
		0.10<C≤0.25%		125	70-180	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
		0.25<C≤0.55%		150	70-150	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
		0.55<C≤0.80%		170	70-130	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
	High carbon Steel	Carbon tool steel		210	70-130	0.04-0.09	0.07-0.11	0.10-0.21	0.18-0.27	0.25-0.35
	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

Precautions for indexable short hole drilling

1 Precautions for short hole drilling in lathe

I. The peripheral insert is mounted parallel to the X axis of the equipment.

II. The peripheral insert should be mounted towards the operator. With upper and lower turrets on the lathe, if the drill bit needs to be mounted on the lower one, The peripheral insert should face towards the operator.



2 Adjustment method of center height:

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

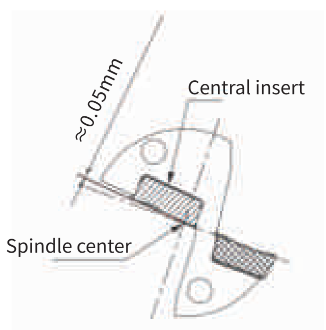


Figure 2
Illustration of center height of the drill bit inner insert

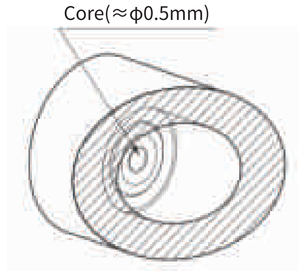


Figure 3
Illustration of core residues in blind hole drilling

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

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

◎The blind holes used for checking is machined by a feed rate below 0.1 mm/rev and a depth of about 10mm.

◎If there is no core residue at all (or it is very small), it is necessary to adjust the center height because the parts around the drill bit center of the inner cutter insert are prone to collapse.

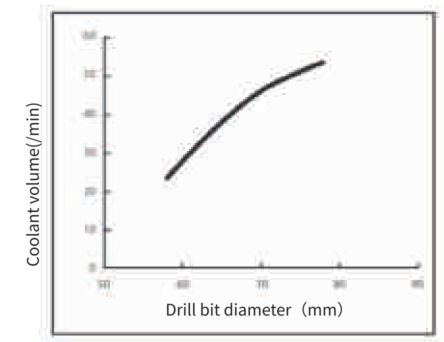
Short hole drilling and recommended countermeasures

1 Countermeasures to drill hole diameter changes

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

2 Can external cooling be used for short hole drilling?

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



Recommended relationship between drill bit diameter and coolant volume

3 Chip entanglement is highly possible in the cutting process.

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

At a low speed + large feed, thicker chips are produced, which are easy to break and control.

At a high speed + small feed, thinner chips are produced, and the chip flow direction could be controlled by centrifugal force.

1-10mm can be processed by segment cutting, which can be followed by continuous machining.

4 There is tool vibration in the cutting process.

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

Increase the feed rate if it is too small.

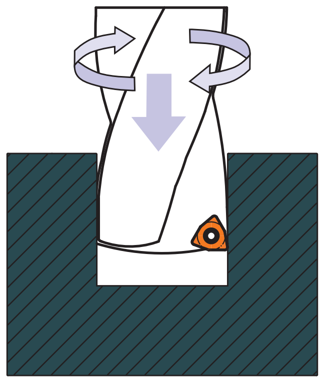
If the feed rate is below f=0.06mm/rev, please increase it to f=0.08-0.12mm/rev.

If the over fast cutting speed causes cutter vibration, decrease to about Vc=100-150m/rev.

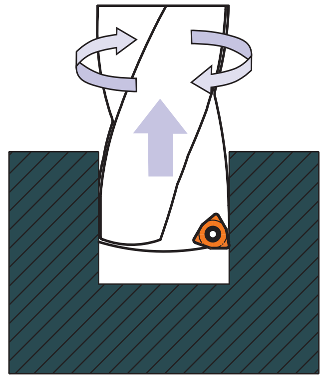
If there are obvious burrs at the drill or the workpiece clamping rigidity is poor, decrease the feed rate to f=0.07-0.08 mm/rev.

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

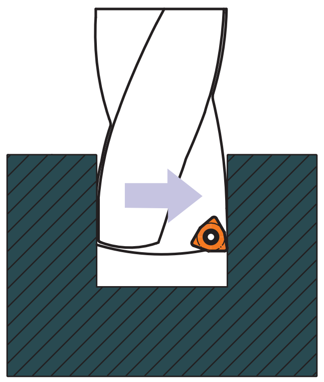
Please change the cutting parameters or optimize the way of returning the insert.



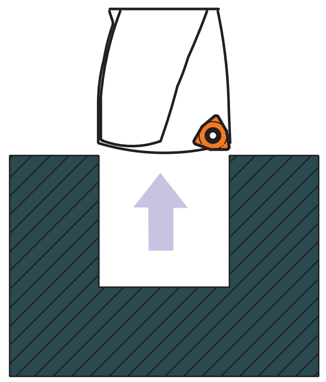
① Rotate to return the insert



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



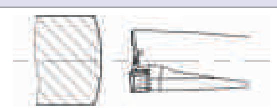
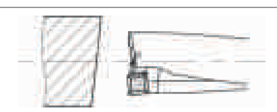
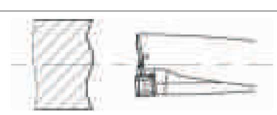
③ Return the insert eccentrically



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.

