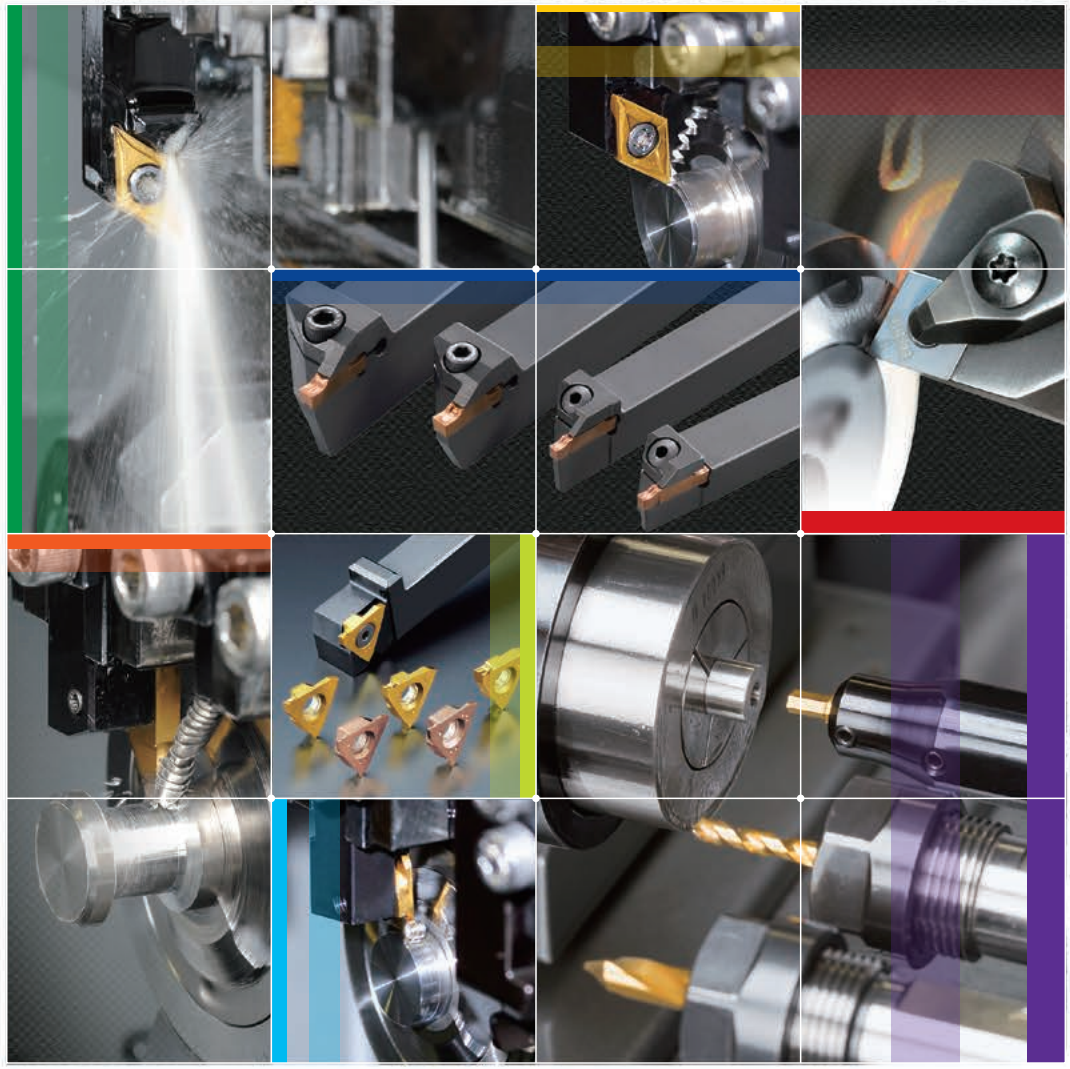
NTK
CUTTING TOOLS

Cutting Tools

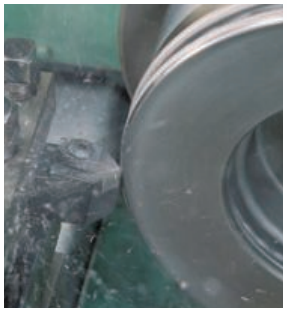
GENERAL CATALOG

Vol.4

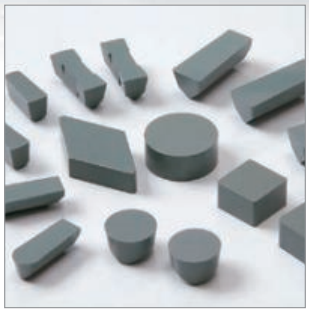


NTK Technology

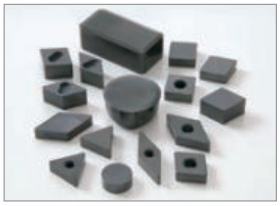
Disc and Drum Brakes



Aerospace Components



Steel Mill Rolls

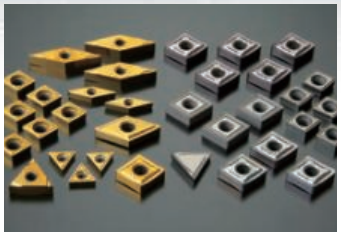


Poly – V Pulleys

Cylinder Liners

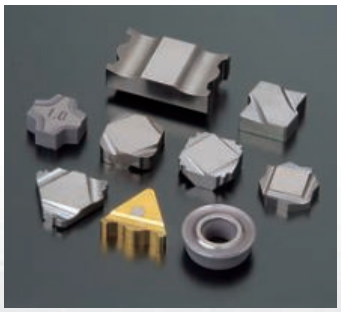
Hardened Materials

Steel Machining



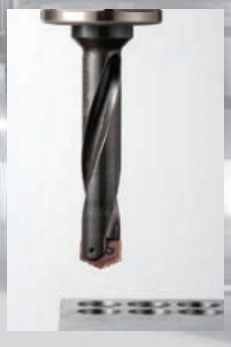
Grooving

Bearing Production

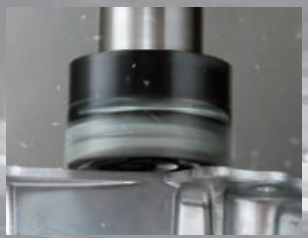


SS Tools for Small Parts Machining

Throw-Away Insert Drills



High Speed Machining of Aluminum



Safety instructions for using ultra hard cutting tools

1. Instructions for using ultra hard cutting tools

As required by the laws concerning Product Liability enforced on July 1, 1996, we place warning or caution labels on the packages of applicable NTK products. However, each tool body itself bears no detailed safety instructions. Therefore, you are requested to read and understand fully the "Safety instructions for the use of carbide cutting tools" before putting any ultra hard tool materials into use. In addition, we request all relevant staff and operators fully understand these safety instructions prior to use.

2. Basic characteristics of ultra hard tool materials

2−1. Meaning and classifications of terms used in this leaflet

Ultra hard tool materials: The collective name for materials used as cutting tools, including carbides, cermets, ceramics, CBN and diamond (PCD) sintered materials.

Carbide: Tool materials where the main component is WC (Tungsten Carbide)

Ultra hard materials: The collective name for materials used as ultra hard tools. Also used as a convenient way of referring to carbides under a narrower definition.

Ultra hard tools: The collective name for tools using ultra hard tool materials.

2−2. Physical properties

Appearance: Varies depending on the material. Example: gray, black or gold

Odour: No odour

Hardness: Cemented carbide: HV500 up to 3,000 kg/mm^2

Specific gravity: Carbide: 9 up to 19

2−3. Constituents

Carbide, nitride, carbo-nitride, or oxidized materials of W, Ti, Al, Ta, B or the like; some contain metallic components such as Co, Ni, Cr and/or Mo.

3. Precautions for handling ultra hard tool materials

- One of the properties specific to these materials is high hardness, another is brittleness. Therefore, shock loads or impacts, or excessive clamping of these materials may result in breakage or other damage.
- As the specific gravity (density) of these materials is very high, a large component made up of these materials or such products in large quantity should be handled with care.
- Ultra hard materials are different in their thermal expansion ratio from metals. These products are prone to thermal shock and subsequent breakage when subjected to sudden increase or decrease in temperature.
- As cutting oil, lubricant and general moisture may corrode ultra hard materials and affect their strength, pay extra attention to storing them in good conditions.

4. Precautions for processing ultra hard tools

- The strength of ultra hard tools may be significantly lowered depending on the surface condition. Always use diamond grinding wheels for finish machining.
- Dust is produced when ultra hard tools are ground. Install appropriate ventilation/disposal equipment and wear protective gear such as masks, as inhalation of such dust may be hazardous to health. If such dust contacts your skin or comes into contact with your eyes, flush well with flowing water.
- After the grinding of ultra hard tools or brazed tools, the waste coolant contains components of heavy metals. Be sure to dispose of such waste liquid properly.
- After re-grinding ultra hard tools, check that they are free of cracks or damage before use.
- When ultra hard material or products made of ultra hard material is marked with lasers or an electric pen, cracking may occur to the marked area. Do not mark in areas where stress is applied during use.
- Processing ultra hard material by electric discharge may cause residual cracks on the surface, resulting in lower strength. Thus, remove any cracks completely by grinding as required.
- Be careful when brazing ultra hard material. If the temperature is lower or higher than the melting point of the brazing material, the insert may not be permanently fixed.

Precautions for Safe Use of Cutting Tools

Applicable Products	Possible Risks	Safety Measures
General Cutting Tools	◎Contact with a sharp cutting edge with bare hands may result in injury.	＊Use protective gear such as protective gloves when taking the tool out of packaging and installing into the machine.
	◎Misuse or using under inappropriate conditions may cause the cutting tool to break and/or shatter into pieces, resulting in personal injury.	＊Use protective equipment, machine guarding and/or protective glasses. ＊Use within the range of recommended conditions. Please refer to the instruction manual and catalogue.
	◎Sudden increase in cutting resistance due to sudden impact load or excessive wear may cause the cutting tool to break and/or shatter into pieces, resulting in personal injury.	＊Use protective gear such as protective gloves when taking the tool out of packaging and installing into the machine.
	◎High-temperature chips may be produced and long chips may be ejected, resulting in injury and/or burns.	＊Use protective equipment, machine guarding and/or protective glasses. ＊Before removing chips, always stop the machine. Wear protective gloves and use proper equipment for chip removal.
	◎The tool and material/work being cut can become very hot. Touching them immediately after use may cause burns.	＊Use protective gear such as protective gloves.
	◎Sparks, heat generation due to breakage and/or chips during cutting may cause fire.	＊Do not use the machine and tools in locations where there are risks of ignition or explosion. ＊When using water-insoluble cutting oil, fire prevention measures must be implemented.
	◎Out of balance machine set ups when used at a high-speed, may cause insert breakage due to excess vibration or chatter, resulting in injury.	＊Use protective equipment, machine guarding and/or protective glasses. ＊Perform a trial-run beforehand to make sure the setup is stable, free of chatter, vibration and abnormal noise.
	◎Touching burrs and flashes on machined work may result in personal injury.	＊Use adequate hand protection.
Throw-Away Type Tools (With indexable insert)	◎Inappropriately clamped inserts and/or components may become detached from the machine during cutting, resulting in injury.	＊Before installing the insert, clean the seating surface and clamping components so that they are free of debris. ＊Use the wrench supplied to install the insert and check that the insert and components are securely clamped. Do not use any inserts or components other than the items specified.
	◎Excessively tightening with a device such as a pipe extension may cause the insert and/or components to break or detach due to over clamping.	＊Do not use tightening devices such as pipe extensions to obtain further torque. Always use the supplied wrench.
	◎At a high speeds inserts and/or components may lose clamping pressure due to the loosening effect of centrifugal force. This is very dangerous. Always ensure secure clamping systems and check regularly.	＊Use within the range the recommended conditions. Please refer to the instruction manual and catalogue.
Cutters and Rotational Tools	◎As cutters have sharp cutting edges, contact with bare hands may result in injury.	＊Use protective equipment such as protective gloves.
	◎Imbalance or eccentric rotation may cause the tool to break due to vibration or chatter, resulting in potential injury.	＊Use at a rotational speed within the recommended conditions. ＊To prevent eccentric rotation and vibration due to worn bearings, regularly check the machine rotor/ rotating parts for the accuracy and balance and adjust as required.
Drills	◎Extra care should be taken when through hole drilling as chips may be ejected at high speed as the drill breaks through the workpiece.	＊Use protective equipment such as machine guards and/or protective glasses. Additional guarding around the chuck and drill may be advisable.
	◎Drill tips of a very small diameter are usually pointed and extremely sharp. Extra care and safety precautions should be taken when handling to avoid puncture wounds.	＊Always use precautions and secure safe handling methods. ＊Wear protective gloves and glasses.
Brazed Inserts / Tools	◎Inserts may break or become, detached due to incorrect brazing.	＊Use protective equipment such as machine guards and/or protective glasses. Additional guarding around the chuck and drill may be advisable.
Others	◎It is not advisable to use repeatedly brazed inserts as the braze may progressively weaken.	＊Do not use repeatedly brazed inserts as the strength of such inserts is lowered.
	◎Use only for the original and intended purpose. Using outside recommended parameters is very dangerous, causing damages to machines and/or tools.	＊Always use and operate as specified, observing the required safety rules and conditions.

Precautions for Safe Use

- This catalogue lists products as of September 2014.
- Please note that specifications of the products listed in this catalogue may be changed without notice due to continuous research & development and product improvements in order to offer even better products.
- This catalogue contains the major features and relevant information on our products. Please contact our sales representatives or dealers for more detailed information.
- Stock Status Symbols
  - ● : Standard stock available for LH-, RH- and neutral products
  - R : Stock available for only RH-products
  - L : Stock available for only LH-products
  - ★ : Special service stock (Please contact us for stock.)
  - ◉ : Stock available (Time required for delivery: approx. 3 weeks)
  - ■ : Product scheduled to be manufactured on production-to-order basis in the future (Please contact us for stock/availability.)
  - No symbol : Not stocked
- Please note that this catalogue was prepared based on products intended mainly for sale in Japan.

●Standard items – per unit

1) Holder Type	Unit of Sales	Notes
Holder main body	1 pcs./case	
Drill holder main body	1 pcs./case	
Cutter main body	1 pcs./case	
2) Part Type	**Unit of Sales**	**Notes**
Screw	10 pcs./case	Clamp screw, Clamp bolt, Double screw, Button screw
Spring	10 pcs./case	Spring
Seat	10 pcs./case	Shim seat
Clamp	10 pcs./case	Clamp
Wrench	5 pcs./case	Wrench, bit
Handle	1 pcs./case	Handle with magnet, handle and bit
3) Insert Type	**Unit of Sales**	**Notes**
CBN	1 pcs./case	B16・B22・B23・B30・B36・B40・B52・B5K・B6K
PCD	1 pcs./case	PD1・PD2
CTPW insert for cutting off	5 pcs./case	CTPW
STICK DUO Super-hardened solid bar. SHAPER DUO	1 pcs./case	SHFS・SHFB・SBFS・SBFB・SBG・SFG・SBT・SSP
Types other than the above	10 pcs./case	
Drilling insert size Y–2 series	2 pcs./case	Drilling insert size Y–2 series
Drilling insert size 3 series and higher	1 pcs./case	Drilling insert size 3 series and higher

＊Packaging may vary depending on the product size. For more information on the available units for our products, please contact your nearest dealer or our sales office.

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New G class 3D chipbreaker for front turning **"YL" chipbreaker** ··· A2 ~ 3

GTMH32 type grooving insert **GX chipbreaker** ····· A4 ~ 8

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Super Micro Grain PCD tool **PD2** ····· A38 ~ 39

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New toolholder for small lathe ····· A42

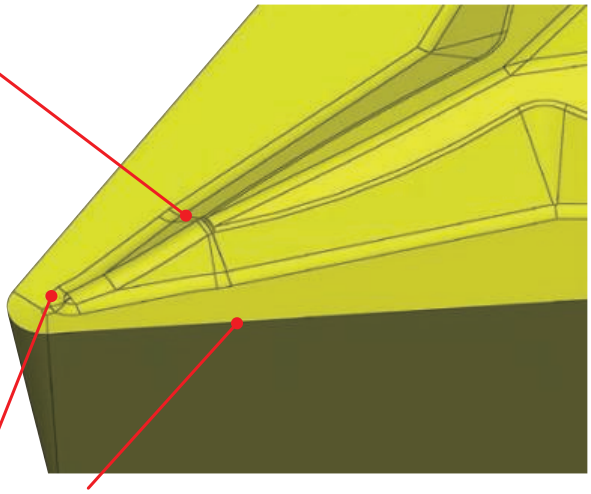
NEW

New G class 3D chipbreaker for front turning
"YL" chipbreaker

WATCH ON YouTube

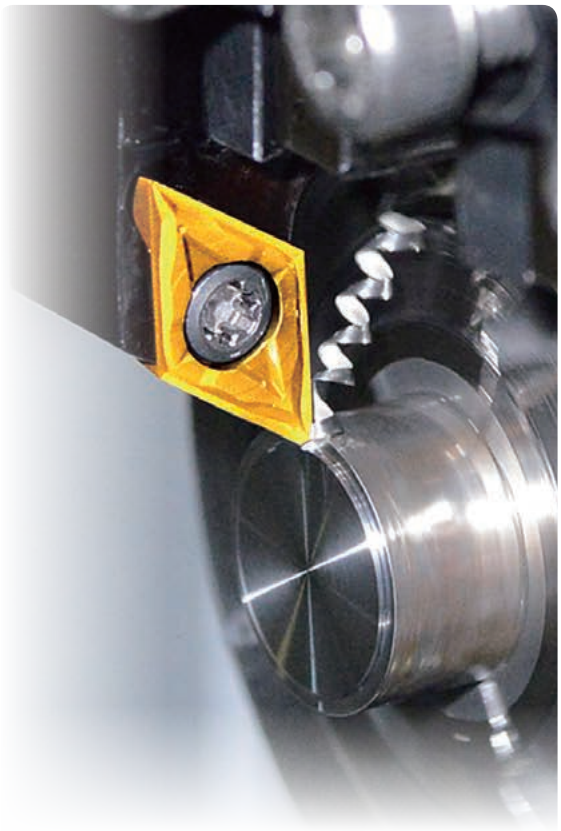
Features

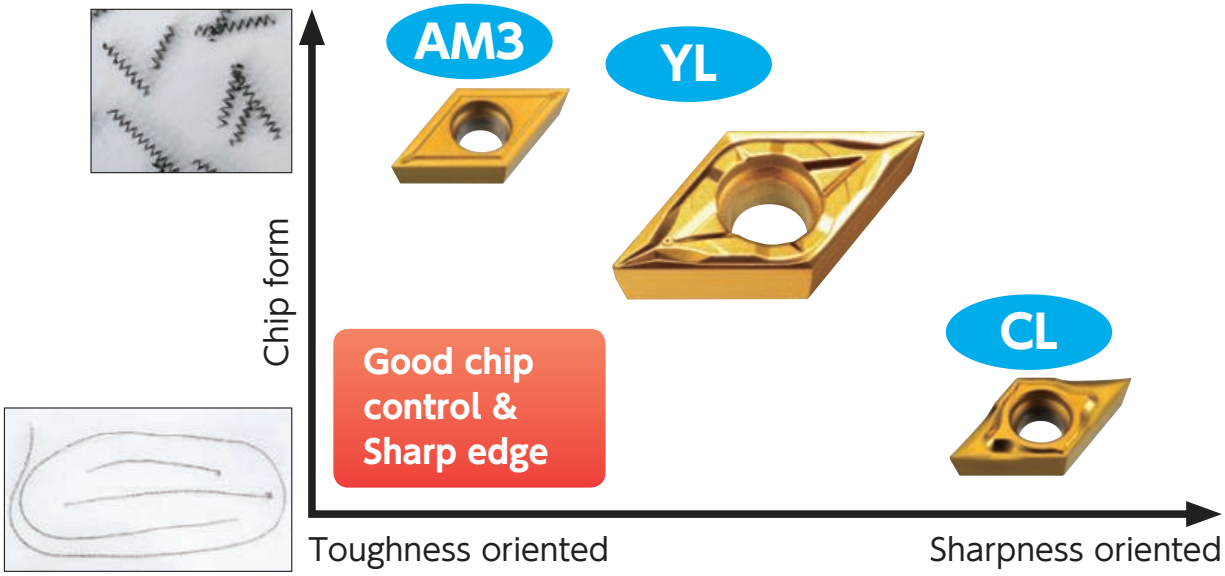
Dot distance from edge is step away per D.O.C. Helps reduce the cutting force in deep D.O.C. machining.



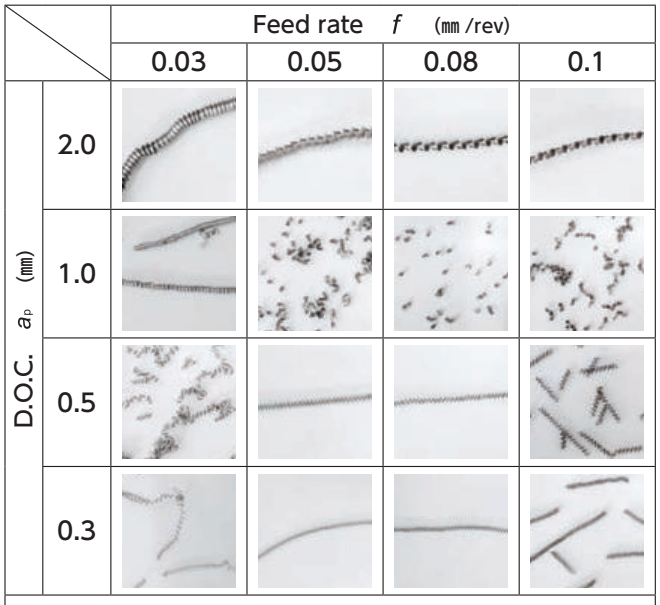
Up sharp cutting edge and high rake angle provides excellent surface finish !

Front dot controls chips well under light depth of cut.



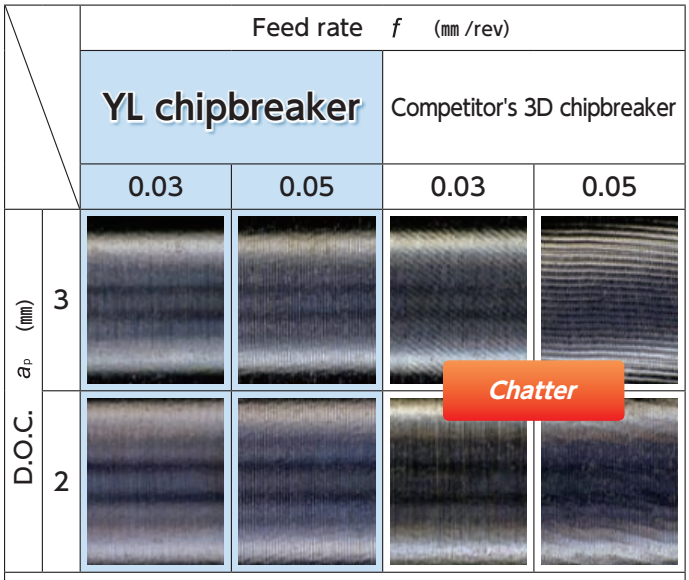


Chip control performance



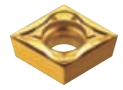
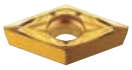
【Cutting condition】Work material : SUS304 φ16 V_c =80m/min WET

Chatter vibration resistance

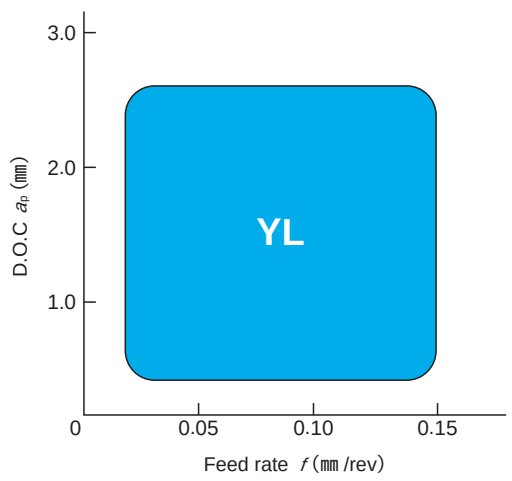


【Cutting condition】Work material : SUS304 φ16
V_c =80m/min f =0.05mm/rev a_p =2,3mm WET

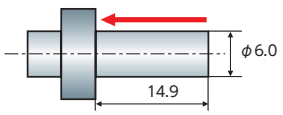
Stock list

Shape	Part number	Dimensions			PVD coated micrograin carbide			
		I.C.	Thickness	Corner radius	DM4	Stock	TM4	Stock
	CCGT09T301MYL	9.525	3.97	0.08	5922455	●	5922471	●
	09T302MYL			0.18	5922489	●	5922505	●
	09T304MYL			0.38	5922422	●	5922448	●
	DCGT11T301MYL	9.525	3.97	0.08	5922380	●	5922398	●
	11T302MYL			0.18	5922406	●	5922414	●
	11T304MYL			0.38	5922356	●	5922372	●
	VCGT110301MYL	6.35	3.18	0.08	5922307	●	5922315	●
	110302MYL			0.18	5922331	●	5922349	●
	110304MYL			0.38	5922281	●	5922299	●
	VBGT160402FNYL	9.525	4.76	0.2	5919519	●	5922109	●
	160404FNYL			0.4	5919543	●	5922117	●
	160408FNYL			0.8	5919527	●	5922125	●

Chip control performance



Work material	: SUS304L
Cutting speed (m/min)	: 50
Feed (mm/rev)	: 0.03
D.O.C a_p (mm)	: 1.5
Coolant	: WET



YL chipbreaker	3000pcs/corner
PVD coated carbide	2000pcs/corner

NTK YL chipbreaker has excellent chip control performance.
Compared with conventional tool, NTK YL chipbreaker achived longer tool life.
It resuletd in stable machining with high dimensional accracy.

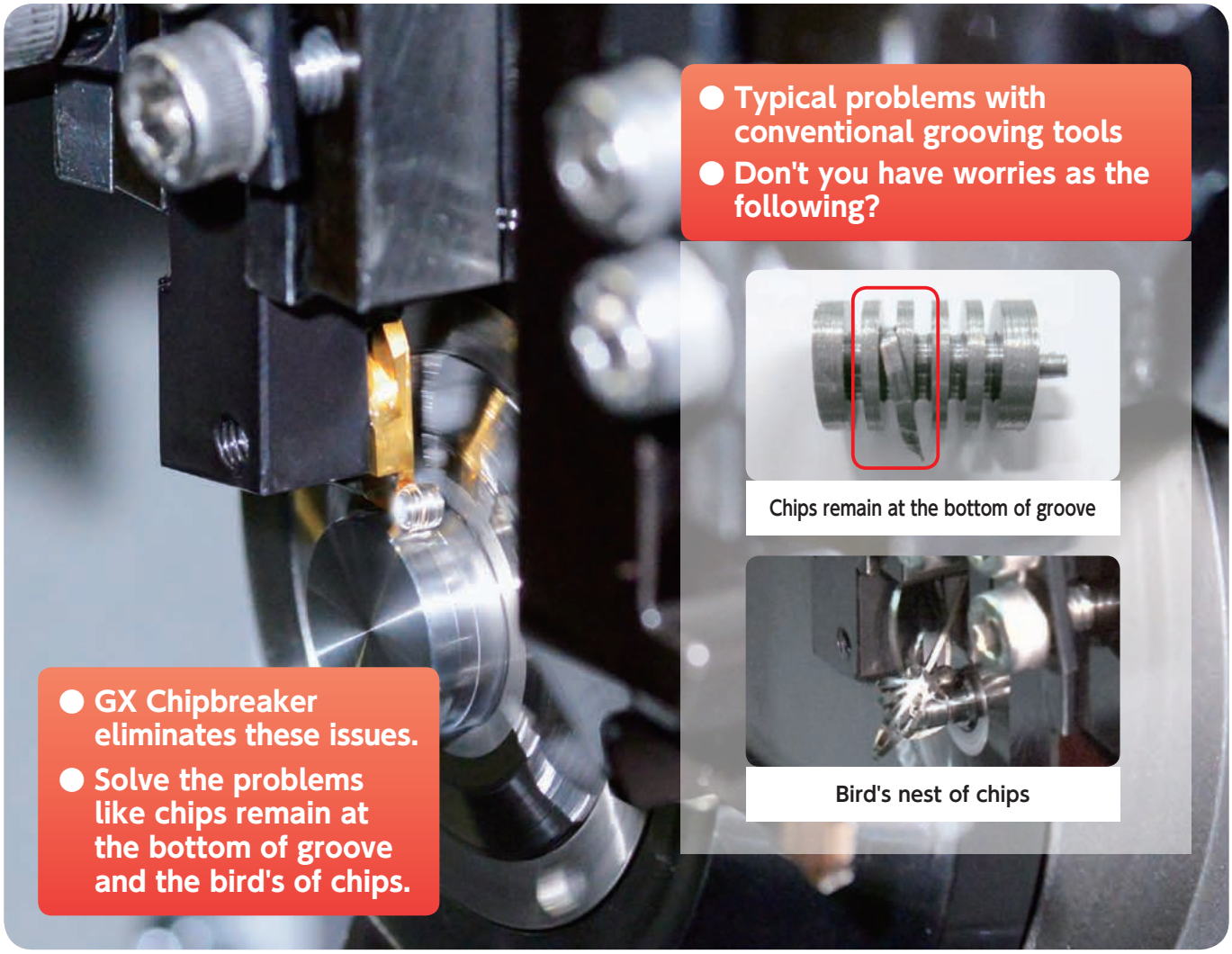
NEW

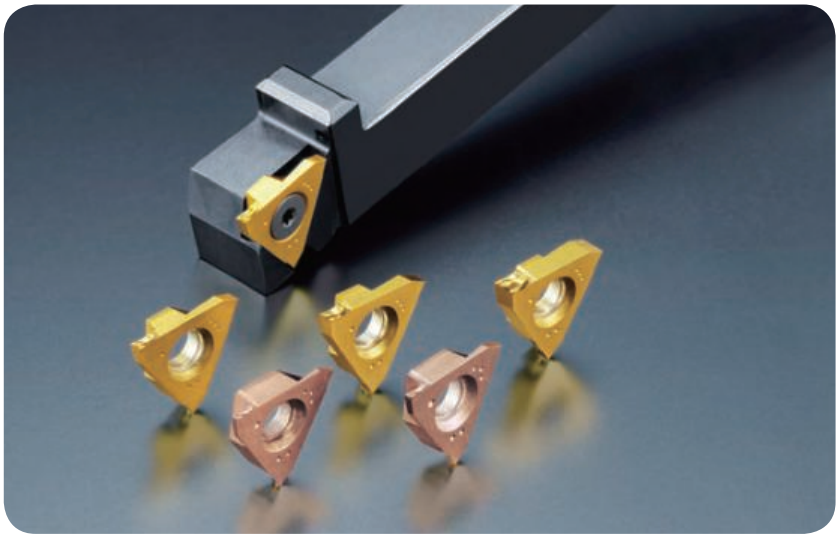
GTMH32 type grooving insert

GX chipbreaker

The world's first 3D chipbreaker for 32 size triangle shaped type insert

WATCH ON YouTube





※1 NTK adopted the world's first 3D chipbreaker in triangle shaped type insert in 32 size. An internal investigation on 5/26/2014.

Features

1 Center bump and dent design improve chip control !

Helps chip shape curl&control.
Excellent surface finish at grooving.

※ Chipbreaker geometry grooving width 1.5mm～.

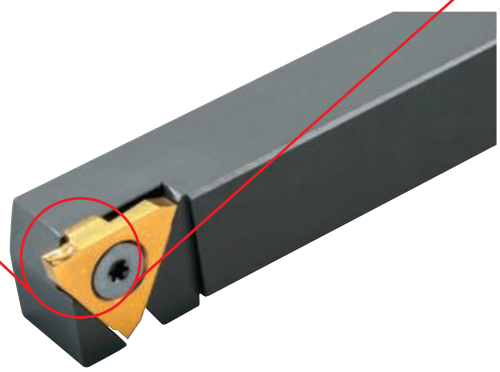
※ Chipbreaker geometry grooving width ～1.0mm.

2 Traversing is available !

Chip control performance at side turning improved, (MAX.ap～2.0mm).

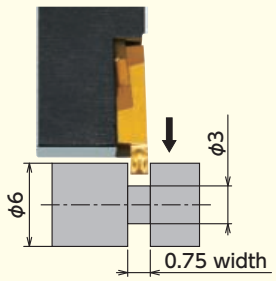
3 Outer periphery polishing offers excellent sureface finish !

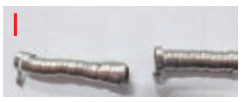
Sharpness equal to ground chipbreaker !



Chip control

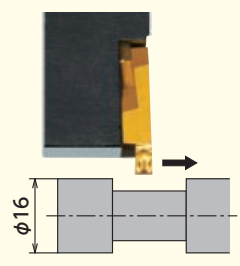
Grooving (Assumed snapring grooving)

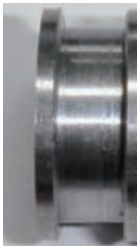


	Feed (mm /rev) Length : 3mm		
	0.01	0.03	0.05
GX chipbreaker			
Conventional insert (ground chipbreaker)			

Work material : SUS304 (ϕ 6⇒ϕ 3) v_c =80m/min a_p =1.5mm Width : 0.75mm

GX chipbreaker surface finish by side turning

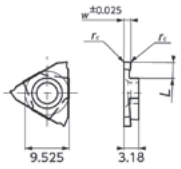


D.O.C. at side turning (mm)	Surface finish	End face at the groove
2.0		

Work material : S45C v_c=80m/min f =0.05mm /rev WET Insert : DM4GTMH32150RGX Holder : GTTR12K00

Standard Stock Items

Shape	Description	Dimensions (mm)					PVD coated carbide			
		w	*L*	r_ε	Max. groove depth	Traversing	TM4	Stock	DM4	Stock
Traversing available	**GTMH32075RGX**	0.75	2.0	0.05	1.6	0.75	5910765	●	5910898	●
	095RGX	0.95				1.50	5922224	●	5922216	●
	100RGX	1.00					5910815	●	5910906	●
	100RGX01			0.1			5910823	●	5910963	●
	150RGX	1.50	3.0	0.05	2.7	2.00	5910740	●	5910914	●
	150RGX01			0.1			5910849	●	5910971	●
	150RGX02			0.2			5910864	●	5910997	●
	200RGX	2.00		0.05			5910732	●	5910930	●
	200RGX01			0.1			5910856	●	5910989	●
	200RGX02			0.2			5910872	●	5911003	●
	300RGX	3.00		0.05			5910724	●	5910948	●
	300RGX02			0.2			5910880	●	5911011	●



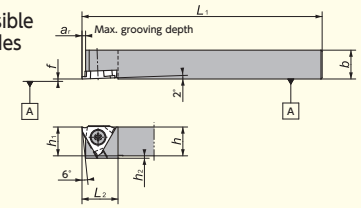
〈Chipbreaker geometry〉
Front rake angle:17°
Side rake angle:14°

●R-hand style shown

Holder

GTT

Screw accessible from both sides



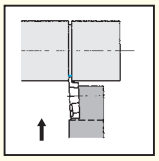


Figure.1

●R-hand style shown

GTT-OH Coolant through

Th (Thread type)
M6, Rc1/8 (PT1/8)

Screw accessible from both sides

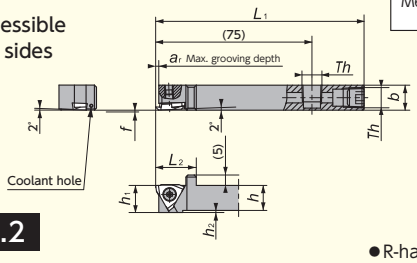


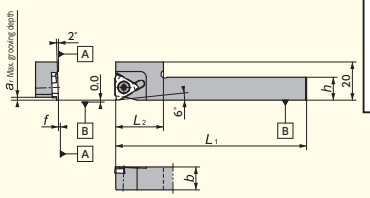
Figure.2

●R-hand style shown

Y-GTT

Screw accessible from both sides

Y-axis toolholder



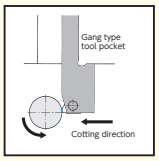


Figure.3

●R-hand style shown
※R-hand insert for Right-hand Toolholder

Y-GTT-OH Coolant through

Th (Thread type)
Rc1/8 (PT1/8)

Screw accessible from both sides

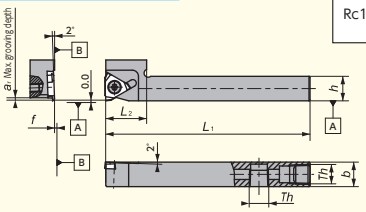
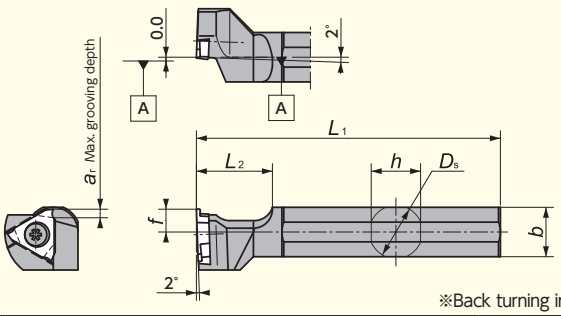


Figure.4

●R-hand style shown
※R-hand insert for Right-hand Toolholder

DS-GTT

DS Holder



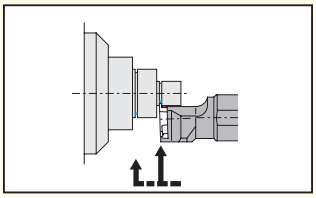
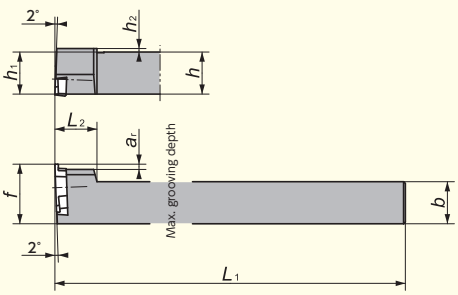


Figure.5

●L-hand style shown
※R-hand insert for Left-hand Toolholder
※Back turning insert "TBMH32 type" also available to GTT typeToolholder

CH-GTT

For horizontal gang style



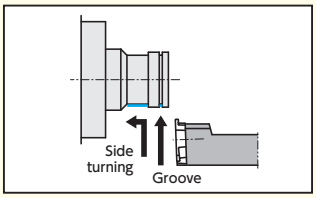


Figure.6

●L-hand style shown
※R-hand insert for Left-hand Toolholder

Toolholder Dimensions

Shape	CodeNo. R	CodeNo. L	Toolholder	Stock R	Stock L	dimension (mm) h	b	L_1	h_1	f	L_2	a_r	h_2	D_s	Th	Width (mm) w	Parts: Screw	Parts: Wrench
Figure.1	5107305	5107313	**GTT$^{R}_{L}$08F00**	●	●	8	8	80	8	0	15	1.6	5	—	—	0.3 ~ 3.00	Right-hand : LR-S-4*10PW (A) Left-hand : LR-S-4*5.8 (B)	CLR-15S (A)
	5608682		**0810F00**	●			10										LR-S-4*10PW (A)	
	5107206	5107214	**08K00**	●	●		8	120									Right-hand : LR-S-4*10PW (A) Left-hand : LR-S-4*5.8 (B)	
	5608690		**0810K00**	●			10										LR-S-4*10PW (A)	
	5107321	5107339	**10F00**	●	●	10	10	80	10				3					
	5107222	5107230	**10K00**	●	●			120										
	5107347	5107354	**12F00**	●	●	12	12	80	12				1					
	5107248	5107255	**12K00**	●	●			120										
	5459896	5551387	**16H00**	●	●	16	16	100	16				0					
	5173687	5173679	**16K00**	●	●			120										
	5530852	5780317	**20K00**	●	●	20	20	125	20			2.7				1.45 ~ 3.00		
	5780309	5780291	**25M00**	●	●	25	25	150	25									
	5107362	5107370	**10F15**	●	●	10	10	80	10				3					
	5107263	5107271	**10K15**	●	●			120										
	5537220	5537147	**12F15**	●	●	12	12	80	12				1					
	5537246	5537162	**12K15**	●	●			120										
	5537261	5537188	**16H15**	●	●	16	16	100	16				0					
	5537287	5537204	**16K15**	●	●			120										
	5107388	5107396	**10F25**	●	●	10	10	80	10				3					
	5107289	5107297	**10K25**	●	●			120										
	5537238	5537154	**12F25**	●	●	12	12	80	12				1			2.5 ~ 3.00		
	5537253	5537170	**12K25**	●	●			120										
	5537279	5537196	**16H25**	●	●	16	16	100	16				0					
	5537295	5537212	**16K25**	●	●			120										
Figure.2	5921705		**GTT$^{R}_{L}$1012H00-OH**	●		10	12	100	10	0	19.5	1.6	1	—	M6×1	0.3 ~ 3.00	LR-S-4*10PW (A)	CLR-15S (A)
	5890157		**12H00-OH**	●		12			12						Rc1/8 (PT1/8)			
	5921713		**16H00-OH**	●		16	16		16				0					
Figure.3	5371604		**Y-GTT$^{R}_{L}$10S**	●		10	10	120	—	0	20	1.6	—	—	—	0.3 ~ 3.00	LR-S-4*10PW (A)	CLR-15S (A)
	5371620		**12S**	●		12	12											
Figure.4	5911466		**Y-GTTR12H00S-OH**	●		12	12	100	12	0	20	1.6	—	—	Rc1/8 (PT1/8)	0.3 ~ 3.00	LR-S-4*10PW (A)	CLR-15S (A)
	5911474		**16H00-OH**	●		16	16		16		25							
Figure.5		5348560	**DS-GTT$^{R}_{L}$14F**		●	13	13	80	—	6	20	1.6	—	14.000	—	0.3 ~ 3.00	LR-S-4*9 (B)	RLR-20S (B)
		5348081	**15H**		●	15	15	100						15.875				
		5341532	**16X**		●			95						16.000				
		5278288	**19**		●	18	18	120						19.050				
		5278304	**20**		●	19	19							20.000				
		5324041	**22**		●	21	21							22.000				
		5317144	**25**		●	24	24			10				25.400				
Figure.6		5659248	**CH-GTT$^{R}_{L}$10H00**		●	10	10	100	10	15	12	1.5	3	—	—	0.3 ~ 3.00	LR-S-4*9 (B)	RLR-20S (B)
		5659255	**12H00**		●	12	12		12	17			1					

GX and conventional insert (ground type) chipbreaker comparision in same cutting condition.

GX chipbreaker		Conventionalr	
	No tangled chips		Tangled chips

Work material : S45C V_c =80m/min f =0.05mm Insert : -DM4 GTMH32075RGX

Recommended cutting conditions

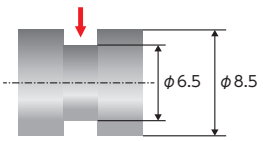
Work Material			Free-cutting steel	Carbon steel	Alloy steel	Stainless steel		Titanium alloy
			SUM22 SUM23	S35C S45C	Scr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti
Recommended Insert grade		1	DM4					
		2	TM4					
Cutting speed Vc(m/min)			50 100 200	50 90 150		50 90 180	40 70 100	50 70 100
Feed f(mm /rev) ①f at grooving ②f at turning	width (mm)	0.75	①0.02~0.08 ②0.01~0.08 (Max.ap 0.75)		①0.02 ~ 0.07 ②0.01 ~ 0.08 (Max.ap 0.75)			①0.02~0.08 ②0.01~0.08 (Max.ap 0.75)
		1.0	①0.02~0.08 ②0.01~0.08 (Max.ap 1.5)		①0.02 ~ 0.07 ②0.01 ~ 0.1 (Max.ap 1.5)			
		1.5	①0.03~0.08 ②0.03~0.1 (Max.ap 2.0)		①0.03 ~ 0.07 ②0.02 ~ 0.1 (Max.ap 2.0)			
		2.0 ~	①0.03 ~ 0.2 ②0.03 ~ 0.1 (Max.ap 2.0)					

※Above cutting condition is for extemal grooving. For internal grooving, set both cutting speed and feed 20% lower.

Application example

Workmaterial SUS440C

	GX chipbreaker	Competitor PVD coated carbide
Cutting speed (m/min)	100-130	←
Feed (mm/rev)	0.06	←
Grooving depth (mm)	0.95	←
Coolant	WET	←



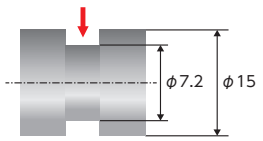
Description -DM4 GTMH32150RGX

GX chipbreaker	300pcs/corner
Competitor PVD coated carbide	200pcs/corner

・NTK GX chipbreaker adopted 3D mold chipbreaker.
It resluted in good chip control, good surface finish, and high dimensional accracy.
Comapred with competitor's, NTK GX chipbreaker achieved 1.5 times longer tool life.
(Evaluation from the user)

Workmaterial SUS420F

	GX chipbreaker	Conventionalr PVD coated carbide
Cutting speed (m/min)	80-165	←
Feed (mm/rev)	0.025	←
Grooving depth (mm)	0.3	←
Coolant	WET	←



Description -DM4 GTMH32075RGX

GX chipbreaker	Stable machining.
Competitor PVD coated carbide	Bird's nest of chips!!

・Using the current tool, the chip unexpectedly got the bird's nest of chips and defective products have occurrred.
NTK GX chipbreaker adopted 3D mold chipbreaker. It performed good chip evacuation, prevented from the bird's nest of chips. Stable machining achieved.
(Evaluation from the user)

NEW

New front turning tool

TFD-AM3 chipbreaker

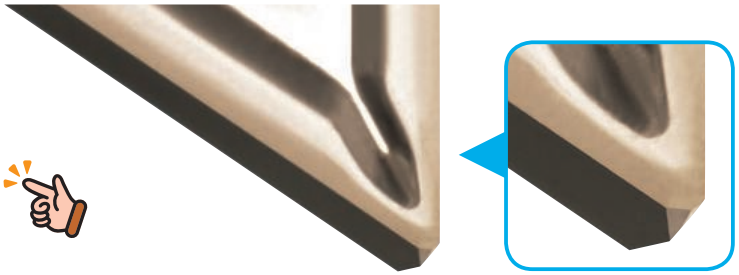
NTK

Wiper Insert

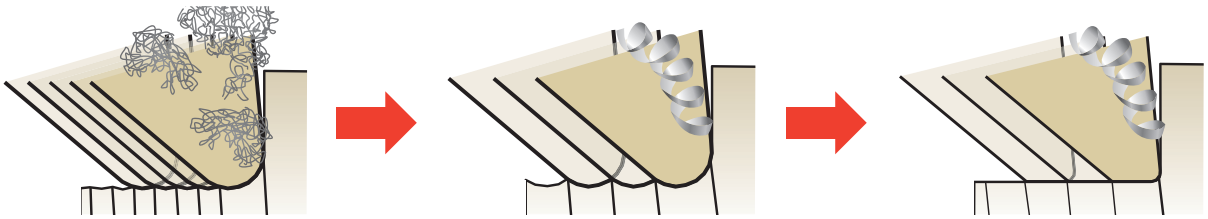
Good surface!

Good chip control!

Good inside corner R!



Surface finish in front turning



Unstable chip control at low feed rate to keep surface finish

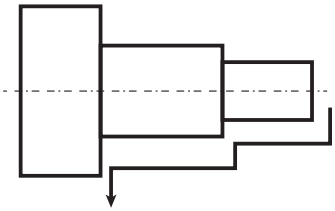
Bad surface finish at high feed rate to improve chip control

TFD wiper insert offers good chip control and surface finish

Cutting condition

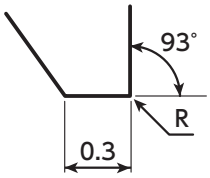
Work material	SUS304
Cutting speed	V_c=30 ~ 80m/min
Feed speed	f =0.015mm /rev
Depth of cut	a_p=0.15mm

DT4 TFD11FR05AM3	1500pcs/corner
Conventional tool	700pcs/corner

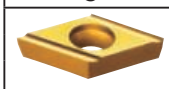


Surface finish of conventional tool after 500pcs machined was Ry10.2 μm, and dimensional change 0.1mm occurred at start of machining.
TFD-AM3 chipbreaker(DT4 grade) achieved stable machining with no dimensional change after 1,000pcs machined. Surface roughness was Ry2.3 μm.

Edge design



Stock list

Shape	Part number	Dimensions (mm) I.C.	Thickness	Corner radius	PVD coated micrograin carbide ZM3 R	Stock	ZM3 L	Stock	QM3 R	Stock	VM1 R	Stock	DT4 R	Stock	Carbide KM1 R	Stock
AM3	NEW TFD11FR05AM3	9.525	3.97	0.05									5881511	●		
	NEW 11FR15AM3			0.15									5881503	●		
S	TFD07F☆05	6.35	2.38	0.05	5106893	●	5133277	●	5335278	●	5328927	●				
	07F☆15			0.15	5106901	●	5133269	●	5601257	●						
	11FR05	9.525	3.97	0.05	5141908	●			5590716	●	5280169	●				
	11FR15			0.15	5141932	●			5560198	●						
 U	TFD07FR05U	6.35	2.38	0.05	5141940	●			5601240	●	5290010	●				
	07FR15U			0.15	5141957	●			5601232	●						
	11FR05U1	9.525	3.97	0.05	5141916	●			5601224	●	5290135	●				
	11FR15U1			0.15	5141924	●			5528385	●						
Without chipbreaker	TFD07FR05H	6.35	2.38	0.05											5556295	●
	11FR05H	9.525	3.97	0.05											5556303	●

※Set the toolholder SDJC type (cutting argle 93 degree) when use TFD type insert.

NEW

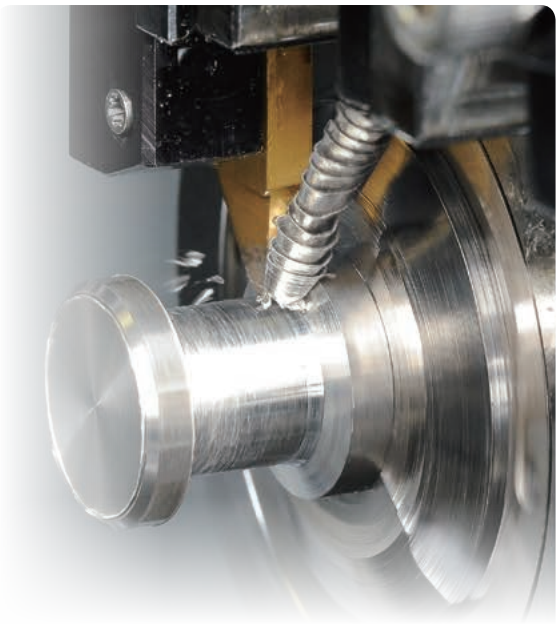
New 3D chipbreaker for back turning

TBP/TBPA-BM type

WATCH ON YouTube

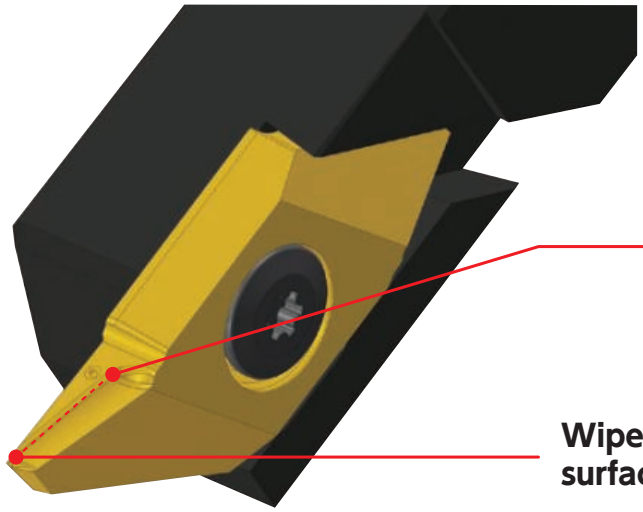
Features

- *"Single pass back turning" offers excellent surface finish.*
- *Up-right type insert and screw clamping offer high rigidity*
- *Wiper flat on cutting edge offers stable surface finish even under high feed cutting condition.*



New BM chipbreaker

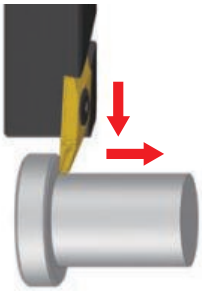
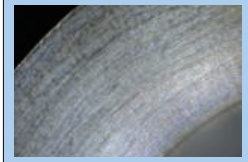
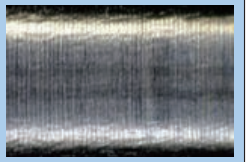
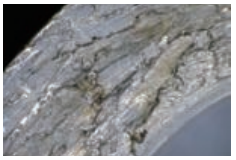
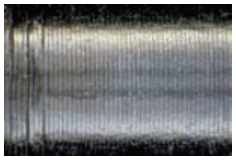
PAT.P



Prevent the rough end face from hitting the chip

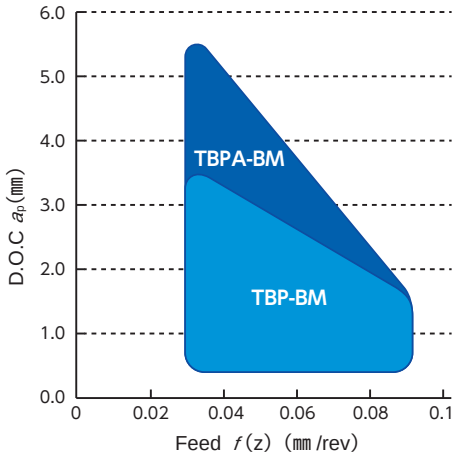
Wiper flat on cutting edge offers excellent surface finish

Case study

1Pass	TBP BM chipbreaker		Competitor	
	End face	Diameter	End face	Diameter
				
	Excellent surface	Ra : 0.72 μm Rz : 4.46 μm	Rough surface	Ra : 1.65 μm Rz : 6.01 μm

Cutting condition : v_c=80m/min f (x)=0.02mm /rev f (z)=0.08mm /rev a_p=3.0mm WET
Work material : SUS304 ϕ16 Holder : TBPR12 Insert : TM4 TBP72FR10M-BM

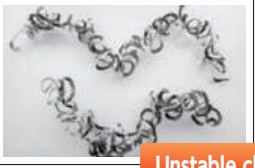
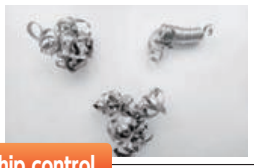
Applicable chipbreaker range



Recommended cutting conditions

D.O.C	a_p=0.5 ~ 3.0mm (TBP) 0.5 ~ 5.0mm (TBPA)
Feed	f (z)=0.05 ~ mm/rev
Feed	f (x)=about 0.02mm/rev
Cutting speed	alomost same speed with front turning

Chip control performance

D.O.C a_p (mm) \ Feed f (z) [mm/rev]	BM chipbreaker 0.05	BM chipbreaker 0.08	Competitor 0.05	Competitor 0.08
0.5				
3.0				

Good chip control

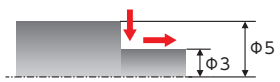
Unstable chip control

Cutting condition : v_c=80m/min WET
Work material : SUS304 ϕ16 Holder : TBPR12 Insert : TM4 TBP72FR10M-BM

Application example

Parts : Shaft
Work material : SUS440C

	BM chipbreaker	Competitor
Cutting speed (m/min)	65	45
Feed (mm/rev)	0.05	0.03
Depth of cut (mm)	1.0	1.0

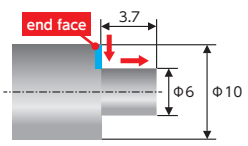


BM chipbreaker	1200pcs
Competitor	500pcs

BM chipbreaker offered about 2.4 times longer tool life compared with conpetitor tool.

Parts : Stud
Work material : SUS430F

	BM chipbreaker	Competitor
Cutting speed (m/min)	50	←
Feed (mm/rev)	0.05	←
Depth of cut (mm)	2.0	①Rough(grooving) ②Finish(back turning) end face 0.1/ dia. 0.2



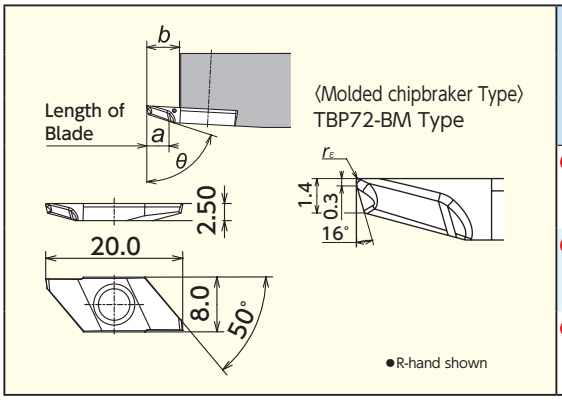
■Conventional tooling
①Rough: Grooving
②Finish: Back turning

■Tooling with BM chipbreaker
①Only 1 pass machining
※ No grooving for roughing.

Conventional back turning requried 2 passes machining (Roughing/Finishing)
NTK BM chipbreker achived reducing C/T and good chip control with only 1 pass.
It prevent rough end face from hitting chip, and got the excellent surface finish.

TBP

Applicable insert



Part number	Breaker	Length of Blade a	Max. Depth of cut b	Dimensions (mm) θ	Dimensions (mm) rε	PVD coated micrograin carbide TM4 R	TM4 Stock	DM4 R	DM4 Stock
NEW TBP72FR05-BM	Provided	3.5	5.3	72°	0.05	5868310	●	5868401	●
NEW 72FR10M-BM					0.08	5868351	●	5868419	●
NEW 72FR20M-BM					0.18	5868336	●	5868393	●

※See the page H41 as for conventinonal insert

Holder

TBP

Back clamp/ screw clamp

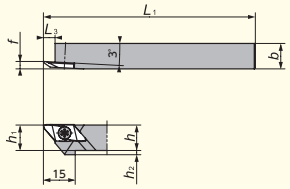


Figure.1 ●R-hand shown

Y-TBP

●R-hand shown
☆Select right-hand insert for right-hand holder

Back clamp/ screw clamp

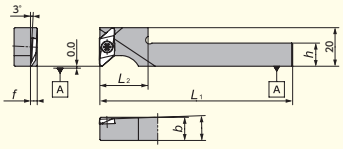


Figure.2

DS-TBP

●L-hand shown
☆Select right-hand insert for left-hand holder

DS holder

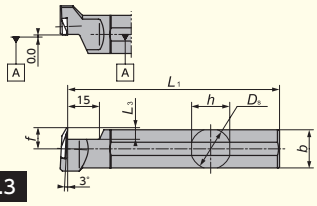


Figure.3

TBP-OH

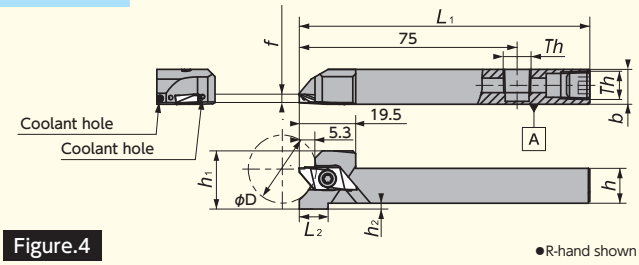


Figure.4 ●R-hand shown

Y-TBP-OH

●R-hand shown
☆Select right-hand insert for right-hand holder

Back clamp/ screw clamp

Y axis holder for high pressure coolant

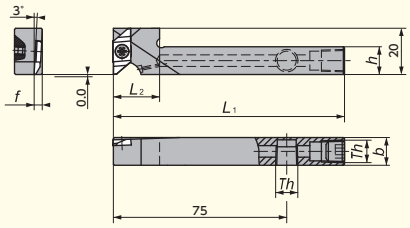
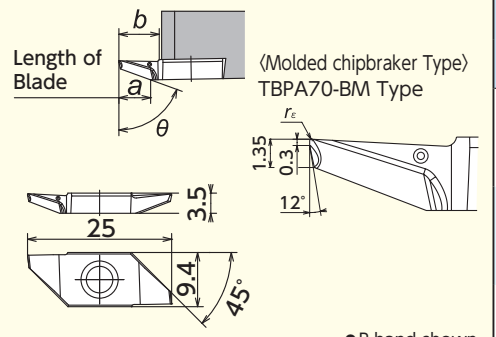


Figure.5

Fig.	Code No. R	Code No. L	Toolholder	Stock R	Stock L	Max. bore Dia. (mm) ϕD	Ds	h	b	L1	h1	h2	f	L2	L3	Applicable insert	Parts: Screw	Parts: Wrench
Figure.1	5133285	5133293	TBP R/L 08	●	●	—	—	8	10	120	8	4	3.5	—	5.5	TBP	LRIS-4*10PW (A)	CLR-15S (A)
NEW	5090436	5090444	10	●	●			10			10	2						
NEW	5873856		10H	★				10	10	100	10	2						
	5459771		12GX	●				12	12	85	12	0					LRIS-4*12PW (A)	
	5090451	5090469	12	●	●					120								
	5090477	5090485	13	●	●			13	13		13							
	5459789		16H	●				16	16	100	16							
	5270822	5270830	16	●	●					120								
Figure.2	5371554		Y-TBP R/L 10S	●		—	—	10	10	120	—	—	3.5	20	—	TBP	LRIS-4*10PW(A)	CLR-15S (A)
	5371588		12S	●				12	12								LRIS-4*12PW(A)	
	5358486		10	■				10	10					25			LRIS-4*10PW(A)	
	5371570		10L	■				10	10								LRIS-4*10PW(A)	
	5371596		12L	■				12	12					30			LRIS-4*12PW(A)	
Figure.3		5540414	DS-TBP R/L 19		●	—	19.050	18	18	120	—	—	11.0	—	5.5	TBP	LRIS-4*10 (B)	LLR-25S -20*65 (B)
		5540422	20		●	—	20.000	19	19									
		5540430	25		●	—	25.400	24	24	150			13.0					
Figure.4	5925722		TBP R/L 1012H-OH	●		25	—	10	12	100	10	4	3.5	19	75	TBP	LRIS-4*10PW(A)	CLR-15S (A)
NEW	5925730		12H-OH	●		25		12	12		12	2		10			LRIS-4*12PW (A)	
NEW	5925748		16H-OH	●		35		16	16		16	0		0				
Figure.5	5699996		Y-TBP R/L 12HS-OH	●		—	—	12	12	100	—	—	3.5	20	75	TBP	LRIS-4*12PW (A)	CLR-15S (A)
	5700000		16H-OH	●				16	16					25				

TBPA

Applicable insert



Part number	Breaker	Length of Blade a	Max. Depth of cut b	Dimensions (mm) θ	Dimensions (mm) rε	PVD coated micrograin carbide TM4 R	TM4 Stock	DM4 R	DM4 Stock
NEW TBPA70FR05-BM	Provided	5.5	6.5	70°	0.05	5892583	●	5892591	●
NEW 70FR10M-BM					0.08	5892567	●	5892575	●
NEW 70FR20M-BM					0.18	5892542	●	5892559	●

※See the page H43 as for conventinonal insert

Holder

CTPA

Back clamp/
screw clamp
(back turning/
cut-off toolholders)

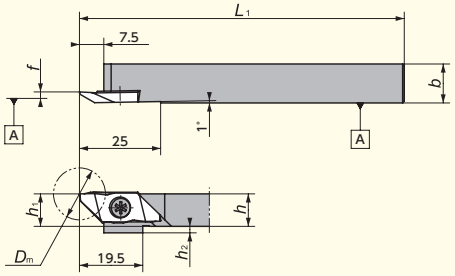


Figure.1 ●R-hand shown

CH-TBPA

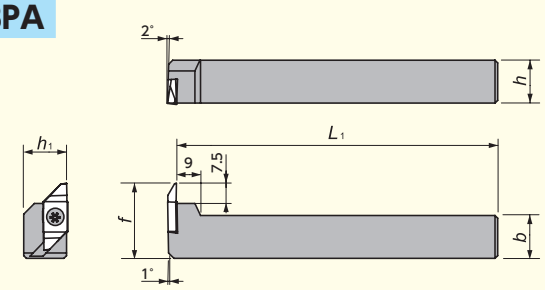


Figure.2 ●L-hand shown

Fig.	Code No. R	Code No. L	Toolholder	Stock R	Stock L	Dimensions (mm) h	b	L1	h1	f	h2	Dm	Applicable insert	Parts: Screw	Parts: Wrench
Figure.1	5199187	5199153	CTPA R/L 10	●	●	10	10	120	10	3.4	2	16	TBPA (Back Turning) CTPA (Cut-off)	LRIS-4*10PW(A)	CLR-15S(A)
	5199195	5199161	12	●	●	12	12		12		0			LRIS-4*12PW(A)	
	5199203	5199179	16	●	●	16	16		16						
	5459540	5459557	20F	●	●	20	20	80	20					LRIS-4*10(B)	LLR-25S(B)
Figure.2		5884945	CH-TBPA R/L 16		●	16	16	120	16	28	—	—	TBPA (Back Turning)	LRIS-4*10(B)	LLR-25S(B)
		5884952	20		●	20	20		20	32					

NEW

Internal coolant type tool holders

SPLASH SERIES

Internal Coolant Holders For Major applications

- Front turning (CC/DC style)
- Back turning (TBP style) NEW
- Grooving (GTM○32 style)
- Cut off (CTP style) NEW
- ID boring (STICK DUO style)

Features

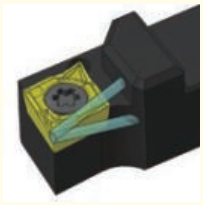
Cooling the edge of insert!

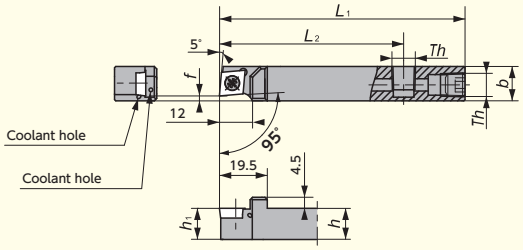
Smooth chip evacuation !
Reduce the chip control problem!

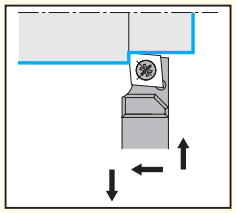
Stock list

For Front turning

SCLC-N-OH







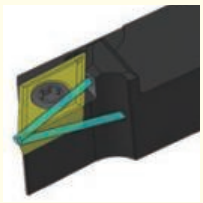
●R-hand shown

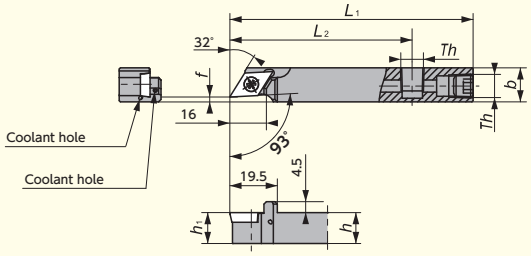
■Holder dimension・Spare parts

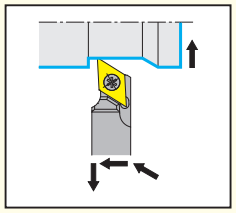
Code No.	Toolholder	Stock	Dimensions (mm)							Applicable insert	Spare parts		
			h	b	L_1	h_1	f	L_2	Th		Clamp screw	Wrench	Screw parts※1
5905740	**SCLCR1014F09N-F02OH**	●	10	14	80	10	2.0	55	M6×1	CC 09T3	LRIS-4＊10	LLR-25S	SS0606SC
5905732	**1214H09N-F02OH**	●	12		100	12		75	Rc1/8 (PT1/8)				SPR1/8
5905658	**1616H09N-F02OH**	●	16	16		16							

※1　Wrench for screw parts is not attached. Use commercial 3.0 hexagon wrench and 5.0 hexagon wrench to SS0606SC and SPR1/8 respectively.

SDJC-N-OH







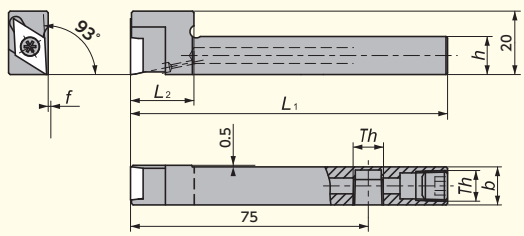
●R-hand shown

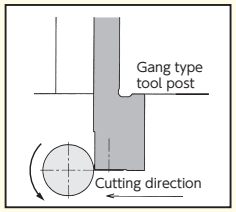
■Holder dimension・Spare parts

Code No.	Toolholder	Stock	Dimensions (mm)							Applicable insert	Spare parts		
			h	b	L_1	h_1	f	L_2	Th		Clamp screw	Wrench	Screw parts※1
5903208	**SDJCR1014F11N-F02OH**	●	10	14	80	10	2	55	M6×1	DC 11T3	LRIS-4＊10	LLR-25S	SS0606SC
5886254	**1214H11N-F02OH**	●	12		100	12		75	Rc1/8 (PT1/8)				SPR1/8
5903216	**1616H11N-F02OH**	●	16	16		16							

※1　Wrench for screw parts is not attached. Use commercial 3.0 hexagon wrench and 5.0 hexagon wrench to SS0606SC and SPR1/8 respectively.

Y-SDJC-OH





●R-hand shown
●Takes Right-hand or Neutral insert

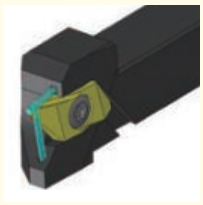
■Holder dimension・Spare parts

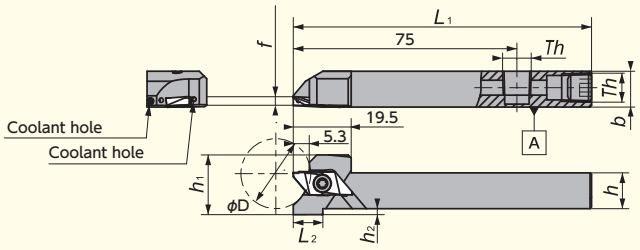
Code No.	Toolholder	Stock	Dimensions (mm)							Applicable insert	Spare parts		
			h	b	L_1	h_1	f	L_2	Th		Clamp screw	Wrench	Screw parts※1
5910575	**Y-SDJCR1212H11S-OH**	●	12	12	100	–	0	20	Rc1/8 (PT1/8)	DC 11T3	LRIS-4＊10	LLR-25S-20＊65	SPR1/8
5910583	**1616H11-OH**	●	16	16				25					

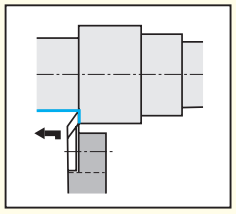
※1　Wrench for screw parts is not attached. Use commercial 5.0 hexagon wrench

For Back turning

TBP-OH







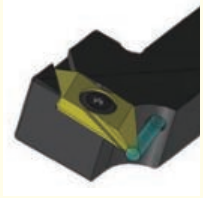
●R-hand shown

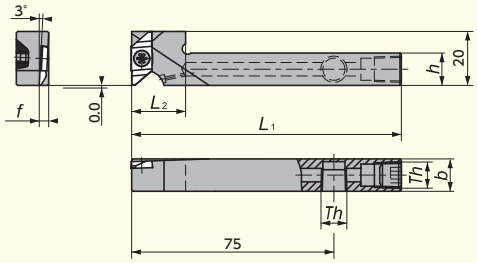
■Holder dimension・Spare parts

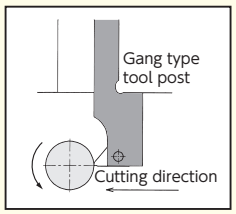
Code No.	Toolholder	Stock	Max. bore Dia. (mm) ϕD	Dimensions (mm) h	b	L_1	h_1	f	L_2	h_2	Th	Applicable insert	Spare parts: Clamp screw	Wrench	Screw parts※1
5925722	**TBPR1012H-OH**	●	25	10	12	100	10	3.5	19	4	M6×1	TBP	LRIS-4＊10PW	CLR-15S	SS0606SC
5925730	**12H-OH**	●	25	12			12		10	2	Rc1/8 (PT1/8)		LRIS-4＊12PW		SPR1/8
5925748	**16H-OH**	●	35	16	16		16		0	0					

※1　Wrench for screw parts is not attached. Use commercial 3.0 hexagon wrench and 5.0 hexagon wrench to SS0606SC and SPR1/8 respectively.

Y-TBP-OH







●R-hand shown
●Takes Right-hand Insert

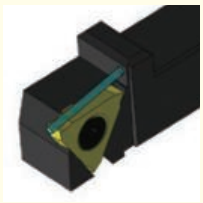
■Holder dimension・Spare parts

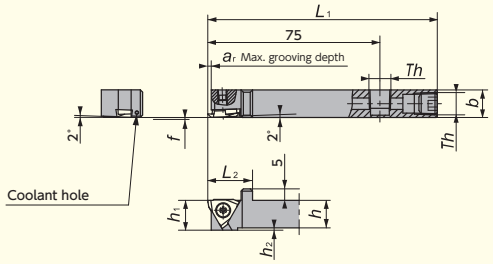
Code No.	Toolholder	Stock	Dimensions (mm) h	b	L_1	h_1	f	L_2	h_2	Th	Applicable insert	Spare parts: Clamp screw	Wrench	Screw parts※1
5911508	**Y-TBPR12HS-OH**	●	12	12	100	–	3.5	20	–	Rc1/8 (PT1/8)	TBP	LRIS-4＊12PW	CLR-15S	SPR1/8
5911516	**16H-OH**	●	16	16				25						

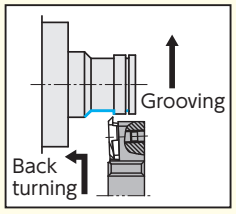
※1　Wrench for screw parts is not attached. Use commercial 5.0 hexagon wrench

For Grooving

GTT-OH







●R-hand shown

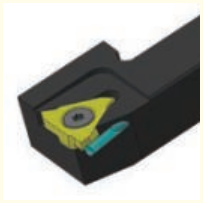
■Holder dimension・Spare parts

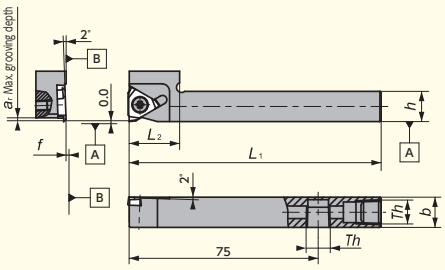
Code No.	Toolholder	Stock	Dimensions (mm) h	b	L_1	h_1	f	L_2	a_r	h_2	Th	Applicable insert	Spare parts: Clamp screw	Wrench	Screw parts※1
5921705	**GTTR1012H00-OH**	●	10	12	100	10	0	19.5	1.6	1	M6×1	GTM□32	LR-S-4＊10PW	CLR-15S	SS0606SC
5890157	**12H00-OH**	●	12			12					Rc1/8 (PT1/8)				SPR1/8
5921713	**16H00-OH**	●	16	16		16				0					

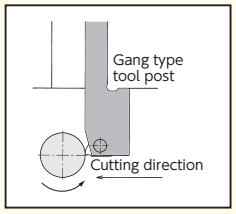
※1　Wrench for screw parts is not attached. Use commercial 3.0 hexagon wrench and 5.0 hexagon wrench to SS0606SC and SPR1/8 respectively.

For Grooving

Y-GTT-OH







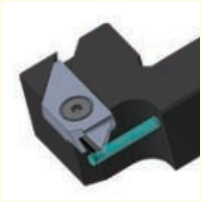
●R-hand shown
●Takes Right-hand Insert

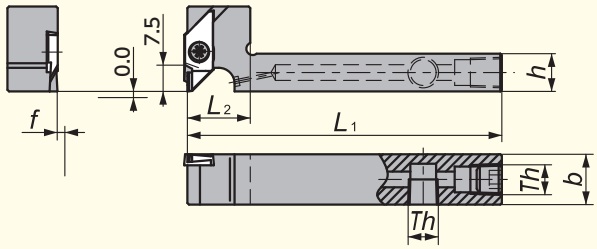
■Holder dimension・Spare parts

Code No.	Toolholder	Stock	Dimensions (mm)									Applicable insert	Spare parts		
			h	b	L_1	h_1	f	L_2	a_r	h_2	Th		Clamp screw	Wrench	Screw parts※1
5911466	**Y-GTTR12H00S-OH**	●	12	12	100	–	0	20	1.6	–	Rc1/8 (PT1/8)	GTM□32	LR-S-4＊10PW	CLR-15S	SPR1/8
5911474	**16H00-OH**	●	16	16				25							

※1 Wrench for screw parts is not attached. Use commercial 5.0 hexagon wrench

Y-GTPA-OH





●R-hand shown

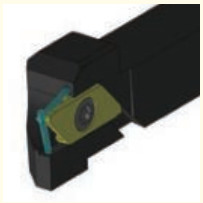
■Holder dimension・Spare parts

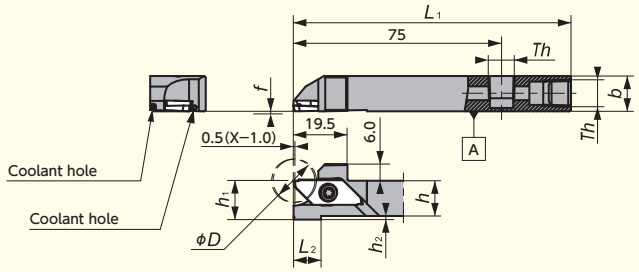
Code No.	Toolholder	Stock	Dimensions (mm)							Applicable insert	Spare parts		
			h	b	L_1	h_1	f	L_2	Th		Clamp screw	Wrench	Screw parts※1
5911482	**Y-GTPAR1216HS-OH**	●	12	16	70	–	0.1	20	Rc1/8 (PT1/8)	GTPA	LRIS-4＊12PW	CLR-15S	SPR1/8
5911490	**1216H-OH**	●	16					25					

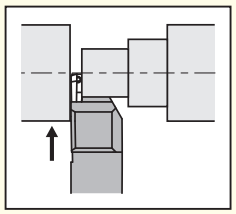
※1 Wrench for screw parts is not attached. Use commercial 5.0 hexagon wrench

For Cut off

CTP-OH







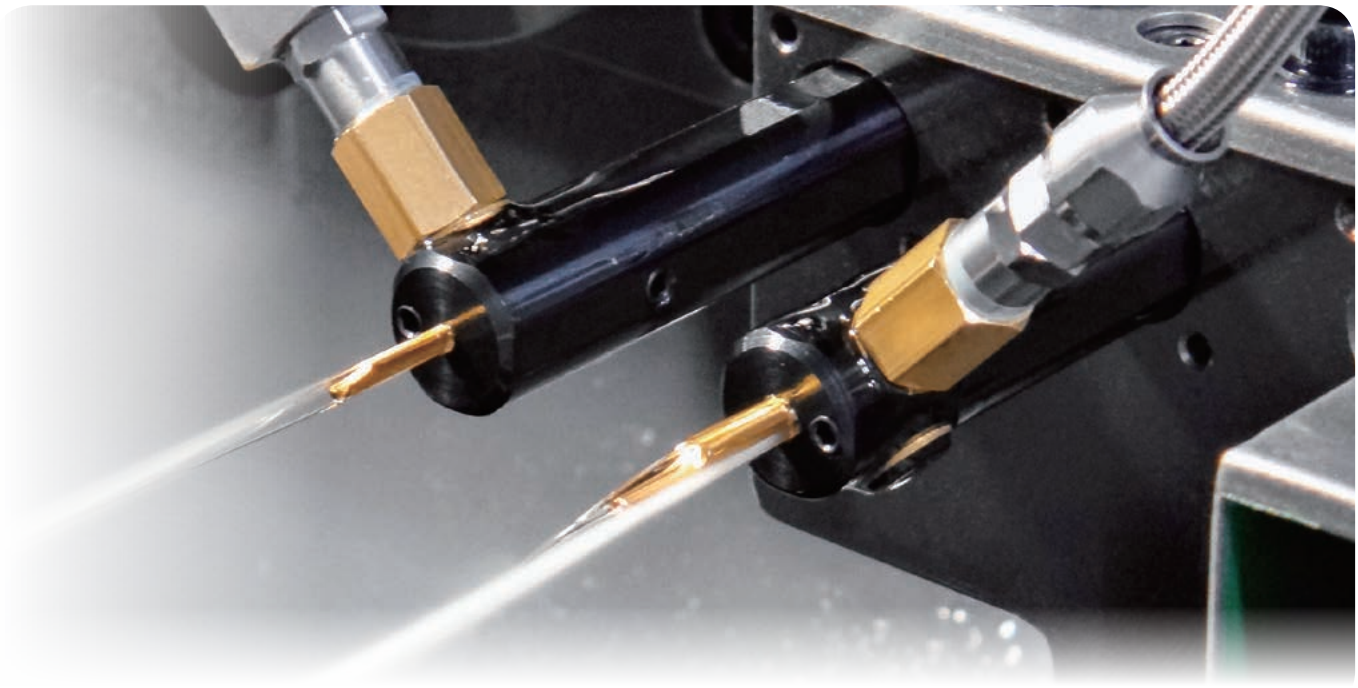
●R-hand shown

■Holder dimension・Spare parts

Code No.		Toolholder	Stock		Max. Cut-off Dia. φD	Dimensions (mm)								Applicable insert	Spare parts		
R	L		R	L		h	b	L_1	h_1	h_2	L_2	f	Th		Clamp screw	Wrench	Screw parts※1
5921853	5921861	CTP□1012H-OH	●	●	12	10	12	100	10	4	19	0.0	M6×1	CTP	LRIS-4＊12PW	CLR-15S	SS0606SC
5918651	5918040	**12H-OH**	●	●		12			12	2	10		Rc1/8 (PT1/8)				SPR1/8
5921879	5921887	**16H-OH**	●	●		16	16		16	0	–						

※1 Wrench for screw parts is not attached. Use commercial 3.0 hexagon wrench and 5.0 hexagon wrench to SS0606SC and SPR1/8 respectively.

Boring bar "STICK DUO SPLASH"

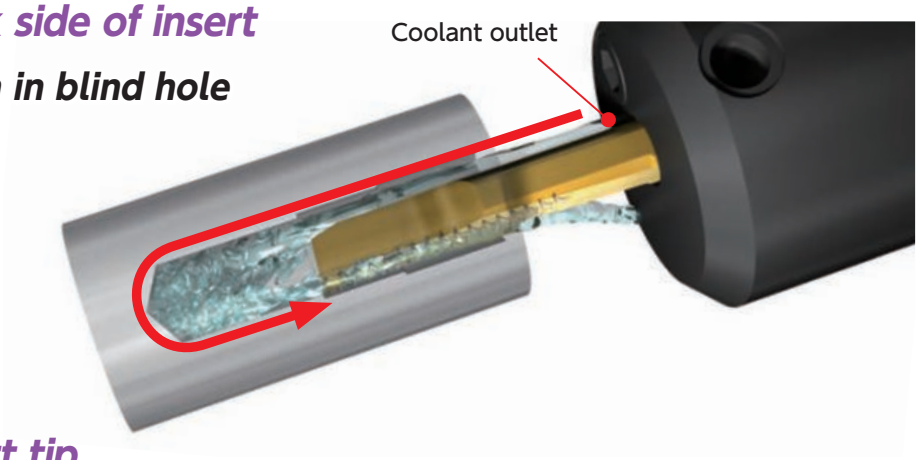


Features

You can select 2 types of coolant outlet

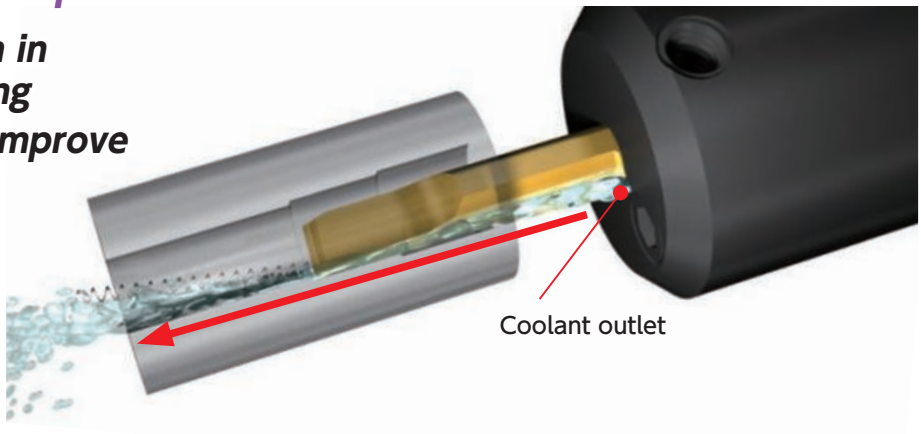
Internal coolant to back side of insert

- *Good chip evacuation in blind hole machining*



Internal coolant to insert tip

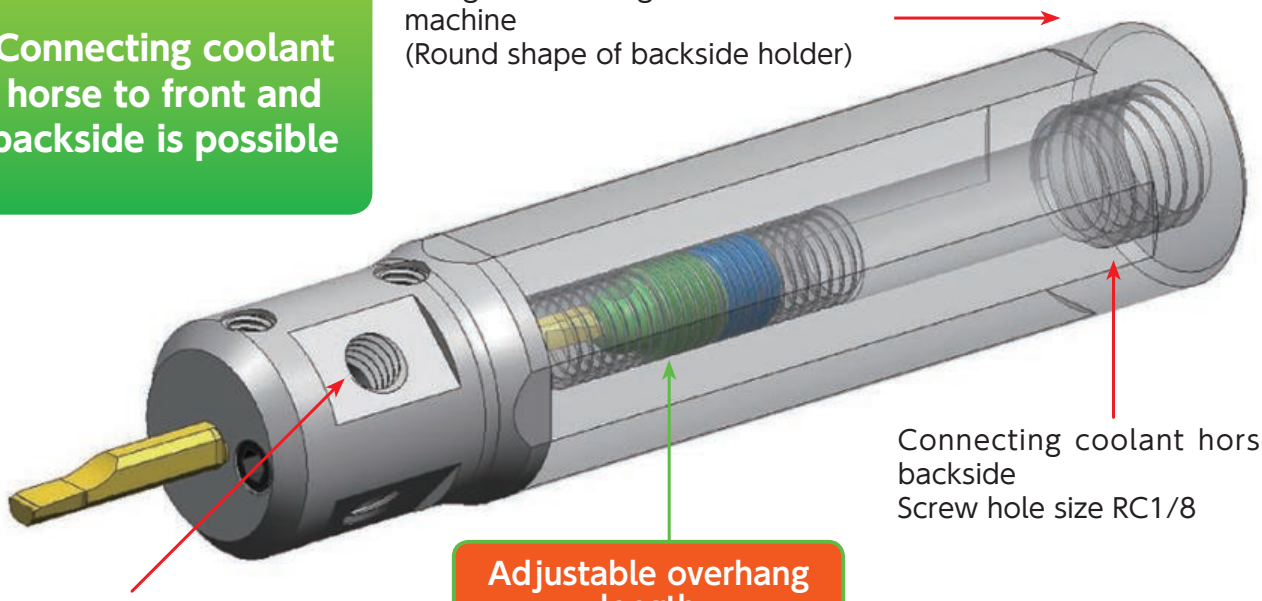
- *Good chip evacuation in through-hole machining*
- *Coolant to insert tip improve the wear resistance*



Structure

Connecting coolant horse to front and backside is possible

Designed for using with coolant fed machine
(Round shape of backside holder)

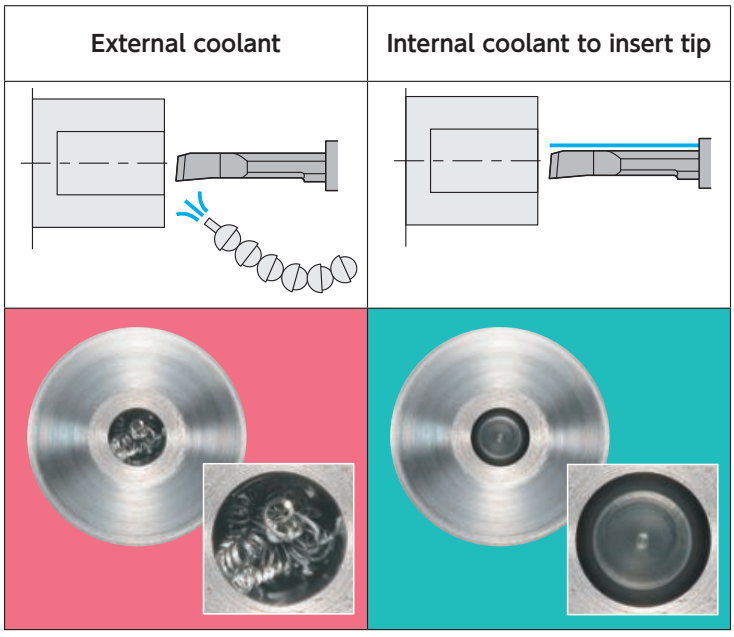


Connecting coolant horse to backside
Screw hole size RC1/8

Adjustable overhang length

Connecting coolant horse for front side M6×1.0screw hole
(Adjusting screw hole size is possible with adapter)

Machined work piece comparison

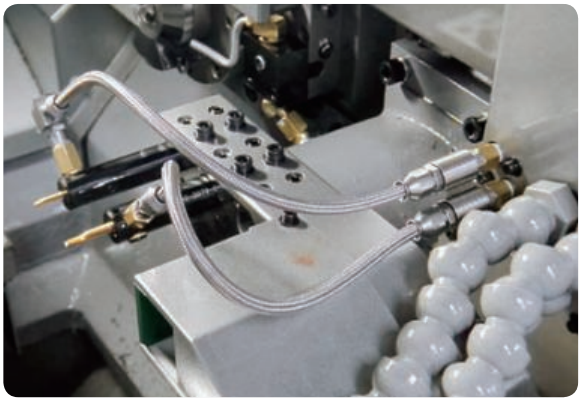


Chip clogging　　No chip clogging

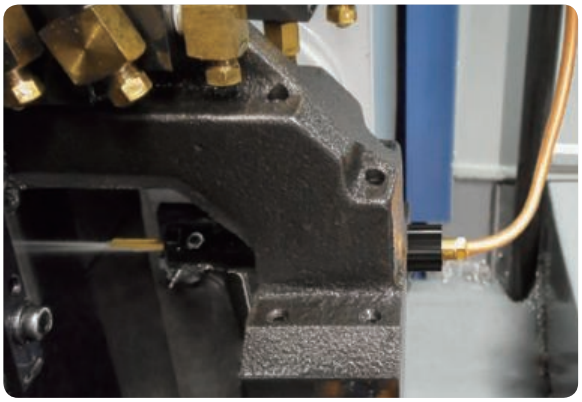
Work material ：SCM435
Insert ：SHFS040R005S
Cutting speed ：v_c=50m/min
D.O.C. ：a_p=0.2
Feed ：f=0.02mm/rev
Hole depth ：15mm
Pilot hole ：ϕ5.1×28L
Coolant pressure ：5MPa

Picture for jointing coolant horse

Frontside jointed



Backside jointed



STICK DUO sleeve (HY-NBH-OH type)

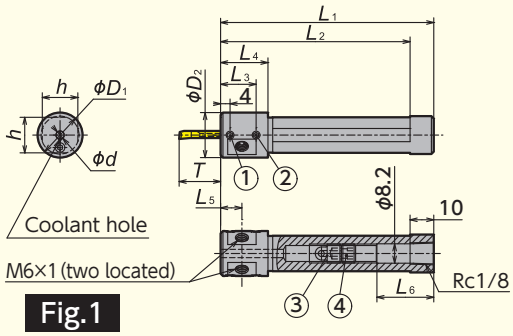


Fig.1

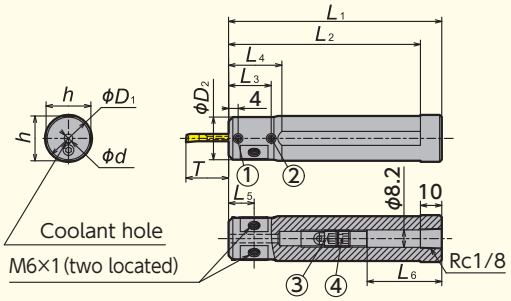
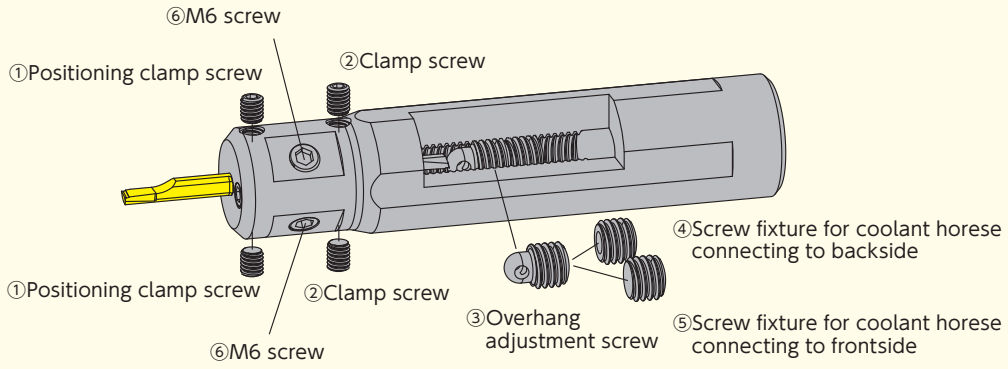


Fig.2

Shape	Code No.	Stock	Holder number	Dimensions (mm)										Overhang length of bar T (mm)	
				I.D. φ d	φ D1	φ D2	h	L1	L2	L3	L4	L5	L6	Min.	Max.
Fig.1	5893011	●	HY-NBH02016G-OH	2	16	19	15	90	80	15	19	9.5	29	5	18
	5893029	●	02516G-OH	2.5									30	6.3	19.5
	5893037	●	03016G-OH	3									31	7.5	21
	5893045	●	03516G-OH	3.5									23	8.8	24.5
	5893052	●	04016G-OH	4						20	24	12	24	10	28
	5893060	●	05016G-OH	5									16	12.5	35
	5893078	●	HY-NBH02019J-OH	2	19.05	19.05	18	110	100	15	—	9.5	49	5	18
	5893086	●	02519J-OH	2.5									50	6.3	19.5
	5893094	●	03019J-OH	3									51	7.5	21
	5893102	●	03519J-OH	3.5									43	8.8	24.5
	5893136	●	04019J-OH	4						20		12	44	10	28
	5893144	●	05019J-OH	5									36	12.5	35
	5893151	●	HY-NBH02020J-OH	2	20	20	19	110	100	15	—	9.5	49	5	18
	5893169	●	02520J-OH	2.5									50	6.3	19.5
	5893177	●	03020J-OH	3									51	7.5	21
	5893185	●	03520J-OH	3.5									43	8.8	24.5
	5893193	●	04020J-OH	4						20		12	44	10	28
	5893201	●	05020J-OH	5									36	12.5	35
Fig.2	5893219	●	HY-NBH02022X-OH	2	22	20	21	120	110	15	25	9.5	59	5	18
	5893227	●	02522X-OH	2.5									60	6.3	19.5
	5893235	●	03022X-OH	3									61	7.5	21
	5893243	●	03522X-OH	3.5									53	8.8	24.5
	5893250	●	04022X-OH	4						20		12	54	10	28
	5893268	●	05022X-OH	5									46	12.5	35
	5893276	●	HY-NBH02025.0K-OH	2	25.0	20	24	125	115	15	25	9.5	64	5	18
	5893284	●	02525.0K-OH	2.5									65	6.3	19.5
	5893292	●	03025.0K-OH	3									66	7.5	21
	5893300	●	03525.0K-OH	3.5									58	8.8	24.5
	5893318	●	04025.0K-OH	4						20		12	59	10	28
	5893326	●	05025.0K-OH	5									51	12.5	35
	5893334	●	HY-NBH02025.4K-OH	2	25.4	20	24	125	115	15	25	9.5	64	5	18
	5893367	●	02525.4K-OH	2.5									65	6.3	19.5
	5893375	●	03025.4K-OH	3									66	7.5	21
	5893383	●	03525.4K-OH	3.5									58	8.8	24.5
	5893391	●	04025.4K-OH	4						20		12	59	10	28
	5893409	●	05025.4K-OH	5									51	12.5	35

Dimension "T" show overhang length of STICKDUO(hyper) bar when attached to sleeve with adjustment screw ③,④.

■Parts



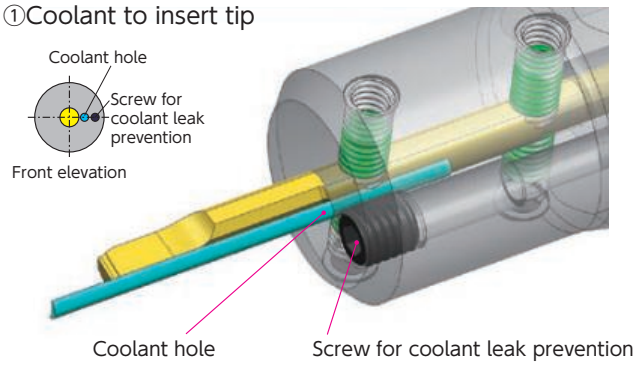
Holder number	Clamp screw		Overhang adjustment			M6 screw	Wrench		
	①	②	③	④※1	⑤※2	⑥	①、②	③、④、⑤	⑥
HY-NBH 020○○-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH (Through hole)	SS0806F	SS0605SC	LW-2	LW-4*104	LW-3
025○○-OH									
030○○-OH									
035○○-OH									
040○○-OH									
050○○-OH									

※1 Select screw ④ to connect coolant hores to backside
※2 Select screw ⑤ to connect coolant hores to frontside

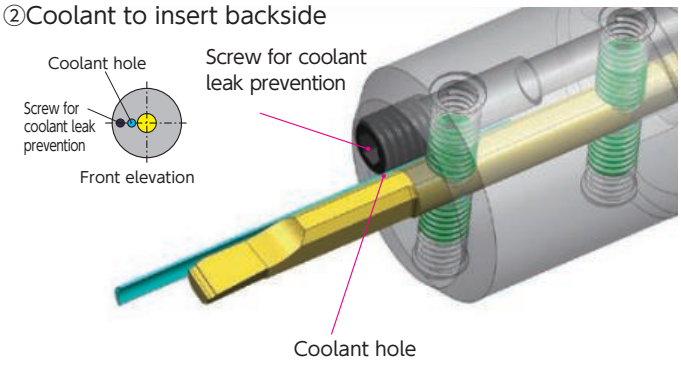
■How to set bar in the sleeve when intrenal coolant to insert tip or to insert backside

By rotating sleeve up side down, you can select the coolant output position
Coolant hole located in screw side for coolant leak prevention. See the following about the details.

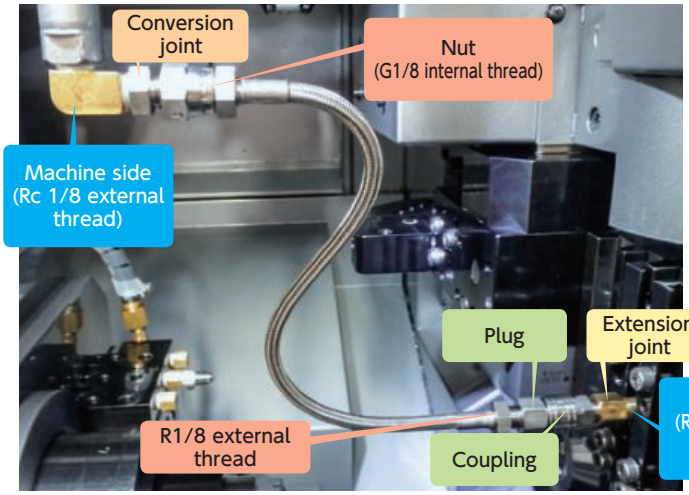
①Coolant to insert tip



②Coolant to insert backside



Coolant hose for connecting with R1/8



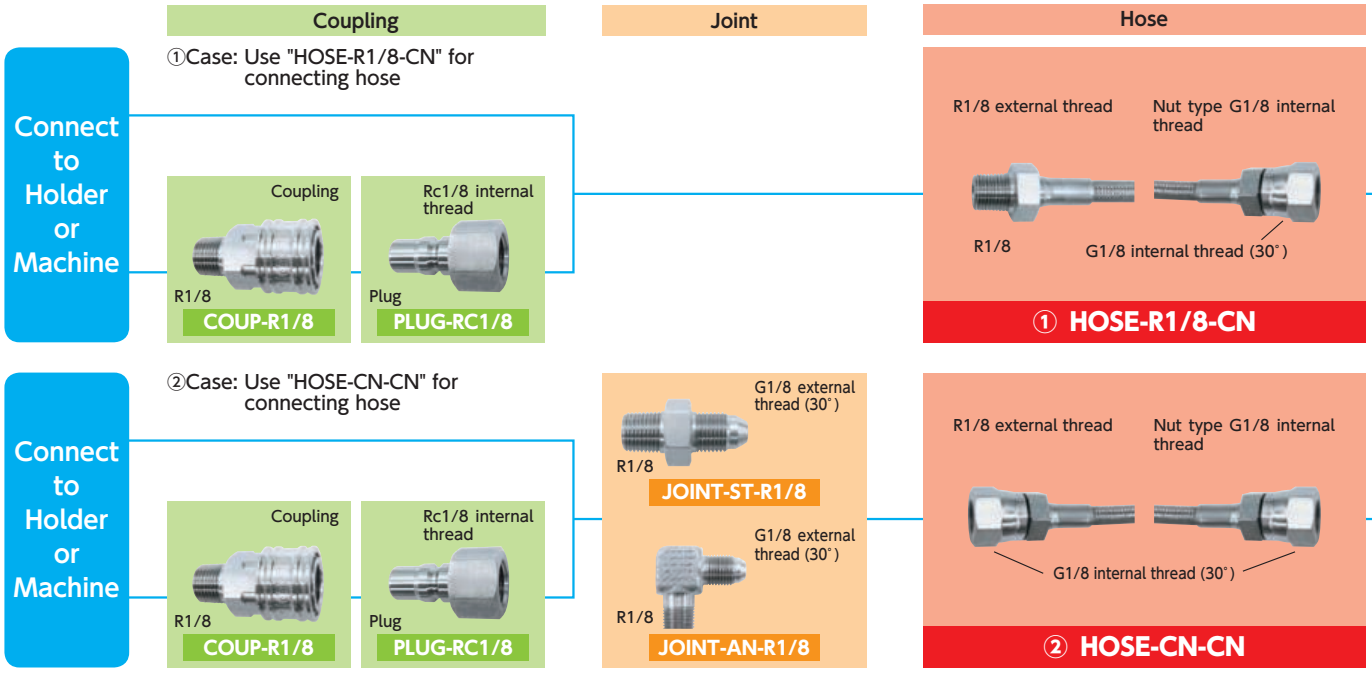
Ex. of connecting ①

- ***Line up wide range of coolant hose length***
- ***Available for 2 types of coupling and conversion joint***
- ***Working pressure MAX. 20.6 MPa***
- ***High quality flexible stainless steel braided hose***

Ex. of connecting ①

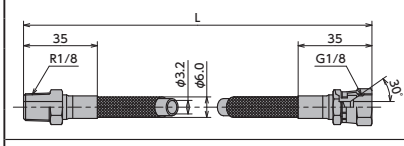
Parts	P/N
Conversion joint	JOINT-ST-R1/8
Hose	HOSE-R1/8-CN-400
Plug	PLUG-RC1/8
Coupling	COUP-R1/8
Extension joint	SCJ-R1/8-RC1/8-L

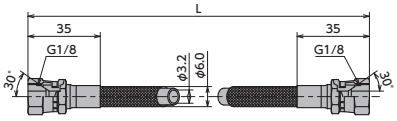
Chart for connecting coolant components



Hose

Shape	Code No.	P/N	Dimensions (mm) L	Working pressure MAX. (MPa)	Working pressure MIN. (mm)
① R1/8 External thread + nut: G1/8 intrenal thread	5923255	HOSE-R1/8-CN-200	200	20.6	50
	5923263	HOSE-R1/8-CN-250	250		
	5923297	HOSE-R1/8-CN-300	300		
	5923305	HOSE-R1/8-CN-400	400		
	5923313	HOSE-R1/8-CN-500	500		
	5923321	HOSE-R1/8-CN-800	800		
② Both side: nut G1/8 intrenal thread	5923339	HOSE-CN-CN-200	200		
	5923347	HOSE-CN-CN-250	250		
	5923354	HOSE-CN-CN-300	300		
	5923388	HOSE-CN-CN-400	400		
	5923396	HOSE-CN-CN-500	500		
	5923304	HOSE-CN-CN-800	800		

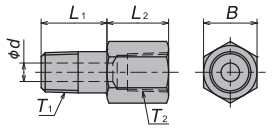




R1/8 External thread
Fix by rotating hose

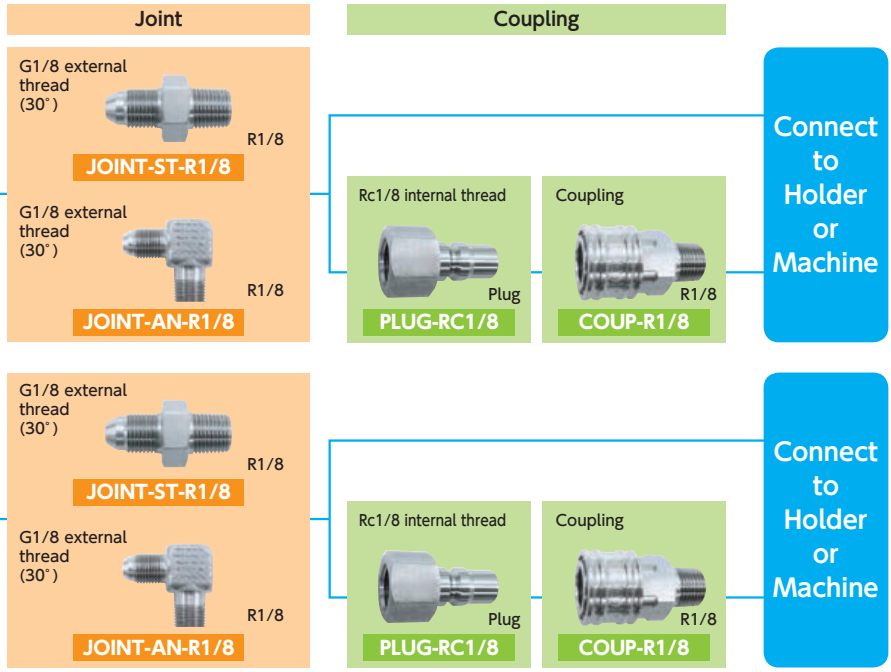
Nut G1/8 internal thread
Fix by rotating nut
(No need to rotate hose)

Conversion / Extension Joint



Code No.	Stock	Spare parts	Dimensions (mm) T_1	T_2	L_1※1	L_2	B	d
5891049	●	SCJ-R1/8-M10-L	R1/8 (PT1/8)	M10×1	16	12	13	4.5
5891056	●	1/8-RC1/8-L		Rc1/8 (PT1/8)		15		
5891064	●	1/8-NPT1/8-L		NPT1/8				
5892906	●	SCJ-M6-M10	M6×1	M10×1	6	15	12	2.5
5892914	●	SCJ-M6-RC1/8		Rc1/8 (PT1/8)			13	
5892922	●	SCJ-M6-NPT1/8		NPT1/8				
5892948	●	SCJ-R1/8-M10	R1/8 (PT1/8)	M10×1	10		12	4.5
5892963	●	SCJ-R1/8-NPT1/8		NPT1/8			13	

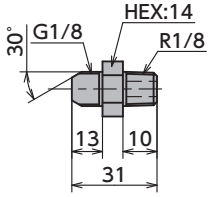
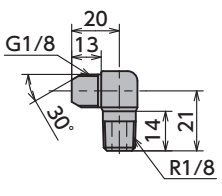
※1 To prevent hitting the coolant connecting part of holder from the gang tool post, "L1" dimension length is set longer.
NPT: ANSI/ASME B.1.20…1-1983(National Taper Pipe)



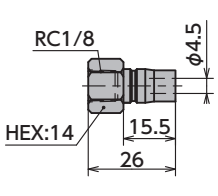
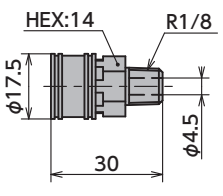
Suitable use of Coupling and Joint

- Detach Hose frequently
  ⇒ Coupling is suitable
- Less detach Hose
  ⇒ Joint is suitable

■Conversion joint (nut G1/8 internal thread)

Parts	Straight style	L style
P/N	**JOINT-ST-R1/8**	**JOINT-AN-R1/8**
Code No.	5918966	5923412
Working pressure MAX.(MPa)	20.6	20.6
Shape		

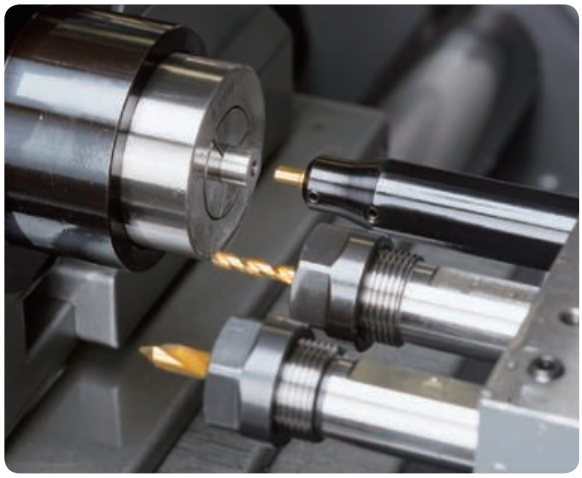
■Coupling

Parts	Plug	Coupling
P/N	**PLUG-RC1/8**	**COUP-R1/8**
Code No.	5915491	5915517
Working pressure MAX.(MPa)	7.5	7.5
Shape		

NEW

STICK DUO series SHAPER DUO

WATCH ON YouTube



New line-up for square shape hole

Hexagon Socket

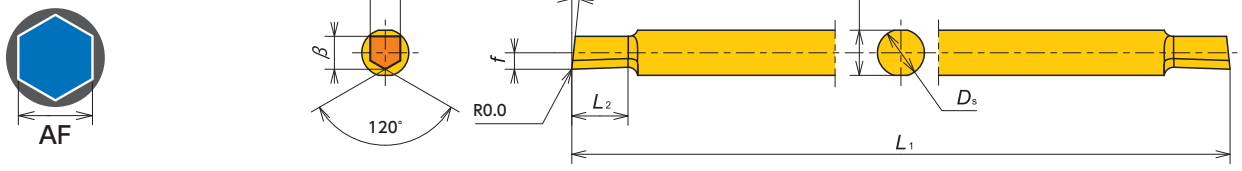
Square Socket

Features

- ***Square and hexagonal hole machining is possible with back spindle of Swiss type lathe!***
- ***Economical with 2 corners cutting edge!***
- ***Easy dimensional correction!***

Stock list

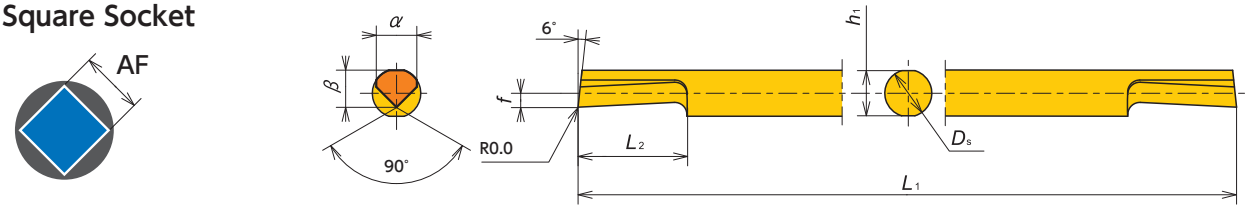
Hexagon Socket



Part number	Base AF (mm)	AF range (mm)	Dimensions (mm)							PVD coated micrograin carbide	
			D_s	L_1	L_2	h_1	α	β	f	TM4	Stock
SSP020N1130H	1.5	1.4 ~ 2.0	φ2	50	3.0	1.8	1.1	0.8	0.4	5885934	●
020N1430H	2.0	1.9 ~ 2.6	φ2				1.4	1.1	0.55	5885942	●
030N1940H	3.0	2.4 ~ 3.6	φ3		4.0	2.8	1.9	1.6	0.8	5885959	●
040N2450H	4.0	3.4 ~ 4.6	φ4	60	5.0	3.8	2.4	2.6	1.3	5885967	●
050N3260H	5.0	4.4 ~ 6.2	φ5	70	6.0	4.8	3.2	3.4	1.7	5885975	●
060N42120H	6.0	5.9 ~ 8.2	φ6	80	12.0	5.6	4.2	4.0	2.0	5873120	●
080N62160H	8.0	7.9 ~ 12.2	φ8		16.0	7.6	6.2	4.7	2.35	5885926	●

※See page L10-11 for sleeve holder.

Square Socket



Part number	Base AF (mm)	AF range (mm)	Dimensions (mm)							PVD coated micrograin carbide	
			D_s	L_1	L_2	h_1	α	β	f	TM4	Stock
SSP020N1740S	2.0	1.9 ~ 2.3	φ2.0	50	4.0	1.8	1.70	1.60	0.70	5920186	●
025N1940S	2.5	2.2 ~ 2.6	φ2.5			2.3	1.95	1.80	0.65	5920194	●
030N2260S	3.0	2.5 ~ 3.0	φ3.0		6.0	2.8	2.20	2.05		5920202	●
035N2760S	3.5	2.9 ~ 3.7	φ3.5	60		3.3	2.70	2.25	0.60	5920210	●
040N3380S	4.0	3.6 ~ 4.6	φ4.0		8.0	3.8	3.35	3.05	1.15	5920228	●
050N39100S	5.0	4.5 ~ 5.4	φ5.0	70	10.0	4.8	3.90	3.95	1.55	5920236	●
060N47120S	6.0	5.3 ~ 6.6	φ6.0	80	12.0	5.6	4.75	4.50	1.70	5920244	●
080N58160S	8.0	6.5 ~ 8.1	φ8.0		16.0	7.6	5.80	5.50		5920251	●

※See page L10-11 for sleeve holder.

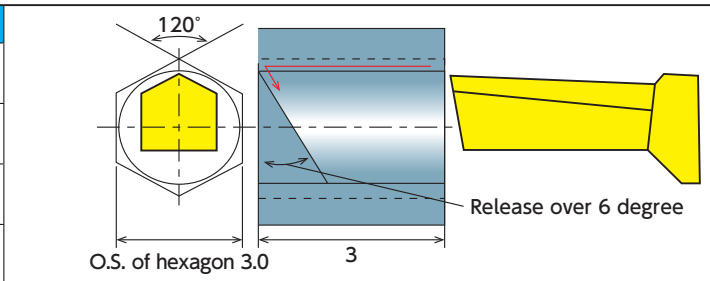
Recommended cutting condition

Feed ···F4000～F1000(㎜／min)　D.O.C.(radial depth) ···0.05～0.01㎜
Following machining process is recommended for beautiful surface finish.
1. Roughing at D.O.C.(radial depth) 0.05mm
2. Finishing at D.O.C.(radial depth) 0.01mm for 1-2 times.

Case study

Hexagonal hole machining

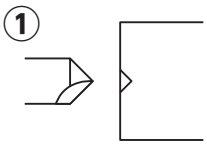
Work material	: SUS303
Feed (㎜/min)	: 2,000
Depth of cut (㎜)	: Rough 0.025 / Finish 0.005
Coolant	: WET



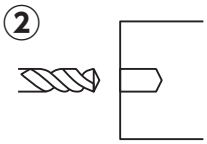
NTK：TM4 SSP030N1840H	10,000 pcs/corner
Competitor : Carbide	300 pcs/corner

・Hexagonal hole machined by competitor's is unstable shape and short tool life.
・NTK's achieved the following good result due to the superior grinding tech and "TM4"PVD coating.
①stable hexagonal shape and longer tool life ② less dimensional correct ③ good surface finish

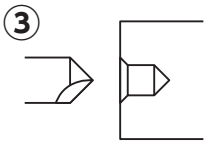
machining process



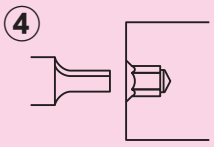
① Center drilling
・Select dia of center drilling over O.S. length



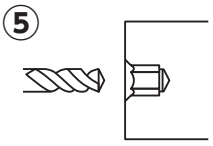
② Drilling(pilot hole)
・Select the dia of drill insert same with hexagonal O.S.
・Deeper depth of pilot hole is recommended, because burrs is accumulated when machined



③ Center drilling(chamferring)
・Use the same drill in process ①
・Machining the process ① and ③ at the same time is also possible.



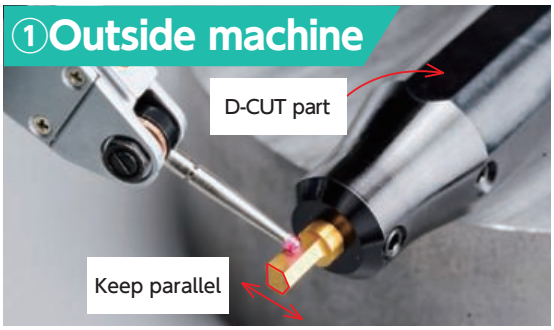
④ Shaping hexagonal hole
・Shaping hexagonal hole
・Shaping hexagonal shape 6 times with 60 degree positioned.



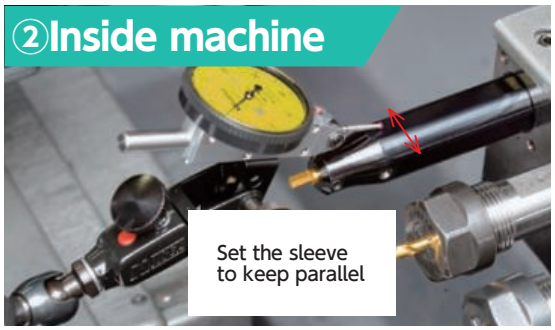
⑤ Drilling finish zero cutting
・Finishing with the same drill in the process ②
※In the zero cutting, reduce the cutting condition due to the heavy interrupted machining

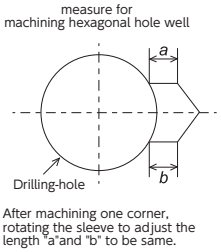
How to set insert in the sleeve

①Outside machine



②Inside machine





After machining one corner, rotating the sleeve to adjust the length "a"and "b" to be same.

SHAPER Programming example

Note : The codes and numbers may vary by machine type. Please contact the machine builder for details.
Programming code example for HEX 3.0mm. **AF : 3.0mm, Depth : 2.7mm, Pilot drill diameter : 3.0mm**

Shaper Main Program

☆ : Back spindle stop rotation
☆ : Back spindle index 0° ·····①
T○○○○ (Shaper)
G50 U2.0 ·····②
G0 X2.9 Z-2.0 T○○ ·····③
☆ : Call sub-program (○○○①) repeat 14 times ·····④
☆ : Call sub-program (○○○②) ·····⑤

☆Back spindle index 60° ·····①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ·····④
☆ : Call sub-program (○○○②) ·····⑤

☆ : Back spindle index 120° ·····①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ·····④
☆ : Call sub-program (○○○②) ·····⑤

☆ : Back spindle index 180° ·····①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ·····④
☆ : Call sub-program (○○○②) ·····⑤

☆ : Back spindle index 240° ·····①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ·····④
☆ : Call sub-program (○○○②) ·····⑤

☆ : Back spindle index 300° ·····①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ·····④
☆ : Call sub-program (○○○②) ·····⑤

☆ : Release spindle index
G0 Z-10.0
G50 U-2.0
G0 U0 W0 T0
M1

Shaper Sub Program #1

N○○○① (Roughing)
G4 U0.02 ·····⑥
G98 G1 Z2.7 F3000 ·····⑦
G4 U0.02
U-0.2 W-0.018 ·····⑧
G4 U0.02
G0 Z-2.0
G4 U0.02
U0.25 ·····⑨
M99

Shaper Sub Program #2

N○○○② (Finishing)
G98 G1 X3.61 Z-2.0 F1000 ·····⑩
G4 U0.02
Z2.7 F3000
G4 U0.02
U-0.2 W-0.018
G4 U0.02
G0 Z-2.0
M99

☆ : Input program for your machinery

①=Index the sub-spindle 6 times in 60 degree increments.

②=Specify the coordinate system shift command (in X axis direction) for the tool. [2 x f, where f is tool dimension located in catalog].
- A positive direction shift is recommended for easier programming.

③=Execute the positioning of the tool.
- X position should be 0.1 mm less than pilot drill diameter.
- Z position should be off-set 2.0 mm from material to achieve program feed rate.

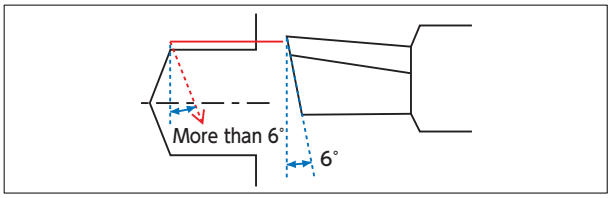
④=Go to the Sub-Program #1.
- Sequence runs 14 times. First cutting point X2.9 and final cutting point X3.6, with 0.05 DOC (for diameter) each time. (3.6 - 2.9 / 0.05 = 14 times)

⑤=Go to the Sub-Program #2, for finishing sequence.

⑥=Specify dwell time. This allows the program and machine to stay synchronized.

⑦=Cut into part 2.7mm. F3000 is recommended feed to be used for most materials; including Titanium Alloy and Stainless Steel.

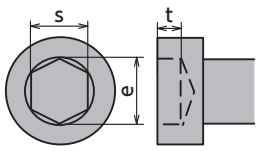
⑧=This code backs off the tool with an angle greater than 6 degrees (10 degrees used in example).



⑨=Return the X position + 0.05mm (the DOC for diameter).

⑩=Finishing operation with 0.01mm DOC (X 3.61) is recommended for better surface finish.

Reference: Hexagon Socket Specification Extract from JIS B1176



s	Name	1.5	1.5	2	2.5	3	4	5	6	8	10	12
	Max.	1.58	1.58	2.08	2.58	3.08	4.095	5.14	6.14	8.175	10.175	12.212
	Min.	1.52	1.52	2.02	2.52	3.02	4.020	5.02	6.02	8.025	10.025	12.032
e	Min.	1.733	1.733	2.303	2.873	3.443	4.583	5.723	6.863	9.149	11.429	13.716
t	Min.	0.7	1	1.1	1.3	2	2.5	3	4	5	6	7
Thread (reference)		M1.6	M2	M2.5	M3	M4	M5	M6	M8	M10	M12	M14

SHAPER Programming example by machine builders

Note : The codes and numbers may vary by machine type. Please contact the machine builder for details.
Programming code example for HEX 3.0mm. **AF : 3.0mm, Depth : 2.7mm, Pilot drill diameter : 3.0mm**

Program example for CITIZEN machine

Shaper Main Program

```
M25
M78 S0 ·····①
T○○○○(Shaper)
G50 U2.0 ·····②
G0 X2.9 Z-2.0 T○○ ·····③
M98 P2100 L14 ·····④
M98 P2200 ·····⑤

M78 S60 ·····①
G0 X2.9 Z-2.0
M98 P2100 L14
M98 P2200
                    ⌐ 《A》

  Repeat 《A》 by S120, S180, S240,
  S300 with each 60 degrees

M20
G0 Z-10.0
G50 U-2.0
G0 U0 W0 T0
M1
```

Shaper Sub Program #1

```
N2100 (Roughing)
G4 U0.02 ·····⑥
G98 G1 Z2.7 F3000 ·····⑦
G4 U0.02
U-0.2 W-0.018 ·····⑧
G4 U0.02
G0 Z-2.0
G4 U0.02
U0.25 ·····⑨
M99
```

Shaper Sub Program #2

```
N2200 (Finishing)
G98 G1 X3.61 Z-2.0 F1000 ·····⑩
G4 U0.02
Z2.7 F3000
G4 U0.02
U-0.2 W-0.018
G4 U0.02
G0 Z-2.0
M99
```

Program example for STAR machine

Shaper Main Program

```
M25
T○○○○ (Shaper)
G50 U2.0 ·····②
M8
G0 X2.9 Z-2.0 C0 T○○ ·····①③
M98 P2100 L14 ·····④
M98 P2200 ·····⑤

G0 C60.0 ·····①
G0 X2.9 Z-2.0
M98 P2100 L14
M98 P2200
                    ⌐ 《A》

  Repeat 《A》 by S120, S180, S240,
  S300 with each 60 degrees

G0 Z-2.0
G50 U-2.0
G0 T0
G28 W0
M1
```

Shaper Sub Program #1

```
O2100 (Roughing)
G4 U0.02 ·····⑥
G98 G1 Z2.7 F3000 ·····⑦
G4 U0.02
U-0.2 W-0.018 ·····⑧
G4 U0.02
G0 Z-2.0
G4 U0.02
U0.25 ·····⑨
M99
```

Shaper Sub Program #2

```
O2200 (Finishing)
G98 G1 X3.61 Z-2.0 F1000 ·····⑩
G4 U0.02
Z2.7 F3000
G4 U0.02
U-0.2 W-0.018
G4 U0.02
G0 Z-2.0
M99
```

Program example for TSUGAMI machine

Shaper Main Program

```
M105
M150
G28 H0 ·····①
M182
T○○○○(Shaper)
G50 U-2.0 ·····②
G0 X2.9 Z2.0 T○○ ·····③
M98 P2100 L14 ·····④
M98 P2200 ·····⑤
M183

G0 C60 ·····①
M182
G0 X2.9 Z2.0
M98 P2100 L14
M98 P2200
M183
                    ⌐ 《A》

  Repeat 《A》 by S120, S180, S240,
  S300 with each 60 degrees

M151
G0 Z10.0
G50 U2.0
G0 U0 W0 T0
M1
```

Shaper Sub Program #1

```
O2100 (Roughing)
G4 U0.02 ·····⑥
G98 G1 Z-2.7 F3000 ·····⑦
G4 U0.02
U-0.2 W0.018 ·····⑧
G4 U0.02
G0 Z2.0
G4 U0.02
U0.25 ·····⑨
M99
```

Shaper Sub Program #2

```
O2200 (Finishing)
G98 G1 X3.61 Z2.0 F1000 ·····⑩
G4 U0.02
Z-2.7 F3000
G4 U0.02
U-0.2 W0.018
G4 U0.02
G0 Z2.0
M99
```

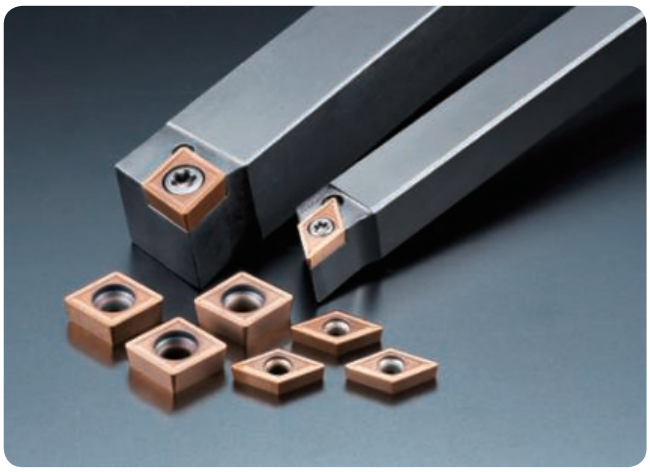
NEW DM4 grade front turning insert with AM3 chipbreaker

Sharpness as if G class !

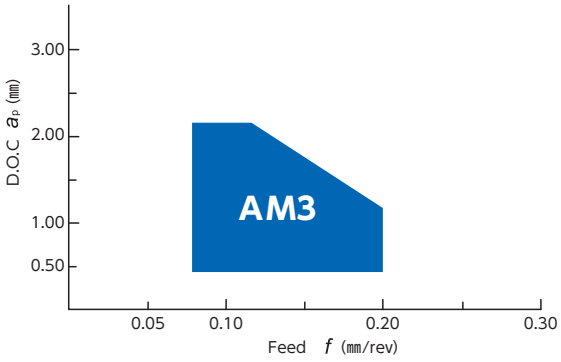
コストメリット

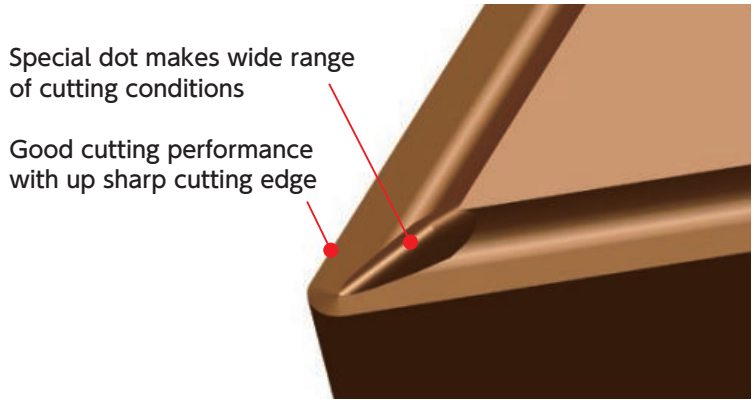
Features

- *M Tolerance but with up sharp cutting edge !*
- *Recommended for stainless steel, hard to cut work material !*
- *Ideal for high speed machining of carbon steel !*
- *Roughing for alloy steel !*



- *Thick coating with both superior oxidation and wear resistance. Excellent adhesion resistance offers stable machining.*

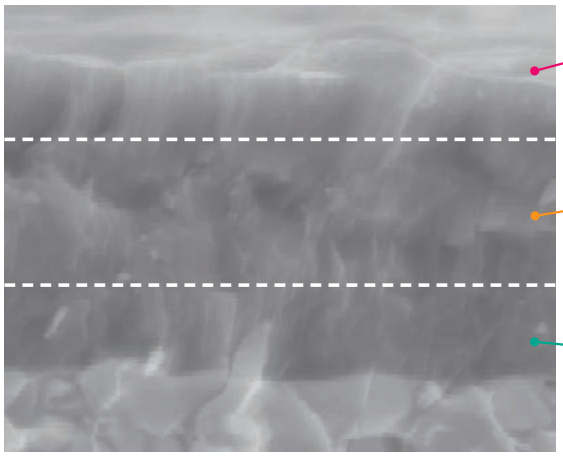




Stock list

Shape	Part number	Dimensions (mm) I.C.	Thickness	Corner radius	PVD coated micrograin carbide DM4	Stock
NEW AM3	CCMT060202FNAM3	6.35	2.38	0.2	5882220	●
	060204FNAM3			0.4	5882212	●
	CCMT09T302FNAM3	9.525	3.97	0.2	5882196	●
	09T304FNAM3			0.4	5882188	●
	09T308FNAM3			0.8	5882170	●
NEW AM3	DCMT070202FNAM3	6.35	2.38	0.2	5882162	●
	070204FNAM3			0.4	5882154	●
	DCMT11T302FNAM3	9.525	3.97	0.2	5882147	●
	11T304FNAM3			0.4	5882139	●
	11T308FNAM3			0.8	5882121	●
NEW AM3	VCMT110302FNAM3	6.35	3.18	0.2	5901038	●
	110304FNAM3			0.4	5901046	●

Structure



Adhension resistance layer

TiN Excellent adhesion resistance
Improved peeling resistance compared with other TiAlN coating

Wear resistance layer

TiCN Excellent wear resistance with NTK original coating layer

Oxidization resistance layer

TiAlN Excellent oxidation and wear resistance

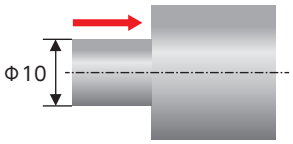
- ***Thick coating with both superior oxidation and wear resistance. Excellent adhesion resistance offers stable machining.***

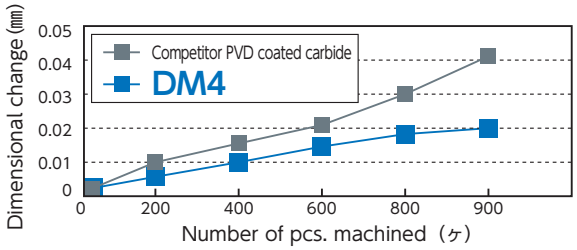
Case study

Front turning with "DM4"

Work material	: SUS440C
Cutting speed (m/min)	: 55
Feed (mm/rev)	: 0.04
Depth of cut (mm)	: 0.4

Tooling

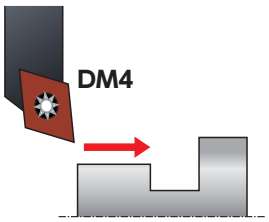




NTK DM4 improved the dimensional stability. Even after 900 pcs machinig, NTK's dimensional change was slightly 0.02mm comapared with competitor's 0.041mm.

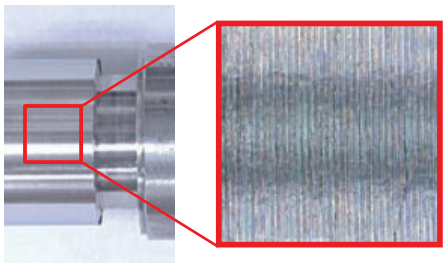
Surfacefinish and burr comparison

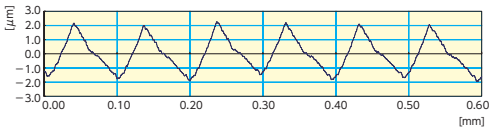
Surfacefinish comparison



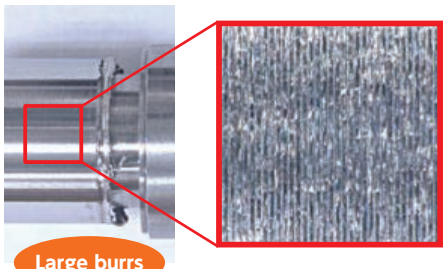
Work material	: SUS304
Insert shape	: DCMT11T04FNAM3
Cutting condition	: V_c =80m/min f =0.1mm /rev a_p =0.7mm , WET

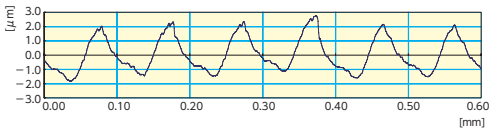
NTK M class





Competitor M class





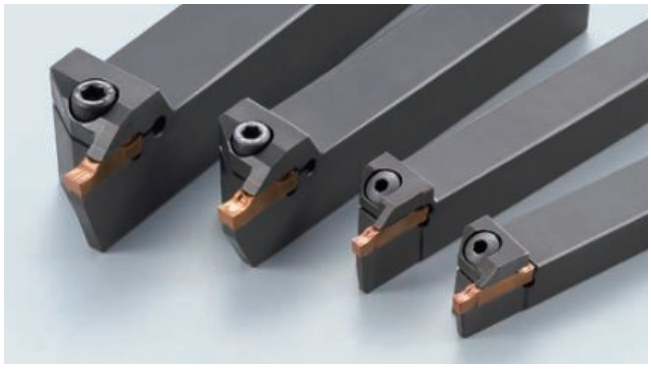
NEW

New grooving tool SCRUM DUO

WATCH ON YouTube

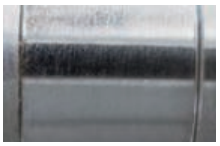
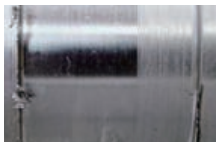
Features

"SCRUM DUO" offers excellent stable machining and longer tool life in grooving and traversing



Wide coverage from small to bigger diameter
Max grooving depth is "20mm"

Traversing

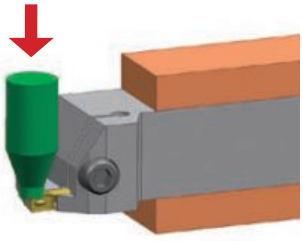
	NTK : GW chipbreaker	Competitor
Chip		
Surface finish		

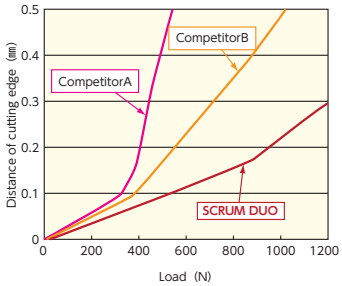
SCM415 v_c=150m/min f=0.1mm/rev a_p=1.0mm WET
Insert : DM4 GWPG500N04F-GW Holder : GTWPR2525M-5F10

Excellent chip control in traversing process
Excellent shiny surface finish

Toolholders and inserts designed to obtain higher rigidity

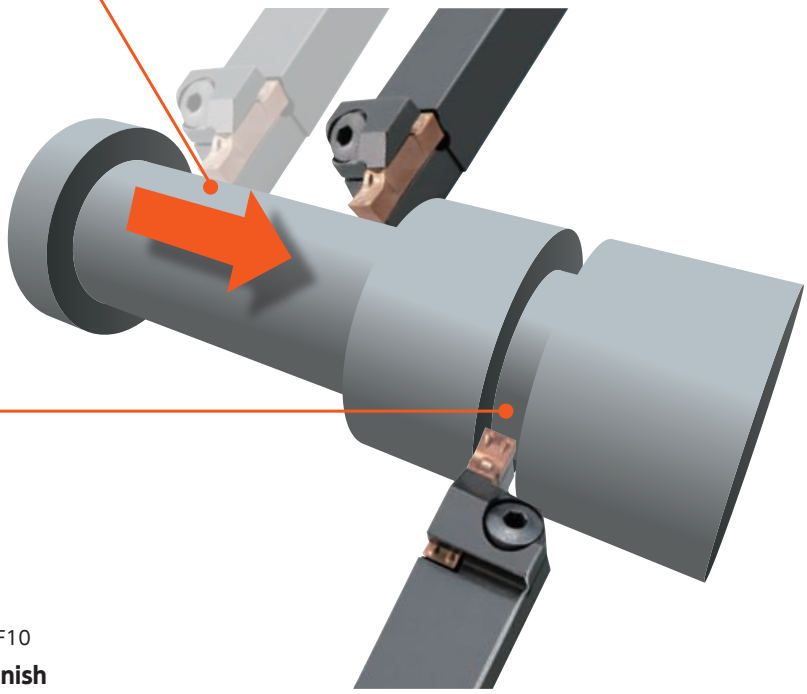
Load N



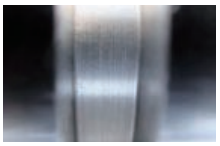
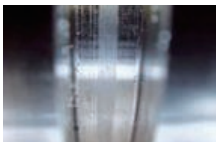


SCRUM DUO : GTWPR2525M-5F10

Thanks to the high rigid designed toolholder, it offers the traversing with max depth of cut 3.5mm !



Grooving

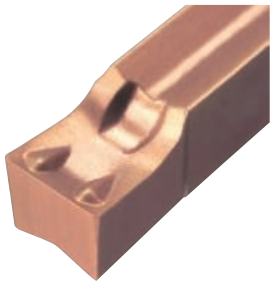
	NTK : GW chipbreaker	Competitor
Chip		
Surface finish		

SCM415 v_c=150m/min f=0.1mm/rev
Grooving depth a_p=7.0mm No step feed WET
Insert : DM4 GWPG500N04F-GW、Holder : GTWPR2525M-5F10

Excellent chip control and excellent shiny surface finish

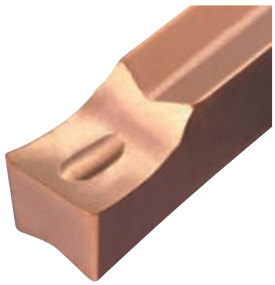
"DM4" and two types chipbreaker offer longer tool life and excellent surface finishing

GW chipbreaker



Multi-purpose chipbreaker utilizing sharpness for better chip control
Traversing is also possible

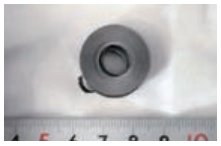
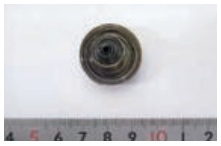
GV chipbreaker



Super sharp chipbreaker with high-rake angle
Best for the applications requiring low cutting forces

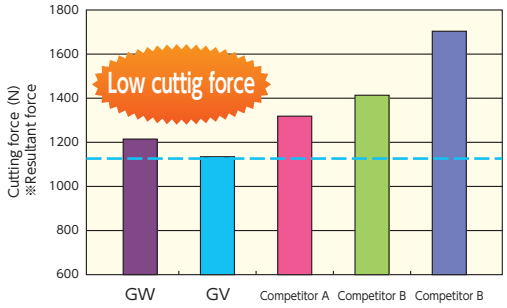
Chip condition (Grooving)

Cutting condition
v_c=80m/min　f=0.08mm/rev　Width : 5mm　WET

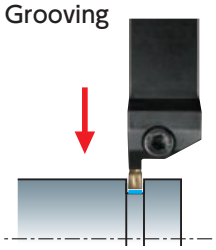
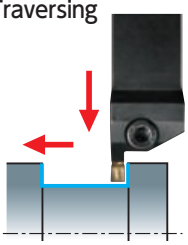
	GW chipbreaker	GV chipbreaker
SUS304		
SUS303		
SCM435		

Cutting force (Grooving)

Cutting condition
v_c=150m/min　f=0.1mm/rev　Width : 5mm　WET



Recommended cutting conditions

Application	Work material	Cutting speed (m/min) 50 100 150 200	Feed (mm/rev) 0.05 0.1 0.15	Depth of cut (mm)
Grooving 	Free cutting steels			
	Carbon steels, Alloy steels			
	Stainless steel			
Traversing 	Free cutting steels			~ 3.5 (mm)
	Carbon steels, Alloy steels			
	Stainless steel			

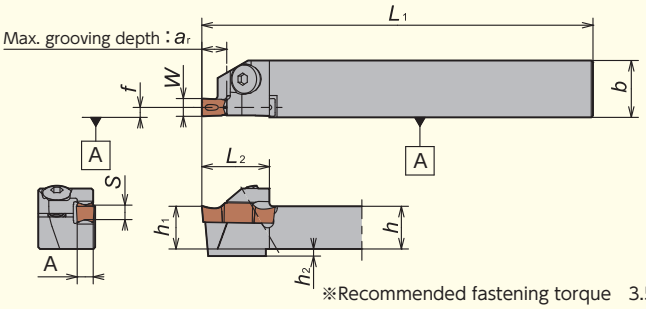
Stock list

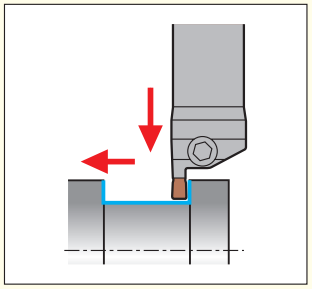
■Holder

For Swiss lathe (shank size ～ □16)

GTWP

Max. Bore dia.





※Recommended fastening torque 3.5[N·m]

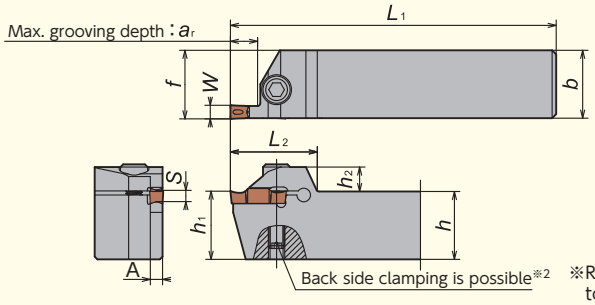
●R-hand shown

Code No. R	Code No. L	Holder number	Stock R	Stock L	Width W	Max. grooving depth a_r	Dimensions (mm) h	b	h_1	h_2	f	L_1	L_2	A	Height※1 S	Applicable insert	Spare Parts Bolt	Spare Parts Wrench
NEW 5875125		GTWP R/L 1016-3D07	●		3	7	10	16	12	2	0.3	120	19	2.6	D	GWP○300	AOB-5*14	LW-3S
5849054	5852280	1216-3D07	●	●		7	12	16	12	0			19.5				AOB-5*16	
5849070	5852306	1616-3D09	●	●		9	16	16	16				22					
NEW 5875133		1016-4E07	●		4	7	10	16	12	2			19	3.5	E	GWP○400	AOB-5*14	
5849088	5852314	1216-4E07	●	●		7	12	16	12	0			19.5				AOB-5*16	
5849096	5852322	1616-4E09	●	●		9	16	16	16				22					
NEW 5875141		1016-5F07	●		5	7	10	16	12	2			19	4.5	F	GWP○500	AOB-5*14	
5849104	5852355	1216-5F07	●	●		7	12	16	12	0			19.5				AOB-5*16	
5849112	5852371	1616-5F09	●	●		9	16	16	16				22					
5893565		1020-6G07	●		6	7	10		10	2			22	5.3	G	GWP○600	AOB-5*14	
5893573		1220-6G07	●			7	12	20	12	0			22.5				AOB-5*16	
5893581	5893599	1620-6G09	●	●		9	16		16				25					

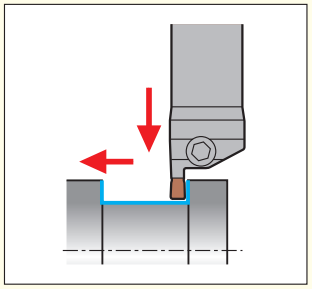
※1 Please make sure the insert height fit on the toolholder

For mutipurpose lathe(shank size □20, □25)

GTWP



※Recommended fastening torque 7.0[N・m]



●R-hand shown

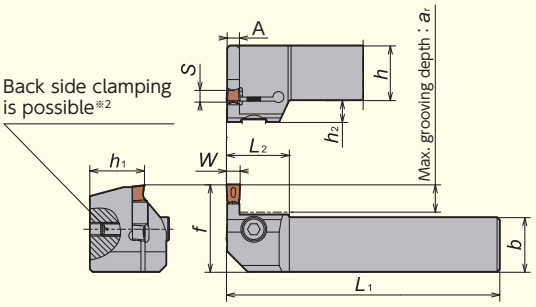
Code No. R	Code No. L	Holder number	Stock R	Stock L	Width W	Max. grooving depth a_r	Dimensions (mm) h	b	h_1	h_2	f	L_1	L_2	A	Height※1 S	Applicable insert	Spare Parts Bolt	Spare Parts Wrench	Spare Parts Wrench※2
5849120	5852397	GTWP R/L 2020K-3D10	●	●	3	10	20	20	20	8	20.2	125	29	2.6	D	GWP○300	CS0520W	LW-4	LW-2.5
5849138	5852405	2525M-3D10	●	●			25	25	25	9	25.2	150	32				CS0625W	LW-5	LW-3
5849146	5852421	2020K-3D20	●	●		20	20	20	20	8	20.2	125	41				CS0520W	LW-4	LW-2.5
5849153	5852439	2525M-3D20	●	●			25	25	25	9	25.2	150	44				CS0625W	LW-5	LW-3
5849161	5852447	2020K-4E10	●	●	4	10	20	20	20	8	20.3	125	29	3.5	E	GWP○400	CS0520W	LW-4	LW-2.5
5849179	5852454	2525M-4E10	●	●			25	25	25	9	25.3	150	32				CS0625W	LW-5	LW-3
5849187	5852470	2020K-4E20	●	●		20	20	20	20	8	20.3	125	41				CS0520W	LW-4	LW-2.5
5849195	5852488	2525M-4E20	●	●			25	25	25	9	25.3	150	44				CS0625W	LW-5	LW-3
5849203	5852496	2020K-5F10	●	●	5	10	20	20	20	8	20.3	125	29	4.5	F	GWP○500	CS0520W	LW-4	LW-2.5
5849211	5852512	2525M-5F10	●	●			25	25	25	9	25.3	150	32				CS0625W	LW-5	LW-3
5849229	5852520	2020K-5F20	●	●		20	20	20	20	8	20.3	125	41				CS0520W	LW-4	LW-2.5
5849237	5852538	2525M-5F20	●	●			25	25	25	9	25.3	150	44				CS0625W	LW-5	LW-3
5849245	5852546	2020K-6G12	●	●	6	12	20	20	20	8	20.35	125	34	5.3	G	GWP○600	CS0520W	LW-4	LW-2.5
5849252	5852553	2525M-6G12	●	●			25	25	25	9	25.35	150	37				CS0625W	LW-5	LW-3
5849260	5852561	2020K-6G25	●	●		25	20	20	20	8	20.35	125	49				CS0520W	LW-4	LW-2.5
5849278	5852587	2525M-6G25	●	●			25	25	25	9	25.35	150	52				CS0625W	LW-5	LW-3

※1 Please make sure the insert height fit on the toolholder
※2 Wrench for back side clamping is optional

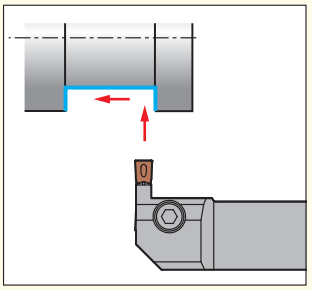
■Fur multipurpose lathe(shank size □20)

GKWP

"L" shape type



※Recommended fastening torque 7.0[N・m]

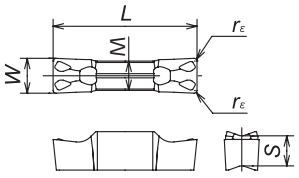
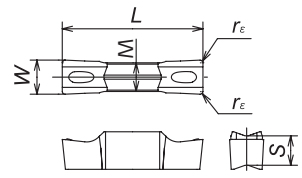


●L-hand shown

Code No. R	Code No. L	Holder number	Stock R	Stock L	Width W	Max. grooving depth ar	h	b	h1	h2	f	L1	L2	A	Height※1 S	Applicable insert	Spare Parts Bolt	Spare Parts Wrench	Spare Parts Wrench※2
	5893607	GKWP※2020K-3D10		●	3	10	20	20	20	8	32	125	23	2.6	D	GWP○300	CS0520W	LW-4	LW-2.5
	5893615	2020K-4E10		●	4									3.5	E	GWP○400			
	5893623	2020K-5F10		●	5									4.5	F	GWP○500			
	5893631	2020K-6G12		●	6	12					34			5.3	G	GWP○600			

※1 Please make sure the insert height fit on the toolholder
※2 Wrench for back side clamping is optional

■Applicable insert

Shape		Part number	Dimensions W Width	Dimensions W Olerance	Dimensions rε	Dimensions M	Dimensions L	Height※1 S	PVD coated micrograin carbide DM4	Stock
 • Good sharpness and chip control • Grooving and traversing possible	**GW** (ground chipbreaker)	GWPG300N02D-GW	3.0	±0.025	0.2	2.5	20.6	D	5848023	●
		300N04D-GW			0.4				5848031	●
		GWPG400N02E-GW	4.0		0.2	3.4		E	5848064	●
		400N04E-GW			0.4				5848072	●
		400N08E-GW			0.8				5852868	●
		GWPG500N02F-GW	5.0		0.2	4.3		F	5848106	●
		500N04F-GW			0.4				5848114	●
		500N08F-GW			0.8				5852876	●
		GWPG600N02G-GW	6.0		0.2	5.2	25.6	G	5848148	●
		600N04G-GW			0.4				5848155	●
		600N08G-GW			0.8				5852900	●
	GW (no-ground chipbreaker)	GWPM300N04D-GW	3.0	±0.05	0.4	2.5	20.6	D	5848171	●
		400N04E-GW	4.0			3.4		E	5848197	●
		500N04F-GW	5.0			4.3		F	5848213	●
		600N04G-GW	6.0			5.2	25.6	G	5848239	●
 • High sharp chip breaker with high-rake anglel • Good chip control by chip breaker dot	**GV** (ground chipbreaker)	GWPG300N02D-GV	3.0	±0.025	0.2	2.5	20.6	D	5848262	●
		300N04D-GV			0.4				5848270	●
		GWPG400N02E-GV	4.0		0.2	4.3		E	5848353	●
		400N04E-GV			0.4				5848361	●
		GWPG500N02F-GV	5.0		0.2	4.3		F	5848395	●
		500N04F-GV			0.4				5848403	●
		GWPG600N02G-GV	6.0		0.2	4.3	25.6	G	5848437	●
		600N04G-GV			0.4				5848445	●

※1 Please make sure the insert height fit on the toolholder

NEW

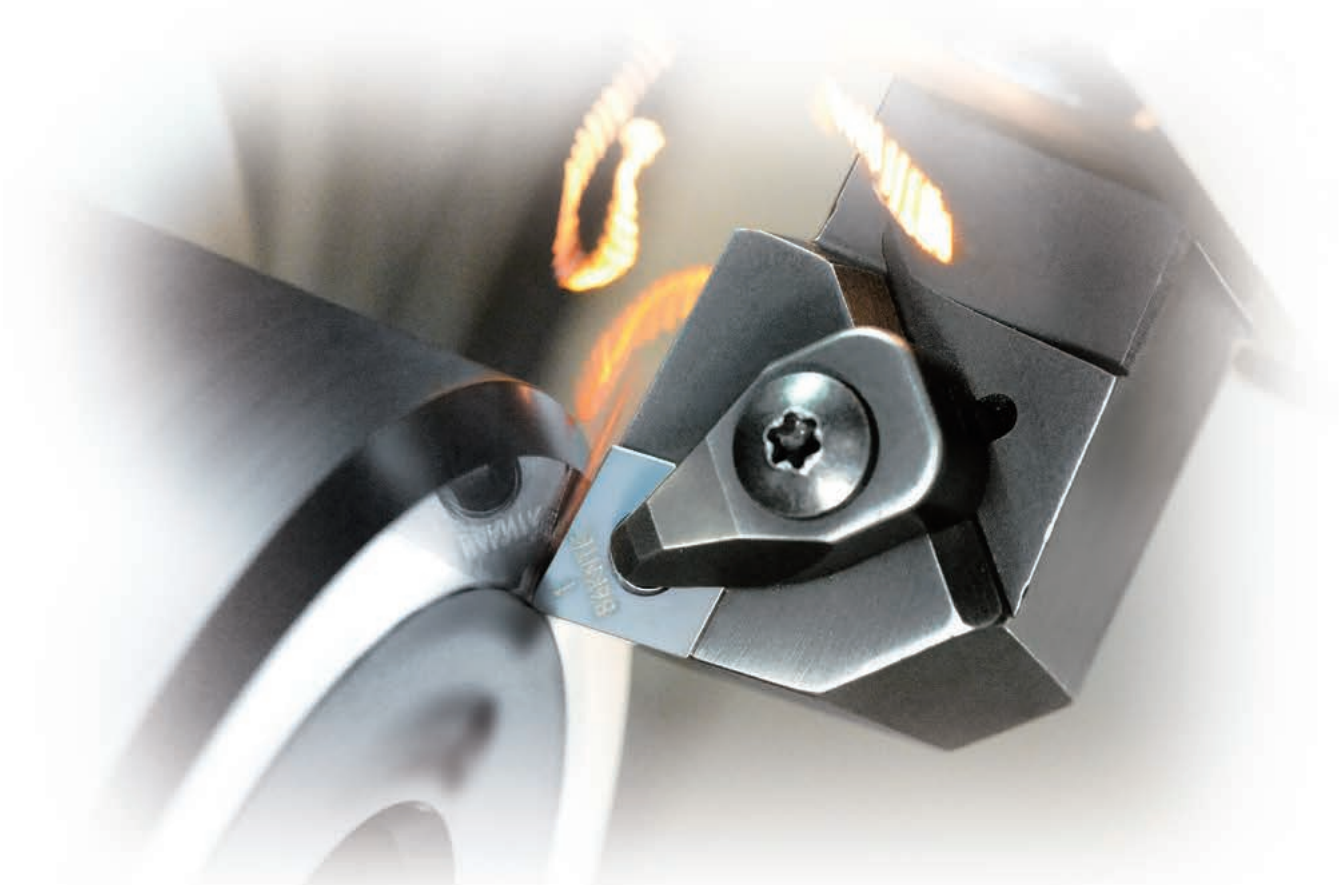
New CBN Lineup

NTK EZCUBE™ B5K/B6K

PVD TiCN hard coating Improve wear and oxidation resistance !

