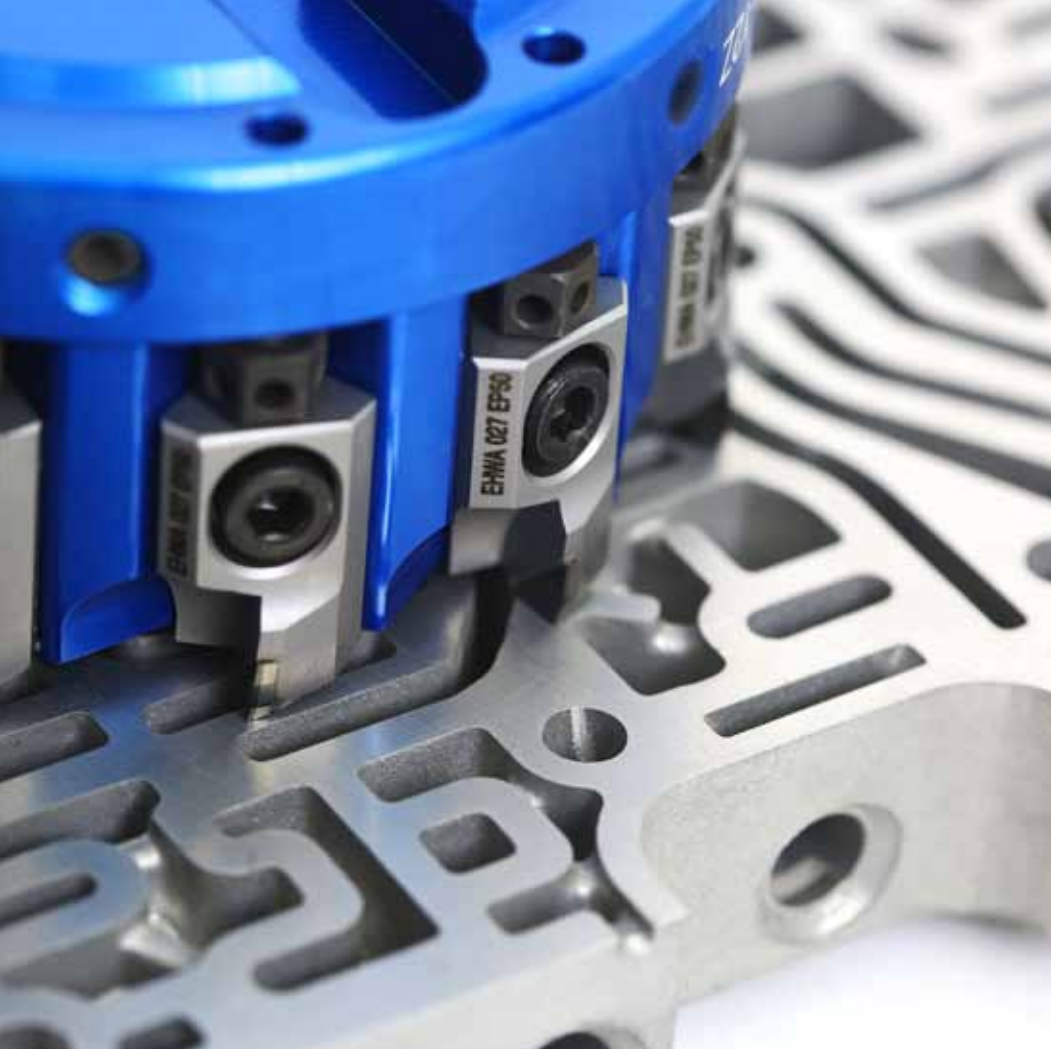
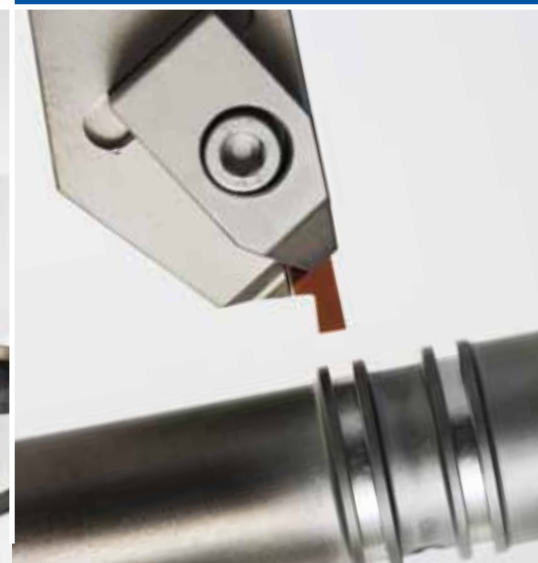
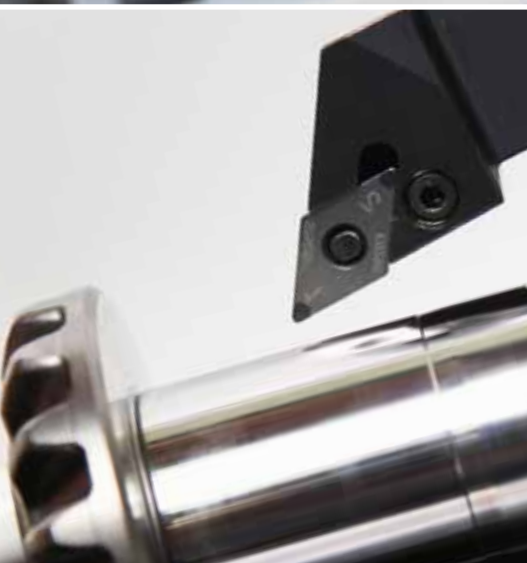




INNOVATOR IN
TECHNOLOGY



PCD | PCBN | CVD • MONO DIAMOND

CUTTING TOOLS

EHWA



- 1975. Founded in Seoul, Korea
- 1981. Established subsidiary in California, USA
- 1985. Headquarters moved to Osan, Korea
- 1993. ISO9001 certified (TÜV)
 - Established plant in Fujian, China
- 1995. Opened sales office in Nagoya, Japan
- 1997. Established plant in Weihai, China
- 2002. Established plant in Shanghai, China
 - Acquired revised ISO 9001 and ISO 14001
- 2003. OSA (Organization for the Safety of Abrasives) certified
- 2004. Opened sales office in Frankfurt, Germany
- 2005. Selected as "Certified excellent company of quality competitiveness" by the Korean government
- 2008. Awarded \$100M export Presidential award
- 2011. Selected as "World class 300 company" by the Korean government (First round)
- 2012. Established plant in Jakarta, Indonesia
- 2013. Opened new facility in Dongtan (R&D center and new business development)
 - Opened sales subsidiary in India
- 2015. Opened sales subsidiary in Mexico
- 2016. Certified KOSHA 18001 (Safety and Health Management System)
- 2017. Designated as a Compliance Program Trader (Ministry of Trade, Industry and Energy)



TÜV





Worldwide competence -

The most advanced technology for diamond tools and quality

EHWA has become an international benchmark for success because of our ability to adapt quickly to the changing markets and diverse needs of customers, and by leading the way in applying the most advanced technology for manufacturing industrial diamond tools.

Since 1975, EHWA has been able to greatly expand its market share throughout the world because we have established a world renowned reputation of high quality products, service and expertise in the industry. EHWA is deeply committed to keeping customers up-to-date and equipped with the most competitive products and technical information. Our success can only be measured by the success of our customers.

The key to our flexibility and strength in the global marketplace is our many alliances with reliable overseas partners and customers throughout the world. EHWA purchases only the highest quality raw materials, industrial diamonds and CBN from reputable sources. In addition to having strong supply lines with major suppliers, EHWA has successfully teamed up with high-tech manufacturers in Europe, Japan, and U.S. under several joint-ventures for the research and development of high precision diamond tools, rotary dressers, and precision electroplated diamond tools.

The success of a company depends on its ability to adapt and compete in the global marketplace. EHWA is able to survive in the age of globalization because we are already globalized.

EHWA diamond tools are your partner for success.



EHWA = Cooperation

'E(二)' means Two Parties: EHWA and People such as customers, employees, partners and our society. 'HWA(和)' means Cooperation. Our philosophy is to nurture and grow long-term partnerships with our customers. Ever since 1975 when EHWA was established, EHWA has been striving to develop into the very best in our industry not only in size but more importantly in quality. We are convinced that we are the best partner for you.

Contents

Tooling improvement service	6
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New products

New PCBN material(HBN solid)	8
New PCBN material(EBC190)	10
CF milling cutter	11

Tool materials

Advantages of diamond tools	12
EHWA PCD	14
EHWA PCBN	16
EHWA CVD/ SCD	18
EHWA coating service	20
EHWA 3D chip breaker	21

Turning

PCD/ CVD	32
PCBN	52
Holder	67

Boring

Boring tool	98
Holder	100

Grooving/ parting

Grooving/ parting tool	122
Holder	135

Milling

PCD	152
PCBN	161
Cutter body_aluminum	164
Cutter body_steel	174

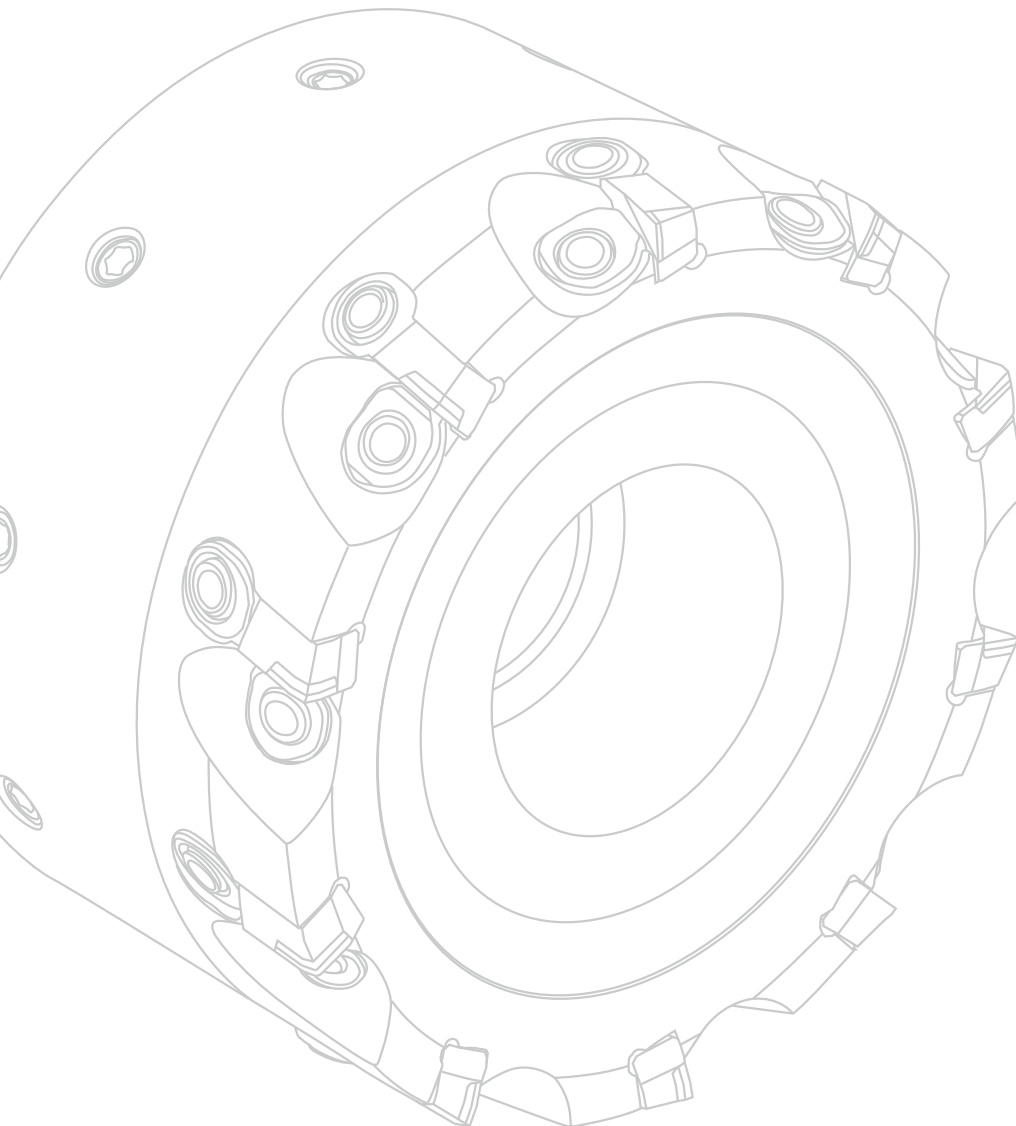
Rotating

Endmill	180
Reamer	186
Drill	191
Cutter	195

Wearless

Applications

Technical information



Tooling Improvement Service



Bottlenecks in production causes multiple problems. They not only reduce productivity, but also increases cycle time and decreases tool life. Customers can easily solve bottlenecks with EHWA tooling improvement service.

improvement



Current production

- Bottle neck
- Cycle time
- Shortened tool life
- Inefficient tool setting
- High C.P.U.
- High defect rate



Process Analysis / Propose solution

- Bottle neck
- Simulate the process with 3D program and check suitability
- Change the current process
- Change PCD/PCBN raw materials
- Propose cost saving solution

Evaluate the process suitability (OK/NG)



Sample test

- Internal test
- Field test

Apply the tool on mass production

Review the tool with its application and working conditions

Item	Check point
Workpiece	Workpiece material, hardness, roughness
Tool information	Specification, tool material
Operation	Application, tool layout
Working condition	Wet/dry, cutting speed(Vc), feed rate, depth of cut

Current tool analysis

Tool shape and edge analysis



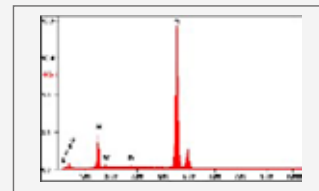
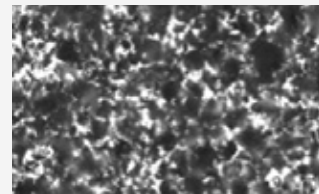
- Check the tool shape
- Measure the dimensions
- Analyze the edge preparation

Wear analysis



- Analyze the wear pattern
 - Analyze the wear location
 - Analyze the wear amount
 - Analyze the chip size and crack
- With optical microscope

Raw material analysis



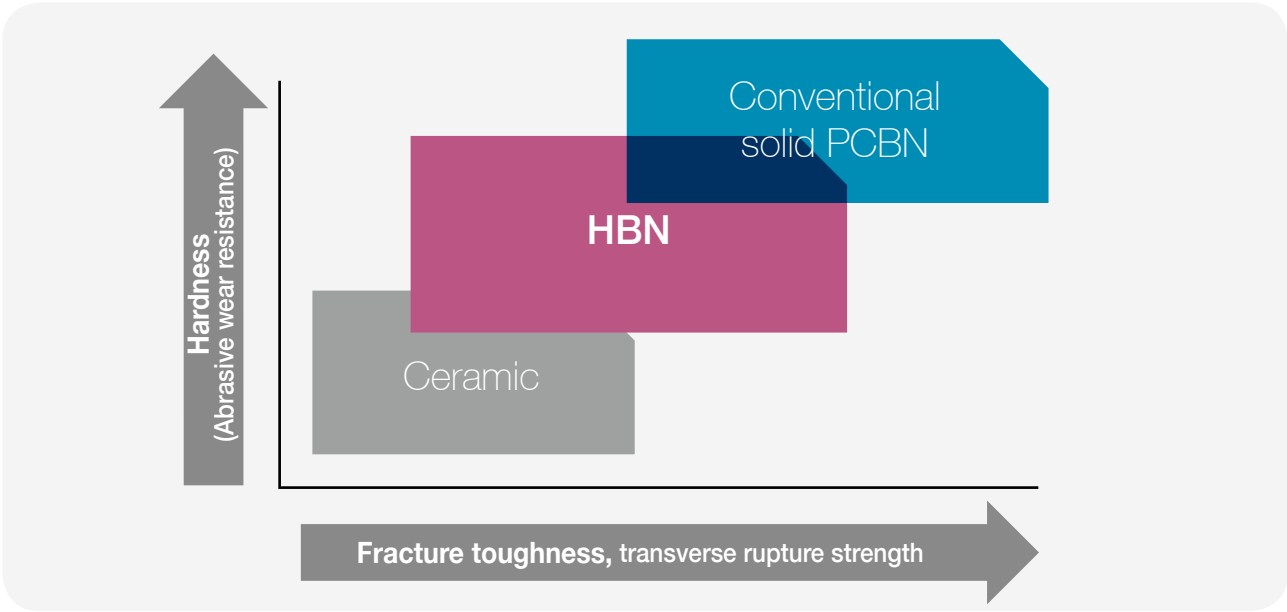
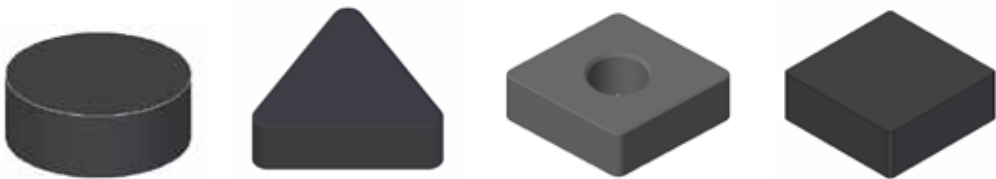
- SEM1 : Grit array analysis
- EDAX2 : Component analysis

Propose technical solutions

EHWA new PCBN material

HBN | Hybrid solid PCBN

HBN is an EHWA hybrid PCBN manufactured by using a special sintering process with a ceramic binder and CBN powder. It's much more competitive than conventional PCBN and it has stronger outstanding wear-resistance & toughness compared to ceramics. Therefore, it's a good solution for both roughing and finishing of cast iron.



Nonferrous material	Conventional solid PCBN	HBN	Ceramic
Chemical resistance	□ □	□ □	□ □ □
Were resistance	□ □ □ □ □	□ □ □ □	□
Impact resistance	□ □ □	□ □ □	□

C type	D type	T type	S type	R type
				
CNGN0903(32)	DNGN1104(33)	TNGN1103(22)	SNGN0903(32)	RNGN0603(22)
CNGN0904(33)	DNGN1504(43)	TNGN1104(23)	SNGN0904(33)	RNGN0904(33)
CNGN1204(43)		TNGN1604(33)	SNGN1204(43)	RNGN1204(43)
CNGN1207(45)		TNGN2204(43)	SNGN1207(45)	RNGN1207(45)

* Special inserts with various shapes are available for turning and milling applications.

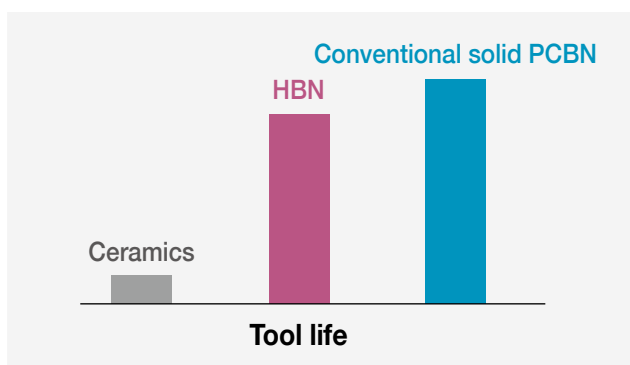
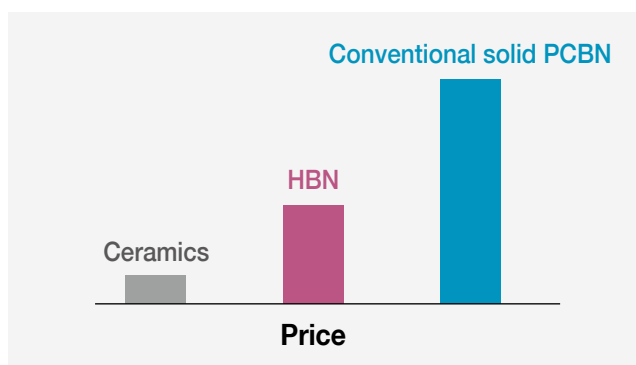


Applications

Brake disk, brake drum, cast iron engine block, impeller, slurry pumps, rolling mill iron rolls



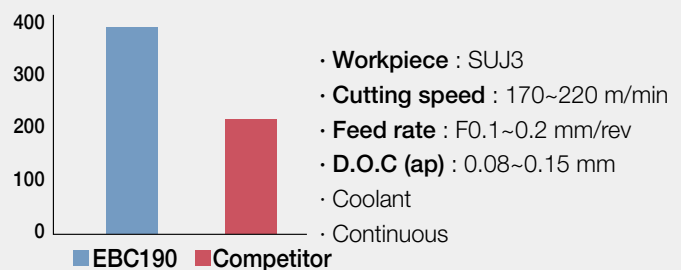
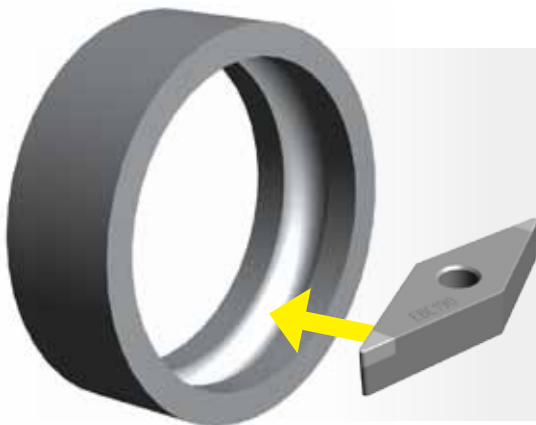
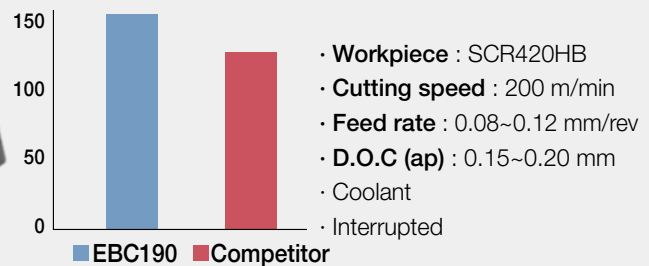
Performance comparison



EHWA new PCBN material

EBC190 | new coated grade for hardened steel

EBC190 is a new PCBN grade which has high toughness and wear resistance. This coated grade performs well in bearing steel and hardened steel applications. EBC190 also performs well in both continuous and interrupted cutting applications.

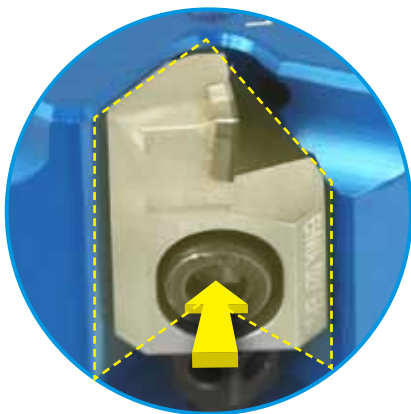


EHWA new milling cutter

CF milling cutter | chip flow cutter

EHWA original design for better chip flow

- Direct coolant spray to the tip edge
- Good chip flowing
- Longer tool life by strong mounting stability
- Good surface finish
- Easy to handle due to the light aluminum body
- Excellent durability and low cutting load
- High productivity and process stability
(more cutting edge → high feed → cycle time reduction)



Strong mounting stability



Direct coolant spray

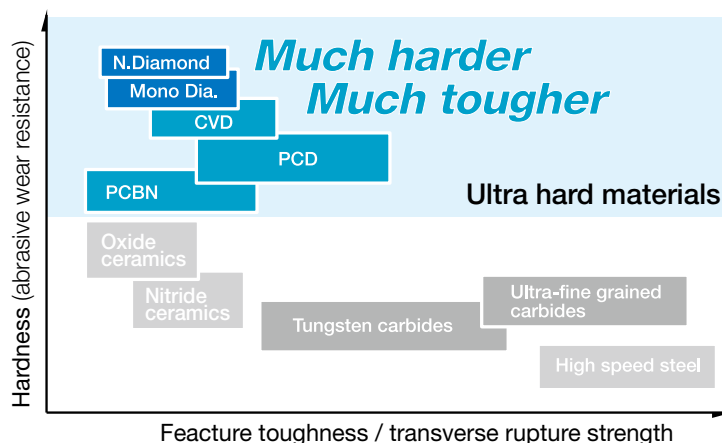


Advantages of diamond tools



Today's modern industrial society continues to push the development and uses of new and advanced materials, and high precision machining to new heights. Along with the improvements in producing processes and difficulties that arise from machining new and advanced materials, there is an increasing demand for new forms of cutting tools that go beyond the conventional cutting tools such as those made out of high speed steel, tungsten carbides, cermets, and ceramics.

Polycrystalline Diamond (PCD), is a synthetic diamond product that is produced by sintering selected diamond particles with a metal matrix using very sophisticated temperature and high pressure technology.



Characteristics of diamond types

	PCD	PCBN	CVD diamond	Mono diamond natural diamond
Definition	Polycrystalline diamond	Polycrystalline cubic boron nitride	Polycrystalline diamond (chemical vapor deposition method)	Single crystal diamond
Applicable work material	Non-ferrous such as Al, copper alloys, etc. & nonmetallic such as wood working, advanced composite, etc.	Ferrous material such as cast iron, hardened steel, super alloy material, etc.	Non-ferrous such as Al, copper alloys, etc. & nonmetallic such as wood working, advanced composite, etc.	Superior edge quality for nonmetallic material
Hardness (Hv, GPa)	50 ~ 70	30 ~ 40	70 ~ 80	80 ~ 100
Magnified structure				

PCD by its nature, is high in uniform hardness, and also more abrasive and shock resistant in all directions than natural diamonds because of its random-oriented structure of the diamond particles.

Polycrystalline cubic boron nitride (PCBN) is an artificially synthesized material. except for diamond, PCBN is the hardest material. however, unlike diamond, PCBN is stable under conditions of high temperature (up to 1000°C), normally seen when machining hardened ferrous or super alloy materials. PCBN tools permit metal cutting with feed and speed rates that are much higher than conventional cutting tools.

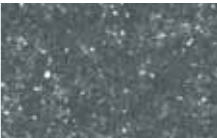
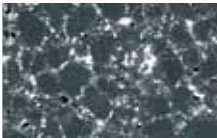
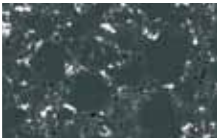
Diamond tools advantage

- Good surface finish
 - High accuracy
 - Longer tool life
- Lower stock management
- Fast material removal rate
 - Lower energy cost
 - Eco friendly



Poly Crystalline Diamond

PCD distinction & application

Grit size	Ultra Fine	Fine	Medium	Coarse	Multi modal
Micro structure (1000 x)					
Type	Carbide backed	Carbide backed	Carbide backed	Carbide backed	Carbide backed
Grain size	0.5 μm	3~4 μm	8~10 μm	20~25 μm	30+2 μm
Diamond (%)	85	90	90	94	94
Grade	EP20	EP51	EP55	EP58	EP29
Surface finish	Better	➡➡	➡➡➡	➡➡➡➡	➡➡➡➡➡
Wear resistance	Worse	➡➡	➡➡➡	➡➡➡➡	➡➡➡➡➡
Application	Wood working				
	Copper alloy				
	Rubber / Acryl_glass				
	(Si <13%) Al-Si alloy (Si >13%)				
	Tungsten carbide				
	Ceramic (sintered/unsintered)				
	M.M.C / CFRP / glass fiber				
	General purpose				

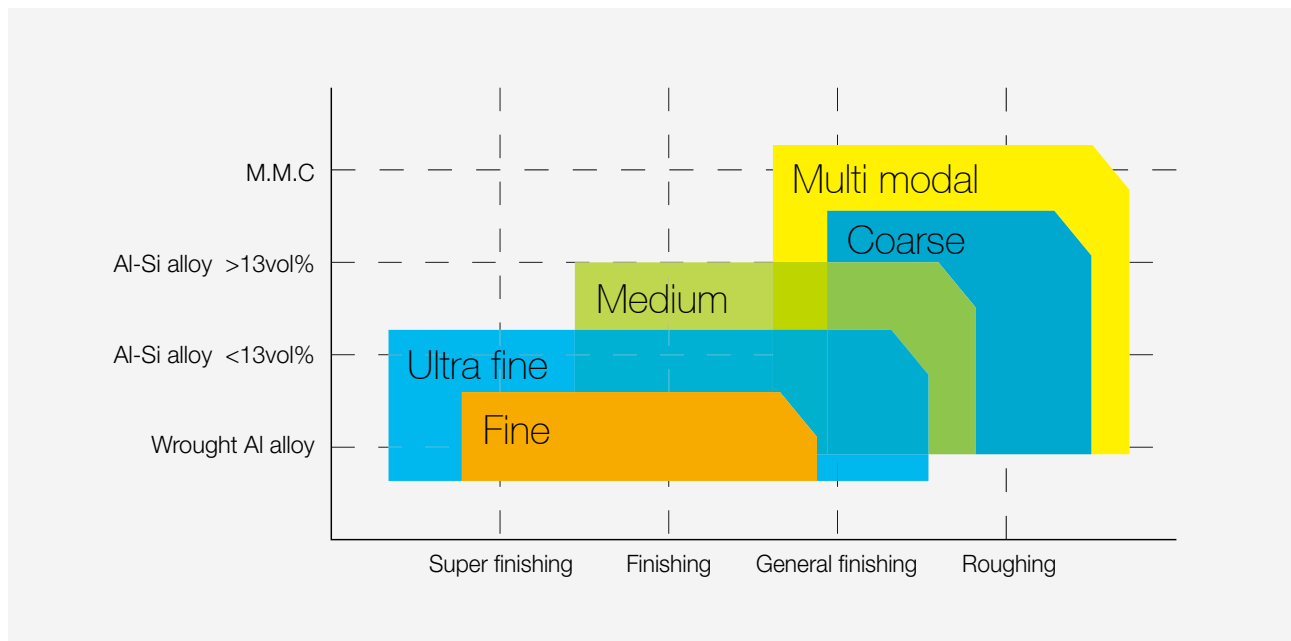
EHWA PCD grade

Grade	Binder	Diamond vol. (%)	Grit size (μm)	Characteristic
EP10	W+Co	85	1.5	Excellent sharp edge, superb sharpness cutting edge
EP20	W+Co	85	0.5	Excellent surface finish, ultra fine grade and fine grade
EP51	W+Co	90	3~4	Excellent surface finish
EP13	W+Co	92	5~6	General purpose, excellent WEDM
EP55	W+Co	90	8~10	General purpose
EP75	W+Co	90	6~8	General purpose, excellent WEDM
EP750	W+Co	90	8+2	Multi-modal, good wear resistance
EP58	W+Co	94	20~25	Excellent wear resistance
EP59	W+Co	95	25+2	Multi-modal, good wear resistance
EP29	W+Co	94	30+2	Multi-modal, good wear resistance, adequate for difficult-to-cut-materials
EP69	W+Co	95	50+ α	Multi-modal, good wear resistance, adequate for difficult-to-cut-materials

EHWA PCD working parameter

Materials	Ultra fine	Fine	Medium	Coarse	Multi modal	Vc (m/min)	f (mm/rev)	ap (μm)
Al alloy (Si <13%)	EP10, EP20		EP13, EP55, EP75			~ 3,000	~ 0.2	~ 3
Al alloy (Si >13%)			EP750	EP58	EP29, EP59, EP69	~ 3,000	~ 0.2	~ 3
Copper alloy	EP10, EP20	EP51	EP13			~ 1,000	~ 0.2	~ 3
Carbide / ceramic			EP55, EP75, EP750	EP58	EP29, EP59, EP69	10~30	~ 0.2	~ 0.5
Engineering plastic	EP10, EP20		EP13, EP55, EP75		EP29, EP59, EP69	~ 1,000	~ 0.4	~ 2
Wood		EP51	EP55, EP75, EP750			~ 4,000	~ 0.4	-
Ti alloy	EP20					50~100	~ 0.3	~ 0.5

Application severity by PCD grade



Applicable work material

Nonferrous material		Nonmetallic material	
Al alloy	High Si >13% / low-medium Si <13% / metal matrix composites	Wood working	High density fiberboard / chipboard / hardboard / laminates
Copper alloy	Brass / bronze / zinc	Advanced composite	Graphite-epoxy / carbon fiber / fiberglass plastic / engineering plastic
Tungsten carbide	Sintered / unsintered	Ceramic & stone	Sintered / unsintered / granite / imitation marble
Ti alloy		Quartz	

Polycrystalline Cubic Boron Nitride

Characteristic of PCBN

Contents	CBN vol. (%)	Grit size (μm)	Binder phase	Strength & toughness	Thermal conductivity	Chemical stability	Wear resistance
Low contents	40~70	0.5~5	Ceramics (TIC, TIN...)	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
High contents	70~95	10~20	Metal (Co, WC...)	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■

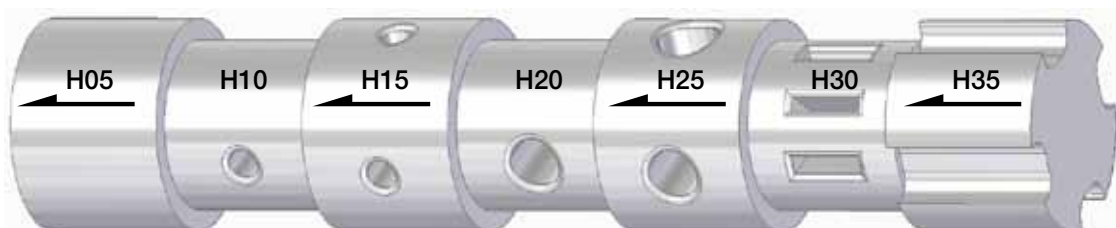
EHWA PCBN grade

 Carbide backed
  Solid tip

	Grade	CBN vol%	Type	Application
Low contents	EB19X	40%	Carbide Backed	H05 (high speed machining)
	EB29X(EB29S)		Carbide Backed, Solid	H05 (high speed machining)
	EB28X(EB28S)		Carbide Backed, Solid	H05 (standard)
	EB180		Carbide Backed	H05~H15
	EB570(EB57S)	70%	Carbide Backed, Solid	H05~H15, bearing steel
	EB160		Carbide Backed, Solid	H05~H15, bearing steel
	EB560(EB56S)		Carbide Backed, Solid	H05~H20
	EB550(EB55S)		Carbide Backed, Solid	H15~H25
	EB150	95%	Carbide Backed	H15~H25
	EB190		Carbide Backed	H05~H30
	EB73		Carbide Backed	H25~H35
	EB54X		Solid	H25~H35
	EB170	95%	Carbide Backed	P/M Valve seat
	EB14		Carbide Backed	P/M Valve seat
High contents	EB130	75%	Carbide Backed	Powder metal(low alloyed)
	EB710		Carbide Backed	Chilled iron, p/m(low alloyed)
	EB120		Carbide Backed	Ductile cast iron, chilled iron
	EB22		Carbide Backed	Chilled iron, p/m(low alloyed)
	EB11	95%	Carbide Backed	Cast iron(Standard), heavy interrupt
	EB51		Carbide Backed	Cast iron(Standard)
	EB71		Carbide Backed & Double side	Cast iron(Standard)
	EB210		Carbide Backed	Cast iron(high interrupt)
	EB71X	95%	Carbide Backed	Chilled iron, p/m(low alloyed)
	EB100X		Solid	White iron, cast iron heavy milling
	EB50		Solid	Grey Cast iron(rough)
	EB1000		Solid	Grey Cast iron (rough & finish)
	HBN	95%	Solid	Grey Cast iron(Standard)
	HBN-T		Solid	Grey Cast iron(rough)
	HBN-W		Solid	Grey Cast iron(rough)
	HBN-N		Solid	Grey Cast iron(rough)
	HBN-R		Solid	Grey cast iron(iron roll)

Interruption of hard steel turning

H05 : Continuous / H15 : Light Interruption / H25 : Medium Interruption / H35 : Heavy Interruption



EHWA PCBN working parameter

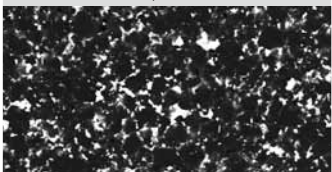
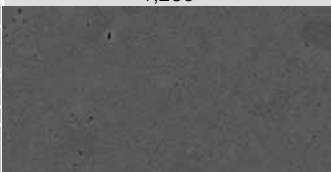
	Continuous cutting	Interrupt cutting			Working parameter		
		Light	Medium	Heavy	Vc (m/min)	f (mm/rev)	ap (mm)
H Hardened steel	EB19X, EB29X(S)				150~300	0.05~0.15	0.05~0.15
	EB28X(S)				120~280	0.05~0.2	0.05~0.2
	EB180, EB570(S)				100~230	0.05~0.15	0.05~0.2
	EB160, EB560(S)				80~200	0.05~0.2	0.05~0.2
	EB550(S), EB150				80~180	0.05~0.2	0.05~0.3
	EB190				70~170	0.05~0.2	0.05~0.3
	EB54X, EB73				70~120	0.05~0.15	0.05~0.2
	EB51, EB210				50~100	0.05~0.15	0.05~0.2
	EB51, EB71				300~1000	0.1~0.5	0.1~2
	EB210, EB71X				300~1500	0.05~0.3	0.1~2
K Cast iron	EB50, EB1000				150~1500	0.1~0.5	0.1~4
	EB100X				150~1000	0.1~0.3	0.1~4
	HBN-W, HBN-T				300~1000	0.1~0.5	0.1~4
	HBN, HBN-N				300~1000	0.1~0.5	0.1~4
P/M High alloyed	EB28X(S)				100~250	0.05~0.2	0.05~0.2
	EB170, EB14				100~200	0.05~0.2	0.05~0.2
P/M Low alloyed	EB550(S)				50~150	0.05~0.25	0.05~0.2
	EB51, EB71				50~150	0.05~0.3	0.05~0.2
	EB710, EB130, EB22				50~150	0.05~0.3	0.05~0.2
	EB120, EB71X				50~150	0.05~0.3	0.05~0.2

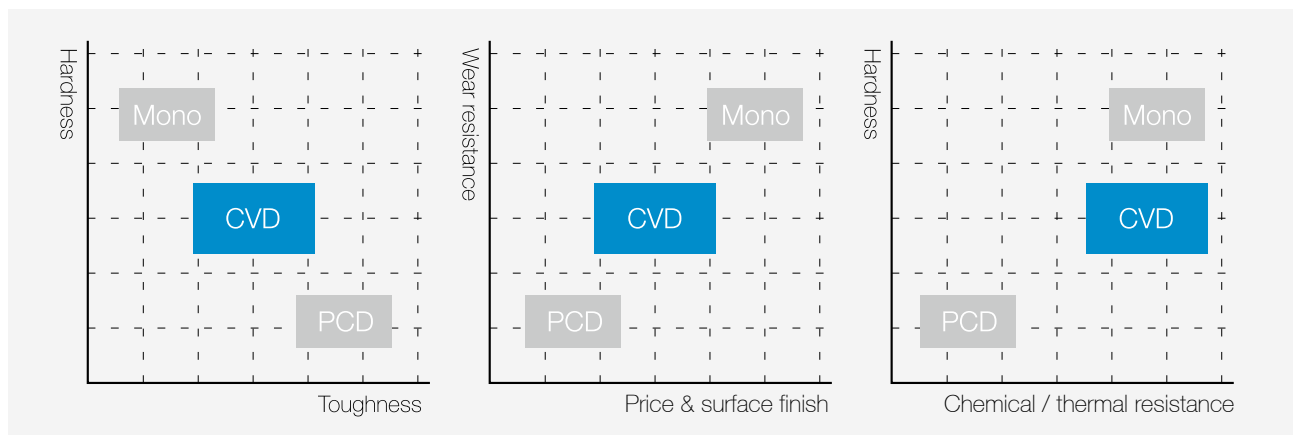
EHWA PCBN working parameter

Low CBN contents	High CBN contents
Hardened steel Tool steel / die steel / hardened steel / Bearing steel / Hi-Cr, Mo steel Work example Gear / transmission / shaft / bearing / die / punch	Cast iron Gray cast iron / Ni-hard cast iron / Alloy cast iron / Chilled cast iron / Nodular cast iron Work example Engine block / brake disc / brake drum / clutch plate / roll / pump / Impeller
Powder metal Sintered metal Work example Valve seat / valve guide / con-rod / oil-pump / gear	Super alloy Inconel 718,901,600 / rene76,77,95 / stellite Work example Turbine / turbine disc / turbine blade / turbine vane

Chemical Vapoured Deposition diamond

General properties of CVD diamond

Property	PCD	CVD (Poly crystalline diamond)	Mono (Single crystalline diamond)
Thermal conductivity	560	560	2,000
Hardness (Gpa)	50~70	70~80	80~100
Toughness (Mpa-m ^{1/2})	8~9	8~9	3~4
Tensile strength (Gpa)	1,260	1,260	2,000
Micro structure (1000 x)			



EHWA CVD diamond grade

Grade	ED501	ED502
Wear resistance	■■■□	■■■■
Toughness	■■■□	■■□□

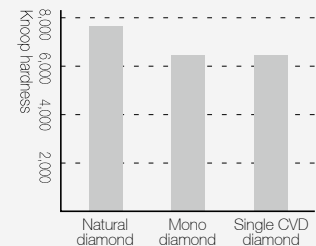
Applicable work material

Nonferrous material	Nonmetallic material
Al alloy High Si >13% / low-medium Si <13% / metal matrix composites	Wood working High density fiberboard / Chipboard / Hardboard / Laminates
Copper alloy Brass / bronze / zinc	Advanced composite Graphite-epoxy / Carbon-fiber / Fiberglass plastic / Engineering plastic
Tungsten carbide Sintered / unsintered	Ceramic & Stone Sintered / Unsintered / Granite / Imitation marble
	Quartz

Single Crystalline Diamond

Application

- Non-ferrous metal
- Acrylic
- Lens
- Microscopic pattern
- FPD (flat panel display)
- BLU (back light unit)



Natural diamond

- Excellent surface finish
- Colorless
- Longest tool life, excellent wear
- Highest thermal conductivity/resistance



Mono diamond

- Available alternative to natural diamond
- Yellow color
- High pressure, High temperature synthesis
- Enhanced and more consistent performance



Single CVD diamond

- Similar to natural diamond
- Colorless
- Superior edge quality for ultra precision machining applications
- Highly consistent material properties

Coating Type

Coating grade (Ehwa code)	Color	Hardeness (Hv)	Temperature (°C)	Characteristic
TIN	Gold	2,300	600	Mono layer Traditionally used for wear part Easily identify used edge
TA	Purple grey	3,400	900	Good heat resistance Good wear resistance Traditionally used for cutting tool
AC	Silver grey	3,200	1,100	Better heat resistance Higher hot hardness Higher oxidation resistance
EL	Dark grey	3,500	1,000	Better wear resistance Better chemical resistance Good performer for hardened steel & bearing steel
NEW TNP	Light dark grey	3,500	1,000	Excellent wear resistance Excellent heat resistance Very good surface finish Best performer for hardened steel & bearing steel

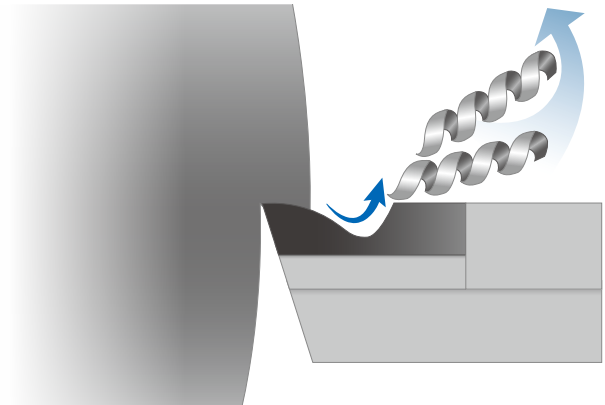
Application Area

EHWA coating	Cast iron	Hardened steel (HRC45~)	Bearing steel	Powder metal (45HRC~)
TIN	TIN			
TA		TA		
AC		AC		AC
EL			EL	
TNP		TNP		

PCD/CVD Chip breaker

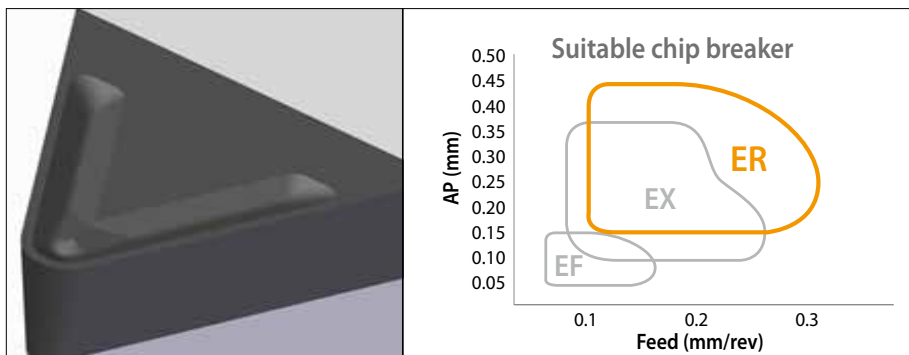
EHWA's 3D chip breaker

- Easy to control long chips
- Smooth and stable cutting at low & high feed rates
- Easy chip control for a variety of cutting conditions
- Various chip breaker design for CCGW, DCGW, VBGW, TCGW etc.



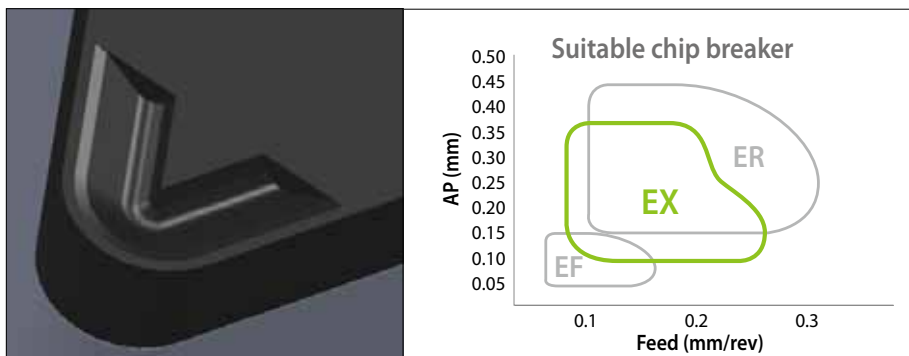
Various PCD chip breaker | ER, EX, EF, ES

ER type



- Excellent chip control for heavy depth of cut
- Perfect chip control by specially designed chip breaker

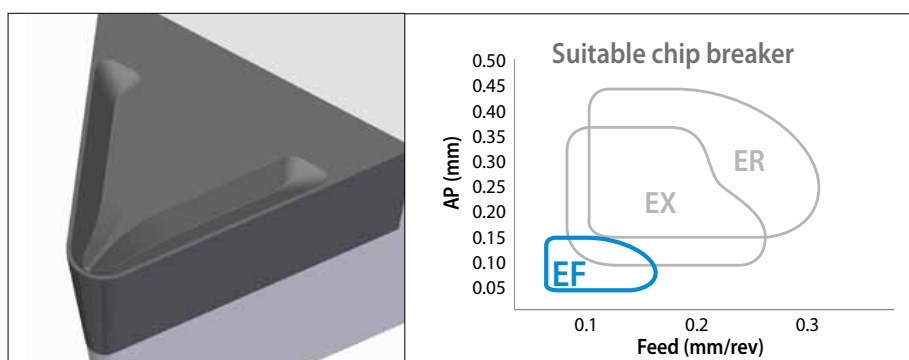
EX type



- Excellent chip control for medium depth of cut
- Special design enhancing cutting edge
- Outstanding chip-resistance at roughing & semi finishing

PCD/CVD Chip breaker

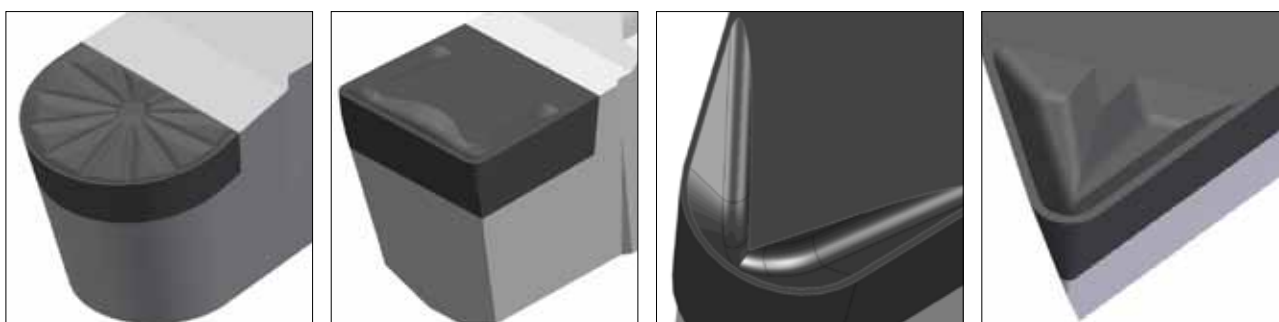
EF type



- Excellent chip control for smaller depths of cut
- Standard design for finishing

ES type

Customized design



Needed information for ES design

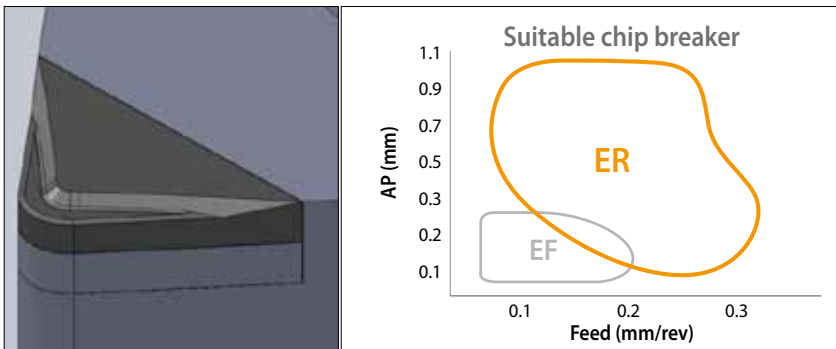
Tool/work piece information		Cutting condition	
Tool spec	VCGW160408	Cutting speed (m/min)	1,800
Holder spec	SWCN2525-16	RPM (rev/min)	2,500
Part name	Aluminium wheel	Feed (mm/rev)	0.15
Workpiece material	ADC12	Depth of cut (mm)	0.3

PCBN

Chip breaker

Various PCBN chip breaker | ER, EF, ES

ER type



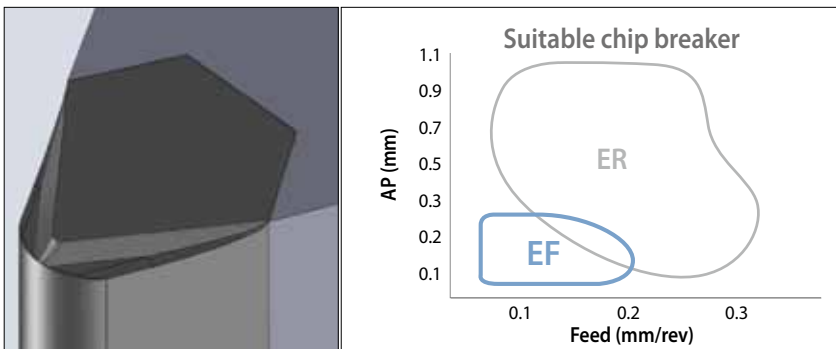
- Excellent chip control for heavy depth of cut
- Special design enhancing cutting edge
- Round corner easily curling chip

ES type

Customized design



EF type



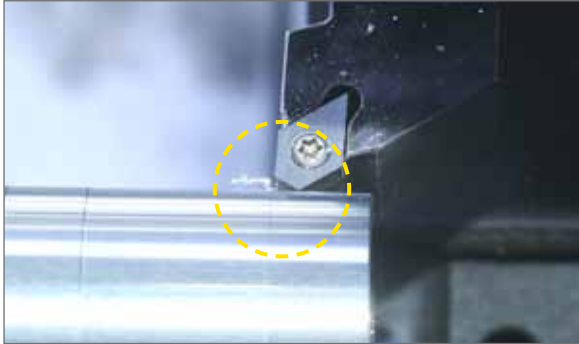
- Excellent chip control for small depth of cut
- Standard design for finishing

Needed information for ES design

Tool/work piece information		Cutting condition	
Tool spec	CNGA120408	Cutting speed (m/min)	850
Holder spec	DCLN R/L3232	RPM (rev/min)	1,000
Part name	Brake disk	Feed (mm/rev)	0.3
Workpiece material	FC250	Depth of cut (mm)	0.4

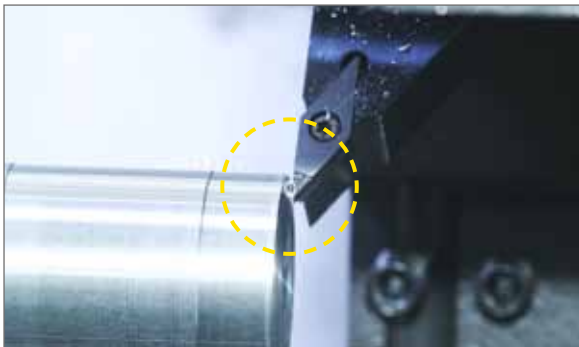
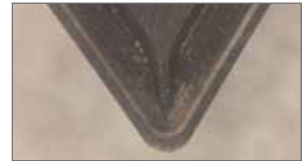
PCD/CVD

Case history



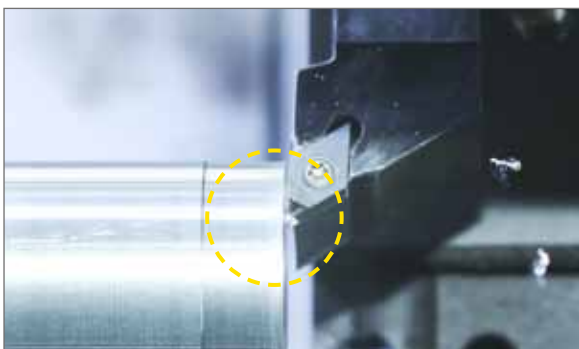
DCGW11T308_ER

- Work : Al alloy
- Vc : ≈ 500 m/min
- D.O.C : 0.5 mm
- Feed : 0.15 mm/rev



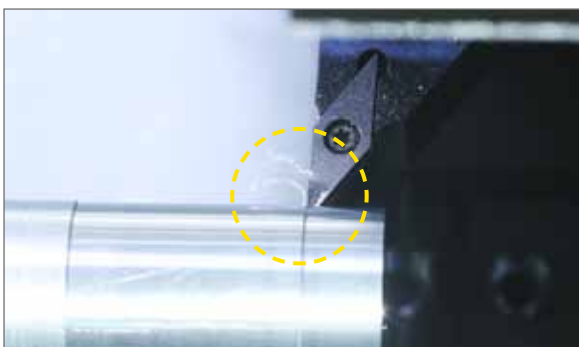
VCGW110302_EF

- Work : Al alloy
- Vc : ≈ 500 m/min
- D.O.C : 0.1 mm
- Feed : 0.1 mm/rev



DCGW11T304_EX

- Work : AL2000 series
- Vc : ≈ 800 m/min
- D.O.C : 0.1 mm
- Feed : 0.5 mm/rev



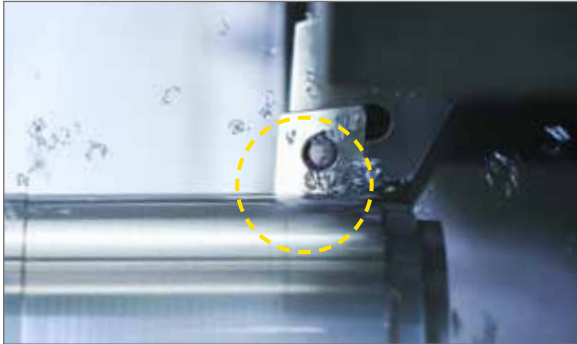
VBGW160408_ES

- Work : AL2024
- Vc : ≈ 1500 m/min
- D.O.C : 0.2 mm
- Feed : 0.3 mm/rev



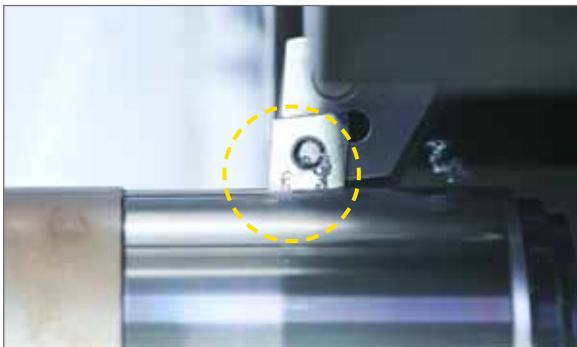
PCBN

Case history



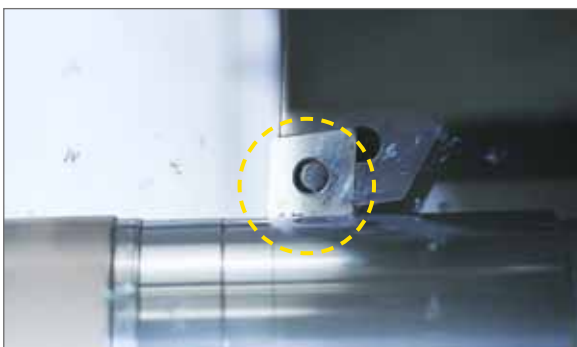
CNGA120408_ER

- Work : SCM420 steel
- Vc : $\approx 150 \sim 250$ m/min
- D.O.C : 0.05~1.10 mm
- Feed : 0.1~0.3 mm/rev



CNGA120408_EF

- Work : SCM420 steel
- Vc : $\approx 150 \sim 250$ m/min
- D.O.C : 0.05~0.25 mm
- Feed : 0.1~0.3 mm/rev



CNGA120408_ES

- Work : Automotive T/M part
- Vc : ≈ 500 m/min
- D.O.C : 0.6~0.75 mm
- Feed : 0.1~0.15 mm/rev



WNGA080408_ES

- Work : Ti alloy
- Vc : ≈ 100 m/min
- D.O.C : 0.25 mm
- Feed : 0.1 mm/rev



Turning





EHWA offers a wide range of PCD & PCBN inserts for turning.
Customers looking for high productivity can count on EHWA's turning tools.
Here is the right choice for an excellent and economical solution.