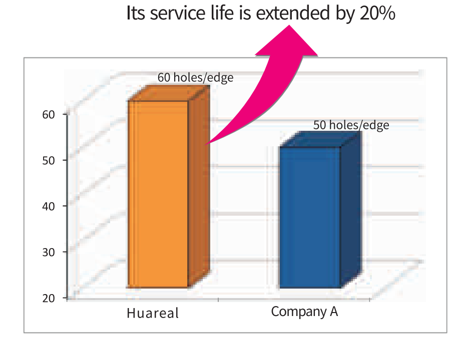
Workpiece surface	Solutions
	The normal feed rate can be adopted for convex surface, because its machining conditions are relatively good, and the drilling core can contact the workpiece first as expected.
	The surface of the drilling part is inclined, so the cutting edge is subjected to uneven load, 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: External cooling drilling
- Insert: WCMX0080412-DX HR5130
- Tool type: HD01-3D-440-S40
- Machining parameters: Vc=76.3m/min，f=0.133mm/r

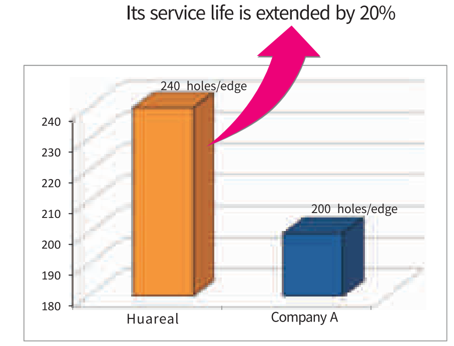
Its service life is extended by 20%



Flange drilling

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

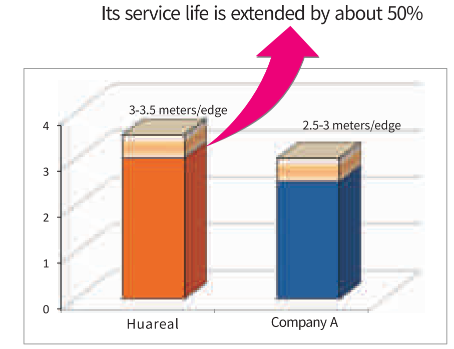
Its service life is extended by 20%



Condenser tube sheet drilling

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

Its service life is extended by about 50%

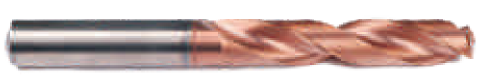


Selection guidance of solid carbide drills

Tool outline drawing

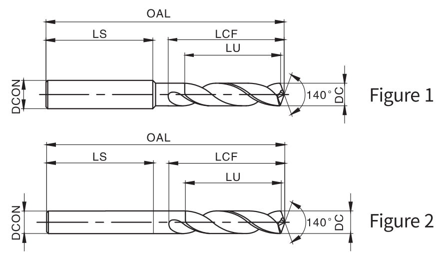
Tool type

BD03 Series



Product specification drawing

Helical angle, coating, insert diameter tolerance, etc.



Order number	Basic dimension (mm) DC	DCON	OAL	LCF	LS	LU	Pattern	Inventory
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

② Length series (length-diameter ratio)	
03	3×D Series
05	5×D Series
08	8×D Series

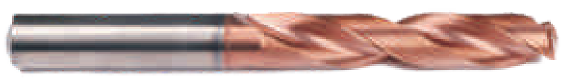
③ Cooling method	
C	Internal cooling
Default	External cooling

④ Shank form	
A	Straight shank (DIN 6535HA)
B	Whistle notch shank (DIN 6535HE)

⑤ Diameter	
0300	3mm
0600	6mm
1000	10mm
1200	12mm
1600	16mm
2000	20mm

Solid carbide drill

BD03 Series



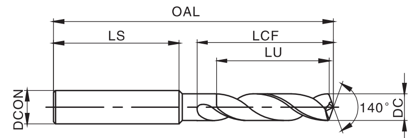


Figure 1

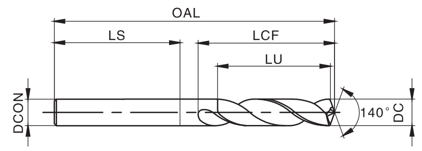


Figure 2

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

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

BD03 Series

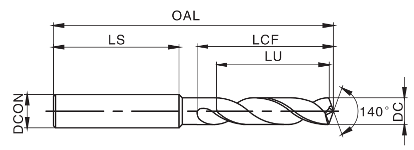


Figure 1

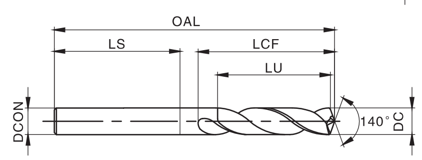


Figure 2

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

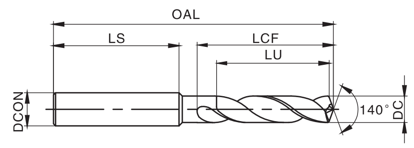


Figure 1

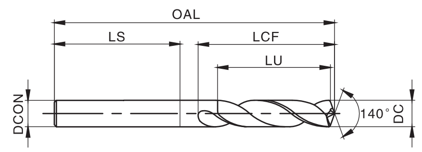


Figure 2

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	●

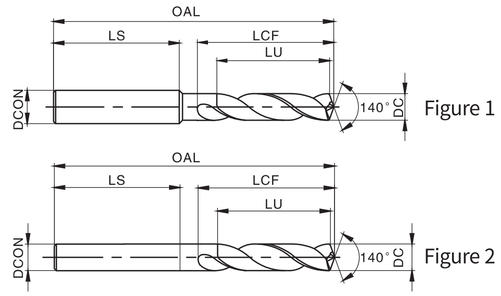
●Running stock ○Make-to-order

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

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

BD03 Series



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

●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

▶ Cutting speed recommendations - BD03 Series

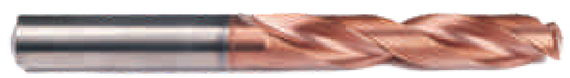
Workpiece material		Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum /min	Optimal /opt	Maximum /max
P	Carbon steel	< 600	< 230	80	90	100
	Alloy steel	< 1200	< 350	60	70	80
	High-alloyed steel and tool steel	< 1400	< 380	50	60	70
M	Austenite and ferrite stainless steel	< 680	<220	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