B5K Suitable for continuous to middle-interrupted machining of hardened-steel
Suitable for finish machining of ductile cast iron

B6K Suitable for middle to heavy interrupted machining of hardened-steel

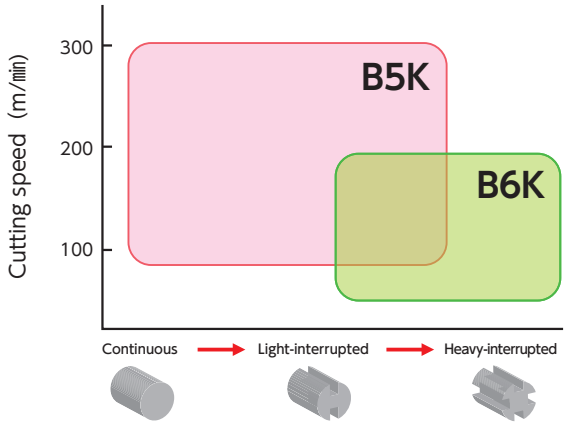


Features

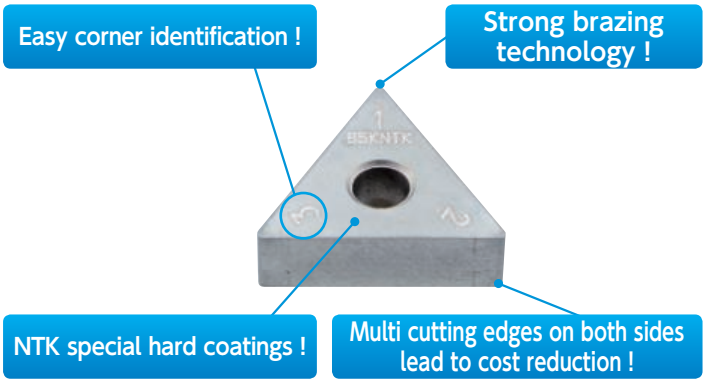
1 *Suitable for longer tool life of continuous to interrupted machining of hardened-steel*
Reduce crater wear and prevent the cutting edge from fracture

2 *Suitable for carburized layer removal*
Reduce CBN dissolve with iron in internal (low-hardness layer) machining

Cutting range



Grade	Main binder	CBN volume	Applications
B5K	TiC base	50%	Hardened steel / continuous to middle-interrupted machining Ductile cast iron / finish machining
B6K	TiCN base	65%	Hardened steel / middle to heavy interrupted machining

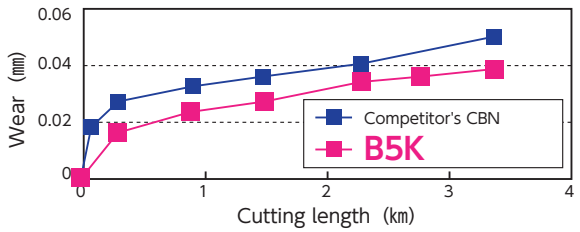


Performance

B5K

Best for continuous to middle-interrupted machining in hardened-steel !

TiCN hard coating offers good wear resistance !



Workmaterial : SCM415 carburized and quenched (64HRC)
Continuous machining

Cutting condition : v_c=150m/min, f=0.1㎜/rev, a_p=0.2㎜, DRY

● **Edge wear comparison**

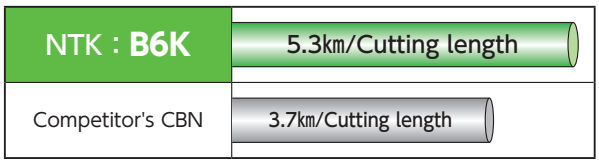
B5K

Competitor's CBN

B6K

Best for heavy interrupted machining in hardened-steel !

TiCN hard coating prevent fracture from crater wear !

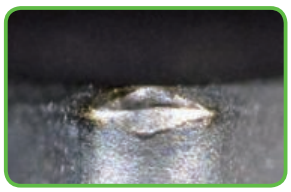


Workmaterial : SCM415 carburized and quenched (64HRC)
Middle-interrupted machining

Cutting condition : v_c=80m/min, f=0.1㎜/rev, a_p=0.15~0.17㎜, DRY

● **Edge wear comparison**

B6K



Competitor's CBN

Description table

Stock list
〈Negative〉

NEW

Shape	Part number	Dimensions (mm) I.C.	Thickness	R	Cutting edge length	Non-coated CBN B23	B30	B36	B40	B52	Coated CBN B5K	B6K
4 cutting edges	CNGA120402PQ	12.70	4.76	0.2	2.3				●	●		
	120404S01015			0.4	2.3						●	
	120404S01325			0.4	2.3							●
	120404PQ			0.4	2.3	●	●	●	●	●		
	120408S01015			0.8	2.2						●	
	120408S01325			0.8	2.2							●
	120408PQ			0.8	2.2	●	●	●	●	●		
	20412S01015			1.2	2.7						●	
	120412PQ			1.2	2.7	●	●		●	●		
	120412PQ	12.70	4.76	1.2	2.4			●				
(with wiper) 4 cutting edges	CNGA120404PQW	12.70	4.76	0.4	2.3				●	●		
	120408PQW			0.8	2.2				●	●		
	120412PQW			1.2	2.7				●	●		
4 cutting edges	DNGA150402PQ	12.70	4.76	0.2	2.4				●	●		
	150404S01015			0.4	2.2						●	
	150404S01325			0.4	2.2							●
	150404PQ			0.4	2.2			●	●	●		
	150408S01015			0.8	1.9						●	
	150408S01325			0.8	1.9							●
	150408PQ			0.8	1.9	●	●	●	●	●		
	150412PQ			1.2	2.6	●	●		●	●		
	150412PQ	12.70	4.76	1.2	2.2			●				
8 cutting edges	SNGA120404PE	12.70	4.76	0.4	1.5		●		●			
	120408PE			0.8	1.3		●	●	●	●		
	120412PE			1.2	1.5	●	●		●	●		
	120412PE	12.70	4.76	1.2	2.5			●				
6 cutting edges	TNGA160401PH	9.525	4.76	0.1	2.1					●		
	160402S01015			0.2	2.2						●	
	160402PH			0.2	2.2				●	●		
	160404S01015			0.4	2.0						●	
	160404S01325			0.4	2.0							●
	160404PH			0.4	2.0		●	●	●	●		
	160404PTFNX※			0.4	2.0		★					
	160408S01015			0.8	1.7						●	
	160408S01325			0.8	1.7							●
	160408PH			0.8	1.7	●	●	●	●	●		
	160408PTFNX※			0.8	1.7		★					
	160412PH			1.2	2.3	●	●		●	●		
	160412PH	9.525	4.76	1.2	2.0			●				

※-B30 TNGA160404PTFNX
-B30 TNGA160404PTFNX and -B30TNGA160404PTFNX have 3 cutting-edges.

NEW

Shape	Part number	Dimensions (mm) I.C.	Thickness	R	Cutting edge length	Non-coated CBN B23	B30	B36	B40	B52	Coated CBN B5K	B6K
4 cutting edges	VNGA160402PQ	9.525	4.76	0.2	2.6				●			
	160404S01015			0.4	2.5						●	
	160404S01325			0.4	2.5							●
	160404PQ			0.4	2.5		●	●	●	●		
	160408S01015			0.8	1.6						●	
	160408S01325			0.8	1.6							●
	160408PQ			0.8	1.6			●	●	●		
	160412PQ			1.2	2.7				●			

Stock list
〈Positive〉

NEW

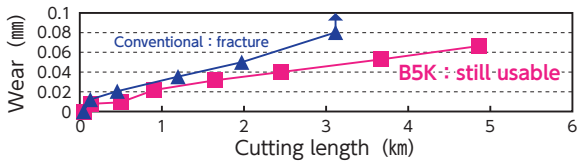
Shape	Part number	Dimensions (mm) I.C.	Thickness	R	Cutting edge length	Non-coated CBN B23	B30	B36	B40	B52	Coated CBN B5K	B6K
2 cutting edges	CCGW060204PD	6.35	2.38	0.4	2.3					●		
	09T302PD	9.525	3.97	0.2	2.3				●	●		
	09T304PD			0.4	2.3				●	●		
	09T308PD			0.8	2.2				●	●		
2 cutting edges	DCGW070202PD	6.35	2.38	0.2	2.4					●		
	070204PD			0.4	2.2				●	●		
	070208PD			0.8	1.9					●		
	11T302S01015	9.525	3.97	0.2	2.4						●	
	11T302PD			0.2	2.4				●	●		
	11T304S01015			0.4	2.2						●	
	11T304PD			0.4	2.2				●	●		
	11T308PD			0.8	1.9				●	●		
4 cutting edges	SPGN090304PQ	9.525	3.18	0.4	1.5	●						
	090308PQ			0.8	1.3	●	●					
3 cutting edges	TPGN110304PT※1	6.35	3.18	0.4	2.0				●			
	110308PT※1			0.8	1.7				●			
	160304PT	9.525		0.4	2.0				●			
	160308PT			0.8	1.7				●			
3 cutting edges	TPGW110302PT	6.35	3.18	0.2	2.2					●		
	110304PT※2			0.4	2.0	●			●	●		
	110308PT			0.8	1.7				●	●		
2 cutting edges	VBGW110302PD	6.35	3.18	0.2	2.6					●		
	110304PD			0.4	2.5					●		
	160408PD	9.525	4.76	0.8	1.6					●		
	VCGW110304PD	6.35	3.18	0.4	2.5				●	●		
	110308PD			0.8	1.6				●	●		
	160404PD	9.525	4.76	0.4	2.5				●	●		
	160408PD			0.8	1.6				●	●		

● : Standard stock items
● : New standard stock items
★ : Standard stock (specific)

Case study of coated CBN

B5K

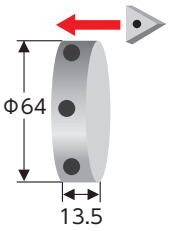
Work material : SCM415 Carburized and quenched continuous machining	Tooling
Cutting speed (m/min) =200	
Feed (mm/rev) =0.1	
Depth of cut (mm) =0.2	
Coolant : DRY	



Work material : FCD450 Boring	Tooling
Cutting speed (m/min) =120	
Feed (mm/rev) =0.05	
Depth of cut (mm) =0.20	
Coolant : WET	
NTK : **B5K**	300pcs
Conventional	200pcs

B6K

Work material : STKMH (HRC50) and quenched Interrupted machining	Tooling
Cutting speed (m/min) =210~220	
Feed (mm/rev) =0.08	
Depth of cut (mm) =0.20	
Coolant : WET	
NTK : **B6K**	700pcs
Conventional	400pcs



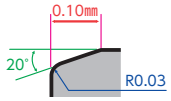
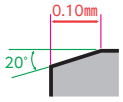
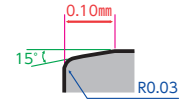
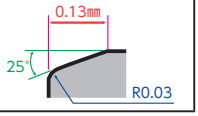
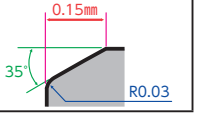
Work material : SCM415 Carburized and quenched Interrupted machining	Tooling
Cutting speed (m/min) =75	
Feed (mm/rev) =0.27	
Depth of cut (mm) =0.8	
Coolant : DRY	
NTK : **B6K**	400pcs
Conventional	150pcs

■Applicable cutting conditions

Work material		Insert grade		Cutting speed (m/min)	Feed (mm/rev)	Depth of cut (mm)	Coolant	
Material	Hardness						DRY	WET
Gray cast iron	HB ~ 280	B23 / B30		Turning 400 ~ 1,000	~ 0.5	~ 2.0	○	●
		B30		Milling 600 ~ 1,500			○	●
Ductile cast iron	HB ~ 330	B5K / B52		Turning 100 ~ 350	~ 0.4	~ 2.0	○	●
Hardened steel	HRC 50 ~ 68	Continuous	B5K / B52	100 ~ 300	~ 0.2	~ 0.3	○	●
		Light-interrupted	B5K / B36	75 ~ 225	~ 0.3	~ 0.5	●	○
		Middle-interrupted	B6K / B36	50 ~ 150	~ 0.2	~ 0.3	●	○
		Heavy-interrupted	B6K / B40	50 ~ 150	~ 0.2	~ 0.3	●	○
Sintered alloy	HRC ~ 35	B23 B30 sharp-edge		40 ~ 200	~ 0.5	~ 0.5	○	●
Steel roll	HS ~ 85	B23		20 ~ 140	~ 0.5	~ 2.0	●	○

●First choice ○Second choice

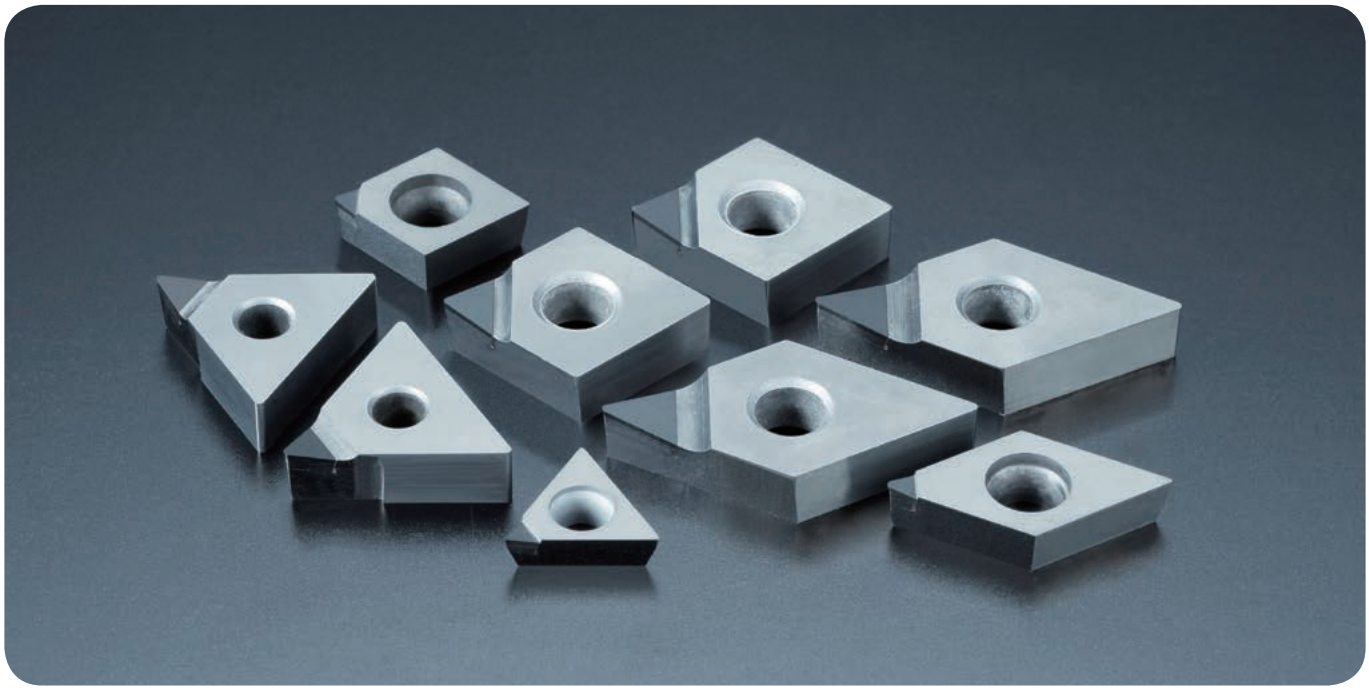
〔Std. Edge preparation〕

Roughing of Cast Iron	Sintered alloy	Finishing of Cast Iron	Finishing of Ductile Cast Iron Continuous & light-interrupted Cutting of Hardened Steel	Light-interrupted Cutting of Hardened Steel	Heavy-interrupted Cutting of Hardened Steel
B23	**B30 Sharp-edge**	**B30**	**B5K / B52**	**B6K / B36**	**B40**
					
S01020	**FNX**	**T01020**	**S01015**	**S01325**	**S01535**

※1 Edge prep. of -B40 TPGN110304PT, 08PT is "S01020 (C=0.10 ×20°+R0.03)"
-B40 TPGN160304PT, 08PT
※2 Edge prep. of -B23 TPGW110304 is "T01535 (C=0.15 × 15°)"

NEW

Super Micro Grain PCD tool
PD2

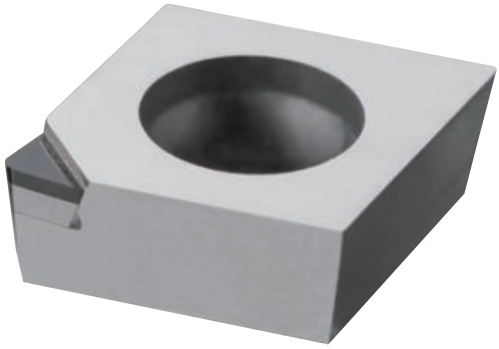


Features

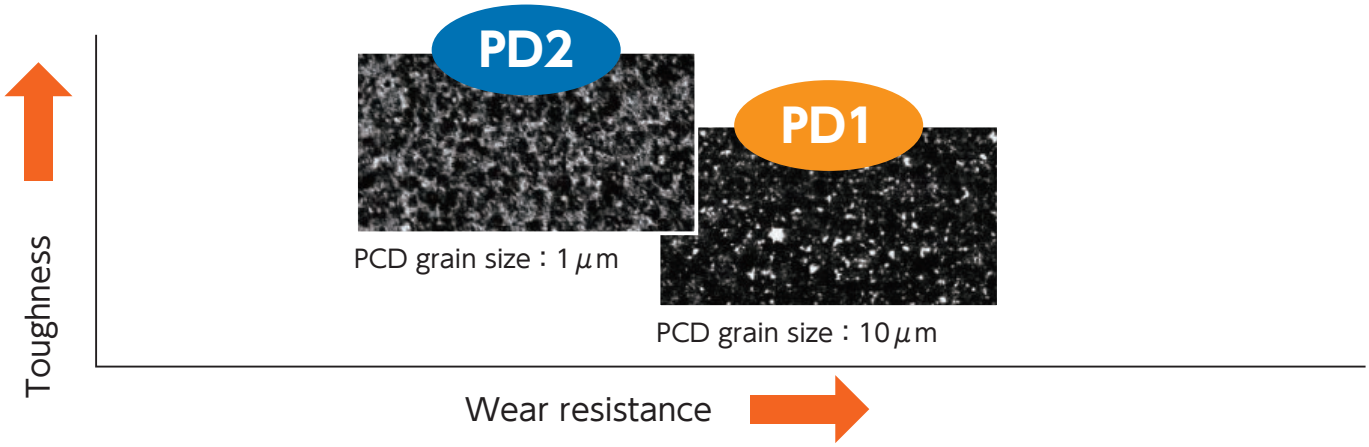
Good edge-sharpning, adhension resistance !
Suitable for machining aluminum alloy and brass !!

1 *Super micro grain PCD features good edge sharpning, chipping resistance.*

2 *Good chip control due to the high rake angle*

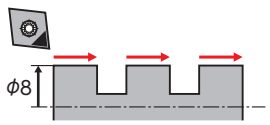


Applicable material map



Case study

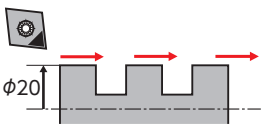
Spool machining		PD2
Work material	: A6061	
Cutting speed (m/min)	: 170	
Feed (mm/rev)	: 0.06	
Depth of cut (mm)	: 0.15	
Coolant	: WET	



NTK : **PD2**	10,000 pcs/corner
Comp. PCD	5,000 pcs/corner

NTK PD2 achieved 2 times longer tool life, and good wear resistance than conpetito's PCD

Spool machining		PD2
Work material	: A6061	
Cutting speed (m/min)	: 210	
Feed (mm/rev)	: 0.07	
Depth of cut (mm)	: 0.13	
Coolant	: WET	

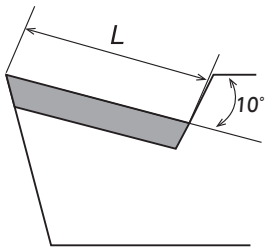
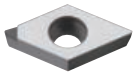


NTK : **PD2**	15,000 pcs/corner
Comp. PCD	10,000 pcs/corner

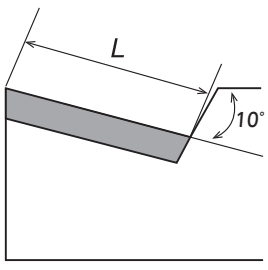
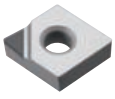
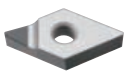
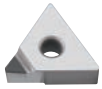
NTK PD2 achieved 1.5 times longer tool life, High rake angle offered stable machining.

Stock list

Positive type

Shape		Part number	Dimensions (mm) Cutting length L	I.C.	Thickness	Corner radius R	Super micro grain PCD NEW PD2	Stock
Cutting edge 		**CCMT09T302PF**	2.3	9.525	9.525	0.2	5860648	●
		09T304PF				0.4	5860630	●
		**DCMT11T302PF**				0.2	5860671	●
		11T304PF				0.4	5860689	●
		TPMT090202PF		5.56	2.38	0.2	5860697	●
		090204PF				0.4	5860705	●
		110302PF		6.35	3.97	0.2	5860713	●
		110304PF				0.4	5860721	●

Negative type

Shape		Part number	Dimensions (mm) Cutting length L	I.C.	Thickness	Corner radius R	Super micro grain PCD NEW PD2	Stock
Cutting edge 		**CNMX120404PF**	3.4	12.7	4.76	0.4	5884044	●
		120408PF				0.8	5884051	●
		**DNMX150404PF**	4.5			0.4	5884036	●
		150408PF				0.8	5884010	●
		**TNMX160404PF**	3.0	9.525		0.4	5884002	●
		160408PF				0.8	5883988	●

NEW

Super low cutting force milling cutter

FU-HA MILL

WATCH ON YouTube

Features

- *Stable gray cast iron milling with lower cutting force*
- *Maximizes ceramic insert potential and can mill faster than 1,000m/min*

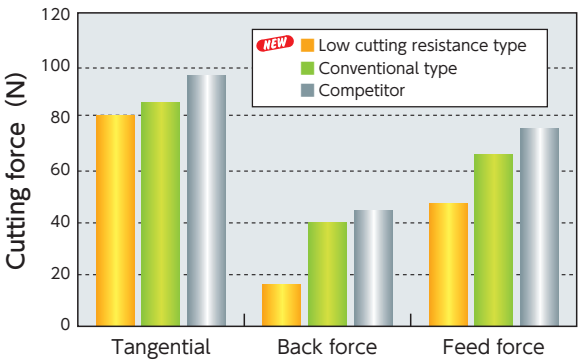
Thanks to lower cutting forces, work piece chipping is reduced Apply up to Ap 6mm

Available cutter dia. ϕ63 - ϕ160

Silicon Nitride grade is the best choice for roughing cast iron with scale. Tool pressure is reduced because of the sharper cutting edge and the ground-in chipbreaker

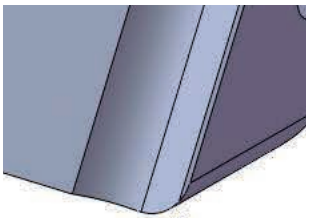
Very cost efficient with a unique 6 cutting edge design

Thanks to low-cutting resistance, over machine load is avoided

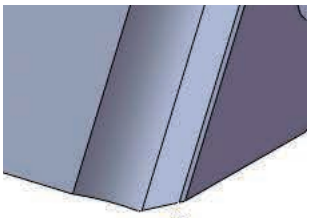


Cutting condition

v_c=800m/min f_z=0.10mm/t a_p=3.0mm a_e=80.0mm



【Radius type】



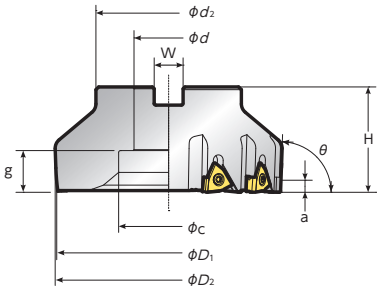
【Chamfered type 】

Two edge preparation are available.
Radius type is good for high feed milling.
Chamfered type is with excellent edge sharpness.

Cycle time reduction with single pass and achieve longer tool life.
Lesser machine horsepower required.

A. R. +5°
R. R. +4°, +7°, +10°

Cutting edge angle



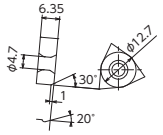
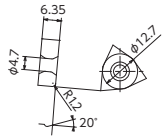
JWNXM type milling body

θ	Code No.	Part number	Stock	No. of inserts	Dimensions (mm) ϕD1	ϕD2	H	a※1	a※2	ϕd1	W	ϕd2	ϕc	g	Weight (kg)	Rake angle A.R.	R.R.	Centering location type
NEW 88°	5851415	JWNXM063C2200R06	●	6	63	63	50	5.5	4.5	22	10.4	60	18	15.5	0.9	+5	+4	FMC
	5851423	080A2540R08	●	8	80	80				25.4	9.5		36	15	1.1		+7	
	5851431	100A3175R10	●	10	100	100				31.75	12.7	80	50	18	1.8		+10	FMA
	5851449	125A3810R12	●	12	125	125	58			38.1	15.9		55	23	3			
	5851456	160A5080R16	●	16	160	160	60			50.8	19.0	100	72	22	4.9			

※1 Dimension when set the insert 「WNX44-C10T01020」
※2 Dimension when set the insert 「WNX44-R12T01020」

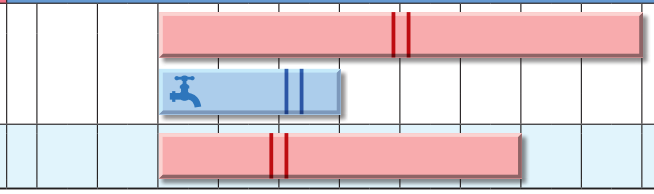
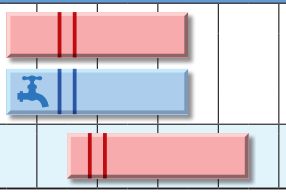
Parts	
Clamp screw FSI 26-4.0×12-LH 5861935 Sales number 10 pcs / case	Wrench LLR-T15 5701909 Sales number 5 pcs / case

Insert

Shape	Dimensions (mm)	Part number	C or rε	Grade	
NEW		WNX44-C10T01020	C1.0	SX6	●
				SP9	●
		WNX44-R12T01020	R1.2	SX6	●
				SP9	●

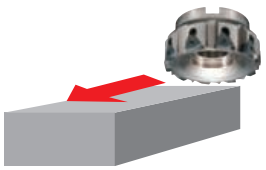
● : New standard stock items

Recommended cutting conditions

Grade	Work material	Cutting speed (m/min) 400 500 600 700 800 900 1000 1100 1200 1300 1400	Feed (mm/t) 0.05 0.1 0.15 0.2 0.25 0.3	Depth of cut (mm)
	K			
SX6	Gray cast iron			～6 (mm)
SP9	Ductile cast iron			

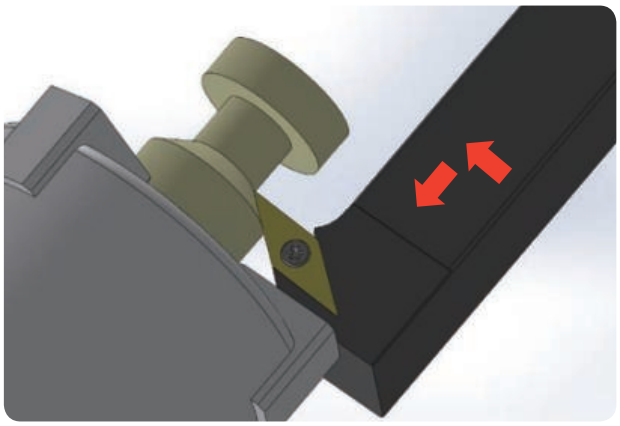
Case study

Transmission case ●Work material : FC230			
		Current tool	NTK
Holder		Competitor	JWNXM125A3810R12
Insert		Ceramic insert	SX6 WNX44-R12T01020
Cutting speed	(m/min)	500	←
Feed pertooth	(mm/t)	0.13	←
Depth of cut	(mm)	1	←
Coolant		DRY	←
Tool life	pcs/coner	60	120



As for competitor's milling cutter, weneeded to change inserts to new ones due to the wearprogress and lower clamping force of work material after machining 60 pcs.
This was caused by increasing sutting force.
NTK NEW Milling cutter "FU-HA MILL" achieved 2 times longer competitor's.
Low cutting force avoided the problem occurred by competitor's milling cutter.

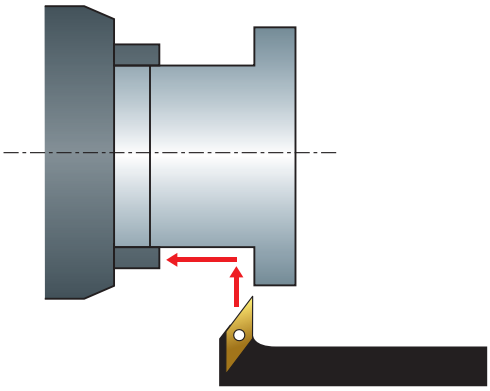
NEW New toolholder for small lathe



Features

New concept !

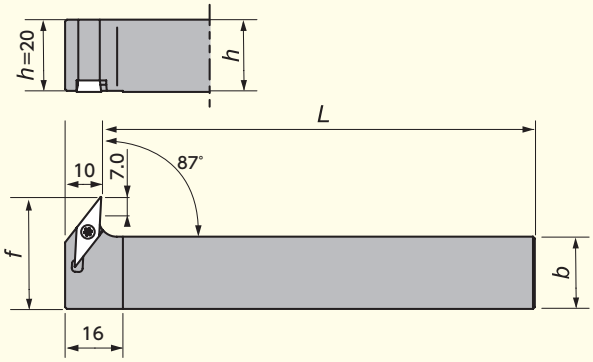
End face machining in horizontal tool post type lathe is possible !



Stock list

■ Holder

CH-SVXCL



Code No.	Tool holder	Stock		Dimensions (mm)				Applicable insert	Spare Parts	
									Clamp screw	Wrench
		R	L	*h*	*b*	*L*	*f*			
NEW 5890637	**CH-SVXC$^{R}_{L}$1616×11**		●	16	16	120	27	VC□□1103	LRIS-2.5*7	CLR-15S
NEW 5890645	**2020×11**		●	20	20		31			

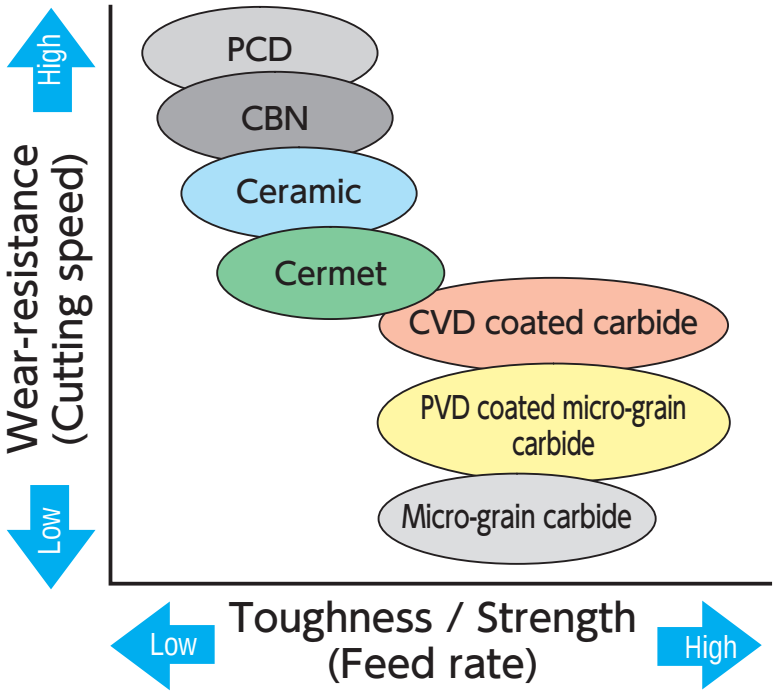
B

Tool Materials / Selection Guide

Tool Materials / Selection Guide

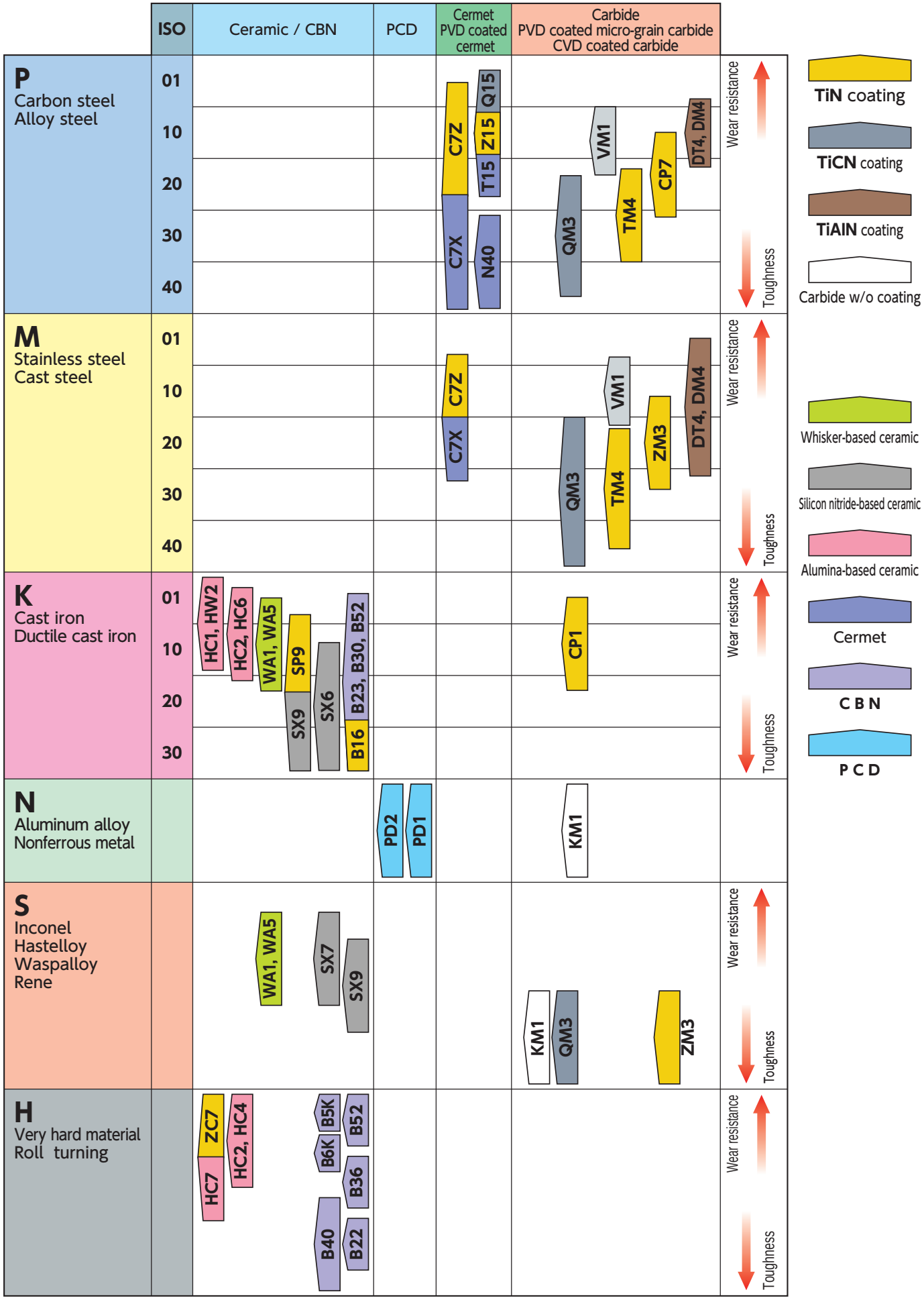
NTK Cutting Tools offer a wide range of tool materials, including PCD, CBN, ceramics, cermets and coated carbides, to accommodate various cutting applications.
In the SS Tool series, PCD, cermet and micro-grain ultra-hard carbides are set as the standard materials to meet the requirements of automatic and sliding head machines.
They are especially suited to micro-machining, offering excellent cutting performance and high quality surface finish.

● Material map

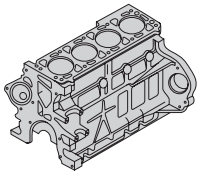


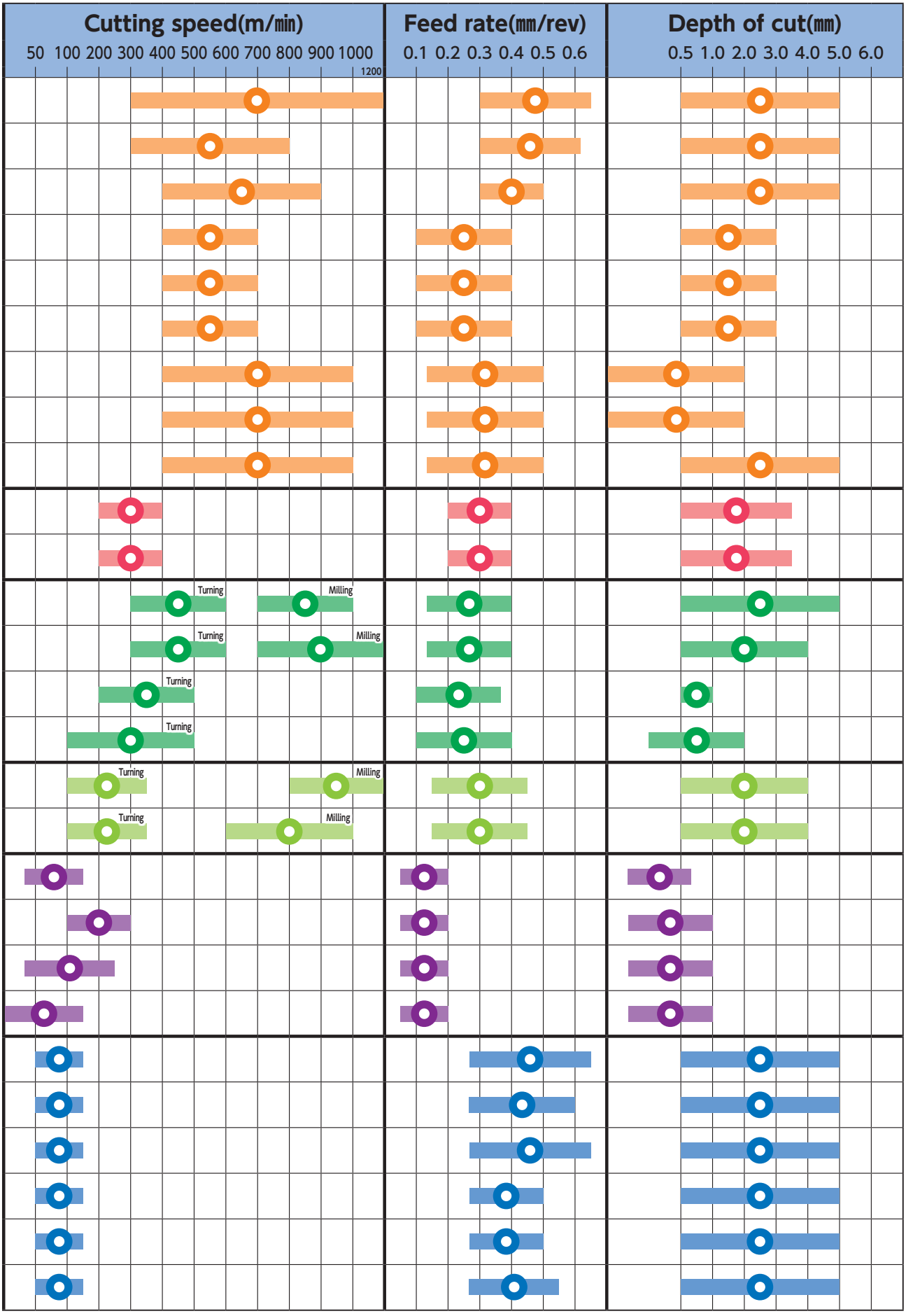
PCD	High-speed cutting of non ferrous metals	Polycrystalline diamond PCD **PD1, PD2**
CBN	High-speed cutting of high hardness materials and cast irons	CBN **B22, B23, B30, B36, B40, B52** PVD coated **B5K, B6K** Solid CBN **B16**
Ceramic	Highly efficient cutting of high hardness materials and cast irons	Whisker grade **WA5 WA1,** Alumina/Titanium carbide grade **HC2, HC4, HC7, ZC7, HC6** Alumina grade **HC1, HW2,** Silicon nitride grade **SX6, SX7, SX9, SP9**
Cermet	Finishing of steels	Cermet **T15** PVD coated cermet **Q15, Z15, C7Z** High strength cermet **N40, C7X**
CVD coated carbide	General and multi-purpose machining of steels and cast irons	CVD coated carbide **CP1**···Cast iron **CP7**···Steel
PVD coated micro-grain carbide	Precision cutting, Cutting of stainless steel and hard-to-cut materials	PVD coated micro-grain carbide **TM4, ZM3, QM3, VM1, DT4, DM4**
Micro-grain carbide	Cutting of nonferrous metals and non-metal materials	Micro-grain carbide **KM1**

■Recommended Types of Materials and Application



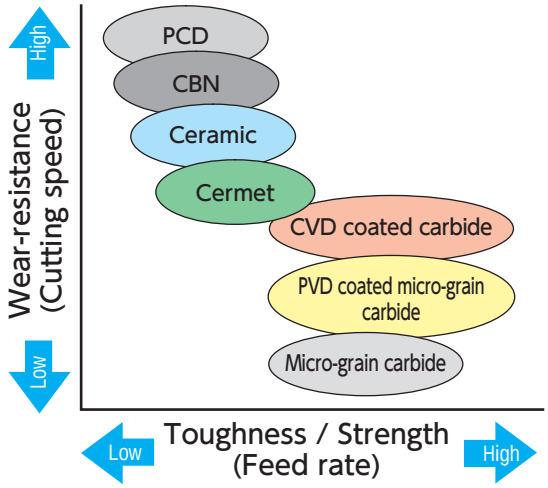
■ Recommended Types of Materials and Applications : Ceramic and CBN ●First Choice ○Second Choice

Work material	Tool material		Process: Rough-ing	Process: Semi-finishing	Process: Finishing	Continuous	Light interruption	Interruption	Cutting oil: Dry	Cutting oil: Wet
Normal cast iron 	Ceramic	SX6	●			●			●	●
		SX9	●			●	●	●	●	●
		SP9		●		●			●	○
		HC1 / HW2			●	●			●	
		HC2 / HC6			●	●			●	●
		WA1			●	●			●	●
	CBN	B23	●			●			○	●
		B30		●	●	●			○	●
		B16	●					●	○	●
Special cast iron	Ceramic	HW2		●		●			●	
		HC2		●	●	●			●	○
Ductile cast iron	Ceramic	SX9	●				●	●	●	○
		SP9	●			●			●	○
		HC6			●	●			○	●
	CBN	B52			●	●			○	●
Heat-resistant alloy	Ceramic	SX7 / SX9	●				●	●	○	●
		WA1 / WA5	●				●	●	○	●
Hardened material	Ceramic	HC4 / ZC7			●	●				●
	CBN	B52		●	●	●			○	●
		B36		●	●		●		●	●
		B40		●	●		●	●	●	○
Rolls High-peed steel	Ceramic	WA1 / WA5	●			●			●	○
	CBN	B22/B23/B36		●	●	●			●	○
Cast iron	Ceramic	HC2 / HC7		●	●	●			●	○
	CBN	B22 / B30			●		●	●	●	○
Ductile iron	Ceramic	SX9		●			●	●	●	○
	CBN	B22 / B52			●		●	●	●	○

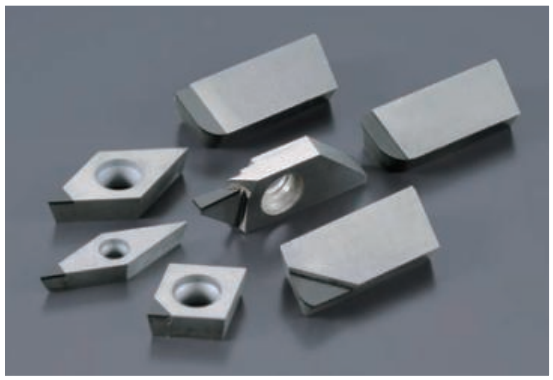

Cutting speed(m/min)
50 100 200 300 400 500 600 700 800 900 1000 1200
Feed rate(mm/rev)
0.1 0.2 0.3 0.4 0.5 0.6
Depth of cut(mm)
0.5 1.0 2.0 3.0 4.0 5.0 6.0
Turning
Milling
Turning
Milling
Turning
Turning
Turning
Milling
Turning
Milling

Tool Materials / Selection Guide

NTK cutting tools offer a wide range of tool materials, including PCD, CBN, ceramics, cermet and coated carbides, to accommodate various cutting conditions.
For the SS tool series, PCD, cermet, micro-grain carbides are set as the standard materials to meet the requirements of automatic lathes specifically micro-machining, with excellent cutting performance and high quality surface finish.



PCD

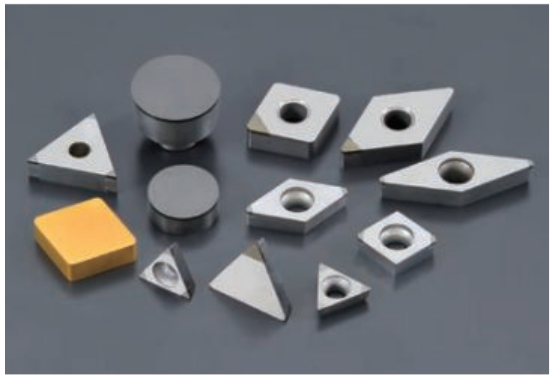


For high-speed cutting of nonferrous metals

As diamond is the hardest and lowest in affinity with nonferrous metals cutting material , its deposition resistance as well as wear resistance is excellent. However, as a tool material, its low toughness and characteristically low chipping resistance posed problems.
PCD is the material that solved these problems by sintering micro-grain diamond to make a polycrystalline structure without affecting the diamond-specific characteristics.
This material allows you to cut non ferrous metals at a higher speed than carbide cutting tools.

For more information, please go to ··· C2

CBN



For high-speed cutting of hardened materials and cast irons

This material is made of CBN (Cubic Boron Nitride) as the base component and a special ceramic binder, giving a high level of hardness at both room and high temperature ranges. One of its superior features is that it causes very little chemical reaction with work piece materials.
It is mainly used for machining of materials with high hardness and high-speed cutting of cast iron.

For more information, please go to ··· C4

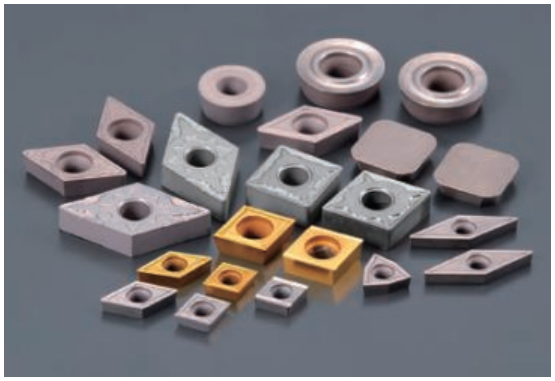
Ceramic

For high-efficiency cutting of high hardness materials and cast irons

Arial Narrow RegulCeramic tools offer high cutting speed and highly efficient machining thanks to their outstanding heat resistance and chemical stability.
A wide range of tools in various shapes, made of different types of ceramic including silicon nitride, alumina and whisker series, enables you to achieve high cutting speeds and higher productivity than carbide tools in many applications.

For more information, please go to ··· C6

Cermet



For finishing and grooving of steels

Cermet excels in resistance against oxidation and heat resistance when compared with ultra-hard alloy, making higher cutting speed possible. This material allows you to realize high quality finished surfaces, having a low affinity with ferrous materials and excellent deposition resistance.

For more information, please go to ··· D2

CVD coated carbide

For general cutting of steels and cast irons

This type of carbides, suitable for cutting steel and cast iron, use carbide as the base material with coating applied by the CVD method for extra wear and heat resistance.

For more information, please go to ··· E7

PVD coated micro-grain carbide

For precision cutting and general machining of hard-to-cut materials including stainless steel

The carbides in this grade has been developed by reducing the size of the WC hard grains, which are the main component of cemented carbide, to approximately 1μ.
By coating such carbide by the PVD method with TiN, TiCN, or TiAlN, these materials are the most suitable for precision cutting and cutting of difficult-to-cut materials.
Provision of PVD coating on such micro grain carbide offers much improved wear resistance and thermal shock resistance.
These carbides are tougher and harder than conventional carbides, with much sharper cutting edges.

For more information, please go to ··· E2

Micro-grain carbide

For cutting of non ferrous metals and non metal materials

Using non-coated micro-grain ultra-hard carbide, which provides ultra sharp cutting edges, this type of carbide usually, has a mirror-like polished surface.
This type is the most appropriate tool material for machining of non ferrous metals and resins, where especially sharp cutting edges are required.

For more information, please go to ··· E2

Part No. Designation Codes for Inserts and Breakers

①Code for shapesl

Classification	Code	Shape	Apex angle (degree)	Symbol
Regular polygons	H	Regular hexagon	120	⬡
	O	Regular octagon	135	○
	P	Regular pentagon	108	⬠
	S	Square	90	□
	T	Equilateral triangle	60	△
Rhomboids and equilateral unequal-angles	C	Rhomboids	80	◇
	D		55	
	E		75	
	F		50	
	M		86	
	V		35	
	W	Hexagon	80	△
Rectangles	L	Rectangle	90	□
Parallelograms	A	Parallelograms	85	▱
	B		82	
	K		55	
Circles	R	Circle	–	○

Note : The smaller of the apex angles is used.

③Codes for accuracy

Code	Diameter of inscribed circle d (mm)	z	Corner height m (mm)
A*	± 0.025	± 0.025	± 0.005
F*	± 0.013		± 0.013
C*	± 0.025		
H	± 0.013		
E	± 0.025	± 0.13	± 0.025
G			
J*	± 0.05 ~ ** ± 0.13	± 0.025	± 0.005
K*			± 0.013
L*			± 0.025
M	± 0.05 ~ ** ± 0.13	± 0.13	± 0.08 ~ ** ± 0.18
N		± 0.025	
U	± 0.08 ~ ** ± 0.25	± 0.13	± 0.13 ~ ** ± 0.38

Notes : The asterisk (*) indicates that the accuracy range is, basically, applied to inserts equipped with a flat drag. The double asterisk (**) indicates that the accuracy range is determined by the size of the insert.

Tolerances for each insert size Except for inserts with 55, 50 or 35 degrees in apex angle

Diameter. of inscribed circle d (mm)	Inscribed circle diameter tolerance d		Corner height tolerance m	
	Class J, L, K, M, N	Class U	Class M or N	Class U
6.35 9.525	± 0.05	± 0.08	± 0.08	± 0.13
12.70	± 0.08	± 0.13	± 0.13	± 0.20
15.875 19.05	± 0.10	± 0.18	± 0.15	± 0.27
25.40	± 0.13	± 0.25	± 0.18	± 0.38

The tolerances for class M inserts with 55 degrees in apex angle are as follows

Diameter. of inscribed circle d (mm)	Inscribed circle diameter tolerance (mm) d	Corner height tolerance (mm) m
6.35 9.525	± 0.05	± 0.11
12.70	± 0.08	± 0.15
15.875 19.05	± 0.10	± 0.18

Note : The accuracy range of "m" can be spread for inserts with apex angles smaller than 55 degrees.

Type of insert material	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Metric METRIC	T15	S	N	M	G	12	04	12	T	N
Inch INCH	T15	S	N	M	G	4	3	3	T	N

②Codes for relief angles

Relief angle (degree)	Code
3	A
5	B
7	C
15	D
20	E
25	F
30	G
0	N
11	P
Other relief angles	O

Note : The relief angle must be that of the major cutting edge.

④Codes for grooved holes

For normal series				
Code	Provision of holes	Shape of hole	Chipbreaker	Pattern
N	No	——	None	
R			Single-sided	
F			Double-sided	
A	Yes	Cylindrical	None	
M			Single-sided	
G			Double-sided	
W		Partially cylindrical Single-sided: 40 - 60 deg	None	
T			Single-sided	
Q		Partially cylindrical Double-sided: 40 - 60 deg.	None	
U			Double-sided	
B		Partially cylindrical Single-sided: 70 - 90 deg.	None	
H			Single-sided	
C		Partially cylindrical Double-sided: 70 - 90 deg.	None	
J			Double-sided	
X		——	——	——

Note : Only the normal series is to be used for the metric system. Always use code X for scalene inserts. However, X must not be used for inserts of shapes not defined in the table (1) above.

For small-size series		
Code	Provision of holes	Chipbreaker
E	No	None
S		Single-sided
L		Double-sided
D	Yes	None
P		Single-sided
K		Double-sided
X	——	——

Note : Use the smaller size series for the inch system when inscribed circle diameter is 7.94 mm or less. However, use normal series only when the diameter is 6.35 mm giving priority to the small-size series.

⑦Codes for corner radii

For corner R		
Corner-R nominal value (mm)	Inch system	Metric system
Sharp corner		
r_ε : 0.2	Y	02
0.4	1	04
0.8	2	08
1.2	3	12
1.6	4	16
2.0	5	20
2.4	6	24
3.2	8	32
Other radii		X
For circular inserts	0	00*
		M0*

Notes : "00" (double zero) is used for insert circle diameter indicated in inches. "M0" is used for insert circle diameter indicated in millimeters.

⑤Codes for cutting edge lengths or for inscribed circle diameters

Diameter of inscribed circle d (mm)	Inch system		Metric system											
	Normal series	Small-size series	Shapes											
			H	O	P	S	T	C	D	E	F	M	V	W	R
3.97	—	5					06			T3					
4.76	—	6					08			04					
5.56	—	7				05	09	05	06	05	07	05	09	03	
6.35	2	(8)	03	02	04	06	11	06	07	06	08	06	11	04	06
7.94	—	0	04	03	05	07	13	08	09	08	10	07	13	05	07
9.525	3	—	05	04	07	09	16	09	11	09	12	09	16	06	09
12.70	4	—	07	05	09	12	22	12	15	13	16	12	22	08	12
15.875	5	—	09	06	11	15	27	16	19	16	20	15	27	10	15
19.05	6	—	11	07	13	19	33	19	23	19	24	19	33	13	19
25.40	8	—	14	10	18	25	44	25	31	26	33	25	44	17	25
31.75	0	—	18	13	23	31	54	32	38	32	41	31	54	21	31

⑥Codes for thickness

Thickness S (mm)	Inch system		Metric system
	Inscribed circle series		
	Normal series	Small-size series	
1.59	—	2	01
2.38	—	3	02
3.18	2	4	03
3.97	—	5	T3
4.76	3	6	04
5.56	—	—	05
6.35	4	—	06
7.94	5	—	07
9.52	6	—	09
12.70	8	—	12

⑩	⑪
•	G
•	G

⑧Codes for major cutting edges

Without honing (Tool nose processing)	F
Angular honing	T
Round honing	E
Angular honing + round honing	S
Special honing	K
Special honing + round honing	P

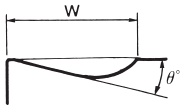
⑨Codes for left/right handed inserts

Type	Code
Right-handed	R
Left-handed	L
Not specified	N

⑪Codes for chipbreaker shapes

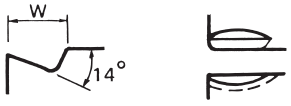
Parallel-honing type (mm)

Code	W	θ°
A	1.0	14
B	1.5	14
C	2.2	14
D	2.8	10
E	3.5	10



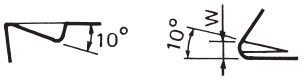
Type N (Double-positive type) (mm)

Code	W
N1	1.5
N2	2.2



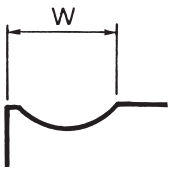
Type P (Angle type) (mm)

Code	W
P1	0.9
P2	1.25



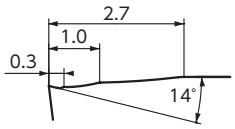
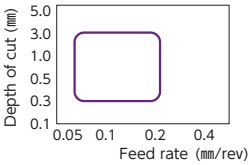
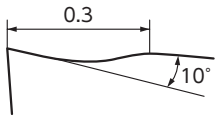
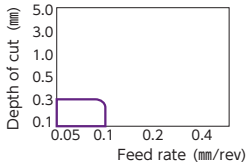
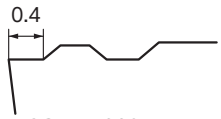
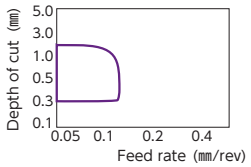
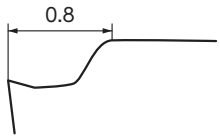
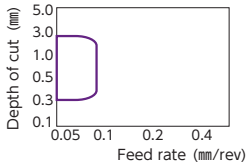
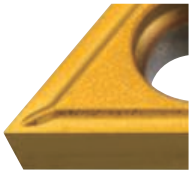
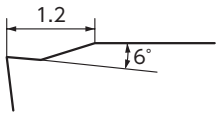
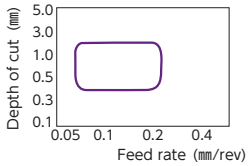
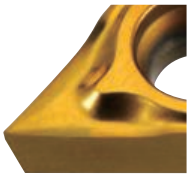
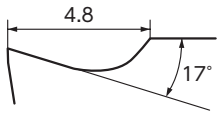
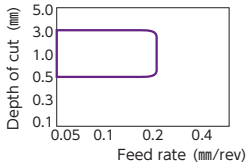
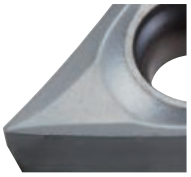
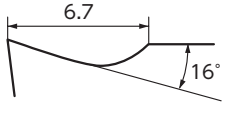
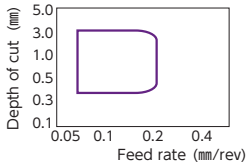
Full-arc embossed type (mm)

Code	W
F	1.5
G	2.2
H	2.8

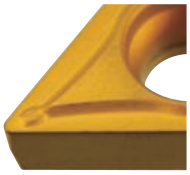
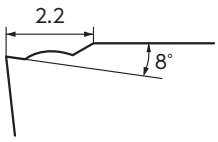
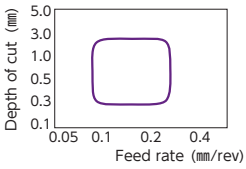
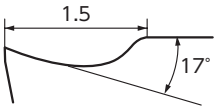
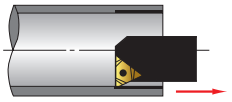
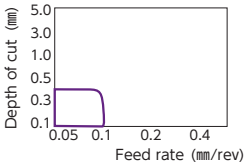
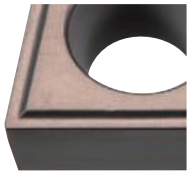
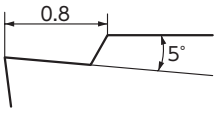
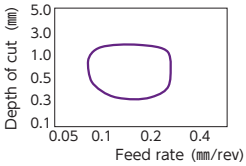
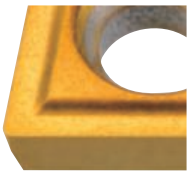
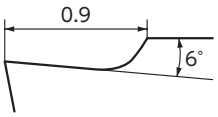
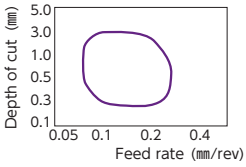


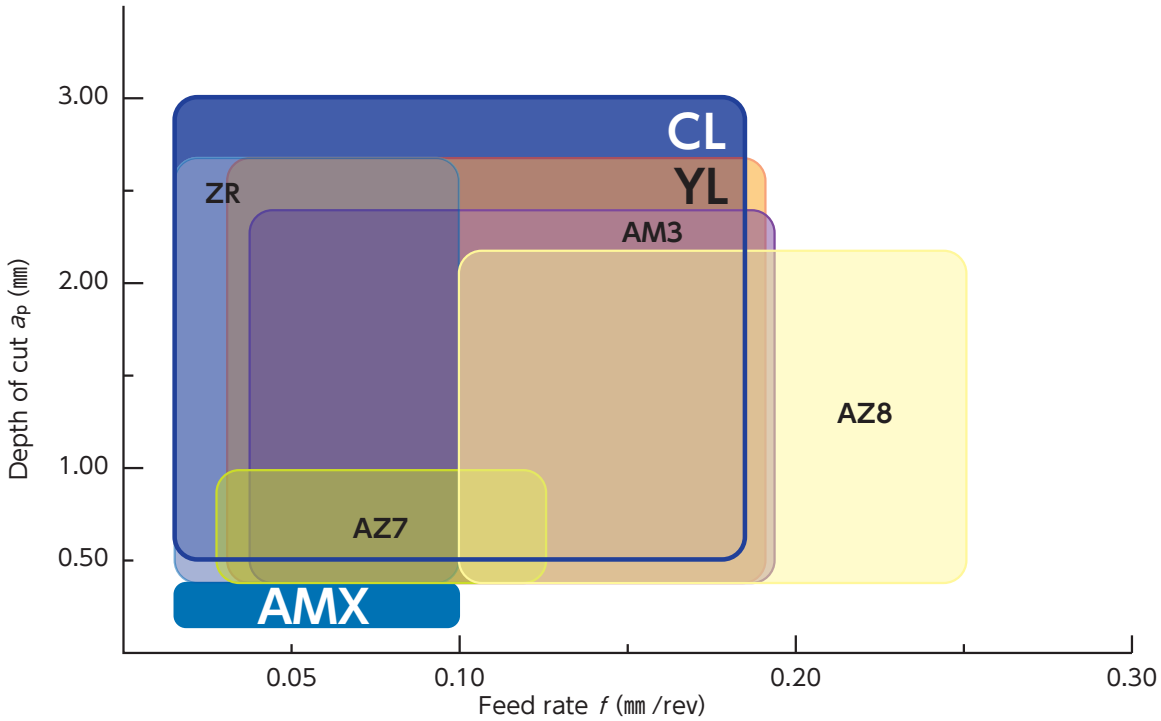
Part No. Designation Codes for Inserts and Breakers

Positive-type molded inserts with chipbreaker

Product Name	Breaker shape / cross-section		Features and applications	Range of chip-control
NEW **YL**		 ※DCGT11T302MYL type	●Great combination of sharpness and toughness ●Covers extremely wide range ●Excellent chip control	
NEW **AMX**		 ※DCGT11T302MAMX type	●Excellent chip control under light depth of cut	
AZ7		 ※DCGT11T302MFN type 0.2mm higher edge than items with FN	●Excellent chip control from low feed and low cutting depth range	
ZR		 ※DCMT11T302 type	●Covers a wide range of depth of cut under high-speed and low-feed conditions	
AM3		 ※DCGT11T302 type	●Versatile chipbreaker with both sharp cutting edge and good chip control	
CL		 ※DCGT11T302M type	●Remarkable cutting performance with the double-positive shape ●Controls chips over a wide ranges ●Upgraded version from the 1L chipbreaker	
1L		 ※DCGT11T302FN type	●Double-positive type with low resistance and high cutting performance ●Offering both strength of cutting edge and excellent cutting performance in combination with QM3	

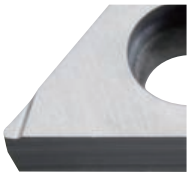
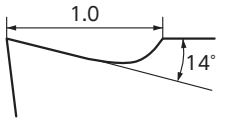
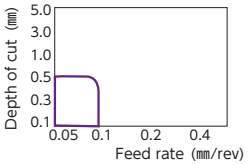
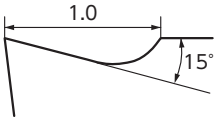
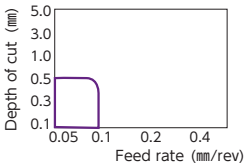
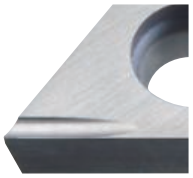
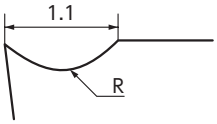
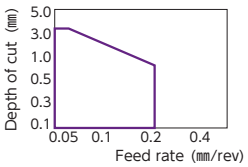
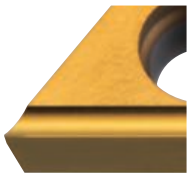
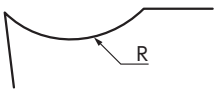
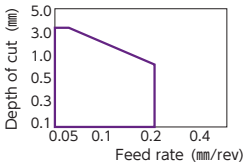
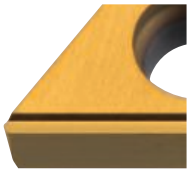
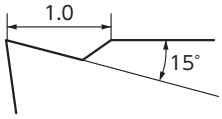
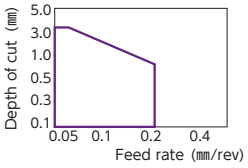
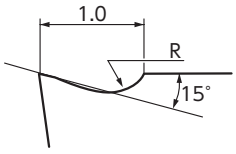
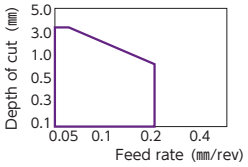
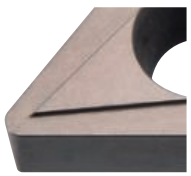
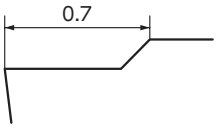
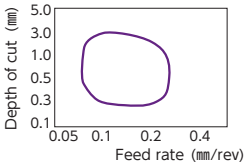
Positive-type molded inserts with chipbreaker

Product Name	Breaker shape / cross-section	Features and applications	Range of chip-control
AZ8	  ※DCMT11T302 type	●CVD-coated versatile chipbreaker with its high cutting performance	
FG	 ※TPGH110304 type	●Chipbreaker for boring ●Possible to evacuate chips forward even in a low-cutting depth range ●First-rate cutting performance with the high rake angle 	
AF1	  ※CCGT09T302ENB type	●Produces remarkable surfaces in semi-finishing of steels	
AM5	  ※CPGH060202FN type	●Chipbreaker for boring ●Provides both good cutting performance and chip control	

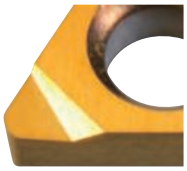
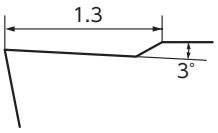
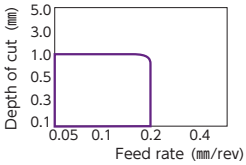
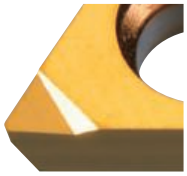
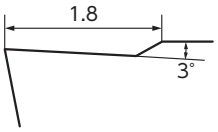
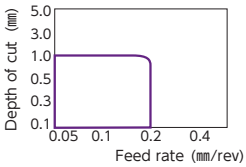
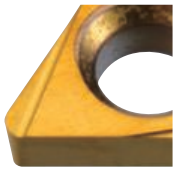
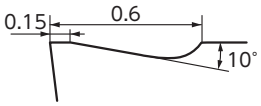
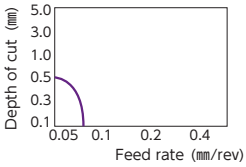
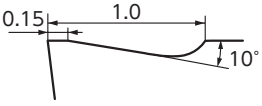
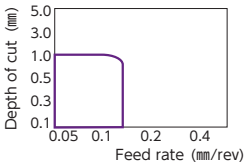
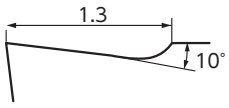
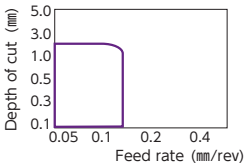
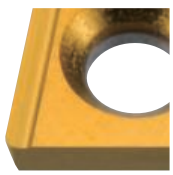
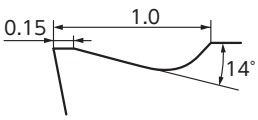
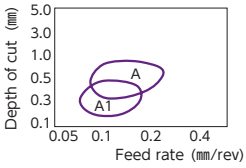
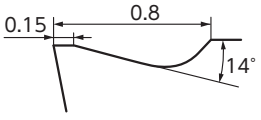
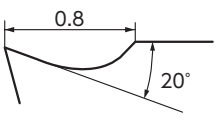
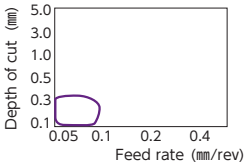


Part No. Designation Codes for Inserts and Breakers

Positive-type inserts with ground chipbreaker

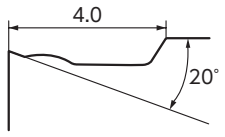
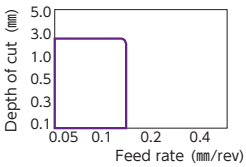
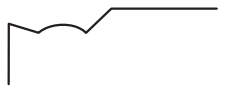
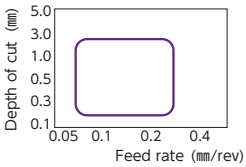
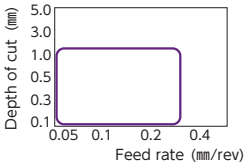
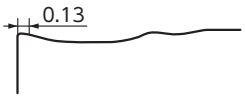
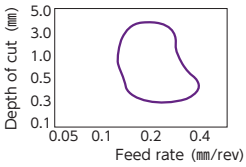
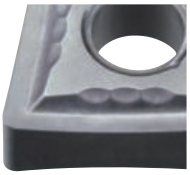
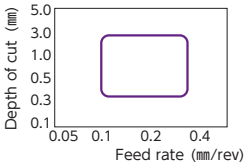
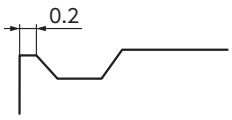
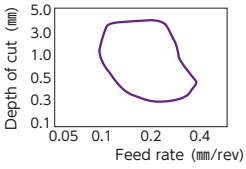
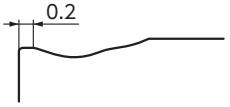
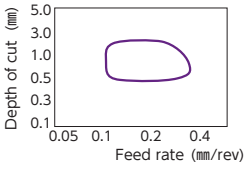
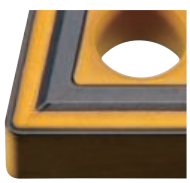
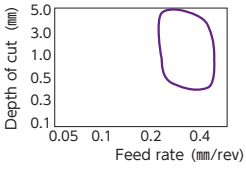
Product Name	Breaker shape / cross-section		Features and applications	Range of chip-control
KHG		 ※DCET11T302 type	●Controls the chip flow in the finishing range ●Suitable for ultra-precision machining with a honed cutting edge ●Dimensional tolerance of the cutting edge nose radius is ± 0.01.	
K		 ※TPGH090202FL type	●Controls chips well in finishing applications ●First-rate cutting performance with the high rake angle	
UHG		 ※DCET11T3008R type	●Offers excellent cutting performance and wide ranging chip control	
U • U1		 ※DCGT11T302 type	●Cuts remarkably well with a high rake angle; this also helps prevent work hardening	
S		 ※DCGT11T302 type	●Standard chipbreaker for low feed range, providing both good cutting performance and chip control	
AT		 ※DCGT11T302 type	●Excels in deposition resistance and ensures dimensional accuracy ●Excellent performance for machining of small diameter workpiece and low carbon steel	
FM		 ※DCGT11T302ENB type	●A step chipbreaker where the entire side surface is honed	

Positive-type inserts with ground chipbreaker

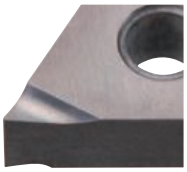
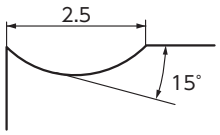
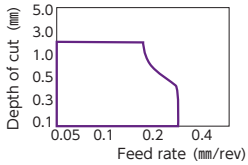
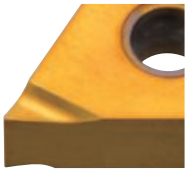
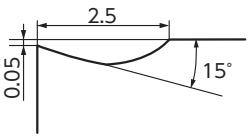
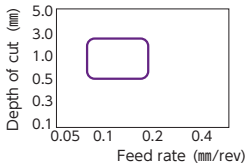
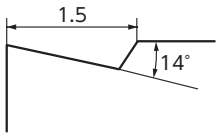
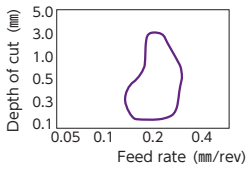
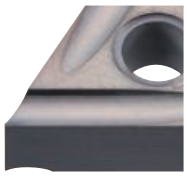
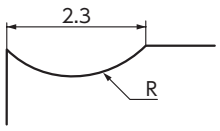
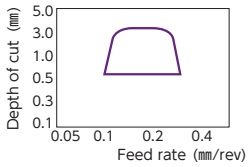
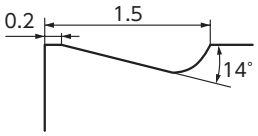
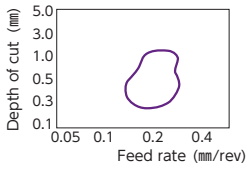
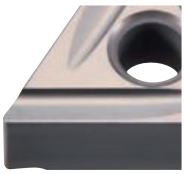
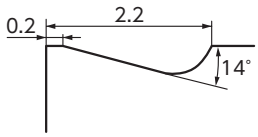
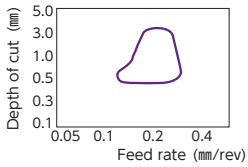
Product Name	Breaker shape / cross-section	Features and applications	Range of chip-control
F05	  ※TPGH060102F type	●Chipbreaker exclusive for boring, and evacuating chips forward ●Performs remarkably well especially in blind hole boring	
F1	  ※TPGH110302F type		
B1	  ※TCGH060102FV type	●Enables stable machining when boring with a high strength cutting edge and excellent cutting performance	
B2	 ※TPGH090202FV type		
B3	 ※TPGH090202F type		
A	  ※CPGH080202 type	●Strengthened edge and good chip controlhardening ●General-purpose chipbreaker	
A1	 ※CPGH040102 type		
A2	 ※ERGHT30102F type	●Good at controlling chips for both boring and face cutting ●Excellent cutting performance with the high rake angle	

Part No. Designation Codes for Inserts and Breakers

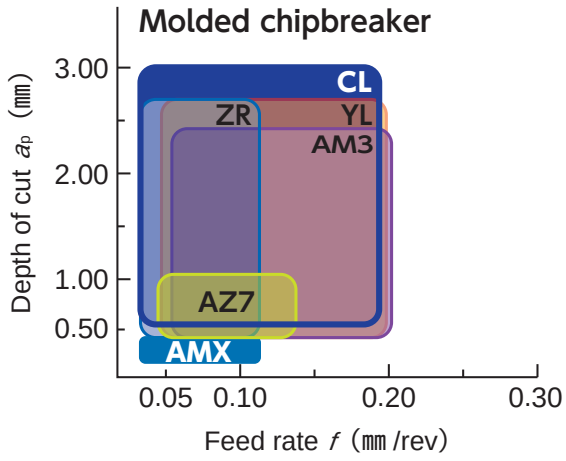
Negative-type molded inserts with chipbreaker

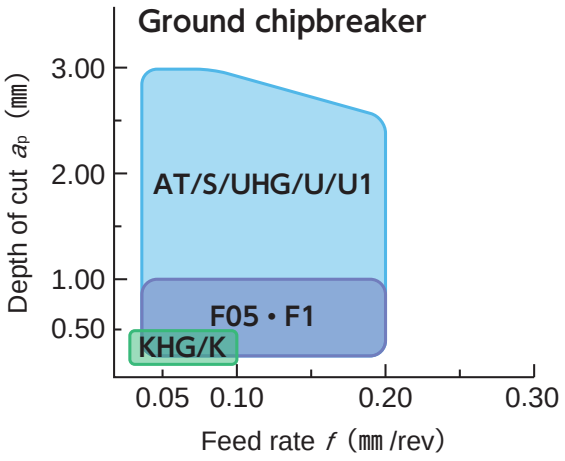
Product Name	Breaker shape / cross-section	Features and applications	Range of chip-control
UL	 ※TNGG160401MFN type	●Has sharpness equal to positive insert ●Excellent chip control under wide range of cutting condition	
ZF1	 ※CNMG120408ENB type	●Chipbreaker that produces very small chip length in the finishing range	
WM	※CNMG120404EN type	●Chipbreaker with remarkable chip control in the low feed range	
ZW1	 ※CNMG120408ENB type	●Versatile chipbreaker with remarkable chip control performance in a wide range	
ZP	 ※CNMG120408 type	●Provides outstanding cutting performance with the combination of the double-positive rake and the sharp cutting edge ●Enables low-resistance machining even with a high cutting depth	
Z5	 ※CNMG120408ENB type	●High strength insert ●Suitable for high loaded interrupted machining	
WV	 ※CNMG120408ENB type	●Offers the advantages of both high strength of cutting edge and chip control	
G	 ※CNMG120408 type	●Chipbreaker for roughing excellent in machining stability with strong cutting edge	

Negative-type inserts with ground chipbeaker

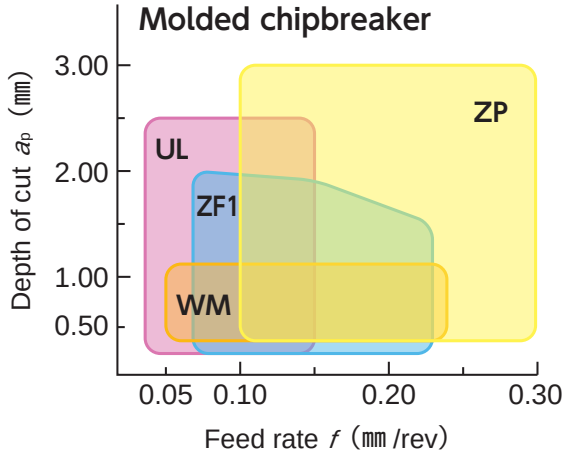
Product Name	Breaker shape / cross-section	Features and applications	Range of chip-control
DA	  ※TNGG160401F type	●Chipbreaker for finishing that controls the chip	
D1	  ※TNEG160402F type		
N1	 ※TNGG160402T type	●Double-positive shape with the large raise angle cutting ed ●Excellent chip control	
U2	  ※TNGG160402F type	●Cuts remarkably well with a high rake angle and this also works to prevent the material being cut from becoming hardened or burred	
B	 ※TNGG110304T type	●General-purpose chipbreaker with high performance in both sharp cutting and chip control	
C	  ※TNGG160402F type		

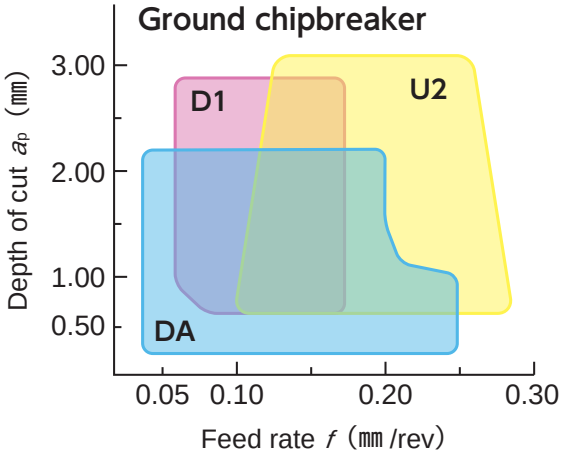
Positive-type inserts





Negative-type inserts



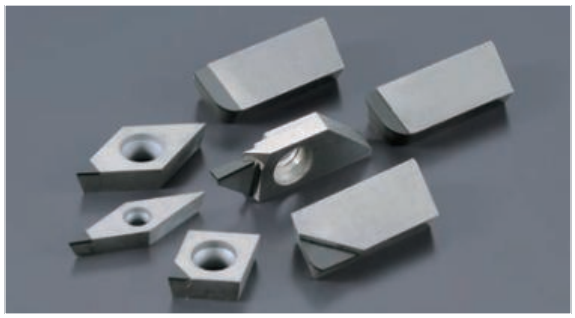


C

PCD, CBN and Ceramic

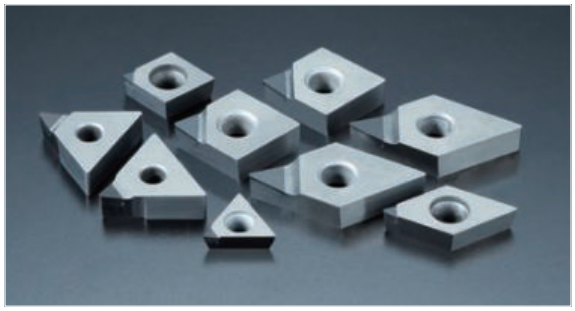
- PCD C2
- CBN C4
- Ceramic C6

Diamond sintered body, PCD



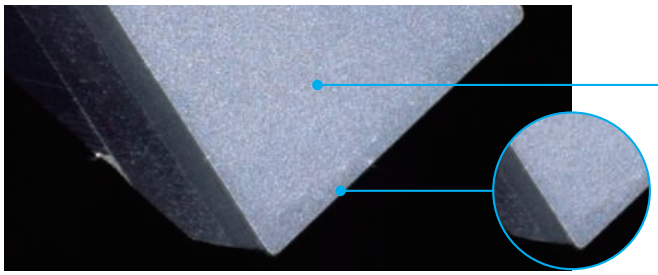
Diamond excels in deposition resistance with its low affinity and has excellent wear resistance with high hardness. But it also has a problem with fracture resistance due to lack of toughness. PCD is the material solving that problem without lossing original characteristics of diamond by sintering fine grain diamond and generating polycrystallization. It enables much higher speed machining of nonferrous metals compared to carbide.

PD1 / PD2 For high speed machining of nonferrous metals!



Features

- ***Elevated cutting speeds when compared to carbide***
- ***Recommended for cutting of aluminum and copper alloys with excellent deposition resistance***
- ***Incorporates a very sharp cutting edge condition***
- ***Pre-grinding and cutting-off types added in addition to the current milling cutter types***



- Uses strictly selected diamond grains , the hardest of all material types
- Further improved strength by poly-crystallizing dense diamond micro grains
- Excellent deposition resistance thanks to a lower affinity to nonferrous materials
- Sharp cutting edge attained
- Enables high precision and stable machining by control of potential built-up edge

Main applications for cutting: aluminum alloys, brass, copper alloys, graphite, ceramic compact, plastics

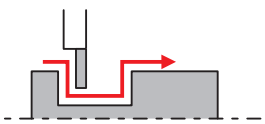
【Recommended cutting conditions】

Work material	Cutting speed (m/min)	Feed rate (mm /rev)	Cutting oil
aluminum alloy	Turning : ~ 350 Milling : ~ 4000	Turning : ~ 0.12mm /rev Milling : ~ 0.20mm /t	WET
Copper alloy	Turning : ~ 200 Milling : ~ 1000		

【Actual machining examples】

Machining of spool ●Work material : A6063		
	Conventional cutting tool	NTK
Material grade	Competitor's brazed carbide grade cutting tool	PD1
Cutting speed (m/min)	100	200
Feed rate (mm/rev)	0.02	0.06
Cutting oil	WET	←
Machining method	Grooving (5) followed by profiling of the grooves	Single stroke
Life (pcs./corner)	1,000	10,000

PD1

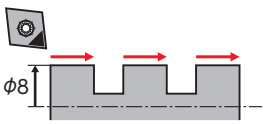


Shorter cycle time due to single pass machining.
PD1 produces an excellent surface finish without deposition, higher efficiency and prolonged life resulted.

Machining of spool

Material grade	: A6061
Cutting speed (m/min)	: 170
Feed rate (mm/rev)	: 0.06
Depth of cut (mm)	: 0.15
Cutting oil	: WET

PD2



NTK : PD2	10,000 pcs./corner
Competitor's PCD product	5,000 pcs./corner

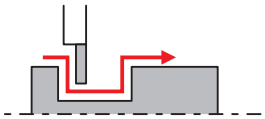
PD2, excellent in wear resistance, achieved twice the life of competitor's product.

【Actual machining examples】

Machining of spool ●Work material : A6063

	Conventional cutting tool	NTK
Material grade	Competitor's brazed carbide grade cutting tool	PD1
Cutting speed (m/min)	100	200
Feed rate (mm/rev)	0.02	0.06
Cutting oil	WET	←
Machining method	Grooving (5) followed by profiling of the grooves	Single stroke
Life (pcs./corner)	1,000	**10,000**

PD1

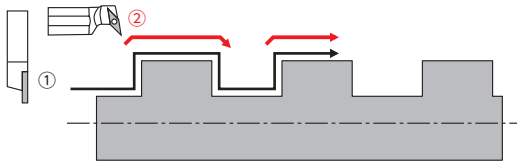


Shorter cycle time due to single pass machining.
PD1 produces an excellent surface finish without deposition, higher efficiency and prolonged life resulted.

Machining of spool ●Work material : A6061

	①Roughing	②Finishing
Material grade	PD1 GTPA25FRN01	PD1 VCMW110302
Cutting speed (m/min)	200	200
Feed rate (mm/rev)	0.1	0.05
Depth of cut (mm)	~ 5	0.2
Life (pcs.)	Roughing 30,000	**Finishing 30,000**

PD1



With GTPA type for roughing, higher efficiency was made possible.
High precision was achieved because of the use of DS holder and VCMW insert for finishing reduced cutting forces and material stress.

Machining of transmission case ●Work material : ADC12 die-cast ●Machine : Vertical type machining center

	Conventional cutting tool	NTK
Material grade	Competitor's PCD	PD1
Cutter specification	80×6 cutting edges	φ80×6 cutting edges
Cutting speed (m/min)	Rough : 700 Finish : 2,000	Rough : 1,500 Finish : 2,000
Revolution (min⁻¹)	Rough : 2,785 Finish : 7,958	Rough : 5,971 Finish : 7,958
Feed rate (mm/t)	Rough : 0.17 Finish : 0.08	Rough : 0.15 Finish : 0.08
Table feed rate (mm/min)	Rough : 2,785 Finish : 3,979	Rough : 7,165 Finish : 5,305
Depth of cut (mm)	Rough : 2.0 Finish : 0.5	←
Cutting oil	Internal lubrication	←
Life (pcs/corner)	10,000	**15,000**

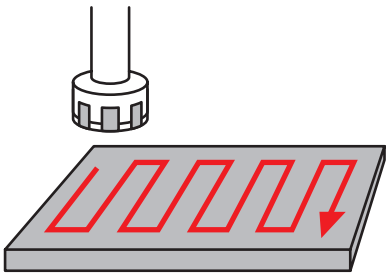
PD1

The cycle time was shortened by 10 seconds for roughing and by 3 seconds for finishing. Also, the life was 1.5 times longer.

Cutting of acrylic plate ●Work material : acryl

	Conventional cutting tool	NTK
Material grade	Competitor's PCD (4 cutting edges)	PD1 (φ80×6 cutting edges)
Cutting speed (m/min)	750	600
Feed rate (mm/t)	0.016	←
Table feed rate (mm/min)	800	1200
Depth of cut (mm)	0.1	←
Cutting oil	DRY	←

PD1

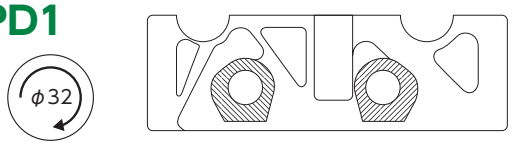


With this cuter, the surface finish was excellent and the cycle time for the following process was improved. The cutting efficiency was improved due to the 6 cutting edges.

Cutting of rocker shaft holder ●Work material: ADC12 aluminum

	Conventional cutting tool	NTK
Material grade	Competitor's PCD	PD1
Cutter specification	φ32×2 cutting edges	φ32×4 cutting edges
Cutting speed (m/min)	600	800
Revolution (min⁻¹)	6,000	8,000
Feed rate (mm/t)	0.025	0.05
Table feed rate (mm/min)	300	1,600
Depth of cut (mm)	MAX1.0	←
Cutting oil	WET (through coolant)	←
Life (pcs./corner)	8,000	**15,000**

PD1



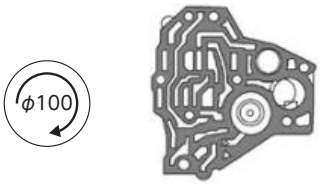
The finish of the machined surface: 1.5S

The cycle time was reduced by 3 minutes.

Cutting of automatic transmission component ●Work material : ADC12 die-cast

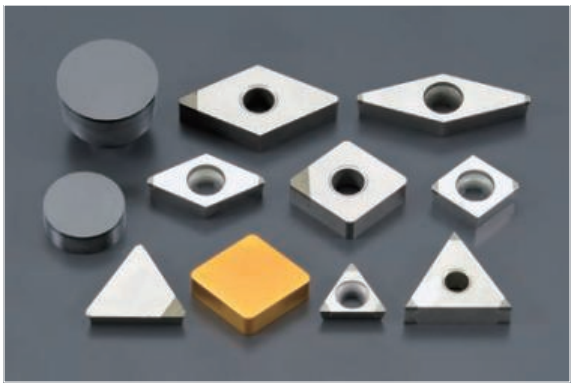
	Conventional cutting tool	NTK
Material grade	Competitor's PCD	PD1
Cutter specification	φ100×6 cutting edges	φ100×8 cutting edges
Cutting speed (m/min)	2,513	←
Revolution (min⁻¹)	8,000	←
Feed rate (mm/t)	0.05	←
Table feed rate (mm/min)	2,400	3,200
Depth of cut (mm)	0.2	←
Cutting oil	WET	←
Life (pcs./corner)	2,000	**10,000**

PD1



The life was significantly prolonged with improved workpiece stability.

High-pressure sintered compact



CBN grade inserts are composed mainly of CBN (Cubic Boron Nitride) particles with a special ceramic binder. The material has excellent cutting material properties including high hardness at normal and highly elevated temperatures, little chemical reactions with work materials, making it a material suitable for cutting tools

CBN inserts can be used for machining of cemented materials and high speed machining of cast iron

B16 Best for high efficiency machining of cast iron !

Features

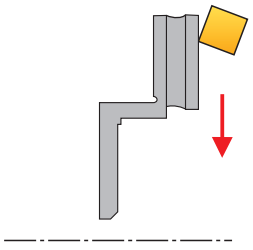
- ***Solid CBN with multiple corners available***
- ***Arial Bold Italig***
- ***The coating allows easy checking of used cutting edges***

Material grade	Main binder	CBN content	Major application
B16	TiN coating + special ceramic	82%	Roughing and finishing of normal cast iron at high speed/rolling rolls

【Actual machining examples】

Rough cutting of disc brake

Work material : FC250
Cutting speed (m/min) = 1,000
Feed rate (mm/rev) = 0.7
Depth of cut (mm) = 1.0
Cutting oil : WET



NTK : **B16**	800 pcs./corner
Competitor's CBN product	650 pcs./corner

B16 produced tool life of 1. 2 times the competitor's product.

B22 Best for machining of rolls of high hardness !

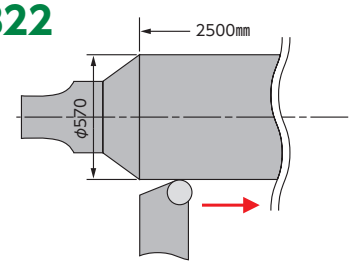
Features

- ***Top layer of CBN with a carbide base offereing multiple cutting edges***
- ***High hardness due to the use of the special binder***

Material grade	Main binder	CBN content	Major application
B22	TiN-base	80%	Turning of very hard rolls

Machining of roll

Work material : High chrome cast iron
Cutting speed (m/min) = 60
Feed rate (mm /rev) = 0.2
Depth of cut (mm) = 2.0
Cutting oil : WET

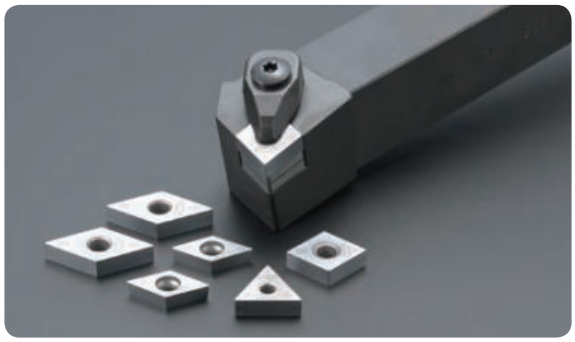


NTK : **B22**	2 passes
Competitor's CBN product	1 pass

B22 produces twice the life of the competitor product.

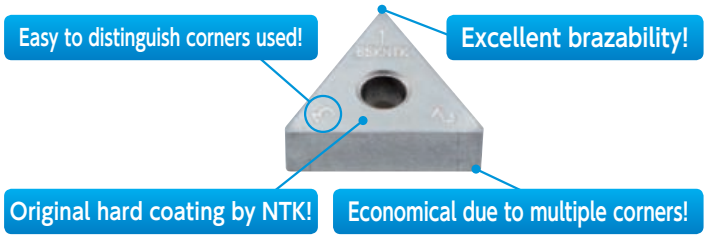
EZCUBE

CBN inserts offer high performance, low price and versatility !



Features

- *Seven grades available for different component materials*
- *Large range for various applications*
- *Multiple corners on both insert sides contributes to cost reduction*



NEW CBN (Cubic Boron Nitride)

●NTK *EZCUBE* / EZ CUBE

Material grade	Main binder	CBN content	Major application
B23	Ti-base	90%	High-speed semi roughing of cast iron/sintered alloys
B30	Ti-base	95%	High-speed finishing of cast iron
B36	TiCN-base	65%	semi-interrupted to interrupted machining of hardened materials
B40	TiN-base	65%	Interrupted machining of highly hardened materials
B52	TiC-base	50%	Finishing of ductile cast iron and continuous machining of highly hardened materials
B5K※	TiC-base	50%	Continuous to semi-interrupted machining of hardened steels Finishing of ductile cast iron
B6K※	TiCN-base	65%	Semi-interrupted to interrupted machining of hadened steels

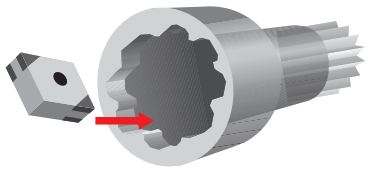
※PVD coating CBN

【Actual machining examples】

Interrupted boring of continuous-velocity universal joint

Work material:S55C(HRC62)
Cutting speed(m/min)=110
Feed rate(mm/rev)=0.14
Depth of cut(mm)=0.15
Cutting oil : DRY

B40



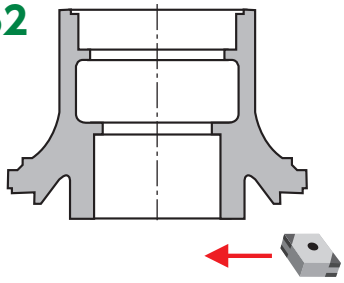
NTK : **B40**	2,300 pcs./corner
Competitor's CBN product	1,500 pcs./corner

B40 grade inserts showed a prolonged life without chipping in the interrupted boring operation.

Arial Narrow Bolg

Work material : FCD600
Cutting speed(m/min)=350~400
Feed rate(mm/rev)=0.08
Depth of cut(mm)=0.2
Cutting oil : WET

B52



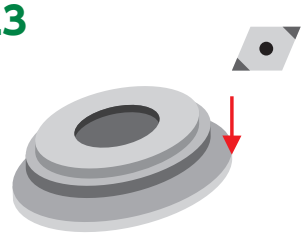
NTK : **B52**	60 pcs./corner
Competitor's CBN product	30 pcs./corner

The life of B52 grade inserts was twice that of the competitor product.

Cutting of outer side of oil pump housing

Work material : FC250
Cutting speed(m/min)=250
Feed rate(mm/rev)=0.2
Depth of cut(mm)=2.0
Cutting oil : WET

B23



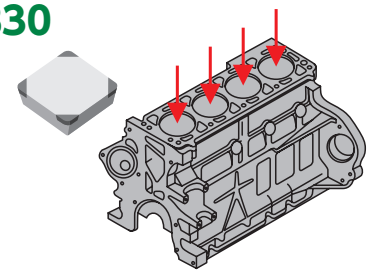
NTK : **B23**	210 pcs./corner
Competitor's CBN product	70 pcs./corner

The life of B23 grade inserts was 3 times as long as the competitor's product.

Continuous boring on cylinder block

Work material : FC material
Cutting speed(m/min)=800
Feed rate(mm/rev)=0.3
Depth of cut(mm)=0.1
Cutting oil : WET

B30

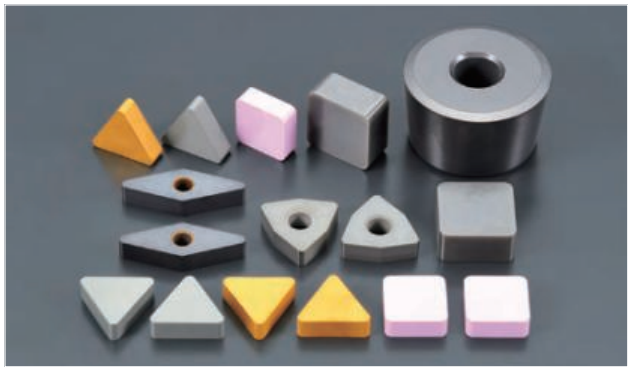


NTK : **B30**	800 pcs./corner
Competitor's CBN product	500 pcs./corner

The life of B30 grade inserts was 1.6 times as long as the competitor's product.

※The recommended cutting conditions for individual CBN grades are described in page A37.

Ceramic



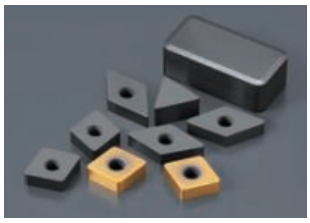
NTK Ceramic Tools ensure highly efficient machining with their superior high temperature hardness, heat resistance and chemical stability
NTK offers various types of ceramic tool material (silicon-nitride-base, alumina-base and whisker-base) in many different shapes to meet the respective requirements of applications for higher efficiency and at higher cutting speeds

● *Alumina-based Ceramics (White ceramics)*

Can be used for high-speed finishing of normal cast iron thanks to its excellent wear resistance

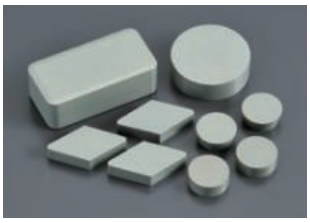
● *Silicon nitride-based ceramics*

Best for high-speed roughing of normal cast iron
Machinin g up to V_c = 1,000m/min is possible



● *Alumina TiC-based ceramics (Black ceramics)*

The toughness of this type is improved by adding TiC
Can be used for semi-finishing to finishing for normal cast iron and hardened materials



● *Whisker-based ceramics*

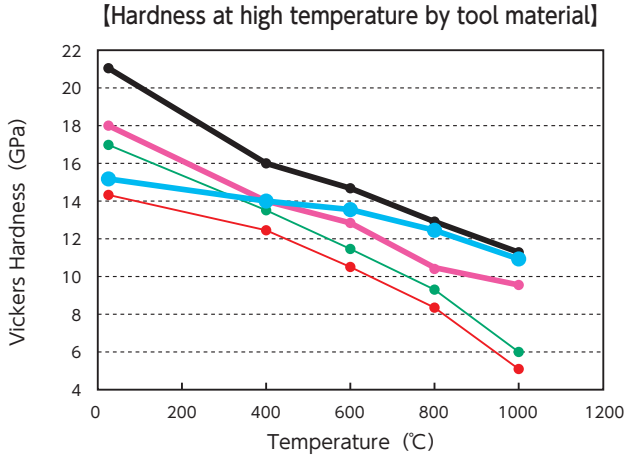
Wear resistance and fracture resistance are strengthened by adding SiC whisker
First choice for machining of heat-resistant alloys and rolls made of cemented materials

■ Advantages of ceramic cutting tools①

The material retains high hardness even at elevated temperatures !!

Excellent wear resistance at high cutting speeds !

【Hardness at high temperature by tool material】

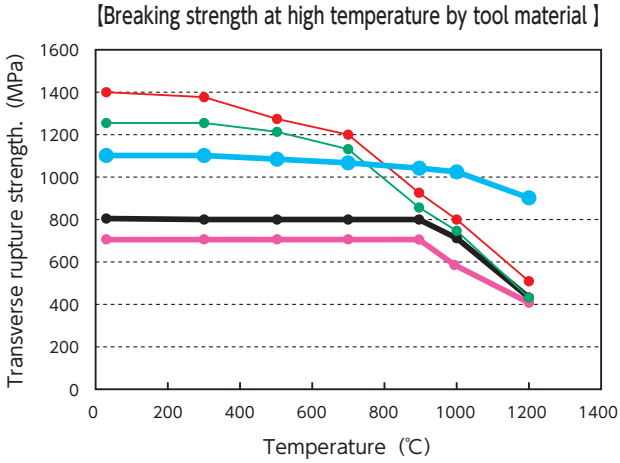


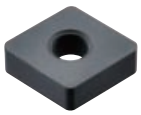
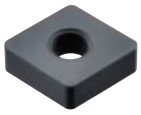
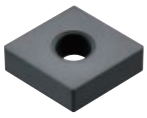
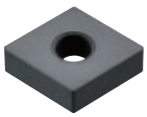
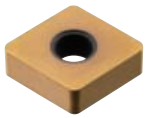
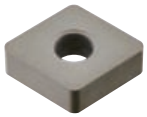
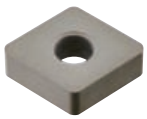
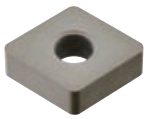
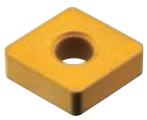
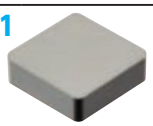
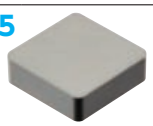
■ Advantages of ceramic cutting tools②

Material breaking strength is not greatly affected by high temperature conditions !!

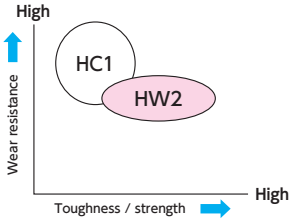
Stable machining is possible in the high speed range

【Breaking strength at high temperature by tool material 】

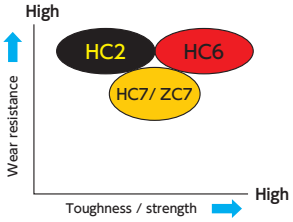


	Material code name / Coating	Applications / Features	Physical properties※ Density g/cm³	Hardness HRA	Transverse intensity MPa	Young's modulus GPa	Thermal expansion coefficient X10⁻⁶/K	Therma conductivity W/m・K	Applications and ceramic property map
White ceramics Alumina - based ceramics	**HC1** Al_2O_3	●Semi-finishing to finishing and grooving of cast iron ●Tube Scarfing	4.0	94.0	700	400	7.8	17	
	HW2 Al_2O_3	●Semi-finishing to finishing of cast iron ●Cylinder Liner machining ●Excellent fracture resistance	4.1	94.0	750	390	7.8	19	
Black ceramics Alumina + TiC-based ceramics	**HC2**  Al_2O_3+TiC	●Semi-finishing to finishing of cast iron	4.3	94.5	800	420	7.9	21	
	HC4  Al_2O_3+TiC	●Cutting of hardened materials	4.6	95.5	1,000	420	7.8	25	
	HC6  $TiC+Al_2O_3$	●Semi-finishing to finishing of ductile cast iron ●Semi-finishing to finishing of cast iron with coolant	4.7	94.0	800	450	7.6	29	
	HC7  Al_2O_3+TiC	●Cutting of hardened materials (removal of carburized layer) ※Substitute for HC5	4.6	95.0	1,100	420	7.9	23	
	ZC7  Al_2O_3+TiC TiN coat	●Recommended for cutting of hardened materials (removal of carburized layer)	4.6	95.0	1,100	420	7.9	23	
Silicon nitride - based ceramics	**SX6**  Si_3N_4	●Normal cast iron turning ●Normal cast iron milling ●Resistance to insert flank wear ※Substitute for SX1	3.2	93.5	1,200	320	3.0	50	
	SX7  Si_3N_4	●Heat resistant alloy turning ●Heat resistant alloy milling ●High wear resistance	3.3	93.0	900	290	3.4	11	
	SX9  Si_3N_4	●Heat resistant alloy turning ●Rough turning of normal cast iron ●High fracture resistance	3.3	93.5	1,200	330	3.0	15	
	SP9  Si_3N_4 TiN+Al_2O_3 coat	●Heat resistant alloy turning ●Rough turning of normal cast iron ※Substitute for SP2 ●Special edge treatment for lower cutting forces + high precision cutting with coated inserts	3.3	93.5	1,200	330	3.0	15	
Whisker - based ceramics	**WA1**  Al_2O_3+SiC	●Heat resistant alloy turning ●High efficiency cutting of normal cast iron	3.7	94.5	1,200	400	7.6	35	
	WA5  Al_2O_3+SiC	●Heat resistant alloy turning ●High efficiency cutting of normal cast iron ●High fracture resistance	3.8	94.5	1,200	400	7.7	35	

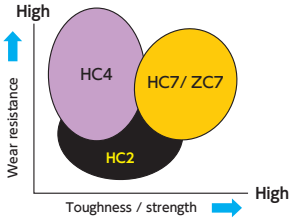
[Normal cast iron, Finishing, DRY, White ceramics]



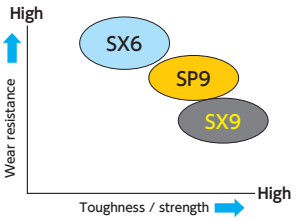
[Normal cast iron, Finishing, WET, Black ceramics]



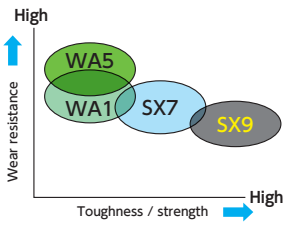
【Cutting of hardened materials】



[Cutting of normal cast iron / Roughing]



【Heat-resistant alloy / Roughing】

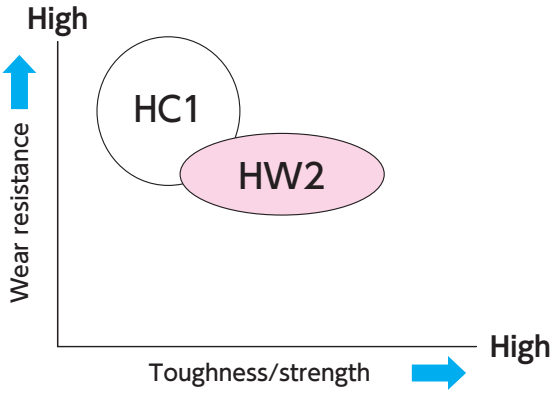


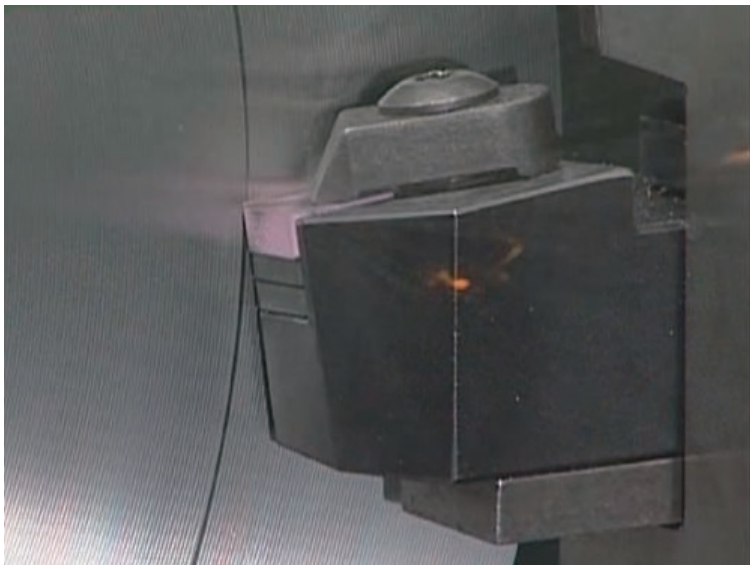
※ For coated products, the values of the base material are indicated.

Alumina-based ceramics (White ceramics)

- Characterized by high oxidation resistance as well as deposition resistance, these ceramics utilise alumina that is thermally and chemically stable. They are best suited for high-speed cutting applications where the temperature at the edges may become high

[Normal cast iron, Finishing, Dry cutting, White ceramic]

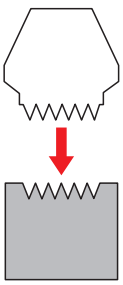


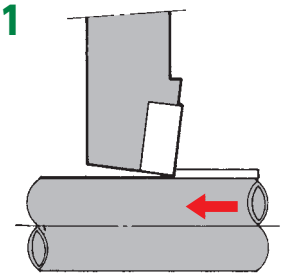


HC1 Ideal material for high-speed finishing of cast iron !

Features

- ***Outstanding wear resistance for high-speed cutting of cast iron, especially semi-finishing or finishing without coolant***
- ***Most suitable for high-speed and high-temperature cutting thanks to the high heat resistance, using high-purity alumina as the main component***
- ***Usable even for finishing of special cast iron and for tube scarfing***

Pulley machining		
Work material : FC250	HC1	
Cutting speed (m/min) =500		
Feed rate (mm /rev) =0.15→0.10→0.05		
Cutting oil : DRY		
NTK : HC1	600 pcs./corner	
Competitor's black ceramic	300 pcs./corner	
HC1 achieved double the tool life of the competitor product.		

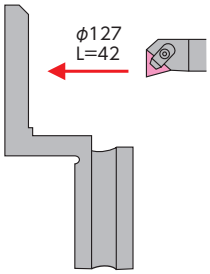
Tube Scarfing		
Work material : SPHT4	HC1	
Cutting speed (m/min) =70		
Depth of cut (mm) =3.0		
Cutting width (mm) =5.0		
Cutting oil : DRY		
NTK : HC1	70 min./corner	
Competitor's black ceramic	30 min./corner	
With its outstanding wear resistance characteristic, HC1 produced double the competitors tool life.		

HW2 Highly tough alumina-based ceramic tool !

Features

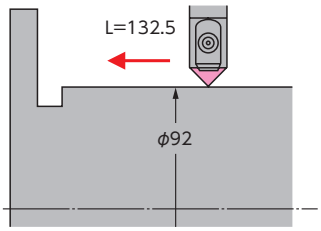
- ***Exhibits high strength and high toughness through the addition of zirconium to high purity alumina***
- ***Suitable for semi-interrupted finishing applications for normal cast iron and roughing and finishing of special cast iron (such as lining materials)***

Brake Disc machining

Work material : FC250	**HW2** 
Cutting speed (m/min) = 359	
Feed rate (mm/rev) = 0.3	
Depth of cut (mm) = 0.5	
Cutting oil : DRY	
NTK : **HW2**	130 pcs./corner
Competitor's black ceramic	65 pcs./corner

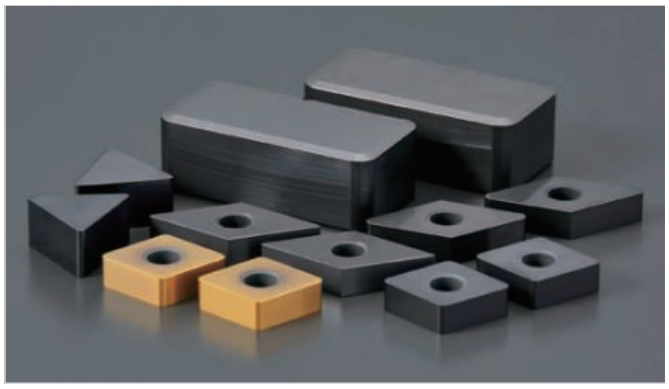
HW2 achieved twice the tool life of the competitor's product, due to its superior strength.

Cylinder liner machining

Work material : special cast iron	**HW2** 
Cutting speed (m/min) = 600	
Feed rate (mm/rev) = 0.32	
Depth of cut (mm) = 3.0	
Cutting oil : DRY	
NTK : **HW2**	70 pcs./corner
Competitor's black ceramic	30 pcs./corner

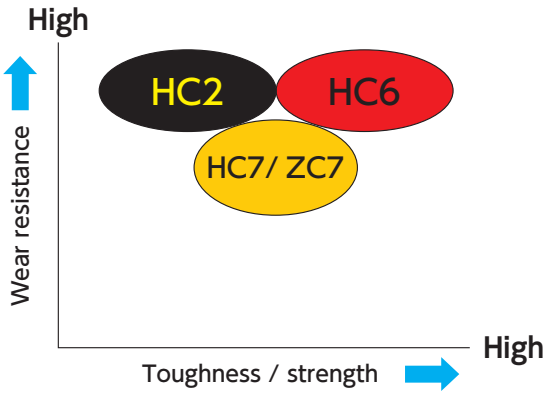
HW2 produced finished surfaces of excellent quality in addition to the life being double that of the competitor's product.

Alumina TiC-based ceramics (Black ceramics)

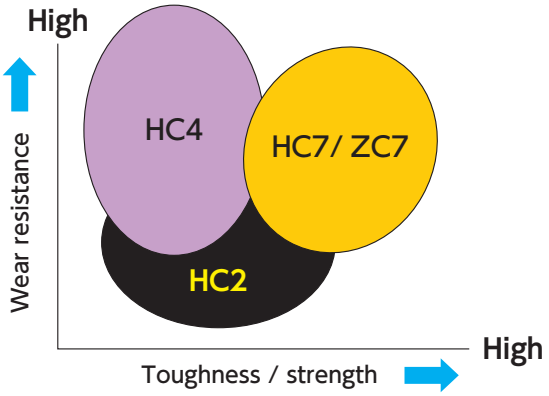


This material group are alumina TiC-based ceramics strengthened by adding hard carbide to high-purity alumina These tool materials exhibit excellent performance in high-speed finishing of cast iron, applications under either WET or DRY cutting, or even in partially interrupted machining, having improved hardness and strength
Excellent at finishing of hardened materials due to the high hardness and low plasticity in high temperature ranges

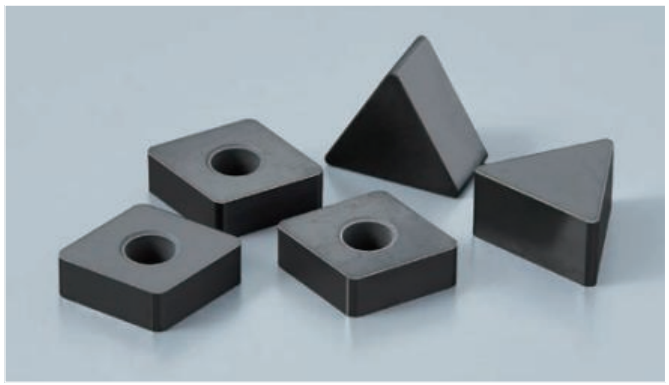
【Normal cast iron, Finishing, WET, Black ceramic】



【Machining of hardened materials】



HC2 The standard tool material for machining cast iron and hardened materials !

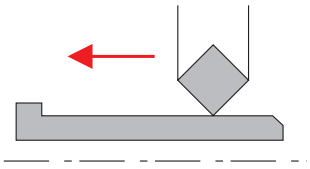


Features

- ***Excellent performance in machining of cast iron and hardened materials thanks to its high hardness and low plasticity in high temperature ranges***

Machining of lining material	● Work material : FC material	
	Conventional cutting tool	NTK
Material grade	Competitor' s carbide	HC2
Cutting speed (m/min)	400	600
Feed rate (mm /rev)	0.50	←
Depth of cut (min)	0.70	←
Cutting oil	DRY	←
Life (pcs./corner)	40	110

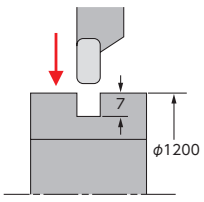
HC2



HC2 produced 1.35 times higher machining efficiency and almost 3 times the tool life of the competitor' s product.

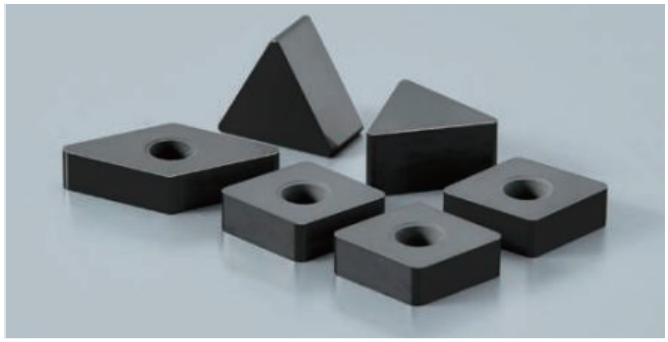
Machining of roller bearing	● Work material : SNCM (HRC58)	
	Conventional cutting tool	NTK
Material grade	Competitor' s carbide	HC2
Cutting speed (m/min)	23	112
Feed rate (mm /rev)	0.06	0.06
Cutting oil	DRY	←
Life (No. of grooves)	4	6

HC2



HC2 produced approximately twice the machining efficiency and 1.5 times longer tool life than the competitor' s product.

HC4 For machining of hardened materials!

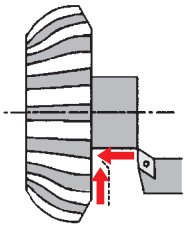


Features

- ***Performs remarkably well as a material exclusively for hardened materials, having improved hardness and strength, by the introduction of micro grains also facilitating a higher melting point***

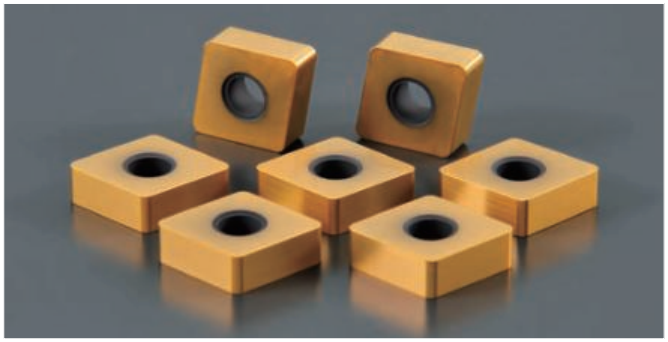
Cutting of side gear

Work material : Case carburizing steel	HC4
Hardness : HRC63	
Cutting speed (m/min) =121	
Feed rate (mm /rev) = 0.03 ~ 0.04	
Depth of cut (mm) =0.15	
Cutting oil : DRY	
NTK : **HC4**	60 pcs./corner
Competitor's black ceramic	30 pcs./corner



HC4, excellent in wear resistance, achieved twice the life of the competitor' s product.

ZC7 For machining of hardened parts with varying levels of hardness!

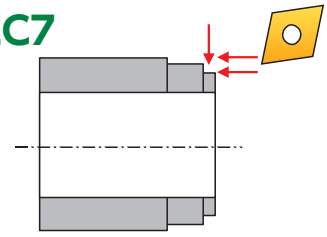


Features

- ***Covers a wide range of hardened materials (HRC45 – 60)***
- ***ZC7 coated with TiN provided as standard stocked product***
- ***Inserts are available with both wiper facets and chipbreakers to further improve machining efficiency***

Gear cutting

Work material : Case carburizing steel	ZC7
Cutting speed=200m/min	
Feed rate=0.20mm /rev	
Depth of cut=0.70mm	
Cutting oil : DRY	
NTK : **ZC7** (w/ 4 corners)	70 pcs./corner
Competitor's CBN (w/ 2 corners)	50 pcs./corner



ZC7 realized significant cost reduction, through longer tool life as compared with the competitor's CBN product.

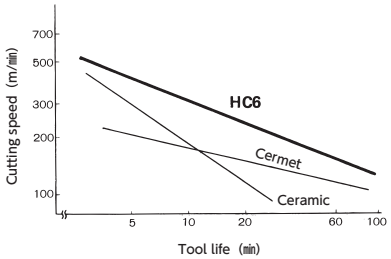
For technical data of machining hardened steels , please go to page Q2

HC6 For machining of ductile cast iron!

Features

- ***World's first TiC-based ceramic put into practical use***
- ***Ideal for semi-finishing and finishing of ductile cast iron at low to high-speed levels***
- ***Also produces excellent dimension stability in machining of cast iron under WET cutting conditions***

■ Cutting performance : V-T curve

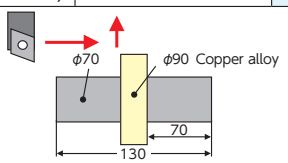


Cutting conditions
Work material : FCD550(HB240 ~ 260)
Insert : SNGN120408
Depth of cut : 0.5mm
Feed rate : 0.2mm /rev
Reference life : Amount of VB wear=0.4mm

Gear cutting ● Work material : Equivalent to FCD450 + copper alloy

	Conventional cutting tool	NTK
Material grade	Competitor's cermet	HC6
Cutting speed (m/min)	300	←
Feed rate (mm /rev)	0.05	←
Depth of cut (min)	0.5	←
Cutting oil	WET	←
Life (pcs/corner)	20	50

HC6

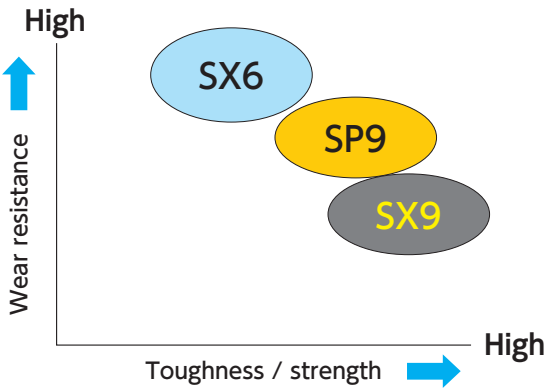


HC6 produced remarkably long life, less dimensional variations and better wear resistance compared with the competitor's product.

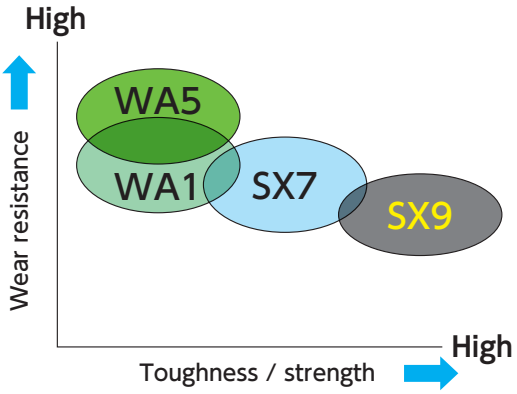
Silicon nitride-based ceramics

The silicon nitride-based ceramics have approximately twice the fracture toughness of alumina-based, having high fracture resistance equal to some carbide tools
These grades allow for efficient machining in high speed ranges where traditional ceramic tools were not able to perform well, including milling of cast iron and interrupted cutting in poor surface conditions

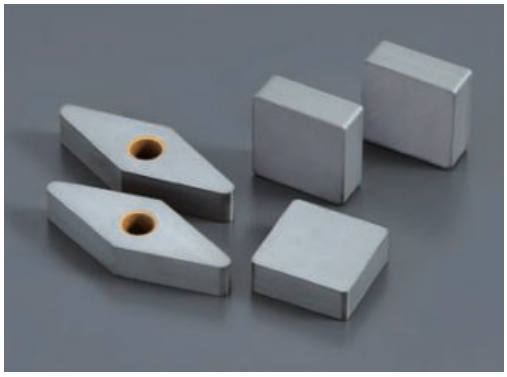
【Normal cast iron, Roughing】



【High Temperature Alloy, Roughing】



SX6 The latest tool material for machining of cast iron through rough surface conditions !



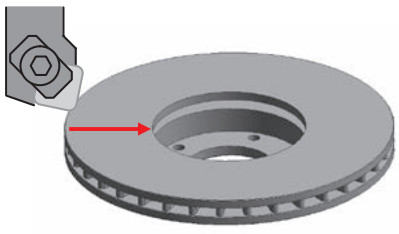
Features

- ***Outstanding boundary wear resistance***
- ***Outstanding thermal shock resistance enabling stable WET machining and milling***
- ***Possible to machine at high efficiency and at high speed over 1,200 m/min***

Material	Work material	Application	Cutting speed	Feed rate
SX6	FC150 ~ 300	Turning	~ 1,200 (m/min)	~ 0.7 (mm /rev)
		Milling	~ 1,000 (m/min)	~ 0.3 (mm /t)

Disc brake machining with coolant

Work material : FC150	SX6
Cutting speed (m/min) = 1,100	
Feed rate (mm/rev) = 0.5	
Depth of cut (mm) = 2.0~3.0	
Cutting oil : WET	

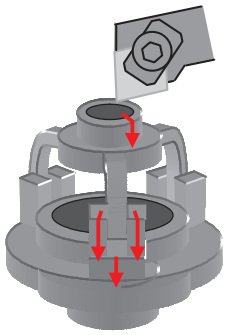


NTK : SX6	75 pcs./corner
Competitor's silicon nitride-based ceramic	50 pcs./corner

SX6 produced 1.5 times longer life than the competitor's silicon nitride-base ceramic product.

Interrupted roughing with coolant of stator housing

Work material : FC300	SX6
Cutting speed (m/min) = 350	
Feed rate (mm/rev) = 0.35	
Depth of cut (mm) = 2.5	
Cutting oil : WET	



NTK : SX6	70 pcs./corner
Competitor's silicon nitride-based ceramic	50 pcs./corner

SX6 achieved stable machining in the interrupted operations without any insert chipping.

SX7 Best for high speed machining for high temperature alloy!

Features

- ***Better notching resistance compared to Whisker ceramics***
- ***No more ramping machining needed to resist notching wear like Whisker ceramics require***
- ***Better flank wear resistance compared to general SiAlON ceramics enables machining in same speed range with Whisker ceramics***
- ***Excellent heat resistance allows for milling in such high speed as 1,000 m/min, which greatly reduces machining time compared to carbide***

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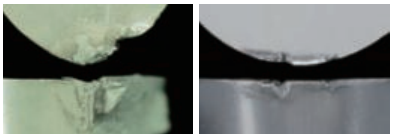
Semi-rough machining of turbine disc ●Work material : Inco 718

		Current	NTK
Material		Whisker Ceramic	SX7
Dimension		RPGX120700	←
Cutting speed	(m/min)	240	←
Feed rate	(mm /rev)	0.15	←
Depth of cut	(mm)	1.50	←
Cutting oil		WET	←
Life (mm/corner)	(min)	7.0	←

Competitor's Whisker Ceramic SX7



SX7, excellent in notching resistance, controlled insert chipping, on the other hand compeditor's Whisker ceramic could not.

Combustion case milling ●Work material : Inco 718

		Current	NTK
Material		Carbide	SX7
Dimension		APKT type	RPGN120400
Cutter		φ40-3 edges	φ40-3 edges
Cutting speed	(m/min)	36	1000
Revolution	(min^{-1})	287	7961
Feed rate	(mm /tooth)	0.60	0.12
Depth of cut	(mm)	0.80	0.80
Coolant		WET	DRY
Efficiency	(m/min)	517	2866
Removal Volume	(cc/min)	21	115
Life (mm/corner)	(cc)	620	**620**
Cycle time	(min)	30	5.4

SX7 achieved about 6 times the working efficiency of competitor's carbide.

SX9 For cost reduction in heat-resistant alloy applications !

Features

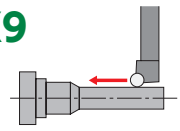
- ***Heat resistance and fracture resistance improved greatly thanks to our own manufacturing method producing needle type grain structure***
- ***Allows for machining of heat-resistant alloys including inconel, waspaloy and stellite***
- ***Significantly cost-effective compared with whisker-based ceramic***

【Actual machining example : Heat resistant alloy】

Machining of aircraft component after rough skin removal

Work material : Inconel 718
Cutting speed(m/min)=180
Feed rate(mm/rev)=0.2
Depth of cut(mm)=~0.6
Cutting oil : WET

SX9



NTK : SX9	2 pcs./corner
Competitor's whisker-based ceramic tool	1 pcs./corner

SX9 exhibited a significant advantage in terms of cost, reduction, the life was twice that of the competitor's whisker-based tool.

SP9 Best for interrupted machining and low-speed machining of cast iron !

Features

- ***Improved fracture resistance in interrupted machining by the use of a highly tough material***
- ***Outstanding dimensional stability by controlling the temperature increase during machining thanks to the minimum condition of the cutting edge***
- ***Longer life for lower speed ranges, such as 300 m/min, due to the coating***

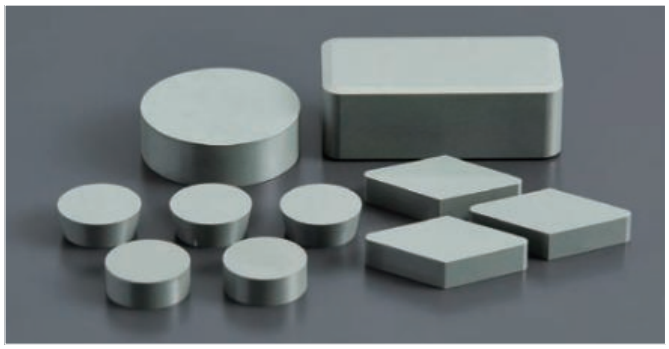
Brake disc machining ●Work material : FC material

	Conventional cutting tool	NTK
Material grade	Competitor's silicon nitride-based ceramic	SP9
Cutting speed (m/min)	550	←
Feed rate (mm /rev)	0.4	←
Cutting oil	DRY	←
Life (pcs./corner)	80	120

SP9

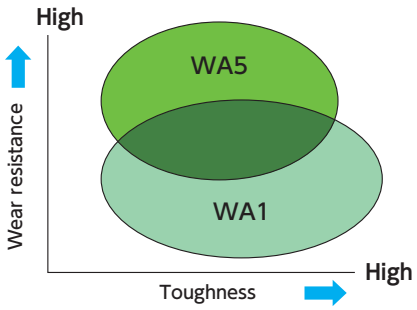
SP9 controlled the major flank boundary wear better than the competitor's silicon nitride-based ceramic tool. "Chipping" was also well controlled due to less cutting resistance from the minimal edge condition.

Whisker-based ceramics

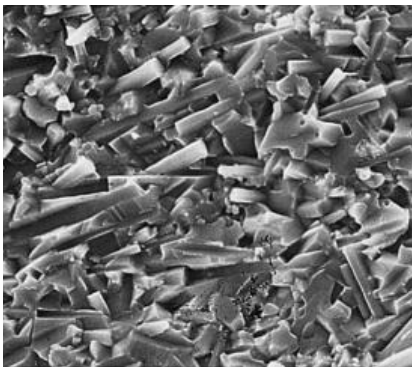


This material grade realize a higher level of wear resistance, toughness and flaking resistance by adding SiC whiskers to alumina, the major component
This grade enables high speed and high feed in cutting normal cast iron, heat-resistant alloys and hardened rolls, with its excellent thermal shock resistance

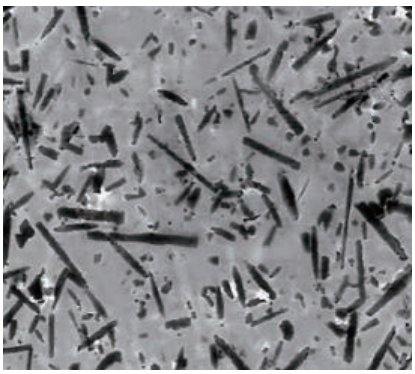
【Heat-resistant alloy】



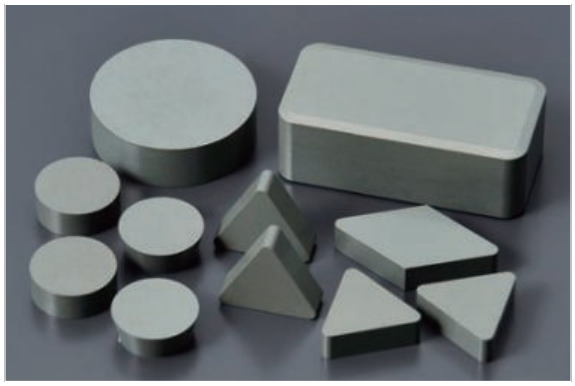
【Photo of WA1 structure】



【Photo of WA5 structure】



WA5 A new generation for machining of heat-resistant alloys !



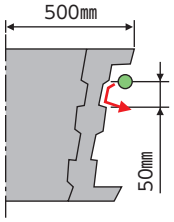
Features

- ***New material grade for machining of heat-resistant alloys including inconel and waspaloy***
- ***Improved wear resistance and flaking resistance by optimizing the amount of whisker content***

【External profiling of heat-resistant alloy with WA5】

Machining of jet engine component ● Work material : Inconel 718		
	Conventional cutting tool	NTK
Material	Competitor's whisker-based ceramic	WA5
Cutting speed (m/min)	200	←
Feed rate (mm/rev)	0.10	←
Depth of cut (mm)	0.30	←
Cutting oil	WET	←
Life (mm/corner)	80	←
Criterion for end of life	Wear marks on the processed surface	Replacement by specified qty of work pieces

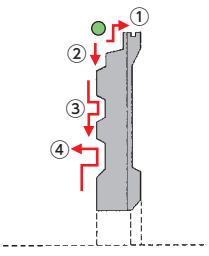
WA5



WA5 achieved stable machining compared with the competitor's product.

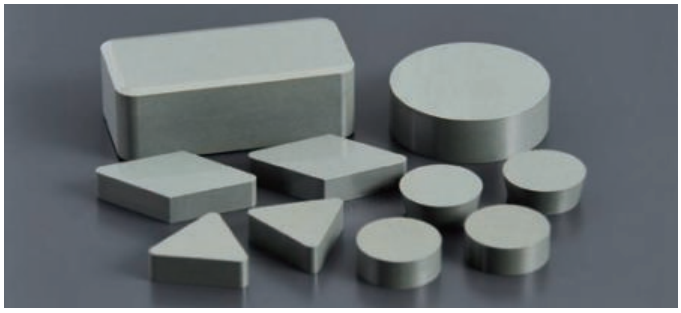
Machining of jet engine turbine disc ● Work material : Inconel 718		
	Conventional cutting tool	NTK
Material	Competitor's whisker-based ceramic	WA5
Cutting speed (m/min)	400	←
Feed rate (mm/rev)	0.15	←
Depth of cut (mm)	0.25 ~ 0.75	←
Cutting oil	WET	←
Life (mm/corner)	2	4

WA5



WA5 produced twice the tool life of the competitor's product.

WA1 Ultra high-speed machining of heat-resistant alloys and cast iron !



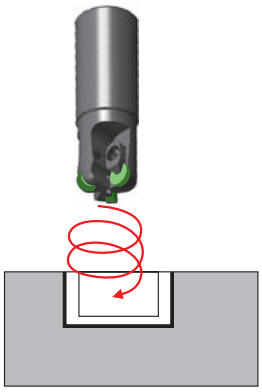
Features

- ***Excellent thermal shock resistance enables to machine high temperature alloy with high speed*** V_c ***= ~500m/min***
- ***Superior wear resistance allows high speed cutting*** V_c ***= ~ 1,000m/min on cast iron.***
- ***Wet machining is feasible by high thermal shock resistance***

【Actual machining example : Gas turbine material】

Case machining	● Work material : Inconel 718	
	Conventional cutting tool	**NTK**
Material grade	Competitor's carbide end mill cutter	WA1
Holder	Solid	RPIW125E125R03
Cutting speed (m/min)	50	800
Feed rate (mm /edge)	0.14	0.10
Depth of cut (mm)	2	←
Cutting oil	WET	DRY
Life (mm /corner)	1 pass = 60 min.	**1 pass = 2 min.**

WA1

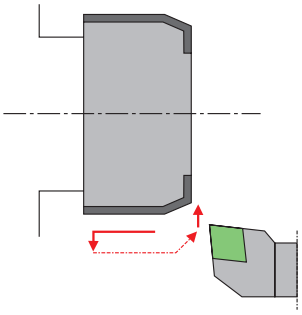


WA1 gave 1.6 times better machining efficiency than the competitor's product.

【Semi-finishing of planetary gear】

Machining of planetary gear	● Work material : FCD700	
	Conventional cutting tool	**NTK**
Material grade	Competitor's carbide	WA1
Cutting speed (m/min)	100	300
Feed rate (mm /rev)	0.4	←
Depth of cut (mm)	1.5	←
Cutting oil	DRY	←
Life (mm /corner)	45	**100**

WA1



WA1 produced better machining efficiency when compared to the competitor's product.

For technical data of machining heat-resistant alloys with ceramic cutting tools, please go to page Q4

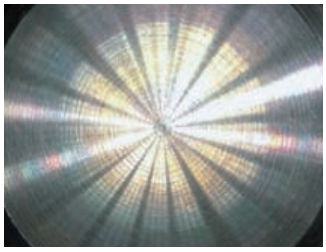
MEMO

D

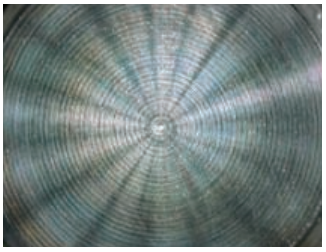
Cermet, PVD-coated Cermet

Cermet Series

Cermet is a tool material composed mainly of TiC (Titanium Carbide) and TiN (Titanium Nitride). The name, cermet, is derived from the words CERAMIC and METAL (representing carbide). As the name suggests, cutting performance is also is in the mid- range of ceramic' s and carbide' s. The advantages of this material grade are that high-quality and excellent surface finishes can be achieved allied with elevated cutting speeds



Surface finished with cermet

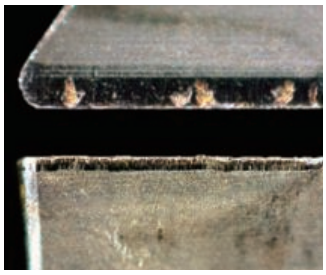


Surface finished with carbide

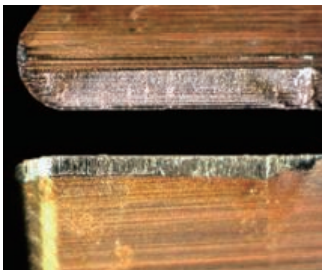
Features

High quality surface finish

The main components, TiC and TiN, have good deposition resistance as they are low in affinity with work materials. Thus, machining with these grades allows for a high degree of surface finish over extended periods of cut



Cermet



Carbide

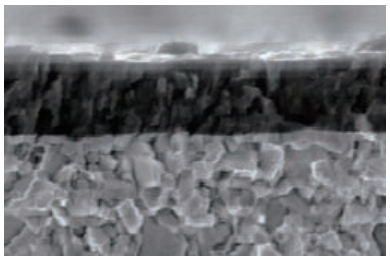
Features

High cutting speed

The main components, TiC and TiN, are more resistant to wear and oxidation at high temperature than WC (tungsten carbide), the main component of carbide tools. Because of this, cermet grades are less reactive with work materials, allowing for stable machining at high speed

PVD-coated cermet series

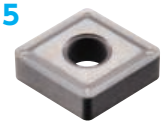
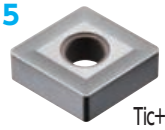
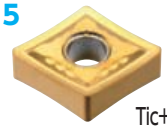
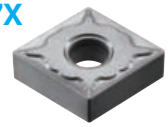
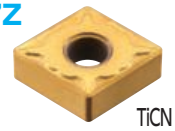
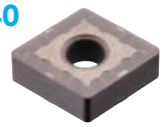
This grade has improved wear resistance by coating the cermet with TiN or TiCN. Since the coating layer does not contain any binder components, the original wear resistance of the titanium compound delivers excellent performance, enabling the tool life to be



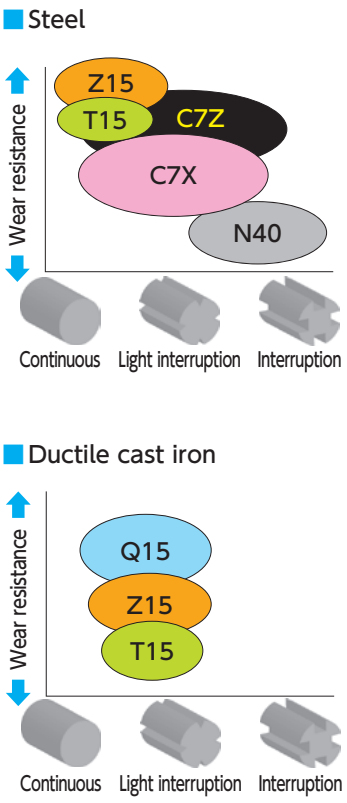
Features

Highly wear- and deposition-resistant due to the PVD coat providing high hardness and surface smoothness

【Types, applications and features of tool materials】

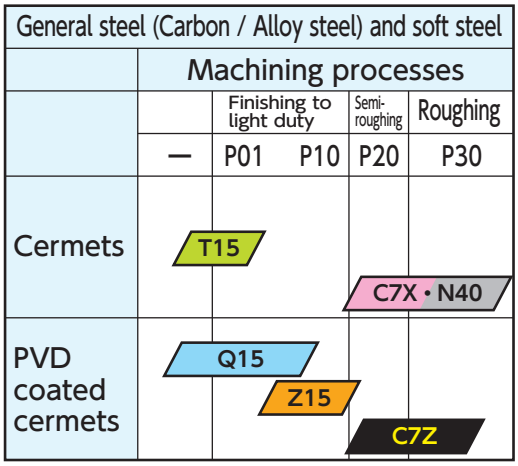
Material code name / Coating	Applications / Features	Physical properties※ Density g/cm³	Hardness HRA	Transverse intensity GPa	Young's modulus GPa	Thermal expansion coefficient X10⁻⁶/K	Thermal conductivity W/m・K
T15  TiCN base	●Semi-finishing and finishing of steel ●Finishing of ductile cast iron	6.3	92.5	1,700	450	8.4	21
Q15  Tic+TiN + TiCN coat	●Finishing of ductile cast iron at high speed	6.3	92.5	1,700	450	8.4	21
Z15  Tic+TiN + TiN coat	●Semi-finishing and finishing of steel ●Finishing of ductile cast iron	6.3	92.5	1,700	450	8.4	21
C7X  TiCN base	●Semi-finishing and finishing of steel ●Grooving of steel ●Bearing machining	7.0	91.5	1,800	440	8.2	31
C7Z  TiCN base +TiN coat	●Semi-finishing and finishing of steel ●Grooving of steel ●Bearing machining	7.0	91.5	1,800	440	8.2	31
N40  TiN base	●General cutting of steel ●Grooving of steel	5.9	91.5	1,900	450	8.9	42

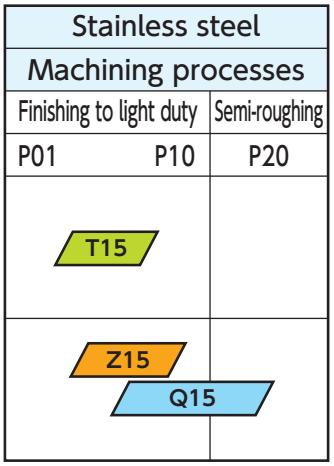
【Applications and ceramic property map】

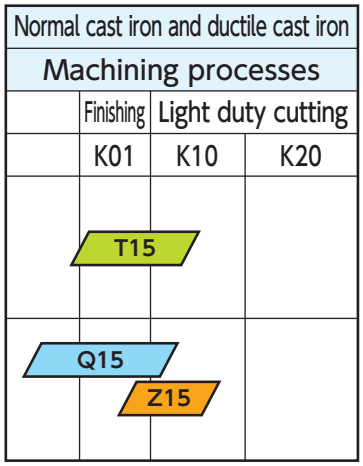


※For products with coating, the values of the base material are indicated.

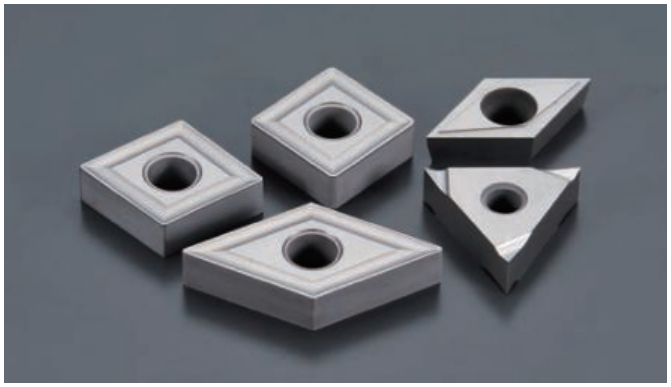
【Applications and application areas of cermets】







T15 Well balanced between wear resistance and fracture resistance !



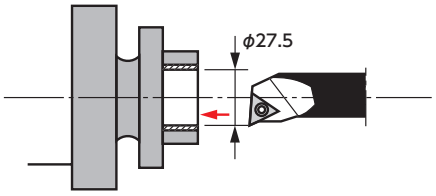
Features

- *Well balanced between wear resistance and fracture resistance*
- *Covers a wide range of steel cutting, from medium cutting to finishing of steel*

Crank shaft machining ● Work material : S50C

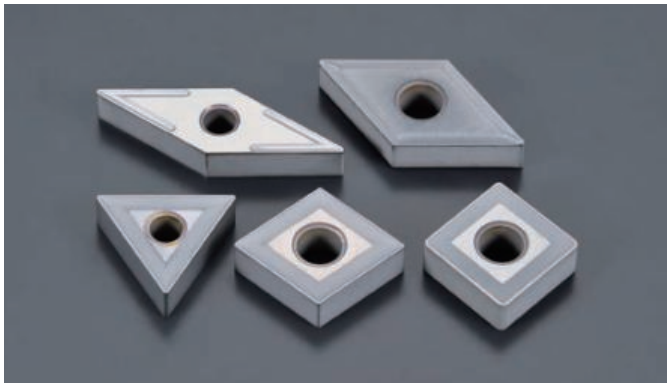
	Conventional tool	NTK
Material	Competitor's cermet	T15
Cutting speed (m/min)	75	←
Feed rate (mm/rev)	0.05	←
Depth of cut (mm)	0.25	←
Cutting oil	WET	←
Life (pcs./corner)	60	100

T15



T15 gave 1.7 times the tool life of the competitor's product.

Q15 Cermet grade for high-speed finishing of ductile cast iron !



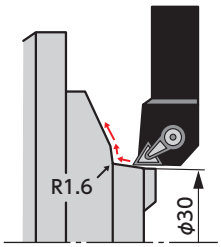
Features

- *Further improved wear resistance and fracture resistance from the TiCN-based coating*
- *The recommended grade for finishing of ductile cast iron at high speed*

Differential case machining ● Work material : FCD550

	Conventional tool	NTK
Material	Competitor's cermet	Q15
Cutting speed (m/min)	160	←
Feed rate (mm/rev)	0.10	←
Depth of cut (mm)	0.2	←
Cutting oil	WET	←
Life (pcs./corner)	20	35

Q15



Q15 produced 1.7 times longer tool life than the competitor's product.

Z15 Combining the advantages of wear resistance and fracture resistance !

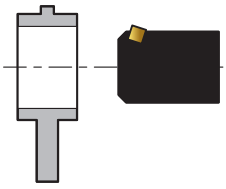
Features

- *Further improved wear resistance and fracture resistance from TiN-based coating*
- *Suitable for finishing of ductile cast iron in addition to medium cutting and finishing of steel*

Connecting rod machining ● Work material : Sintered alloy

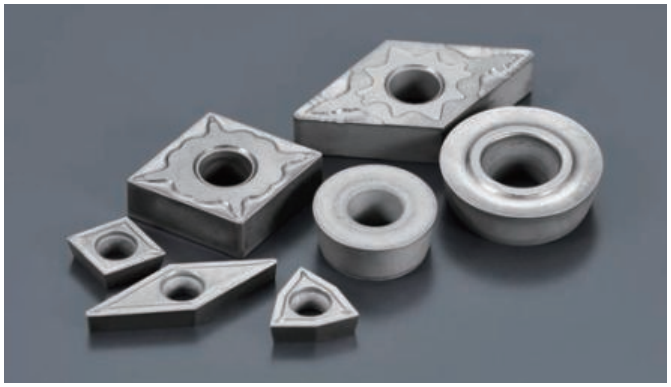
	Conventional tool	NTK
Material	Competitor's cermet	Z15
Cutting speed (m/min)	180	←
Feed rate (mm/rev)	0.35	←
Depth of cut (mm)	0.5	←
Cutting oil	WET	←
Life (pcs./corner)	100	300

Z15



Z15 produced 3 times longer tool life than the competitor's product, with excellent surface finish and dimensional accuracy. Z15 proved its wear resistance in cutting sintered alloy and chipping resistance in interrupted cutting.

C7X High-strength cermet grade that offers remarkable machining stability !

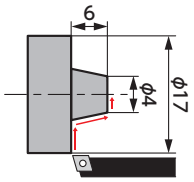


Features

- ***Overcomes the traditional weakness of conventional cermet grades with improved thermal shock resistance***
- ***Performs well especially for grooving and bearing machining***

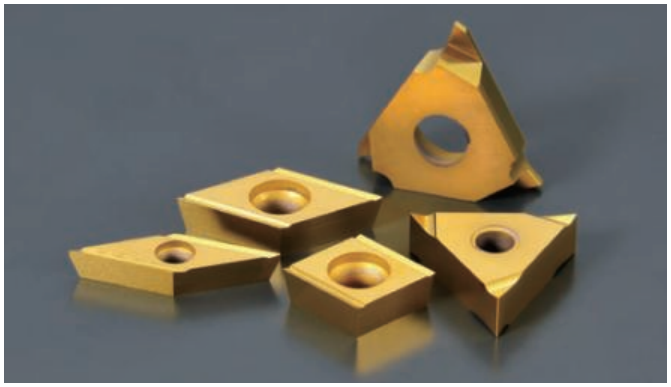
Seat spring machining ● Work material : SUJ2		
	Conventional tool	**NTK**
Material	Competitor's cermet	C7X
Cutting speed (m/min)	130	←
Feed rate (mm/rev)	0.05	←
Depth of cut (mm)	0.3	←
Cutting oil	WET	←
Life (pcs./corner)	1,400	**2,000**

C7X



C7X controlled the progress of wear better than the competitor's product, giving extended tool life with an excellent surface finish

C7Z Combining the advantages of thermal shock resistance and fracture resistance !

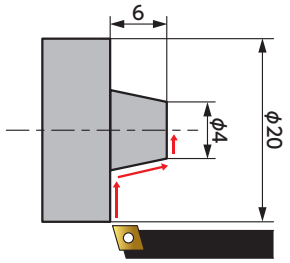


Features

- ***Achieved further improved wear resistance and thermal shock resistance with a TiN-based coating***
- ***Performs well especially in grooving and bearing machining***
- ***The recommended grade for high-efficiency machining of steel***

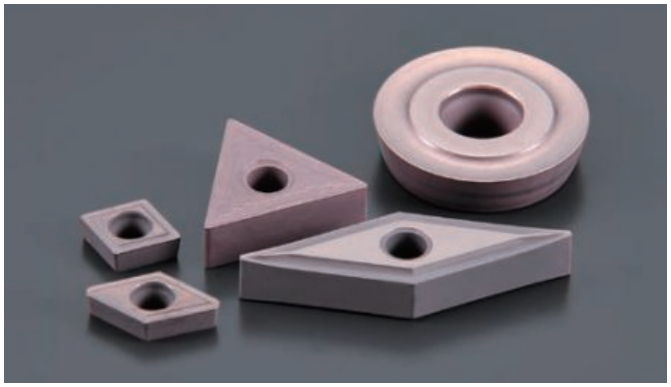
Spring machining ● Work material : SUJ2		
	Conventional tool	**NTK**
Material	Competitor's cermet	C7Z
Cutting speed (m/min)	130	←
Feed rate (mm/rev)	0.05	←
Depth of cut (mm)	0.3	←
Cutting oil	WET	←
Life (pcs./corner)	1,200	**1,600**

C7Z



C7Z produced longer tool life and better dimensional accuracy on finished surfaces than the competitor's product.

N40 Highly tough cermet grade with excellent fracture resistance !

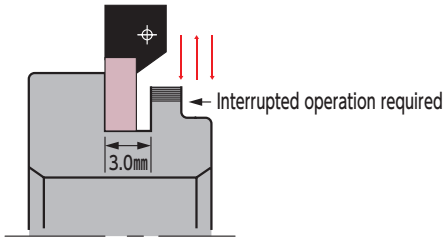


Features

- ***Allows for stable machining with longer tool life thanks to its excellent fracture resistance***

Gear machining ● Work material : SCr420H		
	Conventional tool	**NTK**
Material	Competitor's cermet	N40
Cutting speed (m/min)	110	←
Feed rate (mm/rev)	0.09	←
Cutting oil	WET	←
Life (pcs./corner)	200	**300**

N40



N40's high toughness enabled very low rates of breakage, allied with excellent chip control and burr free machining.