- Maximum metal removal & higher productivity
- Stronger wear resistance & longer tool life
- Superior surface finish
- Precise tolerance control



Designation system | unit: metric



Insert shape Clearance angle Tolerances Clamp type

Symbol	Shape
C	
D	
E	
K	
R	
S	
T	
V	
W	

Symbol	Angle
N	0°
A	3°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°

Class	I.C size (mm)	m (mm)	Tolerance t (mm)	I.C (mm)
A	6.35	±0.005	±0.025	±0.025
F	9.525	±0.005	±0.025	±0.013
C	12.7	±0.013	±0.025	±0.025
H	15.875	±0.013	±0.025	±0.013
E	19.05	±0.025	±0.025	±0.025
G	25.4	±0.025	±0.13	±0.025
	31.75	±0.08	±0.13	±0.05
	9.525	±0.08	±0.13	±0.05
M	12.7	±0.13	±0.13	±0.08
	15.875	±0.15	±0.13	±0.1
	19.05	±0.15	±0.13	±0.1
	25.4	±0.18	±0.13	±0.13
	31.75	±0.18	±0.13	±0.13
	6.36	±0.13	±0.13	±0.08
	9.525	±0.13	±0.13	±0.08
U	12.7	±0.2	±0.13	±0.13
	15.875	±0.27	±0.13	±0.13
	19.05	±0.27	±0.13	±0.18
	25.4	±0.38	±0.13	±0.25
	31.75	±0.38	±0.13	±0.25

Symbol	Shape
A	
G	
M	
R	
B, W	
T, H	
N	
Z, X	Special

12

04

08

T2501

(R)

1

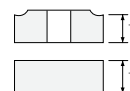
2

Cutting edge length

Thickness

Corner radius

									I.C size (mm)
03	04			03	06				3.97
05	06			05	09	09	03		5.56
06	07			06	11	11	04		6.35
08	09			07	13	13	05		7.94
			08						8
09	11		09	09	16	16	06	16	9.525
			10						10
			12						12
12	15	13	12.7	12	22	22	08		12.7
16	19		15	15	27	27	10		15.875
			16						16
19	23		19	19	33	33	13		19.05
			20						20
			25						25
25	31		25	25	44				25.4
			32						32



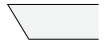
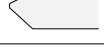
Symbol	t (mm)
01	1.59
T1	1.98
02	2.38
T2	2.78
03	3.18
T3	3.97
04	4.76
05	5.56
06	6.35
07	7.94
09	9.52



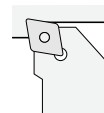
Symbol	R (mm)
01	0.1
02	0.2
04	0.4
05	0.5
08	0.8
12	1.2
16	1.6
20	2
24	2.4
32	3.2

1 Edge shape

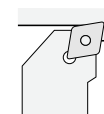
2 Hand of insert

Symbol	Shape
F	
E	
T	
S	

R Right hand



L Left hand



Designation system | unit: inch



Insert shape Clearance angle Tolerances Clamp type

Symbol	Shape
C	
D	
E	
K	
R	
S	
T	
V	
W	

Symbol	Angle
N	0°
A	3°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°

Class	I.C size	Tolerance		
		m (inch)	t (inch)	I.C (inch)
A	2	±0.002	±0.001	±0.001
	3	±0.002	±0.001	±0.0005
	4	±0.0005	±0.001	±0.001
	5	±0.0005	±0.001	±0.0005
	6	±0.0005	±0.001	±0.0005
	8	±0.001	±0.001	±0.001
	10	±0.001	±0.005	±0.001
	2	±0.003	±0.005	±0.002
	3	±0.003	±0.005	±0.002
	4	±0.005	±0.005	±0.003
M	5	±0.006	±0.005	±0.004
	6	±0.006	±0.005	±0.004
	8	±0.007	±0.005	±0.005
	10	±0.007	±0.005	±0.005
	2	±0.007	±0.005	±0.003
	3	±0.007	±0.005	±0.003
U	4	±0.008	±0.005	±0.005
	5	±0.01	±0.005	±0.005
	6	±0.01	±0.005	±0.007
	8	±0.015	±0.005	±0.01
	10	±0.015	±0.005	±0.01

Symbol	Shape
A	
G	
M	
R	
B, W	
T, H	
N	
Z, X	Special

4

3

2

T2501

(R)

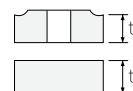
1

2

Cutting edge length

									Symbol	C size (inch)
03	04			1.2	1.2				1.2	5/32
05	06			05	09	09		03	1.8	7/32
06	07			06	11	11		04	2	1/4
08	09			07	13	13		05	2.5	5/16
			08						-	-
09	11		09	09	16	16		06	3	3/8
			10						-	-
			12						-	-
04	15	13	12.7	12	22	22		08	4	1/2
16	19		15	15	27	27		10	5	5/8
			16						-	-
19	23		19	19	33	33		13	6	3/4
			20						-	-
			25						-	-
25	31		25	25	44				8	1
			32						10	1-1/4

Thickness



Symbol	t (inch)
1	1/16
1.2	5/64
1.5	3/32
1.75	7/64
2	1/8
2.5	5/32
3	3/16
3.5	7/32
4	1/4
5	5/16
6	3/8

Corner radius



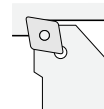
Symbol	R (inch)
0.2	0.004
0.5	0.008
1	1/64
2	1/32
3	3/64
4	1/16
5	5/64
6	3/32
7	7/64
8	1/8

1 Edge shape

Symbol	Shape
F	
E	
T	
S	

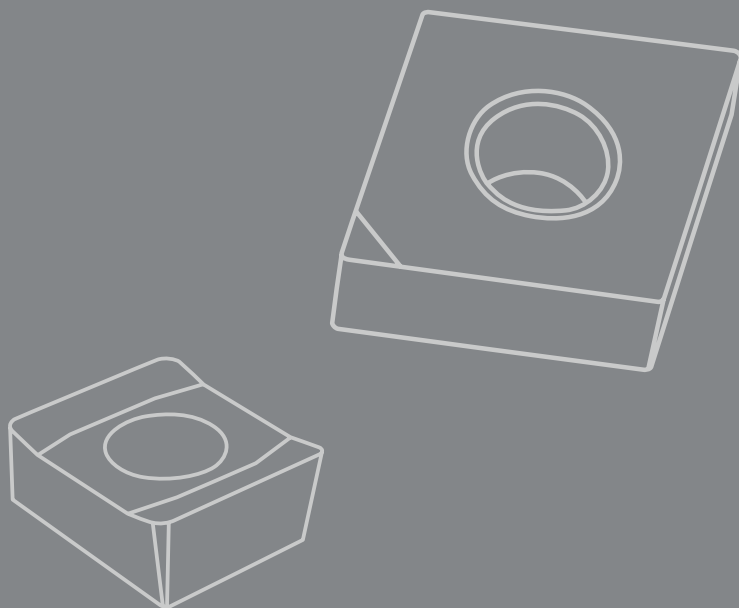
2 Hand of insert

R Right hand



L Left hand

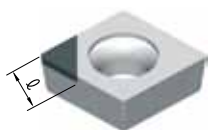




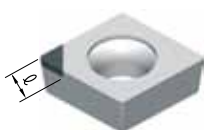
Turning_ **PCD/CVD**



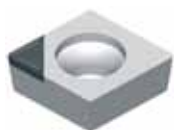
Insert tip types



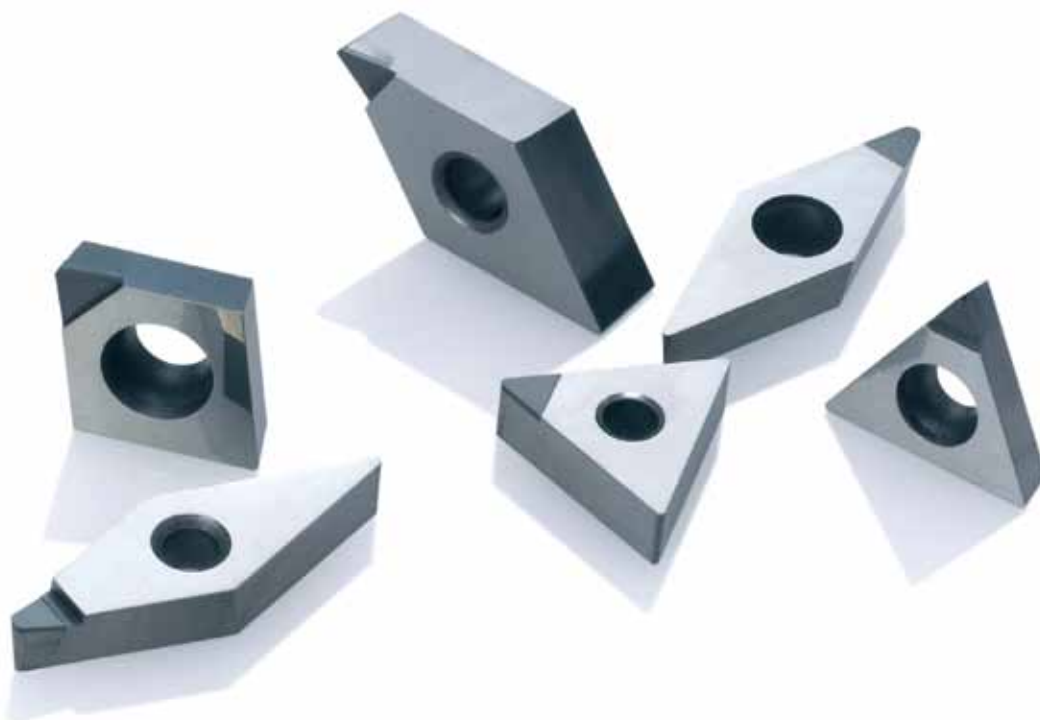
Standard



Mini tip (MT)

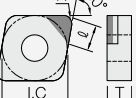


3D Chip breaker



CN

NEGATIVE _ hole

CNGA				ISO code		Dimensions (mm)						PCD										CVD	
				Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	CNGA	120402	CNGA	43(0.5)	12.7	4.76	0.2	5.16	4.3													
			120404		431	12.7	4.76	0.4	5.16	4.3													
			120408		432	12.7	4.76	0.8	5.16	4.2													
			120412		433	12.7	4.76	1.2	5.16	4.1													
	MT	CNGA	120402	CNGA	43(0.5)	12.7	4.76	0.2	5.16	2.8													
			120404		431	12.7	4.76	0.4	5.16	2.8													
			120408		432	12.7	4.76	0.8	5.16	2.7													
			120412		433	12.7	4.76	1.2	5.16	3.1													

■ MT : Mini Tip

Holder : 75p, 79p, 82p, 83p, 108p, 119p

CNGX				ISO code		Dimensions (mm)					PCD										CVD	
				Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	MT	Standard	CNGX	120402	CNGX 43(0.5)	12.7	4.76	0.2	5.16	4.3												
				120404	431	12.7	4.76	0.4	5.16	4.3												
				120408	432	12.7	4.76	0.8	5.16	4.2												
				120412	433	12.7	4.76	1.2	5.16	4.1												
		CNGX	120402	CNGX 43(0.5)	12.7	4.76	0.2	5.16	2.8													
			120404	431	12.7	4.76	0.4	5.16	2.8													
			120408	432	12.7	4.76	0.8	5.16	2.7													
			120412	433	12.7	4.76	1.2	5.16	3.1													

■ MT : Mini Tip

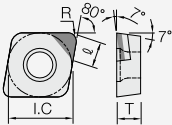
Holder : 75p, 79p, 82p, 83p, 108p, 119p

CC POSITIVE 7° hole

ISO code			Dimensions (mm)						PCD										CVD	
CCGW																				
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	CCGW 09T302	CCGW 3(2.5)0.5	9.525	3.97	0.2	4.4	4.3												
		09T304	3(2.5)1	9.525	3.97	0.4	4.4	4.3												
		09T308	3(2.5)2	9.525	3.97	0.8	4.4	4.2												
		120402	430	12.7	4.76	0.2	5.5	4.3												
		120404	431	12.7	4.76	0.4	5.5	4.3												
		120408	432	12.7	4.76	0.8	5.5	4.2												
		120412	433	12.7	4.76	1.2	5.5	4.1												
	MT	CCGW 060202	CCGW 2(1.5)0.5	6.35	2.38	0.2	2.8	2.8												
		060204	2(1.5)1	6.35	2.38	0.4	2.8	2.8												
		060208	2(1.5)2	6.35	2.38	0.8	2.8	2.7												
		09T302	3(2.5)0.5	9.525	3.97	0.2	4.4	2.8												
		09T304	3(2.5)1	9.525	3.97	0.4	4.4	2.8												
		09T308	3(2.5)2	9.525	3.97	0.8	4.4	2.7												
	Chip breaker	120402	430	12.7	4.76	0.2	5.5	2.8												
		120404	431	12.7	4.76	0.4	5.5	2.8												
		120408	432	12.7	4.76	0.8	5.5	2.7												
		120412	433	12.7	4.76	1.2	5.5	3.1												
		CCGW 060202	CCGW 2(1.5)0.5	6.35	2.38	0.2	2.8	2.8												
		060204	2(1.5)1	6.35	2.38	0.4	2.8	2.8												
		060208	2(1.5)2	6.35	2.38	0.8	2.8	2.7												
		09T302	3(2.5)0.5	9.525	3.97	0.2	4.4	4.3												
		09T304	3(2.5)1	9.525	3.97	0.4	4.4	4.3												
		09T308	3(2.5)2	9.525	3.97	0.8	4.4	4.2												
		120402	430	12.7	4.76	0.2	5.5	4.3												
		120404	431	12.7	4.76	0.4	5.5	4.3												
		120408	432	12.7	4.76	0.8	5.5	4.2												
		120412	433	12.7	4.76	1.2	5.5	4.1												

■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

Holder : 88p, 112p

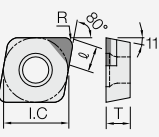
CCGT			ISO code		Dimensions (mm)					PCD										CVD		
			Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	CCGT 09T302	CCGT 3(2.5)0.5	9.525	3.97	0.2	4.4	4.3														
		09T304	3(2.5)1	9.525	3.97	0.4	4.4	4.3														
		09T308	3(2.5)2	9.525	3.97	0.8	4.4	4.2														
		120402	430	12.7	4.76	0.2	5.5	4.3														
		120404	431	12.7	4.76	0.4	5.5	4.3														
		120408	432	12.7	4.76	0.8	5.5	4.2														
		120412	433	12.7	4.76	1.2	5.5	4.1														
	MT	CCGT 060202	CCGT 2(1.5)0.5	6.35	2.38	0.2	2.8	2.8														
		060204	2(1.5)1	6.35	2.38	0.4	2.8	2.8														
		060208	2(1.5)2	6.35	2.38	0.8	2.8	2.7														
		09T302	3(2.5)0.5	9.525	3.97	0.2	4.4	2.8														
		09T304	3(2.5)1	9.525	3.97	0.4	4.4	2.8														
		09T308	3(2.5)2	9.525	3.97	0.8	4.4	2.7														
		120402	430	12.7	4.76	0.2	5.5	2.8														
		120404	431	12.7	4.76	0.4	5.5	2.8														

■ MT : Mini Tip

Holder : 88p, 112p

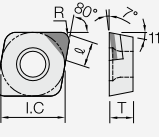
CP

POSITIVE 11 _ hole

CPGW			ISO code		Dimensions (mm)					PCD										CVD		
			Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	CPGW 090302	CPGW 320.5	9.525	3.18	0.2	4.4	4.3														
		090304	321	9.525	3.18	0.4	4.4	4.3														
		090308	322	9.525	3.18	0.8	4.4	4.2														
	MT	CPGW 080202	CPGW 2.5(1.5)0.5	7.94	2.38	0.2	3.4	2.8														
		080204	2.5(1.5)1	7.94	2.38	0.4	3.4	2.8														
		090302	320.5	9.525	3.18	0.2	4.4	2.8														
		090304	321	9.525	3.18	0.4	4.4	2.8														
		090308	322	9.525	3.18	0.8	4.4	2.7														
	Chip breaker	CPGW 080202	CPGW 2.5(1.5)0.5	7.94	2.38	0.2	3.4	4.3														
		080204	2.5(1.5)1	7.94	2.38	0.4	3.4	4.3														
		090302	320.5	9.525	3.18	0.2	4.4	4.3														
		090304	321	9.525	3.18	0.4	4.4	4.3														
		090308	322	9.525	3.18	0.8	4.4	4.2														

■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

Holder : 112p

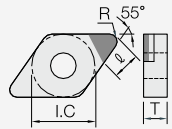
CPGT	ISO code			Dimensions (mm)						PCD										CVD	
	Metric		Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	CPGT 090302	CPGT 320.5	9.525	3.18	0.2	4.4	4.3													
			090304	321	9.525	3.18	0.4	4.4	4.3												
			090308	322	9.525	3.18	0.8	4.4	4.2												
	MT	CPGT 080202	CPGT 2.5(1.5)0.5	7.94	2.38	0.2	3.4	2.8													
			080204	2.5(1.5)1	7.94	2.38	0.4	3.4	2.8												
			090302	320.5	9.525	3.18	0.2	4.4	2.8												
			090304	321	9.525	3.18	0.4	4.4	2.8												
			090308	322	9.525	3.18	0.8	4.4	2.7												

■ MT : Mini Tip

Holder : 112p

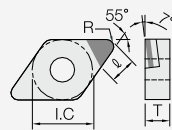
DN

NEGATIVE _ hole

DNGA		ISO code		Dimensions (mm)					PCD									CVD			
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	DNGA 110404	DNGA 331	9.525	4.76	0.4	3.81	3.9													
		110408	332	9.525	4.76	0.8	3.81	3.5													
		150404	431	12.7	4.76	0.4	5.16	3.9													
		150408	432	12.7	4.76	0.8	5.16	3.5													
		150412	433	12.7	4.76	1.2	5.16	3.1													
	MT	DNGA 110404	DNGA 331	9.525	4.76	0.4	3.81	2.4													
		110408	332	9.525	4.76	0.8	3.81	2													
		150404	431	12.7	4.76	0.4	5.16	2.4													
		150408	432	12.7	4.76	0.8	5.16	2													
		150412	433	12.7	4.76	1.2	5.16	2.1													

■ MT : Mini Tip

Holder : 75p, 79p, 80p, 83p, 84p, 108p, 109p

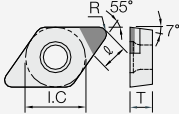
DNGX		ISO code		Dimensions (mm)					PCD										CVD		
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	DNGX 110404	DNGX 331	9.525	4.76	0.4	3.81	3.9													
		110408	332	9.525	4.76	0.8	3.81	3.5													
		150404	431	12.7	4.76	0.4	5.16	3.9													
		150408	432	12.7	4.76	0.8	5.16	3.5													
		150412	433	12.7	4.76	1.2	5.16	3.1													
	MT	DNGX 110404	DNGX 331	9.525	4.76	0.4	3.81	2.4													
		110408	332	9.525	4.76	0.8	3.81	2													
		150404	431	12.7	4.76	0.4	5.16	2.4													
		150408	432	12.7	4.76	0.8	5.16	2													
		150412	433	12.7	4.76	1.2	5.16	2.1													

■ MT : Mini Tip

Holder : 75p, 79p, 80p, 83p, 84p, 108p, 109p

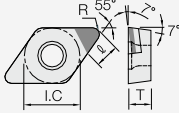
DC

POSITIVE 7 _ hole

DCGW	ISO code			Dimensions (mm)						PCD										CVD	
	Metric		Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	DCGW 11T302	DCGW 3(2.5)0.5	9.525	3.97	0.4	4.4	4													
			11T304	3(2.5)1	9.525	3.97	0.4	4.4	3.9												
			11T308	3(2.5)2	9.525	3.97	0.8	4.4	3.5												
			150404	431	12.7	4.76	0.4	5.16	3.9												
			150408	432	12.7	4.76	0.8	5.16	3.5												
	MT	DCGW 070202	DCGW 2(1.5)0.5	6.35	2.38	0.2	2.8	2.5													
			070204	2(1.5)1	6.35	2.38	0.4	2.8	2.4												
			11T302	3(2.5)0.5	9.525	3.97	0.4	4.4	2.5												
			11T304	3(2.5)1	9.525	3.97	0.4	4.4	2.4												
			11T308	3(2.5)2	9.525	3.97	0.8	4.4	2												
	Chip breaker	DCGW 070202	DCGW 2(1.5)0.5	6.35	2.38	0.2	2.8	2.5													
			070204	2(1.5)1	6.35	2.38	0.4	2.8	2.4												
			11T302	3(2.5)0.5	9.525	3.97	0.4	4.4	4												
			11T304	3(2.5)1	9.525	3.97	0.4	4.4	3.9												
			11T308	3(2.5)2	9.525	3.97	0.8	4.4	3.5												

■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

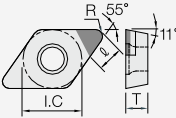
Holder : 89p, 113p, 114p

DCGT		ISO code		Dimensions (mm)						PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	DCGT	11T302	DCGT	3(2.5)0.5	9.525	3.97	0.4	4.4	4											
			11T304		3(2.5)1	9.525	3.97	0.4	4.4	3.9											
			11T308		3(2.5)2	9.525	3.97	0.8	4.4	3.5											
			150404		431	12.7	4.76	0.4	5.16	3.9											
			150408		432	12.7	4.76	0.8	5.16	3.5											
	MT	DCGT	070202	DCGT	2(1.5)0.5	6.35	2.38	0.2	2.8	2.5											
			070204		2(1.5)1	6.35	2.38	0.4	2.8	2.4											
			11T302		3(2.5)0.5	9.525	3.97	0.4	4.4	2.5											
			11T304		3(2.5)1	9.525	3.97	0.4	4.4	2.4											
			11T308		3(2.5)2	9.525	3.97	0.8	4.4	2											

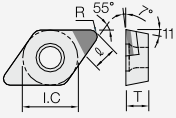
■ MT : Mini Tip

Holder : 89p, 113p, 114p

DP POSITIVE 11 _ hole

ISO code			Dimensions (mm)						PCD										CVD	
DPGW			I.C	T	R	Hole	ℓ		EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
Metric	Inch																			
	Standard	DPGW 11T302	DPGW 3(2.5)0.5	9.525	3.97	0.4	4.4	4												
		11T304	3(2.5)1	9.525	3.97	0.4	4.4	3.9												
		11T308	3(2.5)2	9.525	3.97	0.8	4.4	3.5												
	MT	DPGW 070202	DPGW 2(1.5)0.5	6.35	2.38	0.2	2.8	2.5												
		070204	2(1.5)1	6.35	2.38	0.4	2.8	2.4												
		11T302	3(2.5)0.5	9.525	3.97	0.4	4.4	2.5												
		11T304	3(2.5)1	9.525	3.97	0.4	4.4	2.4												
	Chip breaker	11T308	3(2.5)2	9.525	3.97	0.8	4.4	2												
		DPGW 070202	DPGW 2(1.5)0.5	6.35	2.38	0.2	2.8	2.5												
		070204	2(1.5)1	6.35	2.38	0.4	2.8	2.4												
		11T302	3(2.5)0.5	9.525	3.97	0.4	4.4	4												
		11T304	3(2.5)1	9.525	3.97	0.4	4.4	3.9												
		11T308	3(2.5)2	9.525	3.97	0.8	4.4	3.5												

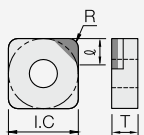
■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

ISO code			Dimensions (mm)						PCD										CVD	
DPGT			I.C	T	R	Hole	ℓ		EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
Metric	Inch																			
	Standard	DPGT 11T302	DPGT 3(2.5)0.5	9.525	3.97	0.4	4.4	4												
		11T304	3(2.5)1	9.525	3.97	0.4	4.4	3.9												
		11T308	3(2.5)2	9.525	3.97	0.8	4.4	3.5												
	MT	DPGT 070202	DPGT 2(1.5)0.5	6.35	2.38	0.2	2.8	2.5												
		070204	2(1.5)1	6.35	2.38	0.4	2.8	2.4												
		11T302	3(2.5)0.5	9.525	3.97	0.4	4.4	2.5												
		11T304	3(2.5)1	9.525	3.97	0.4	4.4	2.4												
	Chip breaker	11T308	3(2.5)2	9.525	3.97	0.8	4.4	2												
		DPGT 070202	DPGT 2(1.5)0.5	6.35	2.38	0.2	2.8	2.5												
		070204	2(1.5)1	6.35	2.38	0.4	2.8	2.4												
		11T302	3(2.5)0.5	9.525	3.97	0.4	4.4	2.5												
		11T304	3(2.5)1	9.525	3.97	0.4	4.4	2.4												
		11T308	3(2.5)2	9.525	3.97	0.8	4.4	2												

■ MT : Mini Tip

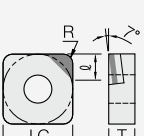
SN

NEGATIVE _ hole

SNGA		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	SNGA 090304	SNGA 321	9.525	3.18	0.4	3.81	4.4												
		090308	322	9.525	3.18	0.8	3.81	4.4												
		120404	431	12.7	4.76	0.4	5.16	4.4												
		120408	432	12.7	4.76	0.8	5.16	4.4												
		120412	433	12.7	4.76	1.2	5.16	4.4												
	MT	SNGA 090304	SNGA 321	9.525	3.18	0.4	3.81	2.9												
		090308	322	9.525	3.18	0.8	3.81	2.9												
		120404	431	12.7	4.76	0.4	5.16	2.9												
		120408	432	12.7	4.76	0.8	5.16	2.9												
		120412	433	12.7	4.76	1.2	5.16	3.4												

■ MT : Mini Tip

 Holder : 76p, 77p, 80p, 81p, 84p, 85p, 109p, 119p

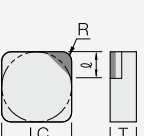
SNGX		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	SNGX 090304	SNGX 321	9.525	3.18	0.4	3.81	4.4												
		090308	322	9.525	3.18	0.8	3.81	4.4												
		120404	431	12.7	4.76	0.4	5.16	4.4												
		120408	432	12.7	4.76	0.8	5.16	4.4												
		120412	433	12.7	4.76	1.2	5.16	4.4												
	MT	SNGX 090304	SNGX 321	9.525	3.18	0.4	3.81	2.9												
		090308	322	9.525	3.18	0.8	3.81	2.9												
		120404	431	12.7	4.76	0.4	5.16	2.9												
		120408	432	12.7	4.76	0.8	5.16	2.9												
		120412	433	12.7	4.76	1.2	5.16	3.4												

■ MT : Mini Tip

 Holder : 76p, 77p, 80p, 81p, 84p, 85p, 109p, 119p

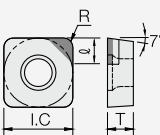
SNGN

NEGATIVE

SNGN		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	SNGN 090304	SNGN 321	9.525	3.18	0.4	3.81	4.4												
		090308	322	9.525	3.18	0.8	3.81	4.4												
		120404	431	12.7	4.76	0.4	5.16	4.4												
		120408	432	12.7	4.76	0.8	5.16	4.4												
		120412	433	12.7	4.76	1.2	5.16	4.4												
	MT	SNGN 090304	SNGN 321	9.525	3.18	0.4	3.81	2.9												
		090308	322	9.525	3.18	0.8	3.81	2.9												
		120404	431	12.7	4.76	0.4	5.16	2.9												
		120408	432	12.7	4.76	0.8	5.16	2.9												
		120412	433	12.7	4.76	1.2	5.16	3.4												

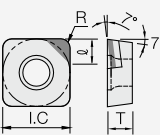
■ MT : Mini Tip

SC POSITIVE 7 _ hole

ISO code			Dimensions (mm)					PCD										CVD	
SCGW																			
	Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	SCGW 120404	SCGW 431	12.7	4.76	0.4	5.5	4.4											
		120408	432	12.7	4.76	0.8	5.5	4.4											
		120412	433	12.7	4.76	1.2	5.5	4.4											
	MT	SCGW 120404	SCGW 431	12.7	4.76	0.4	5.5	2.9											
		120408	432	12.7	4.76	0.8	5.5	2.9											
		120412	433	12.7	4.76	1.2	5.5	3.4											

■ MT : Mini Tip

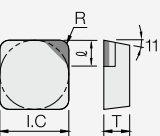
 Holder : 91p, 114p

ISO code			Dimensions (mm)					PCD										CVD	
SCGT																			
	Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	SCGT 120404	SCGT 431	12.7	4.76	0.4	5.5	4.4											
		120408	432	12.7	4.76	0.8	5.5	4.4											
		120412	433	12.7	4.76	1.2	5.5	4.4											
	MT	SCGT 120404	SCGT 431	12.7	4.76	0.4	5.5	2.9											
		120408	432	12.7	4.76	0.8	5.5	2.9											
		120412	433	12.7	4.76	1.2	5.5	3.4											

■ MT : Mini Tip

 Holder : 91p, 114p

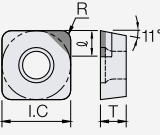
SPGN POSITIVE 11

ISO code			Dimensions (mm)					PCD										CVD	
SPGN																			
	Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	SPGN 090304	SPGN 321	9.525	3.18	0.4	4.4												
		090308	322	9.525	3.18	0.8	4.4												
		120304	421	12.7	4.76	0.4	4.4												
	MT	120308	422	12.7	4.76	0.8	4.4												
		SPGN 090304	SPGN 321	9.525	3.18	0.4	2.9												
		090308	322	9.525	3.18	0.8	2.9												
		120304	421	12.7	4.76	0.4	2.9												
		120308	422	12.7	4.76	0.8	2.9												

■ MT : Mini Tip

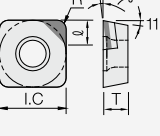
SP

POSITIVE 11 _ hole

ISO code				Dimensions (mm)					PCD										CVD	
SPGW				I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
Metric		Inch																		
	Standard	SPGW	090304	SPGW	321	12.7	4.76	0.4	4.4	4.4										
			090308		322	12.7	4.76	0.8	4.4	4.4										
			120404		431	12.7	4.76	0.4	5.5	4.4										
			120408		432	12.7	4.76	0.8	5.5	4.4										
			120412		433	12.7	4.76	1.2	5.5	4.4										
		SPGW	090304	SPGW	321	12.7	4.76	0.4	4.4	2.9										
	MT		090308		322	12.7	4.76	0.8	4.4	2.9										
			120404		431	12.7	4.76	0.4	5.5	2.9										
			120408		432	12.7	4.76	0.8	5.5	2.9										
			120412		433	12.7	4.76	1.2	5.5	3.4										

■ MT : Mini Tip

Holder : 115p

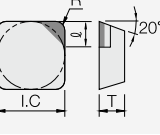
ISO code				Dimensions (mm)					PCD										CVD	
SPGT				I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
Metric		Inch																		
	Standard	SPGT	090304	SPGT	321	12.7	4.76	0.4	4.4	4.4										
			090308		322	12.7	4.76	0.8	4.4	4.4										
			120404		431	12.7	4.76	0.4	5.5	4.4										
			120408		432	12.7	4.76	0.8	5.5	4.4										
			120412		433	12.7	4.76	1.2	5.5	4.4										
	MT	SPGT	090304	SPGT	321	12.7	4.76	0.4	4.4	2.9										
			090308		322	12.7	4.76	0.8	4.4	2.9										
			120404		431	12.7	4.76	0.4	5.5	2.9										
			120408		432	12.7	4.76	0.8	5.5	2.9										
			120412		433	12.7	4.76	1.2	5.5	3.4										

■ MT : Mini Tip

Holder : 115p

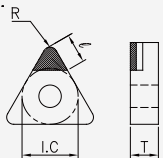
SEGN

POSITIVE 20

ISO code				Dimensions (mm)					PCD										CVD	
SEGN				I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
Metric		Inch																		
	Standard	SEGN	120304	SEGN	431	12.7	3.18	0.4	4.4											
			120308		432	12.7	3.18	0.8	4.4											

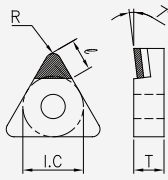
TN

NEGATIVE _ hole

TNGA		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	TNGA	110302	TNGA	22(0.5)	6.35	3.18	0.2	2.4	4.1										
			110304		221	6.35	3.18	0.4	2.4	4										
			160402		33(0.5)	9.525	4.76	0.2	3.81	4.1										
			160404		331	9.525	4.76	0.4	3.81	4										
			160408		332	9.525	4.76	0.8	3.81	3.7										
			220404		431	12.7	4.76	0.4	5.16	4										
	MT	TNGA	110302	TNGA	22(0.5)	6.35	3.18	0.2	2.4	2.6										
			110304		221	6.35	3.18	0.4	2.4	2.5										
			160402		33(0.5)	9.525	4.76	0.2	3.81	2.6										
			160404		331	9.525	4.76	0.4	3.81	2.5										
			160408		332	9.525	4.76	0.8	3.81	2.2										

■ MT : Mini Tip

Holder : 77p, 81p, 85p, 86p, 110p, 111p

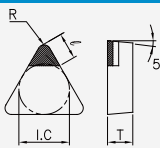
TNGX		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	TNGX	110302	TNGX	22(0.5)	6.35	3.18	0.2	2.4	4.1										
			110304		221	6.35	3.18	0.4	2.4	4										
			160402		33(0.5)	9.525	4.76	0.2	3.81	4.1										
			160404		331	9.525	4.76	0.4	3.81	4										
			160408		332	9.525	4.76	0.8	3.81	3.7										
			220404		431	12.7	4.76	0.4	5.16	4										
	MT	TNGX	110302	TNGX	22(0.5)	6.35	3.18	0.2	2.4	2.6										
			110304		221	6.35	3.18	0.4	2.4	2.5										
			160402		33(0.5)	9.525	4.76	0.2	3.81	2.6										
			160404		331	9.525	4.76	0.4	3.81	2.5										
			160408		332	9.525	4.76	0.8	3.81	2.2										

■ MT : Mini Tip

Holder : 77p, 81p, 85p, 86p, 110p, 111p

TBGN

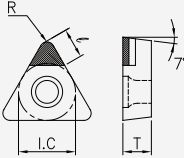
POSITIVE 5

TBGN		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	TBGN	060102	TBGN	(1.2)10.5	3.97	1.59	0.2		2.1										
			060104		(1.2)11	3.97	1.59	0.4		2										
			080202		1.5(1.5)0.5	4.76	2.38	0.2		2.6										
			080204		1.5(1.5)1	4.76	2.38	0.4		2.5										



TCGW

POSITIVE 7 _ hole

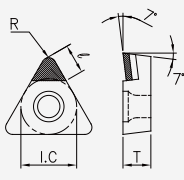
TCGW		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	TCGW 090202	TCGW 2(1.5)0.5	5.56	2.38	0.2	2.5	3.6												
		090204	2(1.5)1	5.56	2.38	0.4	2.5	3.5												
		110202	2(1.5)0.5	6.35	2.38	0.2	2.8	4.1												
		110204	2(1.5)1	6.35	2.38	0.4	2.8	4												
		110208	2(1.5)2	6.35	2.38	0.8	2.8	3.7												
		16T302	3(2.5)0.5	9.525	3.97	0.2	4.4	4.1												
		16T304	3(2.5)1	9.525	3.97	0.4	4.4	4												
		16T308	3(2.5)2	9.525	3.97	0.8	4.4	3.7												
	MT	TCGW 090202	TCGW 2(1.5)0.5	5.56	2.38	0.2	2.5	2.6												
		090204	2(1.5)1	5.56	2.38	0.4	2.5	2.5												
		110202	2(1.5)0.5	6.35	2.38	0.2	2.8	2.6												
		110204	2(1.5)1	6.35	2.38	0.4	2.8	2.5												
		110208	2(1.5)2	6.35	2.38	0.8	2.8	2.2												
		16T302	3(2.5)0.5	9.525	3.97	0.2	4.4	2.6												
		16T304	3(2.5)1	9.525	3.97	0.4	4.4	2.5												
		16T308	3(2.5)2	9.525	3.97	0.8	4.4	2.2												
	Chip breaker	TCGW 090202	TCGW 2(1.5)0.5	5.56	2.38	0.2	2.5	3.6												
		090204	2(1.5)1	5.56	2.38	0.4	2.5	3.5												
		110202	2(1.5)0.5	6.35	2.38	0.2	2.8	4.1												
		110204	2(1.5)1	6.35	2.38	0.4	2.8	4												
		110208	2(1.5)2	6.35	2.38	0.8	2.8	3.7												
		16T302	3(2.5)0.5	9.525	3.97	0.2	4.4	4.1												
		16T304	3(2.5)1	9.525	3.97	0.4	4.4	4												
		16T308	3(2.5)2	9.525	3.97	0.8	4.4	3.7												

■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

Holder : 92p, 93p, 115p

TCGT

POSITIVE 7 _ hole

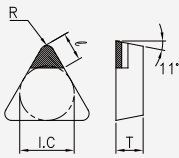
TCGT			ISO code		Dimensions (mm)					PCD										CVD	
			Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	TCGT	090202	TCGT	2(1.5)0.5	5.56	2.38	0.2	2.5	3.6											
			090204		2(1.5)1	5.56	2.38	0.4	2.5	3.5											
			110202		2(1.5)0.5	6.35	2.38	0.2	2.8	4.1											
			110204		2(1.5)1	6.35	2.38	0.4	2.8	4											
			110208		2(1.5)2	6.35	2.38	0.8	2.8	3.7											
			16T302		3(2.5)0.5	9.525	3.97	0.2	4.4	4.1											
			16T304		3(2.5)1	9.525	3.97	0.4	4.4	4											
			16T308		3(2.5)2	9.525	3.97	0.8	4.4	3.7											
	MT	TCGT	090202	TCGT	2(1.5)0.5	5.56	2.38	0.2	2.5	2.6											
			090204		2(1.5)1	5.56	2.38	0.4	2.5	2.5											
			110202		2(1.5)0.5	6.35	2.38	0.2	2.8	2.6											
			110204		2(1.5)1	6.35	2.38	0.4	2.8	2.5											
			110208		2(1.5)2	6.35	2.38	0.8	2.8	2.2											
			16T302		3(2.5)0.5	9.525	3.97	0.2	4.4	2.6											
			16T304		3(2.5)1	9.525	3.97	0.4	4.4	2.5											
			16T308		3(2.5)2	9.525	3.97	0.8	4.4	2.2											

■ MT : Mini Tip

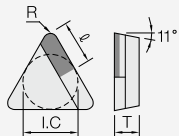
Holder : 92p, 93p, 115p

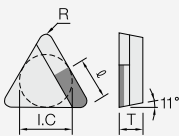
TPGN

POSITIVE 11

TPGN		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	TPGN 110302	TPGN 22(0.5)	6.35	3.18	0.2		4.1												
		110304	221	6.35	3.18	0.4		4												
		110308	222	6.35	3.18	0.8		3.7												
		160302	32(0.5)	9.525	3.18	0.2		4.1												
		160304	321	9.525	3.18	0.4		4												
		160308	322	9.525	3.18	0.8		3.7												
	MT	TPGN 110302	TPGN 22(0.5)	6.35	3.18	0.2		2.6												
		110304	221	6.35	3.18	0.4		2.5												
		110308	222	6.35	3.18	0.8		2.2												
		160302	32(0.5)	9.525	3.18	0.2		2.6												
		160304	321	9.525	3.18	0.4		2.5												
		160308	322	9.525	3.18	0.8		2.2												
	Chip breaker	TPGN 110302	TPGN 22(0.5)	6.35	3.18	0.2		4.1												
		110304	221	6.35	3.18	0.4		4												
		110308	222	6.35	3.18	0.8		3.7												
		160302	32(0.5)	9.525	3.18	0.2		4.1												
		160304	321	9.525	3.18	0.4		4												
		160308	322	9.525	3.18	0.8		3.7												

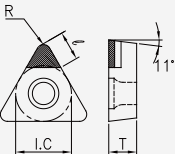
■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

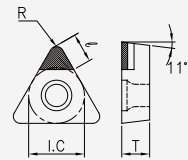
TPGN (L)		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	TPGN 160304 L	TPGN 331 L	9.525	3.18	0.4														
		160308 L	332 L	9.525	3.18	0.8														

TPGN (R)		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	TPGN 160304 R	TPGN 331 R	9.525	3.18	0.4														
		160308 R	332 R	9.525	3.18	0.8														

TPGW

POSITIVE 11 _ hole

TPGW			ISO code		Dimensions (mm)					PCD										CVD		
			Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	TPGW 110202	TPGW 210.5	6.35	2.38	0.2	2.8	4.1														
		110204	211	6.35	2.38	0.4	2.8	4														
		110304	221	6.35	3.18	0.4	3.4	4														
		110308	222	6.35	3.18	0.8	3.4	3.7														
		160302	32(0.5)	9.525	3.18	0.2	4.4	4.1														
		160304	321	9.525	3.18	0.4	4.4	4														
		160308	322	9.525	3.18	0.8	4.4	3.7														
		160404	331	9.525	4.76	0.4	4.4	4														
		160408	332	9.525	4.76	0.8	4.4	3.7														
		TPGW 080202	TPGW 1.5(1.5)0.5	4.76	2.38	0.2	2.3	2.6														
	MT	080204	1.5(1.5)1	4.76	2.38	0.4	2.3	2.5														
		110202	210.5	6.35	2.38	0.2	2.8	2.6														
		110204	211	6.35	2.38	0.4	2.8	2.5														
		110304	221	6.35	3.18	0.4	3.4	2.5														
		110308	222	6.35	3.18	0.8	3.4	2.2														
		160302	32(0.5)	9.525	3.18	0.2	4.4	2.6														
		160304	321	9.525	3.18	0.4	4.4	2.5														
		160308	322	9.525	3.18	0.8	4.4	2.2														
		160404	331	9.525	4.76	0.4	4.4	2.5														
		160408	332	9.525	4.76	0.8	4.4	2.2														
	Chip breaker	TPGW 080202	TPGW 1.5(1.5)0.5	4.76	2.38	0.2	2.3	2.6														
		080204	1.5(1.5)1	4.76	2.38	0.4	2.3	2.5														
		110202	210.5	6.35	2.38	0.2	2.8	4.1														
		110204	211	6.35	2.38	0.4	2.8	4														
		110304	221	6.35	3.18	0.4	3.4	4														
		110308	222	6.35	3.18	0.8	3.4	3.7														
		160302	32(0.5)	9.525	3.18	0.2	4.4	4.1														
		160304	321	9.525	3.18	0.4	4.4	4														
160308		322	9.525	3.18	0.8	4.4	3.7															
160404		331	9.525	4.76	0.4	4.4	4															
160408	332	9.525	4.76	0.8	4.4	3.7																

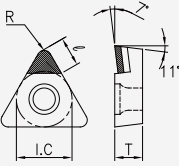


■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

Holder : 116p

TPGT

POSITIVE 11 _ hole

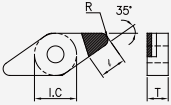
TPGT		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	TPGT	110202	TPGT	210.5	6.35	2.38	0.2	2.8	4.1										
			110204		211	6.35	2.38	0.4	2.8	4										
			110304		221	6.35	3.18	0.4	3.3	4										
			110308		222	6.35	3.18	0.8	3.3	3.7										
			160302		32(0.5)	9.525	3.18	0.2	4.4	4.1										
			160304		321	9.525	3.18	0.4	4.4	4										
			160308		322	9.525	3.18	0.8	4.4	3.7										
			160404		331	9.525	4.76	0.4	4.4	4										
			160408		332	9.525	4.76	0.8	4.4	3.7										
	MT	TPGT	080202	TPGT	1.5(1.5)0.5	4.76	2.38	0.2	2.3	2.6										
			080204		1.5(1.5)1	4.76	2.38	0.4	2.3	2.5										
			110202		210.5	6.35	2.38	0.2	2.8	2.6										
			110204		211	6.35	2.38	0.4	2.8	2.5										
			110304		221	6.35	3.18	0.4	3.3	2.5										
			110308		222	6.35	3.18	0.8	3.3	2.2										
			160302		32(0.5)	9.525	3.18	0.2	4.4	2.6										
			160304		321	9.525	3.18	0.4	4.4	2.5										
			160308		322	9.525	3.18	0.8	4.4	2.2										
			160404		331	9.525	4.76	0.4	4.4	2.5										
			160408		332	9.525	4.76	0.8	4.4	2.2										

■ MT : Mini Tip

Holder : 116p

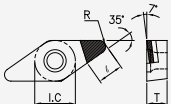
VN

NEGATIVE _ hole

VNGA		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	VNGA	160402	VNGA	33(0.5)	9.525	4.76	0.2	3.81	5										
			160404		331	9.525	4.76	0.4	3.81	4.5										
			160408		332	9.525	4.76	0.8	3.81	3.7										
	MT	VNGA	160402	VNGA	33(0.5)	9.525	4.76	0.2	3.81	3										
			160404		331	9.525	4.76	0.4	3.81	2.5										
			160408		332	9.525	4.76	0.8	3.81	2.2										
	Chip breaker	VNGA	160402	VNGA	33(0.5)	9.525	4.76	0.2	3.81	5										
			160404		331	9.525	4.76	0.4	3.81	4.5										
			160408		332	9.525	4.76	0.8	3.81	3.7										

■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

Holder : 78p, 87p, 111p

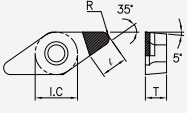
VNGX		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	VNGX	160402	VNGX	33(0.5)	9.525	4.76	0.2	3.81	5										
			160404		331	9.525	4.76	0.4	3.81	4.5										
			160408		332	9.525	4.76	0.8	3.81	3.7										
	MT	VNGX	160402	VNGX	33(0.5)	9.525	4.76	0.2	3.81	3										
			160404		331	9.525	4.76	0.4	3.81	2.5										
			160408		332	9.525	4.76	0.8	3.81	2.2										

■ MT : Mini Tip

Holder : 78p, 87p, 111p

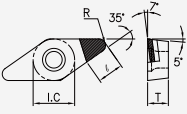
VB

POSITIVE 5 _ hole

VBGW		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	VBGW 110302	VBGW 220.5	6.35	3.18	0.2	2.8	5												
		110304	221	6.35	3.18	0.4	2.8	4.5												
		110308	222	6.35	3.18	0.8	2.8	3.7												
		160402	32(0.5)	9.525	4.76	0.2	4.4	5												
		160404	331	9.525	4.76	0.4	4.4	4.5												
		160408	332	9.525	4.76	0.8	4.4	3.7												
	MT	VBGW 110302	VBGW 220.5	6.35	3.18	0.2	2.8	3												
		110304	221	6.35	3.18	0.4	2.8	2.5												
		110308	222	6.35	3.18	0.8	2.8	2.2												
		160402	32(0.5)	9.525	4.76	0.2	4.4	3												
		160404	331	9.525	4.76	0.4	4.4	2.5												
		160408	332	9.525	4.76	0.8	4.4	2.2												
	Chip breaker	VBGW 110302	VBGW 220.5	6.35	3.18	0.2	2.8	5												
		110304	221	6.35	3.18	0.4	2.8	4.5												
		110308	222	6.35	3.18	0.8	2.8	3.7												
		160402	32(0.5)	9.525	4.76	0.2	4.4	5												
		160404	331	9.525	4.76	0.4	4.4	4.5												
		160408	332	9.525	4.76	0.8	4.4	3.7												
		160412	333	9.525	4.76	1.2	4.4	3.3												

■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

Holder : 93p, 94p, 117p

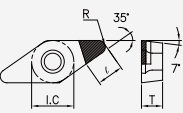
VBGT		ISO code		Dimensions (mm)					PCD										CVD	
		Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502
	Standard	VBGT 110302	VBGT 220.5	6.35	3.18	0.2	2.8	5												
		110304	221	6.35	3.18	0.4	2.8	4.5												
		110308	222	6.35	3.18	0.8	2.8	3.7												
		160402	32(0.5)	9.525	4.76	0.2	4.4	5												
		160404	331	9.525	4.76	0.4	4.4	4.5												
		160408	332	9.525	4.76	0.8	4.4	3.7												
	MT	VBGT 110302	VBGT 220.5	6.35	3.18	0.2	2.8	3												
		110304	221	6.35	3.18	0.4	2.8	2.5												
		110308	222	6.35	3.18	0.8	2.8	2.2												
		160402	32(0.5)	9.525	4.76	0.2	4.4	3												
		160404	331	9.525	4.76	0.4	4.4	2.5												
		160408	332	9.525	4.76	0.8	4.4	2.2												
	Chip breaker	VBGT 110302	VBGT 220.5	6.35	3.18	0.2	2.8	5												
		110304	221	6.35	3.18	0.4	2.8	4.5												
		110308	222	6.35	3.18	0.8	2.8	3.7												
		160402	32(0.5)	9.525	4.76	0.2	4.4	5												
		160404	331	9.525	4.76	0.4	4.4	4.5												
		160408	332	9.525	4.76	0.8	4.4	3.7												
		160412	333	9.525	4.76	1.2	4.4	3.3												

■ MT : Mini Tip

Holder : 93p, 94p, 117p

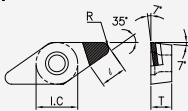
VC

POSITIVE 7 _ hole

VCGW				ISO code		Dimensions (mm)						PCD										CVD	
				Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	VCGW	110302	VCGW	220.5	6.35	3.18	0.2	2.8	5													
			110304		221	6.35	3.18	0.4	2.8	4.5													
			110308		222	6.35	3.18	0.8	2.8	3.7													
			160402		32(0.5)	9.525	4.76	0.2	4.4	5													
			160404		331	9.525	4.76	0.4	4.4	4.5													
			160408		332	9.525	4.76	0.8	4.4	3.7													
			160412		333	9.525	4.76	1.2	4.4	3.3													
			220512		4(3.5)3	12.7	5.56	1.2	5.5	3.3													
			220520		4(3.5)5	12.7	5.56	2	5.5	3.1													
	MT	VCGW	110302	VCGW	220.5	6.35	3.18	0.2	2.8	3													
			110304		221	6.35	3.18	0.4	2.8	2.5													
			110308		222	6.35	3.18	0.8	2.8	2.2													
			160402		32(0.5)	9.525	4.76	0.2	4.4	3													
			160404		331	9.525	4.76	0.4	4.4	2.5													
			160408		332	9.525	4.76	0.8	4.4	2.2													
			160412		333	9.525	4.76	1.2	4.4	1.8													
	Chip breaker	VCGW	110302	VCGW	220.5	6.35	3.18	0.2	2.8	5													
			110304		221	6.35	3.18	0.4	2.8	4.5													
			110308		222	6.35	3.18	0.8	2.8	3.7													
			160402		32(0.5)	9.525	4.76	0.2	4.4	5													
			160404		331	9.525	4.76	0.4	4.4	4.5													
			160408		332	9.525	4.76	0.8	4.4	3.7													
		160412		333	9.525	4.76	1.2	4.4	3.3														

■ MT : Mini Tip Chip breaker type : Rough / Finish / Semi Finish

Holder : 95p, 116p, 117p, 118p

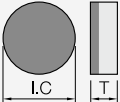
VCGT			ISO code		Dimensions (mm)						PCD										CVD	
			Metric	Inch	I.C	T	R	Hole	ℓ	EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69	ED501	ED502	
	Standard	VCGT	110302	VCGT	220.5	6.35	3.18	0.2	2.8	5												
			110304		221	6.35	3.18	0.4	2.8	4.5												
			110308		222	6.35	3.18	0.8	2.8	3.7												
			160402		32(0.5)	9.525	4.76	0.2	4.4	5												
			160404		331	9.525	4.76	0.4	4.4	4.5												
			160408		332	9.525	4.76	0.8	4.4	3.7												
			160412		333	9.525	4.76	1.2	4.4	3.3												
			220512		4(3.5)3	12.7	5.56	1.2	5.5	3.3												
	MT		220520		4(3.5)5	12.7	5.56	2	5.5	3.1												
		VCGT	110302	VCGT	220.5	6.35	3.18	0.2	2.8	3												
			110304		221	6.35	3.18	0.4	2.8	2.5												
			110308		222	6.35	3.18	0.8	2.8	2.2												
			160402		32(0.5)	9.525	4.76	0.2	4.4	3												
			160404		331	9.525	4.76	0.4	4.4	2.5												
			160408		332	9.525	4.76	0.8	4.4	2.2												
			160412		333	9.525	4.76	1.2	4.4	1.8												

■ MT : Mini Tip

Holder : 95p, 116p, 117p, 118p

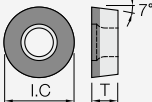
RNGN

NEGATIVE

ISO code			Dimensions (mm)					PCD									
RNGN																	
	Metric	Inch	I.C	T	R	Hole		EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69
	RNGN	090300	RNGN	320	9.525	3.18											
		090400		330	9.525	4.76											
		120300		420	12.7	3.18											
		120400		430	12.7	4.76											
		150400		530	15.875	4.76											

RCGW

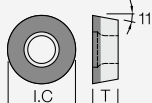
POSITIVE 7 _ hole

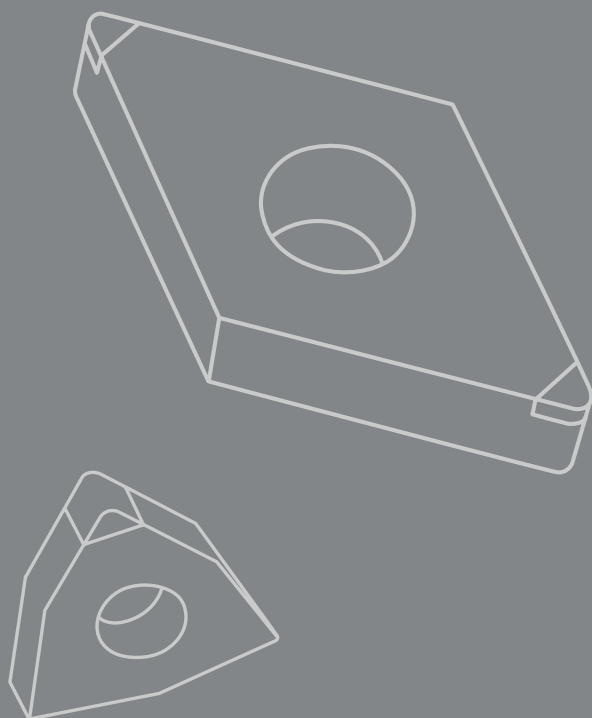
ISO code			Dimensions (mm)					PCD									
RCGW																	
	Metric	Inch	I.C	T	R	Hole		EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69
	RCGW	060200	RCGW	21.5	6.35	2.38	2.8										
		080300	-	-	8.0	3.18	3.4										
		10T300	-	-	10	3.18	4.4										
		12T300	-	-	12.7	3.97	4.4										

 Holder : 90p

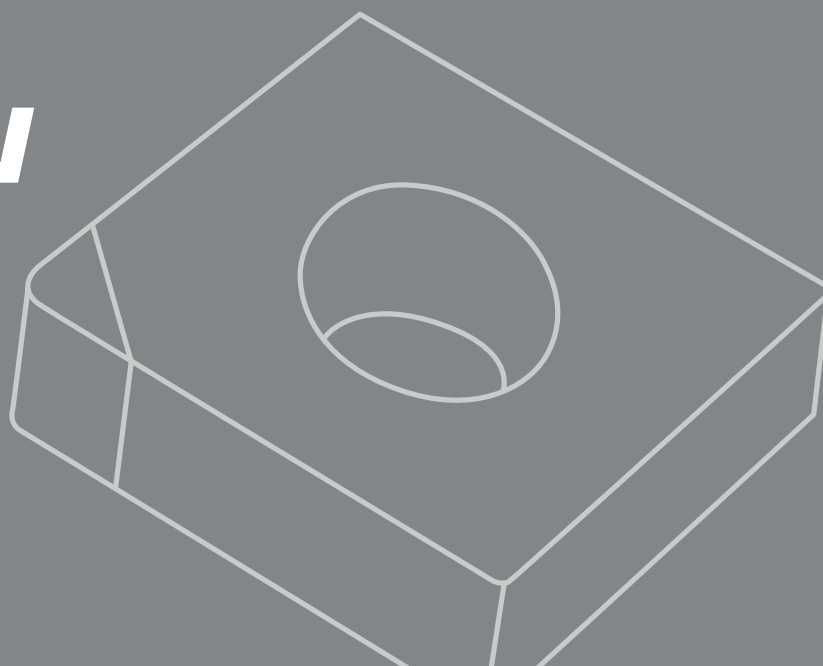
RPGW

POSITIVE 11 _ hole

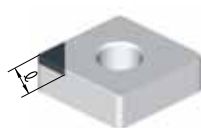
ISO code			Dimensions (mm)					PCD									
RPGW																	
	Metric	Inch	I.C	T	R	Hole		EP10	EP20	EP13	EP51	EP55	EP750	EP58	EP59	EP29	EP69
	RPGW	060200	RPGW	21.5	6.35	2.38	2.8										
		080300	-	-	8.0	3.18	3.4										
		10T300	-	-	10	3.18	4.4										
		12T300	-	-	12.7	3.97	4.4										



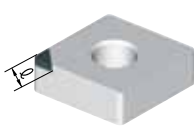
Turning_ **PCBN**



Insert tip types



Standard



Mini tip



Mini 2tips



Mini 4tips



Vertical tip



Solid

CNGA

NEGATIVE _ hole



CNGA			ISO code		Dimensions (mm)					PCBN													
			Metric	Inch	I.C	T	R	Hole	ℓ	EB23X (S)	EB570 (S)	EB160	EB560 (S)	EB150	EB550 (S)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X
	Standard	CNGA 120402	CNGA 43(0.5)	12.7	4.76	0.2	5.16	4.3															
		120404	431	12.7	4.76	0.4	5.16	4.3															
		120408	432	12.7	4.76	0.8	5.16	4.2															
		120412	433	12.7	4.76	1.2	5.16	4.1															
	MT	CNGA 120402	CNGA 43(0.5)	12.7	4.76	0.2	5.16	2.8															
		120404	431	12.7	4.76	0.4	5.16	2.8															
		120408	432	12.7	4.76	0.8	5.16	2.7															
		120412	433	12.7	4.76	1.2	5.16	3.1															
	2MT	CNGA 120402	CNGA 43(0.5)	12.7	4.76	0.2	5.16	2.8															
		120404	431	12.7	4.76	0.4	5.16	2.8															
		120408	432	12.7	4.76	0.8	5.16	2.7															
		120412	433	12.7	4.76	1.2	5.16	3.1															
	4MT	CNGA 120402	CNGA 43(0.5)	12.7	4.76	0.2	5.16	2.8															
		120404	431	12.7	4.76	0.4	5.16	2.8															
		120408	432	12.7	4.76	0.8	5.16	2.7															
		120412	433	12.7	4.76	1.2	5.16	3.1															
	4VT solid	CNGA 120402	CNGA 43(0.5)	12.7	4.76	0.2	5.16	2.7															
		120404	431	12.7	4.76	0.4	5.16	2.6															
		120408	432	12.7	4.76	0.8	5.16	2.5															
		120412	433	12.7	4.76	1.2	5.16	2.5															

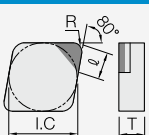
■ MT : Mini Tip 2MT : Mini 2Tips 4MT : Mini 4Tips 4VT : Vertical 4Tips

Holder : 75p, 79p, 82p, 83p, 108p, 119p

CNGN

NEGATIVE



CNGN			ISO code		Dimensions (mm)					PCBN													
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (S)	EB570 (S)	EB160	EB560 (S)	EB150	EB550 (S)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X
	Standard	CNGN 120408	CNGN 432	12.7	4.76	0.8		4.2															
		120412	433	12.7	4.76	1.2		4.1															

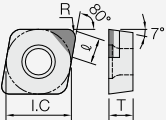
■ Solid

CNGN			ISO code		Dimensions (mm)						PCBN																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
			Metric	Inch	I.C	T	R	Hole		EB1000	EB50	EB100X	HBN	HBN-T	HBN-W	HBN-N																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

CCGW

POSITIVE 7 _ hole



CCGW			ISO code		Dimensions (mm)					PCBN													
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X
	Standard	CCGW 060208	CCGW 2(1.5)2	6.35	2.38	0.8	2.8	3.2															
		09T302	3(2.5)0.5	9.525	3.97	0.2	4.4	4.3															
		09T304	3(2.5)1	9.525	3.97	0.4	4.4	4.3															
		09T308	3(2.5)2	9.525	3.97	0.8	4.4	4.2															
		120402	430	12.7	4.76	0.2	5.5	4.3															
		120404	431	12.7	4.76	0.4	5.5	4.3															
		120408	432	12.7	4.76	0.8	5.5	4.2															
		120412	433	12.7	4.76	1.2	5.5	4.1															
	MT	CCGW 060202	CCGW 2(1.5)0.5	6.35	2.38	0.2	2.8	2.8															
		060204	2(1.5)1	6.35	2.38	0.4	2.8	2.8															
		060208	2(1.5)2	6.35	2.38	0.8	2.8	2.7															
		09T302	3(2.5)0.5	9.525	3.97	0.2	4.4	2.8															
		09T304	3(2.5)1	9.525	3.97	0.4	4.4	2.8															
		09T308	3(2.5)2	9.525	3.97	0.8	4.4	2.7															
		120402	430	12.7	4.76	0.2	5.5	2.8															
		120404	431	12.7	4.76	0.4	5.5	2.8															
	2MT	CCGW 060202	CCGW 2(1.5)0.5	6.35	2.38	0.2	2.8	2.8															
		060204	2(1.5)1	6.35	2.38	0.4	2.8	2.8															
		060208	2(1.5)2	6.35	2.38	0.8	2.8	2.7															
		09T302	3(2.5)0.5	9.525	3.97	0.2	4.4	2.8															
		09T304	3(2.5)1	9.525	3.97	0.4	4.4	2.8															
		09T308	3(2.5)2	9.525	3.97	0.8	4.4	2.7															
		120402	430	12.7	4.76	0.2	5.5	2.8															
		120404	431	12.7	4.76	0.4	5.5	2.8															

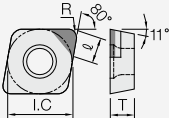
■ MT : Mini Tips 2MT : Mini 2Tips

Holder : 88p, 112p

CPGW

POSITIVE 11 _ hole



CPGW			ISO code		Dimensions (mm)					PCBN															
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X		
	Standard	CPGW 090302	CPGW 320.5	9.525	3.18	0.2	4.4	4.3																	
		090304	321	9.525	3.18	0.4	4.4	4.3																	
		090308	322	9.525	3.18	0.8	4.4	4.2																	
	MT	CPGW 080202	CPGW 2.5(1.5)0.5	7.94	2.38	0.2	3.4	2.8																	
		080204	2.5(1.5)1	7.94	2.38	0.4	3.4	2.8																	
		090302	320.5	9.525	3.18	0.2	4.4	2.8																	
		090304	321	9.525	3.18	0.4	4.4	2.8																	
		090308	322	9.525	3.18	0.8	4.4	2.7																	
	2MT	CPGW 080202	CPGW 2.5(1.5)0.5	7.94	2.38	0.2	3.4	2.8																	
		080204	2.5(1.5)1	7.94	2.38	0.4	3.4	2.8																	
		090302	320.5	9.525	3.18	0.2	4.4	2.8																	
		090304	321	9.525	3.18	0.4	4.4	2.8																	
090308		322	9.525	3.18	0.8	4.4	2.7																		