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

Solid carbide drill

BD03C Series



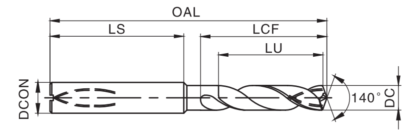


Figure 1

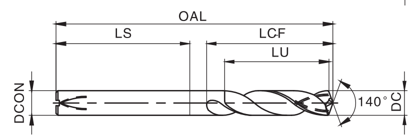


Figure 2

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

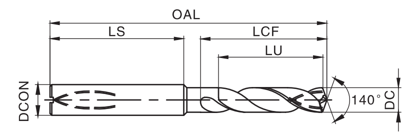


Figure 1

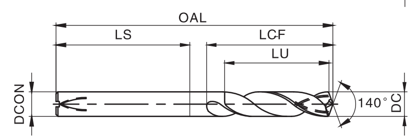


Figure 2

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

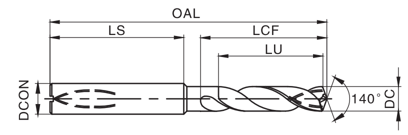


Figure 1

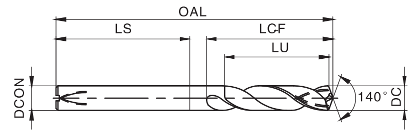


Figure 2

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

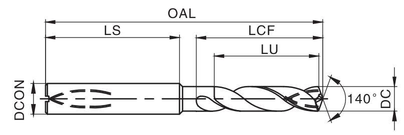


Figure 1

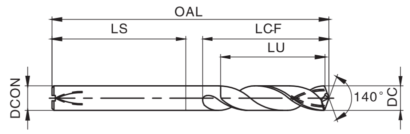


Figure 2

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/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 - BD03C Series

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

Solid carbide drill

BD05 Series

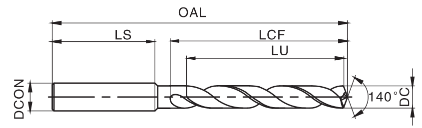


Figure 1

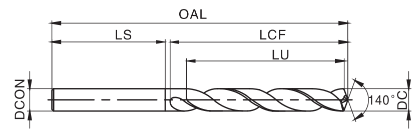


Figure 2

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

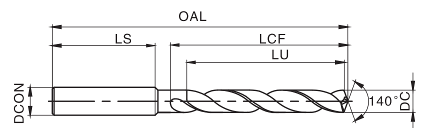


Figure 1

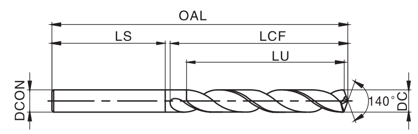


Figure 2

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

●Running stock ○Make-to-order

BD05 Series

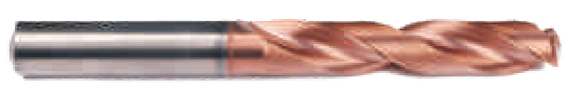
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05A0950	9.50	10.00	103	61	40	45.0	Figure 1	○
BD05A0952	9.52	10.00	103	61	40	45.0	Figure 1	●
BD05A0960	9.60	10.00	103	61	40	44.9	Figure 1	○
BD05A0970	9.70	10.00	103	61	40	44.7	Figure 1	●
BD05A0980	9.80	10.00	103	61	40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

●Running stock ○Make-to-order

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

☀ Fit well ☼ Applicable

BD05 Series



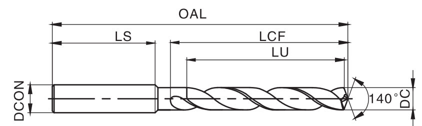


Figure 1

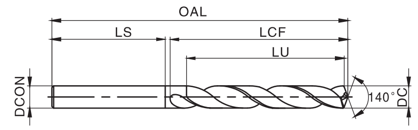


Figure 2

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

HUAREAL

BD05 Series

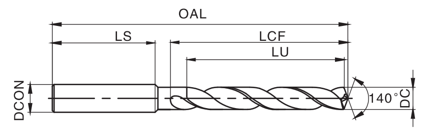


Figure 1

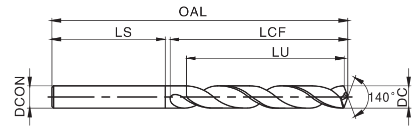


Figure 2

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 - BD05 Series

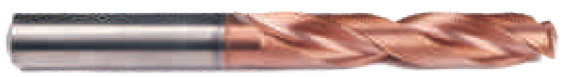
	Workpiece material	Strength (N/mm²)	Hardness (HB/HRC)	Cutting speed (m/min)		
				Minimum /min	Optimal /opt	Maximum /max
P	Carbon steel	< 600	< 230	80	90	100
	Alloy steel	< 1200	< 350	60	70	80
	High-alloyed steel and tool steel	< 1400	< 380	50	60	70
M	Austenite and ferrite stainless steel	< 680	<220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