MEMO

E

Micro-grain Carbide
PVD-coated Carbide
CVD-coated Carbide

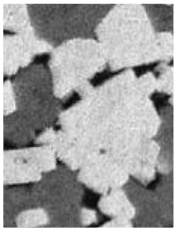
● Micro-grain Carbide and PVD-coated Carbide ·· E4
● CVD-coated Carbide ····· E8

Micro-grain Carbide and PVD-coated Carbide

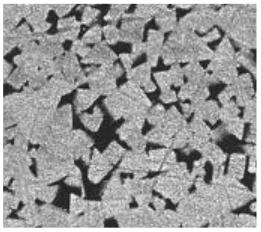
Precision machining and machining of hard-to-cut stainless materials

These material grades use WC micro grain carbide, the hard layer of which is granulated to a micro size 1 μm), as the base material. Furthermore, the base material is coated by the PVD method with TiN, TiCN, and/or TiAlN. Thus, the materials are suitable for precision machining and machining of materials that are difficult to cut. Inserts of these grades are tougher and harder than carbide, exhibiting precision sharp cutting edges
They even have higher toughness and sharper cutting edges than those materials with ultra micro-grain carbide, exhibiting excellent wear resistance and thermal crack resistance

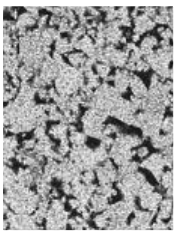
Carbide grade



General carbide structure



Micro-grain carbide structure

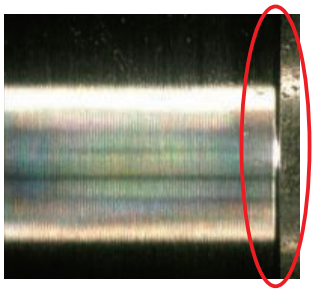


Super micro-grain carbide structure

The result of a long development period aimed at improving carbides

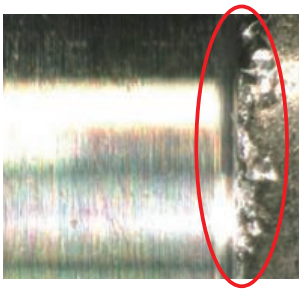
The NTK carbide grade series perform very stably under a wide variety of conditions, using micro-grain carbide well balanced between wear resistance and chipping resistance, as the base material

Features Superior cutting performance



W/o burrs

Machined with our insert having a sharp cutting edge



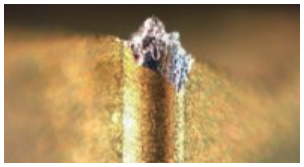
Burrs caused

Machined with a competitor's product having a honed cutting edge

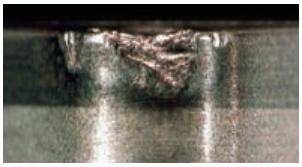
Long-time pursuit of better cutting performance

NTK takes pride in its carbide grade series for their outstanding cutting performance attained with honed and ultra sharp cutting edges. This outstanding cutting performance allows for better burr control, lower cutting forces, stabilized dimensions, improved work hardening control and more (grinding grade inserts)

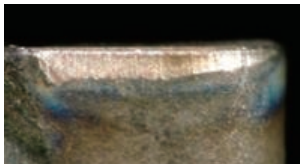
Features Solutions by pin-point analysis of various concerns



Build-up edge



Chipping / fracture



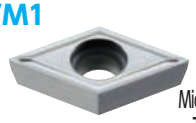
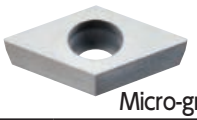
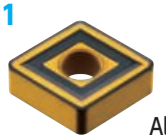
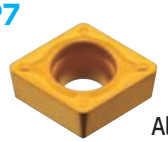
Wear on flank

Wear on face

Long-time research on insert tool life

While the forms of damages showing on cutting edges vary depending on the machining process and the work material, there are various types of coating that control such damages to prolong the tool life
The NTK carbide series offer a wide variety of coated material grades which have been greatly improved in their resistance characteristics, including wear, fracture, deposition, oxidation and the likes, by the original technologies developed by the company

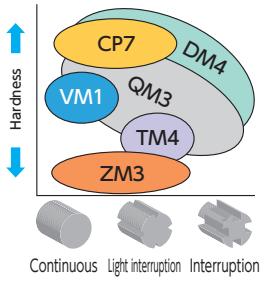
【Types, applications and features of tool materials】

	Material code name / Appearance	Applications / Features	Physical properties※ Density g/cm³	Hardness HRA	Transverse intensity MPa	Young's modulus GPa	Thermal expansion coefficient X10⁻⁶/K	Thermal conductivity W/m・K
PVD coating	**TM4** Micro-grain carbide + Thin film TiN-TiCN coat	● Machining of stainless steel and steel (Excels in deposition resistance and sharp cutting, with focus on wear resistance)	14.4	91.0	3000	580	5.8	63
	ZM3 Micro-grain carbide + Thick film TiN coat	● Machining of soft steel and stainless steel (free cutting type) (Focus on deposition resistance)	14.4	91.0	3000	580	5.8	63
	QM3 Micro-grain carbide + Thick film TiCN coat	● Machining of stainless steel and steel (For interrupted machining) (Focus on wear and fracture resistance)	14.4	91.0	3000	580	5.8	63
	VM1  Micro-grain carbide + Thin film TiCN coat	● Machining of free cutting type steel (For high precision machining, with sharp cutting edge)	14.8	92.0	2500	640	5.7	84
	DT4 Thin film TiAlN coat	● Micro-grain carbide + Thin film TiAlN coat Machining of stainless steel (hard-to-cut type) (Focus on oxidation and deposition resistance with sharp cutting edge)	14.4	91.0	3000	580	5.8	63
	DM4 Thick film TiAlN coat	● Micro-grain carbide + Thick film TiAlN coat Machining of stainless steel (hard-to-cut type) (Focus on oxidation, deposition and wear resistance)	14.4	91.0	3000	580	5.8	63
Non-coat	**KM1**  Micro-grain carbide	● Machining of nonferrous metals such as aluminum and brass, and non-metal materials	14.8	92.0	2500	640	5.7	84
CVD coating	**CP1**  Carbide + Thick film Al_2O_3-TiCN coat	● High-speed machining of cast iron and ductile cast iron	14.9	92.0	2400	640	—	—
	CP7  Carbide + Thick film Al_2O_3-TiCN coat	● Roughing and semi-finishing of steel	13.8	90.1	2200	580	—	—

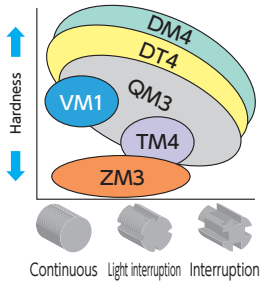
※For products with coating, the values of the base material are indicated.

Applications and ceramic property map

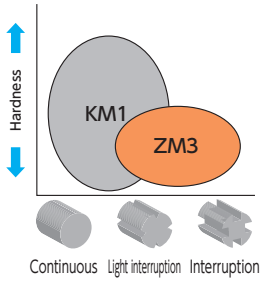
■ Carbon steel / Alloy steel



■ Stainless steel



■ Aluminum / Brass



DT4/ DM4 Challenge Hard-to-cut materials !

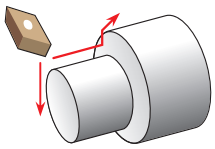
● *For ultra-precision machining DT4*

● *For high efficient machining DM4*

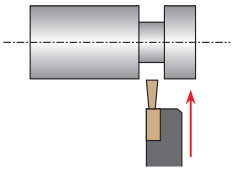
Features

- ***For longer tool life, high efficiency and high precision when machining of hard-to-cut materials***
- ***DT4…Thin coating with excellent oxidation resistance***
  Superior sharp cutting edge
- ***DM4…Thick coating with both superior oxidation and wear resistance***
  Excellent adhesion resistance offers stable machining

【Actual machining examples】

Machining of automotive part		
Work material : S20C	**DT4**	
Cutting speed (m/min) =180		
Feed rate (mm/rev) =0.05		
Depth of cut (mm) = ~0.15		
Cutting oil : WET		
NTK : **DT4**	1,000 pcs./corner	
Competitor's TiAlN coated carbide	500 pcs./corner	

DT4 achieved twice longer tool life and better surface finish than competitor's product.

Machining of housing part		
Work material : S15C	**DM4**	
Cutting speed (m/min) =180		
Feed rate (mm/rev) =0.02		
Depth of cut (mm) = ~1.0		
Cutting oil : WET		
NTK : **DM4**	4,500 pcs./corner	
Competitor's coated carbide	1,500 pcs./corner	

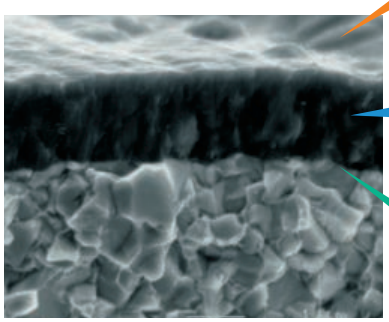
DM4 achieved much longer tool life than competitor's product as well as burr-free.

TM1 / TM4 The standard for the next generation of material grades for inserts on automatic lathes !

Features

- ***Produce excellent machined surfaces by deposition- resistant coating***
- ***Stable machining with coatings that firmly adhere to the base material***
- ***Superior cutting performance for machining of hard-to-cut materials such as stainless steel***

● Structure of the coat



Excellent deposition resistance

Hard layer excells in deposition resistance.

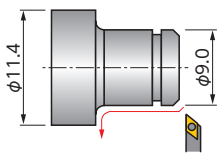
Excellent wear resistance

Hard layer highly resistant to wear is used as the middle layer

Excellent adhesion

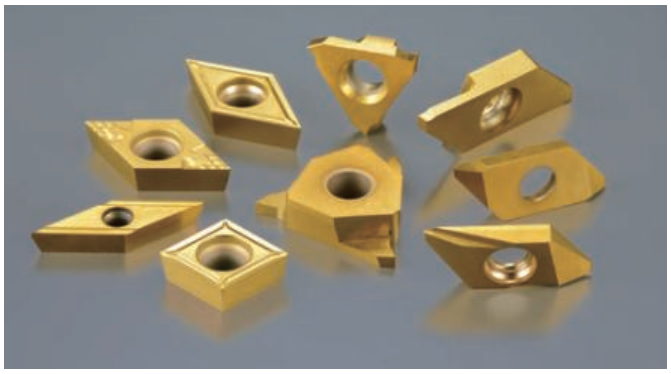
Hard layer excells in adhesion, used as the top surface of the base material

【Actual machining example】

Machining of automotive part		
Work material : SUS304	**TM4**	
Cutting speed (m/min) =80		
Feed rate (mm/rev) =0.02		
Depth of cut (mm) = ~1.2		
Cutting oil : WET		
NTK : **TM4**	950 pcs./corner	
Competitor's PVD product	500 pcs./corner	

TM4 produced 1.9 times the tool life of the competitor's product, making the insert stable for longer due to its remarkable fracture resistance.

ZM3 The best selling grade for automatic lathes !

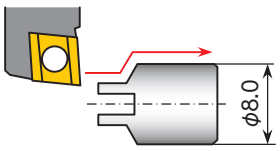


Features

- ***Exhibits outstanding deposition resistance and cutting performance due to the company's original TiN coating***
- ***Stabilizes machining dimensions thanks to the coating firmly adhering to the base material***
- ***A wide range of cutting tools in various types available for automatic lathes***

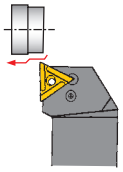
【Actual machining examples】

Machining of electronic components

Work material : SUS304	ZM3 
Cutting speed (m/min) =100	
Feed rate (mm /rev) =0.02	
Depth of cut (mm) =0.2	
Cutting oil : WET	
NTK : **ZM3**	1,300 pcs./corner
Competitor's PVD coated carbide	1,000 pcs./corner

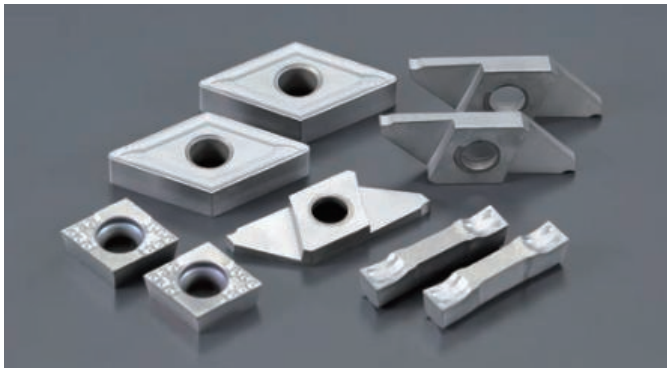
ZM3 grade inserts was able to keep the required surface finish for 1.3 times longer. The deposition resistance allows for longer tool life.

Case machining

Work material : S10C	ZM3 
Cutting speed (m/min) =100	
Feed rate (mm /rev) =0.12	
Depth of cut (mm) =0.3～0.4	
Cutting oil : WET	
NTK : **ZM3**	6,000 or more pcs./corner
Competitor's PVD coated carbide	150 pcs./corner

ZM3 gave stable dimensions with the outstanding deposition resistance and the tool life was 40 times longer than the competitor's product.

QM3 Superb wear resistance and fracture resistance for interrupted machining !

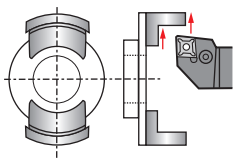


Features

- ***Highly resistant to fracture thanks to the good combination of tough and strong base material + special TiCN coating***
- ***Resistant to mechanical wear, exhibiting high wear resistance especially in low-speed range***
- ***Stable for interrupted machining of steel***

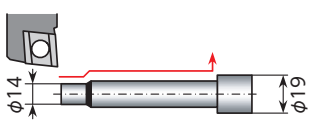
【Actual machining examples】

Flange machining

Work material : S50C	QM3 
Cutting speed (m/min) =156	
Feed rate (mm /rev) =0.33	
Depth of cut (mm) =1.5	
Cutting oil : WET	
NTK : **QM3**	120 pcs./corner
Competitor's CVD coated carbide	45 pcs./corner

QM3 with the Z5 chipbreaker produced 2.5 times longer life than the competitor's conventional product which also struggled for repeatability.

Spindle machining

Work material : SCM435	QM3 
Cutting speed (m/min) =100	
Feed rate (mm /rev) =0.03	
Depth of cut (mm) =～0.2	
Cutting oil : WET	
NTK : **QM3**	600 pcs./corner
Competitor's PVD coated carbide	300 pcs./corner

QM3 achieved stable surface finish and component dimensions, with the life twice as long as the competitor's product. The wear resistance of the QM3 was excellent.

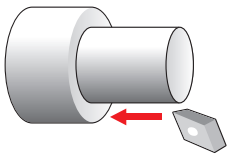
VM1 High-accuracy machining of small-diameters !

Features

- ***Offers the advantages of both wear resistance and remarkable cutting performance with the thin film TiCN coating***
- ***The recommended material grade for machining of free cutting steels (SUM materials)***
- ***For high-precision machining with longer tool life even in the high-speed machining range***

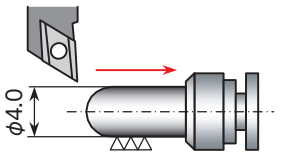
【Actual machining examples】

Machining of electronic component

Work material : SF20T	VM1 
Cutting speed (m/min) =400	
Feed rate (mm/rev) =0.01	
Depth of cut (mm) =0.1	
Machining length (mm) =15	
Cutting oil : WET	
NTK : **VM1**	600 pcs./corner
Competitor's PVD coated carbide	100 pcs./corner

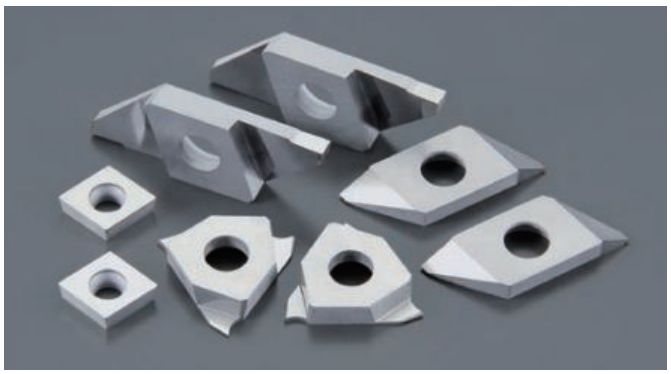
VM1 continued to exhibit outstanding dimensional stability even after machining 600 pieces.

Plug machining

Work material : SUM24L	VM1 
Cutting speed (m/min) =140	
Feed rate (mm/rev) =0.015	
Depth of cut (mm) =0.1	
Cutting oil : WET	
NTK : **VM1**	800 ~ 1,000 pcs./corner
Competitor's PVD coated carbide	150 pcs./corner

VM1 produced 5 times longer tool life than the competitor's product, giving stable surface finish and machining dimensions.

KM1 Longer tool life even for machining of hard-to-cut materials !

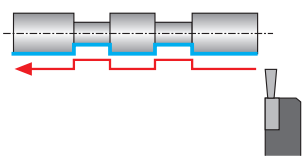


Features

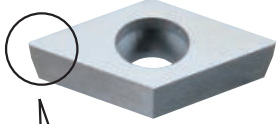
- ***Allows very sharp cutting edges with non-coated micro-grain carbide***
- ***Exhibits excellent deposition resistance because of mirror-like honed surface.***
- ***A wide range of cutting tools in various types available for automatic lathes***

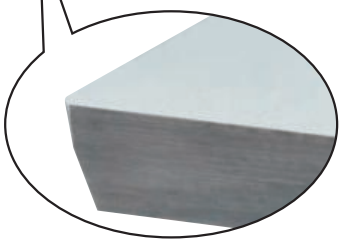
【Actual machining examples】

Spool machining

Work material : A5056	KM1 
Cutting speed (m/min) =90~170	
Feed rate (mm/rev) =0.04	
Depth of cut (mm) =0.5~5.0	
Cutting oil : WET	
NTK : **KM1**	300 or more pcs.
Competitor's PVD coated carbide	200 pcs.

With the competitor's product, finishing was carried out after 3 rough grooving operations, often resulting in insert fracture caused by chip jamming. In this case, more than 3 minutes per cycle was required. By contrast, NTK's KM1 enabled single pass machining, reducing the cycle time to 1 minute and 50 seconds.





Suitable for machining of aluminum, brass and resins

- Sharp edge
- Mirror-like honing

CVD-coated Carbide

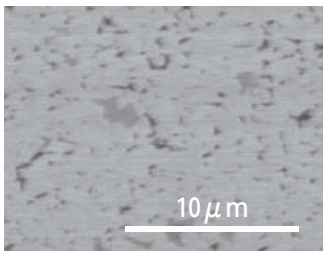
CP1 Material grade for roughing of cast iron and ductile cast iron !

Features

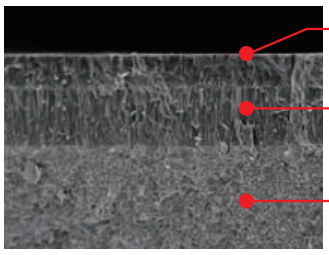
- ***High wear resistance achieved by laminating thick film TiCN layer and Al_2O_3 layer as the coating; Used for cast iron cutting even in high-speed range***
- ***Excellent deposition resistance due to the company's original insert face treatment to make the mirror finish***
- ***Can be also used for machining of ductile cast iron***

Construction of coating

Photo of structure (COMP) x 5,000



Film structure

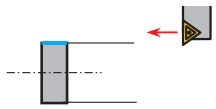


Equivalent to HRA 91.3　Young's modulus : 640 GPa

【Actual machining example】

Machining of motor component　●Work material : FCD450

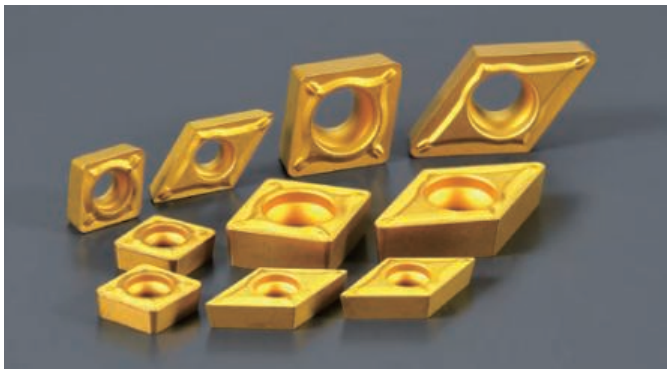
CP1



	Conventional tool	NTK
Material	Competitor's PVD-coated carbide	CP1
Cutting speed (m/min)	100	200
Feed rate (mm/rev)	0.12	←
Depth of cut (mm)	1.0	←
Cutting oil	WET	←
Life (pcs./corner)	5	20

CP1 achieved a higher efficiency than the competitor's insert.

CP7 For roughing at high speed in steel machining !



Features

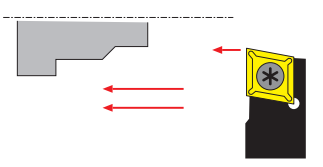
- ***High wear resistance and fracture resistance achieved by multi-layer coating of the base material by CVD method; used for a wide range of cutting conditions***
- ***Recommended for high-speed machining of alloy steel and general steels***
- ***Best for machining of automotive components on automatic lathes***

【Actual machining examples】

Machining of automotive component

Work material : SUM24
Cutting speed (m/min) =160
Feed rate (mm/rev) =0.05
Depth of cut=1.5×2pass
Cutting oil : WET

CP7



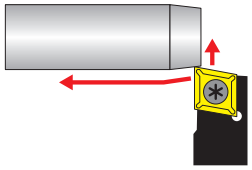
NTK : **CP7**	3,000 pcs./corner
Competitor's coated carbide	2,000 pcs./corner

CP7 giving good economy and achieved the life set, achieving 1.5 times longer tool life than the competitor's product and allowing for more stable machining.

Finishing of face and outside of small pin

Work material : SUJ2
Cutting speed (m/min) =90
Feed rate (mm/rev) =0.15
Depth of cut (mm) =0.5
Cutting oil : WET

CP7



NTK : **CP7**	10,000 pcs./corner
Competitor's coated carbide	3,500 pcs./corner

CP7 achieved longer tool life approximately 3 times longer than the competitor's coated carbide product; Used for a wide range of machining conditions.

MEMO

F

Insert Stock List

- Part No. for Ceramic and CBN insert / Specifications of cutting edge treatment·· F2
- Ceramic inserts ····· F4
- CBN • PCD ····· F16
- Cermet and carbide ····· F24

Part No. for Ceramic and CBN insert / Specifications of cutting edge treatment

C	N	G	A	12	04	12

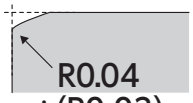
Part No. Designation Code for Inserts → Refer to page B8.

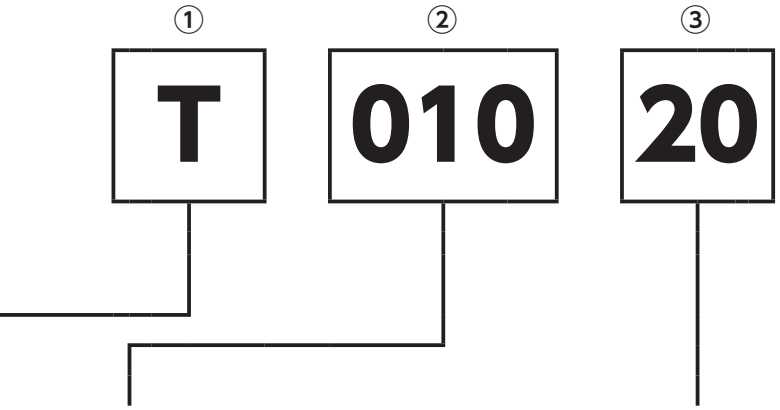
① Codes for major cutting edges

Cutting edge treatment : Chamfering or honing of the cutting edge in order to strengthen the edge or to adjust the cutting performance

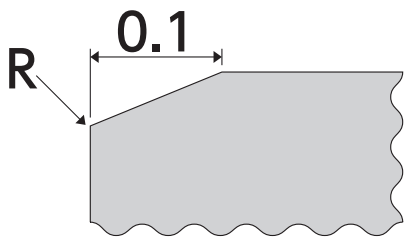
Cutting performance

Strength of cutting edge

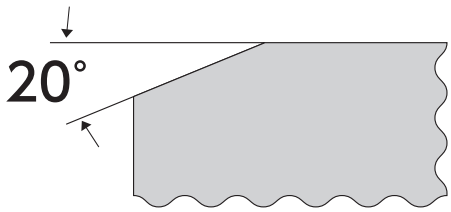
	Code	Shape
Sharp edge	F	
Round honing	E	
Angular grinding	T	
Angular grinding + round honing	Z	
	S	
2-step chamfering + round honing	P	



② Edge condition - width and hone.



③ Angle of treatment



Codes for cutting edges and the shapes

Code	Shape of the cutting edge
E002	Round honing with R = 0.02
E004	Round honing with R = 0.04
E007	Round honing with R = 0.07
EX0004	Round honing with R = 0.02
S01015	Chamfering 0.10 mm x 15 deg. + round honing with R = 0.04 (*R0.03)
S01020	Chamfering 0.10 mm x 20 deg. + round honing with R = 0.04 (*R0.03)
S01325	Chamfering 0.13 mm x 25 deg. + round honing with R = 0.04 (*R0.03)
S01535	Chamfering 0.15 mm x 35 deg. + round honing with R = 0.04 (*R0.03)
S02025	Chamfering 0.20 mm x 25 deg. + round honing with R = 0.04 (*R0.03)
T00320	Chamfering 0.03 mm x 20 deg.
T00520	Chamfering 0.05 mm x 20 deg.
T00525	Chamfering 0.05 mm x 25 deg.
T00820	Chamfering 0.08 mm x 20 deg.
T01020	Chamfering 0.10 mm x 20 deg.
T01025	Chamfering 0.10 mm x 25 deg.
T01525	Chamfering 0.15 mm x 25 deg.
T02020	Chamfering 0.20 mm x 20 deg.
T02025	Chamfering 0.20 mm x 25 deg.
Z01015	Chamfering 0.10 mm x 15 deg. + round honing with R = 0.02
Z01025	Chamfering 0.10 mm x 25 deg. + round honing with R = 0.02
Z01030	Chamfering 0.10 mm x 30 deg. + round honing with R = 0.02
Z01520	Chamfering 0.15 mm x 20 deg. + round honing with R = 0.02
Z02025	Chamfering 0.20 mm x 25 deg. + round honing with R = 0.02

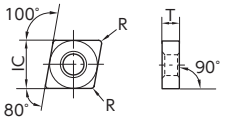
*CBN=R0.03

Ceramic inserts

⟨80 degree Rhombic Negative type⟩

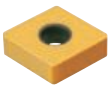
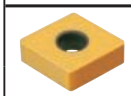
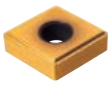
Part No.	Inscribed circle	Thickness
CN_1204_	12.7	4.76

Example code	Cutting edge treatment specification
S02025	Chamfering 0.20 mm x 25 deg. + honing R0.04
T01025	Chamfering 0.10 mm x 25 deg.
Z02025	Chamfering 0.20 mm x 25 deg. + honing R0.02



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

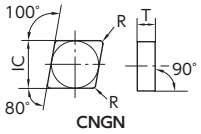
● : First choice
● : Second choice

Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	CNGA120404S02025	CNGA431-SNF	0.4						●							
	120404T01025	431-TN	0.4						●							
	120404T01525	431-TNE	0.4													
	120404Z02025	431-ZNF	0.4				●									
	120408S02025	432-SNF	0.8						●							
	120408T00520	—	0.8									●		●		
	120408T01020	—	0.8										●	●		
	120408T01025	432-TN	0.8			●		●	●							
	120408T01525	432-TNE	0.8													
	120408T02020	—	0.8							●						
	120408T02025	432-TNF	0.8									●				
	120408Z02025	432-ZNF	0.8				●									G7 G9 L41
	120412S02025	433-SNF	1.2						●							
	120412T00520	—	1.2									●		●		
	120412T01020	—	1.2										●	●		
	120412T01025	433-TN	1.2	●		●		●	●							
	120412T01525	433-TNE	1.2													
	120412T02020	—	1.2							●						
	120412T02025	433-TNF	1.2									●				
	120416T00520	—	1.6									●		●		
	120416T01020	—	1.6										●			
	120416T02020	—	1.6							●						
	120416T02025	434-TNF	1.6									●				
	CNMA120408T02025	CNMA432-TNF	0.8													
	120412T02025	433-TNF	1.2													
 Wiper	CNGA120408WLT01025	CNGA432WL-TN	0.8						●							G7 L41
	120412WLT01025	433WL-TN	1.2						●							
 with chipbreaker	CNGG120408Z01030AG	CNGG432-ZNCGAG	0.8						●							G7 G9 L41
	120412Z01030AG	433-ZNCGAG	1.2						●							

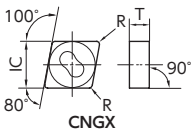
● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

Part No.	Inscribed circle	Thickness
CN_1204_	12.7	4.76
CN_1207_	12.7	7.94
CN_1607_	15.875	7.94

Example code	Cutting edge treatment specification
S02025	Chamfering 0.20 mm x 25 deg. + honing R0.04
T01025	Chamfering 0.10 mm x 25 deg.
Z02025	Chamfering 0.20 mm x 25 deg. + honing R0.02



CNGN



CNGX

	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

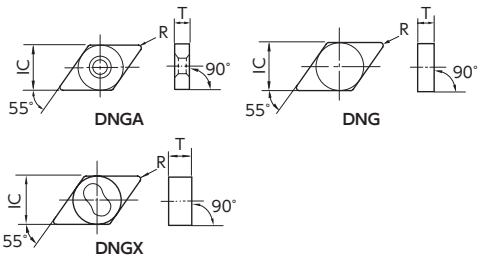
Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	CNGN120404T01025	CNGN431-TN	0.4			●		●								
	120408S02025	432-SNF	0.8						●							
	120408T00520	—	0.8									●		●		
	120408T00820	—	0.8												●	
	120408T01020	—	0.8										●	●		
	120408T01025	432-TN	0.8			●		●	●							
	120408T02020	—	0.8							●						
	120408T02025	432-TNF	0.8	●								●		●		
	120408Z02025	432-ZNF	0.8				●									
	120412S02025	433-SNF	1.2						●							
	120412T00520	—	1.2									●		●		
	120412T00820	—	1.2												●	
	120412T01020	—	1.2										●	●		
	120412T01025	433-TN	1.2	●		●		●	●					●		G7 G9 L41
	120412T02020	—	1.2							●						
	120412T02025	433-TNF	1.2	●								●		●		
	120412Z02025	433-ZNF	1.2				●									
	120416T00520	—	1.6											●		
	120416T02020	—	1.6							●						
	120416T01020	—	1.6										●			
	120416T02025	434-TNF	1.6									●				
	120420T01025	435-TN	2.0					●								
	CNMN120412T02025	CNMN433-TNF	1.2													
	120416T02025	434-TNF	1.6													
	CNGN120708T00520	—	0.8											●		
	120708T02025	CNGN452-TN	0.8			●										
	120712T02025	453-TN	1.2			●										
	CNGN160716T00520	—	1.6											●		
	CNGX120712T02025	—	1.2										●			G7 L41
	120716T02025	—	1.6										●			

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨55 degree Rhombic Negative type⟩

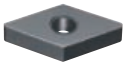
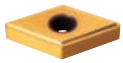
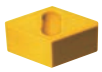
Part No.	Inscribed circle	Thickness
DN_1504_	12.7	4.76
DN_1507_	12.7	7.94

Example code	Cutting edge treatment specification
S02025	Chamfering 0.20 mm x 25 deg. + honing R0.04
T01025	Chamfering 0.10 mm x 25 deg.
Z02025	Chamfering 0.20 mm x 25 deg. + honing R0.02



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

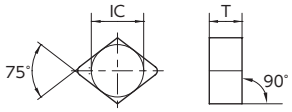
Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	DNGA150404S02025	DNGA431-SNF	0.4						●							G11 G13 L42
	150404T01025	431-TN	0.4			●		●	●							
	150404T01525	431-TNE	0.4													
	150404Z02025	431-ZNF	0.4				●									
	150408S02025	432-SNF	0.8			●			●							
	150408T00520	—	0.8									●		●		
	150408T01020	—	0.8										●			
	150408T01025	432-TN	0.8			●		●	●							
	150408T01525	432-TNE	0.8													
	150408T02020	—	0.8							●						
	150408T02025	432-TNF	0.8									●				
	150408Z02025	432-ZNF	0.8				●									
	150412S02025	433-SNF	1.2						●							
	150412T01020	—	1.2										●	●		
	150412T01025	433-TN	1.2		●				●							
	150412T01525	433-TNE	1.2													
	150412T02020	—	1.2							●						
	150412T02025	433-TNF	1.2									●				
	DNGN150404T01025	DNGN431-TN	0.4			●										G11 G13
	150408S02025	432-SNF	0.8						●							
	150408T01025	432-TN	0.8					●	●							
	150408Z02025	432-ZNF	0.8				●									
	150412T00520	—	1.2											●		
	150412T02025	433-TNF	1.2											●		
	DNGN150712T02025	DNGN453-TN	1.2											●		
 with chipbreaker	DNGG150408Z01030AG	DNGG432-ZNCGAG	0.8						●							G11 G13 L42
	150412Z01030AG	433-ZNCGAG	1.2						●							
	DNGX150716T02025	—	1.6										●			G11 G13 L42

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨75 degree Rhombic Negative type⟩

Part No.	Inscribed circle	Thickness
EN_1307_	12.7	7.94

Example code	Cutting edge treatment specification
T02025	Chamfering 0.20 mm x 25 deg.



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

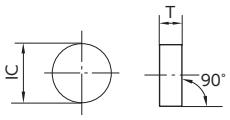
Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	ENGN130708T02025	ENGN452-TN	0.8	■		●										—
	130712T02025	453-TN	1.2			●										

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨Round Negative type⟩

Part No.	Inscribed circle	Thickness
RN_1204_	12.7	4.76
RN_1207_	12.7	7.94
RN_1507_	15.875	7.94
RN_1907_	19.05	7.94
RN_2507_	25.4	7.94

Example code	Cutting edge treatment specification
E007	Honing R0.07
S02025	Chamfering 0.20 mm x 25 deg. + honing R0.04
T01025	Chamfering 0.10 mm x 25 deg.
Z02025	Chamfering 0.20 mm x 25 deg. + honing R0.02



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

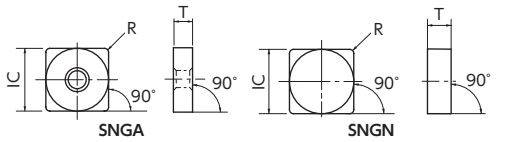
Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	RNGN120400S02025	RNGN430-SNF	–						●							G14 P28
	120400T00520	—	–											●		
	120400T00820	—	–												●	
	120400T00525	430-TNB	–									●		●		
	120400T01020	—	–									●		●		
	120400T01025	430-TN	–			●			●							
	120400T02020	—	–							●						
	120400T02025	430-TNF	–									●				
	120400Z02025	430-ZNF	–				●									
	RNGN120700E002	—	–									●				
	120700E004	—	–								●					
	120700E007	RNGN450-ENC	–			●										
	120700S02025	450-SNF	–						●							
	120700T00520	—	–									●		●		
	120700T00525	450-TNB	–									●		●		
	120700T00820	—	–								●				●	
	120700T01020	—	–											●		
	120700T02025	450-TN	–			●			●							
	120700Z01520	—	–											●		
	120700Z02025	450-ZNF	–				●									
	RNGN150700T00520	—	–									●				—
	150700T00525	RNGN550-TNB	–									●		●		
	150700T00820	—	–												●	
	RNGN190700T00520	—	–									●				
	190700T00525	RNGN650-TNB	–									●				
	190700T00820	—	–												●	
	190700T01020	—	–											●		
	RNGN250700T00520	—	–									●		●		
	250700T00820	—	–												●	

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨90 degree Square Negative type⟩

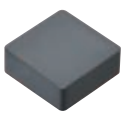
Part No.	Inscribed circle	Thickness
SN_0903_	9.525	3.18
SN_0904_	9.525	4.76
SN_1204_	12.7	4.76
SN_1207_	12.7	7.94

Part No.	Inscribed circle	Thickness
SN_1507_	15.875	7.94
SN_1906_	19.05	6.35
SN_1907_	19.05	7.94



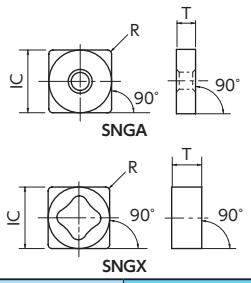
	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	SNGA120408S02025	SNGA432-SNF	0.8						●							G17 G19 L43
	120408T01025	432-TN	0.8						●							
	120408T01525	432-TNE	0.8													
	120408T02020	—	0.8							●						
	120408T02025	432-TNF	0.8													
	120412S02025	433-SNF	1.2						●							
	120412T01020	—	1.2													
	120412T01025	433-TN	1.2						●							
	120412T01525	433-TNE	1.2													
	120412T02020	—	1.2							●						
	120412T02025	433-TNF	1.2													
	120416T02020	—	1.6							●						
	120416T02025	434-TNF	1.6													
	SNMA120408T02025	SNMA432-TNF	0.8													
	120412T02025	433-TNF	1.2													
	SNGN090308T01025	SNGN322-TN	0.8			●										—
	090316T01025	324-TN	1.6	●		●										
	SNGN090408T01025	SNGN332-TN	0.8			●										
	SNGN120404T01025	SNGN431-TN	0.4			●										G17 G19 G21 L43 P23
	120408S02025	432-SNF	0.8						●							
	120408T00520	—	0.8											●		
	120408T00820	—	0.8												●	
	120408T01020	—	0.8										●			
	120408T01025	432-TN	0.8	●		●		●	●					●		
	120408T02020	—	0.8							●						
	120408T02025	432-TNF	0.8									●				
	120408Z02025	432-ZNF	0.8				●									
	120412S02025	433-SNF	1.2						●							
	120412T00520	—	1.2											●		
	120412T00820	—	–												●	
	120412T01020	—	1.2										●	●		

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

Example code	Cutting edge treatment specification
S02025	Chamfering 0.20 mm x 25 deg. + honing R0.04
T01025	Chamfering 0.10 mm x 25 deg.
Z02025	Chamfering 0.20 mm x 25 deg. + honing R0.02



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

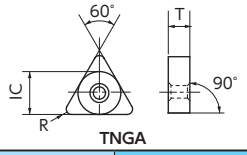
Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	SNGN120412T01025	SNGN433-TN	1.2	●		●		●	●					●		
	120412T02020	—	1.2							●			●			
	120412T02025	433-TNF	1.2									●				
	120412Z02025	433-ZNF	1.2				●									
	120416S02025	434-SNF	1.6						●							
	120416T00520	—	1.6											●		
	120416T01020	—	1.6										●	●		
	120416T01025	434-TN	1.6	●		●		●	●					●		
	120416T02020	—	1.6							●						
	120416T02025	434-TNF	1.6									●				
	120416Z02025	434-ZNF	1.6				●									G17
	120420T01025	435-TN	2			●		●								G19
	120420T01020	—	2										●			G21
	120420T02020	—	2							●						L43
	120420T02025	435-TNF	2	●										●		P23
	120424T01025	436-TN	2.4			●										
	120424T02020	—	2.4							●						
	120424T02025	436-TNF	2.4													
	SNMN120412T02025	SNMN433-TNF	1.2													
	120420T02025	435-TNF	2													
	SNGN120708T02025	SNGN452-TN	0.8	●		●										
	120712S02025	453-SNF	1.2			●										
	120712T02025	453-TN	1.2			●										
	120716T02025	454-TN	1.6		●											
	SNMN120720S02025	SNMN455-SNF	2	■												
	SNGN150716T02025	SNGN554-TN	1.6											●		
	SNGN190616T00525	SNGN644-TNB	1.6									●				
	SNGN190724T00525	SNGN656-TNB	2.4									●				—
	190724T02020	—	2.4											■		
	SNGX120712T02025	—	1.2										●			G17
	120716T02025	—	1.6										●			L43

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨60 degree Triangle Negative type⟩

Part No.	Inscribed circle	Thickness
TN_1103_	6.35	3.18
TN_1603_	9.525	3.18
TN_1604_	9.525	4.76

Part No.	Inscribed circle	Thickness
TN_1607_	9.525	7.94
TN_2204_	12.7	4.76
TN_2207_	12.7	7.94



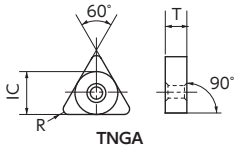
	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	TNGA160404S02025	TNGA331-SNF	0.4						●							G23 G25 H31
	160404T01025	331-TN	0.4						●							
	160404T01525	331-TNE	0.4													
	160404Z02025	331-ZNF	0.4				●									
	160408S02025	332-SNF	0.8						●							
	160408T01025	332-TN	0.8			●		●	●							
	160408T01525	332-TNE	0.8													
	160408T02020	—	0.8							●						
	160408T02025	332-TNF	0.8									●				
	160408Z02025	332-ZNF	0.8				●									
	160412S02025	333-SNF	1.2						●							
	160412T01025	333-TN	1.2			●		●	●							
	160412T01525	333-TNE	1.2													
	160412T02020	—	1.2							●						
	160412T02025	333-TNF	1.2									●				
	160416T02025	334-TNF	1.6									●				
	TNMA160408T02025	TNMA332-TNF	0.8													
	TNGN110308T00525	TNGN222-TN	0.8			●										—
	TNGN160304T01025	TNGN321-TN	0.4			●										
	TNGN160404T01025	TNGN331-TN	0.4			●										G23 G24 G25
	160404Z02025	331-ZNF	0.4				●									
	160408S02025	332-SNF	0.8						●							
	160408T00820	—	0.8												●	
	160408T01020	—	0.8										●	●		
	160408T01025	332-TN	0.8	●		●		●	●					●		
	160408T02020	—	0.8							●						
	160408T02025	332-TNF	0.8									●				
	160408Z02025	332-ZNF	0.8				●									
	160412S02025	333-SNF	0.8						●							
	160412T00820	—	1.2												●	
	160412T01020	—	1.2										●			
	160412T01025	333-TN	1.2	●		●		●	●					●		
	160412T02020	—	1.2							●						
	160412T02025	333-TNF	1.2									●				
	160412Z02025	333-ZNF	1.2				●									

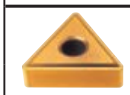
● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

Example code	Cutting edge treatment specification
S02025	Chamfering 0.20 mm x 25 deg. + honing R0.04
T01025	Chamfering 0.10 mm x 25 deg.
Z02025	Chamfering 0.20 mm x 25 deg. + honing R0.02



Steel / Stainless steel / Cast iron / Nonferrous metal / Heat-resistant alloy / Hardend material

● : First choice
● : Second choice

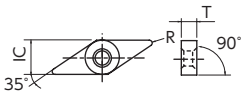
Shape	Part No.	(Previous Part No.)	Nose Radius	Alumina-based ceramic grade						Silicon nitride-based ceramic grade				Whisker-based ceramic grade		For applicable holder, see pages:
				HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	
	TNGN160416T01020	—	1.6										●			G23 G24 G25
	160416T01025	TNGN334-TN	1.6	●	●	●										
	160416T02020	—	1.6							●						
	160416T02025	334-TNF	1.6									●				
	160420T01025	335-TN	1.6	●		●										
	160420T02020	—	2							●						
	160420T02025	335-TNF	2													
	TNGN160708T02025	TNGN352-TN	0.8			●										
	160712T02025	353-TN	1.2			●										
	TNGN220408T00520	—	0.8											■		
	220416T00520	—	1.6											●		
	TNGN220716T00520	—	1.6											●		
	TNMN160412T02025	TNMN333-TNF	1.2													
 with chipbreaker	TNGG160408Z01030AG	TNGG332-ZNCGAG	0.8						●							G23 G25 H31
	160412Z01030AG	333-ZNCGAG	1.2						●							

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨35 degree Rhombic Negative type⟩

Part No.	Inscribed circle	Thickness
VN_1604_	9.525	4.76
VN_2204_	12.7	4.76

Example code	Cutting edge treatment specification
S02025	Chamfering 0.20 mm x 25 deg. + honing R0.04
T01025	Chamfering 0.10 mm x 25 deg.
Z02025	Chamfering 0.20 mm x 25 deg. + honing R0.02



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

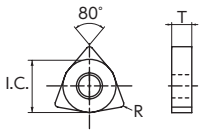
Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	VNGA160404S02025	VNGA331-SNF	0.4						●							G27
	160404T01020	—	0.4							●						
	160404T01025	331-TN	0.4			●		●	●							
	160404T01525	331-TNE	0.4													
	160404Z02025	331-ZNF	0.4				●									
	160408S02025	332-SNF	0.8						●							
	160408T00520	—	0.8											●		
	160408T01020	—	0.8							●			●			
	160408T01025	332-TN	0.8			●		●	●							
	160408T01525	332-TNE	0.8													
	160408Z02025	332-ZNF	0.8				●									
	160412S02025	333-SNF	1.2						●							
	160412T01020	—	1.2							●			●			
	160412T01025	333-TN	1.2						●							
	160412T01525	333-TNE	1.2													
	160412T02025	333-TNF	1.2													
	160412Z02025	333-ZNF	1.2				●									
	VNMA160412T02025	VNMA333-TNF	1.2													
	VNGA220424T01020	—	2.4											●		

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨80 degree Hexagon Negative type⟩

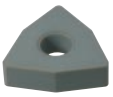
Part No.	Inscribed circle	Thickness
WN_0804_	12.7	4.76

Example code	Cutting edge treatment specification
T00520	Chamfering 0.05 mm x 20 deg.



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

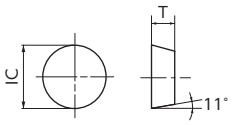
Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	WNGA080408T00520	—	0.8											●		G28 L44
	080408T01020	—	0.8										●			
	080408T02020	—	0.8							●						
	080408T02025	WNGA432-TNF	0.8													
	080412T00520	—	1.2											●		
	080412T01020	—	1.2										●			
	080412T02020	—	1.2							●						
	080412T02025	433-TNF	1.2													
	080416T02020	—	1.6							●						
	080416T02025	434-TNF	1.6													

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨Round Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
RP_0602_	6.35	2.38	11°
RP_0903_	9.525	3.18	11°
RP_1204_	12.70	4.76	11°

Example code	Cutting edge treatment specification
T00520	Chamfering 0.05 mm x 20 deg.



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

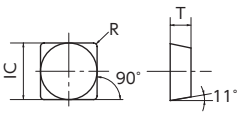
Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	RPGN060200T00520	—	–											●		P28 P29
	RPGN090300T00520	—	–											●		
	RPGN120400E004	—	–								●					
	120400EX0004	—	–									●				
	120400T00520	—	–											●		
	120400T00525	RPGN430-TNB	–									●				
	120400T00820	—	–								●					
	120400T01020	—	–									●		●		

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨90 degree Square Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
SP_0903_	9.525	3.18	11°
SP_1203_	12.7	3.18	11°
SP_1204_	12.7	4.76	11°

Example code	Cutting edge treatment specification
T01025	Chamfering 0.10 mm x 25 deg.



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

● : First choice
● : Second choice

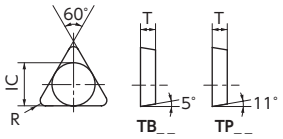
Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	SPGN090308T01025	SPGN322-TN	0.8			●										—
	SPGN120308T01025	SPGN422-TN	0.8			●										
	SPGN120408T01025	SPGN432-TN	0.8			●										
	120412T01025	433-TN	1.2			●										

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

Part No.	Inscribed circle	Thickness	Relief angle
TB_0601_	3.97	1.59	5°
TP_0902_	5.56	2.38	11°
TP_1103_	6.35	3.18	11°
TP_1603_	9.525	3.18	11°
TP_2204_	12.7	4.76	11°

Example code	Cutting edge treatment specification
T01025	Chamfering 0.10 mm x 25 deg.
Z02025	Chamfering 0.20 mm x 25 deg. + honing R0.02

⟨60 degree Triangle Positive type⟩



	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5
Steel												
Stainless steel												
Cast iron	●	●	●	●	●	●	●	●	●	●	●	●
Nonferrous metal												
Heat-resistant alloy								●	●		●	●
Hardend material			●	●		●					●	●

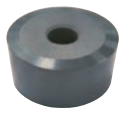
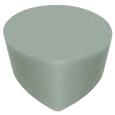
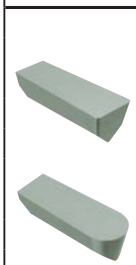
● : First choice
● : Second choice

Shape	Part No.	(Previous Part No.)	Nose Radius	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	For applicable holder, see pages:
	TBGN060104T00525	TBGE521-TN	0.4			●										—
	060108T00525	522-TN	0.8			●										
	TPGN090204T00525	TPGE731-TN	0.4			●										
	090208T00525	732-TN	0.8			●										
	TPGN110304T00525	TPGN221-TN	0.4			●										
	110304T01025	221-TNC	0.4						●							
	110308T00525	222-TN	0.8			●										
	110308T01025	222-TNC	0.8						●							
	TPGN160304T01025	TPGN321-TN	0.4			●			●							
	160304Z01025	321-ZNC	0.4				●									
	160308T01025	322-TN	0.8			●		●	●							
	160308Z01025	322-ZNC	0.8				●									
	160312T01025	323-TN	1.2		●											
	TPGN220408T01025	TPGN432-TN	0.8													

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨For Machining Mill Rolls and Heat-Resistant Alloys⟩

※For details of insert mesurement, please go to page **M4 to M5**.

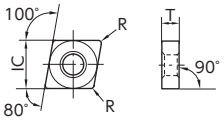
	HC1	HW2	HC2	HC4	HC6	ZC7	SX6	SX7	SX9	SP9	WA1	WA5	Shape	Part No.	(Previous Part No.)	Nose Radius	For applicable holder, see pages:
Steel																	
Stainless steel																	
Cast iron	●	●	●	○	●	○	●	○	○	●	●	●					● : First choice ○ : Second choice
Nonferrous metal																	
Heat-resistant alloy								●	●		●	●					
Hardend material			○	●		●						○					
	Alumina-based ceramic grade						Silicon nitride-based ceramic grade				Whisker-based ceramic grade						
														CDH22PN	—	—	
														CDH33PN	—	—	
														CDH42PN	—	—	
														CDH43PN	—	—	
														CDH53PN	—	—	
											●	●		RCGX060400T00520	—	—	
											●			RCGX060700T00520	—	—	
														RCGX0608PN	—	—	
									●		●			RCGX090700T00520	—	—	
											●			090700T01020	—	—	
												●		090700T00820	—	—	
			●											RCGX0908PN	—	—	
									●		●			0908TNB	—	—	
									●		●			RCGX120700T00520	—	—	
												●		120700T00820	—	—	G29
											●			120700T01020	—	—	M4
											●			120700Z01520	—	—	
			●											RCGX1208PN	—	—	
									●					1208TNB	—	—	
											●			RPGX060400T00520	—	—	
									●		●			RPGX090700T00520	—	—	
								●				●		090700T00820	—	—	
									●					RPGX0908TNB	—	—	
									●		●			RPGX120700T00520	—	—	
											●			120700T01020	—	—	
								●				●		120700T00820	—	—	
									●					RPGX1208TNB	—	—	
											●			RCGY090603TNB	—	—	
											●			RCGY120603TNB	—	—	
			●											RBGX16SPN	—	—	
											●			16SSN2	—	—	
														16S	—	—	
			●											RBGX20SPN	—	—	
														20SSN3	—	—	
														20S	—	—	
			●											RBGX26SPN	—	—	
											●			26SSN3	—	—	
												●		LNM6688PNX8	—	3.2	—
											●			6688SN2	—	3.2	
														6688PN9	—	3.2	
											●	●		VGW4125-2EX0001	—	0.8	
											●	●		4125-REX0001	—	fullR	
											●	●		VGW4156-2EX0001	—	0.8	
											●	●		4156-REX0001	—	fullR	
											●	●		VGW4187-2EX0001	—	0.8	
											●	●		4187-REX0001	—	fullR	
											●	●		VGW6250-2EX0001	—	0.8	
											●	●		6250-REX0001	—	fullR	
											●	●		VGW8375-2EX0001	—	0.8	
											■	●		8375-REX0001	—	fullR	

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order

⟨80 degree Rhombic Negative type⟩

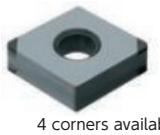
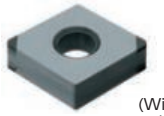
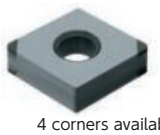
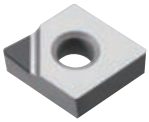
Grade	Code	Cutting edge treatment specification
B23	S01020	Chamfering 0.10 mm x 20 deg. + round honing R0.03
B30	T01020	Chamfering 0.10 mm x 20 deg.
B6K/B36	S01325	Chamfering 0.13 mm x 25 deg. + round honing R0.03
B40	S01535	Chamfering 0.15 mm x 35 deg. + round honing R0.03
B5K/B52	S01015	Chamfering 0.10 mm x 15 deg. + round honing R0.03

Part No.	Inscribed circle	Thickness
CN_1204_	12.7	4.76



	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2
Steel											
Stainless steel											
Cast iron	●	●			●	●			●		
Nonferrous metal										●	●
Heat-resistant alloy											
Hardend material		●	●	●			●	●	●		

● : First choice
● : Second choice

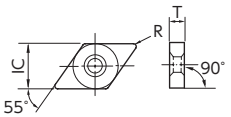
Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2	For applicable holder, see pages:
 4 corners available	**CNGA120402PQ**	—	S01015	0.2									●			G7 G9 H32 L41
	120402PQ	—	S01535	0.2								●				
	120404PQ	—	S01015	0.4									●			
	120404PQ	—	S01020	0.4					●							
	120404PQ	**CNGA431PQ**	S01325	0.4							●					
	120404PQ	—	S01535	0.4								●				
	120404PQ	—	T01020	0.4						●						
	120404S01015	—	S01015	0.4		●										
	120404S01325	—	S01325	0.4			●									
	120408PQ	—	S01015	0.8									●			
	120408PQ	—	S01020	0.8					●							
	120408PQ	**CNGA432PQ**	S01325	0.8							●					
	120408PQ	—	S01535	0.8								●				
	120408PQ	—	T01020	0.8						●						
	120408S01015	—	S01015	0.8		●										
	120408S01325	—	S01325	0.8			●									
	120412PQ	—	S01015	1.2									●			
	120412PQ	—	S01020	1.2					●							
	120412PQ	—	S01535	1.2								●				
	120412PQ	—	T01020	1.2						●						
	120412S01015	—	S01015	1.2		●										
 (Wiper) 4 corners available	**CNGA120404PQW**	—	S01015	0.4									●			
	120404PQW	—	S01535	0.4								●				
	120408PQW	—	S01015	0.8									●			
	120408PQW	—	S01535	0.8								●				
	120412PQW	—	S01015	1.2									●			
	120412PQW	—	S01535	1.2								●				
 4 corners available	**CNMA120412PQ**	**CNMA433PQ**	S01325	1.2							●					
 1 corner available	**CNMX120404PF**	—	Sharp edge rake angle 10°	0.4											●	
	120408PF	—		0.8											●	

● : Standard stock ● : New standard stock

Grade	Code	Cutting edge treatment specification
B23	S01020	Chamfering 0.10 mm x 20 deg. + round honing R0.03
B30	T01020	Chamfering 0.10 mm x 20 deg.
B6K/B36	S01325	Chamfering 0.13 mm x 25 deg. + round honing R0.03
B40	S01535	Chamfering 0.15 mm x 35 deg. + round honing R0.03
B5K/B52	S01015	Chamfering 0.10 mm x 15 deg. + round honing R0.03

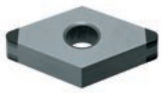
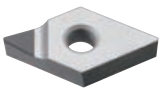
Part No.	Inscribed circle	Thickness
DN_1504_	12.7	4.76

⟨55 degree Rhombic Negative type⟩



	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2
Steel											
Stainless steel											
Cast iron	●	●			●	●			●		
Nonferrous metal										●	●
Heat-resistant alloy											
Hardend material		●	●	●			●	●	●		

● : First choice
● : Second choice

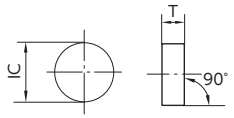
Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2	For applicable holder, see pages:
 4 corners available	DNGA150402PQ	—	S01015	0.2									●			G11 G13 H33 L42
	150402PQ	—	S01535	0.2								●				
	150404PQ	—	S01015	0.4									●			
	150404PQ	DNGA431PQ	S01325	0.4							●					
	150404PQ	—	S01535	0.4								●				
	150404S01015	—	S01015	0.4		●										
	150404S01325	—	S01325	0.4			●									
	150408PQ	—	S01015	0.8									●			
	150408PQ	—	S01020	0.8					●							
	150408PQ	DNGA432PQ	S01325	0.8							●					
	150408PQ	—	S01535	0.8								●				
	150408PQ	—	T01020	0.8						●						
	150408S01015	—	S01015	0.8		●										
	150408S01325	—	S01325	0.8			●									
	150412PQ	—	S01015	1.2									●			
	150412PQ	—	S01020	1.2					●							
	150412PQ	—	S01535	1.2								●				
	150412PQ	—	T01020	1.2						●						
	DNMA150412PQ	DNMA433PQ	S01325	1.2							●					
	DNMX150404PF	—	Sharp edge rake angle 10°	0.4											●	
	150408PF	—		0.8											●	

● : Standard stock ● : New standard stock

Grade	Code	Cutting edge treatment specification
B23	S01020	Chamfering 0.10 mm x 20 deg. + round honing R0.03
B30	T01020	Chamfering 0.10 mm x 20 deg.
B6K/B36	S01325	Chamfering 0.13 mm x 25 deg. + round honing R0.03
B40	S01535	Chamfering 0.15 mm x 35 deg. + round honing R0.03
B5K/B52	S01015	Chamfering 0.10 mm x 15 deg. + round honing R0.03

Part No.	Inscribed circle	Thickness
RN_1203_	12.7	3.18
RN_1204_	12.7	4.76

⟨Round Negative type⟩



Steel / Stainless steel / Cast iron / Nonferrous metal / Heat-resistant alloy / Hardend material

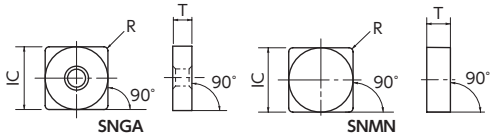
● : First choice ● : Second choice

Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	PVD-coated CBN grade B16	B5K	B6K	CBN B22	B23	B30	B36	B40	B52	PCD grade PD1	PD2	For applicable holder, see pages:
(top full-face CBN)	RNGN120400S	RNGN430S	Z01015	–				●								G14 P28
(Solid CBN)	RNMN120300STN	RNMN420STN	T01025	–	●											—
	RNMN120400STN	RNMN430STN	T01025	–	●											G14 P28

● : Standard stock ● : New standard stock

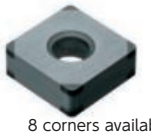
Part No.	Inscribed circle	Thickness
SN_0903_	9.525	3.18
SN_1203_	12.7	3.18
SN_1204_	12.7	4.76

⟨90 degree Square Negative type⟩



Steel / Stainless steel / Cast iron / Nonferrous metal / Heat-resistant alloy / Hardend material

● : First choice ● : Second choice

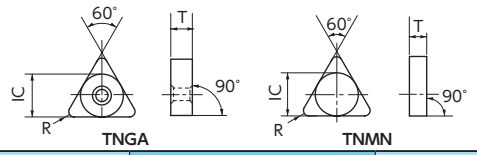
Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	PVD-coated CBN grade B16	B5K	B6K	CBN B22	B23	B30	B36	B40	B52	PCD grade PD1	PD2	For applicable holder, see pages:
 8 corners available	SNGA120404PE	—	S01535	0.4								●				G17 G19 L43
	120404PE	—	T01020	0.4						●						
	SNGA120408PE	—	S01015	0.8						●			●			
	120408PE	SNGA432PE	S01325	0.8							●					
	120408PE	—	S01535	0.8								●				
	SNGA120412PE	—	S01015	1.2									●			
	120412PE	—	S01020	1.2					●							
	120412PE	—	S01535	1.2								●				
	120412PE	—	T01020	1.2						●						
	SNMA120412PE	SNMA433PE	S01325	1.2							●					
(Solid CBN)	SNMN090308STNB	SNMN322STNB	T00525	0.8	●											G17 G19 G21 L43 P23
	090312STN	323STN	T01025	1.2	●											
	SNMN120308STN	SNMN422STN	T01025	0.8	●											
	120312STN	423STN	T01025	1.2	●											
	SNMN120408STN	SNMN432STN	T01025	0.8	●											
	120412STNF	433STNF	T02025	1.2	●											
	120416STNF	434STNF	T02025	1.6	●											

● : Standard stock ● : New standard stock ★ : Standard stock (Specified)

Grade	Code	Cutting edge treatment specification
B23	S01020	Chamfering 0.10 mm x 20 deg. + round honing R0.03
B30	T01020	Chamfering 0.10 mm x 20 deg.
B6K/B36	S01325	Chamfering 0.13 mm x 25 deg. + round honing R0.03
B40	S01535	Chamfering 0.15 mm x 35 deg. + round honing R0.03
B5K/B52	S01015	Chamfering 0.10 mm x 15 deg. + round honing R0.03

Part No.	Inscribed circle	Thickness
TN_1103_	6.35	3.18
TN_1604_	9.525	4.76

⟨60 degree Triangle Negative type⟩



	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2
Steel											
Stainless steel											
Cast iron	●	●			●	●			●		
Nonferrous metal										●	●
Heat-resistant alloy											
Hardend material		●	●	●			●	●	●		

● : First choice
● : Second choice

Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2	For applicable holder, see pages:
6 corners available	TNGA160401PH	—	S01015	0.1									●			G23 G25 H13 H31
	160402PH	—	S01015	0.2									●			
	160402PH	—	S01535	0.2								●				
	160402S01015	—	S01015	0.2		●										
	160404PTFNX※	—	Sharp edge	0.4						★						
	160404PH	—	S01015	0.4									●			
	160404PH	TNGA331PH	S01325	0.4							●					
	160404PH	—	S01535	0.4								●				
	160404PH	—	T01020	0.4						●						
	160404S01015	—	S01015	0.4		●										
	160404S01325	—	S01325	0.4			●									
	160408PTFNX※	—	Sharp edge	0.8						★						
	160408PH	—	S01015	0.8									●			
	160408PH	—	S01020	0.8					●							
	160408PH	TNGA332PH	S01325	0.8							●					
	160408PH	—	S01535	0.8								●				
	160408PH	—	T01020	0.8						●						
	160408S01015	—	S01015	0.8		●										
	160408S01325	—	S01325	0.8			●									
	160412PH	—	S01015	1.2									●			
	160412PH	—	S01020	1.2					●							
	160412PH	—	S01535	1.2								●				
	160412PH	—	T01020	1.2						●						
	TNMA160412PH	TNMA333PH	S01325	1.2							●					
1 corner available	TNMX160404PF	—	Sharp edge rake angle 10°	0.4											●	
	160408PF	—		0.8											●	
(Solid CBN)	TNMN110312STNC	TNMN223STNC	Chamfering 0.1×25°	1.2	●											G23 G24 G25
	TNMN160408STN	TNMN332STN		0.8	●											
	160412STNF	333STNF	Chamfering 0.2×25°	1.2	●											

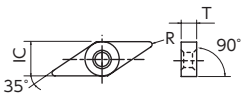
※TNGA160404PTFNX and TNGA160408PTFNX have 3 cutting edges.

● : Standard stock ● : New standard stock ★ : Standard stock (Specified)

Grade	Code	Cutting edge treatment specification
B23	S01020	Chamfering 0.10 mm x 20 deg. + round honing R0.03
B30	T01020	Chamfering 0.10 mm x 20 deg.
B6K/B36	S01325	Chamfering 0.13 mm x 25 deg. + round honing R0.03
B40	S01535	Chamfering 0.15 mm x 35 deg. + round honing R0.03
B5K/B52	S01015	Chamfering 0.10 mm x 15 deg. + round honing R0.03

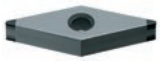
Part No.	Inscribed circle	Thickness
VN_1604_	9.525	4.76

⟨35 degree Rhombic Negative type⟩



Steel / Stainless steel / Cast iron / Nonferrous metal / Heat-resistant alloy / Hardend material	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2
Cast iron	●	●			●	●			●		
Nonferrous metal										●	●
Hardend material		●	●	●			●	●	●		

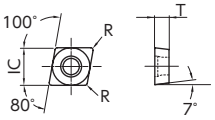
● : First choice ● : Second choice

Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	For applicable holder, see pages:
 4 corners available	**VNGA160402PQ**	—	S01535	0.2	**G27**
	160404PQ	—	S01015	0.4	
	160404PQ	**VNGA331PQ**	S01325	0.4	
	160404PQ	—	S01535	0.4	
	160404PQ	—	T01020	0.4	
	160404S01015	—	S01015	0.4	
	160404S01325	—	S01325	0.4	
	160408PQ	—	S01015	0.8	
	160408PQ	**VNGA332PQ**	S01325	0.8	
	160408PQ	—	S01535	0.8	
	160408S01015	—	S01015	0.8	
	160408S01325	—	S01325	0.8	
	160412PQ	—	S01535	1.2	

● : Standard stock ● : New standard stock

Part No.	Inscribed circle	Thickness	Relief angle
CC_0602_	6.35	2.38	7°
CC_09T3_	9.525	3.97	7°

⟨80 degree Rhombic Positive type⟩



Steel / Stainless steel / Cast iron / Nonferrous metal / Heat-resistant alloy / Hardend material	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2
Cast iron	●	●			●	●			●		
Nonferrous metal										●	●
Hardend material		●	●	●			●	●	●		

● : First choice ● : Second choice

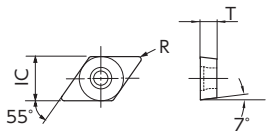
Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	For applicable holder, see pages:
2 corners available	**CCGW060204PD**	—	S01015	0.4	**H13**
	CCGW09T302PD	—	S01015	0.2	
	09T302PD	—	S01535	0.2	
	09T304PD	—	S01015	0.4	
	09T304PD	—	S01535	0.4	
	09T308PD	—	S01015	0.8	
	09T308PD	—	S01535	0.8	
1 corner available	**CCMW09T301**	—	Sharp edge	0.1	**H17**
	09T302	—	Sharp edge	0.2	**L36**
	09T304	—	Sharp edge	0.4	
	09T308	—	Sharp edge	0.8	
1 corner available	**CCMT09T302PF**	—	Sharp edge rake angle 10°	0.2	
	09T304PF	—		0.4	

● : Standard stock ● : New standard stock

Grade	Code	Cutting edge treatment specification
B23	S01020	Chamfering 0.10 mm x 20 deg. + round honing R0.03
B30	T01020	Chamfering 0.10 mm x 20 deg.
B6K/B36	S01325	Chamfering 0.13 mm x 25 deg. + round honing R0.03
B40	S01535	Chamfering 0.15 mm x 35 deg. + round honing R0.03
B5K/B52	S01015	Chamfering 0.10 mm x 15 deg. + round honing R0.03

Part No.	Inscribed circle	Thickness	Relief angle
DC_0702_	6.35	2.38	7°
DC_11T3_	9.525	3.97	7°

⟨55 degree Rhombic Positive type⟩



Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	PVD-coated CBN grade B16	PVD-coated CBN grade B5K	PVD-coated CBN grade B6K	CBN B22	CBN B23	CBN B30	CBN B36	CBN B40	CBN B52	PCD grade PD1	PCD grade PD2	For applicable holder, see pages:
			Steel													● : First choice
			Stainless steel													● : Second choice
			Cast iron		●	●			●	●			●			
			Nonferrous metal											●	●	
			Heat-resistant alloy													
			Hardend material			●	●	●			●	●	●			
2 corners available	DCGW070202PD	—	S01015	0.2									●			H13 H19 H21
	070204PD	—	S01015	0.4									●			
	070204PD	—	S01535	0.4								●				
	070208PD	—	S01015	0.8									●			
	DCGW11T302PD	—	S01015	0.2									●			
	11T302PD	—	S01535	0.2								●				
	11T302S01015	—	S01015	0.2		●										
	11T304PD	—	S01015	0.4									●			
	11T304PD	—	S01535	0.4								●				
	11T304S01015	—	S01015	0.4		●										
	11T308PD	—	S01015	0.8									●			
	11T308PD	—	S01535	0.8								●				
1 corner available	DCMW11T301	—	Sharp edge	0.1										●		
	11T302	—	Sharp edge	0.2										●		
	11T304	—	Sharp edge	0.4										●		
	11T308	—	Sharp edge	0.8										●		
1 corner available	DCMT11T302PF	—	Sharp edge rake angle 10°	0.2											●	
	11T304PF	—		0.4											●	

● : Standard stock ● : New standard stock

⟨For Machining Mill Rolls and Heat-Resistant Alloys⟩

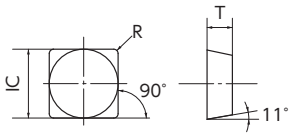
※For details of insert mesurement, please go to page **M5**.

Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	PVD-coated CBN grade B16	PVD-coated CBN grade B5K	PVD-coated CBN grade B6K	CBN B22	CBN B23	CBN B30	CBN B36	CBN B40	CBN B52	PCD grade PD1	PCD grade PD2	For applicable holder, see pages:
			Steel													● : First choice
			Stainless steel													● : Second choice
			Cast iron		●	●			●	●			●			
			Nonferrous metal											●	●	
			Heat-resistant alloy													
			Hardend material			●	●	●			●	●	●			
	RBGX16SPN	—		–												—
	16SSN2	—		–												
	16S	—		–				●								
	RBGX20SPN	—		–												
	20SSN3	—		–												
	20S	—		–				●								
	RBGX26SPN	—		–												
	26SSN3	—		–												

● : Standard stock ● : New standard stock

⟨90 degree Square Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
SP_0903_	9.525	3.18	11°



Steel															● : First choice ● : Second choice
Stainless steel															
Cast iron	●	●			●	●			●						
Nonferrous metal													●	●	
Heat-resistant alloy															
Hardend material		●	●	●			●	●	●						

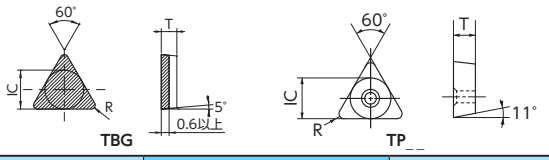
Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	PVD-coated CBN grade			CBN						PCD grade		For applicable holder, see pages:
					B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2	
4 corners available	SPGN090304PQ	—	S01020	0.4					●							—
	SPGN090308PQ	—	S01020	0.8					●							
	090308PQ	—	T01020	0.8						●						

● : Standard stock ● : New standard stock

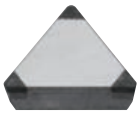
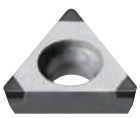
⟨60 degree Triangle Positive type⟩

Grade	Code	Cutting edge treatment specification
B23	S01020	Chamfering 0.10 mm x 20 deg. + round honing R0.03
B30	T01020	Chamfering 0.10 mm x 20 deg.
B6K/B36	S01325	Chamfering 0.13 mm x 25 deg. + round honing R0.03
B40	S01535	Chamfering 0.15 mm x 35 deg. + round honing R0.03
B5K/B52	S01015	Chamfering 0.10 mm x 15 deg. + round honing R0.03

Part No.	Inscribed circle	Thickness	Relief angle
TB_0601_	3.97	1.59	5°
TP_0902_	5.56	2.38	11°
TP_1103_	6.35	3.18	11°
TP_1603_	9.525	3.18	11°



Steel															● : First choice ● : Second choice
Stainless steel															
Cast iron	●	●			●	●			●						
Nonferrous metal													●	●	
Heat-resistant alloy															
Hardend material		●	●	●			●	●	●						

Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	PVD-coated CBN grade			CBN						PCD grade		For applicable holder, see pages:
					B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2	
3 corners available	TBGN060102SSNCD	—	S01015	0.2									★			—
	060104SSNCD	—	S01015	0.4									★			
	060108SSNCD	—	S01015	0.8									★			
 ※1 3 corners available	TPGN110304PT	—	S01020	0.4								●				—
	110308PT	—	S01020	0.8								●				
	TPGN160304PT	—	S01020	0.4								●				
	160308PT	—	S01020	0.8								●				
 3 corners available	TPGW110302PT	—	S01015	0.2									●			L38 L39 L40
	110304PT	—	S01015	0.4									●			
	110304PT	—	S01535	0.4								●				
	110304PT	—	T01515 ※2	0.4					●							
	110308PT	—	S01015	0.8									●			
	110308PT	—	S01535	0.8								●				
1 corner available	TPMT090202PF	—	Sharp edge rake angle 10°	0.2											●	
	090204PF	—		0.4											●	
	TPMT110302PF	—		0.2											●	
	110304PF	—		0.4											●	

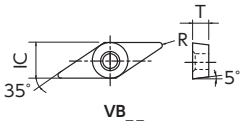
※1 Edge preparation of -B40 TPGN type is "S01020 (chamfer 0.10mm × 20° + R0.03)".
※2 Edge preparation of -B23 TPGW110304PT is "T01515 (chamfer 0.15mm × 15°)".

● : Standard stock ● : New standard stock ★ : Standard stock (Specified)

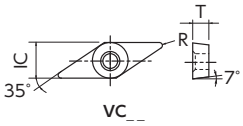
⟨35 degree Rhombic Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
VB_1103_	6.35	3.18	5°
VB_1604_	9.525	4.76	5°

Part No.	Inscribed circle	Thickness	Relief angle
VC_1103_	6.35	3.18	7°
VC_1604_	9.525	4.76	7°



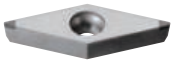
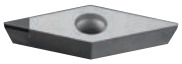
VB_ _



VC_ _

	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2
Steel											
Stainless steel											
Cast iron	●	●			●	●			●		
Nonferrous metal										●	●
Heat-resistant alloy											
Hardend material		●	●	●			●	●	●		

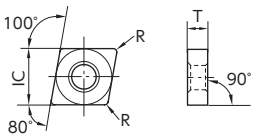
● : First choice
● : Second choice

Shape	Part No.	Inch system	Cutting edge spec. code	Nose Radius	B16	B5K	B6K	B22	B23	B30	B36	B40	B52	PD1	PD2	For applicable holder, see pages:
 2 corners available	VBGW110302PD	—	S01015	0.2									●			H23 H25 H46
	110304PD	—	S01015	0.4									●			
	VBGW160408PD	—	S01015	0.8									●			
	VCGW110304PD	—	S01015	0.4									●			
	110304PD	—	S01535	0.4								●				
	110308PD	—	S01015	0.8									●			
	110308PD	—	S01535	0.8								●				
	VCGW160404PD	—	S01015	0.4									●			
	160404PD	—	S01535	0.4								●				
	160408PD	—	S01015	0.8									●			
	160408PD	—	S01535	0.8								●				
 1 corner available	VCMW110301	—	Sharp edge	0.1										●		
	110302	—	Sharp edge	0.2										●		
	110304	—	Sharp edge	0.4										●		

● : Standard stock ● : New standard stock

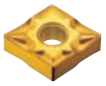
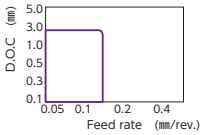
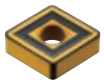
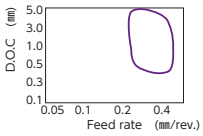
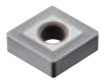
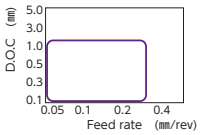
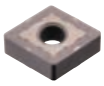
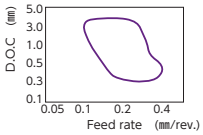
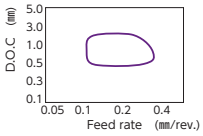
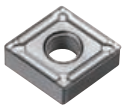
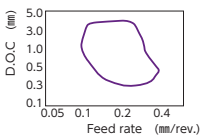
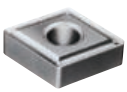
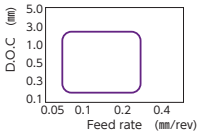
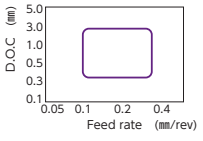
⟨80 degree Rhombic Negative type⟩

Part No.	Inscribed circle	Thickness
CN_1204	12.7	4.76



	Cermet			PVD cermet		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade
	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

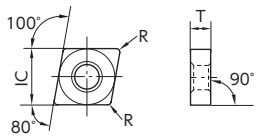
● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1	For applicable holder, see pages:	Chipbreaker applicable range
 UL	CNGG120404FNUL		0.4									●		●				G7 H32	
	120408FNUL		0.8									●		●					
 G	CNMG120408G	CNMG432-G	0.8												●				
	120412G	433-G	1.2												●				
	120416G	434-G	1.6												●				
 G	CNMG120404ENBG	CNMG431-ENB-G	0.4	●		●													
	120408ENBG	432-ENB-G	0.8	●		●													
	120412ENBG	433-ENB-G	1.2			●													
	120404TNG	431-TN--G	0.4				●												
	120408TNG	432-TN--G	0.8				●												
	120412TNG	433-TN--G	1.2				●												
WM	CNMG120404ENWM	CNMG431-EN--WM	0.4		●			●											
	120408ENWM	432-EN--WM	0.8		●			●											
 WR	CNMG120408ENBWR	CNMG432-ENB-WR	0.8			●													
WV	CNMG120408ENWV	CNMG432-EN--WV	0.8		●			●											
 Z5	CNMG120408ENBZ5	CNMG432-ENB-Z5	0.8			●													
	120408TNBZ5	432-TNB-Z5	0.8							●				●					
 ZF1	CNMG120404ENBZF1	CNMG431-ENB-ZF1	0.4	●		●	●												
	120408ENBZF1	432-ENB-ZF1	0.8	●		●	●												
	120412ENBZF1	433-ENB-ZF1	1.2	●		●													
ZP	CNMG120408ENBZP	CNMG432-ENB-ZP	0.8	●															
	CNGG120404FNZP	CNGG431-FN--ZP	0.4						●	●				●					
	120408FNZP	432-FN--ZP	0.8						●	●				●					

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

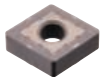
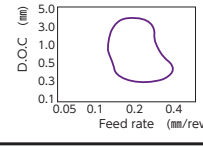
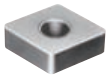
⟨80 degree Rhombic Negative type⟩

Part No.	Inscribed circle	Thickness
CN_1204	12.7	4.76



	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●		●	●	●			

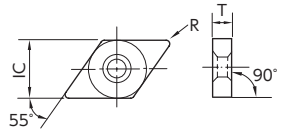
● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
 ZW1	CNMG120408ENBZW1	CNMG432-ENB-ZW1	0.8	●		●												G7 H32	
	120412ENBZW1	433-ENB-ZW1	1.2	●		●													
 without chipbreaker	CNGA120408TN	CNGA432-TN	0.8	●															—
	120412TN	433-TN	1.2	●															
	CNMA120408TN	CNMA432-TN	0.8	●															

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

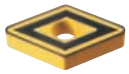
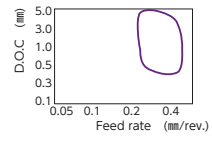
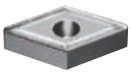
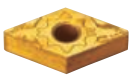
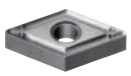
⟨55 degree Rhombic Negative type⟩

Part No.	Inscribed circle	Thickness
DN_1504	12.7	4.76
DN_1506	12.7	6.35



	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●		●	●	●			

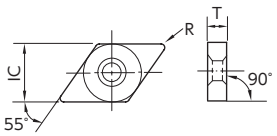
● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
 G	DNMG150404G	DNMG431-G	0.4												●			G11 H33	
	150408G	432-G	0.8												●				
	150412G	433-G	1.2												●				
 G	DNMG150404ENBG	DNMG431-ENB-G	0.4	●															
	150404TNG	431-TN--G	0.4				●			●									
	150408TNG	432-TN--G	0.8				●												
	DNMG150604ENBG	DNMG441-ENB-G	0.4			●													
WM	DNMG150404ENWM	DNMG431-EN--WM	0.4		●			●											
	150408ENWM	432-EN--WM	0.8		●			●											
WR	DNMG150408ENBWR	DNMG432-ENB-WR	0.8			●													
	150412ENBWR	433-ENB-WR	1.2			●													
 WV	DNMG150408ENWV	DNMG432-EN--WV	0.8		●			●											
 Z5	DNMG150408TNBZ5	DNMG432-TNB-Z5	0.8						●					●					

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

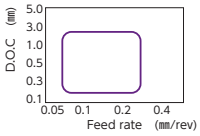
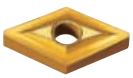
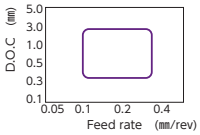
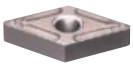
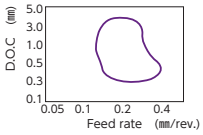
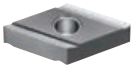
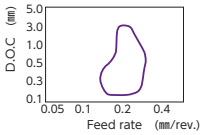
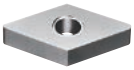
⟨55 degree Rhombic Negative type⟩

Part No.	Inscribed circle	Thickness
DN_1504	12.7	4.76
DN_1506	12.7	6.35



	Steel	Stainless steel	Cast iron	Nonferrous metal	Heat-resistant alloy	Hardend material
T15	●	●	●	●		
C7X	●	●	●	●		
N40	●	●		●		
Q15	●	●	●			
C7Z	●	●	●	●		
ZM3	●	●		●	●	●
QM3	●	●				●
VM1	●	●		●		
TM4	●	●		●	●	
DT4	●	●			●	●
DM4	●	●			●	●
CP1			●			
CP7	●					
KM1	●	●		●		

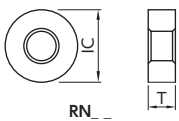
● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	PVD-coated micro-grain carbide grade QM3	PVD-coated micro-grain carbide grade VM1	PVD-coated micro-grain carbide grade TM4	PVD-coated micro-grain carbide grade DT4	PVD-coated micro-grain carbide grade DM4	CVD-coated carbide grade CP1	CVD-coated carbide grade CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
ZF1	DNMG150404ENBZF1	DNMG431-ENB-ZF1	0.4	●		●	●											G11 H33	
	150408ENBZF1	432-ENB-ZF1	0.8	●		●	●												
	DNMG150604ENBZF1	DNMG441-ENB-ZF1	0.4	●		●													
	150608ENBZF1	442-ENB-ZF1	0.8	●		●													
 ZP	DNGG150404FNZP	DNGG431-FN--ZP	0.4						●	●				●					
	150408FNZP	432-FN--ZP	0.8						●	●				●					
 ZW1	DNMG150404ENBZW1	DNMG431-ENB-ZW1	0.4			●													
	150408ENBZW1	432-ENB-ZW1	0.8			●													
	DNMG150608ENBZW1	DNMG442-ENB-ZW1	0.8	●		●													
 N1 R-hand shown	DNGG150404TR/LRN1	DNGG431-TR/L--N1	0.4	R															
 without chipbreaker	DNGA150412TN	DNGA433-TN	1.2	●															—

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

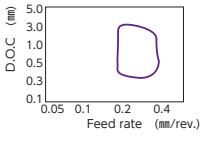
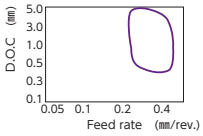
⟨Round Negative type⟩

Part No.	Inscribed circle	Thickness
RN_0903	9.525	3.18
RN_1204	12.7	6.35



	Steel	Stainless steel	Cast iron	Nonferrous metal	Heat-resistant alloy	Hardend material
T15	●	●	●	●		
C7X	●	●	●	●		
N40	●	●		●		
Q15	●	●	●			
C7Z	●	●	●	●		
ZM3	●	●		●	●	●
QM3	●	●				●
VM1	●	●		●		
TM4	●	●		●	●	
DT4	●	●			●	●
DM4	●	●			●	●
CP1			●			
CP7	●					
KM1	●	●		●		

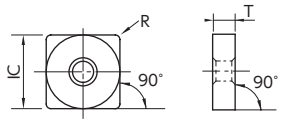
● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	PVD-coated micro-grain carbide grade QM3	PVD-coated micro-grain carbide grade VM1	PVD-coated micro-grain carbide grade TM4	PVD-coated micro-grain carbide grade DT4	PVD-coated micro-grain carbide grade DM4	CVD-coated carbide grade CP1	CVD-coated carbide grade CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
F・G	RNMG090300ENBF	RNMG320-ENB-F	–			●												—	
	RNMG120400ENBG	RNMG430-ENB-G	–			●												G15	

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

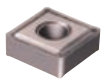
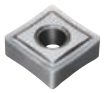
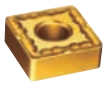
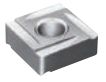
Part No.	Inscribed circle	Thickness
SN_0903	9.525	3.18
SN_1204	12.7	4.76

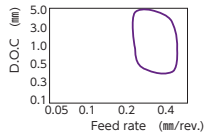
⟨90 degree Square Negative type⟩

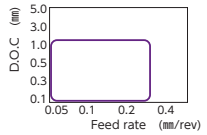


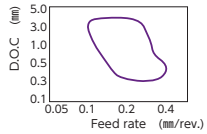
	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

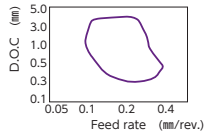
● : First choice
● : Second choice

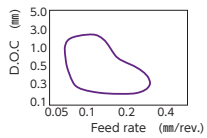
Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
G	SNMG120408G	SNMG432-G	0.8												●				
	SNMG120412G	SNMG433-G	1.2												●				
	SNMG120416G	SNMG434-G	1.6												●				
G	SNMG090308ENBG	SNMG322-ENB-G	0.8			●													
	SNMG120408ENBG	SNMG432-ENB-G	0.8	●		●													
	SNMG120412ENBG	SNMG433-ENB-G	1.2			●													
	SNMG120416ENBG	SNMG434-ENB-G	1.6			●													
	SNMG120408TNG	SNMG432-TN--G	0.8				●												
	SNMG120412TNG	SNMG433-TN--G	1.2				●												
WM	SNMG120408ENWM	SNMG432-EN--WM	0.8		●			●											
WR	SNMG120408ENBWR	SNMG432-ENB-WR	0.8			●													
Z5	SNMG120408ENBZ5	SNMG432-ENB-Z5	0.8			●												G17 G19 L43	
	SNMG120408TNBZ5	SNMG432-TNB-Z5	0.8						●					●					
 ZF1	SNMG120408ENBZF1	SNMG432-ENB-ZF1	0.8	●		●													
	SNMG120412ENBZF1	SNMG433-ENB-ZF1	1.2	●															
 ZP	SNMG120408ENBZP	SNMG432-ENB-ZP	0.8	●															
 ZW1	SNMG120408ENBZW1	SNMG432-ENB-ZW1	0.8			●													
	SNMG120412ENBZW1	SNMG433-ENB-ZW1	1.2			●													
 B R-hand shown	SNGG090304T$^{R}_{L}$B	SNGG321-T$^{R}_{L}$--B	0.4	L															
	SNGG090308T$^{R}_{L}$B	SNGG322-T$^{R}_{L}$--B	0.8	●															
	SNGG120404T$^{R}_{L}$B	SNGG431-T$^{R}_{L}$--B	0.4	●															

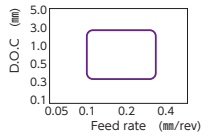


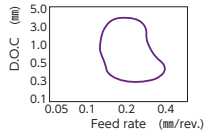


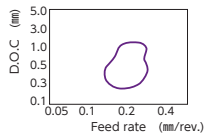








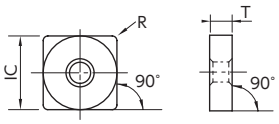




● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

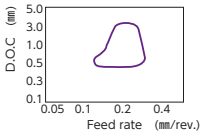
⟨90 degree Square Negative type⟩

Part No.	Inscribed circle	Thickness
SN_0903	9.525	3.18
SN_1204	12.7	4.76



	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade
	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

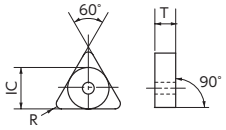
● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
C R-hand shown	SNGG120408T$^{R}_{L}$C	SNGG432-T$^{R}_{L}$--C	0.8	●	R													G17 G19 G21 L43 P23	
	SNGN090308TN	SNGN322-TN	0.8	●															—
	SNGN120408TN	SNGN432-TN	0.8	●	●														

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

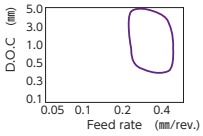
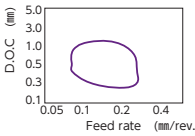
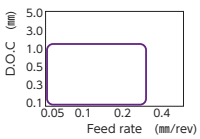
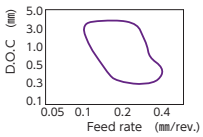
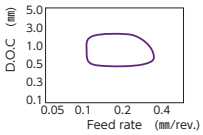
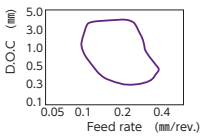
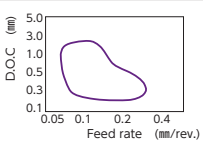
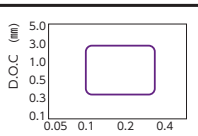
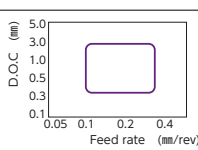
⟨60 degree Triangle Negative type⟩

Part No.	Inscribed circle	Thickness
TN_1604	9.525	4.76
TN_2204	12.7	4.76



	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade
	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

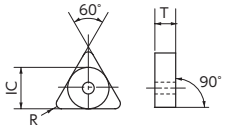
Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	PVD-coated micro-grain carbide grade QM3	PVD-coated micro-grain carbide grade VM1	PVD-coated micro-grain carbide grade TM4	PVD-coated micro-grain carbide grade DT4	PVD-coated micro-grain carbide grade DM4	CVD-coated carbide grade CP1	CVD-coated carbide grade CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
G	TNMG160408G	TNMG332-G	0.8												●			G23 H13 H31	
	160412G	333-G	1.2												●				
G	TNMG160404ENBG	TNMG331-ENB-G	0.4	●		●													
	160412ENBG	333-ENB-G	1.2			●													
	160404TNG	331-TN--G	0.4				●												
	160408TNG	332-TN--G	0.8				●												
	160412TNG	333-TN--G	1.2				●												
	TNMG220412ENBG	TNMG433-ENB-G	1.2			●													
R1	TNGG160404ENBR1	TNGG331-ENB-R1	0.4																
	160408ENBR1	332-ENB-R1	0.8	●															
WM	TNMG160404ENWM	TNMG331-EN--WM	0.4		●			●											
	160408ENWM	332-EN--WM	0.8		●			●											
WR	TNMG160408ENBWR	TNMG332-ENB-WR	0.8			●													
WV	TNMG160408ENWV	TNMG332-EN--WV	0.8		●			●											
Z5	TNMG160408ENBZ5	TNMG332-ENB-Z5	0.8			●													
	160404TNBZ5	331-TNB-Z5	0.4							●				●					
	160408TNBZ5	332-TNB-Z5	0.8							●				●					
ZF1	TNMG160404ENBZF1	TNMG331-ENB-ZF1	0.4			●	●												
	160408ENBZF1	332-ENB-ZF1	0.8	●		●	●												
	160412ENBZF1	333-ENB-ZF1	1.2	●															
ZP	TNMG160404ENBZP	TNMG331-ENB-ZP	0.4	●															
	160408ENBZP	332-ENB-ZP	0.8	●															
	TNMG220408ENBZP	TNMG432-ENB-ZP	0.8	●															
ZP	TNGG160402FNZP	TNGG33Y-FN--ZP	0.2						●	●	●		●						
	160404FNZP	331-FN--ZP	0.4						●	●	●		●						
	160408FNZP	332-FN--ZP	0.8						●	●	●		●						

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

⟨60 degree Triangle Negative type⟩

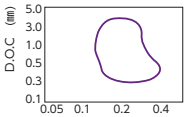
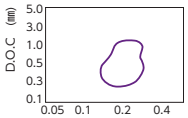
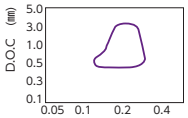
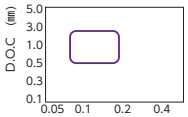
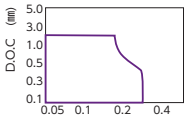
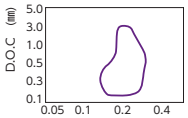
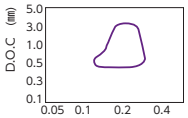
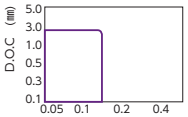
Part No.	Inscribed circle	Thickness
TN_1103	6.35	3.18
TN_1603	9.525	3.18

Part No.	Inscribed circle	Thickness
TN_1604	9.525	4.76
TN_2204	12.7	4.76



	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

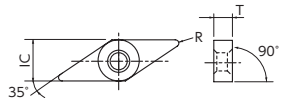
Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
ZW1	TNMG160404ENBZW1	TNMG331-ENB-ZW1	0.4			●													
	160408ENBZW1	332-ENB-ZW1	0.8	●		●													
	TNMG220408ENBZW1	TNMG432-ENB-ZW1	0.8			●													
B R-hand shown	TNGG110304TR/LB	TNGG221-TR/L--B	0.4	●															
	110308TR/LB	222-TR/L--B	0.8	L															
	TNGG160308TR/LB	TNGG322-TR/L--B	0.8	L															
	160404TR/LB	TNGG331-TR/L--B	0.4	●															
	160408TR/LB	332-TR/L--B	0.8	●															
C R-hand shown	TNGG160402FR/LC	TNGG33Y-FR/L--C	0.2						R										
	160404TR/LC	331-TR/L--C	0.4	●															
	160408TR/LC	332-TR/L--C	0.8	●															
	TNGG220408TR/LC	TNGG432-TR/L--C	0.8	R															
	TNMG160404TR/LC	TNMG331-TR/L--C	0.4	●		R													
	160408TR/LC	332-TR/L--C	0.8	R															
D1 R-hand shown	TNEG160402FR/LD1		0.2				●				●								
	160404FR/LD1		0.4				●				●								
	160408FR/LD1		0.8				●				●								
	160401MFR/LD1		*0.08				●												
DA R-hand shown	TNGG160401FR/LDA	TNGG331CFR/L--DA	0.1	R					R		R							G23 H13 H31	
N1 R-hand shown	TNGG160402TR/LN1	TNGG33Y-TR/L--N1	0.2	●															
	160404TR/LN1	331-TR/L--N1	0.4	●															
	160408TR/LN1	332-TR/L--N1	0.8	●															
U2 R-hand shown	TNGG160401FR/LU2	TNGG331CFR/L--U2	0.1	R					R		R								
	160402FR/LU2	33Y-FR/L--U2	0.2	●					●					●					
	160404FR/LU2	331-FR/L--U2	0.4	●					●					●					
	160408FR/LU2	332-FR/L--U2	0.8						●										
UL	TNGG160401MFNUL		*0.08									●		●					
	160402MFNUL		*0.18									●		●					
	160404MFNUL		*0.38									●		●					
without chipbreaker	TNGA110308TN	TNGA222-TN	0.8	●															—
	TNGA160408TN	TNGA332-TN	0.8	●															
	160412TN	333-TN	1.2	●															
	TNGA220408TN	TNGA432-TN	0.8	●															

*Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

⟨35 degree Rhombic Negative type⟩

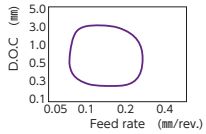
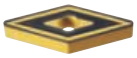
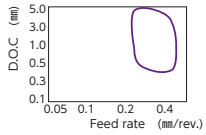
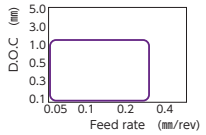
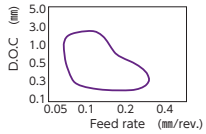
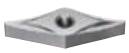
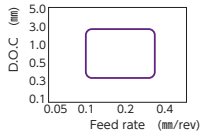
Part No.	Inscribed circle	Thickness
VN_1604	9.525	4.76



VN__

	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●		●				●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

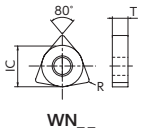
● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
AM1	VNMG160404ENAM1	VNMG331-EN--AM1	0.4		●			●										G27	
	160408ENAM1	332-EN--AM1	0.8		●			●											
	160404ENBAM1	331-ENB-AM1	0.4	●		●	●												
	160408ENBAM1	332-ENB-AM1	0.8	●		●	●												
	160404TNBAM1	331-TNB-AM1	0.4							●				●					
	160408TNBAM1	332-TNB-AM1	0.8							●				●					
 G	VNMG160404G	VNMG331-G	0.4												●				
	160408G	332-G	0.8												●				
	160412G	333-G	1.2												●				
WM	VNMG160408ENWM	VNMG332-EN--WM	0.8		●			●											
ZF1	VNMG160404ENBZF1	VNMG331-ENB-ZF1	0.4			●													
 ZP	VNMM160404ENBZP	VNMM331-ENB-ZP	0.4	●															
	VNGG160402FNZP	VNGG33Y-FN--ZP	0.2							●				●					
	160404FNZP	331-FN--ZP	0.4							●				●					
	160408FNZP	332-FN--ZP	0.8							●				●					

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

⟨80 degree Hexagon Negative type⟩

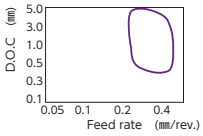
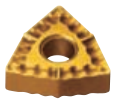
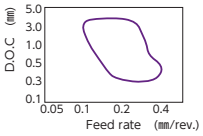
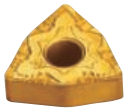
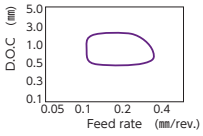
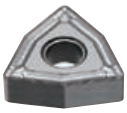
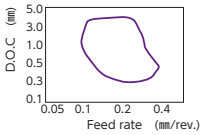
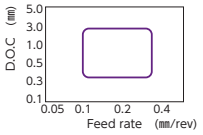
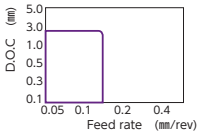
Part No.	Inscribed circle	Thickness
WN_0804	12.7	4.76



WN__

Steel	●● ●● ● ●● ●● ●● ●● ●● ●● ●● ●● ● ●● ●
Stainless steel	●● ●● ● ●● ●● ●● ●● ●● ●● ●● ●●	●
Cast iron	●● ● ●● ●	●
Nonferrous metal	● ● ● ● ● ● ● ● ● ● ●
Heat-resistant alloy	● ● ● ● ● ●
Hardend material	● ● ● ●

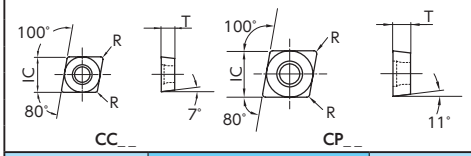
● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	PVD-coated micro-grain carbide grade QM3	PVD-coated micro-grain carbide grade VM1	PVD-coated micro-grain carbide grade TM4	PVD-coated micro-grain carbide grade DT4	PVD-coated micro-grain carbide grade DN4	CVD-coated carbide grade CP1	CVD-coated carbide grade CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
G	WNMG080408G	WNMG432-G	0.8												●			G28 L44	
	080412G	433-G	1.2												●				
 WR	WNMG080408ENWR	WNMG432-EN--WR	0.8		●			●											
 WV	WNMG080408ENWV	WNMG432-EN--WV	0.8		●			●											
 Z5	WNMG080408TNBZ5	WNMG432-TNB-Z5	0.8							●				●					
	080412TNBZ5	433-TNB-Z5	1.2							●				●					
ZP	WNGG080404FNZP	WNGG431-FN--ZP	0.4						●	●				●					
	080408FNZP	432-FN--ZP	0.8						●	●				●					
NEW UL	WNGG080404FNUL	WNGG431FNUL	0.4									●		●					
	080408FNUL	432FNUL	0.8									●		●					

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

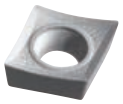
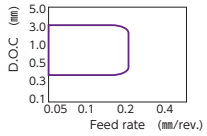
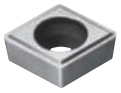
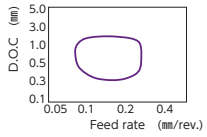
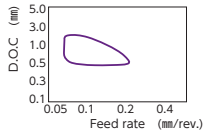
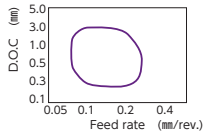
⟨80 degree Rhombic Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
CC_0602	6.35	2.38	7°
CC_09T3	9.525	3.97	7°



	Steel	Stainless steel	Cast iron	Nonferrous metal	Heat-resistant alloy	Hardend material
T15	●	●	●	●		
C7X	●	●	●	●		
N40	●	●				
Q15	●	●	●	●		
C7Z	●	●	●	●		
ZM3	●	●		●		
QM3	●	●		●	●	●
VM1	●	●		●		
TM4	●	●		●	●	
DT4	●	●			●	●
DM4	●	●			●	●
CP1			●			
CP7	●					
KM1	●	●		●		

● : First choice
● : Second choice

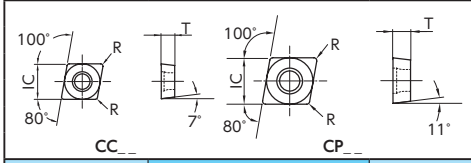
Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	PVD-coated micro-grain carbide grade QM3	PVD-coated micro-grain carbide grade VM1	PVD-coated micro-grain carbide grade TM4	PVD-coated micro-grain carbide grade DT4	PVD-coated micro-grain carbide grade DM4	CVD-coated carbide grade CP1	CVD-coated carbide grade CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
 1L	CCGT060202FN1L		0.2							●									
	CCGT09T304FN1L		0.4							●									
 AF1	CCGT09T302ENBAF1		0.2	●															
	09T304ENBAF1		0.4	●															
	09T308ENBAF1		0.8	●															
AM3	CCGT060200FNAM3		0.03								●		●					H17 L36	
	060202FNAM3		0.2						●		●								
	060204FNAM3		0.4						●										
	060201FNXAM3		0.1		●														
	060202FNXAM3		0.2		●														
	060201MFNAM3		*0.08							●									
	060202MFNAM3		*0.18							●			●						
	060204MFNAM3		*0.38							★			●						
	CCGT09T300FNAM3		0.03								●	●	●						
	09T302FNAM3		0.2							●	●								
	09T304FNAM3		0.4							●	●								
	09T301FNXAM3		0.1		●														
	09T302FNXAM3		0.2		●														
	09T304FNXAM3		0.4		●														
	09T301MFNAM3		*0.08						●	●	●	●	●						
	09T302MFNAM3		*0.18						●	●	●	●	●						
	09T304MFNAM3		*0.38						●	●	●	●	●						
	CCMT060202ENBAM3		0.2		●			●											
	060204ENBAM3		0.4		●			●											
	060202FNAM3		0.2											●					
	060204FNAM3		0.4											●					
	CCMT09T302ENBAM3		0.2		●			●											
	09T304ENBAM3		0.4		●			●											
	09T308ENBAM3		0.8		●			●											
	09T312ENBAM3		1.2		●			●											
	09T302FNAM3		0.2											●					
	09T304FNAM3		0.4											●					
	09T308FNAM3		0.8											●					
AM5	CCMT060204ENBAM5		0.4			●													
	CCMT09T304ENBAM5		0.4			●													
	09T308ENBAM5		0.8			●													

*Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

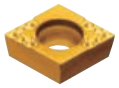
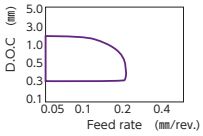
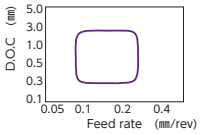
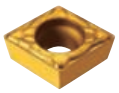
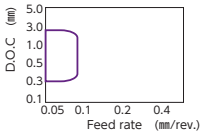
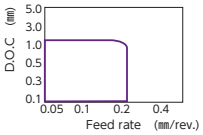
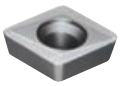
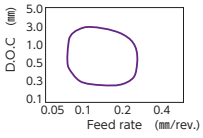
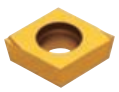
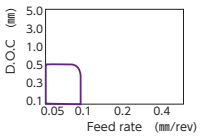
⟨80 degree Rhombic Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
CC_0602	6.35	2.38	7°
CC_09T3	9.525	3.97	7°



	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
 AZ7 ※	CCGT060200FNAZ7		0.03							■									
	060201MFNAZ7		*0.08							■									
	060202MFNAZ7		*0.18							■									
	CCGT09T300FNAZ7		0.03						■	■	■	■	■						
	09T301MFNAZ7		*0.08						■	■	■	■	■						
	09T302MFNAZ7		*0.18						■	■	■	■	■						
	09T304MFNAZ7		*0.38						■	■	■	■	■						
	CCGT060200AZ7		0.03							●									
	060201MAZ7		*0.08							●									
	060202MAZ7		*0.18							●									
	CCGT09T300AZ7		0.03						●	●		●	●						
	09T301MAZ7		*0.08						●	●		●	●						
	09T302MAZ7		*0.18						●	●		●	●						
	09T304MAZ7		*0.38						●	●		●	●						
AZ8	CCMT060202ENAAZ8		0.2													●			
	060204ENBAZ8		0.4													●			
	060208ENBAZ8		0.8													●			
	CCMT09T302ENAAZ8		0.2													●			
	09T304ENBAZ8		0.4													●			
	09T308ENBAZ8		0.8													●			
 ZR	CCMT060202ENBZR		0.2		●			●										H17 L36	
	060204ENBZR		0.4		●			●											
	CCMT09T302ENAZR		0.2																
	09T304ENAZR		0.4																
	09T308ENAZR		0.8																
	09T302ENBZR		0.2		●			●											
	09T304ENBZR		0.4		●			●											
	09T308ENBZR		0.8		●			●											
F1 R-hand shown	CCGT060201F R/L F1		0.1									R							
	060202F R/L F1		0.2									R							
	060204F R/L F1		0.4									R							
	CCGT09T302F R/L F1		0.2									R							
	09T304F R/L F1		0.4									R							
 FM	CCGT060202ENBFM		0.2	●															
	060204ENBFM		0.4	●															
 KHG	CCET0602005 R/L KHG		0.05							●									
	0602008 R/L KHG		0.08							●									
	0602018 R/L KHG		0.18							●									
	060202 R/L KHG		0.2							●									
	CCET09T3005 R/L KHG		0.05							●	R								
	09T3008 R/L KHG		0.08							●	R								
	09T3018 R/L KHG		0.18							●	R								
	09T302 R/L KHG		0.2							●	R								

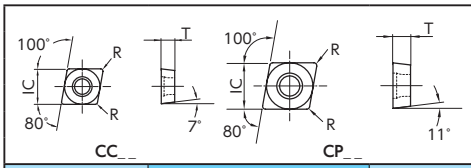
*Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.
※AZ7 chipbreaker was redesigned with 0.2mm higher cutting edge height than conventional ones, which has FN in the item numbers.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

⟨80 degree Rhombic Positive type⟩

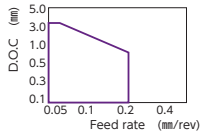
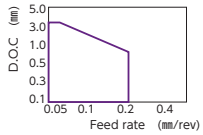
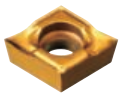
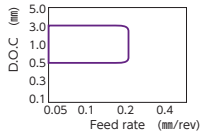
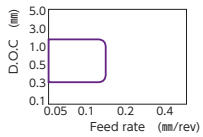
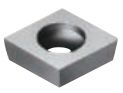
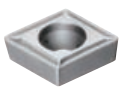
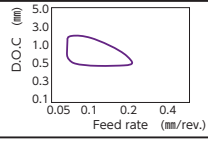
Part No.	Inscribed circle	Thickness	Relief angle
CC_0602	6.35	2.38	7°
CC_09T3	9.525	3.97	7°

Part No.	Inscribed circle	Thickness	Relief angle
CP_0602	6.35	2.38	11°
CP_09T3	9.525	3.97	11°



	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	QM3	VM1	TM4	DT4	DM4	CVD-coated carbide grade CP1	CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
S L-hand shown	CCGT060200R/LS		0.03						●		●		R						
	060201R/LS		0.1		●				●		●								
	060202R/LS		0.2		●				●		●								
	060201MR/LS		*0.08							R			R						
	060202MR/LS		*0.18							R									
	CCGT09T300R/LS		0.03						R		●	R	R						
	09T301R/LS		0.1						●	R	●								
	09T302R/LS		0.2						R	R	●								
	09T304R/LS		0.4							R									
	09T301MR/LS		*0.08							R		R	R						
	09T302MR/LS		*0.18							R		R	R						
	09T304MR/LS		*0.38							R		R							
	CCMT060201TR/LAS		0.1		●			●											
	060202TR/LAS		0.2		●			●											
	060204TR/LAS		0.4		●			●											
	CCMT09T301TR/LAS		0.1		●			●											
	09T302TR/LAS		0.2		●			●											
	09T304TR/LAS		0.4		●			●											
U・U1 R-hand shown	CCGT060200R/LU		0.03						R				R						
	060201R/LU		0.1						●				R						
	060202R/LU		0.2						●				R						
	CCGT09T300R/LU1		0.03						●			R							
	09T301R/LU1		0.1						●			R	R						
	09T302R/LU1		0.2						●			R	R						
	09T304R/LU1		0.4						●			R						H17	
 CL ※2	CCGT060201MCL		*0.08									●	●					L36	
	060202MCL		*0.18									●	●						
	09T300CL		0.03									★	★						
	09T301MCL		*0.08									●	●						
	09T302MCL		*0.18									●	●						
	09T304MCL		*0.38									●	●						
NEW YL	CCGT09T301MYL		0.08									●		●					
	09T302MYL		0.18									●		●					
	09T304MYL		0.38									●		●					
 without chipbreaker	CCGW060200FN		0.03						●										—
	060201FN		0.1						●										
	060200H		0.03														●		
	060201H		0.1														●		
	060202H		0.2														●		
	CCGW09T300FN		0.03						●										
	09T301FN		0.1						●										
	09T300H		0.03														●		
	09T301H		0.1														●		
	09T302H		0.2														●		
	09T302MP		*0.18											●					
	09T30V		0.0								●								
	09T301P		0.1								●								
	09T302P		0.2								●								
 AM3	CPGT060201FNXAM3		0.1		●														
	060202FNXAM3		0.2		●													L36	
	CPGT09T301FNXAM3		0.1		●													L37	
	09T302FNXAM3		0.2		●														

*Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.

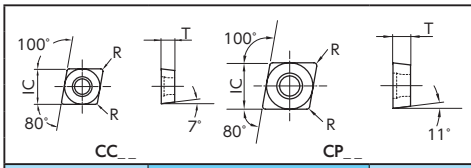
※2 The specifications of CL chipbreaker are slightly different from the above dimensions, but it has no problem for machining.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

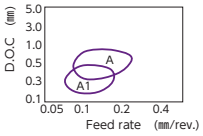
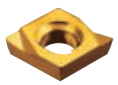
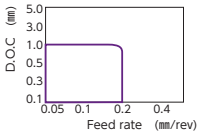
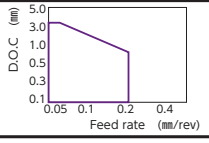
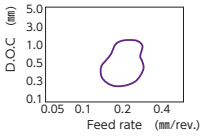
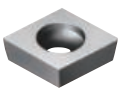
⟨80 degree Rhombic Positive type⟩

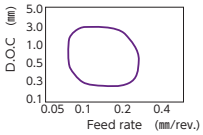
Part No.	Inscribed circle	Thickness	Relief angle
CP_0401	4.76	1.59	11°
CP_0602	6.35	2.38	11°

Part No.	Inscribed circle	Thickness	Relief angle
CP_0802	7.94	2.38	11°
CP_0903	9.525	3.18	11°



Steel	●	●	●	●	●	●	●	●	●	●	●		●	●	● : First choice
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●	● : Second choice
Cast iron	●	●		●	●								●		
Nonferrous metal	●	●			●	●		●		●	●			●	
Heat-resistant alloy							●		●	●	●				
Hardend material							●			●	●				

Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
AM5	CPGH060202ENBAM5	CPGP83Y-ENB-AM5	0.2			●													
	CPGH080202ENBAM5	CPGP03Y-ENB-AM5	0.2			●													
	CPGH090302ENBAM5	CPGM32Y-ENB-AM5	0.2	●															
	090304ENBAM5	321-ENB-AM5	0.4	●															
	090308ENBAM5	322-ENB-AM5	0.8	●															
	CPGH060202FNAM5	CPGP83Y-FN--AM5	0.2						●			●							
	CPGH080202FNAM5	CPGP03Y-FN--AM5	0.2						●			●							
	CPGH090302FNAM5	CPGM32Y-FN--AM5	0.2						●			●							
	090304FNAM5	321-FN--AM5	0.4						●			●							
	090308FNAM5	322-FN--AM5	0.8						●			●							
	CPMH060204AM5	CPMP831-AM5	0.4			●													
	CPMH080204AM5	CPMP031-AM5	0.4			●													
	080208AM5	032-AM5	0.8			●													
	CPMH090304AM5	CPMM321-AM5	0.4			●													
	090308AM5	322-AM5	0.8			●													
A・A1 L-hand shown	CPGH040102FR/LA1	CPGP62Y-FR/L--A1	0.2						L			L						L36 L37	
	040104FR/LA1	621-FR/L--A1	0.4						L			L							
	CPGH060202FR/LA	CPGP83Y-FR/L--A	0.2						L			L							
	060204FR/LA	831-FR/L--A	0.4						L			L							
	CPGH080202FR/LA	CPGP03Y-FR/L--A	0.2						L			L							
	080204FR/LA	031-FR/L--A	0.4						L			L							
	CPGH040102TR/LA1	CPGP62Y-TR/L--A1	0.2	L	L														
	040104TR/LA1	621-TR/L--A1	0.4	L	L														
	CPGH060202TR/LA	CPGP83Y-TR/L--A	0.2	L	L														
	060204TR/LA	831-TR/L--A	0.4	L	L														
	CPGH080204TR/LA	CPGP031-TR/L--A	0.4	L	L														
 F1 R-hand shown	CPGH040101FR/LF1		0.1									R							
	040102FR/LF1		0.2									R							
	040104FR/LF1		0.4									R							
	CPGH060202FR/LF1		0.2									R							
	060204FR/LF1		0.4									R							
S L-hand shown	CPGH040102R/LS		0.2									L							
	040104R/LS		0.4									L							
	CPGH060202R/LS		0.2									L							
	060204R/LS		0.4									L							
B L-hand shown	CPMH090304TR/LB	CPMM321-TR/L--B	0.4		L													—	
	090308TR/LB	322-TR/L--B	0.8		L														
 without chipbreaker	CPGB080204TN	CPGD031-TN	0.4	●														—	—

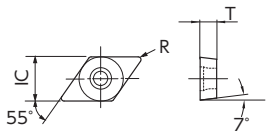


*Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

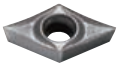
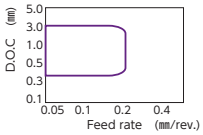
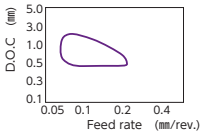
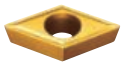
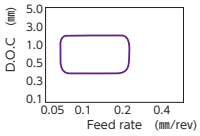
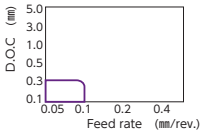
⟨55 degree Rhombic Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
DC_0702	6.35	2.38	7°
DC_11T3	9.525	3.97	7°



	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

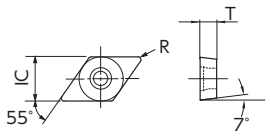
Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
 1L	DCGT070204FN1L		0.4							●									
	DCGT11T302FN1L		0.2							●									
	11T304FN1L		0.4							●									
AF3	DCGT11T302ENBAF3		0.2	●															
	11T304ENBAF3		0.4	●															
 AM3	DCGT070202ENBAM3		0.2	●														H19 H21	
	070204ENBAM3		0.4	●															
	070200FNAM3		0.03						●		●		●						
	070201FNAM3		0.1						●		●								
	070202FNAM3		0.2						●		●								
	070204FNAM3		0.4						●		●								
	070201FNXAM3		0.1		●														
	070202FNXAM3		0.2		●														
	070204FNXAM3		0.4		●														
	070201MFNAM3		*0.08							●			●						
	070202MFNAM3		*0.18							●			●						
	070204MFNAM3		*0.38										●						
	DCGT11T308ENBAM3		0.8	●															
	11T300FNAM3		0.03						●		●	●							
	11T302FNAM3		0.2						●	●	●								
	11T304FNAM3		0.4						●	●	●								
	11T301FNXAM3		0.1		●														
	11T302FNXAM3		0.2		●														
	11T304FNXAM3		0.4		●														
	11T308FNXAM3		0.8		●														
	11T301MFNAM3		*0.08						●	●	●	●	●						
	11T302MFNAM3		*0.18						●	●	●	●	●						
	11T304MFNAM3		*0.38						●	●	●	●	●						
	DCMT070202ENBAM3		0.2		●			●											
	070204ENBAM3		0.4		●	●		●											
	070208ENBAM3		0.8			●													
	070202FNAM3		0.2											●					
	070204FNAM3		0.4											●					
	DCMT11T302ENBAM3		0.2		●			●											
	11T304ENBAM3		0.4		●	●		●											
	11T308ENBAM3		0.8		●	●		●											
	11T312ENBAM3		1.2		●			●											
	11T302FNAM3		0.2											●					
	11T304FNAM3		0.4											●					
	11T308FNAM3		0.8											●					
AMX	DCGT070201MAMX		*0.08									●							
	070202MAMX		*0.18									●							
	DCGT11T301MAMX		*0.08									●		●					
	11T302MAMX		*0.18									●		●					
	11T304MAMX		*0.38									●		●					

*Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

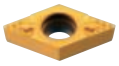
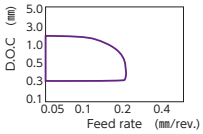
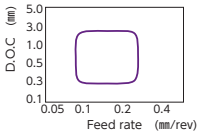
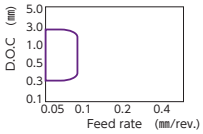
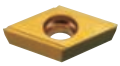
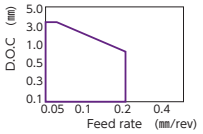
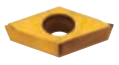
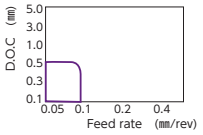
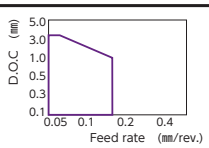
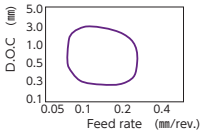
⟨55 degree Rhombic Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
DC_0702	6.35	2.38	7°
DC_11T3	9.525	3.97	7°



	Cermet T15	Cermet C7X	Cermet N40	PVD cermet Q15	PVD cermet C7Z	PVD-coated micro-grain carbide ZM3	PVD-coated micro-grain carbide QM3	PVD-coated micro-grain carbide VM1	PVD-coated micro-grain carbide TM4	PVD-coated micro-grain carbide DT4	PVD-coated micro-grain carbide DM4	CVD-coated carbide CP1	CVD-coated carbide CP7	Carbide KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

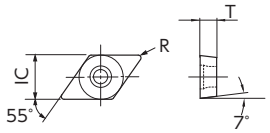
Shape	Part No.	Inch system	Nose Radius	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1	For applicable holder, see pages:	Chipbreaker applicable range
 AZ7 ※	DCGT070200FNAZ7		0.03							■									
	070201MFNAZ7		*0.08							■									
	070202MFNAZ7		*0.18							■									
	DCGT11T300FNAZ7		0.03						■	■	■	■	■						
	11T301MFNAZ7		*0.08						■	■	■	■	■						
	11T302MFNAZ7		*0.18						■	■	■	■	■						
	11T304MFNAZ7		*0.38						■	■	■	■	■						
	11T308FNAZ7		0.8						■	■	■		■						
	DCGT070200AZ7		0.03							●									
	070201MAZ7		*0.08							●									
	070202MAZ7		*0.18							●									
	DCGT11T300AZ7		0.03						●	●		●	●						
	11T301MAZ7		*0.08						●	●		●	●						
	11T302MAZ7		*0.18						●	●		●	●						
	11T304MAZ7		*0.38						●	●		●	●						
	11T308AZ7		0.8						●	●			●						
AZ8	DCMT070202ENAAZ8		0.2												●				
	070204ENBAZ8		0.4												●				
	070208ENBAZ8		0.8												●				
	DCMT11T302ENAAZ8		0.2												●				
	11T304ENBAZ8		0.4												●				
	11T308ENBAZ8		0.8												●				
ZR	DCMT070202ENBZR		0.2		●			●										H19 H21	
	070204ENBZR		0.4		●			●											
	DCMT11T302ENAZR		0.2																
	11T304ENAZR		0.4																
	11T308ENAZR		0.8																
	11T302ENBZR		0.2		●			●											
	11T304ENBZR		0.4		●			●											
	11T308ENBZR		0.8		●			●											
 AT	DCET11T301M[R/L]AT		*0.08									R							
	11T302M[R/L]AT		*0.18									R							
 KHG	DCET0702005[R/L]KHG		0.05								●								
	0702008[R/L]KHG		0.08								●								
	0702018[R/L]KHG		0.18								●								
	070202[R/L]KHG		0.2								●								
	DCET11T3005[R/L]KHG		0.05								●	R							
	11T3008[R/L]KHG		0.08								●	R							
	11T3018[R/L]KHG		0.18								●	R							
	11T302[R/L]KHG		0.2								●	R							
UHG R-hand shown	DCET0702008[R/L]UHG		0.08								R								
	DCET11T3008[R/L]UHG		0.08								R								
FM	DCGT11T302ENBFM		0.2	●															
	11T304ENBFM		0.4	●															
	11T308ENBFM		0.8	●															

∗Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.
※AZ7 chipbreaker was redesigned with 0.2mm higher cutting edge height than conventional ones, which has FN in the item numbers.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

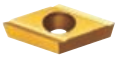
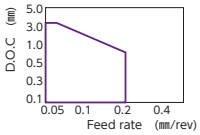
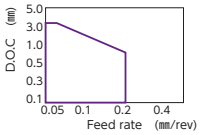
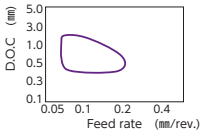
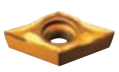
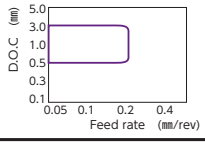
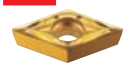
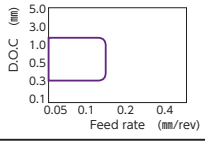
Part No.	Inscribed circle	Thickness	Relief angle
DC_0702	6.35	2.38	7°
DC_11T3	9.525	3.97	7°
DP_0702	6.35	2.38	11°

⟨55 degree Rhombic Positive type⟩



	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

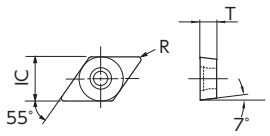
Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	QM3	VM1	TM4	DT4	DM4	CVD-coated carbide grade CP1	CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
 S R-hand shown	DCGT070200R/LS		0.03						●		●								
	070201R/LS		0.1		R				●		●								
	070202R/LS		0.2		●				●		●								
	070204R/LS		0.4-								R								
	070201MR/LS		*0.08							R			R						
	070202MR/LS		*0.18							R			R						
	DCGT11T300R/LS		0.03						R		●	R	R						
	11T301R/LS		0.1						R	R	●								
	11T302R/LS		0.2						R	R	●								
	11T304R/LS		0.4							R									
	11T301MR/LS		*0.08							R		R	R						
	11T302MR/LS		*0.18							R		R	R						
	11T304MR/LS		*0.38							R		R							
	DCMT070201TR/LAS		0.1		●			●											
	070202TR/LAS		0.2		●			●											
	070204TR/LAS		0.4		●			●											
	DCMT11T301TR/LAS		0.1		●			●											
	11T302TR/LAS		0.2		●			●											
	11T304TR/LAS		0.4		●			●										H19	
U・U1 R-hand shown	DCGT070200R/LU		0.03						R		R							H21	
	070201R/LU		0.1						R		R								
	070202R/LU		0.2						●		R								
	DCGT11T300R/LU1		0.03						●		R	R							
	11T301R/LU1		0.1						●		R	R	R						
	11T302R/LU1		0.2						●		R	R	R						
	11T304R/LU1		0.4						●		R	R							
without chipbreaker	DCGW070200FN		0.03						●										—
	070201FN		0.1						●										
	070200H		0.03														●		
	070201H		0.1														●		
	070202H		0.2														●		
	07020V		0.0								●								
	DCGW11T300FN		0.03						●										
	11T301FN		0.1						●										
	11T300H		0.03														●		
	11T301H		0.1														●		
	11T302H		0.2														●		
	11T30V		0.0								●								
AM3	DPGT070204FNXAM3		0.4		●													—	
 CL ※2	DCGT070201MCL		*0.08									●	●						
	070202MCL		*0.18									●	●						
	DCGT11T301MCL		*0.08									●	●						
	11T302MCL		*0.18									●	●						
	11T304MCL		*0.38									●	●					H19	
NEW  YL	DCGT11T301MYL		0.08									●		●				H21	
	11T302MYL		0.18									●		●					
	11T304MYL		0.38									●		●					

※Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.
※2 The specifications of CL chipbreaker are slightly different from the above dimensions, but it has no problem for machining.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

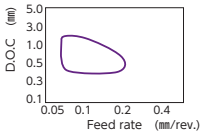
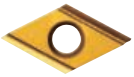
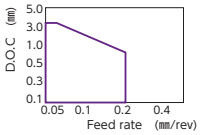
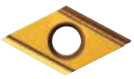
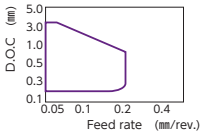
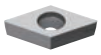
〈TFD with Wiper edge〉

Part No.	Inscribed circle	Thickness	Relief angle
TFD_07	6.35	2.38	7°
TFD_11	9.525	3.97	7°



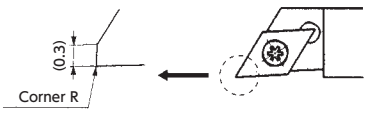
	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade
	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1	For applicable holder, see pages:	Chipbreaker applicable range
AM3	TFD11FR05AM3		0.05					R					H19 H21	
	11FR15AM3		0.15					R						
 S ※ R-hand shown	TFD07F$^{R}_{L}$05		0.05	●	R	R								
	07F$^{R}_{L}$15		0.15	●	R									
	TFD11FR05		0.05	R	R	R								
	11FR15		0.15	R	R									
 U・U1 ※ R-hand shown	TFD07FR05U		0.05	R	R	R								
	07FR15U		0.15	R	R									
	TFD11FR05U1		0.05	R	R	R								
	11FR15U1		0.15	R	R									
 without chipbreaker	TFD07FR05H 鏡面		0.05									R		—
	TFD11FR05H 鏡面		0.05									R		

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

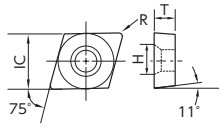
◆TFD features



※TFD insert has same shape with DCGT insert.
It is designed to have a 0.3mm flat on the cutting on the toolholders.
※The flat ensures a superior surface even when feed rates are increased.
※TFD insert can be used on the toolholders with 93 degree cutting angle.

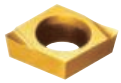
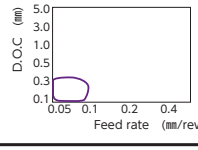
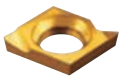
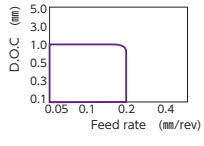
⟨75 degree Rhombic Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
ER_T301	3.97	1.59	9°



	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1	For applicable holder, see pages:	Chipbreaker applicable range
 A2 R-hand shown	ERGHT30102F$^{R}_{L}$A2	ERGP52Y-F$^{R}_{L}$--A2	0.2	●	●				●			●	●					L35	
	30104F$^{R}_{L}$A2	521-F$^{R}_{L}$--A2	0.4						L			R							
 F1 ※ R-hand shown	ERGHT30101F$^{R}_{L}$F1	—	0.1									R							
	30102F$^{R}_{L}$F1	—	0.2									R							
	30104F$^{R}_{L}$F1	—	0.4									R							

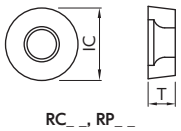
※F1, F05, FG chipbreakers : Right hand inserts are for right hand toolholders to evacuate chips backword.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

⟨Round Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
RC_1204	12.7	4.76	7°
RP_0602	6.00	2.38	11°
RP_0802	8.00	2.38	11°
RP_10T2	10.00	2.78	11°

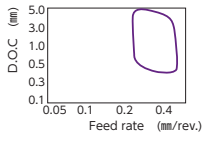
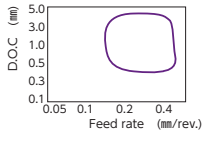
Part No.	Inscribed circle	Thickness	Relief angle
RP_1203	12.7	3.18	11°
RP_1604	16.00	4.76	11°
RP_2004	20.00	4.76	11°



RC_ _, RP_ _

	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

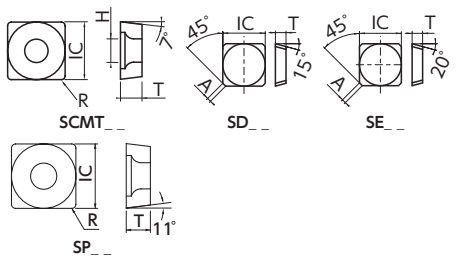
Shape	Part No.	Inch system	Nose Radius	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1	For applicable holder, see pages:	Chipbreaker applicable range
GM	RCMX1204M0ENBGM	RCMX43M0ENB-GM	–		●	●												G15	
GB	RCMX1204M0GB	RCMX43M0-GB	–		●	●												G15	
	RPMT0602M0GB		–		●	●													
	RPMT0802M0GB		–		●	●												M16	
	RPMT10T2M0GB		–		●	●													
	RPMT1203M0GB		–		●	●													
	RPMT1604M0GB		–		●	●												M14	
	RPMT2004M0GB		–		●	●												M16	
	RPMX1203M0GB		–		●	●												M15	

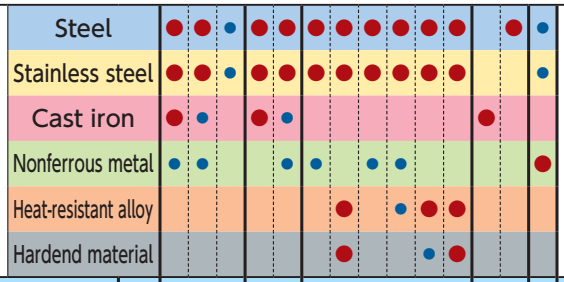
● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

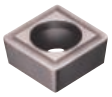
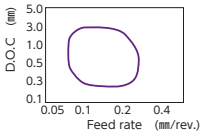
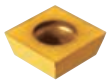
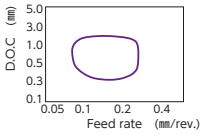
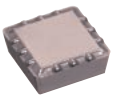
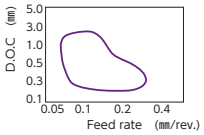
Part No.	Inscribed circle	Thickness	Relief angle
SC_09T3	9.525	3.97	7°
SD_0602	6.35	2.38	15°
SP_0903	9.525	2.38	11°

Part No.	Inscribed circle	Thickness	Relief angle
SP_1203	12.7	3.18	11°
SP_1204	12.7	4.76	11°
SP_1904	19.05	4.76	11°
SE_1203	12.7	3.18	20°

⟨90 degree Square Positive type⟩





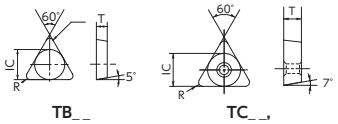
Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	PVD-coated micro-grain carbide grade QM3	PVD-coated micro-grain carbide grade VM1	PVD-coated micro-grain carbide grade TM4	PVD-coated micro-grain carbide grade DT4	PVD-coated micro-grain carbide grade DM4	CVD-coated carbide grade CP1	CVD-coated carbide grade CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
 AM5	SCMT09T308ENBAM5		0.8			●												—	
 without chipbreaker	SDEW060202FN		0.2						●									—	—
AF1	SPGR090308ENBAF1	SPGR322-ENB-AF1	0.8	●														—	
	SPGR120308ENBAF1	SPGR422-ENB-AF1	0.8	●															
 QZ	SPGR090308ENBQZ	SPGR322-ENB-QZ	0.8			●													
H1 L-hand shown	SPMH090324T$^{R}_{L}$BH1	SPMH326-T$^{R}_{L}$B-H1	2.4	L															—
	SPMH090332T$^{R}_{L}$AH1	SPMH328-T$^{R}_{L}$A-H1	3.2	L															
H2 L-hand shown	SPMR120440T$^{R}_{L}$H2	SPMR4310T$^{R}_{L}$--H2	4.0	L														M17	—
without chipbreaker	SPGN090304TN	SPGN321-TN	0.4	●															—
	SPGN090308TN	SPGN322-TN	0.8	●															
	SPGN120304TN	SPGN421-TN	0.4																
	SPGN120308TN	SPGN422-TN	0.8	●															
	SPMN120440TN	SPMN4310TN	4.0	■															
	SPMN190408TN	SPMN632-TN	0.8			●													
without chipbreaker	SDKN1203AEN	SDK42AEN	–		●													—	—
	SDKN1504AETN	SDK53A	–		■														
	SEKN1203AFN	SEK42AFN	–		●														

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

⟨60 degree Triangle Positive type⟩

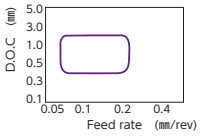
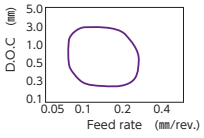
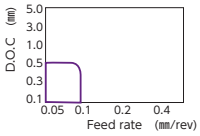
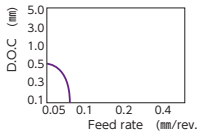
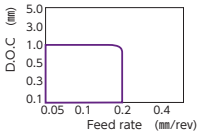
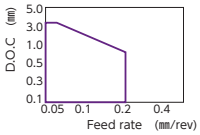
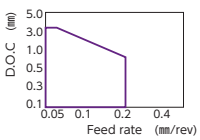
Part No.	Inscribed circle	Thickness	Relief angle
TB_0601	3.97	1.59	5°
TC_0601	3.97	1.59	7°
TC_0902	5.56	2.38	7°

Part No.	Inscribed circle	Thickness	Relief angle
TC_1102	6.35	2.38	7°
TC_16T3	9.525	3.97	7°



Steel	●	●	●	●	●	●	●	●	●	●	●		●	●				
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●				
Cast iron	●	●		●	●								●					
Nonferrous metal	●	●			●	●		●		●		●			●			
Heat-resistant alloy									●		●		●	●				
Hardend material									●				●	●				

● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
without chipbreaker	TBGN060108TN	TBGE522-TN	0.8	●														—	—
AM3	TCGT110202FNXAM3		0.2		●													H28	
	TCGT16T304ENBAM3		0.4	●															
	TCMT110204ENBAM3		0.4		●														
AM5	TCMT16T308ENBAM5		0.8			●												—	
K L-hand shown	TCGH060102FR/LK		0.2									L							
	060104FR/LK		0.4									L							
B1 L-hand shown	TCGH060102FR/LB1	TCGP52Y-FR/L--B1	0.2						L			L						L38 L39 L40	
	060104FR/LB1	521-FR/L--B1	0.4						L			L							
	060102TR/LB1	52Y-TR/L--B1	0.2	●															
	060104TR/LB1	521-TR/L--B1	0.4	L															
F05 ※ R-hand shown	TCGH060101FR/LF05	TCGP521CFR/L--F05	0.1									R							
	060102FR/LF05	52Y-FR/L--F05	0.2						●		R	●							
	060104FR/LF05	521-FR/L--F05	0.4						R		R	R							
	060102TR/LF05	52Y-TR/L--F05	0.2		●			R											
	060104TR/LF05	521-TR/L--F05	0.4		●			R											
S R-hand shown	TCGT090201R/LS		0.1		R				R		●								
	090202R/LS		0.2		●				R										
	TCGT110201R/LS		0.1						R		●								
U R-hand shown	TCGT090201R/LU		0.1						R									H28	
	090202R/LU		0.2						R										

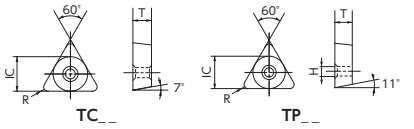
※F1, F05, FG chipbreakers : Right hand inserts are for right hand toolholders to evacuate chips backword.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

Part No.	Inscribed circle	Thickness	Relief angle
TC_0601	3.97	1.59	7°
TC_0902	5.56	2.38	7°
TC_1102	6.35	2.38	7°

Part No.	Inscribed circle	Thickness	Relief angle
TP_0802	4.76	2.38	11°
TP_0902	5.56	2.38	11°
TP_1103	6.35	3.18	11°
TP_1603	9.525	3.18	11°

⟨60 degree Triangle Positive type⟩



Steel	●	●	●	●	●	●	●	●	●	●		●	● : First choice
Stainless steel	●	●	●	●	●	●	●	●	●	●		●	● : Second choice
Cast iron	●	●		●	●						●		
Nonferrous metal	●	●			●	●		●	●			●	
Heat-resistant alloy							●		●	●			
Hardend material							●			●			

Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	PVD-coated micro-grain carbide grade QM3	PVD-coated micro-grain carbide grade VM1	PVD-coated micro-grain carbide grade TM4	PVD-coated micro-grain carbide grade DT4	PVD-coated micro-grain carbide grade DM4	CVD-coated carbide grade CP1	CVD-coated carbide grade CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
without chipbreaker	TCGB060102TN	TCGD52Y-TN	0.2	●														L38 L39 L40	—
	060104TN	521-TN	0.4	●															
	TCGW06T108FN		0.8						●									H28	
	TCGW090200FN		0.03						●										
	090201FN		0.1						●										
	TCGW110200FN		0.03						●										
	110201FN		0.1						●										
AF1	TPGR110304ENBAF1	TPGR221-ENB-AF1	0.4	●														—	D.O.C (mm) 5.0 3.0 1.0 0.5 0.3 0.1 0.05 0.1 0.2 0.4 Feed rate (mm/rev.)
	110308ENBAF1	222-ENB-AF1	0.8	●															
	TPGR160304ENBAF1	TPGR321-ENB-AF1	0.4	●															
	160308ENBAF1	322-ENB-AF1	0.8	●															
AK	TPGH110304ENBAK	TPGH221-ENB-AK	0.4			●												L38 L40	D.O.C (mm) 5.0 3.0 1.0 0.5 0.3 0.1 0.05 0.1 0.2 0.4 Feed rate (mm/rev.)
B R-hand shown	TPGR160304TR/LB	TPGR321-TR/L--B	0.4	L														—	D.O.C (mm) 5.0 3.0 1.0 0.5 0.3 0.1 0.05 0.1 0.2 0.4 Feed rate (mm/rev.)
B2・B3 L-hand shown	TPGH090202FR/LB2	TPGP73Y-FR/L--B2	0.2						L			L							D.O.C (mm) 5.0 3.0 1.0 0.5 0.3 0.1 0.05 0.1 0.2 0.4 Feed rate (mm/rev.)
	090204FR/LB2	731-FR/L--B2	0.4						L			L							
	090208FR/LB2	732-FR/L--B2	0.8						L			L							
	090204TR/LB2	731-TR/L--B2	0.4	L															
	TPGH080202FR/LB3	TPGP63Y-FR/L--B3	0.2						L			L							D.O.C (mm) 5.0 3.0 1.0 0.5 0.3 0.1 0.05 0.1 0.2 0.4 Feed rate (mm/rev.)
	080204FR/LB3	631-FR/L--B3	0.4						L			L							
	080204TR/LB3	631-TR/L--B3	0.4	L															
	TPGH110304TR/LB3	TPGH221-TR/L--B3	0.4	L															
K L-hand shown	TPGH090202FR/LK		0.2									L						L38 L39 L40	D.O.C (mm) 5.0 3.0 1.0 0.5 0.3 0.1 0.05 0.1 0.2 0.4 Feed rate (mm/rev)
	090204FR/LK		0.4									L							
	090208FR/LK		0.8									L							
F1 ※ R-hand shown	TPGH080202FR/LF1	TPGP63Y-FR/L--F1	0.2						R		R	R							D.O.C (mm) 5.0 3.0 1.0 0.5 0.3 0.1 0.05 0.1 0.2 0.4 Feed rate (mm/rev) chip backward
	080204FR/LF1	631-FR/L--F1	0.4						R		R	R							
	TPGH090201FR/LF1	TPGP731CFR/L--F1	0.1									R							
	090202FR/LF1	73Y-FR/L--F1	0.2						R		R	R							
	090204FR/LF1	731-FR/L--F1	0.4						R		R	R							
	090208FR/LF1	732-FR/L--F1	0.8						R			R							
	TPGH110302FR/LF1	TPGH22Y-FR/L--F1	0.2						R		R	R							
	110304FR/LF1	221-FR/L--F1	0.4						R		R	R							
	110308FR/LF1	222-FR/L--F1	0.8						R			R							

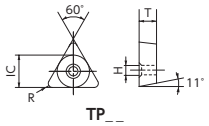
※F1, F05, FG chipbreakers : Right hand inserts are for right hand toolholders to evacuate chips backword.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

⟨60 degree Triangle Positive type⟩

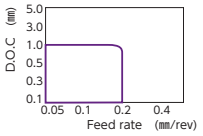
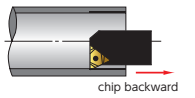
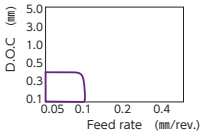
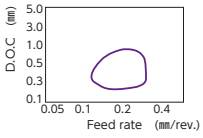
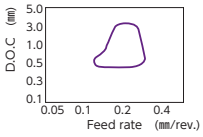
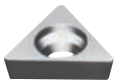
Part No.	Inscribed circle	Thickness	Relief angle
TP_0802	4.76	2.38	11°
TP_0902	5.56	2.38	11°
TP_1103	6.35	3.18	11°

Part No.	Inscribed circle	Thickness	Relief angle
TP_1603	9.525	3.18	11°
TP_2204	12.70	4.76	11°
TE_2204	12.70	4.76	20°



	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

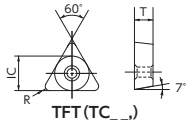
Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	QM3	VM1	TM4	DT4	DM4	CVD-coated carbide grade CP1	CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
F1 ※ R-hand shown	TPGH080202TR/LF1	TPGP63Y-TR/L--F1	0.2		R			R										L39	  chip backward
	080204TR/LF1	631-TR/L--F1	0.4		R			R											
	TPGH090202TR/LF1	TPGP73Y-TR/L--F1	0.2		R			R											
	090204TR/LF1	731-TR/L--F1	0.4		R			R										L38	
	TPGH110302TR/LF1	TPGH22Y-TR/L--F1	0.2		R			R										L39	
	110304TR/LF1	221-TR/L--F1	0.4		R			R										L40	
	110308TR/LF1	222-TR/L--F1	0.8		R			R											
FG ※ R-hand shown	TPGH090202R/LFG		0.2					R				R							
	090204R/LFG		0.4					R				R							
	TPGH110302R/LFG		0.2					R				R							
	110304R/LFG		0.4					R				R							
P2 L-hand shown	TPGR090204TR/LP2	TPGS731-TR/L--P2	0.4	L														—	
C R-hand shown	TPGR160304TR/LC	TPGR321-TR/L--C	0.4		L													—	
 without chipbreaker	TPGB080202TN	TPGD63Y-TN	0.2	●														L39	
	080204TN	631-TN	0.4	●															
	TPGB090202TN	TPGD73Y-TN	0.2	●														L38 L39	
	090204TN	731-TN	0.4	●														L40	
without chipbreaker	TPGN090204TN	TPGE731-TN	0.4	●														—	—
	TPGN110304TN	TPGN221-TN	0.4	●															
	110308TN	222-TN	0.8	●	●													—	
	TPGN160304TN	TPGN321-TN	0.4																
	160308TN	322-TN	0.8	●															
	TPGN220420TN	TPGN435-TN	2.0	●															
without chipbreaker	TPKN1603PDTR	TPK32PR	–		●													—	—
	TPKN2204PDTR	TPK43PR	–		●														
without chipbreaker	TEEN2204PFTR	TEE43PR	–		●													—	—

※F1, F05, FG chipbreakers : Right hand inserts are for right hand toolholders to evacuate chips backword.

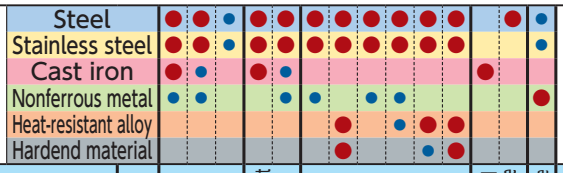
● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

〈TFT with Wiper edge〉

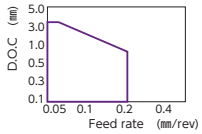
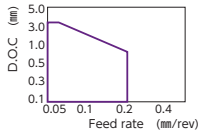
Part No.	Inscribed circle	Thickness	Relief angle
TFT_09	5.56	2.38	7°
TFT_11	6.35	2.38	7°



TFT (TC_ _)

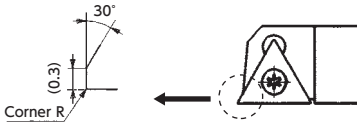


● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
S ※ R-hand shown	TFT09FR05		0.05						●									H28	
	09FR15		0.15						●										
	TFT11FR05		0.05						●										
	11FR15		0.15						●										
	TFT09FL05		0.05						●										
	09FL15		0.15						●										
U・U1 ※ R-hand shown	TFT09FR05U		0.05						●										
	09FR15U		0.15						●										
	TFT11FR05U1		0.05						●										
	11FR15U1		0.15						●										

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

◆TFT features

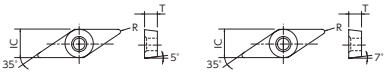


※TFT inserts has same shape with TCGT.
It is designed to have a 0.3mm flat on the cutting on the toolholders.
※The flat ensures a superior surface even when feed rates are increased.
※TFT insert can be used on the toolholders with 91 degree cutting angle.

⟨35 degree Rhombic Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
VB_1102	6.35	2.38	5°
VB_1103	6.35	3.18	5°
VB_1604	9.525	4.76	5°

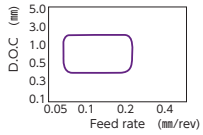
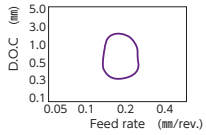
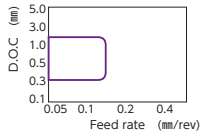
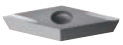
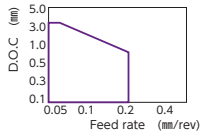
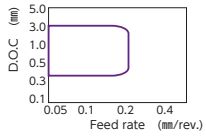
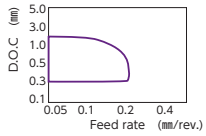
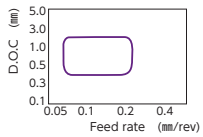
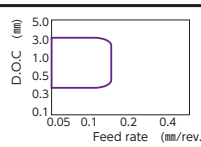
Part No.	Inscribed circle	Thickness	Relief angle
VC_1102	6.35	2.38	7°
VC_1103	6.35	3.18	7°
VC_1303	7.94	3.18	7°



VB__ VC__

	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade T15	Cermet grade C7X	Cermet grade N40	PVD cermet grade Q15	PVD cermet grade C7Z	PVD-coated micro-grain carbide grade ZM3	QM3	VM1	TM4	DT4	DM4	CVD-coated carbide grade CP1	CP7	Carbide grade KM1	For applicable holder, see pages:	Chipbreaker applicable range
AM3	VBGT110204FNXAM3		0.4		●													—	
	VBGT110302FNXAM3		0.2		●														
	VBMT160404ENBAM3	VBMT331-ENB-AM3	0.4			●													
GA	VBGT160404ENBGA	VBGT331-ENB-GA	0.4	●														—	
	160412ENBGA	333-ENB-GA	1.2	●															
NEW YL	VBGT160402FNYL		0.2									●		●				—	
	160404FNYL		0.4									●		●					
	160408FNYL		0.8									●		●					
 UHG R-hand shown	VCET1103008R/LUHG		0.08								R							H23 H25	
1L	VCGT110202FN1L		0.2							●								H23	
AZ7	VCGT110300FNAZ7		0.03						■	■	■								
	110301MFNAZ7		*0.08						■	■	■								
	110302MFNAZ7		*0.18						■	■	■								
	110304MFNAZ7		*0.38						■	■	■								
	VCGT110300AZ7		0.03						●	●									
	110301MAZ7		*0.08						●	●									
	110302MFZ7		*0.18						●	●									
	110304MFZ7		*0.38						●	●								H23	
AM3	VCGT110300FNAM3		0.03								●							H25	
	110301FNAM3		0.1						●		●								
	110302FNAM3		0.2						●		●								
	110302FNXAM3		0.2		●														
	110304FNXAM3		0.4		●														
	110301MFNAM3		*0.08							●	●	●	●						
	110302MFNAM3		*0.18							●	●	●	●						
	110304MFNAM3		*0.38							●		●	●						
	VCMT110302FNAM3		0.2											●					
	110304FNAM3		0.4											●					
2M R-hand shown	VCGT130300FR/L2M		0.03							●								H23	
	130301FR/L2M		0.1							●									

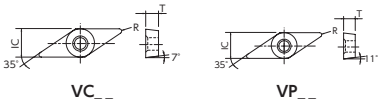
*Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.
※AZ7 chipbreaker was redesigned with 0.2mm higher cutting edge height than conventional ones, which has FN in the item numbers.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

⟨35 degree Rhombic Positive type⟩

Part No.	Inscribed circle	Thickness	Relief angle
VC_1103	6.35	3.18	7°

Part No.	Inscribed circle	Thickness	Relief angle
VP_0802	4.76	2.38	11°
VP_1103	6.35	3.18	11°



Steel	●	●	●	●	●	●	●	●	●	●	●	●		●	●		
Stainless steel	●	●	●	●	●	●	●	●	●	●	●	●			●		
Cast iron	●	●		●	●									●			
Nonferrous metal	●	●			●	●		●		●	●						
Heat-resistant alloy							●		●		●	●					
Hardend material							●				●	●					

● : First choice
● : Second choice

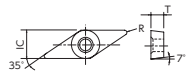
Shape	Part No.	Inch system	Nose Radius	Cermet grade			PVD cermet grade		PVD-coated micro-grain carbide grade						CVD-coated carbide grade		Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
				T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1		
U R-hand shown	VCGT110300R/LU		0.03						R		R								
	110301R/LU		0.1						R		R								
	110302R/LU		0.2						R		R								
	110301MR/LU		*0.08										R						
	110302MR/LU		*0.18										R						
S R-hand shown	VCMT110301TR/LAS		0.1		●			●											
	110302TR/LAS		0.2		●			●											
	110304TR/LAS		0.4		●			●											
without chipbreaker	VCGW110300H		0.03														●	H23 H25	—
	110301H		0.1														●		
	110302H		0.2														●		
CL ※2	VCGT110301MCL		*0.08									●	●						
	110302MCL		*0.18									●	●						
NEW YL	VCGT110301MYL		0.08									●		●					
	110302MYL		0.18									●		●					
	110304MYL		0.38									●		●					
KHG R-hand shown	VPET0802005R/LKHG		0.05								●	R							
	0802008R/LKHG		0.08								●	R	R						
	0802018R/LKHG		0.18								●	R							
	080202R/LKHG		0.2								●	R							
	VPET1103005R/LKHG		0.05								●	R							
	1103008R/LKHG		0.08								●	R							
	1103018R/LKHG		0.18								●	R							
	110302R/LKHG		0.2								●	R							
UHG R-hand shown	VPET0802008R/LUHG		0.08										●					H27	
	VPET1103008R/LUHG		0.08																
	1103018R/LUHG		0.18																
AM3	VPGT110300FNAM3		0.03									●	●						
	110301MFNAM3		*0.08							●		●	●						
	110302MFNAM3		*0.18							●		●	●						

※Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.
※2 The specifications of CL chipbreaker are slightly different from the above dimensions, but it has no problem for machining.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

⟨TFV with Wiper edge⟩

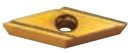
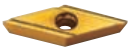
Part No.	Inscribed circle	Thickness	Relief angle
TFV_11	6.35	3.18	7°



TFV(VC_ _)

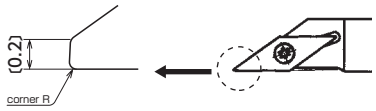
	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade	PVD cermet grade	PVD-coated micro-grain carbide grade	CVD-coated carbide grade	Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
 U	TFV11FR05U		0.05			ZM3 ● VM1 ●			H23 H25	—
	11FR10U		0.10			ZM3 ● VM1 ●				
 small flat land on edge	TFV11FR05SX		0.05			ZM3 ● VM1 ●				
	11FR10SX		0.10			ZM3 ● VM1 ●				

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

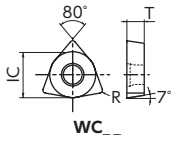
◆TFV features



※TFV has same shape with VCGT.
It is designed to have a 0.2mm flat on the cutting on the toolholders.
※The flat ensures a superior surface even when feed rates are increased.
※TFV insert can be used on the toolholders with 91 degree cutting angle.

⟨80 degree Hexagon Positive type⟩

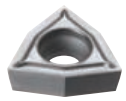
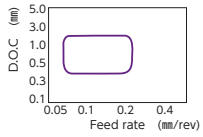
Part No.	Inscribed circle	Thickness	Relief angle
WC_0402	6.35	2.38	7°



WC_ _

	T15	C7X	N40	Q15	C7Z	ZM3	QM3	VM1	TM4	DT4	DM4	CP1	CP7	KM1
Steel	●	●	●	●	●	●	●	●	●	●	●		●	●
Stainless steel	●	●	●	●	●	●	●	●	●	●	●			●
Cast iron	●	●		●	●							●		
Nonferrous metal	●	●			●	●		●	●					●
Heat-resistant alloy							●		●	●	●			
Hardend material							●			●	●			

● : First choice
● : Second choice

Shape	Part No.	Inch system	Nose Radius	Cermet grade	PVD cermet grade	PVD-coated micro-grain carbide grade	CVD-coated carbide grade	Carbide grade	For applicable holder, see pages:	Chipbreaker applicable range
 AM3	WCGT040201FNXAM3		0.1	●					—	

✻Inserts having 01M, 02M or 04M as the R code can be used for machining when the component drawing specifies that the radius is less than R=0.1, R=0.2 or R=0.4 respectively.

● : Standard stock ● : New standard stock ■ : Scheduled to be produced by order ★ : Standard stock (Specified)

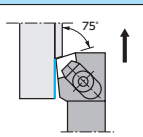
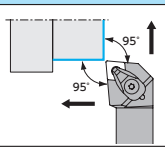
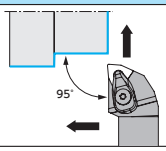
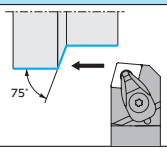
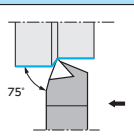
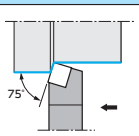
MEMO

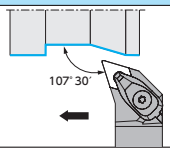
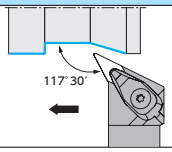
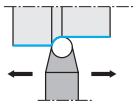
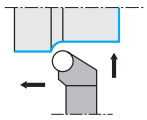
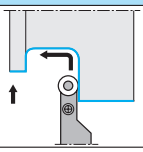
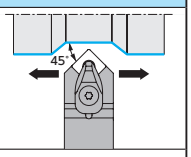
G

Outside Machining Toolholders

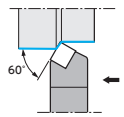
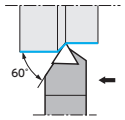
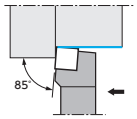
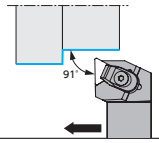
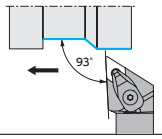
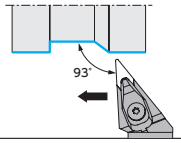
- For 80° Rhombic CN type inserts ····· G6
- For 55° Rhombic DN type inserts ···· G10
- For Round RN type inserts ····· G14
- For Square SN type inserts ····· G16
- For Triangle TN type inserts ····· G22
- For 35° Rhombic VN type inserts ···· G26
- For 80° Hexagon WN type inserts ···· G28
- For Machining Mill Rolls and Heat-Resistant Alloys ·· G29

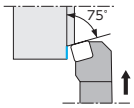
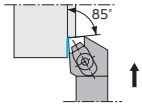
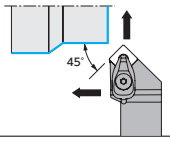
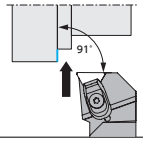
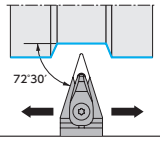
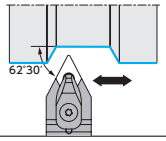
Chart for selecting NTK outside diameter machining toolholders

Application		Facing	Outside machining/Facing		Outside machining		
Lead Angle/Insert shape		75° CN□□Insert	95° CN□□Insert	95° WN□□Insert	75° CN□□Insert	75° TN□□Insert	75° SN□□Insert
Tooling illustration							
Tooling for ceramic or CBN inserts	Double clamp W Series		WCLN type ···**G6**	WWLM type ···**G28** WWLN-2 type ···**G28**	WCBN type ···**G8**		
	Clamp-on T Series		TCLN type ···**G6**		TCBN type ···**G8**		
	Dimple clamp H Series		HCLN type ···**G6**				
	Clamp-on C Series	CCKN type ···**G8**	C31/CCLN type ···**G6**		CCBN type ···**G8**	C23 type ···**G24**	C11 type ···**G18** C16 type ···**G18**
Tooling for general inserts	Lever locking P Series		PCLN type ···**G6**				PSBN type ···**G18**

Application		Outside/Profiling/Necking		Special machining			Outside/Chamfering
Lead Angle/Insert shape		107.5° DN□□Insert	117.5° VN□□Insert	Round R □□□			45° SN□□Insert
Tooling illustration							
Tooling for ceramic or CBN inserts	Double clamp W Series	WDHN type ···**G12**	WVPN type ···**G26**				WSDN type ···**G16**
	Clamp-on T Series						TSDN type ···**G16**
	Dimple clamp H Series	HDHN type ···**G12**	HVPN type ···**G26**				HSDN type ···**G16**
	Clamp-on C Series			C54/CRDN type ···**G14**	C55/CRGN type ···**G14**		C14 type/CSDN type ···**G16**
Tooling for general inserts	Lever locking P Series				PRGN type ···**G15** PRGC type ···**G15**	PRXC type ···**G15**	PSDN type ···**G16**

NTK offers the following toolholder types classified by the lead angle, insert shape and clamping system:
Please select toolholders suitable for your machining application. For more information, please contact your nearest NTK dealer or sales branch.