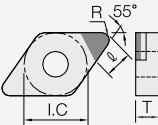
■ MT : Mini Tips 2MT : Mini 2Tips

Holder : 112p

DNGA

NEGATIVE _ hole



DNGA				ISO code		Dimensions (mm)					PCBN												
				Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210
	Standard	DNGA	110404	DNGA	331	9.525	4.76	0.4	3.81	3.9													
			110408		332	9.525	4.76	0.8	3.81	3.5													
			150404		431	12.7	4.76	0.4	5.16	3.9													
			150408		432	12.7	4.76	0.8	5.16	3.5													
			150412		433	12.7	4.76	1.2	5.16	3.1													
			150604		441	12.7	6.35	0.4	5.16	3.9													
			150608		442	12.7	6.35	0.8	5.16	3.5													
		150612		443	12.7	6.35	1.2	5.16	3.1														
	MT	DNGA	110404	DNGA	331	9.525	4.76	0.4	3.81	2.4													
			110408		332	9.525	4.76	0.8	3.81	2													
			150404		431	12.7	4.76	0.4	5.16	2.4													
			150408		432	12.7	4.76	0.8	5.16	2													
			150412		433	12.7	4.76	1.2	5.16	2.1													
			150604		441	12.7	6.35	0.4	5.16	2.4													
			150608		442	12.7	6.35	0.8	5.16	2													
		150612		443	12.7	6.35	1.2	5.16	2.1														
	2MT	DNGA	110404	DNGA	331	9.525	4.76	0.4	3.81	2.4													
			110408		332	9.525	4.76	0.8	3.81	2													
			150404		431	12.7	4.76	0.4	5.16	2.4													
			150408		432	12.7	4.76	0.8	5.16	2													
			150412		433	12.7	4.76	1.2	5.16	2.1													
			150604		441	12.7	6.35	0.4	5.16	2.4													
			150608		442	12.7	6.35	0.8	5.16	2													
		150612		443	12.7	6.35	1.2	5.16	2.1														
	4MT	DNGA	110404	DNGA	331	9.525	4.76	0.4	3.81	2.4													
			110408		332	9.525	4.76	0.8	3.81	2													
			150404		431	12.7	4.76	0.4	5.16	2.4													
			150408		432	12.7	4.76	0.8	5.16	2													
			150412		433	12.7	4.76	1.2	5.16	2.1													
			150604		441	12.7	6.35	0.4	5.16	2.4													
			150608		442	12.7	6.35	0.8	5.16	2													
		150612		443	12.7	6.35	1.2	5.16	2.1														
	4VT solid	DNGA	110404	DNGA	331	9.525	4.76	0.4	3.81	2.7													
			110408		332	9.525	4.76	0.8	3.81	2.3													
			150404		431	12.7	4.76	0.4	5.16	2.7													
			150408		432	12.7	4.76	0.8	5.16	2.3													
			150412		433	12.7	4.76	1.2	5.16	2													

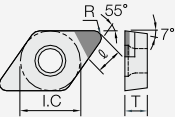
■ MT : Mini Tips 2MT : Mini 2Tips 4MT : Mini 4Tips 4VT : Vertical 4Tips

Holder : 75p, 79p, 80p, 83p, 84p, 108p, 109p

DCGW

POSITIVE 7 _ hole



DCGW			ISO code		Dimensions (mm)					PCBN														
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X	
	Standard	DCGW 11T302	DCGW 3(2.5)0.5	9.525	3.97	0.4	4.4	4																
		11T304	3(2.5)1	9.525	3.97	0.4	4.4	3.9																
		11T308	3(2.5)2	9.525	3.97	0.8	4.4	3.5																
		150404	431	12.7	4.76	0.4	5.16	3.9																
		150408	432	12.7	4.76	0.8	5.16	3.5																
	MT	DCGW 11T302	DCGW 3(2.5)0.5	9.525	3.97	0.4	4.4	2.5																
		11T304	3(2.5)1	9.525	3.97	0.4	4.4	2.4																
		11T308	3(2.5)2	9.525	3.97	0.8	4.4	2																
		150404	431	12.7	4.76	0.4	5.16	2.4																
		150408	432	12.7	4.76	0.8	5.16	2																
	2MT	DCGW 11T302	DCGW 3(2.5)0.5	9.525	3.97	0.4	4.4	2.5																
		11T304	3(2.5)1	9.525	3.97	0.4	4.4	2.4																
		11T308	3(2.5)2	9.525	3.97	0.8	4.4	2																
		150404	431	12.7	4.76	0.4	5.16	2.4																
		150408	432	12.7	4.76	0.8	5.16	2																

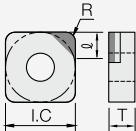
■ MT : Mini Tips 2MT : Mini 2Tips

Holder : 89p, 113p, 114p

SNGA

NEGATIVE _ hole



SNGA				ISO code		Dimensions (mm)					PCBN												
				Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210
	Standard	SNGA	090304	SNGA	321	9.525	3.18	0.4	3.81	4.4													
			090308		322	9.525	3.18	0.8	3.81	4.4													
			120404		431	12.7	4.76	0.4	5.16	4.4													
			120408		432	12.7	4.76	0.8	5.16	4.4													
			120412		433	12.7	4.76	1.2	5.16	4.4													
	MT	SNGA	090304	SNGA	321	9.525	3.18	0.4	3.81	2.9													
			090308		322	9.525	3.18	0.8	3.81	2.9													
			120404		431	12.7	4.76	0.4	5.16	2.9													
			120408		432	12.7	4.76	0.8	5.16	2.9													
			120412		433	12.7	4.76	1.2	5.16	3.4													
	2MT	SNGA	090304	SNGA	321	9.525	3.18	0.4	3.81	2.9													
			090308		322	9.525	3.18	0.8	3.81	2.9													
			120404		431	12.7	4.76	0.4	5.16	2.9													
			120408		432	12.7	4.76	0.8	5.16	2.9													
			120412		433	12.7	4.76	1.2	5.16	3.4													
	4MT	SNGA	120404	SNGA	431	12.7	4.76	0.4	5.16	2.9													
			120408		432	12.7	4.76	0.8	5.16	2.9													
			120412		433	12.7	4.76	1.2	5.16	3.4													
	8VT solid																						
		SNGA	120404	SNGA	431	12.7	4.76	0.4	5.16	2.2													
			120408		432	12.7	4.76	0.8	5.16	2.2													
		120412		433	12.7	4.76	1.2	5.16	2.2														

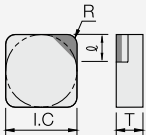
■ MT : Mini Tips 2MT : Mini 2Tips 4MT : Mini 4Tips 8VT : Vertical 8Tips

Holder : 76p, 77p, 80p, 81p, 84p, 85p, 109p, 119p

SNGN

NEGATIVE



SNGN				ISO code		Dimensions (mm)					PCBN												
				Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210
	Standard	SNGN 090304	SNGN 321	9.525	3.18	0.4		4.4															
		090308	322	9.525	3.18	0.8		4.4															
		120404	431	12.7	4.76	0.4		4.4															
		120408	432	12.7	4.76	0.8		4.4															
		120412	433	12.7	4.76	1.2		4.4															
	MT	SNGN 090304	SNGN 321	9.525	3.18	0.4		2.9															
		090308	322	9.525	3.18	0.8		2.9															
		120404	431	12.7	4.76	0.4		2.9															
		120408	432	12.7	4.76	0.8		2.9															
		120412	433	12.7	4.76	1.2		3.4															
	2MT	SNGN 090304	SNGN 321	9.525	3.18	0.4		2.9															
		090308	322	9.525	3.18	0.8		2.9															
		120404	431	12.7	4.76	0.4		2.9															
		120408	432	12.7	4.76	0.8		2.9															
		120412	433	12.7	4.76	1.2		3.4															
	4MT	SNGN 120404	SNGN 431	12.7	4.76	0.4		2.9															
		120408	432	12.7	4.76	0.8		2.9															
		120412	433	12.7	4.76	1.2		3.4															
	8VT solid	SNGN 120404	SNGN 431	12.7	4.76	0.4		2.2															
		120408	432	12.7	4.76	0.8		2.2															
		120412	433	12.7	4.76	1.2		2.2															

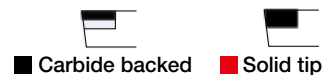
■ MT : Mini Tips 2MT : Mini 2Tips 4MT : Mini 4Tips 8VT : Vertical 8Tips

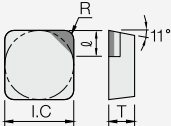
■ Solid

SNGN		ISO code		Dimensions (mm)					PCBN						
		Metric	Inch	I.C	T	R	Hole	ℓ	EB1000	EB50	EB100X	HBN	HBN-T	HBN-W	HBN-N
	Solid	SNGN 090304	SNGN 321	9.525	3.18	0.4									
		090308	322	9.525	3.18	0.8									
		120404	431	12.7	4.76	0.4									
		120408	432	12.7	4.76	0.8									
		120412	433	12.7	4.76	1.2									

SPGN

POSITIVE 11



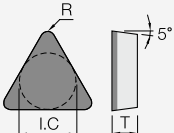
SPGN			ISO code		Dimensions (mm)					PCBN														
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X	
	Standard	SPGN 090304	SPGN 321	9.525	3.18	0.4		4.4																
		090308	322	9.525	3.18	0.8		4.4																
		120404	431	12.7	4.76	0.4		4.4																
		120408	432	12.7	4.76	0.8		4.4																
		120412	433	12.7	4.76	1.2		4.4																
	MT	SPGN 090304	SPGN 321	9.525	3.18	0.4		2.9																
		090308	322	9.525	3.18	0.8		2.9																
		120404	431	12.7	4.76	0.4		2.9																
		120408	432	12.7	4.76	0.8		2.9																
		120412	433	12.7	4.76	1.2		3.4																
	2MT	SPGN 090304	SPGN 321	9.525	3.18	0.4		2.9																
		090308	322	9.525	3.18	0.8		2.9																
		120404	431	12.7	4.76	0.4		2.9																
		120408	432	12.7	4.76	0.8		2.9																
		120412	433	12.7	4.76	1.2		3.4																
	4MT	SPGN 120404	SPGN 431	12.7	4.76	0.4		2.9																
		120408	432	12.7	4.76	0.8		2.9																
		120412	433	12.7	4.76	1.2		3.4																
	Full face	SPGN 090304	SPGN 321	9.525	3.18	0.4																		
		090308	322	9.525	3.18	0.8																		
		120404	431	12.7	4.76	0.4																		
		120408	432	12.7	4.76	0.8																		
		120412	433	12.7	4.76	1.2																		

■ MT : Mini Tips 2MT : Mini 2Tips 4MT : Mini 4Tips

TBGN

POSITIVE 5

■ Carbide backed

TBGN			ISO code		Dimensions (mm)					PCBN											
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X	EB570	EB160	EB560	EB150	EB550	EB190	EB170	EB73	EB51	EB710	EB210
	Full face	TBGN 060102	TBGN(1.2)10.5	3.97	1.59	0.2															
		060104	(1.2)11	3.97	1.59	0.4															
		060108	(1.2)12	3.97	1.59	0.8															
		080202	1.5(1.5)0.5	4.76	2.38	0.2															
		080204	1.5(1.5)1	4.76	2.38	0.4															
		080208	1.5(1.5)2	4.76	2.38	0.8															
		080212	1.5(1.5)3	4.76	2.38	1.2															



TNGA

NEGATIVE _ hole



TNGA		ISO code		Dimensions (mm)						PCBN													
		Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X	
Standard MT 3MT 6VT Solid	TNGA	110304	TNGA	221	6.35	3.18	0.4	2.4	4														
		160404		331	9.525	4.76	0.4	3.81	4														
		160408		332	9.525	4.76	0.8	3.81	3.7														
		220404		431	12.7	4.76	0.4	5.16	4														
		220408		432	12.7	4.76	0.8	5.16	3.7														
	TNGA	110304	TNGA	221	6.35	3.18	0.4	2.4	2.5														
		160404		331	9.525	4.76	0.8	3.81	2.5														
		160408		332	9.525	4.76	0.4	3.81	2.2														
	TNGA	110304	TNGA	221	6.35	3.18	0.4	2.4	2.5														
		160404		331	9.525	4.76	0.4	3.81	2.5														
		160408		332	9.525	4.76	0.8	3.81	2.2														
		220404		431	12.7	4.76	0.4	5.16	2.5														
		220408		432	12.7	4.76	0.8	5.16	2.2														
	TNGA	160404	TNGA	331	9.525	4.76	0.4	3.81	2.9														
		160408		332	9.525	4.76	0.8	3.81	2.6														

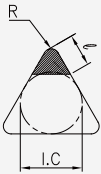
■ MT : Mini Tips 3MT : Mini 3Tips 6VT : Vertical 6Tips

Holder : 77p, 81p, 85p, 86p, 110p, 111p

TNGN

NEGATIVE



TNGN		ISO code		Dimensions (mm)						PCBN												
		Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X
	Standard	TNGN	160404	TNGN	331	9.525	4.76	0.4	4													
			160408		332	9.525	4.76	0.8	3.7													
			160412		333	9.525	4.76	1.2	3.4													
	MT	TNGN	160404	TNGN	331	9.525	4.76	0.4	2.5													
			160408		332	9.525	4.76	0.8	2.2													
			160412		333	9.525	4.76	1.2	2.4													
	3MT	TNGN	160404	TNGN	331	9.525	4.76	0.4	2.5													
			160408		332	9.525	4.76	0.8	2.2													
			160412		333	9.525	4.76	1.2	2.4													
	6VT Solid	TNGN	160404	TNGN	331	9.525	4.76	0.4	2.9													
			160408		332	9.525	4.76	0.8	2.6													
			160412		333	9.525	4.76	1.2	2.3													

■ MT : Mini Tips 3MT : Mini 3Tips 6VT : Vertical 6Tips

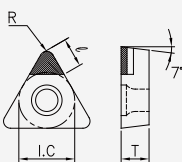
■ Solid

TNGN		ISO code		Dimensions (mm)					PCBN						
		Metric	Inch	I.C	T	R	Hole	ℓ	EB1000	EB50	EB100X	HBN	HBN-T	HBN-W	HBN-N
	Solid	TNGN	110304	TNGN	221	6.35	3.18	0.4							
			110308		222	6.35	3.18	0.8							
			160408		332	9.525	4.76	0.8							
			160412		333	9.525	4.76	1.2							

TCGW

POSITIVE 7 _ hole



TCGW			ISO code		Dimensions (mm)					PCBN															
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X		
	Standard	TCGW 16T302	TCGW 3(2.5)0.5	9.525	3.97	0.2	4.4	4.1																	
		16T304	3(2.5)1	9.525	3.97	0.4	4.4	4																	
		16T308	3(2.5)2	9.525	3.97	0.8	4.4	3.7																	
	MT	TCGW 090202	TCGW 2(1.5)0.5	5.56	2.38	0.2	2.5	2.6																	
		090204	2(1.5)1	5.56	2.38	0.4	2.5	2.5																	
		110202	2(1.5)0.5	6.35	2.38	0.2	2.8	2.6																	
		110204	2(1.5)1	6.35	2.38	0.4	2.8	2.5																	
		110208	2(1.5)2	6.35	2.38	0.8	2.8	2.2																	
		16T302	3(2.5)0.5	9.525	3.97	0.2	4.4	2.6																	
		16T304	3(2.5)1	9.525	3.97	0.4	4.4	2.5																	
		16T308	3(2.5)2	9.525	3.97	0.8	4.4	2.2																	
		3MT	TCGW 090202	TCGW 2(1.5)0.5	5.56	2.38	0.2	2.5	2.6																
	090204		2(1.5)1	5.56	2.38	0.4	2.5	2.5																	
	110202		2(1.5)0.5	6.35	2.38	0.2	2.8	2.6																	
	110204		2(1.5)1	6.35	2.38	0.4	2.8	2.5																	
	110208		2(1.5)2	6.35	2.38	0.8	2.8	2.2																	
	16T302		3(2.5)0.5	9.525	3.97	0.2	4.4	2.6																	
	16T304		3(2.5)1	9.525	3.97	0.4	4.4	2.5																	
	16T308	3(2.5)2	9.525	3.97	0.8	4.4	2.2																		

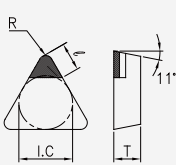
■ MT : Mini Tips 3MT : Mini 3Tips

Holder : 92p, 93p, 115p

TPGN

POSITIVE 11



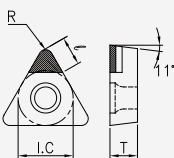
TPGN				ISO code		Dimensions (mm)					PCBN													
				Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X
	Standard	TPGN	160304	TPGN	321	9.525	3.18	0.4		4														
			160308		322	9.525	3.18	0.8		3.7														
			220404		431	12.7	4.76	0.4		4														
			220408		432	12.7	4.76	0.8		3.7														
			220412		433	12.7	4.76	1.2		3.4														
	MT	TPGN	160304	TPGN	321	9.525	3.18	0.4		2.5														
			160308		322	9.525	3.18	0.8		2.2														
	3MT	TPGN	160304	TPGN	321	9.525	3.18	0.4		2.5														
			160308		322	9.525	3.18	0.8		2.2														

■ MT : Mini Tips 3MT : Mini 3Tips

TPGW

POSITIVE 11 _ hole



TPGW			ISO code		Dimensions (mm)					PCBN														
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X	
	Standard	TPGW 160302	TPGW 32(0.5)	9.525	3.18	0.2	4.4	4.1																
			160304	321	9.525	3.18	0.4	4.4	4															
			160308	322	9.525	3.18	0.8	4.4	3.7															
			160404	331	9.525	4.76	0.4	4.4	4															
			160408	332	9.525	4.76	0.8	4.4	3.7															
	MT	TPGW 080202	TPGW 1.5(1.5)0.5	4.76	2.38	0.2	2.3	2.6																
			080204	1.5(1.5)1	4.76	2.38	0.4	2.3	2.5															
			090202	1.5)0.5	5.56	2.38	0.2	2.5	2.6															
			090204	1.5)1	5.56	2.38	0.4	2.5	2.5															
			110202	21(0.5)	6.35	2.38	0.2	2.8	2.6															
			110204	211	6.35	2.38	0.4	2.8	2.5															
			110302	22(0.5)	6.35	3.18	0.2	3.4	2.6															
			110304	221	6.35	3.18	0.4	3.4	2.5															
			110308	222	6.35	3.18	0.8	3.4	2.2															
			160302	32(0.5)	9.525	3.18	0.2	4.4	2.6															
			160304	321	9.525	3.18	0.4	4.4	2.5															
			160308	322	9.525	3.18	0.8	4.4	2.2															
			160404	331	9.525	4.76	0.4	4.4	2.5															
			160408	332	9.525	4.76	0.8	4.4	2.2															
	3MT	TPGW 080202	TPGW 1.5(1.5)0.5	4.76	2.38	0.2	2.3	2.6																
			080204	1.5(1.5)1	4.76	2.38	0.4	2.3	2.5															
			090202	1.5)0.5	5.56	2.38	0.2	2.5	2.6															
			090204	1.5)1	5.56	2.38	0.4	2.5	2.5															
			110202	21(0.5)	6.35	2.38	0.2	2.8	2.6															
			110204	211	6.35	2.38	0.4	2.8	2.5															
			110302	22(0.5)	6.35	3.18	0.2	3.4	2.6															
			110304	221	6.35	3.18	0.4	3.4	2.5															
			110308	222	6.35	3.18	0.8	3.4	2.2															
			160302	32(0.5)	9.525	3.18	0.2	4.4	2.6															
			160304	321	9.525	3.18	0.4	4.4	2.5															
			160308	322	9.525	3.18	0.8	4.4	2.2															
			160404	331	9.525	4.76	0.4	4.4	2.5															
			160408	332	9.525	4.76	0.8	4.4	2.2															

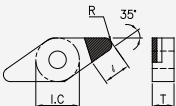
■ MT : Mini Tips 3MT : Mini 3Tips

Holder : 116p

VNGA

NEGATIVE _ hole



VNGA			ISO code		Dimensions (mm)							PCBN											
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X
	Standard	VNGA 160402	VNGA 33(0.5)	9.525	4.76	0.2	3.81	5															
		160404	331	9.525	4.76	0.4	3.81	4.5															
		160408	332	9.525	4.76	0.8	3.81	3.7															
	MT	VNGA 160402	VNGA 33(0.5)	9.525	4.76	0.2	3.81	3															
		160404	331	9.525	4.76	0.4	3.81	2.5															
		160408	332	9.525	4.76	0.8	3.81	2.2															
	2MT	VNGA 160402	VNGA 33(0.5)	9.525	4.76	0.2	3.81	3															
		160404	331	9.525	4.76	0.4	3.81	2.5															
		160408	332	9.525	4.76	0.8	3.81	2.2															
	4VT solid	VNGA 160402	VNGA 33(0.5)	9.525	4.76	0.2	3.81	2.6															
		160404	331	9.525	4.76	0.4	3.81	2.2															
		160408	332	9.525	4.76	0.8	3.81	2.3															

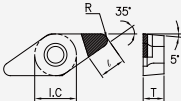
■ MT : Mini Tips 2MT : Mini 2Tips 4VT : Vertical 4Tips

Holder : 78p, 87p, 111p

VBGW

POSITIVE 5 _ hole



ISO code			Dimensions (mm)					PCBN													
			I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X
Metric	Inch																				
	Standard	VBGW 110302	VBGW 22(0.5)	6.35	3.18	0.2	2.8	5													
		110304	221	6.35	3.18	0.4	2.8	4.5													
		160402	33(0.5)	9.525	4.76	0.2	2.8	5													
		160404	331	9.525	4.76	0.4	4.4	4.5													
		160408	332	9.525	4.76	0.8	4.4	3.7													
		160412	333	9.525	4.76	1.2	4.4	3.3													
	MT	VBGW 110302	VBGW 22(0.5)	6.35	3.18	0.2	2.8	3													
		110304	221	6.35	3.18	0.4	2.8	2.5													
		160402	33(0.5)	9.525	4.76	0.2	2.8	3													
		160404	331	9.525	4.76	0.4	4.4	2.5													
		160408	332	9.525	4.76	0.8	4.4	2.2													
		160412	333	9.525	4.76	1.2	4.4	1.8													
	2MT	VBGW 110302	VBGW 22(0.5)	6.35	3.18	0.2	2.8	3													
		110304	221	6.35	3.18	0.4	2.8	2.5													
		160402	33(0.5)	9.525	4.76	0.2	2.8	3													
		160404	331	9.525	4.76	0.4	4.4	2.5													
		160408	332	9.525	4.76	0.8	4.4	2.2													
		160412	333	9.525	4.76	1.2	4.4	1.8													

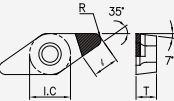
■ MT : Mini Tips 2MT : Mini 2Tips

Holder : 93p, 94p, 117p

VCGW

POSITIVE 7 _ hole



VCGW			ISO code		Dimensions (mm)					PCBN													
			Metric	Inch	I.C	T	R	Hole	ℓ	EB28X (\$)	EB570 (\$)	EB160	EB560 (\$)	EB150	EB550 (\$)	EB190	EB170	EB73	EB54X	EB51	EB710	EB210	EB100X
	Standard	VCGW	110302	VCGW	22(0.5)	6.35	3.18	0.2	2.8	5													
			110304		221	6.35	3.18	0.4	2.8	4.5													
			160402		33(0.5)	9.525	4.76	0.2	4.4	5													
			160404		331	9.525	4.76	0.4	4.4	4.5													
			160408		332	9.525	4.76	0.8	4.4	3.7													
			160412		333	9.525	4.76	1.2	4.4	3.3													
	MT	VCGW	110302	VCGW	22(0.5)	6.35	3.18	0.2	2.8	3													
			110304		221	6.35	3.18	0.4	2.8	2.5													
			160402		33(0.5)	9.525	4.76	0.2	4.4	3													
			160404		331	9.525	4.76	0.4	4.4	2.5													
			160408		332	9.525	4.76	0.8	4.4	2.2													
			160412		333	9.525	4.76	1.2	4.4	1.8													
	2MT	VCGW	110302	VCGW	22(0.5)	6.35	3.18	0.2	2.8	3													
			110304		221	6.35	3.18	0.4	2.8	2.5													
			160402		33(0.5)	9.525	4.76	0.2	4.4	3													
			160404		331	9.525	4.76	0.4	4.4	2.5													
			160408		332	9.525	4.76	0.8	4.4	2.2													
			160412		333	9.525	4.76	1.2	4.4	1.8													

■ MT : Mini Tips 2MT : Mini 2Tips

Holder : 95p, 116p, 117p, 118p

RNGN

NEGATIVE

■ Carbide backed

ISO code			Dimensions (mm)					PCBN							
RNGN			Metric	Inch	I.C	T	R								
	RNGN	060300	RNGN	220	6.35	3.18									
		090300		320	9.525	3.18									
		090400		330	9.525	4.76									
		120300		420	12.7	3.18									
		120400		430	12.7	4.76									

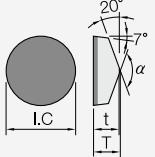
■ Solid

ISO code			Dimensions (mm)					PCBN									
RNGN			Metric	Inch	I.C	T	R										
	RNGN	060300	RNGN	220	6.35	3.18											
		090300		320	9.525	3.18											
		090400		330	9.525	4.76											
		120300		420	12.7	3.18											
		120400		430	12.7	4.76											

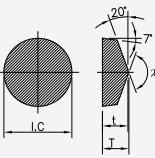
RCGX

POSITIVE 7

■ Carbide backed

RCGX	ISO code		Dimensions (mm)				PCBN									
	Metric	Inch	I.C	t	T	α	EB51	EB71	EB71X							
	RCGX 060300	RCGX 220	6.35	3.18	3.32	140°										
	090300	320	9.525	3.18	3.32	140°										
	090700	3(-)	9.525	7.7	7.94	120°										
	120400	430	12.7	4.76	4.94	140°										
	120700	4(-)	12.7	7.7	7.94	140°										
	191000	(-)	19.05	9.77	10	120°										

■ Solid

RCGX	ISO code		Dimensions (mm)				PCBN									
	Metric	Inch	I.C	t	T	α	HBN-R	HBN-N								
	RCGX 060300	RCGX 220	6.35	3.18	3.32	140°										
	090300	320	9.525	3.18	3.32	140°										
	090700	3(-)	9.525	7.7	7.94	120°										
	120400	430	12.7	4.76	4.94	140°										
	120700	4(-)	12.7	7.7	7.94	140°										
	191000	(-)	19.05	9.77	10	120°										

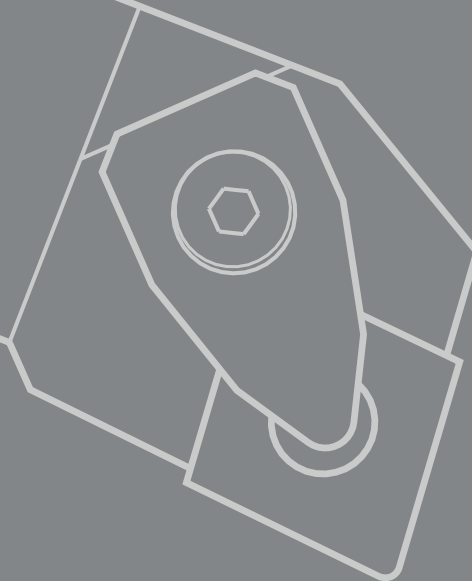
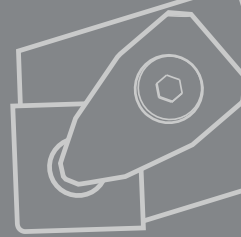


MEMO

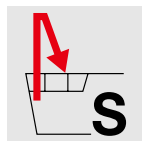
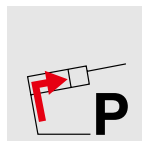
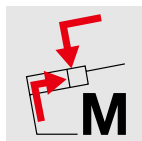
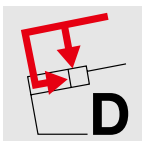
Turning



Turning_ **Holder**



How to combine the holder

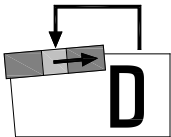


- D** Double clamping
- M** Multi locking
- P** Lever locking
- S** Screw clamping

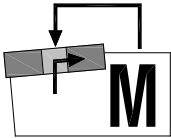
Designation system

D S K D

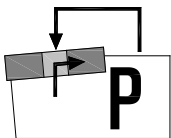
Clamp type Insert shape Tool style Clearance angle



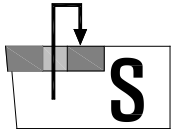
Double clamping



Multi locking



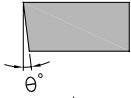
Lever locking



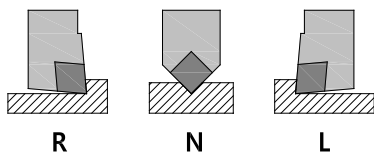
Screw clamping

Symbol	Shape
C	
D	
E	
L	
R	
S	
T	
V	
W	

A	B	D	E
F	G	H	J
K	L	N	Q
R	S	T	V



Symbol	Angle
N	0°
A	3°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°

R**25****25****12****1****Cutting direction****Tool height****Tool width**

H	I.C size (mm)	
12	12	12
16	16	16
20	20	20
25	25	25
32	32	32
40	40	40
50	50	50

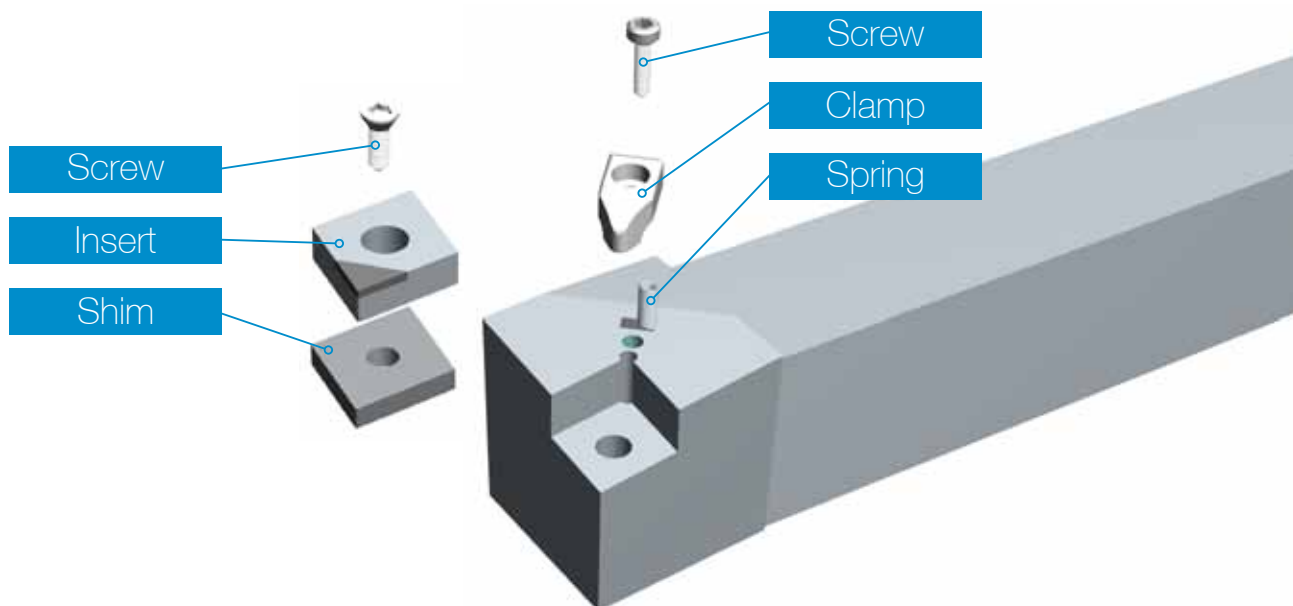
W	W (mm)	
12	12	12
16	16	16
20	20	20
25	25	25
32	32	32
40	40	40
50	50	50

1 Cutting edge length

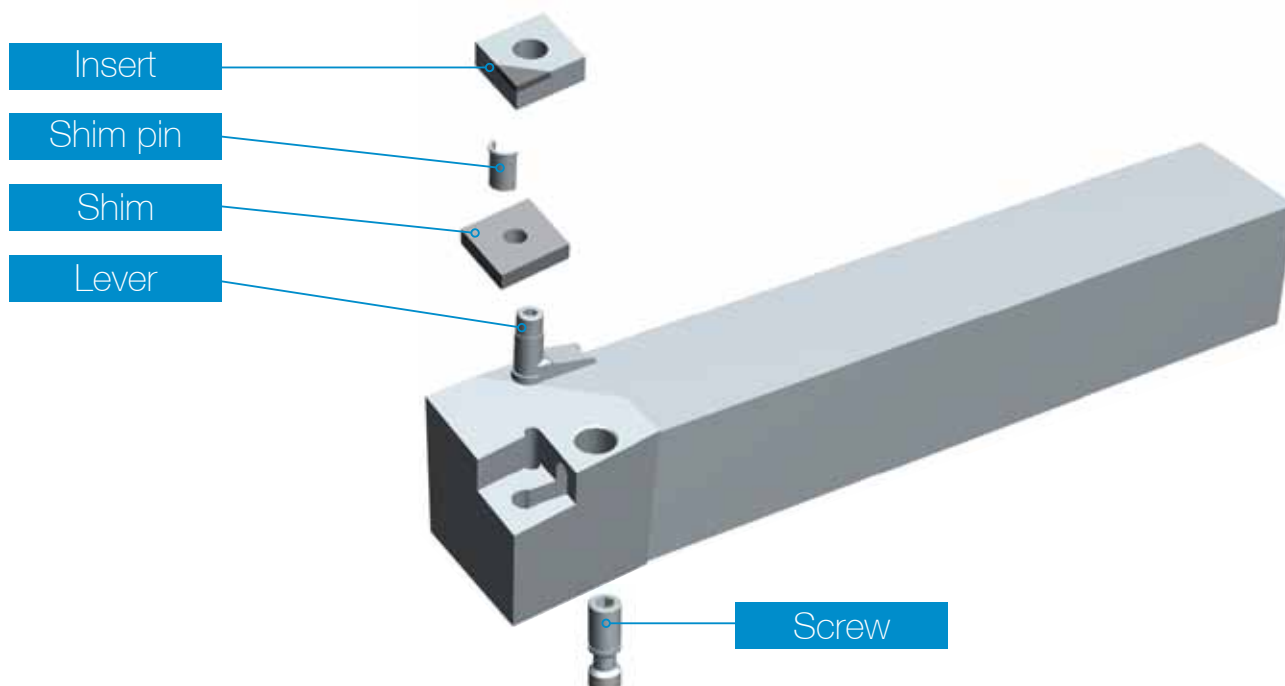
C	D	E	R	S	T	V	W	K	I.C size (mm)
03	04			03	06				3.97
05	06			05	09	09	03		5.56
06	07			06	11	11	04		6.35
08	09			07	13	13	05		7.94
			08						8
09	11		09	09	16	16	06	16	9.525
			10						10
			12						12
12	15	13	12.7	12	22	22	08		12.7
16	19		15	15	27	27	10		15.875
			16						16
19	23		19	19	33	33	13		19.05
			20						20
			25						25
25	31		25	25	44				25.4
			32						32

Tool Holder Clamping Type

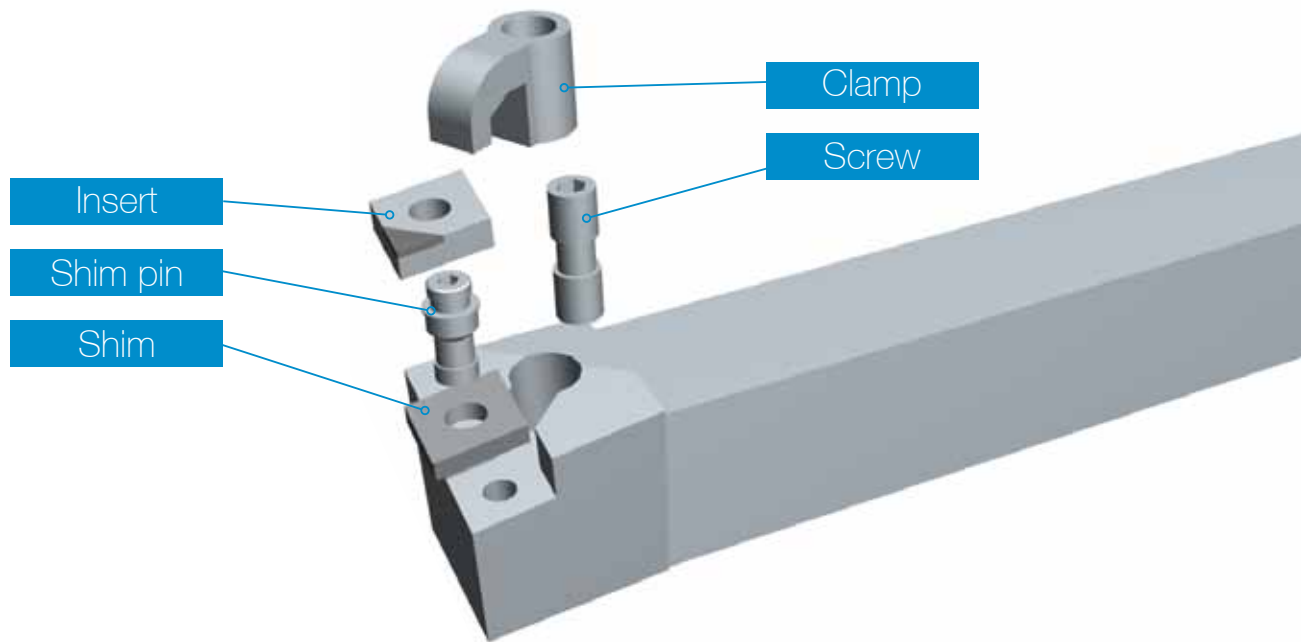
Double clamping



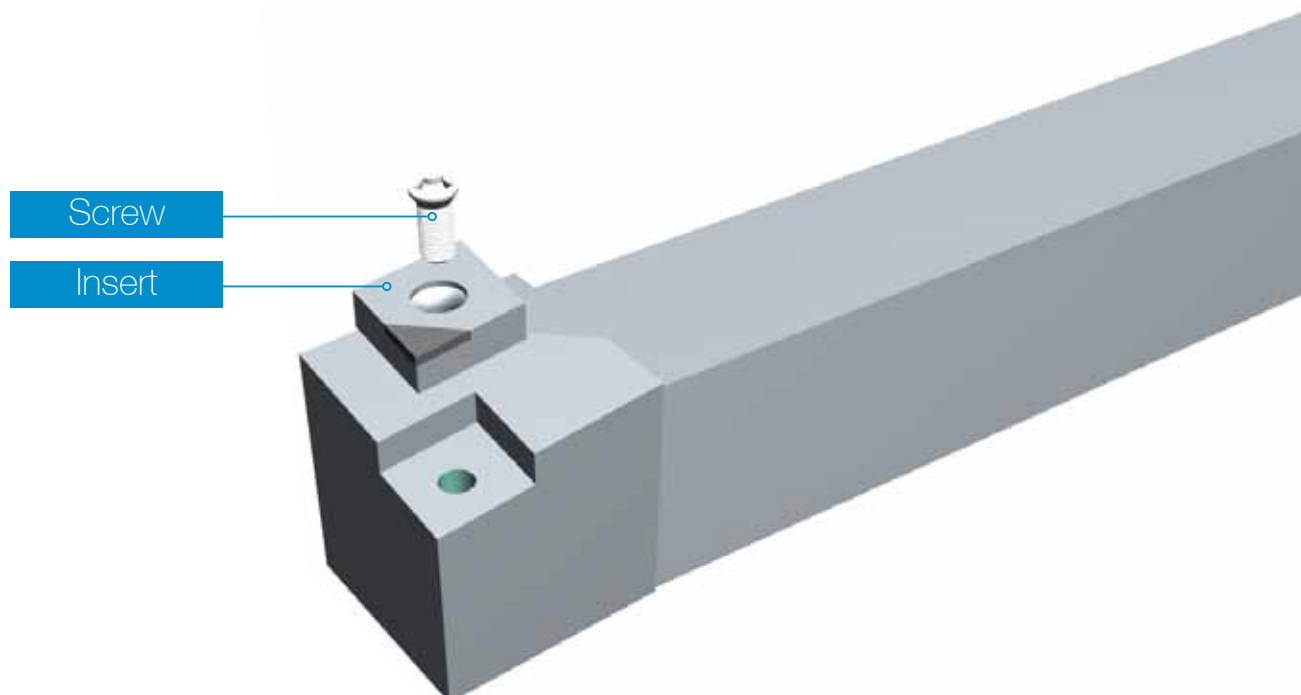
Lever locking



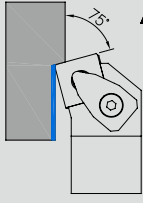
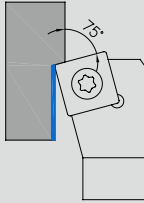
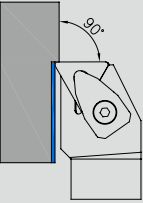
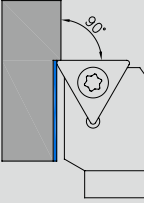
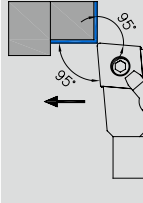
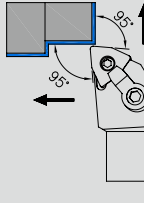
Multi locking

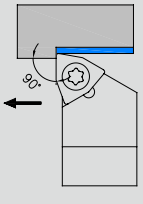
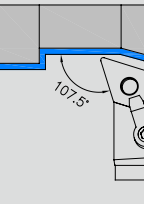
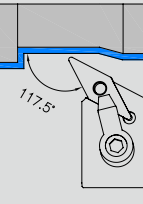
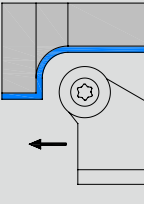
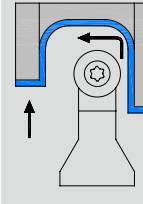
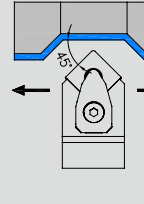


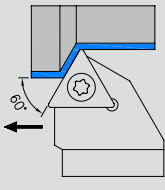
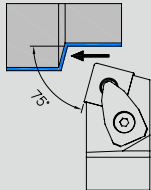
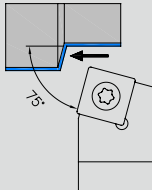
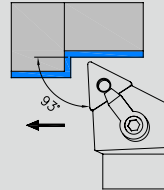
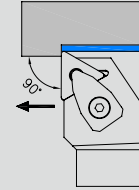
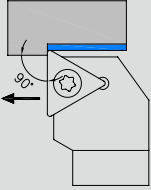
Screw clamping

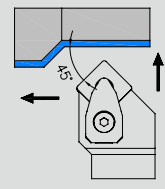
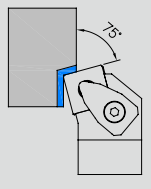
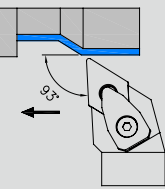
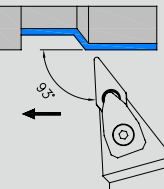
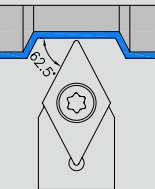
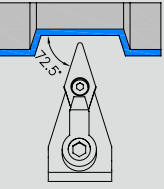


Application Of Holders

Edge/ angle	75° SN□□ type	75° SC□□ type	90° TN□□ type	90° TC□□ type	95° CN□□ type	95° WN□□ type
Touring						
D type			DTFN : 77p		DCLN : 75p	DWLN : 78p
P type			PTFN : 81p		PCLN : 79p	PWLN : 82p
M type	MSKN : 119p		MTFN : 86p		MCCN : 83p	MWLN : 88p
S type		SSKC : 91p		STFC : 92p		

Edge/ angle	90° WC□□ type	107.5° SC□□ type	117.5° VN□□ type	RC□□ type	RC□□ type	45° SN□□ type
Touring						
D type						DSDNN : 76p
P type						PSDNN : 80p
M type		MDQN : 83p	MVQN : 87p			
S type				SRCG : 90p	SRDCN : 90p	

Edge/ angle	60° TC□□ type	75° SN□□ type	75° SC□□ type	93° TN□□ type	90° TN□□ type	90° TC□□ type
Turning						
D type		DSBN : 76p			DTGN : 77p	
P type		PSBN : 80p			PTGN : 82p	
M type		MSRN : 85p		MTJN : 86p		
S type	STTC : 93p		SSBC : 91p			STGC : 93p

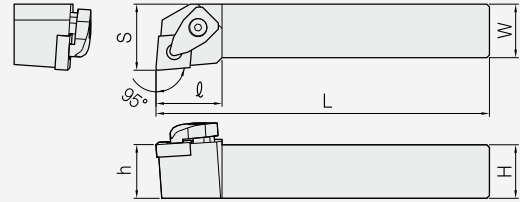
Edge/ angle	45° SN□□ type	75° SN□□ type	93° DN□□ type	93° VN□□ type	62.5° DN□□ type	72.5° VN□□ type
Turning						
D type	DSSN : 77p	DSKN : 76p	DDJN : 75p	DVJN : 78p		DVNN : 78p
P type	PSSN : 81p		PDJN : 79p		PDMN : 80p	
M type	MSSN : 85p	MSKN : 84p	MDJN : 84p	MVJN : 87p	MDNN : 61p	MVNN : 87p
S type						



DCLN^{R/L}

Double Clamping

+ **CN**□□

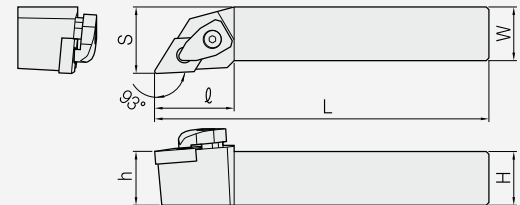


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
CN□□1204□□	EH-DCLN R/L 2020-12	20	20	125	25	20	30	DCL4	DCS0518	DSC44	DSCR0410	DSPR0714	W30P
	2525-12	25	25	150	32	25	30						
	3225-12	32	25	170	32	32	30						
	3232-12	32	32	170	40	32	30						

DDJN^{R/L}

Double Clamping

+ **DN**□□

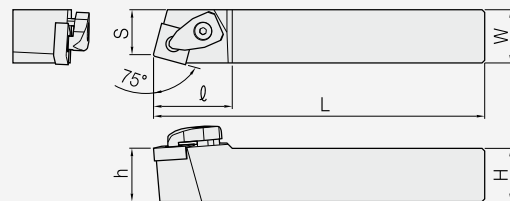


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
DN□□1104□□	EH-DDJN R/L 2020-11	20	20	125	25	20	30	DCL3	DCS0415	DSD32	DSCR0307	DSPR0510	W25P
	2525-11	25	25	150	32	25	30						
	3225-11	32	25	170	32	32	30						
	3232-11	32	32	170	40	32	30						
DN□□1506□□	EH-DDJN R/L 2020-15	20	20	125	25	20	35	DCL4	DCS0518	DSD43	DSCR0410	DSPR0714	W30P
	2525-15	25	25	150	32	25	35						
	3225-15	32	25	170	32	32	35						
	3232-15	32	32	170	40	32	35						
DN□□1504□□	EH-DDJN R/L 2020-15-3	20	20	125	25	20	35	DCL4	DCS0518	DSD44	DSCR0410	DSPR0714	W30P
	2525-15-3	25	25	150	32	25	35						
	3232-15-3	32	32	170	40	32	35						

DSBN^{R/L}

Double Clamping

+ SN □ □

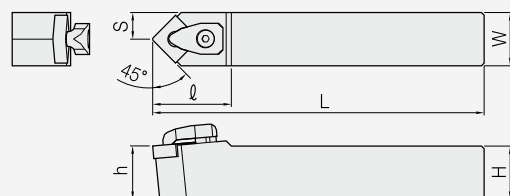


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
SN □ □ 0903 □ □	EH-DSBN R/L 2020-09	20	20	125	17	20	25						
	2525-09	25	25	150	22	25	25						
SN □ □ 1204 □ □	EH-DSBN R/L 2020-12	20	20	125	17	20	32						
	2525-12	25	25	150	22	25	32						
	3225-12	32	25	170	22	32	32						
	3232-12	32	32	170	27	32	32						

DSDNN

Double Clamping

+ SN □ □

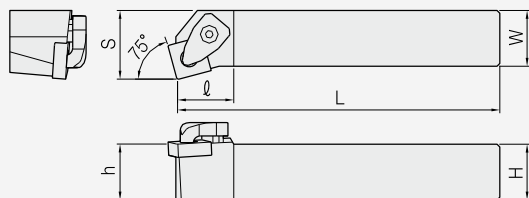


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
SN □ □ 0903 □ □	EH-DSDNN 2020-09	20	20	125	10	20	26.5						
	EH-DSDNN 2020-12	20	20	125	10	20	33						
SN □ □ 1204 □ □	2525-12	25	25	150	12.5	25	33						
	3225-12	32	25	170	12.5	32	33						
	3232-12	32	32	170	16	32	33						

DSKN^{R/L}

Double Clamping

+ SN □ □

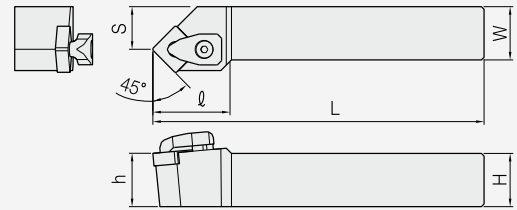


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
SN □ □ 0903 □ □	EH-DSKN R/L 2020-09	20	20	125	25	20	20						
	EH-DSKN R/L 2020-12	20	20	125	25	20	23						
SN □ □ 1204 □ □	2525-12	25	25	150	32	25	23						
	3232-12	32	32	170	40	32	23						

DSSN^{R/L}

Double Clamping

+ **SN**□□

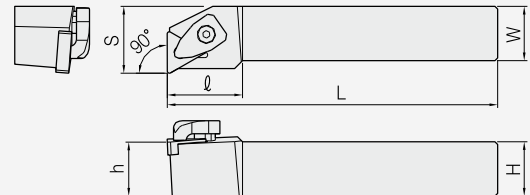


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
SN□□0903□□	EH-DSSN R/L 2020-09	20	20	125	25	20	28.5	DCL3	DCS0415	DSS32	DSCR0307	DSPR0510	W25P
	EH-DSSN R/L 2020-12	20	20	125	25	20	35	DCL4	DCS0518	DSS44	DSCR0410	DSPR0714	W30P
	2525-12	25	25	150	32	25	35						
	3225-12	32	25	170	32	32	35						
	3232-12	32	32	170	40	32	35						

DTFN^{R/L}

Double Clamping

+ **TN**□□

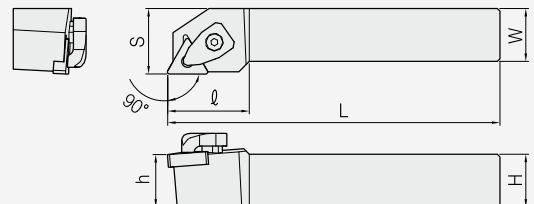


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
TN□□1604□□	EH-DTFN R/L 2020-16	20	20	125	25	20	24.5	DCL3	DCS0415	DST32	DSCR0307	DSPR0510	W25P
	2525-16	25	25	150	32	25	24.5						
	3232-16	32	32	170	40	32	23.5						
TN□□2204□□	EH-DTFN R/L 2525-22	25	25	150	32	25	33	DCL4	DCS0518	DST44	DSCR0410	DSPR0714	W30P
	3225-22	32	25	170	32	32	33						
	3232-22	32	32	170	40	32	33						

DTGN^{R/L}

Double Clamping

+ **TN**□□

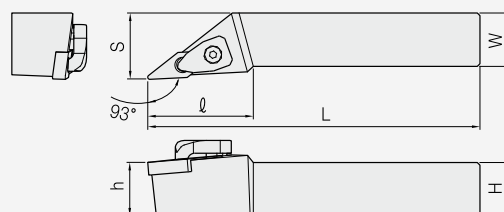


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
TN□□1604□□	EH-DTGN R/L 2020-16	20	20	125	25	20	24.5	DCL3	DCS0415	DST32	DSCR0307	DSPR0510	W25P
	2525-16	25	25	150	32	25	24.5						
	3232-16	32	32	170	40	32	23.5						
TN□□2204□□	EH-DTGN R/L 2525-22	25	25	150	32	25	32.6	DCL4	DCS0518	DST44	DSCR0410	DSPR0714	W30P
	3225-22	32	25	170	32	32	32.6						
	3232-22	32	32	170	40	32	32.6						

DVJN^{R/L}

Double Clamping

+ VN□□

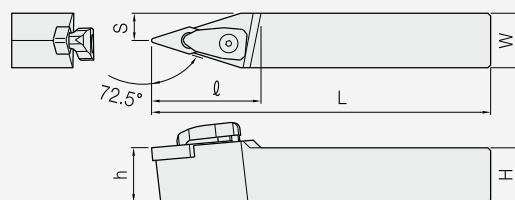


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
VN□□1604□□	EH-DVJN R/L 2020-16	20	20	125	25	20	41.5						
	2525-16	25	25	150	32	25	41.5	DCL3	DCS0518	DSV32	DSCR-03508	DSPR0714	W30P
	3232-16	32	32	170	40	32	41.5						

DVVNN

Double Clamping

+ VN□□

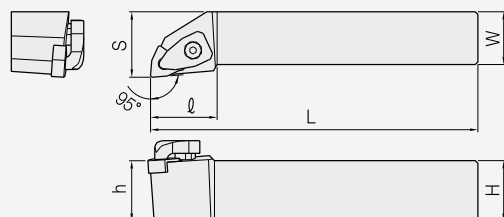


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
VN□□1604□□	EH-DVVNN 2020-16	20	20	125	10	20	40						
	2525-16	25	25	150	12.5	25	40	DCL3	DCS0518	DSV32	DSCR-03508	DSPR0714	W30P
	3232-16	32	32	170	16	32	40						

DWLN^{R/L}

Double Clamping

+ WN□□

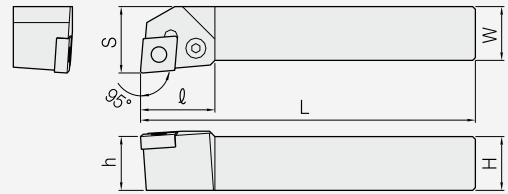


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Screw	Spring	Wrench
		H	W	L	S	h	ℓ						
WN□□0604□□	EH-DWLN R/L 2020-06	20	20	125	25	20	26						
	2525-06	25	25	150	32	25	26	DCL3	DCS0415	DSW32	DSCR0307	DSPR0510	W25P
WN□□0804□□	EH-DWLN R/L 2020-08	20	20	125	25	20	32						
	2525-08	25	25	150	32	25	32	DCL4	DCS0518	DSW44	DSCR0410	DSPR0714	W30P

PCLN^{R/L}

Lever Locking

+ **CN**□□

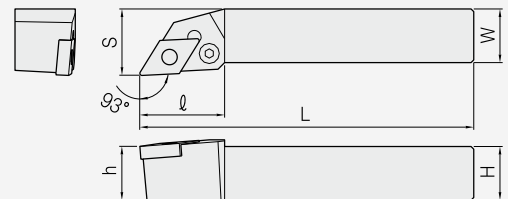


Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	l						
CN□□0903□□	EH-PCLN R/L 1616-09	16	16	100	20	16	20	LV3	LVSCR-0617	LVSC32	LVSP3	W25L	LVSPS3
	2020-09	20	20	125	25	20	22						
	2525-09	25	25	150	32	25	22						
CN□□1204□□	EH-PCLN R/L 1616-12	16	16	100	20	16	28	LV4	LVSCR-0821	LVSC42	LVSP4	W30L	LVSPS4
	2020-12	20	20	125	25	20	28						
	2525-12	25	25	150	32	25	28						
	3225-12	32	25	170	32	32	28						
	3232-12	32	32	170	40	32	28						

PDJN^{R/L}

Lever Locking

+ **DN**□□

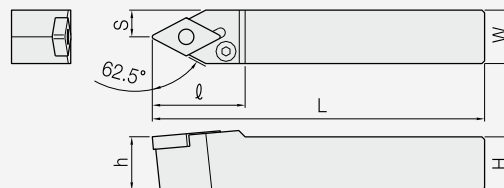


Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	l						
DN□□1104□□	EH-PDJN R/L 1616-11	16	16	100	20	16	25	LV3	LVSCR-0617	LVSD317	LVSP3	W25L	LVSPS3
	2020-11	20	20	125	25	20	25						
	2525-11	25	25	150	32	25	30						
DN□□1506□□	EH-PDJN R/L 2020-15	20	20	125	25	20	35	LV4B	LVSCR-0821	LVSD42	LVSP4	W30L	LVSPS4
	2525-15	25	25	150	32	25	35						
	3225-15	32	25	170	32	32	35						
	3232-15	32	32	170	40	32	35						
DN□□1504□□	EH-PDJN R/L 2020-15-3	20	20	125	25	20	35	LV4	LVSCR-0821	LVSD42	LVSP4	W30L	LVSPS4
	2525-15-3	25	25	150	32	25	35						
	3232-15-3	32	32	170	40	32	35						

PDNN^{R/L}

Lever Locking

+ DN □ □

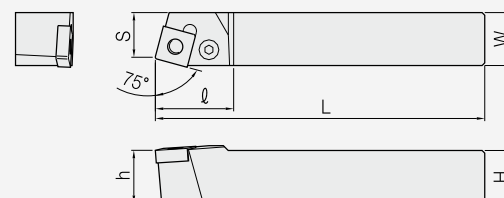


Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	ℓ						
DN□□1506□□	EH-PDNN R/L 2020-15	20	20	125	8	20	37	LV4B	LVSCR-0821	LVSD42	LVSP4	W30L	LVSPS4
	2525-15	25	25	150	12.5	25	37						
	3232-15	32	32	150	16	32	37						
	4025-15	40	25	170	12.5	32	37						
DN□□1504□□	EH-PDNN R/L 2525-15-3	25	25	150	12.5	25	37	LV4	LVSCR-0821	LVSD42	LVSP4	W30L	LVSPS4
	4025-15-3	40	25	150	12.5	25	37						

PSBN^{R/L}

Lever Locking

+ SN □ □

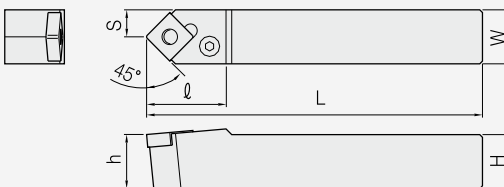


Insert	Item No.	Dimensions (mm)							Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	ℓ							
SN□□0903□□	EH-PSBN R/L 1616-09	16	16	100	13	16	21	LV3	LVSCR-0617	LVSS32	LVSP3	W25L	LVSPS3	
	2020-09	20	20	125	17	20	23							
SN□□1204□□	EH-PSBN R/L 2020-12	20	20	125	17	20	28	LV4	LVSCR-0821	LVSS42	LVSP4	W30L	LVSPS4	
	2525-12	25	25	150	22	25	28							
	3225-12	32	32	170	22	32	28							
	3232-12	32	32	170	27	32	28							

PSDNN

Lever Locking

+ SN □ □

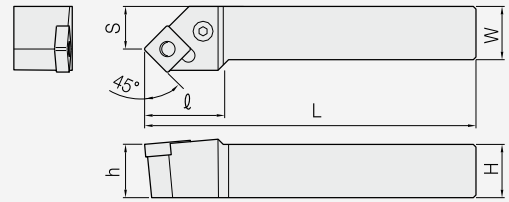


Insert	Item No.	Dimensions (mm)							Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	ℓ							
SN□□0903□□	EH-PSDNN 1616-09	16	16	100	13	16	21	LV3	LVSCR0617	LVSS32	LVSP3	W25L	LVSPS3	
SN□□1204□□	EH-PSDNN 2020-12	20	20	125	10	20	30	LV4	LVSCR-0821	LVSS42	LVSP4	W30L	LVSPS4	
	2525-12	25	25	150	12.5	25	30							
	3232-12	32	32	170	16	32	40							