Recommended feed rate - BD05 Series

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

Solid carbide drill

BD05C Series



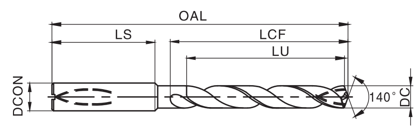


Figure 1

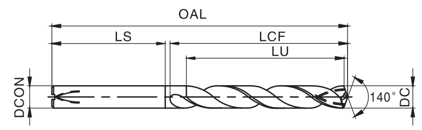


Figure 2

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

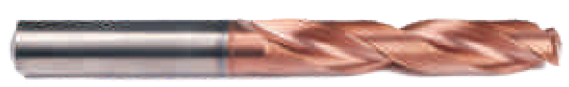
Order number	Basic dimension (mm)						Pattern	Inventory
	DC	DCON	OAL	LCF	LS	LU		
BD05CA0510	5.10	6.00	82	44	36	35.4	Figure 1	●
BD05CA0516	5.16	6.00	82	44	36	35.3	Figure 1	●
BD05CA0520	5.20	6.00	82	44	36	35.3	Figure 1	○
BD05CA0530	5.30	6.00	82	44	36	35.1	Figure 1	●
BD05CA0540	5.40	6.00	82	44	36	34.9	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



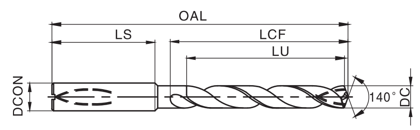


Figure 1

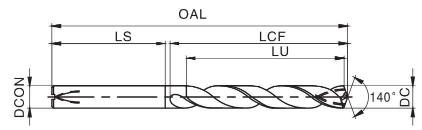


Figure 2

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

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

BD05C Series

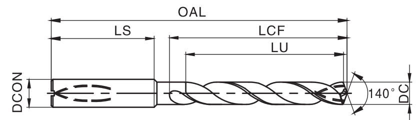


Figure 1

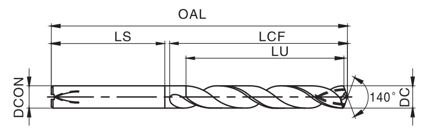
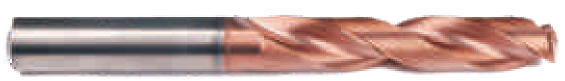


Figure 2



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

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

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

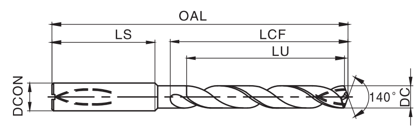


Figure 1

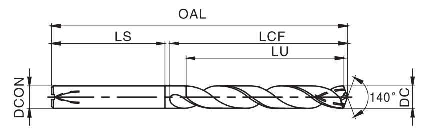


Figure 2

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	-	-	-	-	-	-	-	-	-	-

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

Solid carbide drill

BD08C Series

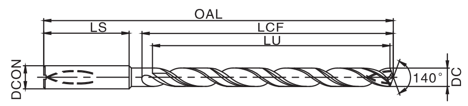


Figure 1

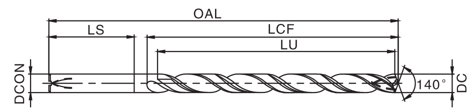


Figure 2

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

HUAREAL

BD08C Series

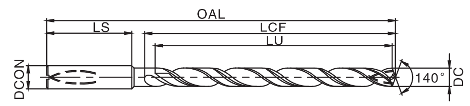


Figure 1

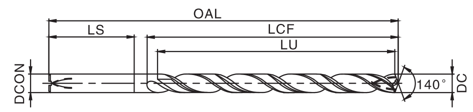


Figure 2

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

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

BD08C Series

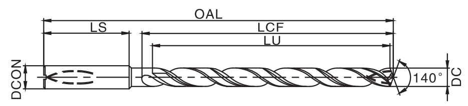


Figure 1

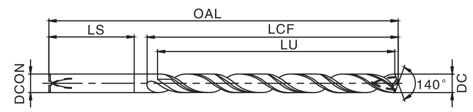


Figure 2

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

Recommended feed rate - BD08C Series

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

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

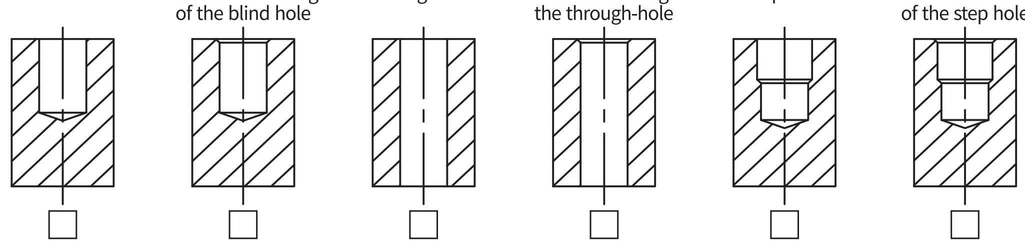
HUAREAL

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

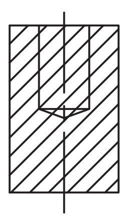
Information of the machined hole

Blind hole	Orifice chamfering of the blind hole	Through-hole	Orifice chamfering of the through-hole	Step hole	Orifice chamfering of the step hole
☐	☐	☐	☐	☐	☐



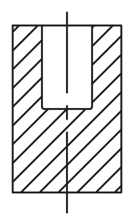
Process condition

☐ Solid drilling



☐ Prepared hole

Size of prepared hole:



Workpiece information

Workpiece material: 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:	

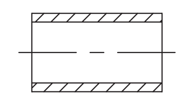
Non-standard customization of solid carbide reamers

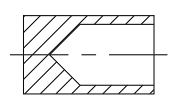
HUAREAL

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	Workpiece information
Shape of machined hole:	☐ Grey cast iron — Grade of machined material:
☐Through-hole ☐Blind hole	☐ Ductile iron — Tensile strength= N/mm²
Size of machined hole (mm):	☐ Aluminum alloy — Hardness (HRC/HB)=
Tolerance of machined hole:	☐ Silicoaluminum Si<10%
Depth of machined hole (mm)	☐ Silicoaluminum Si⩾10%