Outside machining				Outside machining/Profiling	Outside machining/Profiling/Necking
60° SN□□Insert	60° TN□□Insert	85° SN□□Insert	91° TN□□Insert	93° DN□□Insert	93° VN□□Insert
					
			WTGN type ···**G22**	WDJN type···**G10**	WVJN type···**G26**
			TTGN type···**G22**		
				HDJN type···**G10**	HVJN type···**G26**
C13 type···**G18**	C24 type···**G24**	CSHN type···**G18**	C21 type···**G22** C22 type···**G22**	CDJN type···**G10**	
				PDJN type···**G10**	

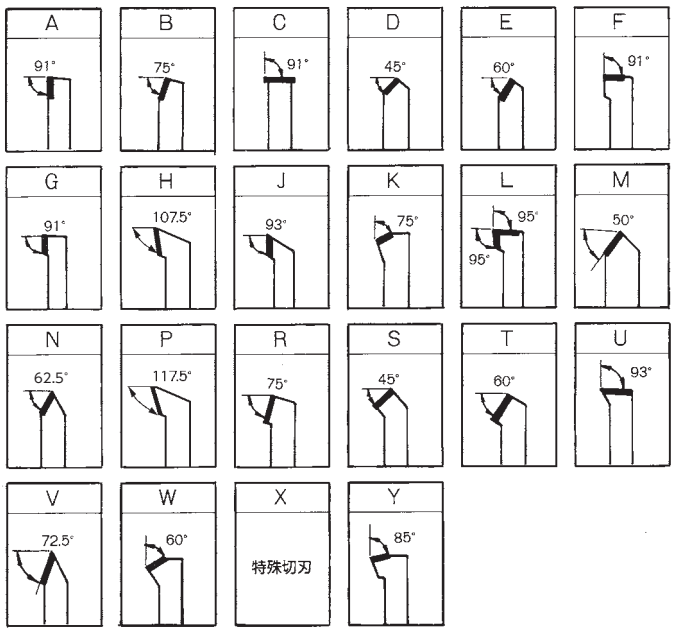
Outside machining/Facing/Chamfering				Outside machining/Profiling	
75° SN□□Insert	85° SN□□Insert	45° SN□□Insert	91° TN□□Insert	72.5° VN□□Insert	62.5° DN□□Insert
					
		WSSN type···**G16**	WTFN type···**G25**	WVVN type ···**G26**	WDNN type ···**G12**
		TSSN type···**G16**	TTFN type···**G25**		
		HSSN type···**G16**		HVVN type···**G26**	HDNN type···**G12**
C15 type···**G20**	C17 type···**G20**	C12/CSSN type ···**G16**	C25 type···**G25**		

Identification system of toolholders

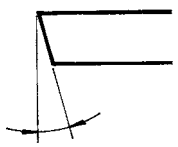
Clamping method	Insert shape	Hand of tool	Shank height	Shank width	Other ID data
C : Clamp-on type (C type) P : Pin-lock type (P type) S : Screw-on type (Screw type) W : Double clamping type (W type) T : Clamp-on type (T type) H : Dimple clamping type (H type)	T : Triangle S : Square C : 80° rhombic D : 55° rhombic V : 35° rhombic R : Round	R : Right hand L : Left hand N : Neutral (Common for R and L)	Shank height indicated in "mm"	Shank width indicated in "mm"	Any ID symbol or number

C	C	L	N	R	25	25	M	12	

Tool style or lead angle



Relief angle of the insert



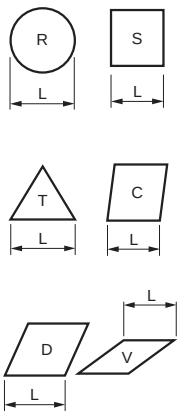
N	0°	Negative
B	5°	Positive
C	7°	Positive
P	11°	Positive
D	15°	Positive
E	20°	Positive

Overall length

(mm)

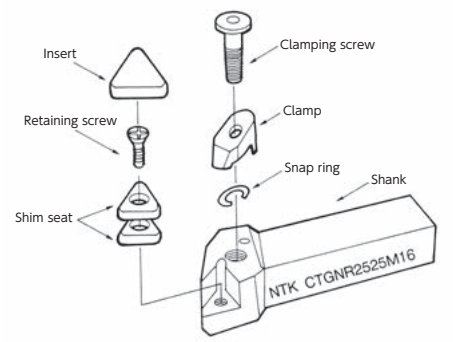
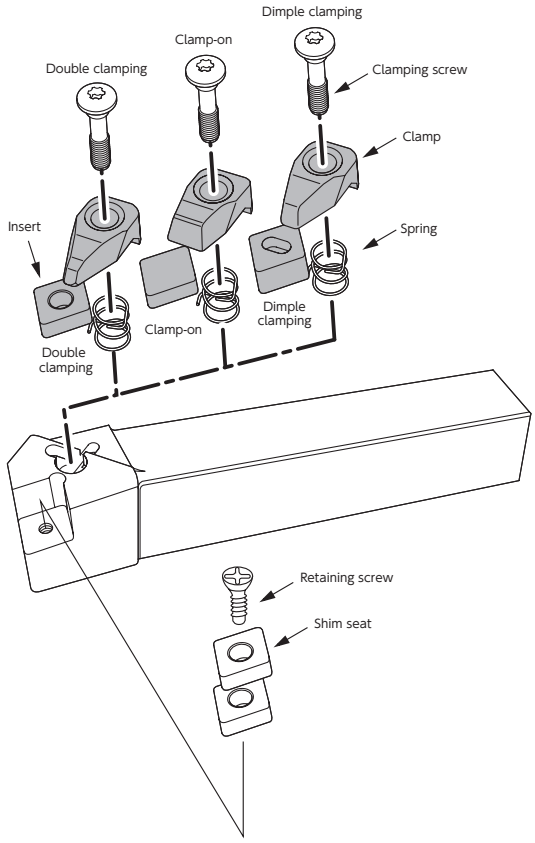
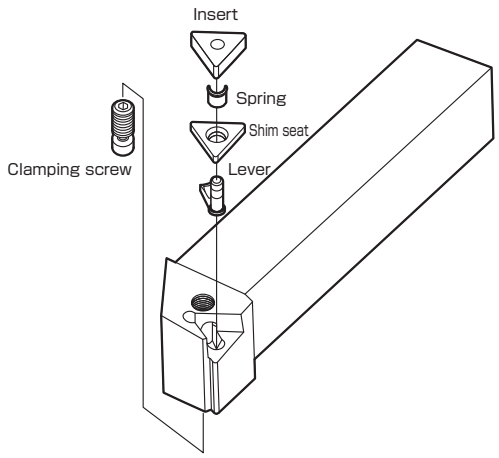
F	80
H	100
K	125
L	140
M	150
N	160
P	170
Q	180
R	200
S	250

Insert size (cutting edge length)



● The dimensions and specifications may be changed due to design improvement without notice.

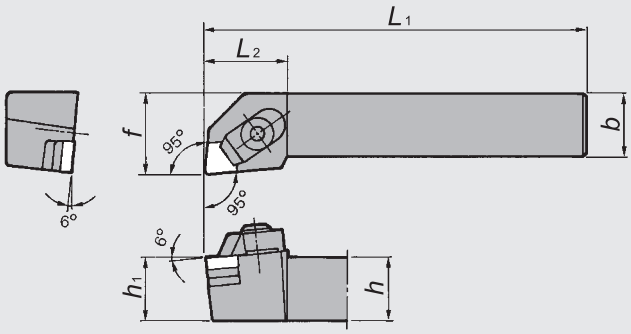
Structures and Features of NTK Toolholders for Outside Machining

Series	Structure	Features
C type : Clamp-on		●Secures the insert with high clamping force ●Excellent in indexing accuracy ●Suitable for heavy-duty applications including interrupted cut machining ●Clamping system for ceramic cutting tools
W type : Double clamping T type : Clamp-on H type : Dimple clamping		●Three different clamping methods can be utilized by a simple clamp change ●Best for ceramic tools, with stronger and more accurate clamping with the improved clamp system ●Prevents insert breakage by optimizing the clamping force ●Allows for highly accurate machining with highly repeatable accuracy ●Inserts can be easily changed as clamping is possible from the front and back of the tool
P type : Lever lock		●General-purpose toolholder ●Allows for smooth chip control without fouling any clamping mechanism ●For inserts of all material grades however not recommended for ceramics

Outside machining/Facing

C31 type/CCLN type

Clamp-on



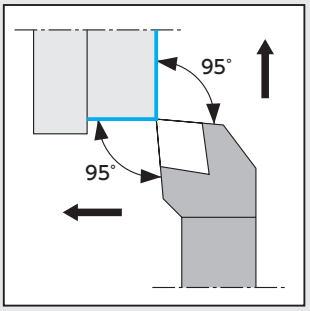
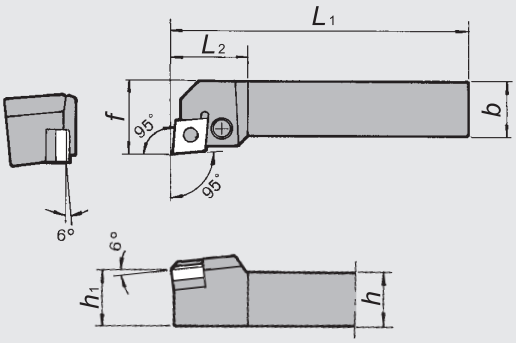


Figure-1

●Right-hand shown.

PCLN type

Lever lock



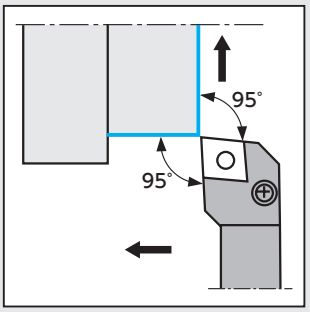


Figure-2

●Right-hand shown.

Multi-clamp holder

TCLN type

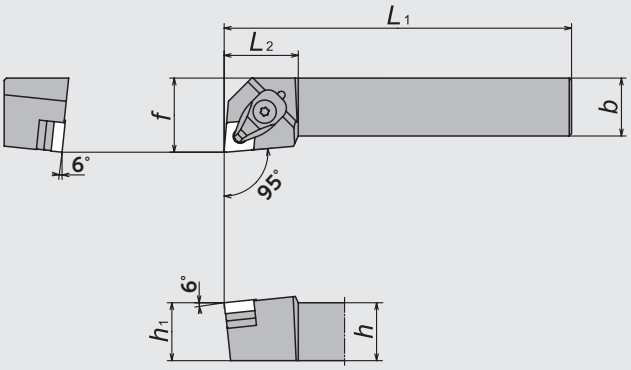
Clamp-on

WCLN type

Double clamping

HCLN type

Dimple clamping



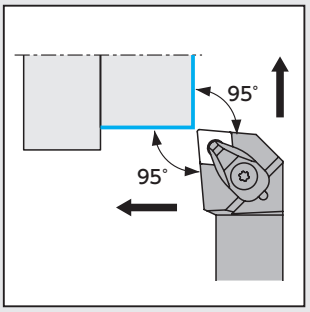


Figure-3

●Right-hand shown.

Dimensions of toolholders and the parts

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Snap ring
Figure-1		5538293	**C31R/L-33**		●	19	19	140	19	25	32	CC08M※ (CC08W)	ACN422	BS0829W	M3＊12	LW-4	SR08
			-34			25	19	160	25	25	32			BS0835W			
	5538301	5538319	**-44**	●	●	25	25	160	25	32	32						
	5601422	5601430	**-45**	●	●	32	25	160	32	32	32						
	5700315	5700299	**CCLNR/L3225P12**	●	●	32	25	170	32	32	32						
														Lever	Clamping screw		Spring
Figure-2	5321997	5322003	**PCLNR/L2020K43**	●	●	20	20	125	20	25	28	—	LSC42			LW-3	
	5322011	5322029	**2525M43**	●	●	25	25	150	25	32	28			LCL4	LCS4		LSP4

※CC08W clamp incorporates a hard carbide facing to eliminate excessive wear from the chip flow.
※For other shank sizes, please contact us for more information.

Dimensions of toolholders and the parts/ Multi-clamp holder

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim wrench	Spring
Figure-3	5701610	5701628	**TCLNR/L2525M12**	●	●	25	25	150	25	32	32	TC6CN Clamp-on	ACN423	AOS-6 ＊30W※ screw-able from both ends	FSS15-3.0＊12	LLR-T20	LLR-T10	ASGL6-D
	5701131	5701636	**3225P12**	●	●	32	25	170	32	32	32							
			3232P12			32	32	170	32	39	32							
	5682570	5682588	**WCLNR/L2525M12**	●	●	25	25	150	25	32	32	DC6CN Double clamping						
	5682604	5682612	**3225P12**	●	●	32	25	170	32	32	32							
			3232P12			32	32	170	32	39	32							
	5701149	5701156	**HCLNR/L2525M12**	●	●	25	25	150	25	32	32	HC6CN Dimple clamping						
	5701875	5701883	**3225P12**	●	●	32	25	170	32	32	32							
			3232P12			32	32	170	32	39	32							

※AOS-6*30WH is an option for hexagonal hole type screw.

Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**C31R/L…※ CCLNR/L12※**	CN□N1204 (1207)		**F5**
Figure-2	**PCLNR/L…43**	CN□A1204 CN□G1204		**F4 • 16 • 24 • 25**
Figure-3	**TCKLNR/L…12※**	CN□N1204 (1207)		**F5**
	WCLNR/L…12※	CN□A1204 (1207) CN□G1204 (1207)		**F4 • 16 • 24 • 25**
	HCLNR/L…12	CN□X1207		**F5**

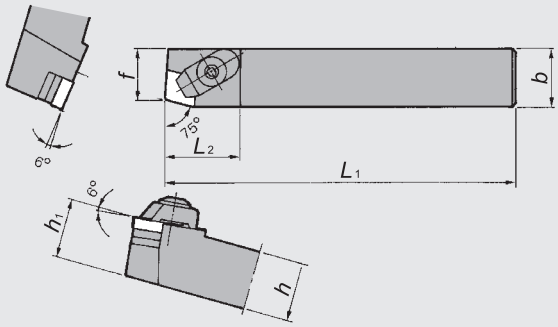
Multi- clamp holder
Just changing the clamps enables the holder to clamp pin type, flat or dimple style inserts.

※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Outside machining/Facing

CCBN type

Clamp-on



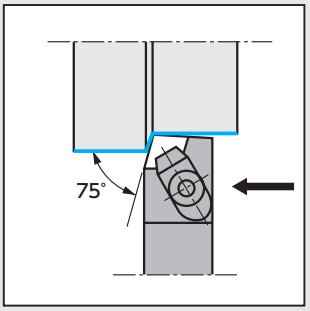
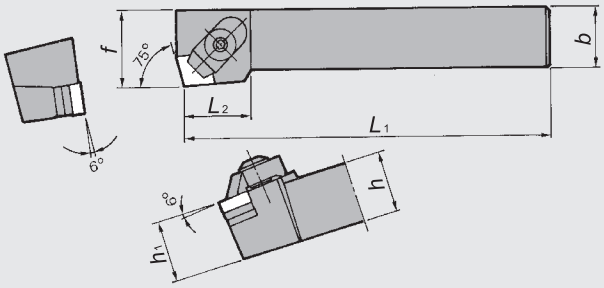


Figure-1

●Right-hand shown.

CCKN type

Clamp-on



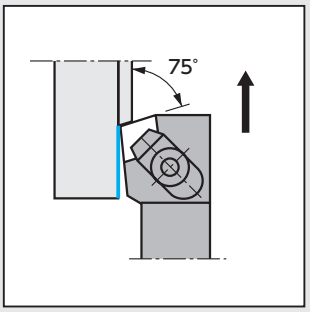


Figure-2

●Right-hand shown.

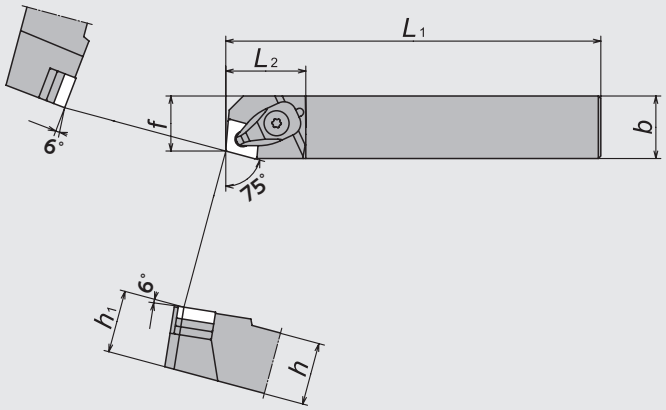
Multi-clamp holder

TCBN type

Clamp-on

WCBN type

Double clamping



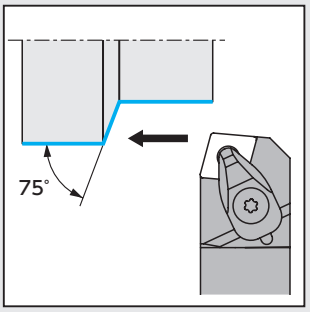


Figure-3

●Right-hand shown.

Dimensions of toolholders and the parts

Shape	コードNo. R	コードNo. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Snap ring
Figure-1	5830617		**CCBNR/L2525M12**	●		25	25	150	25	22	32	CC08M※ (CC08W)	ACN422	BS0835W	M3＊12	LW-4	SR08
Figure-2	5613690		**CCKNR/L2525M12**	●		25	25	150	25	32	30						

※CC08W clamp incorporates a hard carbide facing to eliminate excessive wear from the chip flow.
※For other shank sizes, please contact us for more information.

Dimensions of toolholders and the parts/ Multi-clamp holder

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim wrench	Spring
Figure-3	5701644	5701651	**TCBNR/L2525M12**	●	●	25	25	150	25	22	32	TC6CN Clamp-on	ACN423	AOS-6 ＊30W※ screw-able from both ends	FSS15-3.0＊12	LLR-T20	LLR-T10	ASGL6-D
			3225P12			32	25	170	32	22	32							
			3232P12			32	32	170	32	29	32							
	5682620	5682638	**WCBNR/L2525M12**	●	●	25	25	150	25	22	32	DC6CN Double clamping						
			3225P12			32	25	170	32	22	32							
			3232P12			32	32	170	32	29	32							

※AOS-6*30WH is an option for hexagonal hole type screw.

Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**CCBNR/L2525M12**	CN□N1204 (1207)		**F5**
Figure-2	**CCKNR/L2525M12**			
Figure-3	**TCBNR/L…12**	CN□N1204 (1207)		**F5**
	WCBNR/L…12	CN□A1204 (1207) CN□G1204 (1207)		**F4 • 16 • 24 • 25**

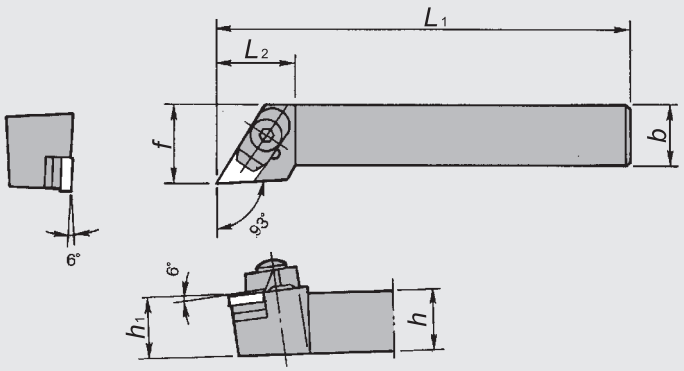
※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Multi- clamp holder
Just changing the clamps enables the holder to clamp pin type, flat or dimple style inserts.

Outside machining/Profiling

CDJN type

Clamp-on



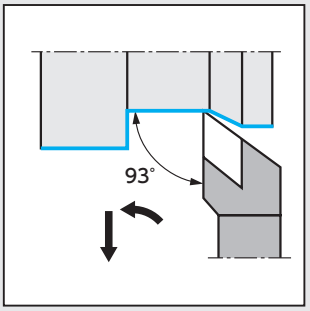
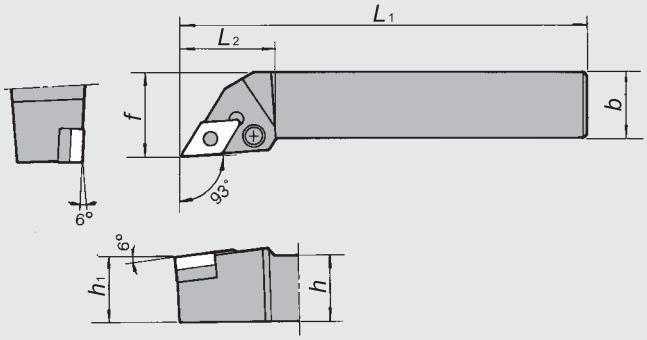


Figure-1

●Right-hand shown.

PDJN type

Lever lock



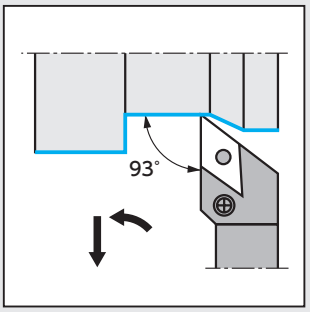


Figure-2

●Right-hand shown.

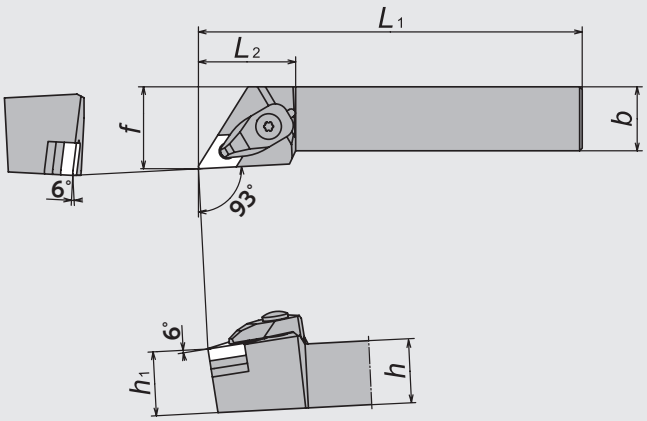
Multi-clamp holder

WDJN type

Double clamping

HDJN type

Dimple clamping



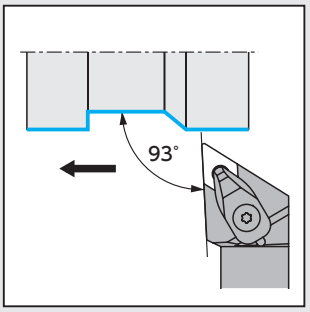


Figure-3

●Right-hand shown.

Dimensions of toolholders and the parts

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Snap ring
Figure-1			**CDJNR/L2525M15**			25	25	150	25	32	32	CC08M※ (CC08W)	ADN422	BS0835W	M3＊12	LW-4	SR08
			3225P15			32	25	170	32	32	32						
Figure-2	5682463		**PDJNR/L2525M43**	●		25	25	150	25	32	32	—	LSD42	Lever: LCL4	Clamping screw: LCS4	LW-3	Spring: LSP4

※CC08W clamp incorporates a hard carbide facing to eliminate excessive wear from the chip flow.
※For other shank sizes, please contact us for more information.

Dimensions of toolholders and the parts/ Multi-clamp holder

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim wrench	Spring
Figure-3	5682729	5682737	**WDJNR/L2525M15**	●	●	25	25	150	25	32	38	DC6DN Double clamping	ADN423	AOS-6 ＊30W※ screw-able from both ends	FSS15-3.0＊12	LLR-T20	LLR-T10	ASGL6-D
	5682745	5682752	**3225P15**	●	●	32	25	170	32	32	38							
			3232P15			32	32	170	32	32	38							
	5701263	5701271	**HDJNR/L2525M15**	●	●	25	25	150	25	32	38	HC6DN Dimple clamping						
	5701289	5701297	**3225P15**	●	●	32	25	170	32	32	38							
			3232P15			32	32	170	32	39	38							

※AOS-6*30WH is an option for hexagonal hole type screw.

Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**CDJNR/L…-15※**	DN□N1504 (1507)		**F6**
Figure-2	**PDLNR/L…43**	DN□A DN□G1504		**F6 • 17 • 25 • 26**
Figure-3	**WDJNR/L…15※**	DN□A1504 (1507) DN□G (1507)		**F6 • 17 • 25 • 26**
	HDJNR/L…15	DN□X1507		**F6**

※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Multi- clamp holder
Just changing the clamps enables the holder to clamp pin type, flat or dimple style inserts.

Outside machining/Profiling

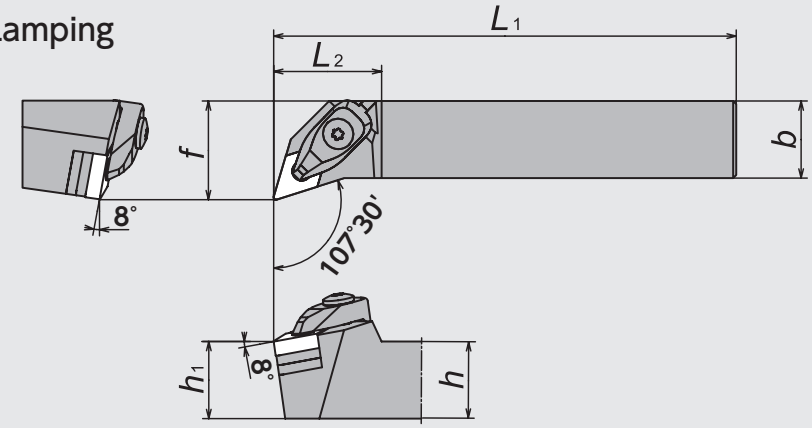
Multi-clamp holder

WDHN type

Double clamping

HDHN type

Dimple clamping



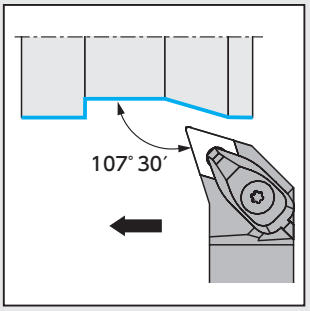


Figure-1

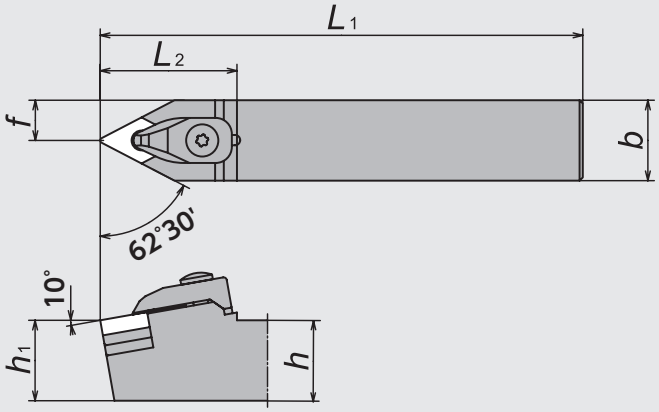
● Right-hand shown.

WDNN type

Double clamping

HDNN type

Dimple clamping



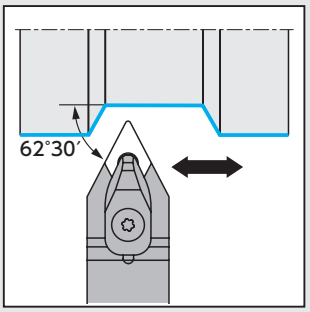


Figure-2

Dimensions of toolholders and the parts/ Multi-clamp holder

Shape	Code No. R (N)	Code No. L (N)	Toolholder Part No.	Stock R (N)	Stock L (N)	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim wrench	Snap ring
Figure-1	5682778	5682786	**WDHNR/L2525M15**	●	●	25	25	150	25	32	35	DC6DN Double clamping	ADN423	AOS-6 *30W※	FSS15-3.0*12	LLR-T20	LLR-T10	ASGL6-D
			3225P15			32	25	170	32	32	35							
			3232P15			32	32	170	32	39	35							
	5701313	5701321	**HDHNR/L2525M15**	●	●	25	25	150	25	32	35	HC6DN Dimple clamping						
			3225P15			32	25	170	32	32	35							
			3232P15			32	32	170	32	39	35							
Figure-2	5682760		**WDNNN2525M15**	●		25	25	150	25	12.5	42.5	DC6DN Double clamping	ADN423	AOS-6 *30W※ screw-able from both ends	FSS15-3.0*12	LLR-T20	LLR-T10	ASGL6-D
			3225P15			32	25	170	32	12.5	42.5							
			3232P15			32	32	170	32	16.0	42.5							
	5701305		**HDNNN2525M15**	●		25	25	150	25	12.5	42.5	HC6DN Dimple clamping						
			3225P15			32	25	170	32	12.5	42.5							
			3232P15			32	32	170	32	16	42.5							

※AOS-6*30WH is an option for hexagonal hole type screw.

Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**WDHNR/L…15※**	DN□A1504 (1507)		**F6 • 17 • 25 • 26**
	HDHNR/L…-15	DN□X1507		**F6**
Figure-2	**WDNNN…15※**	DN□A1504 (1507)		**F6 • 17 • 25 • 26**
	HDNNN…15	DN□X1507		**F6**

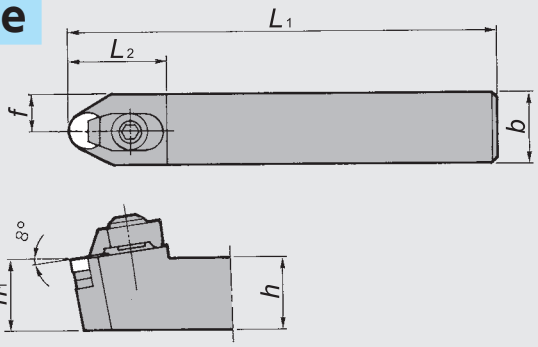
Multi- clamp holder
Just changing the clamps enables the holder to clamp pin type, flat or dimple style inserts.

※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Outside machining/Profiling

C54 type/CRDN type

Clamp-on



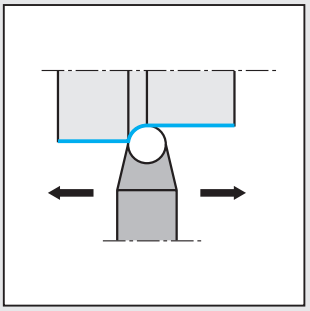
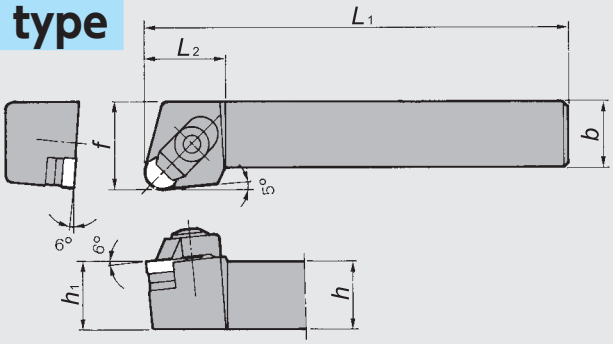


Figure-1

C55 type/CRGN type

Clamp-on



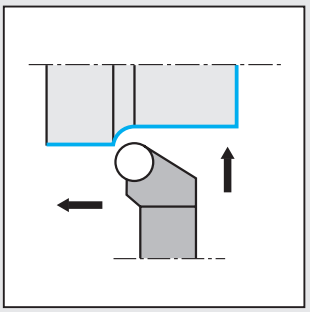


Figure-2

●Right-hand shown.

Dimensions of toolholders and the parts

Shape	Code No. R (N)	Code No. L (N)	Toolholder Part No.	Stock R (N)	Stock L (N)	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim wrench
Figure-1	5538392		**C54M-44**	●		25	25	160	25	12.5	33	CC08M	ARN42	BS0835W	M3＊12	LW-4	SR08
	5700323		**CRDNN2525M12**	●		25	25	150	25	12.5	34						
	5700331		**3225P12**	●		32	25	170	32	12.5	34						
Figure-2	5538400		**C55R/L-33**	●		19	19	140	19	28	30	CC08M	ARN42	BS0829W	M3＊12	LW-4	SR08
	5573027	5538418	**-44**	●	●	25	25	160	25	30	30			BS0835W			
	5768221		**-45**	●		32	25	160	32	30	30						
	5829395		**CRGNR/L3225P12**	●		32	25	170	32	32	30						

Applicable inserts

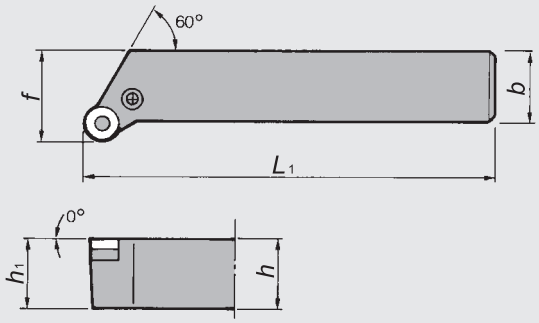
	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**C54M-···**	RN□N1204 (1207)		**F7・18**
	CRDNN···12			
Figure-2	**C55R/L-···**			
	CRGNR/L···-12			

※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Outside machining/Profiling

PRGC type

Lever lock



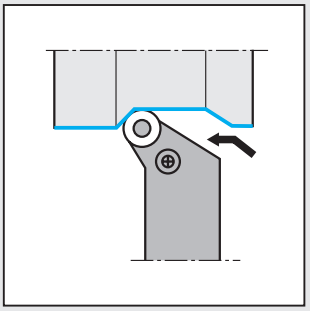
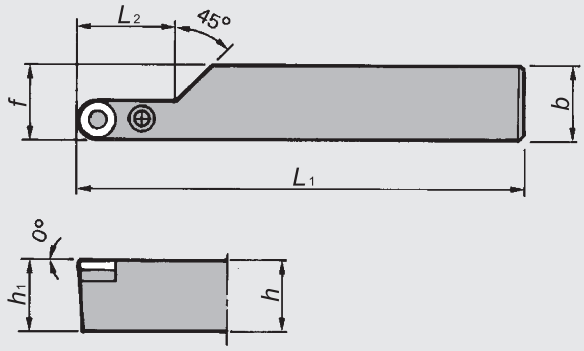


Figure-1

●Right-hand shown.

PRXC type

Lever lock



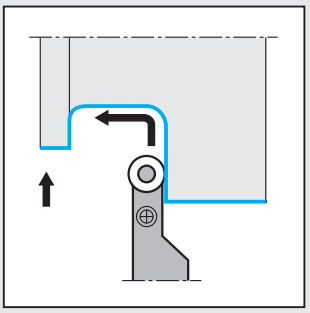
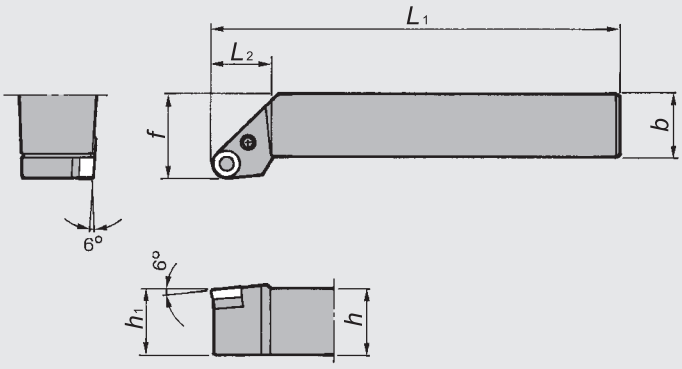


Figure-2

●Right-hand shown.

PRGN type

Lever lock



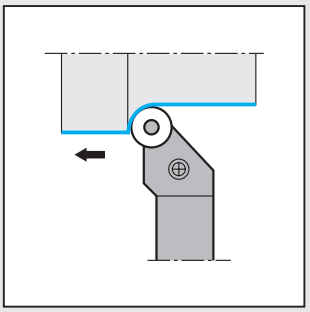


Figure-3

●Right-hand shown.

Dimensions of toolholders and the parts

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Shim seat	Lever	Clamping screw	Spring	Wrench
Figure-1			**PRGCR/L2020K10**			20	20	125	20	25		LSR32C	LCL3C	LCS2	LSP3	LW-2
			2525M12			25	25	150	25	32		LSR42C	LCL4C	LCS3		LW-2.5
Figure-2			**PRXCR/L2020K10**			20	20	125	20	20.5	25	LSR32C	LCL3C	LCS2	LSP3	LW-2
			2525M12			25	25	150	25	25.7	30	LSR42C	LCL4C	LCS3		LW-2.5
Figure-3			**PRGNR/L2525M43**			25	25	150	25	32	32	LSR42	LCL4	LCS4	LSP4	LW-3

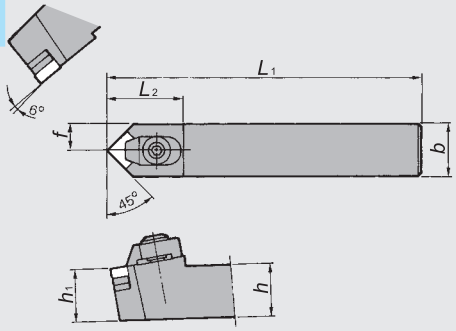
Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**PRGCR/L…10**	RCMX32M0GM		**F41**
	PRGCR/L…12	RCMX43M0GM		
Figure-2	**PRXCR/L…10**	RCMX32M0GM		
	PRXCR/L…12	RCMX43M0GM		
Figure-3	**PRGNR/L…43**	RNMG430G		**F26**

Outside machining/Facing

C14 type/CSDN type

Clamp-on



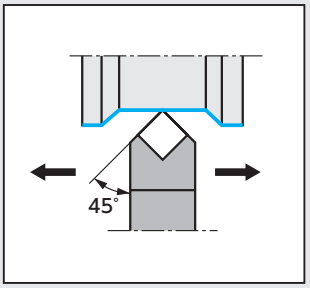
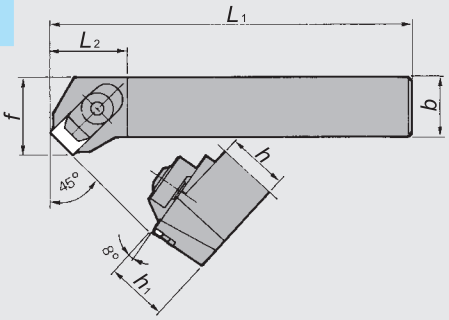


Figure-1

C12 type/CSSN type

Clamp-on



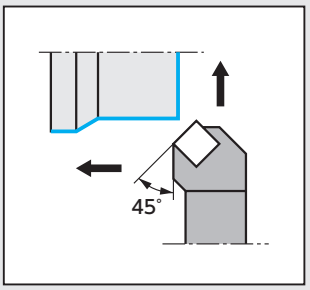
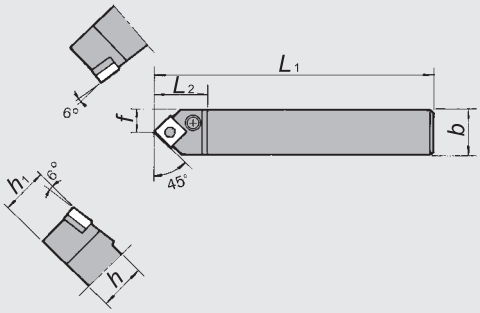


Figure-2

●Right-hand shown.

PSDN type

Lever lock



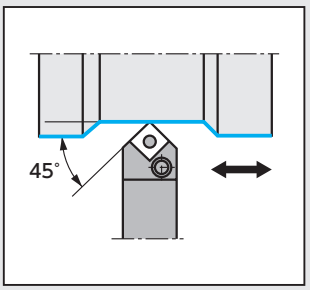


Figure-3

■ Multi-clamp holder

TSDN type

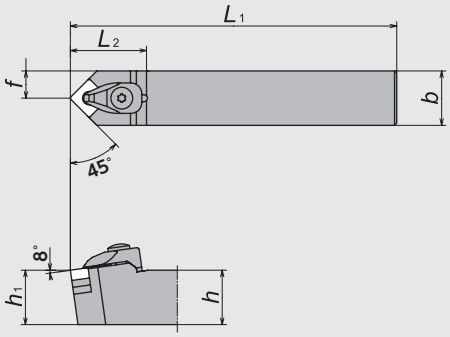
Clamp-on

WSDN type

Double clamping

HSDN type

Dimple clamping



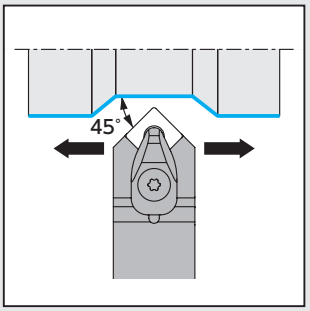


Figure-4

TSSN type

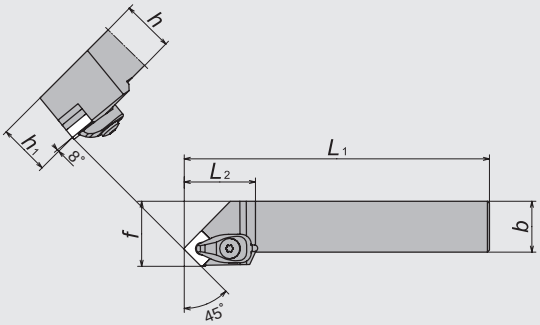
Clamp-on

WSSN type

Double clamping

HSSN type

Dimple clamping



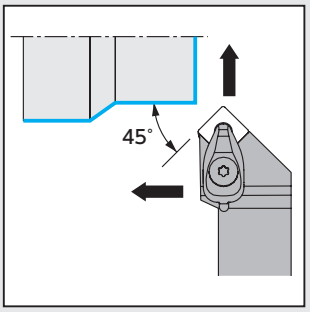


Figure-5

●Right-hand shown.

Dimensions of toolholders and the parts

Shape	Code No. R (N)	Code No. L (N)	Toolholder Part No.	Stock R (N)	Stock L (N)	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Snap ring
Figure-1	5538327		**C14M-33**	●		19	19	140	19	9.5	35	CC08M※ (CC08W)	ASN423	BS0829W	M3＊12	LW-4	SR08
	5538335		**-34**	●		25	19	160	25	9.5	35			BS0835W			
	5538343		**-44**	●		25	25	160	25	12.5	35						
	5638036		**-45**	●		32	25	160	32	12.5	35						
	5700349		**CSDNN2525M12**	●		25	25	150	25	12.5	35						
Figure-2	5538178	5538186	**C12R/L-33**	●	●	19	19	140	19	27	28	CC08MS※ (CC08WS)	ASN423	BS0829W	M3＊12	LW-4	SR08
	5538194	5538202	**-44**	●	●	25	25	160	25	35	31	CC08M※ (CC08W)		BS0835W			
	5620869	5637277	**-45**	●	●	32	25	160	32	35	31						
		5700448	**CSSNR/L2525M12**		●	25	25	150	25	32	31						
		5857172	**3225P12**		●	32	25	170	32	32	31						
Figure-3	5523451		**PSDNN2020K43**	●		20	20	125	20	10	30	—	LSS42	Lever: LCL4	Clamping screw: LCS4	LW-3	Spring: LSP4
	5764006		**2525M43**	●		25	25	150	25	12.5	30						

※CC08W clamp incorporates a hard carbide facing to eliminate excessive wear from the chip flow.
※For other shank sizes, please contact us for more information.

Dimensions of toolholders and the parts / Multi-clamp holder

Shape	Code No. R (N)	Code No. L (N)	Toolholder Part No.	Stock R (N)	Stock L (N)	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim Wrench	Spring
Figure-4	5701784		**TSDNN2525M12**	●		25	25	150	25	12.5	35	TC6CN Clamp-on	ASN423	AOS-6＊30W※ screw-able from both ends	FSS15-3.0＊12	LLR-T20	LLR-T10	ASGL6-D
	5701792		**3225P12**	●		32	25	170	32	12.5	35							
			3232P12			32	32	170	32	16	35							
	5682935		**WSDNN2525M12**	●		25	25	150	25	12.5	35	DC6CN Double clamping						
	5682943		**3225P12**	●		32	25	170	32	12.5	35							
			3232P12			32	32	170	32	16.0	35							
	5701503		**HSDNN2525M12**	●		25	25	150	25	12.5	35	HC6SN Dimple clamping						
	5701511		**3225P12**	●		32	25	170	32	12.5	35							
			3232P12			32	32	170	32	16	35							
Figure-5	5701768	5701776	**TSSNR/L2525M12**	●	●	25	25	150	25	32	35	TC6CN Clamp-on	ASN423	AOS-6＊30W※ screw-able from both ends	FSS15-3.0＊12	LLR-T20	LLR-T10	ASGL6-D
			3225P12			32	25	170	32	32	35							
			3232P12			32	32	170	32	39	35							
	5682901	5682919	**WSSNR/L2525M12**	●	●	25	25	150	25	32	35	DC6CN Double clamping						
			3225P12			32	25	170	32	32	35							
			3232P12			32	32	170	32	39	35							
	5701487	5701495	**HSSNR/L2525M12**	●	●	25	25	150	25	32	35	HC6SN Dimple clamping						
			3225P12			32	25	170	32	32	35							
			3232P12			32	32	170	32	39	35							

※AOS-6*30WH is an option for hexagonal hole type screw.

Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**C14M-…※ CSDNN…12※**	SN□N1204 (1207)		**F8～9・18・28**
Figure-2	**C12R/L-…※ CSSNR/L…-12※**			
Figure-3	**PSDNN…12**	SN□A SN□G1204		**F8・18・27～28**

Multi-Clamp holder
Just changing the clamps enables the holder to clamp pin type, flat or dimple style inserts.

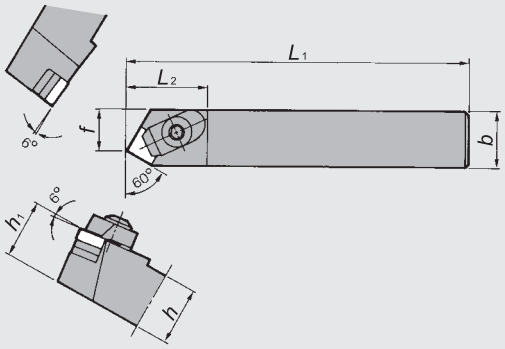
	Toolholder Part No.	Applicable insert		Listed on pages
Figure-4	**TSDNN…12※**	SN□N1204 (1207)		**F8～9・18・28**
	WSDNN…12※	SN□A SN□G1204 (1207)		**F8・18・27～28**
	HSDNN…12	SN□X1207		**F9**
Figure-5	**TSDNN…12※**	SN□N1204 (1207)		**F8～9・18・28**
	WSDNN…12※	SN□A SN□G1204 (1207)		**F8・18・27～28**
	HSDNN…12	SN□X1207		**F9**

※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Outside machining

C13 type

Clamp-on



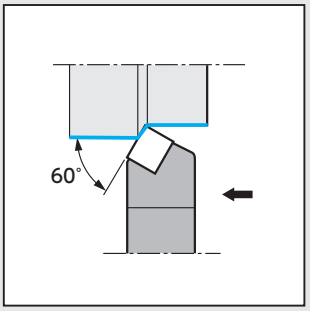
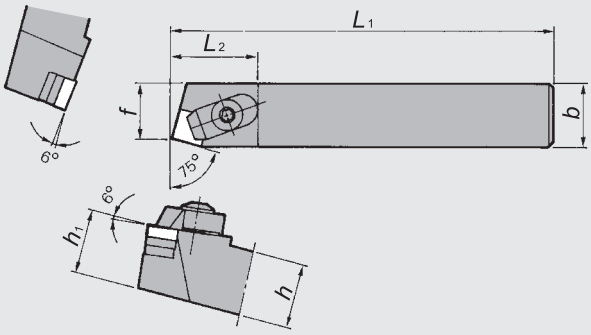


Figure-1

●Right-hand shown.

C11 type

Clamp-on



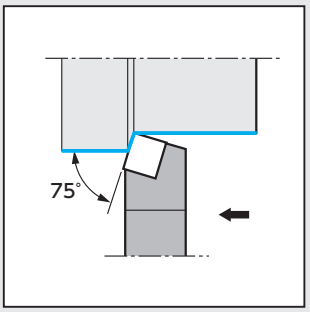
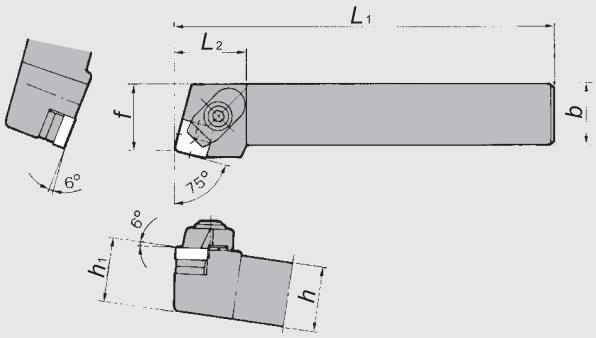


Figure-2

●Right-hand shown.

C16 type

Clamp-on



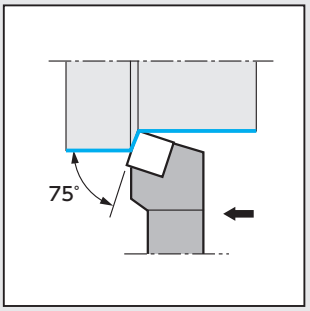
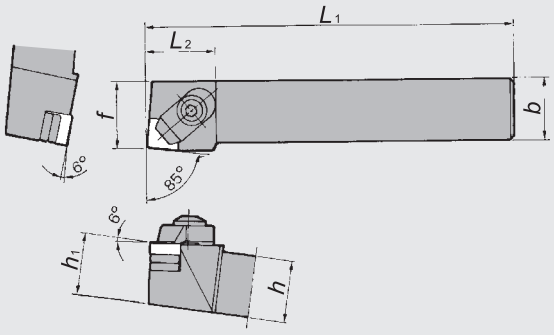


Figure-3

●Right-hand shown.

CSHN type

Clamp-on



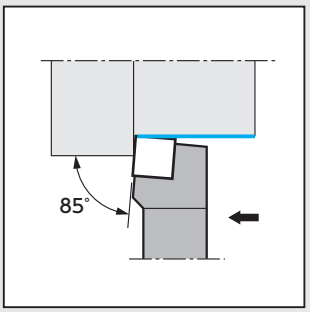
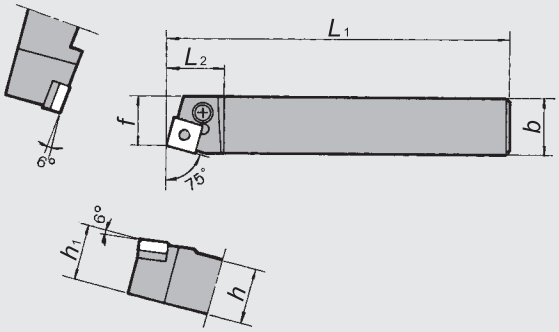


Figure-4

●Right-hand shown.

PSBN type

Lever lock



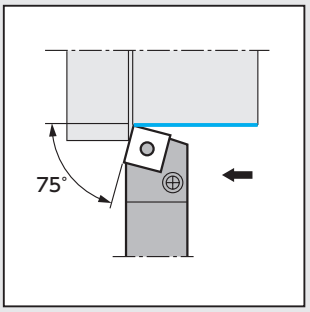


Figure-5

●Right-hand shown.

Dimensions of toolholders and the parts

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Snap ring
Figure-1	5538244	5538251	**C13R/L-33**	●	●	19	19	140	19	12.5	35	CC08M※ (CC08W)	ASN423	BS0829W	M3＊12	LW-4	SR08
	5538269		**-34**	●		25	19	160	25	12.5	35			BS0835W			
	5538277	5538285	**-44**	●	●	25	25	160	25	18.5	35						
	5684816	5802863	**-45**	●	●	32	25	160	32	18.5	35						
Figure-2	5538608	5538616	**C11R/L-33**	●	●	19	19	140	19	15.5	34	CC08M※ (CC08W)	ASN423	BS0829W	M3＊12	LW-4	SR08
	5538624		**-34**	●		25	19	160	25	15.5	34			BS0835W			
	5538632	5538640	**-44**	●	●	25	25	160	25	21.5	34						
	5778170	5710876	**-45**	●	●	32	25	160	32	21.5	34						
Figure-3	5538350	5538368	**C16R/L-33**	●	●	19	19	140	19	22	32	CC08M※ (CC08W)	ASN423	BS0829W	M3＊12	LW-4	SR08
	5538376	5538384	**-44**	●	●	25	25	160	25	25	25			BS0835W			
	5684824	5746862	**-45**	●	●	32	25	160	32	25	25						
Figure-4	5692488	5692470	**CSHNR/L2525M12**	●	●	25	25	150	25	27	30	CC08M※ (CC08W)	ASN423	BS0835W	M3＊12	LW-4	SR08
Figure-5	5934518	5934492	**PSBNR/L2020K43**	●	●	20	20	125	20	17	28	—	LSS42	Lever LCL4	Clamping screw LCS4	LW-3	Spring LSP4

※CC08W clamp incorporates a hard carbide facing to eliminate excessive wear from the chip flow.
※For other shank sizes, please contact us for more information.

Applicable inserts

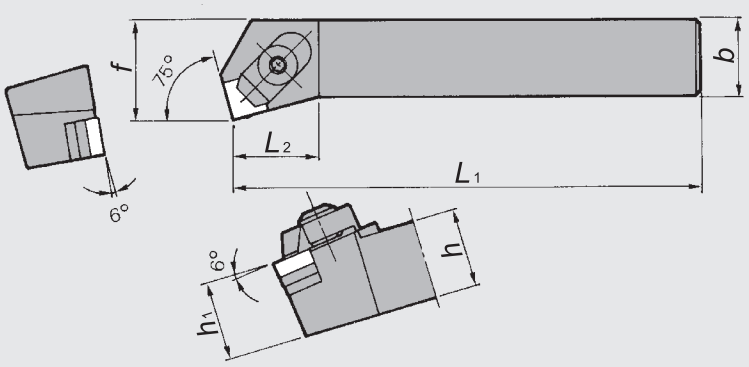
	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**C13…**※	SN□N1204 (1207)		**F8～9・18・28**
Figure-2	**C11…**※			
Figure-3	**C16…**※			
Figure-4	**CSHN…12**※			
Figure-5	**PSBN…43**	SN□A1204 SN□G1204		**F8・18・27～28**

※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Facing

C15 type

Clamp-on



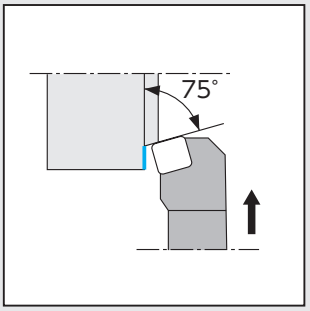
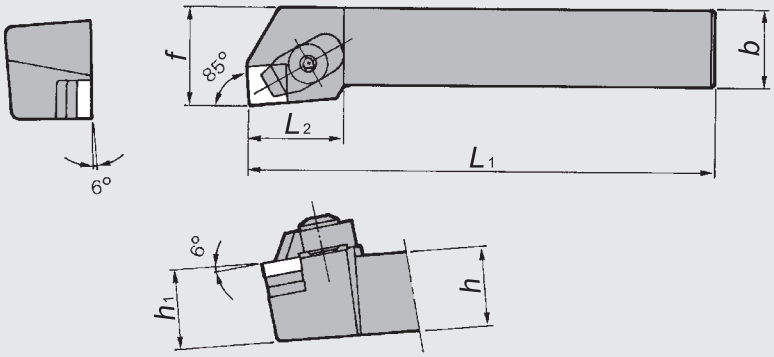


Figure-1

●Right-hand shown.

C17 type

Clamp-on



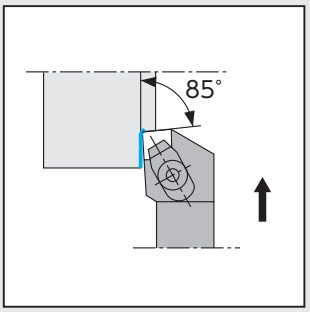


Figure-2

●Right-hand shown.

Dimensions of toolholders and the parts

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Snap ring
Figure-1	5566070	5538210	**C15R/L-33**	●	●	19	19	140	19	25	29	CC08M※ (CC08W)	ASN423	BS0829W	M3＊12	LW-4	SR08
		5538228	**-34**		●	25	19	160	25	25	29			BS0835W			
	5538236	5576863	**-44**	●	●	25	25	160	25	31	28						
	5802848	5759865	**-45**	●	●	32	25	160	32	31	28						
Figure-2	5538145		**C17R/L-33**	●		19	19	140	19	24	30	CC08M※ (CC08W)	ASN423	BS0829W	M3＊12	LW-4	SR08
	5538152	5538160	**-44**	●	●	25	25	160	25	30	30			BS0835W			
	5755400	5743281	**-45**	●	●	32	25	160	32	30	30						

※CC08W clamp incorporates a hard carbide facing to eliminate excessive wear from the chip flow.
※For other shank sizes, please contact us for more information.

Applicable inserts

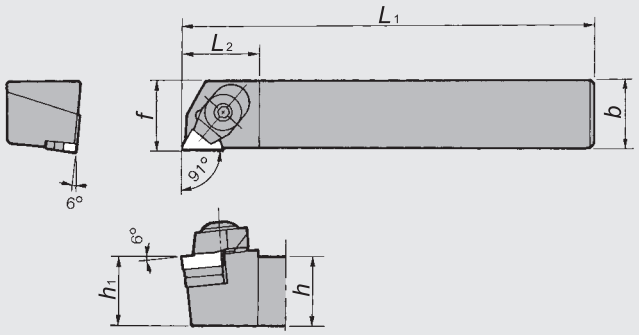
	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**C15…**※	SN□N1204 (1207)		**F8～9・18・28**
Figure-2	**C17…**※			

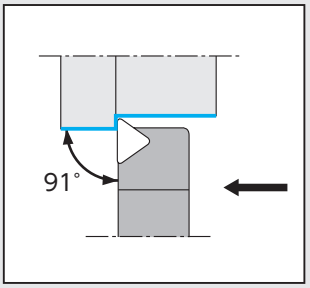
※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Outside machining

C21 type

Clamp-on



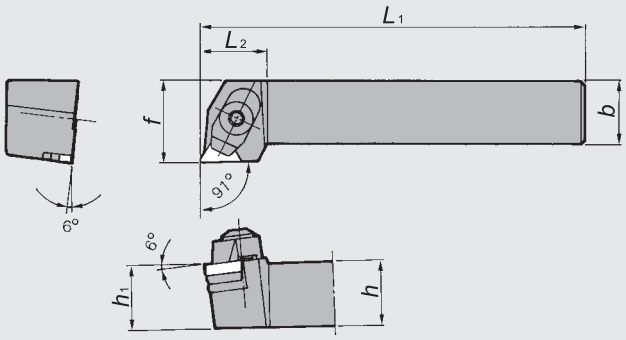


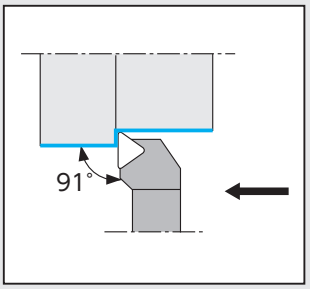
●Right-hand shown.

Figure-1

C22 type

Clamp-on





●Right-hand shown.

Figure-2

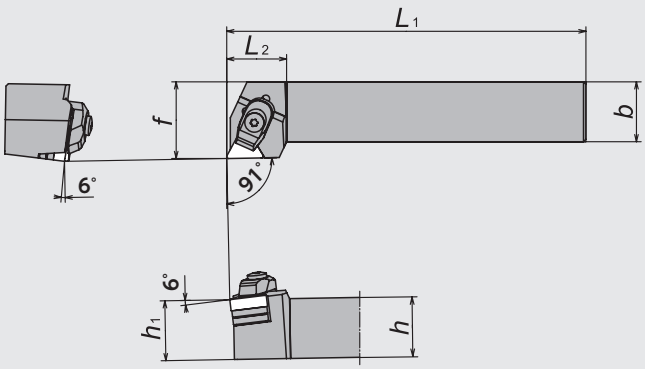
Multi-clamp holder

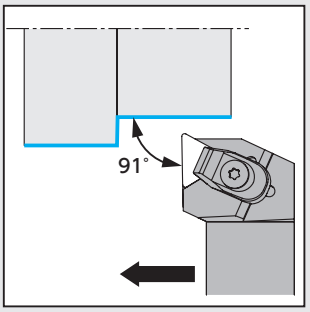
TTGN type

Clamp-on

WTGN type

Double clamping



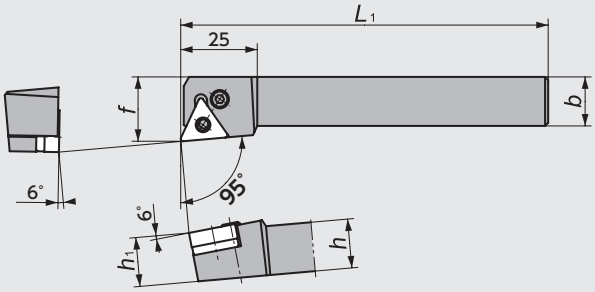


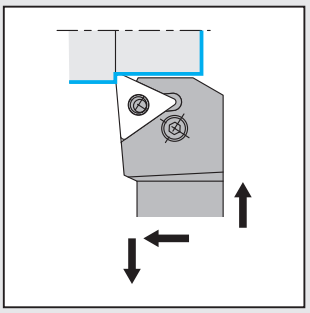
●Right-hand shown.

Figure-3

PTLN type

Lever lock





●Right-hand shown.

Figure-4

Dimensions of toolholders and the parts

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Snap ring
Figure-1	5538426		**C21R/L-33**	●		19	19	140	19	19	28	CC08MS※ (CC08WS)	ATN323	BS0829W	M3＊12	LW-4	SR08
		5538434	**-34**		●	25	19	160	25	19	28			BS0835W			
	5538442	5538459	**-44**	●	●	25	25	160	25	25	28						
	5760558	5650411	**-45**	●	●	32	25	160	32	25	28						
Figure-2	5538467	5538475	**C22R/L-33**	●	●	19	19	140	19	25	25	CC08MS※ (CC08WS)	ATN323	BS0829W	M3＊12	LW-4	SR08
	5538483		**-34**	●		25	19	160	25	25	25			BS0835W			
	5538491	5538509	**-44**	●	●	25	25	160	25	30	25						
	5695630	5692231	**-45**	●	●	32	25	160	32	30	25						
Figure-4	5552336	5552344	**PTLNR/L2020L33**	●	●	20	20	140	20	25	25	—	LST317	Lever LCL3	Clamping screw LCS3	LW-2.5	Spring LSP3

※CC08W clamp incorporates a hard carbide facing to eliminate excessive wear from the chip flow.
※For other shank sizes, please contact us for more information.

Dimensions of toolholder and the parts/ Multi-clamp holder

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim wrench	Snap ring
Figure-3	5701826	5701834	**TTGNR/L2525M16**	●	●	25	25	150	25	32	25	TC5TN Clamp-on	ATN 323	AOS-5 ＊26W※ screw-able from both ends	FSS15-3.0＊12	LLR-T15	LLR-T10	ASGL5-D
			3225P16			32	25	170	32	32	25							
			3232P16			32	32	170	32	39	25							
	5682976	5682984	**WTGNR/L2525M16**	●	●	25	25	150	25	32	25	DC5TN Double clamping						
			3225P16			32	25	170	32	32	25							
			3232P16			32	32	170	32	39	25							

AOS-5*26WH is an option for hexagonal hole type screw.

Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**C21…**※	TN□N1604 (1607)		**F10～11・19**
Figure-2	**C22…**※			
Figure-3	**TTGNR/L…16**※	TN□N1604 (1607)		**F10～11・19**
	WTGNR/L…16※	TN□A1604 (1607)		**F10～11・19・29・30**

※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Multi- clamp holder
Just changing the clamps enables the holder to clamp pin type, flat or dimple style inserts.

Outside machining

C23 type

Clamp-on

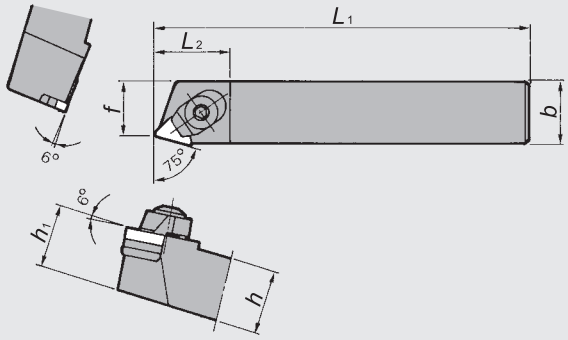
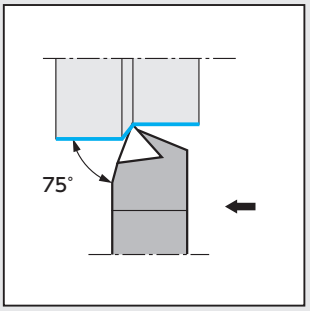


Figure-1



●Right-hand shown.

C24 type

Clamp-on

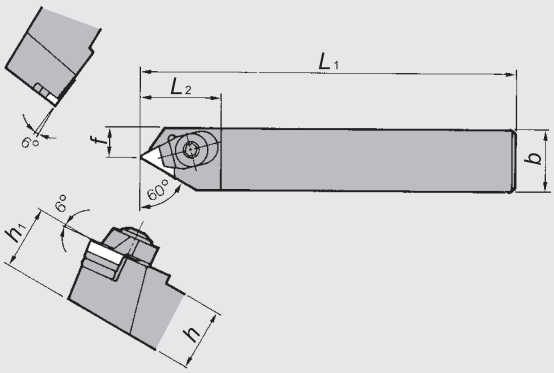
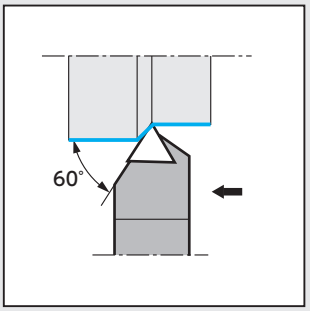


Figure-2



●Right-hand shown.

Dimensions of toolholders and the parts

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Snap ring
Figure-1	5538541		**C23R/L-33**	●		19	19	140	19	14.5	30	CC08MS※ (CC08WS)	ATN323	BS0829W	M3＊12	LW-4	SR08
	5576939	5538558	**-44**	●	●	25	25	160	25	20.5	30			BS0835W			
Figure-2	5538517		**C24R/L-34**	●		25	19	160	25	10.5	32	CC08MS※ (CC08WS)	ATN323	BS0829W	M3＊12	LW-4	SR08
	5538525	5538533	**-44**	●	●	25	25	160	25	16.5	32			BS0835W			

※CC08W clamp incorporates a hard carbide facing to eliminate excessive wear from the chip flow.
※For other shank sizes, please contact us for more information.

Applicable inserts

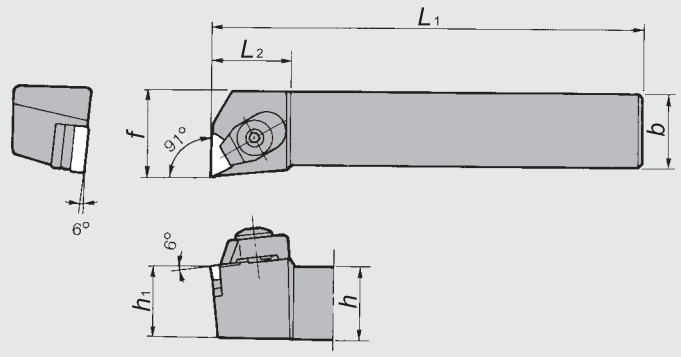
	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**C23…**	TN□N1604 (1607)		**F10～11・19**
Figure-2	**C24…**			

※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Facing

C25 type

Clamp-on



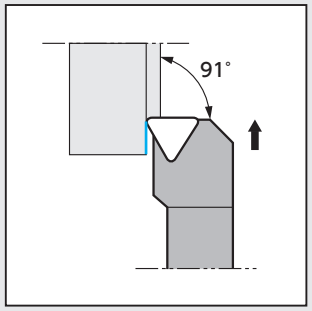


Figure-1

●Right-hand shown.

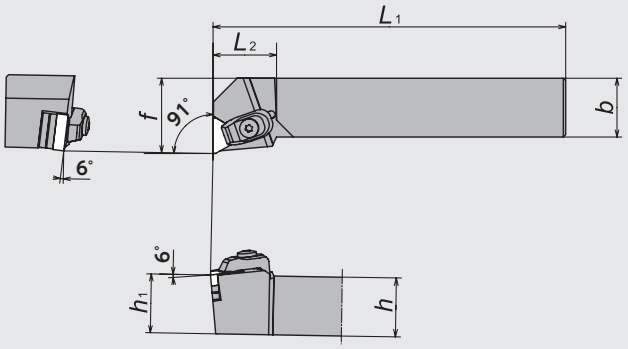
Multi-clamp holder

TTFN type

Clamp-on

WTFN type

Double clamping



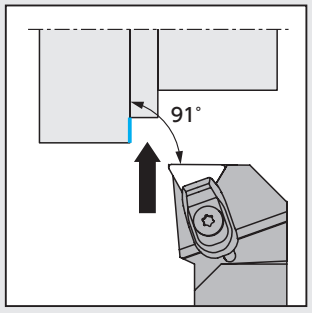


Figure-2

●Right-hand shown.

Dimensions of toolholders and the parts

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Snap ring
Figure-1	5538566	5538574	C25R/L-33	●	●	19	19	140	19	25	25	CC08MS※ (CC08WS)	ATN323	BS0829W	M3＊12	LW-4	SR08
	5576954		-34	●		25	19	160	25	25	25			BS0835W			
	5538582	5538590	-44	●	●	25	25	160	25	30	28						
	5720875		-45	●		32	25	160	32	30	28						

※CC08W clamp incorporates a hard carbide facing to eliminate excessive wear from the chip flow.
※For other shank sizes, please contact us for more information.

Dimensions of toolholders and the parts/ Multi-clamp holder

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim	Snap ring
Figure-2	5701859	5701867	TTFNR/L2525M16	●	●	25	25	150	25	32	27	TC5TN Clamp-on	ATN 323	AOS-5 ＊26W※ screw-able from both ends	FSS15-3.0＊12	LLR-T15	LLR-T10	ASGL5-D
			3225P16			32	25	170	32	32	27							
			3232P16			32	32	170	32	39	27							
	5682992	5683008	WTFNR/L2525M16	●	●	25	25	150	25	32	27	DC5TN Double clamping						
			3225P16			32	25	170	32	32	27							
			3232P16			32	32	170	32	39	27							

AOS-5*26WH is an option for hexagonal hole type screw.

Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	C25···	TN□N1604(1607)		F10～11・19
Figure-2	TTFNR/L···-16	TN□N1604(1607)		F10～11・19
	WTFNR/L···-16	TN□A1604(1607)		F10～11・19・29・30

Multi- clamp holder

Just changing the clamps enables the holder to clamp pin type, flat or dimple style inserts.

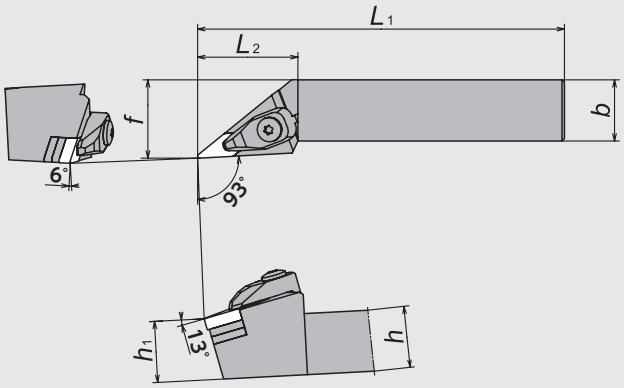
※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Outside machining

Multi-clamp holder

WVJN type
Double clamping

HVJN type
Dimple clamping



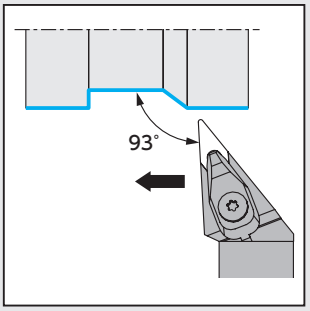
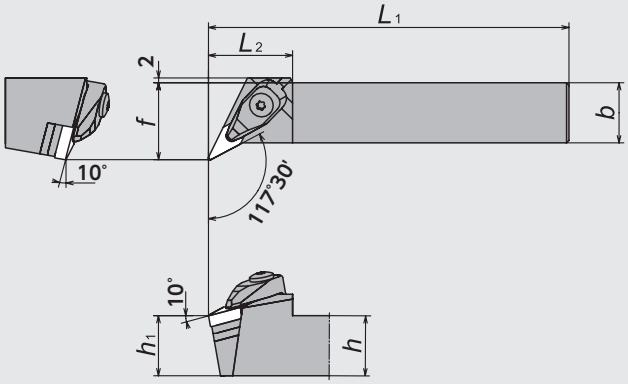


Figure-1

● Right-hand shown.

WVPN type
Double clamping

HVPN type
Dimple clamping



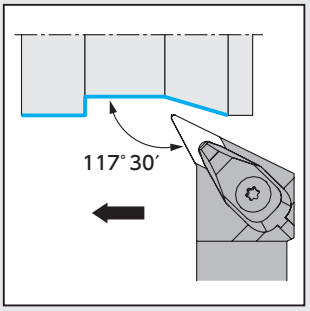
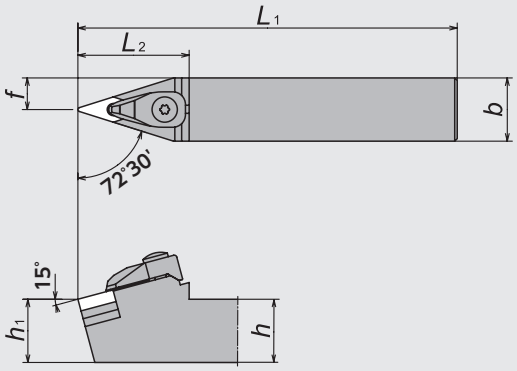


Figure-2

● Right-hand shown.

WVVN type
Double clamping

HVVN type
Dimple clamping



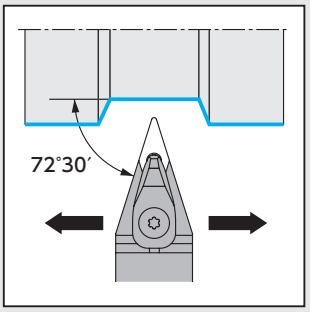


Figure-3

Dimensions of toolholders and the parts/ Multi-clamp holder

Shape	Code No. R (N)	Code No. L (N)	Toolholder Part No.	Stock R (N)	Stock L (N)	h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim wrench	Snap ring
Figure-1	5682828	5682836	**WVJNR/L2525M16**	●	●	25	25	150	25	32	41	DC6VN Double clamping	AVN 323	AOS-6＊30W※ screw-able from both ends	FSS15-3.0＊12	LLR-T20	LLR-T10	ASGL6-D
	5682844	5682851	**3225P16**	●	●	32	25	170	32	32	41							
			3232P16			32	32	170	32	39	41							
	5701396	5701412	**HVJNR/L2525M16**	●	●	25	25	150	25	32	41	HC6VN Dimple clamping						
	5701420	5701438	**3225P16**	●	●	32	25	170	32	32	41							
			3232P16			32	32	170	32	39	41							
Figure-2	5682885	5682893	**WVPNR/L2525M16**	●	●	25	25	150	25	32	35	DC6VN Double clamping	AVN 323	AOS-6＊30W※ screw-able from both ends	FSS15-3.0＊12	LLR-T20	LLR-T10	ASGL6-D
			3225P16			32	25	170	32	32	35							
			3232P16			32	32	170	32	32	35							
	5701461	5701479	**HVPNR/L2525M16**	●	●	25	25	150	25	32	35	HC6VN Dimple clamping						
			3225P16			32	25	170	32	32	35							
			3232P16			32	32	170	32	39	35							
Figure-3	5682877		**WVVNN2525M16**	●		25	25	150	25	12.5	44	DC6VN Double clamping	AVN 323	AOS-6＊30W※ screw-able from both ends	FSS15-3.0＊12	LLR-T20	LLR-T10	ASGL6-D
			3225P16			32	25	170	32	12.5	44							
			3232P16			32	32	170	32	16	44							
	5701453		**HVVNN2525M16**	●		25	25	150	25	12.5	44	HC6VN Dimple clamping						
			3225P16			32	25	170	32	12.5	44							
			3232P16			32	32	170	32	16	44							

※AOS-6*30WH is an option for hexagonal hole type screw.

Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**WVJNR/L…**※	VN□A1604(1607) VN□□1604		**F12・20・31**
	HVJNR/L…	VNGX1607		—
Figure-2	**WVPNR/L…**※	VN□A1604(1607) VN□□1604		**F12・20・31**
	HVPNR/L…	VNGX1607		—
Figure-3	**WVPNR/L…**※	VN□A1604(1607) VN□□1604		**F12・20・31**
	HVPNR/L…	VNGX1607		—

Multi- clamp holder
Just changing the clamps enables the holder to clamp pin type, flat or dimple style inserts.

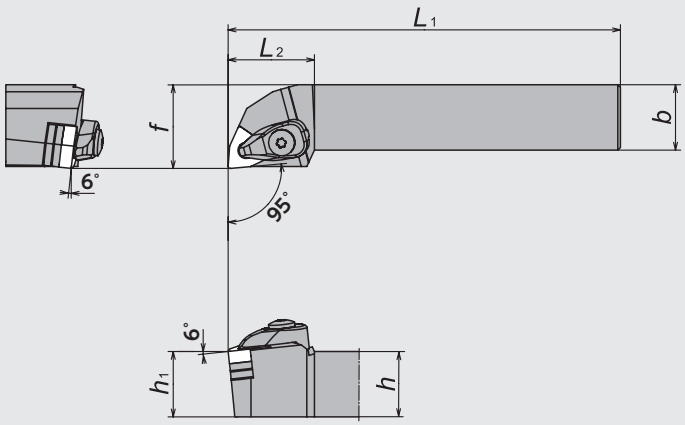
※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

Outside machining/Facing

Multi-clamp holder

WWLN type

Double clamping



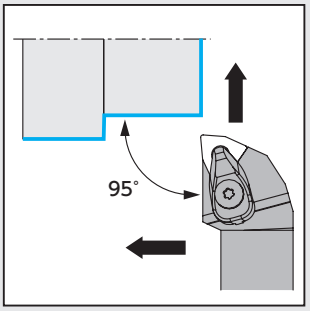
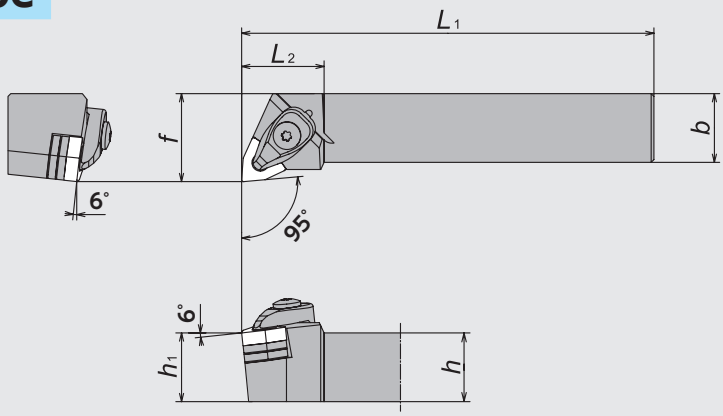


Figure-1

●Right-hand shown.

WWLN-2 type

Double clamping



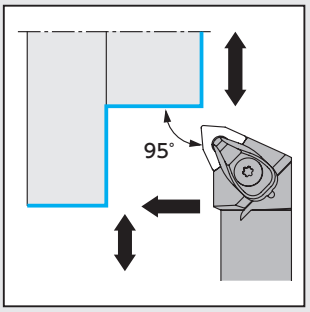


Figure-2

●Right-hand shown.

Dimensions of toolholders and the parts/ NEW Multi-clamp holder

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim wrench	Spring
Figure-1	5683016	5683024	**WWLNR/L2525M08**	●	●	25	25	150	25	32	33	DC6CN Double clamping	AWN423-W	AOS-6 * 30W screw-able from both ends	FSS15-3.0 * 12	LLR-T20	LLR-T10	ASGL6-D
			3225P08			32	25	170	32	32	33							
			3232P08			32	32	170	32	40	33							
Figure-2	5701578	5701586	**WWLNR/L2525M08-2**	●	●	25	25	150	25	32	30	DC6CN Double clamping	AWN423-W	AOS-6 * 30W screw-able from both ends	FSS15-3.0 * 12	LLR-T20	LLR-T10	ASGL6-D
			3225P08-2			32	25	170	32	32	30							
			3232P08-2			32	32	170	32	40	30							

Applicable inserts

	Toolholder Part No.	Applicable insert		Listed on pages
Figure-1	**WWLNR/L…**	WN□A0804 WN□G0804		**F12 • 32**
Figure-2	**WWLNR/L…-2**			

※A holder having the dimension "*h*" of 25 or greater comes with two shim seats. An insert "7.94-mm thick" can be also mounted by removing one of the shim seats.

HRCD type

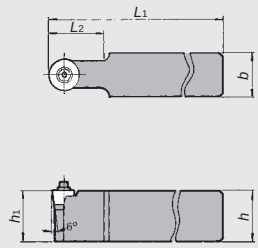
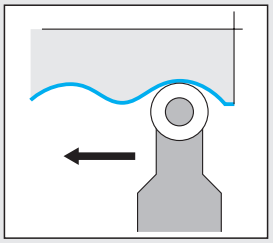


Figure-1



CRDC type

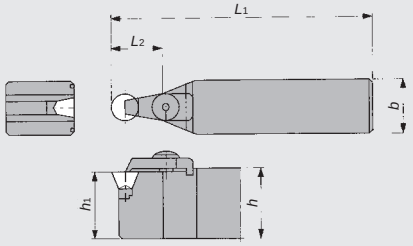
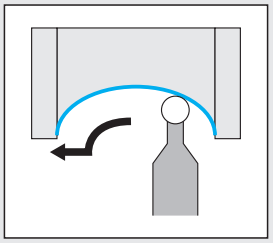


Figure-2



CRXC type

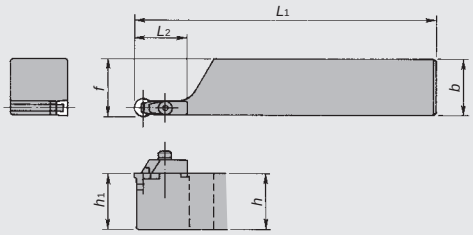
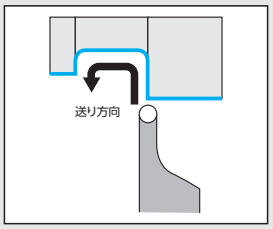


Figure-3



●Right-hand shown.

Dimensions of toolholders

Shape	Code No. R N L	Toolholder Part No.	Stock R N L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Applicable insert	
Figure-1	5454921	**HRCD-22**	●	50	50	300	50	—	30		CDH22
	5144274	**-33**	●						50		CDH33
	5454947	**-42**							80		CDH42
	5844113	**-43**							80		CDH43
		-53							100		CDH53
Figure-2	5720750	**CRDCN2525M06**		25	25	150	25	—	20		※RCGX/RPGX0607(08)
	5478706	**2525M09**									※RCGX/RPGX0907(08)
	5691613	**2525M12**									※RCGX/RPGX1207(08)
	5911557	**3225P06**	●	32		170	32				※RCGX/RPGX0607(08)
	5829528	**3225P09**	●								※RCGX/RPGX0907(08)
	5829510	**3225P12**	●						25		※RCGX/RPGX1207(08)
	5634241	**3232P15**			32				30		RCGX/RPGX1510
Figure-3	5981469	**CRXCR/L3232P09Y**	●	32	32	170	32	32.7	28		RCGY090603
	5981188	**3232P12Y**	●						38		RCGY120603

※Both of thickness 07&08 can be used.
※Applicable inserts detail ➡ F15・M5

Parts

Parts / Toolholder Part No.	Cap screw	Clamping screw	Washer	Shim seat (A) (B) (C) (D)	Retaining screw	Spring	Clamp	Spring pin	Wrench
HRCD-22	CS0316		W120	HACDH22 (A)					LW-2.5
HRCD-33	CS0625		W110	HACDH33 (A)					LW-5
HRCD-42	1/4-20UNC＊11/4		W106	HACDH42 (A)					LWU-4
HRCD-43	1/4-20UNC＊11/2			HACDH43 (A)					
HRCD-53	3/8-16UNC＊11/2		W107	HACDH53 (A)					LWU-5
CRDCN3225P06		BS0520	WS-5	HARCGX06 (C)			HC35KR-4099	—	LW-3
CRDCN3225P09		BS0625	WS-6	HARCGX0908V (D)			HC35KR-6075	2＊8AW	LW-4
CRDCN3225P12				HARCGX1208V (D)			HC35KR-6076	2.5＊8AW	
CRXCR3232P09Y	CS0425		WS-4	HAR09Y (B)	M2＊8	ASGL4	CRN4		LW-3
CRXCR3232P12Y	CS0525		WS-5	HAR12Y (B)	M3＊8	ASGL5	CRN5		LW-4

MEMO

H

SS

SS Tool Range H2

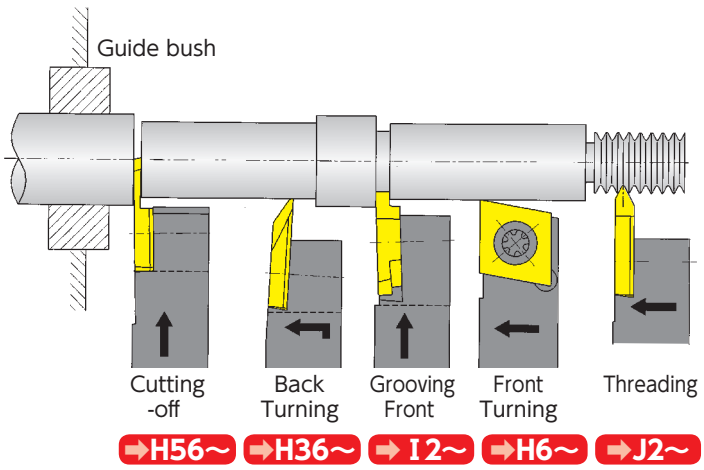
SS Tools for Front Turning H5

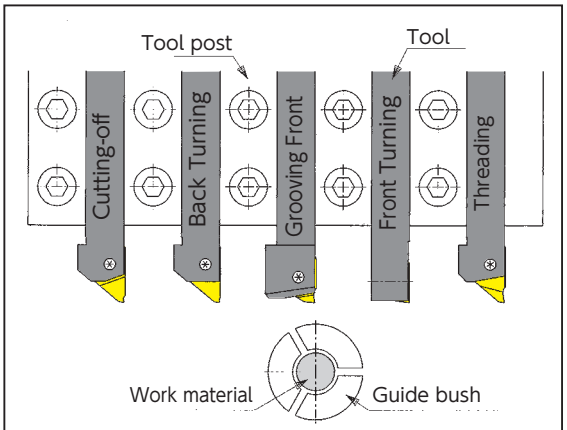
SS Tools for Back Turning H33

SS Tools for Cutting off H51

Original Series H75

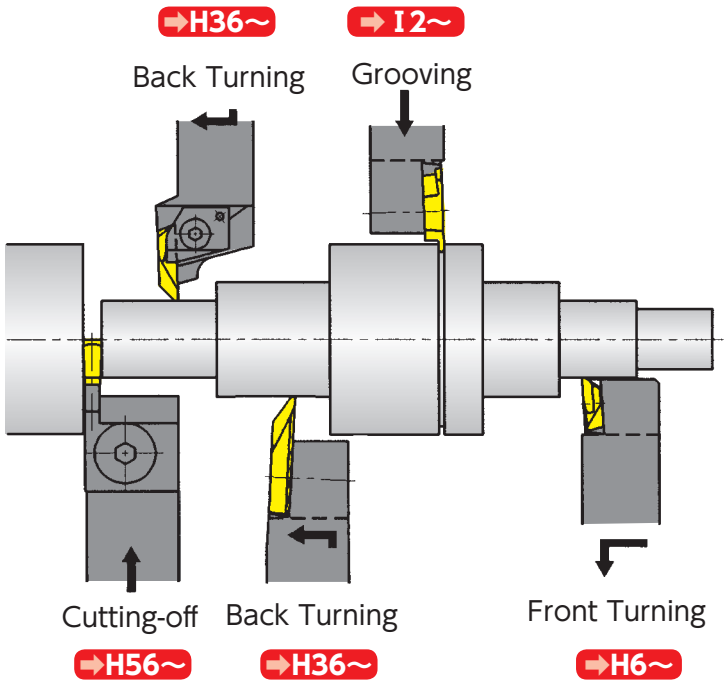
Tooling example for a small CNC automatic lathe (gang type)

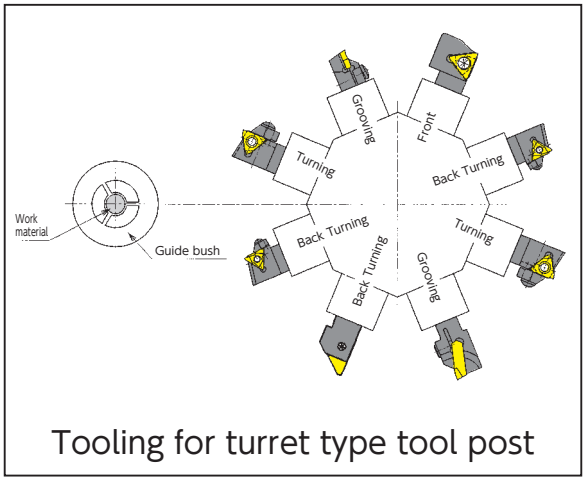




Tooling for gang type tool post

Tooling example for a small CNC automatic lathe (turret type)

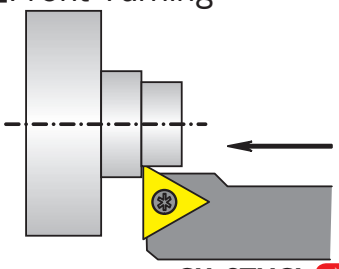




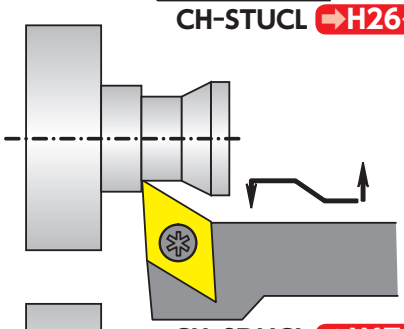
Tooling for turret type tool post

Tooling example for a small CNC automatic lathe (gang type)

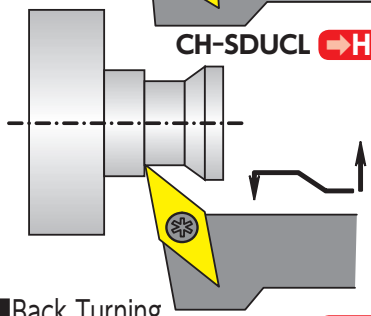
■Front Turning



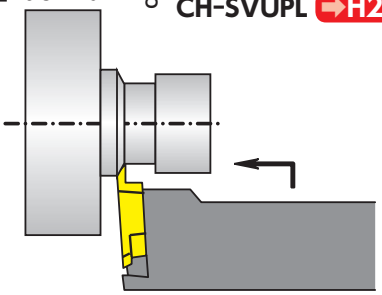
CH-STUCL ➡H26～



CH-SDUCL ➡H17～

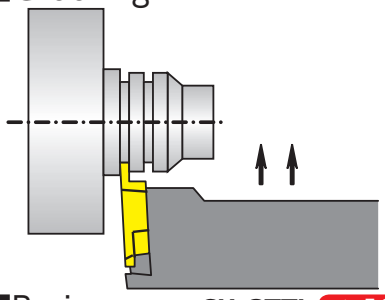


■Back Turning CH-SVUPL ➡H24～



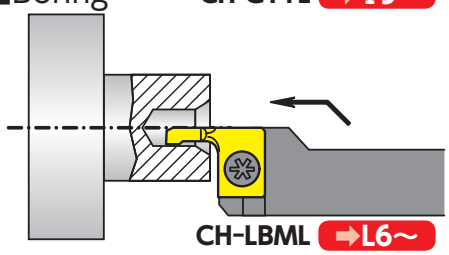
CH-GTTL ➡H49～

■Grooving

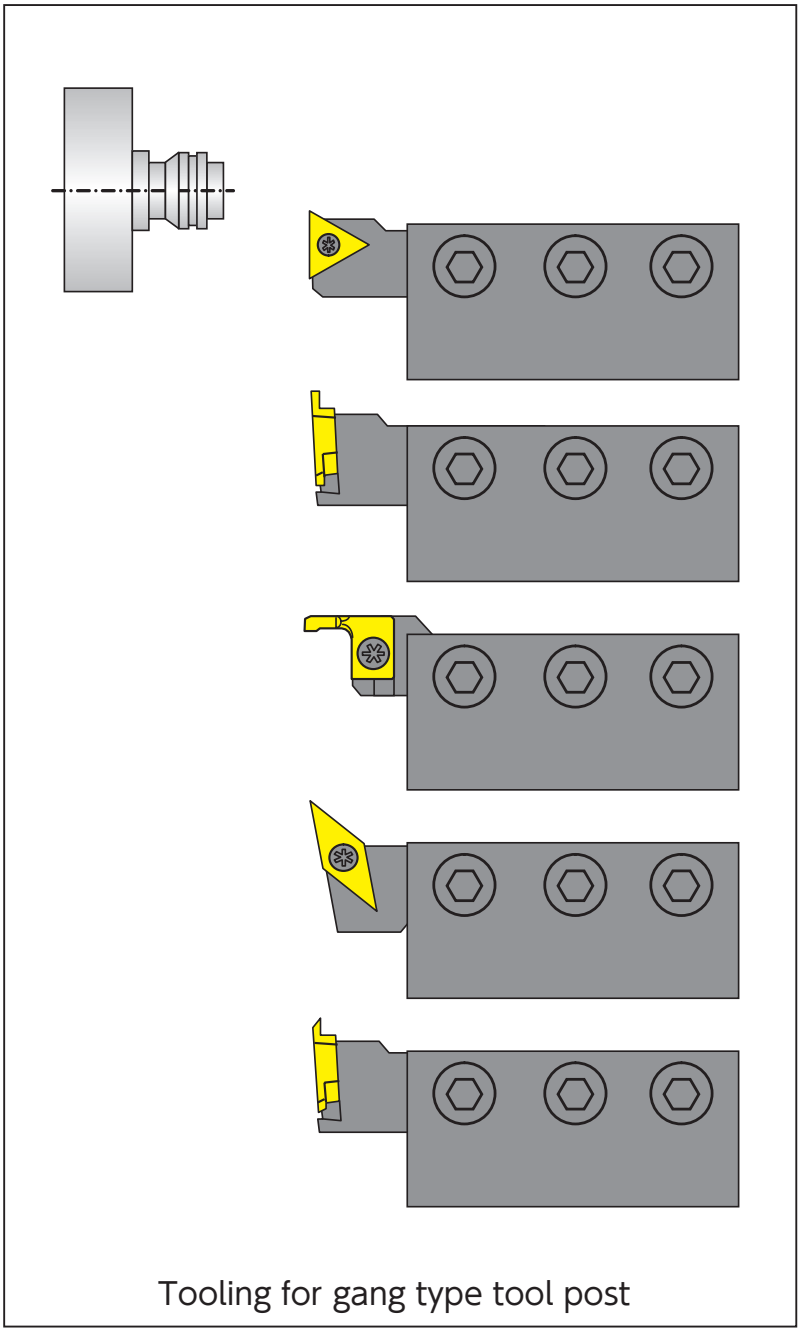


CH-GTTL ➡I9～

■Boring



CH-LBML ➡L6～



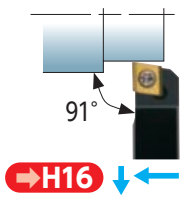
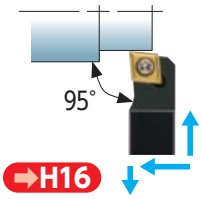
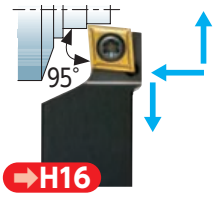
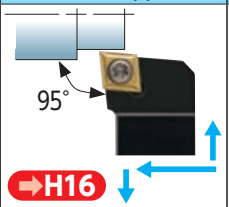
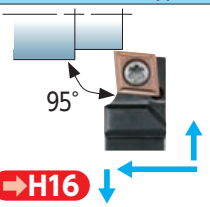
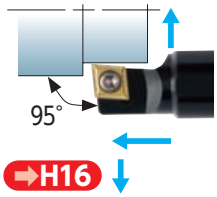
Tooling for gang type tool post

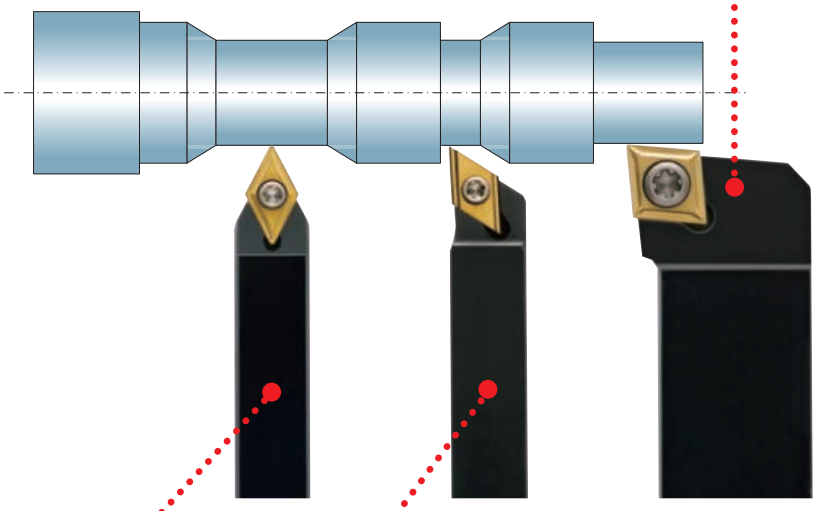
MEMO

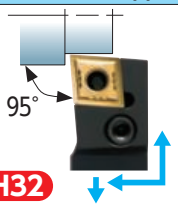
SS Tools
for Front Turning

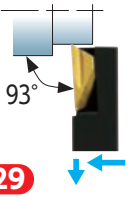
- Selection guide for front turning tools ···· H6
- Guidance for Front Turning ·· H9
- List of front turning holders and applicable inserts ···· H14

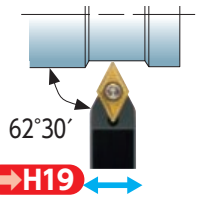
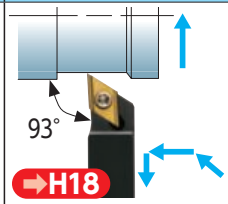
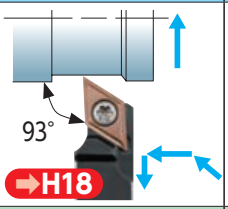
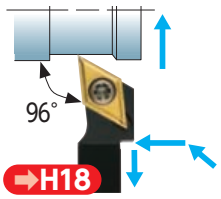
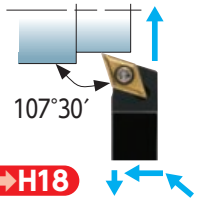
NTK SS Tools Selection guide for front turning tools

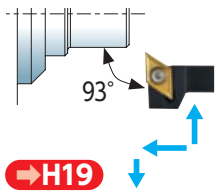
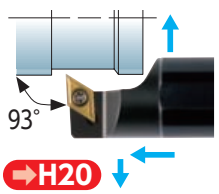
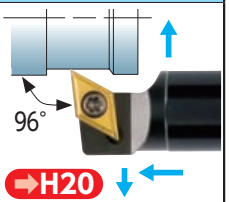
SCAC-N type	SCLC-N type	SCLC-N-F type	SCLC type	NEW SCLC-OH type	DS-SCLL type
					
➡H16	➡H16	➡H16	➡H16	➡H16	➡H16
Applicable insert : CC□□	Applicable insert : CC□□	Applicable insert : CC□□	Applicable insert : CC□□	Applicable insert : CC□□	Applicable insert : CC□□
Shank size : □8 ~□12	Shank size : □8 ~□16	Shank size : □10 ~□12	Shank size : □20	Shank size : □10 ~□16	Shank dia. : ϕ14 ~ϕ25.4
				SPLASH BAR	Center height adjustable··· ➡H13,17

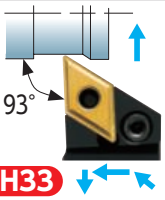


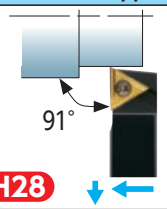
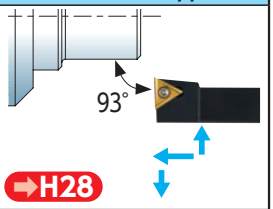
PCLN (-N) type

➡H32
Applicable insert : CN□□
Shank size : □16

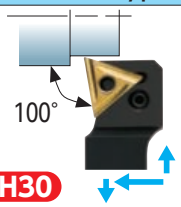
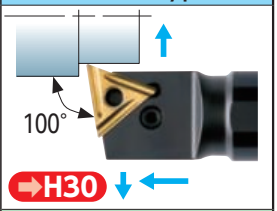
TFT type

➡H29
Applicable insert : TF33
Shank size : □10 ~□20

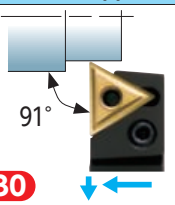
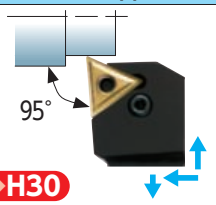
SDNC type	SDJC (-N) type	NEW SDJC-OH type	SDJC-N-F type	SDXC-N type	SDQC type
					
➡H19	➡H18	➡H18	➡H18	➡H18	➡H18
Applicable insert : DC□□	Applicable insert : DC□□	Applicable insert : DC□□	Applicable insert : DC□□	Applicable insert : DC□□	Applicable insert : DC□□
Shank size : □8 ~□20	Shank size : □8 ~□20	Shank size : □10 ~□16	Shank size : □10 ~□12	Shank size : □10 ~□16	Shank size : □10 ~□20
For Y-axis type··· ➡H21	For Y-axis type··· ➡H20	SPLASH BAR			

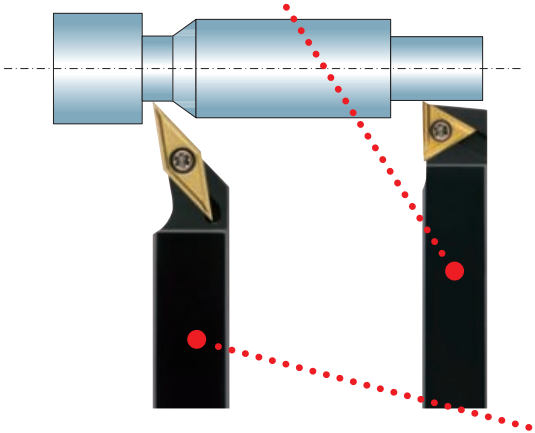
CH-SDUC type	DS-SDU type	DS-SDX type
		
➡H19	➡H20	➡H20
Applicable insert : DC□□	Applicable insert : DC□□	Applicable insert : DC□□
Shank size : □10 ~□12	Shank dia. : ϕ14 ~ϕ25.4	Shank dia. : ϕ19.05 ~ϕ25
	Center height adjustable··· ➡H13,21	

PDJN (-N) type

➡H33
Applicable insert : DN□□
Shank size : □16 ~□25

STAC-N type	CH-STUC type
 ➡H28	 ➡H28
Applicable insert : TC□□	Applicable insert : TC□□
Shank size : □8 ~□12	Shank size : □10 ~□12

PTXN-N type	DS-PTX type
 ➡H30	 ➡H30
Applicable insert : TN□□16	Applicable insert : TN□□16
Shank size : □10 ~□20	Shank dia. : ϕ19.05 ~ϕ25.4
	Center height adjustable··· ➡H13,30

PTAN-N type	PTLN type
 ➡H30	 ➡H30
Applicable insert : TN□□16	Applicable insert : TN□□16
Shank size : □16	Shank size : □20



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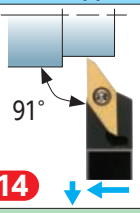
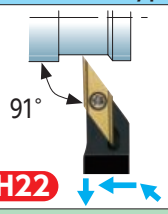
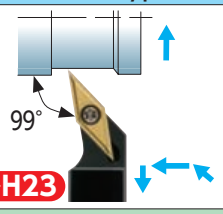
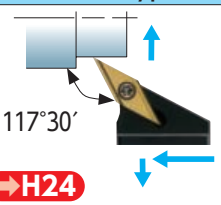
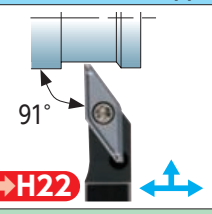
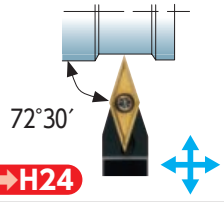
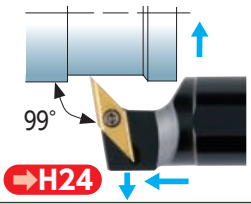
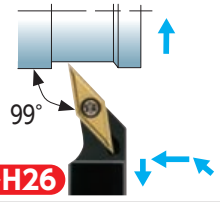
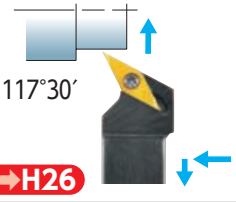
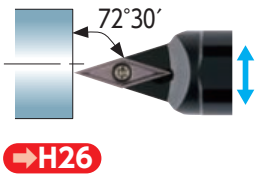
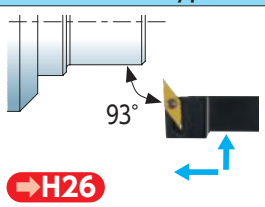
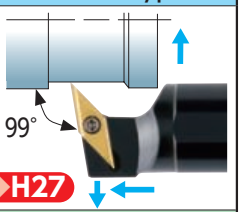
 ➡H14
Applicable insert : CSV□
Shank size : □7 ~□12

SVAC (-N) type	SVJC-N type	SVXC-N type	SVQC type
 ➡H22	➡H23	 ➡H23	 ➡H24
Applicable insert : VC□□	Applicable insert : VC□□	Applicable insert : VC□□	Applicable insert : VC□□
Shank size : □10 ~□20	Shank size : □10 ~□16	Shank size : □10 ~□12	Shank size : □20

SVAC (-N) W type
 ➡H22
Applicable insert : VCGT13
Shank size : □10 ~□20

SVVC-N type	DS-SVX type	SVXP-N type	SVQP-N type
 ➡H24	 ➡H24	 ➡H26	 ➡H26
Applicable insert : VC□□	Applicable insert : VC□□	Applicable insert : VP□□	Applicable insert : VP□□
Shank size : □10 ~□20	Shank dia. : ϕ14 ~ϕ25.4	Shank size : □10 ~□12	Shank size : □10 ~□16

DS-SVVP type	CH-SVUP type	DS-SVXP type
 ➡H26	 ➡H26	 ➡H27
Applicable insert : VP□□	Applicable insert : VP□□	Applicable insert : VP□□
Shank dia. : ϕ16.0 ~ϕ25.4	Shank size : □10 ~□12	Shank dia. : ϕ19.05 ~ϕ25.4
Center height adjustable··· ➡H13,26		

Front Turning Tools Recommended Insert Grade and Cutting Conditions

Work Material		Free cutting Steels	Carbon Steels	Alloy Steels	Free cutting Steels Stainless
JIS Common Grade		SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F
Insert Grade	First Choice	DM4 DT4	DT4 QM3		DT4
	Second Choice	VM1 ZM3	VM1 C7Z		TM4 ZM3
Cutting Speed v_c (m/min)		50 100 200	Carbide 50 90 150 C7Z 120 150 250		50 90 180
Recommended chipbreaker feed speed f (mm/rev)	Precise Finishing	KHG UHG	AMX KHG		
		0.02 0.03 0.05	0.01 0.03 0.04		
	Finishing	YL AM3 AZ7 ZR S	YL AM3 AZ7 ZR CL UL		
		0.03 0.05 0.08	0.02 0.05 0.08		
	Middle Cutting	YL AM3 ZR UL S	YL AM3 CL Z5 ZP		
		0.04 0.08 0.12	0.03 0.06 0.10		

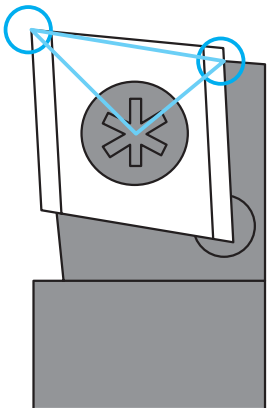
Work Material		Hard-to-cut Stainless steels	Titanium(Alloy)	Aluminum Alloy
JIS Common Grade		SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	First Choice	DM4 QM3	DT4	PD1
	Second Choice	DT4 TM4	TM4	KM1
Cutting Speed v_c (m/min)		40 70 100	50 70 100	PD1 100 200 350 KM1 50 100 200
Recommended chipbreaker feed speed f (mm/rev)	Precise Finishing	AMX KHG		CL U/U1
		0.01 0.02 0.03		0.02 0.03 0.05
	Finishing	YL AT CL S		CL U/U1 without chipbraker
		0.02 0.04 0.06		0.03 0.06 0.08
	Middle Cutting	YL CL S		CL U/U1 without chipbraker
		0.03 0.05 0.08		0.04 0.08 0.12

※Please refer to Technical Information **Q52** for detailed recommendation.

Guidance for front turning

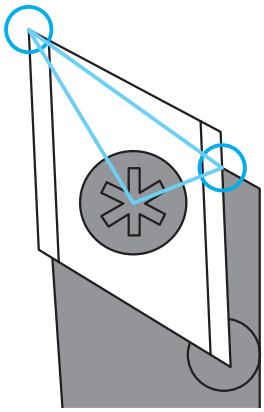
Selecting the insert shape based on the clamping force

CC type 80°



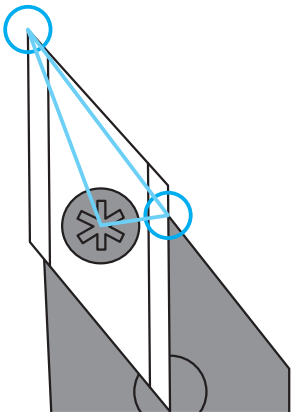
The insert is held securely as clamping/retaining area occurs close to the cutting edge.

DC type 55°



The clamoing strength is slightly lower because the cutting point is further from the clamping/retaining area than that of the C type.

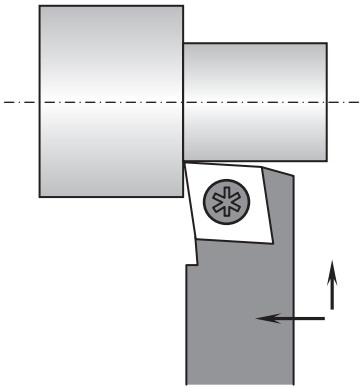
VC type 35°



The insert may tend to move when under large cutting forces as the cutting point is quite distant from the clamping/retaining area.

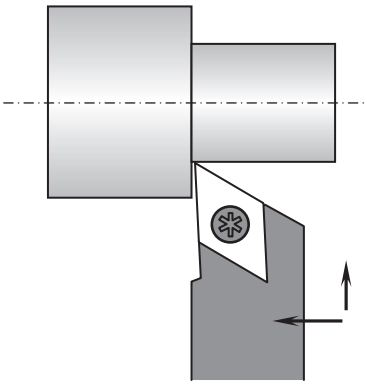
Selecting the insert shape based on dimensional accuracy and chip control

SCLCR ➡H16



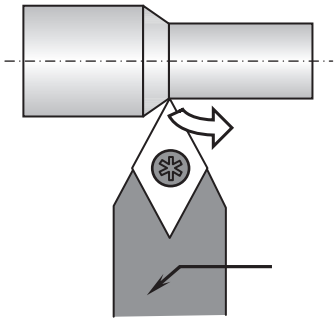
With the insert firmly clamped, the dimensional accuracy is excellent.

SDJCR ➡H18



With clearance for the chip flow, finished surfaces are not damaged , Also, coolant is supplied evenly to allow easy chip control.

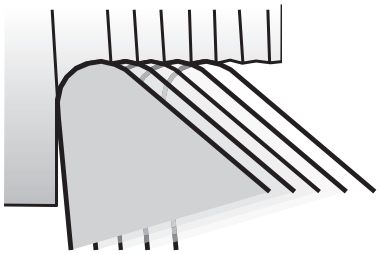
SDNCN ➡H19



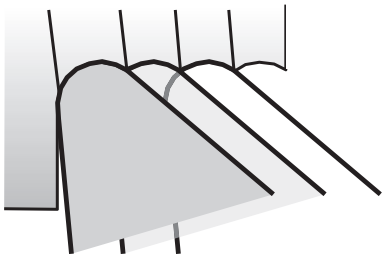
The chips flow away from the work piece reducing trapping of chips around the tool or work piece.

SS Tools for Front Turning

Surface roughness obtained from front turning

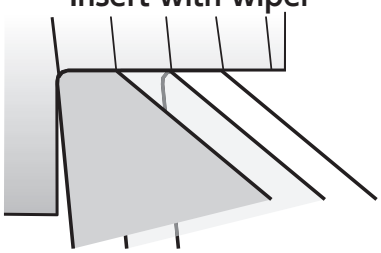


If the feed rate is lowered in order to maintain a certain surface finish, the chip control may become less well controlled in addition wear may increase and cycle time lengthened.



Increased feed rates may well have a positive effect on chip control but this must be balanced with the surface finish required.

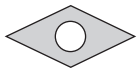
Insert with wiper



Inserts with a wiper facet the possibility of obtaining much improved surface finish while retaining good chip control.

Wiper Insert Range

TFD ➡F40



Applicable holder: SDJC type

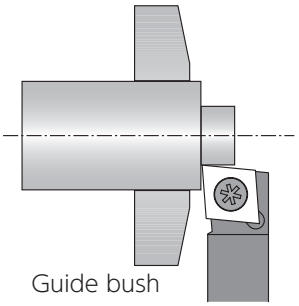
TFT ➡F46

Applicable holder: STAC type

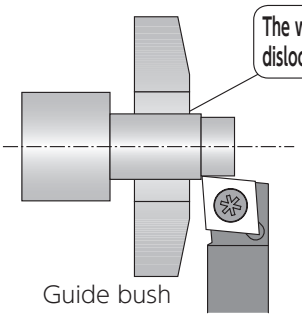
TFV ➡F49

Applicable holder: SVAC type

Roughing and finishing on an automatic lathe

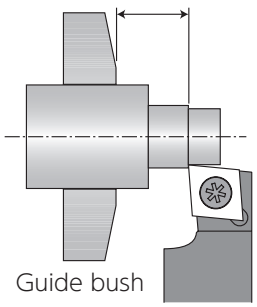


Usually roughing and finishing are carried out in a single pass on an automatic lathe.



When the distance to be cut is relatively long, roughing and finishing is not appropriate. But using our shift holder or drill sleeve holder makes the roughing and finishing operations possible in a single pass.

●Shift holder



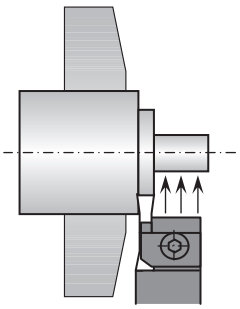
A holder with the cutting point shifted allows the work piece to be retained in the guide bush, meaning the component can be finish machined.

Chip control is improved by the easy access of coolant.

SCLC-N-F type ➡H16

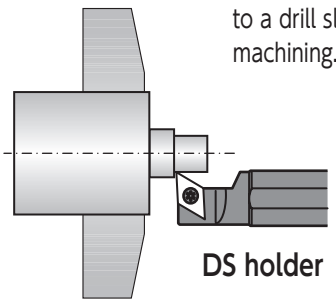
SDJC-N-F type ➡H18

●Combination of a grooving tool and DS holder



Rough grooving with a grooving holder mounted on a gang-type tool post makes chip control easier.

GTWP holder
➡I24



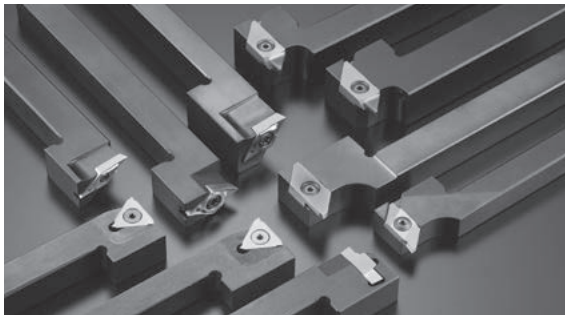
A front turning holder installed to a drill sleeve allows for finish machining.

DS holder

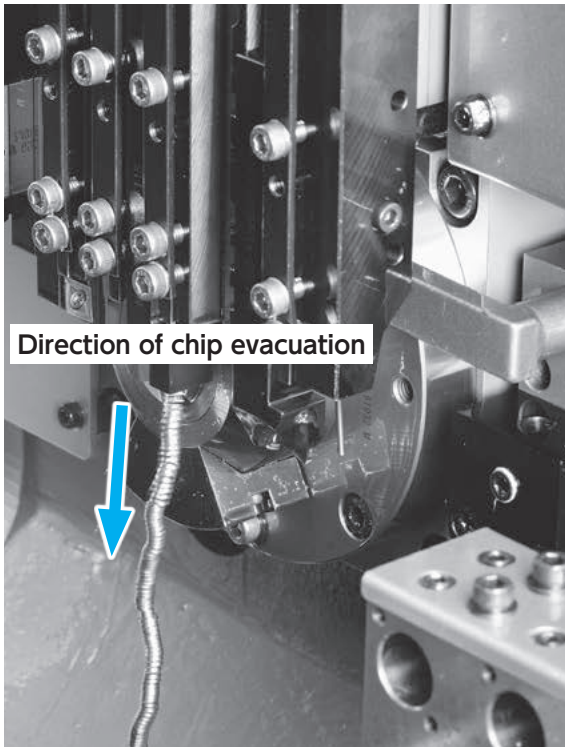
➡H13 ➡H24
➡H16 ➡H26
➡H17 ➡H27
➡H20 ➡H30

To solve chip control problems for automatic CNC lathes with a gang type tool post

Chip control by using Y-axis holders

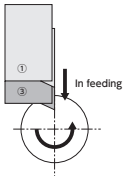


"Tool holders by utilizing the tool change control axis (Y-axis) of automatic CNC lathes with a gang type tool post.
Solves chip control problems by gravity evacuation."



Machining concept

Standard machining

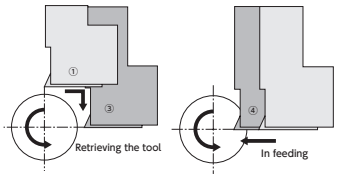


Programming example

①T300 ···Calling the tool
②G0 X11.0 Z0 T3 ···Positioning the tool
③G1 X8.0 F0.08 ···Cutting depth: 8.0 mm
⑤Z5.0 F0.05 ···Cutting length: 5.0 mm
⑥X11.0
⑦G0 X11.0

Generally, for OD machining, the tool is called and positioned before the system starts the cutting operation. The direction of cut along the work diameter is the "X axis".

Machining with Y-axis holders



Programming example

①T300 ···Calling the tool
②G0 Y11.0 T3
③X0 ···Positioning the tool
④G1 Y8.0 F0.08 ···Cutting depth: 8.0 mm
⑤Z5.0 F0.05 ···Cutting length: 5.0 mm
⑥Y11.0
⑦G0 X11.0

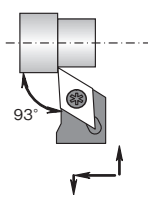
With a Y-axis holder, the tool is called for position (1). Then, at position (3) for the system to start the cutting operation. The tool start cutting from this position. The direction of cut along the work diameter is the "Y axis".

Note) In the actual programme, it is necessary to compensate for the tool length □ for the Y axis either with the tool data or on the program.

Lineup

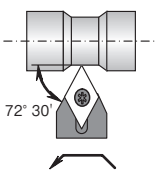
Front turning

Y-SDJC type
Y-SDJC-OH type



➡H20

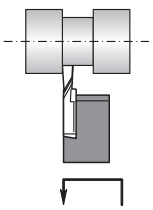
Y-SDNC type



➡H21

Multi-functional

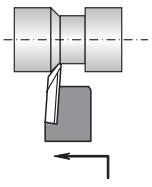
Y-GTPA type
Y-GTPA-OH type



➡I27

Back turning

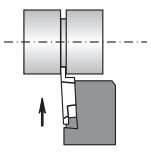
Y-TBPR type
Y-TBPR-OH type



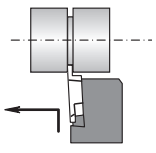
➡H42

Grooving/Back turning

Y-GTTR type
Y-GTTR-OH type



Back turning also possible by mounting a TBMH insert



➡H52

※Before using Y-axis holders, please read and understand "Important notes for using Y-axis holders" on page H88.
※When impossible to install Y-axis holder, use of DS holders or holders for gang type tool post (CH-type) is recommended.

DS Holders with adjustable center height

WATCH ON YouTube

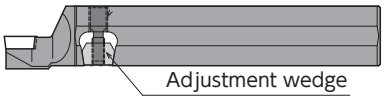
Features

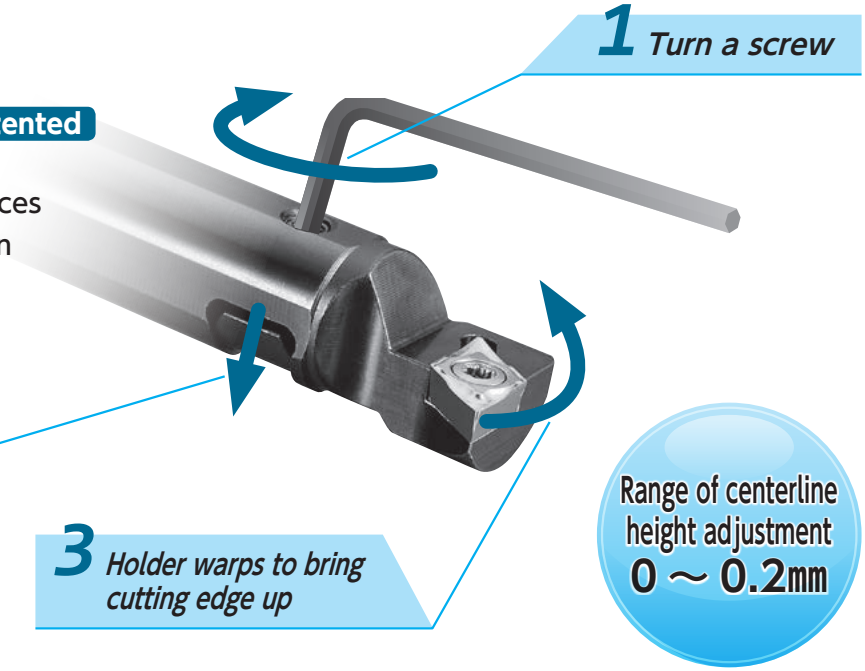
Adjustment of center height is simple with a wrench.
Setting time is reduced.

1 Adjust centerline height easily

Patented

Eliminate center boss on end faces
Provides constant OD dimension
Adjust easily in machine





Range of centerline height adjustment
0 ~ 0.2mm

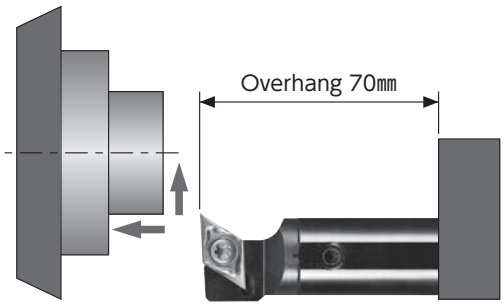
2 Optimized design reduces vibration

Improved chatter resistance.

DS-ACH type	Conventional type
Excellent surface	chatter

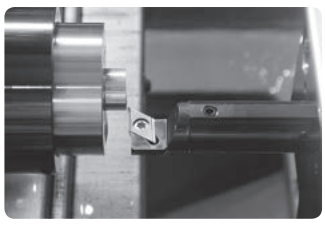
SUS304

Work material : SUS304
Holder : DS-SDUL19-11-ACH
Insert : TM4 DCGT11T302MCL
Cutting conditio : v_c=75 m/min、 f =0.05 mm/rev、a_p=2.0 mm

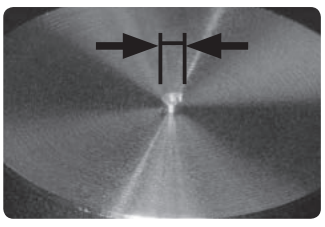


How to use

*For center height adjustment only.(Loosen wedge screw before making any adjustment.)

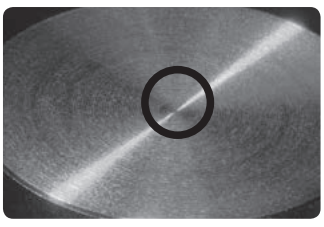


Install the holder slightly below centerline and take a facing test cut loosen the clamping wedge



Measure the diameter of the center boss

Raise the center height by the radius of the boss.
Adjustment references are available in the tool case

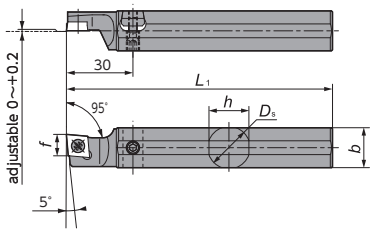


Re-machine the end face

Check if further adjustment is required

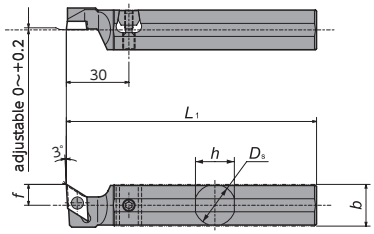
※Adjustment instructions are supplied in the tool case

DS-SCL-ACH type



Code No.	Toolholder Part No.	Stock	Dimensions (mm)					Applicable insert
		L	D_s	h	b	L_1	f	
5833694	**DS-SCLL16F-09-ACH**	●	16.00	15.5	15.5	80	6.0	CC□□09T3
5833702	**DS-SCLL19-09-ACH**	●	19.05	18.0	18.0	120		
5833710	**DS-SCLL20-09-ACH**	●	20.00	19.0	19.0			
5833728	**DS-SCLL22-09-ACH**	●	22.00	21.0	21.0			
5833736	**DS-SCLL25-09-ACH**	●	25.40	24.0	24.0	150		

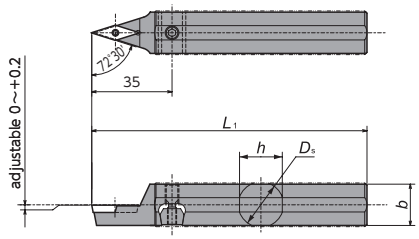
DS-SDU-ACH type



●Left-hand type shown.
Note) Use a R-hand or neutral type insert.

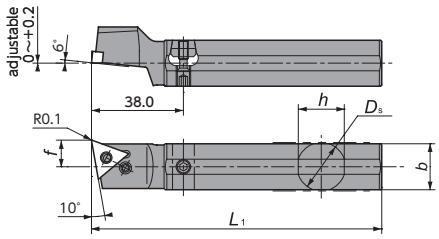
Code No.	Toolholder Part No.	Stock	Dimensions (mm)					Applicable insert
		L	D_s	h	b	L_1	f	
5805635	**DS-SDUL16F-11-ACH**	●	16.00	15.5	15.5	80	10	DC□□11T3 TFD11
5805627	**DS-SDUL19-11-ACH**	●	19.05	18.0	18.0	120		
5799614	**DS-SDUL20-11-ACH**	●	20.00	19.0	19.0			
5799622	**DS-SDUL22-11-ACH**	●	22.00	21.0	21.0			
5799648	**DS-SDUL25-11-ACH**	●	25.40	24.0	24.0	150		

DS-SVVP-ACH type



Code No.	Toolholder Part No.	Stock	Dimensions (mm)					Applicable insert
			D_s	h	b	L_1	f	
5805643	**DS-SVVPN16-11-ACH**	●	16.00	15.5	15.5	120	—	VP□□1103
5799655	**DS-SVVPN19-11-ACH**	●	19.05	18.0	18.0			
5799663	**DS-SVVPN20-11-ACH**	●	20.00	19.0	19.0			
5799671	**DS-SVVPN22-11-ACH**	●	22.00	21.0	21.0			
5807524	**DS-SVVPN25-11-ACH**	●	25.40	24.0	24.0	150		

DS-PTX-ACH type



●Left-hand type shown.
Note) Use a R-hand or neutral type insert.

Code No.	Toolholder Part No.	Stock	Dimensions (mm)					Applicable insert
		L	D_s	h	b	L_1	f	
5805650	**DS-PTXL16-33-ACH**	●	16.00	15.5	15.5	120	11	TN□□1604
5799689	**DS-PTXL19-33-ACH**	●	19.05	18.0	18.0			
5799697	**DS-PTXL20-33-ACH**	●	20.00	19.0	19.0			
5799705	**DS-PTXL22-33-ACH**	●	22.00	21.0	21.0		12	
5799713	**DS-PTXL25-33-ACH**	●	25.40	24.0	24.0	150	13	

CSV type

For radial type tool post

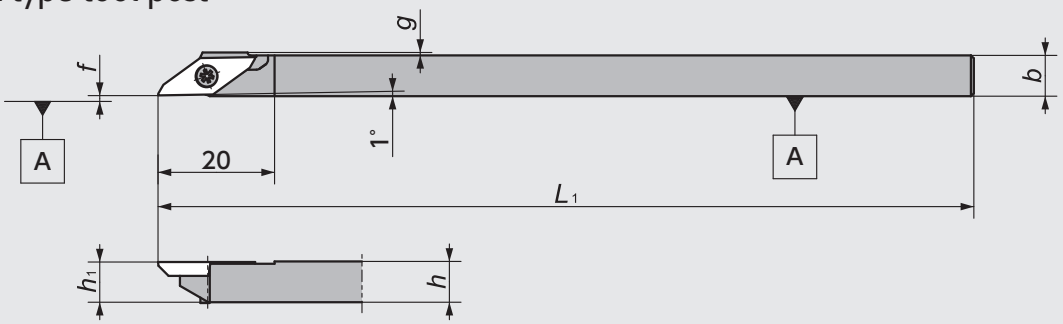


Figure-1

●Right-hand type shown.

CSV-NC/CSV-NC-F type

For gang type tool post

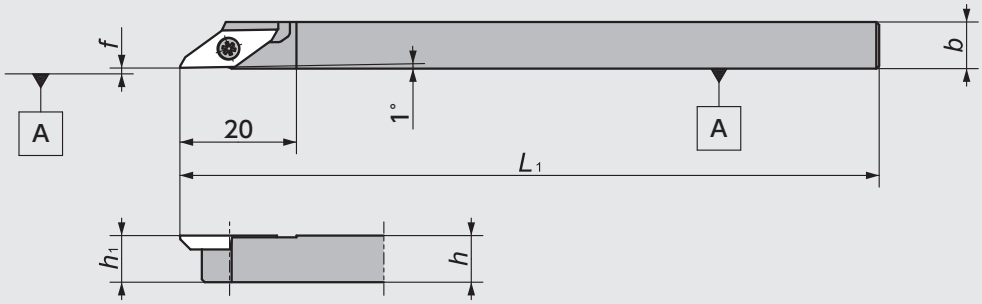


Figure-2

●Right-hand type shown.
●The tool offset of the CSVR/L08NC-F is small.

☆CSV toolholder is interchangeable tool. All CSV type inserts can be used (back turning, grooving, threading) on the same holder. (H80-83 for more information)

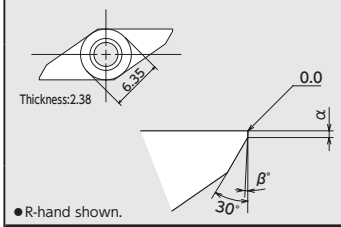
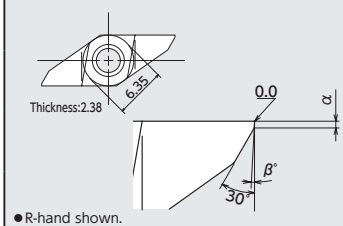
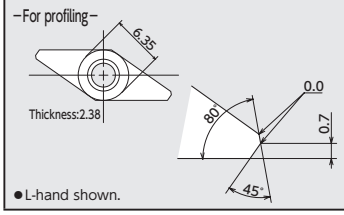
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	g	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5492962		CSV[R/L]07GX	●		7	7	85	7	0.1	0.5	CSVF (See the table below)	LRIS-2.5*7	CLR-15S
	5303169	5303193	07	●	●			140						
	5492954		08GX	●		8	8	85	8		0.0			
	5303151	5303201	08	●	●			140						
	5303136		095	●		9.5	9.5	140	9.5					
	5303144	5303177	10	●	●	10	10		10					
	5474770		12GX	●		12	12	85	12					
	5327929		12	●				140						
Figure-2	5514062	5514070	CSV[R/L]08NC	●	●	8	8	120	8	0.1	—	CSVF (See the table below)	LRIS-2.5*7	CLR-15S
	5789615		08NC-F	●						0.0 ~ 0.1				
	5563010		10GXNC	●		10	10	85	10	0.1				
	5477492	5477542	10NC	●	●			120						
	5477534	5477500	12NC	●	●	12	12		12					

Applicable inserts

CSVF type

Mirror finish

Shape	Part No.	Chip-breaker	Dimensions (mm) Max. machining depth	Dimensions (mm) Cutting edge (α×β°)	PVD-coated micro-grain carbides ZM3 R	ZM3 Stock	ZM3 L	ZM3 Stock	VM1 R	VM1 Stock	VM1 L	VM1 Stock	DT4 R	DT4 Stock
	CSVF11F[R/L]V	None	—	0.3×5°					5303516	●	5303557	●		
	11F[R/L]V-A			0.3×2°					5358858	●				
	11F[R/L]V-M			0.15×2°	5436019	●			5386248	●	5386255	●	5850235 NEW	●
	11F[R/L]V-C			0.15×5°					5358577	●				
	CSVF11F[R/L]VB	Provided	3.00	0.3×5°					5313168	●	5313150	●		
	11F[R/L]VB-A			0.3×2°					5358692	●				
	11F[R/L]VB-M			0.15×2°	5436001	●			5386263	●	5386271	●	5850243 NEW	●
	11F[R/L]VB-C			0.15×5°					5358700	●				
	CSVF11F[R/L]VX	None	—								5358866	●		

※Each angle shown indicates the value when the insert is set into the holder.

SCAC-N type

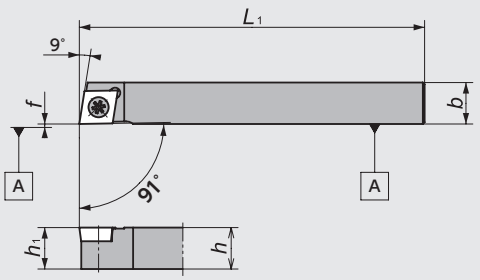
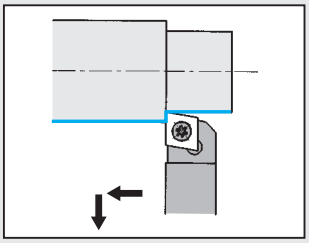


Figure-1



●Right-hand type shown.

SCLC-N type

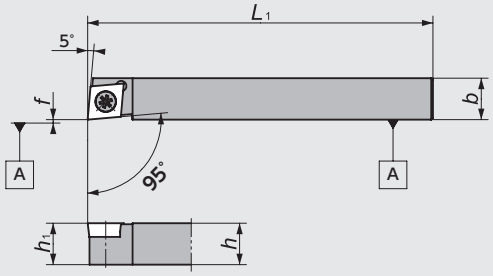
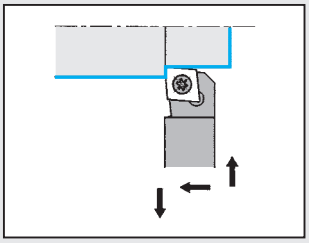


Figure-2



●Right-hand type shown.

SCLC-N-F type

Shift holder

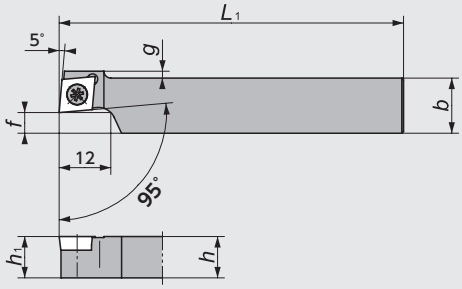
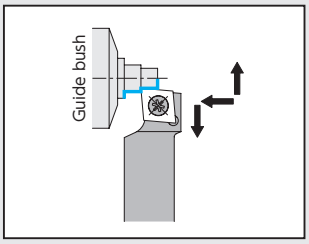


Figure-3



●Right-hand type shown.

SCLC type

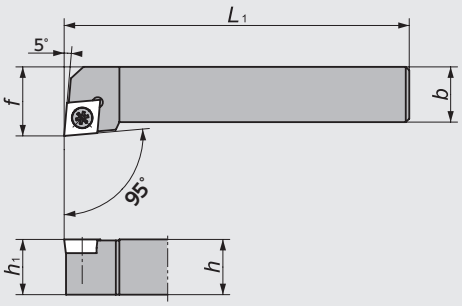
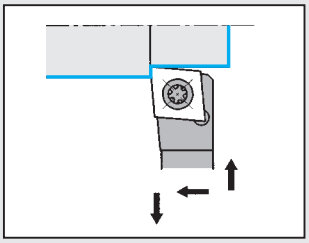


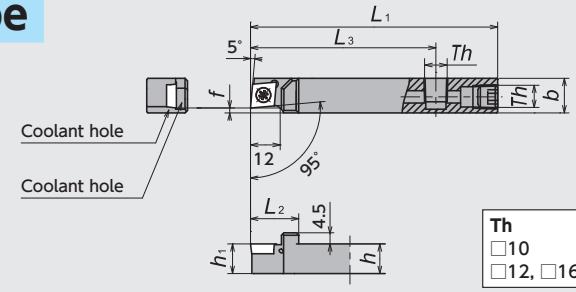
Figure-4



●Right-hand type shown.

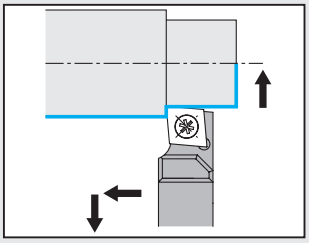
SCLC-OH type

SPLASH BAR NEW



Th	
□10	: M6×1
□12, □16	: Rc1/8 (PT1/8)

Figure-5



●Right-hand type shown.

DS-SCL type

DS holder

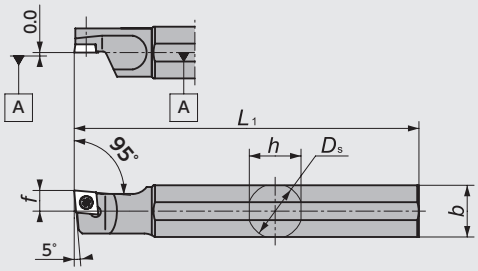
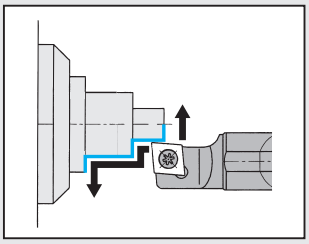


Figure-6



●Left-hand type shown.
Note) Use a R-hand or neutral type insert.

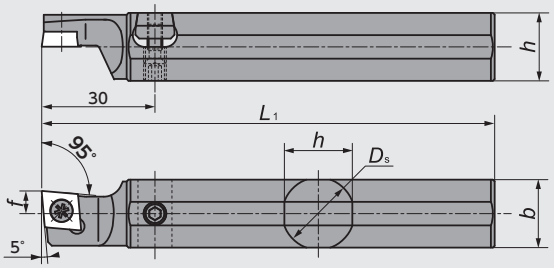
DS-SCLL-ACH type

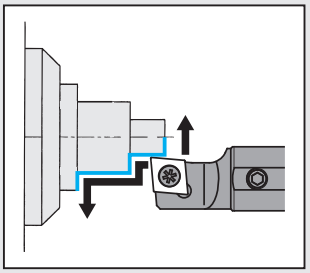
DS holder with adjustable centerline height

〈Parts〉

Shank	Wedge	screw for wedge
ϕ16	ACH-W18 (5805601)	WS060415-003 (5795539)
ϕ19.05		
ϕ20		WS060419-004 (5799226)
ϕ22		
ϕ25.4	ACH-W24 (5805619)	

Figure-7





●Left-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Ds	h	b	L1	h1	f	h2	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5137013	5137922	SCAC[R/L]0808X06N	●	●	–	8	8	120	8	0.0	–	CC□□0602 F20•33~35	LRIS-2.5*7	CLR-15S (A)
	5119060	5137914	1010X06N	●	●		10	10	120	10					
	5459847		1212GX09N	●			12	12	85	12			CC□□09T3 F20•33~35	LRIS-4*10	LLR-25S (B)
	5137088	5137906	1212X09N	●	●		12	12	120	12					
Figure-2	5137021	5137898	SCLC[R/L]0808X06N	●	●	–	8	8	120	8	0.0	–	CC□□0602 F20•33~35	LRIS-2.5*7	CLR-15S (A)
	5122171	5137880	1010X06N	●	●		10	10	120	10					
	5873872		1010H09N	●			10	10	100	10			CC□□09T3 F20•33~35	LRIS-4*10	LLR-25S (B)
	5152889	5152897	1010X09N	●	●		10	10	120	10					
	5459839	5459821	1212GX09N	●	●		12	12	85	12					
	5137039	5137872	1212X09N	●	●		12	12	120	12					
	5191200	5191218	1616X09N	●	●		16	16	120	16					
Figure-3	5700240	5700257	SCLC[R/L]1015X09N-F05	●	■	–	10	15	120	10	5	2	CC□□09T3 F20•33~35	LRIS-4*10	LLR-25S (B)
	5700265	5700273	1020X09N-F10	●	■		10	20	120	10	10	2			
	5700364	5700372	1218X09N-F06	●	■		12	18	120	12	6	0			
	5700380	5700398	1224X09N-F12	●	■		12	24	120	12	12	0			
Figure-4	5744719	5884911	SCLC[R/L]20-X09	●	●	–	20	20	120	20	24.0	–	CC□□09T3 F20•33~35	LRIS-4*10	LLR-25S (B)
NEW Figure-5	5905740		SCLC[R/L]1014F09N-F02OH	●		–	10	14	80	10	2	–	CC□□09T3 F20•33~35	LRIS-4*10	LLR-25S (B)
	5905732		SCLC[R/L]1214H09N-F02OH	●			12	14	100	12	2	–			
	5905658		SCLC[R/L]1616H09N-F02OH	●			16	16	100	16	2	–			
Figure-6		5602636	DS-SCL[R/L]14F-06		●	14.000	13	13	80	–	6.0	–	CC□□0602 F20•33~35	LRIS-2.5*7	CLR-15S (A)
		5486923	15H-06		●	15.875	15	15	100						
		5601703	16F-06※		●	16.000			80						
		5338876	19-06		●	19.050	18	18	120						
		5520630	20X-06		●	20.000	19	19	95						
		5388608	20-06		●				120						
		5484936	22-06		●	22.000	21	21							
		5520689	25-06MET		●	25.000	24	24							
		5486691	25-06		●	25.400			150						
		5601729	14F-09		●	14.000	13	13	80				CC□□09T3 F20•33~35	LRIS-4*8	LLR-25S -20*65 (B)
		5486931	15H-09		●	15.875	15	15	100						
		5601711	16F-09※		●	16.000			80						
		5563168	19GX-09		●	19.050	18	18	85						
		5338884	19-09		●	19.050			120						
		5520655	20X-09		●	20.000	19	19	95						
		5374699	20-09		●				120						
		5401096	22-09		●	22.000	21	21							
		5520671	25-09MET		●	25.000	24	24							
		5486709	25-09		●	25.400			150						
Figure-7		5833694	DS-SCL[R/L]16F-09-ACH※		●	16.00	15.5	15.5	80	–	6.0	–	CC□□09T3 F20•33~35	LRIS-4*8	LLR-25S -20*65 (B)
		5833702	19-09-ACH		●	19.05	18.0	18.0	120						
		5833710	20-09-ACH		●	20.00	19.0	19.0							
		5833728	22-09-ACH		●	22.00	21.0	21.0							
		5833736	25-09-ACH		●	25.40	24.0	24.0	150						

※Please select ϕ16 shank holder When using DS-Sleeve. Details of DS-Sleeve ➔ H91

SDJC-N/SDJC type

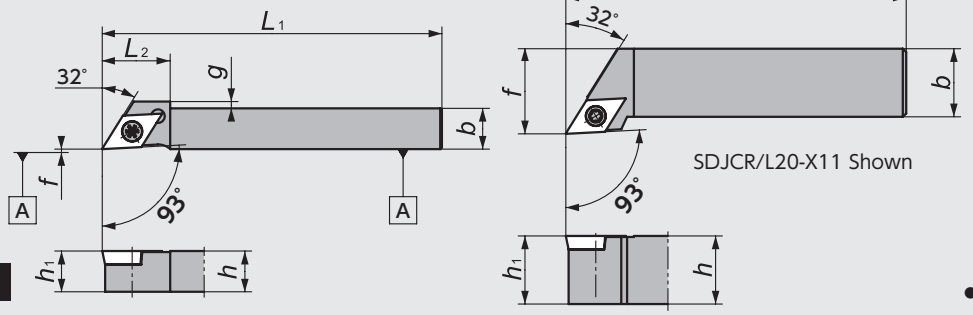
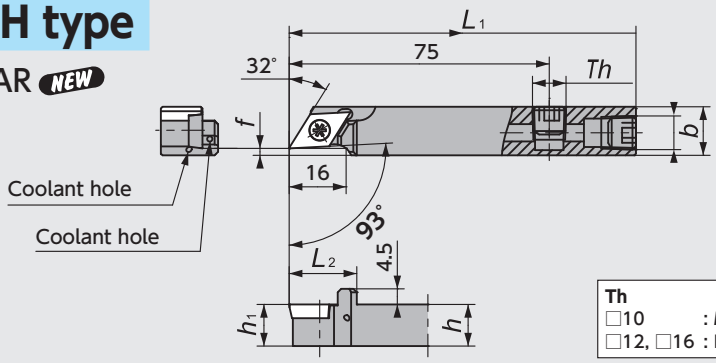


Figure-1

●Right-hand type shown.

SDJC-OH type

SPLASH BAR NEW



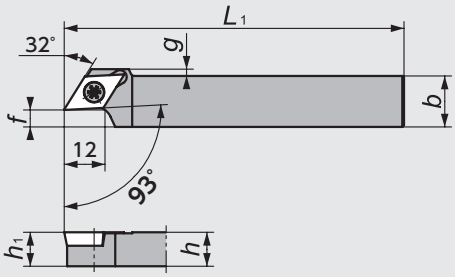
Th
□10 : M6×1
□12, □16 : Rc1/8 (PT1/8)

Figure-2

●Right-hand type shown.

SDJC-N-F type

Shift holder



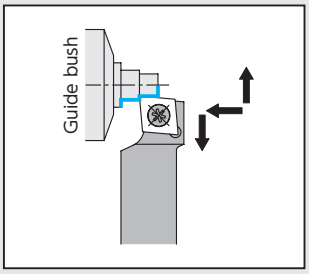


Figure-3

●Right-hand type shown.

SDXC-N type

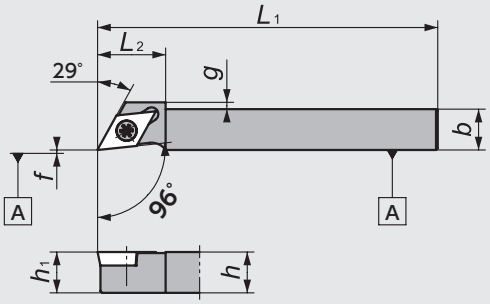


Figure-4

●Right-hand type shown.

SDQC type

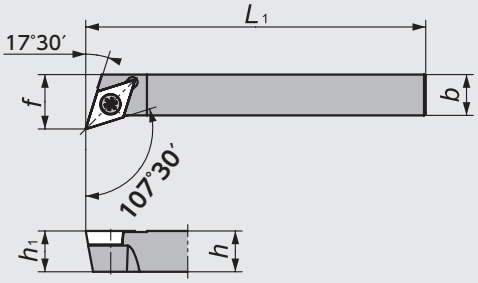
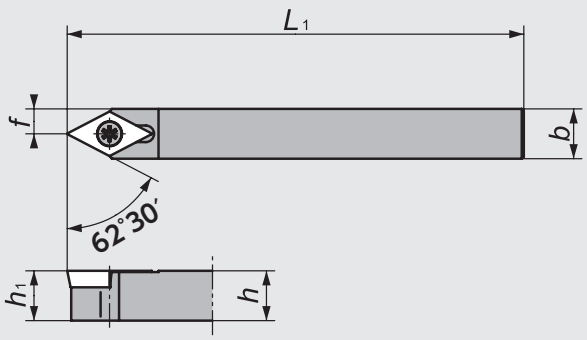


Figure-5

●Right-hand type shown.

SDNC type



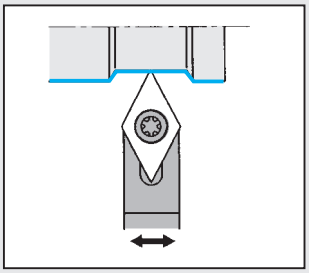
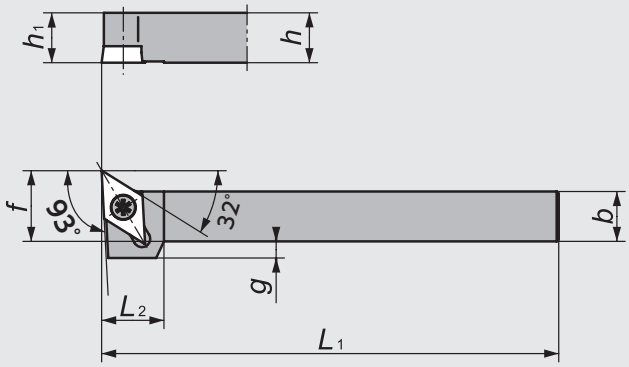


Figure-6

CH-SDUC type

For opposed gang tool post



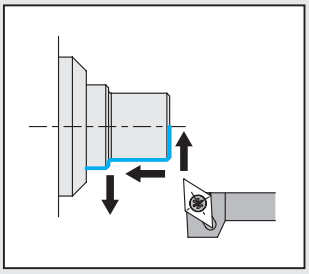
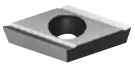
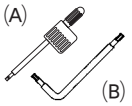


Figure-7

●Left-hand type shown.

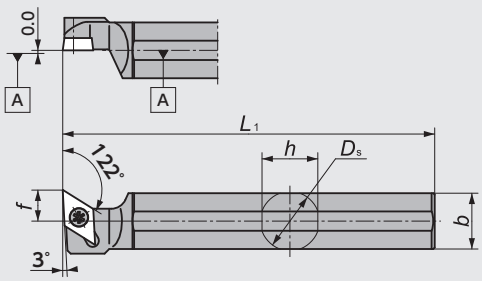
Holder dimensions

Shape	Code No. R (N)	Code No. L (N)	Toolholder Part No.	Stock R (N)	Stock L (N)	h	b	L_1	h_1	f	L_2	g	Applicable insert	Parts: Clamping screw	Parts: Wrench
															 (A) (B)
Figure-1	5137047	5137864	SDJC[R/L]0808X07N	●	●	8	8	120	8	0	–	0	DC□□□0702 **F21・37～39** TFD07 **F40**	LRIS-2.5*7	CLR-15S (A)
	5502125		1010GX07N	●		10	10	85	10						
	5120464	5137856	1010X07N	●	●			120							
NEW	5873880		1010H11N	●				100			19	2	DC□□□11T3 **F21・37～39** TFD11 **F40**	LRIS-4*10	LLR-25S (B)
	5152863	5153234	1010X11N	●	●			120							
	5122155		1210X11N	●			12				–	0			
	5459813	5473681	1212GX11N	●	●			85							
	5593215		1216GX11N	●		12	16		12						
	5122163	5137849	1212X11N	●	●		12	120							
	5180583	5180609	1616X11N	●	●	16	16		16						
	5744743	5852793	20-X11	●	●	20	20		20	25.0		–			
NEW	5903208		SDJC[R/L]1014F11N-F02OH	●		10	14	80	10						
Figure-2	5886254		1214H11N-F02OH※	●		12		100	12	2	19.5	–	DC□□□11T3 **F21・37～39** TFD11 **F40**	LRIS-4*10	LLR-25S (B)
NEW	5903216		1616H11N-F02OH	●		16	16		10						
	5700588	5700570	SDJC[R/L]1015X07N-F05	●	■	10	15	120	10	5	–	0	DC□□□0702 **F21・37～39** TFD07 **F40**	LRIS-2.5*7	CLR-15S (A)
	5700562	5700554	1020X07N-F10	●	■		20			10					
Figure-3	5700547	5700539	1015X11N-F05	●	■		15			5	19	2	DC□□□11T3 **F21・37～39** TFD11 **F40**	LRIS-4*10	LLR-25S (B)
	5700521	5700513	1020X11N-F10	●	■		20			10					
	5700505	5700497	1218X11N-F06	●	■	12	18		12	6	–	0			
	5700471	5700463	1224X11N-F12	●	■		24			12					
	5525449		SDXC[R/L]1010X11N	●		10	10	120	10	0	20	3	DC□□□11T3 **F21・37～39**	LRIS-4*10	LLR-25S (B)
	5553169		1016X11N	●			16				–	0			
Figure-4	5525456		1212X11N	●		12	12		12		20	1			
	5553177		1216X11N	●			16				–	0			
	5525464		1616X11N	●		16			16						
	5743711	5743752	SDQC[R/L]10-X07	●	●	10	10	120	10	12	–	–	DC□□□0702 **F21・37～39**	LRIS-2.5*7	CLR-15S (A)
Figure-5	5743729	5743760	12-X11	●	●	12	12		12	16			DC□□□11T3 **F21・37～39**	LRIS-4*10	LLR-25S (B)
	5743737	5747332	16-X11	●	●	16	16		16	20					
	5743745		20-X11	●		20	20		20	25					
	5742184		SDNCN08-X07	●		8	8	120	8	4	–	–	DC□□□0702 **F21・37～39**	LRIS-2.5*7	CLR-15S (A)
	5742192		N10-X07	●		10	10		10	5					
Figure-6	5742200		N12-X11	●		12	12		12	6			DC□□□11T3 **F21・37～39**	LRIS-4*10	LLR-25S (B)
	5742218		N16-X11	●		16	16		16	8					
	5742226		N20-X11	●		20	20		20	10					
Figure-7		5659222	CH-SDUC[R/L]1010H11		●	10	10	100	10	15	15	6	DC□□□11T3 **F21・37～39**	LRIS-4*10PW	CLR-15S (A)
		5659230	1212H11		●	12	12		12	17		4			

※For details of SPLASH BAR "**SDJCR1214H11N-F02OH**", please refer to page **A14**

DS-SDU type

DS holder



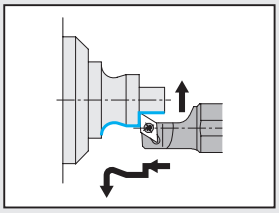


Figure-1

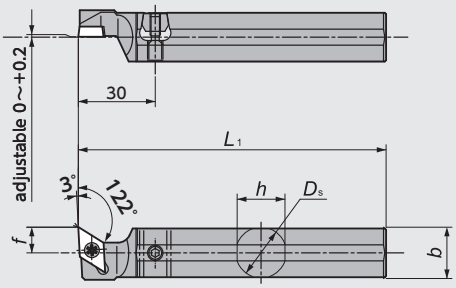
☆Use a R-hand or neutral type insert.
●Left-hand type shown.