PSSN^{R/L}

Lever Locking

+ **SN**□□

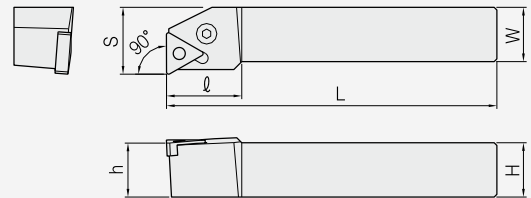


Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	ℓ						
SN□□0903□□	EH-PSSN R/L 1616-09	16	18	100	20	16	25	LV3	LVSCR0617	LVSS32	LVSP10	W25L	LVSPS3
	EH-PSSN R/L 2020-12	20	20	125	25	20	30	LV4	LVSCR-0821	LVSS42	LVSP4	W30L	LVSPS4
	2525-12	25	25	150	32	25	36						
SN□□1204□□	3232-12	32	32	170	40	32	40						

PTFN^{R/L}

Lever Locking

+ **TN**□□

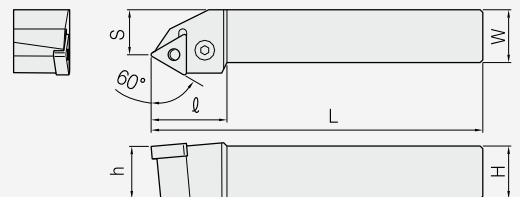


Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	ℓ						
TN□□1604□□	EH-PTFN R/L 1616-16	16	16	100	20	16	20	LV3	LVSCR-0617	LVST317	LVSP3	W25L	LVSPS3
	2020-16	20	20	125	25	20	20						
	2525-16	25	25	150	32	25	20						
TN□□2204□□	EH-PTFN R/L 2525-22	25	25	150	32	25	25	LV4	LVSCR-0821	LVST42	LVSP4	W30L	LVSPS4
	3232-22	32	32	170	40	32	25						

PTTN^{R/L}

Lever Locking

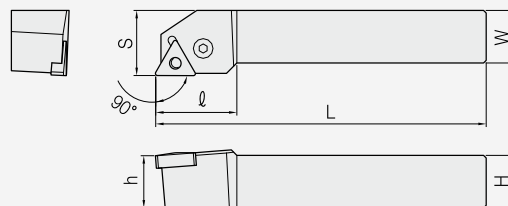
+ **TN**□□



Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	ℓ						
TN□□1604□□	EH-PTTN R/L 1616-16	16	16	100	13	16	25	LV3	LVSCR-0617	LVST317	LVSP3	W25L	LVSPS3
	2020-16	20	20	125	17	20	25						
	2525-16	25	25	150	22	25	32						
TN□□2204□□	EH-PTTN R/L 2525-22	25	25	150	22	25	32	LV4	LVSCR-0821	LVST42	LVSP4	W30L	LVSPS4

PTGN^{R/L}

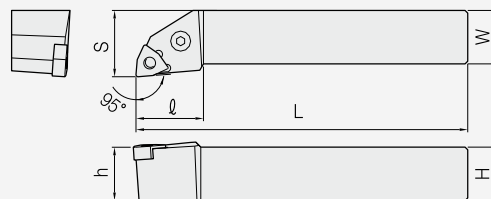
Lever Locking

+ **TN**□□


Insert	Item No.	Dimensions (mm)							Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	l							
TN□□1103□□	EH-PTGN R/L 1212-11	12	12	80	16	12	16	LV2	LVSCR-0509B	-	-	W20L	-	
	1616-11	16	16	100	20	16	18							
	2020-11	20	20	125	25	20	19							
	2525-11	25	25	150	32	25	20							
TN□□1604□□	EH-PTGN R/L 1616-16	16	16	100	20	16	20	LV3	LVSCR-0617	LVST317	LVSP3	W25L	LVSPS3	
	2020-16	20	20	125	25	20	20							
	2525-16	25	25	150	32	25	20							
	3232-16	32	32	170	40	32	20							
TN□□2204□□	EH-PTGN R/L 2525-22	25	25	150	32	25	28	LV4	LVSCR-0821	LVST42	LVSP4	W30L	LVSPS4	
	3232-22	32	32	170	40	32	28							

PWLN^{R/L}

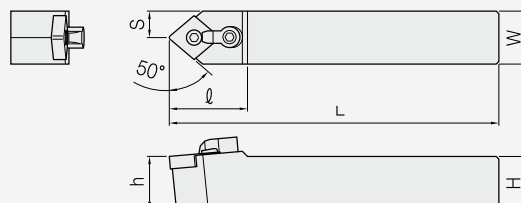
Lever Locking

+ **WN**□□


Insert	Item No.	Dimensions (mm)							Lever	Screw	Shim	Shim Pin	Wrench	Shim pin punch
		H	W	L	S	h	l							
WN□□0604□□	EH-PWLN R/L 1616-06	16	16	100	20	16	20	LV3	LVSCR-0617	LVSW-317	LVSP3	W25L	LVSPS3	
	2020-06	20	20	125	25	20	20							
	2525-06	25	25	150	32	25	20							
WN□□0804□□	EH-PWLN R/L 2020-08	20	20	125	25	20	26	LV4	LVSCR-0821	LVSW42	LVSP4	W30L	LVSPS4	
	2525-08	25	25	150	32	25	26							

MCMNN

Multi Locking

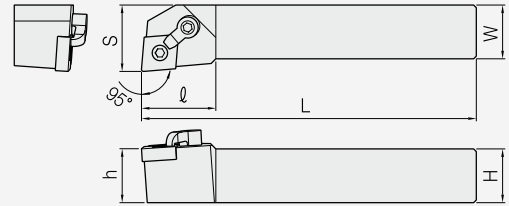
+ **CN**□□


Insert	Item No.	Dimensions (mm)							Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	l						
CN□□1204□□	EH-MCMNN 2020-12	20	20	125	10	20	32	MCL6N		MCSCR-1/4-25	MSC43	MSP4D	W31.8L W23.8L
	2525-12	25	25	150	12.5	25	32						
	3232-12	32	32	170	16	32	32						

MCLN^{R/L}

Multi Locking

+ **CN**□□

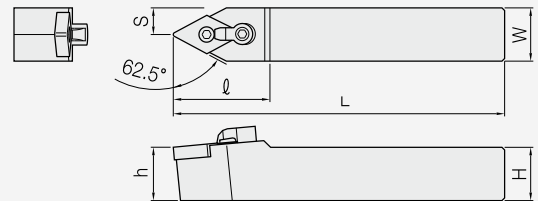


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	l					
CN□□0903□□	EH-MCLN R/L 1616-09	16	16	100	20	16	25	MCL7N	MCSCR-10-32-19	MSC32	MSP3DS	W23.8L W19.8L
	2020-09	20	20	125	25	20	25					
	2525-09	25	25	150	32	25	25					
CN□□1204□□	EH-MCLN R/L 2020-12	20	20	125	25	20	32	MCL6N	MCSCR-1/4-25	MSC43	MSP4D	W31.8L W23.8L
	2525-12	25	25	150	32	25	32					
	3225-12	32	25	170	32	32	32					
	3232-12	32	32	170	40	32	32					

MDNNN

Multi Locking

+ **DN**□□

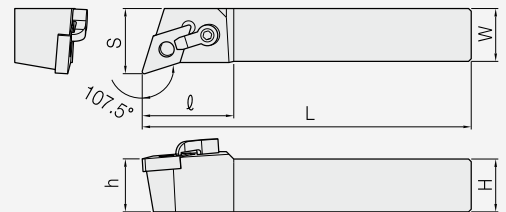


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	l					
DN□□1504□□	EH-MDNNN 2525-15-3	25	25	150	12.5	25	41	MCL8N	MCSCR-5/16-32	MSD43	MSP4D	W39.7L W23.8L
	EH-MDNNN 2525-15	25	25	150	12.5	25	41					
DN□□1506□□	EH-MDNNN 2525-15	25	25	150	12.5	25	41	MCL8N	MCSCR-5/16-32	MSD43	MSP4DL	W39.7L W23.8L

MDQN^{R/L}

Multi Locking

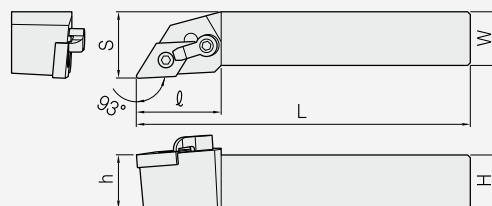
+ **DN**□□



Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	l					
DN□□1504□□	EH-MDQN R/L 2525-15-3	25	25	150	32	25	36	MCL6N	MCSCR-1/4-25	MSD43	MSP4D	W31.8L W23.8L
	3232-15-3	32	32	170	40	32	36					
DN□□1506□□	EH-MDQN R/L 2525-15	25	25	150	32	25	36	MCL6N	MCSCR-1/4-25	MSD43	MSP4DL	W31.8L W23.8L
	3232-15	32	32	170	40	32	36					

MDJN^{R/L}

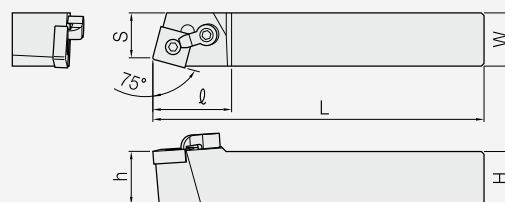
Multi Locking

+ **DN**□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	l					
DN□□1104□□	EH-MDJN R/L 2020-11 2525-11	20	20	125	25	20	32	MCL6N	MCSCR-1/4-19	MSD32	MSP3D	W31.8L W19.8L
		25	25	150	32	25	32					
DN□□1504□□	EH-MDJN R/L 2020-15-3	20	20	125	25	20	36	MCL6N	MCSCR-1/4-25	MSD43	MSP4D	W31.8L W23.8L
	2525-15-3	25	25	150	32	25	36					
	3232-15-3	32	32	170	40	32	36					
DN□□1506□□	EH-MDJN R/L 2020-15	20	20	125	25	20	36	MCL6N	MCSCR-1/4-25	MSD43	MSP4DL	W31.8L W23.8L
	2525-15	25	25	150	32	25	36					
	3232-15	32	32	170	40	32	36					

MSBN^{R/L}

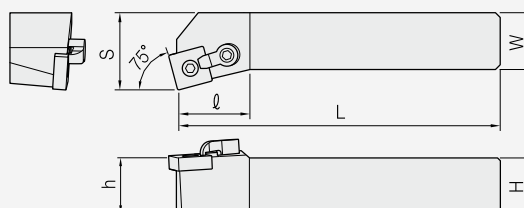
Multi Locking

+ **SN**□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	l					
SN□□1204□□	EH-MSBN R/L 2020-12 2525-12	20	20	125	17	20	32	MCL8N1	MCSCR-5/16-32	MSS43	MSP4D	W39.7L W23.8L
		25	25	150	22	25	32					

MSKN^{R/L}

Multi Locking

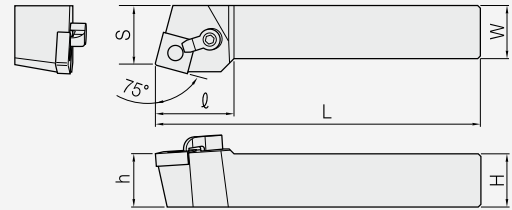
+ **SN**□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	l					
SN□□0903□□	EH-MSKN R/L 1616-09 2020-09	16	16	100	20	16	28	MCL7N	MCSCR-10-32-19	MSS32	MSP3DS	W19.8L W23.8L
		20	20	125	22	20	28					
SN□□1204□□	EH-MSKN R/L 2020-12	20	20	125	25	20	32	MCL8N1	MCSCR-5/16-32	MSS43	MSP4D	W39.7L W23.8L
	2525-12	25	25	150	32	25	32					
	3225-12	32	32	170	32	32	32					

MSRN^{R/L}

Multi Locking

+ **SN**□□

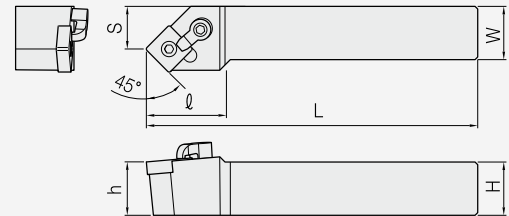


Insert	Item No.	Dimensions (mm)							Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	ℓ						
SN□□0903□□	EH-MSRN R/L 1616-09	16	16	100	17	16	28	MCL7N	MCSCR-10-32-19	MSS32	MSP3DS	W19.8L W23.8L	
	2020-09	20	20	125	22	20	28						
SN□□1204□□	EH-MSRN R/L 2020-12	20	20	125	22	20	32	MCL8N1	MCSCR-5/16-32	MSS43	MSP4D	W39.7L W23.8L	
	2525-12	25	25	150	27	25	32						

MSSN^{R/L}

Multi Locking

+ **SN**□□

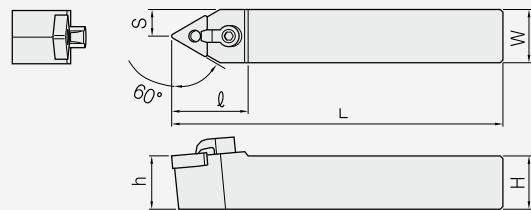


Insert	Item No.	Dimensions (mm)							Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	ℓ						
SN□□0903□□	EH-MSSN R/L 1616-09	16	16	100	20	16	28	MCL7N	MCSCR-10-32-19	MSS32	MSP3DS	W19.8L W23.8L	
	2020-09	20	20	125	25	20	28						
SN□□1204□□	EH-MSSN R/L 2020-12	20	20	125	25	20	32	MCL8N1	MCSCR-5/16-32	MSS43	MSP4D	W39.7L W23.8L	
	2525-12	25	25	150	32	25	32						

MTENN

Multi Locking

+ **TN**□□

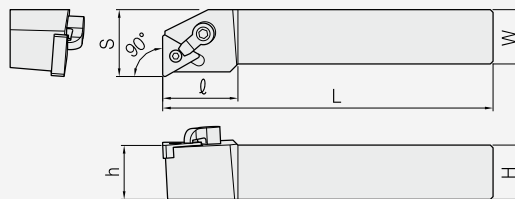


Insert	Item No.		Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
			H	W	L	S	h	ℓ					
TN□□1604□□	EH-MTENN	2020-16	20	20	125	10	20	32	MCL7N	MCSCR-10-32-19	MST32	MSP3D	W23.8L W19.8L
		2525-16	25	25	150	12.5	25	32					
TN□□2204□□	EH-MTENN	2525-22	25	25	150	12.5	25	35	MCL8N1	MCSCR-5/16-32	MST43	MSP4D	W39.7L W23.8L

MTFN^{R/L}

Multi Locking

+ **TN** □ □

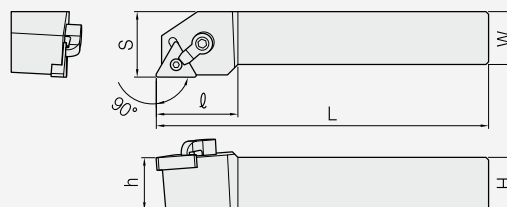


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	ℓ					
TN □ □ 1604 □ □	EH-MTFN R/L 1616-16	16	16	100	20	16	32	MCL7N	MCSCR-10-32-19	MST32	MSP3D	W23.8L W19.8L
	2020-16	20	20	125	25	20	32					
	2525-16	25	25	150	32	25	32					
TN □ □ 2204 □ □	EH-MTFN R/L 2525-22	25	25	150	32	25	32	MCL8N1	MCSCR-5/16-32	MST43	MSP4D	W39.7L W23.8L
	3232-22	32	32	170	40	32	32					
	4040-22	40	40	250	50	40	32					

MTGN^{R/L}

Multi Locking

+ **TN** □ □

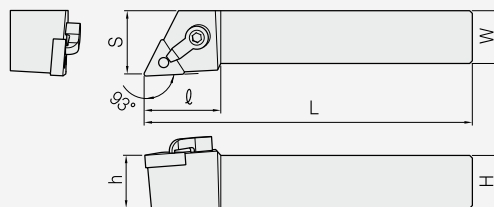


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	ℓ					
TN □ □ 1604 □ □	EH-MTGN R/L 1616-16	16	16	100	20	16	32	MCL7N	MCSCR-10-32-19	MST32	MSP3D	W23.8L W19.8L
	2020-16	20	20	125	25	20	32					
	2525-16	25	25	150	32	25	32					
TN □ □ 2204 □ □	EH-MTGN R/L 2525-22	25	25	150	32	25	32	MCL8N1	MCSCR-5/16-32	MST43	MSP4D	W39.7L W23.8L
	3232-22	32	32	170	40	32	32					

MTJN^{R/L}

Multi Locking

+ **TN** □ □

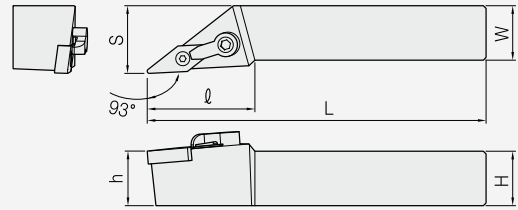


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	ℓ					
TN □ □ 1604 □ □	EH-MTJN R/L 2020-16	20	20	125	25	20	32	MCL7N	MCSCR-10-32-19	MST32	MSP3D	W23.8L W19.8L
	2525-16	25	25	150	32	25	32					
TN □ □ 2204 □ □	EH-MTJN R/L 2525-22	25	25	150	32	25	32	MCL8N1	MCSCR-5/16-32	MST43	MSP4D	W39.7L W23.8L
	3232-22	32	32	170	40	32	32					

MVJN^{R/L}

Multi Locking

+ VN□□

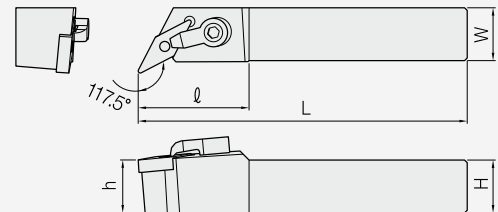


Insert	Item No.	Dimensions (mm)							Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	ℓ						
VN□□1604□□	EH-MVJN R/L 2020-16	20	20	125	25	20	37		MCL8N1	MCSCR-5/16-32	MSV32	MSP3D	W39.7L W23.8L
	2525-16	25	25	150	32	25	37						
	3232-16	32	32	170	40	32	37						

MVQN^{R/L}

Multi Locking

+ VN□□

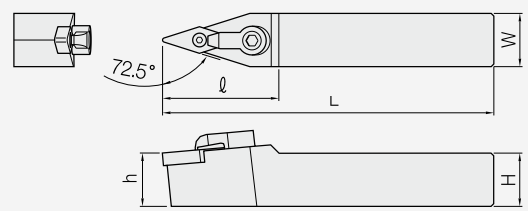


Insert	Item No.	Dimensions (mm)							Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	ℓ						
VN□□1604□□	EH-MVQN R/L 2020-16	20	20	125	25	20	42		MCL8N2		MSV32	MSP3D	W39.7L W19.8L
	2525-16	25	25	150	32	25	42						
	3232-16	32	32	170	40	32	37						

MVVNN

Multi Locking

+ VN□□

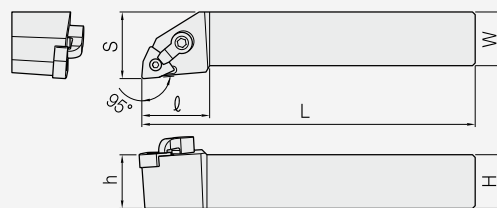


Insert	Item No.	Dimensions (mm)							Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	ℓ						
VN□□1604□□	EH-MVVNN 2020-16	20	20	125	25	20	42		MCL8N2		MSV32	MSP3D	W39.7L W19.8L
	2525-16	25	25	150	32	25	42						

MWLN^{R/L}

Multi Locking

+ **WN**□□

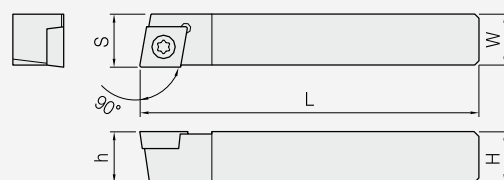


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		H	W	L	S	h	ℓ					
WN□□0604□□	EH-MWLN R/L 2020-06	20	20	125	25	20	32	MCL7N	MCSCR-10-32-19	MSW32	MSP3D	W23.8L W19.8L
	2525-06	25	25	150	32	25	32					
	3232-06	32	32	170	40	32	32					
WN□□0804□□	EH-MWLN R/L 2020-08	20	20	125	25	20	32	MCL8N	MCSCR-1/4-21	MSW43	MSP4D	HW31.8L HW23.8L
	2525-08	25	25	150	32	25	32					
	3232-08	32	32	170	40	32	32					

SCAC^{R/L}

Screw On

+ **CC**□□

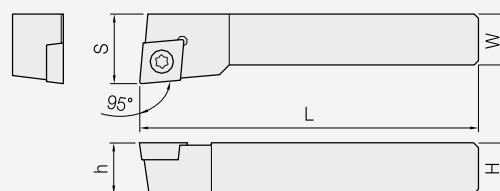


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h					
CC□□0602□□	EH-SCAC R/L 1010-06	10	10	70	10.5	10		SCR02565	-	-	TW07P
CC□□09T3□□	1212-09	12	12	80	12.5	12		SCR03508	-	-	TW15P

SCLC^{R/L}

Screw On

+ **CC**□□

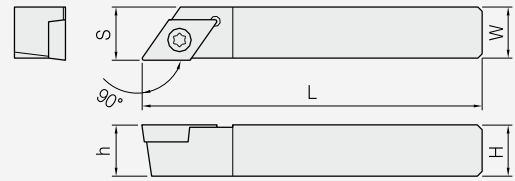


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h	ℓ				
CC□□0602□□	EH-SCLC R/L 0808-06	08	08	60	10	08	10	SCR02565	-	-	TW07P
	1010-06	10	10	70	16	10	10				
CC□□09T3□□	EH-SCLC R/L 1212-09	12	12	80	20	12	16	SCR03508	-	-	TW15P
	1616-09	16	16	100	20	16	16				
	2020-09	20	20	125	25	20	16				
CC□□1204□□	EH-SCLC R/L 2020-12	20	20	125	25	20	25	SCR0411F	SSC42	SSCR0610	TW15P W40L
	2525-12	25	25	150	32	25	26				

SDAC^{R/L}

Screw On

+ **DC** □ □

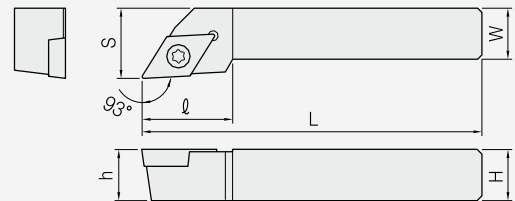


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h					
DC □ □ 0702 □ □	EH-SDAC R/L 1010-07	10	10	70	10.5	10		SCR02565	-	-	TW07P
	EH-SDAC R/L 1212-11	12	12	80	12.5	12		SCR03508	-	-	TW15P
DC □ □ 1T3 □ □	1616-11	16	16	100	16.5	16		SCR03512	SSD32	SSCR0509	TW15P, W35L

SDJC^{R/L}

Screw On

+ **DC** □ □

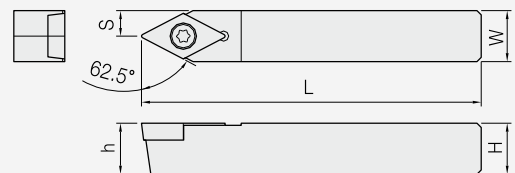


Insert	Item No.	Dimensions (mm)							Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h	ℓ					
DC □ □ 0702 □ □	EH-SDJC R/L 1010-07	10	10	70	12	10	15		SCR02565	-	-	TW07P
	1212-07	12	12	80	16	12	15					
	1616-07	16	16	100	20	16	18					
	2020-07	20	20	125	25	20	15					
DC □ □ 1T3 □ □	EH-SDJC R/L 1212-11	12	12	80	16	12	15		SCR03512	SSD32	SSCR0509	TW15P, W35L
	1616-11	16	16	100	20	16	24					
	2020-11	20	20	125	25	20	24					
	2525-11	25	25	150	32	25	29					

SDNCN

Screw On

+ **DC** □ □

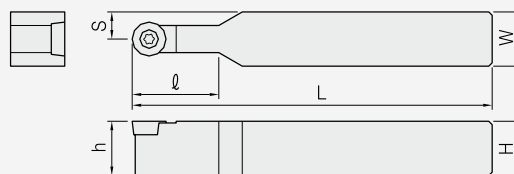


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h					
DC □ □ 0702 □ □	EH-SDNCN 1010-07	10	10	70	5	10		SCR02565	-	-	TW07P
	1212-07	12	12	80	6	12					
DC □ □ 1T3 □ □	EH-SDNCN 1212-11	12	12	100	6	12		SCR03508	-	-	TW15P
DC □ □ 1T3 □ □	EH-SDNCN 1616-11	16	16	100	8	16		SCR03512	SSD32	SSCR0509	TW15P W35L
	2020-11	20	20	125	10	20					

SRDCN

Screw On

+ **RCGT**

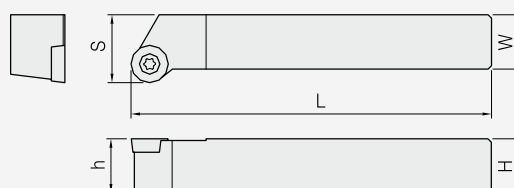


Insert	Item No.		Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
			H	W	L	S	h	ℓ				
RCGT 0602M0	EH-SRDCN	1010-06	10	10	70	5	10	10	SCR02565	-	-	TW07P
		1212-06	12	12	80	6	12	12				
		1616-06	16	16	100	8	16	12				
		2525-06	25	25	150	12.5	25	20				
RCGT 0803M0	EH-SRDCN	1616-08	16	16	100	8	16	16	SCR0307	-	-	TW09P
		2020-08	20	20	125	10	20	20				
		2525-08	25	25	150	12.5	25	20				
RCGT 1003M0	EH-SRDCN	1616-10	16	16	100	8	16	25	SCR03511A	SSR10	SSCR0509	TW15P,W35L
		2020-10	20	20	125	10	20	25				
		2525-10	25	25	150	12.5	25	25				
RCGT 1204M0	EH-SRDCN	2020-12	20	20	125	10	20	28	SCR03512	SSR12	SSCR0509	TW15P,W35L
		2525-12	25	25	150	12.5	25	28				

SRGC^{R/L}

Screw On

+ **RCGT**

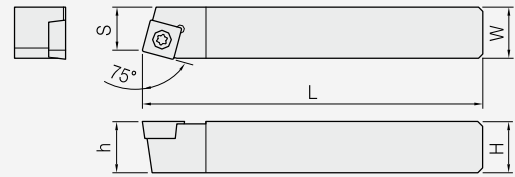


Insert	Item No.	Dimensions (mm)							Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h	ℓ					
RCGT 0602M0	EH-SRGC R/L 1010-06	10	10	70	12	10	–	SCR02565	–	–	TW07P	
	1212-06	12	12	80	16	12	–					
	1616-06	16	16	100	20	16	–					
RCGT 0803M0	EH-SRGC R/L 1616-08	16	16	100	20	16	–	SCR0307	–	–	TW09P	
	2020-08	20	20	125	25	20	–					
	2525-08	25	25	150	32	25	–					
RCGT 1003M0	EH-SRGC R/L 1616-10	16	16	100	20	16	–	SCR03511A	SSR10	SSCR0509	TW15P,W35L	
	2020-10	20	20	125	25	20	–					
	2525-10	25	25	150	32	25	–					
RCGT 1204M0	EH-SRGC R/L 2020-12	20	20	125	25	20	–	SCR03512	SSR12	SSCR0509	TW15P,W35L	
	2525-12	25	25	150	32	25	–					

SSBC^{R/L}

Screw On

+ **SC** □ □

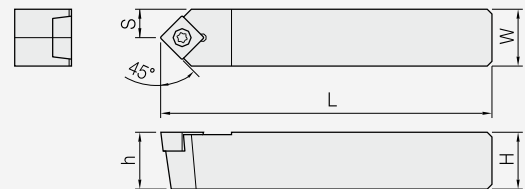


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h					
SC □ □ 09T3 □ □	EH-SSBC R/L 1212-09	12	12	80	11	12		SCR03508	–	–	TW15P
	1616-09	16	16	100	13	16		SCR03512	SSS32	SSCR0509	TW15P,W35L
SC □ □ 1204 □ □	EH-SSBC R/L 2020-12	20	20	125	17	20		SCR0411F	SSS42	SSCR0610	TW15P,W35L

SSDCN

Screw On

+ **SC** □ □

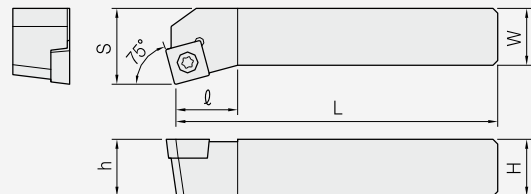


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h					
SC □ □ 09T3 □ □	EH-SSDCN 1212-09	12	12	80	6	12		SCR03508	–	–	TW15P
	1616-09	16	16	100	8	16		SCR03512	SSS32	SSCR0509	TW15P,W35L

SSKC^{R/L}

Screw On

+ **SC** □ □

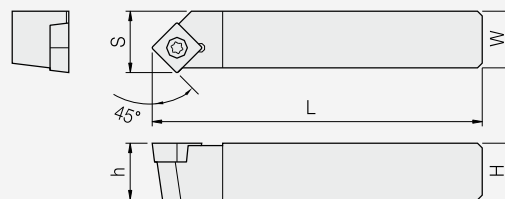


Insert	Item No.	Dimensions (mm)							Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h	ℓ					
SC □ □ 09T3 □ □	EH-SSKC R/L 1616-09	16	16	100	20	16	13		SCR03512	SSS32	SSCR0509	TW15P,W35L

SSSC^{R/L}

Screw On

+ **SC**□□

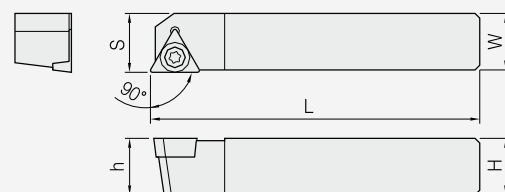


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h					
SC□□09T3□□	EH-SSSC R/L 1616-09	16	16	100	17	16		SCR03512	SSS32	SSCR0509	TW15P,W35L
SC□□1204□□	2020-12	20	20	125	21	20		SCR0411F	SSS42	SSCR0610	TW15P,W40L

STAC^{R/L}

Screw On

+ **TC**□□

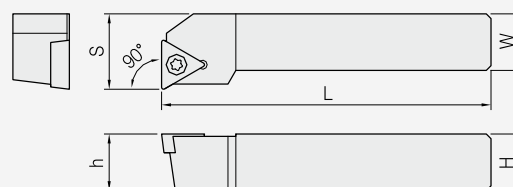


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h					
TC□□0902□□	EH-STAC R/L 1010-09	10	10	70	10.5	10		SCR02206	-	-	TW06P
TC□□1102□□	1212-11	12	12	80	12.5	12		SCR02565	-	-	TW07P

STFC^{R/L}

Screw On

+ **TC**□□

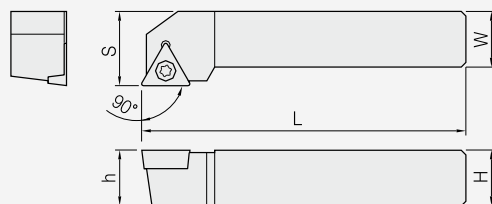


Insert	Item No.	Dimensions (mm)							Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h	ℓ					
TC□□0902□□	EH-STFC R/L 1010-09	10	10	70	12	10	10	SCR02206	-	-	-	TW06P
TC□□1102□□	EH-STFC R/L 1212-11	12	12	80	16	12	14	SCR02565	-	-	-	W07P
	1616-11	16	16	100	20	16	14					
TC□□16T3□□	EH-STFC R/L 1616-16	16	16	100	20	16	19	SCR03512	SST32	SSCR0509	TW15P,W35L	
	2020-16	20	20	125	25	20	19					

STGC^{R/L}

Screw On

+ **TC** □ □

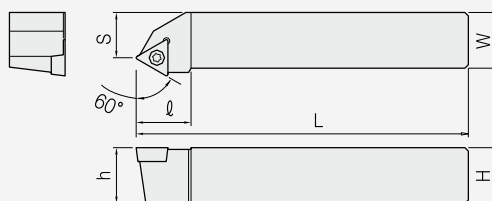


Insert	Item No.	Dimensions (mm)							Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h	ℓ					
TC□□0902□□	EH-STGC R/L 0808-09	8	8	60	10	8	11	SCR02206	-	-	TW06P	
	1010-09	10	10	70	12	10	11					
TC□□1102□□	EH-STGC R/L 1212-11	12	12	80	16	12	14	SCR02565	-	-	TW07P	
	1616-11	16	16	100	20	16	16					
TC□□16T3□□	EH-STGC R/L 2020-16	20	20	125	25	20	21	SCR03512	SST32	SSCR0509	TW15P,W35L	
	2525-16	25	25	150	32	25	21					

STTC^{R/L}

Screw On

+ **TC** □ □

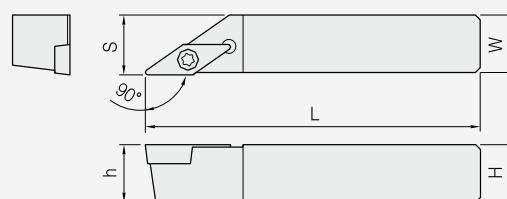


Insert	Item No.		Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
			H	W	L	S	h	ℓ				
TC□□1102□□	EH-STTC R/L	1010-09	16	16	100	13	16	14	SCR02565	—	—	TW07P
	EH-STTC R/L	1212-11	16	16	100	13	16	19	SCR03512	SST32	SSCR0509	TW15P,W35L
TC□□16T3□□		1616-11	20	20	125	17	20	19				

SVAB^{R/L}

Screw On

+ **VB** □ □

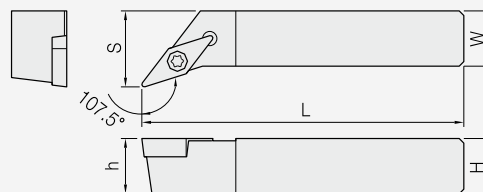


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h					
VB□□1604□□	EH-SVAB R/L 1616-16	16	16	100	16.5	16		SCR03512	SSV32	SSCR0509	TW15P,W35L
	2020-16	20	20	125	20.5	20					

SVHB^{R/L}

Screw On

+ **VB** □ □

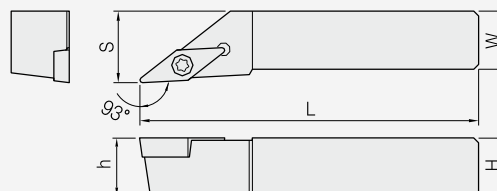


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h					
VB □ □ 1604 □ □	EH-SVHB R/L 2525-16	25	25	150	32	25		SCR03512	SSV32	SSCR0509	TW15P,W35L
	3225-16	32	32	170	32	32					

SVJB^{R/L}

Screw On

+ **VB** □ □

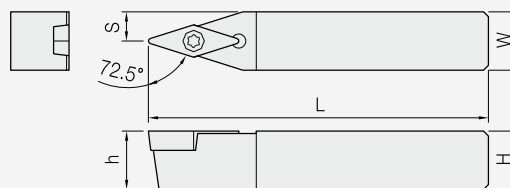


Insert	Item No.	Dimensions (mm)							Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h	ℓ					
VB □ □ 1102 □ □	EH-SVJB R/L 1212-11	12	12	80	16	12	27		SCR02565	-	-	TW07P
	1616-11	16	16	100	20	16	27					
	2020-11	20	20	125	25	20	27					
VB □ □ 1604 □ □	EH-SVJB R/L 1616-16	16	16	100	20	16	36		SCR03512	SSV32	SSCR0509	TW15P W35L
	2020-16	20	20	125	25	20	41					
	2525-16	25	25	150	32	25	41					
	3225-16	32	25	170	32	32	55					

SVVBN

Screw On

+ **VB** □ □

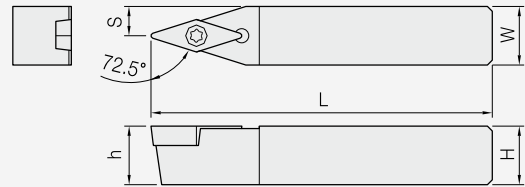


Insert	Item No.	Dimensions (mm)							Screw	Shim	Shim Screw	Wrench
		H	W	L	S	h	ℓ					
VB □ □ 1102 □ □	EH-SVBN 1212-11	12	12	80	6	12			SCR02565	-	-	TW07P
	1616-11	16	16	100	8	16						
	2020-11	20	20	125	10	20						
VB □ □ 1604 □ □	EH-SVBN 1616-16	16	16	100	8	16			SCR03512	SSV32	SSCR0509	TW15P W35L
	2020-16	20	20	125	10	20						
	2525-16	25	25	150	12.5	25						
	3225-16	32	25	170	12.5	32						

SVVCN

Screw On

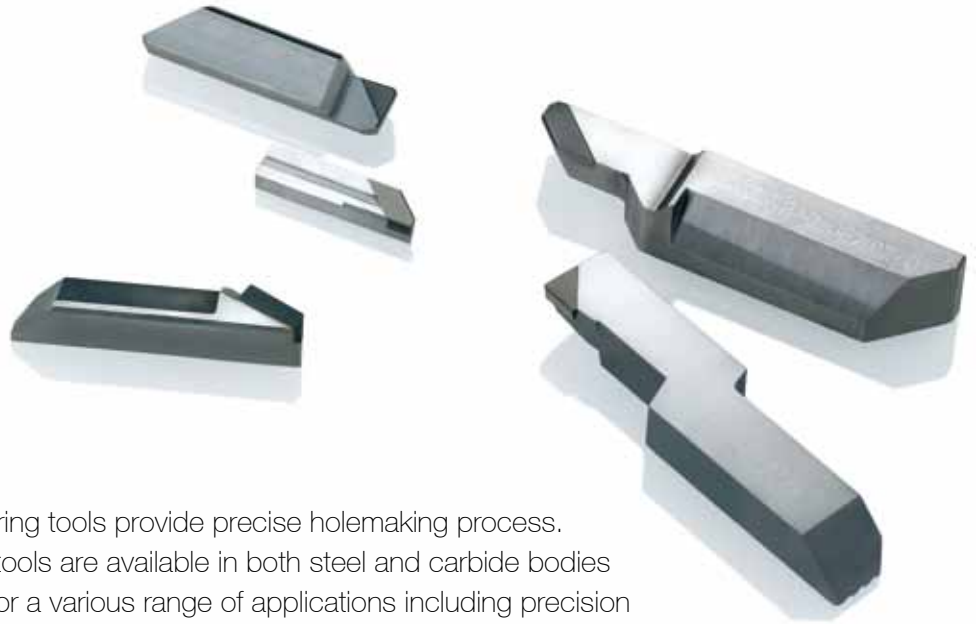
+ **VC**



Insert	Item No.		Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
			H	W	L	S	h					
VC□□1103□□	EH-SVCN	1212-11	12	12	80	6	12	-	SCR02565	-	-	TW07P
		1616-11	16	16	100	8	16	-				
		2020-11	20	20	125	10	20	-				
VC□□1303□□	EH-SVCN	1212-13	12	12	80	6	12	-	SCR0307	-	-	TW09P
		1616-13	16	16	100	8	16	-				
		2020-13	20	20	125	10	20	-				
VC□□1604□□	EH-SVCN	1616-16	16	16	100	6	16	-	SCR03512	SSV32	SSCR0509	TW15P,W35L
		2020-16	20	20	125	8	20	-				
		2525-16	25	25	150	12.5	25	-				



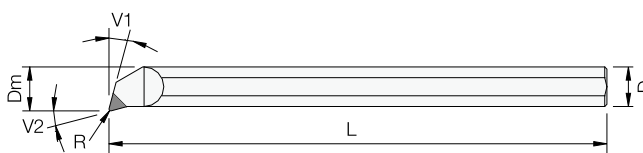
Boring



The EHW A boring tools provide precise holemaking process. These trustful tools are available in both steel and carbide bodies and are ideal for a various range of applications including precision micro boring.

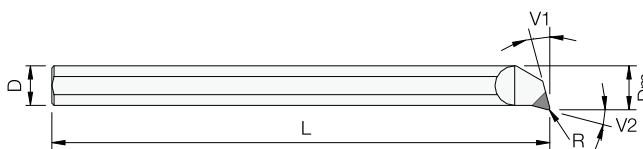


BS type | PCD/PCBN

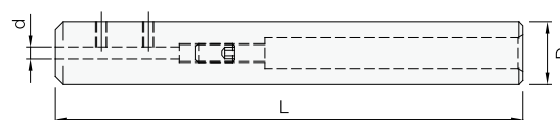


Item No.	Dimensions (mm)						PCD		PCBN	
	R	V1	V2	L	D	Dm	EP20	EP55	EB190	EB51
BSR 25 60 005	0.05	15	15	60	2.5	3				
25 60 01	0.1	15	15	60	2.5	3				
30 60 005	0.05	15	15	60	3	3.5				
30 60 01	0.1	15	15	60	3	3.5				
40 60 01	0.1	15	15	60	4	4.5				
40 60 02	0.2	15	15	60	4	4.5				
50 60 01	0.1	15	15	60	5	5.5				
50 60 02	0.2	15	15	60	5	5.5				
60 80 01	0.1	15	15	80	6	7				
60 80 02	0.2	15	15	80	6	7				

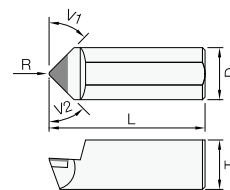
BS type | PCD/PCBN



Item No.	Dimensions (mm)						PCD		PCBN	
	R	V1	V2	L	D	Dm	EP20	EP55	EB190	EB51
BSL 25 60 005	0.05	15	15	60	2.5	3				
25 60 01	0.1	15	15	60	2.5	3				
30 60 005	0.05	15	15	60	3	3.5				
30 60 01	0.1	15	15	60	3	3.5				
40 60 01	0.1	15	15	60	4	4.5				
40 60 02	0.2	15	15	60	4	4.5				
50 60 01	0.1	15	15	60	5	5.5				
50 60 02	0.2	15	15	60	5	5.5				
60 80 01	0.1	15	15	80	6	7				
60 80 02	0.2	15	15	80	6	7				

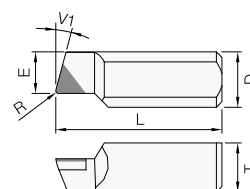


Item No.	Dimensions (mm)									
	d	L	H	D						
SLV 16 025	2.5	100	14	16						
16 03	3	100	14	16						
16 04	4	100	14	16						
16 05	5	100	14	16						
16 06	6	100	14	16						



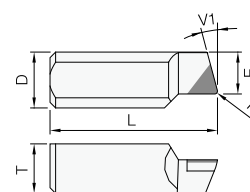
BR type | PCD/PCBN

Item No.	Dimensions (mm)					PCD		PCBN		
	R	V1	V2	L	D	EP20	EP55	EB190	EB51	
BRC 40 15 02	0.2	45	45	15	4					
40 15 04	0.4	45	45	15	4					
50 15 02	0.2	45	45	15	5					
50 15 04	0.4	45	45	15	5					
60 20 02	0.2	45	45	20	6					
60 20 04	0.4	45	45	20	6					
80 30 04	0.4	45	45	30	8					
80 30 08	0.8	45	45	30	8					



BR type | PCD/PCBN

Item No.	Dimensions (mm)						PCD		PCBN	
	R	V1	E	L	D	T	EP20	EP55	EB190	EB51
BRR 40 15 02	0.2	15	15	15	4	3.5				
40 15 04	0.4	15	15	15	4	3.5				
50 15 02	0.2	15	15	15	5	4.5				
50 15 04	0.4	15	15	15	5	4.5				
60 20 02	0.2	20	20	20	6	5.5				
60 20 04	0.4	20	20	20	6	5.5				
80 30 04	0.4	30	30	30	8	7				
80 30 08	0.8	30	30	30	8	7				



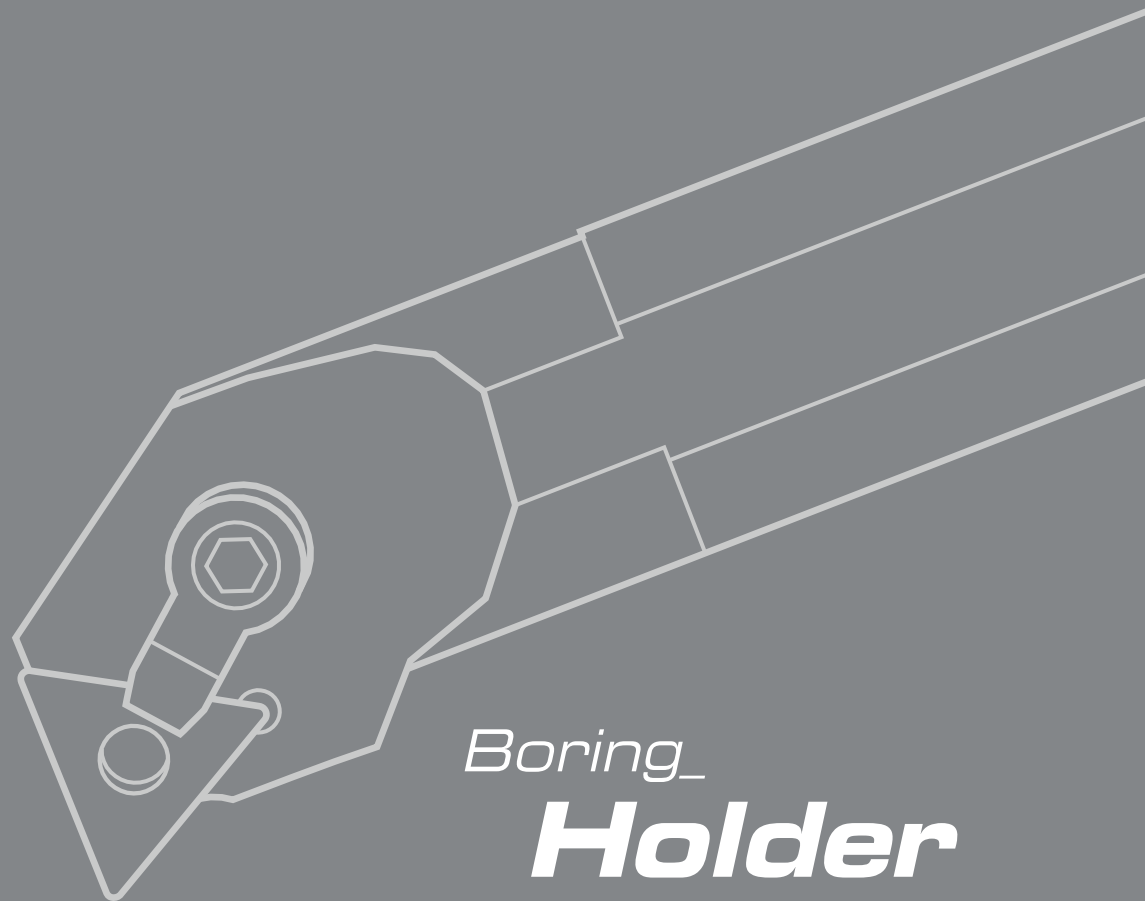
BR type | PCD/PCBN

Item No.	Dimensions (mm)						PCD		PCBN	
	R	V1	E	L	D	T	EP20	EP55	EB190	EB51
BRL 40 15 02	0.2	15	15	15	4	3.5				
40 15 04	0.4	15	15	15	4	3.5				
50 15 02	0.2	15	15	15	5	4.5				
50 15 04	0.4	15	15	15	5	4.5				
60 20 02	0.2	20	20	20	6	5.5				
60 20 04	0.4	20	20	20	6	5.5				
80 30 04	0.4	30	30	30	8	7				
80 30 08	0.8	30	30	30	8	7				

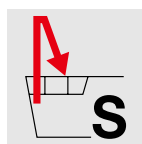
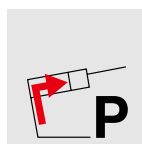
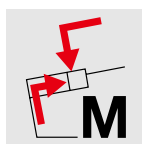
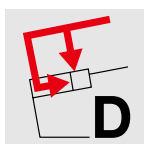
MEMO

Boring





How to combine the holder



- D** Double clamping
- M** Multi locking
- P** Lever locking
- S** Screw clamping

E 25 R - M

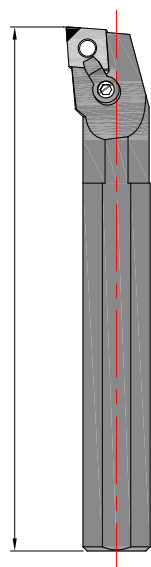
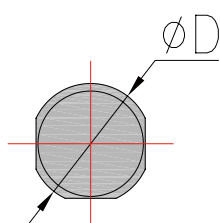
Shank material

Insert diameter

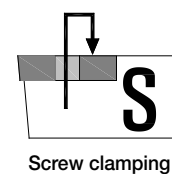
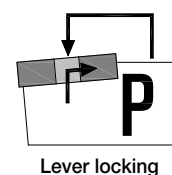
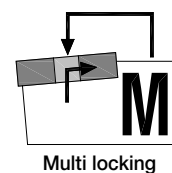
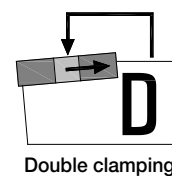
Tool length

Clamp type

A	STEEL SHANK+OIL HOLE
E	TC SHANK+OIL HOLE
C	TC SHANK
S	STEEL SHANK
X	SPECIAL



Symbol (L)	Length (mm)
H	100
J	110
K	125
M	150
N	160
Q	180
R	200
S	250
T	300
U	350
V	400
W	450
Y	500



S

K

D

R

-12

1

Insert shape

Tool style

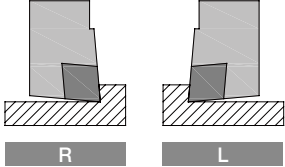
Clearance angle

Cutting direction

Symbol	Shape
C	
D	
K	
S	
T	
V	
W	

L	F
U	K
Q	Z
J	W

Symbol	Angle
N	0°
B	5°
C	7°
P	11°

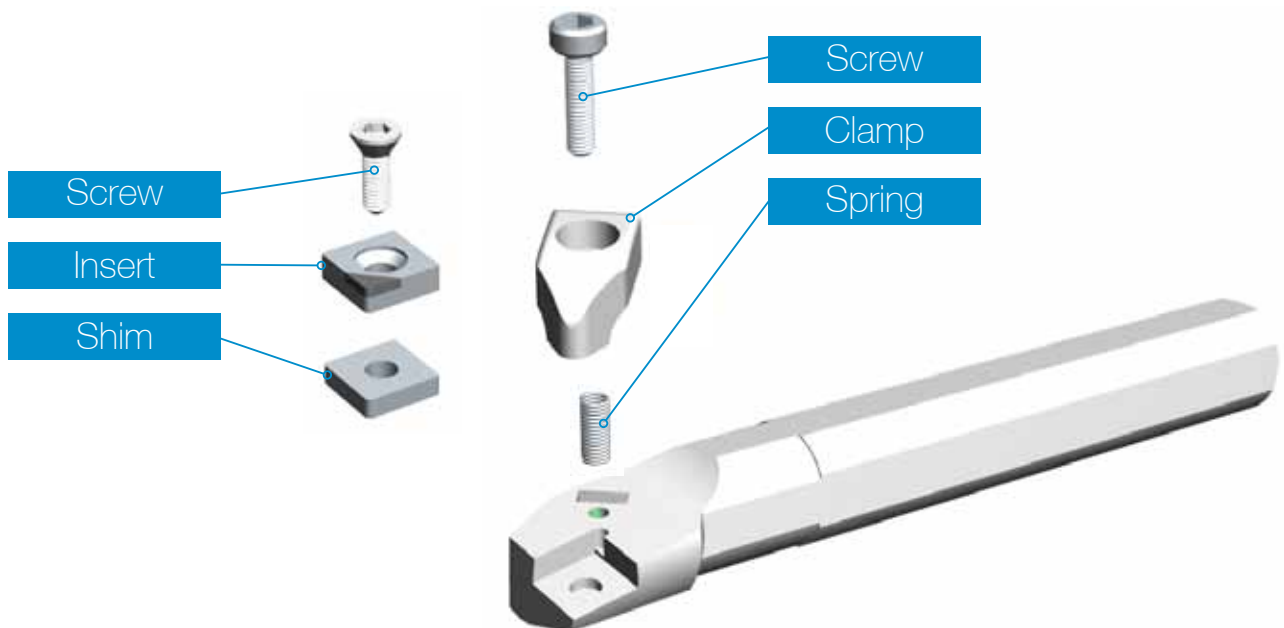


1 Cutting edge length

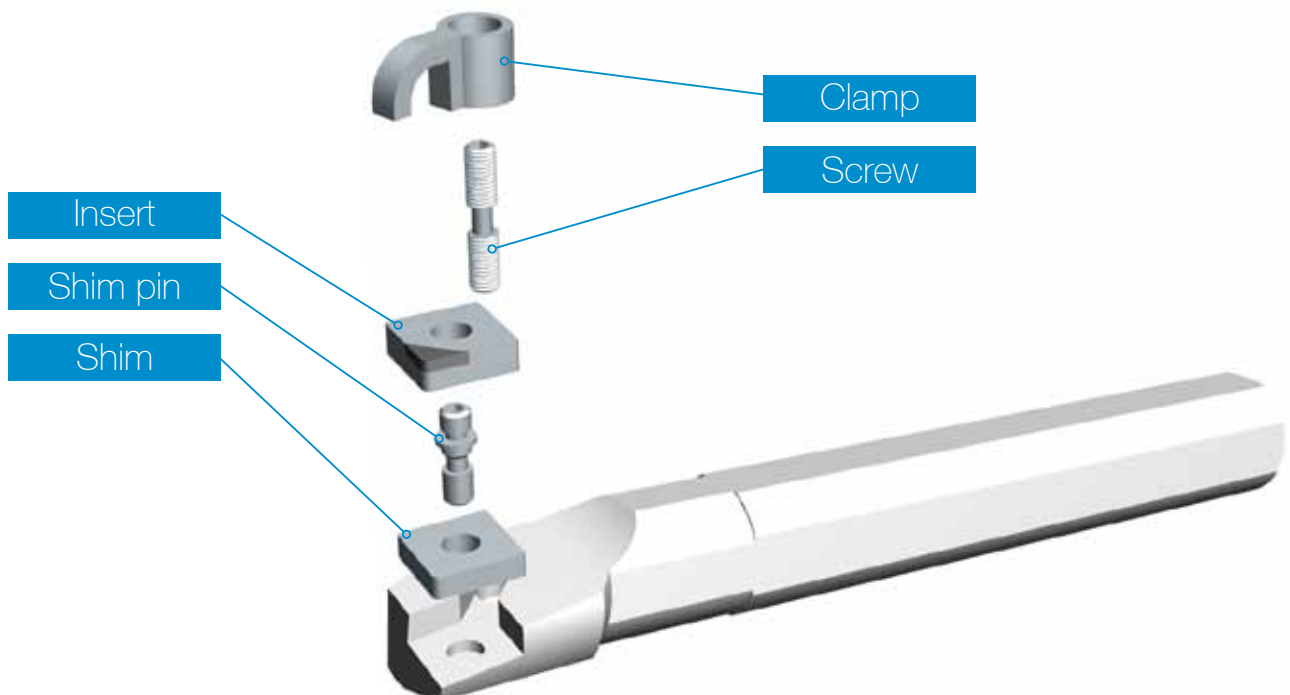
C	D	K	S	T	V	W

Tool **H**older **C**lamping **T**ype

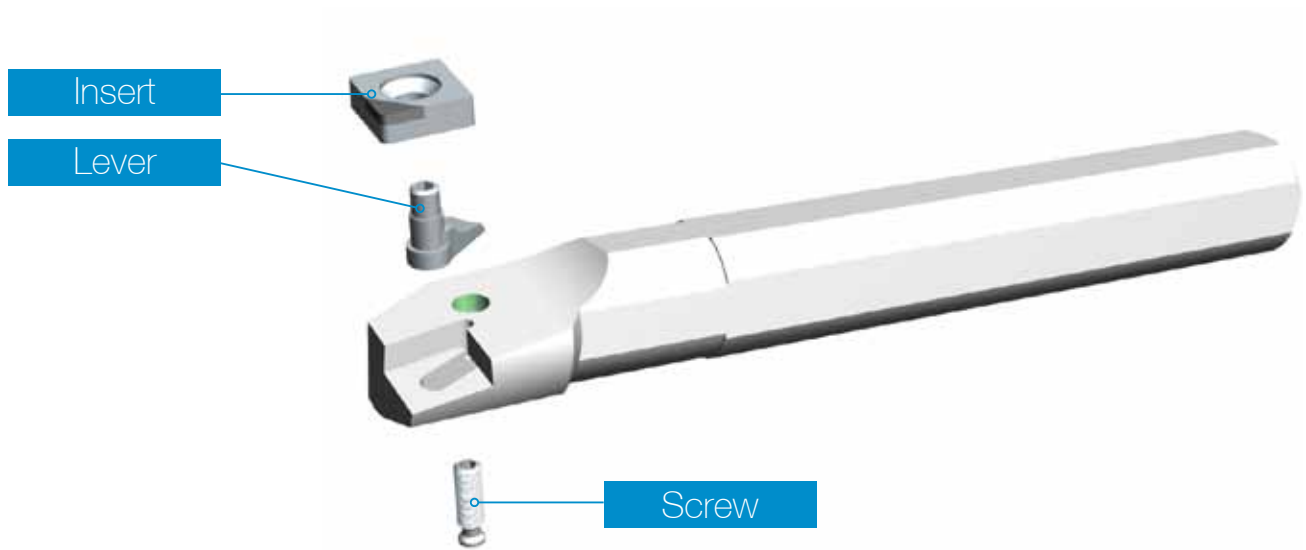
Double clamping



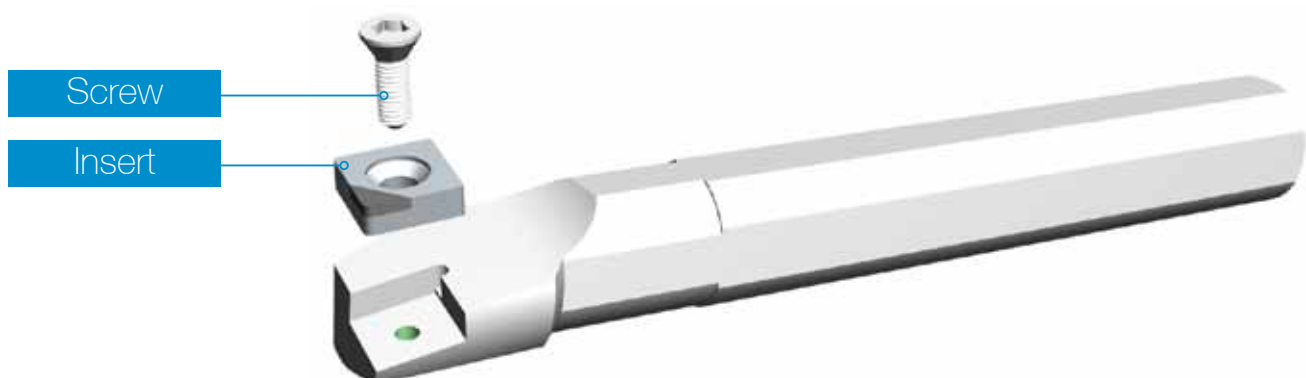
Multi locking



Lever locking



Screw clamping



Application Of Holder

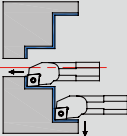
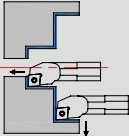
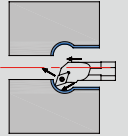
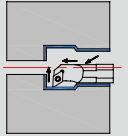
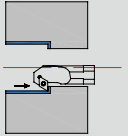
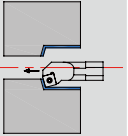
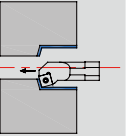
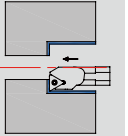
Lever lock system