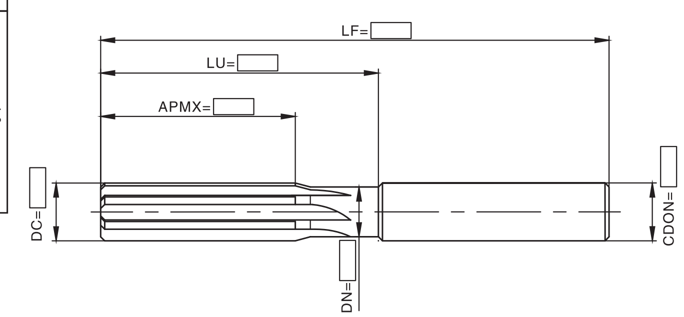


Tool information

Tool rotation direction	Cooling requirements
☐ Dextral rotation	☐ Internal cooling
☐ Straight Fluted	☐ External cooling
☐ Sinistral rotation	

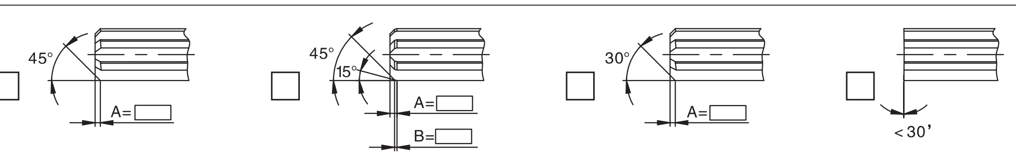
Coating

☐ Yes ☐ No



Cutting edge angle type

☐ ☐ ☐ ☐



Note:

Order quantity:	Piece	Expected delivery date:	MM/	DD/	YYYY
		Date:		Signature:	

Safety standard for carbide

1. Safety responsibility

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

2. Basic features of carbide tools

Carbide tool is a mixture wet grinded by W, Co, Ti, Ta, Nb, Si, 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
P	**Non-alloyed steel**									
	S235JR G2	1.0038	4360 40 C	-	1311	A570.36	E 24-2 Ne	-	-	STKM 12A;C
	S235J2 G3	1.0116	4360 40 B	-	1312	A573-81 65	E 24-U	Fe37-3	-	-
	C15	1.0401	080M15	-	1350	1015	CC12	C15C16	F.111	-
	C22	1.0402	050A20	2C/2D	1450	1020	CC20	C20C21	F.112	-
	C15E	1.1141	080M15	32C	1370	1015	XC12	C16	C15K	S15C
	C25E	1.1158	-	-	-	1025	-	-	-	S25C
	S380N	1.89	4360 55 E	-	2145	A572-60	-	FeE390KG	-	-
	17MnV7	1.087	4360 55 E	-	2142	A572-60	NFA 35–501 E 36	-	-	-
	55Si7	1.0904	250A53	45	2085	9255	55S7	55Si8	56Si7	-
	-	-	-	-	2090	9255	55S7	-	-	-
	C35	1.0501	060A35	-	1550	1035	CC35	C35	F.113	-
	C45	1.0503	080M46	-	1650	1045	CC45	C45	F.114	-
	40Mn4	1.1157	150M36	15	-	1039	35M5	-	-	-
	36MN5	1.1167	-	-	2120	1335	40M5	-	36Mn5	SMn438(H)
	28Mn6	1.117	150M28	14A	-	1330	20M5	C28Mn	-	SCMn1
	C35G	1.1183	060A35	-	1572	1035	XC38TS	C36	-	S35C
	C45E	1.1191	080M46	-	1672	1045	XC42	C45	C45K	S45C
	C53G	1.1213	060A52	-	1674	1050	XC48TS	C53	-	S50C
	C55	1.0535	070M55	-	1655	1055	-	C55	-	-
	C55E	1.1203	070M55	-	-	1055	XC55	C50	C55K	S55C
	S275J2G3	1.0144	4360 43C	-	1412	A573-81	E 28-3	-	-	SM 400A;B;C
	S355J2G3+C2	1.057	4360 50B	-	2132	-	E36-3	Fe52BFN/Fe52CFN	-	SM490A;B;C;YA;YB
	S355J2G3	1.0841	150 M 19	-	2172	5120	20 MC 5	Fe52	F-431	-
	C60E	1.0601	080A62	43D	-	1060	CC55	C60	-	-
	C60E	1.1221	080A62	43D	1678	1060	XC60	C60	-	S58C
	C101E	1.1274	060 A 96	-	1870	1095	XC 100	-	F-5117	-
	C101u	1.1545	BW 1A	-	1880	W 1	Y105	C36KU	F-5118	SK 3
	C105W1	-	BW2	-	2900	W210	Y120	C120KU	F.515	SUP4
	S340 MGC	1.0961	-	-	-	9262	60SC7	60SiCr8	60SiCr8	-
	11SMn30	1.0715	230M07	-	1912	1213	S250	CF9SMn28	11SMn28	SUM22
	11SMnPb30	1.0718	-	-	1914	12L13	S250Pb	CF9SMnPb28	11SMnPb28	SUM22L
	10SPb20	1.0722	-	-	-	-	10PbF2	CF10SPb20	10SPb20	-
	11SMn37	1.0736	240M07	1B	-	1215	S 300	CF9SMn36	12SMn35	-
	11SMnPb37	1.0737	-	-	1926	12L14	S300Pb	CF9SMnPb36	12SMnP35	-
	35S20	1.0726	212M36	8M	1957	1140	35MF4	-	F210G	-
	GC16E	1.1142	030A04	1A	1325	1115	-	-	-	-
	Low-alloyed steel									
	16Mo3	1.5415	1501-240	-	2912	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)