DS-SDU-ACH type

DS holder with adjustable centerline height

〈Parts〉

shank	wedge	screw for wedge
ϕ16	ACH-W18 (5805601)	WS060415-003 (5795539)
ϕ19.05		
ϕ20		WS060419-004 (5799226)
ϕ22		
ϕ25.4	ACH-W24 (5805619)	



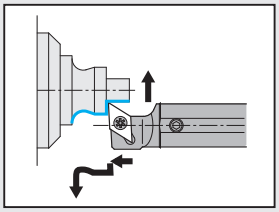
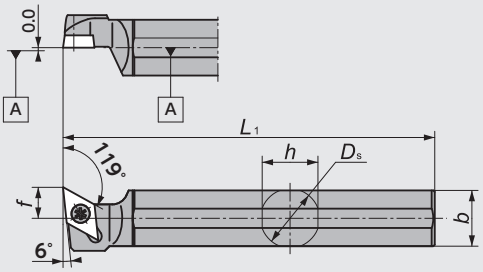


Figure-2

☆Use a R-hand or neutral type insert.
●Left-hand type shown.

DS-SDX type

DS holder



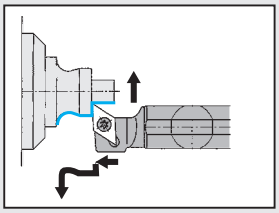
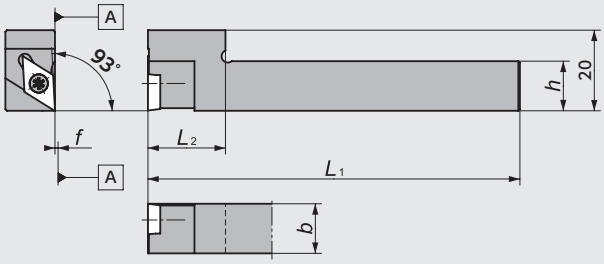


Figure-3

☆Use a R-hand or neutral type insert.
●Left-hand type shown.

Y-SDJC type

Y-axis holder



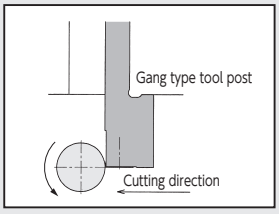
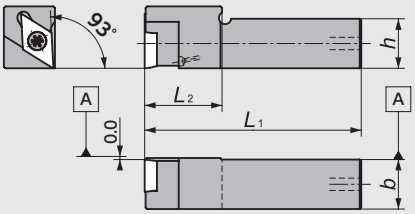


Figure-4

☆Use a R-hand insert for R-hand holder.
●Right-hand type shown.

Y-SDJC-OH type

For high-pressure coolant Y-axis



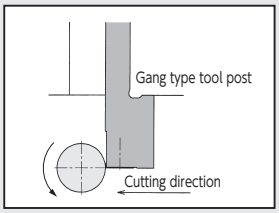
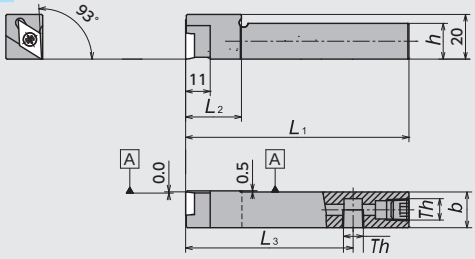


Figure-5

●Right-hand type shown.

Y-SDJC-OH type

SPLASH BAR NEW



Th
□12, □16 : Rc1/8 (PT1/8)

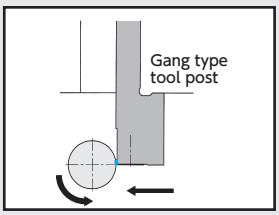


Figure-6

☆Use a R-hand insert for R-hand holder.
●Right-hand type shown.

Y-SDNC type

Y-axis holder

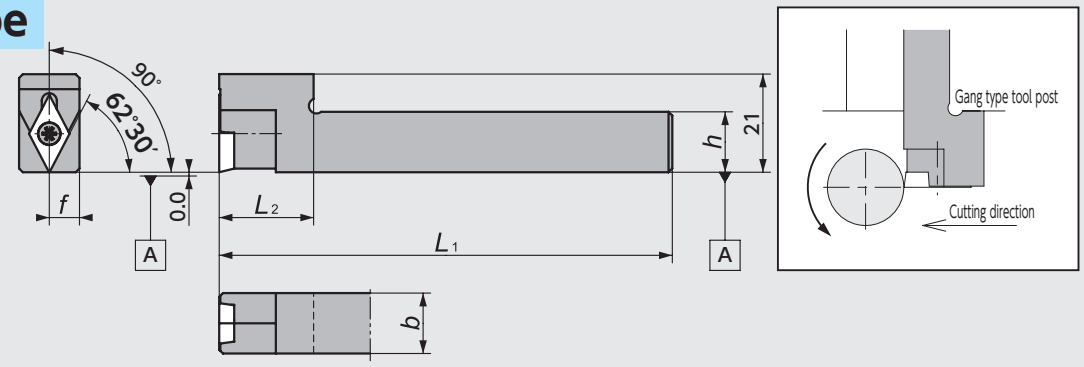
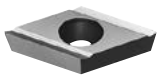
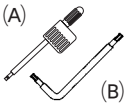


Figure-7

Holder dimensions

Shape	Code No. R (N)	Code No. L (N)	Toolholder Part No.	Stock R (N)	Stock L (N)	D_s	h	b	L_1	h_1	f	L_2	Applicable insert	Parts: Clamping screw	Parts: Wrench
															 (A) (B)
Figure-1		5348545	DS-SDUR/L14F-07		●	14.000	13.0	13	80	–	6.0	–	DC□□0702 **F21・37～39** TFD07□ **F40**	LRIS-2.5*7	CLR-15S (A)
		5348107	15H-07		●	15.875	15.0	15	100						
		5520598	16F-07※		●	16.000			80						
		5341516	16X-07※		●				95						
		5278247	19-07		●	19.050	18.0	18	120						
		5520606	20X-07		●	20.000	19.0	19	95						
		5278239	20-07		●				120						
		5330758	22-07		●	22.000	21.0	21							
		5601745	14F-11		●	14.000	13.0	13	80		10.0		DC□□11T3 **F21・37～39** TFD11□ **F40**	LRIS-4*10	LLR-25S -20*65 (B)
		5601737	16F-11※		●	16.000	15.0	15							
		5278262	19-11		●	19.050	18.0	18	120						
		5572730	19-11SPL		●				160		11.0				
		5520614	20X-11		●	20.000	19.0	19	95		10.0				
		5278254	20-11		●				120						
		5324025	22-11		●	22.000	21.0	21							
		5638606	23-11-007		★	23.000	22.0	22	70						
		5483417	25-11MET		●	25.000	24.0	24	120						
		5317136	25-11		●	25.400			150						
		5713581	25-11SPL		●	25.400					12.5				
Figure-2		5805635	DS-SDUR/L16F-11-ACH※		●	16.000	15.5	15	80	–	10.0	–	DC□□11T3 **F21・37～39** TFD11□ **F40**	LRIS-4*10	LLR-25S -20*65 (B)
		5805627	19-11-ACH		●	19.050	18.0	18	120						
		5799614	20-11-ACH		●	20.000	19.0	19							
		5799622	22-11-ACH		●	22.000	21.0	21							
		5799648	25-11-ACH		●	25.400	24.0	24	150						
Figure-3		5462429	DS-SDXR/L19-11		●	19.050	18.0	18	120	–	10.0	–	DC□□11T3 **F21・37～39**	LRIS-4*10	LLR-25S (B)
		5520622	20X-11		●	20.000	19.0	19	95						
		5462437	20-11		●				120						
		5520697	25-11MET		●	25.000	24.0	24							
Figure-4	5371646		Y-SDJCR/L10-07S	●		–	10.0	10	120	–	0.0	20	DC□□0702 **F21・37～39** TFD07 **F40**	LRIS-2.5*7	CLR-15S (A)
	5371661		12-07S	●			12.0	12							
	5926001		10-11S	●			10.0	10							
	5600671		12-11S	●			12.0	16					DC□□11T3 **F21・37～39** TFD07 **F40**	LRIS-4*10	LLR-25S -20*65 (B)
	5890025		16-11S	●			16.0								
	5358437		Y-SDJCR10-07	■			10.0	10				25	DC□□0702 **F21・37～39** TFD07 **F40**	LRIS-2.5*7	CLR-15S (A)
	5358429		12-07	■			12.0	12							
	5371653		10-07L	■			10.0	10				30			
	5371679		12-07L	■			12.0	12							
	5377742		10-11L	■			10.0	16					DC□□11T3 **F21・37～39** TFD07 **F40**	LRIS-4*10	LLR-25S-20*65 (B)
	5926001		10-11S	●			10.0	16				20			
Figure-5	5699970		Y-SDJCR/L12-11SOH	■		–	12.0	12	70	–	–	20	DC□□11T3 **F21・37～39** TFD11 **F40**	LRIS-4*10	LLR-25S -20*65 (B)
	5699988		16-11OH	■			16.0	16				25			
Figure-6	5910575		Y-SDJCR/L1212H11S-OH	●		–	12	12	100	–	–	20	DC□□11T3 **F21・37～39** TFD11 **F40**	LRIS-4*8	LLR-25S
	5910583		1616H11-OH	●		–	16	16				25			
Figure-7	5479191		Y-SDNCN12-11S		●	–	12.0	12	120	–	6.0	20	DC□□11T3 **F21・37～39**	LRIS-4*10	LLR-25S-20*65 (B)
	5485875		N16-11S		●		16.0	16			8.0				

※Please select ϕ16 shank holder When using DS-Sleeve. Details of DS-Sleeve ➔ H91

For TFD-type, insert with wiper facet at the cutting edge, please refer to page F40

SVAC-N type

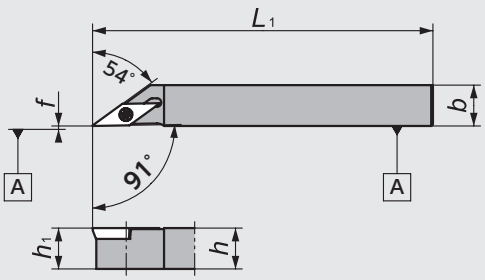
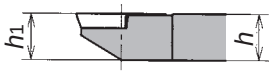


Figure-1



SVACR1010X11N is also available for automatic lathes with a radial type tool post.

●Right-hand type shown.

SVAC-N-1L type

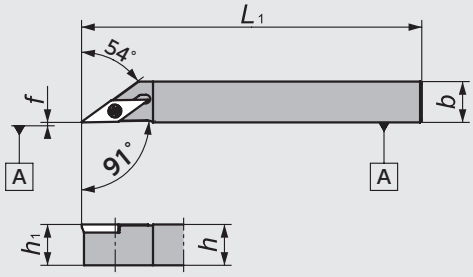
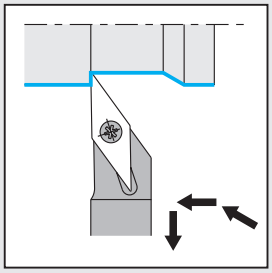


Figure-2



●Right-hand type shown.

SVAC-NW type

For double-edged cutting tool

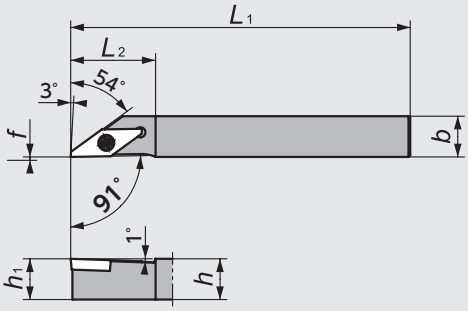
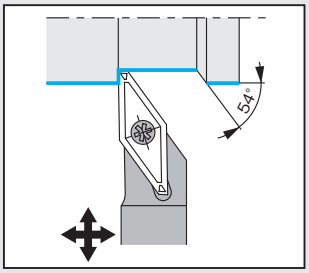


Figure-3



●Right-hand type shown.

SVAC type

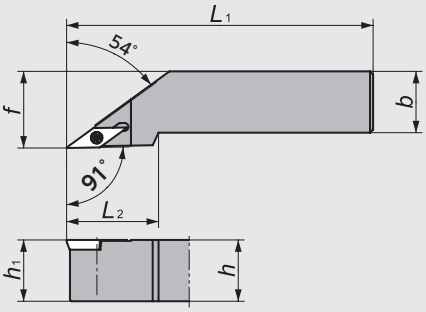
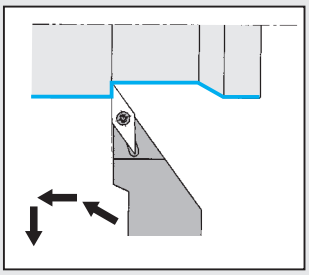


Figure-4



●Right-hand type shown.

SVAC-W type

For double-edged cutting tool

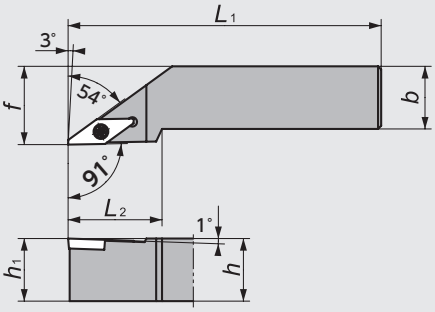
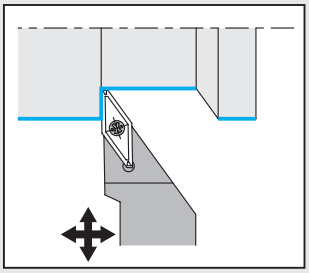


Figure-5



●Right-hand type shown.

SVJC-N type

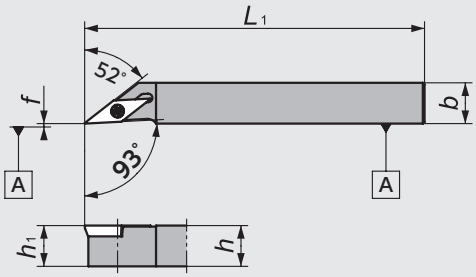
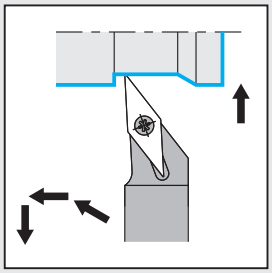


Figure-6



●Right-hand type shown.

SVXC-N type

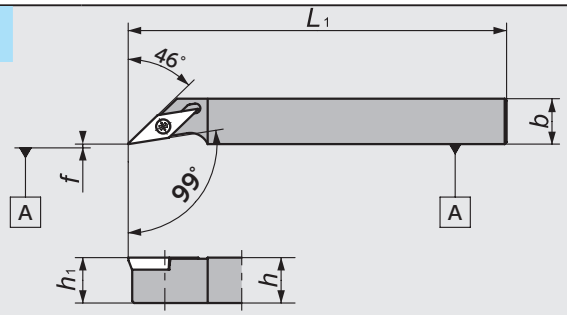
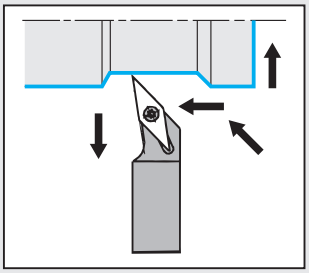


Figure-7



● Right-hand type shown.

Y-SVXCL type

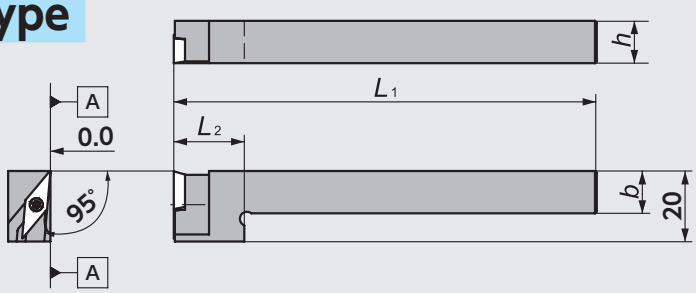
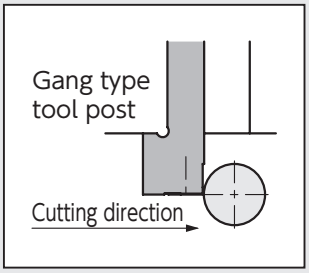


Figure-8



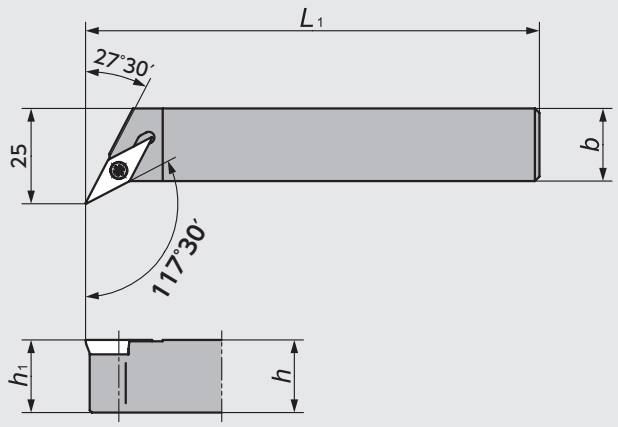
● Left-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5304043	5304092	SVAC□1010X11N	●	●	10	10	120	10	0.0	–	VC□□1103 **F23•47～48** TFV11 **F49**	LRIS-2.5*7	CLR-15S (A)
	5304050	5304076	1212X11N	●	●	12	12		12					
	5304068		1616X11N	●		16	16		16					
Figure-2	5473053	5473038	SVAC□1010X11N-1L	●	●	10	10	120	10	0.0	–	VCGT1102 **F47**	LRIS-2.5*7	CLR-15S (A)
	5473061	5473046	1212X11N-1L	●	●	12	12		12					
Figure-3	5401724	5401708	SVAC□1010L13NW	●	●	10	10	140	10	0.0	25	VCGT1303 **F47～48**	LRIS-3*8	RLR-20S (B)
	5401732	5401716	1212L13NW	●	●	12	12		12					
	5401740	5431077	1616M13NW	●	●	16	16		16					
Figure-4	5744768		SVAC□20-X11	●		20	20	120	20	25.0	30	VC□□1103 **F23•47～48** TFV11 **F49**	LRIS-2.5*7	CLR-15S (A)
Figure-5	5474549		SVAC□2020M13W	●		20	20	150	20	25.0	30	VCGT1303 **F47～48**	LRIS-3*8	RLR-20S (B)
Figure-6	5339940	5517750	SVJC□1010X11N	●	●	10	10	120	10	0.0	–	VC□□1103 **F23•47～48**	LRIS-2.5*7	CLR-15S (A)
	5339932	5517768	1212X11N	●	●	12	12		12					
	5339924	5517743	1616X11N	●	●	16	16		16					
Figure-7	5393731	5415815	SVXC□1210X11N	●	●	10	12	120	10	0.0	–		LRIS-2.5*7	CLR-15S (A)
	5393749		1212X11N	●		12			12					
Figure-8		5917182	Y-SVXCL12-11S		●	12	12	120	–	–	20	VC□□1103 **F23•47～48**	LRIS-2.5*7	CLR-15S (A)

■ For TFV-type, insert with wiper facet at the cutting edge, please refer to page F49

SVQC type



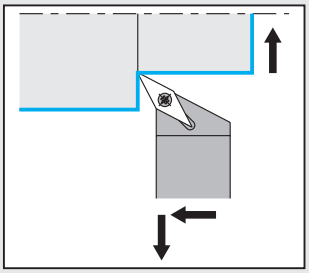
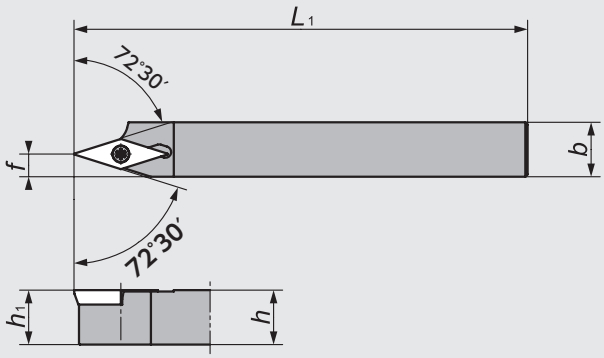


Figure-1

●Right-hand type shown.

SVVC-N type



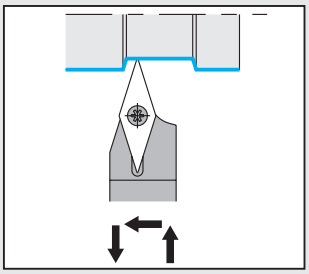
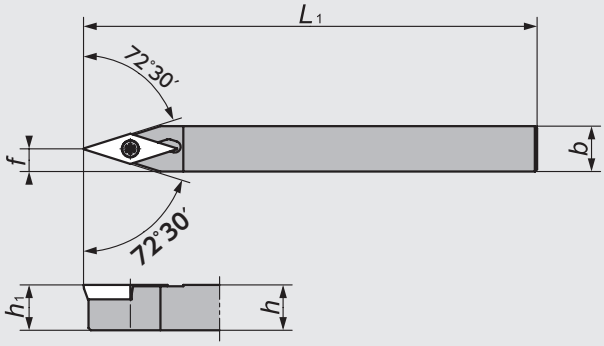


Figure-2

●Right-hand type shown.

SVVC-N type



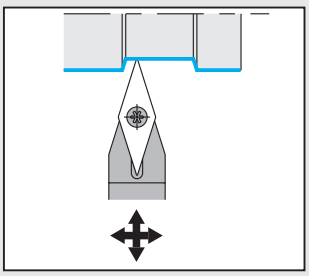
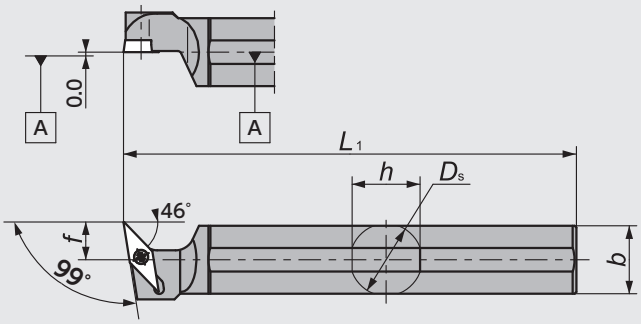


Figure-3

DS-SVX type

DS holder



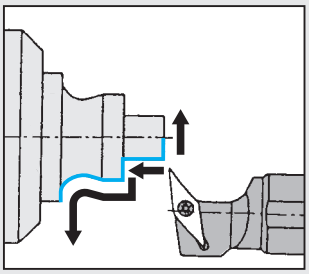


Figure-4

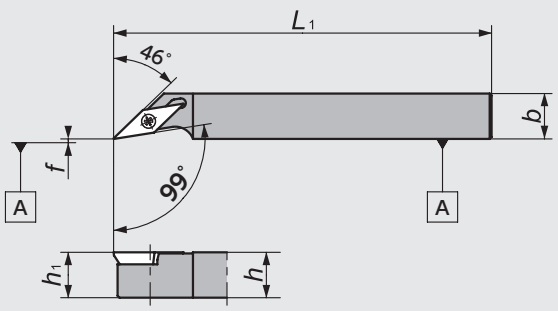
●Left-hand type shown.

Holder dimensions

Shape	Code No. R (N)	Code No. L (N)	Toolholder Part No.	Stock R (N)	Stock L (N)	D_s	h	b	L_1	h_1	f	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5744776		SVQC[R/L]20-X11	●		—	20	20	120	20	—	VC□□1103 **F47～48**	LRIS-2.5*7	CLR-15S
Figure-2	5523238		SVVC[R/L]1212X11N	●		—	12	12	120	12	5		LRIS-2.5*7	CLR-15S
	5523212		1616X11N	●			16	16		16				
Figure-3	5461835		SVVCN1010X11N	●		—	10	10	120	10	5		LRIS-2.5*7	CLR-15S
	5744792		N20-X11	●			20	20		20	10			
Figure-4		5601778	DS-SVX[R/L]14F-11		●	14.000	13	13	80	—	10.0		LRIS-2.5*7	CLR-15S
		5418413	15H-11		●	15.875	15	15	100					
		5601752	16F-11※		●	16.000			80					
		5393756	19-11		●	19.050	18	18	120					
		5572722	19-11SPL		●				160		11.0			
		5520663	20X-11		●	20.000	19	19	95		10.0			
		5393764	20-11		●				120					
		5486675	22-11		●	22.000	21	21						
		5486683	25-11		●	25.400	24	24	150					

※Please select φ16 shank holder When using DS-Sleeve. Details of DS-Sleeve ➔ H91

SVXP-N type



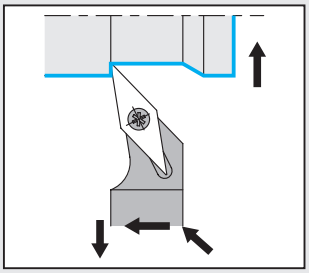
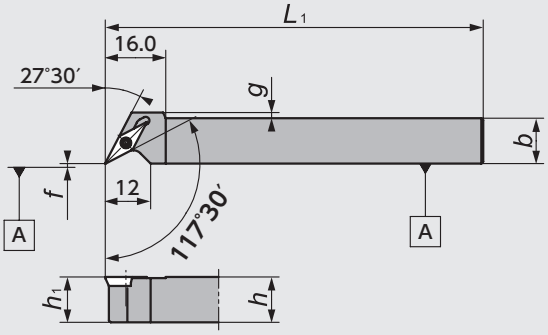


Figure-1

●Right-hand type shown.

SVQP-N type



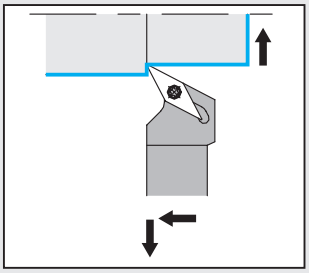
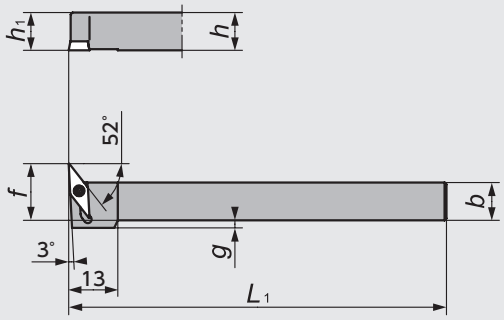


Figure-2

●Right-hand type shown.

CH-SVUP type

For opposed gang tool post



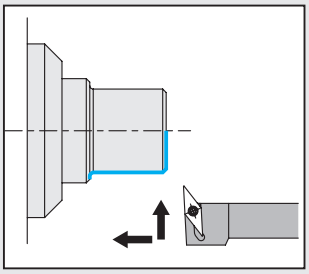
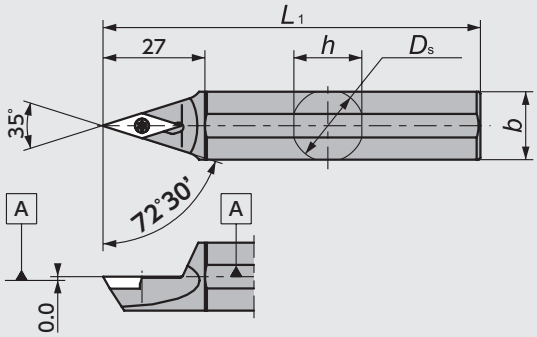


Figure-3

●Left-hand type shown.

DS-SVVP type

DS holder



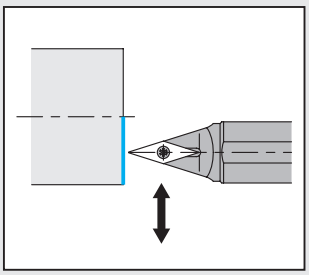


Figure-4

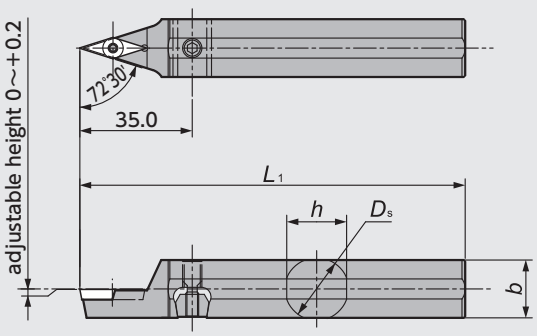
●Neutral type shown.

DS-SVVP-ACH type

DS holder with adjustable centerline height NEW

〈Parts〉

shank	wedge	screw for wedge
ϕ16	ACH-W18 (5805601)	WS060415-003 (5795539)
ϕ19.05		
ϕ20		WS060419-004 (5799226)
ϕ22		
ϕ25.4	ACH-W24 (5805619)	



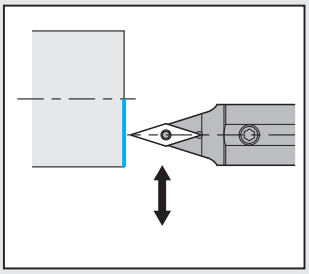
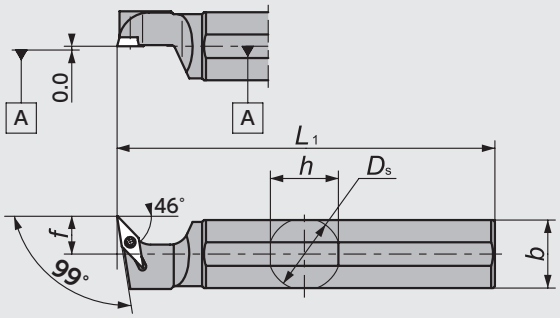


Figure-5

●Neutral type shown.

DS-SVXP type

DS holder



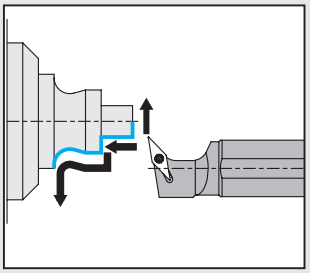


Figure-6

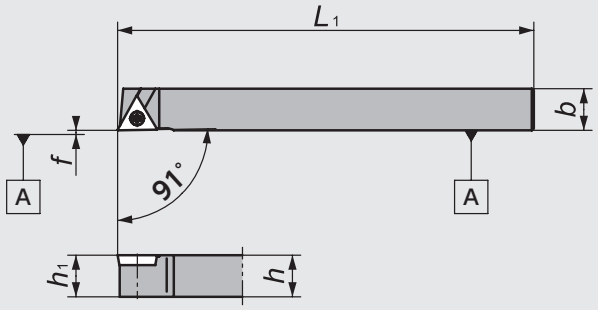
●Left-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	D_s	h	b	L_1	h_1	f	g	Applicable insert	Parts: Clamping screw	Parts: Wrench
				N	N	Dimensions (mm)									
Figure-1	5511506	5511514	**SVXP R/L 1012X11N**	●	●	—	10.0	12	120	10	0.0	—	VP□□1103 **F48**	LRIS-2.5*7	CLR-15S
	5511522	5511548	**1212X11N**	●	●		12.0			12					
Figure-2	5600622	5600614	**SVQP R/L 1010X08N**	●	●	—	10.0	10	120	10	0.0	3.5	VP□□0802 **F48**	LRIS-2*6	CLR-13S
	5600598	5600606	**1212X08N**	●	●		12.0	12				1.5			
	5600580	5600564	**1616X08N**	●	●		16.0	16				—			
Figure-3		5659206	**CH-SVUP R/L 1010H08**		●	—	10.0	10	100	10	15	2	VP□□0802 **F48**	LRIS-2*6	CLR-13S
		5659214	**1212H08**		●		12.0	12		12	17	0			
Figure-4	5511555		**DS-SVVPN19-11**		●	19.050	18.0	18	120	—	—	—	VP□□1103 **F48**	LRIS-2.5*7	CLR-15S
	5511563		**N22-11**		●	22.00	21.0	21							
Figure-5	NEW 5805643		**DS-SVVPN16-11-ACH※**		●	16.000	15.5	15	120	—	—	—	VP□□1103 **F48**	LRIS-2.5*7	CLR-15S
	NEW 5799655		**N19-11-ACH**		●	19.050	18.0	18							
	NEW 5799663		**N20-11-ACH**		●	20.000	19.0	19							
	NEW 5799671		**N22-11-ACH**		●	22.000	21.0	21							
	NEW 5807524		**N25-11-ACH**		●	25.400	24.0	24	150						
Figure-6		5534003	**DS-SVXP R/L 19-08**		●	19.050	18.0	18	120	—	10	—	VP□□0802 **F48**	LRIS-2*6	CLR-13S
		5534011	**20-08**		●	20.000	19.0	19							
		5600549	**22-08**		●	22.000	21.0	21							
		5533997	**25-08**		●	25.400	24.0	24	150						

※Please select φ16 shank holder When using DS-Sleeve. Details of DS-Sleeve ➔ H91

STAC-N type



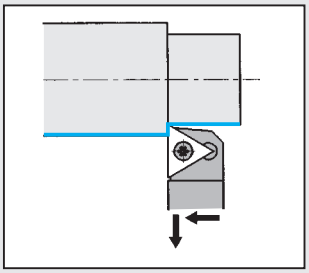
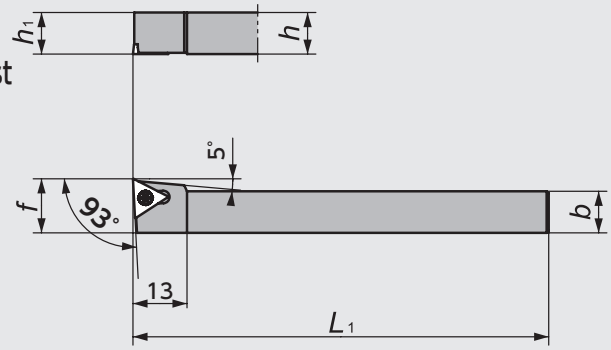


Figure-1

●Right-hand type shown.

CH-STUC type

For opposed gang tool post



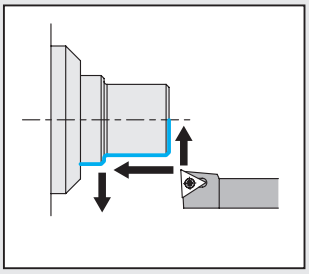


Figure-2

●Left-hand type shown.

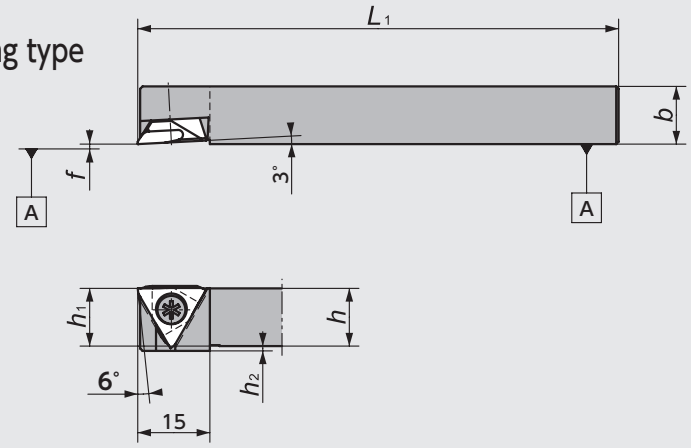
Holder dimensions

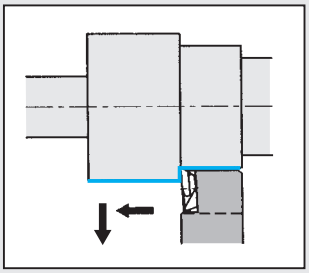
Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5137005	5137831	**STAC$^{R}_{L}$0808X09N**	●	■	8	8	120	8	0.0	TC□□0902 **F43~44** TFT09 **F46**	LR1S-2.2*6	CLR-13S
	5137096	5137948	**1010X09N**	●	●	10	10		10				
	5119078	5137930	**1212X11N**	●	●	12	12		12		TC□□1102 **F43~44** TFT11 **F46**	LR1S-2.5*7	CLR-15S
Figure-2		5659180	**CH-STUC$^{R}_{L}$1010H09**		●	10	10	100	10	13	TC□□0902 **F43~44**	LR1S-2.2*6	CLR-13S
		5659198	**1212H09**		●	12	12		12	15			

■For TFT-type, insert with wiper facet at the cutting edge, please refer to page F46

TFT type

Front/back clamping type





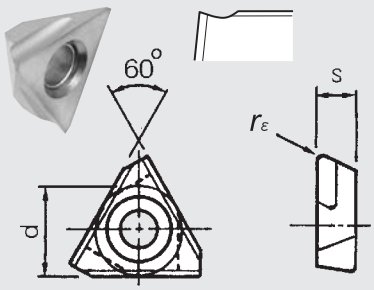
●Right-hand type shown.

Holder dimensions

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	h_2	Applicable insert	Parts: Clamping screw	Parts: Wrench
5196993		TFTR/L10	●		10	10	120	10	0.0	3	TF33 (See the table below)	LR-S-4*10PW	CLR-15S
5197025		12	●		12	12		12		1			
5205190		16	●		16	16		16		—			
5562723		20	●		20	20		20					

Holder dimensions

TF type

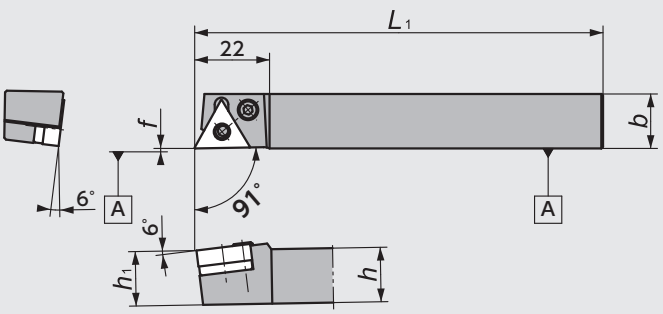
Shape	Part No.	Dimensions (mm) d	s	r_ε	PVD-coated micro-grain carbides ZM3	Stock
	TF3300R	9.525	4.76	0	5947338	●
	3305R			0.05	5914619	●
	3315R			0.15	5906342	●
	3320R			0.2	5971874	●

●Right-hand type shown.

※The max.depth of cut is 4.0 mm.
☆The angles shown here are the values when the insert is set into the holder.

PTAN-N type

Lever lock
Front/back clamping type



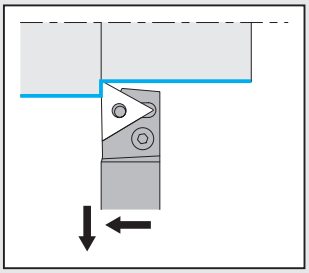
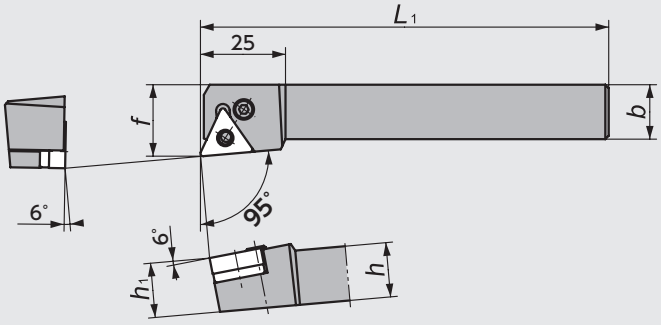


Figure-1

●Right-hand type shown.

PTLN type

Lever lock
Front/back clamping type



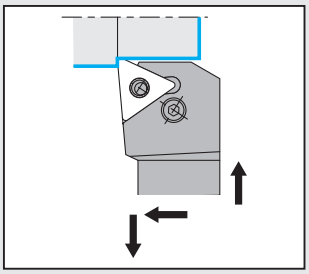
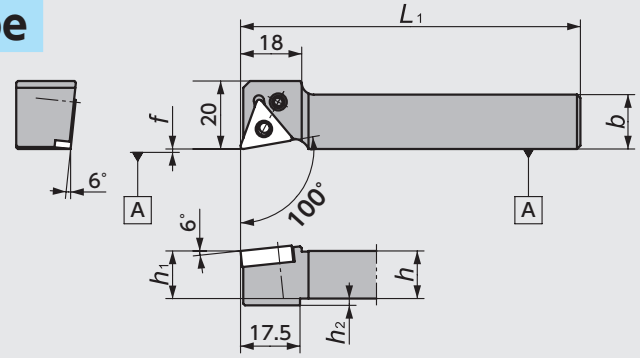


Figure-2

●Right-hand type shown.

PTXN-N type

Lever lock



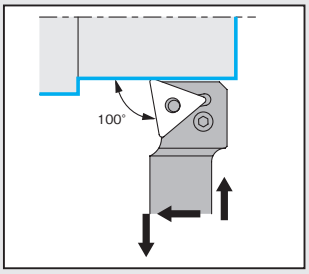
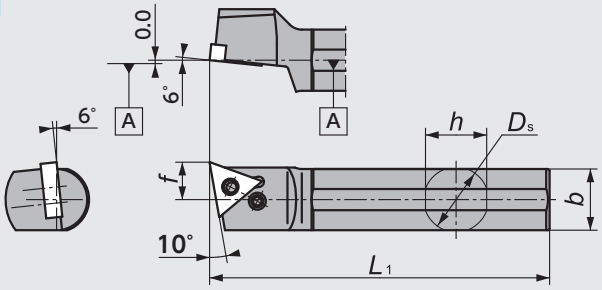


Figure-3

●Right-hand type shown.

DS-PTX type

Lever lock
DS holder



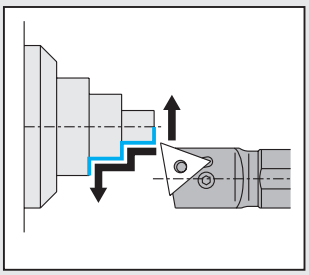


Figure-4

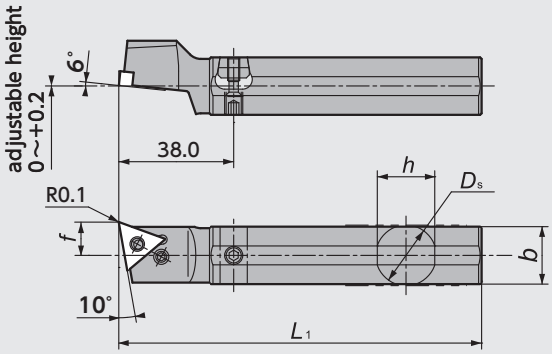
●Left-hand type shown.

DS-PTX-ACH type

DS holder with adjustable centerline height

〈Parts〉

shank	wedge	screw for wedge
ϕ16	ACH-W18 (5805601)	WS060415-003 (5795539)
ϕ19.05		
ϕ20		WS060419-004 (5799226)
ϕ22		
ϕ25.4	ACH-W24 (5805619)	



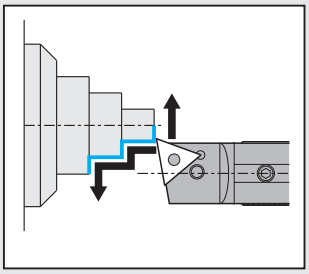


Figure-5

●Left-hand type shown.

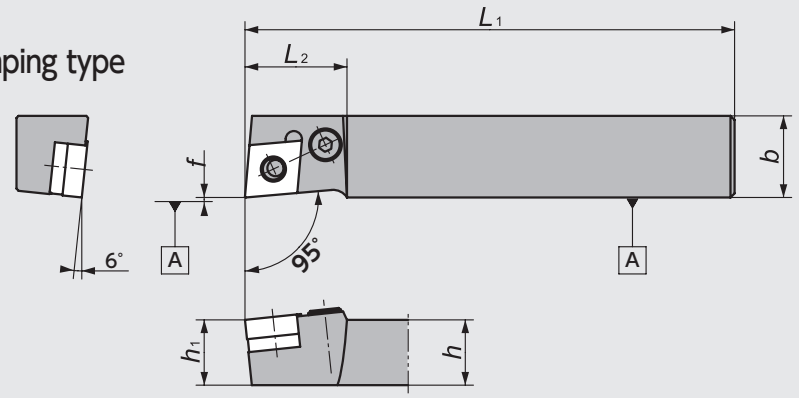
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	D_s	h	b	L_1	h_1	f	L_2	h_2	Applicable insert	Parts: Shim seat	Parts: Lever	Parts: Clamping screw	Parts: Spring	Parts: Wrench
Figure-1	5252325		PTANR/L1616X33N	●		–	16.0	16	120	16	0.0	22	–	TN□□1604 F19・29～30	LST317	LCL3	LCS3	LSP3	LW-2.5
Figure-2	5552336	5552344	PTLNR/L2020L33	●	●	–	20.0	20	140	20	25	25	–	TN□□1604 F19・29～30	LST317	LCL3	LCS3	LSP3	LW-2.5
Figure-3	5479860		PTXNR/L1016X33N	●		–	10.0	16	120	10	0.0	18	2	TN□□1604 F19・29～30		LCL33N	LCS33		LW-2
	5479852		1216X33N	●			12.0			12			0						
	5489901		1616X33N	●			16.0			16									
	5513965		2020X33N	●			20.0	20		20									
Figure-4		5519707	DS-PTXR/L19-33		●	19.050	18.0	18	120	–	11.0	–	–	TN□□1604 F19・29～30		LCL33N	LCS33		LW-2
		5519715	20-33		●	20.000	19.0	19											
	NEW	5591029	22-33		●	22.000	21.0	21			12.0								
		5519699	25M-33		●	25.400	24.0	24	150		13.0								
Figure-5		5805650	DS-PTXR/L16-33-ACH※		●	16.000	15.5	15	120	–	11.0	–	–	TN□□1604 F19・29～30		LCL33N	LCS33		LW-2
		5799689	19-33-ACH		●	19.050	18.0	18											
		5799697	20-33-ACH		●	20.000	19.0	19											
		5799705	22-33-ACH		●	22.000	21.0	21			12.0								
		5799713	25-33-ACH		●	25.400	24.0	24	150		13.0								

※Please select φ16 shank holder When using DS-Sleeve. Details of DS-Sleeve ➔ H91

PCLN-N type

Lever lock
Front/back clamping type



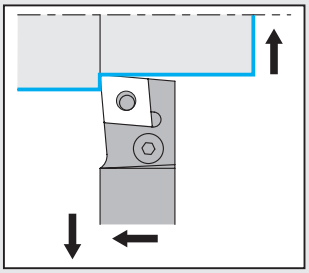
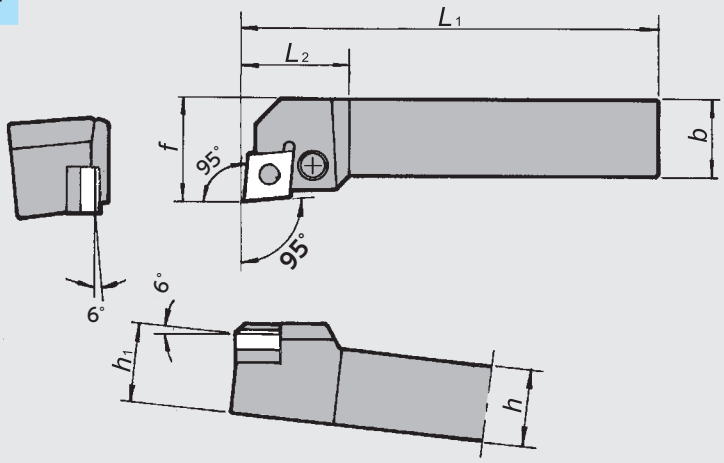


Figure-1

●Right-hand type shown.

PCLN type

Lever lock



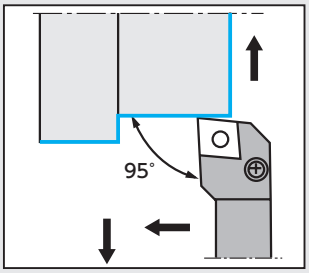


Figure-2

●Right-hand type shown.

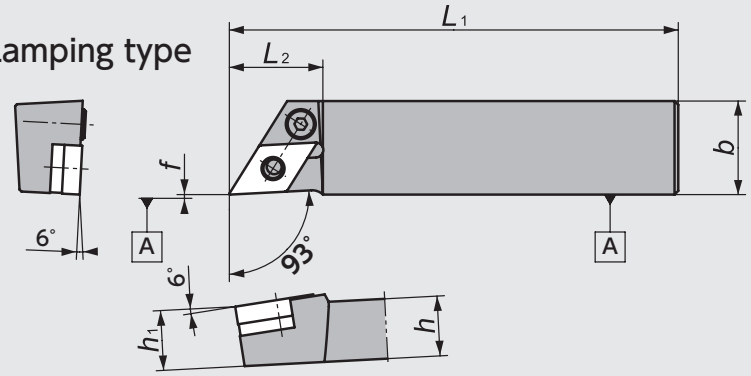
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Applicable insert	Parts: Shim seat	Lever	Clamping screw	Spring	Wrench
Figure-1	5259056		**PCLNR/L1620X43N**	●		16	20	120	16	0.0	25	CN□□43 **F16• 24～25**	LSC42	LCL4	LCS4CA	LSP4	LW-3
Figure-2	5321997	5322003	**PCLNR/L2020K43**	●	●	20	20	125	20	25	28	CN□□43 **F16• 24～25**	LSD42	LCL4	LCS4	LSP4	LW-3
	5322011	5322029	**2525M43**	●	●	25	25	150	25	32	28						

※For other shank sizes, please contact us for more information.

PDJN-N type

Lever lock
Front/back clamping type



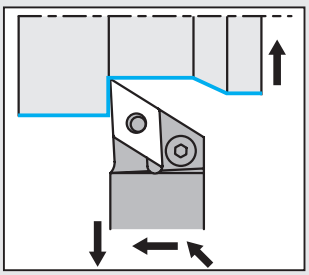
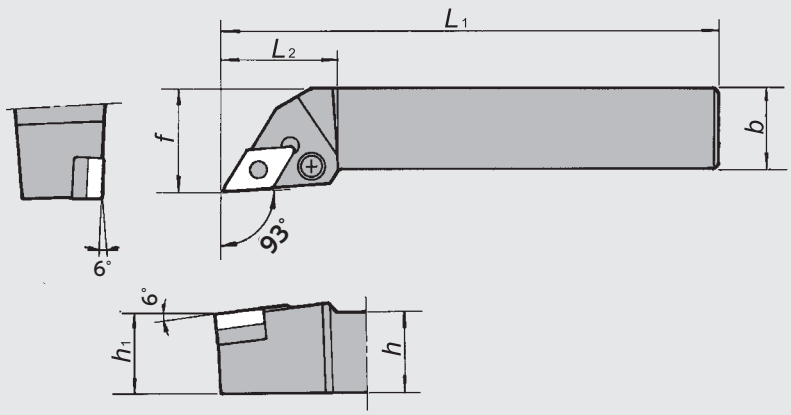


Figure-1

●Right-hand type shown.

PDJN type

Lever lock



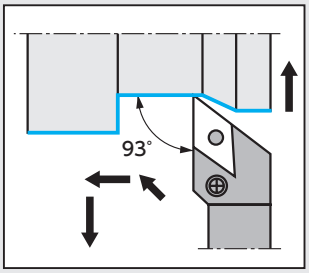


Figure-2

●Right-hand type shown.

Holder dimensions

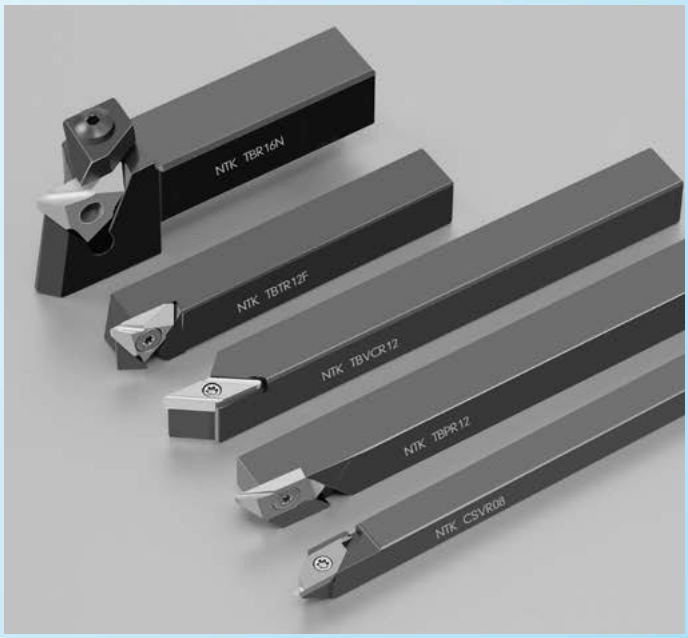
Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Applicable insert	Parts: Shim seat	Lever	Clamping screw	Spring	Wrench
Figure-1	5259072		**PDJNR/L1625X43N**	●		16	25	120	16	0.0	25	DN□□43 **F17・25～26**	LSD42	LCL4	LCS4CA	LSP4	LW-3
Figure-2	NEW 5322037	NEW 5322045	**PDJNR/L2020K43**	●	●	20	20	125	20	25	32	DN□□43 **F17・25～26**	LSD42	LCL4	LCS4	LSP4	LW-3
	5682463		**2525M43**	●		25	25	150	25	32							

※For other shank sizes, please contact us for more information.

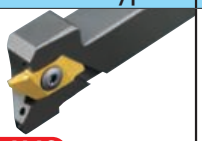
MEMO

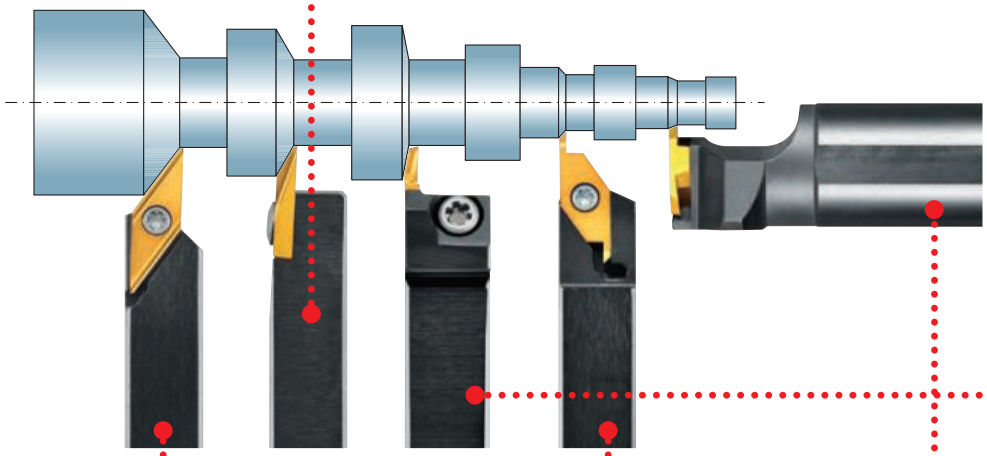
SS Tools
for Back Turning

- Selection guide for Back Turning cutting tools ···· H36
- List of Back Turning holders and applicable inserts ···· H40



NTK SS Tools Selection guide for back turning tools

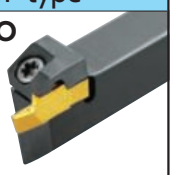
TBP type	TBP-OH type NEW	Y-TBP-OH type	DS-TBP type	CTPA type	CTPS type
					
➡H42	➡H42	➡H42	➡H42	➡H44	➡H41
Dimension "a" : ~ 4.8	Dimension "a" : ~ 4.8	Dimension "a" : ~ 4.8	Dimension "a" : ~ 4.8	Dimension "a" : ~ 6.3	Dimension "a" : ~ 5.0
Dimension "b" : 5.3	Dimension "b" : 5.3	Dimension "b" : 5.3	Dimension "b" : 5.3	Dimension "b" : 5.3/6.8	Dimension "b" : 3.5/4.8
Shank size : □8 ~ □16	Shank size : □10 ~ □16	Shank size : □12 ~ □16	Shank size : □19 ~ □25.4	Shank size : □10 ~ □20	Shank size : □10・□12
Applicable insert : TBP□□FR/L	Applicable insert : TBP□□FR/L	Applicable insert : TBP□□FR/L	Applicable insert : TBP□□FR/L	Applicable insert : TBPA□□FR/L	Applicable insert : TBPS□□FR
A wide range of cutting edge shapes and material grades are offered as NTK standards for many and varied applications !					Common holder type

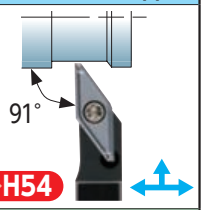


NEW CH-TBPA type
➡H44
Dimension "a" : ~ 6.3
Dimension "b" : 5.3/6.8
Shank size : □16・□20
Applicable insert : TBPA□□FR
For end face machining

NEW CH-SVXCL type
➡H46
Applicable insert : VC□□
Shank size : □16、□20

TBVC type	TB type	CSV type
➡H46	➡H50	➡H40
Dimension "a" : ~ 8.3	Dimension "a" : ~ 4.0	Dimension "a" : ~ 1.0
Dimension "b" : 8.3	Dimension "b" : 4.8/8.8	Dimension "b" : 2.0
Shank size : □10 ~ □20	Shank size : □8 ~ □25	Shank size : □7 ~ □12
Applicable insert : TBVC11	Applicable insert : TB□□R/L	Applicable insert : CSVB11
Greater cutting depth via a long cutting edge !	Highly rigid by due to the triangular insert mounted tangentially !	For back turning work pieces of very small diameter !

TBDP type
BACK DUO 
➡H49
Dimension "a" : ~ 3.5
Dimension "b" : 5.0
Shank size : □10 ~ □20
For Y-axis type··· ➡H49
Applicable insert : TBDP22
Excellent chip control and sharp edge make clean face on flange back.

SVAC (-N) W type

➡H54
Applicable insert : VCGT13
Shank size : □10 ~ □20

GTT type	GTT-OH type	Y-GTT-OH type	CH-GTT type	DS-GTT type
➡H52	➡H52	➡H52	➡H52	➡H52
Dimension "a" : ~ 1.3	Dimension "a" : ~ 1.3	Dimension "a" : ~ 1.3	Dimension "a" : ~ 1.3	Dimension "a" : ~ 1.3
Dimension "b" : 2.7	Dimension "b" : 2.7	Dimension "b" : 2.7	Dimension "b" : 2.7	Dimension "b" : 2.7
Shank size : □8 ~ □16	Shank size : □10 ~ □16	Shank size : □12 ~ □16	Shank dia. : □10・□12	Shank dia. : ϕ14 ~ ϕ25
Applicable insert : TBMH32	Applicable insert : TBMH32	Applicable insert : TBMH32	Applicable insert : TBMH32	Applicable insert : TBMH32
Use 3-corner inserts for machining for small cutting depth !				

Back Turning Tools Recommended Insert Grade and Cutting Conditions

CSVB

Work Material	Free cutting Steels	Carbon Steels	Alloy Steels	Free cutting Steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Aluminum Alloy
JIS Common Grade	SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	DT4 VM1	VM1 DT4		DT4 VM1			
Cutting Speed v_c (m/min)	30 **60** 90				30 **50** 70		30 **60** 90
feed speed f (mm/rev)				X-axis 0.01 **0.02** 0.03 Z-axis 0.01 **0.03** 0.04			

TBDP/TBMH/TBP/TBPA/TBPS/TBVS

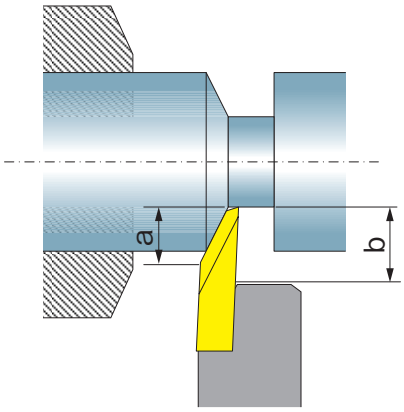
Work Material	Free cutting Steels	Carbon Steels	Alloy Steels	Free cutting Steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Aluminum Alloy
JIS Common Grade	SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	VM1 ZM3	QM3・DM4 DT4		DT4 TM4	DT4 QM3・DM4		PD1 KM1
Cutting Speed v_c (m/min)	50 **100**	50 **90** 150			40 **70** 100		PD1 100 **200** 350 KM1 50 **100** 200
feed speed f (mm/rev)		X-axis 0.01 **0.02** 0.04 Z-axis 0.02 **0.04** 0.08			X-axis 0.01 **0.02** 0.03 Z-axis 0.02 **0.04** 0.06		X-axis 0.01 **0.03** 0.05 Z-axis 0.02 **0.1** 0.15

TB32/43

Work Material	Free cutting Steels	Carbon Steels	Alloy Steels	Free cutting Steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Aluminum Alloy
JIS Common Grade	SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	ZM3	ZM3 Z15		ZM3			
Cutting Speed v_c (m/min)	50 **100** 200	ZM3 50 **90** 150 Z15 120 **180** 250			30 **50** 70		50 **100** 200
feed speed f (mm/rev)		X-axis 0.01 **0.03** 0.05 Z-axis 0.04 **0.08** 0.15			X-axis 0.01 **0.03** 0.05 Z-axis 0.04 **0.05** 0.08		X-axis 0.01 **0.05** 0.07 Z-axis 0.04 **0.15** 0.25

※Please refer to Technical Information Q54 for detailed recommendation.

SS Tools for Back Turning

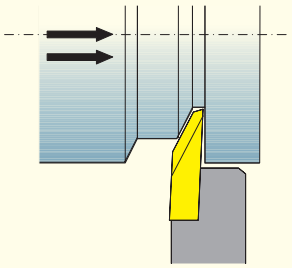


■Guidelines for max D.O.C depth of cut = Effective cutting edge length x guide line value

Work material \ Insert grade	Micro-grain carbide ZM3·QM3·VM1·TAS·TM4	Cermet T15·Z15
Steel	0.7	0.5
Stainless steel	0.6	0.4
Nonferrous metals	0.9	0.8
Nonmetal	0.9	0.9

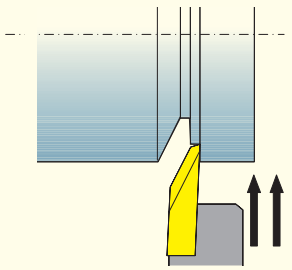
a : Effective length of cutting edge b : Available cutting depth

In the case of not enough cutting edge:

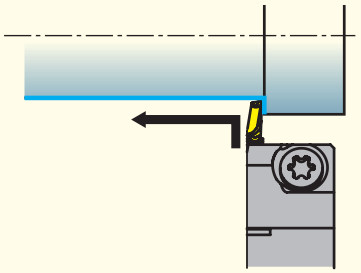


It is possible to cut as deep as the available cutting depth (b) by cutting the diameter twice.

In the case of bad surface finish:



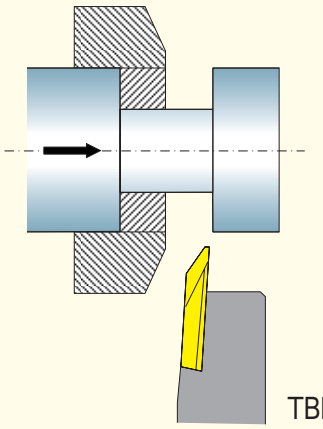
It is possible to improve the surface finish by cutting the end surface twice.



TBDP type, TBP-BM type and TBPA-BM type with originally developed molded chipbreaker enable excellent surfacefinish by single pass.

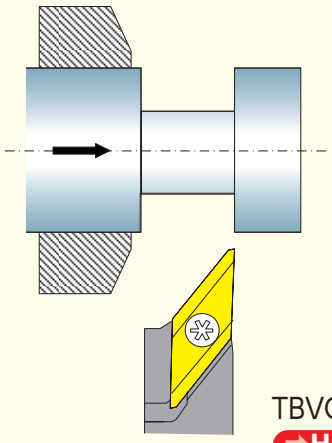
TBDP type ➡H49
TBP-BM type ➡H43
TBPA-BM type ➡H45

Finishing



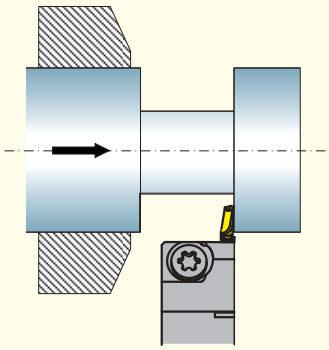
TBP type
➡H42

Prior to finish machining the rough machined raw material must be deburred to enter the guide bush.



TBVCR··F10
➡H46

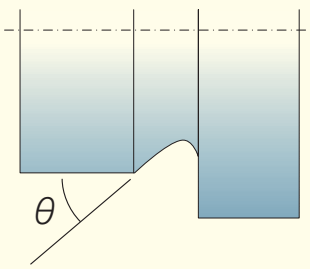
The use of an offset tool means the rough machined raw material is not drawn back into the guide bush.



Cutting edge is shifted from guide bush by using L-hand holder for TBDP type, available for cutting after roughing without returning workpiece into guide bush.

TBDP type ➡H49

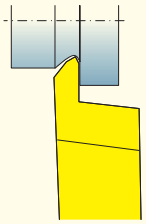
Necking



When necking is required after back turning of the work piece

$\theta = 22^\circ$ type

$\theta = 45^\circ$ type



TBMH type inserts for back turning make it possible.

Insert Part No. : TBMH32 ➡H53

Holder Part Nos. : GTTR

DS-GTTL ➡H52

CSV type

For radial type tool post

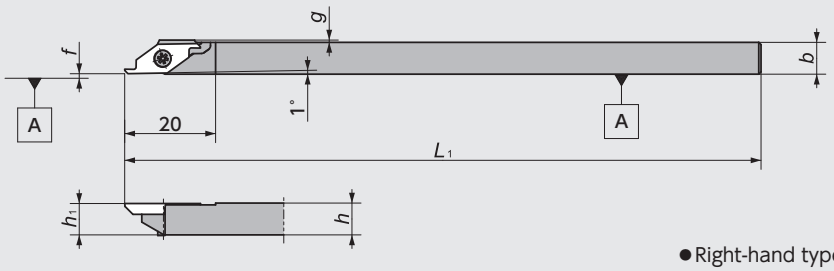


Figure-1

●Right-hand type shown.

CSV-NC/CSV-NC-F type

For gang type tool post

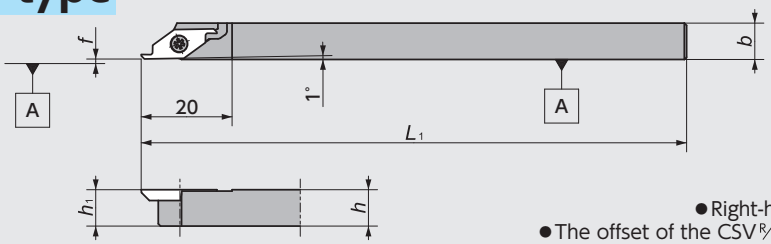


Figure-2

●Right-hand type shown.
●The offset of the CSV□08NC-F is small.

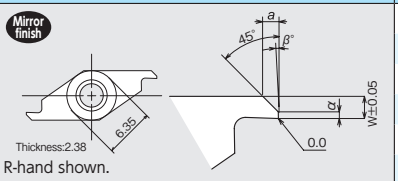
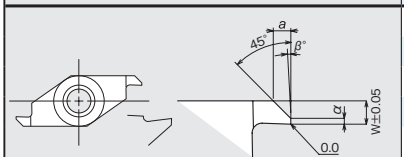
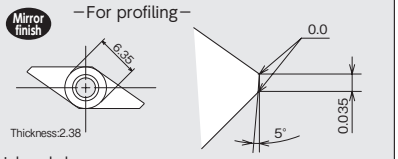
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	h_2	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5492962		CSV□ 07GX	●		7	7	85	7	0.1	0.5	CSVB (See the table below)	LRIS-2.5*7	CLR-15S
	5303169	5303193	07	●	●			140						
	5492954		08GX	●		8	8	85	8		0.0			
	5303151	5303201	08	●	●			140						
	5303136		095	●		9.5	9.5		9.5					
	5303144	5303177	10	●	●	10	10		10					
	5474770		12GX	●		12	12	85	12					
	5327929		12	●				140						
Figure-2	5514062	5514070	CSV□ 08NC	●	●	8	8	120	8	0.1	–	CSVB (See the table below)	LRIS-2.5*7	CLR-15S
	5789615		08NC-F	●						0.0~0.1				
	5563010		10GXNC	●		10	10	85	10	0.1				
	5477492	5477542	10NC	●	●			120						
	5477534	5477500	12NC	●	●	12	12		12					

☆CSV toolholder is interchangeable tool. All CSV type inserts can be used (back turning, grooving, threading) on the same holder. (H80-83 for more information)

Applicable insert

CSVB type

Shape	Part No.	Chip-breaker	Effective length of cutting edge a	Available cutting depth b	Dimensions (mm) Width of the cutting edge W	Dimensions (mm) Cutting edge (α×β°)	PVD-coated micro-grain carbides NEW ZM3 R	ZM3 Stock	VM1 R	VM1 Stock	VM1 L	VM1 Stock	DT4 R	DT4 Stock
 Mirror finish R-hand shown.	CSVB11F□L V	None	0.7	2.0	1.00	0.3×5°			5303573	●	5303532	●		
	11F□L V-A					0.3×2°			5358791	●				
	11F□L V-M					0.15×2°	5435995	●	5386289	●	5386297	●	5827480	●
	11F□L V-C					0.15×5°			5358809	●				
	11F□L V12		0.8		1.20	0.3×5°			5344890	●				
	11F□L V14		1.0		1.40				5344908	●				
 R-hand shown.	CSVB11F□L VB	Provided	0.7	2.0	1.00	0.3×5°			5358825	●				
	11F□L VB-A					0.3×2°			5358833	●				
	11F□L VB-M					0.15×2°	5435987	●	5386305	●	5386313	●	5827472	●
	11F□L VB-C					0.15×5°			5358841	●				
	11F□L VB12		0.8		1.20	0.3×5°			5358718	●				
	11F□L VB14		1.0		1.40				5358726	●				
 Mirror finish —For profiling— L-hand shown.	CSVB11F□L VX	None	–	–	–	–					5358817	●		

CTPS type

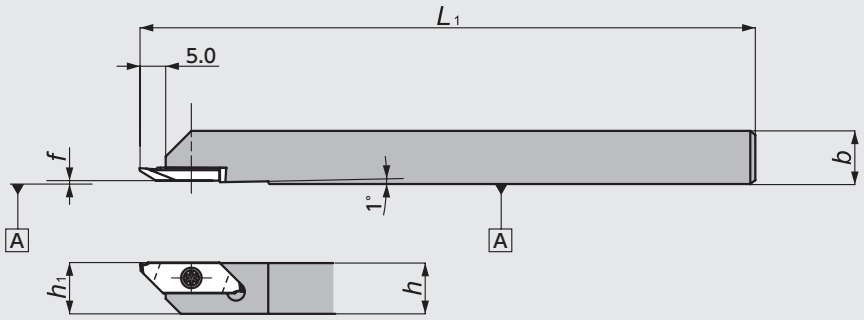


Figure-3

●Right-hand type shown.

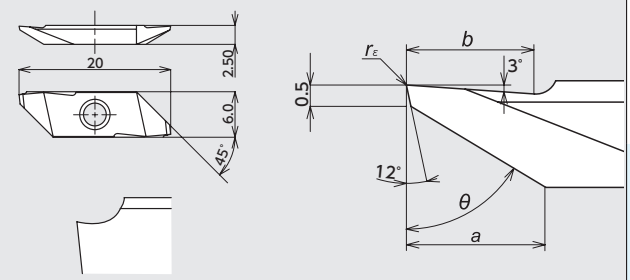
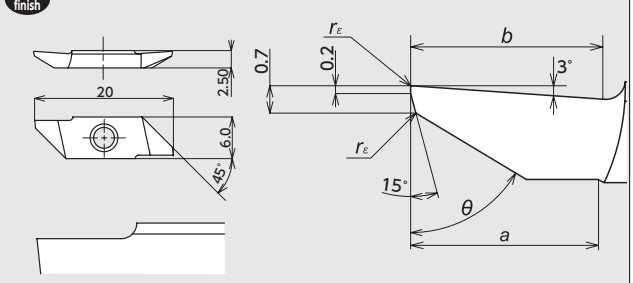
Holder dimensions

Shape	Code No.	Toolholder Part No.	Stock	Dimensions (mm)					Applicable insert	Parts	
				h	b	L_1	h_1	f		Clamping screw	Wrench
Figure-3	5346572	**CTPSR10**	●	10	10	120	10	0.0	TBPS (See the table below)	LR1S-2.5*7	CLR-15S
	5397187	**R12**	●	12	12		12				

☆CTPS toolholder is interchangeable tool. All CTPS type inserts can be used (front turning, back turning, cut-off, threading) on the same holder. (H84-85 for more information)

Applicable insert

TBPS type

Shape	Part No.	Chipbreaker	Effective length of cutting edge a	Available cutting depth b	Dimensions (mm) θ	Dimensions (mm) r_ε	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock
〈With chipbreaker〉  ●Right-hand type shown.	**TBPS60FR00**	Provided	3.1	3.5	60°	0.0	5346150	●	5362553	●
	60FR10					0.1	5346168	●	5362561	●
〈Without chipbreaker〉 Mirror finish  ●Right-hand type shown.	**TBPS60FRV**	None	4.8	4.8	60°	0.0	5357058	●	5362579	●

※θ indicates the value when the insert is set into the holder.

TBP type

Front/back clamping type

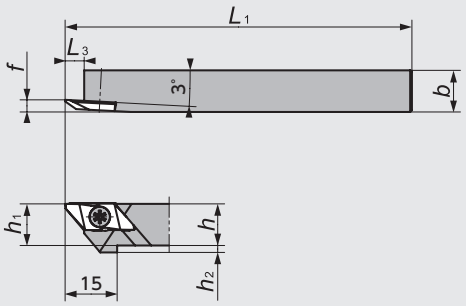
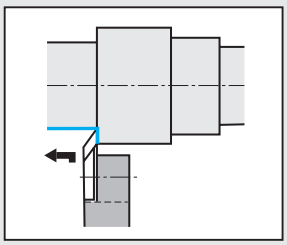


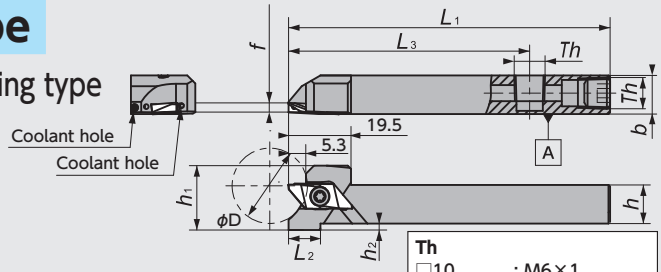
Figure-1



●Right-hand type shown.

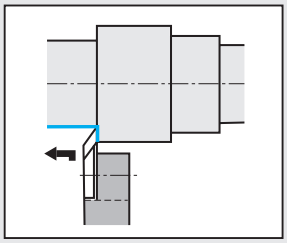
TBP-OH type

Front/back clamping type



Th
□10 : M6×1
□12, □16 : Rc1/8 (PT1/8)

Figure-2



●Right-hand type shown.
☆Use a R-hand insert for L-hand type holder.

DS-TBP type

DS holder

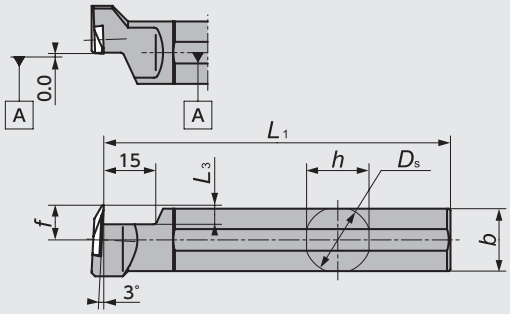
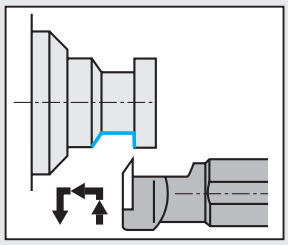


Figure-3



●Left-hand type shown.
☆Use a R-hand insert for L-hand type holder.

Y-TBP type

Front/back clamping type

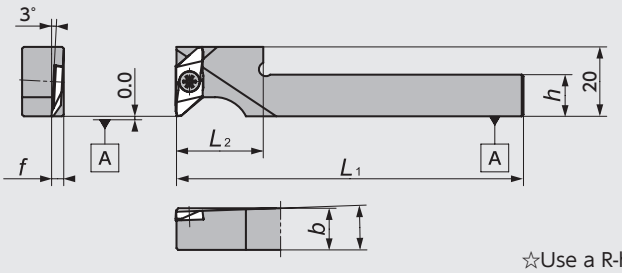
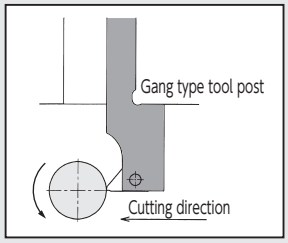


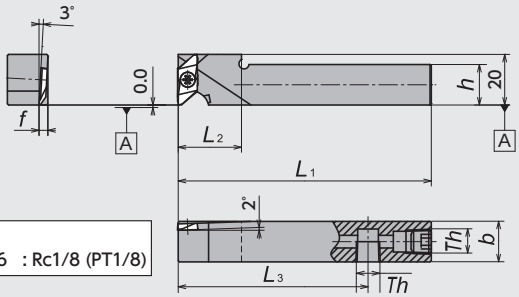
Figure-4



●Right-hand type shown.
☆Use a R-hand insert for R-hand type holder.

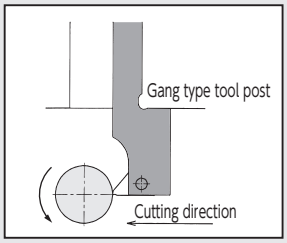
Y-TBP-OH type

Front/back clamping type
SPLASH BAR NEW



Th
□12, □16 : Rc1/8 (PT1/8)

Figure-5



●Right-hand type shown.
☆Use a R-hand insert for R-hand type holder.

Y-TBP-OH type

Front/back clamping type
For high-pressure coolant Y-axis

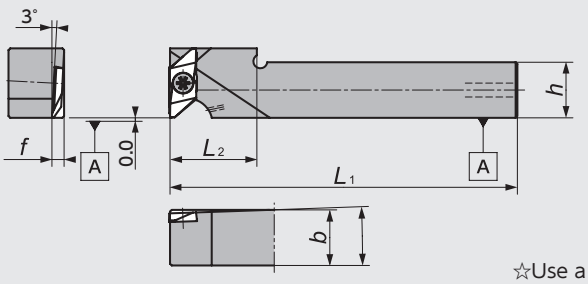
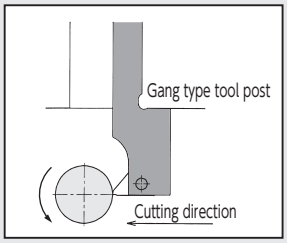


Figure-6



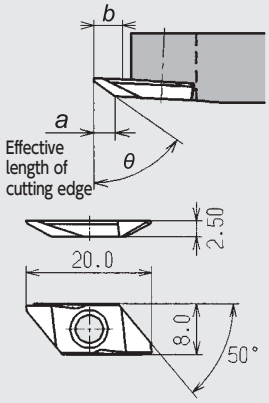
●Right-hand type shown.
☆Use a R-hand insert for R-hand type holder.

Holder dimensions

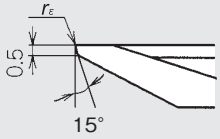
Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Max. bore Dia. (mm) φD	Ds	h	b	L1	h1	h2	f	L2	L3	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5133285	5133293	TBPR/L08	●	●	–	–	8	10	120	8	4	3.5	–	5.5	TBP (See the table below)	LRIS-4*10PW (A)	CLR-15S (A)
NEW	5873856		10H	●				10		100	10	2						
	5090436	5090444	10	●	●					120								
	5459771		12GX	●				12	12	85	12	0					LRIS-4*12PW (A)	
	5090451	5090469	12	●	●					120								
	5090477	5090485	13	●	■			13	13		13							
	5459789		16H	●				16	16	100	16							
	5270822	5270830	16	●	●					120								
Figure-2	5925722		TBPR/L1012H-OH	●		25	–	10	12	100	10	4	3.5	19	75	TBP (See the table below)	LRIS-4*10PW	CLR-15S (A)
	5925730		12H-OH	●				12	12		12	2		10			LRIS-4*12PW	
	5925748		16H-OH	●		35		16	16		16	0		0				
Figure-3		5540414	DS-TBPR/L19		●	–	19.050	18	18	120	–	–	11.0	–	5.5	TBP (See the table below)	LRIS-4*10 (B)	LLR-25S -20*65 (B)
		5540422	20		●		20.000	19	19									
		5540430	25		●		25.400	24	24	150			13.0					
Figure-4	5371554		Y-TBPR/L10S	●		–	–	10	10	120	–	–	3.5	20	–	TBP (See the table below)	LRIS-4*10PW(A)	CLR-15S (A)
	5371588		12S	●				12	12								LRIS-4*12PW(A)	
	5358486		10	■				10	10					25			LRIS-4*10PW(A)	
	5371570		10L	■				10	10					30			LRIS-4*10PW(A)	
	5371596		12L	■				12	12								LRIS-4*12PW(A)	
NEW Figure-5	5911508		Y-TBPR/L12HS-OH	●		–	–	12	12	100	–	–	3.5	20	–	TBP (See the table below)	LRIS-4*12PW (A)	CLR-15S (A)
NEW	5911516		16H-OH	●				16	16					25				
Figure-6	5699996		Y-TBPR/L12SOH	■		–	–	12	12	70	–	–	3.5	20	–	TBP (See the table below)	LRIS-4*12PW (A)	CLR-15S (A)
	5700000		16OH	■				16	16					25				

Applicable insert

TBP type

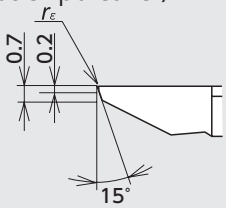


〈With chipbreaker〉

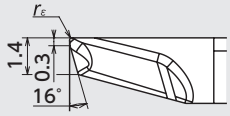


〈Without chipbreaker〉

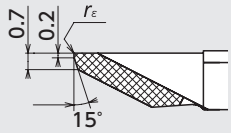
Mirror finish



〈Molded chipbreaker type〉 TBP72-BM Type



〈PD1〉



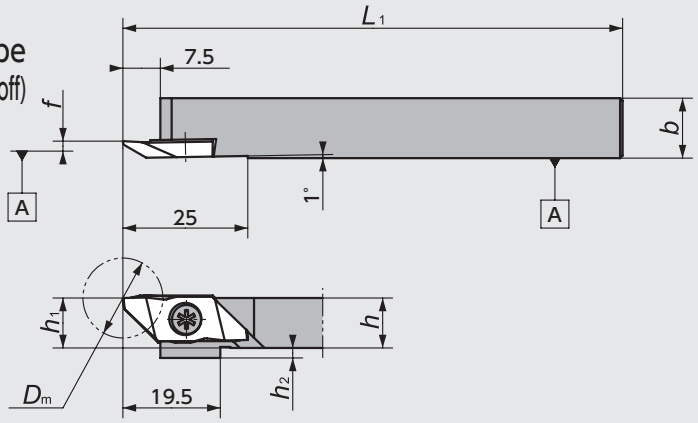
●Right-hand type shown.

Part No.	Chip-breaker	Effective length of cutting edge a	Available cutting depth b	Dimensions (mm) θ	Dimensions (mm) rε	PVD-coated micro-grain carbides: ZM3 R	ZM3 Stock	ZM3 L	ZM3 Stock	QM3 R	QM3 Stock	VM1 R	VM1 Stock	VM1 L	VM1 Stock	TM4 R	TM4 Stock	DT4 R	DT4 Stock	DM4 R	DM4 Stock	Micro-grain carbide KM1 R	KM1 Stock	PCD PD1 R	PD1 Stock	Cermet PVD C7Z R	C7Z Stock
NEW TBP72FR05-BM	Provided	3.5	5.3	72°	0.05											5868310	●			5868401	●						
NEW 72FR10M-BM					0.08											5868351	●			5868419	●						
NEW 72FR20M-BM					0.18											5868336	●			5868393	●						
TBP55FR/L00	Provided	3.0		55°	0.00	5090378	●	5090360	●			5270855	●														
55FR/L10					0.10	5090352	●	5090386	●			5294301	●														
TBP60FR/L00	Provided	3.7		※0.08	0.00	5090410	●	5090428	●	5494711	●	5275508	●			5710108	●	5850805	●								
60FR/L05					0.05																			NEW	5705025	●	
60FR/L10					0.10	5090402	●	5090394	●	5362488	●	5269949	●			5706114	●							NEW	5705017	●	
60FR/L10M					※0.08					5486964	●	5476403	●					5850813	●								
60FR/L20					0.2											5738844	●										
60FR/LV Mirror finish	None	4.8		60°	0.00	5345715	●					5264940	●	5264957	●							5299276	●				
60FRV00-P		4.0			0.00																			5781745 ※1corner	●		
60FR/LV05 Mirror finish		4.8			0.05							5440680	●									5575675	●				
60FR/LV10 Mirror finish					0.10	5482690	●					5440698	●									5575683	●				
60FRV10-P		4.0			0.10																			5785118 ※1corner	●		

※The insert with the nose radius code "10M" can be used for machining if the radius required on the work piece is 0.1 or less.
※θ indicates the value when the insert is set into the holder.

CTPA type

Front/back clamping type
(For both back turning and cutting-off)



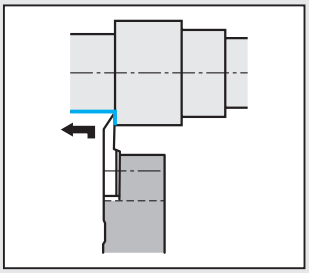


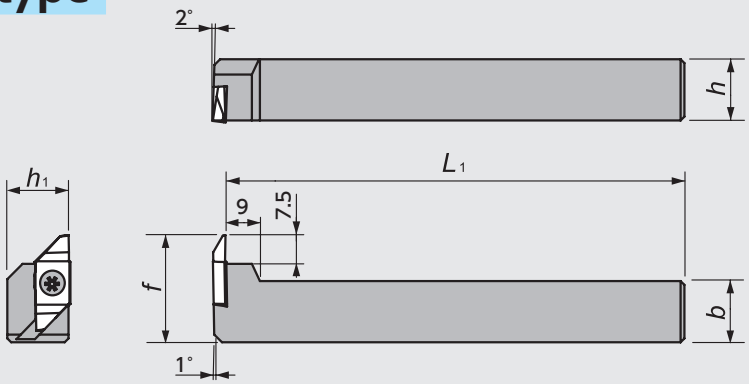
Figure-1

●Right-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L1	h1	f	h2	Dm	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5199187	5199153	CTPA R/L 10	●	●	10	10	120	10	3.4	2	16	TBPA(post-grinding) H45 CTPA(cutting-off) H68～69	LR1S-4*10PW(A)	CLR-15S (A)
	5199195	5199161	12	●	●	12	12		12		0			LR1S-4*12PW(A)	
	5199203	5199179	16	●	●	16	16		16						
	5459540	5459557	20F	●	●	20	20	80	20					LR1S-4*10(B)	LLR-25S(B)

CH-TBPA type



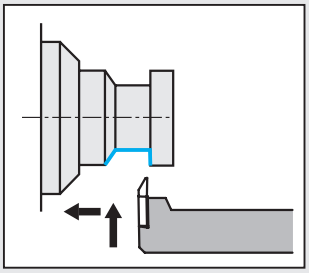


Figure-2

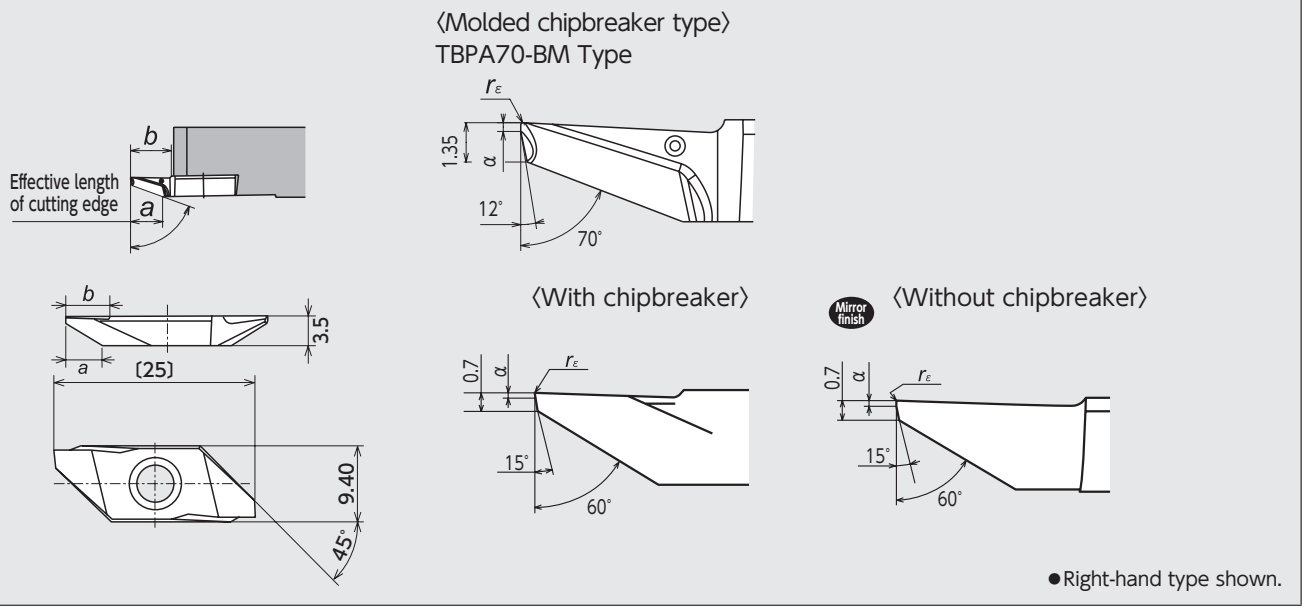
●Left-hand type shown.
☆Use a R-hand insert for L-hand type holder.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L1	h1	f	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-2	NEW	5884945	CH-TBPA R/L 16		●	16	16	120	16	28	TBPA□□FR H45	LR1S-4*10	LLR-25S
	NEW	5884952	20		●	20	20		20	32			

Applicable insert

TBPA type



●Right-hand type shown.

Shape	Chip-breaker	Effective length of cutting edge *a*	Available cutting depth *b*	Dimensions (mm) α	Dimensions (mm) r_ε	PVD-coated micro-grain carbides ZM3 R	ZM3 Stock	ZM3 L	ZM3 Stock	QM3 R	QM3 Stock	VM1 R	VM1 Stock	TM4 R	TM4 Stock	DT4 R	DT4 Stock	DM4 R	DM4 Stock
NEW TBPA70FR05-BM	Provided	5.5	6.5	0.3	0.05									5892583	●			5892591	●
NEW 70FR10M-BM					0.08									5892567	●			5892575	●
NEW 70FR20M-BM					0.18									5892542	●			5892559	●
TBPA60F$^{R}_{L}$VB Mirror finish		4.5	5.3	0.2	0.0	5344833	●	5362538	●			5439344	●			5850847	●		
60F$^{R}_{L}$PB10 Mirror finish				0.3	0.1	5344858	●	5362520	●			5379151	●						
60F$^{R}_{L}$10M					*0.08					5486956	●								
60F$^{R}_{L}$PB10M Mirror finish												5476395	●			5850821	●		
60F$^{R}_{L}$PB20M Mirror finish					*0.18											5850839	●		
60F$^{R}_{L}$V Mirror finish	None	6.3	6.8	0.2	0.0	5344817	●	5362546	●			5439336	●						

SS Tools for Back Turning

TBVC type

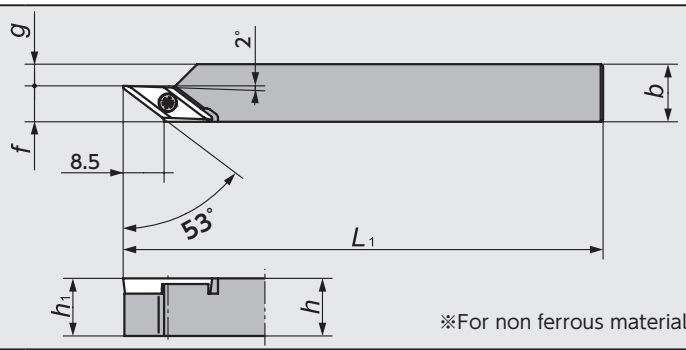
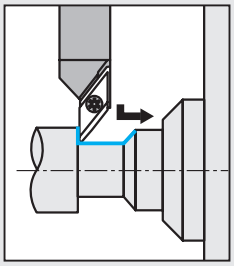


Figure-1



●Right-hand type shown.
※For non ferrous materials such as aluminum and copper.

TBVC-F10 type

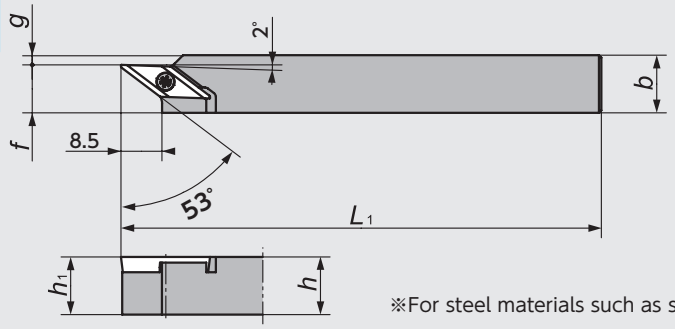
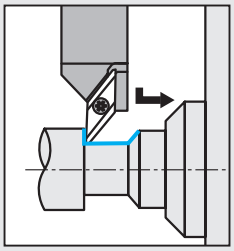


Figure-2



●Right-hand type shown.
※For steel materials such as stainless steels and carbon steels.

CH-SVXCL type

For opposed gang tool post

NEW

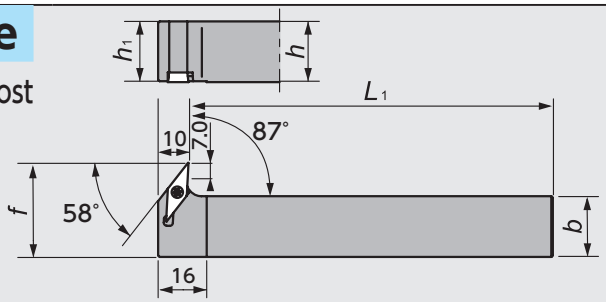
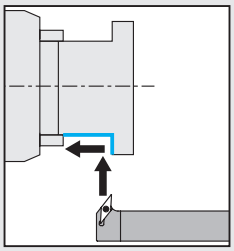


Figure-3



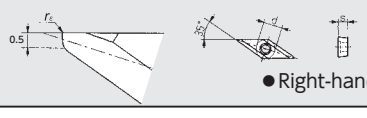
●Left-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	g	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5204953		TBVCR/L10	●		10	10	120	10	7.5	2.5	TBVC (See the table below) VCGT1103 F47～48	LR1S-2.5＊7	CLR-15S
	5204946		12	●		12	12		12		4.5			
	5204920		16	●		16	16		16		8.5			
Figure-2	5344254		TBVCR/L10-F10	●		10	10	120	10	10	0	TBVC (See the table below) VCGT1103 F47～48	LR1S-2.5＊7	CLR-15S
	5459797		12GX-F10	●		12	12	85	12		2			
	5344262		12-F10	●				120						
	5459805		16H-F10	●		16	16	100	16		6			
	5344270		16-F10	●				120						
	5459565		20F-F10	●		20	20	80	20		10			
NEW Figure-3		5890637	CH-SVXCR/L1616×11		●	16	16	120	20	27	–	VC□□1103 F23･47～48	LR1S-2.5*7	CLR-15S
		5890645	2020×11		●	20	20			31				

Applicable insert

TBVC type

Shape	Part No.	Dimensions (mm) d	s	r_ε	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock
 ●Right-hand type shown.	TBVC11FR05U	6.35	3.18	0.05	5204870	●		
	11FR10U			0.10	5204888	●	5341763	●
	11FR10S	6.35	3.18	–	5433107	●		

MEMO

New Back Turning Tools BACK DUO

WATCH ON YouTube

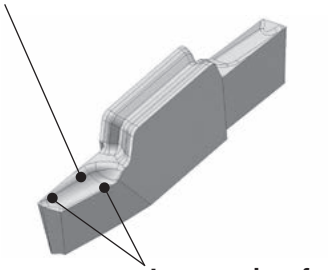
New item added, "Back duo"! The best tool for back turning!

Features

"Single pass back turning" is now possible with newly designed chipbreaker.
Possible to reduce cycle time.

1 New 3D chipbreaker PAT.P

Excellent surface with good chip control

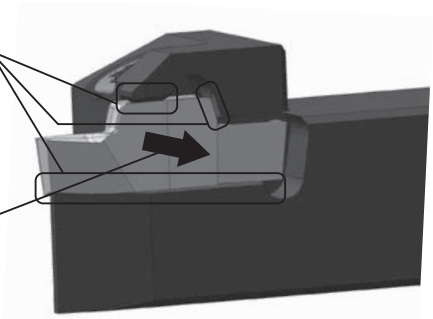


Improved surface finish thanks to wiper flat on cutting edge

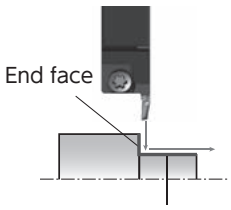
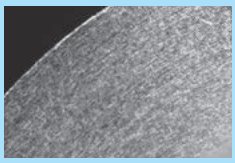
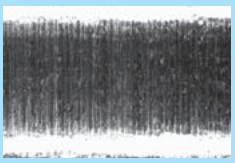
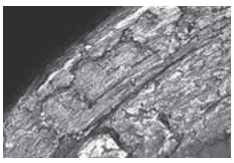
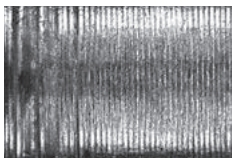
2 New clamping system

Stable clamping force from three face contact with V-bottom

Utilizes tool pressure to increase clamping force



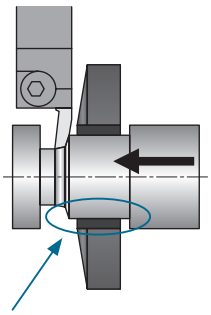
Surface comparison for SUS304

1Pass	BACK DUO		Competitor	
	End face	Diameter	End face	Diameter
				
	Excellent surface	Ra : 0.90μm Rz : 4.11μm	Rough surface	Ra : 2.16μm Rz : 10.28μm

Work material : SUS304 Holder : TBDPR12 Insert : TM4 TBDP2201MR
Cutting condition : v_c=80m/min f (x)=0.02mm/rev f (z)=0.08mm/rev a_p=3.0mm WET

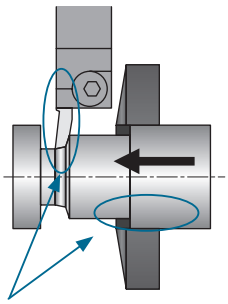
Case study with left-hand tolholder

Finishing with right hand toolholder...



Guide bush can't hold work material

Finishing with left hand toolholder...

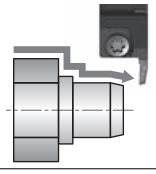


Machining point is apart from guide bush and guide bush can hold work material rigidly

Please select right-hand insert for left-hand toolholder

Case study

Interrupted back turning with "QM3"

Work material : SUS304	
Cutting speed (m/min) : 40 ~ 110	
Feed (mm/rev) : 0.02	
Depth of cut (mm) : 0.1	
Coolant : WET	
QM3	1,000pcs/corner
PVD coted carbide	200pcs/corner

Because of interrupted maching of hexagonal shape workmaterial, the conventional tool often caused burr issue at the beginning of cut.
"QM3" achived 5 times longer tool life with the extreme toughness.

BACK DUO

TBDP type

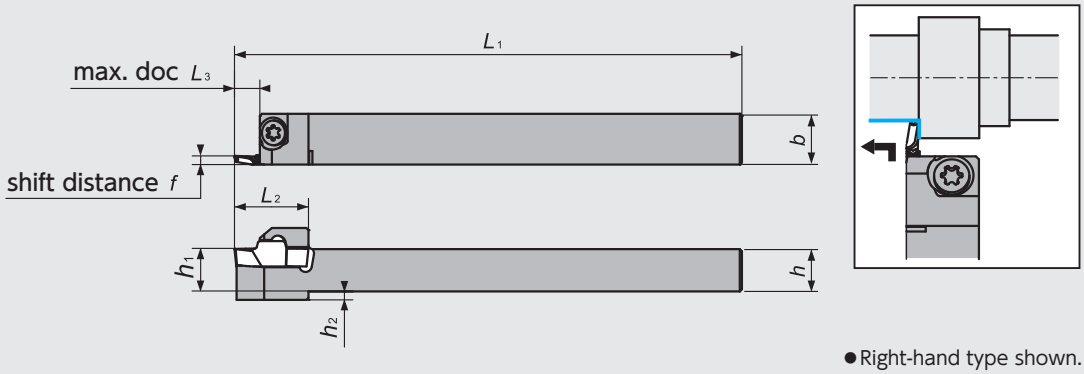


Figure-1

● Right-hand type shown.

Y-TBDP type

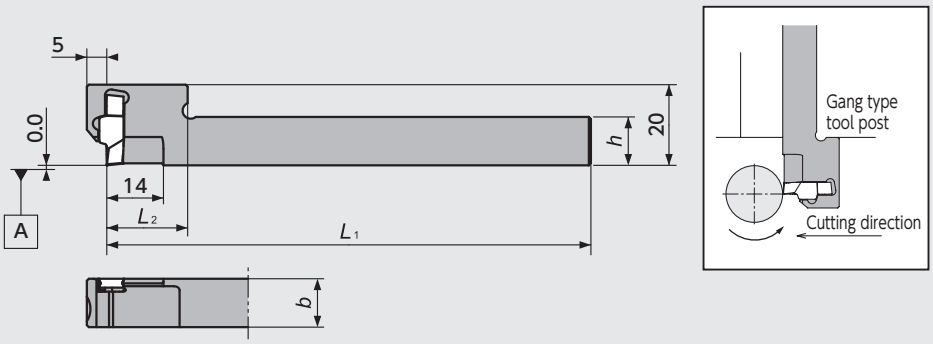
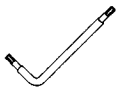


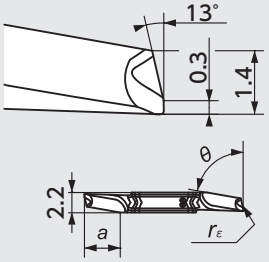
Figure-2

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	L_3	h_2	Applicable insert	Parts: Clamping screw	Parts: Wrench
																
Figure-1	5873864	NEW TBDPR/L1012H		●		10	12	100	10		15	3	2	TBDP (See the table below)	LR1S-4＊12	LLR-25S
	5814678	5837265	1012	●	●			120								
	5810445	5837273	12	●	●	12	12		12	2.05	18	5	0			
	5810452	5837281	16	●	●	16	16		16		19.5					
	5842414		20	●		20	20		20		19.5					
Figure-2	5839139	NEW	Y-TBDPR/L12S	★		12	12	120	—	2.05	20	5.0	—			

Applicable insert

TBDP type

Shape	Part No.	Effective length of cutting edge a	Dimensions (mm) θ	Corner R r_ε	PVD-coated micro-grain carbides QM3	Stock	TM4	Stock	DM4	Stock
	TBDP22005R	3.5	80	0.05	5833116	●	5810460	●	5877685	●
	2201MR			0.08	5833132	●	5810486	●	5903125	●
	2202MR			0.18	5833140	●	5810577	●	5902408	●

TBT type

Front/back clamping type

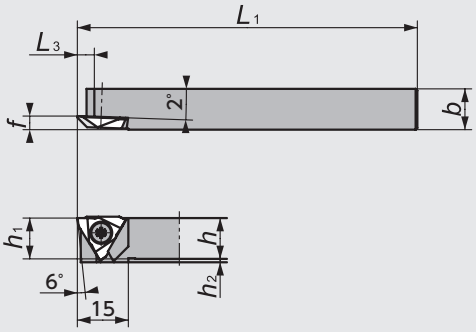
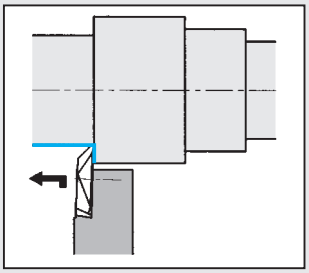


Figure-1



● Right-hand type shown.

TB-N type

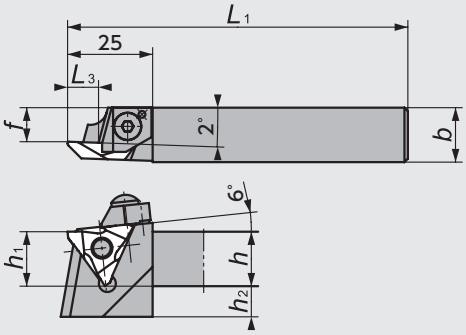
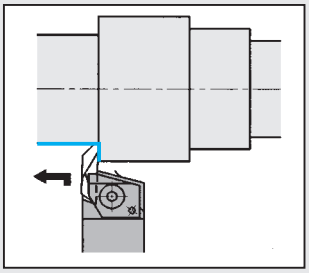


Figure-2



● Right-hand type shown.

TB-F type

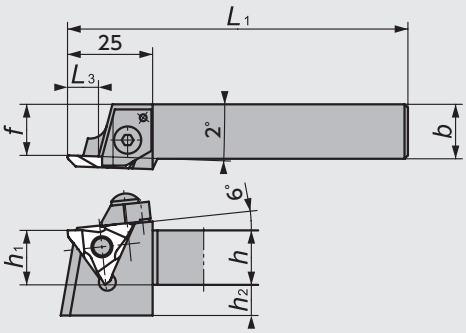
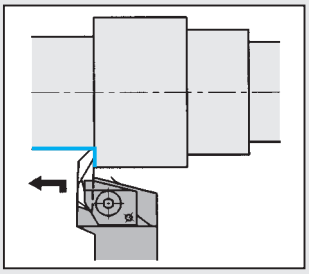


Figure-3



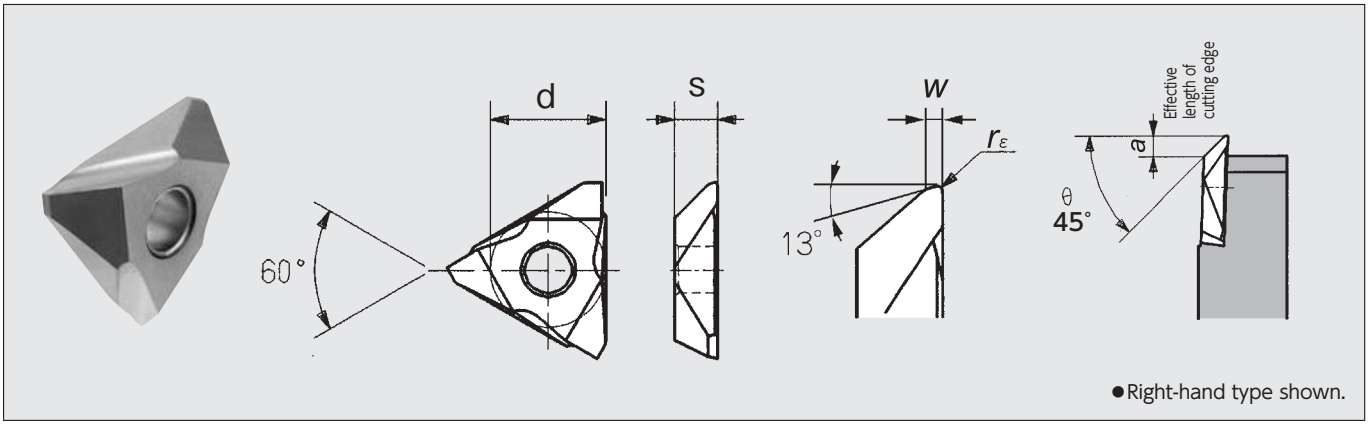
● Right-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	h_2	f	L_3	Applicable insert	Parts: Clamping screw	Clamp	Clamping bolt	Spring	Wrench
Figure-1	5107511	5107503	TBTR/L 08F	●	●	8	8	80	8	5	4	5.0	TB32 H51	LR-S-4* 10PW	–	–	–	CLR-15S (A)
	5107578	5107560	08K	●	●			120										
	5107495	5107487	10F	●	●	10	10	80	10	3								
	5107552	5107545	10K	●	●			120										
	5107479	5107461	12F	●	●	12	12	80	12	1								
	5107537	5107529	12K	●	●			120										
Figure-2	5837141		TBR/L 16N-42	●		16	16	78	16	9	11.5	9.0	TB42 H51	–	CPR/L5S	A0S-5*25	ASG-5	LW-2.5 (B)
	5504543		16NS	●							10	5.0	TB43 H51					
	5504550	5524145	16N	●	●							9.0						
	5820618		16N-H	●				100										
	5848288		16N-K	●				125										
	5553540	5524152	20N	●	●	20	20	100	20	5								
		5524160	25N		●	25	25	150	25	0								
Figure-3	5505029		TBR/L 16FS	●		16	16	100	16	9	15	5.0	TB43 H51	–	CPR/L5	A0S-5*25	ASG-5	LW-2.5 (B)
	5505037		16F	●								9.0						
	5526298		20FS	●		20	20		20	5	20	5.0						
	5505052		20F	●								9.0						
	5519723		25F	●		25	25	150	25	0	25							

Applicable insert

TB32 • 42 • 43 type



Part No.	Chip-breaker	Effective length of cutting edge *a*	Available cutting depth *b*	Dimensions (mm) θ	r_ε	*w*	*d*	*s*	Cermet T15 R	Stock	L	Stock	PVD-coated cermet Z15 R	Stock	PVD-coated micro-grain carbides ZM3※1 R	Stock	L	Stock
TB3200R/L	Provided	2.7	4.8	45°	0.00	0.5	9.525	3.18							5810544	●		
TB3205R/L					0.05				5505110	●					5810536	●	5982335	●
TB3210R/L					0.10						5524178	●						
TB3215R/L					0.15				5504519	●	5505102	●	5802095	●	5810528	●	5033550	●
TB3220R/L					0.20										5160544	●		
TB4215R/L		2.3	8.8	45°	0.15	1.0	12.70	3.18							5914270	●		
TB4300R/L		4.0	4.8※2 8.8	45°	0.00	1.0	12.70	4.76										
TB4305R/L					0.05				5505060	●					5810502	●		
TB4315R/L					0.15				5503719	●	5524244	●	5745609	●	5756614	●		
TB4340R/L		3.9			0.40				5503701	●	5524251	●	5745526	●	5796412	●		

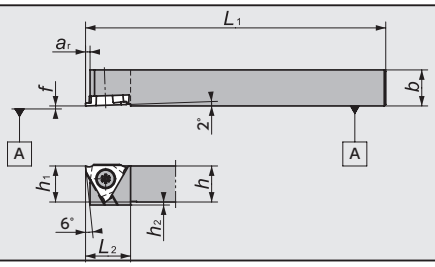
※1 The PVD-coated micro-grain carbide grade ZM3 has a sharp edge.
※2 in case of using holders which name ends by ---NS, ----FS
Note: All angles shown are obtained when insert is set in the holder.

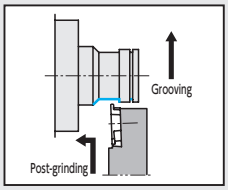
SS Tools for Back Turning

GTT type

Front/back clamping type

Figure-1

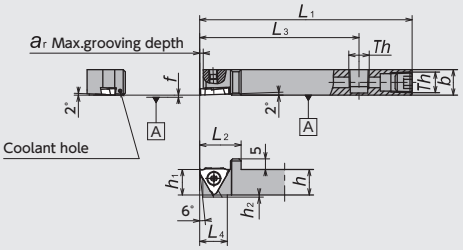




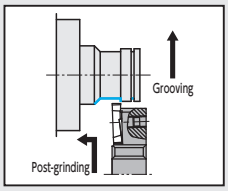
●Right-hand type shown.

GTT-OH type

Figure-2



Th
□10 : M6×1
□12, □16 : Rc1/8 (PT1/8)

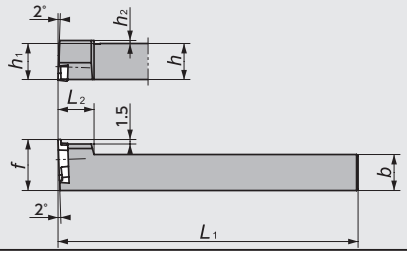


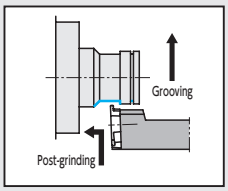
●Right-hand type shown.

CH-GTT type

For opposed gang tool post

Figure-3



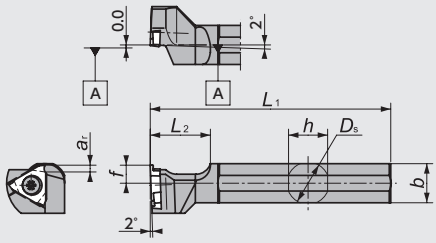


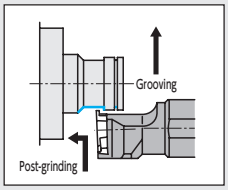
●Left-hand type shown.

DS-GTT type

DS holder

Figure-4



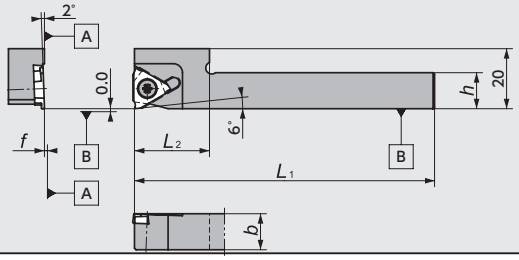


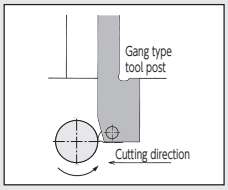
●Left-hand type shown.
☆Use a R-hand insert for L-hand type holder.

Y-GTT type

Front/back clamping type
For Y-axis

Figure-5



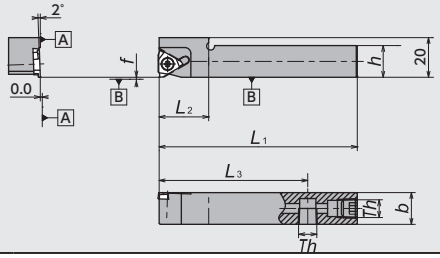


●Right-hand type shown.
☆Use a R-hand insert for R-hand type holder.

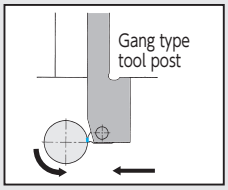
Y-GTT-OH type

Front/back clamping type
For high-pressure coolant Y-axis
SPLASH BAR NEW

Figure-6



Th
□12, □16 : Rc1/8 (PT1/8)

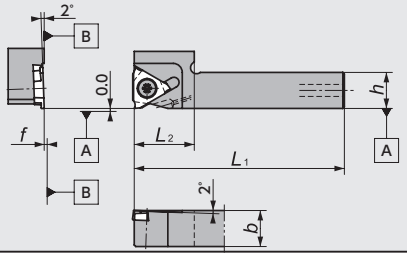


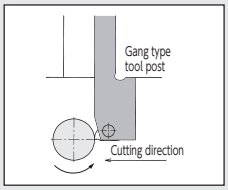
●Right-hand type shown.
☆Use a R-hand insert for R-hand type holder.

Y-GTT-OH type

Front/back clamping type
For high-pressure coolant Y-axis

Figure-7





●Right-hand type shown.

※The GTM32, GTMH32 and GTMX32 can be mounted to the toolholders of the GTT types.

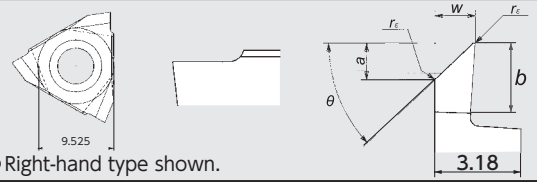
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	D_s	h	b	L_1	h_1	f	L_2	a_r	h_2	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5107305	5107313	GTT[R/L]08F00	●	●	—	8	8	80	8	0	15	1.6	5	TBMH32 (back turning) (See the table below) GTM32 (grooving) GTMH32 (grooving) GTMX32 (grooving) I12 ∫ I15	R-hand : LR-S-4*10PW (A) L-hand : LR-S-4*5.8 (B)	CLR-15S (A)
	5608682		0810F00	●				10								LR-S-4*10PW (A)	
	5107206	5107214	08K00	●	●			8	120							R-hand : LR-S-4*10PW (A) L-hand : LR-S-4*5.8 (B)	
	5608690		0810K00	●				10									
	5107321	5107339	10F00	●	●		10	10	80	10				3		LR-S-4*10PW (A)	
	5107222	5107230	10K00	●	●				120								
	5107347	5107354	12F00	●	●		12	12	80	12				1			
	5107248	5107255	12K00	●	●				120								
	5459896	5551387	16H00	●	●		16	16	100	16				0			
	5173687	5173679	16K00	●	●				120								
	5530852	5780317	20K00	●	●		20	20	125	20			2.7				CLR-15S (A)
	5780309	5780291	25M00	●	●		25	25	150	25							
	5107362	5107370	10F15	●	●		10	10	80	10				3		LR-S-4*10PW (A)	
	5107263	5107271	10K15	●	●				120								
	5537220	5537147	12F15	●	●		12	12	80	12				1			
	5537246	5537162	12K15	●	●				120								
	5537261	5537188	16H15	●	●		16	16	100	16				0			
	5537287	5537204	16K15	●	●				120								
	5107388	5107396	10F25	●	●		10	10	80	10				3			
	5107289	5107297	10K25	●	●				120								
	5537238	5537154	12F25	●	●		12	12	80	12				1			
	5537253	5537170	12K25	●	●				120								
	5537279	5537196	16H25	●	●		16	16	100	16				0			
	5537295	5537212	16K25	●	●				120								
Figure-2	5921750		GTT[R/L]1012H00-OH	●		—	10	12	100	10	0	19.5	1.6	1		LR-S-4*10PW (A)	CLR-15S (A)
	5890157		12H00-OH	●			12			12				1			
	5921713		16H00-OH	●			16	16		16				0			
Figure-3		5659248	CH-GTT[R/L]10H00		●	—	10	10	120	10	15	12	1.5	3		LR-S-4*9 (B)	CLR-15S (A)
		5659255	12H00		●		12	12		12	17			1			
Figure-4		5348560	DS-GTT[R/L]14F		●	14.000	13	13	80	—	6	20	1.6	—		LR-S-4*9 (B)	RLR-20S (B)
		5348081	15H		●	15.875	15	15	100								
		5341532	16X※		●	16.000			95								
		5278288	19		●	19.050	18	18	120								
		5278304	20		●	20.000	19	19									
		5324041	22		●	22.000	21	21									
		5317144	25		●	25.400	24	24			10						
Figure-5	5371604		Y-GTT[R/L]10S	●		—	10	10	120	—	0	20	1.6	—		LR-S-4*10PW (A)	CLR-15S (A)
	5371620		12S	●			12	12				20					
	5358452		Y-GTTR10	■			10	10				25					
	5371612		10L	■								30					
	5358445		12	■			12	12				25					
	5371638		12L	■								30					
Figure-6	5911466		Y-GTT[R/L]12H00S-OH	●		—	12	12	100	—	0	20	1.6	—		LR-S-4*10PW (A)	CLR-15S (A)
	5911474		16H00-OH	●			16	16				25					
Figure-7	5700034		Y-GTT[R/L]12SOH	■		—	12	12	70	—	0	20	1.6	—			

※Please select ϕ16 shank holder When using DS-Sleeve. Details of DS-Sleeve ➔ H91

Applicable insert

TBMH32 type for back turning

Shape	Part No.	Chipbreaker	Effective length of cutting edge a	Available cutting depth b	Dimensions (mm) w	θ	r_ε	PVD-coated micro-grain carbides ZM3	Stock
 ●Right-hand type shown.	TBMH32100R05-22	Provided	0.3	1.8	1.0	22°	0.05	5395199	●
	100R05-45		0.9			45°		5395215	●
	TBMH32150R05-22		0.5	2.7	1.5	22°		5395207	●
	150R05-45		1.3	2.6		45°		5395223	●

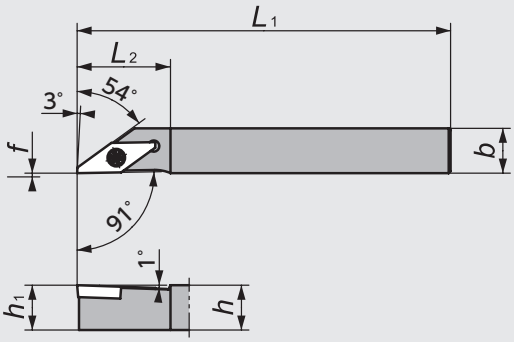
▶This type can be also used with the GTMH32 type toolholders for grooving inserts, listed from pages **I8 to I11**.

※θ indicates the value when the insert is set into the holder.

For both Front and Back Turning

SVAC-NW type

For double-edged cutting tool



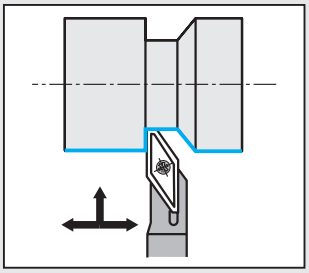
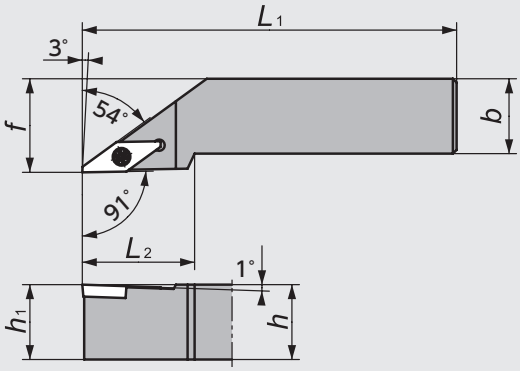


Figure-1

●Right-hand type shown.

SVAC-W type

For double-edged cutting tool



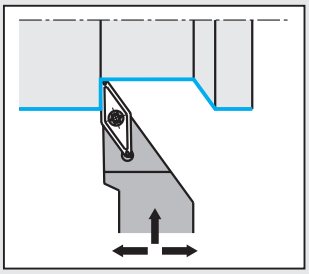


Figure-2

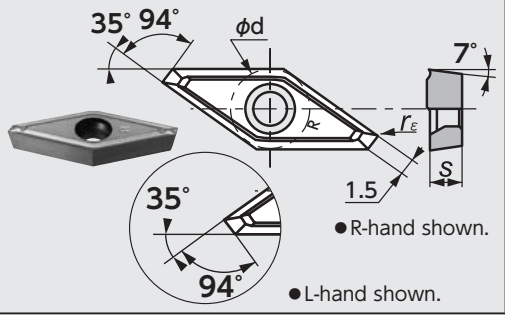
●Right-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	f	h_1	L_2	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5401724	5401708	SVACR/L1010L13NW	●	●	10	10	140	0.0	10	25	VCGT1303 (See the table below)	LR1S-3*8	RLR-20S
	5401732	5401716	1212L13NW	●	●	12	12			12				
	5401740	5431077	1616M13NW	●	●	16	16	150		16				
Figure-2	5474549		SVACR/L2020M13W	●		20	20	150	25.0	20	30			

Applicable insert

VCGT1303 type

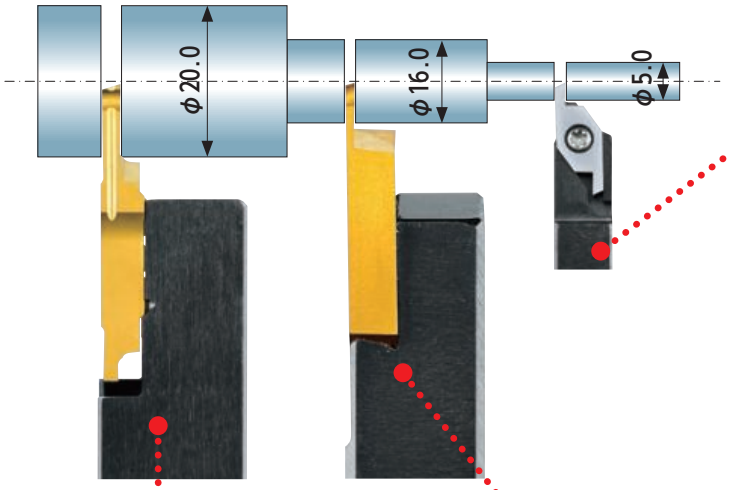
Shape	Part No.	Dimensions (mm) d	s	r_ε	PVD-coated micro-grain carbides QM3 R	Stock	L	Stock
 ●R-hand shown. ●L-hand shown.	VCGT130300FR/L2M	7.94	3.18	0.0	5360334	●	5360300	●
	VCGT130301FR/L2M	7.94	3.18	0.1	5360326	●	5360292	●

SS Tools for Cutting off

- Selection guide for cut off tools ···· H56
- List of holders for cutting-off and applicable inserts ····· H60

NTK SS Tools Selection guide for cut off tools

A wide variety of NTK cut off tools are available for cut off widths of 3.00 mm or less. They meet the needs of the many different requirements in cut off operations especially in small diameter component production.



CSV type	CSV-NC type
➡H60	➡H60
Machining dia. : up to ϕ5.0	Machining dia. : up to 5.0
Width : 0.6 ~ 1.5	Width : 0.6 ~ 1.5
Shank size: □7 ~□12	Shank size: □10 ~□12
For radial type tool post	With 120 mm overall tool length, this type is best for automatic NC lathes

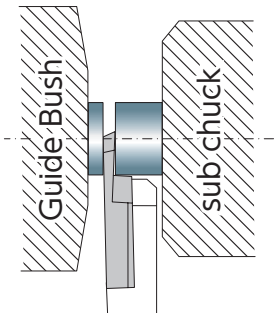
- Compact design, available as series from size 7 mm shank
- The inserts with mirror-surface honing give excellent cutting performance !

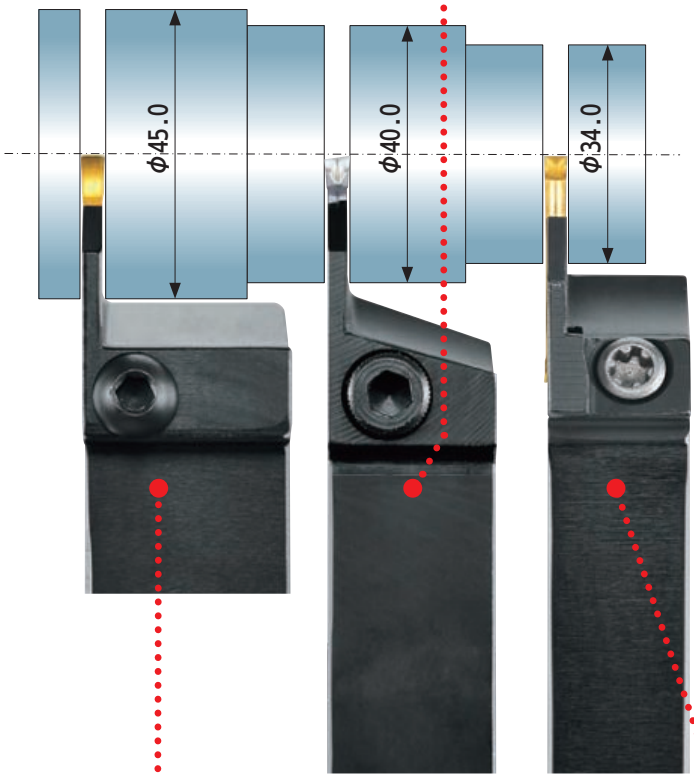
CTPA type	CTP type	NEW CTP-OH type	CTPS type
➡H66	➡H62	➡H62	➡H61
Machining dia. : up to ϕ16.0	Machining dia. : up to ϕ12.0	Machining dia. : up to ϕ12.0	Machining dia. : up to ϕ10.0
Width : 0.7 ~ 2.0	Width : 0.5 ~ 2.0	Width : 0.5 ~ 2.0	Width : 0.7 ~ 2.0
Shank size : □10 ~□20	Shank size : □8 ~□16	Shank size : □10 ~□16	Shank size : □8 ~□12
The overhang at the head is 19.5 mm.	Compact design with a 15-mm overhang at the head.	SPLASH BAR	Smaller head size available for radial type tool posts

- These holders allow for a stable cut off operation by securely clamping the insert in a reversed taper shape.
- Mirror-like honed inserts without a chipbreaker are also available in addition to the honed inserts with chipbreaker depending on application !

CTPW type
➡H70
Machining dia. : up to ϕ20.0
Width : 2.5
Shank size : □10 ~□20
A 20-mm cut off diameter is the largest possible allowed by the rhombus shape inserts.
The insert is firmly clamped by the serration on the back of the insert.

We also offer toolholders for **sub-chuck** operations in the **CTPS, CTP and CTPA series.**





NTG type

➡H77

Machining dia. : up to ϕ40.0
Width : 2.2 and 3.0
Shank size : □10 ~□20
The maximum machining diameter varies from 20 to 40 depending on the shank size.

NTGW type

➡H76

Machining dia. : up to ϕ37.5
Width : 2.2
Shank size : □10 ~□20
Economical 2-corner insert.

- The top and bottom surface of the inserts are V-shaped for secure and stable machining, secure clamping eliminates any possibility of insert movement or mislocation.
- The original chipbreaker gives improved chip control, tightly curling up the cut material giving excellent chip evacuation to prevent damage to machined surfaces.

CTV-K2 type

➡H71

Machining dia. : up to ϕ20.0
Width : 2.2 ~ 2.5
Shank size : □10 ~□12

CTVN-K2 type

➡H71

Machining dia. : up to ϕ20.0
Width : 2.2 ~ 2.5
Shank size : □10 ~□12
This toolholder can be used for sub-chuck type cutting as the insert is held at the center.

Excellent cutting performance for mould type insert with chipbreaker !

CTDP type

CUT DUO

➡H73

Machining dia. : up to ϕ34.0
Width : 2.0 and 2.5
Shank size : □10 ~□20
Sharp cut by ground finish.

CTV-B type

➡H74

Machining dia. : up to ϕ45.0
Width : 3.0
Shank size : □25

CTV type

➡H74

Machining dia. : up to ϕ35.0
Width : 2.5 and 3.0
Shank size : □16 ~□20

CTV-M type

➡H74

Machining dia. : up to ϕ28.0
Width : 2.5 and 3.0
Shank size : □16 and □20

CTV-S type

➡H74

Machining dia. : up to ϕ23.0
Width : 2.5 and 3.0
Shank size : □16 and □20

A wide range of toolholders is available dependant on component diameter !

Cut-off Tools Recommended Insert Grade and Cutting Conditions

CSV

Work Material	Free cutting Steels	Carbon Steels	Alloy Steels	Free cutting Steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Aluminum Alloy
JIS Common Grade	SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	DM4 VM1	VM1 DT4		DT4 VM1			
Cutting Speed v_c (m/min)	30 60 100				30 50 70		30 60 90
feed speed f (mm/rev)	0.01 0.03 0.05				0.01 0.02 0.03		0.01 0.03 0.05

CTP/CTPA/CTPS/CTPW

Work Material	Free cutting Steels	Carbon Steels	Alloy Steels	Free cutting Steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Aluminum Alloy
JIS Common Grade	SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	VM1 ZM3	QM3 DT4		DT4 ZM1	DT4 QM3		PD1 KM1
Cutting Speed v_c (m/min)	50 90 150				40 70 100		PD1 100 200 350 KM1 50 100 200
feed speed f (mm/rev)	0.02 0.04 0.06				0.02 0.03 0.05		0.03 0.05 0.08

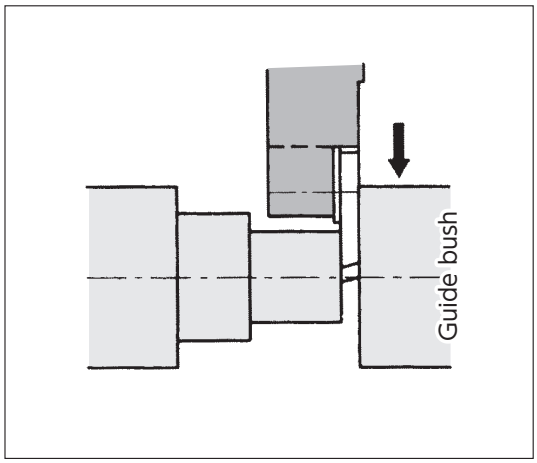
CTDP/CTV/NTG/NTGW

Work Material	Free cutting Steels	Carbon Steels	Alloy Steels	Free cutting Steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Aluminum Alloy
JIS Common Grade	SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	DM4 QM3	DM4 QM3		TM4 ZM3	DM4 QM3	DT4 TM4	TM4 ZM3
Cutting Speed v_c (m/min)	50 100 200	50 90 150			40 70 100		50 100 200
feed speed f (mm/rev)	0.04 0.08 0.12				0.03 0.05 0.08		0.05 0.1 0.2

※Please refer to Technical Information **Q56** for detailed recommendation.

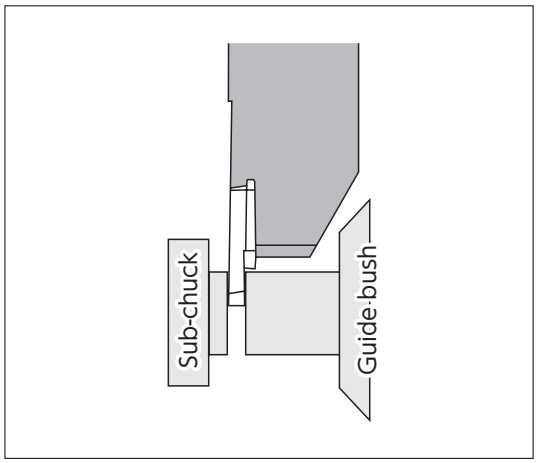
How to use R-hand and L-hand properly for "CTP/CTPA/CTPS/CTPW type"

In case of R-hand use



R-hand holder is recommended when workpiece is not holded.R-hand angled type of insert is recommended.

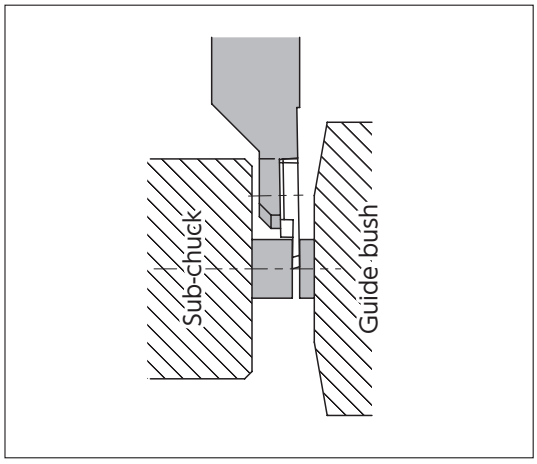
In case of L-hand use



L-hand holder is recommended when workpiece is holded by Sub Spindle. Neutral type of insert is recommended due to no concern about generation of boss.

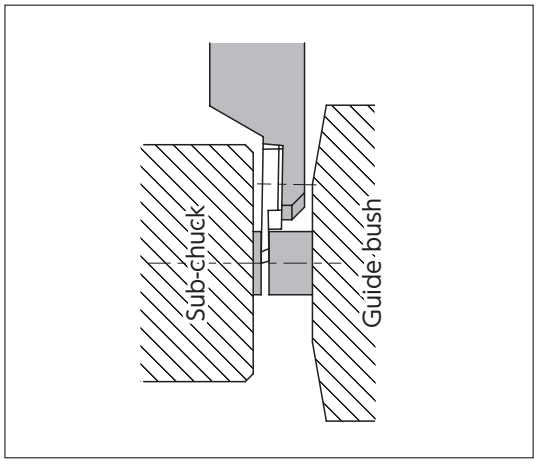
How to use R-hand and L-hand properly for "CTP/CTPA-SUB type"

In case of R-hand use



R-hand holder is recommended when workpiece is long or its diameter is quite small. If workpiece is too short to be holded by Sub-Chuck, use L-hand holder under low cutting conditions.

In case of L-hand use



L-hand holder is recommended when workpiece is short."

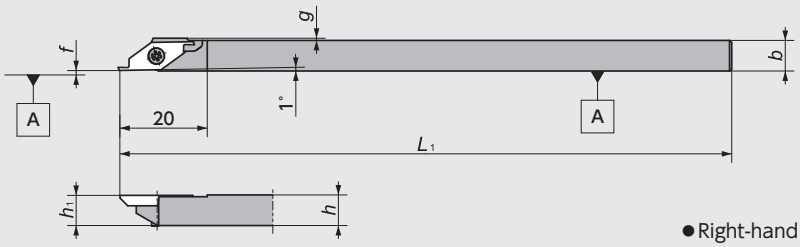
SS Tools for Cutting off

Maximum diameter for cutting off : ϕ5

CSV type

For radial type tool post

Figure-1

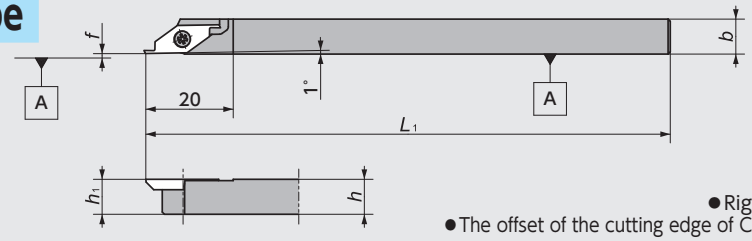


●Right-hand type shown.

CSV-NC/CSV-NC-F type

For gang type tool post

Figure-2



●Right-hand type shown.
●The offset of the cutting edge of CSV R/L08NC-F is small.

Holder dimensions

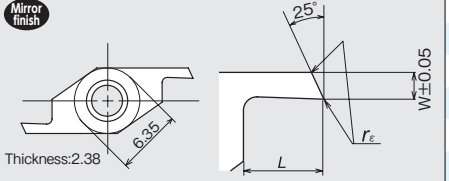
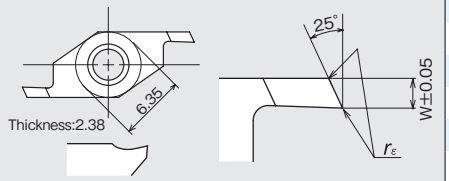
Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Max. cutting-off dia (mm) ϕD	Dimensions (mm) h	b	L_1	h_1	f	g	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5492962		CSVR/L 07GX	●		5.0 ※	7	7	85	7	0.1	0.5	CSVC (See table below)	LR1S-2.5*7	CLR-15S
	5303169	5303193	07	●	●				140						
	5492954		08GX	●			8	8	85	8		0.0			
	5303151	5303201	08	●	●				140						
	5303136		095	●			9.5	9.5		9.5					
	5303144	5303177	10	●	●		10	10		10					
	5474770		12GX	●			12	12	85	12					
	5327929		12	●					140						
Figure-2	5514062	5514070	CSVR/L 08NC	●	●		8	8	120	8	0.1	–	CSVC (See table below)	LR1S-2.5*7	CLR-15S
	5789615		08NC-F	●							0.0~0.1				
	5563010		10GXNC	●			10	10	85	10	0.1				
	5477492	5477542	10NC	●	●				120						
	5477534	5477500	12NC	●	●		12	12		12					

※The max. cut off diameter varies depending on the insert used. Please refer to the table below.

☆CSV toolholder is interchangeable tool. All CSV type inserts can be used (back turning, grooving, threading) on the same holder. (H80-83 for more information)

Applicable inserts

CSVC type

Shape	Part No.	Chip-breaker	Max. cutting off dia (mm) ϕD	Dimensions (mm) L	r_ε	w	PVD-coated micro-grain carbides VM1 R	Stock	L	Stock
Mirror finish  ●R-hand shown.	CSVC 11FR/L V06	None	3.0	2.0	0.0	0.6	5352547	●		
	11FR/L V07		4.0	2.5		0.7	5324272	●	5330840	●
	11FR/L V08					0.8	5324256	●	5330832	●
	11FR/L V09					0.9	5352554	●		
	11FR/L V10		5.0	3.0		1.0	5303490	●	5303599	●
	11FR/L V13					1.3	5311824	●	5311816	●
	11FR/L V15					1.5	5303615	●	5303631	●
 ●R-hand shown.	CSVC 11FR/L VB06	Provided	3.0	2.0		0.6	5358734	●		
	11FR/L VB07		4.0	2.5		0.7	5358742	●		
	11FR/L VB08					0.8	5358767	●		
	11FR/L VB09					0.9	5358775	●		
	11FR/L VB10		5.0	3.0		1.0	5358783	●		
	11FR/L VB13					1.3	5358676	●		
	11FR/L VB15					1.5	5358668	●		

※The angles shown indicate the values when the insert is set into the holder.

Maximum diameter for cutting off : ϕ10

CTPS type

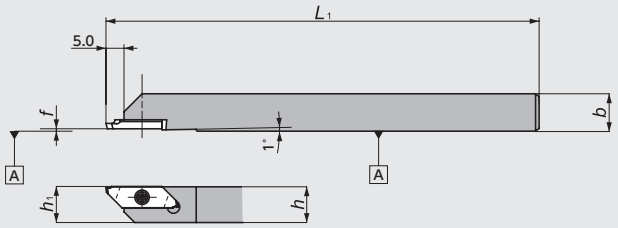


Figure-1

●Right-hand type shown.

Maximum diameter for cutting off : ϕ4

CTPSR-SUB type

Applicable with sub-chuck

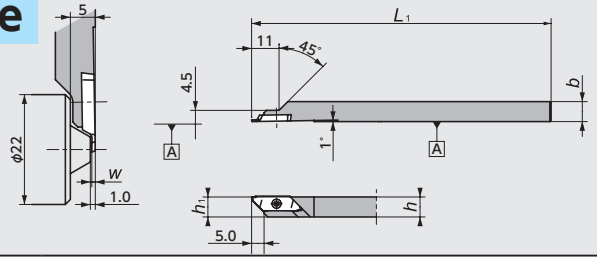
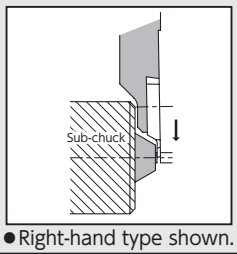


Figure-2



●Right-hand type shown.

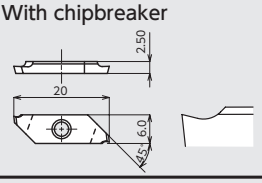
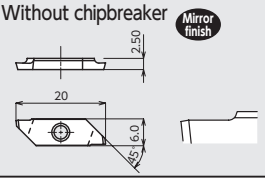
Holder dimensions

Shape	Code No.	Toolholder Part No.	Stock	Max. cutting-off dia (mm) φD	Dimensions (mm) h	b	L_1	h_1	f	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5346572	**CTPSR10**	●	**10.0**	10	10	120	10	0.0	CTPS (See table below)	LR1S-2.5*7	CLR-15S
	5397187	**R12**	●		12	12		12				
Figure-2	5486717	**CTPSR08-SUB04**	●	**4.0**	8	8	120	8	—	CTPS-001 (See table below)	LR1S-2.5*5	CLR-15S

☆CTPS toolholder is interchangeable tool. All CTPS type inserts can be used (front turning, back turning, cut-off, threading) on the same holder. (H84-85 for more information)

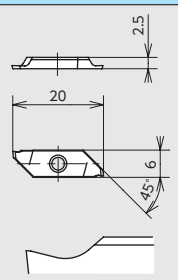
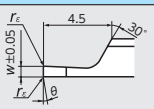
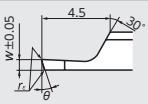
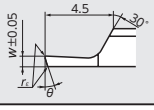
Applicable inserts

CTPS type

Shape	Part No.	Chip-breaker	Max. cutting-off dia (mm) φD	Dimensions (mm) w	L	θ	r_ε	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock
With chipbreaker  ●Right-hand type shown.	**CTPS12FR**	Provided	**4.0**	1.2	3.5	16°	0.05	5346275	●	5362587	●
	15FR		**5.0**	1.5	4.0			5346267	●	5362595	●
	18FR		**8.5**	1.8	5.5			5346283	●	5362603	●
	20FR		**10.0**	2.0	6.0			5374210	●	5374194	●
Without chipbreaker Mirror finish  ●Right-hand type shown.	**CTPS12FRV**	None	**4.0**	1.2	3.5	20°	0.0	5346937	●	5362611	●
	15FRV		**5.0**	1.5	4.0			5346929	●	5362629	●
	18FRV		**8.5**	1.8	5.5			5346945	●	5362637	●
	20FRV		**10.0**	2.0	6.0			5374202	●	5374228	●

※θ shows degrees on the holders tool.

CTPS-001 type

Shape	Cutting edge shape	Part No.	Chip-breaker	Max. cutting-off dia (mm) φD	Dimensions (mm) w	θ	r_ε	PVD-coated micro-grain carbides ZM3	Stock
 ●Right-hand type shown.		**CTPS07FRN-001**	Provided	**4.0**	0.7	0°	0.05	5460670	●
		**CTPS07FR-001**				16°	0.05	5441852	●
		**CTPS07FRV-001** Mirror finish	None			20°	0.0	5441860	●

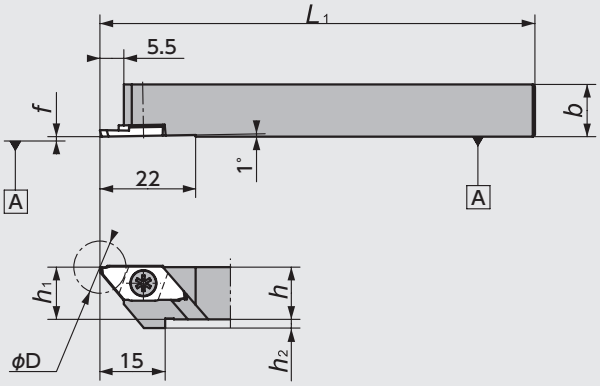
※θ shows degrees on the tool holders.

SS Tools for Cutting off

Maximum diameter for cutting off : ϕ12

CTP type

Front/back clamping type



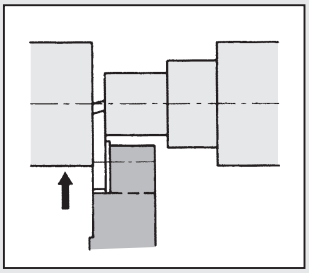
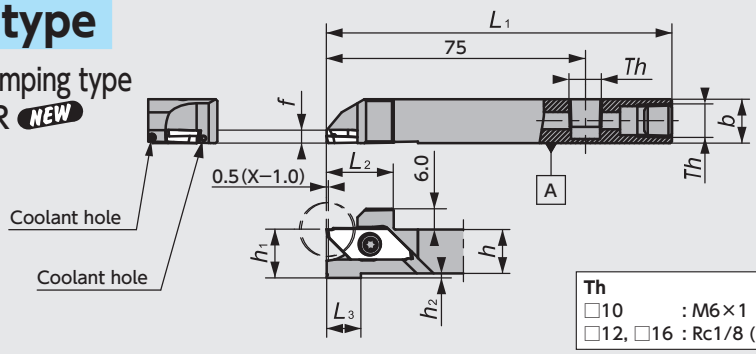


Figure-1

●Right-hand type shown.

CTP-OH type

Front/back clamping type
SPLASH BAR NEW



Th	
□10	: M6×1
□12, □16	: Rc1/8 (PT1/8)

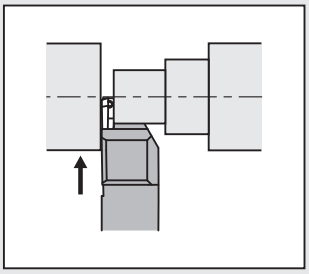


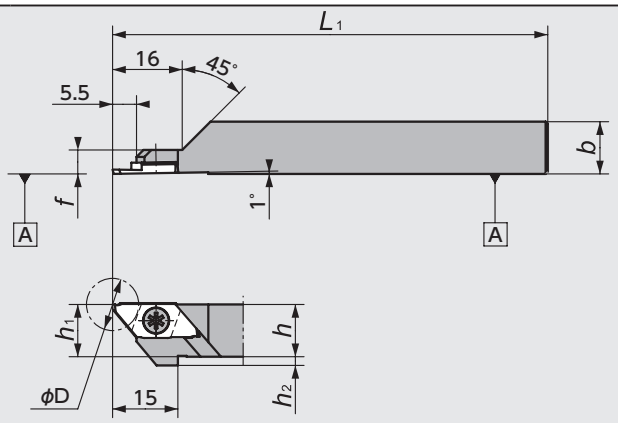
Figure-2

●Left-Hand holders are designed for Right-Hand machines.
(The positions for coolant supply connection are same between right and left hand.)

●Right-hand type shown.

⟨For mounting on back spindle⟩

CTPR-SUB type



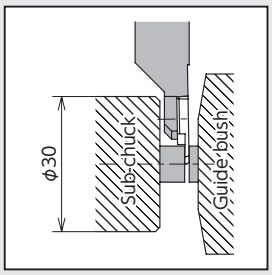
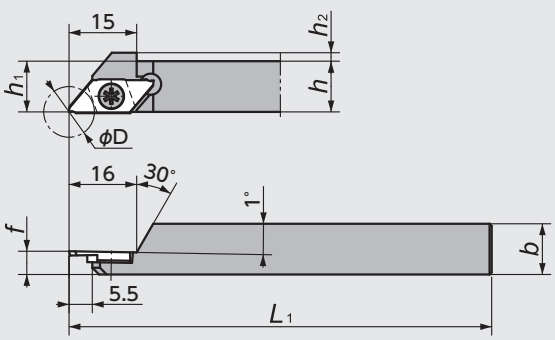


Figure-3

●Right-hand type shown.

CTPL-SUB type



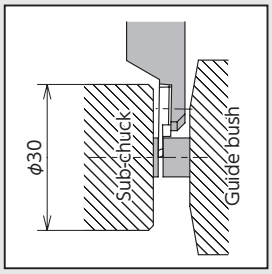
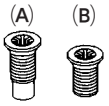
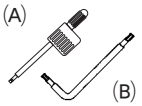


Figure-4

●Left-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Max. cutting-off dia (mm) φD	Dimensions (mm) h	b	L_1	h_1	h_2	f	Applicable insert	Parts: Clamping screw	Parts: Wrench
															
Figure-1	5131362	5131354	CTP[R/L]08	●	●	12.0※	8	12	120	8	4	0.0	CTP CTP-X CTPX **H64～65**	LRIS-4*10PW (A)	CLR-15S (A)
	5873849	5893458	10H	●	●		10	10	100	10	2				
	5089644	5089636	10	●	●				120						
	5459730	5459748	12GX	●	●		12	12	85	12	0			LRIS-4*12PW (A)	
	5089651	5089669	12	●	●				120						
	5089677	5089685	13	●	●		13	13		13					
	5459755		16H	●			16	16	100	16					
	5183496	5183504	16	●	●				120						
Figure-2	5921853	5921861	CTP[R/L]1012H-OH	●	●	12.0※	10	10	100	12	4.475	0.0	CTP CTP-X CTPX **H64～65**	LRIS-4*12PW (A)	CLR-15S (A)
	5918651	5918040	12H-OH	●	●		12	12			1.3				
	5921879	5921887	16H-OH	●	●		16	16		16	0				
Figure-3	5571831		CTP[R/L]08-SUB	●		12.0※	8	8	120	8	4	5.5	CTP-FR(N) (V) (NV) CTP-FRX (FRNX) CTPX-FR(N) **H64～65**	LRIS-4*5 (B)	LLR-25S (B)
	5607999		08J-SUB	★					110						
	5391610		10F-SUB	●			10	10	80	10	2				
	5605282		10KX-SUB	●					120						
	5474580		12GX-SUB	●			12	12	85	12	0				
	5391628		12-SUB	●					120						
Figure-4		5570791	CTP[R/L]08-SUB		●	12.0※	8	8	120	8	4	5.5	CTP-FLK CTP-FLKV CTP-FLN CTP-FLNV CTPX-FLN CTP-FLNX **H64～65**	LRIS-4*5 (B)	LLR-25S (B)
		5608005	08J-SUB		★				110						
		5499389	10GX-SUB		●		10	10	85	10	2				
		5482534	12GX-SUB		●		12	12		12	0				

※The max. cut off diameter varies depending on the insert used.
Please refer to page **H64～65.**

SS Tools for Cutting off

Applicable inserts

CTP type

Shape	Cutting edge shape	Part No.	Max. cutting off dia (mm) ϕD	Dimensions (mm) w	L	θ	r_ε	Micro-grain carbide KM1	Stock	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock	DT4	Stock
⟨With chipbreaker⟩		CTP05FR-SH	5.0	0.5	2.8	15°	0.03			5788732	●				
		07FR	8.0	0.7	4.5	16°				5126255	●				
		10FR	12.0	1.0	6.7					5089594	●			5847868	●
		10FR-SH	7.0	1.0	4.1	15°	0.05			5788724	●			5847876	●
		15FR	12.0	1.5	6.7	16°				5089602	●	5284690	●		
		20FR		2.0						5125521	●	5432372	●		
		CTP05FRN-SH	5.0	0.5	2.8		0.03			5788799	●				
		10FRN	12.0	1.0	6.7					5133327	●			5847884	●
		10FRN-SH	7.0	1.0	4.1	0°				5788757	●			5847892	●
		15FRN	12.0	1.5						5133301	●	5306543	●		
		20FRN		2.0						5133335	●	5272224	●		
		CTP10FRK	11.0	1.0	6.7	16°	0.05			5131412	●				
		15FRK		1.5						5131404	●				
		20FRK		2.0						5131388	●				
		CTP07FL	8.0	0.7	4.5					5126263	●				
		10FL	12.0	1.0	6.7	16°	0.05			5089586	●				
		15FL		1.5						5089610	●				
		20FL		2.0						5125513	●				
		CTP05FLN-SH	5.0	0.5	2.8		0.03			5788773	●				
		10FLN	12.0	1.0	6.7					5133350	●			5847900	●
		10FLN-SH	7.0	1.0	4.1	0°				5788765	●			5847918	●
		15FLN	12.0	1.5	6.7		0.05			5133319	●	5378526	●		
		20FLN		2.0						5133343	●	5273008	●		
		CTP05FLK-SH	5.0	0.5	2.8	17°	0.03			5788781	●				
		10FLK	11.0	1.0	6.7	16°				5131420	●			5847926	●
		10FLK-SH	7.0	1.0	4.1	17°				5788807	●			5847934	●
		15FLK	11.0	1.5	6.7	16°	0.05			5131396	●	5328240	●		
		20FLK		2.0						5131370	●	5280722	●		
		15FLKB ※		1.5						5645254	●				
⟨Without chipbreaker⟩ Mirror finish		CTP10FRV	12.0	1.0	6.7	20°	0.0	5576079	●	5255708	●	5264841	●	5847942	●
		15FRV		1.5				5576087	●	5255682	●	5264858	●		
		20FRV		2.0				5576095	●	5255666	●	5264866	●		
		CTP15FRNV		1.5		0°		5576111	●						
		20FRNV		2.0				5576020	●						
		CTP10FLV	12.0	1.0	6.7	20°	0.0			5255641	●	5264882	●		
		15FLV		1.5						5255625	●	5264890	●		
		20FLV		2.0						5255609	●	5264908	●		
		CTP15FLNV		1.5		0°		5576012	●						
		20FLNV		2.0				5576004	●						
		CTP15FLKV	11.0	1.5		20°		5576103	●			5264874	●		
		20FLKV										5392691	●		

The above figures denote the CTP⋯FR type.
θ indicates the angle when the insert is set into the holder.
R-hand shown.