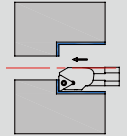
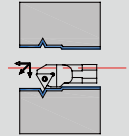
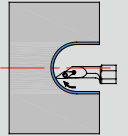
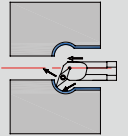
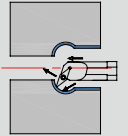
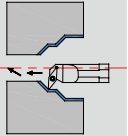
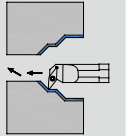
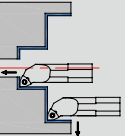
Cutting shape						
Designation	PCLNR/L	PDSNR/L	PDUNR/L	PSKNR/L	PTFNR/L	PWLNLR/L
Approach angle	95°	62.5°	93°	75°	90°	95°
Page	108	108	109	109	110	110
Copying		•	•			
Facing	•					•
Back truning		•	•			•
Turning	•	•	•	•	•	•

Multi lock system

Cutting shape						
Designation	MTFNR/L	MVUNR/L	MWLNR/L	MCLNR/L	MDUNR/L	MSKNR/L
Approach angle	90°	93°	95°	95°	93°	75°
Page	111	111	111	119	119	119
Copying		•			•	
Facing			•	•		
Back truning		•			•	
Turning	•	•	•	•	•	•

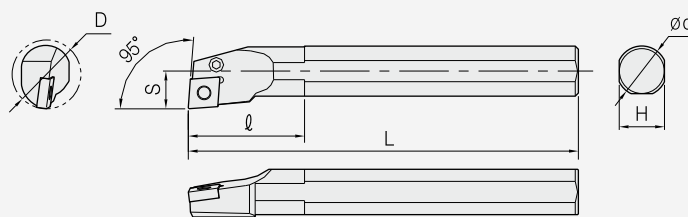
Screw on system

Cutting shape								
Designation	SCLCR/L	SCLPR/L	SDQCR/L	SDUCR/L	SDZCR/L	SSKCR/L	SSKPR/L	STFCR/L
Approach angle	95°	95°	107.5°	93°	3°	75°	75°	90°
Page	112	112	113	113	114	114	115	115
Copying			•	•				
Facing	•	•						
Back truning			•	•	•			
Turning	•	•	•	•	•	•	•	•

Cutting shape								
Designation	STFPR/L	STWPR/L	SVJCR/L	SVQBR/L	SVQCR/L	SVUBR/L	SVUCR/L	SWLCR/L
Approach angle	90°	60°	142°	108°	108°	93°	93°	95°
Page	116	114	116	117	117	117	118	118
Copying			•	•	•	•	•	•
Facing								
Back truning				•	•	•	•	•
Turning	•	•	•	•	•	•	•	•

PCLN^{R/L} Lever Locking

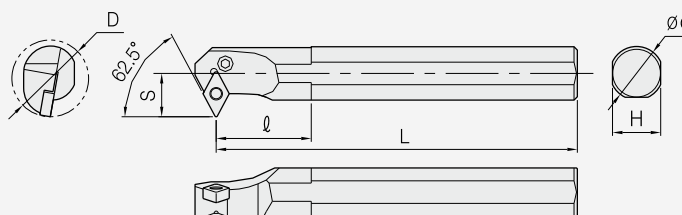
+ **CN**□□



Insert	Item No.	Dimensions (mm)							Lever	Screw	Shim	Shim Pin	Shim pin punch	Wrench
		øD	ød	H	L	S	l							
CN□□0903□□	EH-S16R-PCLN R/L-09	20	16	15	200	11	28							
	EH-S20S-PCLN R/L-09	25	20	18	250	19	32	LV3C	LVSCR0509B	-	-	-	-	W20L
	EH-S25R-PCLN R/L-09	32	25	23	200	17	36							
CN□□1204□□	EH-S25R-PCLN R/L-12	32	25	23	200	17	40	LV4A	LVSCR0613A	-	-	-	-	W25L
CN□□1204□□	EH-S32S-PCLN R/L-12	40	32	30	250	22	50							
	EH-S40T-PCLN R/L-12	50	40	37	300	27	55	LV4	LVSCR0821	LVSC42B	LVSP4	LVSP4	W30L	
	EH-S50U-PCLN R/L-12	63	50	47	350	35	55							

PDSN^{R/L} Lever Locking

+ **DN**□□

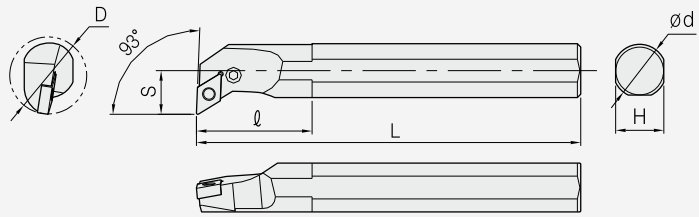


Insert	Item No.	Dimensions (mm)							Lever	Screw	Shim	Shim Pin	Shim pin punch	Wrench
		øD	ød	H	L	S	l							
DN□□1506□□	EH-S32S-PDSN R/L-15	40	32	30	250	22	45							
	EH-S40T-PDSN R/L-15	50	40	37	300	27	43	LV4B	LVSCR0821	LVSD42	LVSP4	LVSP4	W30L	
DN□□1504□□	EH-S32S-PDSN R/L-15-3	40	32	30	450	22	45							
	EH-S40T-PDSN R/L-15-3	50	40	37	300	27	43	LV4	LVSCR0821	LVSD42	LVSP4	LVSP4	W30L	
DN□□1506□□	EH-A32S-PDSN R/L-15	40	32	31	250	22	45	LV4B	LVSCR0821	LVSD42	LVSP4	LVSP4	W30L	
DN□□1504□□	EH-A32S-PDSN R/L-15-3	40	32	31	250	22	45	LV4	LVSCR0821	LVSD42	LVSP4	LVSP4	W30L	

PDUN^{R/L}

Lever Locking

+ DN □ □

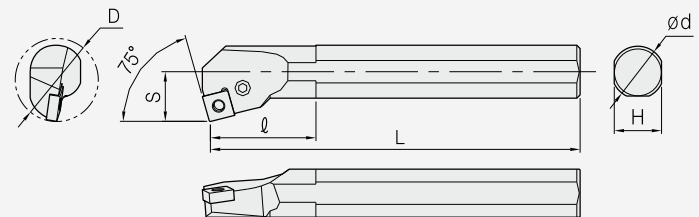


Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Shim pin punch	Wrench
		ØD	ød	H	L	S	l						
DN □ □ 104 □ □	EH-S20S-PDUN R/L-11	25	20	18	250	13	30	LV3D	LVSCR0512B	-	-	-	W20L
	EH-S25R-PDUN R/L-11	32	25	23	200	17	35	LV3	LVSCR0617	LVSD317	LVSP3	LVSP3	W25L
	EH-S32S-PDUN R/L-11	40	32	30	250	22	40						
DN □ □ 1506 □ □	EH-S32S-PDUN R/L-15	40	32	30	250	22	50	LV4B	LVSCR0821	LVSD42	LVSP4	LVSP4	W30L
	EH-S40T-PDUN R/L-15	50	40	37	300	27	50						
	EH-S50U-PDUN R/L-15	63	50	47	350	35	63						
DN □ □ 1504 □ □	EH-S32S-PDUN R/L-15-3	40	32	30	250	22	50	LV4	LVSCR0821	LVSD42	LVSP4	LVSP4	W30L
	EH-S40T-PDUN R/L-15-3	50	40	37	300	27	50						
DN □ □ 1506 □ □	EH-A32S-PDUN R/L-15	40	32	31	250	22	50	LV4B	LVSCR0821	LVSD42	LVSP4	LVSP4	W30L
DN □ □ 1504 □ □	EH-A32S-PDUN R/L-15-3	40	32	31	250	22	50	LV4	LVSCR0821	LVSD42	LVSP4	LVSP4	W30L

PSKN^{R/L}

Lever Locking

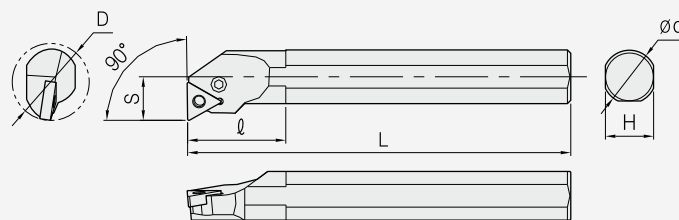
+ SN □ □



Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Shim pin punch	Wrench
		ØD	ød	H	L	S	l						
SN □ □ 1204 □ □	EH-S25R-PSKN R/L-12	32	25	23	200	17	42	LV4A	LVSCR0613A	-	-	-	W25L
	EH-S32S-PSKN R/L-12	40	32	30	250	22	45	LV4	LVSCR0821	LVSS42B	LVSP4	LVSP4	W30L
	EH-S40T-PSKN R/L-12	50	40	37	300	27	50						
SN □ □ 1204 □ □	EH-A25R-PSKN R/L-12	32	25	23	200	17	42	LV4A	LVSCR0613A	-	LVSP4	-	W25L
SN □ □ 1204 □ □	EH-A32S-PSKN R/L-12	40	32	30	250	22	50	LV4	LVSCR0821	LVSS42B	LVSP4	LVSP4	W30L

PTFN^{R/L} Lever Locking

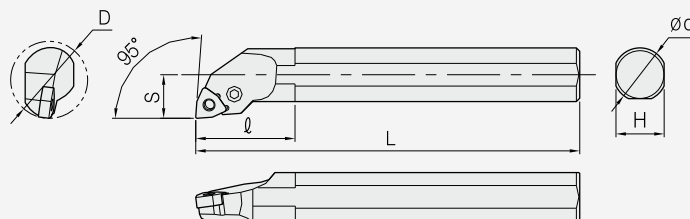
+ TN □ □



Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Shim pin punch	Wrench
		ØD	ød	H	L	S	l						
TN □ □ 103 □ □	EH-S16R-PTFN R/L-11	20	16	15	200	11	28	LV2	LVSCR0509B	-	-	-	W25L
	EH-S20S-PTFN R/L-11	25	20	18	250	13	33						
	EH-S25R-PTFN R/L-11	32	25	23	200	17	36						
TN □ □ 1604 □ □	EH-S25R-PTFN R/L-16	32	25	23	200	17	42	LV3B	LVSCR0512B	-	-	-	W20L
	EH-S32S-PTFN R/L-16	44	32	30	250	22	50						
	EH-S40T-PTFN R/L-16	54	40	37	300	27	55	LV3	LVSCR0617	LVST317B	LVSP3	LVSP3	W25L
	EH-A25R-PTFN R/L-16	32	25	24	200	17	40						
	EH-A32S-PTFN R/L-16	40	32	31	250	22	50						

PWLN^{R/L} Lever Locking

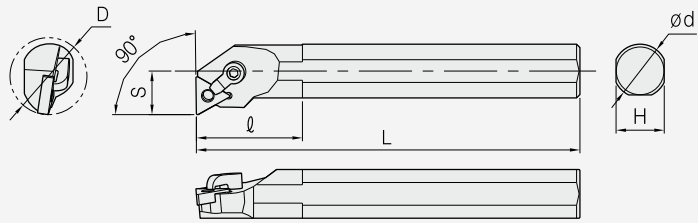
+ WN □ □



Insert	Item No.	Dimensions (mm)						Lever	Screw	Shim	Shim Pin	Shim pin punch	Wrench
		ØD	ød	H	L	S	l						
WN □ □ 0604 □ □	EH-S20S-PWLN R/L-06	25	20	18	250	13	40	LV3B	LVSCR0512B	-	-	-	W20L
	EH-S25R-PWLN R/L-06	32	25	23	200	17	40						
	EH-S32S-PWLN R/L-06	44	32	30	250	22	45	LV3B	LVSCR0613B	LVSW317	LVSP3	LVSP3	W25L
WN □ □ 0804 □ □	EH-S25R-PWLN R/L-08	32	25	23	200	17	45	LV4A	LVSCR0613A	-	-	-	W25L
	EH-S32S-PWLN R/L-08	44	32	30	250	22	50	LV4	LVSCR0821	LVSW42	LVSP4	LVSP3	W30L

MTFN^{R/L}

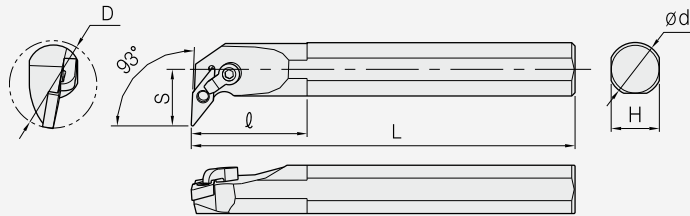
Multi Locking

+ **TN**□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		ØD	ød	H	L	S	l					
TN□□1604□□	EH-S25R-MTFN R/L-16	32	25	23	200	17	36	MCL7N1	MCSCR10-32-19	-	MSP3D3	W23.8L
	EH-S32S-MTFN R/L-16	40	32	30	250	22	50			MST32D	MSP3D	W19.8L
	EH-S40T-MTFN R/L-16	50	40	37	300	27	60			-	MSP3D3	W23.8L
	EH-A25R-MTFN R/L-16	32	25	23	200	17	40			MST32D	MSP3D	W19.8L
	EH-A32S-MTFN R/L-16	40	32	30	250	22	50					

MVUN^{R/L}

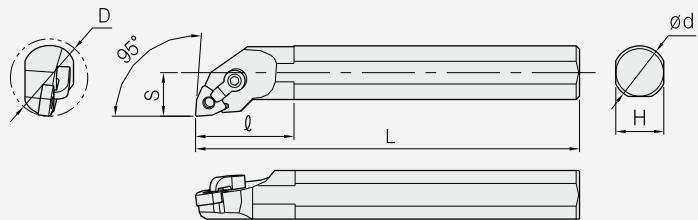
Multi Locking

+ **VN**□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		ØD	ød	H	L	S	l					
VN□□1604□□	EH-S32S-MVUN R/L-16	40	32	30	250	22	50	MCL8N2	MCSCR5/16-28	MSV32	MSP3D	W39.7L W19.8L
	EH-S40T-MVUN R/L-16	50	40	37	300	27	60					
	EH-A32S-MVUN R/L-16	40	32	30	250	22	50					
	EH-A40T-MVUN R/L-16	50	40	37	300	27	60					

MWLN^{R/L}

Multi Locking

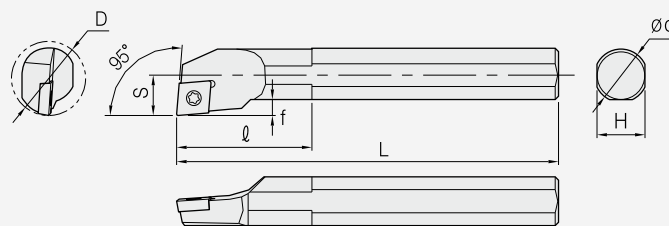
+ **WN**□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		ØD	ød	H	L	S	l					
WN□□0604□□	EH-S25R-MWLN R/L-06	32	25	23	200	17	36	MCL7N	MCSCR10/32-19	-	MSP3D3	W23.8L
	EH-S32S-MWLN R/L-06	40	32	30	250	22	50			MSW32	MSP3D	W19.8L
	EH-S40T-MWLN R/L-06	50	40	37	300	27	60					
WN□□0804□□	EH-S25R-MWLN R/L-08	32	25	23	200	17	36	MCL6N	MCSCR1/4-21	-	MSP4DS	W31.8L
	EH-S32S-MWLN R/L-08	40	32	30	250	22	50			MSW43	MSP4D	W23.8L
	EH-S40T-MWLN R/L-08	50	40	37	300	27	60					

SCLC^{R/L}

Screw On

+ **CC** □ □

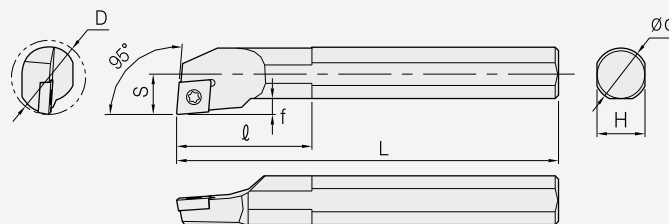


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench	
		øD	ød	H	L	S	ℓ					
CC□□0602□□	EH-S08K SCLC R/L 06	10	8	7	125	5	14	SCR02555	-	-	TW07P	
	EH-S10K SCLC R/L 06	12	10	9	125	6	14	SCR02565				
	EH-S10M SCLC R/L 06	12	10	9	150	6	14					
	EH-S12M SCLC R/L 06	16	12	11	150	9	25					
	EH-S16R SCLC R/L 06	20	16	15	200	11	32					
CC□□09T3□□	EH-S12M SCLC R/L 09	16	12	11	150	9	25	SCR03508	-	-	TW15P	
	EH-S16R SCLC R/L 09	20	16	15	200	11	32.5					
	EH-S20S SCLC R/L 09	25	20	18	250	13	38					SCR03510
	EH-S25R SCLC R/L 09	32	25	23	200	17	45					
CC□□1204□□	EH-S25R SCLC R/L 12	32	25	23	200	17	45	SCR0411F	-	-	TW15P	
	EH-S32S SCLC R/L 12	40	32	30	250	22	50		SSC42	SSCR0610	W40L	
	EH-S40T SCLC R/L 12	50	40	37	300	27	60				TW15P	
CC□□0602□□	EH-A08F SCLC R/L 06	10	8	7.5	80	5	14	SCR02555	-	-	TW07P	
	EH-A10H SCLC R/L 06	12	10	9.5	100	6	14	SCR02565				
	EH-A12K SCLC R/L 06	16	12	11	125	9	25					
CC□□09T3□□	EH-A12K SCLC R/L 09	16	12	11	125	9	25	SCR03508	-	-	TW15P	
	EH-A16M SCLC R/L 09	20	16	15	150	11	32.5					
	EH-A20Q SCLC R/L 09	25	20	19	180	13	-					SCR03510
	EH-A25R SCLC R/L 09	32	25	24	200	17	45					
CC□□1204□□	EH-A25R SCLC R/L 12	32	25	24	200	17	45	SCR0411F	-	-	TW15P	
	EH-A32S SCLC R/L 12	40	32	31	250	32	50		SSC42	SSCR0610	W40L, TW15P	

SCLP^{R/L}

Screw On

+ **CP** □ □

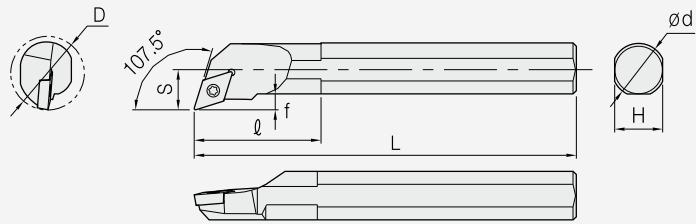


Insert	Item No.	Dimensions (mm)						Screw	Wrench
		ØD	Ød	H	L	S	ℓ		
CP□□0802□□	EH-S10M SCLP R/L 08	12	10	9	150	6	–	SCR0305	TW09P
	EH-S12M SCLP R/L 08	16	12	11	150	8	15	SCR0307	
CP□□0903□□	EH-S16N SCLP R/L 09	20	16	15	160	10	15	SCR0408	TW15P
	EH-S16R SCLP R/L 09	20	16	15	200	11	35		
	EH-S20N SCLP R/L 09	25	20	18	160	12.5	20		
	EH-S20S SCLP R/L 09	25	20	15	250	12.5	20		
CP□□0802□□	EH-A10H SCLP R/L 08	12	10	9.5	100	9	–	SCR0305	TW09P
	EH-A12K SCLP R/L 08	16	12	11	125	8	20	SCR0307	
CP□□0903□□	EH-A16M SCLP R/L 09	20	16	15	150	10	25	SCR0408	TW15P
	EH-A20Q SCLP R/L 09	25	20	19	180	12.5	28		

SDQC^{R/L}

Screw On

+ DC □ □

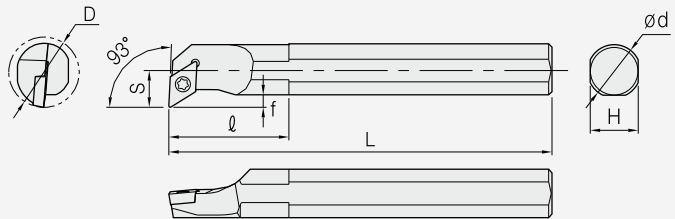


Insert	Item No.	Dimensions (mm)							Screw	Wrench
		ØD	ød	H	L	S	l	f		
DC □ □ 0702 □ □	EH-S10M-SDQCR R/L-07	13	10	9	150	7	20	2.5	SCR02555	TW07P
	EH-S12M-SDQCR R/L-07	16	12	11	150	9	22	3.5	SCR02565	
	EH-S16R-SDQCR R/L-07	20	16	15	200	11	27	4		
DC □ □ 11T3 □ □	EH-S16R-SDQCR R/L-11	20	16	15	200	11	32	4	SCR03508	TW15P
	EH-S20S-SDQCR R/L-11	25	20	18	250	13	32	4.5		
	EH-S25R-SDQCR R/L-11	32	25	23	200	17	32	7	SCR03510	
DC □ □ 0702 □ □	EH-A10H-SDQCR R/L-07	13	10	9.5	100	7	20	2	SCR02555	TW07P
	EH-A12K-SDQCR R/L-07	16	12	11	125	9	22	3	SCR02565	
DC □ □ 11T3 □ □	EH-A16M-SDQCR R/L-11	20	16	15	150	11	27	3	SCR03508	TW15P
	EH-A20Q-SDQCR R/L-11	25	20	19	180	13	32	3		
	EH-A25R-SDQCR R/L-11	32	25	24	200	17	32	4	SCR03510	

SDUC^{R/L}

Screw On

+ DC □ □

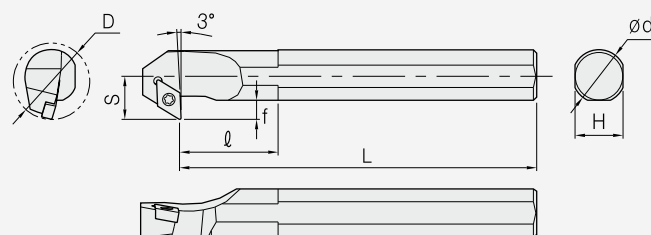


Insert	Item No.	Dimensions (mm)							Screw	Wrench
		ØD	ød	H	L	S	l	f		
DC □ □ 0702 □ □	EH-S10M-SDUCR R/L-07	13	10	9	150	7	0	2.5	SCR02555	TW07P
	EH-S12M-SDUCR R/L-07	16	12	11	150	9	22	3.5	SCR02565	
	EH-S16R-SDUCR R/L-07	20	16	15	200	11	27	4		
DC □ □ 11T3 □ □	EH-S16R-SDUCR R/L-11	20	16	15	200	11	27	4	SCR03508	TW15P
	EH-S20S-SDUCR R/L-11	25	20	18	250	13	35	4.3		
	EH-S25R-SDUCR R/L-11	32	25	23	200	17	46	6.8	SCR03510	
	EH-S32S-SDUCR R/L-11	40	32	30	250	22	50	8.4		
DC □ □ 0702 □ □	EH-A10H-SDUCR R/L-07	13	10	9.5	100	7	0	2	SCR02555	TW07P
	EH-A12K-SDUCR R/L-07	16	12	11	125	9	22	3	SCR02565	
	EH-A16M-SDUCR R/L-07	20	16	15	150	11	27	3		
DC □ □ 11T3 □ □	EH-A20Q-SDUCR R/L-11	25	20	19	180	13	35	3	SCR03508	TW15P
	EH-A25R-SDUCR R/L-11	32	25	24	200	17	46	4.5	SCR03510	

SDZC^{R/L}

Screw On

+ **DC** □ □

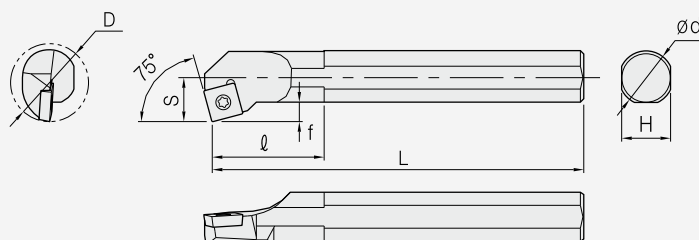


Insert	Item No.	Dimensions (mm)							Screw	Shim	Shim Screw	Wrench
		ØD	Ød	H	L	S	l	f				
DC□□0702□□	EH-S16R SDZC R/L 07	20	16	15	200	11	29	4	SCR02565	-	-	TW07P
	EH-S20S SDZC R/L 07	25	20	18	250	13	36.5	4.5	SCR03510	-	-	TW15P
DC□□11T3□□	EH-S25R SDZC R/L 11	32	25	23	200	17	30	6.9	SCR03512	SSD32	SSCR0509	TW15P,W35L
	EH-S32S SDZC R/L 11	40	32	30	250	22	39	8.4	SCR03510	-	-	TW15P
	EH-S40T SDZC R/L 11	50	40	37	300	27	47	9.4	SCR03512	SSD32	SSCR0509	TW15P,W35L
	EH-A25R SDZC R/L 11	32	25	24	200	17	30	4.5	SCR03512	SSD32	SSCR0509	TW15P,W35L
	EH-A32S SDZC R/L 11	40	32	31	250	22	39	6				

SSKC^{R/L}

Screw On

+ **SC** □ □

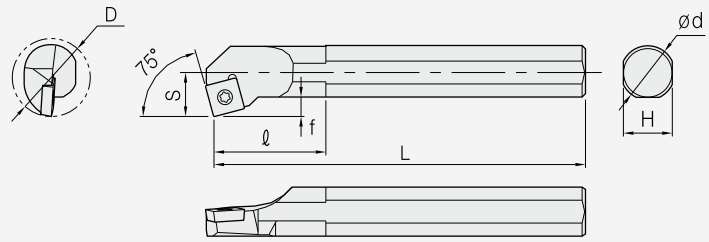


Insert	Item No.	Dimensions (mm)							Screw	Shim	Shim Screw	Wrench
		ØD	Ød	H	L	S	l					
SC□□09T3□□	EH-S12M SSKC R/L 09	16	20	11	150	9	26	SCR03507	-	-	-	-
	EH-S16R SSKC R/L 09	20	16	15	200	11	40	SCR03508	-	-	-	TW15P
	EH-S20S SSKC R/L 09	25	20	18	250	13	46					
SC□□1204□□	EH-S25R SSKC R/L 12	32	25	23	200	17	36	SCR0411F	SSC42	SSCR0610		TW15P
	EH-S32S SSKC R/L 12	40	32	30	250	22	43					TW15P,W40L
SC□□09T3□□	EH-A12K SSKC R/L 09	16	12	11	125	9	26	SCR03507	-	-	-	-
	EH-A16M SSKC R/L 09	20	16	15	150	11	32	SCR03508	-	-	-	TW15P
	EH-A20Q SSKC R/L 09	25	20	19	180	13	34					
SC□□1204□□	EH-A25R SSKC R/L 12	32	25	24	200	17	36	SCR0411F	SSC42	SSCR0610		TW15P
	EH-A32S SSKC R/L 12	40	32	31	250	22	43					TW15P,W40L

SSKP^{R/L}

Screw On

+ **SP**□□

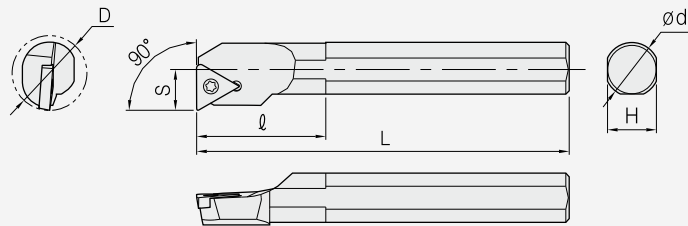


Insert	Item No.	Dimensions (mm)						Screw	Wrench
		øD	ød	H	L	S	ℓ		
SP□□0903□□	EH-S12M SSKP R/L 09	16	12	11	150	8	18	SCR0307	TW09P
	EH-S16N SSKP R/L 09	20	16	15	160	10	30		
	EH-S16R SSKP R/L 09	20	16	15	200	10	32		
	EH-S20N SSKP R/L 09	25	20	18	160	12.5	32		
	EH-S20S SSKP R/L 09	25	20	18	250	12.5	35		
SP□□0903□□	EH-A12K SSKP R/L 09	16	12	11	125	8	21	SCR03508	TW09P
	EH-A16M SSKP R/L 09	20	16	15	150	10	30	SCR0307	
	EH-A20Q SSKP R/L 09	25	20	19	180	12.5	32		

STFC^{R/L}

Screw On

+ **TC**□□

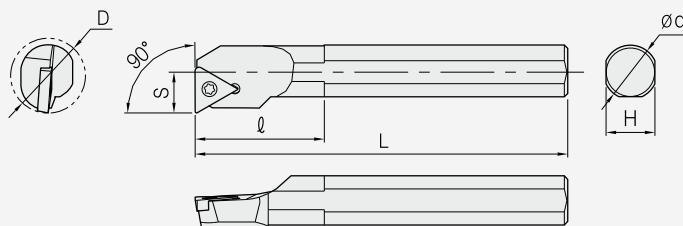


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		ØD	ød	H	L	S	l				
TC□□0902□□	EH-S10M STFC R/L 09	13	10	9	150	7	23	SCR02206	-	-	TW06P
	EH-S12M STFC R/L 09	16	12	11	150	9	28				
TC□□1102□□	EH-S12M STFC R/L 11	16	12	11	150	9	30	SCR02565	-	-	TW07P
	EH-S16R STFC R/L 11	20	16	15	200	11	35				
	EH-S20S STFC R/L 11	25	20	18	250	13	36				
TC□□16T3□□	EH-S20S STFC R/L 16	25	20	18	250	13	36	SCR03510	-	-	TW15P
	EH-S25R STFC R/L 16	32	25	23	200	17	49				
TC□□16T3□□	EH-S32S STFC R/L 16	40	32	30	250	22	50	SCR03512	SST32	SSCR0509	TW15P,W35L
	EH-S40T STFC R/L 16	50	40	37	300	27	60				
	EH-A10M STFC R/L 09	13	10	9.5	100	7	23				
TC□□0902□□	EH-A12K STFC R/L 09	16	12	11	125	9	23	SCR02206	-	-	TW06P
	EH-A12K STFC R/L 11	16	12	11	125	9	30				
TC□□1102□□	EH-A16M STFC R/L 11	20	16	15	150	11	30	SCR02565	-	-	TW07P
	EH-A20Q STFC R/L 11	25	20	19	180	13	36				
TC□□16T3□□	EH-A25R STFC R/L 16	32	25	24	200	17	49	SCR03510	-	-	TW15P
	EH-A32S STFC R/L 16	40	32	31	250	22	50				

STFP^{R/L}

Screw On

+ **TP**□□

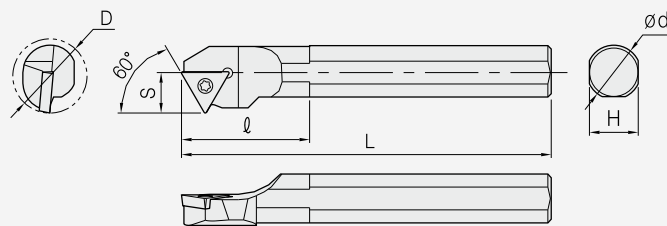


Insert	Item No.	Dimensions (mm)						Screw	Wrench
		øD	ød	H	L	S	ℓ		
TP□□1103□□	EH-S10M STFP R/L 11	12	10	9	150	6	-	SCR030508	TW09P
	EH-S12M STFP R/L 11	16	12	11	150	8	10	SCR0307	TW09P
	EH-S16N STFP R/L 11	20	16	15	160	10	12		
	EH-S16R STFP R/L 11	20	16	15	200	10	12		
TP□□1604□□	EH-S20N STFP R/L 16	25	20	18	160	12.5	32	SCR0408	TW15P
	EH-S20S STFP R/L 16	25	20	18	250	12.5	14		
TP□□1103□□	EH-A10H STFP R/L 11	12	10	9.5	100	6	-	SCR030508	TW09P
	EH-A12K STFP R/L 11	16	12	11	125	8	10	SCR0307	TW09P
	EH-A16M STFP R/L 11	20	16	15	150	10	23		
TP□□1604□□	EH-A20Q STFP R/L 16	25	20	19	180	12.5	41	SCR0408	TW15P

STWP^{R/L}

Screw On

+ **TP**□□

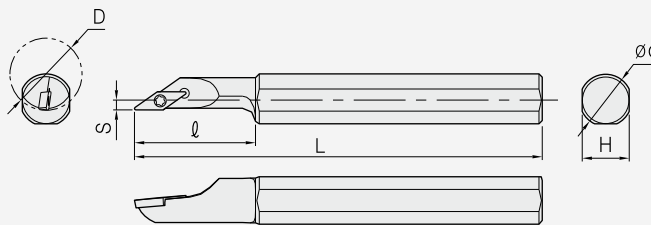


Insert	Item No.	Dimensions (mm)						Screw	Wrench
		øD	ød	H	L	S	ℓ		
TPGH1102□□	EH-S10M STWP R/L 11	12	10	9	150	6	23	SCR030508	TW09P
TPGH1103□□ TPGH1103□□	EH-S12M STWP R/L 11	16	12	11	150	8	30	SCR0306	TW09P
	EH-S16R STWP R/L 11	20	16	15	180	10	35		
	EH-S20R STWP R/L 11	25	20	19	200	12.5	40		

SVJC^{R/L}

Screw On

+ **VC**□□

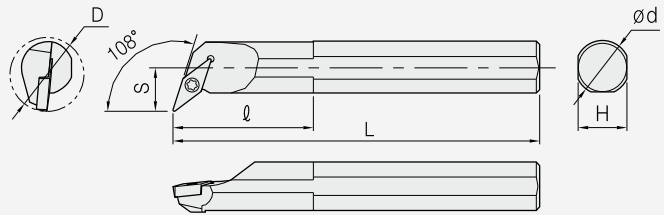


Insert	Item No.	Dimensions (mm)						Screw 	Wrench 
		øD	ød	H	L	S	ℓ		
VCMT0802□□	EH-S12M SVJC R/L 08	16	12	11	150	2	26	SCR0204	TW06P
	EH-S16Q SVJC R/L 08	20	16	15	180	2	36		

SVQB^{R/L}

Screw On

+ **VB**□□

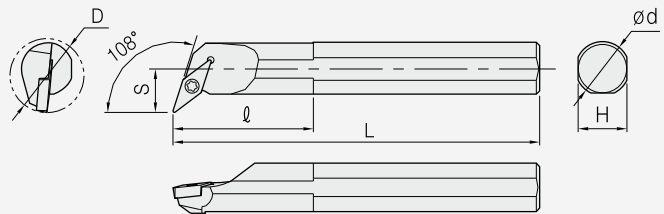


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		ØD	ød	H	L	S	l				
VB□□1604□□	EH-S32S SVQB R/L 16	40	32	30	250	22	56	SCR03512	SSV32	SSCR0509	TW15P,W35L
	EH-S40T SVQB R/L 16	50	40	37	300	27	64				
	EH-A32S SVQB R/L 16	40	32	31	250	22	56				

SVQC^{R/L}

Screw On

+ **VC**□□

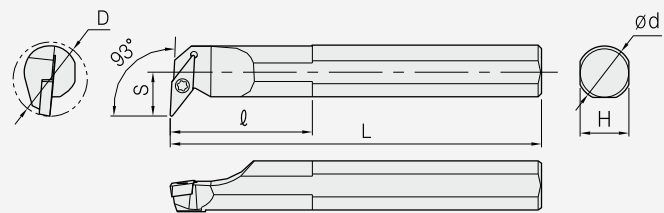


Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		ØD	ød	H	L	S	ℓ				
VC□□1103□□	EH-S16R SVQC R/L 11	20	16	15	200	11	35	SCR02565	-	-	TW07P
	EH-S20S SVQC R/L 11	25	20	18	250	13	38				
	EH-S25R SVQC R/L 11	32	25	23	200	17	42				
VC□□1303□□	EH-S20S SVQC R/L 13	25	20	18	250	13	42	SCR0307	-	-	TW07P
	EH-S25R SVQC R/L 13	32	25	23	200	17	45				
VC□□1604□□	EH-S25R SVQC R/L 16	32	25	23	200	17	50	SCR03510	-	-	TW15P
	EH-S32S SVQC R/L 16	40	32	30	250	22	56	SCR03512	SSV32	SSCR0509	TW15P
	EH-S40T SVQC R/L 16	50	40	37	300	27	64				W35L

SVUB^{R/L}

Screw On

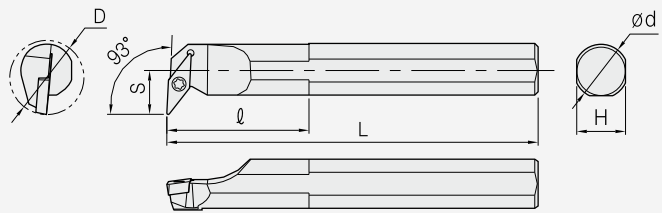
+ **VB**□□



Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		ØD	ød	H	L	S	l				
VB□□1604□□	EH-S32S SVUB R/L 16	40	32	30	250	22	56	SCR03510	SSV32	SSCR0509	TW15P,W35L
	EH-S40T SVUB R/L 16	50	40	37	300	27	64				
	EH-A32S SVUB R/L 16	40	32	31	250	22	56				

SVUC^{R/L} Screw On

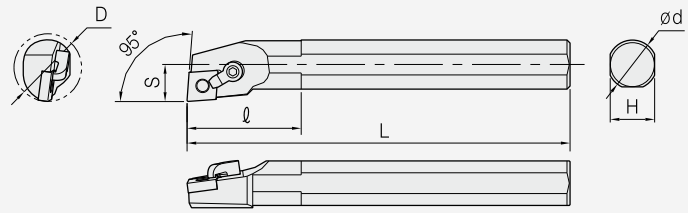
+ VC □ □



Insert	Item No.	Dimensions (mm)						Screw	Shim	Shim Screw	Wrench
		øD	ød	H	L	S	ℓ				
VC□□1103□□	EH-S16R SVUC R/L 11	22	16	15	200	13	30	SCR02565	-	-	TW07P
	EH-S20S SVUC R/L 11	25	20	18	250	14	33				
	EH-S25T SVUC R/L 11	32	25	23	300	17	38				
VC□□1303□□	EH-S20S SVUC R/L 13	28	20	18	250	16	35	SCR0307	-	-	TW09P
	EH-S25R SVUC R/L 13	32	25	23	200	17	40				
VC□□1604□□	EH-S25R SVUC R/L 16	32	25	23	200	19	50	SCR03510	-	-	TW15P
	EH-S32S SVUC R/L 16	40	32	30	250	22	56	SCR03512	SSV32	SSCR0509	TW15P
	EH-S40T SVUC R/L 16	50	40	37	300	27	64				W35L

MCLN^{R/L}

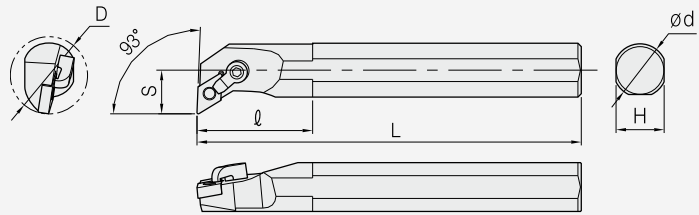
Multi Locking

+ **CN**□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		ØD	ød	H	L	S	l					
CN□□0903□□	EH-S20S-MCLN R/L-09	25	20	18	250	13	30	MCL7N	MCSCR10-32-19	-	MSP3D3	W19.8L
	EH-S25R-MCLN R/L-09	32	25	23	200	17	36					W23.8L
CN□□1204□□	EH-S25R-MCLN R/L-12	32	25	23	200	17	36	MCL6N	MCSCR1/4-21	-	MSP4DS	W31.8L
	EH-S32S-MCLN R/L-12	40	32	30	250	22	50			MSC43	MSP4D	W23.8L
	EH-S40T-MCLN R/L-12	50	40	37	300	27	60					
CN□□1204□□	EH-A25R-MCLN R/L-12	32	25	23	200	17	40	MCL6N	MCSCR1/4-21	-	MSP4DS	W31.8L
	EH-A32S-MCLN R/L-12	40	32	30	250	22	50			MSC43	MSP4D	W23.8L

MDUN^{R/L}

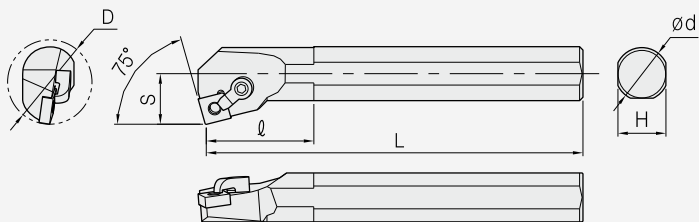
Multi Locking

+ **DN**□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		ØD	ød	H	L	S	l					
DN□□1504□□	EH-S32S-MDUN R/L-15-3	40	32	30	250	22	50	MCL6N	MCSCR1/4-21	MSD43	MSP4D	W31.8L
	EH-S40T-MDUN R/L-15-3	50	40	37	300	27	60					W23.8L
	EH-A32S-MDUN R/L-15-3	40	32	30	250	22	50					

MSKN^{R/L}

Multi Locking

+ **SN**□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Shim	Shim Pin	Wrench
		ØD	ød	H	L	S	l					
SN□□1204□□	EH-S25R-MSKN R/L-12	32	25	23	200	17	36	MCL8N1	MCSCR5/16-28	-	MSP4DS	W39.7L
	EH-S32S-MSKN R/L-12	40	32	30	250	22	50			MSS43	MSP4D	W23.8L
	EH-S40T-MSKN R/L-12	50	40	37	300	27	60					
SN□□1204□□	EH-A25R-MSKN R/L-12	32	25	23	200	17	40	MCL8N1	MCSCR5/16-28	-	MSP4DS	W39.7L
	EH-A32S-MSKN R/L-12	40	32	30	250	22	50			MSS43	MSP4D	W23.8L
	EH-A40T-MSKN R/L-12	50	40	37	300	27	60					



**Grooving
Parting**

Grooving/ Parting



EHWA grooving tools are suitable for precise grooving and cutting of the workpieces. The tools are designed with optimal PCD, PCBN or carbide grades by the applications, providing longer tool life and effective cutting.



Grooving/ Parting

ES type | PCD/PCBN

ESG

30

04

R/L

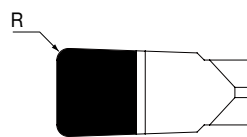
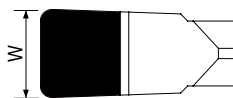
Insert shape

Width

Corner radius

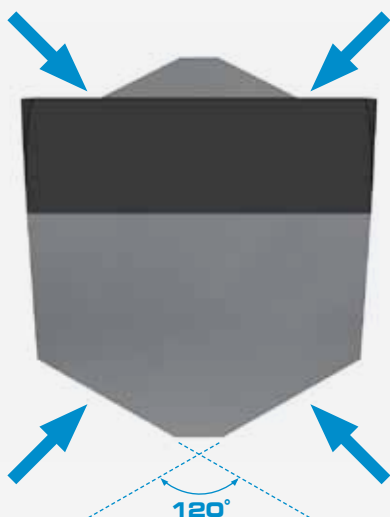
Hand of insert

Symbol	Shape
ESG	
ESR	
ESX	Special



Symbol	Shape
R	
L	

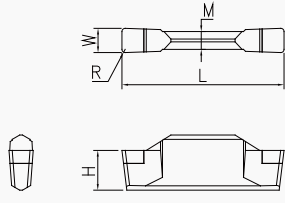
ES type

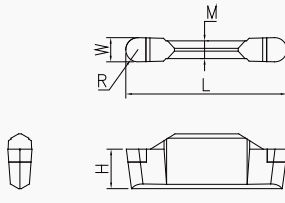


Characteristic

- Ehwa standard type
- You can choose various processing type, groove, width and groove depth for holder
- Higher clamping strength achieved by 120° taper

ES type | PCD/PCBN

Shape	Item No.	Dimensions (mm)					PCD			PCBN			
		W	R	M	L	H	EP20	EP55	EP750	EB29X	EB190	EB570	EB51
	ESG2002-R/L	2	0.2	1.7	20	7							
	ESG3002-R/L	3	0.2	2.2	20	7							
	ESG4002-R/L	4	0.2	3.0	20	7							
	ESG4004-R/L	4	0.4	3.0	20	7							
	ESG6002-R/L	6	0.2	5.0	25	7.5							
	ESG6004-R/L	6	0.4	5.0	25	7.5							
	ESG8002-R/L	8	0.2	6.0	30	8.7							
	ESG8004-R/L	8	0.4	6.0	30	8.7							

Shape	Item No.	Dimensions (mm)					PCD			PCBN			
		W	R	M	L	H	EP20	EP65	EP750	EB29X	EB190	EB570	EB51
	ESR2010	2	1	1.7	20	7							
	ESR3015	3	1.5	2.2	20	7							
	ESR4020	4	2	3.0	20	7							
	ESR6030	6	3	5.0	25	7.5							
	ESR8040	8	4	6.0	30	8.7							

Special order (possible to choose W1, X1, R, PCD, PCBN material)

 Holder : 136~145p

Grooving/ Parting

ED type | PCD/PCBN

EDG

30

04

R/L

Insert shape

Width

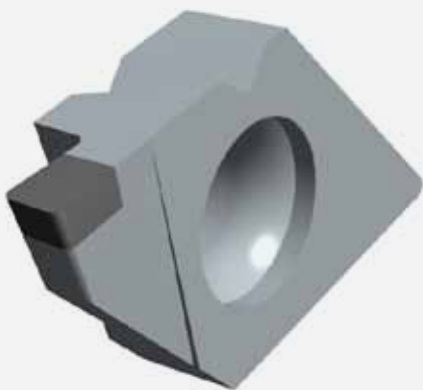
Corner radius

Hand of insert

Symbol	Shape
EDG	
EDR	
EDX	Special

Symbol	Shape
R	
L	

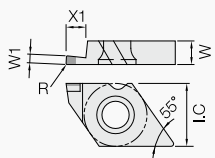
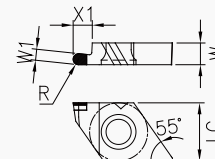
ED type



Characteristic

- Suitable for grooving requiring a narrow groove and high rigidity
- Excellent clamping rigidity by double clamping of screw and clamp

ED type | PCD/PCBN

Shape	Item No.	Dimensions (mm)					PCD			PCBN			
		W1	X1	R	W	I.C	EP20	EP55	EP750	EB28X	EB190	EB570	EB51
	EDG 1502-R/L	1.5	2.6	0.2	4.76	12.7							
	2002-R/L	2	3	0.2	4.76	12.7							
	3002-R/L	3	4.5	0.2	4.76	12.7							
	4002-R/L	4	4.5	0.2	4.76	12.7							
	EDR 1502-R/L	1.5	2.6	0.75	4.76	12.7							
	2002-R/L	2	3	1.0	4.76	12.7							
	3002-R/L	3	4.5	1.5	4.76	12.7							
	4002-R/L	4	4.5	2.0	4.76	12.7							

Special order (possible to choose W1, X1, R, PCD, PCBN material)

 **Holder** : 143p

Grooving/ Parting

ET type | PCD/PCBN

ETG

30

04

R/L

Insert shape

Width

Corner radius

Hand of insert

Symbol	Shape
ETG	
ETR	
ETX	Special

Symbol	Shape
R	
L	

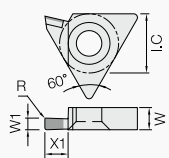
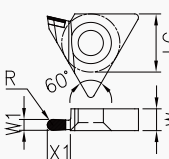
ET type



Characteristic

- Suitable for narrow grooving
- Easy tool setting

ET type | PCD/PCBN

Shape	Item No.	Dimensions (mm)						PCD			PCBN		
		W1	X1	R	W	I.C	EP20	EP55	EP750	EB28X	EB190	EB570	EB51
	ETG 1502-R/L	1.5	3	0.2	4.76	12.7							
	2002-R/L	2	3.5	0.2	4.76	12.7							
	3002-R/L	3	4.5	0.2	4.76	12.7							
	4002-R/L	4	4.5	0.2	4.76	12.7							
	ETR 1502-R/L	1.5	3	0.75	4.76	12.7							
	2002-R/L	2	3.5	1.0	4.76	12.7							
	3002-R/L	3	4.5	1.5	4.76	12.7							
	4002-R/L	4	4.5	2.0	4.76	12.7							

Special order (possible to choose W1, X1, R, PCD, PCBN material)

 Holder : 144p

Grooving/ Parting

EM type | PCD/PCBN

EMG

30

04

R/L

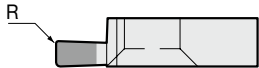
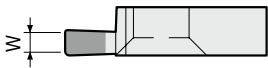
Insert shape

Width

Corner radius

Hand of insert

Symbol	Shape
EMG	
EMX	Special



Symbol	Shape
R	
L	

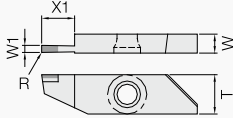
EM type



Characteristic

- Micro-grooving tool for automatic lathes
- Suitable for small and precise grooving

EMG type | PCD/PCBN

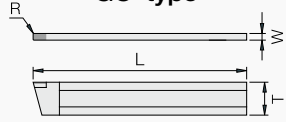
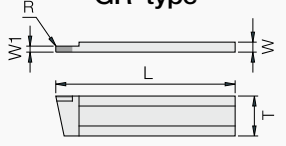
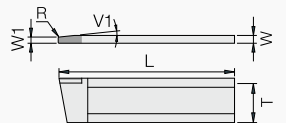
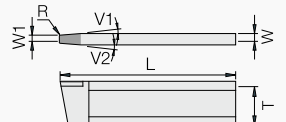
Shape	Item No.	Dimensions (mm)						PCD			PCBN		
		W1	X1	R	W	L	T	EP20	EP65	EP750	EB570	EB22	EB51
	EMG 05000-L/R	0.5	3.0	0.00	2.7	22.2	5.6						
	10005-L/R	1.0	3.5	0.00	2.7	22.2	5.6						
	15005-L/R	1.5	3.5	0.05	2.7	22.2	5.6						
	2001-L/R	2.0	4.0	0.10	2.7	22.2	5.6						
	2501-L/R	2.5	4.0	0.10	2.7	22.2	5.6						

Special order (possible to choose W1, X1, R, PCD, PCBN material)

 **Holder** : 145p

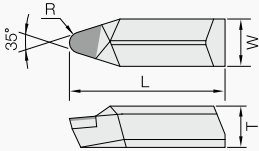
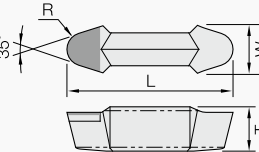
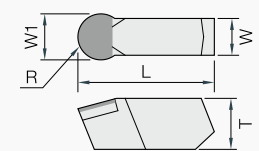
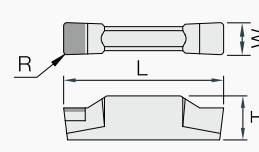
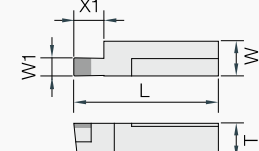
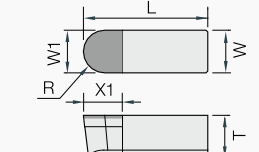
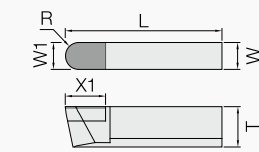
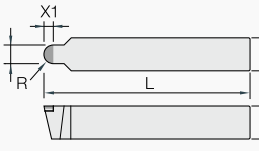
Grooving/ Parting

Customized design | Piston ring - PCD/ PCBN

Shape	Item No.	Dimensions (mm)						PCD			PCBN	
		W	T	L	R	V1	V2	EP13	EP750	EP59	EB51	EB710
GC type 												
GR type 												
GL type 												
1Side Taper type 												
2Side Taper type 												

Please specify the workpiece, W, W1, R, L, T and V.

Customized design | Others - PCD/ PCBN

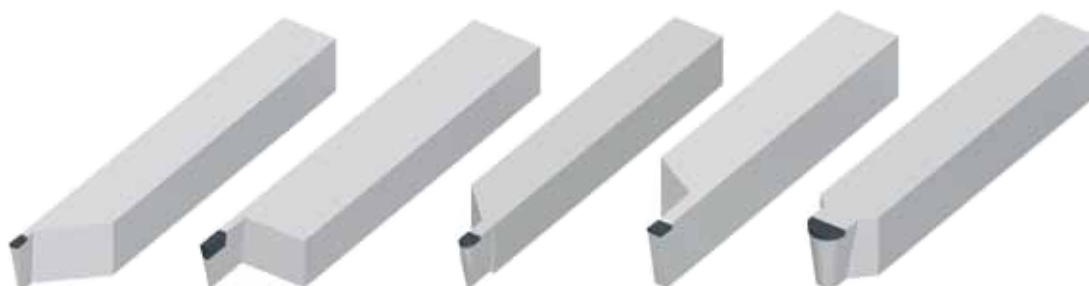
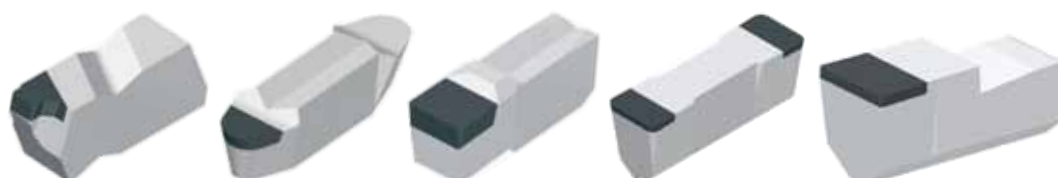
Shape	Dimensions (mm)						PCD			PCBN			
	W	W1	R	X1	L	T	EP20	EP65	EP750	EB28X	EB670	EB190	EB51
													
													
													
													
													
													
													
													

Please specify the workpiece, W, W1, R, X1, L and T.

Grooving/ Parting

Customized design | PCD/ PCBN

- Face, slot, chamfer, profile, etc.
- Optimized tooling service depending on the customer's demand.



Customized design | PCD/ PCBN

- Face, slot, chamfer, profile, etc.
- Optimized tooling service depending on the customer's demand.