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

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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									
								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

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	-	-	-

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

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

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

- Conversion value approximate to brinell hardness of steel

Brinell hardness 3000kgf HB	Rockwell hardness				Vickers hardness 50kgf HV	Shore hardness HS	Tensile strength (Gpa)
	A Scale 60kgf brale Brale HRA	B Scale 100kgf 1/10in Ball HRB	C Scale 150kgf brale Brale HRC	D Scale 100kgf brale Brale 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

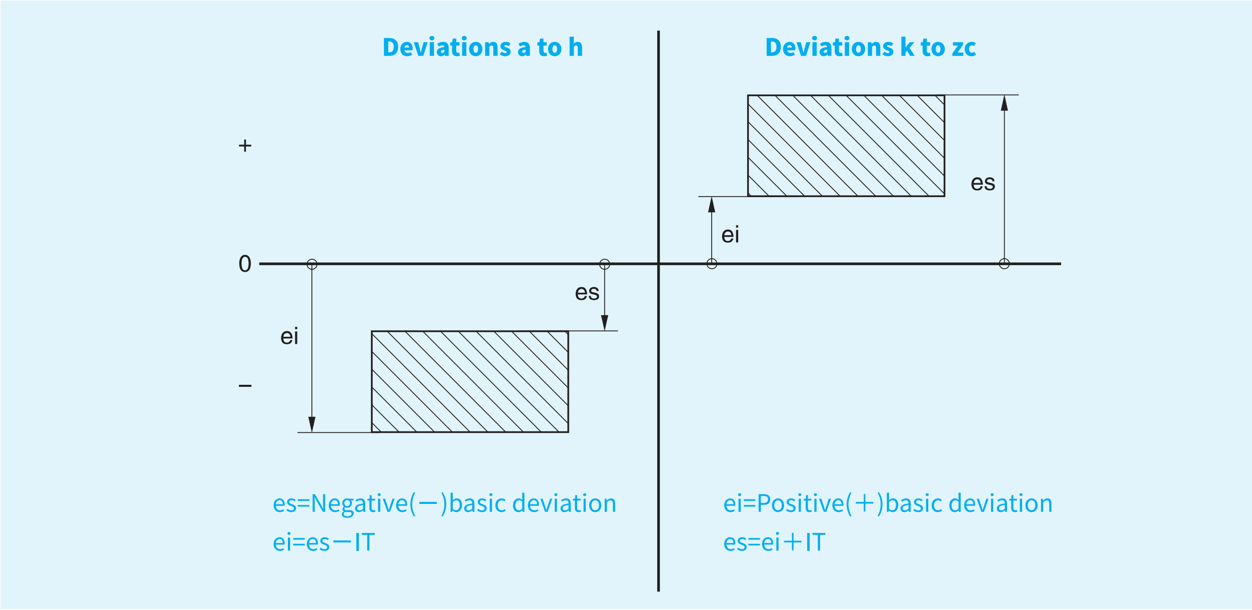
1) Generally value in ( ) is not used in the table.
2) Brales of Rockwell hardness A, C and D are made of diamond.
3) This table is excerpted from the JIS Steel Standard (1980).