The above figures denote the CTP⋯FR type.
θ indicates the angle when the insert is set into the holder.
R-hand shown.

※CTP15FLKB is the high performanceversion of CTP15FLK. (The rake angle is greater)

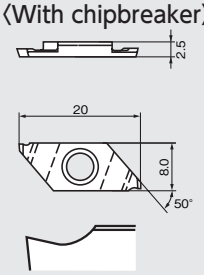
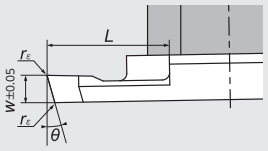
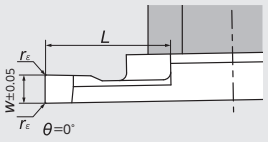
⋯ Indicates inserts available for machines with sub-chucking.

Applicable inserts

CTP-X type

Cost effective

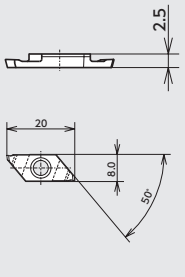
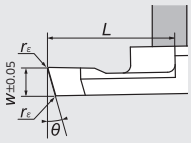
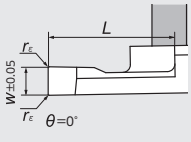
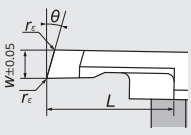
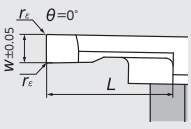
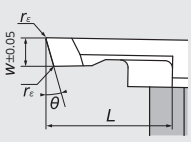
Strengthened cutting edge with land

Shape	Cutting edge shape	Part No.	Max. cutting off dia (mm) ϕD	Dimensions (mm) w	L	θ	r_ε	PVD-coated micro-grain carbides ZM3	Stock
⟨With chipbreaker⟩  The above figures denotes the CTP□□FRX type. θ indicates the angle when the insert is set into the holder. R-hand shown.		CTP15FRX	12.0	1.5	6.7	16°	0.05	5360847	●
		20FRX		2.0				5360839	●
		CTP15FRNX		1.5		0°		5360813	●
		20FRNX		2.0				5360821	●

Applicable inserts

CTPX type

Cost effective

Shape	Cutting edge shape	Part No.	Max. cutting off dia (mm) ϕD	Dimensions (mm) w	L	θ	r_ε	PVD-coated micro-grain carbides ZM3	Stock	QM3	Stock	DT4	Stock
⟨With chipbreaker⟩  R-hand shown.		CTPX15FR	12.0	1.5	6.7	16°	0.05	5334909	●	5535729	●	5827514	●
		20FR		2.0				5334834	●	5535745	●	5850169	●
		CTPX15FRN		1.5		0°				5535711	●	5850193	●
		20FRN		2.0						5535737	●	5850144	●
		CTPX15FL		1.5		16°						5850227	●
		20FL		2.0								5850185	●
		CTPX15FLN		1.5		0°				5535653	●	5850201	●
		20FLN		2.0						5535638	●	5830468	●
		CTPX15FLK	11.0	1.5		16°				5535646	●	5850219	●
		20FLK		2.0						5535620	●	5850177	●

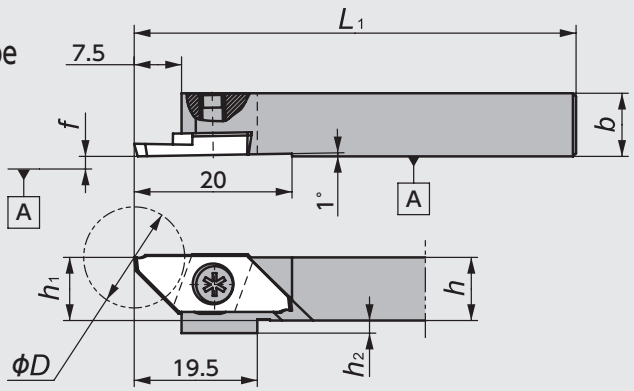
▭ ··· Indicates inserts available for machines with sub-chucking.

SS Tools for Cutting off

Maximum diameter for cutting off : ϕ16

CTPA type

Front/back clamping type



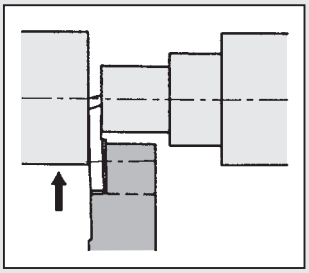
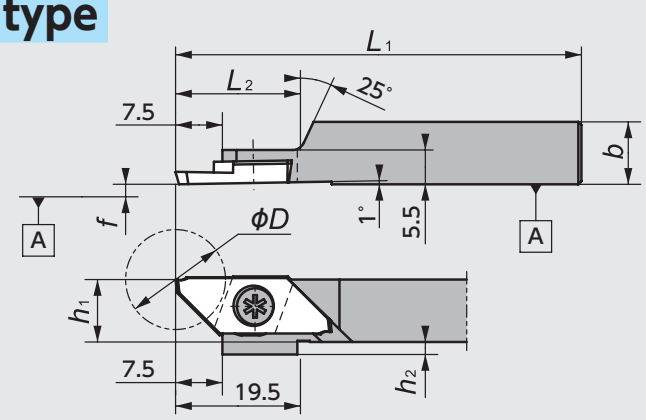


Figure-1

●Right-hand type shown.

⟨For mounting on back spindle⟩

CTPAR-SUB type



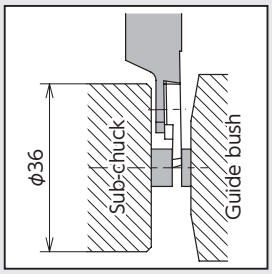
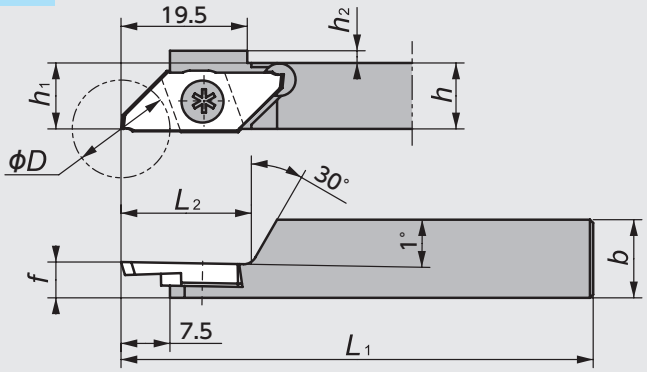


Figure-2

●Right-hand type shown.
●For machining of short length work pieces

CTPAL-SUB type



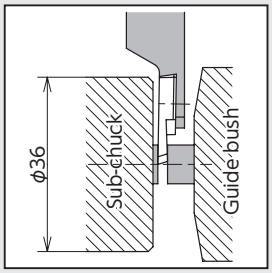
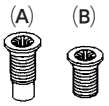
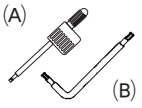


Figure-3

●Left-hand type shown.
●For machining of very short length work pieces

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Max. cutting off dia (mm) φD	Dimensions (mm) h	b	L_1	h_1	h_2	L_2	f	Applicable insert	Parts: Clamping screw	Parts: Wrench
																
Figure-1	5199187	5199153	CTPA[R/L]10	●	●	16.0 ※	10	10	120	10	2	—	0.0	CTPA (cutting-off) CTPAX (cutting-off) **H68～69** TBPA (back turning) **H45**	LRIS-4*10PW (A)	CLR-15S (A)
	5199195	5199161	12	●	●		12	12		12	0				LRIS-4*12PW (A)	
	5199203	5199179	16	●	●		16	16		16						
	5459540	5459557	20F	●	●		20	20	80	20					LRIS-4*10 (B)	LLR-25S (B)
Figure-2	5600770		CTPAR10GX-SUB	●		16.0 ※	10	10	85	10	2	20	0.0	CTPA-FR (N)(V)(NV) CTPAX-FR (N) **H68～69**	LRIS-4*5 (B)	LLR-25S (B)
	5454681		12GX-SUB	●			12	12		12	0					
	5570676		12KX-SUB	●					120							
Figure-3		5505904	CTPAL10GX-SUB		●	16.0 ※	10	10	85	10	2	20	5.5	CTPA-FL (N)(K)(NV)(KV) CTPAX-FL (N)(K) **H68～69**	LRIS-4*5 (B)	LLR-25S (B)
		5454699	12GX-SUB		●		12	12		12	0					
		5570684	12KX-SUB		●				120							
		5604871	16GX-SUB		●		16	16	85	16		28				

※The max. cutting off diameter varies depending on the insert used.
Please refer to pages **H68 and H69.**

Holder dimensions

CTPA type

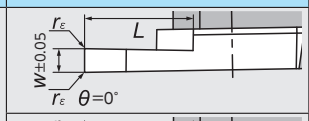
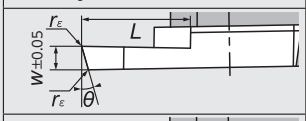
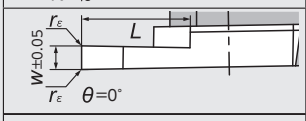
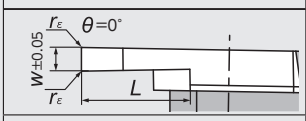
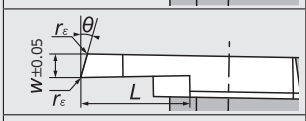
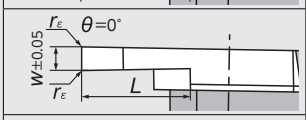
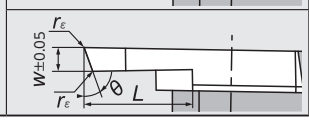
Shape	Toolholder Part No.	Part No.	Max. cutting off dia (mm) ϕD	Dimensions (mm) w	L	θ	r_ε	PVD-coated micro-grain carbides ZM3	Stock	QM3	Stock	VM1	Stock	DT4	Stock	PCD PD1	Stock
⟨With chipbreaker⟩		CTPA07FR	8.0	0.7	4.5	16°	0.05	5501242	●								
		10FR	12.0	1.0	6.7			5501218	●								
		15FR	16.0	1.5	9.2			5248075	●	5270020	●	5439328	●	5855077	●		
		20FR		2.0				5194113	●	5229596	●	5439310	●	5854997	●		
		CTPA07FRN	8.0	0.7	4.5	0°	0.05	5512496	●								
		10FRN	12.0	1.0	6.7			5496880	●								
		15FRN	16.0	1.5	9.2			5271473	●	5556881	●	5415096	●	5855051	●		
		20FRN		2.0				5199146	●	5562715	●	5476338	●	5854989	●		
		20FRN-P					0.1									5781620 ※1-corner spec.	●
	⟨PD1⟩	30FRN		3.0			0.05			5789151	●						
		CTPA07FL	8.0	0.7	4.5	16°	0.05	5501234	●								
		10FL	12.0	1.0	6.7			5501226	●								
		15FL	16.0	1.5	9.2			5342688	●					5855101	●		
		20FL		2.0				5199138	●					5855036	●		
		CTPA10FLN	12.0	1.0	6.7	0°	0.05	5496898	●								
		10FLND	16.0		9.2			5789599	●								
		15FLN		1.5				5286349	●	5562707	●	5365747	●	5855085	●		
		20FLN		2.0				5199120	●	5250964	●	5439351	●	5854971	●		
		20FLN-P					0.1									5781646 ※1-corner spec.	●
	⟨PD1⟩	30FLN		3.0			0.05			5782677	●						
		CTPA07FLK	6.5	0.7	4.5	16°	0.05	5505912	●								
		10FLK	11.0	1.0	6.7			5496906	●								
		10FLKD	16.0		9.2			5789607	●								
		15FLK	14.5	1.5				5248083	●	5562699	●	5476320	●	5855093	●		
		20FLK		2.0				5199112	●	5250774	●	5439369	●	5855002	●		

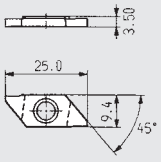
● The above figures denote the CTPA FR type.
● R-hand shown.

☆θ indicates the angle when the insert is set into the holder.
··· Indicates inserts available for machines with sub-chucking.

Applicable inserts

CTPA type

Shape	Cutting edge shape	Part No.	Max. cutting off dia (mm) ϕD	Dimensions (mm) w	L	θ	r_ε	Micro-grain carbide KM1	Stock	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock
⟨Without chipbreaker⟩		**CTPA20FRS**	16.0	2.0	9.2	0°	0.05			5378823	●		
		**CTPA20FRV** Mirror finish				20°	0.0	5576038	●			5264916	●
		**CTPA20FRNV** Mirror finish				0°		5576046	●				
		**CTPA20FLS**	16.0	2.0	9.2	0°	0.05			5225255	●		
		**CTPA20FLV** Mirror finish				20°	0.0					5264924	●
		**CTPA20FLNV** Mirror finish				0°		5576053	●				
● The above figures denotes the CTPA FRS type. ● R-hand shown.		**CTPA20FLKV** Mirror finish	14.5			20°		5576061	●			5264932	●

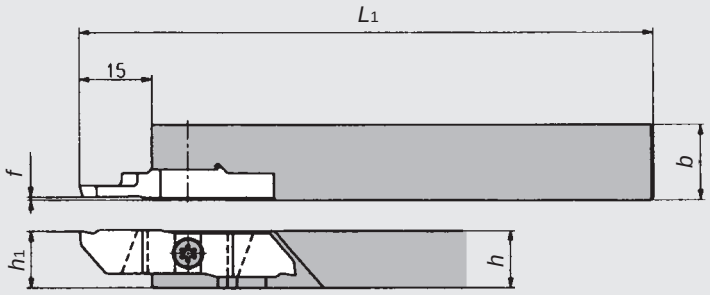


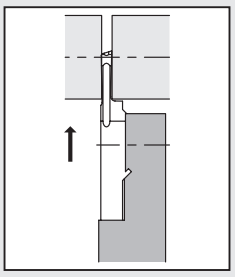
☆θ indicates the angle when the insert is set into the holder. ▭ ···Indicates inserts available for machines with sub-chucking.

SS Tools for Cutting off

Maximum diameter for cutting off : ϕ20

CTPW type





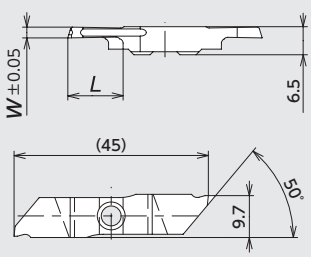
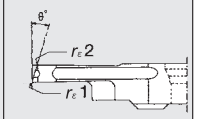
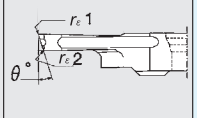
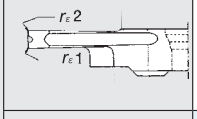
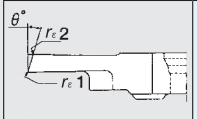
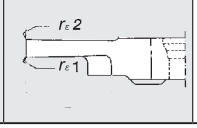
●Right-hand type shown.

Holder dimensions

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Max. cutting off dia (mm) ϕD	Dimensions (mm) h	b	L_1	h_1	f	Applicable insert	Parts: Clamping screw	Parts: Wrench
–	5487004	CTPW$^{R}_{L}$10A	–	●	20.0	10	12	120	9.95	0.6	CTPW25□$^{R}_{L}$ (See table below)	LR1S-4*10	LLR-25S
5443593	–	10	●	–			16						
–	5488150	12A	–	●		12	12		11.95				
5443601	–	12	●	–			16						
5443627	5486980	16	●	●		16	16		15.95				
5443635	5486998	20	●	●		20	20		19.95				

Applicable inserts

CTPW type

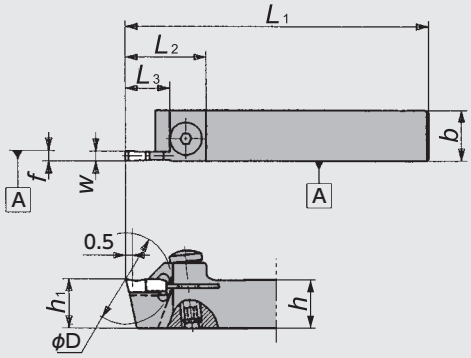
Shape	Cutting edge shape	Part No.	Chip-breaker	Max. cutting off dia (mm) ϕD	Dimensions (mm) w	L	θ	$r_{\varepsilon 1}$	$r_{\varepsilon 2}$	PVD-coated micro-grain carbides ZM3 R	Stock	L	Stock
 ●L-hand shown.		CTPW25F$^{R}_{L}$	Provided	20.0	2.5	12	17°	0.05	0.20	5437991	●	5487053	●
		CTPW25F$^{R}_{L}$K					17°	0.05	0.20			5487012	●
		CTPW25F$^{R}_{L}$N					0°	0.05	0.05	5438056	●	5487046	●
		CTPW25F$^{R}_{L}$P	None				17°	0.05	0.20	5443650	●	5487038	●
		CTPW25F$^{R}_{L}$NV※					0°	0.00	0.00	5438049	●	5487020	●

※This insert is made to be multi-functionally.

Maximum diameter for cutting off : ϕ20

CTV-K2 type

Front/back clamping type



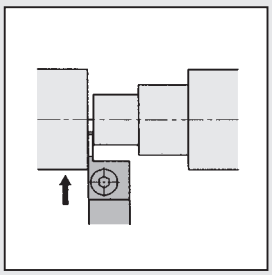
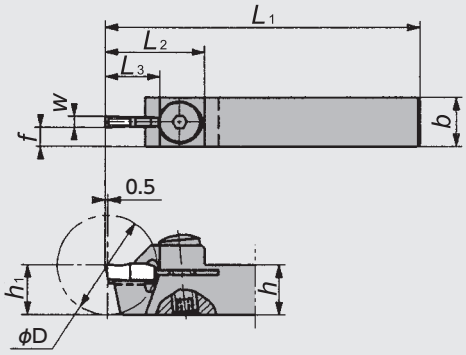


Figure-1

● Right-hand type shown.

CTVN-K2 type

Front/back clamping type



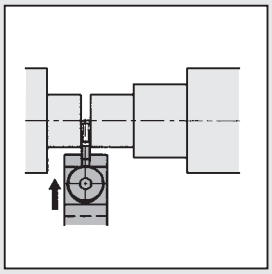


Figure-2

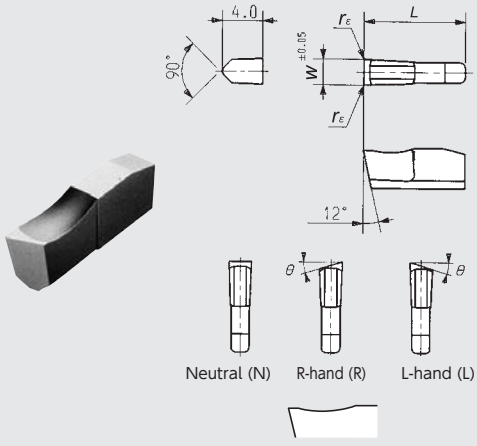
Holder dimensions

Shape	Code No. R	Code No. N	Code No. L	Toolholder Part No.	Stock R	Stock N	Stock L	Max. cutting off dia (mm) φD	Dimensions (mm) w	h	b	L_1	h_1	f	L_2	L_3	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5111919		5111927	CTV[R/L]10K2	●		●	20.0	2.2 (2.5)	10	10	120	10	0.0	20.0	11	CTV-S (See table below)	A0S-5*16	LW-2.5S
			5459763	12GX2			●			12	12	85	12						
	5111950		5111935	12K2	●		●					120							
Figure-2	5208236			CTVN10K2	●			20.0	2.2 (2.5)	10	10	120	10	3.9	19.5	11	CTV-S (See table below)	A0S-5*16	LW-2.5S
	5208244			12K2	●					12	12		12	4.9					

Note) The dimension f indicates the value when an insert of CTV22□○○S type is used.

Applicable inserts

CTV-S type

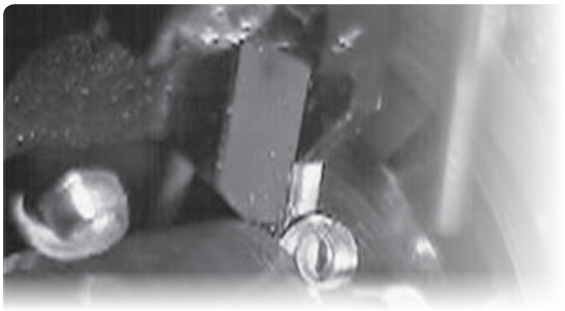
Shape	Part No.	Dimensions (mm) w	L	θ	r_ε	PVD-coated micro-grain carbides ZM3	Stock
	CTV22N05S	2.2	10	0°	0.05	5111976	●
	22N10S				0.10	5111992	●
	CTV25N05S	2.5			0.05	5112024	●
	25N10S				0.10	5112073	●
	CTV22R05S	2.2		17°	0.05	5111968	●
	22R10S				0.10	5112008	●
	CTV25R05S	2.5			0.05	5112032	●
	25R10S				0.10	5112065	●
	CTV22L05S	2.2			0.05	5111984	●
	22L10S				0.10	5112016	●
	CTV25L05S	2.5			0.05	5112040	●
	25L10S				0.10	5112057	●

CUT DUO

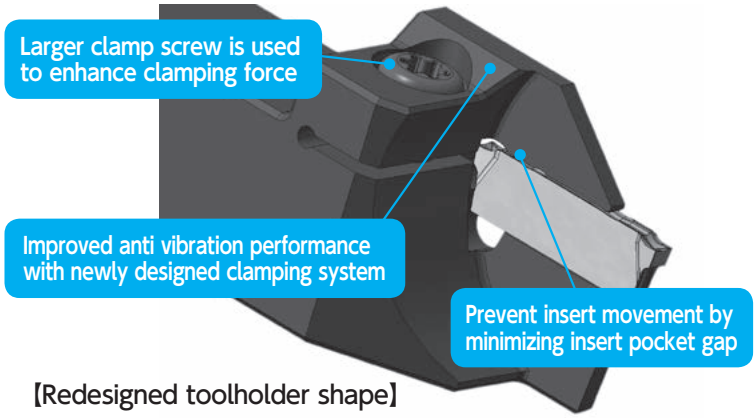
High rigidity cut-off tool

Renewed CUT DUO

Improved clamping system offers more stable machining



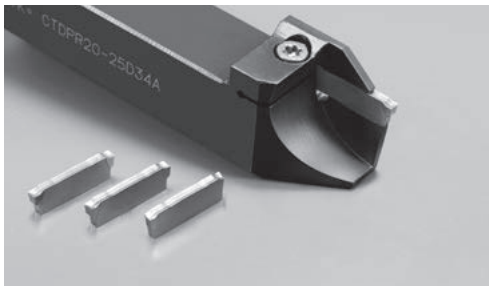
Redesigned toolholder offers increased reliability and productivity



【Redesigned toolholder shape】

Precision ground chipbreaker enables low cutting force and good chip control

New PVD coated carbide "DM4" is available



Cut Duo offers longer tool life in all types of hard to cut materials, like, carbon steel, alloy steel, SUS304, SUS440C etc...

Chip control

Cutting condition v_c=80m/min WET

f	0.05mm/rev	0.08mm/rev	0.12mm/rev
SCM435			
SUS304			

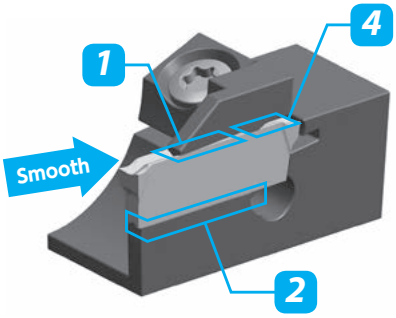
Triple Dimple Structure

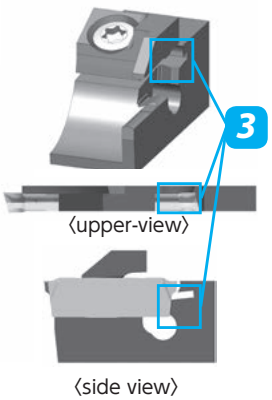
Clamping System

1 *Pulling in system* ***to avoid dropping off***

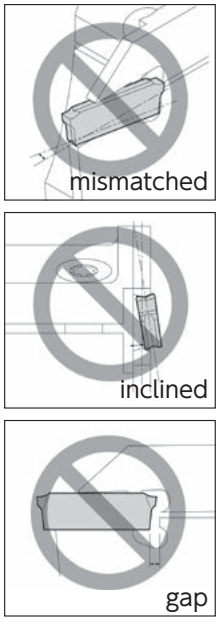
1 2 4 ***Smoothly attach*** *by guide function*

3 *Stable clamping on convex configuration*

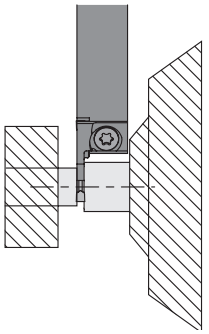




● check points



Example

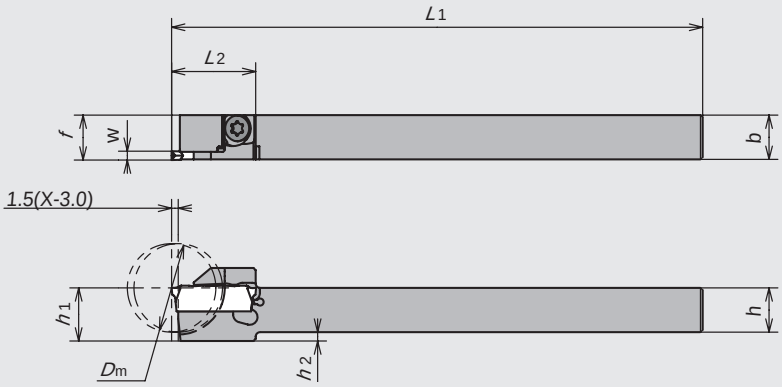
Shaft Cut-off	
Work Material: SCM435	
Cutting Speed: 80m/min	
Feed speed : 0.05mm/rev	
Coolant : WET	
NTK : QM3	6,000pcs/corner
competiter's PVD coat	3,000pcs/corner
CUT DUO get's donble tool life and exellent finish.	

Applicable inserts

Max. Cut-off diameter ～ φ20、～ φ25.4、～ φ32、～ φ34

CTDP type

Double edges



●Right-hand type shown.

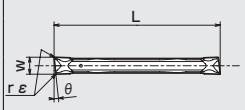
Holder dimensions

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) w	h	b	L_1	h_1	h_2	f	L_2	Max. cutting off dia (mm) D_m	Applicable insert	Parts: Clamping screw	Parts: Wrench
5750534	5750559	CTDP[R/L]10-20D20	●	●	2.0	10	10	120	10	2	10.15	19.0	20.0	CTDP20 (See table below)	LRIS-4＊12 ※1	LLR-25S
5717087	5717079	12-20D20	●	●	2.0	12	12	120	12	0	12.15	19.0				
5717103	5717095	12-20D25	●	●	2.0	12	12	120	12	0	12.15	22.0	25.4			
5750567	5750575	16-20D25	●	●	2.0	16	16	120	16	0	16.15	22.0				
5842299	5842307	16-20D32A	●	●	2.0	16	16	120	16	0	16.15	27.5	32.0	CTDP20 (See table below)	LRIS5＊10 ※2	LLR-28S
5842331	5842349	2012-20D32A	●	●	2.0	20	12	120	20	0	12.15	29.5				
5842315	5842323	20-20D32A	●	●	2.0	20	20	120	20	0	20.15	29.5				
5842356	5842364	16-25D34A	●	●	2.5	16	16	120	16	0	16.15	28.5	34.0	CTDP25 (See table below)	CS0516LSH ※3	LW-3 ※3
5842398	5842406	2012-25D34A	●	●	2.5	20	12	120	20	0	12.15	29.5				
5842372	5842380	20-25D34A	●	●	2.5	20	20	120	20	0	20.15	29.5				

※1 Recommended tightening torque 3.0N.m　※2 Recommended tightening torque 5.0N.m

※3 Parts had been changed since June.2013. (Old)LRIS5*10➡(New)CS0516LSH　(Old)LLR-28S➡(New)LW-3

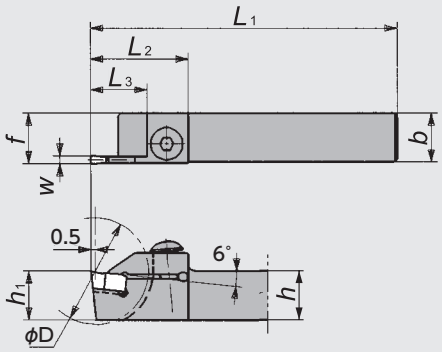
Applicable inserts

Shape	Part No.	Dimensions (mm) w	L	θ	r_ε	PVD-coated micro-grain carbides TM4	Stock	QM3	Stock	DM4	Stock
	CTDP20N	2.0	19.1	0°	0.05	5717012	●	5717004	●	5844972	●
	20N02				0.2	5716998	●	5716980	●	5839352	●
	20R6			6°	0.05	5717038	●	5717020	●	5844956	●
	20R15			15°	0.05	5717061	●	5717046	●	5844964	●
	CTDP25N	2.5	21.2	0°	0.05	5750682	●	5750690	●	5846944	●
	25N02				0.2	5750708	●	5750732	●	5846936	●
	25R6			6°	0.05	5750740	●	5750757	●	5852694	●
	25R15			15°	0.05	5750765	●	5750773	●	5849377	●

SS Tools for Cutting off

Maximum diameter for cutting off : ϕ45

CTV(-S) type



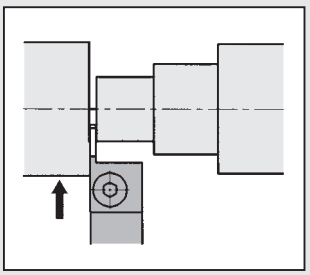
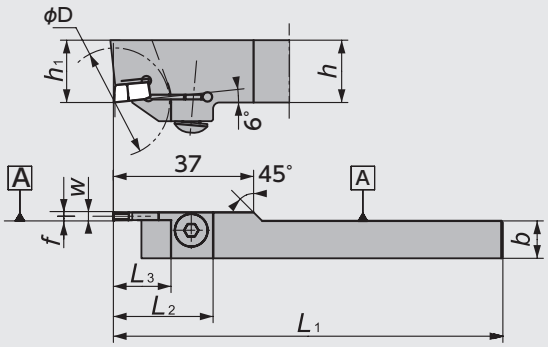


Figure-1

● Right-hand type shown.

CTV-X type



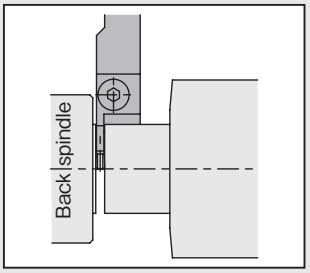
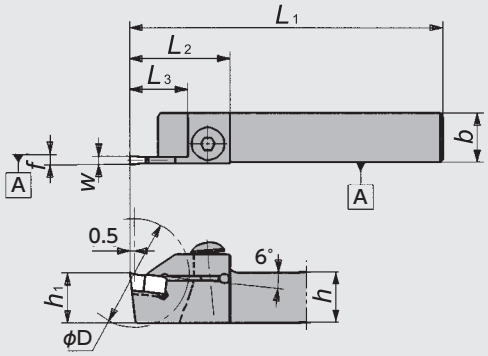


Figure-2

● Left-hand type shown.

CTV-M(B) type



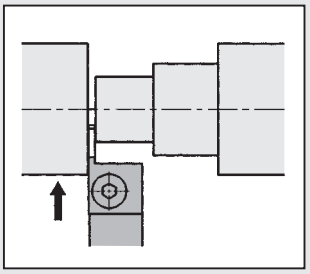


Figure-3

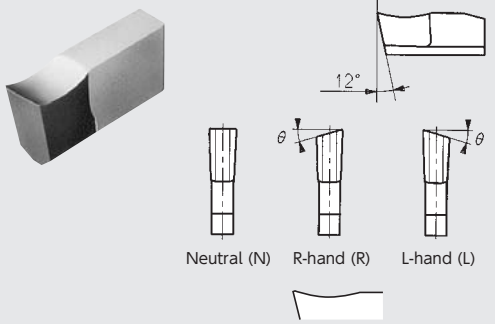
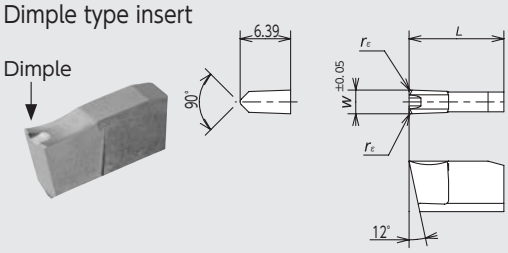
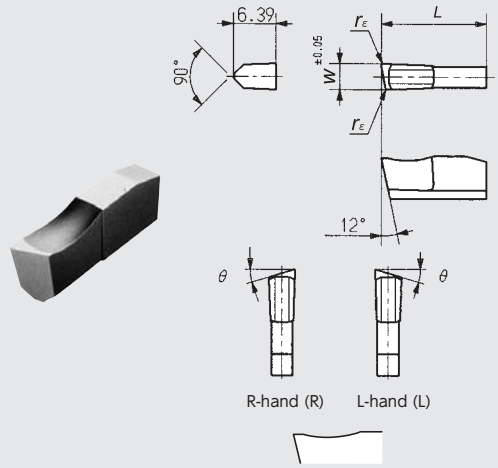
● Right-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Max. cutting off dia (mm) φD	Dimensions (mm) w	h	b	L_1	h_1	f	L_2	L_3	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5904131		CTV R/L 16K25S	●		23.0	2.5	16	16	125	16	16.5	24	12.2	CTV25□ H75	BS0620	LW-4
	5904180		20K25S	●				20	20		20	20.5					
	5904149		16K30S	●			3.0	16	16		16	16.5			CTV30□ H75		
	5904172		20K30S	●				20	20		20	20.5					
	5853619	5853627	16K25	●	●	35.0	2.5	16	16		16	16.5	32	18.5	CTV25□ H75		
	5853643	5853635	20K25	●	●			20	20		20	20.5					
	5853593	5853601	16K30	●	●		3.0	16	16		16	16.5			CTV30□ H75		
	5853577	5853585	20K30	●	●			20	20		20	20.5					
	5120423	5122197	1913L25	●	●		2.5	19	13	140	19	13.0			CTV25□ H75		
	5120431	5122189	1913L30	●	●		3.0								CTV30□ H75		
Figure-2		5595384	CTVL2012K30X-1		●			20	12	125	20	3.0					
Figure-3	5177100		CTV R/L 16-25M	●		28.0	2.5	16	16	120	16	0.5	25.5	15	CTV25□ H75	BS0520	LW-3
	5185541		20-25M	●				20	20		20						
	5185566		16-30M	●			3.0	16	16		16				CTV30□ H75		
	5183314		20-30M	●				20	20		20						
	5162219	5184528	25-30B	●	●	45.0		25	25	150	25		34.5	23.5		BS0625	LW-4

Applicable inserts

CTV type

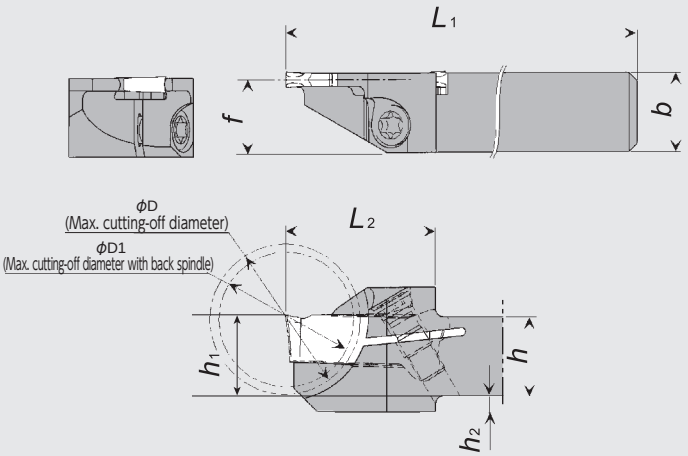
Shape	Part No.	Dimensions (mm)				PVD-coated micro-grain carbides			
		w	*L*	*θ*	r_ε	ZM3	Stock	QM3	Stock
	**CTV25N**	2.5	12	0°	0.20	5862248	●		
	30N	3.0				5864145	●	5972997	●
	25R	2.5		8°		5868633	●		
	30R	3.0				5866892	●		
	25L	2.5							
	30L	3.0				5129564	●		
Dimple type insert 	**CTV30N038**	3.0	12	0°	0.20	5524921	●		
	**CTV25R00A**	2.5	12	8°	0.05 or less	5162003	●		
	30R00A	3.0				5185327	●		
	25R00B	2.5		17°		5185178	●		
	30R00B	3.0				5183223	●		

SS Tools for Cutting off

Maximum diameter for cutting off : ϕ37.5

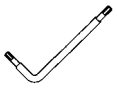
NTGW type

2-corner specification



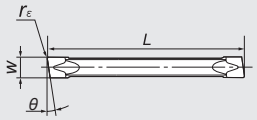
● Left-hand type shown.

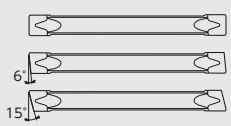
Holder dimensions

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Max. cutting-off dia (mm) φD	Max. cutting-off dia w/ back spindle (mm) φD1	w	h	b	L1	h1	f	L2	h2	Applicable insert	Parts: Clamping screw	Parts: Wrench
																	
5500574	5500582	NTGW R/L 1010-2	●	●	19.8	17.0	2.2	10	10	120	10	9.2	19	2	KT□W22 (See table below.)	SR-16-236/P	TORX-T15
5500590	5500657	1212-2	●	●	23.6	21.0		12	12		12	11.2		0			
5500665	5500673	1616-2	●	●	24.6	22.0		16	16		16	15.2	19.5				
5559992	5559984	2012-2	●	●	37.0	34.0		20	12		12	11.2	27				
5559976	5559968	2020-2	●	●					20		20	15.2					

Applicable inserts

KT□W type

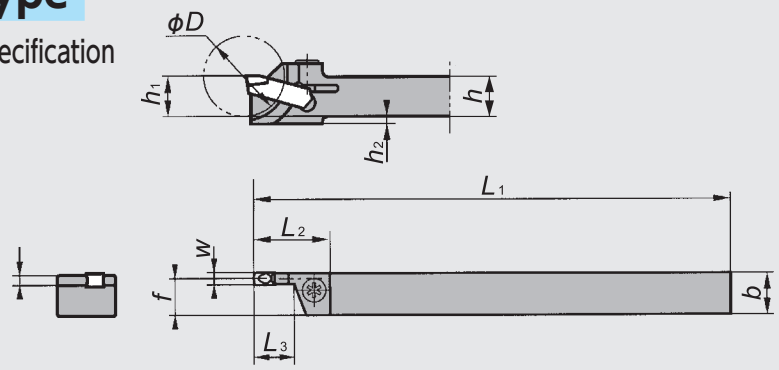
Shape	Part No.	Dimensions (mm) w	L	θ	r_ε	PVD-coated micro-grain carbides QM3	Stock
	KTNW22J	2.2	19.80	0°	0.20	5500756	●
	22JS		19.45		0.02	5500541	●
	KTRW22JS6D		20.55	6°		5500558	●
	22JS15D			15°		5500566	●



Maximum diameter for cutting off : ϕ40

NTG type

1-corner specification



[Max. cutting off diameter by work shape]

Part. No.	Round bar	Pipe
NTGR2020-2	φ34	φ60, 17
NTGR2020-3	φ40	φ60, 20

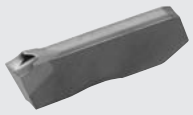
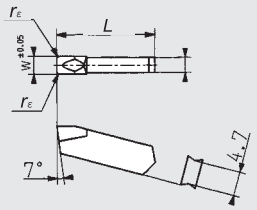
●Left-hand type shown.

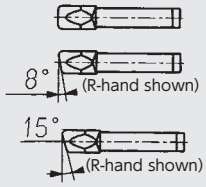
Holder dimensions

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Max. cutting off dia (mm) φD	w	h	b	L_1	h_1	f	L_2	L_3	h_2	Applicable insert	Parts: Clamping screw	Parts: Wrench
5103882	5103890	NTGR/L1010-2	●	●	20.0	2.2	10	10	120	10	9.1	19	10	2	KTN22J KTR22J8D KTR22J15D (See table below)	SR-16-236/P (A)	T0RX-T15 (A)
5459888		1212GX-2	●		25.0		12	12	85	12	11.1	21	12.5				
5103908	5103916	1212-2	●	●					120								
5103924	5103932	1616-2	●	●	32.0		16	16		16	15.1	28	16	0		SR-16-212(A)	T0RX-T20(A)
5103940	5191689	2020-2	●	●	34.0		20	20		20	19.1	33	17			CS0520(B)	LW-4(B)
5103957	5191671	2020-3	●	●	40.0	3.0					18.8	36	20		KTN30J KTR30J8D (See table below)	CS0620(B)	LW-5(B)

Applicable inserts

KT□ type

Shape	Part No.	Dimensions (mm) w	Dimensions (mm) L	Dimensions (mm) θ	Dimensions (mm) r_ε	PVD-coated micro-grain carbides QM3	Stock
 	KTN22J	2.2	16.2	0°	0.17	5103965	●
	30J	3.0		0°	0.25	5103999	●
	KTR22J8D	2.2		8°	0.17	5103973	●
	30J8D	3.0		8°	0.25	5104005	●
	22J15D	2.2		15°	0.00	5103981	●



Neutral **KTN** type

R/L **KTR□□J8D** type

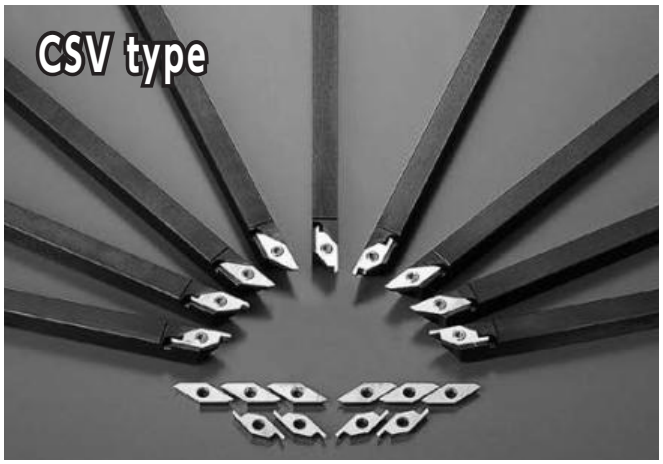
R/L **KTR22J15D** type

MEMO

SS Tools
Original Series

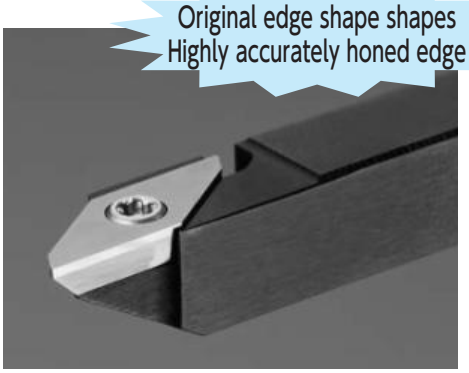
- CSV throw away type for machining of ultra small diameter ···· H80
- CTPS suitable for radial type tool post ···· H84
- Y-axis holders for Y-axis cutting operations ···· H86
- Shift holder ····· H90
- DS Sleeve ····· H91

For machining of ultra small diameters
CSV Series



Features

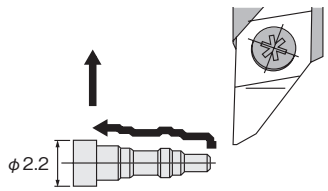
- Changing to this indexable type insert from brazed tools eliminates the need for regrinding and ensures repeatable results !
- Offers stable and precise machining with highly accurately honed cutting edges !

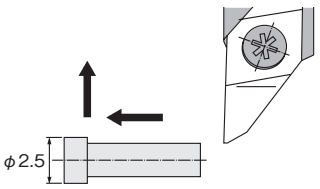


Best for machining work pieces with a very small diameter of ϕ5 or less

Possible to use on cam-type automatic lathes

Actual machining examples

Machining of wrist watch part ● Work material : SK4	
Cutting speed (m/min) = 15	
Feed rate (mm/rev) = 0.007	
Depth of cut (mm) = 0.03	
Coolant : WET	
NTK : **VM1**	40,000 pcs.
Brazed grade insert	20,000 pcs.

Machining of rivets ● Work material : SUS630	
Cutting speed (m/min) = 20	
Feed rate (mm/rev) = 0.015	
Depth of cut (mm) = 0.3	
Coolant : WET	
NTK : **VM1**	70,000 pcs.
Brazed grade insert	10,000 pcs.

The CSV series exhibited excellent machining accuracy and overwhelmingly longer tool life in the machining of very small diameter work pieces.

CSV type

For radial type tool post

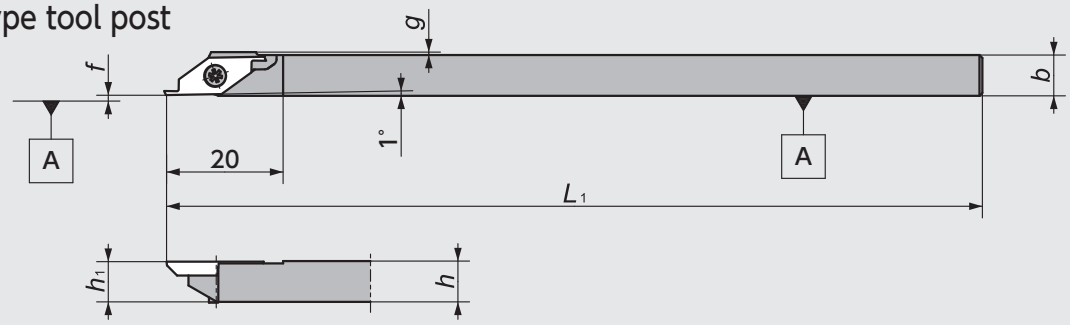


Figure-1

●Right-hand type shown.

CSV-NC/CSV-NC-F type

For gang type tool post

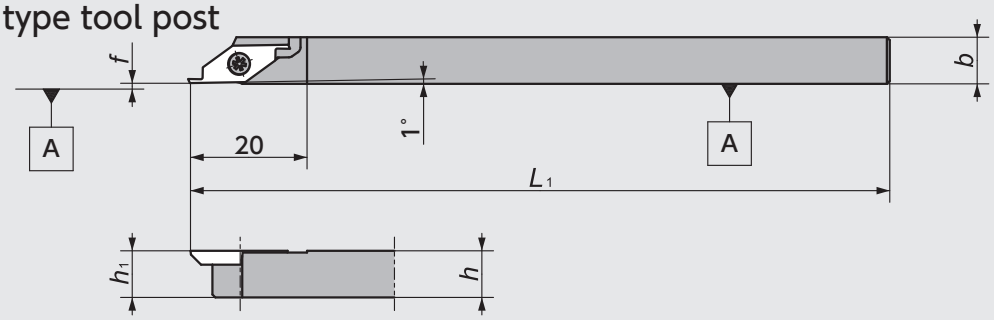


Figure-2

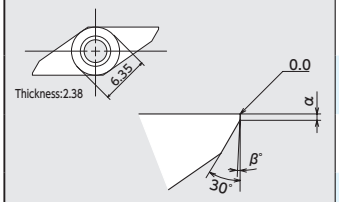
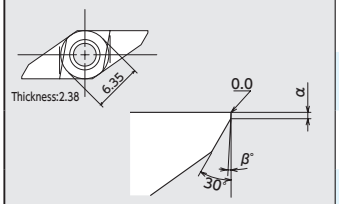
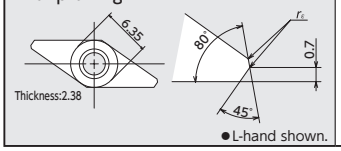
●Right-hand type shown.
●The offset of the cutting edge of CSV□08NC-F is small.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	g	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5492962		**CSV□07GX**	●		7	7	85	7	0.1	0.5	CSVF (front turning) CSVB (back turning) CSVC (cutting-off) CSVG (grooving) CSVT (threading) **H82～83**	LRIS-2.5*7	CLR-15S
	5303169	5303193	**07**	●	●			140						
	5492954		**08GX**	●		8	8	85	8		0.0			
	5303151	5303201	**08**	●	●			140						
	5303136		**095**	●		9.5	9.5		9.5					
	5303144	5303177	**10**	●	●	10	10		10					
	5474770		**12GX**	●		12	12	85	12					
	5327929		**12**	●				140						
Figure-2	5514062	5514070	**CSV□08NC**	●	●	8	8	120	8	0.1	—	CSVF (front turning) CSVB (back turning) CSVC (cutting-off) CSVG (grooving) CSVT (threading) **H82～83**	LRIS-2.5*7	CLR-15S
	5789615		**08NC-F**	●						0.0～0.1				
	5563010		**10GXNC**	●		10	10	85	10	0.1				
	5477492	5477542	**10NC**	●	●			120						
	5477534	5477500	**12NC**	●	●	12	12		12					

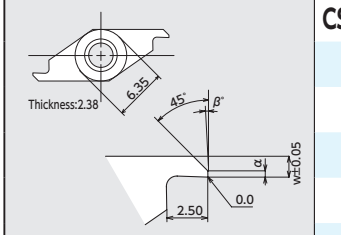
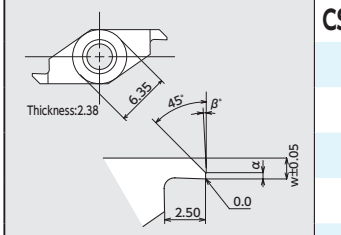
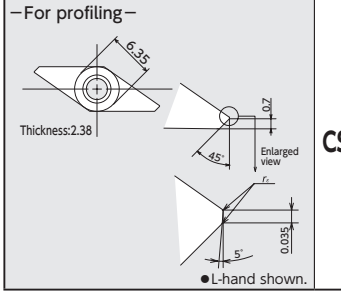
Applicable inserts

CSVF type — for front turning — Mirror finish

Shape	Part No.	Chip-breaker	Max. machining depth (mm)	Dimensions (mm) Cutting edge (α×β°)	r_ε	PVD-coated micro-grain carbides ZM3 R	ZM3 Stock	ZM3 L	ZM3 Stock	VM1 R	VM1 Stock	VM1 L	VM1 Stock	DT4 R	DT4 Stock	DT4 L	DT4 Stock
 ●Right-hand type shown.	CSVF11F[R/L]V	None	—	0.3×5°	0.0					5303516	●	5303557	●				
	11F[R/L]V-A			0.3×2°						5358858	●						
	11F[R/L]V-M			0.15×2°		5436019	●			5386248	●	5386255	●	5850235	●		
	11F[R/L]V-C			0.15×5°						5358577	●						
 ●Right-hand type shown.	CSVF11F[R/L]VB	Provided	3.0	0.3×5°	0.0					5313168	●	5313150	●				
	11F[R/L]VB-A			0.3×2°						5358692	●						
	11F[R/L]VB-M			0.15×2°		5436001	●			5386263	●	5386271	●	5850243	●		
	11F[R/L]VB-C			0.15×5°						5358700	●						
—For profiling—  ●L-hand shown.	CSVF11F[R/L]VX	None	—	—	0.0							5358866	●				

※The angles shown indicate the values when the insert is set into the holder.

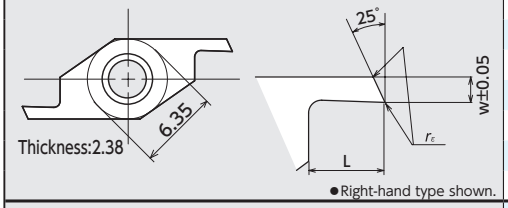
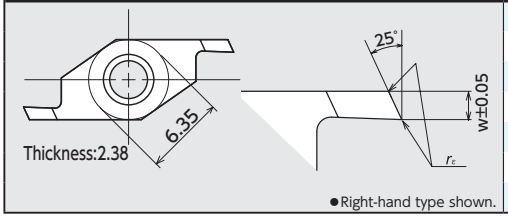
CSVB type — for back turning — Mirror finish

Shape	Part No.	Chip-breaker	Max. machining depth (mm)	Dimensions (mm) Width of the cutting edge W	Cutting edge (α×β°)	r_ε	PVD-coated micro-grain carbides ZM3 R	ZM3 Stock	ZM3 L	ZM3 Stock	VM1 R	VM1 Stock	VM1 L	VM1 Stock	DT4 R	DT4 Stock	DT4 L	DT4 Stock
 ●Right-hand type shown.	CSVB11F[R/L]V	None	2.0	1.00	0.3×5°	0.0					5303573	●	5303532	●				
	11F[R/L]V-A				0.3×2°						5358791	●						
	11F[R/L]V-M				0.15×2°		5435995	●			5386289	●	5386297	●	5827480	●		
	11F[R/L]V-C				0.15×5°						5358809	●						
	11F[R/L]V12			1.20	0.3×5°						5344890	●						
	11F[R/L]V14			1.40							5344908	●						
 ●Right-hand type shown.	CSVB11F[R/L]VB	Provided	2.0	1.00	0.3×5°	0.0					5358825	●						
	11F[R/L]VB-A				0.3×2°						5358833	●						
	11F[R/L]VB-M				0.15×2°		5435987	●			5386305	●	5386313	●	5827472	●		
	11F[R/L]VB-C				0.15×5°						5358841	●						
	11F[R/L]VB12			1.20	0.3×5°						5358718	●						
	11F[R/L]VB14			1.40							5358726	●						
—For profiling—  ●L-hand shown.	CSVB11F[R/L]VX	None	—	—	—	0.0							5358817	●				

※The angles shown indicate the values when the insert is set into the holder.

CSVC type

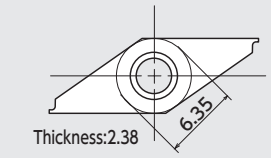
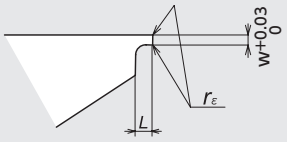
for cutting off Mirror finish

Shape	Part No.	Chip-breaker	Max. machining depth (mm)	Dimensions (mm) w	L	r_ε	PVD-coated micro-grain carbides VM1 R	Stock	L	Stock
 ●Right-hand type shown.	CSVC11F$^{R}_{L}$V06	None	3.0	0.6	2.0	0.0	5352547	●		
	11F$^{R}_{L}$V07		4.0	0.7	2.5		5324272	●	5330840	●
	11F$^{R}_{L}$V08			0.8			5324256	●	5330832	●
	11F$^{R}_{L}$V09			0.9			5352554	●		
	11F$^{R}_{L}$V10		5.0	1.0	3.0		5303490	●	5303599	●
	11F$^{R}_{L}$V13			1.3			5311824	●	5311816	●
	11F$^{R}_{L}$V15			1.5			5303615	●	5303631	●
 ●Right-hand type shown.	CSVC11F$^{R}_{L}$VB06	Provided	3.0	0.6	2.0	0.0	5358734	●		
	11F$^{R}_{L}$VB07		4.0	0.7	2.5		5358742	●		
	11F$^{R}_{L}$VB08			0.8			5358767	●		
	11F$^{R}_{L}$VB09			0.9			5358775	●		
	11F$^{R}_{L}$VB10		5.0	1.0	3.0		5358783	●		
	11F$^{R}_{L}$VB13			1.3			5358676	●		
	11F$^{R}_{L}$VB15			1.5			5358668	●		

※The angles shown indicate the values when the insert is set into the holder.

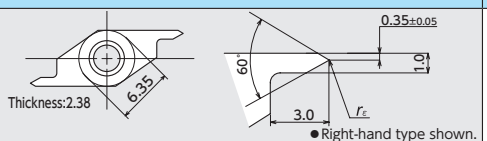
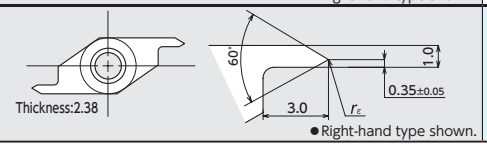
CSVG type

for grooving Mirror finish

Shape	Part No.	Chip-breaker	Max. machining depth (mm)	Dimensions (mm) w	L	r_ε	PVD-coated micro-grain carbides VM1 R	Stock	L	Stock
  ●Right-hand type shown.	CSVG11F$^{R}_{L}$V025	None	0.15	0.25	0.50	0.0	5354634	●		
	11F$^{R}_{L}$V030			0.30			5344940	●		
	11F$^{R}_{L}$V035			0.35			5354402	●		
	11F$^{R}_{L}$V040			0.40			5344932	●		
	11F$^{R}_{L}$V045		0.45	0.45	1.00		5354394	●		
	11F$^{R}_{L}$V050			0.50			5354642	●		
	11F$^{R}_{L}$V055			0.55			5344924	●		
	11F$^{R}_{L}$V060			0.60			5344916	●		
	11F$^{R}_{L}$V065			0.65			5354410	●		
	11F$^{R}_{L}$V070			0.70			5354428	●		
	11F$^{R}_{L}$V075		1.40	0.75			5332812	●	5332820	●
	11F$^{R}_{L}$V080			0.80			5358650	●		
	11F$^{R}_{L}$V085			0.85			5354436	●		
	11F$^{R}_{L}$V090			0.90			5354444	●		
	11F$^{R}_{L}$V095			0.95			5332846	●	5332838	●
	11F$^{R}_{L}$V100			1.00			5352562	●		
	11F$^{R}_{L}$V110		2.60	1.10	3.00		5358643	●		
	11F$^{R}_{L}$V120			1.20			5352570	●	5357561	●
	11F$^{R}_{L}$V130			1.30			5358627	●		
	11F$^{R}_{L}$V140			1.40			5358619	●		
	11F$^{R}_{L}$V150			1.50			5358601	●		

CSVT type

for threading Mirror finish

Shape	Part No.	Chip-breaker	Applicable thread Pitch	Dimensions (mm) r_ε	PVD-coated micro-grain carbides VM1 R	Stock	L	Stock
 ●Right-hand type shown.	CSVT11F$^{R}_{L}$P60-035A	None	0.2 ~ 0.5	R0.03MAX	5344874	●	5386909	●
 ●Right-hand type shown.	CSVT11F$^{R}_{L}$P60-035B	None	0.2 ~ 0.5	R0.03MAX	5344882	●	5386917	●

※The angles shown indicate the values when the insert is set into the holder.

Most suitable for radial type tool posts!! CTPS

Features

- Designed to be used for back turning, cutting-off, grooving and threading
- The same common holder accommodates all insert types
- The dedicated SVAC-N type is offered for front turning

CTPS type

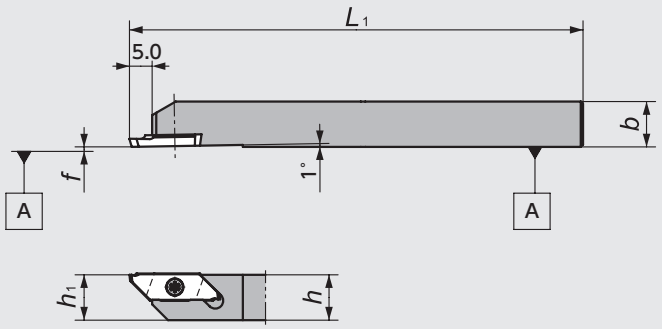


Figure-1

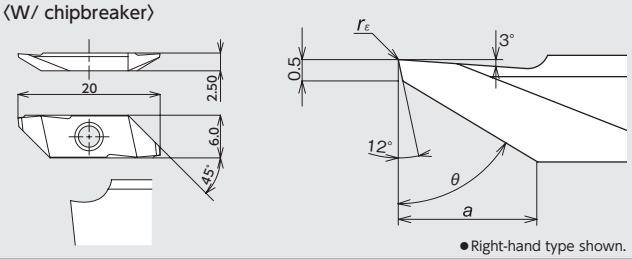
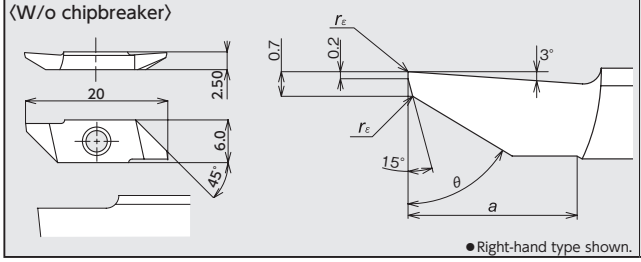
● Right-hand type shown.

Holder dimensions

Shape	Code No.	Toolholder Part No.	Stock	Dimensions (mm) h	b	L1	h1	f	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5346572	**CTPSR10**	●	10	10	120	10	0.0	TBPS(back turning) (See table below) CTPS(cutting-off) GTPS(grooving) TTPS(threading) **H85**	LR1S-2.5*7	CLR-15S
	5397187	**R12**	●	12	12		12				

TBPS type

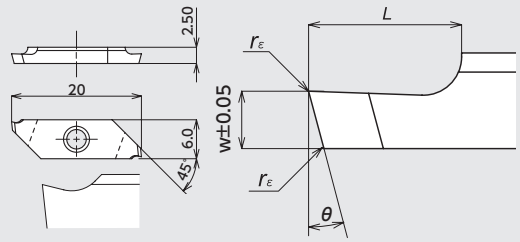
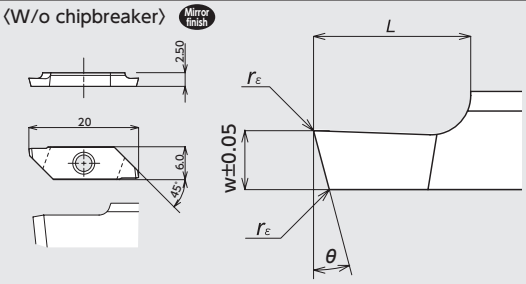
for back turning

Shape	Part No.	Chip-breaker	Effective length of cutting edge a	Available cutting depth b	Dimensions (mm) θ	rε	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock
⟨W/ chipbreaker⟩  ● Right-hand type shown.	**TBPS60FR00**	Provided	3.1	3.5	60°	0.0	5346150	●	5362553	●
	60FR10					0.1	5346168	●	5362561	●
⟨W/o chipbreaker⟩  ● Right-hand type shown.	**TBPS60FRV**	None	4.8	4.8	60°	0.0	5357058	●	5362579	●

※The angles shown indicate the values when the insert is set into the holder.

CTPS type

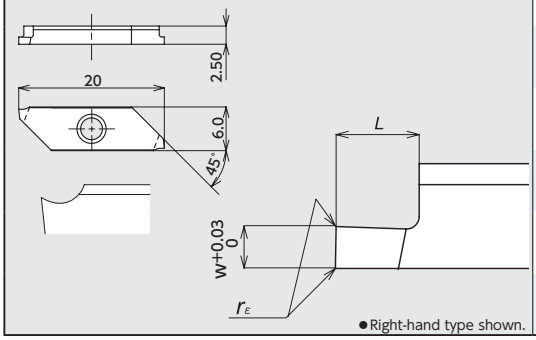
for cutting-off

Shape	Part No.	Chipbreaker	Max. cutting-off dia. φD	Dimensions (mm) w	L	θ	r_ε	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock
⟨W/ chipbreaker⟩  ●Right-hand type shown.	CTPS12FR	Provided	4.0	1.2	3.5	16°	0.05	5346275	●	5362587	●
	15FR		5.0	1.5	4.0			5346267	●	5362595	●
	18FR		8.5	1.8	5.5			5346283	●	5362603	●
	20FR		10.0	2.0	6.0			5374210	●	5374194	●
⟨W/o chipbreaker⟩ Mirror finish  ●Right-hand type shown.	CTPS12FRV	None	4.0	1.2	3.5	20°	0.0	5346937	●	5362611	●
	15FRV		5.0	1.5	4.0			5346929	●	5362629	●
	18FRV		8.5	1.8	5.5			5346945	●	5362637	●
	20FRV		10.0	2.0	6.0			5374202	●	5374228	●

※The angles shown indicate the values when the insert is set into the holder.

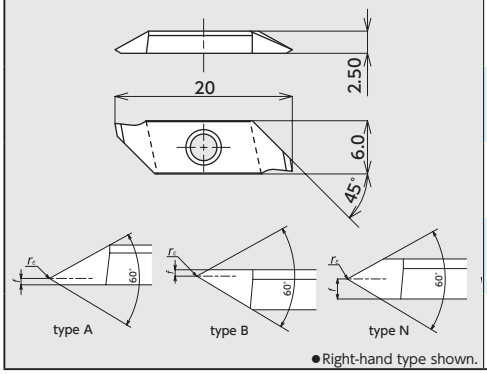
GTPS type

for cutting-off

Shape	Part No.	Dimensions (mm) w	L	r_ε	Effective machining depth	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock
⟨W/ chipbreaker⟩  ●Right-hand type shown.	GTPS075FR	0.75	1.5	0.0	1.0	5346952	●	5362652	●
	095FR	0.95	2.0		1.5	5346960	●	5362660	●
	100FR	1.00				5346978	●	5362678	●
	120FR	1.20	3.0		2.5	5346986	●	5362686	●
	150FR	1.50				5346994	●	5362694	●
	200FR	2.00				5347000	●	5362702	●

TTPS type

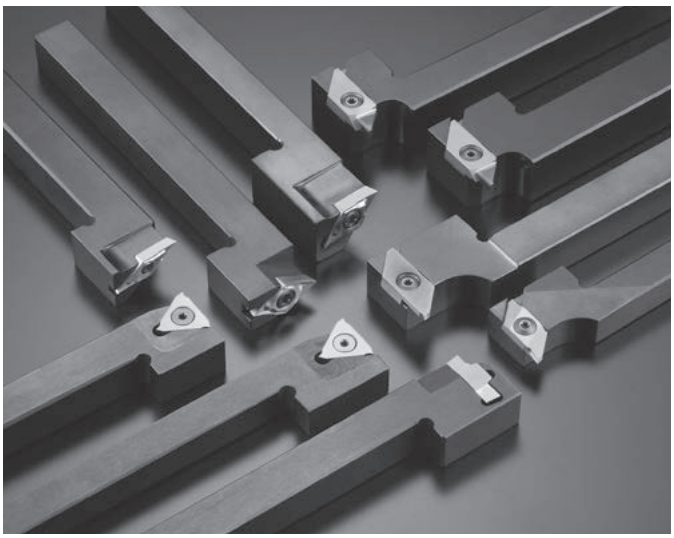
for threading

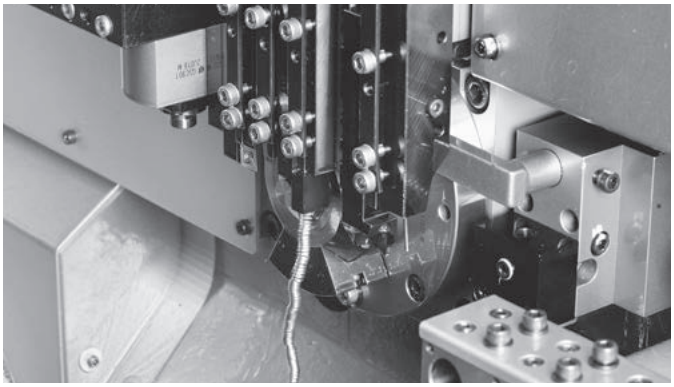
Shape	Part No.	Dimensions (mm) Cutting edge shape	f	r_ε	Applicable thread Pitch	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock
 ●Right-hand type shown.	TTPS60FR4A	A	0.4	0.05MAX flat	0.2～0.75	5346648	●	5362710	●
	60FR4B	B				5346663	●	5362728	●
	60FR8A	A	0.8	0.05	0.5～1.25	5346689	●	5362744	●
	60FR8B	B				5346671	●	5362736	●
	60FR-N	N	1.25	0.1	1.0～1.5	5346655	●	5362751	●

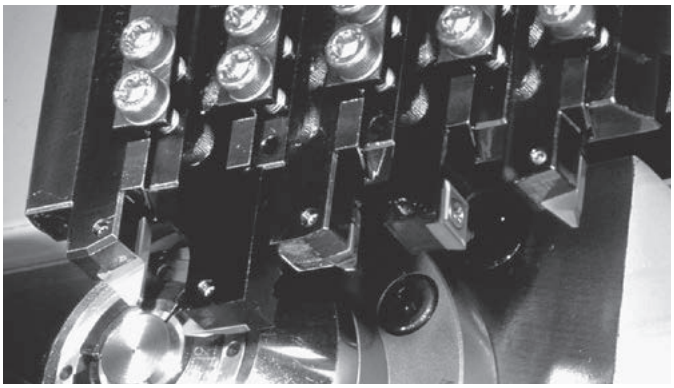
※The angles shown indicate the values when the insert is set into the holder.

Y-axis holders for Y-axis machining !!

A great solution to solve chip control problems







Holders for use with high pressure coolant

Toolholders developed from an innovative idea to utilize the tool change control axis (Y axis) of automatic CNC lathes with a gang type tool post
Holders enabling front turning, back turning, grooving and multi-functional machining have been made available by utilizing the Y-axis control.

Features

- *A solution for better chip control by gravity evacuation*

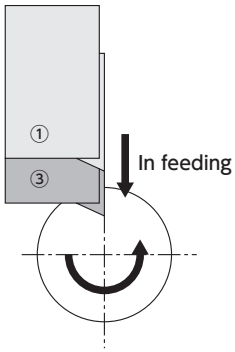
NEW

Holders with coolant-through specifications are also added to the series

- *The through coolant further improves chip control performance*
- *Coolant fed from the flanks works better for wear control and more stable machining*

Machining concept

Standard machining

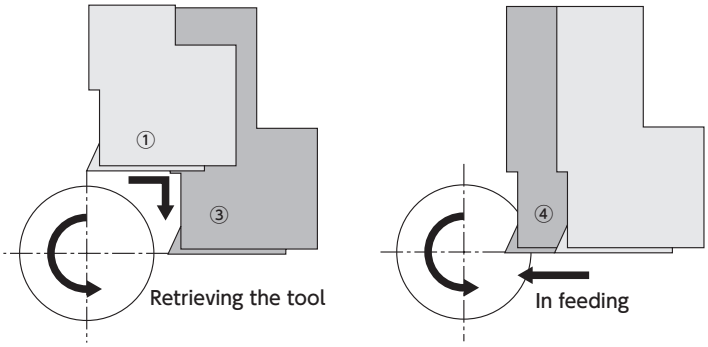


Programming example

①T300 ···Calling the tool
②G0 Y11.0 Z0 T3 ···Positioning the tool
③G1 X8.0 F0.08 ···Cutting depth: 8.0 mm
⑤Z5.0 F0.05 ···Cutting length: 5.0 mm
⑥X11.0
⑦G0 X11.0

Generally, for OD machining, the tool is called and positioned before the system starts the cutting operation. The direction of cut along the work diameter is the "X axis".

Machining with Y-axis holders



Programming example

①T300 ···Calling the tool
②G0 Y11.0 T3
③X0 ···Positioning the tool
④G1 Y8.0 F0.08 ···Cutting depth: 8.0 mm
⑤Z5.0 F0.05 ···Cutting length: 5.0 mm
⑥Y11.0
⑦G0 X11.0

With a Y-axis holder, the tool is called for position (1). Then, at position (3) for the system to start the cutting operation. The tool start cutting from this position. The direction of cut along the work diameter is the "Y axis".

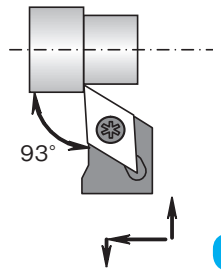
Note) In the actual programme, it is necessary to compensate for the tool length □ for the Y axis either with the tool data or on the program.

※Before using Y-axis holders, please read and understand "Important notes for using Y-axis holders" on page H88.

Lineup

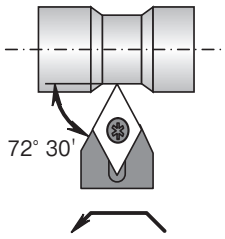
Front turning

Y-SDJC type Y-SDJC-OH type



➡H20

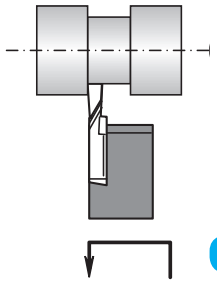
Y-SDNC type



➡H21

Multi-functional

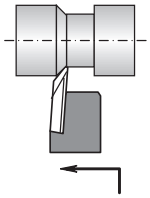
Y-GTPA type Y-GTPA-OH type



➡ I27

Back turning

Y-TBDP type Y-TBPR-OH type
Y-TBPR type



Y-TBPR type
Y-TBPR-OH type
➡H42

Y-TBDP type
➡H49

Grooving/Back turning

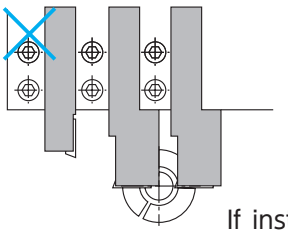
Y-GTTR type
Y-GTTR-OH type

Back turning also possible by mounting a TBMH insert

➡H52

◆Important notes for using Y-axis holders

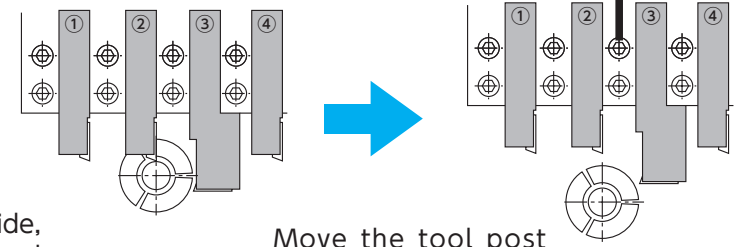
Up to 2 Y-axis holders can be installed on a tool post. Do not install side by side in order to prevent interference.



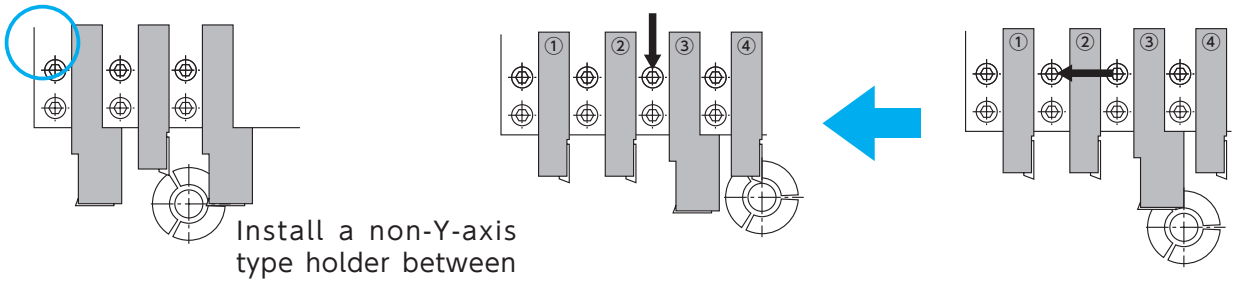
If installed side by side, the work piece and the Y-axis holders may interfere with each other.

When changing tools, set the backward position of the tool post with the overhang of the Y-axis holder(s) as per the reference.

When changing from the tool No. (2) to (4)



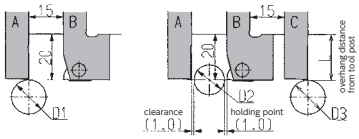
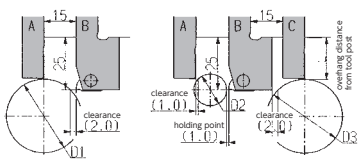
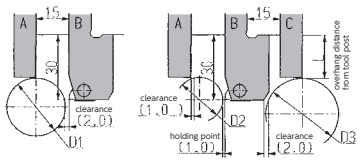
Move the tool post back based on the position of the cutting edge of the Y-axis holder (3).



Install a non-Y-axis type holder between the two Y-axis holders.

OD machining table

The OD that can be machined are indicated by the grooving holder "Y-GTTR type" as an example (The dimensions of other Y-axis holders are the same.)

Overhang of the Y-axis holder	Figures	Item \ L	20	22	25
20		D1 Machinable outer dia.for holder A	Not limited	Not limited	Not limited
		D2 Machinable outer dia.for holder B	13	13	13
		D3 Machinable outer dia.for holder C	Not limited	Not limited	Not limited
25		D1 Machinable outer dia.for holder A	38	58	Not limited
		D2 Machinable outer dia.for holder B	14.9	13.6	13
		D3 Machinable outer dia.for holder C	38	58	Not limited
30		D1 Machinable outer dia.for holder A	26.8	29	38.5
		D2 Machinable outer dia.for holder B	20.6	17.9	14.9
		D3 Machinable outer dia.for holder C	33 (26.8 for TBP type)	37 (29 for TBP type)	51.5 (38.5 for TBP type)

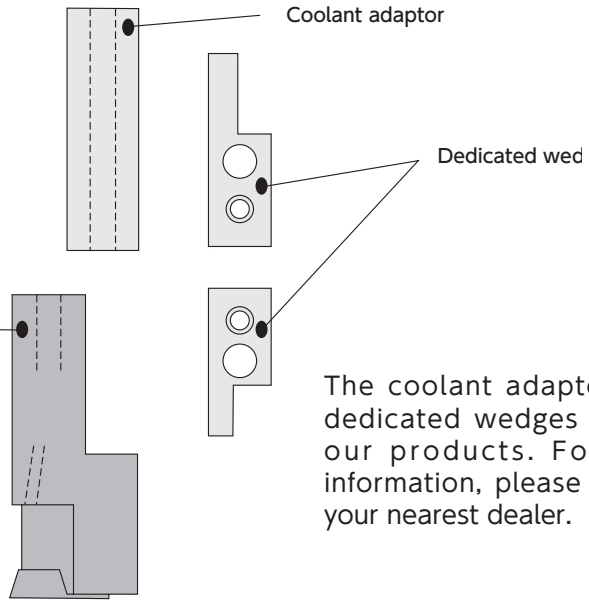
◆How to install a high-pressure coolant type holder

★New Splash Bar series don't require adapter.

Target toolholders for adapters	
Y-SDJCR12-11SOH	Y-GTTR12SOH
Y-SDJCR16-11OH	Y-GTPAR1216SOH
Y-TBPR12SOH	Y-GTPAR1616OH
Y-TBPR16OH	

Another series of Y-axis holders with a coolant hole is now available for better chip control and improved dimensional stability. By connecting the holder to the dedicated adaptor, it is possible to supply coolant directly to the flank from the coolant hole in the holder.

■ Components



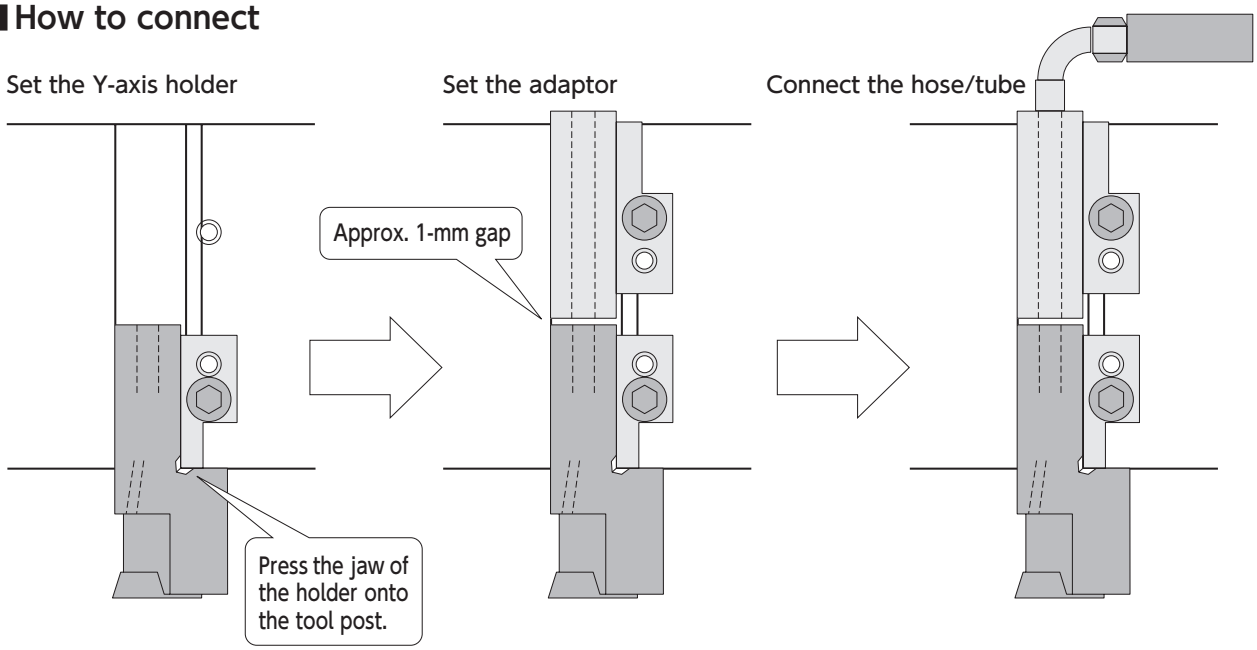
Select your Y-axis coolant holders from our catalogue.

Front turning➡**H20**
Back turning➡**H42**
Grooving➡**I 10**
Multi-functional➡**I 27**

Part No. : Y-□□・・□□-OH

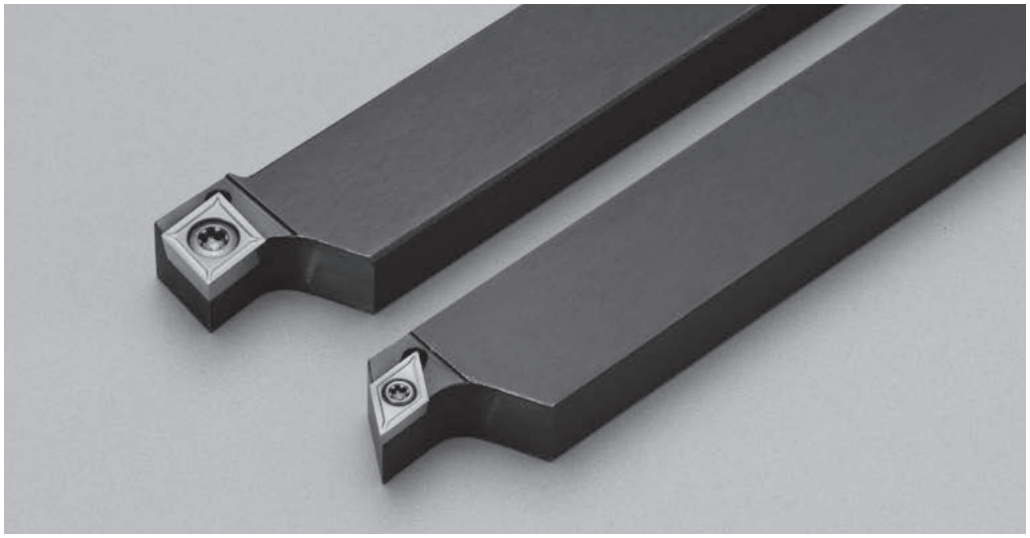
The coolant adaptors and dedicated wedges are not our products. For more information, please contact your nearest dealer.

■ How to connect



Turn on the coolant valve and check for leakage. (The discharge pressure makes the connecting part fit the Y-axis holder for the complete connection.)

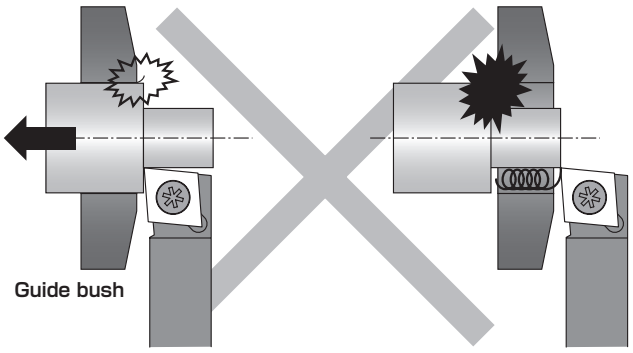
Shift holder



Features

- For spindle moving type automatic lathes
- Available for finish machining without returning workpiece into guide bush

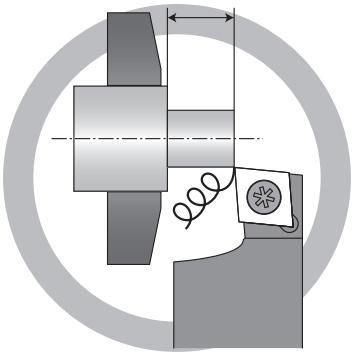
Problems of using general holder



The burr caused by rough machining can damage workpiece when workpiece moving back to guide bush.

Workpiece gets out of control of guide bush. Chips may come into guide bush.

Using Shift holder



Available for finish machining without returning workpiece into guide bush! Great chip evacuation!

Holders for 80 degree and 55 degree positive inserts are available!

Please refer to page H16 and H18 for details.

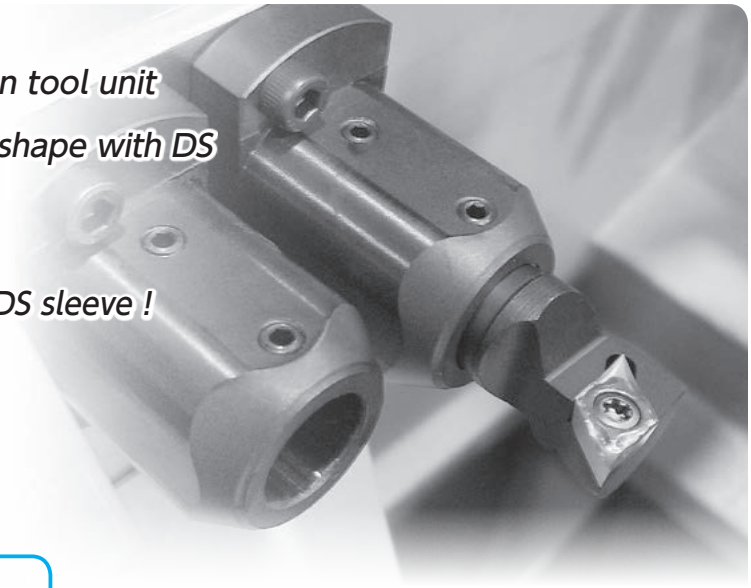
Rotation Tools protect unit

DS Sleeve

Stop coolant and chip going in rotation tool unit.

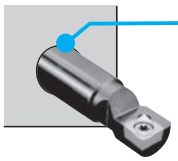
Features

- *Keep chips and coolant out of rotation tool unit*
- *Applicable for a variety of machining shape with DS sleeve by back machining*
- *ϕ22 attachment diameter !*
- *ϕ16 DS holder can be attached in the DS sleeve !*



1 *Keep coolant and chip away*

△

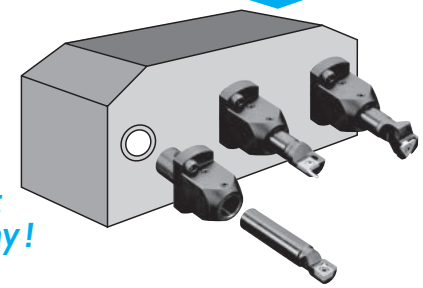


coolant and ship going in rotation tool unit!

Direct attachment in the rotation tool unit may cause troubles by coolant and chip.

W/ DS sleeve

○



Keep coolant and chip away !

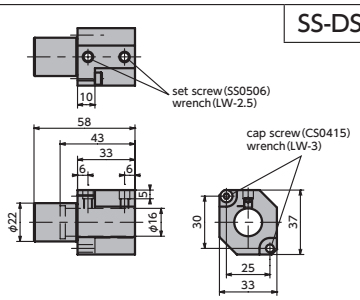
No problem and can attach more tools !!

2 *DS sleeves enable a variety of machining from back side.*

Standard Item

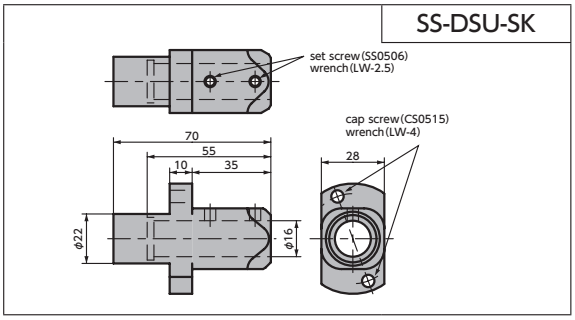
code	Part No.	Stock	Parts			
			cap screw	Wrench	set screw	Wrench
5788401	**SS-DSU-SK**	●	CS0515	LW-4	SS0506	LW-2.5
5814512	**SS-DSU-L23**	●	CS0515	LW-4	SS0506 SS0515	LW-2.5
NEW 5892070	**SS-DSU-B8L23**	●	CS0415	LW-3	SS0506	LW-2.5

SS-DSU-B8L23



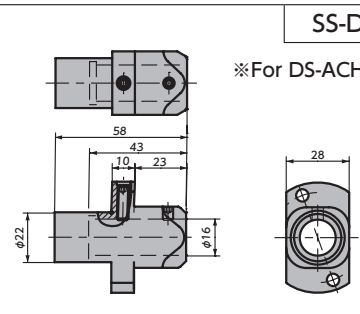
Configurations

SS-DSU-SK



SS-DSU-L23

※For DS-ACH Holders



MEMO

I

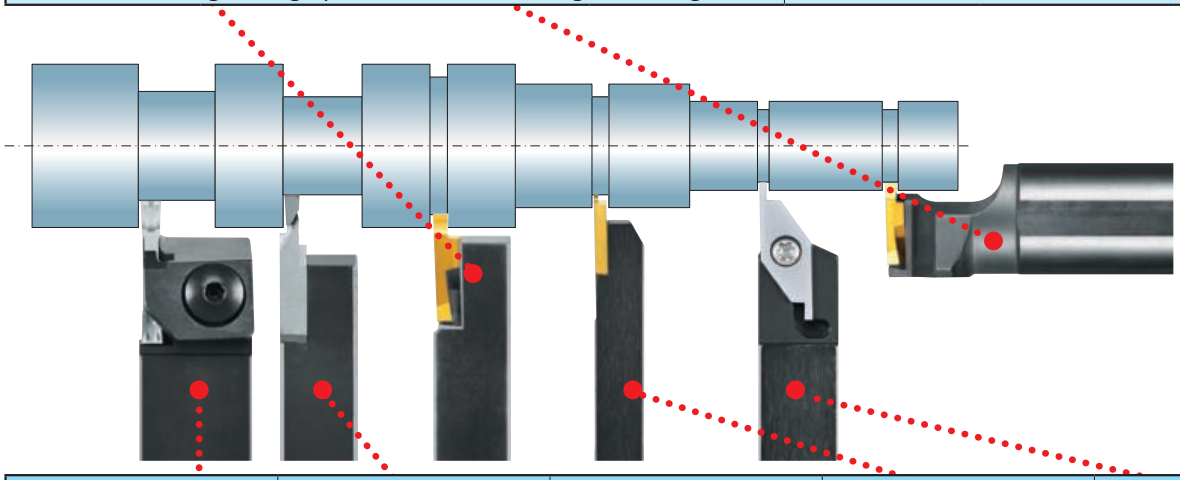
Grooving Tools

- Selection guide for grooving tools ···· I 2
- Grooving tools ····· I 6
- Multi-functional tools ····· I 26
- Internal grooving tools ····· I 27
- Face grooving tools ····· I 32

NTK SS Cutting Tools Selection guide for grooving and multi-functional cutting tools

Grooving

GTT type	GTT-OH type	Y-GTT-OH type	DS-GTT type	NGTN type	NGTB type	NGTA type
➡I 9	➡I 9	➡I 11	➡I 9	➡I 16	➡I 16	➡I 11・16
Groove width : 0.3～3.0	Groove width : 0.3～3.0	Groove width : 0.3～3.0	Groove width : 0.3～3.0	Groove width : 0.3～5.5	Groove width : 0.3～5.5	Groove width : 0.3～5.5
Machining depth : 0.25～2.7	Machining depth : 0.25～1.6	Machining depth : 0.25～1.6	Machining depth : 0.25～1.6	Machining depth : 0.25～4.5	Machining depth : 0.25～4.5	Machining depth : 0.25～3.0
Shank size : □8～□25	Shank size : □10～□16	Shank size : □12～□16	Shank dia. : ϕ14～ϕ25.4	Shank size : □16	Shank size : □16 and □25	Shank size : □20
Applicable inserts : GTMH32, GTMX32, GTM32				Applicable inserts : GTMH32, GTMX32, GTM32, GTMA43, GTMT43, GTM43		
For narrow grooving operations such as E-ring machining!!				Economical 3-corner design !!		

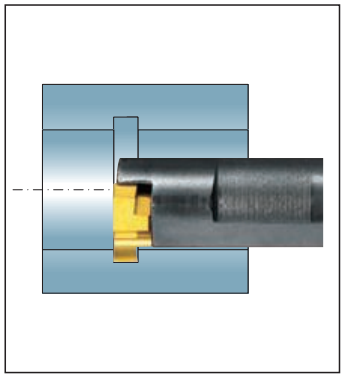


GTVW type	GTPA type	Y-GTPA-OH type	CTPS type	CSV type
➡I 26	➡I 27	➡I 27	➡I 37	➡I 6
Groove width : 3.0～6.0	Groove width : 2.0～2.5	Groove width : 2.0～2.5	Groove width : 0.75～2.0	Groove width : 0.25～1.5
Machining depth : 6.2～12.0	Machining depth : 3.0～6.0	Machining depth : 3.0～6.0	Machining depth : 1.0～2.5	Machining depth : 0.15～2.6
Shank size : □10～□25	Shank size : □10～□16	Shank size : □12～□16	Shank size : □10～□12	Shank size : □7～□12
Applicable inserts : GVW □□□N□□	Applicable inserts : GTPA□□FRN□□	Applicable inserts : GTPA□□FRN□□	Applicable inserts : GTPS□□□ FR	Applicable inserts : CSVG11
For wide or rough grooving !!	Suitable for machining of spools !!		The same holder can be used for cutting-off and back turning	Suitable for small-diameter work pieces !!

SCRUM DUO

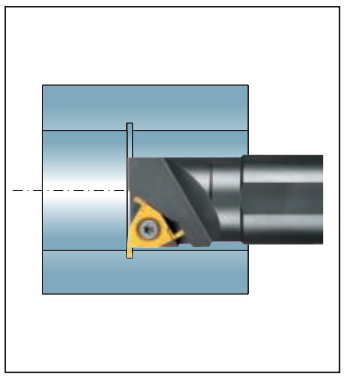
Flat 3 TWG type	GTV type	GKV type	GTWP type NEW
➡I 19	➡I 20	➡I 20	➡I 24
Groove width : 2.0～3.0	Groove width : 3.0～9.0	Groove width : 4.0～9.0	Groove width : 3.0～6.0
Machining depth : 3.0	Machining depth : 11.0	Machining depth : 11.0	Machining depth : 7.0～25.0
Shank size : □20～□25	Shank size : □16～□25	Shank size : □20～□25	Shank size : □10～□25
Applicable inserts : TWG□□□	Applicable inserts : GEV and GTV	Applicable inserts : GEV and GTV	Applicable inserts : GWP
Excellent chip control !!	Groove and side turning !!	Groove and side turning !!	Groove and side turning !!

Internal grooving



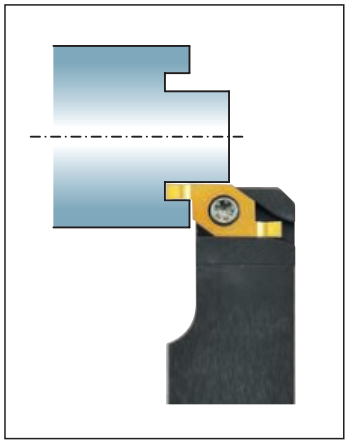
STICK DUO

SBG type	BG type	GKV type
➡I28	➡I30	➡I31
Groove width : 0.5～2.0	Groove width : 0.5～2.0	Groove width : 3.0～3.5
Machining depth : 0.8～2.2	Machining depth : 1.0～3.0	Machining depth : 5.5～9.5
Shank dia. : ϕ3～ϕ8	Shank dia. : ϕ8～ϕ20	Shank dia. : ϕ32～ϕ40
Min. machining dia. : from ϕ3～ϕ8.0	Applicable inserts : GTG□□	Applicable inserts : GEV□□□
Highly stable machining!!	Economical 3-corner design!!	Suitable for deep grooving!!



Flat 3 TWG type
➡I19
Groove width : 2.0～3.0
Machining depth : 3.0
Shank dia. : ϕ32～ϕ40
Applicable inserts: TWG□□
Chip control and economy focused !!

Face grooving



STICK DUO

SFG type	CH-FGV type	DS-FGV type
ID Face grooving		
➡I29	➡I34	➡I34
Groove width :1.0～3.0	Groove width : 1.0～2.0	Groove width : 1.0～2.0
Machining depth : 1.5～3.0	Machining depth : 1.5～3.0	Machining depth : 1.5～3.0
Shank dia. : ϕ6・ϕ8	Shank size. : □10～□16	Shank dia. : ϕ16.0～ϕ25.4
Min. machining dia. : ϕ6.0～ϕ8.0	Applicable inserts : FGV□□□	Applicable inserts : FGV□□□
Highly stable machining!!	Suitable for front gang type tool post	For DS drill sleeve holders

FGV type	GFV type	GSV type
➡I34	➡I36	➡I36
Groove width : 1.0～2.0	Groove width : 6.0	Groove width : 6.0
Machining depth : 1.5～3.0	Machining depth : 6.0	Machining depth : 6.0
Shank dia. : □10～□16	Shank size. : □20 and □25	Shank size. : □20～□25
Applicable inserts : FGV□□□	Applicable insert : GFV600N	Applicable inserts : GFV600N
For L-shaped gang type tool posts	Groove and side turning	Groove and side turning

Grooving Tools Recommended Insert Grade and Cutting Conditions

CSV・GTG・GTM・GTMH・GTMT・GTMX・GTPS・SBG

Work Material			Free cutting steels	Carbon steels	Alloy steels	Free cutting steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Stainless Alloy
JIS Common Grade			SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	First Choice		DM4 DT4	DT4 QM3		DT4	DM4 DT4	DT4	PD1
	Second Choice		VM1 ZM3	VM1 C7Z		TM4 ZM3	QM3 VM1	ZM3	KM1
Cutting Spead v_c (m/min)			50 100 200	Carbide 50 90 150 C7Z 120 150 250		50 90 180	40 70 100	50 70 100	PD1 100 200 350 KM1 50 100 200
Feed spead f (mm/rev) ①grooving ②cross cutting	grooving width	0.25～0.5	①0.005～0.03 ②0.002～0.005						
		0.5～1.0	①0.02～0.07 ②0.005～0.01		①0.02～0.06 ②0.005～0.01				①0.02～0.07 ②0.005～0.01
		1.0～2.0	①0.03～0.08 ②0.03～0.06		①0.03～0.07 ②0.02～0.05				①0.03～0.08 ②0.03～0.06
		2.0～	①0.03～0.2 ②0.03～0.06						①0.05～0.25 ②0.04～0.1

Max. depth of cut is 0.2mm in cross cutting (unusable for inserts of width below 0.4mm)

GTV・GEV・GVMB・GVMN・GVW・GWP・TWG

Work Material			Free cutting steels	Carbon steels	Alloy steels	Free cutting steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Stainless Alloy
JIS Common Grade			SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	First Choice		QM3	DM4 QM3		DM4 QM3		TM1	PD1
	Second Choice		TM1	TM1 C7Z N40		TM1			KM1
Cutting Spead v_c (m/min)			50 100 200	Carbide 50 90 150 C7Z 120 150 250		50 90 180	40 70 100	50 70 100	PD1 100 200 350 KM1 50 100 200
Feed spead f (mm/rev) ①grooving ②cross cutting	grooving width	2.0～3.0	①0.04～0.2 ②0.03～0.15						①0.05～0.2 ②0.1～0.2
		3.0～4.0	①0.04～0.2 ②0.03～0.15						①0.05～0.2 ②0.1～0.2
		4.0～5.0	①0.04～0.3 ②0.03～0.15			①0.04～0.2 ②0.03～0.15			①0.08～0.25 ②0.1～0.25
		5.0～							①0.1～0.25 ②0.1～0.25

Max. depth of cut is 3.5mm in cross cutting.

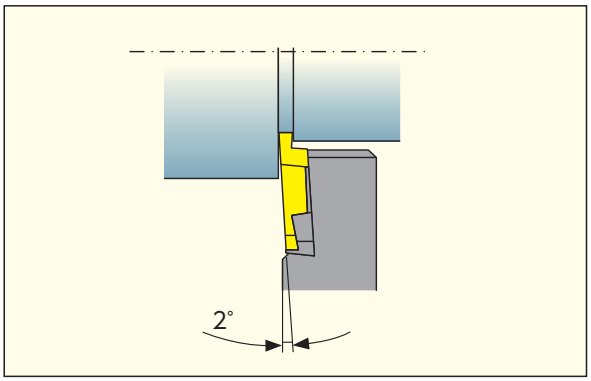
GTPA Aluminum (A5056/6061,etc)

Work Material			Stainless Alloy
Cutting Spead v_c (m/min)			PD1 100 200 350 KM1 50 100 200
Feed spead f (mm/rev) ①grooving ②cross cutting	grooving width	2	①0.05～0.15 ②0.05～0.15
		2.5	①0.05～0.15 ②0.05～0.15

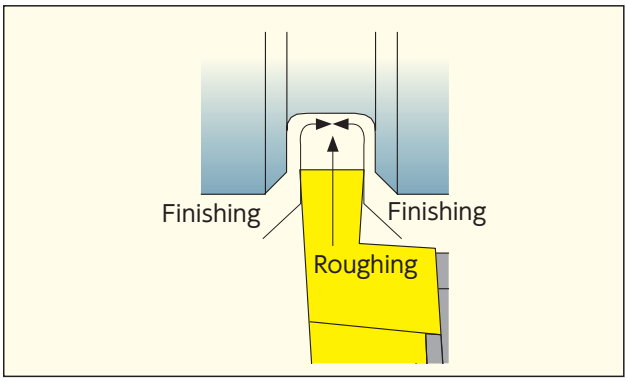
※Please refer to the page **Q58** for recommended cutting parameters.

General grooving

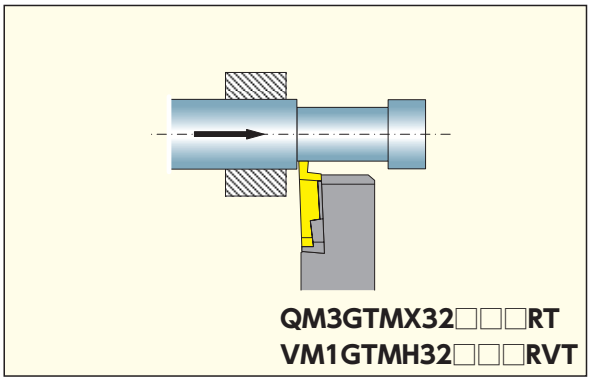
The NTK triangular tangential inserts for grooving incline at the angle of 2 degrees, thus allowing clearance for grooving a shaft having various diameters.



Chamfering and rounding at the bottom corners of a groove can be carried out by side turning after rough-grooving the center of the groove.

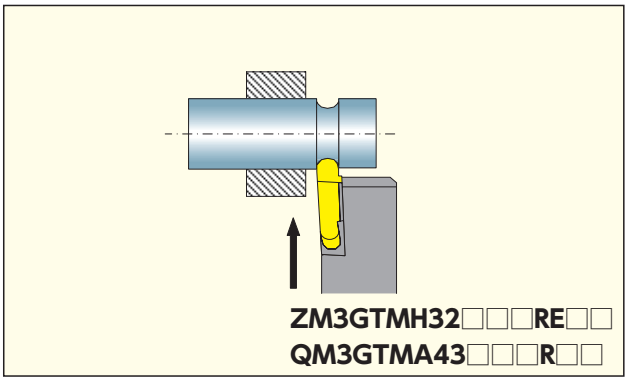


Side turning



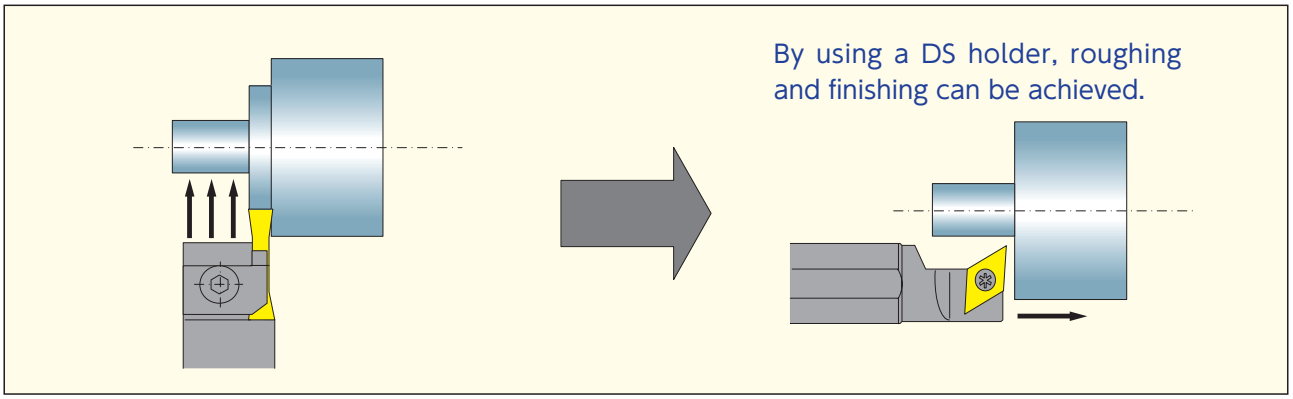
QM3GTMX32□□□RT
VM1GTMH32□□□RVT

Grooving full radius

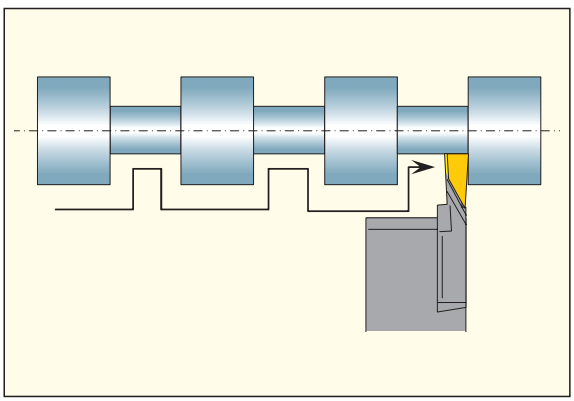


ZM3GTMH32□□□RE□□
QM3GTMA43□□□R□□

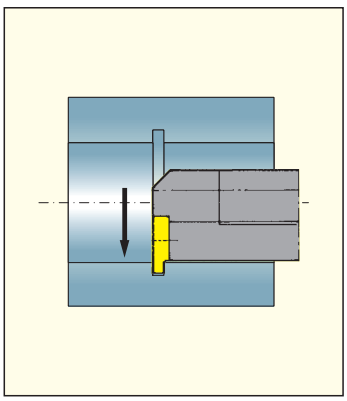
Front turn roughing



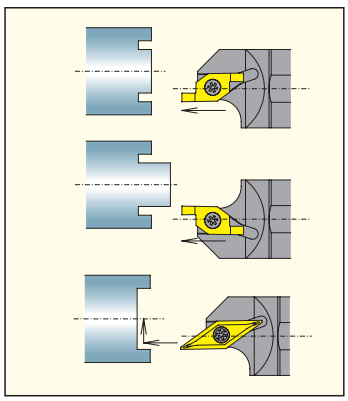
Grooving for spools



Internal grooving



Face grooving



CSV type

For radial type tool post

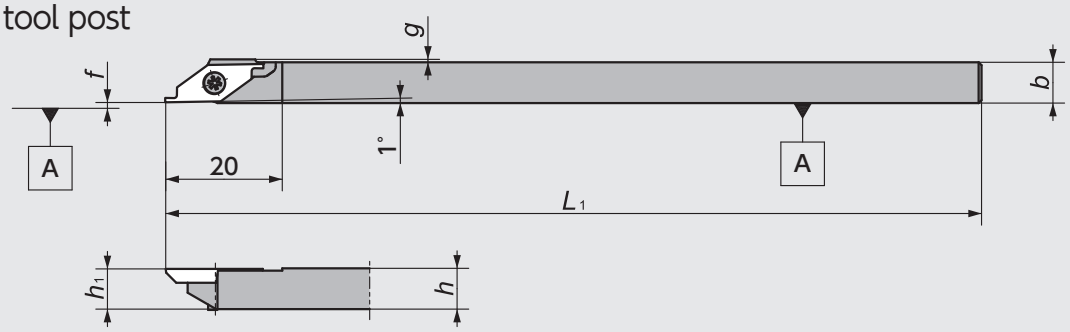


Figure-1

●Right-hand type shown.

CSV-NC/CSV-NC-F type

For gang type tool post

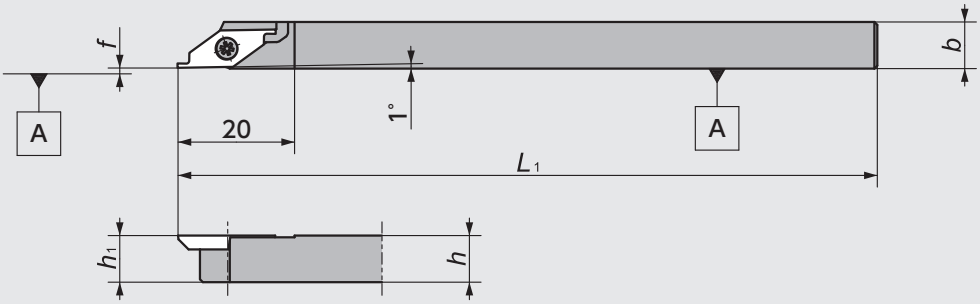


Figure-2

●Right-hand type shown.
●The cutting edge offset of CSVR/L08NC-F is small.

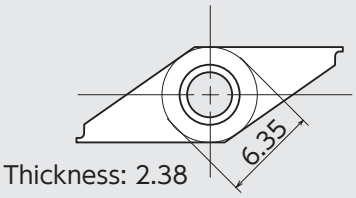
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	g	Width of groove (mm) w	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5492962		CSVR/L07GX	●		7	7	85	7	0.1	0.5	0.25 ≀ 1.50	CSVG I7	LRIS-2.5＊7	CLR-15S
	5303169	5303193	07	●	●			140							
	5492954		08GX	●		8	8	85	8		0.0				
	5303151	5303201	08	●	●			140							
	5303136		095	●		9.5	9.5		9.5						
	5303144	5303177	10	●	●	10	10		10						
	5474770		12GX	●		12	12	85	12						
	5327929		12	●				140							
Figure-2	5789615		CSVR/L08NC-F	●		8	8	120	8	0.0 ≀ 0.1	—	0.25 ≀ 1.50	CSVG I7	LRIS-2.5＊7	CLR-15S
	5514062	5514070	08NC	●	●					0.1					
	5563010		10GXNC	●		10	10	85	10						
	5477492	5477542	10NC	●	●			120							
	5477534	5477500	12NC	●	●	12	12		12						

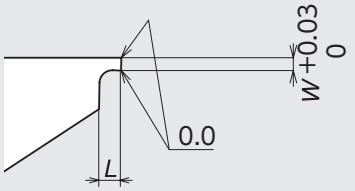
Applicable inserts

CSVG type

Shape	Part No.	Chip-breaker	Dimensions (mm)				PVD-coated micro-grain carbides VM1			
			w	*L*	r_ε	Effective machining depth	R	Stock	L	Stock
Mirror finish	CSVG11F$^{R}_{L}$V025	None	0.25	0.50	0.0	0.15	5354634	●		
	11F$^{R}_{L}$V030		0.30				5344940	●		
	11F$^{R}_{L}$V035		0.35				5354402	●		
	11F$^{R}_{L}$V040		0.40				5344932	●		
	11F$^{R}_{L}$V045		0.45	1.00		0.45	5354394	●		
	11F$^{R}_{L}$V050		0.50				5354642	●		
	11F$^{R}_{L}$V055		0.55				5344924	●		
	11F$^{R}_{L}$V060		0.60				5344916	●		
	11F$^{R}_{L}$V065		0.65				5354410	●		
	11F$^{R}_{L}$V070		0.70				5354428	●		
	11F$^{R}_{L}$V075		0.75	2.00		1.40	5332812	●	5332820	●
	11F$^{R}_{L}$V080		0.80				5358650	●		
	11F$^{R}_{L}$V085		0.85				5354436	●		
	11F$^{R}_{L}$V090		0.90				5354444	●		
	11F$^{R}_{L}$V095		0.95				5332846	●	5332838	●
	11F$^{R}_{L}$V100		1.00				5352562	●		
	11F$^{R}_{L}$V110		1.10	3.00		2.60	5358643	●		
	11F$^{R}_{L}$V120		1.20				5352570	●	5357561	●
	11F$^{R}_{L}$V130		1.30				5358627	●		
	11F$^{R}_{L}$V140		1.40				5358619	●		
	11F$^{R}_{L}$V150		1.50				5358601	●		



Thickness: 2.38

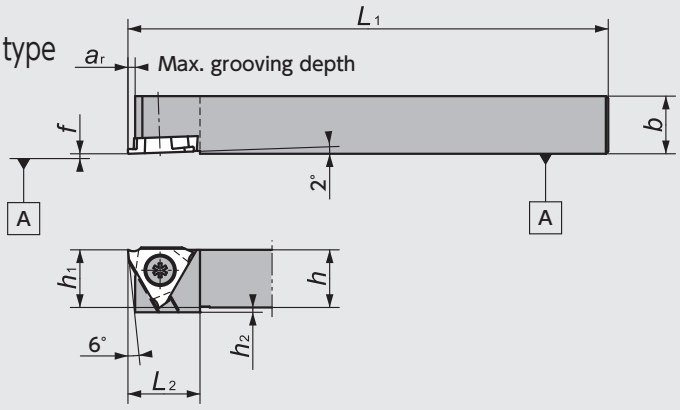


●R-hand shown.

☆CSV toolholder is interchangeable tool. All CSV type inserts can be used (back turning, grooving, threading) on the same holder. (H80-83 for more information)

GTT type

Front/back clamping type



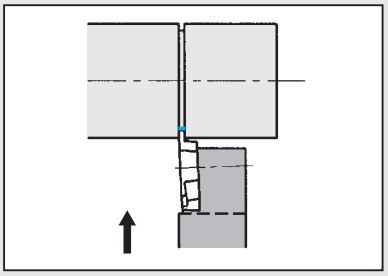
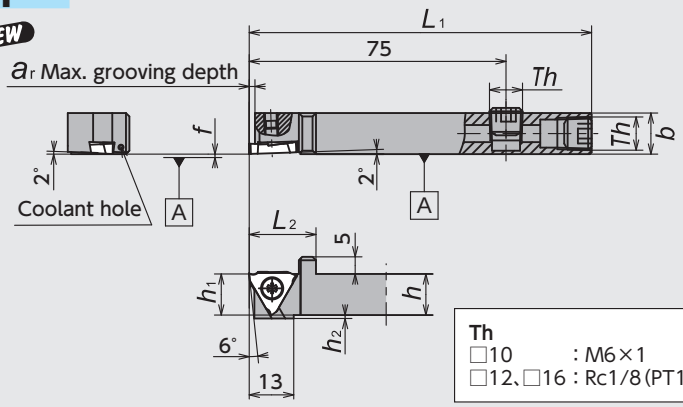


Figure-1

●Right-hand type shown.

GTT-OH type

SPLASH BAR NEW



Th
□10 : M6×1
□12、□16 : Rc1/8 (PT1/8)

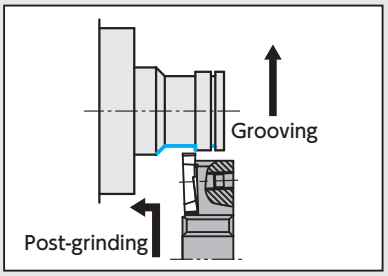
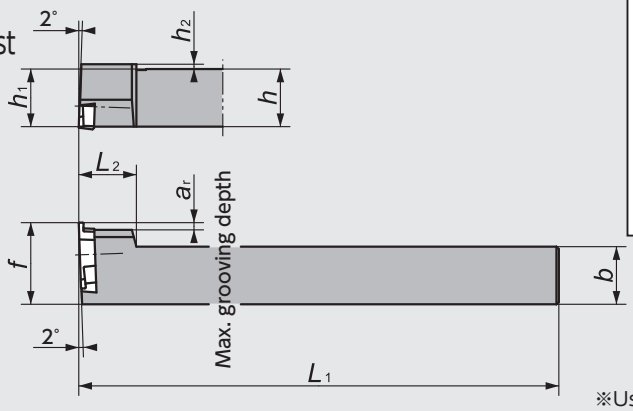


Figure-2

●Right-hand type shown.

CH-GTT type

For front gang type tool post



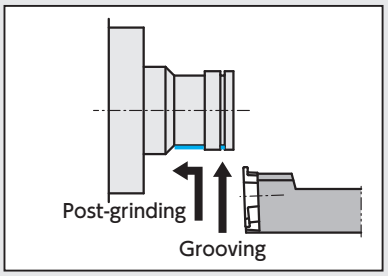
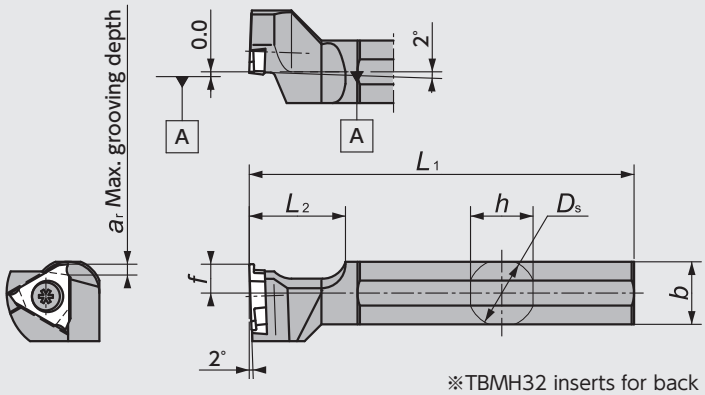


Figure-3

●Left-hand type shown.
※Use R-hand inserts for L-hand type holder

DS-GTT type

DS holder



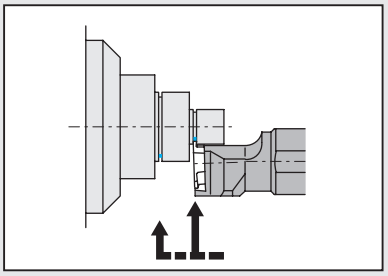
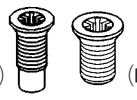
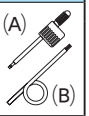


Figure-4

●Left-hand type shown.
※Use R-hand inserts for L-hand type holder.
※TBMH32 inserts for back turning can be mounted onto GTT type holders.

Holder dimensions

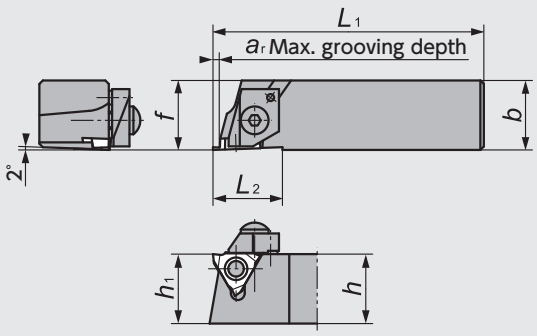
Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	a_r	h_2	D_s	Width of groove (mm) w	Applicable insert	Parts: Clamping screw	Parts: Wrench
																	 (A) (B)	 (A) (B)
Figure-1	5107305	5107313	GTTR/L08F00	●	●	8	8	80	8	0	15	1.6	5	–	0.30 ⟆ 3.00	GTM32 GTMH32 GTMX32 **I12~15** TBMH32 (back turning) **H53**	R hand : LR-S-4∗10PW (A) L hand : LR-S-4∗5.8 (B)	CLR-15S (A)
	5608682		0810F00	●			10										LR-S-4∗10PW (A)	
	5107206	5107214	08K00	●	●		8	120									R hand : LR-S-4∗10PW (A) L hand : LR-S-4∗5.8 (B)	
	5608690		0810K00	●			10										LR-S-4∗10PW (A)	
	5107321	5107339	10F00	●	●	10	10	80	10				3					
	5107222	5107230	10K00	●	●			120										
	5107347	5107354	12F00	●	●	12	12	80	12				1					
	5107248	5107255	12K00	●	●			120										
	5459896	5551387	16H00	●	●	16	16	100	16				0					
	5173687	5173679	16K00	●	●			120										
	5530852	5780317	20K00	●	●	20	20	125	20			2.7	0					
	5780309	5780291	25M00	●	●	25	25	150	25									
	5107362	5107370	10F15	●	●	10	10	80	10				3		1.45 ⟆ 3.00			
	5107263	5107271	10K15	●	●			120										
	5537220	5537147	12F15	●	●	12	12	80	12				1					
	5537246	5537162	12K15	●	●			120										
	5537261	5537188	16H15	●	●	16	16	100	16				0					
	5537287	5537204	16K15	●	●			120										
	5107388	5107396	10F25	●	●	10	10	80	10				3		2.50 ⟆ 3.00			
	5107289	5107297	10K25	●	●			120										
	5537238	5537154	12F25	●	●	12	12	80	12				1					
	5537253	5537170	12K25	●	●			120										
	5537279	5537196	16H25	●	●	16	16	100	16				0					
	5537295	5537212	16K25	●	●			120										
NEW Figure-2	5921705		GTTR/L1012H00-OH	●		10	12	100	10	0	19.5	1.6	1	–	0.30 ⟆ 3.00		LR-S-4∗10PW (A)	CLR-15S (A)
	5890157		GTTR12H00-OH	●		12			12									
	5921713		GTTR/L16H00-OH	●		16	16		16				0					
Figure-3		5659248	CH-GTTR/L10H00		●	10	10	100	10	15	12	1.5	3	–	0.30 ⟆ 3.00		LR-S-4∗9 (B)	RLR-20S (B)
		5659255	12H00		●	12	12		12	17			1					
Figure-4		5348560	DS-GTTR/L14F		●	13	13	80	—	6	20	1.6	—	14.000	0.30 ⟆ 3.00		LR-S-4∗9 (B)	RLR-20S (B)
		5348081	15H		●	15	15	100						15.875				
		5341532	16X ※		●			95						16.000				
		5278288	19		●	18	18	120						19.050				
		5278304	20		●	19	19							20.000				
		5324041	22		●	21	21							22.000				
		5317144	25		●	24	24			10				25.400				

※For grooving deeper than the specified depth (a_r), adjust as required before use.

※Pleas select ϕ16 shank for DS sleeves DS sleeves details ➔ H91

NGTN type

Without offset



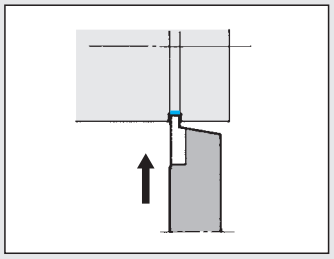
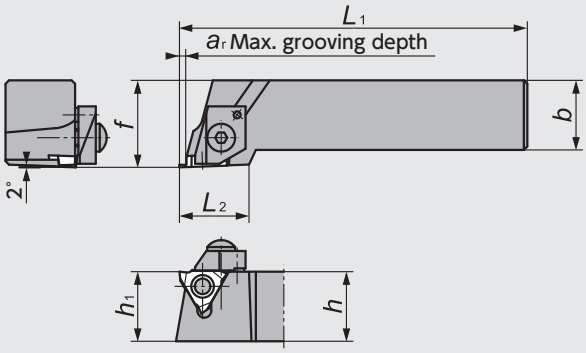


Figure-1

●Right-hand type shown.

NGTB type

With offset



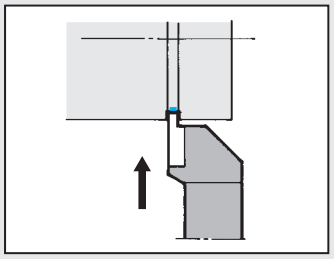
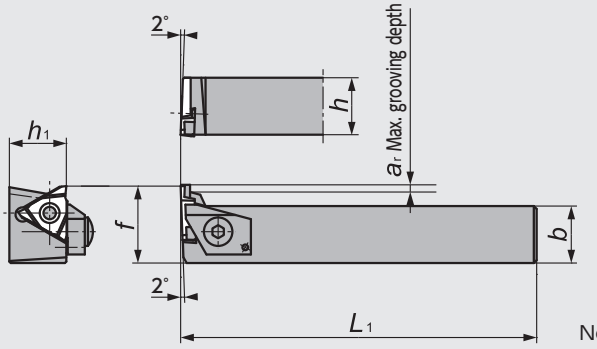


Figure-2

●Right-hand type shown.

NGTA type



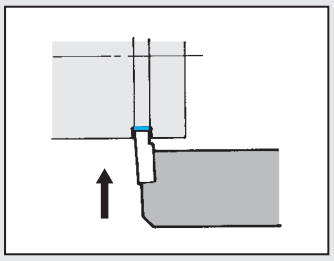
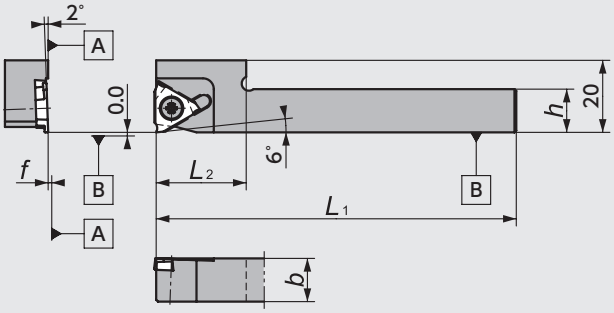


Figure-3

●Left-hand type shown.
Note) Use R-hand inserts for L-hand type holder.

Y-GTT type

Front/back clamping type
Y-axis holder



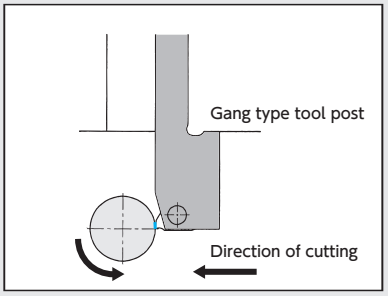
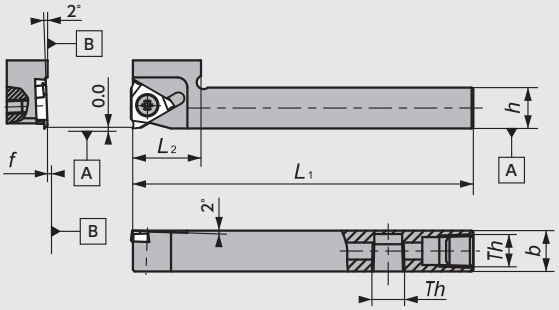


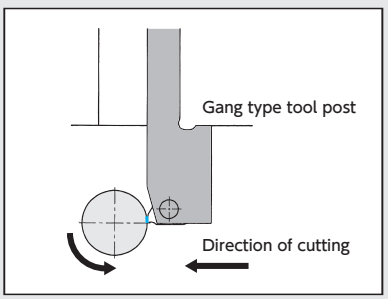
Figure-4

●Right-hand type shown.
Note) Use R-hand inserts for R-hand type holder.

Y-GTT-OH型

Front/back clamping type
SPLASH BAR NEW





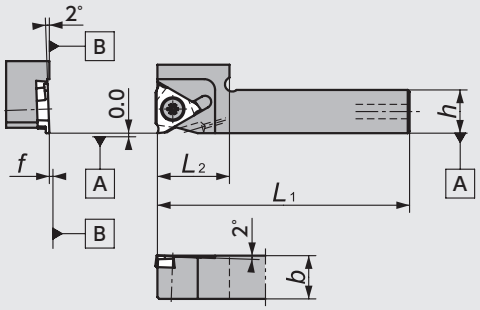
Th
□12、□16 : Rc1/8 (PT1/8)

Figure-5

●Right-hand type shown.
Note) Use R-hand inserts for R-hand type holder.

Y-GTT-OH type

Front/back clamping type
For Y-axis high-pressure coolant



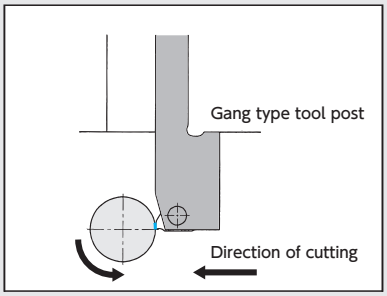


Figure-6

●Right-hand type shown.
Note) Use R-hand inserts for R-hand type holder.

Holder dimensions

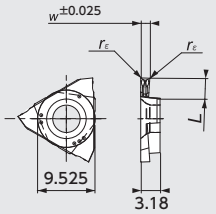
Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	a_r	h_2	Width of groove (mm) w	Applicable insert	Parts: Clamp	Parts: Clamping bolt	Parts: Spring	Parts: Clamping screw	Parts: Wrench
Figure-1	5525928	5525738	NGTN$^{R}_{L}$161632-00	●	●	16	16	78	16	16	20	1.6	—	0.30～3.00	GTM32 GTMH32 GTMX32 **I12～15**	CPR/L5S	AOS-5＊20	ASG-5	—	LW-2.5 (A)
	5534110		**161632-15**	●								2.7		1.45～3.00						
	5534128		**161632-25**	●										2.50～3.00						
Figure-2	5542295		NGTB$^{R}_{L}$202032-00S	●		20	20	125	20	25	25	1.6	—	0.30～3.00	GTM32 GTMH32 GTMX32 **I12～15**	CPR/L5	AOS-5＊25	ASG-5	—	LW-2.5S (A)
	5537717		**202032-15S**	●								2.7		1.45～3.00						
	5553243		**202032-25S**	●										2.50～3.00						
	5549563		**252532-00S**	●		25	25	150	25	30		1.6		0.30～3.00						
	5545801		**252532-15S**	●								2.7		1.45～3.00						
	5553417		**252532-25S**	●										2.50～3.00						
Figure-3		5536370	NGTA$^{R}_{L}$202032-00S		●	20	20	125	20	25	—	1.6	—	0.30～3.00	GTM32 GTMH32 GTMX32 **I12～15**	CPR/L5※	AOS-5＊25	ASG-5	—	LW-2.5 (A)
		5536388	**202032-15S**		●							2.7		1.45～3.00						
Figure-4	5371604		Y-GTT$^{R}_{L}$10S	●		10	10	120	—	0	20	1.6	—	0.30 ⟆ 3.00	GTM32 GTMH32 GTMX32 **I12～15** TBMH32 (back turning) **H53**	—	—	—	LR-S-4＊ 10PW	CLR-15S (B)
	5358452		**10**	■							25									
	5371612		**10L**	■							30									
	5371620		**12S**	●		12	12				20									
	5358445		**12**	■							25									
	5371638		**12L**	■							30									
NEW Figure-5	5911466		Y-GTT$^{R}_{L}$12H00S-OH	●		12	12	100	—	0	20	1.6	—	0.30 ⟆ 3.00		—	—	—	LR-S-4＊ 10PW	CLR-15S (B)
NEW	5911474		Y-GTT$^{R}_{L}$16H00-OH	●		16	16				25									
Figure-6	5700034		Y-GTT$^{R}_{L}$12SOH	■		12	12	70	—	0	20	1.6	—	0.30 ⟆ 3.00		—	—	—	LR-S-4＊ 10PW	CLR-15S (B)

※For grooving deeper than the specified depth (a_r), adjust as required before use.
※The right-hand NGTA type holders come with a left-hand clamp while the left-hand come with a right-hand clamp.

Applicable inserts Micro-grain carbide series

GTMH32-GX type

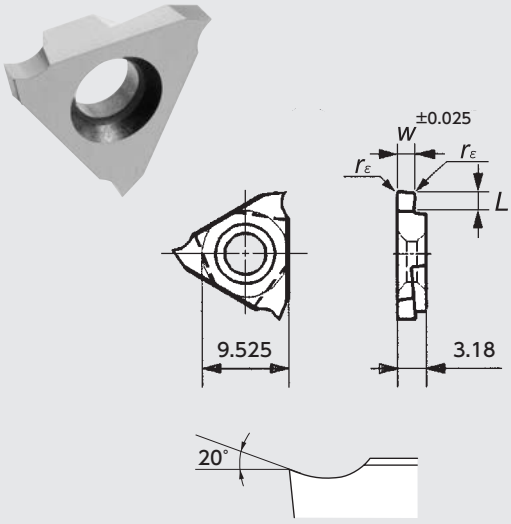
Shape	Part No.	Dimensions (mm) w	L	r_ε	Effective machining depth	Side turning	PVD-coated micro-grain carbides TM4 R	Stock	DM4 R	Stock
Side turning possible	GTMH32075RGX	0.75	2.0	0.05	1.6	0.75	5910765	●	5910898	●
	095RGX	0.95				1.50	5922224	●	5922216	●
	100RGX	1.00					5910815	●	5910906	●
	100RGX01			0.1			5910823	●	5910963	●
	150RGX	1.50	3.0	0.05	2.7	2.00	5910740	●	5910914	●
	150RGX01			0.1			5910849	●	5910971	●
	150RGX02			0.2			5910864	●	5910997	●
	200RGX	2.00		0.05			5910732	●	5910930	●
	200RGX01			0.1			5910856	●	5910989	●
	200RGX02			0.2			5910872	●	5911003	●
	300RGX	3.00		0.05			5910724	●	5910948	●
	300RGX02			0.2			5910880	●	5911011	●



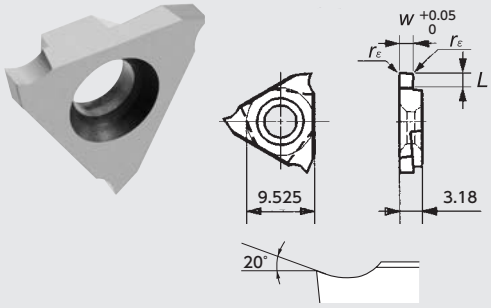
〈Chipbreaker geometry〉
Front rake angle:17°
Side rake angle:14°
●R-hand shown.

GTMH32 type

Shape	Part No.	Dimensions (mm) w	L	r_ε	Effective machining depth	PVD-coated micro-grain carbides ZM3 R	Stock	L	Stock
Tolerance of groove width w±0.025	GTMH32033R/LE	0.33	0.6	0.03	0.3	5108766	●	5109046	●
	043R/LE	0.43	1.2		0.9	5108758	●	5109038	●
	053R/LE	0.53		0.05		5108774	●	5109020	●
	075R/LE	0.75	2.0		1.6	5108790	●	5109012	●
	NEW 077R/LE	0.77				5920574	●		
	095R/LE	0.95				5108808	●	5109004	●
	NEW 097RE	0.97				5919980	●		
	100R/LE	1.00				5108816	●	5108998	●
	120R/LE	1.20				5108824	●	5108980	●
	NEW 125RE	1.25				5373360	●		
	140R/LE	1.40				5108782	●	5108907	●
	NEW 145RE	1.45	3.0		2.7	5231667	●		
	150R/LE	1.50				5108899	●	5108972	●
	NEW 175RE	1.75				5919998	●		
	180R/LE	1.80				5108881	●	5108964	●
	200R/LE	2.00				5108873	●	5108956	●
	225R/LE	2.25				5108865	●	5108949	●
	250R/LE	2.50				5108857	●	5108931	●
	275R/LE	2.75				5108840	●	5108923	●
	300R/LE	3.00				5108832	●	5108915	●
	100R/LE01	1.00	2.0	0.1	1.6	5109079	●	5109087	●
	120R/LE01	1.20				5109277	●	5109251	●
	150R/LE01	1.50	3.0		2.7	5109061	●	5109269	●
	200R/LE01	2.00				5109053	●	5109244	●
Tolerance of groove width w+0.05 0	GTMH32030R/LU	0.30	0.6	0.03	0.3	5995915	■	5107107	■
	050R/LU	0.50	1.2	0.05	0.9	5995899	■	5107099	■
	075R/LU	0.75	2.0		1.6	5995907	■	5948476	■
	095R/LU	0.95				5071451	■	5107081	■
	100R/LU	1.00				5926167	■	5043625	■
	103R/LU	1.03				5283627	■		
	125R/LU	1.25				5961826	■	5107073	■
	145R/LU	1.45	3.0		2.7	5013255	■	5107065	■
	150R/LU	1.50				5992151	■	5923651	■
	175R/LU	1.75				5992144	■	5107123	■
	200R/LU	2.00				5925664	■	5044680	■
	250R/LU	2.50				5037502	■	5107115	■



●R-hand shown.

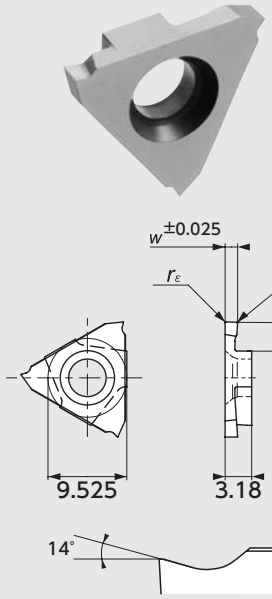


●R-hand shown.

Applicable inserts Micro-grain carbide series

GTMX32 type

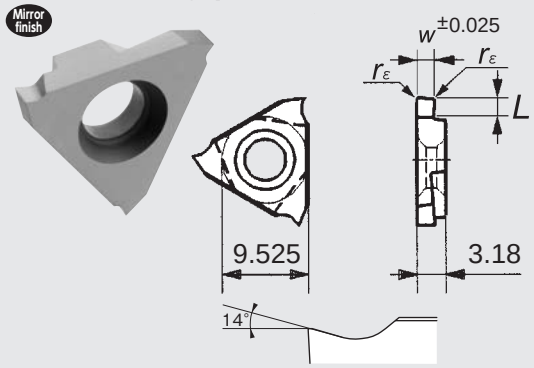
Shape	Part No.	Dimensions (mm)				PVD-coated micro-grain carbides							
						QM3				DT4			
		w	L	r_ε	Effective machining depth	R	Stock	L	Stock	R	Stock	L	Stock
Side turning possible Cost effective	GTMX32030R/LT	0.30	0.6	0.05	0.25	5510110	●	5510490	■	5847967	●		
	033R/LT	0.33				5510102	●	5510508	■				
	043R/LT	0.43	1.2		0.9	5510094	●	5510516	■	5847983	●		
	050R/LT	0.50				5493895	●	5516034	■	5847991	●		
	053R/LT	0.53				5510086	●	5510524	■				
	065R/LT	0.65				5510078	●	5510532	■	5849013	●		
	075R/LT	0.75	2.0		1.6	5493903	●	5510540	●	5848999	●	5848981	●
	080R/LT	0.80				5510060	●	5510573	■	5848965	●		
	095R/LT	0.95				5493911	●	5510581	●	5848882	●	5848874	●
	100R/LT	1.00				5493929	●	5510599	■	5848866	●		
	110R/LT	1.10				5510052	●	5510607	■				
	120R/LT	1.20				5493937	●	5510623	■	5848841	●		
	125R/LT	1.25				5510045	●	5510631	■	5848833	●		
	130R/LT	1.30				5510037	●	5510649	■	5848825	●		
	140R/LT	1.40				5510029	●	5510656	■	5848817	●		
	145R/LT	1.45	3.0		2.7	5510011	●	5510664	■				
	150R/LT	1.50				5493945	●	5510672	●	5848791	●	5848783	●
	160R/LT	1.60				5510003	●	5510680	■	5848775	●		
	175R/LT	1.75				5510243	●	5510458	■	5848767	●		
	180R/LT	1.80				5510250	●	5510466	■	5848759	●		
	200R/LT	2.00				5510227	●	5510425	●	5848742	●	5848734	●
	250R/LT	2.50				5510219	●	5510417	●	5848726	●	5848718	●
	300R/LT	3.00				5510235	●	5510771	■	5848700	●		
	100R/LT01	1.00	2.0	0.1	1.6	5510136	●	5510698	■	5848692	●		
	120R/LT01	1.20				5510128	●	5510706	■	5848684	●		
	150R/LT01	1.50	3.0		2.7	5510482	●	5510714	■	5848676	●		
	200R/LT01	2.00				5510433	●	5510441	●	5848668	●	5848650	●
	250R/LT01	2.50				5523204	●			5848627	●		
	150R/LT02	1.50		0.2		5523196	●			5848643	●		
	200R/LT02	2.00				5523188	●			5848635	●		
	250R/LT02	2.50				5523170	●			5848619	●		
	300R/LT02	3.00				5523162	●			5848601	●		



●R-hand shown.

GTMH32-VT type

Shape	Part No.	Dimensions (mm)				PVD-coated micro-grain carbides			
						VM1			
		w	L	r_ε	Effective machining depth	R	Stock	L	Stock
Side turning possible Mirror finish	GTMH32033R/LVT	0.33	0.6	0.0	0.25	5359484	●		
	043R/LVT	0.43	1.2		0.9	5359500	●		
	053R/LVT	0.53	2.0		1.6	5359526	●		
	065R/LVT	0.65				5359542	●		
	075R/LVT	0.75				5359567	●		
	080R/LVT	0.80				5359609	●		
	085R/LVT	0.85				5359633	●		
	095R/LVT	0.95				5359658	●		
	100R/LVT	1.00				5359674	●		
	110R/LVT	1.10				5359690	●		
	120R/LVT	1.20				5359716	●		
	130R/LVT	1.30				5359732	●		
	140R/LVT	1.40				5359757	●		
	150R/LVT	1.50	3.0		2.7	5359773	●		
	200R/LVT	2.00				5360532	●		



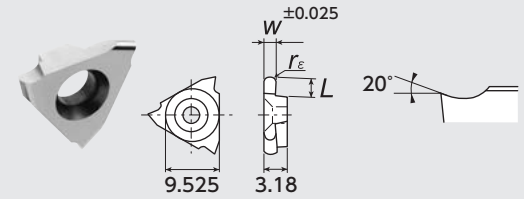
●R-hand shown.

■Useful tips for determining cutting conditions (for GTMH32-VT type)

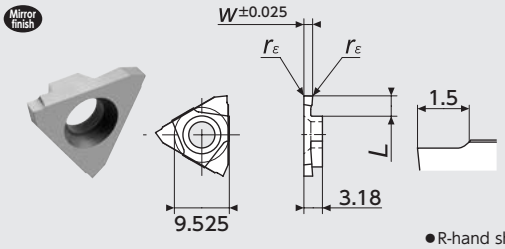
①When grooving as deep as "the effective machining depth" using inserts having a groove width of 0.43 or greater, the feed rate for side turning should be 0.03 mm/rev. or lower.
②When grooving as deep as "the effective machining depth" using inserts with a groove width of 0.43 or greater and using a feed rate exceeding 0.03 mm/rev. (max. 0.1 mm/rev), secure the clearance for chips by grooving at least twice before starting the side turning, as machining at a feed rate exceeding 0.03 mm/rev. may cause the chip to scratch the side surfaces of the grooves.

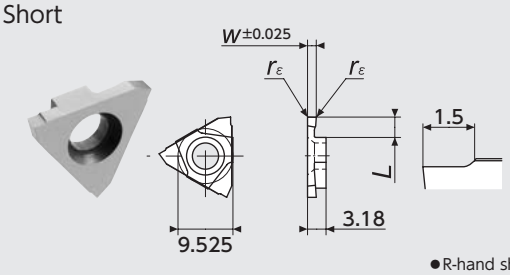
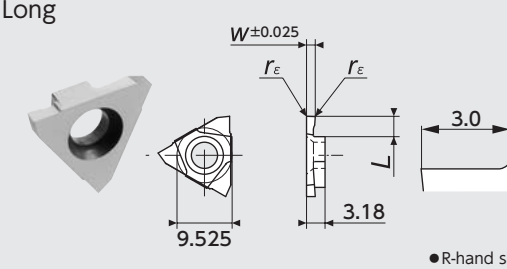
Applicable inserts Micro-grain carbide series

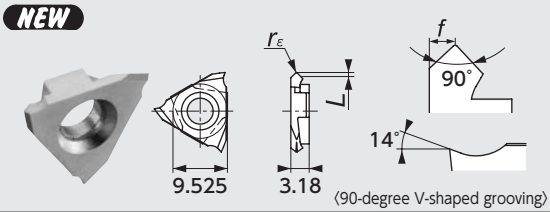
GTMH32 type

Shape	Part No.	Dimensions (mm) w	L	r_ε	Effective machining depth	PVD-coated micro-grain carbides ZM3 R	Stock	L	Stock
Full radius type Tolerance of groove width $w^{\pm 0.025}$  ●R-hand shown.	GTMH32050R/LE025	0.50	1.2	0.25	0.9	5446125	●		
	070R/LE035	0.70	2.0	0.35	1.6	5446141	●		
	100R/LE05	1.00		0.50		5160759	●		
	150R/LE075	1.50	3.0	0.75	2.7	5501200	●		
	200R/LE10	2.00		1.00		5160775	●		
	250R/LE	2.50		1.25		5921671	●		
	300R/LE15	3.00		1.50		5436720	●		

GTMH and GTMX32 type Step-chipbreaker type

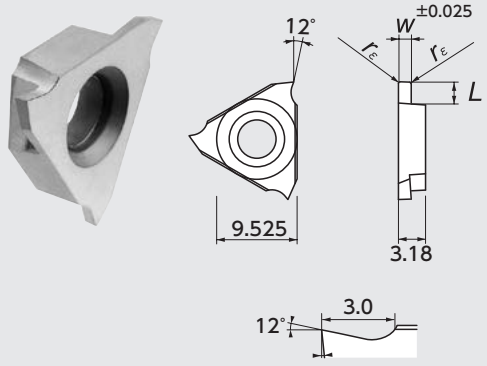
Shape	Part No.	Dimensions (mm) w	L	r_ε	Effective machining depth	PVD-coated micro-grain carbides KM1 R	Stock	L	Stock
Short Mirror finish  ●R-hand shown.	GTMH32100R/LSSH	1.00	2.0	0.05	1.6	5599394	●		
	150R/LSSH	1.50	3.0		2.7	5599386	●		
	200R/LSSH	2.00				5599378	●		

Shape	Part No.	Dimensions (mm) w	L	r_ε	Effective machining depth	PVD-coated micro-grain carbides ZM3 R	Stock	L	Stock
Short  ●R-hand shown.	GTMX32100R/LSS	1.00	2.0	0.05	1.6	5523345	●		
	150R/LSS	1.50	3.0		2.7	5523337	●		
	200R/LSS	2.00				5523329	●		
Long  ●R-hand shown.	GTMX32100R/LLS	1.00	2.0	0.05	1.6	5523295	●		
	150R/LLS	1.50	3.0		2.7	5523303	●		
	200R/LLS	2.00				5523311	●		

Shape	Part No.	Dimensions (mm) Angle	r_ε	f	Effective machining depth	PVD-coated micro-grain carbides TM4 R	Stock	L	Stock
NEW  〈90-degree V-shaped grooving〉	GTMX32V90R005	90°	0.05	0.5	0.5	5773940	●		
	V90R010	90°	0.1	1.0	0.7	5773957	●		

Applicable inserts Cermet series

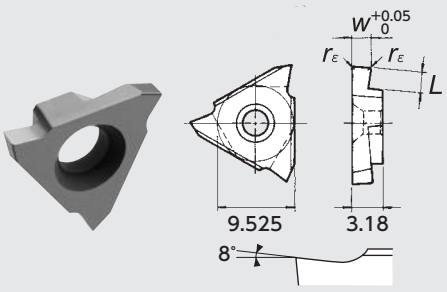
GTMH32-J type

Shape	Part No.	Dimensions (mm) w	L	r_ε	Effective machining depth	PVD-coated cermet C7Z R	Stock	L	Stock
 Product with 6-degree major relief angle	GTMH32075R/LJ005	0.75	2.0	0.05	1.6	5651716	●	5651658	●
	080R/LJ005	0.80				5651724	●	5651666	■
	095R/LJ005	0.95				5651732	●	5651674	■
	100R/LJ005	1.00				5651740	●	5651682	●
	115R/LJ005	1.15				5651757	●	5651690	●
	120R/LJ01	1.20		0.1		5639836	●	5639653	●
	125R/LJ01	1.25				5639844	●	5639661	■
	145R/LJ01	1.45	3.0		2.7	5639760	●	5639588	■
	150R/LJ01	1.50				5639778	●	5639596	■
	160R/LJ01	1.60				5639786	●	5639604	■
	175R/LJ01	1.75				5639794	●	5639612	■
	180R/LJ01	1.80				5639802	●	5639620	●
	200R/LJ01	2.00				5639810	●	5639638	●
	250R/LJ01	2.50				5639828	●	5639646	■
	150R/LJ	1.50		0.2		5651617	●	5651575	●
	200R/LJ	2.00				5651625	●	5651583	●
	250R/LJ	2.50				5651633	●	5651591	●
●R-hand shown.	300R/LJ	3.00				5651641	●	5651609	●

Note) The effective machining depths indicated are for grooving on work pieces having diameter of 120 or less.

GTM32 type

Molded chipbreaker type

Shape	Part No.	Dimensions (mm) w	L	r_ε	Effective machining depth	Cermet N40 R	Stock	L	Stock
	GTM32100R/L01	1.00	2.0	0.1	1.6	5661566	●		
	100R/L	1.00		0.2		5654439	●		
	145R/L	1.45	3.0	0.2	2.7	5654447	●		
	150R/L	1.50				5653936	●	5653969	●
	200R/L	2.00				5654454	●	5654462	●
	230R/L	2.30				5654470	●		
	250R/L	2.50				5653928	●		
●R-hand shown.	300R/L	3.00				5654488	●		

Note) The effective machining depths indicated are for grooving on work pieces having diameter of 120 or less.

NGTN type

Without offset

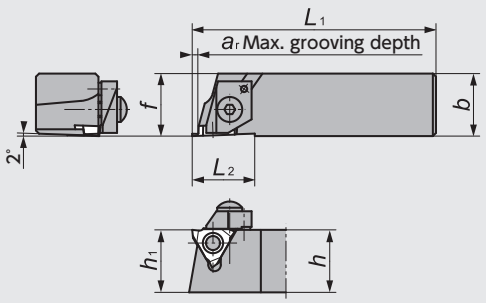
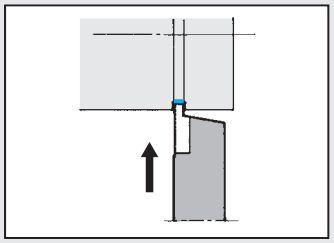


Figure-1



●Right-hand type shown.

NGTB type

With offset

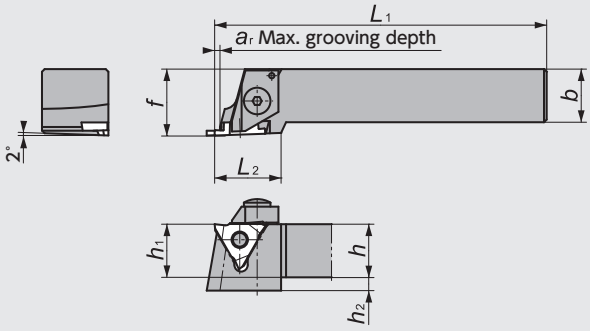
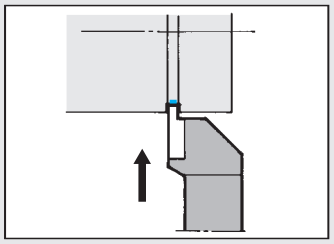


Figure-2



●Right-hand type shown.

NGTA type

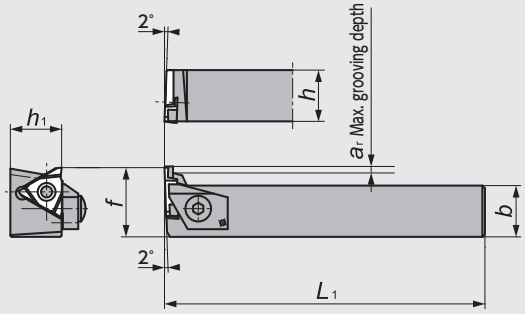
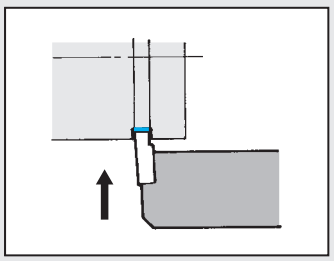


Figure-3



●Left-hand type shown.
Note) Use R-hand inserts for L-hand type holder.

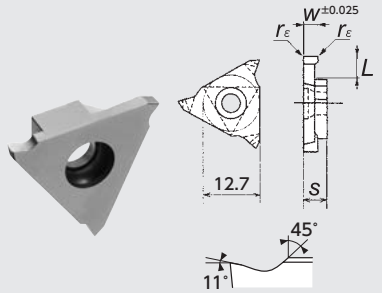
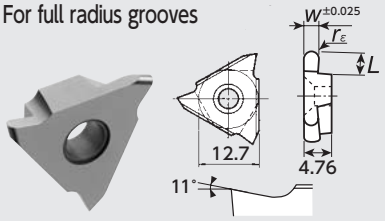
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	a_r	h_2	Width of groove (mm) w	Applicable insert	Parts: Clamp	Clamping bolt	Spring	Wrench
Figure-1	5501994	5554241	NGTN R/L 161643-20	●	●	16	16	78	16	16	20	4.5	9	2.00~3.49	GTM43 GTMA43 GTMT43 I17	CPR/L5S	AOS-5*20	ASG-5	LW-2.5
	5534136	5222112	161643-35	●	●									3.50~5.50					
Figure-2	5239900	5239843	NGTB R/L 161643-00S	●	●	16	16	100	16	20	25	3.0	9	1.00~2.49	GTM43 GTMA43 GTMT43 I17	CPR/L5	AOS-5*25	ASG-5	LW-2.5
	5949615	5210901	161643-20S	●	●							4.5		2.00~3.49					
	5806096	5222021	161643-35S	●	●									3.50~5.50					
	5239850	5239868	202043-00S	●	●	20	20	125	20	25		3.0	5	1.00~2.49	GTM43 GTMA43 GTMT43 I17	CPR/L6	AOS-6*30	ASG-6	LW-3
	5550041	5553367	202043-20S	●	●							4.5		2.00~3.49					
	5553375	5222039	202043-35S	●	●									3.50~5.50					
	5239876	5239892	252543-00S	●	●	25	25	150	25	30		3.5	0	1.00~2.49					
	5550058	5550066	252543-20S	●	●							5.5		2.00~3.49					
	5550074	5550082	252543-35S	●	●									3.50~5.50					
	5553433	5553441	322543-20S	●	●	32		170	32					2.00~3.49					
	5222013	5222047	322543-35S	●	●									3.50~5.50					
Figure-3		5884903	NGTA R/L 202043-00S		●	20	20	125	20	27	—	3.0	—	1.00~2.49	GTM43 GTMA43 GTMT43 I17	CPR/L5※	AOS-5*25	ASG-5	LW-2.5

※For grooving deeper than the specified depth (a_r), adjust as required before use.