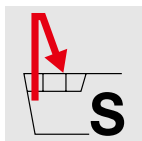
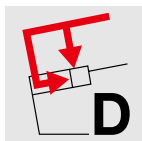
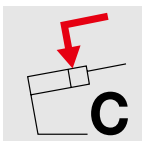
MEMO

Boring



Grooving_ **Holder**

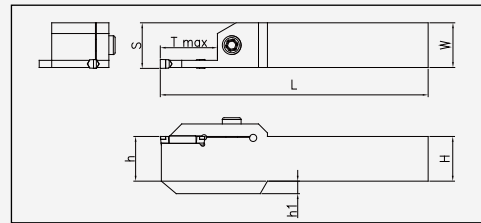
How to combine the holder



- C** Clamp on clamping (ESG Type)
- D** Double clamping (EDG Type)
- S** Screw clamping (ETG, EMG Type)

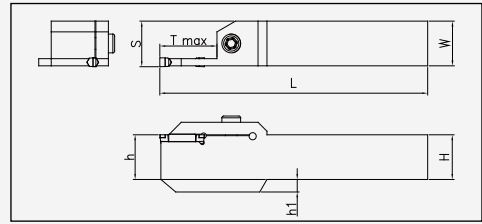
ESEH^{R/L}

+ ESG(R,X)□□



Insert	Item No.	Dimensions (mm)						Clamp Screw 	Wrench 
		H	W	L	S	H1	Tmax		
ES □ 20 □ □	ESEH-R/L 1212-2-T08	12	12	100	12.2		8	HCR0512	W40L
	ESEH-R/L 1616-2-T08	16	16	100	16.2		8		
	ESEH-R/L 2020-2-T08	20	20	125	20.2		8		
	ESEH-R/L 2525-2-T08	25	25	150	25.2		8		
	ESEH-R/L 1616-2-T12	16	16	100	16.2		12		
	ESEH-R/L 2020-2-T12	20	20	125	20.2		12		
	ESEH-R/L 2525-2-T12	25	25	150	25.2		12		
	ESEH-R/L 1616-2-T17	16	16	100	16.2		17		
	ESEH-R/L 2020-2-T17	20	20	125	20.2		17		
	ESEH-R/L 2525-2-T17	25	25	150	25.2		17		
ES □ 30 □ □	ESEH-R/L 1616-3-T10	16	16	100	16.4		10	HCR0512	W40L
	ESEH-R/L 2020-3-T10	20	20	125	20.4		10		
	ESEH-R/L 2525-3-T10	25	25	150	25.4		10		
	ESEH-R/L 3232-3-T10	32	32	170	32.4		10		
	ESEH-R/L 1616-3-T13	16	16	100	16.4		13		
	ESEH-R/L 2020-3-T13	20	20	125	20.4		13		
	ESEH-R/L 2525-3-T13	25	25	150	25.4		13		
	ESEH-R/L 1616-3-T20	16	16	100	16.4		20		
	ESEH-R/L 2020-3-T20	20	20	125	20.4		20		
	ESEH-R/L 2525-3-T20	25	25	150	25.4		20		
	ESEH-R/L 3232-3-T20	32	32	170	32.4		20		
	ESEH-R/L 2525-3-T25	25	25	150	25.4		25		
ES □ 40 □ □	ESEH-R/L 1616-4-T10	16	16	100	16.4		10	HCR0616	W50L
	ESEH-R/L 2020-4-T10	20	20	125	20.4		10		
	ESEH-R/L 2525-4-T10	25	25	150	25.4		10		
	ESEH-R/L 3232-4-T10	32	32	150	32.4		10		
	ESEH-R/L 1616-4-T15	16	16	100	16.4		15		
	ESEH-R/L 2020-4-T15	20	20	125	20.4		15		
	ESEH-R/L 2525-4-T15	25	25	150	25.4		15		
	ESEH-R/L 1616-4-T20	16	16	100	16.4		20		
	ESEH-R/L 2020-4-T20	20	20	125	20.4		20		
	ESEH-R/L 2525-4-T20	25	25	150	25.4		20		
	ESEH-R/L 3232-4-T20	32	32	170	32.4		20		
	ESEH-R/L 1616-4-T25	16	16	100	16.4		25		
	ESEH-R/L 2020-4-T25	20	20	125	20.4		25		
	ESEH-R/L 2525-4-T25	25	25	150	25.4		25		

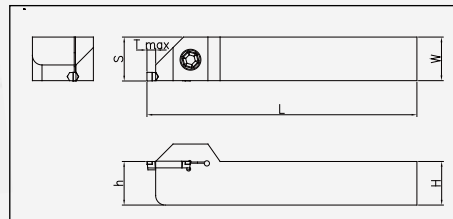
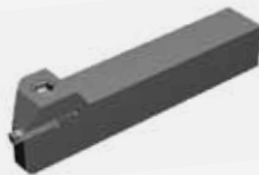
ESEH ^{R/L}

+ **ESG**(R,X)□□


Insert	Item No.	Dimensions (mm)							
		H	W	L	S	H1	Tmax		
ES □ 50 □ □	ESEH-R/L 2020-5-T12	20	20	125	20.5		12	HCR0616	W50L
	ESEH-R/L 2525-5-T12	25	25	150	25.5		12		
	ESEH-R/L 2020-5-T15	20	20	125	20.55		15		
	ESEH-R/L 2525-5-T15	25	25	150	25.55		15		
	ESEH-R/L 3232-5-T15	32	32	170	32.55		15		
	ESEH-R/L 2020-5-T20	20	20	125	20.5		20		
	ESEH-R/L 2525-5-T20	25	25	150	25.5		20	HCR0620	W50L
	ESEH-R/L 3232-5-T20	32	32	170	32.5		20		
	ESEH-R/L 2525-5-T32	25	25	150	25.5	7	32		
ES □ 60 □ □	ESEH-R/L 2020-6-T12	20	20	125	20.5		12	HCR0616	W50L
	ESEH-R/L 2525-6-T12	25	25	150	25.5		12		
	ESEH-R/L 2525-6-T15	25	25	150	25.55		15		
	ESEH-R/L 3232-6-T15	32	32	170	32.55		15		
	ESEH-R/L 2020-6-T20	20	20	125	20.5		20		
	ESEH-R/L 2525-6-T20	25	25	150	25.5		20	HCR0620	W50L
	ESEH-R/L 3232-6-T20	32	32	170	32.5		20		
	ESEH-R/L 2525-6-T32	25	25	150	25.5	7	32		
ES □ 80 □ □	ESEH-R/L 2525-8-T16	25	25	150	26		16	HCR0616	W50L
	ESEH-R/L 3232-8-T16	32	32	170	33.05		16		
	ESEH-R/L 2525-8-T25	25	25	150	26		25		
	ESEH-R/L 3232-8-T25	32	32	170	33		25	HCR0620	W50L
	ESEH-R/L 2525-8-T36	25	25	150	26	7	36		
	ESEH-R/L 3232-8-T36	32	32	170	33		36		

ESEH^{R/L}-T00

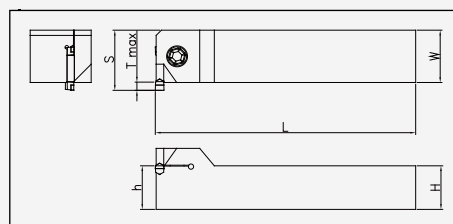
+ ESG(R,X)□□



Insert	Item No.	Dimensions (mm)						Clamp Screw	Wrench
		H	W	L	S	ΦD MIN	Tmax		
ES □ 30 □ □	ESEH-R/L 1616-3-T00	16	16	100	16.4	80	4.8	HCR0512	W40L
	ESEH-R/L 2020-3-T00	20	20	125	20.4	80	4.8		
	ESEH-R/L 2525-3-T00	25	25	150	25.4	80	4.8		
ES □ 40 □ □	ESEH-R/L 1616-4-T00	16	16	100	16.4	80	4.8	HCR0616	W50L
	ESEH-R/L 2020-4-T00	20	20	125	20.4	80	4.8		
	ESEH-R/L 2525-4-T00	25	25	150	25.4	80	4.8		
ES □ 60 □ □	ESEH-R/L 2020-6-T00	20	20	125	20.5	80	6.0	HCR0616	W50L
	ESEH-R/L 2525-6-T00	25	25	150	25.5	80	6.0		

ESEV^{R/L}

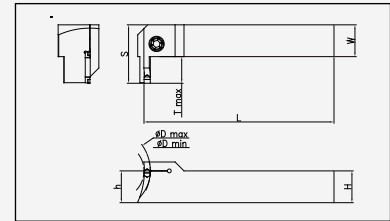
+ ESG(R,X)□□



Insert	Item No.	Dimensions (mm)						Clamp Screw	Wrench
		H	W	L	S	ΦD MIN	Tmax		
ES □ 20 □ □	ESEV-R/L 2020-2-T00	20	20	125	23.5	120	3	HCR0512	W40L
	ESEV-R/L 2525-2-T00	25	25	150	28.5	120	3		
	ESEV-R/L 3232-2-T00	32	32	170	35.5	120	3		
ES □ 30 □ □	ESEV-R/L 2020-3-T00	20	20	125	25	80	4.8	HCR0512	W40L
	ESEV-R/L 2525-3-T00	25	25	150	30	80	4.8		
	ESEV-R/L 3232-3-T00	32	32	170	37	80	4.8		
ES □ 40 □ □	ESEV-R/L 2020-4-T00	20	20	125	25	80	4.8	HCR0616	W50L
	ESEV-R/L 2525-4-T00	25	25	150	30	80	4.8		
	ESEV-R/L 3232-4-T00	32	32	170	37	80	4.8		
ES □ 50 □ □	ESEV-R/L 2020-5-T00	20	20	125	29.5	60	5	HCR0616	W50L
	ESEV-R/L 2525-5-T00	25	25	150	31.5	60	5		
	ESEV-R/L 3232-5-T00	32	32	170	38.5	60	5		
ES □ 60 □ □	ESEV-R/L 2020-6-T00	20	20	125	26.5	60	6	HCR0616	W50L
	ESEV-R/L 2525-6-T00	25	25	150	31.5	80	6		
	ESEV-R/L 3232-6-T00	32	32	170	38.5	60	6		
ES □ 80 □ □	ESEV-R/L 2525-8-T00	25	25	150	33.5	50	8	HCR0616	W50L
	ESEV-R/L 3232-8-T00	32	32	170	38.5	50	8		

ESFV^{R/L}

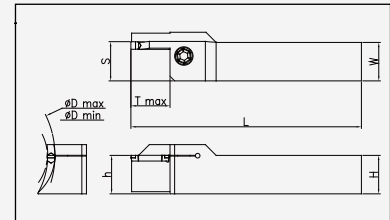
+ ESG(R,X)□□



Insert	Item No.	Dimensions (mm)						ΦD MIN MAX	Clamp Screw	Wrench
		H	W	L	S	Tmax				
ES □40□□	ESFV-R/L 425-44/70-T20	25	25	150	45.5	20	44	70	HCR0616	W50L
	ESFV-R/L 425-60/120-T20	25	25	150	45.5	20	60	120		
	ESFV-R/L 425-112/200-T20	25	25	150	45.5	20	112	200		

ESFH^{R/L}

+ ESG(R,X)□□

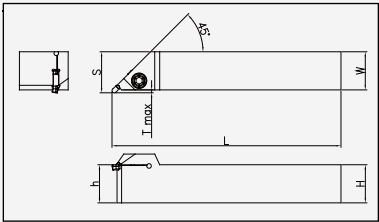


Insert	Item No.	Dimensions (mm)						ΦD MIN MAX	Clamp Screw	Wrench
		H	W	L	S	Tmax				
ES □30□□	ESFH-325-34/50-T10	25	25	150	25.5	10	34	50	HCRL0512	W40L
	ESFH-325-44/70-T15	25	25	150	25.5	15	44	70		
	ESFH-325-64/100-T15	25	25	150	25.5	15	64	100		
ES □40□□	ESFH-425-40/60-T10	25	25	150	25.5	10	40	60	HCR0616	W50L
	ESFH-425-44/70-T20	25	25	150	25.5	20	44	70		
	ESFH-425-84/92-T20	25	25	150	25.5	20	84	92		
	ESFH-425-60/120-T20	25	25	150	25.5	20	60	120		
	ESFH-425-112/200-T20	25	25	150	25.5	20	112	200		
ES □50□□	ESFH-525-190/220-T10	25	25	150	25.5	10	190	200	HCR0616	W50L
ES □60□□	ESFH-625-170/190-T10	25	25	150	25.5	10	170	190	HCR0616	W50L
	ESFH-625-190/220-T10	25	25	150	25.5	10	190	200		

Grooving/ Parting **Holder**

ESEU ^{R/L}

+ **ESG**(R,X)□□

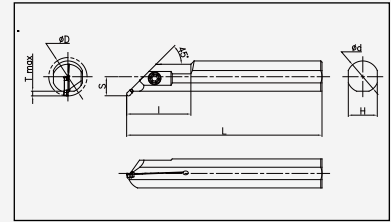


Insert	Item No.	Dimensions (mm)					Clamp Screw 	Wrench 
		H	W	L	S	Tmax		
ES □ 30 □ □	ESEU-R/L 2020-3	20	20	125	23	3	HCR0616	W50L
	ESEU-R/L 2525-3	25	25	150	28	3		
	ESEU-R/L 3232-3	32	32	170	35	3		
ES □ 40 □ □	ESEU-R/L 2020-4	20	20	125	23	3		
	ESEU-R/L 2525-4	25	25	150	28	3		
	ESEU-R/L 3232-4	32	32	170	35	3		
ES □ 50 □ □	ESEU-R/L 2020-5	20	20	125	24	4		
	ESEU-R/L 2525-5	25	25	150	29	4		
	ESEU-R/L 3232-5	32	32	170	36	4		
ES □ 60 □ □	ESEU-R/L 2020-6	20	20	125	24	4		
	ESEU-R/L 2525-6	25	25	150	29	4		
	ESEU-R/L 3232-6	32	32	170	36	4		
ES □ 80 □ □	ESEU-R/L 2525-8	25	25	150	30	5		
	ESEU-R/L 3232-8	32	32	170	37	5		

Grooving/ Parting holder

ESIU^{R/L}

+ ESG(R,X)□□

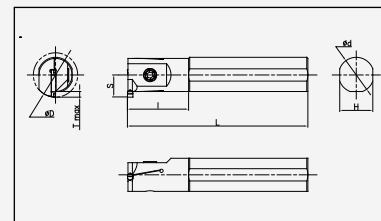


Insert	Item No.	Dimensions (mm)							Clamp Screw 	Wrench 
		ΦD	Φd	L	I	Tmax	H	S		
ES □ 30 □ □	ESIU-R/L 3520-3	35	20	150	45	3.5	18	13	HCR0512	W40L
	ESIU-R/L 4025-3	40	25	200	45	3.5	23	15.5		
	ESIU-R/L 5032-3	50	32	250	65	3.5	30	19		
ES □ 40 □ □	ESIU-R/L 3520-4	35	20	150	45	3.5	18	13		
	ESIU-R/L 4025-4	40	25	200	45	3.5	23	15.5		
	ESIU-R/L 5032-4	50	32	250	65	3.5	30	19		
ES □ 50 □ □	ESIU-R/L 4025-5	40	25	200	45	3.5	23	15.5	HCR0616	W50L
	ESIU-R/L 5032-5	50	32	250	65	3.5	30	19	HCR0620	
ES □ 60 □ □	ESIU-R/L 4025-6	40	25	200	45	3.5	23	19	HCR0616	
	ESIU-R/L 5032-6	50	32	250	65	3.5	30	19	HCR0620	
ES □ 80 □ □	ESIU-R/L 4025-8	40	25	200	45	6.5	23	15.5	HCR0616	
	ESIU-R/L 5032-8	50	32	250	65	6.5	30	19	HCR0620	

Grooving/ Parting Holder

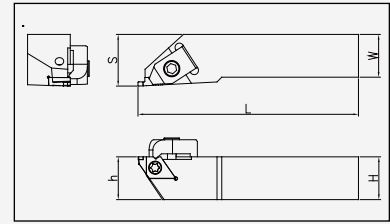
ESIV^{R/L}

+ ESG(R,X)□□



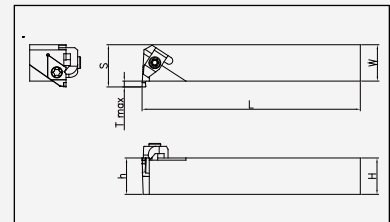
Insert	Item No.	Dimensions (mm)							Clamp Screw 	Wrench 
		ΦD	Φd	L	I	Tmax	H	S		
ES □ 20 □ □	ESIV-R/L 2516-2	25	16	125	35	6.5	15	14	HCR0410	W20L
	ESIV-R/L 2520-2	25	20	150	45	6.5	18	15.5	HCR0512	W30L
	ESIV-R/L 3225-2	32	25	200	45	7	23	19	HCR0410	W40L
ES □ 30 □ □	ESIV-R/L 2520-3	25	20	150	45	6.5	18	15.5	HCR0410	W30L
	ESIV-R/L 3225-3	32	25	200	45	7	23	19	HCR0512	W40L
	ESIV-R/L 4032-3	40	32	250	55	7.5	30	22.5	HCR0616	W50L
ES □ 40 □ □	ESIV-R/L 2520-4	25	20	150	45	6.5	18	15.5	HCRL0410	W30L
	ESIV-R/L 3225-4	32	25	200	45	7	23	19	HCRL0512	W40L
	ESIV-R/L 4032-4	40	32	250	55	7.5	30	22.5	HCR0616	W50L
ES □ 50 □ □	ESIV-R/L 3225-5	32	25	200	45	7.5	23	19.5	HCRL0512	W40L
	ESIV-R/L 4032-5	40	32	250	55	8.5	30	23.5	HCR0616	W50L
ES □ 60 □ □	ESIV-R/L 3225-6	32	25	200	45	7.5	23	19.5	HCRL0512	W40L
	ESIV-R/L 4032-6	40	32	250	55	8.5	30	23.5	HCR0616	W50L
ES □ 80 □ □	ESIV-R/L 4032-8	40	32	250	55	8.5	30	23.5	HCR0616	W50L
	ESIV-R/L 4540-8	45	40	300	70	8.5	37	26.5	HCR0616	W50L

EDEH^{R/L}

+ **EDG**(R,X)□□


Insert	Item No.	Dimensions (mm)					Clamp	Clamp Screw	Screw	Wrench
		T	W	L	S	H				
EDG □□□□	EDEH-R/L 2525-T00	25	25	130	30	25	DCG4	HCRL0512	SCRL0512	W30L, T20L

EDEV^{R/L}

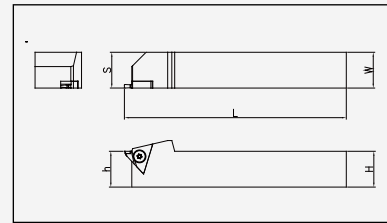
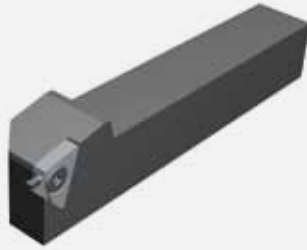
+ **EDG**(R,X)□□


Insert	Item No.	Dimensions (mm)						Clamp	Clamp Screw	Screw	Wrench
		T	W	L	S	ΦD MIN	Tmax				
ED □ 15 □ □	EDEV-R/L 2525-1.5-T00	25	25	150	28	120	2.6	DCG4			
	EDEV-R/L 3232-1.5-T00	32	32	170	35	120	2.6				
ED □ 20 □ □	EDEV-R/L 2020-2-T00	20	20	125	23.5	120	3				
	EDEV-R/L 2525-2-T00	25	25	150	28.5	120	3				
	EDEV-R/L 3232-2-T00	32	32	170	35.5	120	3				
ED □ 30 □ □	EDEV-R/L 2020-3-T00	20	20	125	25	80	4.5				
	EDEV-R/L 2525-3-T00	25	25	150	30	80	4.5				
	EDEV-R/L 3232-3-T00	32	32	170	37	80	4.5				
ED □ 40 □ □	EDEV-R/L 2020-4-T00	20	20	125	25	80	4.5				
	EDEV-R/L 2525-4-T00	25	25	150	30	80	4.5				
	EDEV-R/L 3232-4-T00	32	32	170	37	80	4.5				

Grooving/ Parting Holder

ETEH ^{R/L}

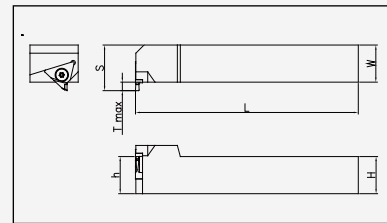
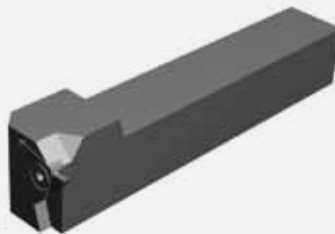
+ **ETG**(R,X) □□



Insert	Item No.	Dimensions (mm)					Screw	Wrench
		T	W	L	S	H		
ETG □□□□	ETEH R/L 2525-T00	25	25	130	30	25	SCR0511	T20L

ETEV ^{R/L}

+ **ETG**(R,X) □□

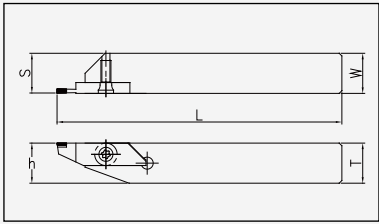


Insert	Item No.	Dimensions (mm)						Clamp Screw	Wrench
		T	W	L	S	ΦD MIN	Tmax		
ED □ 15 □ □	EDEV-R/L 2525-1.5-T00	25	25	150	28.5	120	3	SCRL0511	T20L
	EDEV-R/L 3232-1.5-T00	32	32	170	35.5	120	3		
ED □ 20 □ □	EDEV-R/L 2020-2-T00	20	20	125	24	120	3.5		
	EDEV-R/L 2525-2-T00	25	25	150	29	120	3.5		
	EDEV-R/L 3232-2-T00	32	32	170	36	120	3.5		
ED □ 30 □ □	EDEV-R/L 2020-3-T00	20	20	125	25	80	4.5		
	EDEV-R/L 2525-3-T00	25	25	150	30	80	4.5		
	EDEV-R/L 3232-3-T00	32	32	170	37	80	4.5		
ED □ 40 □ □	EDEV-R/L 2020-4-T00	20	20	125	25	80	4.5		
	EDEV-R/L 2525-4-T00	25	25	150	30	80	4.5		
	EDEV-R/L 3232-4-T00	32	32	170	37	80	4.5		

EMG Type (PCD/PCBN)

EMEH ^{R/L}

+ **EMG**(X) □□



Insert	Item No.	Dimensions (mm)					Screw	Wrench
		T	W	L	S	H		
EMG□□□□	EMEH-R/L 1010-T00	10	10	100	10	10	SCR02565	T07P



Milling



We are dedicated to designing and developing special milling cutters and indexable inserts for machining work-pieces that range from easy-to-machine to difficult-to-machine

- _ Design of insert and cutter for maximized productivity
- _ Available in various grades such as ultra-fine, fine, medium, coarse and multi-modal to machine all material types
- _ Guaranteed increased tool life and enhanced wear resistance
- _ Economical, consistent, and reliable performance
- _ Re-sharpening & re-tipping help the tools extend their total tool life and reduce the tool cost



Designation system | unit : metric



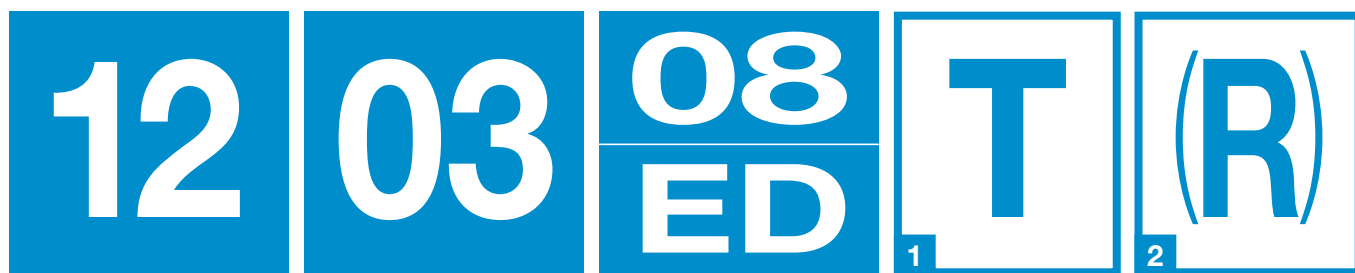
Insert shape Clearance angle Tolerances Clamp type

Symbol	Shape
A	
B	
C	
H	
L	
O	
P	
R	
S	
T	
W	
X	Special

Symbol	Angle
N	0°
A	3°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°
G	30°

Class	I.C size (mm)	m (mm)	t (mm)	I.C (mm)
A	6.35 9.525 12.7 15.875 19.05	±0.025	±0.025	±0.025
C		±0.025	±0.025	±0.025
G		±0.13	±0.13	±0.025
H		±0.025	±0.025	±0.013
K		±0.025	±0.025	±0.05~±0.15
M		±0.13	±0.13	±0.05~±0.15
U		±0.13	±0.13	±0.08~±0.25

Symbol	Shape
A	
F	
G	
M	
N	
R	
T	
W	
X	Special



Cutting edge length

					I.C size (mm)
09					5.56
06	06	11			6.35
08	13				7.94
09	09	16			9.525
12	12	22	05		12.7
16	15	27	09	15.875	
07					17.94
19	19	33	10	19.05	
25	25				25.4

Thickness

Symbol	t (mm)
01	1.59
02	2.38
03	3.18
T3	3.97
04	4.76
05	5.56
06	6.35
07	7.94
09	9.52

Corner radius

Symbol	R (mm)
00	Sharp
02	0.2
04	0.4
05	0.5
08	0.8
10	1.0
12	1.2
15	1.5
16	1.6
24	2.4
32	3.2
40	4.0

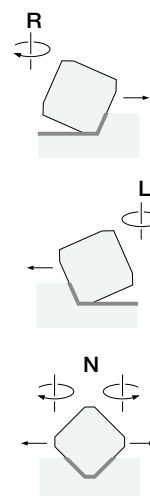
Parallel land

		Clearance angle of land	
Entering angle			
A	45°	B	5°
D	60°	C	7°
E	75°	D	15°
F	85°	E	20°
P	90°	F	25°
Z	Special	G	30°
		N	0°
		P	11°
		Z	Special

1 Edge shape

Symbol	Shape
F	
E	
T	
S	

2 Cutting direction



Designation system | unit : inch



Insert shape Clearance angle Tolerances Clamp type

Symbol	Shape
A	
B	
C	
H	
L	
O	
P	
R	
S	
T	
W	
X	Special

Symbol	Angle
N	0°
A	3°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°
G	30°

Class	I.C size (inch)	Tolerance		
		m (inch)	t (inch)	I.C (inch)
A	6.35 9.525 12.7 15.875 19.05	±0.0002	±0.001	±0.001
C		±0.0005	±0.001	±0.001
G		±0.001	±0.005	±0.001
H		±0.0005	±0.001	±0.0005
K		±0.0005	±0.001	±0.002~±0.006
M		±0.003~±0.008	±0.005	±0.002~±0.006
U		±0.005~±0.015	±0.005	±0.003~±0.001

Symbol	Shape
A	
F	
G	
M	
N	
R	
T	
W	
X	Special

4 2 2 T (R)

Cutting edge length					Symbol	I.C size (inch)
C	R,S	T	H	O		
9					1.8	7/23
06	06	11			2	1/4
09	09	16			3	3/8
12	12	22		05	4	1/2
16	15	27	09		5	5/8
19	19	33	10		6	3/4
25	25				8	1
					10	1-1/4

Thickness	
Symbol	t (inch)
1	1/16
1.5	3/32
2	1/8
2.5	5/32
3	3/16
3.5	7/32
4	1/4
5	5/16
6	3/8

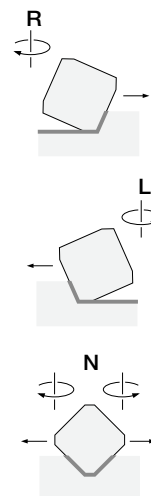
Corner radius	
Symbol	R (inch)
0	Sharp
1	1/64
2	1/32
3	3/64
4	1/16
6	3/32
8	1/8

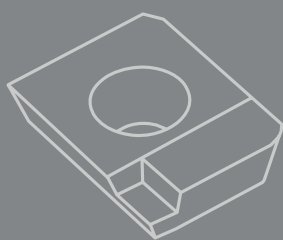
Parallel land	
Entering angle	Clearance angle of land
A 45°	B 5°
D 60°	C 7°
E 75°	D 15°
F 85°	E 20°
P 90°	F 25°
Z Special	G 30°
	N 0°
	P 11°
	Z Special

1 Edge shape

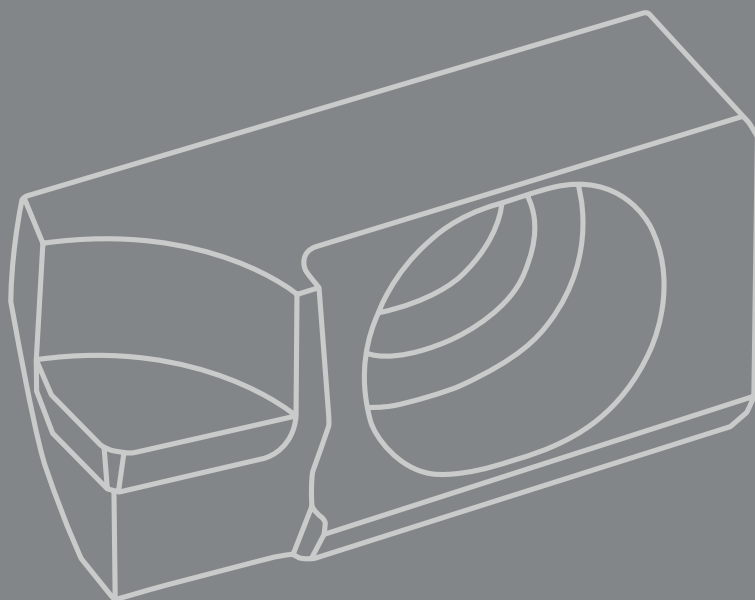
Symbol	Shape
F	
E	
T	
S	

2 Cutting direction

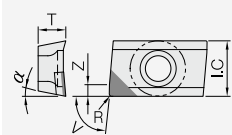




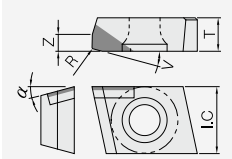
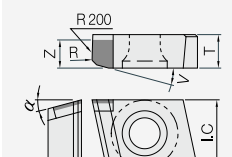
Milling_
PCD



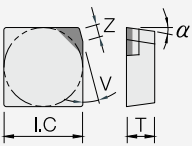
APKT

Shape	ISO code		Dimensions (mm)						PCD				
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29
	APKT 1604PDFR		9.525	2	11			4.76					

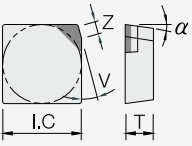
CDEW

Shape	ISO code		Dimensions (mm)						PCD				
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29
	CDEW 1204R-R		12.7	2.4	15	15	-	4.76					
	CDEW 1204R-F		12.7	4.5	15	15	200	4.76					

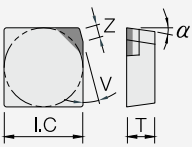
SPGN

Shape	ISO code		Dimensions (mm)						PCD					
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29	
	SPGN 1203EDR	SPGN 42EDR	12.7	1.4	11	15		3.18						
	1203EDL	42EDL	12.7	1.4	11	15		3.18						
	1504EDR	53EDR	15.875	1.4	11	15		3.18						

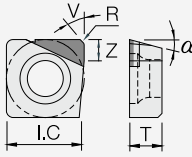
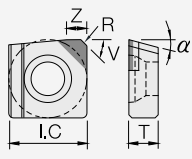
SEGN

Shape	ISO code		Dimensions (mm)						PCD					
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29	
	SEGN 1203AFN	SEGN 42AFN	12.7	2	20	45		3.18						
	1203EFR	42EFR	12.7	2	20	15		3.18						
	1504AFN	53AFN	15.875	2	20	45		4.76						
	1504EFR	53EFR	15.875	2	20	15		4.76						

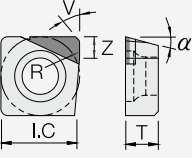
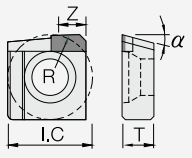
SFGN

Shape	ISO code		Dimensions (mm)						PCD					
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29	
	SFGN 1203EFR	SFGN 42EFR	12.7	2	25	15		3.18						

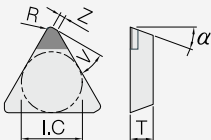
SNEW

Shape	ISO code		Dimensions (mm)						PCD				
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29
	NF-SNEW 09T3ADTR		9.525	2.35	15	45		3.97					
	09T3ADTR-R		9.525	2.35	15		0.5	3.97					
	NF-SNEW 1204AFTR		12.7	3.3	15	45		4.76					
	1204AFTR-R		12.7	3.3	15		1	4.76					

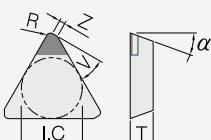
SNEW(W)

Shape	ISO code		Dimensions (mm)						PCD				
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29
	NF-SNEW 09T3ADTR-W		9.525	2.6	15	45	100	3.97					
	NF-SNEW 1204ADFR-W		12.7	5	15	45	300	4.76					

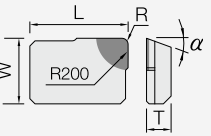
TPGN

Shape	ISO code		Dimensions (mm)						PCD					
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29	
	TPGN 1603PDR	TPGN 32PDR	12.7	1.2	11	30		3.18						
	1603PDL	32PDL	12.7	1.2	11	30		3.18						
	2204PDR	43PDR	15.88	1.4	11	30		4.76						

TEGN

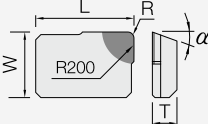
Shape	ISO code		Dimensions (mm)						PCD					
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29	
	TEGN 1603PER	TEGN 32PER	12.7	1.2	20	30	0.8	3.18						
	2204PER	43PER	15.88	1.4	20	30	0.8	4.76						

LDCN

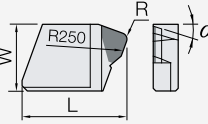
Shape	ISO code		Dimensions (mm)						PCD					
	Metric	Inch	I.C	Z	α	L	R	T	EP20	EP55	EP750	EP58	EP29	
	LDCN 190412R	LDCN	12.7		15	19.05	1.2	4.76						
	190412L		12.7		15	19.05	1.2	4.76						



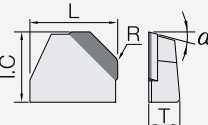
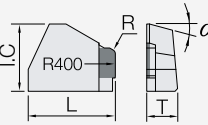
LFCN

Shape	ISO code		Dimensions (mm)						PCD					
	Metric	Inch	W	Z	α	L	R	T	EP20	EP55	EP750	EP58	EP29	
	LFCN 190412R	LFCN	12.7		25	19.05	1.2	4.76						
	190412L		12.7		25	19.05	1.2	4.76						

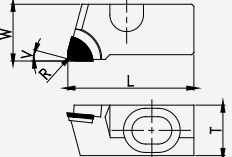
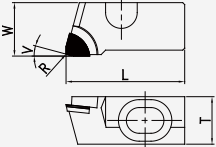
GDCN

Shape	ISO code		Dimensions (mm)						PCD					
	Metric	Inch	W	Z	α	L	R	T	EP20	EP55	EP750	EP58	EP29	
	GDCN 2004PDFR	GDCN	12.7		15	20	1.2	4.76						
	2004PDFL		12.7		15	20	1.2	4.76						

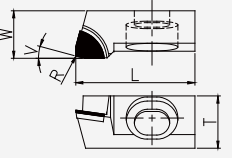
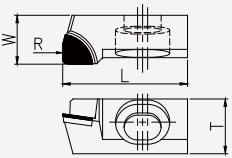
YDEN

Shape	ISO code		Dimensions (mm)						PCD					
	Metric	Inch	I.C	Z	α	V	R	T	EP20	EP55	EP750	EP58	EP29	
	YDEN 1505ADFR		12.7		15	15.875	1.6	5.675						
	YDEN 1505ADFR-WD		12.28		15	15.925	0.8	5.675						

Cartridge_ SD type

SDR	Item No.	Dimensions (mm)					PCD				
		W	V	L	R	T	EP20	EP55	EP750	EP58	EP29
	SDR	13.5	15	30		12					
	SDR-A	13.5	0	30		12					
	SDR-R	13.5	15	30	0.4	12					
	SDR-ES	13.5	15	30		12					
SDW	Item No.	Dimensions (mm)					PCD				
		W	L	R	T		EP20	EP55	EP750	EP58	EP29
	SDW	13	30	400	12						
	SDW-ES	13	30	400	12						

Cartridge_ High feed type

HFR	Item No.	Dimensions (mm)					PCD				
		W	V	L	R	T	EP20	EP55	EP750	EP58	EP29
	HFR	10	15	25		11					
	HFR-A	10	0	25		11					
	HFR-R	10	15	25	0.4	11					
	HFR-ES	10	15	25		11					
HFW	Item No.	Dimensions (mm)					PCD				
		W	L	R	T		EP20	EP55	EP750	EP58	EP29
	HFW	9.8	25	400	11						
	HFW-ES	9.8	25	400	11						

SDR : standard face milling rough

SDR-A : corner milling rough

SDR-R : standard face milling rough with nose radius

SDR-ES : rough with edge hone

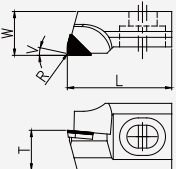
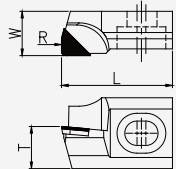
SDW : standard face milling wiper

SDW-ES : wiper with edge hone

CFR : CF milling rough

CFW : CF milling wiper

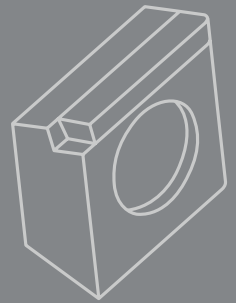
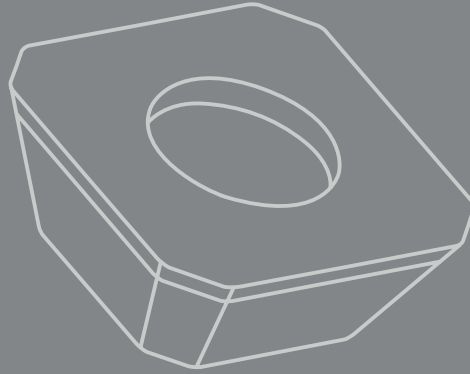
Cartridge_ CF type

CFR	Item No.	Dimensions (mm)					PCD					
		W	V	L	R	T	EP20	EP55	EP750	EP58	EP29	
	CFR	10.5	15	25		10						
	CFR-A	10.5	0	25		10						
	CFR-R	10.5	15	25	0.4	10						
	CFR-ES	10.5	15	25		10						
CFW	Item No.	Dimensions (mm)				PCD						
		W	L	R	T	EP20	EP55	EP750	EP58	EP29		
	CFW	10	25	400	10							
	CFW-ES	10	25	400	10							

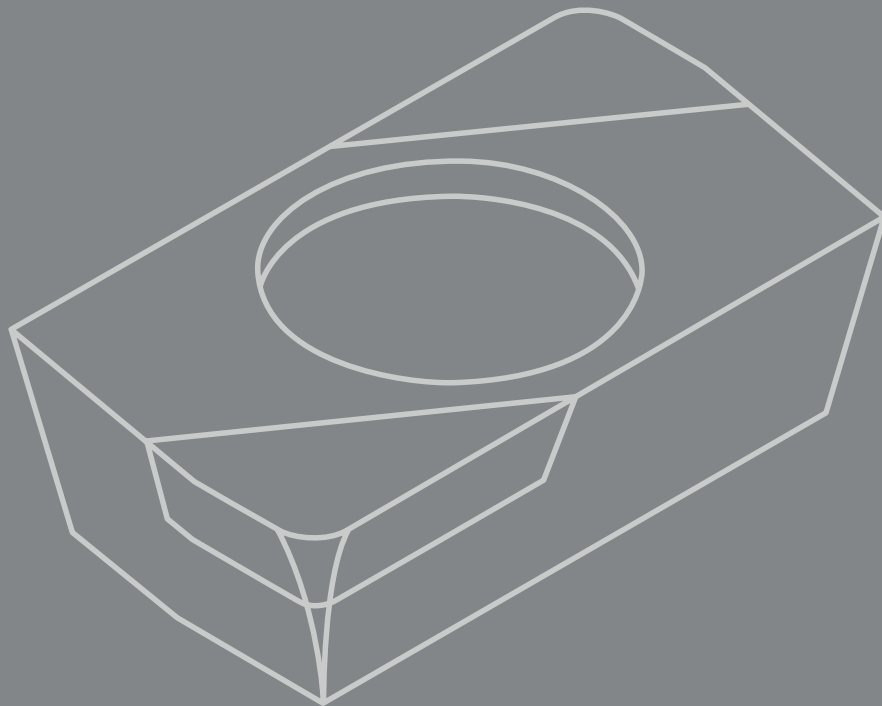
Customized design

- Face, slot, chamfer, profile, etc.
- Optimized tooling service depending on the customer's demand.

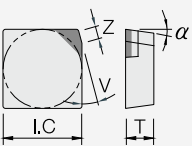




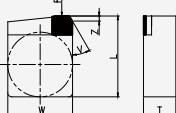
Milling_
PCBN



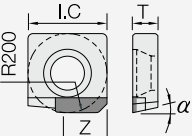
SPGN

Shape	ISO code		Dimensions (mm)						PCBN				
	Metric	Inch	I.C	Z	α	V	R	T	EB11	EB210	EB51	EB71	EB710
	SPGN 1203EDR	SPGN 42EDR	12.7	1.4	11	15		3.18					
	1203EDL	42EDL	12.7	1.4	11	15		3.18					
	1504EDR	53EDR	15.9	1.4	11	15		3.18					

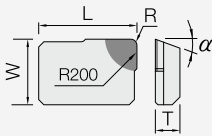
SNGN

Shape	ISO code		Dimensions (mm)						PCBN				
	Metric	Inch	W	Z	V	R	T	L	EB11	EB210	EB51	EB71	EB710
	SNGN 1506APTR	SNGN 54APTR	12.7	2.5	30	250	6.35	15.875					
	1506APTL	54APTL	12.7	2.5	30	250	6.35	15.875					

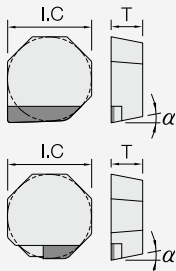
SNEW

Shape	ISO code		Dimensions (mm)						PCBN				
	Metric	Inch	I.C	Z	α	V	R	T	EB11	EB210	EB51	EB71	EB710
	SNEW 09T3ADFR	SNEW 3(2.5)ADFR	9.525	2.6	15	45		3.97					
	1203ADTR	42ADTR	12.7	7	15	45	300	3.18					

LDCN

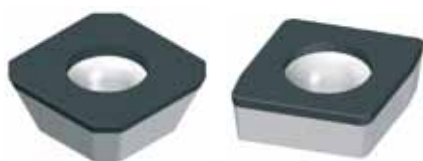
Shape	ISO code		Dimensions (mm)						PCBN				
	Metric	Inch	W	Z	α	L	R	T	EB11	EB210	EB51	EB71	EB710
	LDCN 190412R		12.7		15	19.1	1.2	4.76					
	190412L		12.7		15	19.1	1.2	4.76					

OPHX

Shape	ISO code		Dimensions (mm)						PCBN				
	Metric	Inch	I.C	Z	α	V	R	T	EB11	EB210	EB51	EB71	EB710
	OPHX 0504ZZN-R		12.7		11		-	4.76					
	0504ZZR		12.7		11		300	4.76					
	0504ZZL		12.7		11		300	4.76					

Customized design

- Face, slot, chamfer, profile, etc.
- Optimized tooling service depending on the customer's demand.



Milling_
Cutter body_Aluminum



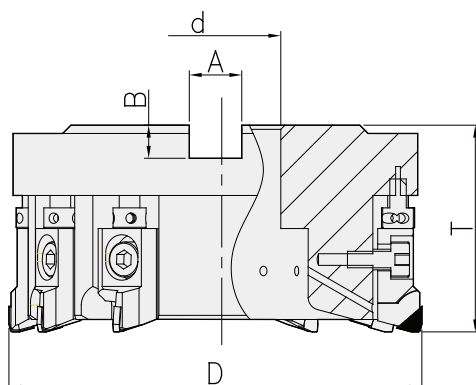


Aluminum body and special inserts designed for high- speed / high precision cutting.
The light weight body makes tool setting easy.

- _ Easy setting with light aluminum body
(50% lighter than steel body)
- _ Excellent milling performance and quality
- Excellent durability and low cutting resistance
- High productivity and process stability

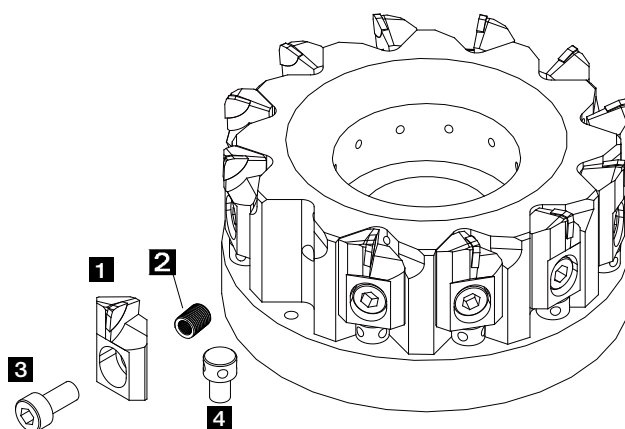
Cutter body_Aluminum & Steel

CF type



Item No.		Dimensions (mm)					Tooth		Weight	Cartridge	Arbor
Standard	High feed	ØD	Ød	A	B	T	standard	High feed	(kg)		
CF 08050-6R(L)	CF 08050-10R(L)	80	25.4	9.5	6	50	6	10	0.7	ROUGH CFR(R) CFR(L)	FMA 25.4
CF 10063-10R(L)	CF 10063-12R(L)	100	31.75	12.7	8	63	10	12	1.0		FMA 31.75
CF 12563-12R(L)	CF 12563-16R(L)	125	38.1	15.9	10	63	12	16	1.8		FMA 38.1
CF 16063-16R(L)	CF 16063-18R(L)	160	50.8	19.0	11	63	16	18	2.9	WIPER CFW(R) CFW(L)	FMA 50.8
CF 20063-20R(L)	CF 20063-24R(L)	200	47.625	25.4	14	63	20	24	4.5		FMA 47.625
CF 25063-24R(L)	CF 25063-30R(L)	250	47.625	25.4	14	63	24	30	7.0		FMA 47.625

- Shoulder type cartridge can be offered by customer's demand.

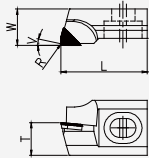


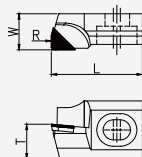
Spare parts

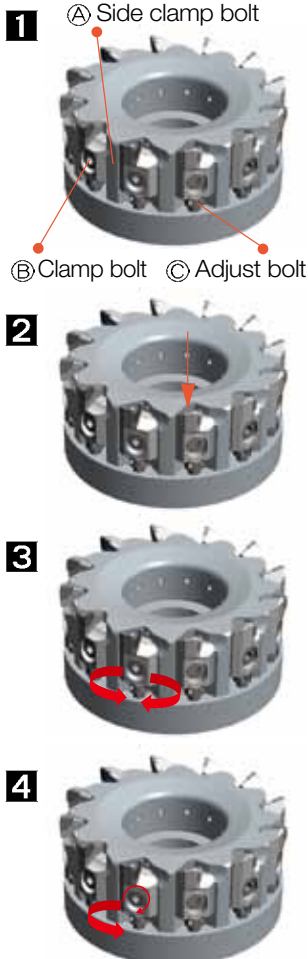
1 Cartridge (Rough) CFR	1 Cartridge (Wiper) CFW	2 Double Bolt M8M5-7	3 Clamp Bolt M5x12	4 Adjust Bolt M5x8	Coolant Bolt

- Every spare parts be offered by extra charge.

Cartridge_ CF type

CFR	Item No.	Dimensions (mm)					PCD						
		W	V	L	R	T	EP20	EP55	EP750	EP58	EP29		
	CFR	10.5	15	25		10							
	CFR-A	10.5	0	25		10							
	CFR-R	10.5	15	25	0.4	10							
	CFR-ES	10.5	15	25		10							

CFW	Item No.	Dimensions (mm)				PCD						
		W	L	R	T	EP20	EP55	EP750	EP58	EP29		
	CFW	10	25	400	10							



Setting manual

1. Installaion of cartridge

Install the (C) Adjust bolt on the cutter body, and insert the cartridge. Then, gently tightening the (B) Clamp bolt and (A) Side clamp bolt.

2. Installaion of bolt

When tightening, secure the cartridge by pressing it downward. Then using a torque wrench. Temporarily tighten the clamp bolt and side clamp bolt to 3N.m using a torque wrench.

3. Cutting edge height adjustment

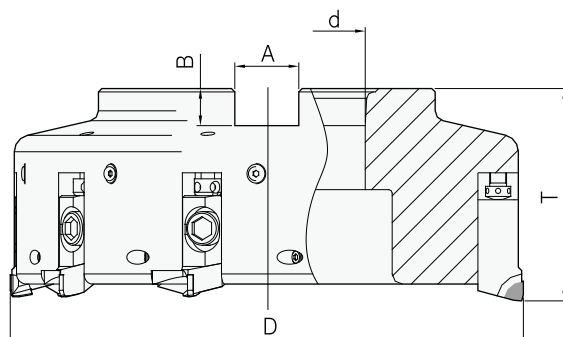
Turn the adjustment bolt and adjust so that the height of the front cutter is $-10\mu\text{m}$ from the target value.

4. Final adjustment

Using a torque wrench, tighten the clamp bolt and side clamp bolt to 10N.m. After then turn the adjustment bolt, And adjust to the target height.

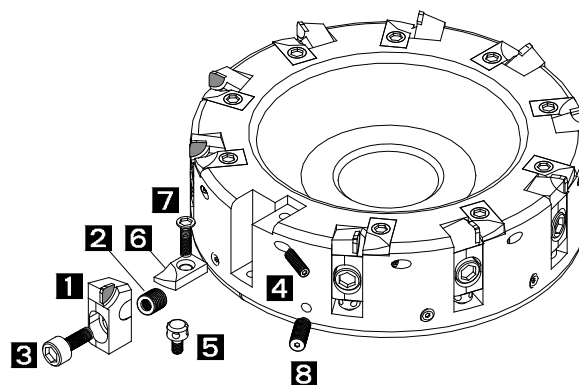
Cutter body_Aluminum & Steel

SD type



Item No. Inch type	Dimensions (mm)					Tooth	Weight (kg)	Cartridge	Arbor
	ØD	Ød	A	B	T				
SD 08050-6R(L)	80	25.4	9.5	6	50	6	0.7	ROUGH SDR (R) SDR (L)	FMA 25.4
SD 10063-8R(L)	100	31.75	12.7	8	63	8	1.0		FMA 31.75
SD 12563-10R(L)	125	38.1	15.9	10	63	10	1.8		FMA 38.1
SD 16063-12R(L)	160	50.8	19.0	11	63	12	2.9	WIPER SDW (R) SDW (L)	FMA 50.8
SD 20063-16R(L)	200	47.625	25.4	14	63	16	4.5		FMA 47.625
SD 25063-18R(L)	250	47.625	25.4	14	63	18	7.0		FMA 47.625

- Shoulder type cartridge can be offered by customer's demand.

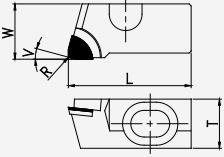
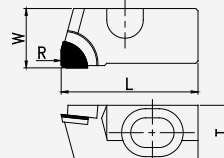


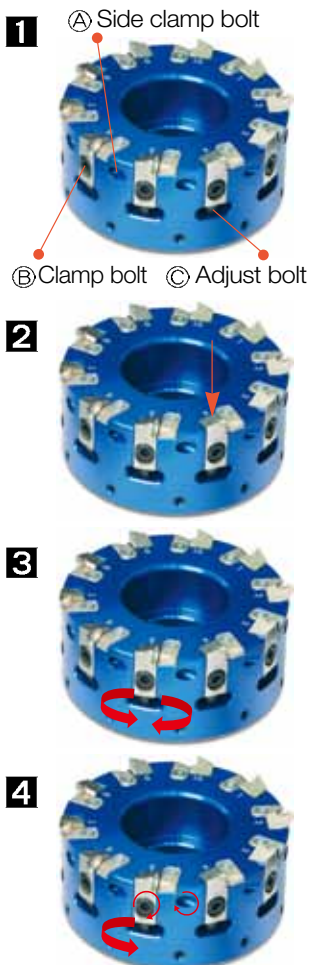
Spare parts

1 Cartridge (Rough) SDR	1 Cartridge (Wiper) SDW	2 Double Bolt M6xM10-8	3 Clamp Bolt M6x15	4 Side Clamp Bolt M6x10
5 Adjust Bolt M5x0.8	6 Chip Cover 4x9.5x18	7 Chip Cover Bolt M4x10	8 Balancing Bolt M6x10	Coolant Bolt

- Every spare parts be offered by extra charge.

Cartridge_ SD type

SDR	Item No.	Dimensions (mm)						PCD				
		W	V	α	L	R	T	EP20	EP55	EP750	EP58	EP29
	SDR	13.5	15	11	30		12					
	SDR-A	13.5	0	11	30		12					
	SDR-R	13.5	15	11	30	0.4	12					
	SDR-ES (EDGE HONE)	13.5	15	11	30		12					
SDW	Item No.	Dimensions (mm)						PCD				
		W	Z	α	L	R	T	EP20	EP55	EP750	EP58	EP29
	SDW	13		11	30	400	12					
	SDW-ES (EDGE HONE)	13		11	30	400	12					



Setting manual

1. Installaion of cartridge

Install the ③ Adjust bolt on the cutter body, and insert the cartridge. After then, gently tightening the ② Clamp bolt and ① Side clamp bolt.

2. Installaion of bolt

When tightening, secure the cartridge by pressing it downward. And using a torque wrench, temporarily tighten the clamp bolt and side clamp bolt to 3N·m.

3. Cutting edge height adjustment

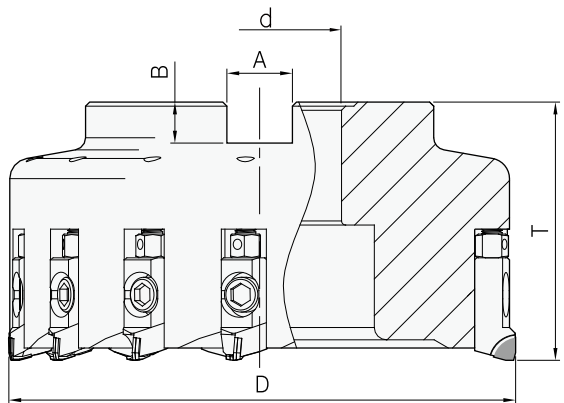
Turn the adjustment bolt and adjust so that the height of the front cutter is $-10\mu\text{m}$ from the target value.

4. Final adjustment

Using a torque wrench, tighten the clamp bolt and Side clamp bolt to 10N·m. And turn the adjustment bolt, then adjust to the target height.

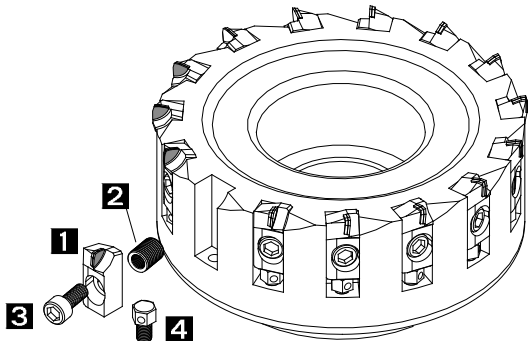
Cutter body_Aluminum & Steel

HF type



Item No. Inch type	Dimensions (mm)					Tooth	Weight (kg)	Cartridge	Arbor
	øD	ød	A	B	T				
HF 08050-10R(L)	80	25.4	9.5	6	50	10	0.7	ROUGH HFR(R) HFR(L)	FMA 25.4
HF 10063-12R(L)	100	31.75	12.7	8	63	12	1.0		FMA 31.75
HF 12563-15R(L)	125	38.1	15.9	10	63	15	1.8		FMA 38.1
HF 16063-18R(L)	160	50.8	19.0	11	63	18	2.9	WIPER HFW(R) HFW(L)	FMA 50.8
HF 25063-24R(L)	200	47.625	25.4	14	63	24	4.5		FMA 47.625
HF 25063-30R(L)	250	47.625	25.4	14	63	30	7.0		FMA 47.625

- Shoulder type cartridge can be offered by customer's demand.

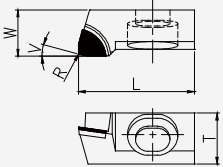
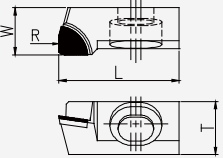


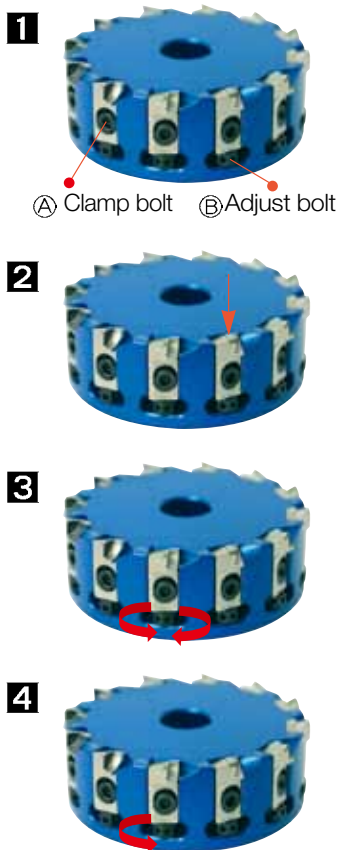
Spare parts

1 Cartridge (Rough) HFR	1 Cartridge (Wiper) HFW	2 Double Bolt M8M5-7	3 Clamp Bolt M5x12	4 Adjust Bolt M5x8	Coolant Bolt

- Every spare parts be offered by extra charge.

Cartridge_ High feed type

HFR	Item No.	Dimensions (mm)						PCD					
		W	Z	α	L	R	T	EP20	EP55	EP750	EP58	EP29	
	HFR	10	15	11	25		11						
	HFR-A	10	0	11	25		11						
	HFR-R	10	15	11	25	0.4	11						
	HFR-ES	10	15	11	25		11						
HFW	Item No.	Dimensions (mm)						PCD					
		W	Z	α	L	R	T	EP20	EP55	EP750	EP58	EP29	
	HFW	9.8			25	400	11						
	HFW-ES	9.8			25	400	11						



Setting manual

1. Installaion of cartridge

Install the ② adjust bolt on the cutter body, and insert the cartridge. After then, gently tightening the ① Clamp bolt.

2. Installaion of bolt

When tightening, secure the cartridge by pressing it downward. And using a torque wrench, temporarily tighten the clamp bolt 3N·m.

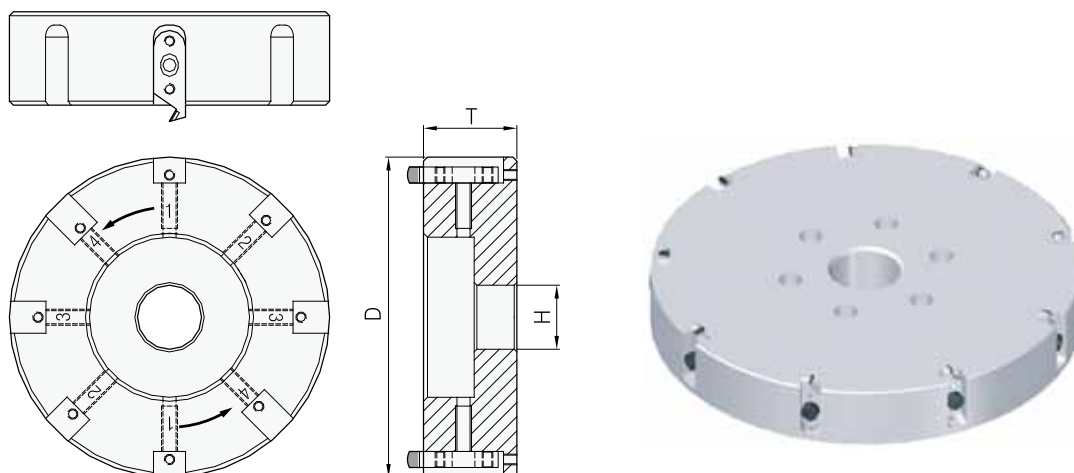
3. Cutting edge height adjustment

Turn the adjustment bolt and adjust so that the height of the front cutter is -10 μ m from the target value.

4. Final adjustment

Using a torque wrench, tighten the clamp Bolt to 10N·m. And turn the adjustment bolt, then adjust to the target height.

Cutter body_Aluminum

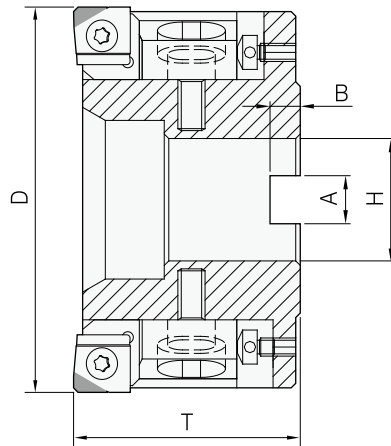


Item No. Inch type	Dimensions (mm)			
	D	Z	H	T
120D-35T-24H-10Z-RH	120	10	24	35
120D-35T-24H-10Z-LH	120	10	24	35
158D-40T-70H-6Z-RH	158	6	70	40
158D-40T-70H-6Z-LH	158	6	70	40
198D-45T-40H-6Z-RH	198	6	40	45
198D-45T-40H-6Z-LH	198	6	40	45
220D-40T-65H-6Z-RH	220	6	65	40
220D-40T-65H-6Z-LH	220	6	65	40
248D-45T-40H-12Z-RH	248	12	40	45
248D-45T-40H-12Z-LH	248	12	40	45



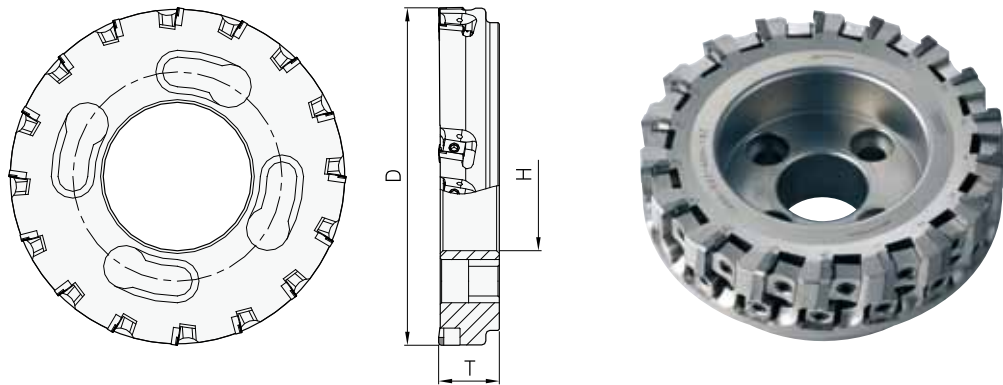
Order made

- PCD inserts and Cartridges can be customized.
- Samples are requested for Cartridge production.



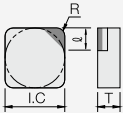
Milling_
Cutter body_Steel





Item No. Inch type	Dimensions (mm)			
	D	Z	H	T
125D-63T-40H-16Z	125	16	40	63
160D-63T-40H-18Z	160	18	40	63
200D-63T-60H-12Z	200	12	60	63
250D-63T-50H-24Z	250	24	50	63
250D-45T-109.88H-16Z	250	16	109.88	45

SNGN

Shape	ISO code		Dimensions (mm)							PCBN				
	Metric	Inch	W	Z	α	V	R	T	L	EB11	EB210	EB51	EB71	EB710
	SNGN 1506APTR	SNGN 54APTR	12.7	5	11	45	250	6.35	15.9					
	1506APTL	54APTL	12.7	5	11	45	250	6.35	15.9					

Customized design

- Customized PCBN inserts and Cartridges
- Must have either samples or drawings of current tool in use

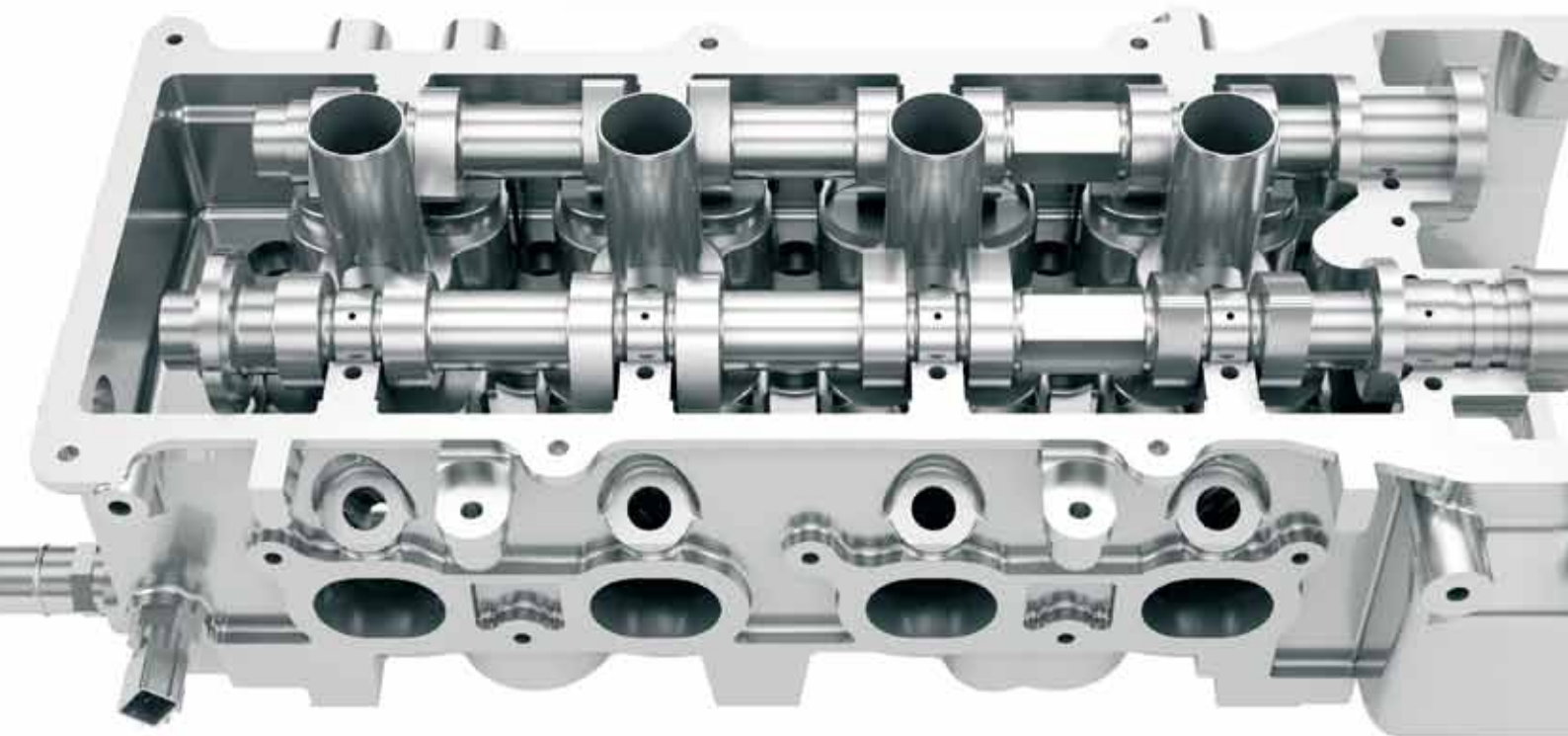




Rotating



Applicable to all general cutting tools such as high-speed steel, solid carbide, carbide-tipped, cermet, PCD, and PCBN with or without internal coolant.