Fit dimension tolerance

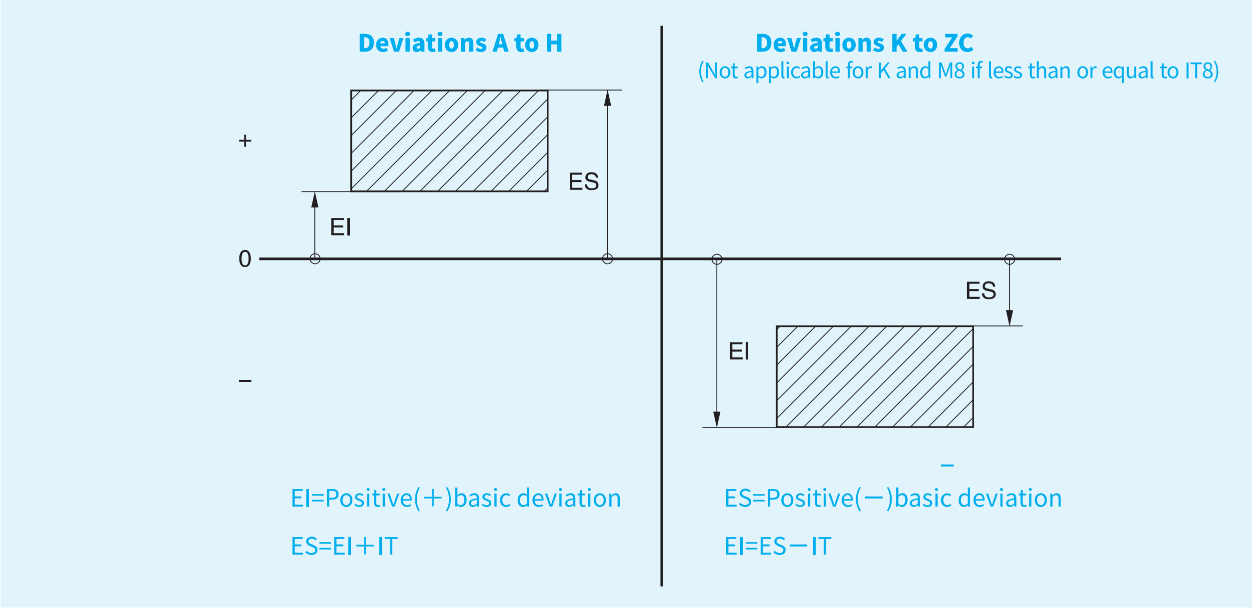
Basic dimension mm		Standard tolerance class																	
		IT1	IT2	IT3	IT4	IT5	IT6	IT7	IT8	IT9	IT10	IT11	IT12	IT13	IT14	IT15	IT16	IT17	IT18
>	To	µm											mm						
---	3	0.8	1.2	2	3	4	6	10	14	25	40	60	0.1	0.14	0.25	0.4	0.6	1	1.4
3	6	1	1.5	2.5	4	5	8	12	18	30	48	75	0.12	0.18	0.3	0.48	0.75	1.2	1.8
6	10	1	1.5	2.5	4	6	9	15	22	36	58	90	0.15	0.22	0.36	0.58	0.9	1.5	2.2
10	18	1.2	2	3	5	8	11	18	27	43	70	110	0.18	0.27	0.43	0.7	1.1	1.8	2.7
18	30	1.5	2.5	4	6	9	13	21	33	52	84	130	0.21	0.33	0.52	0.84	1.3	2.1	3.3
30	50	1.5	2.5	4	7	11	16	25	39	62	100	160	0.25	0.39	0.62	1	1.6	2.5	3.9
50	80	2	3	5	8	13	19	30	46	74	120	190	0.3	0.46	0.74	1.2	1.9	3.	4.6
80	120	2.5	4	6	10	15	22	35	54	87	140	220	0.35	0.54	0.87	1.4	2.2	3.5	5.4
120	180	3.5	5	8	12	18	25	40	63	100	160	250	0.4	0.63	1	1.6	2.5	4	6.3
180	250	4.5	7	10	14	20	29	46	72	115	185	290	0.46	0.72	1.15	1.85	2.9	4.6	7.2
250	315	6	8	12	16	23	32	52	81	130	210	320	0.52	0.81	1.3	2.1	3.2	5.2	8.1
315	400	7	9	13	18	25	36	57	89	140	230	360	0.57	0.89	1.4	2.3	3.6	5.7	8.9
400	500	8	10	15	20	27	40	63	97	155	250	400	0.63	0.97	1.55	2.5	4	6.3	9.7
500	630	9	11	16	22	32	44	70	110	175	280	440	0.7	1.1	1.75	2.8	4.4	7	11
630	800	10	13	18	25	36	50	80	125	200	320	500	0.8	1.25	2	3.2	5	8	12.5
800	1000	11	15	21	28	40	56	90	140	230	360	560	0.9	1.4	2.3	3.6	5.6	9	14
1000	1250	13	18	24	33	47	66	105	165	260	420	660	1.05	1.65	2.6	4.2	6.6	10.5	16.5
1250	1600	15	21	29	39	55	78	125	195	310	500	780	1.25	1.95	3.1	5	7.8	12.5	19.5
1600	2000	18	25	35	46	65	92	150	230	370	600	920	1.5	2.3	3.7	6	9.2	15	23
2000	2500	22	30	41	55	78	110	175	280	440	700	1100	1.75	2.8	4.4	7	11	17.5	28
2500	3150	26	36	50	68	96	135	210	330	540	860	1350	2.1	3.3	5.4	8.6	13.5	21	33

Notice
1. Standard tolerance values from IT1 to IT5 with basic sizes greater than 500mm are on trial.
2. IT4 to IT18 is not applicable if the basic size is less than or equal to 1mm.

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



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



For example:
for a hole with diameter of 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=±[(ITn-1)/2] if the ITn value is odd from js7 to js11 in the tolerance zone.

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							

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

- 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 Δ value can be selected from the right side of the table for K, M, N which is less than or equal to IT8, and P to ZC which is less than or equal to IT7.
For example: K7 in segment 18-30mm: Δ=8 μm, so ES=-2+8=+6 μm
S6 in segment 18-30mm: Δ=4 μm, so ES=-35+4=-31 μm
4) An exceptional circumstance: M5 in segment 250 - 315mm, ES=-9 μm (instead of-11 μm).

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: IOS classification	Classification codes: Groups of materials	HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
PVD turning	P	P10	HR5225 HR7225	GC1025 GC1125	KCS10 KCU10 KC5010	IC807	VP10MF MS6015	AH710	PR930 PR1005 PR1025 PR1115 PR1215 PR1425 PR1225	AC1030U ACZ150 AC5025S AC520U		YBG102
PVD turning	P	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
PVD turning	P	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
PVD turning	P	P40	HR5125 HR7125	GC1025		IC830		AH120 AH725 AH645		AC1030U	TT8020 TT8080 TT9080	
PVD turning	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
PVD turning	M	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
PVD turning	M	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	
PVD turning	M		HR5125 HR7125	GC2035		IC830 IC928	MP7035	AH645		AC6040M AC1030U AC530U	TT8020 TT8080 TT9020 TT9080	

Type	Classification codes: IOS classification	Classification codes: Groups of materials	HUAREAL	SANDVIK	KENNAMETAL	ISCAR	MITSUBISHI	TUNGALOY	KYOCERA	SUMITOMO	TEAGUTEC	ZCC.CT
PVD turning	K	K10		GC3330 GC3220 K20W K20D K20M K15W	KCS10 KCU10 KC5010	IC810		GH110 AH110	PR905 PR1215	AC1030U AC510U ACZ150		
PVD turning	K	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		
PVD turning	K	K30		GC3330 GC3040 K20W GC4240 GC4230		IC830 IC908 IC910 IC928	VP10RT VP20RT VP15TF	AH725 AH7025 AH730 SH725 SH730 GH730 GH330 J740		AC1030U AC530U		
PVD turning	S	S01				IC804 IC806	MP9005 VP05RT	AH8005 AH905			PR005S	YBG102
PVD turning	S	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
PVD turning	S	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
PVD turning	S	S30	HR7225	GC1125		IC3028	MP9025	AH725	PR1535	AC520U		YBG212