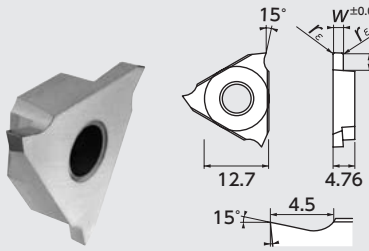
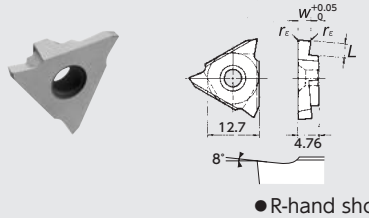
Applicable inserts Micro-grain carbide series

GTMT43 and GTMA43 type

Shape	Part No.	Dimensions (mm) w	L	r_ε	s	Effective machining depth	PVD-coated micro-grain carbides QM3 R	Stock	QM3 L	Stock	DM4 R	Stock	DM4 L	Stock
Molded chipbreaker  ●R-hand shown.	GTMT43145R/L	1.45	3.5	0.2	4.76	3.0	5238076	●	5237912	●	5846852	●	5846860	●
	150R/L	1.50					5238084	●	5237920	●	5846837	●	5846845	●
	175R/L	1.75					5238092	●	5237938	●	5846811	●	5846829	●
	185R/L	1.85					5238100	●	5237946	●	5846795	●	5846803	●
	200R/L	2.00					5238118	●	5237953	●	5846779	●	5846787	●
	230R/L	2.30					5238126	●	5237961	●	5846753	●	5846761	●
	250R/L	2.50	5.5	0.3		4.3	5238134	●	5237979	■	5846746	●		
	265R/L	2.65					5238142	●	5238068	■	5846910	●		
	280R/L	2.80					5238159	●	5237904	●	5846902	●	5846738	●
	300R/L	3.00					5238167	●	5237987	●	5846894	●	5846720	●
	330R/L	3.30					5238175	●	5237995	●				
	350R/L	3.50					5238183	●	5238001	●	5846704	●	5846712	●
	400R/L	4.00		0.4			5238191	●	5238019	●	5846688	●	5846696	●
	430R/L	4.30					5238225	■	5238027	■				
	450R/L	4.50					5238233	●	5238035	●	5846639	●	5846670	●
	500R/L	5.00			5.76		5238241	●	5238043	●	5846613	●	5846621	●
	550R/L	5.50					5238258	●	5238050	●	5846597	●	5846605	●
For full radius grooves  ●R-hand shown.	GTMA43200R/L10R	2.00	3.5	Full radius 1.0	—	3.0	5437918	●						
	300R/L15R	3.00	5.5	Full radius 1.5		4.5	5437926	●						
	400R/L20R	4.00		Full radius 2.0			5437934	●						

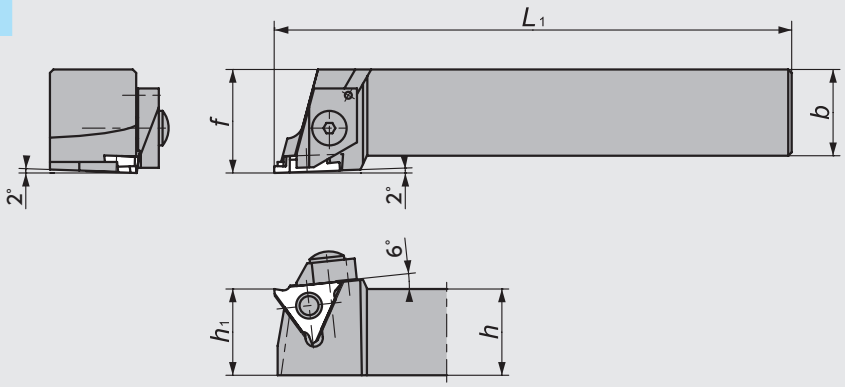
Applicable inserts Cermet series

GTMA43-J and GTM43 type

Shape	Part No.	Dimensions (mm) w	L	r_ε	Effective machining depth	PVD-coated cermet C7Z R	Stock	C7Z L	Stock	Cermet N40 R	Stock	N40 L	Stock
 Product with 6-degree major relief angle ●R-hand shown.	GTMA43100R/L J01	1.00	2.0	0.1	1.6	5640529	●	5640354	●				
	125R/L J01	1.25				5640537	●	5640362	■				
	145R/L J01	1.45	3.5		3.0	5640503	●	5640347	●				
	150R/L J	1.50		0.2		5640453	●	5640297	●				
	175R/L J	1.75				5640461	●	5640305	●				
	185R/L J	1.85				5640479	●	5640313	■				
	200R/L J	2.00				5640487	●	5640321	■				
	230R/L J	2.30				5640495	●	5640339	■				
	250R/L J03	2.50	5.5	0.3	4.5	5640396	●	5640230	●				
	265R/L J03	2.65				5640404	●	5640248	■				
	280R/L J03	2.80				5640412	●	5640255	■				
	300R/L J03	3.00				5640420	●	5640263	●				
	330R/L J03	3.30				5640438	●	5640271	■				
	350R/L J03	3.50				5640446	●	5640289	■				
	400R/L J04	4.00		0.4		5640370	●	5640214	●				
	450R/L J04	4.50				5640388	●	5640222	●				
Product with 0-degree major relief angle ●R-hand shown.	GTMA43100R/L J05R	1.00	2.0	0.50	1.6	5638358	●						
	150R/L J075R	1.50	3.5	0.75	3.0	5638341	●						
	200R/L J10R	2.00		1.00		5638333	●						
	250R/L J125R	2.50	5.5	1.25	4.0	5638382	●						
	300R/L J15R	3.00		1.50		5638374	●						
	400R/L J20R	4.00		2.00		5638366	■						
 ●R-hand shown.	GTM43200R/L	2.00	3.5	0.2	3.0					5654009	●	5654033	●
	230R/L	2.30								5654546	●		
	250R/L	2.50	5.5		4.2					5654553	●	5654561	●
	265R/L	2.65								5852785	●		
	300R/L	3.00								5653993	●	5654025	●
	330R/L	3.30								5445846	●		
	350R/L	3.50								5690896	●	5667787	●
	400R/L	4.00								5653985	●	5654017	●
	450R/L	4.50								5654579	●		

Note) The effective machining depths indicated are for grooving on work pieces having a diameter of 120 or less.

NGBB type

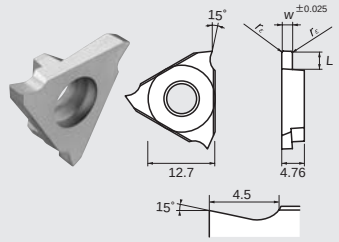
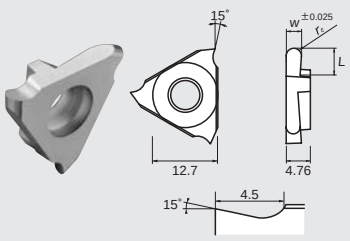


Holder dimensions

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	a_r	Width of groove (mm) w	Applicable insert	Parts: Clamp	Parts: Clamping bolt	Parts: Spring	Parts: Wrench
5768387		NGBB$^{R}_{L}$252543-00S	●		25	25	150	25	30	–	1.0 ~ 2.49	GTMX43-J (See table below)	CPR6	AOS-6*30	ASG-6	LW-3
5768395		-25S	●								2.5 ~ 4.50					

Applicable inserts

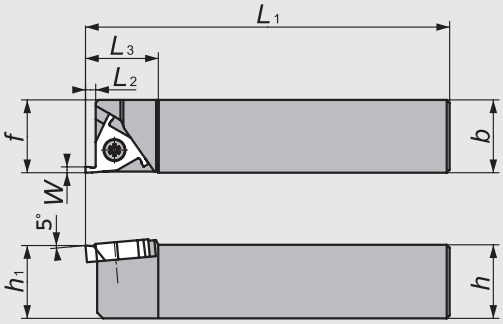
GTMX43-J type

Shape	Part No.	Dimensions (mm) w	L	r_ε	d	s	Effective machining depth	PVD-coated cermet C7Z R	Stock	L	Stock
 Product with 0-degree major relief angle shown ●R-hand shown.	GTMX43100$^{R}_{L}$J01	1.00	2.0	0.1	12.70	4.76	1.6	5659081	●	5658927	■
	125$^{R}_{L}$J01	1.25						5659073	●	5658919	■
	145$^{R}_{L}$J01	1.45	3.5				3.0	5659065	●	5658901	■
	150$^{R}_{L}$J	1.50		0.2				5659057	●	5658877	■
	175$^{R}_{L}$J	1.75						5659040	●	5658869	●
	185$^{R}_{L}$J	1.85						5659032	●	5658851	■
	200$^{R}_{L}$J	2.00						5659024	●	5658786	●
	230$^{R}_{L}$J	2.30						5659016	●	5658778	●
	250$^{R}_{L}$J03	2.50	5.5	0.3			4.5	5659008	●	5658760	■
	265$^{R}_{L}$J03	2.65						5658992	●	5658752	■
	280$^{R}_{L}$J03	2.80						5658984	●	5658737	■
	300$^{R}_{L}$J03	3.00						5658976	●	5658729	■
	330$^{R}_{L}$J03	3.30						5658968	●	5658711	■
	350$^{R}_{L}$J03	3.50						5658950	●	5658703	■
	400$^{R}_{L}$J04	4.00		0.4				5658943	●	5658695	■
	450$^{R}_{L}$J04	4.50						5658935	●	5658687	■
J type for full radius grooves  Product with 0-degree major relief angle shown	GTMX43100RJ05R	1.00	2.0	0.50	12.70	4.76	1.6	5659149	●	-	—
	150RJ075R	1.50	3.5	0.75			3.0	5659131	●	-	—
	200RJ10R	2.00		1.00				5659123	●	-	—
	250RJ125R	2.50	5.5	1.25			4.0	5659115	●	-	—
	300RJ15R	3.00		1.50				5659107	●	-	—
	400RJ20R	4.00		2.00				5659099	●	-	—

Flat 3

TWG type

Side turning possible*
※Limited to 1.5 mm grooving depth



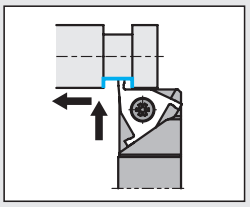
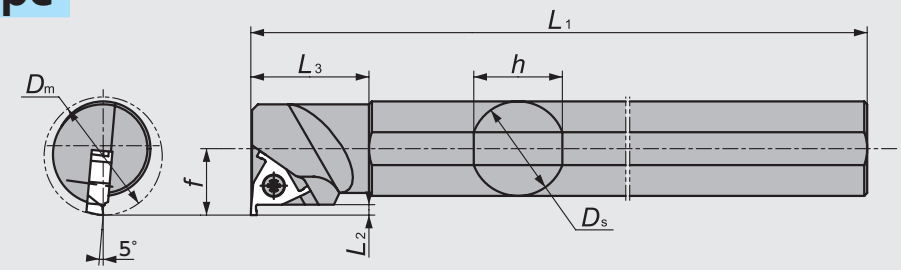


Figure-1

●Right-hand type shown.

TWG type



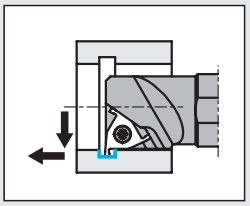


Figure-2

●Right-hand type shown.
Note)Use L-hand inserts for R-hand type holders.

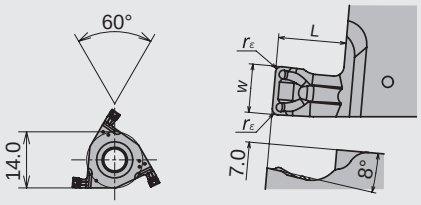
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions(mm) h	Ds	Dm	b	L1	h1	f	L2	L3	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5794649		TWGR/L2012X	★		12	–	–	20	120	12	20	3.5	25	TWG (See table below)	FSS25-5.0*10	RLR-20S
	5859350		2016X	★		16					16					FSS10-5.0*14	LLR-20S
	5714332	5720511	2020K	●	●	20				125	20					FSS10-5.0*14	RLR-20S
	5714233	5720503	2525K	●	●	25			25		25	25					
Figure-2	5722541		S32S-TWGR38	●		30	32	38	–	250	40	20.5	3.5	40	TWG (See table below)	FSS10-5.0*14	RLR-20S
	5722533		S40T-TWGR46	●		38	40	46		300		24.5					

Applicable inserts

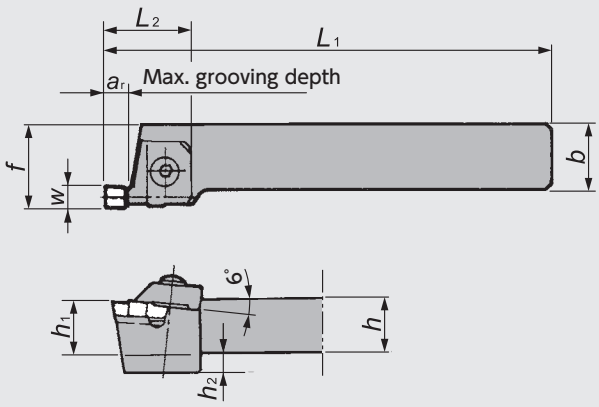
TWG type

Flat 3 inserts Molded chipbreaker

Shape	Part No.	Dimensions(mm) w	L	rε	Effective machining depth	PVD-coated micro-grain carbides TM1 R	Stock	L	Stock
 ●R-hand shown.	TWG20R/L005	2.0	(3.5)	0.05	3.0	5714340	●	5720040	●
	020			0.2		5714357	●	5720057	●
	TWG25R/L010	2.5		0.1		5714365	●	5720065	●
	030			0.3		5714373	●	5720073	●
	TWG30R/L010	3.0		0.1		5714381	●	5720081	●
	030			0.3		5714399	●	5720099	●

Grooving tools

GTV type



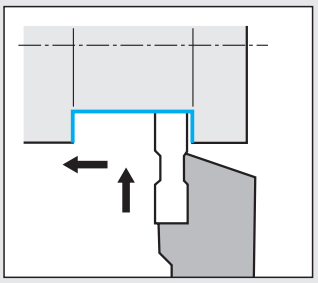
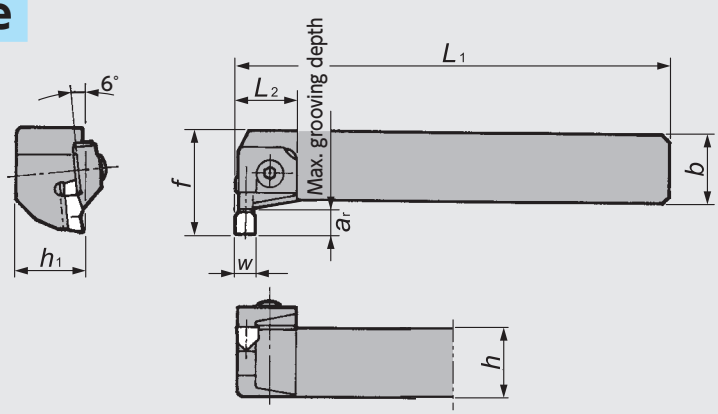


Figure-1

●Right-hand type shown.

GKV type



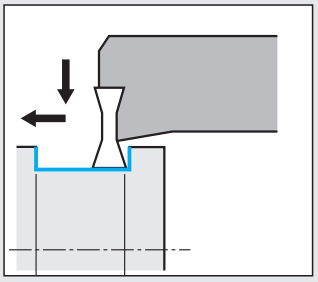


Figure-2

●Right-hand type shown.

Holder dimensions

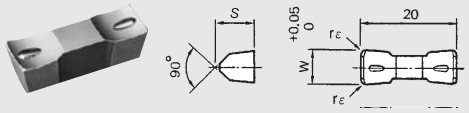
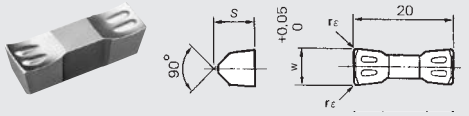
Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	a_r	h_2	Width of groove (mm) w	Applicable insert	Parts: Clamp	Parts: Clamping bolt	Parts: Spring	Parts: Wrench
Figure-1	5765920		GTV[R/L]16-3N	●		16	16	100	16	20	25	11	9	3.00 ~ 3.50	GEV300N(04) GEV350N(04) I21	CVR/L3SN	AOB-5C	ASG-5	LW-3
	5778980		20-3N	●		20	20	125	20	25	32		0			CVR/L3N	AOB-6C	ASG-6	LW-4
	5801667	5801675	25-3N	●	●	25	25	150	25	30	32								
	5657739	5657747	16-4N	●	●	16	16	100	16	20	25		9	4.00 ~ 5.90	GEV I21 GTV (cross-grinding) GVMB GVMN GVGN I21~22	CVR/L4SN	AOB-5C	ASG-5	LW-3
	5657754	5657762	20-4N	●	●	20	20	125	20	25	32					CVR/L4N	AOB-6C	ASG-6	LW-4
	5657770	5657788	25-4N	●	●	25	25	150	25	30	32								
	5657796	5657804	20-6	●	●	20	20	125	20	25	32		0	6.00 ~ 7.90		CVR/L6			
	5609193	5611397	25-6	●	●	25	25	150	25	30	32								
	5657812		20-8	●		20	20	125	20	25	32			8.00 ~ 9.00		CVR/L8			
	5657697	5657705	25-8	●	●	25	25	150	25	30	32								
Figure-2	5657820	5657838	GKV[R/L]20-4N	●	●	20	20	125	20	33	32	11	—	4.00 ~ 5.90		CVR/L4N	AOB-6C	ASG-6	LW-4
	5657846	5657853	25-4N	●	●	25	25	150	25	38	32								
	5657861		20-6	●		20	20	125	20	33	32			6.00 ~ 7.90		CVR/L6			
	5657713	5657721	25-6	●	●	25	25	150	25	38	32								
			20-8			20	20	125	20	33	32			8.00 ~ 9.00		CVR/L8			
			25-8			25	25	150	25	38	32								

Note) The right-hand GKV type holders come with a left-hand clamp.

Applicable inserts

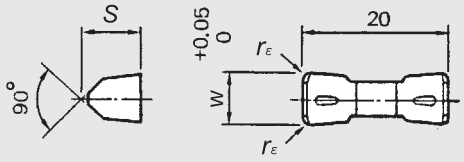
GVGN type

V-shaped location type Molded chipbreaker

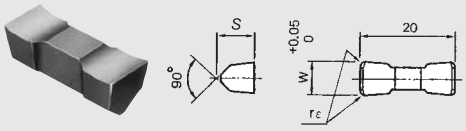
Shape	Part No.	Dimensions (mm)			Cermet		PVD-coated micro-grain carbide	
		w	S	r_ε	N40	Stock	QM3	Stock
	GTV400N	4.0	8.5	0.15	5654496	●	5027610	●
	400N04			0.4	5654504	●	5046727	●
	GTV600N	6.0	8.5	0.15	5654512	●	5027602	●
	600N04			0.4	5654520	●	5046735	●

GEV type

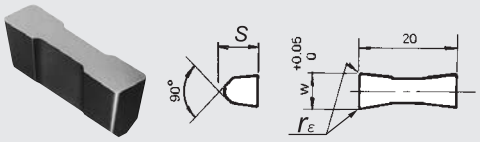
Molded chipbreaker

Shape	Part No.	Dimensions (mm)			Cermet		PVD-coated micro-grain carbide	
		w	S	r_ε	N40	Stock	QM3	Stock
	GEV300N	3.0	5.2	0.2	5763271	●	5027586	●
	300N04			0.4			5048392	●
	GEV350N	3.5		0.2	5801972	●		
	350N04			0.4			5053616	●
	GEV400N	4.0	8.5	0.2	5658893	●	5046818	●
	400N04			0.4	5669726	●	5035233	●
	GEV450N	4.5		0.2				
	450N04			0.4			5227517	●
	GEV500N	5.0		0.2	5653829	●	5046800	●
	500N04			0.4			5035225	●
	GEV550N	5.5		0.2	5653837	●		
	550N04			0.4			5255385	●
	GEV600N	6.0		0.2	5653845	●	5082961	●
	600N04			0.4			5042189	●
	GEV650N	6.5		0.2	5653852	●		
	650N04			0.4			5064191	●
	GEV700N	7.0		0.2				
	700N04			0.4	5653860	●	5037080	●
	GEV750N	7.5		0.2	5653878	●		
	750N04			0.4			5255393	●
	GEV800N	8.0		0.2	5653886	●		
	800N04			0.4			5255401	●
	GEV900N	9.0		0.2				
	900N04			0.4				

GVMB type

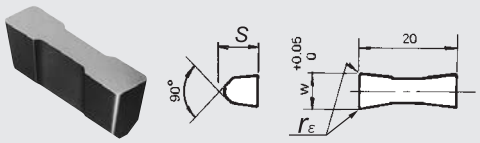
Shape	Part No.	Dimensions (mm)			Cermet	
		w	*S*	r_ε	C7X	Stock
 With chipbreaker	GVMB20400N	4.0	8.5	0.2	5687520	●
	20450N	4.5				
	20500N	5.0			5687512	●
	20550N	5.5				
	20600N	6.0			5687538	●
	20650N	6.5				
	20700N	7.0			5687546	●
	20750N	7.5			5687553	●
	20800N	8.0			5687561	●
	20900N	9.0				

GVMN type

Shape	Part No.	Dimensions (mm)			Cermet	
		w	*S*	r_ε	C7X	Stock
 Without chipbreaker	GVMN20400N	4.0	8.5	0.2	5691167	●
	20450N04※	4.5		0.4		
	20500N	5.0		0.2		
	20550N	5.5				
	20600N	6.0			5687652	●
	20650N	6.5				
	20700N	7.0				
	20750N	7.5				
	20800N	8.0				
	20900N	9.0				

※This part no. alone has a nose radius of 0.4.

GVGN type

Shape	Part No.	Dimensions (mm)			Ceramic			
		w	*S*	r_ε	HC2	Stock	HC4	Stock
 Without chipbreaker	GVGN20400N	4.0	8.5	0.2				
	20500N	5.0						
	20600N	6.0						
	20700N	7.0						
	20800N	8.0						
	20900N	9.0						

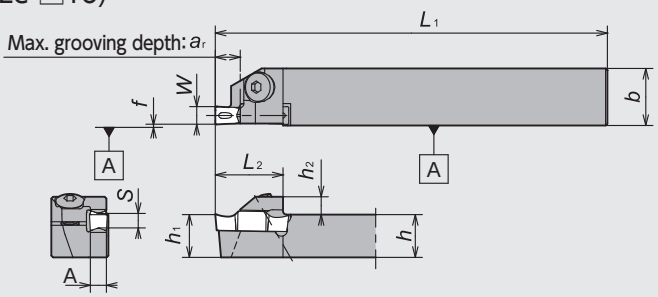
The ceramic grade inserts are manufactured on a production-to-order basis.

MEMO

SCRUM DUO

GTWP type

For Swiss lathe (shank size □16)
Side turning possible
Maximum diameter for grooving ϕ42



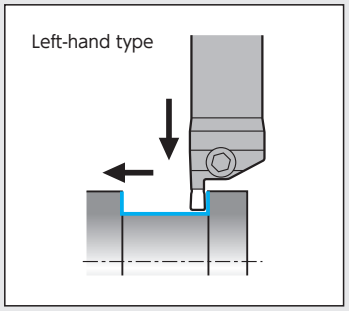
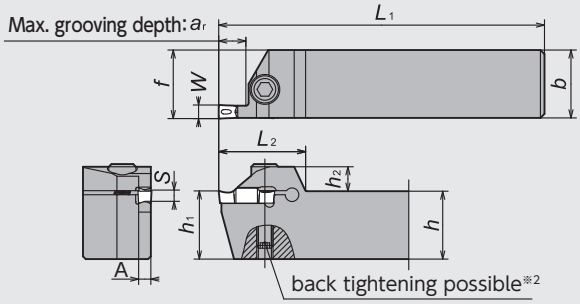


Figure-1

●Right-hand type shown.

GTWP type

For mutipurpose lathe(shank size □20, □25)
Side turning possible



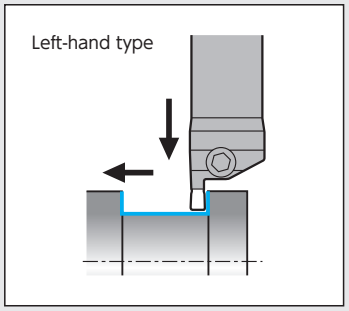


Figure-2

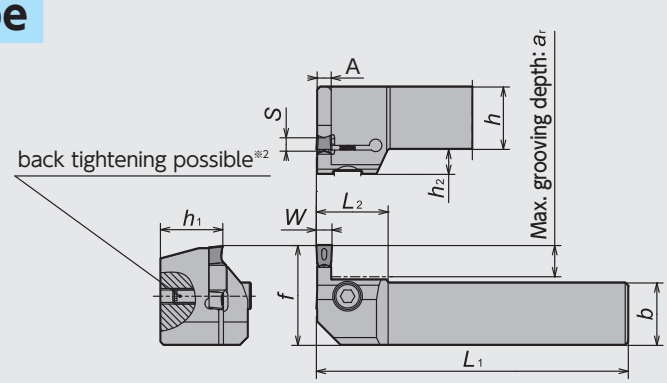
●Right-hand type shown.

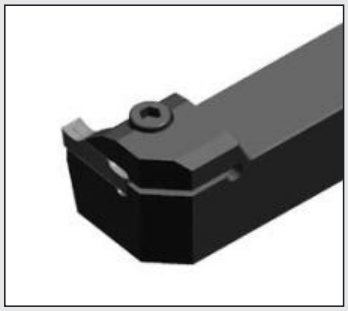
Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Width of groove (mm) w	Max. grooving depth a_r	Dimensions (mm) h	b	h_1	h_2	f	L_1	L_2	A	Height※1 S	Applicable insert	Parts: Clamping bolt	Parts: Wrench	Parts: Wrench※2
Figure-1	5875125		GTWP R/L 1016-3D07	●		3	7	10	16	12	2	0.3	120	19	2.6	D	GWP○300 I25	A0B-5*14	LW-3S	—
	5849054	5852280	1216-3D07	●	●			12			0			19.5				A0B-5*16		
	5849070	5852306	1616-3D09	●	●		9	16		16				22						
	5875133		1016-4E07	●		4	7	10		12	2			19	3.5	E	GWP○400 I25	A0B-5*14		
	5849088	5852314	1216-4E07	●	●			12			0			19.5				A0B-5*16		
	5849096	5852322	1616-4E09	●	●		9	16		16				22						
	5875141		1016-5F07	●		5	7	10		12	2			19	4.5	F	GWP○500 I25	A0B-5*14		
	5849104	5852355	1216-5F07	●	●			12			0			19.5				A0B-5*16		
	5849112	5852371	1616-5F09	●	●		9	16		16				22						
	5893565		1020-6G07	●		6	7	10	20	10	2			22	5.3	G	GWP○600 I25	A0B-5*14		
	5893573		1220-6G07	●			7	12	20	12	0			22.5				A0B-5*16		
	5893581	5893599	1620-6G09	●	●		9	16	20	16				25						
Figure-2	5849120	5852397	GTWP R/L 2020K-3D10	●	●	3	10	20	20	20	8	20.2	125	29	2.6	D	GWP○300 I25	CS0520W	LW-4	LW-2.5
	5849138	5852405	2525M-3D10	●	●			25	25	25	9	25.2	150	32				CS0625W	LW-5	LW-3
	5849146	5852421	2020K-3D20	●	●		20	20	20	20	8	20.2	125	41				CS0520W	LW-4	LW-2.5
	5849153	5852439	2525M-3D20	●	●			25	25	25	9	25.2	150	44				CS0625W	LW-5	LW-3
	5849161	5852447	2020K-4E10	●	●	4	10	20	20	20	8	20.3	125	29	3.5	E	GWP○400 I25	CS0520W	LW-4	LW-2.5
	5849179	5852454	2525M-4E10	●	●			25	25	25	9	25.3	150	32				CS0625W	LW-5	LW-3
	5849187	5852470	2020K-4E20	●	●		20	20	20	20	8	20.3	125	41				CS0520W	LW-4	LW-2.5
	5849195	5852488	2525M-4E20	●	●			25	25	25	9	25.3	150	44				CS0625W	LW-5	LW-3
	5849203	5852496	2020K-5F10	●	●	5	10	20	20	20	8	20.3	125	29	4.5	F	GWP○500 I25	CS0520W	LW-4	LW-2.5
	5849211	5852512	2525M-5F10	●	●			25	25	25	9	25.3	150	32				CS0625W	LW-5	LW-3
	5849229	5852520	2020K-5F20	●	●		20	20	20	20	8	20.3	125	41				CS0520W	LW-4	LW-2.5
	5849237	5852538	2525M-5F20	●	●			25	25	25	9	25.3	150	44				CS0625W	LW-5	LW-3
	5849245	5852546	2020K-6G12	●	●	6	12	20	20	20	8	20.35	125	34	5.3	G	GWP○600 I25	CS0520W	LW-4	LW-2.5
	5849252	5852553	2525M-6G12	●	●			25	25	25	9	25.35	150	37				CS0625W	LW-5	LW-3
	5849260	5852561	2020K-6G25	●	●		25	20	20	20	8	20.35	125	49				CS0520W	LW-4	LW-2.5
	5849278	5852587	2525M-6G25	●	●			25	25	25	9	25.35	150	52				CS0625W	LW-5	LW-3

※1 Please make sure the insert height fit on the toolholder.
※2 Wrench for back side clamping is optional.

GKWP type

L style holder





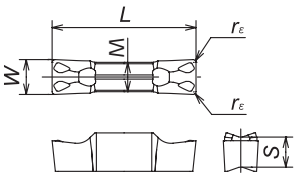
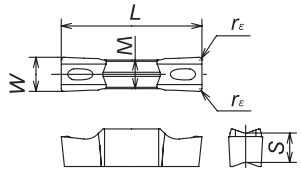
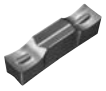
※Recommended torque 7.0〔N・m〕
●Left-hand type shown.

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Width of groove (mm) w	Max. grooving depth ar	Dimensions (mm) h	b	h1	h2	f	L1	L2	A	Height※1 S	Applicable insert	Parts: Clamping bolt	Parts: Wrench	Parts: Wrench※2
	5893607	GKWP※L2020K-3D10		●	3	10	20	20	20	8	32	125	23	2.6	D	GWP○300	CS0520W	LW-4	LW-2.5
	5893615	2020K-4E10		●	4									3.5	E	GWP○400			
	5893623	2020K-5F10		●	5									4.5	F	GWP○500			
	5893631	2020K-6G12		●	6	12					34			5.3	G	GWP○600			

※1 Please make sure the insert height fit on the toolholder.
※2 Wrench for back side clamping is optional.

GWP type

Applicable insert

Shape		Part No.	Dimensions (mm) W Width	W Tolerance	rε	M	L	Height※1 S	PVD coated micro-grain carbide DM4	Stock
 ●Excellent in both sharpness and chipcontrol ●Applicable for both grooving and travese maching	**GW** (ground chipbreaker)	GWPG300N02D-GW	3.0	±0.025	0.2	2.5	20.6	D	5848023	●
		300N04D-GW			0.4				5848031	●
		GWPG400N02E-GW	4.0		0.2	3.4		E	5848064	●
		400N04E-GW			0.4				5848072	●
		400N08E-GW			0.8				5852868	●
		GWPG500N02F-GW	5.0		0.2	4.3		F	5848106	●
		500N04F-GW			0.4				5848114	●
		500N08F-GW			0.8				5852876	●
		GWPG600N02G-GW	6.0		0.2	5.2	25.6	G	5848148	●
		600N04G-GW			0.4				5848155	●
		600N08G-GW			0.8				5852900	●
	GW (no-ground chipbreaker)	GWPM300N04D-GW	3.0	±0.05	0.4	2.5	20.6	D	5848171	●
		400N04E-GW	4.0			3.4		E	5848197	●
		500N04F-GW	5.0			4.3		F	5848213	●
		600N04G-GW	6.0			5.2	25.6	G	5848239	●
 ●Excellent sharpness with high-rake angle ●Chipbreaker designed to V chip shape so that it does not rub on side walls of part	**GV** (ground chipbreaker) 	GWPG300N02D-GV	3.0	±0.025	0.2	2.5	20.6	D	5848262	●
		300N04D-GV			0.4				5848270	●
		GWPG400N02E-GV	4.0		0.2	4.3		E	5848353	●
		400N04E-GV			0.4				5848361	●
		GWPG500N02F-GV	5.0		0.2	4.3		F	5848395	●
		500N04F-GV			0.4				5848403	●
		GWPG600N02G-GV	6.0		0.2	4.3	25.6	G	5848437	●
		600N04G-GV			0.4				5848445	●

※1 Please make sure the insert height fit on the toolholder.

GTVW type

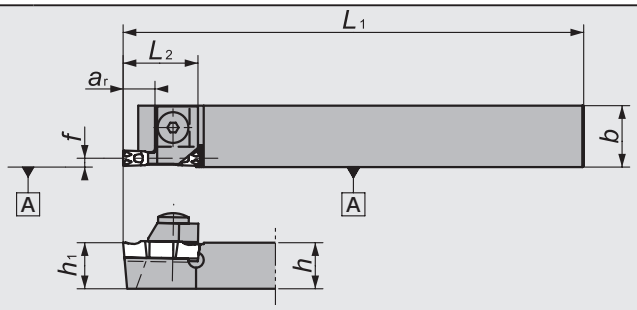
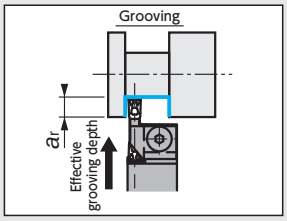


Figure-1



- Use for grooving.
- Right-hand type shown.

GTVW type

With offset

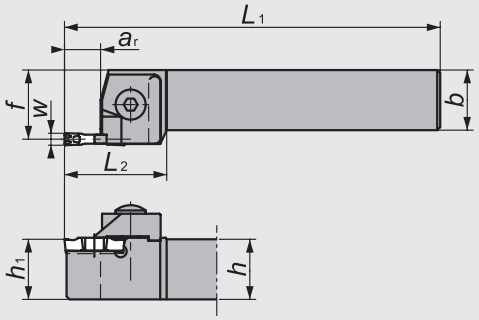


Figure-2

- Right-hand type shown.

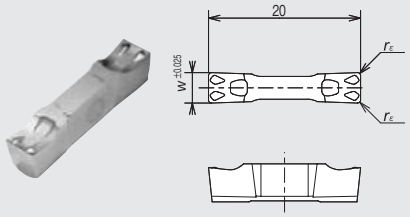
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	h	b	L_1	h_1	f	L_2	a_r	Width of groove (mm) w	Applicable insert	Clamp	Clamping bolt	Spring	Wrench
Figure-1		5512355	GTVW R/L 1016-3		■	10	16	120	10	1.8	19.5	6.2	3.0	GVW300 (See table below)	CVSR/L3	AOS-5*16	ASG-5	LW-2.5S
		5512371	1216-3		■	12			12									
			1616-3			16			16		22	8.0				AOS-5*20		
	5565189		2020-3	■		20	20		20									
	5509989		1016-4	■		10	16		10	2.3	19.5	6.2	4.0	GVW400 GVW500 (See table below)	CVSR/L4	AOS-5*16		
			1216-4			12			12									
		5509948	1616-4		■	16			16		22	8.0	5.0			AOS-5*20		
	5565205	5565213	2020-4	■	■	20	20		20									
			1020-6			10	20		10	3.3	19.5	6.2	6.0	GVW600 (See table below)	CVSR/L6	AOS-5*16		
			1220-6			12			12									
	5520903	5520853	1620-6	■	■	16			16		22	8.0				AOS-5*20		
		5565239	2020-6		■	20			20									
Figure-2	5519293		GTVW R/L 20-3	■		20	20	125	20	23.5	34	12	3.0	GVW300 (See table below)	CVR/L3N	AOB-6C	ASG-6	LW-4
	5517081		25-3	■		25	25	150	25	28.0								
	5514013	5514021	20-4	■	■	20	20	125	20	23.5			4.0 5.0	GVW400 GVW500 (See table below)	CVR/L4N			
		5514047	25-4		■	25	25	150	25	28.0								
	5520895		20-6	■		20	20	120	20	27			6.0	GVW600 (See table below)	CVR/L6			
	5520887		25-6	■		25	25	150	25									

Applicable inserts

GVW type

Molded chipbreaker

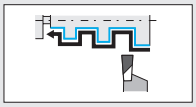
Shape	Part No.	Dimensions (mm) w	Dimensions (mm) r_ε	PVD-coated micro-grain carbides QM3	Stock
	GVW300N02	3.00	0.2	5520390	■
	300N04		0.4	5520382	■
	GVW400N02	4.00	0.2	5510839	■
	400N04		0.4	5510847	■
	GVW500N02	5.00	0.2	5520432	■
	500N04		0.4	5520424	■
	GVW600N02	6.00	0.2	5520374	■
	600N04		0.4	5520366	■

※■ change to non-stock items as soon as no stock

Multi-functional tools for machining of aluminum

GTPA type

Front/back clamping type



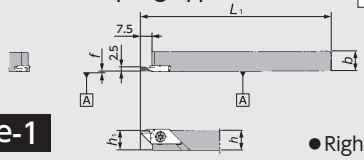


Figure-1

●Right-hand type shown.

Y-GTPA type

Front/back clamping type
Y-axis holder

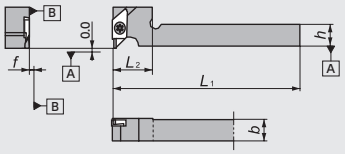


Figure-2

●Right-hand type shown.

GTPA-OH型

Front/back clamping type
SPLASH BAR

Th
□12：Rc1/8(PT1/8)

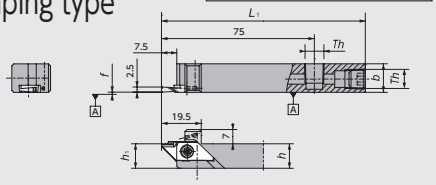


Figure-3

Y-GTPA-OH型

Front/back clamping type
SPLASH BAR NEW

Th
□12：Rc1/8(PT1/8)

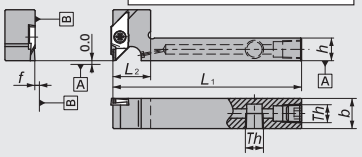


Figure-4

●Right-hand type shown.

Y-GTPA-OH type

Front/back clamping type
For Y-axis high-pressure coolant

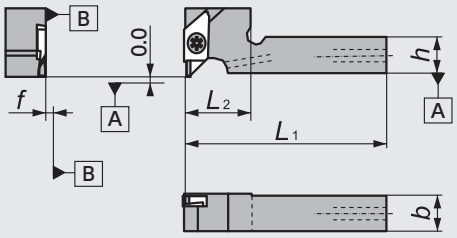
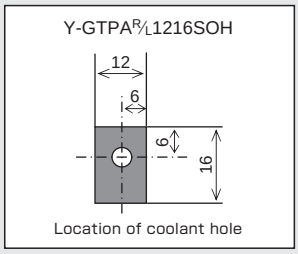


Figure-5



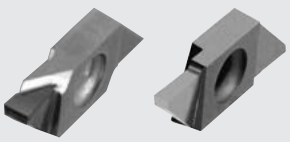
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Width of groove (mm) w	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5552401		GTPAR/L1010	●		10	10	120	10	0.1	—	2.0 ≀ 2.5	GTPA (See table below)	LRIS-4＊10PW	CLR-15S
	5552419		1212	●		12	12		12						
NEW	5577291		1616	★		16	16		16					LRIS-4＊12PW	
Figure-2	5563820		Y-GTPAR/L1216	●		12	16	120	—	0.1	20			LRIS-4＊12PW	CLR-15S
NEW Figure-3	5912845		GTPAR/L1214H-OH	★		12	14	100	12	0.1	—			LRIS-4＊12PW	CLR-15S
Figure-4	5911482		Y-GTPAR/L1216HS-OH	●		12	16	70	—	0.1	20			LRIS-4＊12PW	CLR-15S
	5911490		Y-GTPAR/L1216H-OH	●		16	16				25				
Figure-5	5700018		Y-GTPAR/L1216SOH	■		12	16	70	—	0.1	20			LRIS-4＊12PW	CLR-15S
	5700026		1616OH	■		16	16				25				

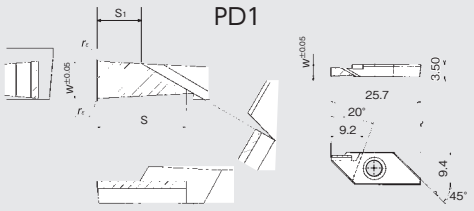
Applicable inserts

GTPA type

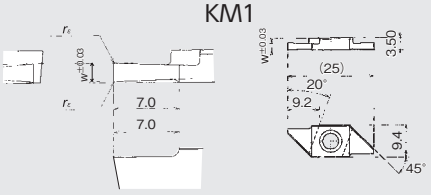
Shape



PD1



KM1



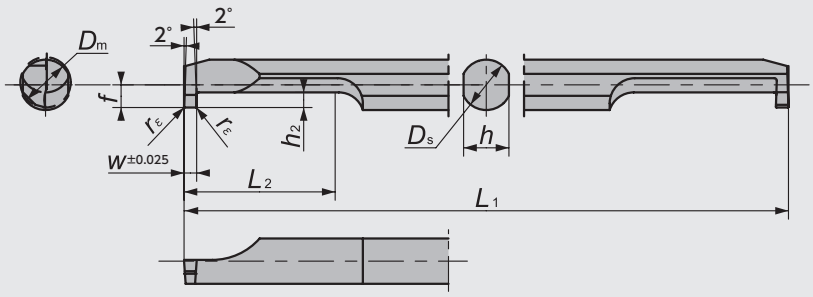
●R-hand type shown.

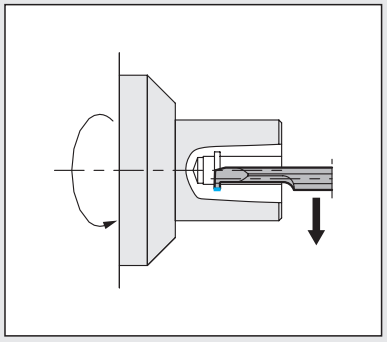
Part No.	Dimensions (mm) w	s	s_1	r_ε	Effective grooving depth	PCD PD1	PCD Stock	Micro-grain carbide KM1	Micro-grain carbide Stock
GTPA20FRN01	2.0	6.0	4.0	0.1and or less	5.0	5552385	●		
20FRN01		—	—		6.0			5576525	●
20FRN01-082		4.0	2.0		3.0	5574611	●		
GTPA25FRN01	2.5	6.0	3.0		5.0	5552393	●		
25FRN01		—	—		6.0			5576533	●
25FRN01-081		4.0	1.0		3.0	5561808	●		

STICK DUO®

SBG type

Minimum diameter for grooving: From ϕ3.0



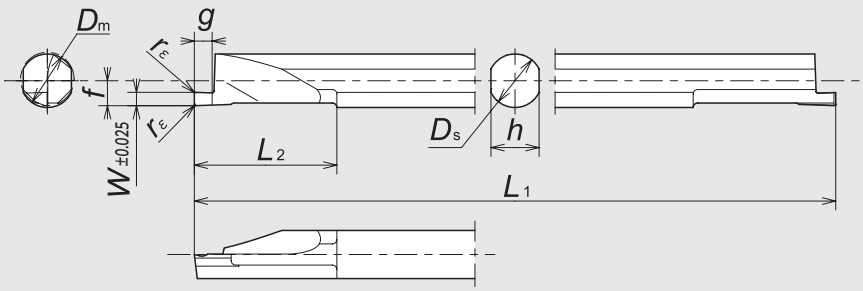


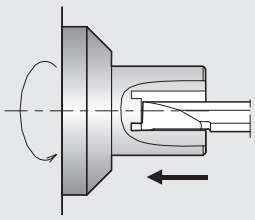
type	Shape	Chip breaker	Min. diameter for grooving (mm) Dm	Dimensions (mm) w	Ds	L1	L2	f	h	h2	rε	PVD-coated micro-grain carbides ZM3	Stock
Short type	SBG030050RB-S	Provided	3.0	0.50	3.0	50	4.5	1.3	2.7	0.8	0.05	5815782	●
	030075RB-S			0.75								5815808	●
	030100RB-S			1.00								5815816	●
	030150RB-S			1.50								5815824	●
	SBG040050RB-S		4.0	0.50	4.0	60	6	1.8	3.6	1.0	0.05	5815832	●
	040075RB-S			0.75								5815840	●
	040100RB-S			1.00								5815857	●
	040150RB-S			1.50								5815865	●
	SBG050050RB-S		5.0	0.50	5.0	70	7.5	2.3	4.5	1.2	0.05	5815881	●
	050100RB-S			1.00								5815899	●
	050150RB-S			1.50								5815907	●
	050200RB-S			2.00								5815915	●
	SBG060100RB-S		6.0	1.00	6.0	80	7.5	2.8	5.4	1.8	0.05	5815931	●
	060150RB-S			1.50								5815949	●
	060200RB-S			2.00								5815956	●
	SBG080100RB-S		8.0	1.00	8.0		8.5	3.8	7.3	2.2	0.05	5815964	●
	080150RB-S			1.50								5815980	●
	080200RB-S			2.00								5815998	●
Regular type	SBG030050RB	Provided	3.0	0.50	3.0	50	9	1.3	2.7	0.8	0.05	5652821	●
	030075RB			0.75								5652839	●
	030100RB			1.00								5652847	●
	SBG040050RB		4.0	0.50	4.0	60	12	1.8	3.6	1.0	0.05	5652797	●
	040075RB			0.75								5652805	●
	040100RB			1.00								5652813	●
	SBG050050RB		5.0	0.50	5.0	70	20	2.3	4.5	1.2	0.05	5652854	●
	050100RB			1.00								5652862	●
	050150RB			1.50								5652870	●
	SBG060100RB		6.0	1.00	6.0	80	20	2.8	5.4	1.8	0.05	5704846	●
	060150RB			1.50								5704838	●
	060200RB			2.00								5704820	●
	SBG080100RB		8.0	1.00	8.0		20	3.8	7.3	2.2	0.05	5704895	●
	080150RB			1.50								5704903	●
	080200RB			2.00								5704911	●

▶For sleeves, please refer to pages **L22 and L23.**

STICK DUO®

SFG type





● Right-hand type shown.

Shape	Chip breaker	Min. diameter for grooving (mm) Dm	Dimensions (mm)								PVD-coated micro-grain carbides	
			W	Ds	L1	L2	g	f	h	rε	TM4	Stock
SFG060R100B	Provided	6.0	1.00	6.0	80	16.0	1.5	2.8	5.4	0.05	5813837	●
060R150B			1.50				2.0				5813845	●
060R200B			2.00				3.0				5813852	●
SFG080R100B		8.0	1.00	8.0		16.0	1.5	3.8	7.3		5813878	●
080R150B			1.50				2.0				5813886	●
080R200B			2.00				3.0				5813894	●
080R300B			3.00				3.0				5813902	●

▶For sleeves, please refer to pages **L22 and L23.**

S-BG type

Minimum diameter for grooving: From ϕ10

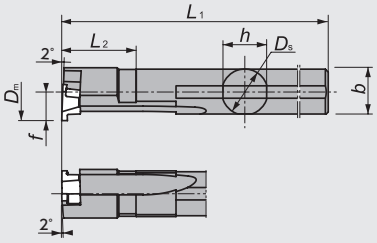
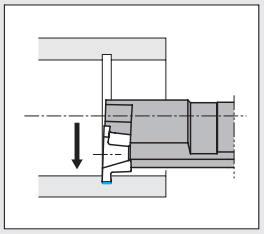


Figure-1



●Right-hand type shown.
Note) Use L-hand inserts for R-hand type holders.

BG type

Minimum diameter for grooving: From ϕ10

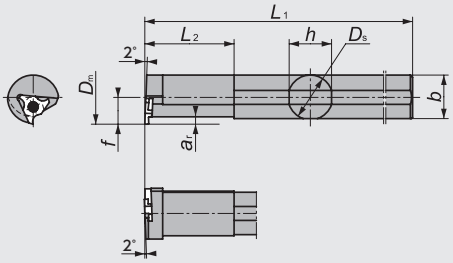
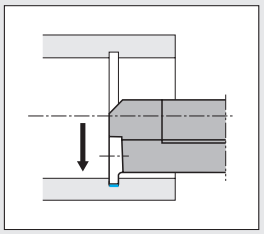


Figure-2



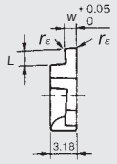
●Right-hand type shown.
Note) Use L-hand inserts for R-hand type holders.

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Min.dia. for grooving D_m	Effective grooving depth a_r	Dimensions (mm) D_s	h	b	L_1	f	L_2	Width of groove (mm) w	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5854500		S08H-BGR/L10D10	●		10.0	1.0	8	7.7	7.85	120	5.0	20	0.50 ~ 2.00	GTG10 (See table below)	LR-S-2.5*6.8	CLR-15S (A)
	5854518		S10K-BGR/L10D12	●		12.0		10	9.6	9.8	120	6.0	25				
Figure-2	5711585		BGR/L08-00S	●		10.0	1.0	8	7.0	7.5	125	5.0	20	0.50 ~ 2.00	GTG10 (See table below)	LR-S-2.5*6.8	CLR-15S (A)
	5711593		08-10S	●										1.00 ~ 2.00			
	5711601		10-00S	●		12.0	2.0	10	9.0	9.5	150	6.0	25	0.50 ~ 2.00			
	5711619		10-10S	●										1.00 ~ 2.00			
	5711627		12-00S	●		14.0	2.0	12	11.0	11.5	180	7.0	30	1.00 ~ 2.00	GTG14 (See table below)	LR-S-3*7.8	RLR-20S (B)
	5711635		12-12S	●										1.45 ~ 2.00			
	5711643		14-00S	●		16.0	3.0	14	13.0	13.5	180	8.0	35	1.00 ~ 2.00			
	5711650		14-12S	●										1.45 ~ 2.00			
	5536362		16	●		20.0	3.0	16	15.0	15.5	200	10.0	40	1.50 ~ 2.00	GTG20 (See table below)	LR-S-3*7.8	RLR-20S (B)
	5435433		20	●		25.0		20	19.0	19.5	200	12.0	40				

※Use applicable holders from -00s, -10s and -12s accordingly with the groove width required.

Applicable inserts

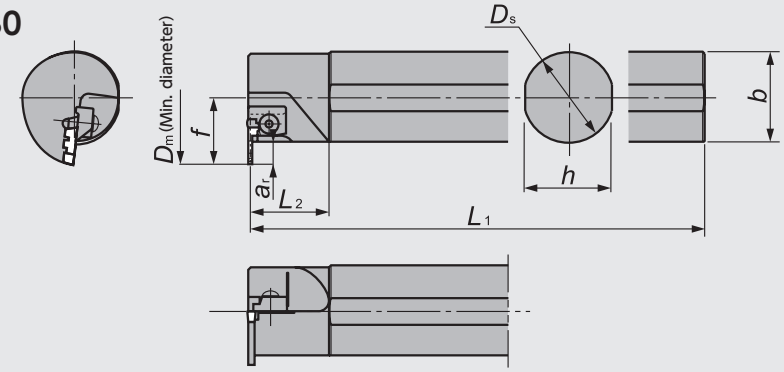
GTG type

Shape	Part No.	Dimensions (mm) w	Effective grooving depth	L	r_ε	d	Cermet C7X	Stock	PVD-coated micro-grain carbides TM4	Stock	ZM3	Stock	QM3	Stock
	GTG10050FL005	0.50	1.0	1.2	0.05	5.56			5853130	●				
	10075FL005	0.75							5853114	●				
	10100FL005	1.00							5853098	●				
	10150FL005	1.50							5853080	●				
	10200FL005	2.00							5853072	●				
	GTG10050FL00	0.50	1.0	1.2	0.05	5.56					5514088	●		
	10065FL00	0.65									5514104	●		
	10075FL00	0.75									5376835	●		
	10100FL00	1.00									5376843	●		
	10125L	1.25			0.2		5687611	●						
	10150FL00	1.50			0.05						5376850	●		
	10200FL01	2.00			0.1						5357884	●		
	GTG14100FL00	1.00	2.0	2.2	0.05	7.94					5376868	●		
	14145L	1.45			0.2		5687579	●						
	14150FL00	1.50			0.05						5376876	●		
	14175L	1.75			0.2		5687587	●						
	14200FL01	2.00			0.1						5376884	●		
	GTG20150FL	1.50	3.0	3.2	0.2	9.525							5396239	●
	20175L	1.75					5687595	●						
	20200L	2.00					5687603	●						
	20200FL												5376991	●

●L-hand shown.

GKV type

Minimum diameter for grooving: From ϕ30



●Right-hand type shown.

Holder dimensions

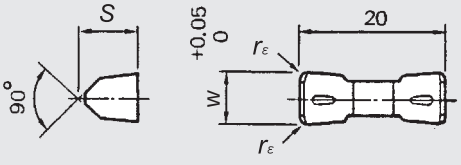
Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	D_s	h	b	L_1	f	L_2	a_r	D_m	Width of groove (mm) w	Applicable insert	Parts: Clamp	Parts: Clamping bolt	Parts: Spring	Parts: Wrench
5255567		GKV$^{R}_{L}$3230-3	●		32	30	31	200	21	50	5.5	30	3.00 ⟆ 3.50	GEV (See table below)	CVL/R3SN	AOB-5C	ASG-5	LW-3
5255559		3240-3	●		32	30	31	250	23	50	7.5	40						
5255542		4055-3	●		40	38	39	300	29	35	9.5	55						

Note) The right-hand type holders come with a left-hand clamp.

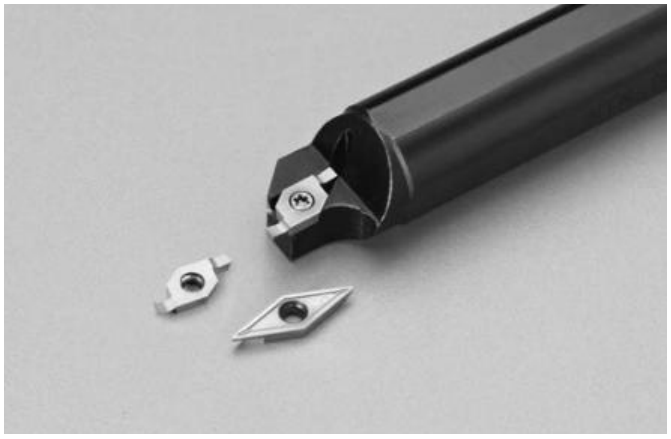
Applicable inserts

GEV type

Molded chipbreaker

Shape	Part No.	Dimensions (mm) w	S	r_ε	Cermet N40	Cermet Stock	PVD-coated micro-grain carbide QM3	PVD-coated micro-grain carbide Stock
	**GEV300N**	3.0	5.2	0.2	5763271	●	5027586	●
	300N04			0.4			5048392	●
	GEV350N	3.5		0.2	5801972	●		
	350N04			0.4			5053616	●

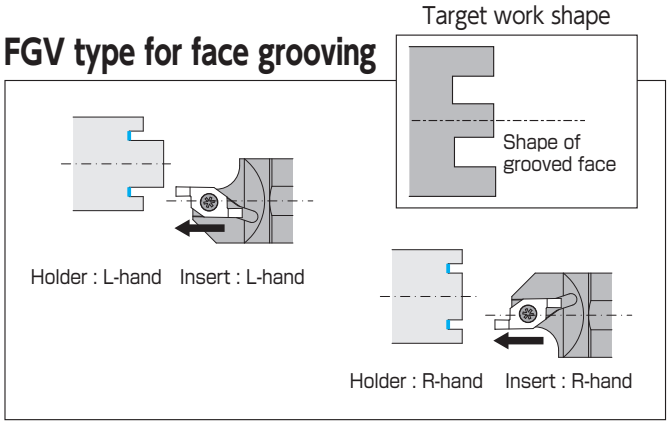
Face grooving tool series SATURN DUO



Features

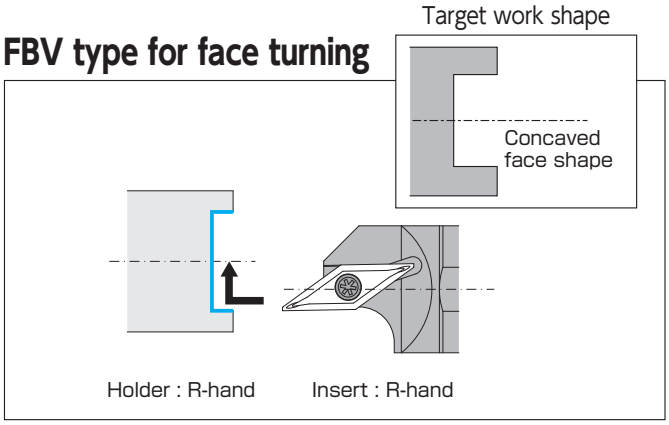
- FGV type for face grooving and FBV type for face turning.
- Economical double-corner specification.
- Improved tool rigidity by optimizing overhang and holder shape.
- Gang-type, front-gang-type and sleeve holder type are available.
- A new coating, ultra Z-coated "TM4" is used as the insert material.
- Both cutting performance and wear resistance improved.

FGV type for face grooving



- Grooving possible under a wide range of cutting conditions due to the improved rigidity of both inserts and holders
- Minimum machining diameter from ϕ6, groove width from 1.0 mm
- L-hand types available for machining work with a boss

FBV type for face turning



- Further improved face machining efficiency
- Minimum machining diameter from ϕ8

<FGV type for face grooving> Minimum machining diameter : ϕ6 WET

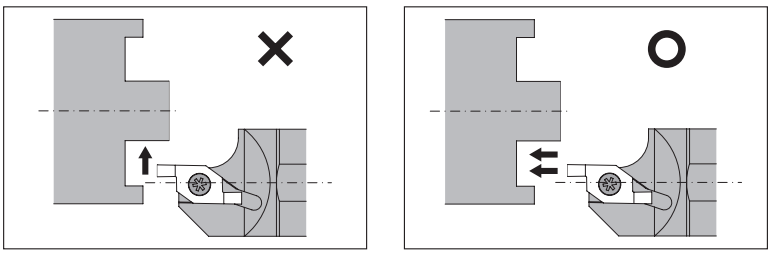
			General steel (carbon steel, alloy steel)	Stainless steel (excluding SUS303)	Free-cutting steel (including SUS303)	Non ferrous metal (Brass, aluminum, copper, etc.)
Cutting speed (m/min)			50 (30 ~ 100)	40 (30 ~ 100)	60 (30 ~ 100)	80 (50 ~ 120)
Feed rate (mm/rev)	Groove width W (mm)	1.0	0.03 (0.01 ~ 0.05)	0.02 (0.01 ~ 0.04)	0.04 (0.01 ~ 0.06)	0.04 (0.01 ~ 0.06)
		1.5	0.02 (0.01 ~ 0.04)	0.01 (0.005 ~ 0.03)	0.03 (0.01 ~ 0.05)	0.03 (0.01 ~ 0.05)
		2.0	0.01 (0.005 ~ 0.03)	0.01 (0.005 ~ 0.03)	0.02 (0.01 ~ 0.04)	0.02 (0.01 ~ 0.04)

☆Useful tips for machining

①It's possible to cut wider than the groove width of the insert by dividing the cut into several passes. When grooving, always cut from the outer to the inner side because the insert may otherwise interfere with the work piece. (Especially when widening the groove width so that the face diameter becomes the minimum advised or less.)
②If tool pass is left on the boss of the work, decrease the feed for withdrawing the insert.
③If the tip end of the boss of the work is marked, lower the feed rate.
④If the outer peripheral surfaces of grooves on the work show feed marks, either lower the feed rate or increase the cutting speed.
⑤If the back end surface shows feed marks under a condition of low feed rate and low cutting speed, increase the cutting speed.

☆Caution

- Side turning is not possible.



Recommended cutting conditions for face grooving tool series

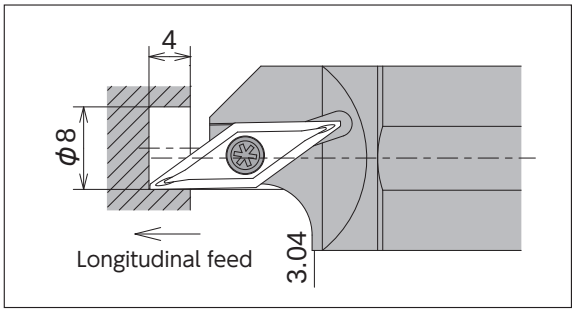
<FBV type for face machining> Minimum machining diameter : ϕ8 WET

			General steel (carbon steel, alloy steel)	Stainless steel (excluding SUS303)	Free-cutting steel (including SUS303)	Nonferrous metal (Brass, aluminum, copper, etc.)
Cutting speed (m/min)			50 (30 ~ 70)	40 (30 ~ 60)	60 (30 ~ 80)	80 (50 ~ 100)
Feed rate Longitudinal/ cross (mm/rev)	Depth of machining (mm)	1.0	Longitudinal : 0.015/cross : 0.06	Longitudinal : 0.015/cross : 0.06	Longitudinal : 0.03/cross : 0.06	Longitudinal : 0.03/cross : 0.06
		2.0	Longitudinal : 0.01/cross : 0.04	※	Longitudinal:0.015/cross : 0.03	Longitudinal : 0.015/cross : 0.03
		3.0	※	※	Longitudinal : 0.015/cross : 0.03	Longitudinal : 0.015/cross : 0.03
		4.0	※	※	Longitudinal : 0.015/cross : 0.03	Longitudinal : 0.015/cross : 0.03

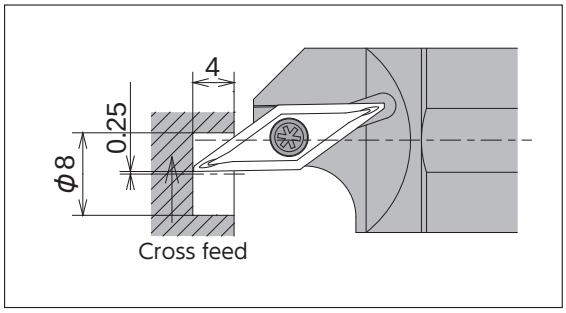
※When machining difficult materials where chip control is problematic (such as SUS304), it is recommended that the machining be carried out in several stages.

☆Machining method

- With materials allowing easy chip control, it is possible to machine up to 4 mm deep at a low feed rate in a single pass for both longitudinal feed and cross feed.



Cutting in the direction of Z: Longitudinal feed



Cutting in the direction of X: Cross feed

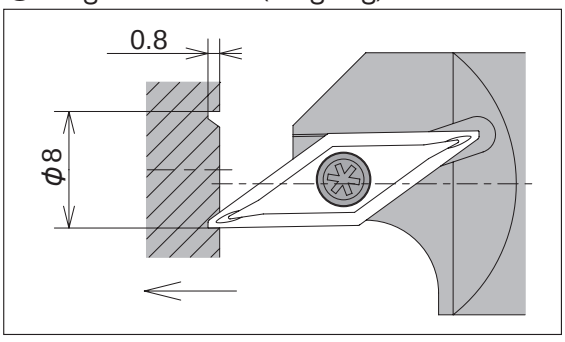
Supplemental explanation : Cutting in the direction of Z axis is expressed as the longitudinal feed and cutting in the direction X axis is expressed as the cross feed, here.

☆Useful tips for machining

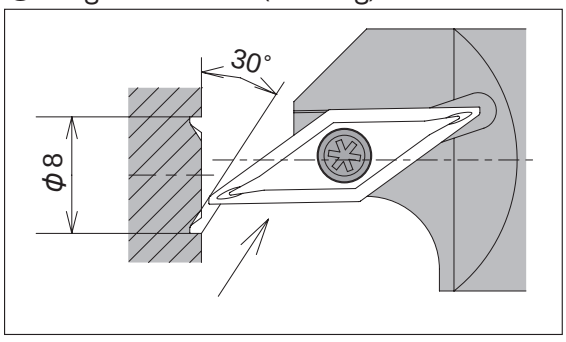
- When an area of inner peripheral is gauged,
  it is recommended that the machining be carried out in 2 passes , one of roughing and one of finishing in the following procedure:

☆Example of 2-pass machining: With 0.2 mm finishing allowance left, first carry out roughing and then, finish machine.

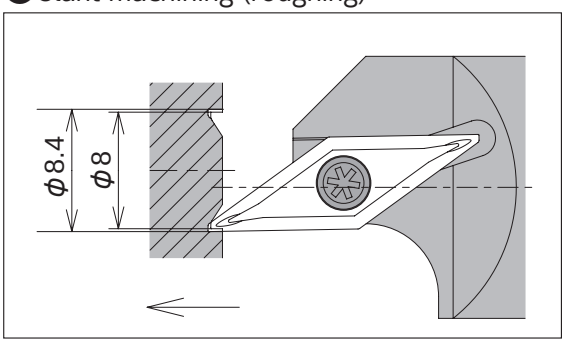
❶ Longitudinal feed (roughing)



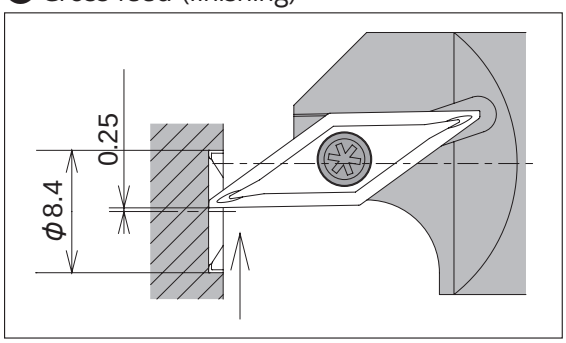
❷ Longitudinal feed (finishing)



❸ Slant machining (roughing)



❹ Cross feed (finishing)



CH-FGV type

For front gang type tool post

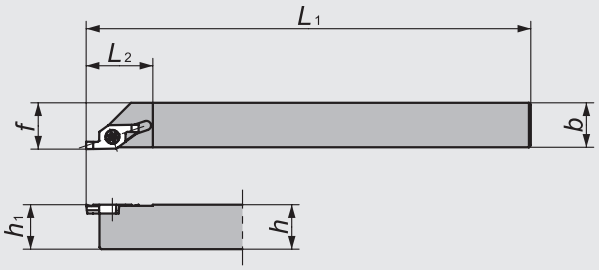
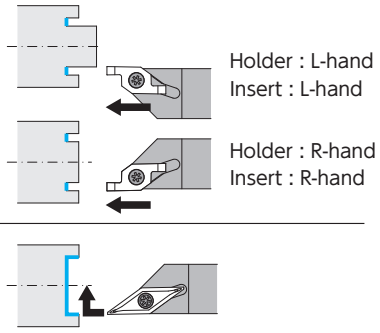


Figure-1

●Right-hand type shown.



Only R-hand type available with FBV type inserts.

FGV type

For gang type tool post

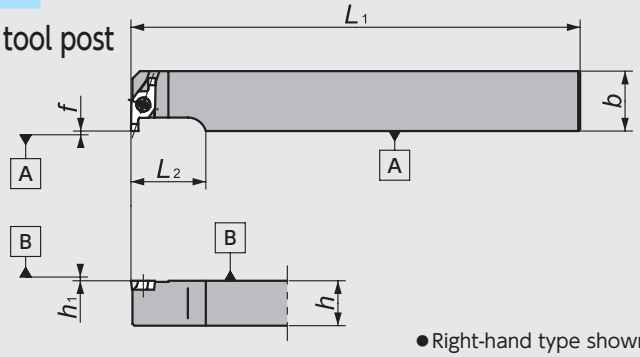
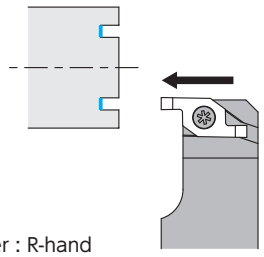


Figure-2

●Right-hand type shown.
Note)Use L-hand inserts for R-hand type holders.



Holder : R-hand
Insert : L-hand

DS-FGV type

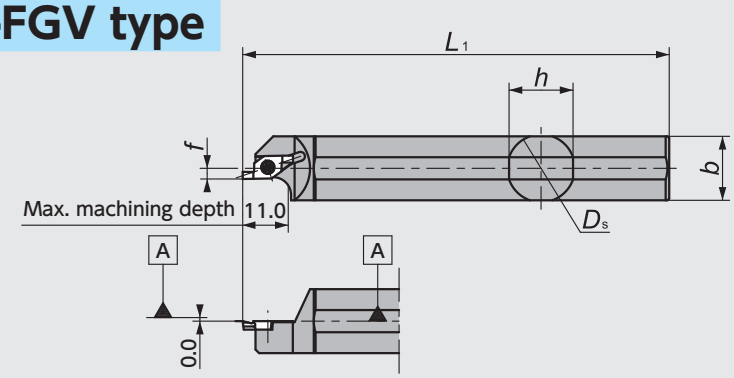
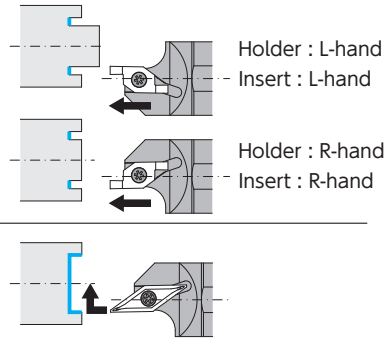


Figure-3

●Right-hand type shown.
●With an FGV type insert mounted



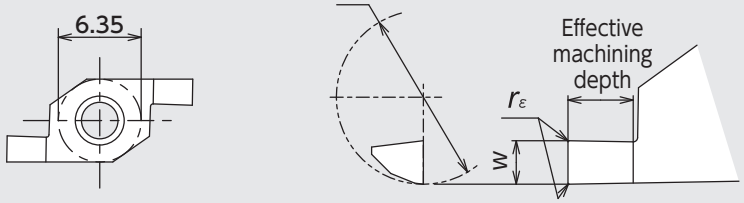
Only R-hand type available with FBV type inserts.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Ds	h	b	L1	h1	f	L2	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5691068	5691076	CH-FGV R/L 1010	●	●	—	10	10	120	10	10.5	18	FGV FBV I35	LRIS-2.5×7	CLR-15S
	5691084	5691100	1212	●	●	—	12	12		12	12.5				
	5691118	5691134	1616	●	●	—	16	16		16	16.5				
Figure-2	5691035	-	FGV R/L 1016	●	—	—	10	16	120	0.0	0.0	20	FGV□□□L I35	LRIS-2.5×7	CLR-15S
	5691043	-	1216	●	—	—	12								
	5691050	-	1616	●	—	—	16								
Figure-3	NEW 5841861	5772439	DS-FGV R/L 16-012	●	★	16	15	15	80	—	3.0	—	FGV FBV I35	LRIS-2.5×7	CLR-15S
	5690938	5690946	19	●	●	19.05	18	18	120						
	5690953	5690961	20	●	●	20	19	19							
	5690979	5690987	22	●	●	22	21	21							
	5690995	5691001	25	●	●	25.4	24.5	24.5							

Applicable inserts

FGV type

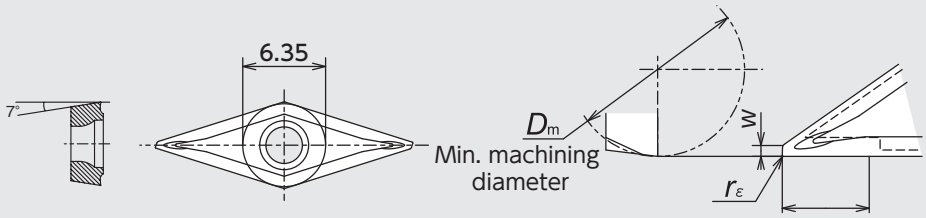


● Right-hand type shown.

	Part No.	Min. machining dia	Dimensions (mm) Thickness	w	rε	Effective machining depth	PVD-coated micro-grain carbides TM4	Stock
R-hand shown	FGV100RB00D6	6.0	2.38	1.0	0.00	1.5	5704580	●
	100RB05D6				0.05		5704606	●
	FGV150RB00D6			1.5	0.00	2.0	5704614	●
	150RB05D6				0.05		5704622	●
	FGV200RB00D6			2.0	0.00	3.0	5704630	●
	200RB05D6				0.05		5704648	●
L-hand shown	FGV100LB00D6	6.0	2.38	1.0	0.00	1.5	5704572	●
	100LB05D6				0.05		5704564	●
	FGV150LB00D6			1.5	0.00	2.0	5704556	●
	150LB05D6				0.05		5704549	●
	FGV200LB00D6			2.0	0.00	3.0	5704531	●
	200LB05D6				0.05		5704523	●

Applicable inserts

FBV type



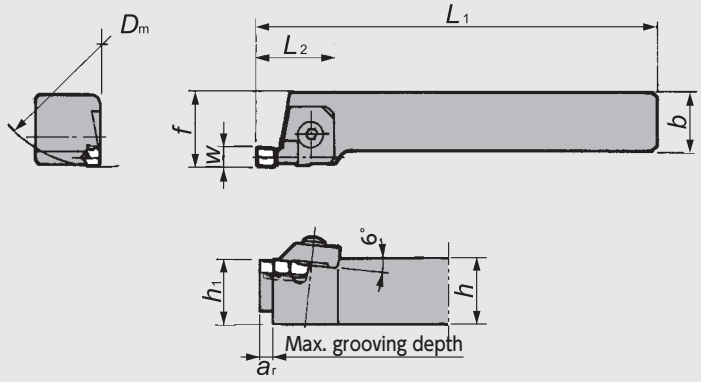
● Right-hand type shown.

	Part No.	Min. machining dia	Dimensions (mm) Thickness	w	rε	Effective machining depth	PVD-coated micro-grain carbides TM4	Stock
R-hand shown	FBV40R05D8AM3	8.0	2.58	0.5	0.05	4.0	5697453	●
	40R15D8AM3				0.15		5697461	●

Note)The FVB type inserts are applicable only for right-hand holders of CH-FGVR and DS-FGVR types; Not applicable for left-hand types and FGV R/L type holders.

Face grooving tools

GFV type



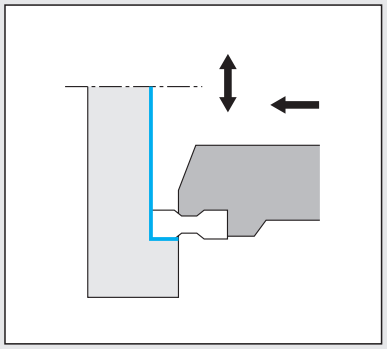
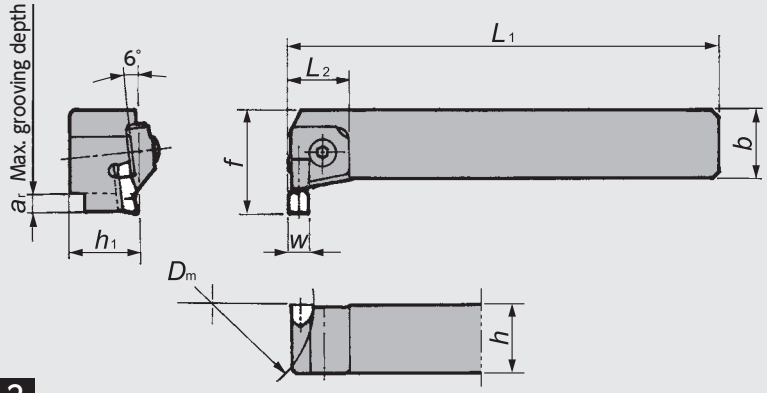


Figure-1

●Right-hand type shown.

GSV type



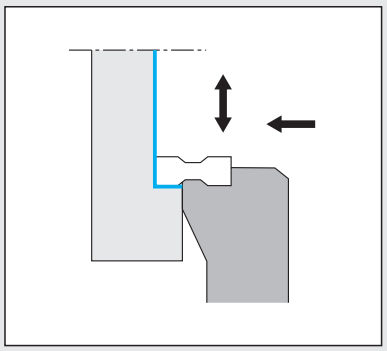


Figure-2

●Right-hand type shown.

Holder dimensions

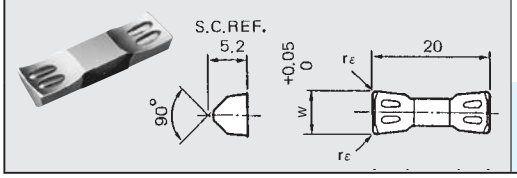
Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	a_r	D_m	Width of groove (mm) w	Applicable insert	Parts Clamp	Clamping bolt	Spring	Wrench
Figure-1	5657887	5657895	GFVR/L20-6	●	●	20	20	125	20	25	32	6	38	6.0	GFV (See table below)	CVR/L6	AOB-6C	ASG-6	LW-4
	5655220	5657903	25-6	●	●	25	25	150	25	30									
Figure-2	5657911	5657929	GSVR/L20-6	●	●	20	20	125	20	33	23.5	6	38	6.0	GFV (See table below)	CVR/L6	AOB-6C	ASG-6	LW-4
	5645965	5657937	25-6	●	●	25	25	150	25	38									

Note)The right-hand holders of GSV type come with a left-hand clamp.

Applicable inserts

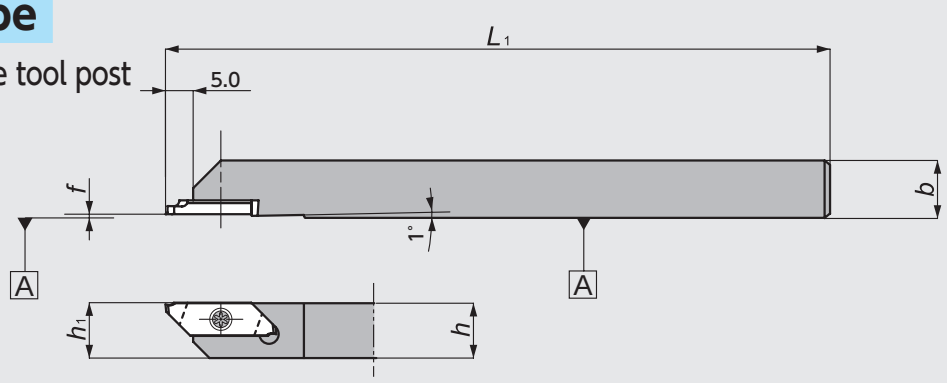
GFV type

V-shaped location type with chipbreaker

Shape	Part No.	Dimensions (mm) w	Dimensions (mm) r_ε	Cermet N40	Cermet Stock	PVD-coated micro-grain carbides QM3	PVD-coated micro-grain carbides Stock
	GFV600N	6.0	0.15	5654538	●	5027594	●
	600N04		0.4	5653209	●	5068218	●

CTPS type

For radial type tool post



●Right-hand type shown.

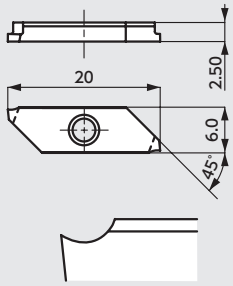
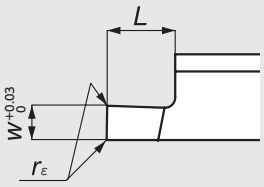
Holder dimensions

Code No.	Toolholder Part No.	Stock	Dimensions (mm)					Width of groove (mm)	Applicable insert	Parts	
										Clamping screw	Wrench
			h	b	L_1	h_1	f	w			
5346572	**CTPSR10**	●	10	10	120	10	0.0	0.75 ⟆ 2.00	GTPS (See table below)	LRIS-2.5＊7	CLR-15S
5397187	**R12**	●	12	12		12					

☆CTPS toolholder is interchangeable tool. All CTPS type inserts can be used (front turning, back turning, cut-off, threading) on the same holder. (H84-85 for more information)

Applicable inserts

GTPS type

Shape	Cutting edge shape	Part No.	Dimensions (mm)				PVD-coated micro-grain carbides			
			w	r_ε	L	Effective machining depth	ZM3	Stock	VM1	Stock
 ●R-hand type shown. ☆θ indicates the value when the insert is set in the holder.		**GTPS075FR**	0.75	0.0	1.5	**1.0**	5346952	●	5362652	●
		095FR	0.95		2.0	**1.5**	5346960	●	5362660	●
		100FR	1.00				5346978	●	5362678	●
		120FR	1.20		3.0	**2.5**	5346986	●	5362686	●
		150FR	1.50				5346994	●	5362694	●
		200FR	2.00				5347000	●	5362702	●

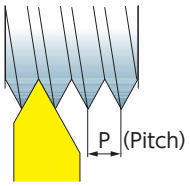
MEMO

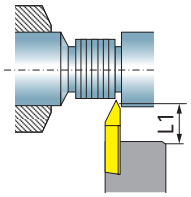
J

Threading Tools

- Selection guide for threading tools ···· J2
- List of holders and inserts for threading ·· J6
- Thread whirling ····· J22

NTK SS Tools Selection guide for threading tools





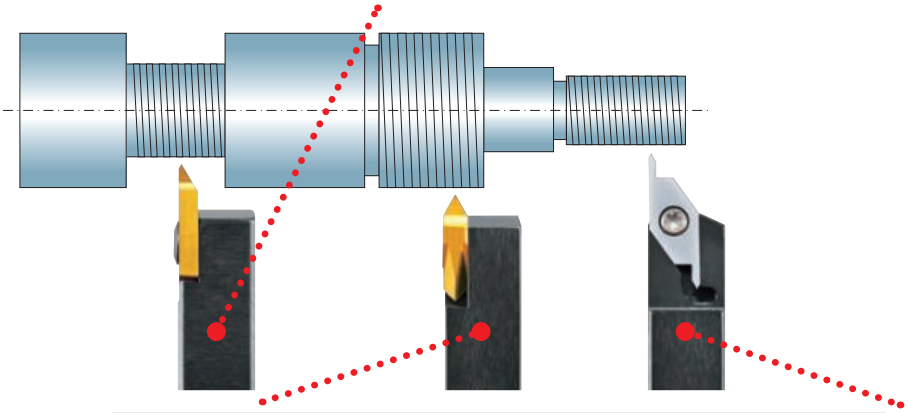
Features

- Produces smooth, burr-free finished thread surfaces.
- Does not require a change to pitch-specific tool(s) due to single point cutting.

OD threading

TTP type	DS-TTP type	CH-TTP type
➡J10	➡J10	➡J10
Pitch : 0.2 ~ 2.0		
L1 : 5.5		
Shank size : □8 ~□20	Shank dia. : ϕ16 ~ϕ25.4	Shank size : □16 · □20
Applicable inserts : TTP□□FR/L		Applicable inserts : TTP□□FR
For various shapes of work pieces !		

CTPS type
➡J8
Pitch : 0.2 ~ 1.5
L1 : 5.0
Shank size : □10 · □12
Applicable inserts : TTPS□□FR
Common holder for cutting-off and back-turning

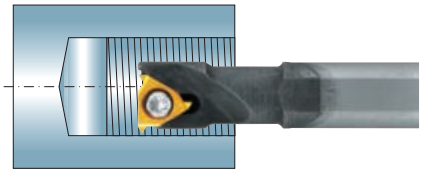


Thread whirling
➡J22
Applicable inserts : Special (Short delivery time)
High efficiency threading !

STTN type	DS-STT type	NTTB type
➡J14	➡J14	➡J14
Pitch : 0.8 ~ 3.0		
L1 : 4.0	L1 : 3.0	L1 : 4.0
Shank size : □10 · □12	Shank dia. : ϕ14 ~ϕ16	Shank size : □16 ~□25
Applicable inserts : TTMH32		

CSV type
➡J6
Pitch : 0.2 ~ 0.5
L1 : 3.0
Shank size : □7 ~□12
Applicable inserts : CSVT11FR
Recommended for small diameter threading !

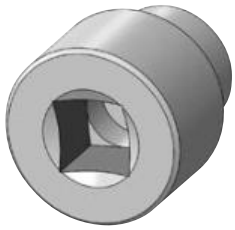
Internal threading



TGC type: Carbide shank HN59 type: Steel shank
➡J20
Pitch : 0.4 ~ 0.75
L1 : 0.7 ~ 1.0
Shank dia. : ϕ6.0 ~ϕ10.0
Applicable inserts : TMN

SBT type
➡J18
Pitch : 0.5 ~ 1.75
L1 : 0.8 ~ 1.8
Shank dia. : ϕ2.5 ~ϕ6.0
Solid bar type

Hexagon socket machining

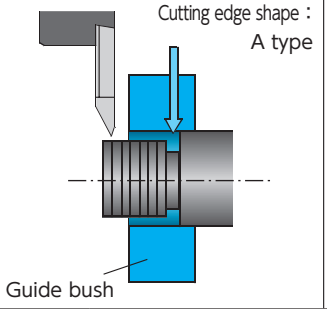
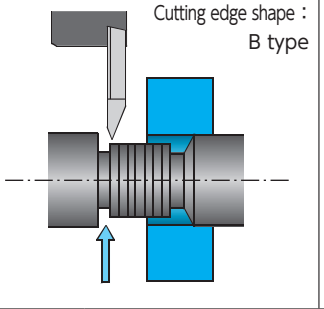
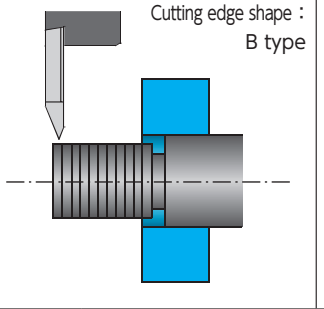
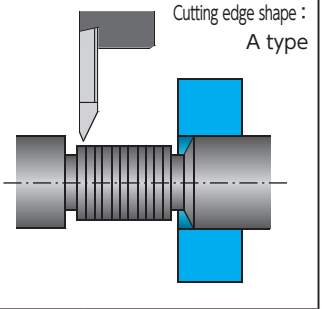


SHAPER DUO
➡K2
Machineable side distance : 1.4 ~ 12.2
Shank dia. : ϕ2.0 ~ ϕ6.0、ϕ8.0
Solid bar type

Recommended threading pitches and threading ranges

Insert Part No.	Dimensions (mm)		
	Edge radius	Recommended threading pitch	Machining pitch range
TTP(S)60FR/L4A 60FR/L4B 60FR/L8A 60FR/L8B	0.05 Max. flat	0.3	0.2～0.75
	0.05	0.4	0.4～1.25
60FR/L-N	0.1	1.0	1.0～1.5
TTP60FR/L-N02	0.2	1.5	1.5～2.0
TTP55FR/L8A 55FR/L8B	0.05		16～48 threads/inch
TTMH3260R/L010	0.1	1.0	0.8～3.0
3260R/L015	0.15	1.5	1.0～3.0
3260R/L020	0.2	2.0	1.5～3.0
3260R/L025	0.25	2.5	1.75～3.0
CSVT11FR/LP60-035A 11FR/LP60-035B	0.03Max	0.3	0.2～0.5
TTMA4360R015	0.15	1.5	1.0～4.0
4360R020	0.20	2.0	1.5～4.0

Selectively using inserts having a different edge onfiguration, A or B type

Right-handed				Left-handed			
Machining close to the guide bush		Close to back turned section		Machining close to the guide bush		Close to back turned section	
							
Holder	Holder	Holder	TTPR	Holder	TTPL	Holder	TTPL
Insert	TTP□□FR□A	Insert	TTP□□FR□B	Insert	TTP□□FL□B	Insert	TTP□□FL□A
Frequently used for threading operations where the front section of the workpiece is threaded. Using a right-handed holder with A type allows machining very close to the guide bush when required		Frequently used for threading in areas which are previously back turned allowing access and total flexibility in threading direction. Using a right-handed holder with the B type insert allows threading up to the back turned face.		Using a left-handed holder moves the cutting point further away from the guide bush. Again increasing flexibility of machining.			

■ For operations with a left-handed holder, select the cutting edge shape opposite to the shape/type for right-handed holders. (For left-handed holders use A type for operations close to the guide bush and B type for near back turned areas.)
■ In addition, you may select a left-handed holder when you do not wish to return the machined diameter into the guide bush. (as any burrs on the outer surface can damage the guide bush)
■ The cutting edge length of the inserts of A and B types is designed to be 0.4 or 0.8 mm, with the pitch either 0.2 to 0.75 or 0.5 to 1.25 so that they can cut very close to the guide bush/a ground area. Inserts of N type should be used where a greater thread pitch is required.

Range of threads for machining

Metric thread (60°)

Machining thread ranges

Pitch	Effective diameter of thread																							
	1	2	4	5	6	7	8	9	10	15	20	25	30	35	40	45	50	60	70	80	90	100	125	150
0.20	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.25		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.30		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.35		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.40		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.45		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.50			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.60			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.70			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.75			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.80			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1.00				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1.25					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1.50						■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1.75							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2.00								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2.50										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3.00										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3.50											■	■	■	■	■	■	■	■	■	■	■	■	■	■
4.00											■	■	■	■	■	■	■	■	■	■	■	■	■	■

55° thread (Whitworth screw threads, parallel threads for pipes)

Machining thread ranges

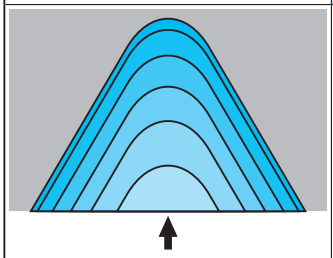
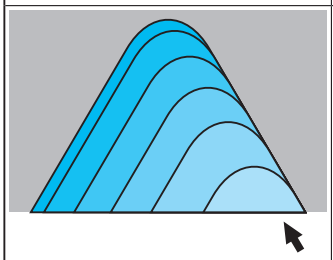
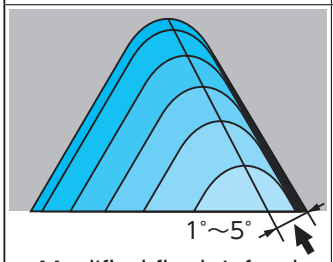
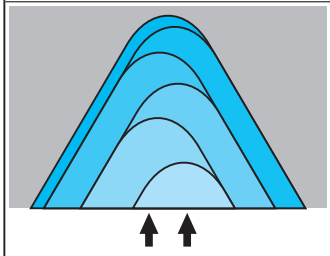
Pitch	No. of threads	Effective diameter of thread																						
		1	2	4	5	6	7	8	9	10	15	20	25	30	35	40	45	50	60	70	80	90	100	125	150
0.5292	48		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.6048	42		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.7056	36		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.7938	32		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
0.9071	28		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1.0583	24		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1.2700	20				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1.3368	19				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1.5875	16					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1.8143	14						■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2.1167	12								■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2.3091	11									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2.5400	10									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2.8222	9									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3.1750	8									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Threading Tools Recommended Insert Guide and Cutting Conditions

Work Material		Free cutting steels	Carbon steels	Alloy steels	Free cutting steels Stainless	Hard-to-cut Stainless Stainless	Titanium (Alloy)	Stainless Alloy
JIS Common Grade		SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	First Choice	VM1 ZM3	QM3 ZM3 C7X		VM1 ZM3		VM1 ZM3	KM1
	Second Choice	QM3	VM1		QM3		KM1	ZM3
Cutting Spead V_c (m/min)		50 100 200	carbide 50 90 150 C7X 120 150 250		50 90 180	40 70 100	50 70 100	50 100 200

※Please refer to Technical Information **Q62** for detailed recommendation.

Infeed Methods

	Features	
	Strengths	Weaknesses
 Radial infeed	● Most common and usual method. ● Easy to change cutting conditions. ● Wears on right and left side edges are proceeded equally.	● Chip control can be difficult. ● Chattering tends to be causing since contact area of cutting edge is larger. ● Unsuitable for large pitch size threads.
 Flank infeed	● Reratively easy method. ● Suitable for large pitch threads or easy to tear materials due to low cutting force. ● Good chip control.	● Edge on the right (with zero infeed) tends to be worn heavily. ● Difficult to change infeed amount.
 Modified flank infeed	● Wear of the right edge can be suppressed. ● Suitable for large pitch threads or easy to tear materials due to low cutting force. ● Good chip control.	● Difficult to creat NC program. ● Difficult to change infeed amount.
 Alternating flank infeed	● Wears on right and left side edges are proceeded equally. ● Suitable for large pitch threads or easy to tear materials due to low cutting force.	● Difficult to creat NC program. ● Difficult to change infeed amount. ● Chip control can be difficult. (Chips are discharged alternately in right and left directions, resulting possibly in entanglement.)

※Machine feed speed(F)need to be set within 2000㎜/min so as not to generate inperect thread.
(This situation doesn't applies to the case the machine has high speed threading setting)

〈Calculating method〉

① Calculating Revolution speed $n = \dfrac{Vc \times 1000}{\pi \times \text{nominal diameter}}$

② Calculating Feed speed F = n (Revolution speed) × P (Pitch)

CSV type

For radial type tool post

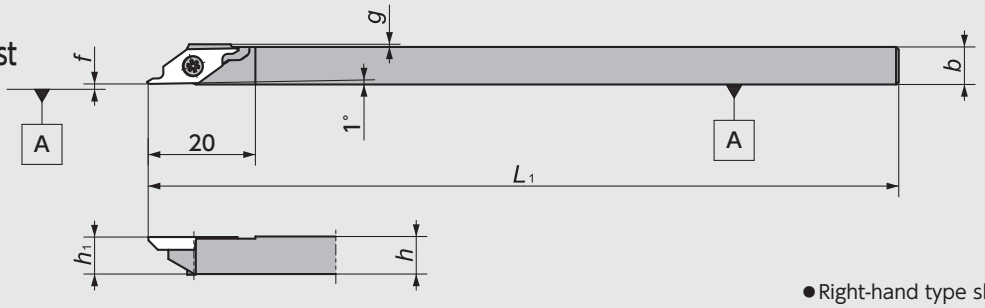


Figure-1

●Right-hand type shown.

CSV-NC/CSV-NC-F type

For gang type tool post

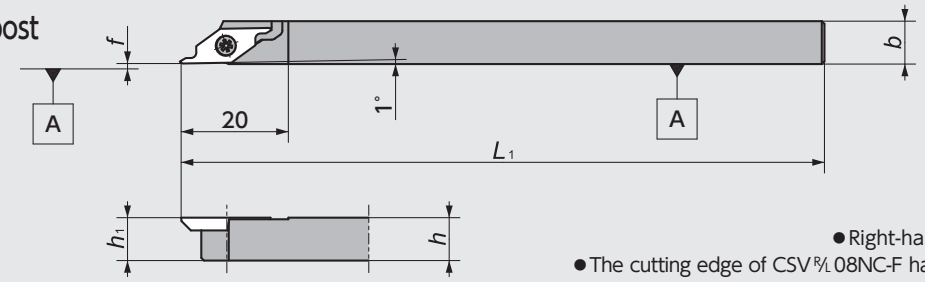


Figure-2

●Right-hand type shown.
●The cutting edge of CSV R/L 08NC-F has a small offset.

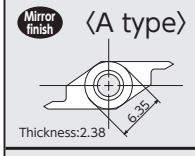
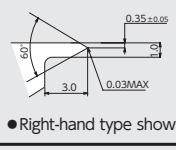
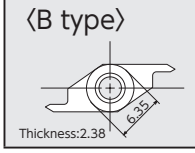
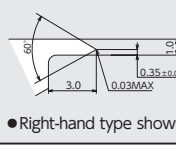
☆CSV toolholder is interchangeable tool. All CSV type inserts can be used (back turning, grooving, threading) on the same holder. (H80-83 for more information)

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) h	b	L1	h1	f	g	Applicable inserts	Parts: Clamping screw	Parts: Wrench
Figure-1	5492962		CSVR/L07GX	●		7	7	85	7	0.1	0.5	CSVT (See table below)	LR1S-2.5*7	CLR-15S
	5303169	5303193	07	●	●			140						
	5492954		08GX	●		8	8	85	8		0.0			
	5303151	5303201	08	●	●			140						
	5303136		095	●		9.5	9.5		9.5					
	5303144	5303177	10	●	●	10	10		10					
	5474770		12GX	●		12	12	85	12					
	5327929		12	●				140						
Figure-2	5789615		CSVR/L08NC-F	●		8	8	120	8	0.0～0.1	–	CSVT (See table below)	LR1S-2.5*7	CLR-15S
	5514062	5514070	08NC	●	●									
	5563010		10GXNC	●		10	10	85	10	0.1				
	5477492	5477542	10NC	●	●			120						
	5477534	5477500	12NC	●	●	12	12		12					

Applicable inserts

CSVT type

Shape	Code No.	Chip-breaker	Dimensions (mm) rε	Applicable thread Pitch	PVD-coated micro-grain carbides VM1 R	Stock	L	Stock
Mirror finish 〈A type〉   ●Right-hand type shown.	CSVT11FR/LP60-035A	None	R0.03MAX	0.2 ～ 0.5	5344874	●	5386909	●
〈B type〉   ●Right-hand type shown.	CSVT11FR/LP60-035B				5344882	●	5386917	●

☆Angles shown indicate the value when the insert is set into the holder.

CSVT type

▶For applicable holders and inserts, please refer to page **J6**.

Metric thread/for both coarse and fine threads

Nominal dia. of thread			Pitch				
No.1	No. 2	No. 3	0.50	0.40	0.35	0.25	0.20
M1						Coarse	Fine
M2				Coarse		Fine	
M3			Coarse		Fine		
M4			Fine				
M5							

Unified thread

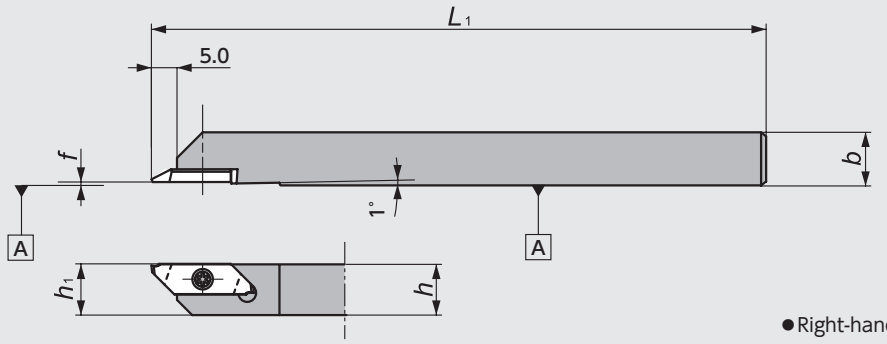
	Nominal dia. of thread			Pitch
	No.1	No. 2	(for reference)	(for reference)
Coarse		No.1-64 UNC	0.0730-64 UNC	0.3969
	No.2-56 UNC		0.0860-56 UNC	0.4536
Fine	No.0-80 UNF		0.0600-80 UNF	0.3175
		No.1-72 UNF	0.0730-72 UNF	0.3528
	No.2-64 UNF		0.0860-64 UNF	0.3969
		No.3-56 UNF	0.0990-56 UNF	0.4536

Depth of cut and number of passes (The depth of cut indicates the value of the on component radius not diameter.)

TTP, TTPS, TTMH, TTMA and CSVT type, 60 degrees, without wiper (Guideline for the radius of 0.05)

Holder		Pitch (mm)	Total D.O.C (mm)	No. of passes	1	2	3	4	5	6	7	8	9	10
Metric thread 60	Pin type screw	0.20	0.20	4	0.08	0.06	0.04	0.02						
		0.25	0.24	4	0.10	0.08	0.04	0.02						
		0.30	0.28	5	0.08	0.07	0.07	0.04	0.02					
		0.35	0.32	5	0.10	0.09	0.07	0.04	0.02					
		0.40	0.35	5	0.12	0.10	0.07	0.04	0.02					
		0.45	0.39	5	0.16	0.10	0.07	0.04	0.02					
		0.50	0.33	5	0.10	0.10	0.07	0.04	0.02					
		0.60	0.40	6	0.10	0.10	0.08	0.06	0.04	0.02				
		0.70	0.48	6	0.10	0.10	0.10	0.10	0.06	0.02				
		0.75	0.52	7	0.10	0.10	0.10	0.08	0.07	0.05	0.02			
		0.80	0.56	7	0.10	0.10	0.10	0.10	0.08	0.06	0.02			
		1.00	0.71	8	0.15	0.15	0.12	0.10	0.08	0.06	0.03	0.02		
		1.25	0.90	9	0.20	0.18	0.13	0.10	0.10	0.07	0.05	0.05	0.02	
		1.50	1.09	10	0.22	0.20	0.15	0.12	0.10	0.10	0.08	0.05	0.05	0.02

CTPS type



●Right-hand type shown.

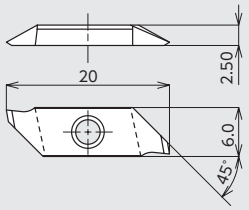
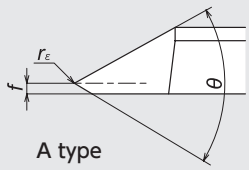
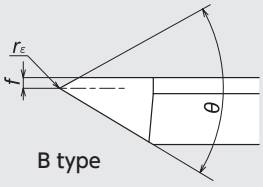
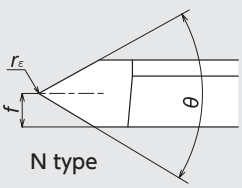
Holder dimensions

Code No.	Toolholder Part No.	Stock		Dimensions (mm)					Applicable inserts	Parts	
		R	L	h	b	L_1	h_1	f		Clamping screw	Wrench
5346572	CTPSR/L10	●		10	10	120	10	0.0	TTPS (See table below)	LRIS-2.5*7	CLR-15S
5397187	12	●		12	12		12				

☆CTPS toolholder is interchangeable tool. All CTPS type inserts can be used (front turning, back turning, cut-off, threading) on the same holder. (H84-85 for more information)

Applicable inserts

TTPS type

Shape	Code No.	Dimensions (mm)				Applicable screw	PVD-coated micro-grain carbides			
		Edge shape	θ	f	r_ε	Pitch	ZM3	Stock	VM1	Stock
	TTPS60FR4A	A	60°	0.4	(0.05) Max.flat	0.2 ~ 0.75	5346648	●	5362710	●
 A type	60FR4B	B					5346663	●	5362728	●
 B type	60FR8A	A		0.8	(0.05)	0.4 ~ 1.25	5346689	●	5362744	●
	60FR8B	B					5346671	●	5362736	●
 N type	60FR-N	N		1.25	(0.1)	1.0 ~ 1.5	5346655	●	5362751	●

●Right-hand type shown.

☆θ indicates the value when the insert is set into the holder.
☆Nose R shows referential value.

TTPS type

▶For applicable holders and inserts, please refer to page **J8**.

【Machining pitch range】

Part No.	Pitch
TTPS60FR4A(B)	0.2-0.75
TTPS60FR8A(B)	0.4-1.25
TTPS60FR-N	1.0-1.5

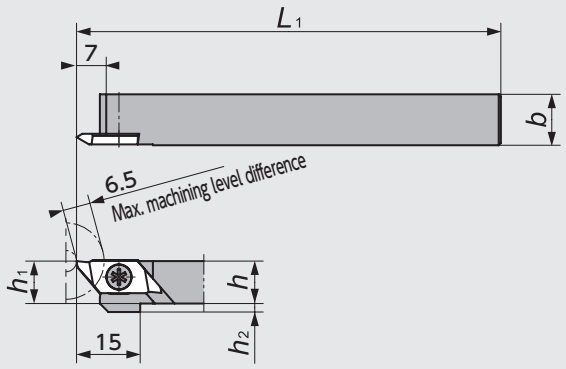
Metric screw/for both coarse and fine threads

Nominal dia. of thread			Pitch										
No.1	No. 2	No. 3	1.50	1.25	1.00	0.80	0.75	0.70	0.50	0.40	0.35	0.25	0.20
M1												Coarse	Fine
M2										Coarse		Fine	
M3									Coarse		Fine		
M4								Coarse	Fine				
M5						Coarse							
M6					Coarse		Fine						
	M7												
M8				Coarse	Fine								
		M9											
M10			Coarse	Fine									
		M11											
M12			Fine										
	M14												
		M15											
M16													
		M17											
	M18												
M20													
	M22												
M24													
		M25											
		M26											
	M27				Fine								
		M28											

Unified screw

	Nominal dia. of thread			Pitch	Applicable part No.
	No.1	No. 2	(for reference)	(for reference)	
Coarse		No.1-64 UNC	0.0730-64 UNC	0.397	**TTPS60FR4A(B)**
	No.2-56 UNC		0.0860-56 UNC	0.454	**TTPS60FR4A(B)** **TTPS60FR8A(B)**
		No.3-48 UNC	0.0990-48 UNC	0.529	
	No.4-40 UNC		0.1120-40 UNC	0.635	
	No.5-40 UNC		0.1250-40 UNC	0.635	
	No.6-32 UNC		0.1380-32 UNC	0.794	
	No.8-32 UNC		0.1640-32 UNC	0.794	
	No.10-24 UNC		0.1900-24 UNC	1.058	**TTPS60FR4A(B)** **TTPS60FR8A(B)** **TTPS60FR-N**
		No.12-24 UNC	0.2160-24 UNC	1.058	
	1/4-20 UNC		0.2500-20 UNC	1.270	
	5/16-18 UNC		0.3125-18 UNC	1.411	**TTPS60FR-N**
Fine	No.0-80 UNF		0.0600-80 UNF	0.318	**TTPS60FR4A(B)**
		No.1-72 UNF	0.0730-72 UNF	0.353	
	No.2-64 UNF		0.0860-64 UNF	0.397	
		No.3-56 UNF	0.0990-56 UNF	0.454	**TTPS60FR4A(B)** **TTPS60FR8A(B)**
	No.4-48 UNF		0.1120-48 UNF	0.529	
	No.5-44 UNF		0.1250-44 UNF	0.577	
	No.6-40 UNF		0.1380-40 UNF	0.635	
	No.8-36 UNF		0.1640-36 UNF	0.706	
	No.10-32 UNF		0.1900-32 UNF	0.794	
		No.12-28 UNF	0.2160-28 UNF	0.907	**TTPS60FR8A(B)**
	1/4-28 UNF		0.2500-28 UNF	0.907	
	5/16-24 UNF		0.3125-24 UNF	1.058	**TTPS60FR8A(B)** **TTPS60FR-N**
	3/8-24 UNF		0.3750-24 UNF	1.058	
	7/16-20 UNF		0.4375-20 UNF	1.270	
	1/2-20 UNF		0.5000-20 UNF	1.270	
	9/16-18 UNF		0.5625-18 UNF	1.411	**TTPS60FR-N**
	5/8-18 UNF		0.6250-18 UNF	1.411	

TTP type



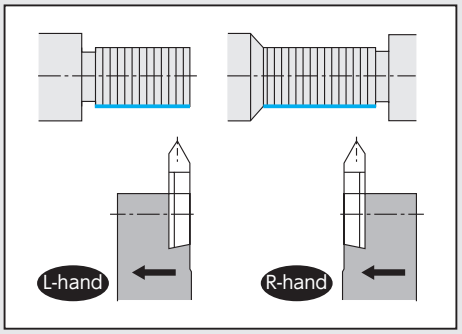
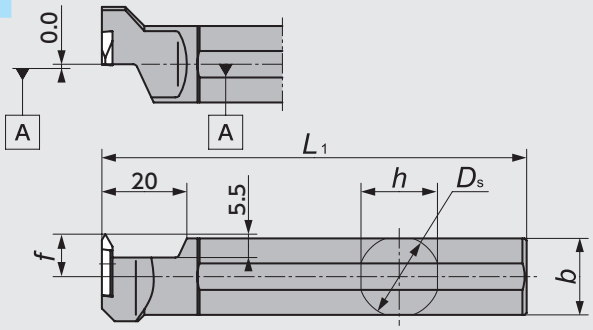


Figure-1

●Right-hand type shown.

DS-TTP type

DS Holder



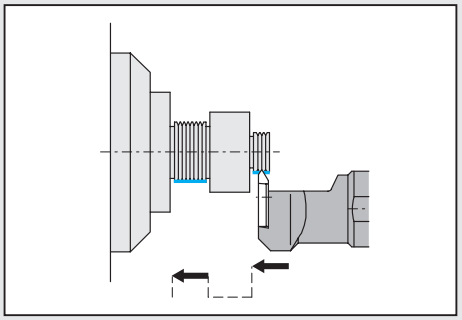
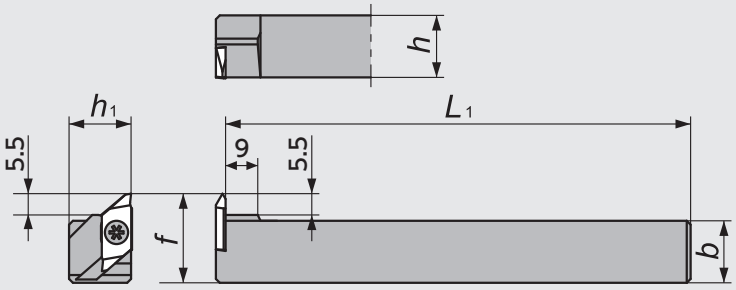


Figure-2

●Left-hand type shown.
☆Use R-hand inserts for L-hand type holders.

CH-TTP type NEW



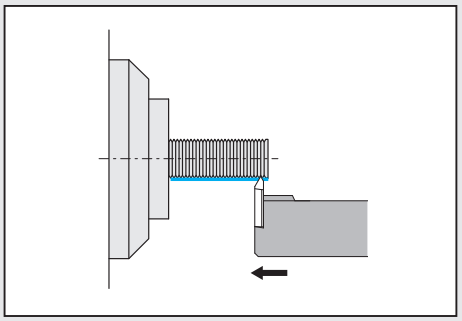
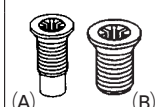
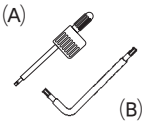


Figure-3

●Left-hand type shown.
☆Use R-hand inserts for L-hand type holders.

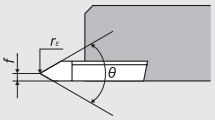
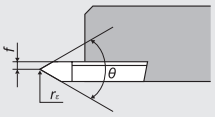
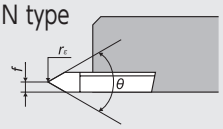
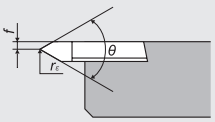
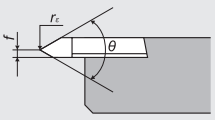
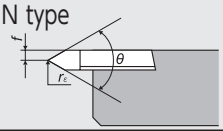
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Ds	h	b	L1	h1	f	h2	Applicable insert	Parts: Clamping screw	Parts: Wrench
														 (A) (B)	 (A) (B)
Figure-1	5146238	5146220	TTPR/L08	●	●	–	8	10	120	8	–	4	TTP J11	LRIS-4*10PW (A)	CLR-15S (A)
	5145693	5145685	10	●	●		10			10		2			
	5459854	5503024	12GX	●	●		12	12	85	12		0		LRIS-4*12PW (A)	
	5145701	5145719	12	●	●				120						
	5459862	5459870	16H	●	●		16	16	100	16					
	5191234	5267190	16	●	●				120						
	5459573	5459581	20F	●	●		20	20	80	20					
Figure-2		5782149	DS-TTPR/L16F※		★	16.00	15	15	80	–	10.0	–		LRIS-4*10 (B)	LLR-25S-20*65 (B)
		5278270	19		●	19.05	18	18	120						
		5278296	20		●	20.00	19	19							
		5324033	22		●	22.00	21	21							
		5317151	25		●	25.40	24	24	150						
NEW Figure-3		5885090	CH-TTPR/L16		●	–	16	16	120	16	23	–	TTP FR J11	LRIS-4*10 (B)	LLR-25S (B)
		5885108	20		●		20	20		20	27				

※Please select φ16 shank DS sleeves. DS sleeves details ➡ H91

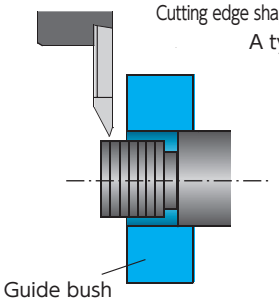
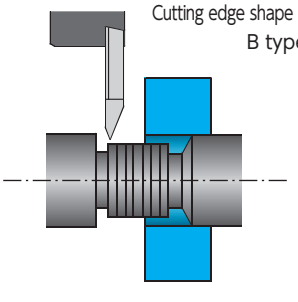
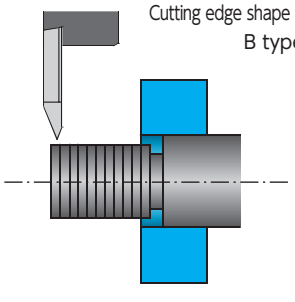
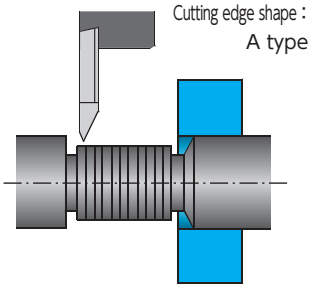
Applicable inserts

TTP type

handed	Shape	Code No.	θ	f	r_ε	Pitch	No. of threads/inch	Micro-grain carbide KM1	Stock	PVD-coated micro-grain carbides ZM3	Stock	QM3	Stock
Right-handed	A type 	**TTP60FR2A**	60°	0.2	(0.05) MAX flat	0.2～0.75				5892278	★		
		60FR4A		0.4						5145602	●	5234216	●
		60FR4AS Mirror finish						5578158	●				
		60FR8A		0.8	(R0.05)	0.4～1.25				5145537	●	5337340	●
		60FR8AS Mirror finish						5578117	●				
		TTP55FR8A	55°				48～16			5145495	●		
	B type 	**TTP60FR2B**	60°	0.2	(0.05) MAX flat	0.2～0.75				5892302	★		
		60FR4B		0.4						5145586	●	5601315	●
		60FR4BS Mirror finish						5578133	●				
		60FR8B		0.8	(R0.05)	0.4～1.25				5145529	●	5506472	●
		60FR8BS Mirror finish						5578091	●				
		TTP55FR8B	55°				48～16			5145487	●		
	N type 	**TTP60FR-N**	60°	1.25	(R0.1)	1.0～1.5				5145560	●	5474630	●
		60FR-NS Mirror finish						5578067	●				
		60FR-N02			(R0.2)	1.5～2.0				5626247	●	5626254	●
Left-handed	A type 	**TTP60FL2A**	60°	0.2	(0.05) MAX flat	0.2～0.75				5892286	★		
		60FL4A		0.4						5145594	●	5601307	●
		60FL4AS Mirror finish						5578174	●				
		60FL8A		0.8	(R0.05)	0.4～1.25				5145545	●	5601273	●
		60FL8AS Mirror finish						5578125	●				
		TTP55FL8A	55°				48～16			5145503	●		
	B type 	**TTP60FL2B**	60°	0.2	(0.05) MAX flat	0.2～0.75				5912555	★		
		60FL4B		0.4						5145578	●	5601299	●
		60FL4BS Mirror finish						5578141	●				
		60FL8B		0.8	(R0.05)	0.4～1.25				5145511	●	5503438	●
		60FL8BS Mirror finish						5578109	●				
		TTP55FL8B	55°				48～16			5145479	●		
	N type 	**TTP60FL-N**	60°	1.25	(R0.1)	1.0～1.5				5145552	●	5601265	●
		60FL-NS Mirror finish						5578083	●				
		60FL-N02			(R0.2)	1.5～2.0				5626270	●	5626262	●

☆Nose R shows referential value.

Selectively using inserts having a different edge configuration, A or B type

Right-handed				Left-handed			
Machining close to the guide bush		Close to back turned section		Machining close to the guide bush		Close to back turned section	
Cutting edge shape : A type  Guide bush		Cutting edge shape : B type 		Cutting edge shape : B type 		Cutting edge shape : A type 	
Holder	TTPR	Holder	TTPR	Holder	TTPL	Holder	TTPL
Insert	TTP□□FR□A	Insert	TTP□□FR□B	Insert	TTP□□FL□B	Insert	TTP□□FL□A

TTP type

For applicable holders and inserts, please refer to pages **J10 and 11**.

【Machining pitch range】

Part No.	Pitch
TTP60FR/L4A,AS(B,BS)	0.2-0.75
TTP60FR/L8A,AS(B,BS)	0.4-1.25
TTP60FR/L-N(S)	1.0-1.5
TTP60FR/L-N02	1.5-2.0

TTP60FR/L-N02 allows for machining up to M150. (with 2.0 as the pitch)

Metric screw/for both coarse and fine threads

Nominal dia. of thread			Pitch											
No.1	No. 2	No. 3	2.00	1.50	1.25	1.00	0.80	0.75	0.70	0.50	0.40	0.35	0.25	0.20
M1													Coarse	Fine
M2											Coarse		Fine	
M3										Coarse		Fine		
M4									Coarse	Fine				
M5							Coarse							
M6						Coarse		Fine						
	M7													
M8					Coarse	Fine								
		M9												
M10				Coarse	Fine									
		M11												
M12				Fine										
	M14		Coarse											
		M15				Fine								
M16			Coarse											
		M17												
	M18		Fine	Fine										
M20														
	M22													
M24														
		M25												
		M26												
	M27		Fine			Fine								
		M28												
M30														
		M32												

Unified screw

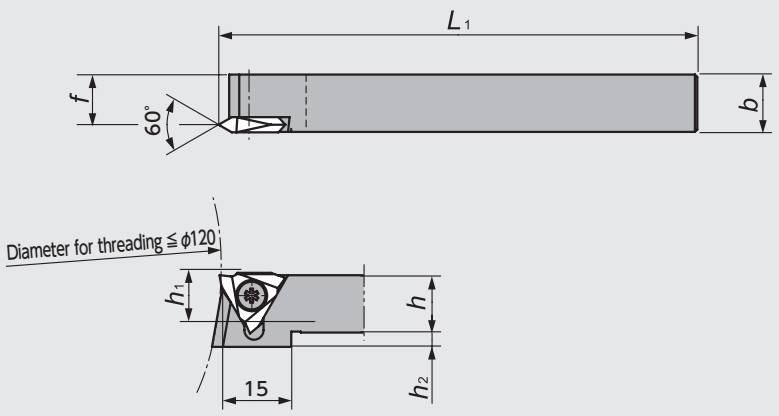
	Nominal dia. of thread		Pitch	Applicable part No.
	No.1	No. 2	(for reference)	
Coarse		No.1-64 UNC	0.3969	**TTP60FR/L4A, AS(B, BS)**
	No.2-56 UNC		0.4536	**TTP60FR/L4A, AS(B, BS)** **TTP60FR/L8A, AS(B, BS)**
		No.3-48 UNC	0.5292	
	No.4-40 UNC		0.6350	
	No.5-40 UNC		0.6350	
	No.6-32 UNC		0.7938	**TTP60FR/L8A, AS(B, BS)**
	No.8-32 UNC		0.7938	
	No.10-24 UNC		1.0583	**TTP60FR/L8A, AS(B, BS)** **TTP60FR/L-N(S)**
		No.12-24 UNC	1.0583	
	1/4-20 UNC		1.2700	
	5/16-18 UNC		1.4111	**TTP60FR/L-N(S)**
	3/8-16 UNC		1.5875	**TTP60FR/L-N02**
	7/16-14 UNC		1.8143	
	1/2-13 UNC		1.9538	

	Nominal dia. of thread		Pitch	Applicable part No.
	No.1	No. 2	(for reference)	
Fine	No.0-80 UNF		0.3175	**TTP60FR/L4A, AS(B, BS)**
		No.1-72 UNF	0.3528	
	No.2-64 UNF		0.3969	
		No.3-56 UNF	0.4536	**TTP60FR/L4A, AS(B, BS)** **TTP60FR/L8A, AS(B, BS)**
	No.4-48 UNF		0.5292	
	No.5-44 UNF		0.5773	
	No.6-40 UNF		0.6350	
	No.8-36 UNF		0.7056	
	No.10-32 UNF		0.7938	**TTP60FR/L8A, AS(B, BS)**
		No.12-28 UNF	0.9071	
	1/4-28 UNF		0.9071	
	5/16-24 UNF		1.0583	**TTP60FR/L8A, AS(B, BS)** **TTP60FR/L-N(S)**
	3/8-24 UNF		1.0583	
	7/16-20 UNF		1.2700	**TTP60FR/L-N(S)**
	1/2-20 UNF		1.2700	
	9/16-18 UNF		1.4111	
	5/8-18 UNF		1.4111	
	3/4-16 UNF		1.5875	**TTP60FR/L-N02**
	7/8-14 UNF		1.8143	

Parallel screws for pipes

Code No.	Nominal dia. of thread	Pitch (for reference)
TTP55FR⅛8A(B)	G1/16	0.9071
	G1/8	0.9071
	G1/4	1.3368
	G1/8	1.3368

STTN type



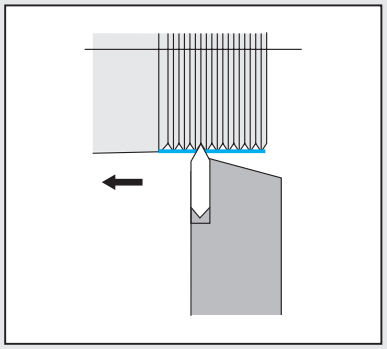
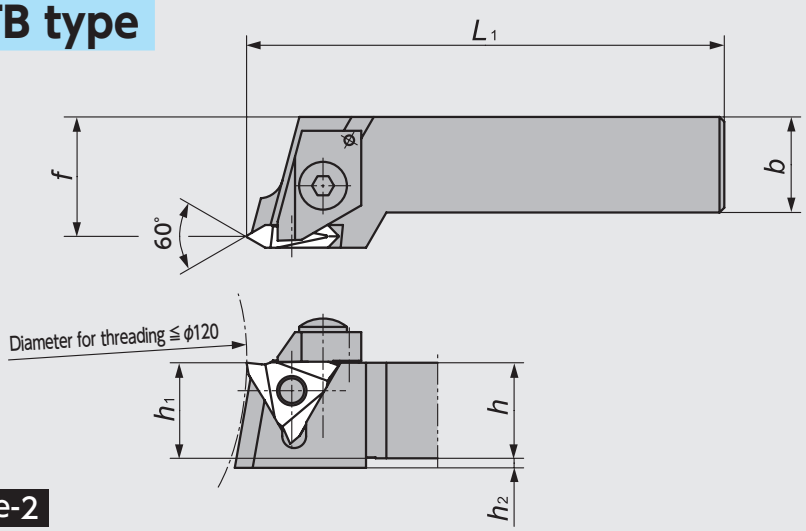


Figure-1

●Right-hand type shown.

NTTB type



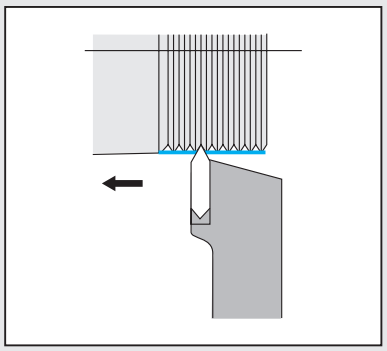
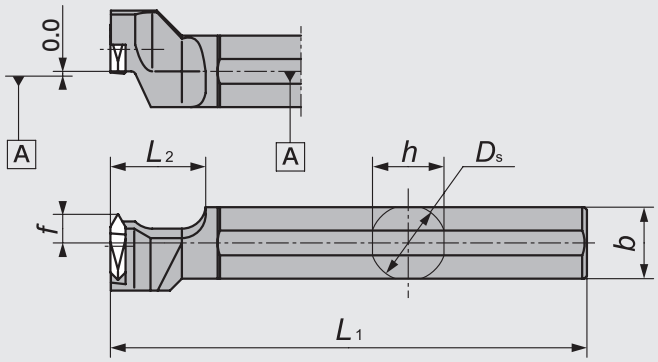


Figure-2

●Right-hand type shown.

DS-STT type



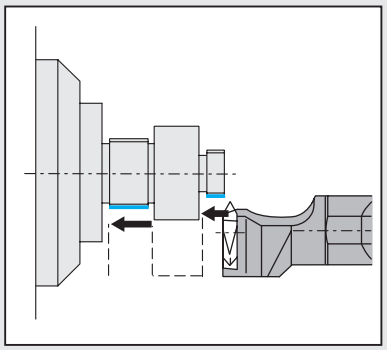
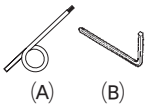


Figure-3

☆Use R-hand inserts for left-hand type holders.
●Left-hand type shown.

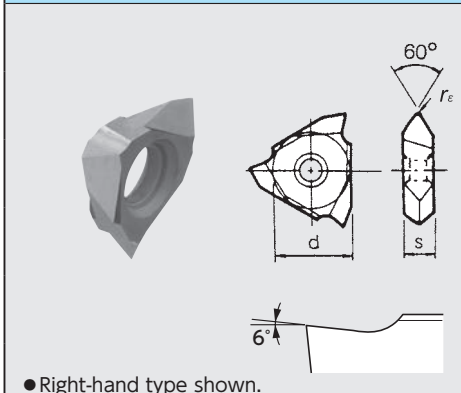
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Dimensions (mm) D_s	h	b	L_1	h_1	f	h_2	Applicable insert	Parts: Clamp	Parts: Clamping bolt	Parts: Spring	Parts: Clamping screw	Parts: Wrench
																		 (A) (B)
Figure-1	5630405		STTNR/L101032	●		—	10	10	80	10	8.5	5.0	TTMH3260 (See table below)	—	—	—	LR-S-4*9	RLR-20S (A)
	5827662		121232	●			12	12		12	10.5							
	5834817		121232-K	●					125									
Figure-2	5262530		NTTBR/L161632	●		—	16	16	120	16	20.0	4.0	TTMH3260 (See table below)	CPR/L5	A0S-5*25	ASG-5	—	LW-2.5 (B)
	5262548		202032	●			20	20	140	20	25.0	0.0						
	5262555	5307434	252543	●	●		25	25	160	25	30.0	0.0	TTMA4360 (See table below)	CPR/L6	A0S-6*30	ASG-6		LW-3 (B)
Figure-3		5348552	DS-STTR/L14F		●	14.000	13	13	80	—	6.0	—	TTMH3260 (See table below)	—	—	—	LR-S-4*9	RLR-20S (A)
		5348099	15H		●	15.875	15	15	100									
		5341508	16X※		●	16.000			85									

※Please select ϕ16 shank DS sleeves. DS sleeves details ➡ H91

Applicable inserts

TTMH • TTMA type

Shape	Code No.	Dimensions (mm) d	s	r_ε	Applicable screw Pitch	Cermet C7X	Cermet Stock	PVD-coated micro-grain carbides ZM3	PVD-coated micro-grain carbides Stock
 ●Right-hand type shown.	TTMH3260R010	9.525	3.18	0.10	0.8~3.0	5687694	●	5120928	●
	3260R015			0.15	1.0~3.0	5687686	●	5211826	●
	3260R020			0.20	1.5 ~ 3.0			5105697	●
	3260R025			0.25	1.75 ~ 3.0	5687702	●		
	TTMA4360R015	12.70	4.76	0.15	1.0 ~ 4.0	5687678	●	—	
	4360R020			0.20	1.5 ~ 4.0	5687660	●		

※The left-handed inserts: produced to order.

TTMH type

For applicable holders and inserts, please refer to pages **J14 and 15**.

【Machining pitch range】

Part No.	Pitch
TTMH3260R010	0.8-3.0
TTMH3260R015	1.0-3.0
TTMH3260R020	1.5-3.0
TTMH3260R025	1.75-3.0

Metric screw/for both coarse and fine threads

Nominal dia. of thread			Pitch							
No.1	No. 2	No. 3	3.00	2.50	2.00	1.75	1.50	1.25	1.00	0.80
M5										Coarse
M6									Coarse	
	M7									
M8								Coarse	Fine	
		M9								
M10							Coarse	Fine		
		M11								
M12						Coarse	Fine			
	M14				Coarse					
		M15								
M16					Coarse					
		M17								
	M18			Coarse	Fine					
M20										
	M22									
M24			Coarse							
		M25								
		M26					Fine			
	M27		Coarse		Fine					
		M28								
M30			Fine							
		M32								
	M33		Fine							
		M35								
M36			Fine		Fine					
		M38								
	M39		Fine		Fine					
		M40								

Unified screw

	Nominal dia. of thread		Pitch	Applicable part No.
	No.1	No. 2	(for reference)	
Coarse	No.10-24 UNC		1.0583	**TTMH3260R010 TTMH3260R015**
		No.12-24 UNC	1.0583	
	1/4-20 UNC		1.2700	
	5/16-18 UNC		1.4111	
	3/8-16 UNC		1.5875	**TTMH3260R010,R015 TTMH3260R020**
	7/16-14 UNC		1.8143	**TTMH3260R010,R015 TTMH3260R020,R025**
	1/2-13 UNC		1.9538	
	9/16-12 UNC		2.1167	
	5/8-11 UNC		2.3091	
	3/4-10 UNC		2.5400	
	7/8-9 UNC		2.8222	

	Nominal dia. of thread		Pitch	Applicable part No.
	No.1	No. 2	(for reference)	
Fine		No.12-28 UNF	0.9071	**TTMH3260R010**
	1/4-28 UNF		0.9071	
	5/16-24 UNF		1.0583	**TTMH3260R010 TTMH3260R015**
	3/8-24 UNF		1.0583	
	7/16-20 UNF		1.2700	
	1/2-20 UNF		1.2700	
	9/16-18 UNF		1.4111	
	5/8-18 UNF		1.4111	
	3/4-16 UNF		1.5875	**TTMH3260R010,R015 TTMH3260R020**
	7/8-14 UNF		1.8143	**TTMH3260R010,R015 TTMH3260R020,R025**
	1-12 UNF		2.1167	
	1 1/8-12 UNF		2.1167	
	1 1/4-12 UNF		2.1167	
	1 3/8-12 UNF		2.1167	
	1 1/2-12 UNF		2.1167	

TTMA type

▶For applicable holders and inserts, please refer to pages **J14 and 15**.

【Machining pitch range】

Part No.	Pitch
TTMA4360R015	1.0–4.0
TTMA4360R020	1.5–4.0

Metric screw/for both coarse and fine threads

Nominal dia. of thread			Pitch								
No.1	No. 2	No. 3	4.00	3.50	3.00	2.50	2.00	1.75	1.50	1.25	1.00
M6											Coarse
	M7										
M8										Coarse	Fine
		M9									
M10									Coarse	Fine	
		M11									
M12								Coarse	Fine		
	M14						Coarse				
		M15									
M16							Coarse				
		M17									
	M18					Coarse	Fine				
M20											
	M22										
M24					Coarse						
		M25									
		M26									
	M27				Coarse		Fine				
		M28									
M30				Coarse	Fine						
		M32									
	M33			Coarse	Fine						
		M35									
M36			Coarse		Fine		Fine				
		M38									
	M39		Coarse		Fine		Fine				
		M40									
M42			Fine		Fine		Fine				
	M45										
M48											
		M50									

Unified screw

	Nominal dia. of thread		Pitch	Applicable part No.
	No.1	No. 2	(for reference)	
Coarse	No.10-24 UNC		1.0583	**TTMA4360R015**
		No.12-24 UNC	1.0583	
	1/4-20 UNC		1.2700	
	5/16-18 UNC		1.4111	
	3/8-16 UNC		1.5875	**TTMA4360R015** **TTMA4360R020**
	7/16-14 UNC		1.8143	
	1/2-13 UNC		1.9538	
	9/16-12 UNC		2.1167	
	5/8-11 UNC		2.3091	
	3/4-10 UNC		2.5400	
	7/8-9 UNC		2.8222	
	1-8 UNC		3.1750	
	1 1/8-7 UNC		3.6286	
	1 1/4-7 UNC		3.6286	

	Nominal dia. of thread		Pitch	Applicable part No.
	No.1	No. 2	(for reference)	
Fine	5/16-24 UNF		1.0583	**TTMA4360R015**
	3/8-24 UNF		1.0583	
	7/16-20 UNF		1.2700	
	1/2-20 UNF		1.2700	
	9/16-18 UNF		1.4111	
	5/8-18 UNF		1.4111	
	3/4-16 UNF		1.5875	**TTMA4360R015** **TTMA4360R020**
	7/8-14 UNF		1.8143	
	1-12 UNF		2.1167	
	1 1/8-12 UNF		2.1167	
	1 1/4-12 UNF		2.1167	
	1 3/8-12 UNF		2.1167	
	1 1/2-12 UNF		2.1167	

For inside boring

STICK DUO®

SBT type

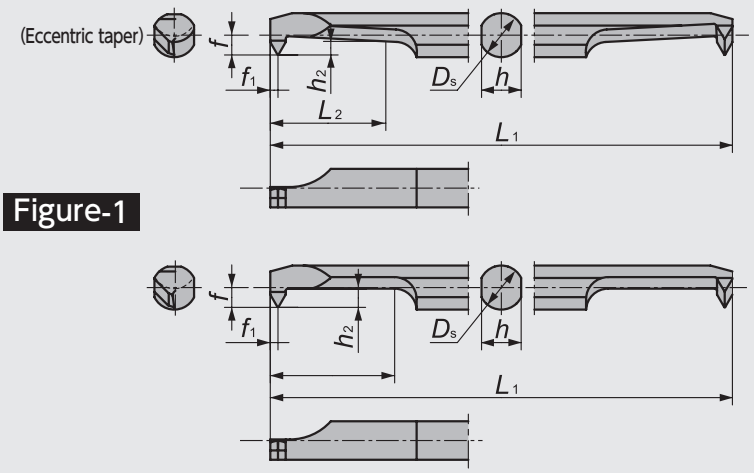
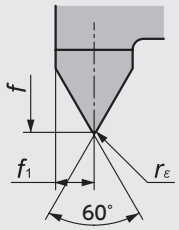
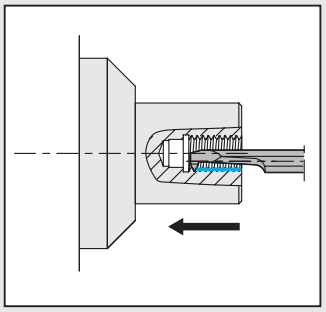


Figure-1

Figure-2

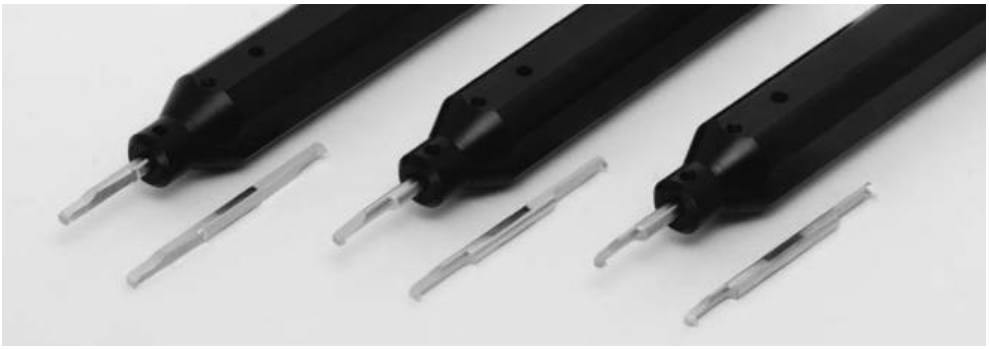




●Right-hand type shown.

Insert Shape	Code No.	Min. machining dia	Chip-breaker	Dimensions (mm)								Applicable screw				General recommendations for screw selection		PVD Micro-grain carbide	
												Metric screw		Unified screw		Metric screw	Unified screw		
				D_s	L_2	h_2	L_1	f	f_1	h	r_ε	Nominal dia. of thread	Pitch (mm)	Nominal dia. of thread	No. of threads/inch	Nominal dia. of thread		ZM3	Stock
Figure-1	SBT025M3R	2.5	None	2.5	5.4	0.6	50	1.1	0.4	2.3	0.05 max flat	M3	0.5	—	—	M3×0.5	—	5784459	●
	030M4R	3.0	None	3.0	7.5	0.8	50	1.3	0.5	2.7	0.05 max flat	M4 and larger	0.5~0.8	No.8-32UNC and larger	36~32	M4×0.7	No.8-32UNC	5784467	●
	030M4RB	3.0	Provided	3.0	7.5	0.8	50	1.30	0.50	2.7	0.05 max flat	M4 and larger	0.5~0.8	No.8-32UNC and larger	36~32	M4×0.7	No.8-32UNC	5658018	●
	035M5RB	3.5	Provided	3.5	8.5	1.0	60	1.55	0.55	3.2	0.05 max flat	M4.5 and larger	0.5~1.0	No.10-24UNC and larger	32~24	M5×0.8	No.10-24UNC No.12-24UNC	5658117	●
	040M6RB	4.0	Provided	4.0	10.5	1.2	60	1.80	0.70	3.6	R0.05	M5.5 and larger	0.75~1.25	No.12-24UNC and larger	28~20	M6×1.0	1/4-20UNC	5658000	●
Figure-2	SBT050M8RB	5.0	Provided	5.0	15.8	1.5	70	2.30	0.80	4.5	R0.05	M7 and larger	0.75~1.5	1/4-28UNF and larger	28~18	M8×1.25	5/16-18UNC	5657994	●
	060M10RB	6.0	Provided	6.0	18.4	1.8	80	2.80	0.95	5.4	R0.05	M8 and larger	0.75~1.75	5/16-24UNF and larger	28~16	M10×1.5	3/8-16UNC	5685870	●

▶For cutting conditions, please refer to page **J19**.
▶For sleeves, please refer to pages **L22~23**.



SBT type (for internal threading)

For inside boring STICK DUO®

Metric screw/for both coarse and fine threads

Nominal dia. of thread			Pitch (Feed)								
No.1	No. 2	No. 3	2.0	1.75	1.5	1.25	1.0	0.8	0.75	0.7	0.5
M3	–	–	–	–	–	–	–	–	–	–	Coarse (φ2.5) SBT025M3R
M4	–	–	–	–	–	–	–	–	–	Coarse (φ3.3) SBT030M4R(B)	Fine (φ3.5) SBT030M4R(B)
–	M4.5	–	–	–	–	–	–	–	Coarse (φ3.75) SBT035M5RB	–	Fine (φ4) SBT035M5RB
M5	–	–	–	–	–	–	–	Coarse (φ4.2) SBT035M5RB	–	–	Fine (φ4.5) SBT035M5RB
–	–	M5.5	–	–	–	–	–	–	–	–	Fine (φ5) SBT035M5RB
M6	–	–	–	–	–	–	Coarse (φ5) SBT040M6RB	–	Fine (φ5.25) SBT040M6RB	–	–
–	M7	–	–	–	–	–	Coarse (φ6) SBT050M8RB	–	Fine (φ6.25) SBT050M8RB	–	–
M8	–	–	–	–	–	Coarse (φ6.75) SBT050M8RB	Fine (φ7) SBT050M8RB	–	Fine (φ7.25) SBT050M8RB	–	–
–	–	M9	–	–	–	Coarse (φ7.75) SBT060M10RB	Fine (φ8) SBT060M10RB	–	Fine (φ8.25) SBT060M10RB	–	–
M10	–	–	–	–	Coarse (φ8.5) SBT060M10RB	Fine (φ8.75) SBT060M10RB	Fine (φ9) SBT060M10RB	–	Fine (φ9.25) SBT060M10RB	–	–
–	–	M11	–	–	Coarse (φ9.5) SBT060M10RB	–	Fine (φ10) SBT060M10RB	–	Fine (φ10.25) SBT060M10RB	–	–
M12	–	–	–	Coarse (φ10.25) SBT060M10RB	Fine (φ10.5) SBT060M10RB	Fine (φ10.75) SBT060M10RB	Fine (φ11) SBT060M10RB	–	–	–	–
–	M14	–	Coarse ×	–	Fine (φ12.5) SBT060M10RB	Fine (φ12.6) SBT060M10RB	Fine (φ13) SBT060M10RB	–	–	–	–
–	–	M15	–	–	Fine (φ13.5) SBT060M10RB	–	Fine (φ14) SBT060M10RB	–	–	–	–

Unified screw

	Nominal dia. of thread			Recommended pilot hole (mm)	Pitch	Recommended Part No.
	No.1	No. 2	(for reference)	(for reference)	(for reference)	
Coarse	No.8-32UNC	–	0.1640-32UNC	φ3.42	0.7938	**SBT030M4R(B)**
	No.10-24UNC	–	0.1900-24UNC	φ3.83	1.0583	**SBT035M5RB**
	–	No.12-24UNC	0.2160-24UNC	φ4.47	1.0583	
	1/4-20UNC	–	0.2500-20UNC	φ5.12	1.2700	**SBT040M6RB**
	5/16-18UNC	–	0.3125-18UNC	φ6.57	1.4111	**SBT050M8RB**
	3/8-16UNC	–	0.3750-16UNC	φ7.98	1.5875	**SBT060M10RB**
Fine	No.8-36UNF	–	0.1640-36UNF	φ3.51	0.7056	**SBT030M4RB**
	No.10-32UNF	–	0.19000-32UNF	φ4.07	0.7938	**SBT035M5RB**
	–	No.12-28UNF	0.2160-28UNF	φ4.61	0.9071	**SBT040M6RB**
	1/4-28UNF	–	0.2500-28UNF	φ5.47	0.9071	
	5/16-24UNF	–	0.3125-24UNF	φ6.91	1.0583	**SBT050M8RB**
	3/8-24UNF	–	0.3750-24UNF	φ8.51	1.0583	**SBT060M10RB**
	7/16-20UNF	–	0.4375-20UNF	φ9.88	1.2700	
	1/2-20UNF	–	0.5000-20UNF	φ11.47	1.2700	
	9/16-18UNF	–	0.5625-18UNF	φ12.9	1.4111	
	5/8-18UNF	–	0.6250-18UNF	φ14.5	1.4111	
	3/4-16UNF	–	0.7500-16UNF	φ17.5	1.5875	

Cutting conditions for STICK DUO

Depth of cut guide for pitch at revolution speed n(min^{-1}) between 600 and 1,500

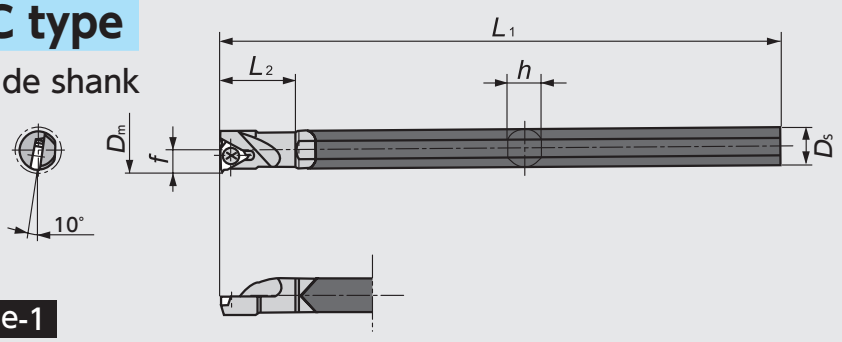
Metric screw		Counts of cutting																				
Machining pitch (mm)	Total depth of cut (mm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
0.5	0.3	0.06	0.05	0.05	0.04	0.04	0.03	0.02	0.01	–	–	–	–	–	–	–	–	–	–	–	–	–
0.7	0.43	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.03	0.02	0.01	–	–	–	–	–	–	–	–	–	–	–
0.75	0.46	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.02	0.01	–	–	–	–	–	–	–	–	–	–
0.8	0.49	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	–	–	–	–	–	–	–	–	–
1.0	0.62	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	–	–	–	–	–	–	–
1.25	0.76	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.02	0.01	–	–	–	–	–	–
1.5	0.92	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.01	–	–	–
1.75	1.09	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.01

Unified screw		Counts of cutting																		
No. of threads/inch	Total depth of cut (mm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
36	0.43	0.06	0.05	0.05	0.05	0.04	0.05	0.04	0.03	0.02	0.01	–	–	–	–	–	–	–	–	–
32	0.49	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	–	–	–	–	–	–	–
28	0.56	0.07	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	–	–	–	–	–	–
24	0.66	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	–	–	–	–
20	0.78	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.01	–	–	–
18	0.87	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.03	0.03	0.02	0.01	–	–
16	0.98	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.01

Minimum machining diameter: from ϕ8

TGC type

Carbide shank



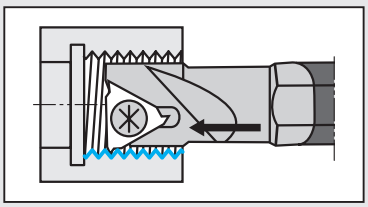
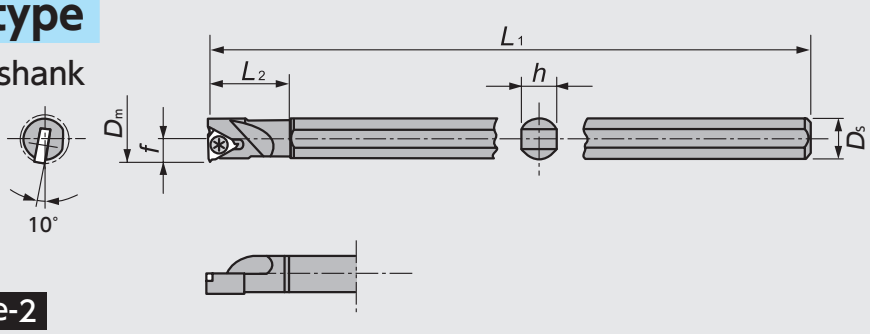


Figure-1

●Right-hand type shown.

HN type

Steel shank



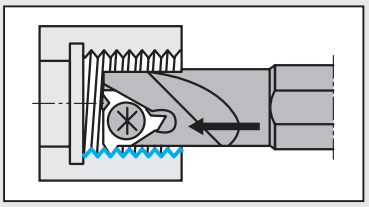


Figure-2

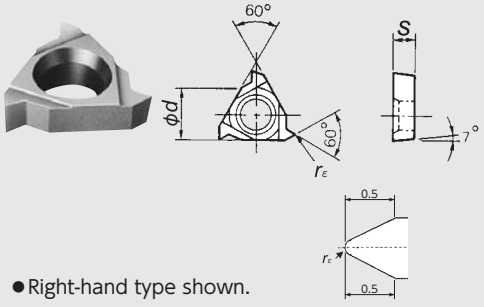
●Right-hand type shown.

Holder dimensions

Shape	Code No.	Toolholder Part No.	Stock	Min. Machining dia (mm) D_m	Dimensions (mm) D_s	h	L_1	f	L_2	Applicable inserts	Parts: Clamping screw	Parts: Wrench
Figure-1	5455092	**TGC10T06H161R**	●	**8.0**	6	5.5	100	3.8	13.0	TMN06 (See table below)	LR-S-2＊4.4	CLR-13S
	5455084	**08K162R**	●	**10.0**	8	7.0	125	4.7	17.0	TMN08 (See table below)	LR-S-2＊5.5	
	5455076	**10M163R**	●	**12.0**	10	9.0	150	6.0	20.0	TMN09 (See table below)	LRIS-2.2＊6	
Figure-2	5845177	**HN59Z-0028**	●	**8.0**	6	5.5	100	3.8	13.0	TMN06 (See table below)	LR-S-2＊4.4	CLR-13S
	5845193	**-0029**	●	**10.0**	8	7.0	125	4.7	17.0	TMN08 (See table below)	LR-S-2＊5.5	
	5845185	**-0030**	●	**12.0**	10	9.0	150	6.0	20.0	TMN09 (See table below)	LRIS-2.2＊6	

Applicable inserts

TMN type

Shape	Code No.	Dimensions (mm) ϕd	s	r_ε	Applicable screw: Recommended pitch for machining	Applicable screw: Machining pitch range	PVD-coated micro-grain carbides ZM3	Stock
 ●Right-hand type shown.	**TMN06FR03**	3.97	1.59	0.03	0.5	**0.4 ～ 0.75**	5228044	●
	08FR03	4.76	2.38				5293642	●
	09FR03	5.56					5484647	●

TMN type

▶For applicable holders, please refer to page **J20**.

■ Metric screw/for both coarse and fine threads (ϕ ～ : recommended prepared hole diameter)

Nominal dia. of thread			Pitch		
No.1	No. 2	No. 3	0.75	0.50	0.40
		M9	Fine (ϕ8.25)		
M10			Fine (ϕ9.25)		
		M11	Fine (ϕ10.25)		

THREAD WHIRLING

Thread Whirling

High efficiency threading!

Features

High efficiency threading

- Threading completed in just a single pass

⬇

Greatly shortens the cycle time

- Allows for multi-start threading in a single operation

Longer life

- Prolonged tool life due to the use of multiple cutting edges
- Stable tool life attained thanks to the excellent cutting performance and insert coating

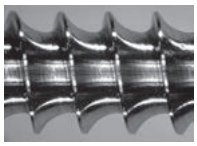
Short delivery time

- Inserts will be shipped from our factory in approx. 3 weeks after required information is received (For multi start threading inserts add one week for delivery.)
- Express delivery (Special fees are charged)

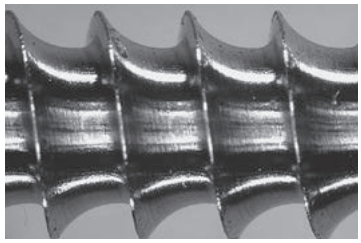
High quality machined surface

- The multi-edged design, excellent grinding quality and coating technologies realize high quality machined surfaces

Ti-6Al-4V ELI (×50)



Single point threading



NTK Thread Whirling

Excellent chip control

- The interrupted cutting process of thread whirling ensures chip evacuate the work area easily

Ti-6Al-4V ELI

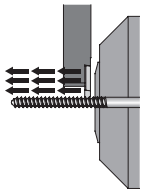
Single point threading

NTK Thread Whirling

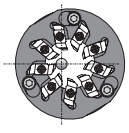
Single point threading

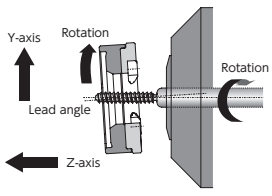
Conventional threading with Swiss type automatic lathes is carried out by repeating the same cutting process several times. However, in the cases of threading long medical type screws, the work piece is not fully supported by the guide bush during conventional threading. Conversely, Thread Whirling produces highly efficient threading for long medical type screws by making the threading operation complete in a single pass.

Single point threading



Thread Whirling

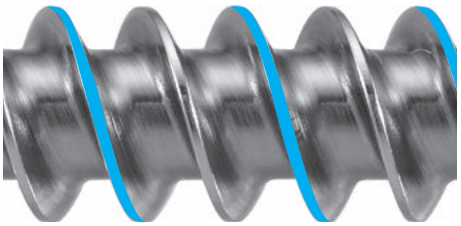
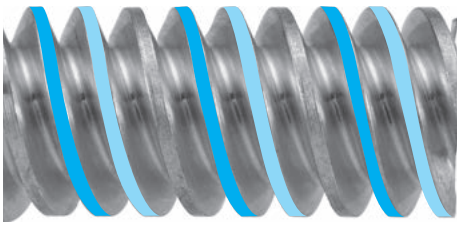
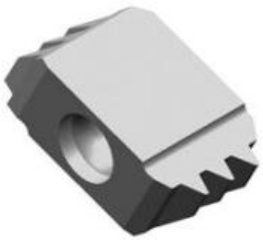




With Thread Whirling, the whiling head is tilted by the amount of the thread lead angle while rotated at high speed, with the work (C-axis) being turned at a low speed and fed by the pitch in the direction of Z-axis. The inserts are provided with a wiper so that the threading process in a single pass is made possible.

"Multi-start threading in a single process," for which there has been a large demand, can be successfully achieved!

Patented ★Possible to perform 2-start or 3-start threads in a single pass!

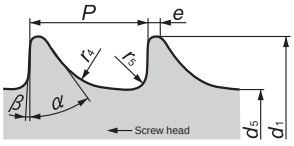
	Example of 2-start threading in a single pass	Example of 3-start threading in a single pass
Work	Bone screw	Worm screw
Material	Ti-6Al-4V ELI	Brass
Work		
Insert shape		
Outer diameter of the screw	ϕ4.0	ϕ7.0
Bottom surface diameter of the screw	ϕ2.4	ϕ4.7
Pitch	3.42mm	4.9mm

★6.5-mm thick inserts for even greater pitch now released!

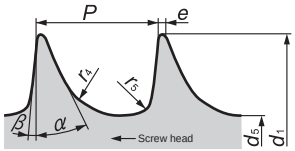
Advice : For multi-start threading in a single process, there are certain restrictions in terms of the specifications of machines, spindles, inserts, tooling and the likes. Please consult us for a higher productivity in your threading operations.

Threading inserts for ISO standard are in stock.