Rotating

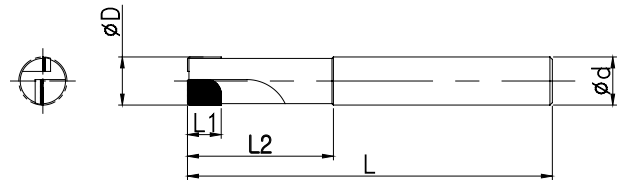
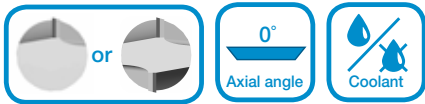




Rotating
Endmill

Square endmill

The range from D3 to D20 with various edge length is common in use.

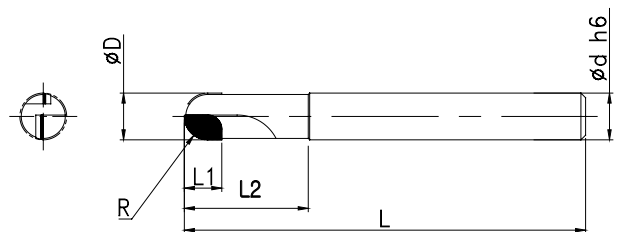


Item No.	Dimensions (mm)					
	D	d	L1	L2	L	Z
EDES 10303-0515-60	3	3	5	15	60	1
10404-0715-60	4	4	7	15	60	1
10505-1020-60	5	5	10	20	60	1
10606-1020-60	6	6	10	20	60	1
20808-1020-60	8	8	10	20	60	2
21010-1030-75	10	10	10	30	75	2
21212-1035-85	12	12	10	35	85	2
21616-1035-85	16	16	10	35	85	2
22020-1040-100	20	20	10	40	100	2

- Over center, Oil hole: Please contact separately for further discussion.
- EDES: Ehwa pcD/cvD Endmill Square

Ball nose endmill

Teeth, 1Z or 2Z can be determined by diameter.



Item No.	Dimensions (mm)					
	D	d	L1	L2	L	Z
EDEB 10303-0515-60	3	3	5	15	60	1
10404-0715-60	4	4	7	15	60	1
10505-1020-60	5	5	10	20	60	1
10606-1020-60	6	6	10	20	60	1
20606-1020-60	6	6	10	20	60	2
20808-1020-60	8	8	10	20	60	2
21010-1020-80	10	10	10	20	80	2
21212-1020-80	12	12	10	20	80	2

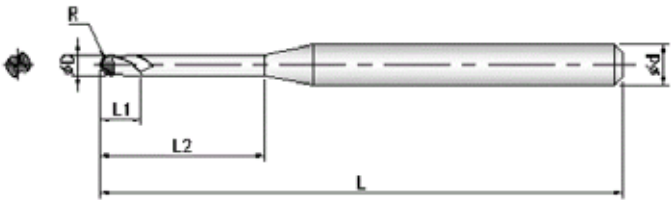
- Oil hole : Please contact separately for further discussion.
- EDEB : Ehwa pcD/cvD Endmill Ballnose

Ball nose endmill

The range from D3 to D20 with various edge length is common in use.



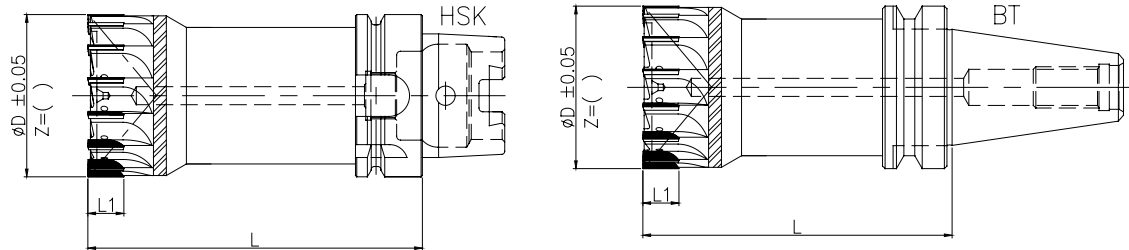
- Design:
- Diameter: 2,0~3,0mm
- N of blades: 2
- Helix angle: 35



Item No.	Dimensions (mm)					
	D	R	L1	L2	L	d
EBEB 20204-0104-50	2	1	1.2	4	50	4
20204-0106-50	2	1	1.2	6	50	4
20204-0108-50	2	1	1.2	8	50	4
20204-0110-50	2	1	1.2	10	50	4
20204-0112-50	2	1	1.2	12	50	4
20204-0114-50	2	1	1.2	14	50	4
20204-0116-50	2	1	1.2	16	50	4
20204-0118-50	2	1	1.2	18	50	4
20204-0120-50	2	1	1.2	20	50	4
20306-1.508-66	3	1.5	1.8	8	66	6
20306-1.510-66	3	1.5	1.8	10	66	6
20306-1.512-66	3	1.5	1.8	12	66	6
20306-1.516-66	3	1.5	1.8	16	66	6
20306-1.520-66	3	1.5	1.8	20	66	6
20306-1.525-66	3	1.5	1.8	25	66	6
20306-1.530-66	3	1.5	1.8	30	66	6

- EBEB : Ehwa pcBn Endmill Ballnose

Monoblock type

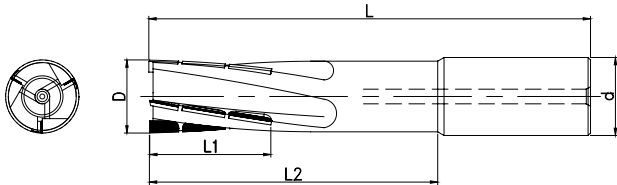


Item No.	Dimensions (mm)				
	ØD	d	L1	L	type
EDEM 0832-HSKA63	30	8	14	150	HSKA63
0840-HSKA63	40	8	14	150	HSKA63
0850-HSKA63	50	8	14	150	HSKA63
1463-HSKA63	63	14	14	150	HSKA63
1463-HSKA100	63	14	14	150	HSKA100
1463-BT40	63	14	14	150	BT40

- EDEM : Ehwa pcD/cvD Endmill Monoblock
- Available type : HSK type - HSK 32, 40, 50, 63, 100
Taper type - BT 30, 40, 50 / SK 30, 40, 50 / CAT 30, 40, 50

Special Helical endmill

This special helical endmill can achieve high performance with long tool life. The cutting force of the helical design is outstanding. Therefore, it is suitable for high removal rate.

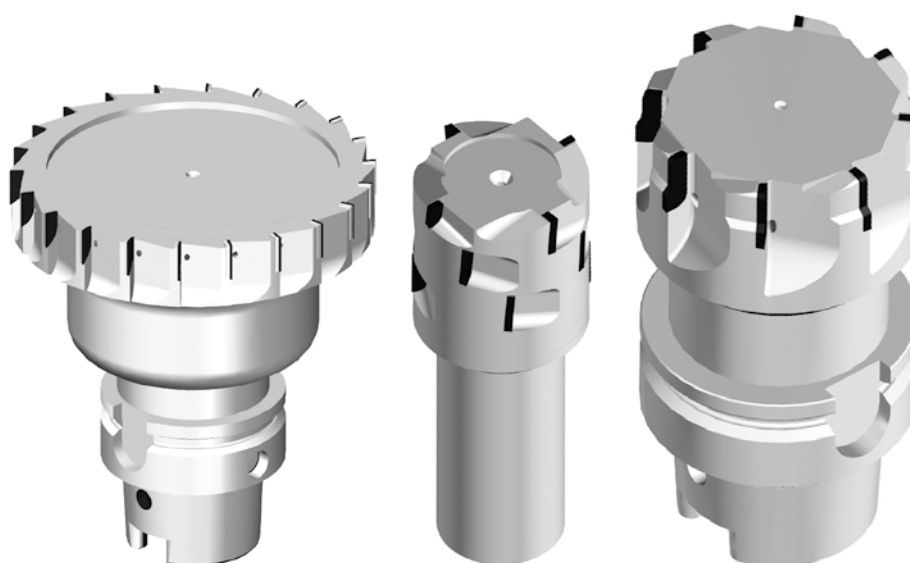
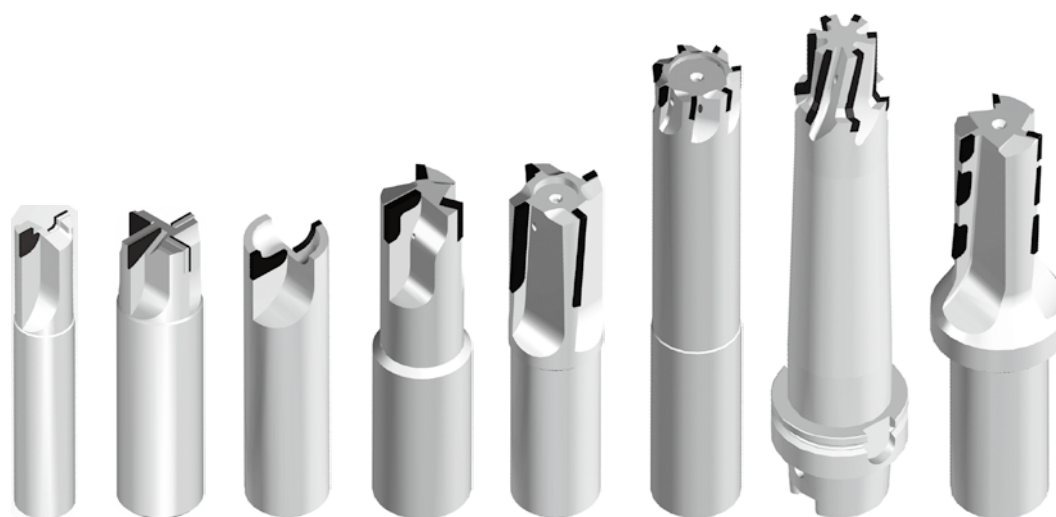


Item No.		Dimensions (mm)					
		D	d	L1	L2	L	F
EDEH	31616-30-120	16	16	30	50	120	3
	32020-30-120	20	20	30	50	120	3
	32525-30-120	25	25	30	50	120	3
	33032-30-120	30	32	30	50	120	4

■ EDEH : Ehwa pcD Endmill Helix

Customized design

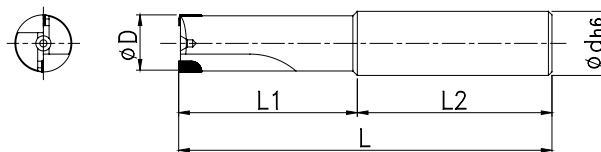
- Face, slot, chamfer, profile, etc.
- Optimized tooling service depending on the customer's demand.



Rotating_ **Reamer**



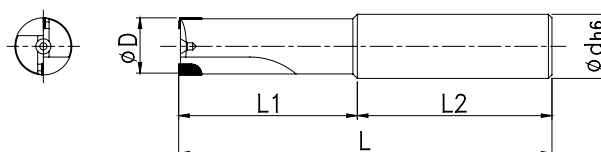
Normal type



Item No.	Dimensions (mm)					
	ØD	Ød	L1	L2	L	Z
EDRS 20406-15-60	4	6	15	45	60	2
20506-15-60	5	6	15	45	60	2
20606-25-80	6	6	25	55	80	2
20808-25-80	8	8	25	55	80	2
21010-40-100	10	10	40	60	100	2
21212-40-100	12	12	40	60	100	2

■ EDRS : Ehwa pcD Reamer Straight flute

Chip breaker type



Item No.	Dimensions (mm)					
	ØD	Ød	L1	L2	L	Z
EDRS CB 20406-15-60	4	6	15	45	60	2
20506-15-60	5	6	15	45	60	2
20606-25-80	6	6	25	55	80	2
20808-25-80	8	8	25	55	80	2
21010-40-100	10	10	40	60	100	2
21212-40-100	12	12	40	60	100	2

■ EDRS CB : Ehwa pcD Reamer Straight flute Chip Breaker

■ Chip breaker design : varies with cutting conditions



Normal type





Customized design

- Face, slot, chamfer, profile, etc.
- Optimized tooling service depending on the customer's demand.





Rotating_
Drill

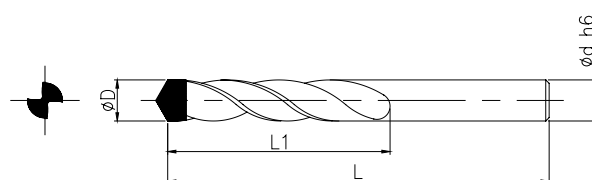
PCD helical drill



HELIX E



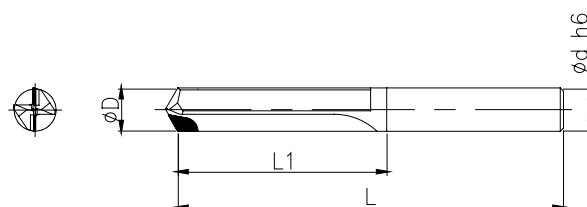
HELIX S



Item No.	Dimensions (mm)			
	ØD	L1	L	Ød
EDDHE(or S) 20303-30-80	3	30	80	3
20404-30-80	4	30	80	4
20505-30-80	5	30	80	5
20606-30-80	6	30	80	6
20707-35-90	7	35	90	7
20808-35-90	8	35	90	8
20909-40-100	9	40	100	9
21010-40-100	10	40	100	10
21111-50-110	11	50	110	11
21212-50-110	12	50	110	12

■ EDDHE : Ehwa pcD Drill Helix Economic PCD / EDDHS : Ehwa pcD Drill Helix Sandwich PCD

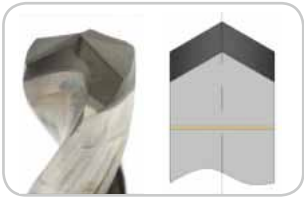
PCD burnishing drill



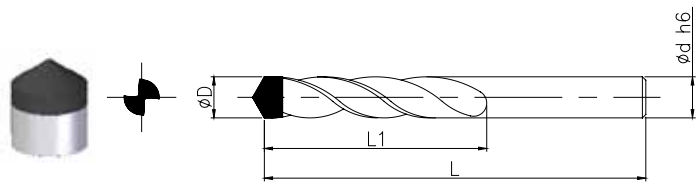
Item No.	Dimensions (mm)			
	ØD	L1	L	Ød
EDDS 20505-30-80	5	30	80	5
20606-30-80	6	30	80	6
20707-35-90	7	35	90	7
20808-35-90	8	35	90	8
20909-40-100	9	40	100	9
21010-40-100	10	40	100	10
21111-50-110	11	50	110	11
21212-50-110	12	50	110	12

■ EDDS : Ehwa pcD Drill Straight flute

PCD helical drill



HELIX D



Item No.	Dimensions (mm)			
	ØD	L1	L	Ød
EDHDD 20303-30-80	3	30	80	3
20404-30-80	4	30	80	4
20505-30-80	5	30	80	5
20606-30-80	6	30	80	6
20707-35-90	7	35	90	7
20808-35-90	8	35	90	8
20909-40-100	9	40	100	9
21010-40-100	10	40	100	10
21111-50-110	11	50	110	11
21212-50-110	12	50	110	12

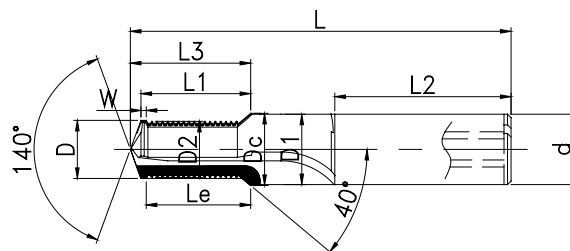
■ EDDHDD : Ehwa pcD Drill Helix Dom PCD

Customized design

- Face, slot, chamfer, profile, etc.
- Optimized tooling service depending on the customer's demand.



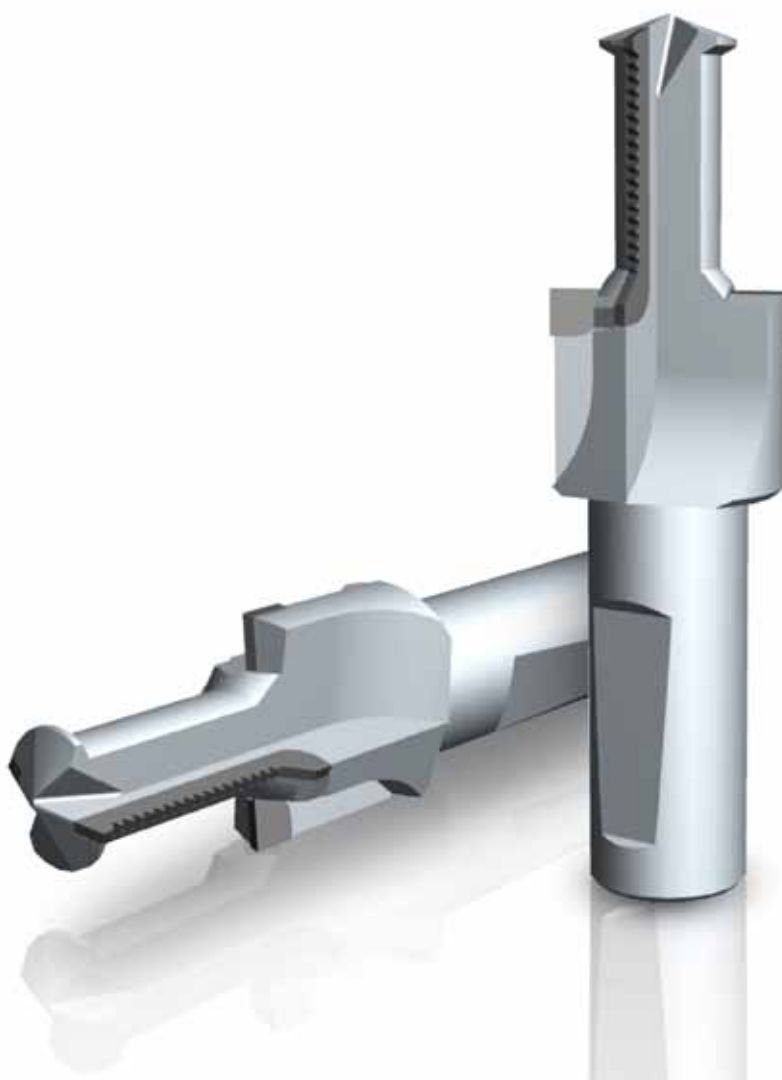
Drill thread milling tool



Item No.		ISO 2D metric coarse thread	Pitch	Dimensions (mm)												
				L	L3	L1	L2	W	Le	D	d	D1	Dc	D2	Z	Zt
EDTMS	2M10-1.5	M10*1.5	1.5	79	23.4	22.1	45	1.5	20.6	8.5	12	11	10.3	8.08	2	12
	2M12-1.75	M12*1.75	1.75	89	27.1	25.5	45	1.5	24	10.3	14	13.5	12.3	9.74	2	12

Item No.	ISO 2D metric coarse thread	Pitch	Dimensions (mm)												
			L	L3	L1	L2	W	Le	D	d	D1	Dc	D2	Z	Zt
EDTMS 2.5DM10-1.5	M10*1.5	1.5	79	27.9	26.6	45	1.5	25.1	8.5	12	11	10.3	8.08	2	15

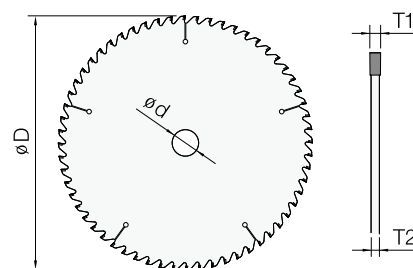
- EDTMS : Ehwa pcD Thread Mill Straight flute



Rotating_
Cutter

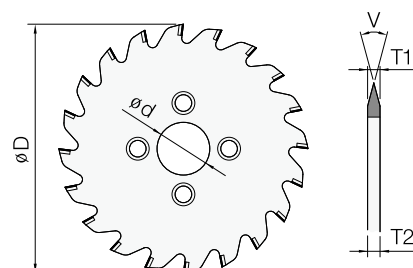


PCD saw



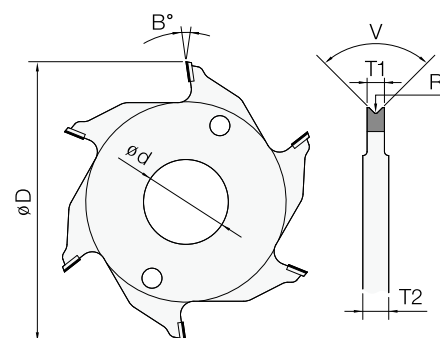
Item No.	Dimensions (mm)				
	ØD	Ød	T1	T2	Z
EDSC-255	255	25.4 / 31.75	2.2 / 2.5 / 3 / 3.2	2.2	40 / 60 / 80
EDSC-305	305	25.4 / 31.75	2.2 / 2.5 / 3 / 3.2	2.2	40 / 60 / 80
EDSC-355	355	25.4 / 31.75	2.2 / 2.5 / 3 / 3.2	2.2	40 / 60 / 80

PCD V-cutter



Item No.	Dimensions (mm)					
	ØD	Ød	T1	T2	V	Z
EDVC 100-V	100	20 / 25.4	2	2	35° / 40° / 45°	20 / 30
EDVC 105-V	105	20 / 25.4	2	2	35° / 40° / 45°	20 / 30
EDVC 110-V	110	20 / 25.4	2	2	35° / 40° / 45°	20 / 30
EDVC 120-V	120	20 / 25.4	2	2	35° / 40° / 45°	20 / 30

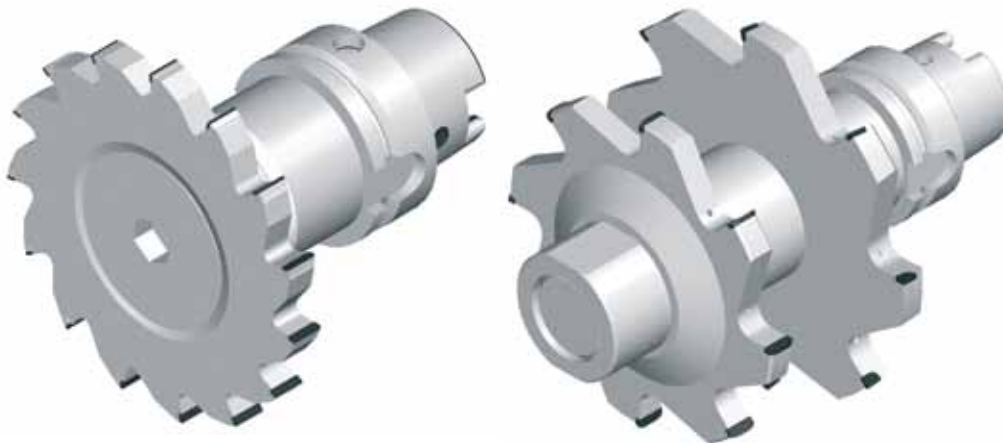
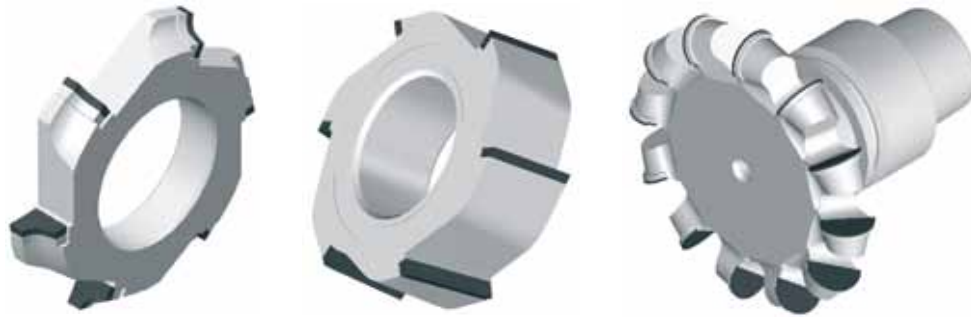
PCD bevel cutter

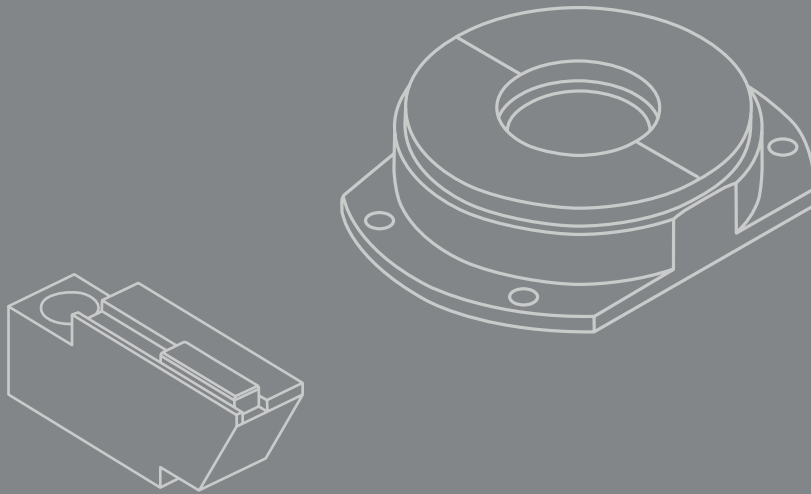


Item No.	Dimensions (mm)						
	ØD	Ød	T1	T2	V	R	B
EDBC 80-B	80	25.4	5	6.5 / 7 / 7.5	40° / 60° / 90°	0.2 / 0.5 / 1	3° / 4° / 6° / 8°
EDBC 83-B	83	25.4	5	6.5 / 7 / 7.5	40° / 60° / 90°	0.2 / 0.5 / 1	3° / 4° / 6° / 8°
EDBC 90-B	90	25.4	5	6.5 / 7 / 7.5	40° / 60° / 90°	0.2 / 0.5 / 1	3° / 4° / 6° / 8°

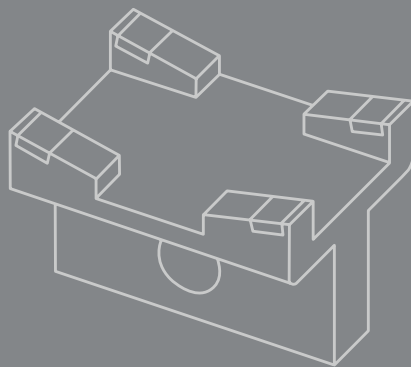
Customized design

- Face, slot, chamfer, profile, etc.
- Optimized tooling service depending on the customer's demand.





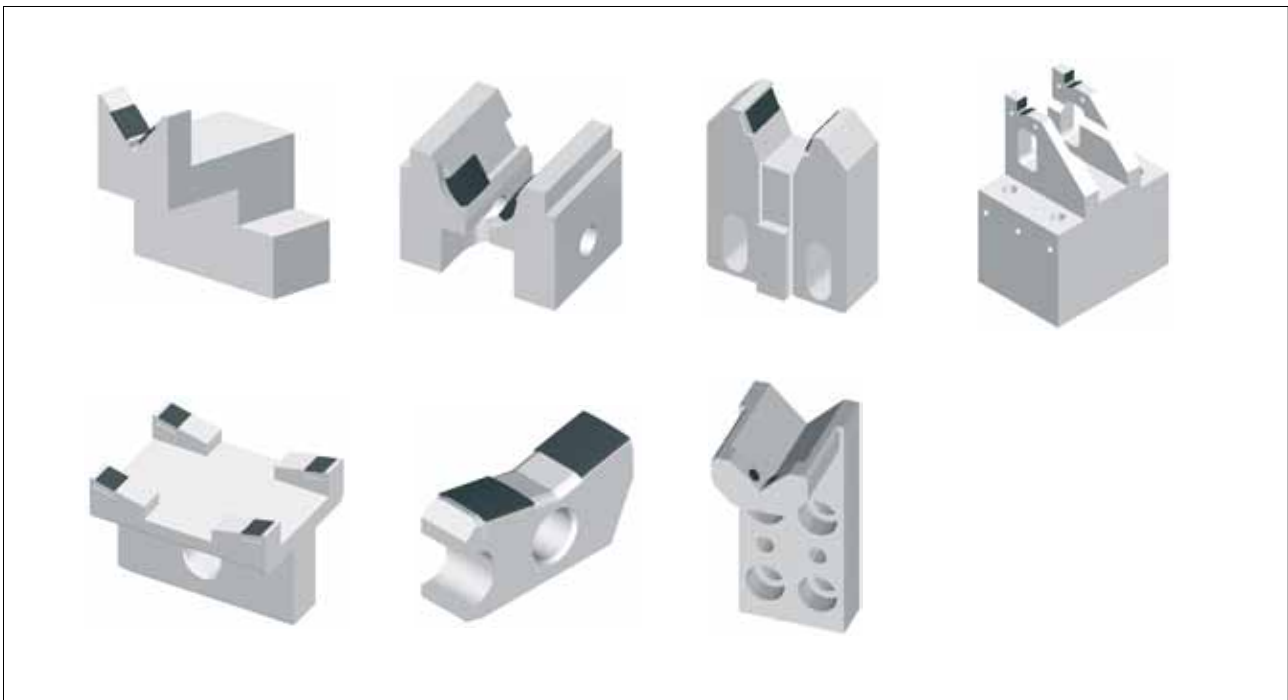
Wearless



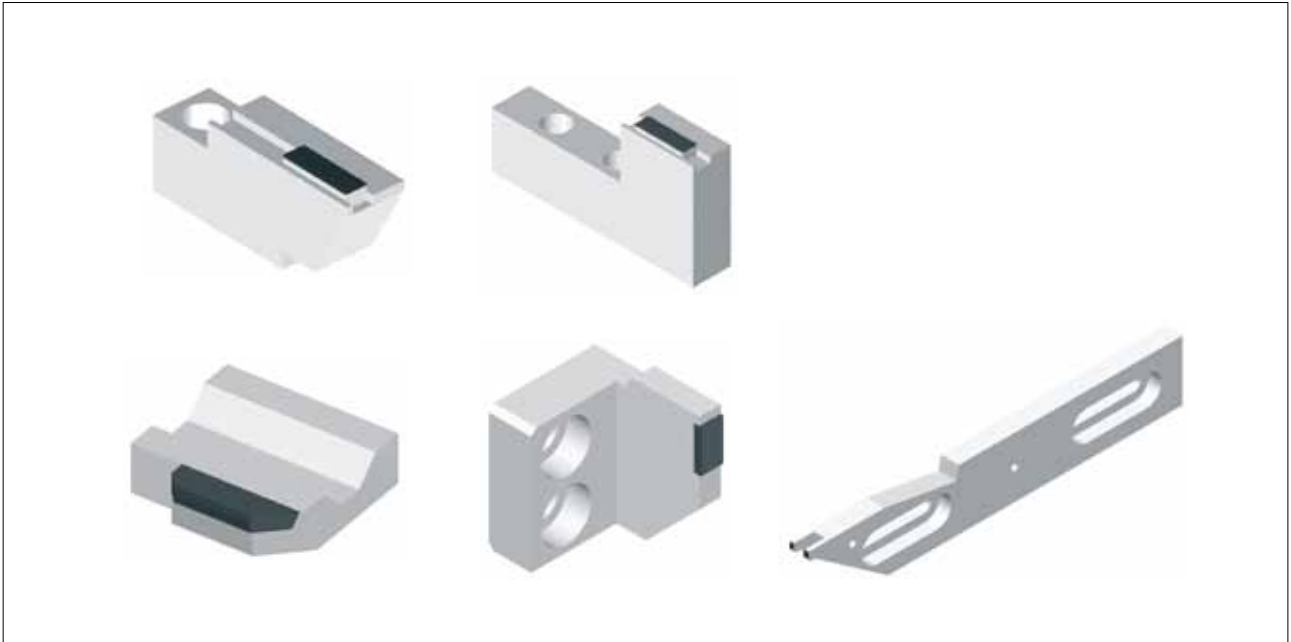
Bearing backing plate



V-block



Shoe



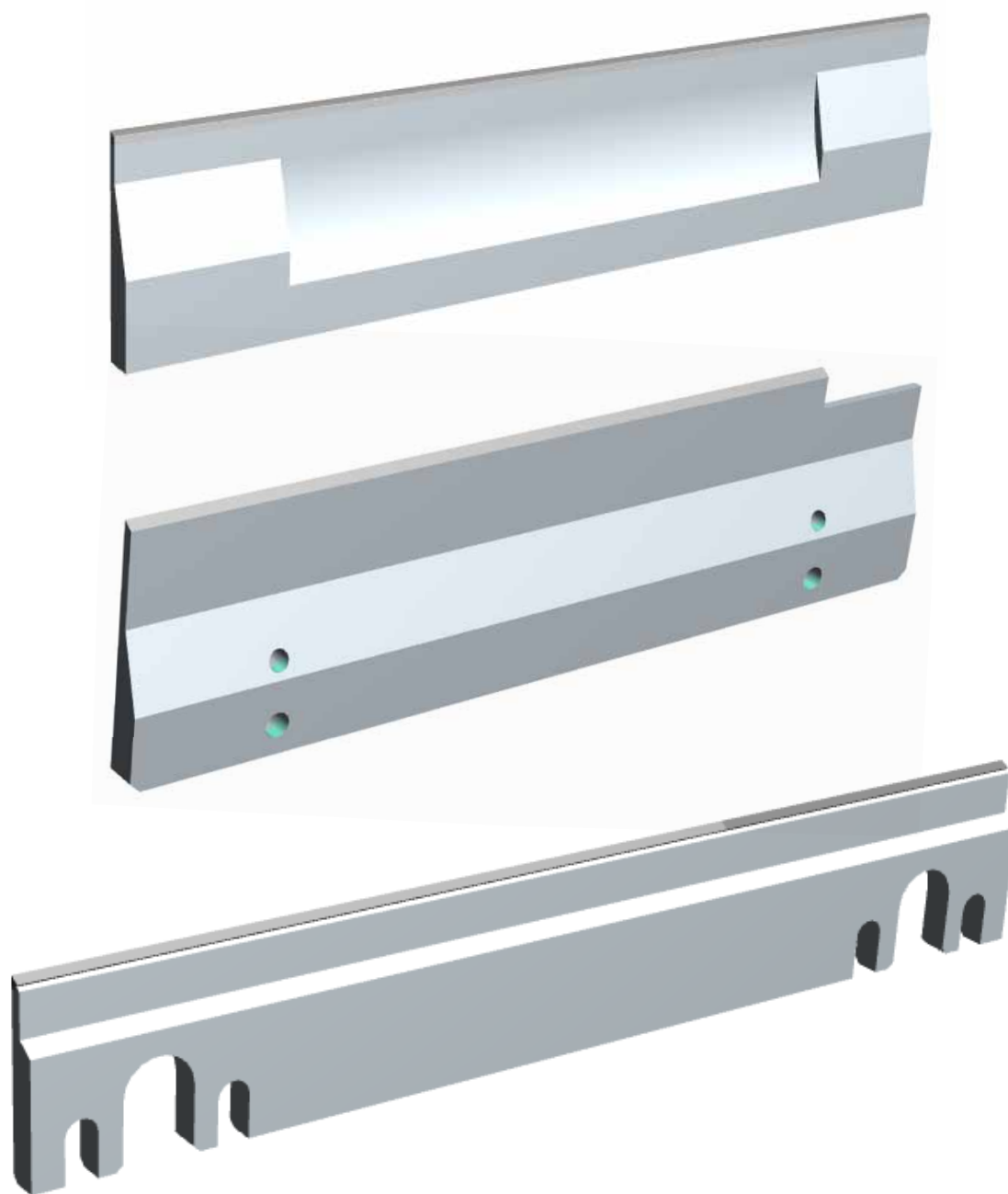
Dead center



Special gauges



Guide blade



MEMO

ETHWA



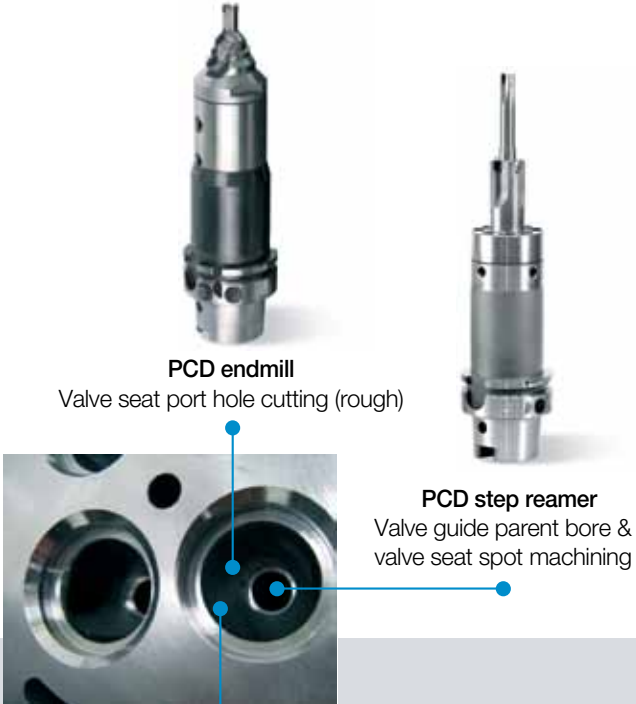
Applications

Automotive
Cylinder head (Al alloy)



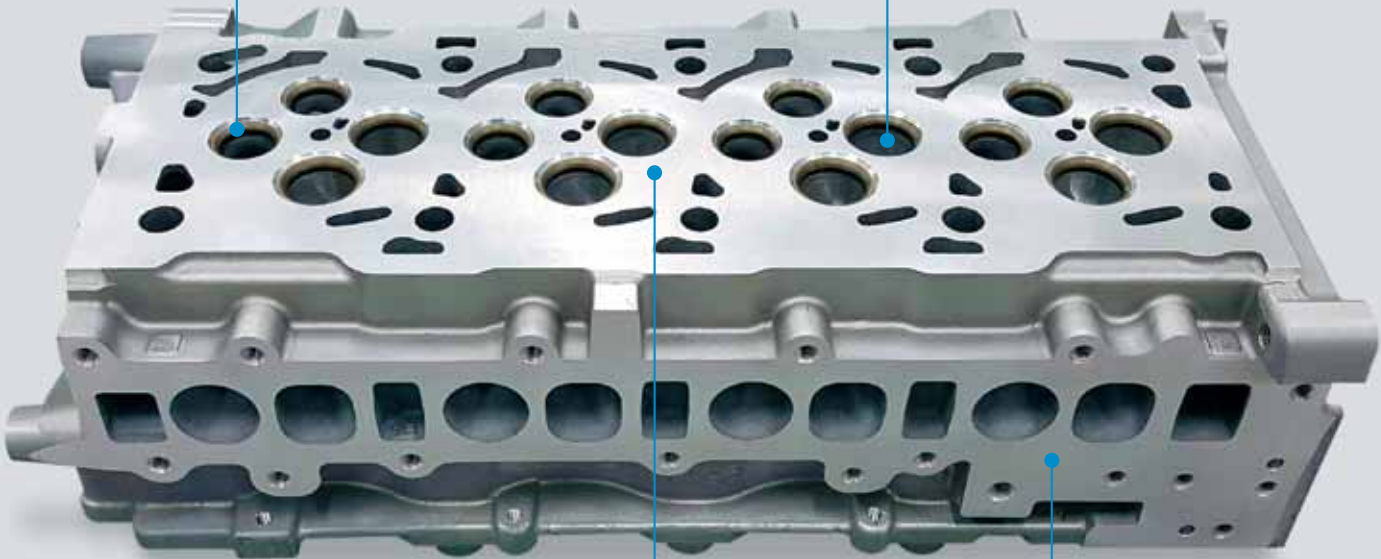
PCBN tool
Valve seat chamfering

PCD reamer
Valve guide reaming



PCD endmill
Valve seat port hole cutting (rough)

PCD step reamer
Valve guide parent bore & valve seat spot machining



PCD cutter
Mold excess cutting



PCD milling cutter
Top face milling
(rough & finish)



PCD milling cutter
Manifold face milling
(rough & finish)

Automotive
Cylinder head (Al alloy)



PCD boring tool
Oil seal bore spot boring
(rough & finish)



PCD milling cutter
Bottom face milling
(rough & finish)



PCD step reamer
Inject hole reaming
(finish)



PCD tool & insert
Cam bore journal (finish)



PCD ball endmill
Cam bore journal (rough)

Applications

Automotive
Cylinder block (cast iron)



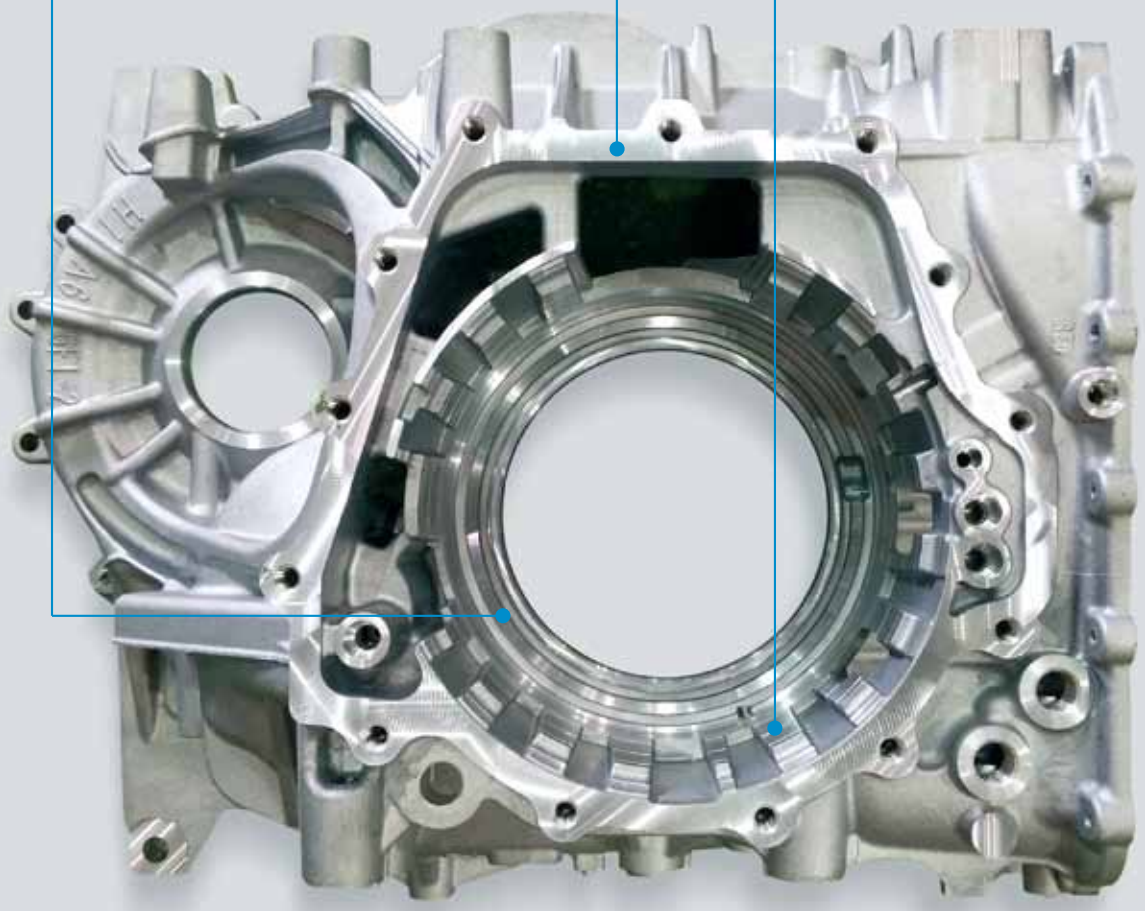
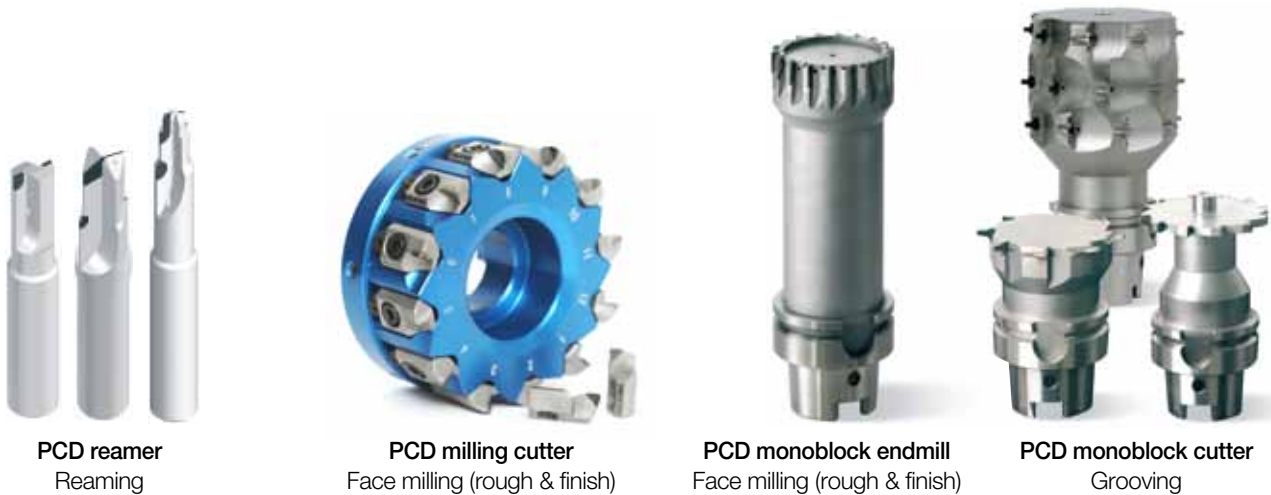
PCBN milling cutter
Top, front & rear face milling (finish)



PCBN insert
Cylinder boring (rough & finish)



Automotive
Transmissionhousing (Al alloy)



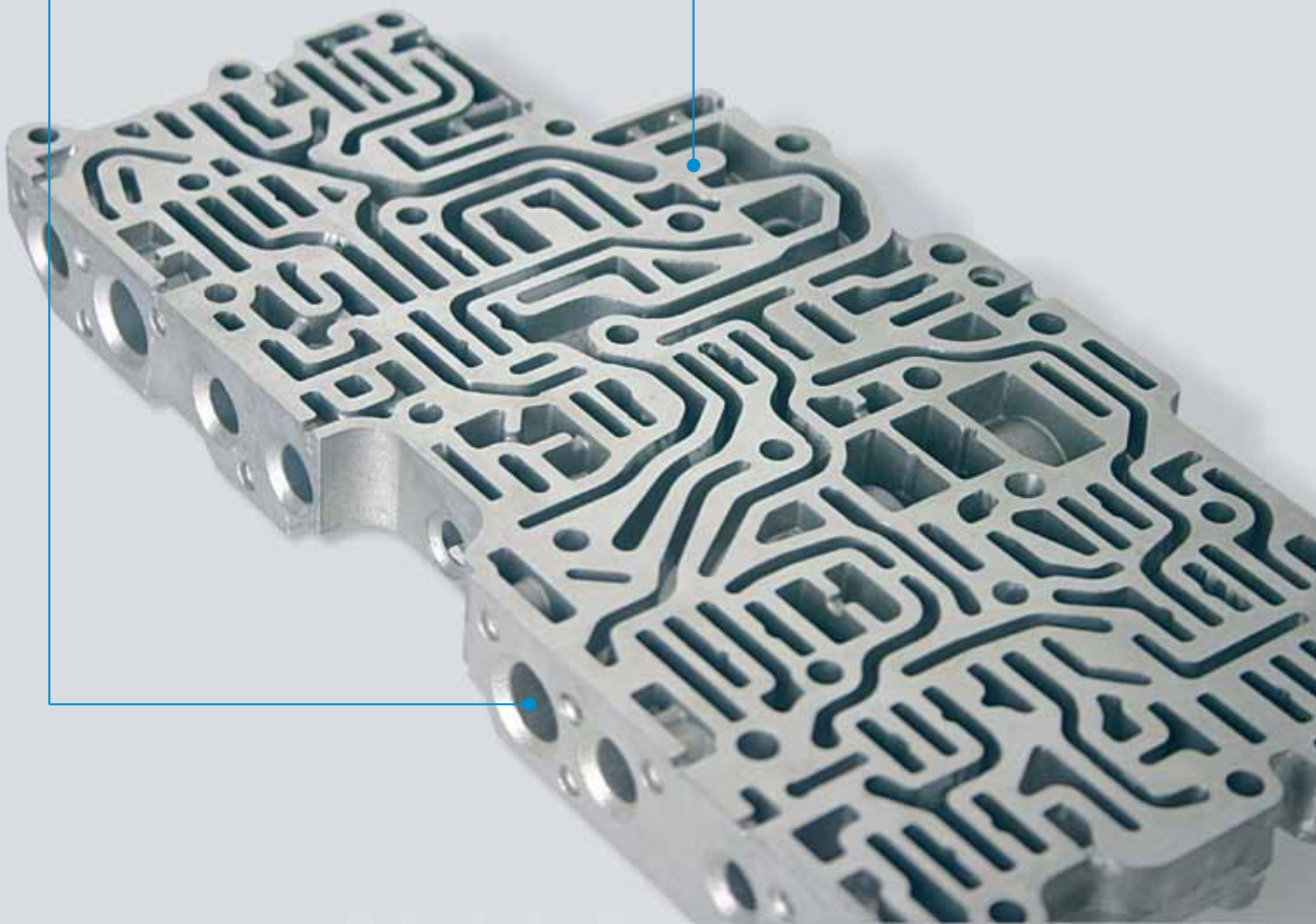
Applications

Automotive
Valve bodies (Al alloy)

PCD insert & reamer
Reaming (rough & finish)



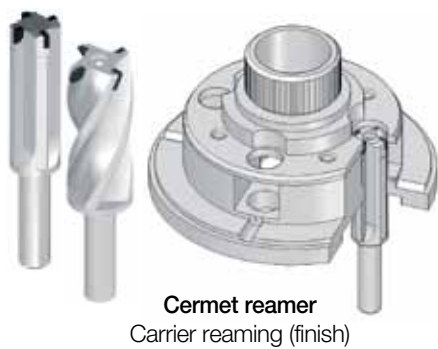
PCD milling cutter
Top face milling (rough & finish)



Applications



D-burnishing tool
Auto clutch burnishing (finish)



Cermet reamer
Carrier reaming (finish)



PCBN insert
Turning (rough & finish)

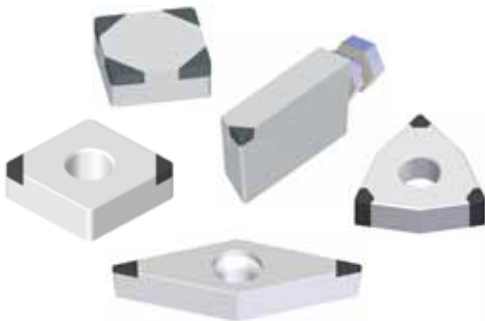


PCBN insert
Interrupted turning/facing & inner diameter boring (finish)

Automotive
Transmission shaft

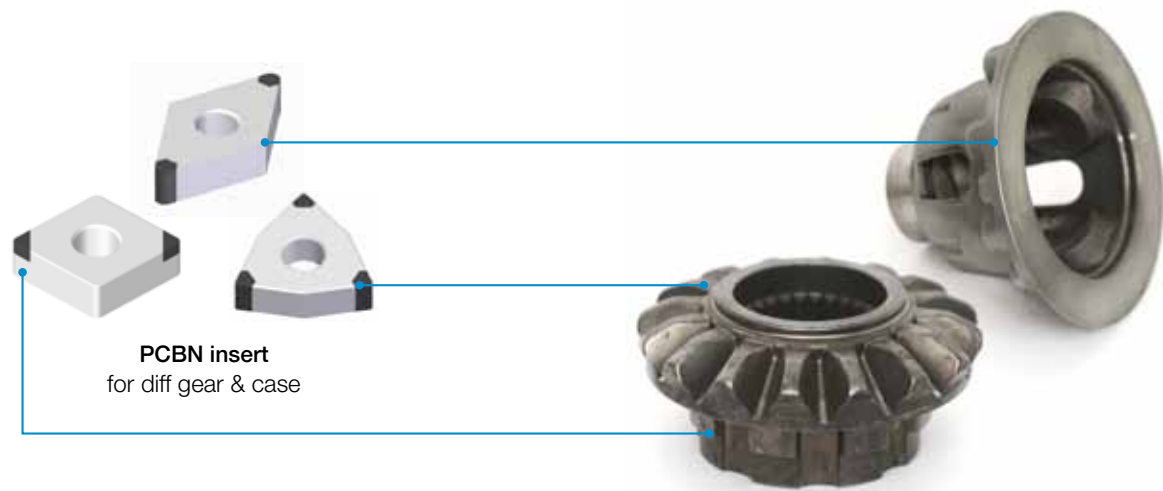


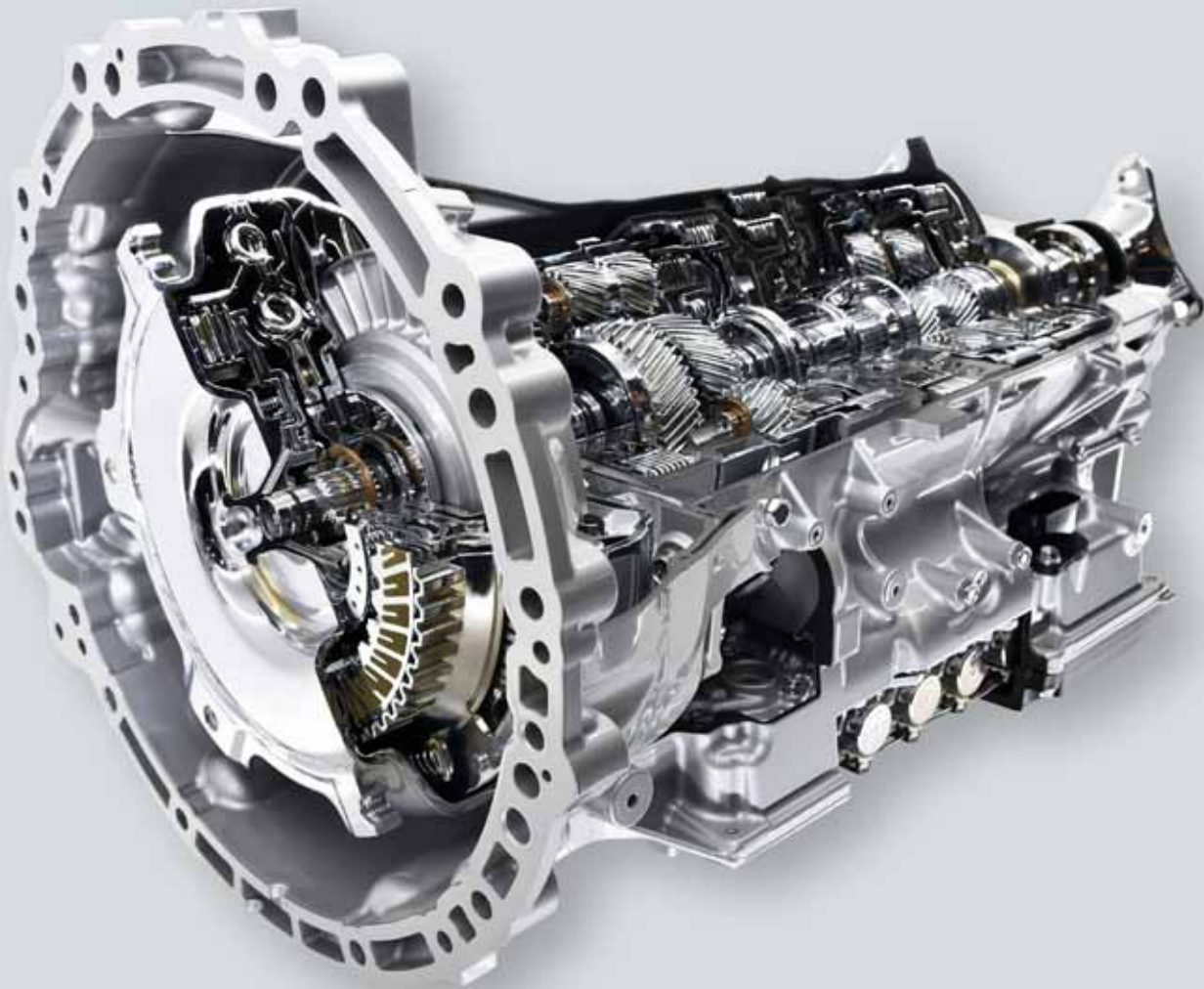
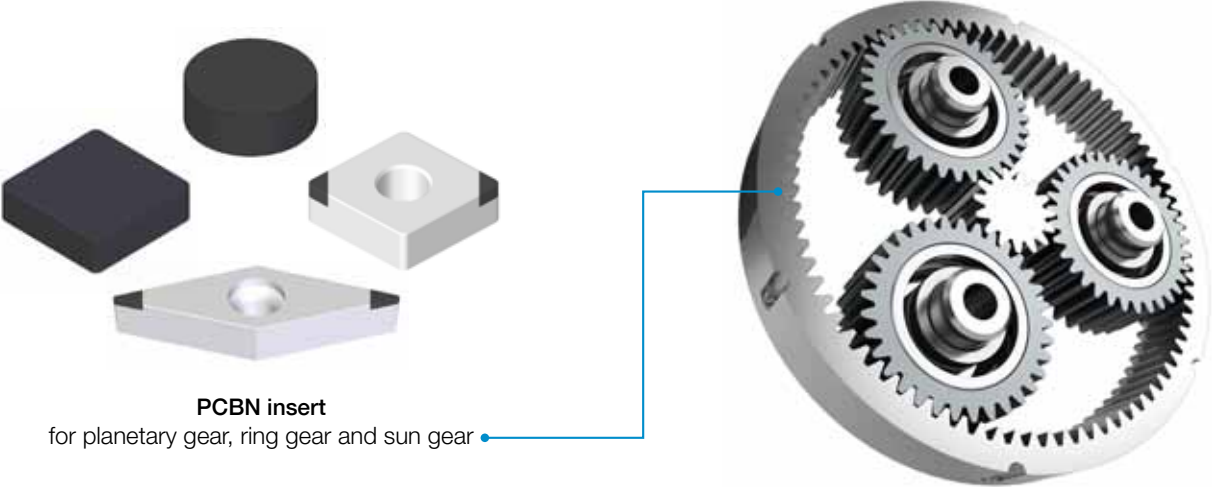
PCBN tool
Grooving (finish)