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

Comparison table of PVD milling grades

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

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

Comparison table of CVD turning grades

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

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

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

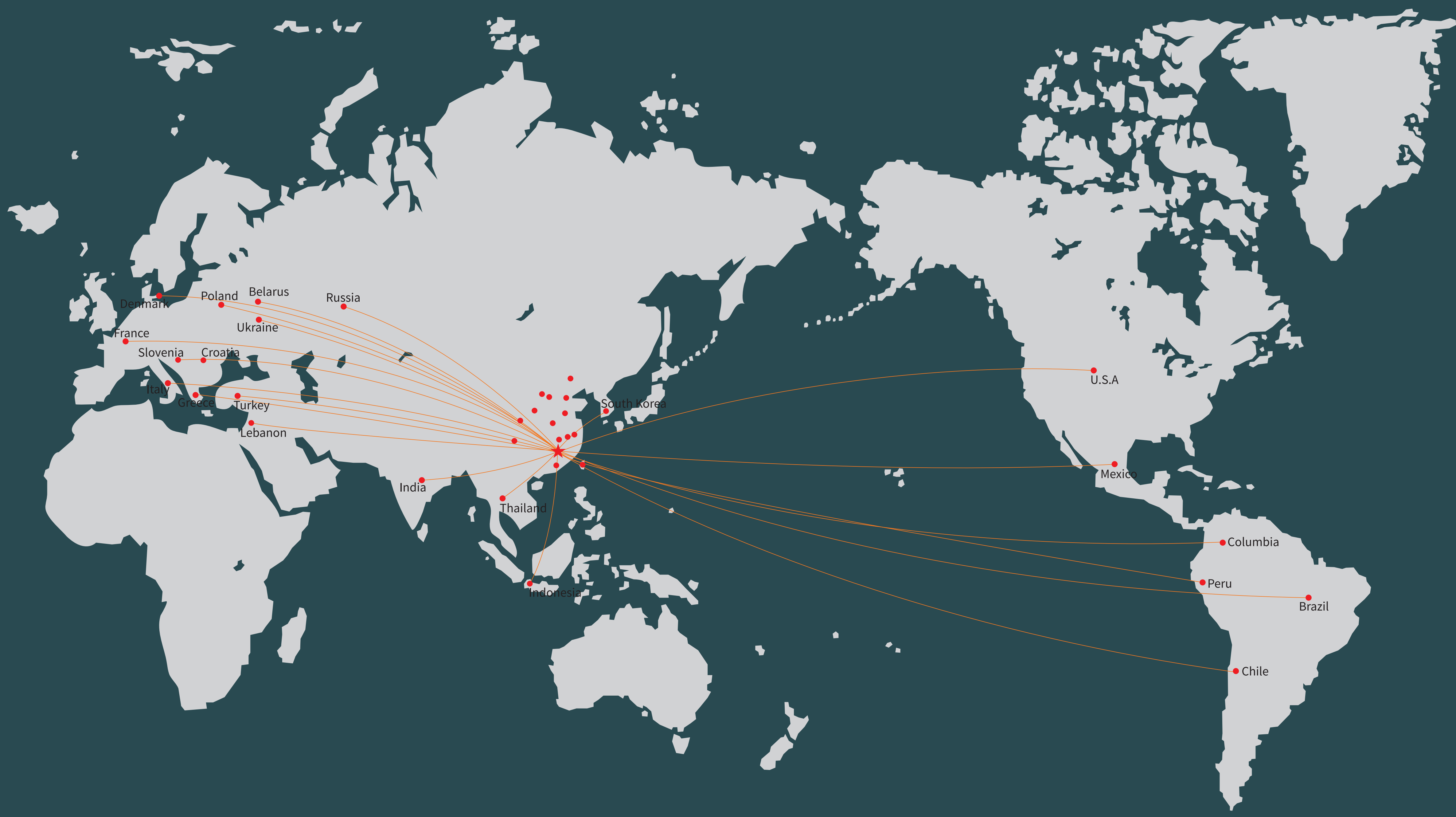
Comparison table of CVD turning grades

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		GC4220 GC4230 GC3040	SC6525 SP6519		F7030 MC7020	T3225		ACP2000 ACP100	TT7515	YBC301 YBC251
		P30	HR8140	GC4230 GC3040 GC2040 M30B	MP91M SC6525 KCPK30 X500		F7030 MC7020	T3130 T3225		ACP2000 ACP100	TT7800	YBM351
		P40	HR8140	GC4240 GC4230 GC3040 GC2040 M30B	KCPK30 X500						TT7800	YBC302
	M	M10								ACM200		
		M20		GC2040 GC4230	SC6525		F7030 MC7020	T3225	CA6535	ACM200		YBM251 YBM253
		M30		GC2040 GC4230 GC4240 M30B S40T	SC6525 X500	IC5820	F7030 MC7020	T3225 T3130		ACM200	TT7800	YBM302
		M40		GC2040 M30B S40T GC4240	X500					ACM200	TT7800	
	K	K10			SC3025 KCK15	IC5100	MC5020	T1215 T1115		ACK2000 ACK100 ACK200	TT7515	YBD151
		K20		GC3220 K20W	KCK15 SC3025 MP91M	IC5100 DT7150 IC4010 IC4050 IC4100	MC5020	T1215	CA420M	ACK200 ACK200	TT7515	YBD252
		K30	HR8140	GC3040	MP91M KCPK30 SC6525							YBD252

Comparison table of cermet grades

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

HUAREAL 华锐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