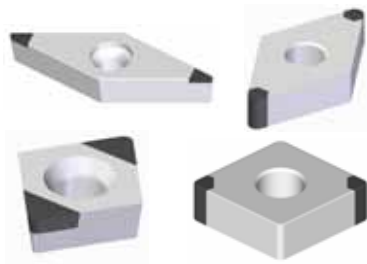


PCBN insert & tool
Main shaft turning (finish)









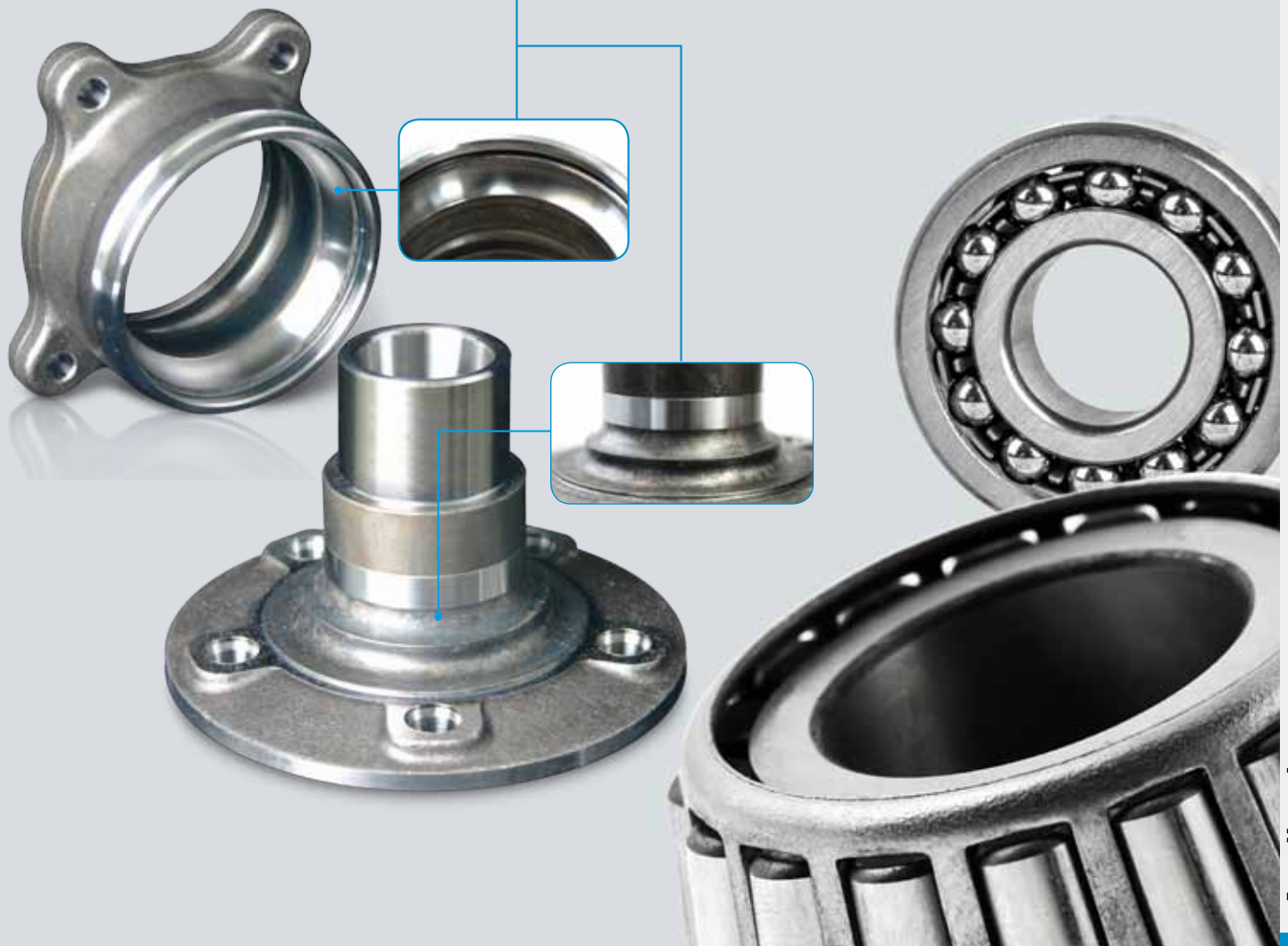
PCBN insert
for hub bearing



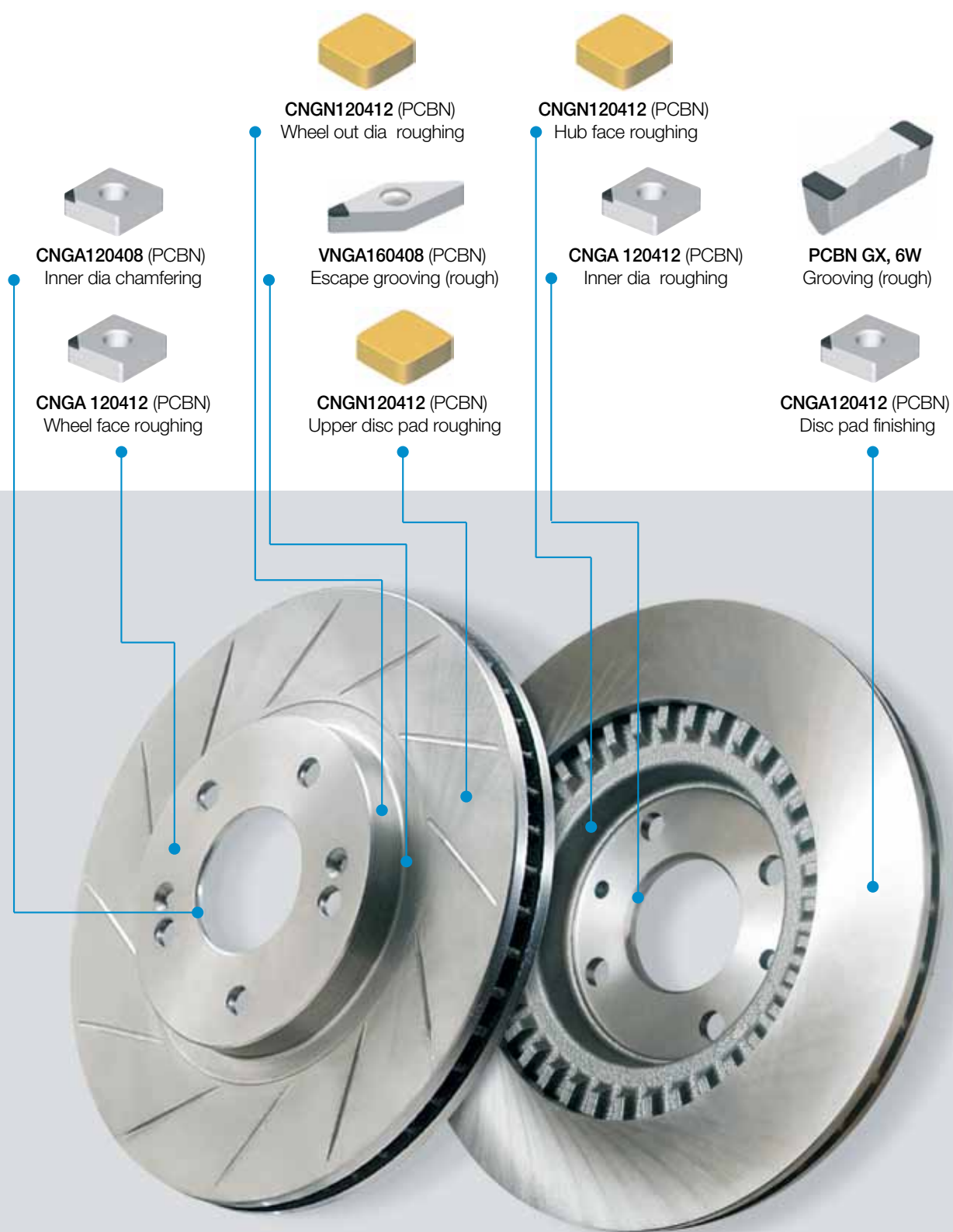
D-guage



PCD backing plate



Automotive Brake disc





PCD, MONO insert & tool
Turning



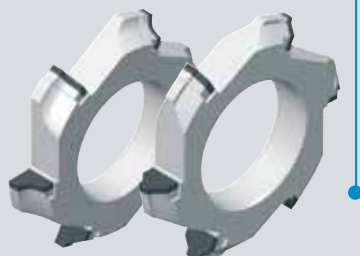
PCD grooving tool
Ring grooving



PCD special tool
Combustion chamber cutting



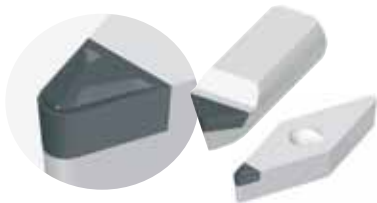
PCD reamer
Pin boring & chamfering



PCD cutter
Circlip & R boss cutting



Automotive
Compressor piston & housing



PCD boring tool (chip breaker)
Piston OD turning



PCD endmill
Piston ball seat
chamfer cutting



PCD ball endmill
Piston ball seat cutting



PCD reamer & blade
Piston bore & shaft bore reaming



PCD milling cutter
Piston housing face milling



PCD double cutter
Piston side cutting



Applications



PCD step reamer
Steering housing reaming

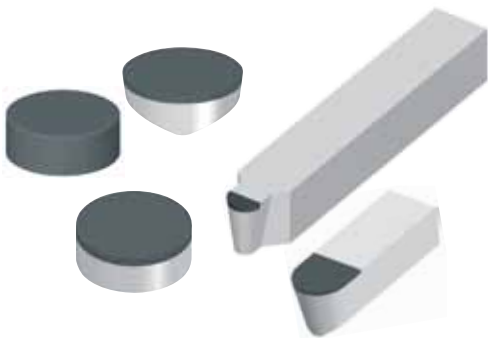




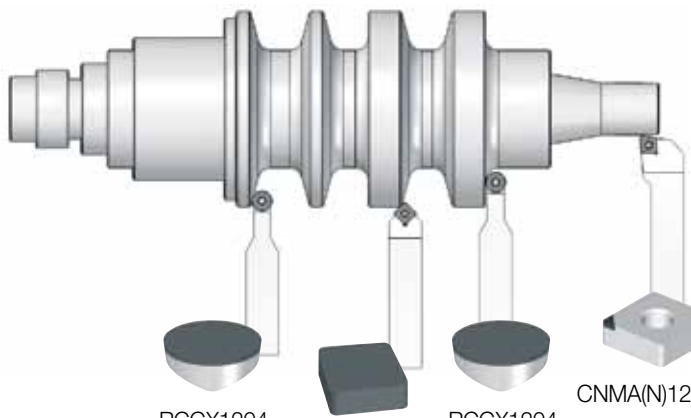
PCD step reamer, endmill
Pump housing cutting



Notch tool
(PCD, PCBN, carbide)



Grooving & turning
(PCD, PCBN, carbide, ceramic)



RCGX1204

SNMN120408

RCGX1204

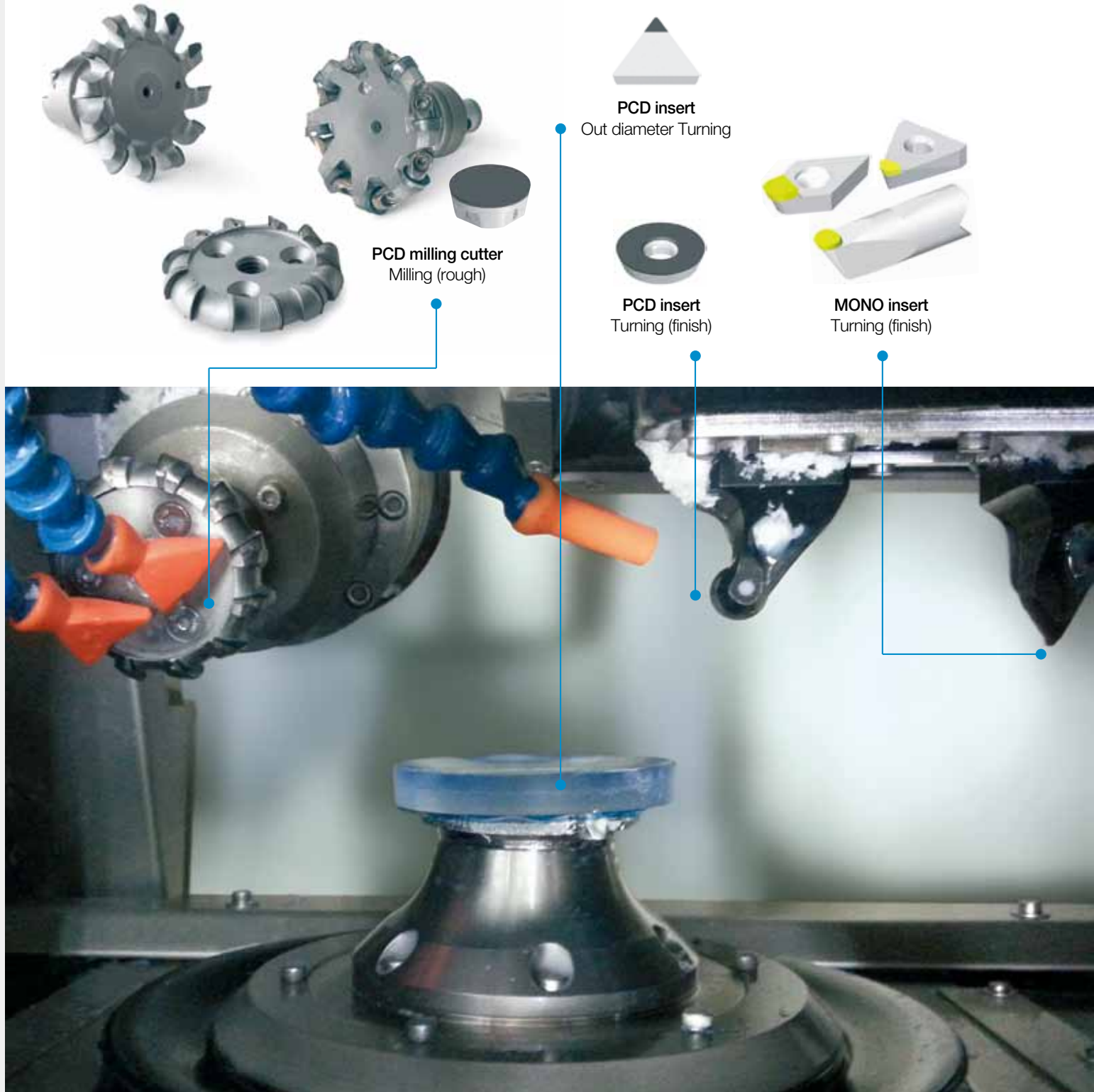
CNMA(N)120408



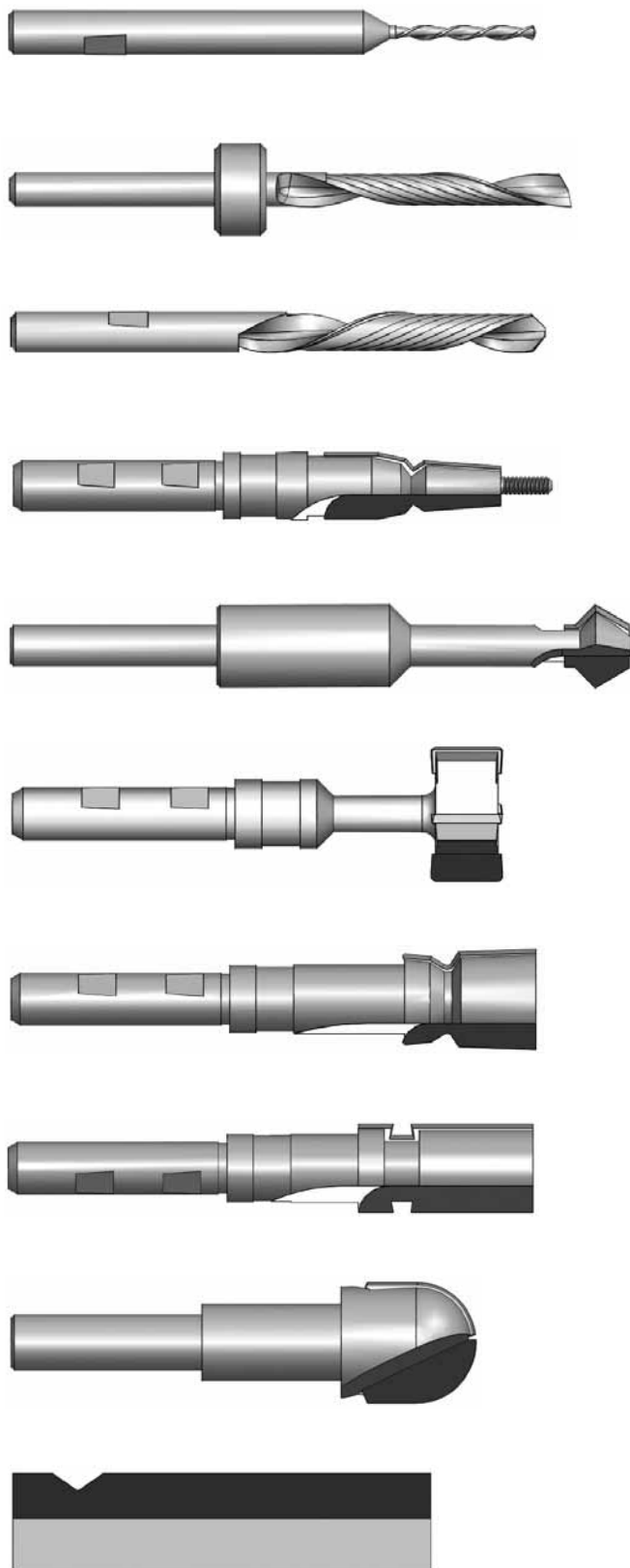
Engraving
(PCD, TC)



Ophthalmic lens



Edge machining

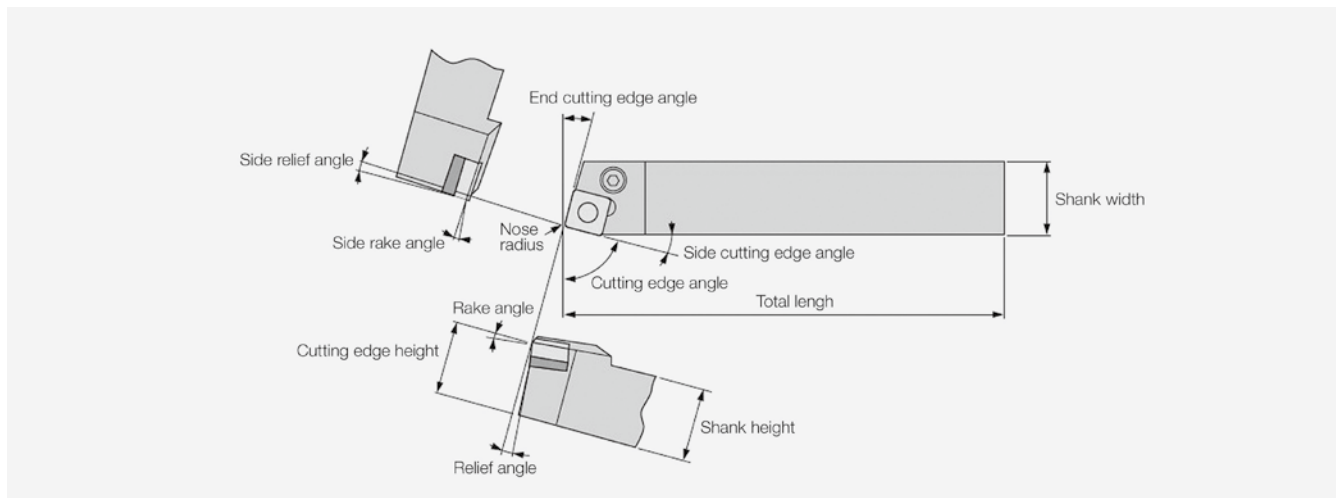


MEMO

ETHWA

Technical information

Insert shape and terms



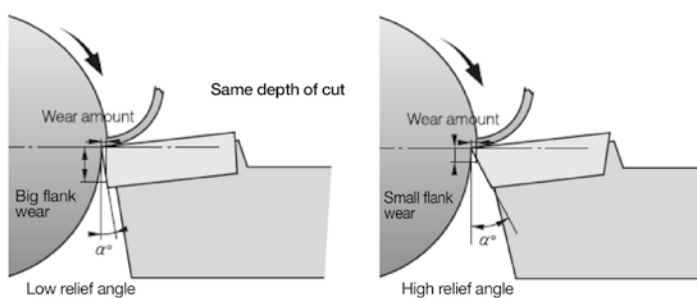
Role of edge angle

Angle	Defination	Function	Features
Rake angle	Side rake angle Rake angle	Cutting force, cutting heat, chip flow and tool life	* Positive angle : excellent machine-ability (reduce the cutting load, whereas weaken edge strength) * Positive angle : proper for "easy to cut" and thin workpieces * Negative angle : proper for mill scale or interrupted cutting demanding strong edge strength.
Relief angle	Relief angle Side relief angle	Eliminate unnecessary interference	* Must be designed considering the tool life and edge
Cutting edge angle	Cutting edge angle	Control chip size and cutting direction	* As the angle becomes bigger, chip thickness becomes thicker, resulting easy chip flow.
	Side cutting edge angle	Control chip size and cutting direction	* As the angle becomes bigger, cutting edge becomes wider, resulting strong edge strength. * As the angle becomes smaller, chip thickness becomes thinner, resulting easy chip flow.
	End cutting edge angle	Prevent friction between cutting edge and cutting face	* Small angle strengthens edge strength, whereas shortens tool life by flank wear.

Relief angle

Relief angle makes move of the cutting edge easily by avoiding the friction between workpiece and relief face.

Relationship between various relief angle and flank wear



Features

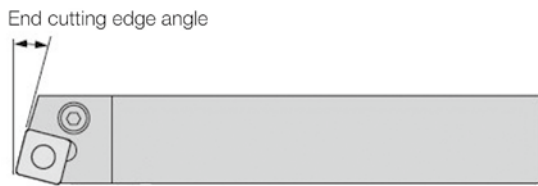
- Big relief angle causes less flank wear.
- Big relief angle weakens cutting edge strength.
- Small relief angle causes chattering.

Recommendation

- For hard workpiece or strong edge strength => low relief angle
- For soft workpiece or "easy to work hardening" workpiece => high relief angle

End cutting edge angle

It influences the surface finish by preventing friction between the machined face and the tool.



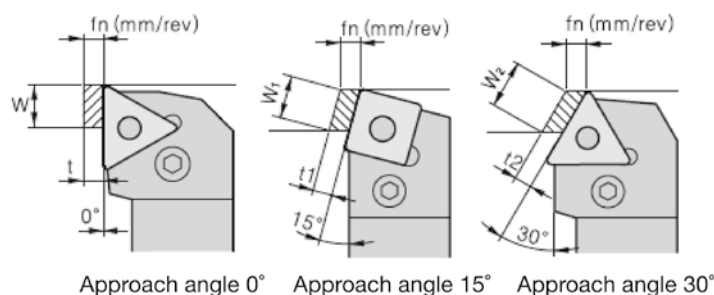
Effects

- If end cutting edge angle reduces cutting edge get stronger but cutting heat generated by machining increases.
- Small end cutting edge angle can cause chattering due to the increases cutting force.

Side cutting edge angle

Side cutting edge angle influences chip flow and cutting load. Therefore, it is necessary to design proper angle considering the tool strength.

Side cutting edge angle and chip thickness

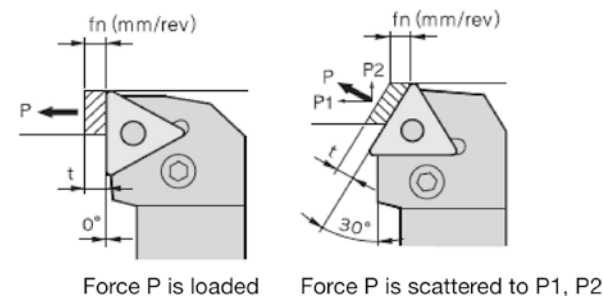


As approach angle becomes bigger, chip thickness becomes thinner and tip width becomes wider. When the feed and depth of cut are the same, and approach angle is 0°, chip thickness is the same as the feed rate and chip width is the same as depth of cut. ($t=fn$) and chip width is equal to depth of cut ($W=ap$).

$$t_1 = 0.97t, W_1 = 1.04W$$

$$t_2 = 0.87t, W_2 = 1.15W$$

Side cutting edge angle and cutting load



As approach angle becomes bigger, radial cutting force becomes bigger, whereas feed component force becomes smaller.

Side cutting edge angle and cutting performance

Low	← ← ←	Lead angle	→ → →	High
High	← ← ←	Wear rate	→ → →	Low
Easy to cut material	← ← ←	Workpiece	→ → →	Difficult to cut material
Small	← ← ←	Machining power	→ → →	Big
Hard to occur	← ← ←	Chatter	→ → →	Easy to occur
Finishing	← ← ←	How to machine	→ → →	Roughing
Long thin workpiece	← ← ←	Workpiece rigidity	→ → →	Thick workpiece
In case of low rigidity	← ← ←	Machine rigidity	→ → →	In case of high rigidity

Nose-R

Nose radius influences not only the surface finish but also the edge strength. generally, it is designed with 2~3 times bigger than the feed.

Features

- Big nose radius makes a good surface finish.
- Big nose radius strengthens the edge strength.
- Big nose radius reduces flank and crater wears.
- But if the radius is too big, it would cause chattering by big cutting load.

Recommendation

- For small depth of cut or thin and long workpiece => small nose R
- For interrupted cutting, big size workpiece or roughing => big nose R

Cutting edge shape and the affects

Rake angle

Rake angle influences cutting force, chip flow and tool life.

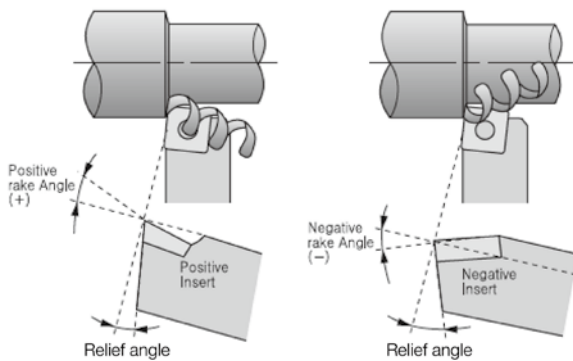
Features

- High rake angle makes a good surface finish.
- As the rake angle becomes bigger by 1°, spindle power becomes decrease by 1%.
- High rake angle weakens cutting edge.

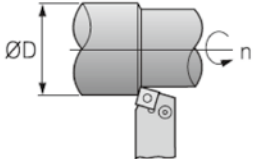
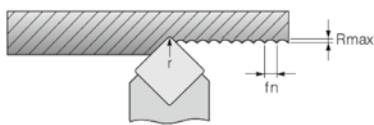
Recommendation

- For hard workpiece or interrupted cutting => small rake angle
- For soft workpiece or "easy to cut" material => big rake angle

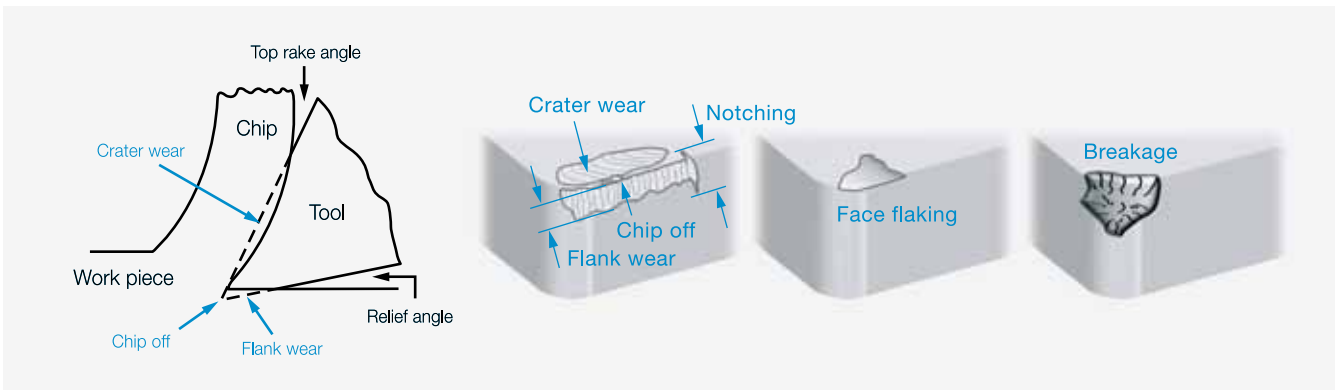
Rake angle and the direction of chip flow



Major cutting formulas

Cutting speed	Feed	Theoretical surface roughness
$V_c = \frac{\pi \times D \times N}{1,000} \text{ (m/min)}$ • V_c : Cutting speed (m/min) • D : Diameter (mm) • N : Revolution per minute (min^{-1}) • π : Circular constant (3.14) 	$f_n = \frac{V_f}{N} \text{ (mm/rev)}$ • f_n : Feed per revolution (mm/rev) • v_f : Table feed (mm/min) • N : Revolution per minute (min^{-1})	$R_{\max} = \frac{f_n^2}{8r} \times 1,000$ Practical surface roughness • Steel : $R_{\max} \times (1.5 \sim 3)$ • Cast iron : $R_{\max} \times (3 \sim 5)$ • $R_{\max}$: Profile depth (μm) (Maximum height roughness) • f_n : feed (mm/rev) • r : nose radius 

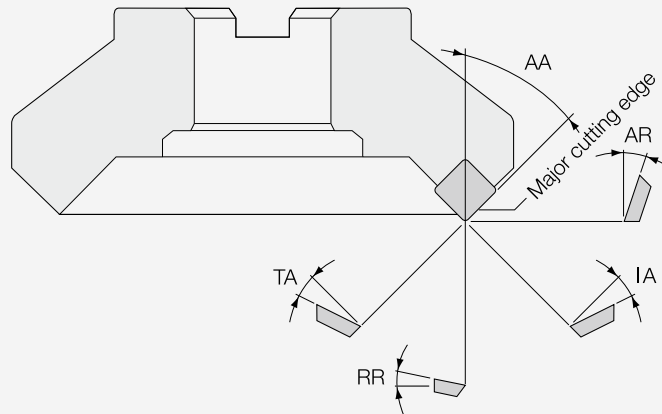
Wear behavior



Trouble shooting by wear behavior

Wear type	Trouble shooting
Crater wear	• Reduce cutting speed • Reduce feed rate • Add coating on the insert • Coolant
Flank wear	• Increase cutting speed (for grey cast iron) • Reduce cutting speed (for hardened steel) • Increase feed rate • Increase depth of cut • Check tool center height
Notching	• Increase cutting speed • Reduce feed rate • Increase approach angle • Increase chamfer angle • Change D.O.C
Chipping	• Use chamfered or horned edge preparation • Change cutting speed to eliminate vibration
Flaking (continuous cut)	• Increase cutting speed reduce feed rate • Use chamfered and horned edge preparation • Reduce insert approach angle • Check tool center height
Flaking (interrupted cut)	• Dry cutting • Reduce feed rate • Use chamfered and horned edge preparation • Reduce insert approach angle • Check cutting tool center height
Breakage	• Increase cutting speed • Reduce feed rate • Increase approach angle • Use chamfered edge preparation

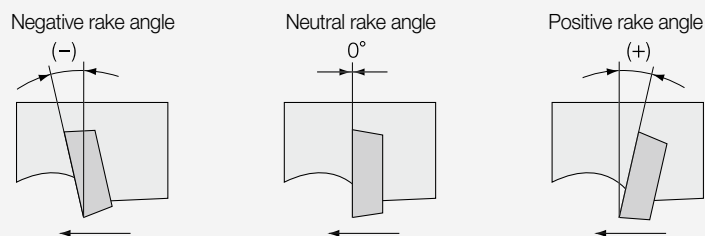
Milling cutter shape and designation



Role of cutting edge angle

Tool failure	Symbol	Function	Features
Axial rake angle	A.R	Direction of chip flow, machinability	—
Radial rake angle	R.R	Direction of chip flow, machinability	—
Approach angle	A.A	Chip thickness, direction of chip flow	As A.A becomes bigger, chip thickness becomes thinner and cutting load becomes lower.
True rake angle	T.A	Effective rake angle	As T.A becomes bigger, machinability becomes better, whereas weakens edge strength. As T.A becomes smaller, it strengthens the edge strength, whereas machinability becomes worse.
Cutting edge inclination angle	I.A	Direction of chip flow, Machinability	As I.A becomes bigger, machinability becomes better and it helps easy chip flow, whereas weakens edge strength.
Face angle	F.A	Surface finish	As it approaches to 0deg, surface becomes better.
Relief angle	R.A	Edge strength, tool life, chattering	—

Positive and negative rake angle

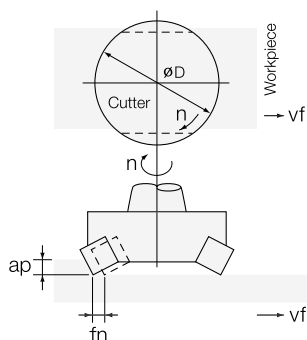


- Insert shape whose cutting edge precedes is a positive rake angle (+)
- Insert shape whose cutting edge follows is a negative rake angle (-)

Features by combination of rake angle

	Double positive angle	Double negative angle	Posi - negative angle	Nega - positive angle
Application	• For steel, cast iron, stainless steel • For soft steel to prevent built-up edge • For better surface finish	• For interrupted cutting • Roughing of cast iron and steel	• For "difficult to cut" material • For roughing of steel and cast iron (big D.O.C)	—
Advantages	• Excellent surface finish by preventing built-up edge for soft material • Proper design for low cutting load and good machinability	• Strong cutting edge • Proper for roughing of mill scale or bad surface condition • Cost saving by double side • Easy chip flow	• Easy chip flow and good machinability. • Suitable for "hard-to-cut" material • Proper design to prevent the chattering by special design	—
Disadvantages	• Weak cutting edge • Only available with single side	• Not recommended for low machine power and rigidity	• Only available with single side	• Bad chip flow

Major cutting formulas



Cutting speed

$$V_c = \frac{\pi \times D \times N}{1,000} \text{ (m/min)}$$

- V_c : Cutting speed (m/min)
- D : Diameter of tool (mm)
- N : Revolution per minute (min^{-1})
- π : Circular constant (3.14)

Feed

$$f_z = \frac{V_f}{N \times z} \text{ (mm/tooth)}$$

- f_z : Feed per tooth (mm/tooth)
- v_f : Feed per minute (mm/min)
- N : Revolution per minute (min^{-1})
- z : Number of tooth

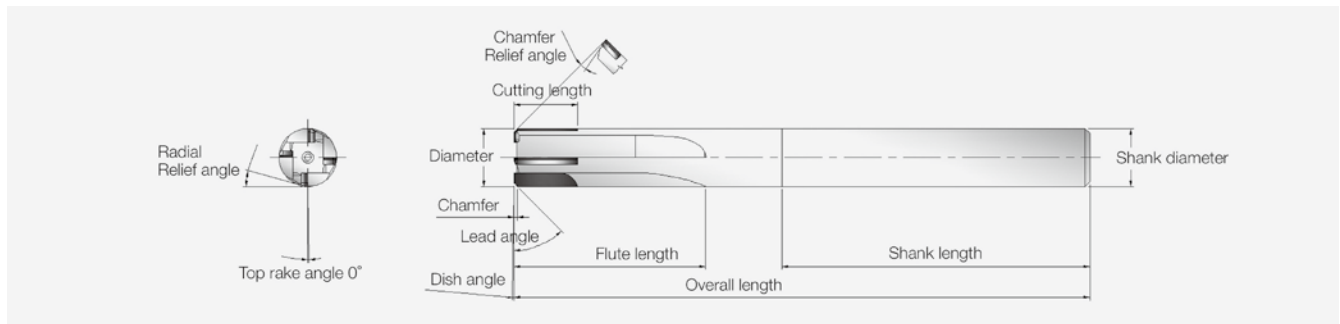
Machining time

$$T = \frac{60 \times L_t}{V_f} \text{ (sec)}$$

- T : Machining time (sec)
- L_t : Total length of table feed (mm) ($=L_w + D + 2R$)
- L_w : The length of workpiece (mm)
- D : Diameter of cutter body (mm)
- v_f : Table feed (mm/min)
- R : Relief length (mm)

Endmill

Endmill shape and terms



The comparison by number of flute

Flute	2 flutes	3 flutes	4 flutes	Specification	Major features	2 flutes	4 flutes
Shape				Tool rigidity	Torsional rigidity	○	◎
					Bending rigidity	○	◎
					Surface finish	○	◎
Chip flow	Good ←	←	←	Surface finish	Machining precision	○	◎
					Chip control	◎	○
					Chip evacuation	◎	○
Tool rigidity	Weak →	→	→	Grooving	Chip evacuation	◎	○
					Grooving	◎	○
					Side facing	○	◎
Purpose	hole, side, General purpose	Side, Finishing	Hard material, Side, finishing	Side facing	Surface finish	○	◎
					Vibration	◎	○

○ Good ◎ Excellent

Formula of cutting condition

Calculations of cutting speed	Calculations of feed speed
$V_c = \frac{\pi \times D \times N}{1,000} \text{ (m/min)}$ • V_c : Cutting speed (m/min) • π : Circular constant (3.14) • D : Endmill diameter (mm) • N : Revolution per minute (min^{-1})	$f_z = \frac{V_f}{N \times Z} = \frac{f_n}{Z} \text{ (mm/tooth)}$ $V_f = N \times f_z \times Z = N \times f_n \text{ (m/min)}$ $f_n = \frac{V_f}{N} = f_z \times Z \text{ (mm/rev)}$ • V_f : Feed speed (m/min) • f_n : Feed per revolution (mm/rev) • f_z : Feed per tooth (mm/tooth) • Z : Number of flute

The effect of flute length

Expression of aspect ratio

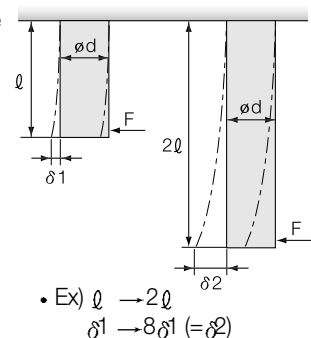
- Aspect ratio
- ℓ/d
- Ex) 3d, 5d, 10d

Deformation rate by length

- Deformation rate is "reaction force" against external force
- The more flute, the better rigidity

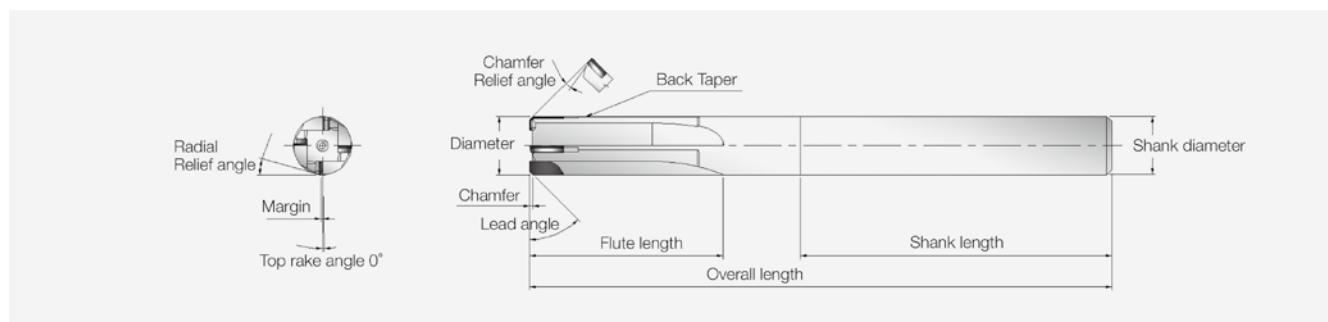
$$\delta = \frac{P\ell^3}{3EI} \quad l = \frac{\pi d^4}{64}$$

- δ : Deformation volume
- P : Cutting force
- ℓ : Length of cut
- E : Elasticity coefficient
- I : Inertia moment



- Ex) $\ell \rightarrow 2\ell$
 $\delta_1 \rightarrow 8\delta_1 (= \delta_2)$

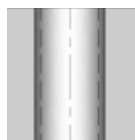
Reamer shape and terms



Margin	A tiny cylindrical area of the outer diameter for better dimensional accuracy and surface finish - Decrease the cutting load - Generate less heat - Bad roughness & guide Low ← Margin → High - Increase the cutting load - Generate more heat - Good roughness & guide
Lead angle	Major cutting edge - Good straightness - Bad roughness & Guide - Thicker chip Low ← Lead angle → High - Bad straightness - Good roughness & Guide - Thinner chip
Back taper	Slight angle to the shank to prevent unnecessary friction between the work piece and the tool O.D. - Bad machinability - Good roughness - Refurbish multiple times Low ← Back taper → High - Good machinability - Bad roughness - Refurbish few times
Relief angle	Angle for preventing the interference between the edge and workpiece and for effective cutting - Decrease edge sharpness - Better edge strength - Proper for hard material Low ← Relief angle → High - Increase edge sharpness - Better cutting ability - Proper for soft material

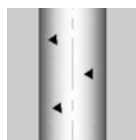
Trouble shooting

Too large diameter



- Tool diameter may be too large
- Cutting speed too high
- Feed too high
- Run-out error too high
- Cutting lead uneven
- Coolant unsuitable

Bad surface



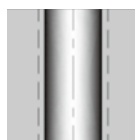
- Coolant unsuitable
- Build-up on cutting edge
- Tool blunt-possible fracturing on blade
- Chip removal bad
- Residual imbalance too large

Deformed hole



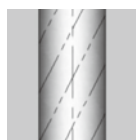
- Workpiece not correctly clamped

Too small diameter



- Tool worn
- Cutting speed too low
- Feed too low
- Ductile material - contracts after machining
- Allowance insufficient

Chatter marks



- Build-up on cutting edge
- Tool blunt
- Coolant unsuitable
- Run-out error too high
- Residual imbalance too great
- Clamping set-up not correct

Curved hole



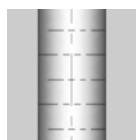
- Wrong lead geometry
- Wrong axial position of blade

Tapered hole



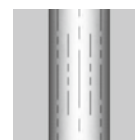
- Run-out error too high
- Cutting lead not correct
- Pre-machining not correct

Feed grooves



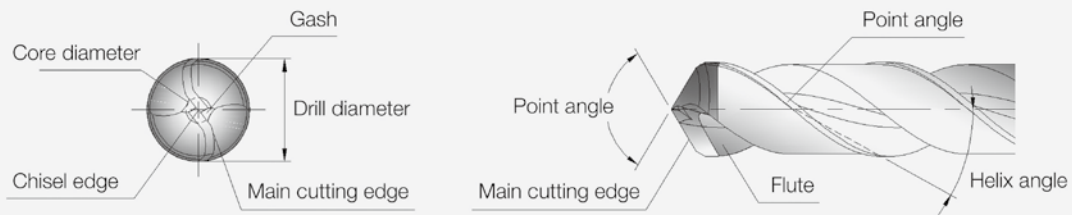
- Tool blunt, possible fracturing on blade
- Build-up on cutting edge
- Coolant unsuitable

Facets



- Centering error
- Too small back taper

Drill's shape and terms



Point angle	Point angle has big influence on cutting performance. It mainly depends on workpiece. In case of standard drills Point angle is generally 118°. • Thrust resistance decrease • Torque increase, Burr on exit increase • Soft material (aluminum etc) Low ← Point angle → High • Thrust resistance increase • Torque decrease, Burr on exit decrease • Hard workpiece (hardened steel)			
Helix angle	Plays rake angle of cutting edge's role. If helix angle increases Cutting force decreases. on the other hand If helix angle is too big drill rigidity decreases. • Poor machinability • Hard workpiece (hardened steel) Low ← Helix angle → High • Smooth chip evacuation • Soft material (aluminum etc)			
Flute	The path of both chip evacuation and cooling lubricant. too big length of flute weakens drill rigidity and too small length of flute worsens chip evacuation to breakage.			
Relief angle	Angle for preventing the interference between the edge and workpiece and for effective drilling • Decrease edge sharpness • Better edge strength • Proper for hard material Low ← Relief angle → High • Increase edge sharpness • Better drilling ability • Proper for soft material			
Gash (thinning)	The chisel edge is determined by web thickness and chisel angle. Thinner web weakens the drill strength. Therefore, we recommend to add thinning instead of reducing the web thickness to modify the chisel edge for less thrust.			

Helical and burnishing type comparison

	Helical drill	Burnishing drill
		
Cutting load	Good (small)	Bad (big)
Roughness	Bad	Good
Chip flow	Good	Bad
Heat generation	Good (small)	Bad (big)
Purpose	Deep hole, ferrous materials, etc.	Al, non-ferrous materials, shallow hole

Major cutting formulas

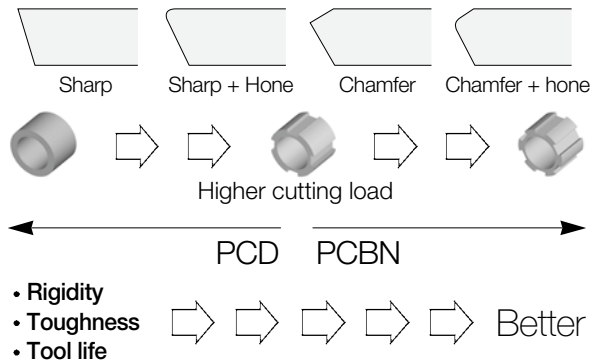
Cutting speed	Feed	Machining time
$V_c = \frac{\pi \times D \times N}{1,000} \text{ (m/min)}$ • V_c : Cutting speed (m/min) • D : Diameter (mm) • N : Revolution per minute (min⁻¹) • π : Circular constant (3.14)	$f_n = \frac{V_f}{N} \text{ (mm/rev)}$ • f_n : Feed per revolution (mm/rev) • v_f : Table feed (mm/min) • N : Revolution per minute (min⁻¹)	$T = \frac{L}{N \times f_n} \text{ (min)}$ • T : Machining time (min) • n : Revolution per minute (min⁻¹) • L : Length of drilling (mm) • f_n : Feed (mm/rev)

Tool shapes



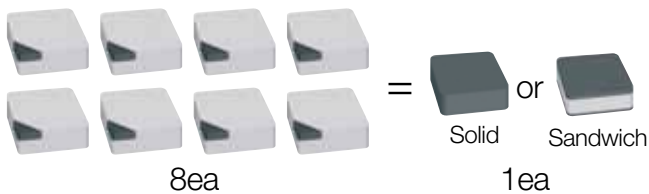
- Cutting load & vibration → → → → → Higher
- Rigidity → → → → → Better
- Toughness → → → → → Better
- Tool life → → → → → Better

Edge preparations



Advantages of solid PCBN & sandwich PCBN

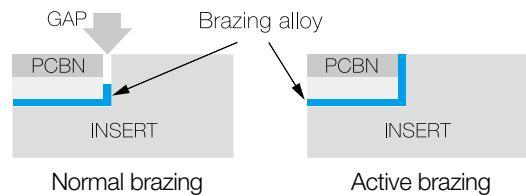
For cast iron machining



Advantages

- Better tool strength due to solid design
- Full cutting edge available
- Cost saving
- Eco friendly

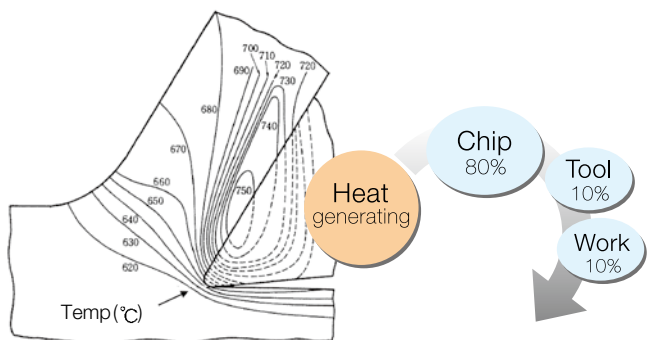
Benefits of active brazing



Advantages

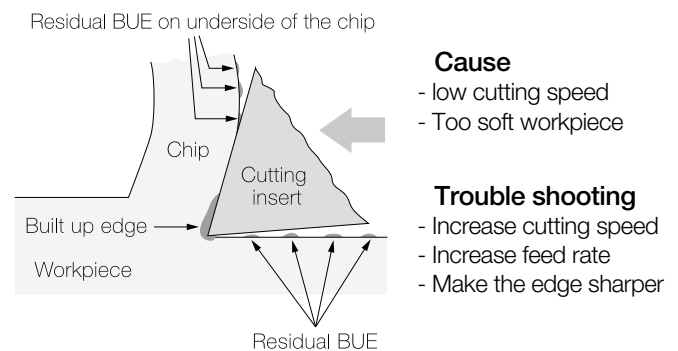
- No oxidation due to vacuum condition
- Less GAP between PCD/PCBN blank and carbide insert
- Higher brazing strength

Effect of Heat generation



- Weaken tool rigidity
- Accelerate tool wear
- Cause tool deformation → → → Poor tool life & precision

Built-up edge (BUE)



Effect on cutting process

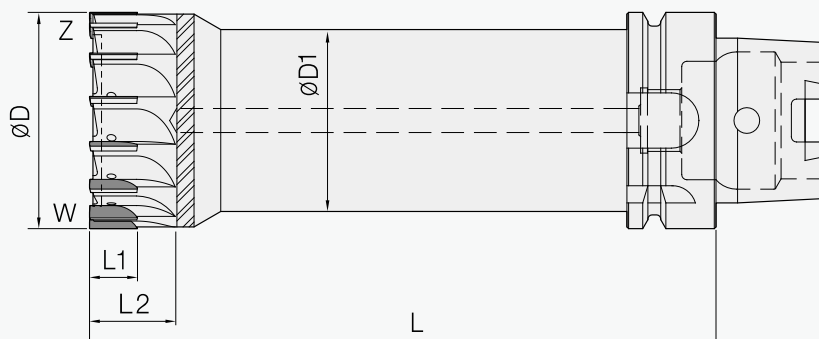
- Good - Protect the tool head against wear
- Bad - Poor surface finish
 - Hard to control the dimensions
 - Cause more chipping or flaking on the edge

Endmill order sheet

Date.

Customer			End_user		
Workpiece	Part name			Hardness	HRc / HRB
	Material			Roughness	Ra / Rz / Rmax

Tool information



Tool size

D	Diameter, tolerance	mm
D1	Diameter of shank body	mm
L1	Length of tip	mm
L2	Width of tip	mm
W	Length of tool	mm
L	No. of teeth	mm
Z	No. of flute	ea
F	Length of flute	ea

Shank

Solid carbide	☐
Solid carbide + steel	☐
Steel	☐

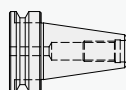
Coolant hole

Yes	☐
No	☐

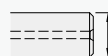
Holder & adaptor



HSKA	☐
Size	32, 40, 50, 63, 80, 100



BT	☐
SK	☐
Size	30, 40, 50



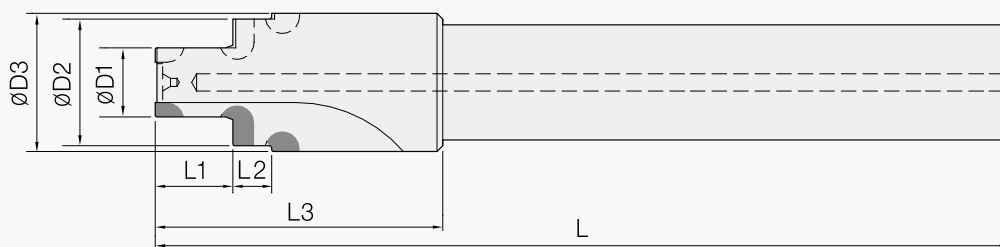
Ø	mm
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Reamer order sheet

Date.

Customer				End_user			
Workpiece	Part name				Hardness	HRc / HRB	
	Material				Roughness	Ra / Rz / Rmax	

Tool information



Tool size

D1	Diameter, tolerance	mm
D2	Diameter, tolerance	mm
D3	Diameter, tolerance	mm
L1	Length of step	mm
L2	Length of step	mm
L3	Length of clearance	mm
L	Length of tool	mm
F	No. of flute	ea

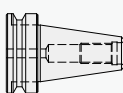
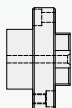
Shank

Solid carbide	☐
Solid carbide + steel	☐
Steel	☐

Coolant hole

Yes (Y-hole)	☐
Yes (through)	☐
No	☐

Holder & adaptor

	HSKA ☐
	Size 32, 40, 50, 63, 80, 100
	BT ☐
	SK ☐
	Size 30, 40, 50
	Module ☐
	Size 60, 70
	Ø mm

Hole type

Through hole	☐
Blind hole	☐

Guide

Yes 	☐
No 	☐

Interrupted cut

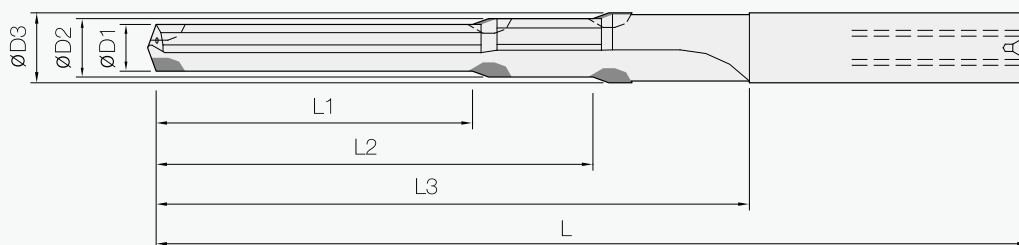
Yes	☐
No	☐

Drill order sheet

Date.

Customer				End_user			
Workpiece	Part name				Hardness	HRc / HRB	
	Material				Roughness	Ra / Rz / Rmax	

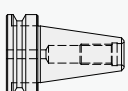
Tool information



Tool size

D1	Diameter, tolerance	mm
D2	Diameter, tolerance	mm
D3	Diameter, tolerance	mm
L1	Length of step	mm
L2	Length of step	mm
L3	Length of clearance	mm
L	Length of tool	mm
F	No. of flute	ea

Holder & adaptor

	HSKA ☐
	Size 32, 40, 50, 63, 80, 100
	BT ☐
	SK ☐
	Size 30, 40, 50
	Ø mm

Shank

Solid carbide	☐
Solid carbide + steel	☐
Steel	☐

Coolant hole

Yes (Y-hole)	☐
Yes (through)	☐
No	☐

Hole type

Through hole	☐
Blind hole	☐

Guide

Yes 	☐
No 	☐

Interrupted cut

Yes	☐
No	☐

Test information

Date.

Customer				End_user			
Workpiece	Part name				Hardness	HRc / HRB	
	Material *				Roughness	Ra / Rz / Rmax	
Work figure Drawing							
Machine	M.C.T	☐			C.N.C turnig / milling	☐	
	Manual	☐			Machine maker		

Cutting data

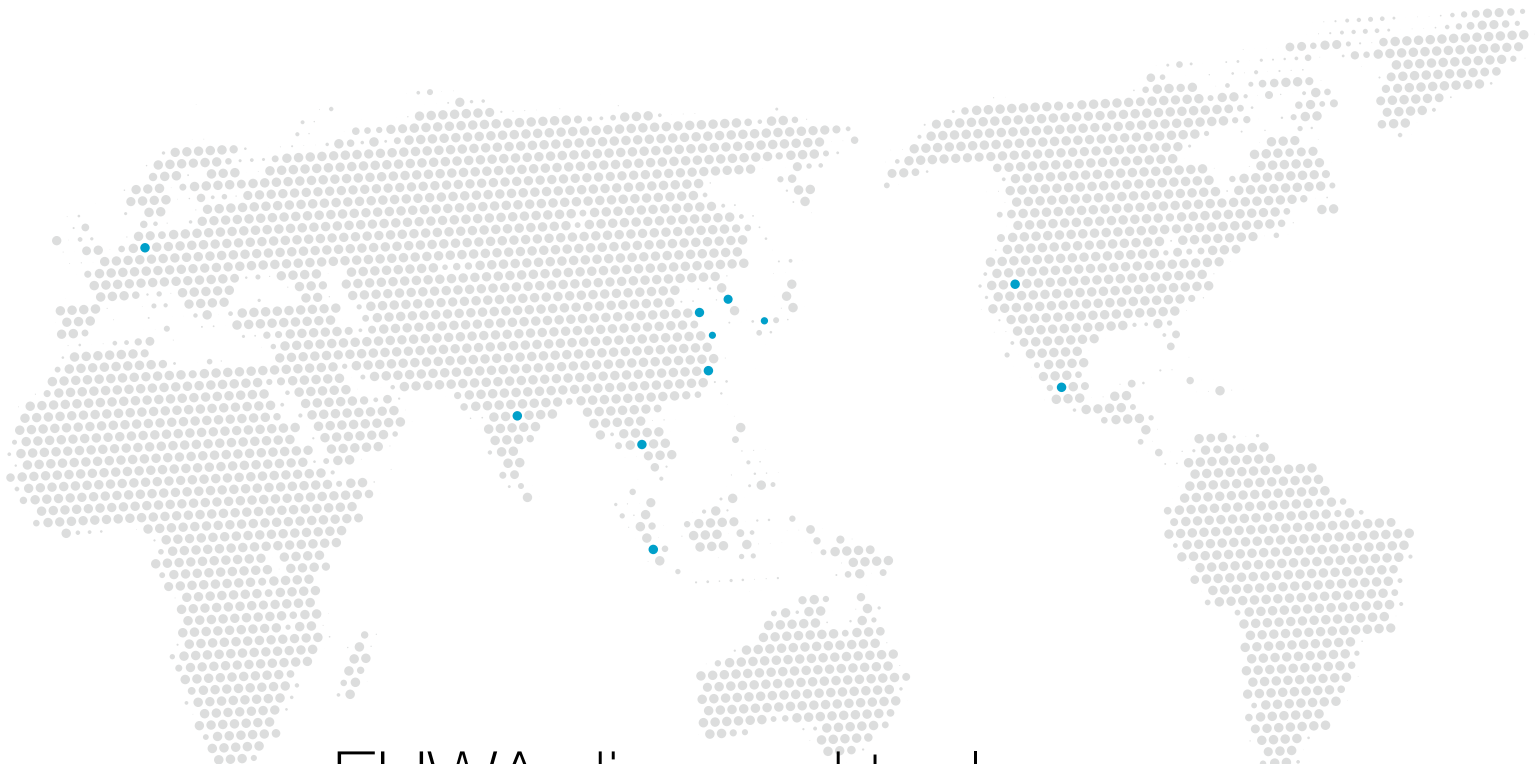
Speed (V)	(m/min)
RPM (N)	(rev/min)
Feed (F)	(mm/rev)
	(mm/min)
D.O.C *	(pass)
	(mm)

Cutting condition

Continuous *	Continuous	☒	☐
	Light	☒	☐
Interrupt *	Medium	☒	☐
	Heavy	☒	☐
Coolant*	Dry	☐	☐
	Inner	☐	Out (Wet) ☐

Tool information

Tool material *	PCD	☐	SPEC *			
	PCBN	☐				
	CVD	☐				
	SCD natural	☐		Competitor *		
	SCD mono	☐				
	TC	☐		Tool life	(time)	
	Cermet	☐			(EA)	
Shank *	Ceramic	☐	Operation *	turning	☐	
	Others	☐		milling	☐	
	T.C	☐		boring	☐	
	STEEL	☐		grooving / cutting	☐	
T.C+STEEL	☐	reaming		☐		
Mono block		☐	endmill	☐		
		☐	drilling	☐		
			Wearless	☐		
			Need to be determined*	☐		



EHWA diamond tools serve as a promoter of globalization

Since 1975, EHWA DIAMOND has been growing by developing long-term partnerships with customers worldwide and across the industries. EHWA is tirelessly striving to provide the very best customer satisfaction through continuous product innovation and world class service.

Korea



Osan



Osan 2



Dongtan



Pyeongtaek



Seochon



Cheongju

Overseas



China Fujian



China Weihai



China Shanghai



Indonesia



USA



Japan



Thailand



Germany



India



Mexico



EHWA

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