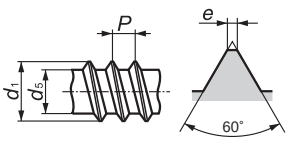
Inserts applicable to ISO standard ※For cutter part of which diameter between cutting edges is ϕ12



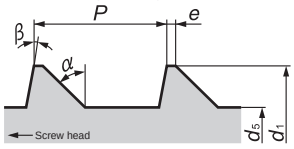
ISO5835 HA



ISO5835 HB



ISO9268 HC



ISO9268 HD

Code No.	PVD-coated Micro-grain carbide		Screw configuration ※ see above								Standardized code	Standard
	ZM3	Stock	d_1	d_5	e	P	r_4	r_5	α	β		
TW5835-HA1.5-D12	5818356	●	1.5 $^{0}_{-0.15}$	1.1 $^{0}_{-0.1}$	0.1	0.5	0.3	0.1	35°	3°	HA1.5	ISO5835
5835-HA2.0-D12	5818349	●	2.0 $^{0}_{-0.15}$	1.3 $^{0}_{-0.1}$		0.6	0.4				HA2.0	
5835-HA2.7-D12	5818323	●	2.7 $^{0}_{-0.15}$	1.9 $^{0}_{-0.15}$		1	0.6	0.2			HA2.7	
5835-HA3.5-D12	5818315	●	3.5 $^{0}_{-0.15}$	2.4 $^{0}_{-0.15}$		1.25	0.8				HA3.5	
5835-HA4.0-D12	5818307	●	4.0 $^{0}_{-0.15}$	2.9 $^{0}_{-0.15}$		1.5					HA4.0	
5835-HA4.5-D12	5818281	●	4.5 $^{0}_{-0.15}$	3.0 $^{0}_{-0.15}$		1.75	1	0.3			HA4.5	
5835-HA5.0-D12	5818273	●	5.0 $^{0}_{-0.15}$	3.5 $^{0}_{-0.15}$							HA5.0	
TW5835-HB4.0-D12	5818265	●	4.0 $^{0}_{-0.15}$	1.9 $^{0}_{-0.15}$	0.1	1.75	0.8	0.3	25°	5°	HB4.0	
5835-HB6.5-D12	5818257	●	6.5 $^{0}_{-0.15}$	3.0 $^{0}_{-0.15}$	0.2	2.75	1.2	0.8			HB6.5	
TW9268-HC2.9-D12	5818240		2.79 to 2.9	2.03 to 2.18	0.1 max	1.06	—	—	—	—	HC2.9	ISO9268
9268-HC3.5-D12	5818232		3.43 to 3.53	2.51 to 2.64		1.27	—	—	—	—	HC3.5	
9268-HC3.9-D12	5818224		3.78 to 3.91	2.77 to 2.92			—	—	—	—	HC3.9	
9268-HC4.2-D12	5818216		4.09 to 4.22	2.95 to 3.25			—	—	—	—	HC4.2	
TW9268-HD4.0-D12	5818208		4.0±0.03	2.92±0.03	0.1	1.59	—	—	45°	10°	HD4.0	
9268-HD4.5-D12	5818190		4.5±0.03			2.18	—	—			HD4.5	

Threading Tools

Whirling set includes 「mount adapter」・「insert exchange holder」・「adapter attachment bolt」・「holder attachment bolt」・「insert screw」・「Wrench」

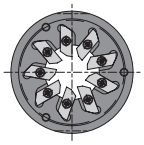
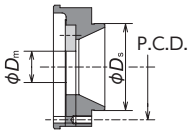


Figure-1



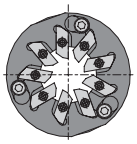
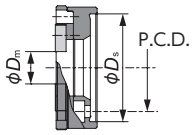


Figure-2



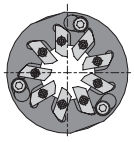
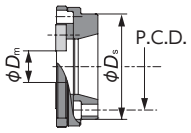


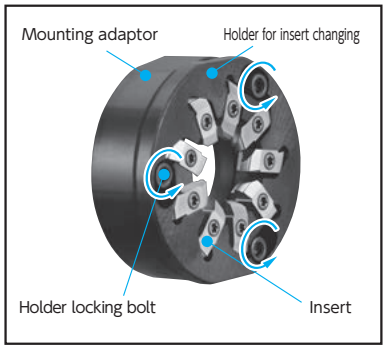
Figure-3



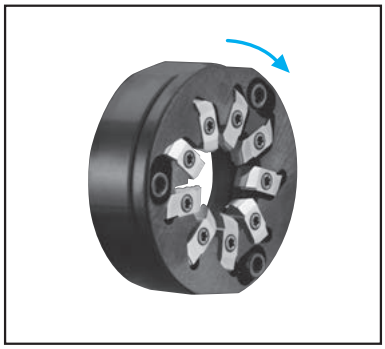
Machine Manufacturer	Machine model	Spindle installation	Spindle manufacturer	Spindle Part No.	Lead angle	NTK cutter Part No.
CITIZEN	L20E/L20X	Gang	CITIZEN	BTW-3000	0° ～−15°	TWC9C0746HP1
	A20	Gang		BTW-2000	±25°	TWC9C1040HP1 TWC6C1040HP1 TWC9C1040HP1-D16
	C32			BTW-1000	±25°	
	L20					
	M20				+20° ～−25°	
	M32				±25°	
	C12/16	Gang	CITIZEN	LTR0170	±15°	TWC9C1037P2
	M12/16	Turret		LTR0168		
	M12/16Ⅲ			MSW105		
	M20/32Ⅲ			KSW110		
	L20	Gang	CITIZEN	LTR0183	±15°	TWC9J1040P2
	M20/32					
	M20/32	Turret		LTR0169		
	L20	Gang	PCM	LSW-101-L20	±10°	TWC9P1340P2
	M12/16	Turret		MSW-101		
	M20/M32			KSW-101		
STAR	ECAS-12/20	Attachment	STAR	54178	±10°	TWC9S1640P2
	SB-20R			0M171	−20° ～0°	
	SR-20J/20RⅢ/20RIV			68172		
	SW-20					
	ECAS-20T	Turret		59172	±20°	
	ECAS-32T			58171	±10°	
	ST-38			43156	±10°	
	SV-12			45172	±10°	
	SV-20			42173	±10°	
	SV-32			43172	±10°	
	SV-38R			43156	±20°	
TSUGAMI	BH20/BH38	Turret	TSUGAMI	3263-Y481	±10°	TWC9TS2252P2
	BS20	Attachment		3214-Y1371	±10°	TWC9TS20550P2
	SS20/SS26/SS32 B0265/B0266-Ⅱ B0325/B0326-Ⅱ			3268-Y450/451	0° ～10°	TWC9TS2244HP1
					0° ～20°	TWC9TS1944HP1
	S205/S206			3281-Y451	0° ～25°	TWC9TS1644HP1
	B0123/124/125/126-Ⅱ B0203/204/205/205-Ⅲ/206-Ⅱ			3220-Y6541	0° ～30°	TWC9TS1044HP1
	SS207/SS267/SS327	———		———	0° ～15°	TWC4TS3010HP1
TORNOS	DECO 10/10a	Attachment	TORNOS	224-1900	±15°	TWC6TO11542HP1
	Evo DECO 10/10			242-1900		
	DECO 13a/13e			226-1900	±15°	TWC9TO10540P2
	Evo DECO 16/10			243-1900		
	DECO 20a			223-1900		
	DECO 26a			225-1900		
	Sigma 20			234-2750	±15°	TWC9TO12050P2-D18
	Sigma 32			236-2750		
HASEGAWA	JS-1W	———	HASEGAWA	———	0° ～20°	TWC9HA22594P2

NTK-simplified attaching/detaching system

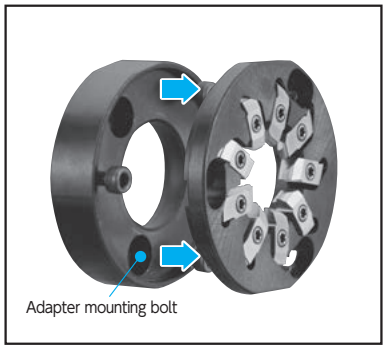
Allows you to change inserts outside of the machine, by detaching the holder easily **without the need to remove any bolts.** (Excluding the types shown in Fig. 4 and 5)



①Loosen the holder locking bolts.



②Rotate the holder to change inserts by 10 degrees.



③Pull off the holder for insert changing.
(No need to remove fixing bolts)

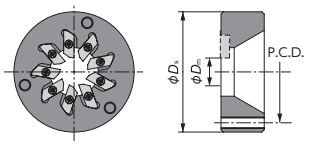


Figure-4

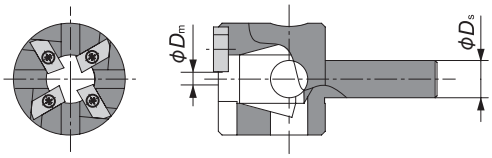


Figure-5

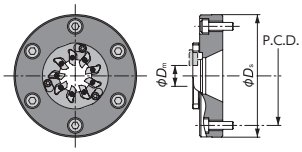


Figure-6

Code	Stock	Shape	No. of cutting edges	ϕD_m	ϕD_s	P.C.D.	adapter mounting bolts	
5829312		**Fig. 1**	**9**	φ12	φ46	φ35	——	
5720966 5762737 5798301	● ★ ★	**Fig. 1**	**9** **6** **9**	φ12 φ12 φ16	φ33	φ40	——	
5703368	●	**Fig. 2**	**9**	φ12	φ37	φ30.5	CS0310(M3)	5770763
5699947	■	**Fig. 2**			φ40	φ32.5	H-M4×12	5703392
5699921	●	**Fig. 2**			φ40	φ32.5	CS0414(M4)	5609797
5699863	●	**Fig. 3**	**9**	φ12	φ40	φ33	CS04148S(M4)	5702212
5724174	●	**Fig. 3**	**9**	φ12	φ52	φ42	CS0515(M5)	5442199
5774674		**Fig. 3**		φ16	φ50	φ40		
5779467	●	**Fig. 4**		φ12	φ52	φ44	CS0520(M5)	5426895
5779459	●							
5779434	●						CS0515(M5)	5442199
5779426	●							
5789698	●	**Fig. 5**	**4**	φ7	φ10	Specification of 1-corner inserts		
5823620		**Fig. 4**	**6**	φ12	φ42	φ32	CS0410(M4)	5902481
5743265		**Fig. 3**	**9**	φ12	φ40	φ31		
5847348		**Fig. 3**	**9**	φ18	φ50	φ40		
5786447		**Fig. 6**	**9**	φ16	φ94	φ76	CS0620(M6)	5883764

※Cutters include insert screws for thickness of 4.5mm and 6.5mm. Please use the suitable screw for your inserts.

Holders for indexing inserts.

NTK Part No.	Code	Stock	No. of cutting edges	Diameter between the cutting edges	
TWC9HP2	5699962	●	9	12	Common for Fig. 2 and 3
TWC9HP2-D16	5756762		9	12	Fig. 6

The holder locking bolts are not supplied.Only the screw and wrench for inserts supplied.

Mounting adaptor

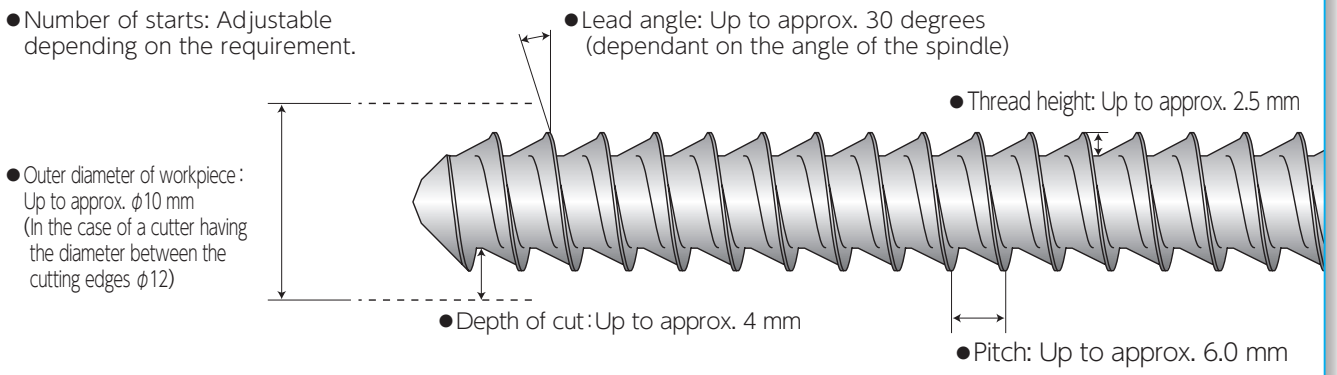
NTK Part No.	Code
Various types	Various types

Various types of mounting adaptors are available for our thread whirling sets.

Other parts

Part Name		NTK Part No.	Code	Stock	
Screws for inserts	For 4-mm thick insert	**FSI17-2.2＊6.0**	5683768	●	Common for the series
	For 6.5-mm thick insert	**FSI24-2.2＊7.9**	5786595	●	Common for the series
Wrench		**T-07**	5094917	●	Common for the series
Holder locking bolts		**CS0309-TW**	5702196	●	Common for the series

Applicable Thread Shapes (Reference)



The above values are for reference use only, as they may vary depending on the shape of the workpiece.

Recommended cutting conditions and procedure for use

(1) Check and confirm the model of the machine in use and its spindle type. Select a whirling cutter suitable for your machine and spindle type from our listed range.
(2) Please send drawings of your component to NTK. We will manufacture inserts dedicated to cutting your work piece by calculating the lead angle and shape of inserts required from the drawings sent.
(3) Set the whirling cutter at the specified lead angle and set the cutting conditions.

Cutting conditions

Cutter speed	Work speed	Feed rate
1,000-4,000 min⁻¹	10-30 min⁻¹	The same as the thread pitch

Applicable work

Work diameter	Material
ϕ3～ϕ10mm (In the case of a cutter having the diameter between the cutting edges ϕ12)	Pure titanium, titanium alloys, SUS316 and the likes

Useful tip

Calculation of Cutting time via Thread Whirling (Time for threading only)

$$T(\text{second}) = \frac{60 \times \text{overall length (length to be cut)}}{\text{Main spindle rotation speed} \times \text{feed (pitch)}}$$

Technical know-how

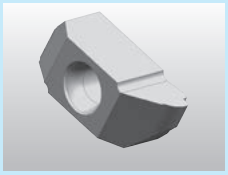
- Give advice how to set up tools to get accurate form.
- Flexibly make inserts to get form which can't be got with canventional tools.

Insert Lineup

Two grades of PVD coated carbide materials are available.
The thickness is 4mm or 6.5mm. The inserts are 2-corner type (except in special cases)

TM4

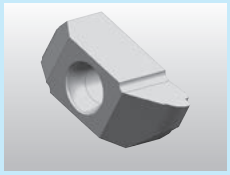
Suitable for pure titanium and titanium alloys



New material grade excellent in wear resistance, deposition resistance and chipping resistance

ZM3

Suitable for titanium alloys and SUS316

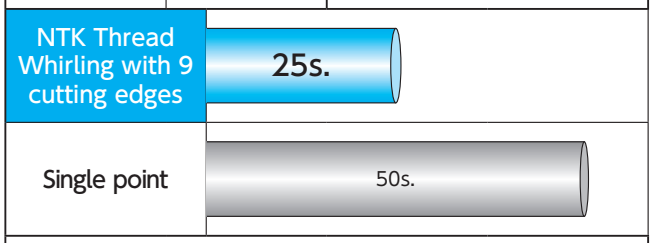


General-purpose grade excellent in deposition resistance, chipping resistance and resistance to adhesion

Actual cutting examples

Worm screw ● Material : Brass

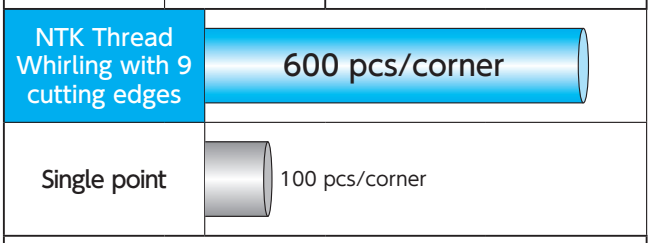
Work diameter	φ 7	No. of starts	2
Outer diameter of the screw	φ 6	Lead angle	10.1°
Bottom surface diameter of the screw	φ 4	Direction of thread	Left
Cutting condition with Thread Whirling			
Main spindle speed(min⁻¹)	30	Cutter speed(min⁻¹)	3,200
Pitch = feed (mm/rev)	2.8		



The total cycle time was halved, with the threading time for each workpiece significantly reduced by changing to thread whirling from single point cutting.

Pin ● Material : Hastelloy

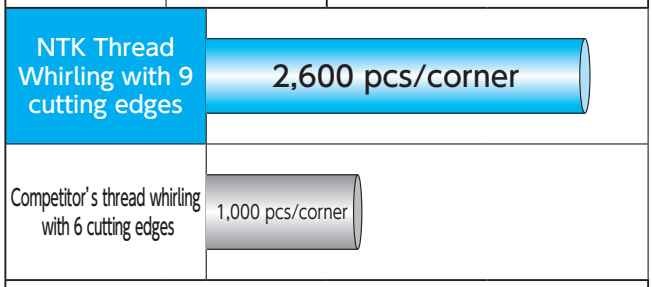
Work diameter	φ 3	No. of starts	1
Outer diameter of the screw	φ 1.5	Lead angle	4.3°
Bottom surface diameter of the screw	φ 1.1	Direction of thread	Right
Cutting condition with Thread Whirling			
Main spindle speed(min⁻¹)	20	Cutter speed(min⁻¹)	2,250
Pitch = feed (mm/rev)	0.3		



Greatly improved cutter life was achieved in the threading of Hastelloy, a very tough, abrasive material, by changing to thread whirling from single point cutting.

Bone screw ● Material : SUS316

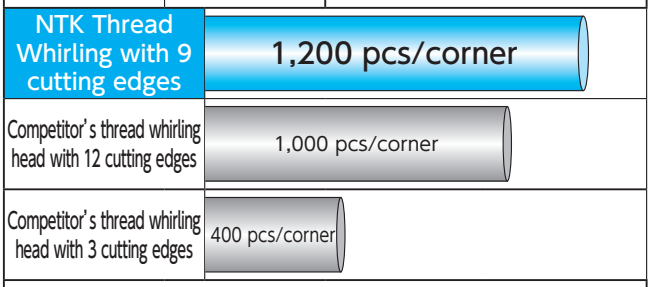
Work diameter	φ 8	No. of starts	1
Outer diameter of the screw	φ 3.45	Lead angle	7.5°
Bottom surface diameter of the screw	φ 2.67	Direction of thread	右
Cutting condition with Thread Whirling			
Main spindle speed(min⁻¹)	23	Cutter speed(min⁻¹)	2,000
Pitch = feed (mm/rev)	1.24		



NTK's thread whirling achieved 2.6 times longer life, compared with the competitor's product.

Bone screw ● Material : SUS316

Work diameter	φ 6.35	No. of starts	1
Outer diameter of the screw	φ 3.23	Lead angle	8.5°
Bottom surface diameter of the screw	φ 2.2	Direction of thread	Right
Cutting condition with Thread Whirling			
Main spindle speed(min⁻¹)	15	Cutter speed(min⁻¹)	2,250
Pitch = feed (mm/rev)	1.27		



NTK's thread whirling achieved 1.2 up to 3 times longer life, compared with the competitor's product.

More than 100 orders for our thread whirling sets in just 2 years after release !

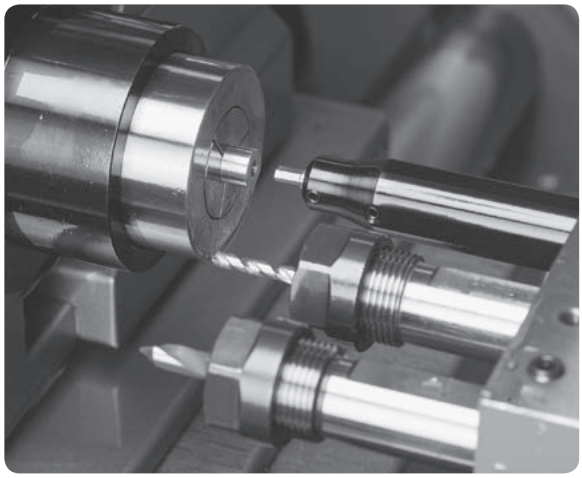
- Work material : bore screw • implant • worm gear • ball screw, etc
- Material : Pure titanium, Ti-6Al-4V ELI, SUS316, Hastelloy, Brass, 17-4PH, Platinum, and more
- Work diameter : φ3～φ10mm
- Thread height : 0.1~1.78mm
- Pitch : 0.32～6mm
- Number of starts : 1～3

MEMO

K

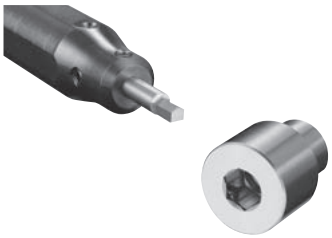
Shaper

WATCH ON YouTube

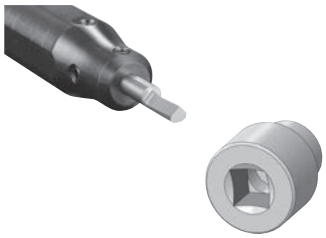


New line-up for square shape hole

■ Hexagon socket



■ Square socket

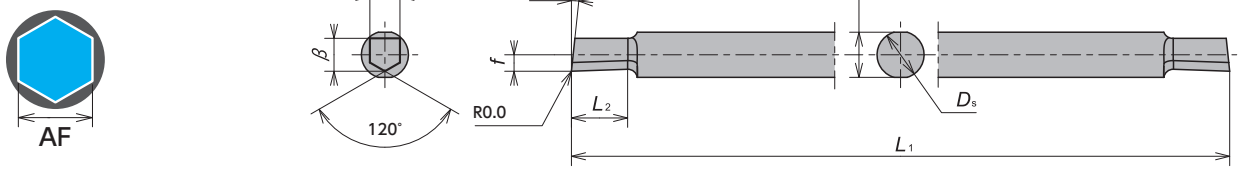


Features

- ***Hexagonal hole machining is possible with back spindle of Swiss type lathe!***
- ***Economical with 2 corners cutting edge!***
- ***Easy dimensional correction!***

Stock list

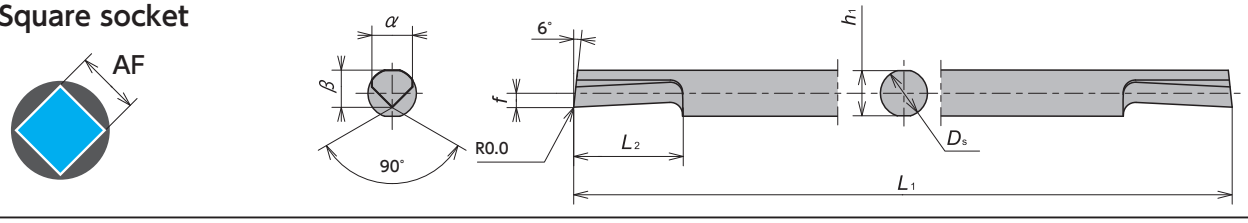
■ Hexagon socket



Part number	Base O.S. for capable machining AF (mm)	O.S. for capable machining AF (mm)	Dimensions (mm)							PVD coated micrograin carbide	
			D_s	L_1	L_2	h_1	α	β	f	TM4	Stock
SSP020N1130H	1.5	1.4 ~ 2.0	φ2	50	3.0	1.8	1.1	0.8	0.4	5885934	●
020N1430H	2.0	1.9 ~ 2.6	φ2				1.4	1.1	0.55	5885942	●
030N1940H	3.0	2.4 ~ 3.6	φ3		4.0	2.8	1.9	1.6	0.8	5885959	●
040N2450H	4.0	3.4 ~ 4.6	φ4	60	5.0	3.8	2.4	2.6	1.3	5885967	●
050N3260H	5.0	4.4 ~ 6.2	φ5	70	6.0	4.8	3.2	3.4	1.7	5885975	●
060N42120H	6.0	5.9 ~ 8.2	φ6	80	12.0	5.6	4.2	4.0	2.0	5873120	●
080N62160H	8.0	7.9 ~ 12.2	φ8		16.0	7.6	6.2	4.7	2.35	5885926	●

※See page L20-21 for sleeve holder.

■ Square socket



Part number	Base O.S. for capable machining AF (mm)	O.S. for capable machining AF (mm)	Dimensions (mm)							PVD coated micrograin carbide	
			D_s	L_1	L_2	h_1	α	β	f	TM4	Stock
SSP020N1740S	2.0	1.9 ~ 2.3	φ2.0	50	4.0	1.8	1.70	1.60	0.70	5920186	●
025N1940S	2.5	2.2 ~ 2.6	φ2.5			2.3	1.95	1.80	0.65	5920194	●
030N2260S	3.0	2.5 ~ 3.0	φ3.0		6.0	2.8	2.20	2.05		5920202	●
035N2760S	3.5	2.9 ~ 3.7	φ3.5	60		3.3	2.70	2.25	0.60	5920210	●
040N3380S	4.0	3.6 ~ 4.6	φ4.0		8.0	3.8	3.35	3.05	1.15	5920228	●
050N39100S	5.0	4.5 ~ 5.4	φ5.0	70	10.0	4.8	3.90	3.95	1.55	5920236	●
060N47120S	6.0	5.3 ~ 6.6	φ6.0	80	12.0	5.6	4.75	4.50	1.70	5920244	●
080N58160S	8.0	6.5 ~ 8.1	φ8.0		16.0	7.6	5.80	5.50		5920251	●

※See page L20-21 for sleeve holder.

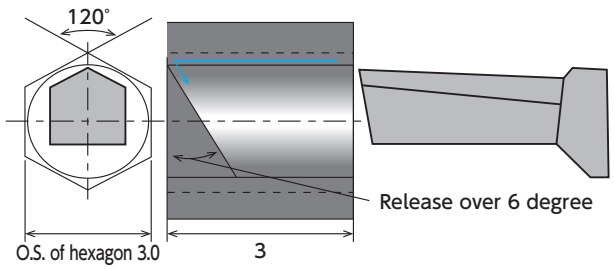
Recommended cutting condition

Feed···F4000~F1000 (㎜/min)　D.O.C.(radial depth)···0.05~0.01㎜

Following machining process is recommended for beautiful surface finish.
1. Roughing at D.O.C.(radial depth) 0.05mm
2. Finishing at D.O.C.(radial depth) 0.01mm for 1-2 times.

Case study

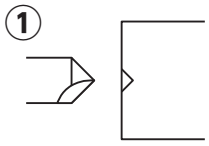
Hexagonal hole machining	
Work material	: SUS303
Feed (㎜/min)	: 2,000
Depth of cut (㎜)	: Rough 0.025 / Finish 0.005
Coolant	: WET



NTK : TM4 SSP030N1840H	10,000 pcs/corner
competitor : carbide	300pcs/corner

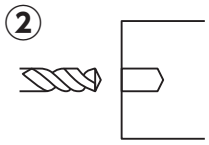
- Hexagonal hole machined by competitor's is unstable shape and short tool life.
- NTK's achieved the following good result due to the superior grinding tech and "TM4" PVD coating.
  ① stable hexagonal shape and longer tool life　② less dimensional correct　③ good surface finish

machining process



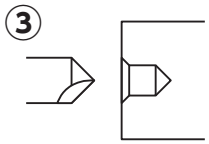
① center drilling

- select dia of center drilling over O.S. length



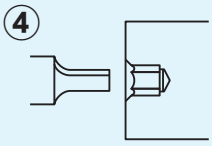
② drilling (pilot hole)

- select the dia of drill insert same with hexagonal O.S.
- Deeper depth of pilot hole is recommended, because burrs is accumulated when machined



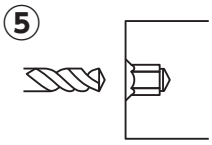
③ center drilling (chamferring)

- use the same drill in process ①
- machining the process ① and ③ at the same time is also possible.



④ shaping hexagonal hole

- shaping hexagonal hole
- shaping hexagonal shape 6 times with 60 degree positioned.

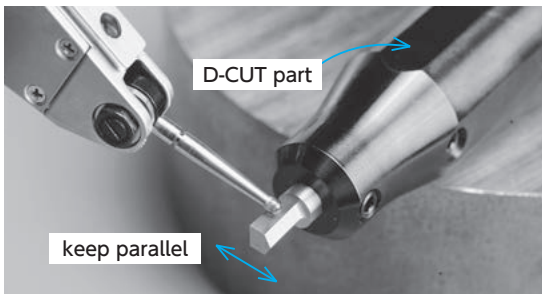


⑤ drilling finish zero cutting

- finishing with the same drill in the process ②

※In the zero cutting, reduce the cutting condition due to the heavy interrupted machining

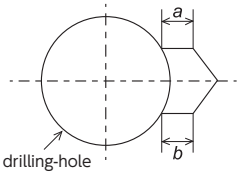
How to set insert in the sleeve



①outside machine

②inside machine

measure for machining hexagonal hole well



after machining one corner, rotating the sleeve to adjust the length "a" and "b" to be same.

SHAPER Programming example

Caution: The command codes and values will change according to the types of machinery. Please ask Machine builder for detailed information.

Sample work piece: Hexagon socket…AF 3.0mm Diagonal 3.6mm Depth 2.7mm Pre-hole diameter…φ3.0mm

Shaper Main Program

☆ : Back spindle stop rotation
☆ : Back spindle index 0° ……①
T○○○○ (シェーパー)
G50 U2.0 ……②
G0 X2.9 Z-2.0 T○○ ……③
☆ : Call sub-program (○○○①) repeat 14 times ……④
☆ : Call sub-program (○○○②) ……⑤

☆Back spindle index 60° ……①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ……④
☆ : Call sub-program (○○○②) ……⑤

☆ : Back spindle index 120° ……①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ……④
☆ : Call sub-program (○○○②) ……⑤

☆ : Back spindle index 180° ……①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ……④
☆ : Call sub-program (○○○②) ……⑤

☆ : Back spindle index 240° ……①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ……④
☆ : Call sub-program (○○○②) ……⑤

☆ : Back spindle index 300° ……①
G0 X2.9 Z-2.0
☆ : Call sub-program (○○○①) repeat 14 times ……④
☆ : Call sub-program (○○○②) ……⑤

☆ : Release spindle index
G0 Z-10.0
G50 U-2.0
G0 U0 W0 T0
M1

Shaper Sub Program①

N○○○① (Roughing)
G4 U0.02 ……⑥
G98 G1 Z2.7 F3000 ……⑦
G4 U0.02
U-0.2 W-0.018 ……⑧
G4 U0.02
G0 Z-2.0
G4 U0.02
U0.25 ……⑨
M99

Shaper Sub Program②

N○○○② (Finishing)
G98 G1 X3.61 Z-2.0 F1000 ……⑩
G4 U0.02
Z2.7 F3000
G4 U0.02
U-0.2 W-0.018
G4 U0.02
G0 Z-2.0
M99

☆ : Input program for your machinery

①=index each 60 degrees, total 6times

②=input value of (distance from tool center to cutting edge)×2
※The program will become easy by setting tools to plus direction. Minus direction setting requires program with minus X coordinate.

③=Approach coordinate
X2.9=a little value minus to pre-hole diameter
Z-2.0=Approach position a little way considering time to reach the commanded speed.

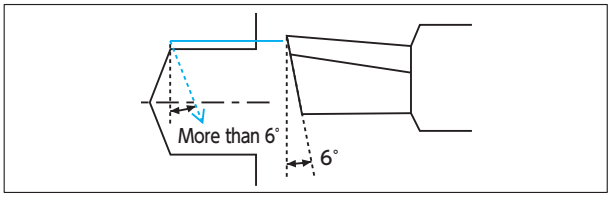
④=To shaper sub program①
14times=X2.9 start point X3.6 end point
Each depth of cut is 0.05mm(diameter)
⇒ (3.6-2.9)÷0.05=14 times

⑤=To Shaper Sub Program②

⑥=Input dwell or error detection after each operation because of slack in axis operation

⑦=Cut to target Z coordinate

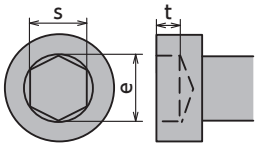
⑧=Release by more than 6 degrees. 10 degrees in this case below. More than 6 degrees



⑨=Each depth of cut is 0.05mm in this case
Go back by (released X coordinate value in⑧+depth of cut)

⑩Tiny Doc cutting for finishing will make the machined surface good.
The end X position is 3.6mm. Finish cutting by positioning with additional 0.01mm

Reference: Hexagon Socket Specification Extract from JIS B1176



s	Name	1.5	1.5	2	2.5	3	4	5	6	8	10	12
	Max.	1.58	1.58	2.08	2.58	3.08	4.095	5.14	6.14	8.175	10.175	12.212
	Min.	1.52	1.52	2.02	2.52	3.02	4.020	5.02	6.02	8.025	10.025	12.032
e	Min.	1.733	1.733	2.303	2.873	3.443	4.583	5.723	6.863	9.149	11.429	13.716
t	Min.	0.7	1	1.1	1.3	2	2.5	3	4	5	6	7
Thread (reference)		M1.6	M2	M2.5	M3	M4	M5	M6	M8	M10	M12	M14

SHAPER Programming example by machine builders

Caution: The command codes and values will change according to the types of machinery. Please ask Machine builder for detailed information.

Sample work piece: Hexagon socket…AF 3.0mm Diagonal 3.6mm Depth 2.7mm Pre-hole diameter…φ3.0mm

Program example for CITIZEN machine

Shaper Main Program

```
M25
M78 S0 ……①
T○○○○(Shaper)
G50 U2.0 ……②
G0 X2.9 Z-2.0 T○○ ……③
M98 P2100 L14 ……④
M98 P2200 ……⑤

M78 S60 ……①
G0 X2.9 Z-2.0
M98 P2100 L14
M98 P2200
《A》

  Repeat《A》by S120, S180, S240,
  S300 with each 60 degrees

M20
G0 Z-10.0
G50 U-2.0
G0 U0 W0 T0
M1
```

Shaper Sub Program①

```
N2100 (Roughing)
G4 U0.02 ……⑥
G98 G1 Z2.7 F3000 ……⑦
G4 U0.02
U-0.2 W-0.018 ……⑧
G4 U0.02
G0 Z-2.0
G4 U0.02
U0.25 ……⑨
M99
```

Shaper Sub Program②

```
N2200 (Finishing)
G98 G1 X3.61 Z-2.0 F1000 ……⑩
G4 U0.02
Z2.7 F3000
G4 U0.02
U-0.2 W-0.018
G4 U0.02
G0 Z-2.0
M99
```

Program example for STAR machine

Shaper Main Program

```
M25
T○○○○ (Shaper)
G50 U2.0 ……②
M8
G0 X2.9 Z-2.0 C0 T○○ ……①
M98 P2100 L14 ……④
M98 P2200 ……⑤

G0 C60.0 ……①
G0 X2.9 Z-2.0
M98 P2100 L14
M98 P2200
《A》

  Repeat《A》by S120, S180, S240,
  S300 with each 60 degrees

G0 Z-2.0
G50 U-2.0
G0 T0
G28 W0
M1
```

Shaper Sub Program①

```
O2100 (Roughing)
G4 U0.02 ……⑥
G98 G1 Z2.7 F3000 ……⑦
G4 U0.02
U-0.2 W-0.018 ……⑧
G4 U0.02
G0 Z-2.0
G4 U0.02
U0.25 ……⑨
M99
```

Shaper Sub Program②

```
O2200 (Finishing)
G98 G1 X3.61 Z-2.0 F1000 ……⑩
G4 U0.02
Z2.7 F3000
G4 U0.02
U-0.2 W-0.018
G4 U0.02
G0 Z-2.0
M99
```

Program example for TSUGAMI machine

Shaper Main Program

```
M105
M150
G28 H0 ……①
M182
T○○○○(Shaper)
G50 U-2.0 ……②
G0 X2.9 Z2.0 T○○ ……③
M98 P2100 L14 ……④
M98 P2200 ……⑤
M183

G0 C60 ……①
M182
G0 X2.9 Z2.0
M98 P2100 L14
M98 P2200
M183
《A》

  Repeat《A》by S120, S180, S240,
  S300 with each 60 degrees

M151
G0 Z10.0
G50 U2.0
G0 U0 W0 T0
M1
```

Shaper Sub Program①

```
O2100 (Roughing)
G4 U0.02 ……⑥
G98 G1 Z-2.7 F3000 ……⑦
G4 U0.02
U-0.2 W0.018 ……⑧
G4 U0.02
G0 Z2.0
G4 U0.02
U0.25 ……⑨
M99
```

Shaper Sub Program②

```
O2200 (Finishing)
G98 G1 X3.61 Z2.0 F1000 ……⑩
G4 U0.02
Z-2.7 F3000
G4 U0.02
U-0.2 W0.018
G4 U0.02
G0 Z2.0
M99
```

MEMO

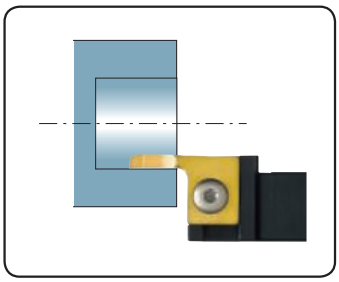
L

Boring Bars

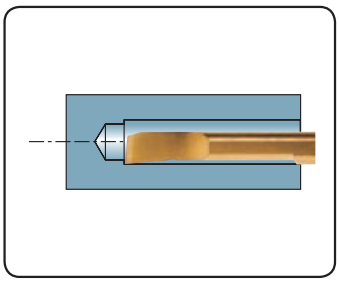
- Selection guide for boring and internal machining tools·· L2
- LBM ····· L6
- STICK DUO SPLASH····· L8
- STICK DUO Hyper ····· L16
- STICK DUO ····· L22
- MOGUL BAR ····· L28
- Multi-clamp holder ····· L41

NTK Selection guide for boring and internal machining tools

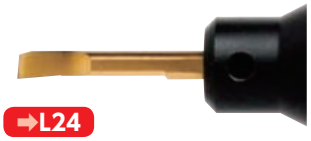
Minimum machining diameter ϕ1.0 ~ 8.2 Solid type



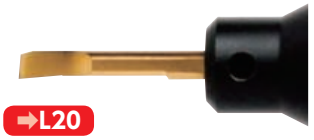
LBMA/LBMA-S type	CH-LBM type	DS-LBMB type
➡L6	➡L6	➡L6
Min. machining dia. : ϕ1.0 ~ ϕ2.3	Min. machining dia. : ϕ1.0 ~ ϕ3.0	Min. machining dia. : ϕ1.0 ~ ϕ3.0
Shank size : □8 ~ □16	Shank size : □10 • □12	Shank dia. : ϕ14 ~ ϕ25.4



For inside boring STICK DUO®

SBFS type(Carbide solid bar)
 ➡L24
Min. machining dia. : ϕ2.2 ~ ϕ8.2
Shank dia. : ϕ2.0 ~ ϕ8.0

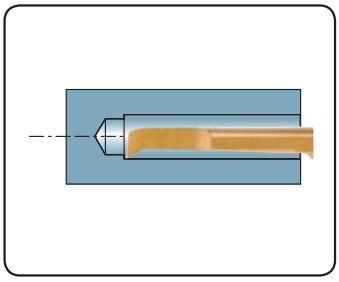
For inside boring STICK DUO® Hyper

SHFS type(Carbide solid bar)
 ➡L20
Min. machining dia. : ϕ2.2 ~ ϕ8.2
Shank dia. : ϕ2.0 ~ ϕ8.0

High degree of accuracy results in precise tool length setting with STICK DUO!!

S chipbreaker

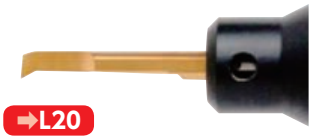
Excellent cutting performance



For inside boring STICK DUO®

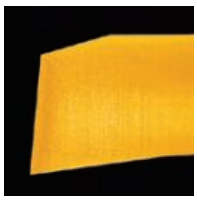
SBFB type(Carbide solid bar)
➡L24
Min. machining dia. : ϕ2.2 ~ ϕ6.2
Shank dia. : ϕ2.0 ~ ϕ6.0

For inside boring STICK DUO® Hyper

SHFB type(Carbide solid bar)
 ➡L20
Min. machining dia. : ϕ2.2 ~ ϕ6.2
Shank dia. : ϕ2.0 ~ ϕ6.0

High degree of accuracy results in precise tool length setting with STICK DUO!!

H No chipbreaker

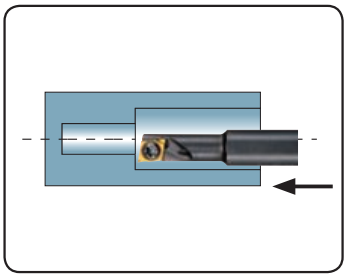


Mirror-like honing

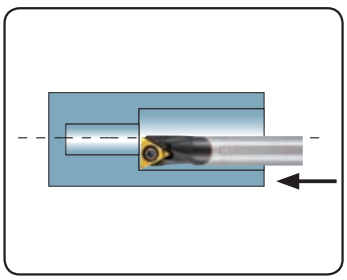
F chipbreaker

Evacuates chips in the forward direction.

Minimum machining diameter from ϕ5.0 Insert type MOGUL BAR



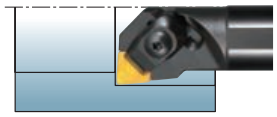
C-MBR type(Carbide shank)	S-MBR type(Steel shank)	C-SEXR type(Carbide shank)	S-SEXR type(Steel shank)
➡L32	➡L34	➡L34	➡L34
Min. machining dia. : ϕ5.0	Min. machining dia. : ϕ5.0	Min. machining dia. : ϕ6.0	Min. machining dia. : ϕ6.0
Shank dia. : ϕ4.5 • ϕ6.0	Shank dia. : ϕ6.0	Shank dia. : ϕ5.0 • ϕ6.0	Shank dia. : ϕ8.0

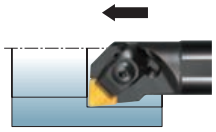
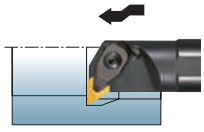
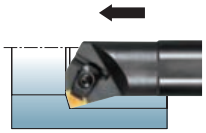
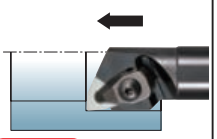


C-STUC(P) type(Carbide shank)	S-STUC(P) type(Steel shank)	C-SCLP(C) type(Carbide shank)	S-SCLP(C) type(Steel shank)
➡L39	➡L38	➡L36	➡L36
Min. machining dia. : ϕ8.0 ~ ϕ18.0	Min. machining dia. : ϕ8.0 ~ ϕ18.0	Min. machining dia. : ϕ7.0 ~ ϕ14.0	Min. machining dia. : ϕ7.0 ~ ϕ18.0
Shank dia. : ϕ7.0 ~ ϕ16.0	Shank dia. : ϕ7.0 ~ ϕ16.0	Shank dia. : ϕ6.0 ~ ϕ12.0	Shank dia. : ϕ6.0 ~ ϕ16.0

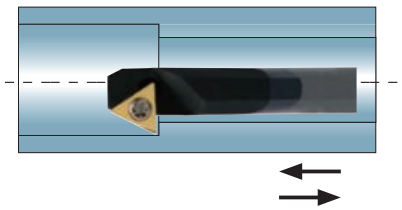
Multi-clamp series

Machining illustration



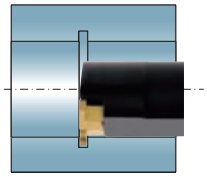
S-□CLN type	S-□DUN type	S-□SKN type	S-□WLN-2 type
 ➡L41	 ➡L42	 ➡L43	 ➡L44
T type : Clamp-on	T type : Clamp-on	T type : Clamp-on	W type : Dimple clamping
W type : Dimple clamping	H type : Dimple clamping	W type : Dimple clamping	
H type : Dimple clamping		H type : Dimple clamping	
Min. machining dia. : ϕ33～ϕ63	Min. machining dia. : ϕ42～ϕ50	Min. machining dia. : ϕ50	Min. machining dia. : ϕ33～ϕ50
Shank size : ϕ25～ϕ50	Shank size : ϕ32～ϕ40	Shank size : ϕ40	Shank size : ϕ25～ϕ40

Multi-clamp series

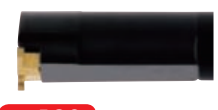


C-MSBR type(Carbide shank)	C-STZP(C) type(Carbide shank)	SBB type(Carbide solid bar)
➡L33	➡L40	NEW ➡L24
Min. machining dia. : ϕ5.7・ϕ7.7	Min. machining dia. : ϕ10.0～ϕ17.5	Min. machining dia. : ϕ3.0～ϕ4.0
Shank dia. : ϕ4.0・ϕ6.0	Shank dia. : ϕ6.0～ϕ12.0	Shank dia. : ϕ4.0

Internal grooving

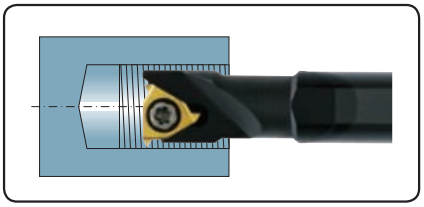


For inside boring STICK DUO

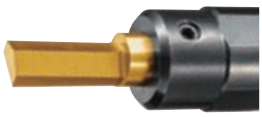
SBG type	BG type	GKV type	FLAT 3
➡I28	 ➡I30	➡I31	➡I19

SFG type
ID Face grooving ➡I29

Internal threading

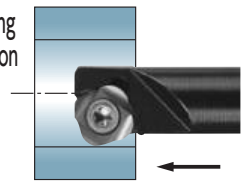


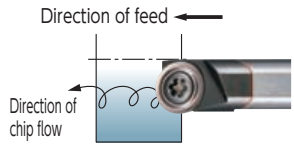
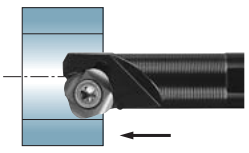
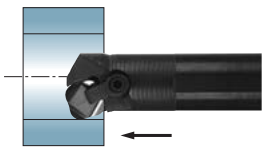
For inside boring STICK DUO

TGC type…Carbide shank HN59 type…Steel shank	SBT type	SHAPER DUO
➡J20	➡J18	 ➡K2
		O.S. for capable machining : 1.4～11.5
		Shank dia. : ϕ2.0～ϕ6.0・ϕ8.0
		Solid bar type

For machining of bearings

Machining illustration



SRC type	BBR type	BBR type
Direction of feed ← Direction of chip flow  ➡M16	 ➡M17	 ➡M17

Boring bars and internal machining tool range

Internal Machining Tools Recommended Insert Grade and Cutting Conditions

■～φ6 (LBM・STICKDUO)

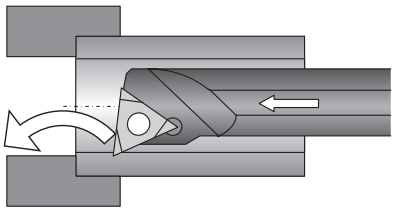
Work Material		Free cutting steels	Carbon steels	Alloy steels	Free cutting steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Stainless Alloy
JIS Common Grade		SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	First Choice	VM1 TM4	VM1		DT4 TM4			TM4
	Second Choice	TM4 ZM3	TM4 ZM3		ZM3 VM1			ZM3
Cutting Spead v_c (m/min)		30 60 90				20 50 70		30 60 90
depth of cut (mm)		0.05 0.08 0.10						
Feed spead f (mm /rev)		0.03 0.05 0.07						

■φ6～

Work Material		Free cutting steels	Carbon steels	Alloy steels	Free cutting steels Stainless	Hard-to-cut Stainless steels	Titanium (Alloy)	Stainless Alloy
JIS Common Grade		SUM22 SUM23 SUM24	S35C S45C	SCr420 SCM435	SUS303 SUS430F	SUS304 SUS440C	6AL-4V-Ti	A5056 A6061
Insert Grade	First Choice	VM1	TM1 ZM3		DT4 TM1		DT4	PD1
	Second Choice	TM1 DT4	QM3 C7Z		TM4		TM1	KM1 ZM3
Cutting Spead v_c (m/min)		50 100 200	carbide 50 90 150		50 90 180	40 70 100	50 70 100	PD1 100 200 350
			C7Z 120 180 250					carbide 50 100 200
depth of cut (mm)		0.10 0.50 2.0						
Feed spead f (mm /rev)		0.01 0.04 0.12						

※Please refer to Technical Information **Q64** for detailed recommendation.

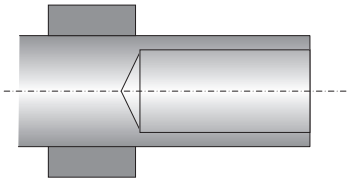
Boring on a conventional lathe



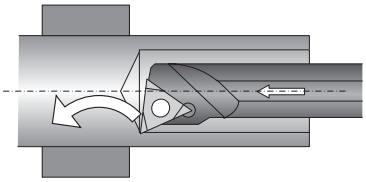
As the component has a through hole it is possible to evacuate the chips out through the bore.

Molded type chipbreaker (AM5) and honed chipbreaker A and B type can be used.

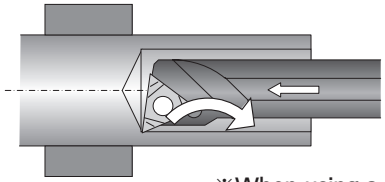
Boring on an automatic lathe



Boring into a blind hole.



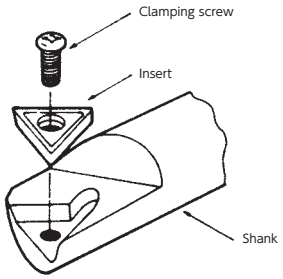
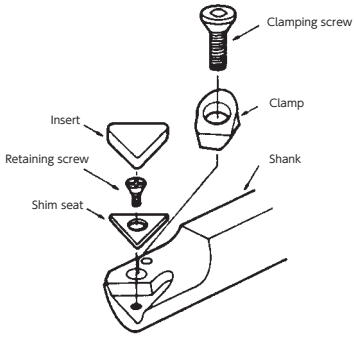
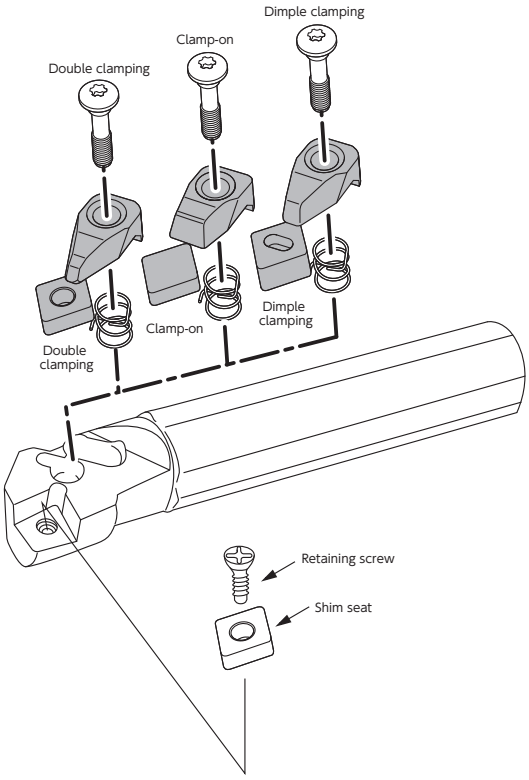
Insert breakage may occur as chips jam in the blind hole.



FG, F1, and F05 chipbreakers allow the chips to evacuate the bore reducing the possibility of insert damage.

※When using a chipbreaker of FG, F1 or F05 type, use an R-hand insert for an R-hand holder.

Structure and features of NTK boring bars

Series	Structure	Features
Screw-on type		●Screw-on type that clamps small insert securely ●Durable torx screw ensures secure clamping. ●Available for three inserts type : triangle, 75°and 80°rhombus ●Both steel and carbide shanks are offered as standard holders (Minimum machining diameter : ϕ5 or larger)
Clamp-on type		●Most suitable for ceramic insert use or for cermet inserts without hole ●Available for two types of inserts : triangle and square ●Minimum machining diameter : ϕ20 or larger
W typeDouble clamping T typeClamp-on H typeDimple clamping		●Three clamping methods are possible by a simple exchange of clamps. ●First choice for ceramic, stronger and more accurate clamping via the new clamp system ●Prevents insert breakage by optimizing the clamping force evenly. ●Allows for highly accurate machining with high repeatability. ●Inserts can be clamped from both the front and back sides of the toolholder.

Boring bars and internal machining tool range

Minimum machining diameter : ϕ1.0 ~ ϕ3.0

LBMA/LBMA-S type

LBMAR□□-S

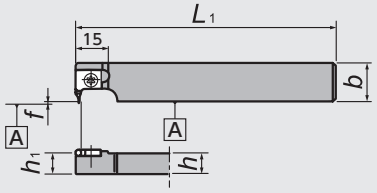


Figure-1

LBMAR□□

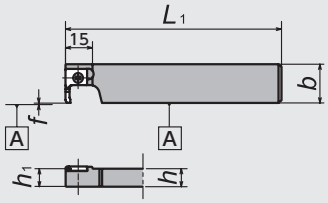


Figure-2

LBMAR□□-F

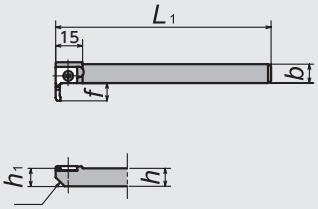


Figure-3

● Right-hand type shown.

CH-LBM type

For gang-type tool post

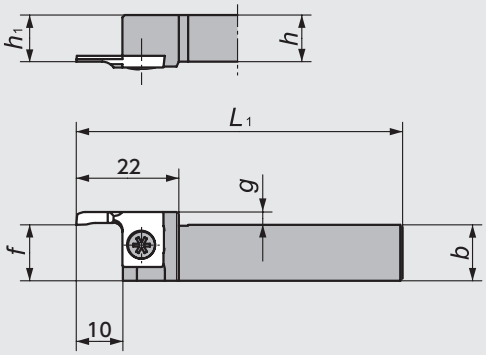
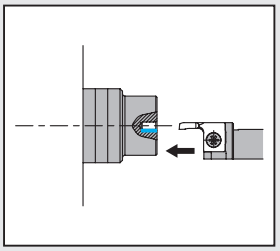


Figure-4



● Left-hand type shown.

DS-LBMB type

DS holder

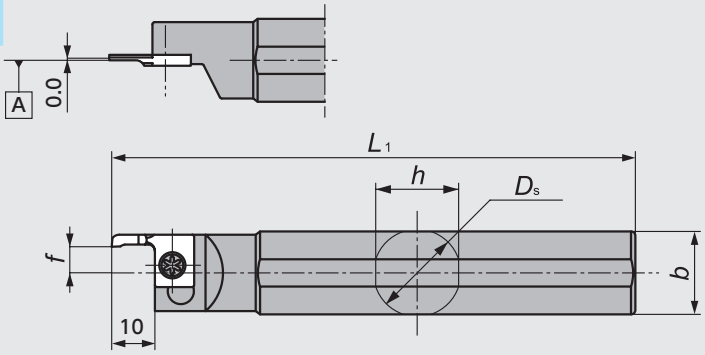
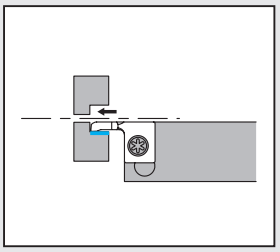


Figure-5



● Left-hand type shown.

Holder dimensions

Shape	Code No.	Toolholder Part No.	Stock	Dimensions (mm) Ds	h	b	L1	h1	f	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5571435	**LBMAR10SGX**	●	—	10	18	85	10	0.0	Short type **L7**	LRIS-4*10PW	CLR-15S (A)
	5486311	**R10S**	●	—	10		120	10				
	5486329	**R12S**	●	—	12		120	12			LRIS-4*12PW	
Figure-2	5383476	**LBMAR08**	●	—	8	21.5	120	8	0.0	Long type **L7**	LRIS-4*10	LLR-25S (B)
	5359849	**R10**	●	—	10			10			LRIS-4*10PW	CLR-15S (A)
	5362199	**R12**	●	—	12			12				
	5378278	**R16**	●	—	16			16			LRIS-4*12PW	
Figure-3	5359831	**LBMAR10-F**	●	—	10	10.0	120	10	10.0			
Figure-4	5659164	**CH-LBML1012H**	●	—	10	12	100	10	※1	Short type **L7**	LRIS-4*10PW	CLR-15S (A)
	5659172	**L1212H**	●	—	12			12				
Figure-5	5359856	**DS-LBMBL14F**	●	14.000	13	13	80※3	—	※2	Long type **L7**	LRIS-4*10PW	CLR-15S (A)
	5359914	**L15H**	●	15.875	15	15	100※3	—				
	5359906	**L16X**※4	●	16.000			95※3	—				
	5359898	**L19**	●	19.050	18	18	120※3	—				
	5359880	**L20**	●	20.000	19	19		—				
	5359872	**L22**	●	22.000	21	21		—				
	5483441	**L25-MET**	●	25.000	24	24		—				
	5393905	**L25**	●	25.400			150※3	—				

※1 With an insert having the min. machining diameter of ϕ3→12.35mm With an insert having any min. machining diameter than ϕ3→12.75mm

※2 With an insert having the min. machining diameter of ϕ3→6.35mm With an insert having any min. machining diameter than ϕ3→6.75mm

※3 With a short type insert mounted, the overall length (L1) becomes reduced by approx. 4.0 mm.

※4 Please select ϕ16 shank for DS sleeves. DS sleeves details ➡ H91

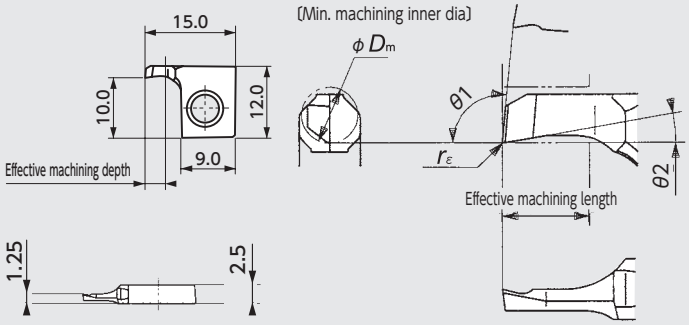
Applicable insert

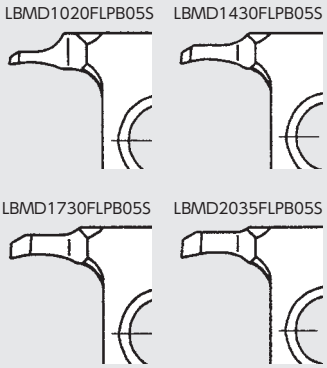
LBMD-S type

Short type

Mirror finish

Enlarged photo of the cutting edge





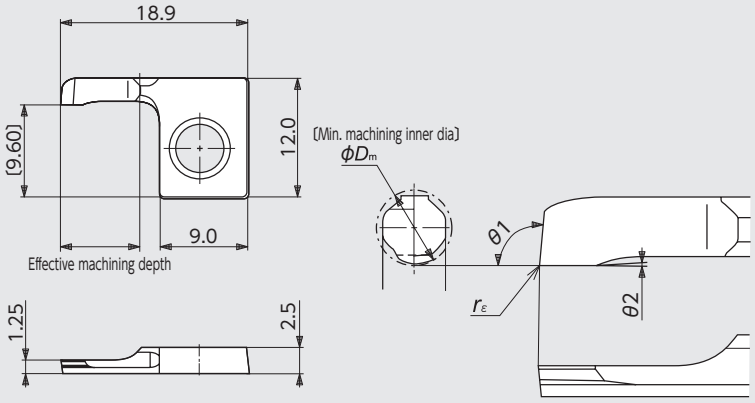
※LBMD2335FLPB05S is shown here.

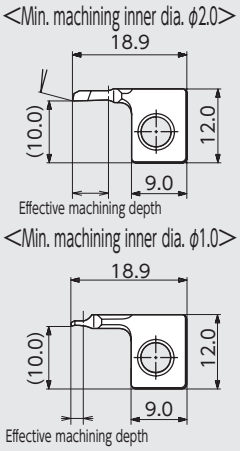
LBM type

Long type

Mirror finish

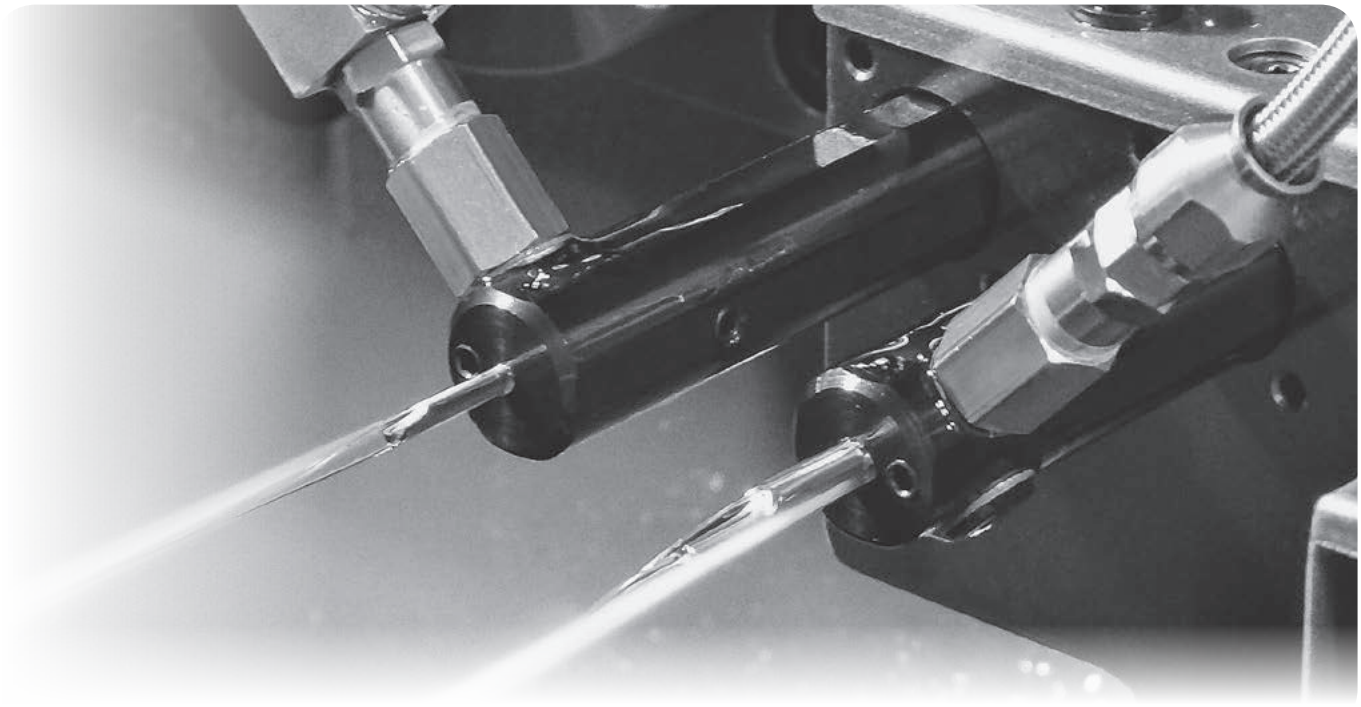
Enlarged photo of the cutting edge





Insert type	Part No.	Chipbreaker	Dimensions (mm) Min. machining dia. ϕ D_m	Effective machining depth	θ1	θ2	r_ε	PVD-coated micro-grain carbides ZM3	Stock	VM1	Stock
Short type	LBMD1020FLVBS	Provided	ϕ1.0	2.0	95°	10°	0.00			5638150	●
	1020FLPB05S						0.05			5486592	●
	LBMD1430FLVBS		ϕ1.4	3.0			0.00			5529169	●
	1430FLPB05S						0.05			5486600	●
	LBMD1730FLVBS		ϕ1.7				0.00			5638143	●
	1730FLPB05S						0.05			5486618	●
	LBMD2035FLVBS		ϕ2.0	3.5			0.00			5638135	●
	2035FLPB05S						0.05			5486626	●
	LBMD2335FLVBS		ϕ2.3				0.00			5638127	●
	2335FLPB05S						0.05			5486634	●
Long type	LBMD1020FLVB	Provided	ϕ1.0	2.0	95°	10°	0.00			5433222	●
	1020FLPB05						0.05			5433214	●
	LBMD2060FLVB		ϕ2.0	6.0			0.00			5421888	●
	2060FLPB05						0.05			5421896	●
	LBME2060FLV	None			105°	2°	0.00			5421920	●
	2060FLP05						0.05			5421938	●
	2060FLVB	Provided					0.00			5421904	●
	2060FLPB05						0.05			5421912	●
	LBMC3080FLV	None	ϕ3.0	8.0	95°		0.00	5372834	●	5359799	●
	3080FLP05						0.05	5372826	●	5359807	●
	LBM3080FLVB	Provided			90°		0.00			5368030	●
	3080FLPB05						0.05			5368048	●
	LBMC3080FLVB				95°		0.00	5372842	●	5359815	●
	3080FLPB05						0.05	5372859	●	5359823	●

STICK DUO SPLASH

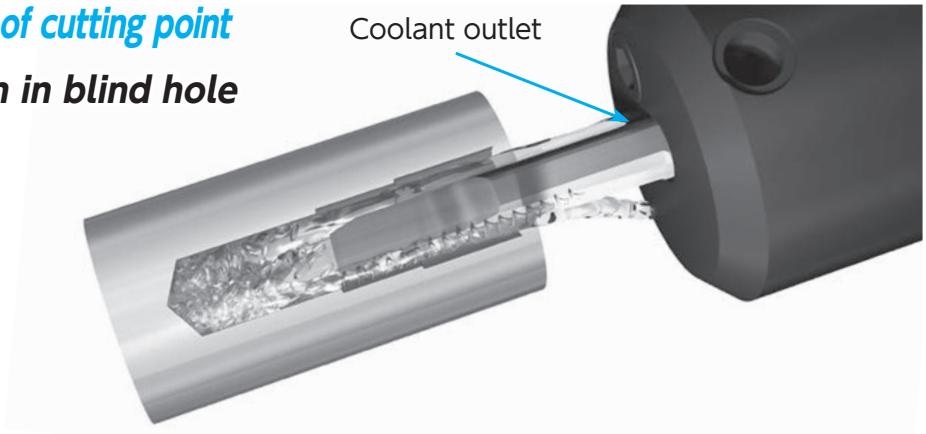


Features

You can select 2 types of coolant outlet

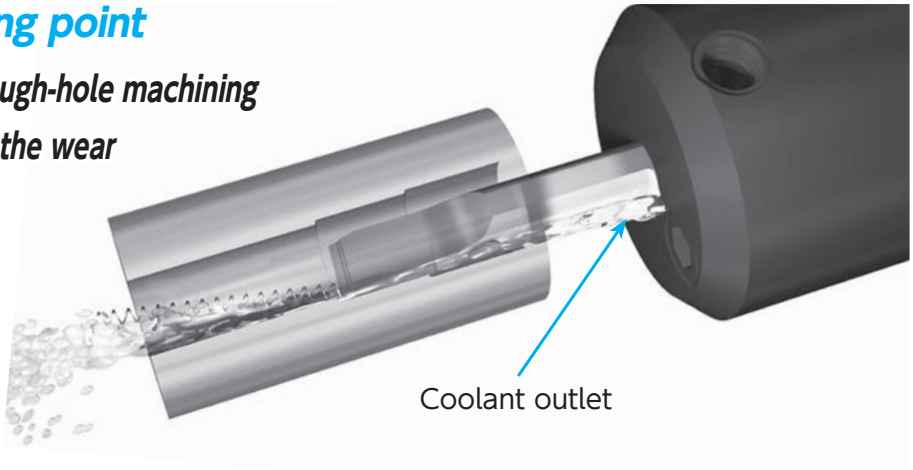
Internal coolant to back side of cutting point

- **Good chip evacuation in blind hole machining**



Internal coolant to cutting point

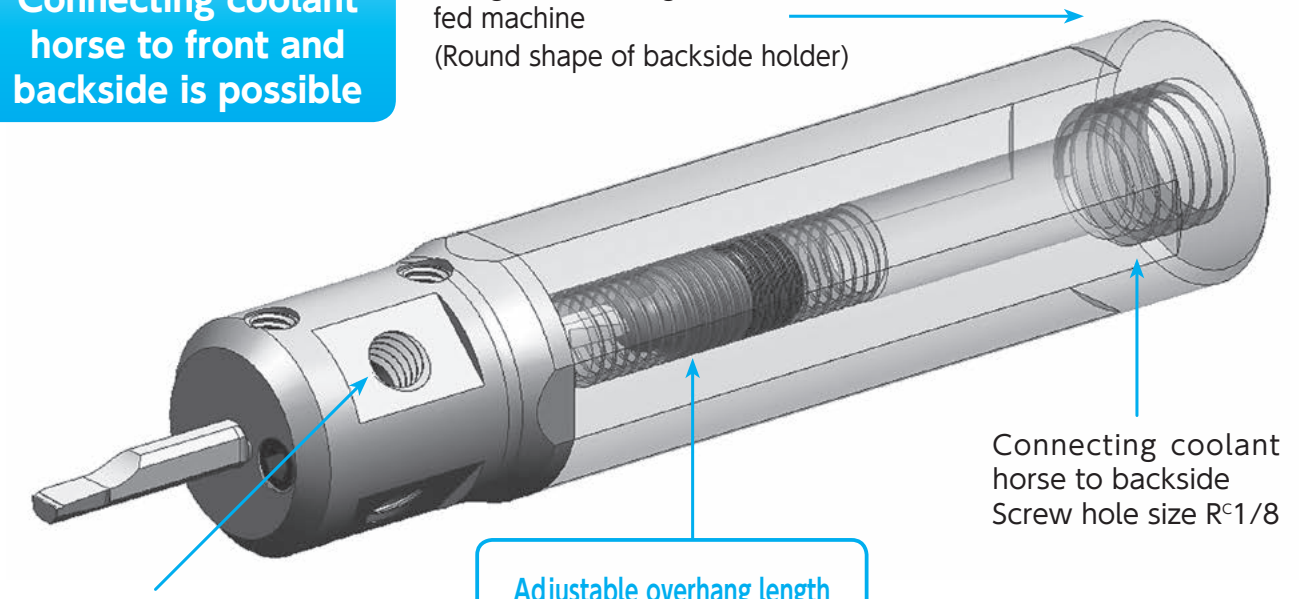
- **Good chip evacuation in through-hole machining**
- **Coolant to insert tip improve the wear resistance**



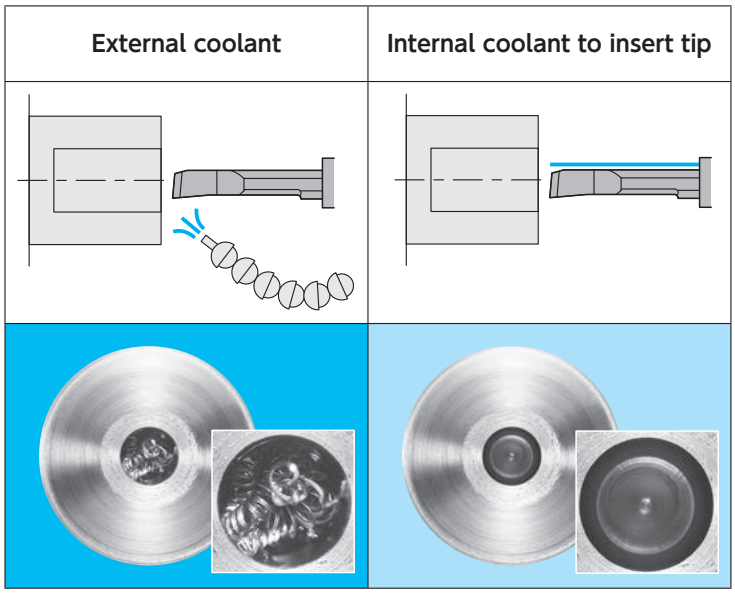
Structure

Connecting coolant horse to front and backside is possible

Designed for using with coolant fed machine
(Round shape of backside holder)



Machined work piece comparison

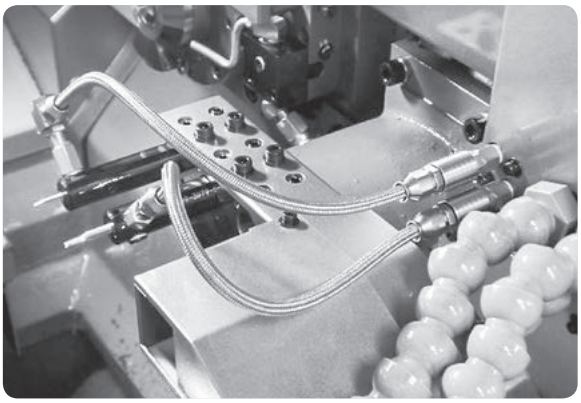


Chip clogging　　No chip clogging

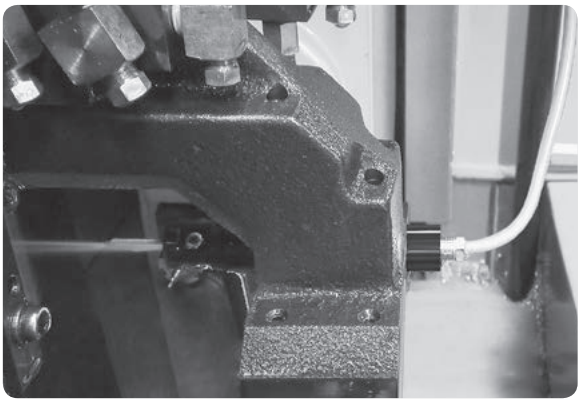
Work material : SCM435
Insert : SHFS040R005S
Cutting speed : v_c=50m/min
D.O.C. : a_p=0.2
Feed : f =0.02mm /rev
Hole depth : 15mm
Pilot hole : ϕ5.1×28L
Coolant pressure : 5MPa

Picture for jointing coolant horse

Frontside jointed



Backside jointed



STICK DUO sleeve (HY-NBH-OH type)

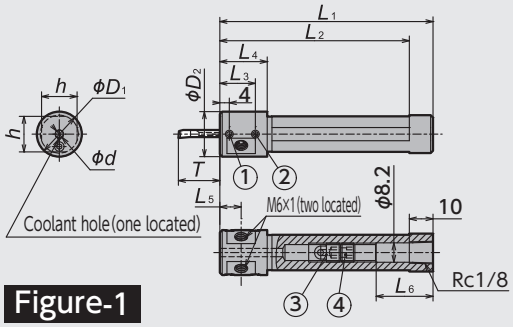


Figure-1

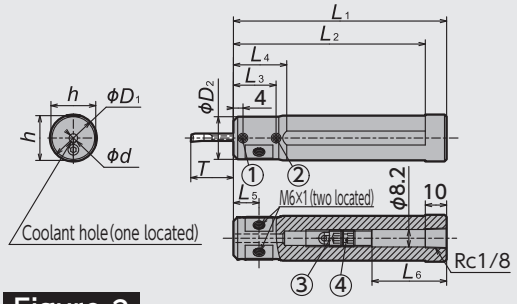
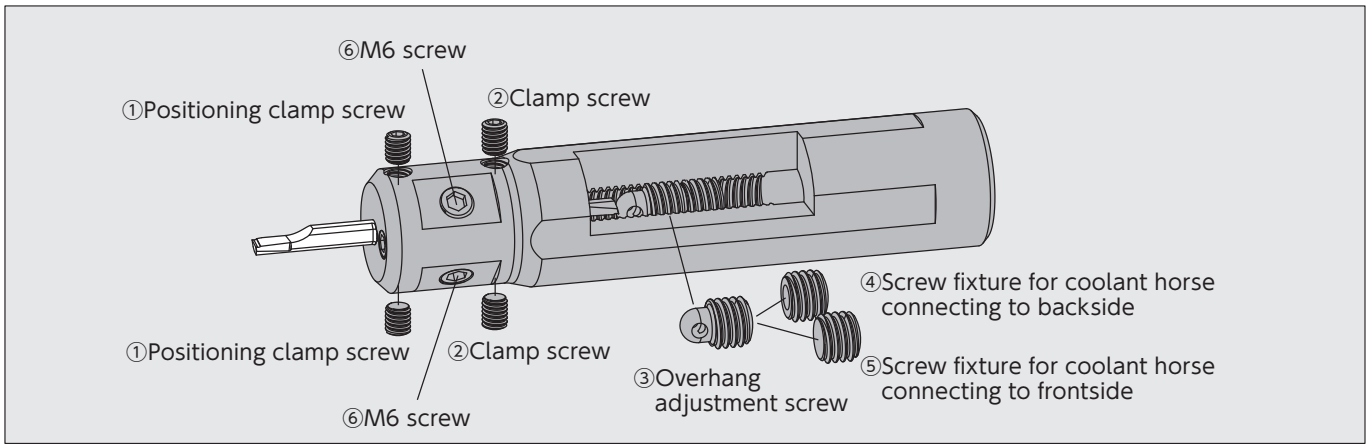


Figure-2

Shape	Code No.	Stock	Toolholder Part No.	Dimensions (mm)										overhang length of bar T (mm)	
				I.D. φd	φD1	φD2	h	L1	L2	L3	L4	L5	L6	Min.	Max.
Figure-1	5893011	●	HY-NBH02016G-OH	2	16	19	15	90	80	15	19	9.5	29	5	18
	5893029	●	02516G-OH	2.5									30	6.3	19.5
	5893037	●	03016G-OH	3									31	7.5	21
	5893045	●	03516G-OH	3.5									23	8.8	24.5
	5893052	●	04016G-OH	4						20	24	12	23	10	28
	5893060	●	05016G-OH	5									16	12.5	35
Figure-2	5893078	●	HY-NBH02019J-OH	2	19.05	19.05	18	110	100	15	—	9.5	49	5	18
	5893086	●	02519J-OH	2.5									50	6.3	19.5
	5893094	●	03019J-OH	3									51	7.5	21
	5893102	●	03519J-OH	3.5									43	8.8	24.5
	5893136	●	04019J-OH	4						20		12	43	10	28
	5893144	●	05019J-OH	5									36	12.5	35
	5893151	●	HY-NBH02020J-OH	2	20	20	19	110	100	15	—	9.5	49	5	18
	5893169	●	02520J-OH	2.5									50	6.3	19.5
	5893177	●	03020J-OH	3									51	7.5	21
	5893185	●	03520J-OH	3.5									43	8.8	24.5
	5893193	●	04020J-OH	4						20		12	43	10	28
	5893201	●	05020J-OH	5									36	12.5	35
	5893219	●	HY-NBH02022X-OH	2	22	20	21	120	110	15	25	9.5	59	5	18
	5893227	●	02522X-OH	2.5									60	6.3	19.5
	5893235	●	03022X-OH	3									61	7.5	21
	5893243	●	03522X-OH	3.5									53	8.8	24.5
	5893250	●	04022X-OH	4						20		12	53	10	28
	5893268	●	05022X-OH	5									46	12.5	35
	5893276	●	HY-NBH02025.0K-OH	2	25.0	20	24	125	115	15	25	9.5	64	5	18
	5893284	●	02525.0K-OH	2.5									65	6.3	19.5
	5893292	●	03025.0K-OH	3									66	7.5	21
	5893300	●	03525.0K-OH	3.5									58	8.8	24.5
	5893318	●	04025.0K-OH	4						20		12	58	10	28
	5893326	●	05025.0K-OH	5									51	12.5	35
	5893334	●	HY-NBH02025.4K-OH	2	25.4	20	24	125	115	15	25	9.5	64	5	18
	5893367	●	02525.4K-OH	2.5									65	6.3	19.5
	5893375	●	03025.4K-OH	3									66	7.5	21
	5893383	●	03525.4K-OH	3.5									58	8.8	24.5
	5893391	●	04025.4K-OH	4						20		12	58	10	28
	5893409	●	05025.4K-OH	5									51	12.5	35

Dimension "T" show overhang length of STICKDUO(hyper) bar when attached to sleeve with adjustment screw ③,④.

■Parts



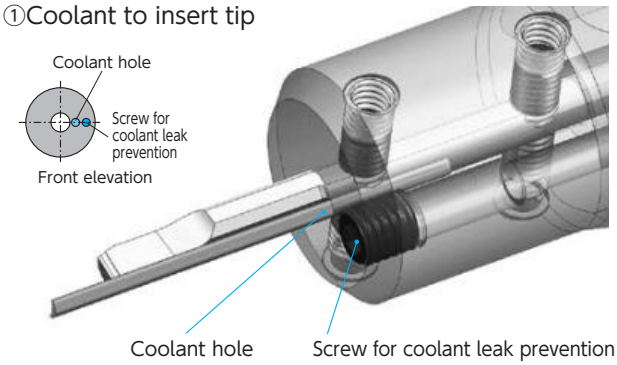
Toolholder Part No.	Clamping screw		Overhang Adjustment			M6 screw	Wrench		
	①	②	③	④※1	⑤※2	⑥	①、②	③、④、⑤	⑥
HY-NBH 020○○-OH	SS04045FS	SS0406F	SS0811R-OH	SS0806F-OH (Through hole)	SS0806F	SS0606SC	LW-2	LW-4*104	LW-3
025○○-OH									
030○○-OH									
035○○-OH									
040○○-OH									
050○○-OH									

※1 Select screw ④ to connect coolant hores to backside
※2 Select screw ⑤ to connect coolant hores to frontside

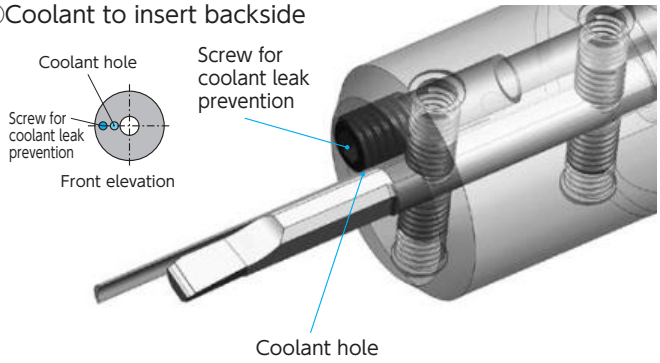
■How to set bar in the sleeve when intrenal coolant to insert tip or to insert backside

By rotating sleeve up side down, you can select the coolant output position
Coolant hole located in the side of screw for coolant leak prevention. See the following about the details.

①Coolant to insert tip

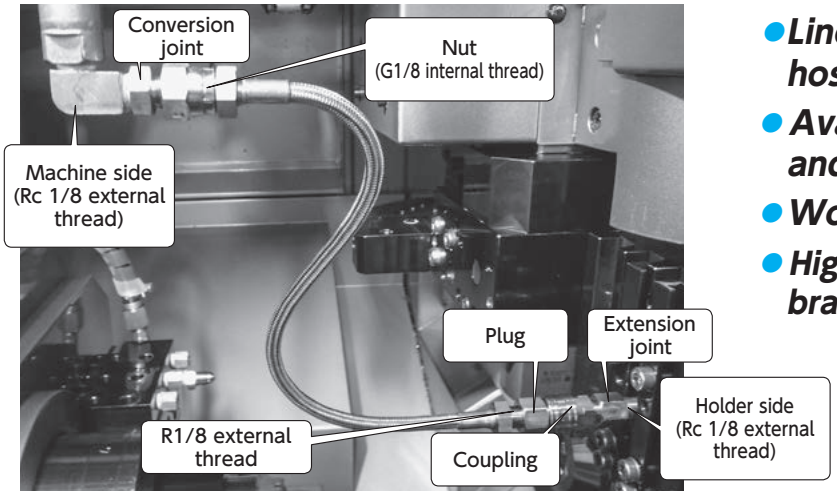


②Coolant to insert backside



Coolant Components

Coolant hose for connecting with R1/8



Ex. of connecting ①

- ***Line up wide range of coolant hose length***
- ***Available for 2 types of coupling and conversion joint***
- ***Working pressure MAX. 20.6 MPa***
- ***High quality flexible stainless steel braided hose***

Ex. of connecting ①

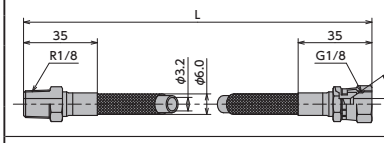
Parts	P/N
Conversion joint	**JOINT-ST-R1/8**
Hose	**HOSE-R1/8-CN-400**
Plug	**PLUG-RC1/8**
Coupling	**COUP-R1/8**
Extension joint	**SCJ-R1/8-RC1/8-L**

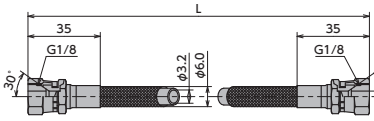
Chart for connecting coolant components

	Coupling	Joint	Hose
Connect to Holder or Machine	①Case: Use "HOSE-R1/8-CN" for connecting hose Coupling: R1/8 **COUP-R1/8** Rc1/8 internal thread: Plug **PLUG-RC1/8**		R1/8 external thread / Nut type G1/8 internal thread R1/8 — G1/8 internal thread (30°) **① HOSE-R1/8-CN**
Connect to Holder or Machine	②Case: Use "HOSE-CN-CN" for connecting hose Coupling: R1/8 **COUP-R1/8** Rc1/8 internal thread: Plug **PLUG-RC1/8**	G1/8 external thread (30°) R1/8 **JOINT-ST-R1/8** G1/8 external thread (30°) R1/8 **JOINT-AN-R1/8**	R1/8 external thread / Nut type G1/8 internal thread G1/8 internal thread (30°) **② HOSE-CN-CN**

Hose

Shape	Code No.	P/N	Dimensions (mm) L	Working pressure MAX. (MPa)	Working pressure MIN. (mm)
① R1/8 External thread + nut: G1/8 intrenal thread	5923255	**HOSE-R1/8-CN-200**	200	20.6	50
	5923263	**HOSE-R1/8-CN-250**	250		
	5923297	**HOSE-R1/8-CN-300**	300		
	5923305	**HOSE-R1/8-CN-400**	400		
	5923313	**HOSE-R1/8-CN-500**	500		
	5923321	**HOSE-R1/8-CN-800**	800		
② Both side: nut G1/8 intrenal thread	5923339	**HOSE-CN-CN-200**	200		
	5923347	**HOSE-CN-CN-250**	250		
	5923354	**HOSE-CN-CN-300**	300		
	5923388	**HOSE-CN-CN-400**	400		
	5923396	**HOSE-CN-CN-500**	500		
	5923304	**HOSE-CN-CN-800**	800		

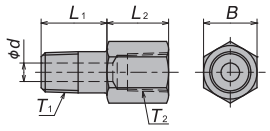
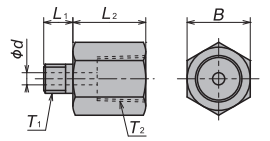




R1/8 External thread
Fix by rotating hose

Nut G1/8 internal thread
Fix by rotating nut
(No need to rotate hose)

Conversion / Extension Joint

	Code No.	Stock	Spare parts	Dimensions (mm)					
					T_2	L_1※1	L_2	B	d
	5891049	●	**SCJ-R1/8-M10-L**	R1/8 (PT1/8)	M10×1	16	12	13	4.5
	5891056	●	**1/8-RC1/8-L**		Rc1/8 (PT1/8)		15		
	5891064	●	**1/8-NPT1/8-L**		NPT1/8				
	5892906	●	**SCJ-M6-M10**	M6×1	M10×1	6	15	12	2.5
	5892914	●	**SCJ-M6-RC1/8**		Rc1/8 (PT1/8)			13	
	5892922	●	**SCJ-M6-NPT1/8**		NPT1/8				
	5892948	●	**SCJ-R1/8-M10**	R1/8 (PT1/8)	M10×1	10		12	4.5
	5892963	●	**SCJ-R1/8-NPT1/8**		NPT1/8			13	

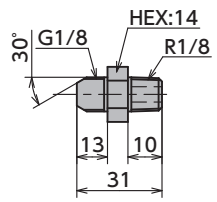
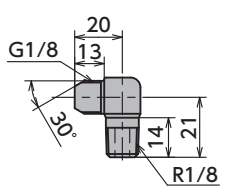
※1 To prevent hitting the coolant connecting part of holder from the gang tool post, "L1" dimension length is set longer.
NPT: ANSI/ASME B.1.20…1-1983(National Taper Pipe)

Joint	Coupling	
G1/8 external thread (30˚) R1/8 **JOINT-ST-R1/8** G1/8 external thread (30˚) R1/8 **JOINT-AN-R1/8**	Rc1/8 internal thread Plug **PLUG-RC1/8** Coupling R1/8 **COUP-R1/8**	Connect to Holder or Machine
G1/8 external thread (30˚) R1/8 **JOINT-ST-R1/8** G1/8 external thread (30˚) R1/8 **JOINT-AN-R1/8**	Rc1/8 internal thread Plug **PLUG-RC1/8** Coupling R1/8 **COUP-R1/8**	Connect to Holder or Machine

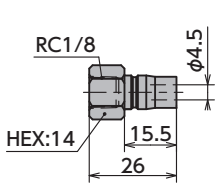
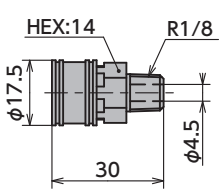
Suitable use of Coupling and Joint

- Detach Hose frequently
  ⇒ Coupling is suitable
- Less detach Hose
  ⇒ Joint is suitable

■Conversion joint (nut G1/8 internal thread)

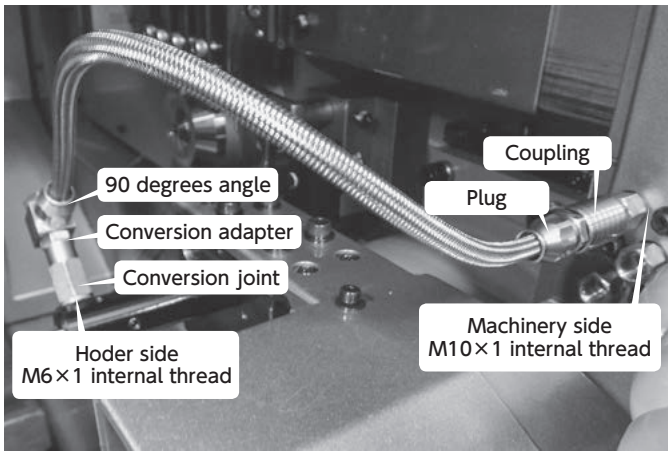
Parts	Straight style	L style
P/N	**JOINT-ST-R1/8**	**JOINT-AN-R1/8**
Code No.	5918966	5923412
Working pressure MAX.(MPa)	20.6	20.6
Shape		

■Coupling

Parts	Plug	Coupling
P/N	**PLUG-RC1/8**	**COUP-R1/8**
Code No.	5915491	5915517
Working pressure MAX.(MPa)	7.5	7.5
Shape		

Coolant Components

Coolant hose by HEB for connecting M10×1, M8×1, G1/8



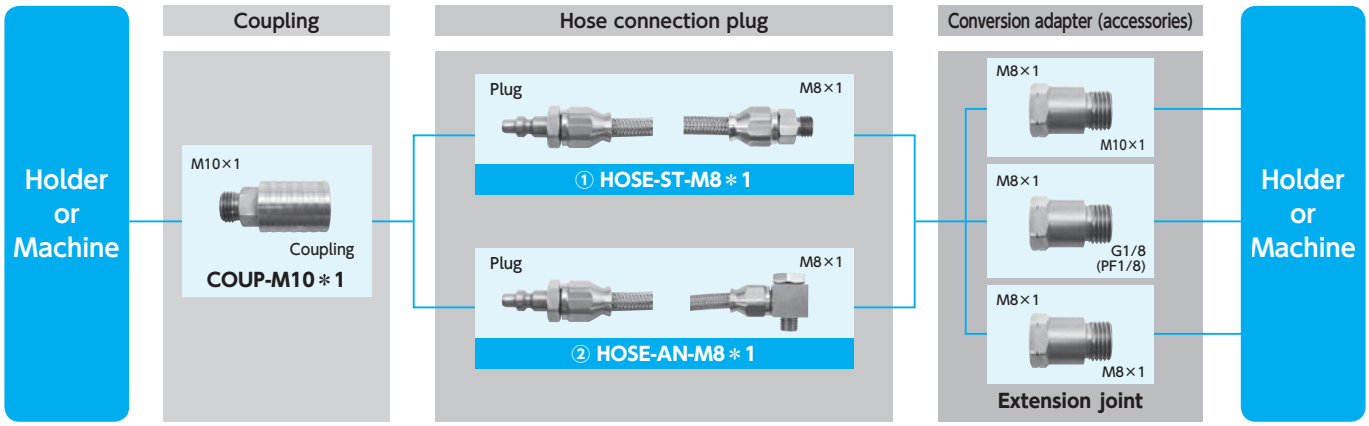
Ex. of connecting

- ***Hos length 300mm***
- ***Coupling by HEB***
- ***Working pressure MAX. 20MPa***

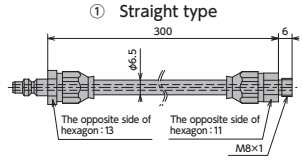
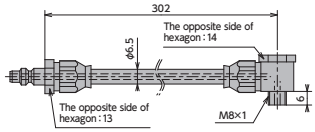
Ex. of connecting

Parts	P/N
Coupling	**COUP-M10＊1**
Hose	**HOSE-AN-M8＊1**
Conversion adapter	**M8×1-M10×1**
Conversion joint	**SCJ-M6-M10**

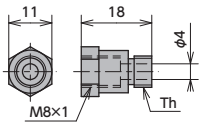
■Ex. of coolant hose connection



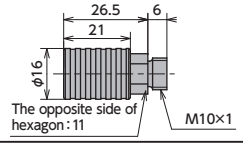
■Horse set with plug

Shape	Code No.	Part No.	Adapter (Th) ①	Adapter (Th) ②	Adapter (Th) ③	Working pressure MAX. (MPa)
① Straight type 	5894290	**HOSE-ST-M8＊1**	M10×1	G1/8 (PF1/8)	—	20
② 90 degrees angle type 	5894282	**HOSE-AN-M8＊1**	M10×1	G1/8 (PF1/8)	M8×1	

■Conversion Adapter (Accessories of Hose Set)

Shape	

■Coupling

Parts	Coupling
Part No.	**COUP-M10＊1**
Code No.	5894308
Shape	

MEMO

For inside boring

STICK DUO® released!!

Hyper

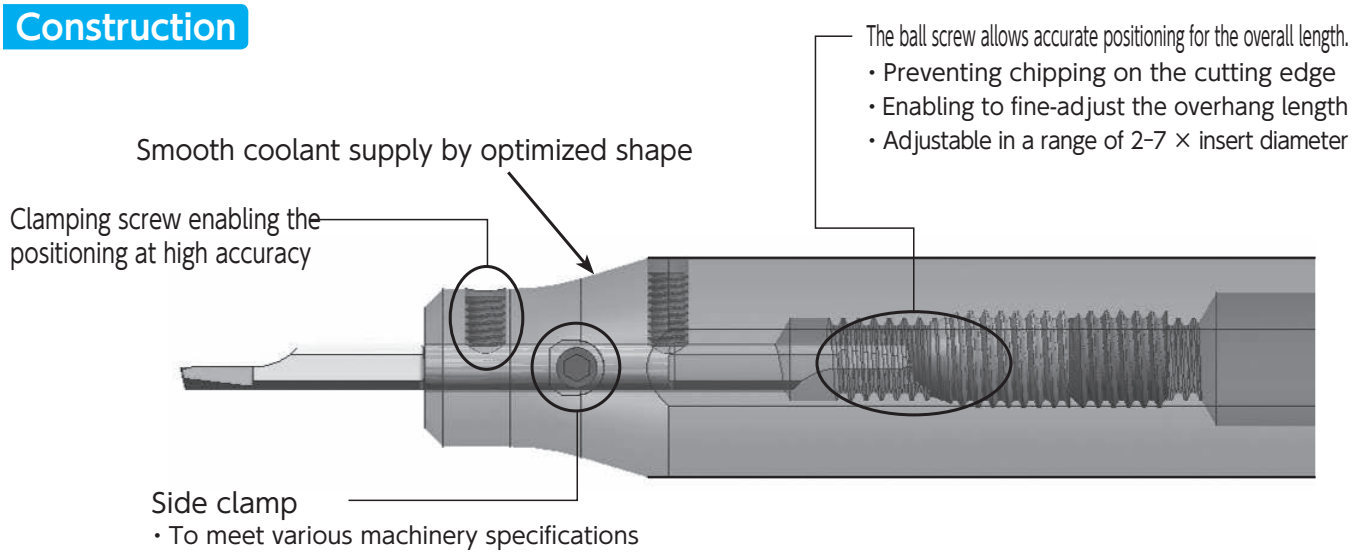
Higher precision than STICK DUO series with accurate overall length positioning !!

Features

- *Offers high precision while maintaining compatibility with STICK DUO series*
- *For the first time in the industry, the new series offers accurate positioning for the overall length of a 2-cornered solid bar type※*
- *A high precision sleeve that offers excellent repeatability under clamping*
- *Hangover length is easily adjusted via a precision ball screw*
- *A new ultra Z-coated "TM4" grade is available*

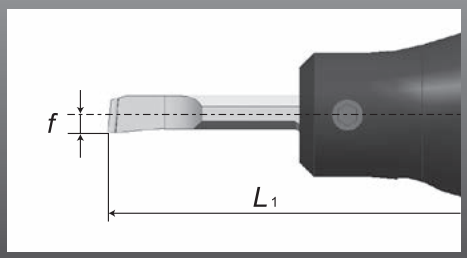
※Based on our research

Construction

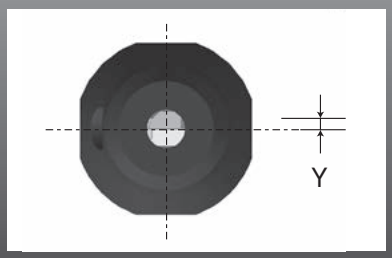


Precision of the boring bars range has been further improved !

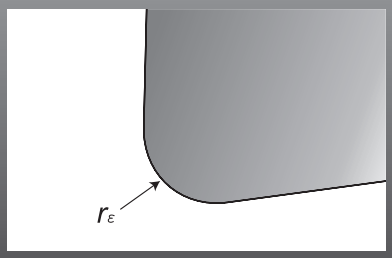
Dimensional tolerances



Offset f : ±0.015mm
Overall length L_1 : ±0.02mm



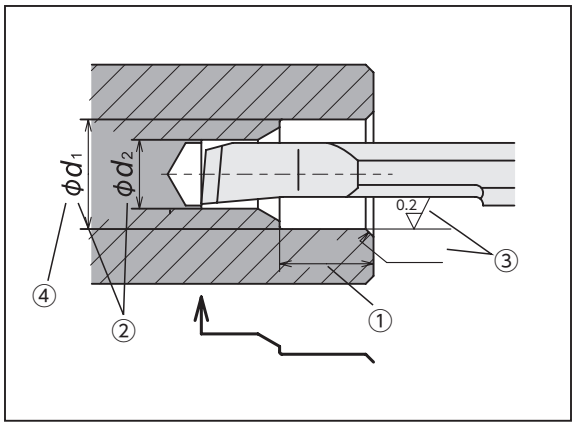
Center heightY : +0.05/0mm



Nose R : ±0.015mm

Application example

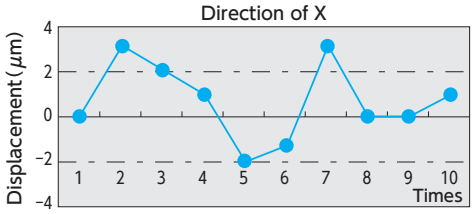
Work piece example

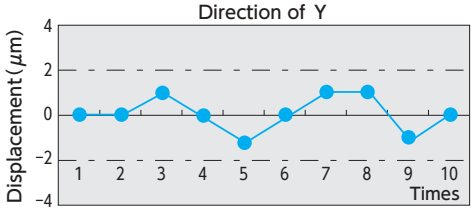


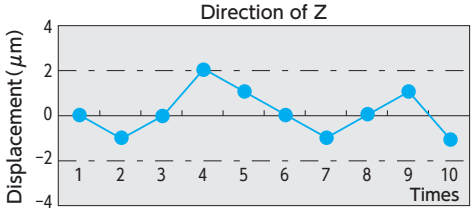
When replacing the insert

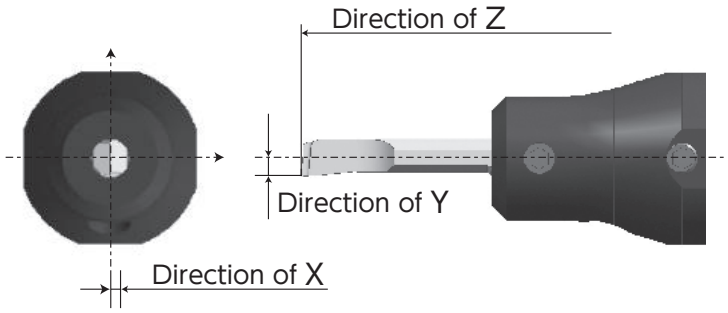
	Check for :
①The machinined depth is unstable ※Face machining included.	Overall length
②The bored diameters (φd1, d2) are not stable at the staged part	Center height
③Unstable surface roughness Unstable chamfering dimension ※Tapering.	Nose Radius
④Bored diameters not stable	Offset

Repeat accuracy









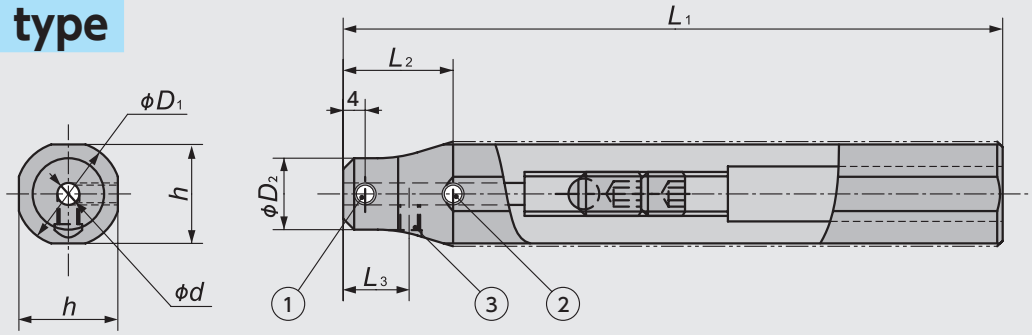
Excellent mounting accuracy leads to high precision machining !

For inside boring

STICK DUO® Hyper

Shank diameter : ϕ16 ~ 25.4

HY-NBH type



Holder dimensions

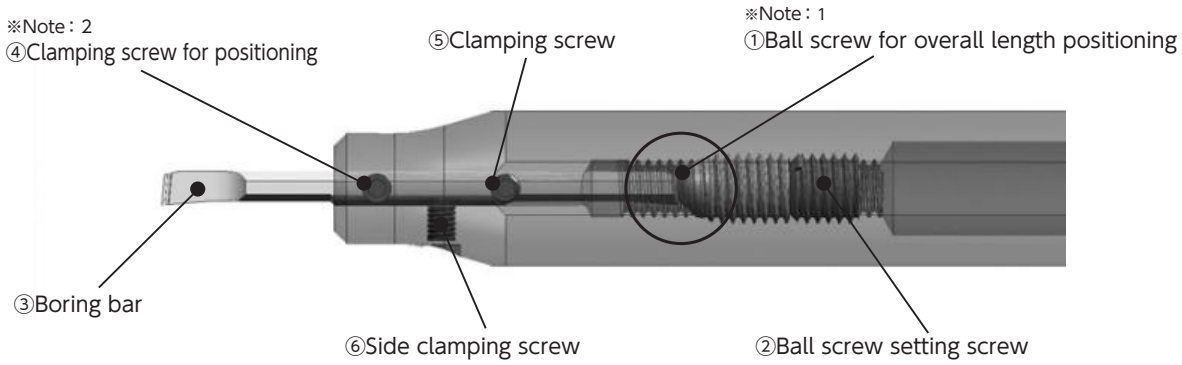
Code No.	Toolholder Part No.	Stock	Dimensions (mm)							Clamping screw		
			ϕd	ϕD_1	ϕD_2	h	L_1	L_2	L_3	①	②	③
5709894	**HY-NBH02016H**	●	2.0	16	11	15	100	15	9.5	SS04045FS	SS0406F	SS0404F
5709902	**02516H**	●	2.5		11.5							
5709910	**03016H**	●	3.0		12							
5709936	**03516H**	●	3.5		12.5			20	12		SS0404F	
5709944	**04016H**	●	4.0		13							
5709951	**05016H**	●	5.0		14							
5709969	**HY-NBH02019K**	●	2.0	19.05	11	18	125	15	9.5	SS04045FS	SS0406F	SS0404F
5709977	**02519K**	●	2.5		11.5							
5709985	**03019K**	●	3.0		12							
5709993	**03519K**	●	3.5		12.5			20	12			
5710009	**04019K**	●	4.0		13							
5710017	**05019K**	●	5.0		14							
5712708	**HY-NBH02020K**	●	2.0	20	11	19	125	15	9.5	SS04045FS	SS0406F	SS0404F
5712716	**02520K**	●	2.5		11.5							
5712724	**03020K**	●	3.0		12							
5712740	**03520K**	●	3.5		12.5			20	12			
5712757	**04020K**	●	4.0		13							
5712765	**05020K**	●	5.0		14							
5712773	**HY-NBH02022K**	●	2.0	22	11	21	125	15	9.5	SS04045FS	SS0406F	SS0404F
5712799	**02522K**	●	2.5		11.5							
5712831	**03022K**	●	3.0		12							
5712856	**03522K**	●	3.5		12.5			20	12			
5712872	**04022K**	●	4.0		13							
5712914	**05022K**	●	5.0		14							
5712732	**HY-NBH02025K-MET**	●	2.0	25	11	24	125	15	9.5	SS04045FS	SS0406F	SS0404F
5712823	**02525K-MET**	●	2.5		11.5							
5712849	**03025K-MET**	●	3.0		12							
5712864	**03525K-MET**	●	3.5		12.5			20	12			
5712898	**04025K-MET**	●	4.0		13							
5712922	**05025K-MET**	●	5.0		14							
5713003	**HY-NBH02025K**	●	2.0	25.4	11	24	125	15	9.5	SS04045FS	SS0406F	SS0404F
5713029	**02525K**	●	2.5		11.5							
5713045	**03025K**	●	3.0		12							
5713060	**03525K**	●	3.5		12.5			20	12			
5713086	**04025K**	●	4.0		13							
5713102	**05025K**	●	5.0		14							

Parts

Name	P/N	Width between two facing sides of the hexagonal hole
Ball screw for overall length positioning	**SS0812R**	**4.0**
Screw for setting the ball screw	**SS0808F**	**4.0**
Wrench for clamping screw	**LW-2**	—

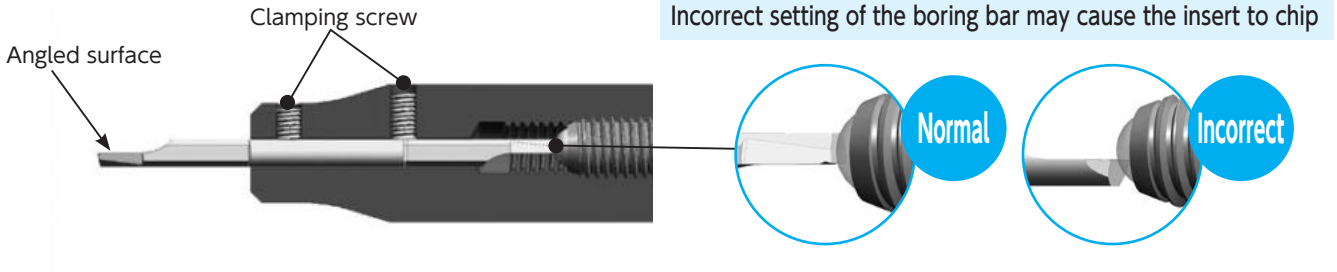
Precautions for use

●Procedure for clamping the boring bar



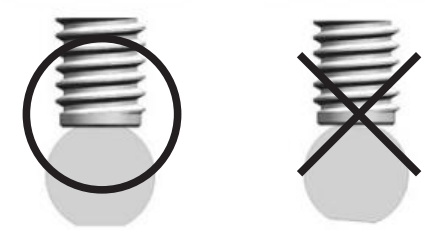
- Step(1) Slide the ball screw to position to determine the overall length.
- Step(2) Slide the ball screw setting screw into postion.
- Step(3) Insert the boring bar.

※Note1：As shown in the illustrations below, make the angled surface of the boring bar parallel with the end surfaces of the clamping screws before inserting the bar.



- Step(4) Clamp the bar with the clamping screw for positioning. ▶Recommended clamping force: 2.0 Nm

※Note2：Be careful that the bottom surface of the clamping screw is located and fits against the flat surface of the boring bar without causing the bar to tilt.



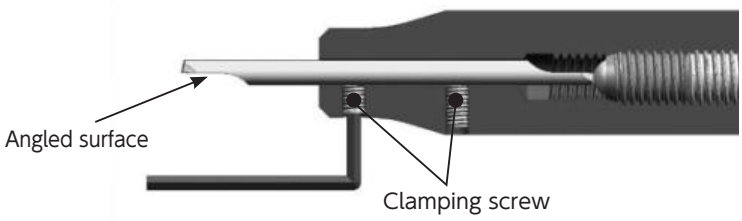
A boring bar clamped in a slant position may make the center height and offset dimension unstable.

- Step(5) Clamp the bar with the clamping screw. ▶Recommended clamping force: 2.0 Nm
- Step(6) If the clamping screws described in steps (4) and (5) cannot be used due to your tooling layout, it is possible to use the boring bar for by just clamping with the side clamping screw.

Once the overall length has been correctly calibrated for the initial cut, only steps (3) to (5) need be repeated.

●Precaution for use in the opposite direction

※As described in *Note 1 above, make the angled surface of the boring bar parallel with the end surfaces of the clamping screws before inserting the bar.

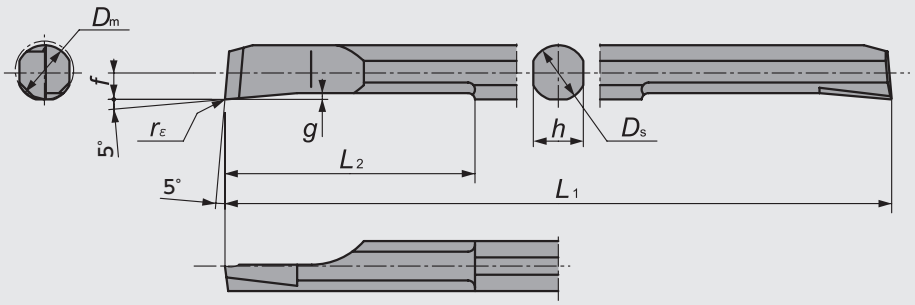


For inside boring

STICK DUO® Hyper

Minimum machining diameter : ϕ2.2 ~ 5.2

SHFS-S type



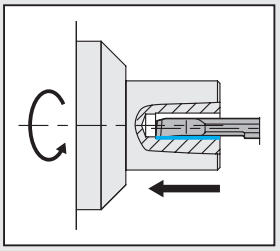
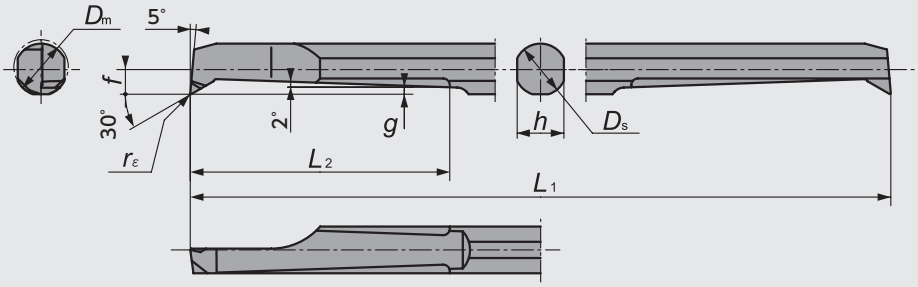


Figure-1

SHFB-F type



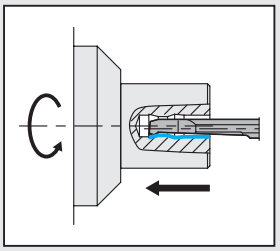
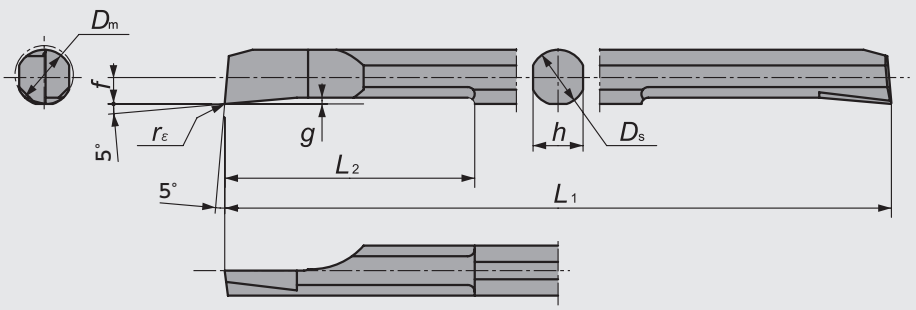


Figure-2

SHFS-H type

Mirror finish



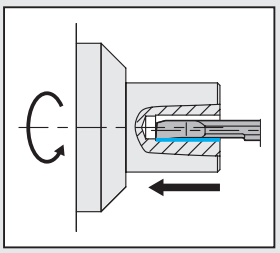


Figure-3

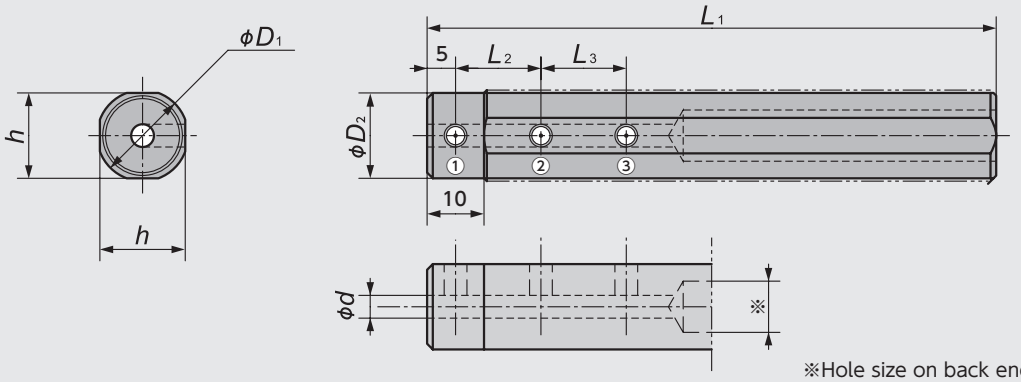
Shape	Part No.	Min. machining dia. (mm) D_m	Dimensions (mm)								PVD-coated micro grain carbide	
			D_s	L_1	L_2	f	h	g	r_ε	Chipbreaker	TM4	Stock
Figure-1	SHFS020R005S	2.2	2	50	10	0.9	1.8	0.25	0.05	Provided	5709548	●
	025R005S	2.7	2.5	50	12.5	1.15	2.3	0.30	0.05		5709563	●
	025R015S								0.15		5709571	●
	030R005S	3.2	3	50	15	1.4	2.7	0.40	0.05		5709589	●
	030R015S								0.15		5709597	●
	035R005S	3.7	3.5	60	17.5	1.65	3.2	0.40	0.05		5709605	●
	035R015S								0.15		5709613	●
	040R005S	4.2	4	60	20	1.9	3.6	0.45	0.05		5709621	●
	040R015S								0.15		5709639	●
	050R005S	5.2	5	70	25	2.4	4.5	0.50	0.05		5709647	●
	050R015S								0.15		5709654	●
Figure-2	SHFB020R005F	2.2	2	50	8	0.95	1.8	0.25	0.05	Provided	5709779	●
	025R005F	2.7	2.5	50	12.5	1.2	2.3	0.30	0.05		5709787	●
	025R015F								0.15		5709795	●
	030R005F	3.2	3	50	15	1.4	2.7	0.45	0.05		5709803	●
	030R015F								0.15		5709811	●
	035R005F	3.7	3.5	60	17.5	1.65	3.2	0.50	0.05		5709829	●
	035R015F								0.15		5709837	●
	040R005F	4.2	4	60	20	1.9	3.6	0.50	0.05		5709845	●
	040R015F								0.15		5709852	●
	050R005F	5.2	5	70	25	2.4	4.5	0.70	0.05		5709860	●
	050R015F								0.15		5709878	●
Figure-3	SHFS020R005H	2.2	2	50	10	0.9	1.8	0.25	0.05	None	5709662	●
	025R005H	2.7	2.5	50	12.5	1.15	2.3	0.30	0.05		5709670	●
	025R015H								0.15		5709688	●
	030R005H	3.2	3	50	15	1.4	2.7	0.40	0.05		5709696	●
	030R015H								0.15		5709704	●
	035R005H	3.7	3.5	60	17.5	1.65	3.2	0.40	0.05		5709712	●
	035R015H								0.15		5709720	●
	040R005H	4.2	4	60	20	1.9	3.6	0.45	0.05		5709738	●
	040R015H								0.15		5709746	●
	050R005H	5.2	5	70	25	2.4	4.5	0.50	0.05		5709753	●
	050R015H								0.15		5709761	●

For inside boring

STICK DUO®

Shank diameter : ϕ15.875 ~ 19.05

NBH type



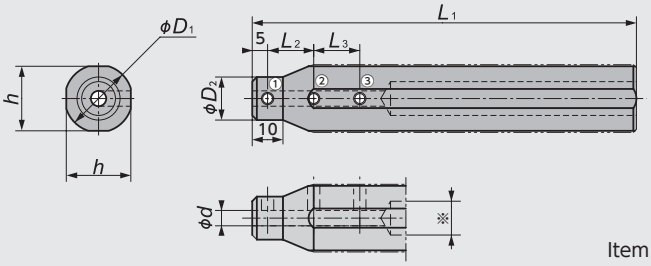
※Hole size on back end of the holder
Item number 'NBH...15H/16H' : ϕ9
Item number 'NBH...19K ~ 25K(MET)' : ϕ11

Holder dimensions

Code No.	Toolholder Part No.	Stock	Dimensions (mm)							Clamping screw			Wrench
			ϕd_1	ϕD_1	ϕD_2	h	L_1	L_2	L_3	①	②	③	
5631403	**NBH02015H**	●	2.0	15.875	15	15	100	10	—	SS0406F	SS0406F	—	LW-2
5702915	**02515H**	●	2.5										
5631411	**03015H**	●	3.0						10	SS0404F	SS0404F	SS0404F	
5586110	**03515H**	●	3.5										
5586128	**04015H**	●	4.0					15	15				
5585997	**04515H**	●	4.5										
5585989	**05015H**	●	5.0										
5585971	**06015H**	●	6.0					20	20				
5585963	**08015H**	●	8.0							SS0403F	SS0403F	SS0403F	
5631429	**NBH02016H**	●	2.0	16	15	15	100	10	—	SS0406F	SS0406F	—	LW-2
5702899	**02516H**	●	2.5										
5631437	**03016H**	●	3.0						10	SS0404F	SS0404F	SS0404F	
5586102	**03516H**	●	3.5										
5586094	**04016H**	●	4.0					15	15				
5586086	**04516H**	●	4.5										
5586078	**05016H**	●	5.0										
5586060	**06016H**	●	6.0					20	20				
5774195	**07016H**	●	7.0							SS0403F			
5586052	**08016H**	●	8.0								SS0403F	SS0403F	
5631445	**NBH02019K**	●	2.0	19.05	18	18	125	10	—	SS0408F	SS0408F	—	LW-2
5702907	**02519K**	●	2.5										
5631452	**03019K**	●	3.0						10	SS0406F	SS0406F	SS0406F	
5586045	**03519K**	●	3.5										
5586037	**04019K**	●	4.0					15	15				
5586029	**04519K**	●	4.5										
5586011	**05019K**	●	5.0										
5586003	**06019K**	●	6.0					20	20				
5774203	**07019K**	●	7.0							SS0404F	SS0404F	SS0404F	
5586227	**08019K**	●	8.0										
5586219	**10019K**	●	10.0							SS0403F			

Shank diameter : ϕ20 ~ 25.4

NBH type



※Hole size on back end of the holder
Item number 'NBH...15H/16H' : ϕ9
Item number 'NBH...19K ~ 25K(MET)' : ϕ11

Holder dimensions

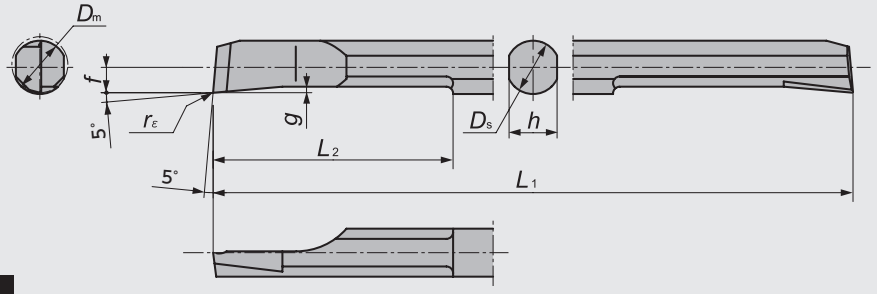
Code No.	Toolholder Part No.	Stock	Dimensions (mm)							Clamping screw			Wrench
			ϕd	ϕD_1	ϕD_2	h	L_1	L_2	L_3	①	②	③	
5631460	**NBH02020K**	●	2.0	20	11	19	125	10	—	SS0404F	SS0404F	—	LW-2
5702881	**02520K**	●	2.5										
5631478	**03020K**	●	3.0		12				10			SS0406F	
5586201	**03520K**	●	3.5										
5586185	**04020K**	●	4.0		13			15	15		SS0406F		
5586177	**04520K**	●	4.5										
5586169	**05020K**	●	5.0		14								
5586151	**06020K**	●	6.0		15			20	20		SS0404F	SS0404F	
5774211	**07020K**	●	7.0		16								
5586144	**08020K**	●	8.0		17								
5586136	**10020K**	●	10.0		19								
5914742	**12020K**	★	12.0					25	25	SS0403F	SS0403F	SS0403F	
5631486	**NBH02022K**	●	2.0	22	11	21	125	10	—	SS0404F	SS0406F	—	LW-2
5702873	**02522K**	●	2.5										
5631494	**03022K**	●	3.0		12				10			SS0408F	
5586326	**03522K**	●	3.5										
5586318	**04022K**	●	4.0		13			15	15			SS0406F	
5586300	**04522K**	●	4.5										
5586292	**05022K**	●	5.0		14								
5586284	**06022K**	●	6.0		15			20	20				
5774229	**07022K**	●	7.0		16								
5586276	**08022K**	●	8.0		17								
5586268	**10022K**	●	10.0		19						SS0404F	SS0404F	
5631502	**12022K**	●	12.0		21			25	25				
5631510	**NBH02023K**	●	2.0	23	11	21	125	10	—	SS0404F	SS0406F	—	LW-2
5702857	**02523K**	●	2.5										
5631528	**03023K**	●	3.0		12				10			SS0408F	
5586250	**03523K**	●	3.5										
5651336	**04023K**	●	4.0		13			15	15			SS0406F	
5586243	**04523K**	●	4.5										
5631536	**05023K**	●	5.0		14								
5631544	**06023K**	●	6.0		15			20	20				
5631551	**08023K**	●	8.0		17								
5631569	**10023K**	●	10.0		19						SS0404F	SS0404F	
5631577	**12023K**	●	12.0		21			25	25				
5631585	**NBH02025K-MET**	●	2.0	25	11	24	125	10	—	SS0404F	SS0406F	—	LW-2
5704283	**02525K-MET**	●	2.5										
5631593	**03025K-MET**	●	3.0		12				10			SS0408F	
5631601	**03525K-MET**	●	3.5										
5651328	**04025K-MET**	●	4.0		13			15	15		SS0408F		
5631619	**04525K-MET**	●	4.5										
5631627	**05025K-MET**	●	5.0		14								
5631635	**06025K-MET**	●	6.0		15			20	20				
5774252	**07025K-MET**	●	7.0		16								
5631643	**08025K-MET**	●	8.0		17						SS0406F	SS0406F	
5631650	**10025K-MET**	●	10.0		19								
5631668	**12025K-MET**	●	12.0		21			25	25		SS0404F	SS0404F	
5631676	**NBH02025K**	●	2.0	25.4	11	24	125	10	—	SS0404F	SS0406F	—	LW-2
5702865	**02525K**	●	2.5										
5631684	**03025K**	●	3.0		12				10			SS0408F	
5586235	**03525K**	●	3.5										
5586383	**04025K**	●	4.0		13			15	15		SS0408F		
5586375	**04525K**	●	4.5										
5586367	**05025K**	●	5.0		14								
5586359	**06025K**	●	6.0		15			20	20				
5774260	**07025K**	●	7.0		16								
5586342	**08025K**	●	8.0		17						SS0406F	SS0406F	
5586334	**10025K**	●	10.0		19								
5631692	**12025K**	●	12.0		21			25	25		SS0404F	SS0404F	

For inside boring

STICK DUO®

Minimum machining diameter : ϕ2.2 ~ 8.2

SBFS-S type



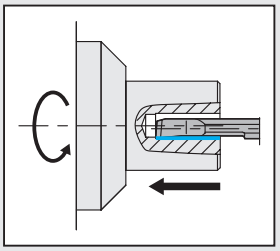
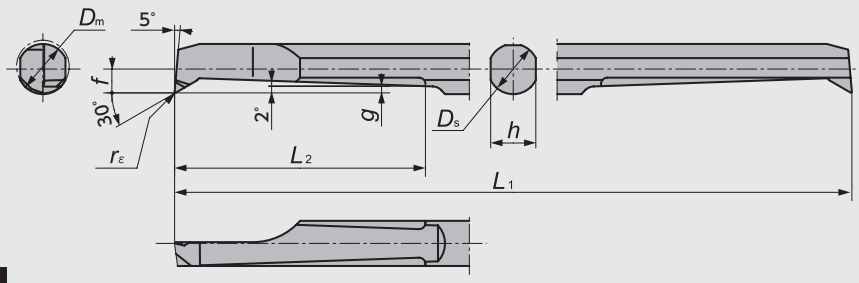


Figure-1

SBFB-F type



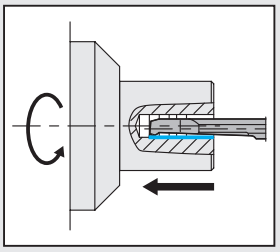
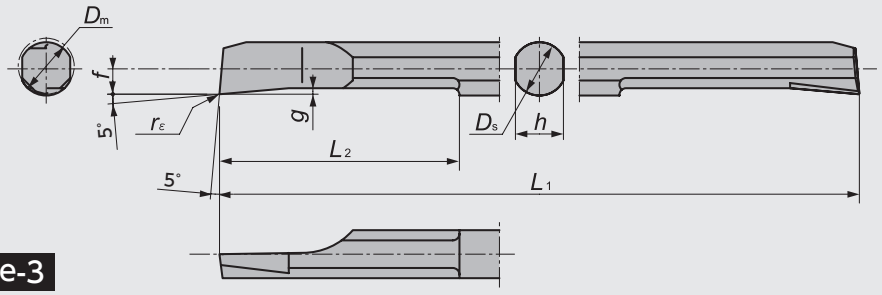


Figure-2

SBFS-H type

Mirror finish



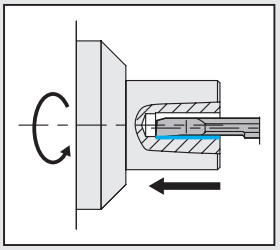


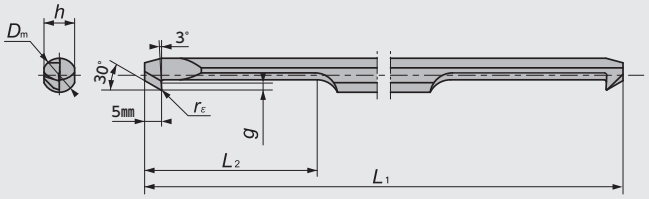
Figure-3

ID back turning　Minimum machining diameter ϕ3.0mm

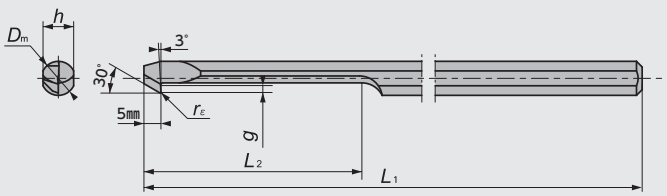
SBB type

NEW

Short type
2 cutting edges



Long type
1 cutting edge



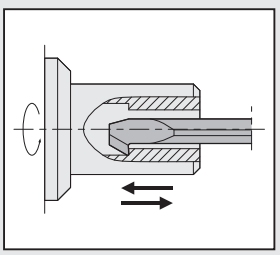


Figure-4

Shape	Part No.	Min. machining dia. (mm) D_m	Dimensions (mm) D_s	L_1	L_2	f	h	g	r_ε	Chipbreaker	PVD-coated micro grain carbide NEW DT4	Stock	ZM3	Stock
Figure-1	SBFS020R005S	2.2	2	50	10	0.9	1.8	0.25	0.05	Provided	5882907	●	5654975	●
	025R005S	2.7	2.5	50	12.5	1.15	2.3	0.30	0.05		5882881	●	5685995	●
	025R015S								0.15		5882873	●	5685987	●
	030R005S	3.2	3	50	15	1.4	2.7	0.40	0.05		5882865	●	5640891	●
	030R015S								0.15		5882857	●	5649165	●
	035R005S	3.7	3.5	60	17.5	1.65	3.2	0.40	0.05		5882840	●	5685888	●
	035R015S								0.15		5882832	●	5685979	●
	040R005S	4.2	4	60	20	1.9	3.6	0.45	0.05		5882824	●	5640867	●
	040R015S								0.15		5882816	●	5649140	●
	050R005S	5.2	5	70	25	2.4	4.5	0.50	0.05		5882808	●	5654983	●
	050R015S								0.15		5882790	●	5654991	●
	060R005S	6.2	6	80	30	2.9	5.4	0.60	0.05		5882782	●	5704861	●
	060R015S								0.15		5882766	●	5704853	●
Figure-2	SBFB020R005F	2.2	2	50	8	0.95	1.8	0.25	0.05	Provided	5882758	●	5658026	●
	025R005F	2.7	2.5	50	12.5	1.2	2.3	0.30	0.05		5882741	●	5685920	●
	025R015F								0.15		5882733	●	5685912	●
	030R005F	3.2	3	50	15	1.4	2.7	0.45	0.05		5882725	●	5640883	●
	030R015F								0.15		5882717	●	5649173	●
	035R005F	3.7	3.5	60	17.5	1.65	3.2	0.50	0.05		5882709	●	5685904	●
	035R015F								0.15		5882691	●	5685896	●
	040R005F	4.2	4	60	20	1.9	3.6	0.50	0.05		5882683	●	5640875	●
	040R015F								0.15		5882675	●	5649157	●
	050R005F	5.2	5	70	25	2.4	4.5	0.70	0.05		5882667	●	5655006	●
	050R015F								0.15		5882659	●	5655014	●
	060R005F	6.2	6	80	30	2.9	5.4	0.90	0.05		5882634	●	5704796	●
	060R015F								0.15		5882626	●	5704812	●
Figure-3	SBFS020R005H	2.2	2	50	10	0.9	1.8	0.25	0.05	None			5674866	●
	025R005H	2.7	2.5	50	12.5	1.15	2.3	0.30	0.05				5685961	●
	025R015H								0.15				5685953	●
	030R005H	3.2	3	50	15	1.4	2.7	0.40	0.05				5674874	●
	030R015H								0.15				5674882	●
	035R005H	3.7	3.5	60	17.5	1.65	3.2	0.40	0.05				5685946	●
	035R015H								0.15				5685938	●
	040R005H	4.2	4	60	20	1.9	3.6	0.45	0.05				5674890	●
	040R015H								0.15				5674908	●
	050R005H	5.2	5	70	25	2.4	4.5	0.50	0.05				5674924	●
	050R015H								0.15				5674940	●
	060R005H	6.2	6	80	30	2.9	5.4	0.60	0.05				5705207	●
	060R015H								0.15				5705199	●
	080R005H	8.2	8	80	30	3.9	7.3	0.80	0.05				5705850	●
	080R015H								0.15				5705843	●
Figure-4 Short Type	SBB030RB005-S	3.0	3	50	15	1.3	2.7	0.50	0.05	Provided			5917067	●
	030RB010-S								0.1				5917042	●
	040RB005-S	4.0	4	60	18	1.8	3.6	0.80	0.05				5917414	●
	040RB015-S								0.15				5917372	●
Figure-4 Long Type	SBB030RB005	3.0	3	50	19	1.3	2.7	0.50	0.05	Provided			5917059	●
	030RB010								0.1				5917034	●
	040RB005	4.0	4	60	24	1.8	3.6	0.80	0.05				5917380	●
	040RB015								0.15				5917364	●

For cutting conditions, please refer to page **L26**

Cutting conditions for STICK DUO

Boring

	General steel (Carbon steel and alloy steel)	Stainless steel (excluding SUS303)	Free cutting steel ((including SUS303)	Non ferrous metals (brass, aluminum, copper, etc.)
Cutting speed (m/min)	50 (30 ~ 70)	40 (30 ~ 60)	60 (30 ~ 80)	80 (50 ~ 100)
Feed rate (mm /rev)	0.03 (0.01 ~ 0.05)			

※For depths of cut : a_p : 0.05 ~ 0.2mm
※Please refer to **Q64 ~ 65** for detailed cutting parameters.

Grooving

			General steel (Carbon steel and alloy steel)	Stainless steel (excluding SUS303)	Free cutting steel ((including SUS303)	Non ferrous metals (brass, aluminum, copper, etc.)
Cutting speed (m/min)			40 (20 ~ 50)	40 (20 ~ 50)	50 (30 ~ 60)	60 (50 ~ 80)
Feed rate (mm /rev)	Groove width w (mm)	0.50	0.04 (0.01 ~ 0.06)			
		0.75	0.03 (0.01 ~ 0.05)			
		1.00	0.02 (0.01 ~ 0.04)			
		1.50	0.02 (0.01 ~ 0.04)			

Threading

Depth of cut guide for thread pitch at speed n(min $^{-1}$) between 600 and 1,500

Metric screw		Counts of cutting																				
Machining pitch (mm)	Total depth of cut (mm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
0.5	0.3	0.06	0.05	0.05	0.04	0.04	0.03	0.02	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—
0.7	0.43	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.03	0.02	0.01	—	—	—	—	—	—	—	—	—	—	—
0.75	0.46	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.02	0.01	—	—	—	—	—	—	—	—	—	—
0.8	0.49	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	—	—	—	—	—	—	—	—	—
1.0	0.62	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	—	—	—	—	—	—	—
1.25	0.76	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.02	0.01	—	—	—	—	—	—
1.5	0.92	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.01	—	—	—
1.75	1.09	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.01

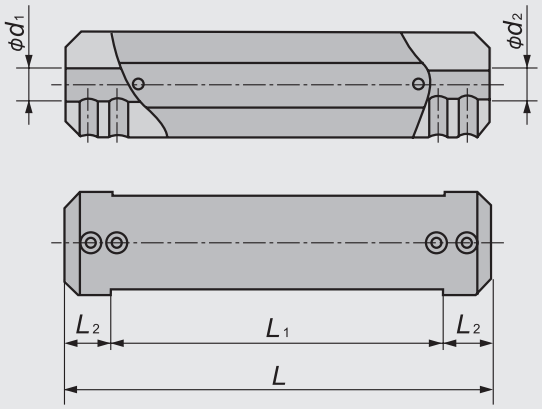
Unified screw		Counts of cutting																		
Machining pitch No. of threads/inch	Total depth of cut (mm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
36	0.43	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.03	0.02	0.01	—	—	—	—	—	—	—	—	—
32	0.49	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	—	—	—	—	—	—	—
28	0.56	0.07	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	—	—	—	—	—	—
24	0.66	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	—	—	—	—
20	0.78	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.01	—	—	—
18	0.87	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.03	0.03	0.02	0.01	—	—
16	0.98	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.01

"NBP" type internal back threading tool

Features

- Able to machine deeper bores (Max. 22 mm deep for 4.0 diameter)
- Improved accuracy when indexing due to the positioning mechanism
- Ease of insert clamping/unclamping

NBP type

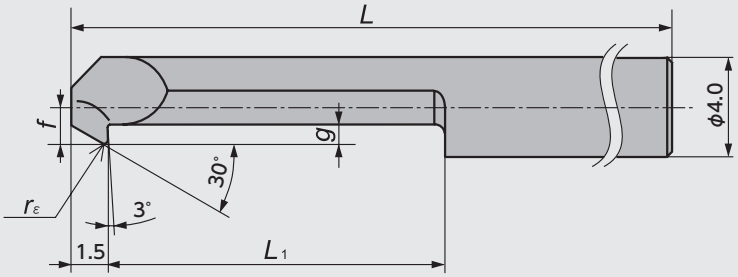


Holder dimensions

Code No.	Toolholder Part No.	Stock	Dimensions (mm)						Applicable insert	Parts	
			φd	φd1	φd2	L	L1	L2		Clamping screw	Wrench
5500731	**NBPR19**	■	19.05	5	4	88.9	68.9	10	KBR (See table below)	SR-M5*6	LW-2.5
5500749	**R22**	■	22.00			90	70	10			

Applicable insert

KBR type



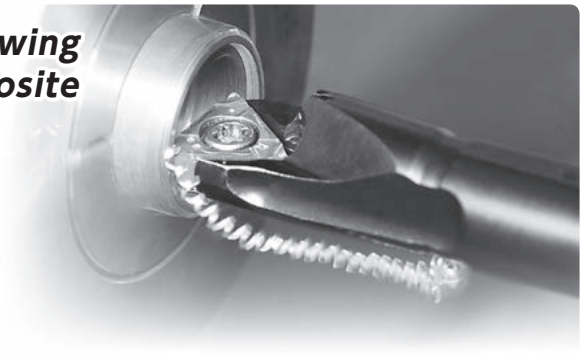
Part No.	Min. machining dia. (mm) Dm	Dimensions (mm)					PVD-coated micro grain carbide	
		L	L1	g	f	rε	ZM3	Stock
KBR03170PB	**φ3.0**	34	17	0.5	0.6	0.1	5500681	■
04220PB	**φ4.0**	39	22	0.8	1.5	0.15	5500723	■

Anti vibration boring bar "Mogul Bar"

WATCH ON YouTube

Features

Boring bar with special chipbreaker allowing chips to flow out of the bore in the opposite direction to the feed.
Improved anti vibration boring bar.
Minimun maching diameter ϕ5～



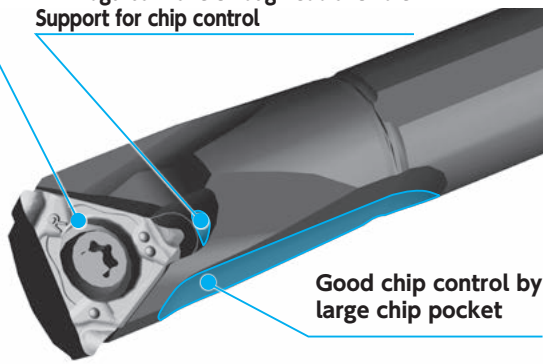
1 Useful with good chipcontrol chip breaker

Excellent performance from the F type chipbreaker

FG chipbreaker

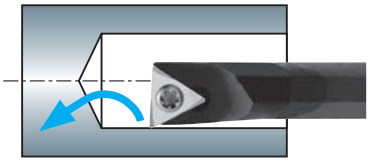
F1•F05 chipbreaker

All Mogulbar have through coolant hole
Support for chip control



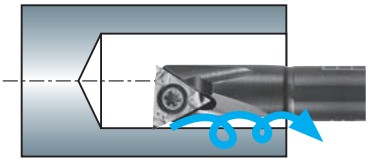
Good chip control by large chip pocket

Conventional chipbreaker

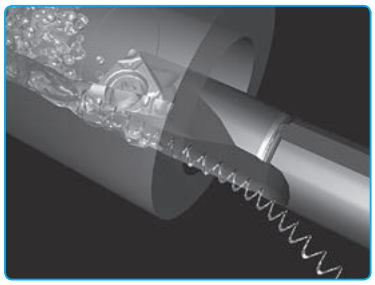


Allows chips to flow the direction to the feed possibly causing chips to jam in the bore.

FG chipbreaker / F1 • F05 chipbreaker ※



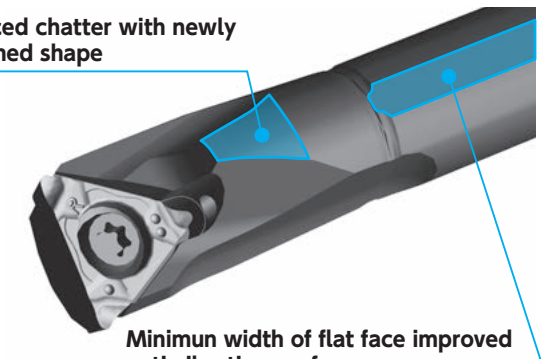
Allows chips to flow in the opposite direction to the feed, good chip control!



※FG • F1 • F05 chipbreaker, R-hand inserts fit to R-hand toolholder.

2 Improved anti vibration with special design

Reduced chatter with newly designed shape

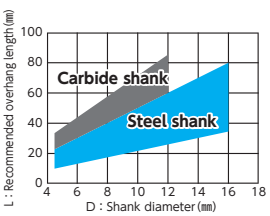


Minimun width of flat face improved anti vibration performance

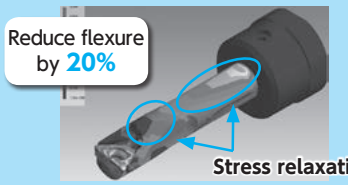
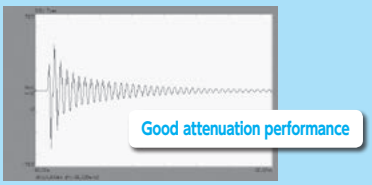
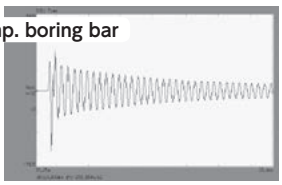
Recommended overhang length

Steel shank	L/D≦5
Carbide shank	L/D≦7

※L : Overhang length
D : Shank diameter

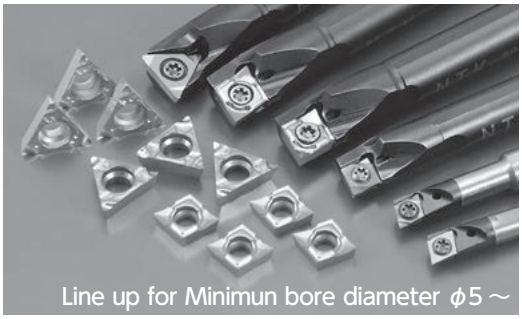


Work material : Alloy steel • Stainless steel
Cutting condition : v_c=80m/min f =0.05～0.10mm/rev a_p=0.1～0.5mm (D.O.C.)

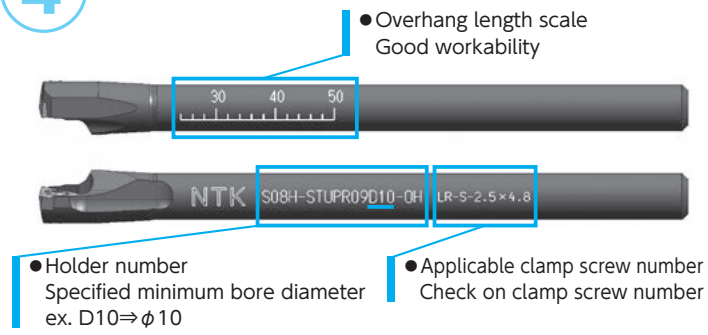
	Rigidity analysis (FEM) ※1	Vibration analysis (FFT analysis) ※2
MogulBar		
Conventional boring bar		

注：Overhang length L/D=5　※1：Principal force directions=100N　※2：Acceleration test by same impactive force
MogulBar：S08H-STUPR09D10-OH

3 CC.CP.TP.TC type insert Minimun bore diameter ϕ5～

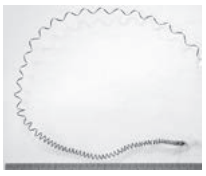
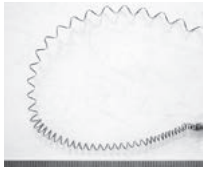
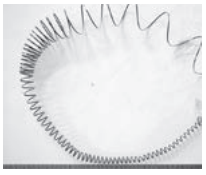


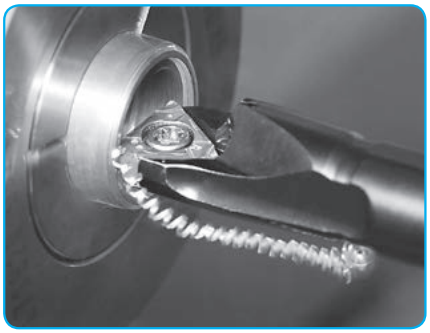
4 Desinged to be useful



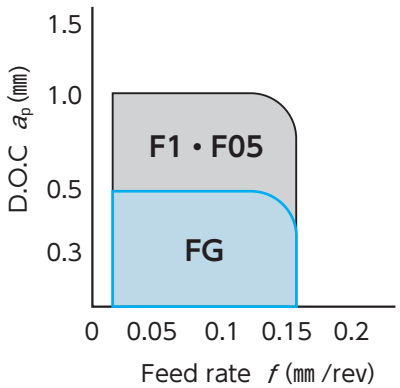
Features of "F chipbreaker"

"F chipbreaker" allows chips to be disposed to opposite direction from feed.
Combination of F chipbreaker and MogulBar achieve the best performance.

Insert	D.O.C a_p (mm)	Feed rate f (mm/rev) 0.05	0.1
FG chipbreaker ● Perfect for Finishing ● Applicable for low depth of cut ～ 0.5mm ● Cut cleanly with excellent sharp edge	0.1		
	0.3		
F1・F05 chipbreaker ● For wide cutting condition range ● Cut cleanly with ground chipbreaker	0.5		
※FG・F1・F05 chipbreaker, R-hand inserts fit to R-hand toolholder.	Work material：SCM435 Holder：S10K-STUPR11D12-OH　Insert：TPGH110304 Cutting condition：v_c=80m/min　Bore diameter：ϕ12 External coolant　**Depth：20mm**		

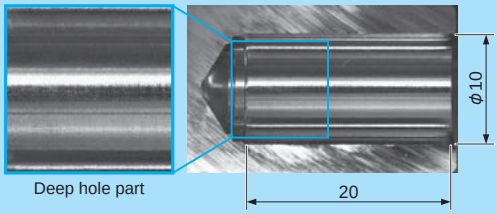
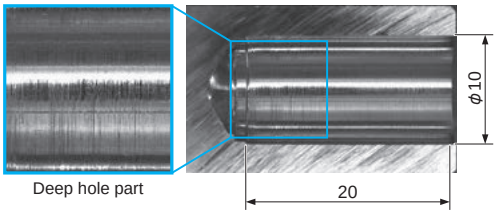
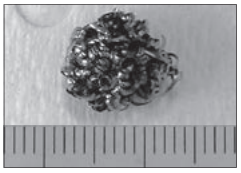


■ Chip control rage of "F chipbreaker"



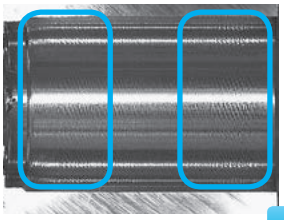
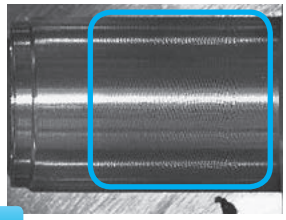
Boring bars and internal machining tool range

Chip control performance

Holder	MogulBar S08H-STUPR09D10-OH	Comp. boring bar
Insert	F1-chipbreaker ZM3 TPGH090204FRF1	Comp. chipbreaker
Surface		
Chip	Good chip control	 Chip packing

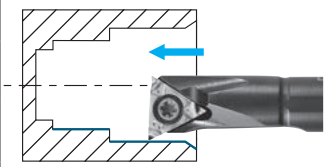
Work material : SCM435 Holder : S08H-STUPR09D10-OH (Min.bore Dia.: ϕ10)
Shank diameter : ϕ8 Insert : TPGH090204
Cutting condition : v_c=80m/min f =0.05mm/rev a_p=0.25mm Bore diameter : ϕ10 External coolant
Overhang length : L/D=4 Depth : 20mm
※For F1 chip breaker, R-hand inserts fit to R-hand toolholder.

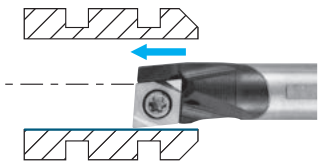
Chatter resistant

	MogulBar	Comp.A	Comp.B
	Reduce chatter !	 Chatter	

Work material : SCM435 Holder : S08H-STUPR09D10-OH Shank diameter : ϕ8
Steel shank Insert : ZM3 TPGH090204FRF1
Cutting condition : v_c=80m/min f =0.1mm /rev a_p=0.25mm Bore diameter : ϕ10mm External coolant
Depth : 15mm Overhang length : L/D=5

Application example

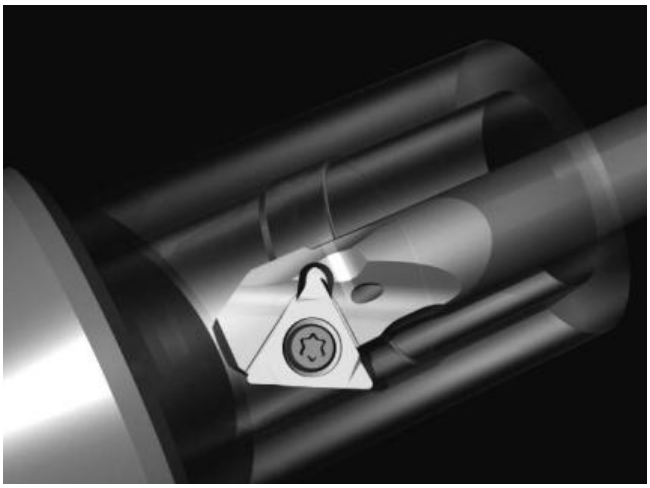
Valve	Good chip control
Work material : SUS304	
Holder : S08H-STUPR09D10-OH	
Insert : TPGH090202RFG	
Cutting speed (m/min) =80	
Feed (mm /rev) =0.05	
Depth of cut (mm) =0.2 ~ 0.5	
MogulBar+FG chip breaker	1500 pcs
Competitor	700 pcs
MogulBar+FG chipbreaker achieves : 2.1 times tool life & Stable tool life.	

Sleeve	Anti vibration + Cut cleanly
Work material : SUM43	 Overhang length L/D=9 over
Holder : C06H-SCLPR04D07-OH	
Insert : CPGH04102FRF1	
Cutting speed (m/min) =75	
Feed (mm /rev) =0.05	
Depth of cut (mm) =0.1	
MogulBar+F1 chip breaker	900 pcs
Competitor + Ground chip breaker	500 pcs
MogulBar+F1 chipbreaker achieves : Reduce chatter & 1.8 times tool life.	

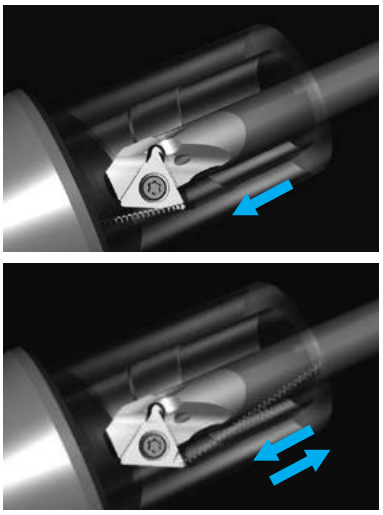
Anti vibration boring bar for internal backtorning "C-STZP" type

Prevent chattering with higher rigidity toolholder design

Higher rigidity toolholder offers max. machining length L/D ≦ 7

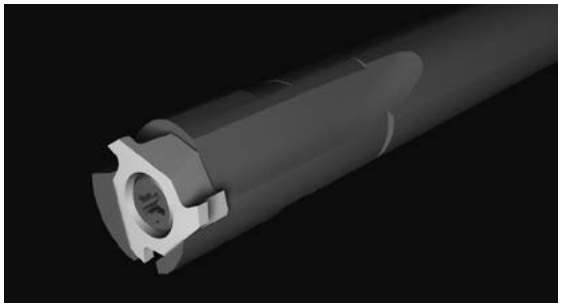


Both machining directions are available



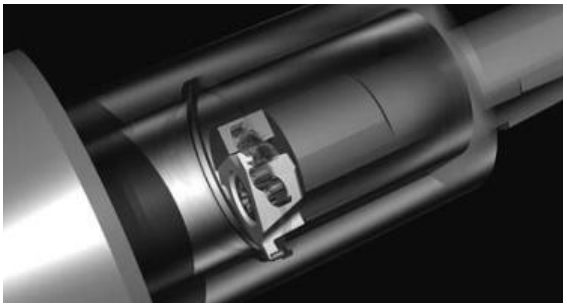
Anti vibration boring bar for internal grooving "S-BG" type

Prevent chattering with higher rigidity toolholder design



Newly designed chipbreaker offers good chip control

Sharp cutting edge prevents burrs



Economical 3 cutting edges

Recommencled cutting conditions

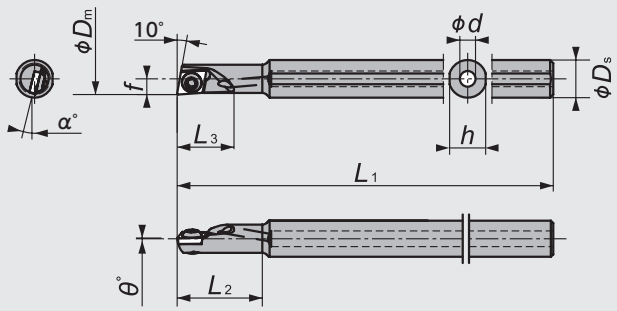
Work material	Cutting speed v_c (m/min)				Feed f (mm/rev) Width (mm) 0.25 ~ 0.5	0.5 ~ 1.0	1.0 ~ 2.0	2.0以上
Free cutting steels		50	100	200	0.005 ~ 0.03	0.02 ~ 0.07	0.02 ~ 0.06	0.03 ~ 0.2
Carbon steels	Carbide	50	90	150				
Alloy steels	Cermet	120	150	250		0.03 ~ 0.08	0.03 ~ 0.07	
Free cutting stainless steels		50	90	180				
Hard-cut stainless steels		40	70	100				
Non ferrous metal		50	100	200		0.02 ~ 0.07	0.03 ~ 0.08	0.05 ~ 0.25

MOGUL BAR

Minimum machining diameter : ϕ5

S-MBR type

Steel shank
(Thin end type)



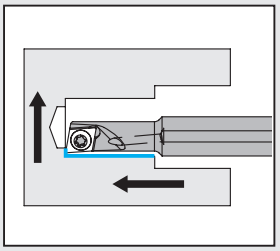
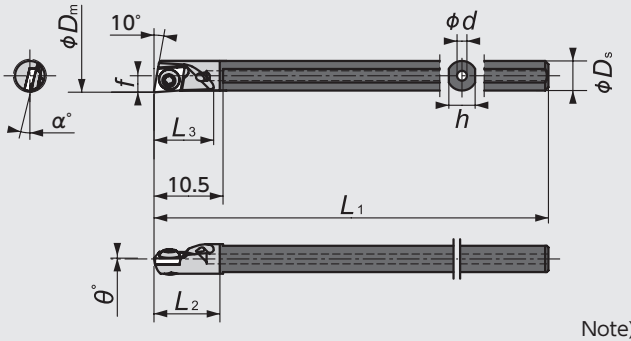


Figure-1

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using F1 type chipbreaker, use R-hand insert for R-hand holder in order to evacuate chips in the opposite direction to the feed.

C-MBR type

Carbide shank
(Straight type)



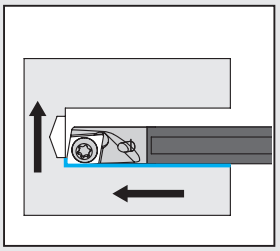
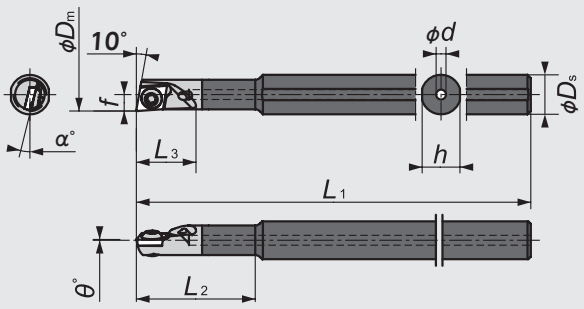


Figure-2

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using F1 type chipbreaker, use R-hand insert for R-hand holder in order to evacuate chips in the opposite direction to the feed.

C-MBR type

Carbide shank
(Thinner end type)



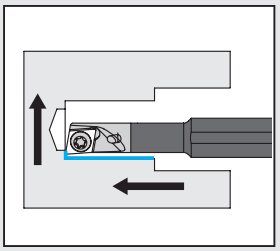


Figure-3

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using F1 type chipbreaker, use R-hand insert for R-hand holder in order to evacuate chips in the opposite direction to the feed.

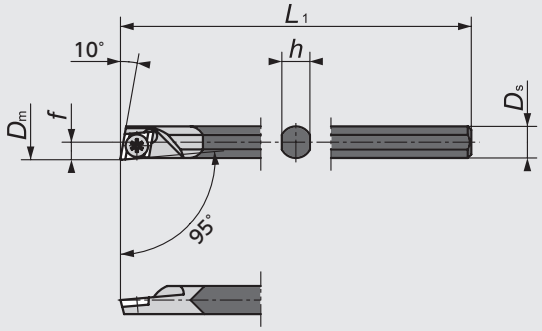
Holder dimensions

Shape		Code No.	Toolholder Part No.	Stock	Min. machining dia. (mm) D_m	Dimensions (mm) ϕD_s	h	L_1	f	L_2	L_3	L_4	ϕd	θ	α	Standard nose radius (mm) $r_{\varepsilon 1}$	Applicable insert	Parts: Clamping screw	Parts: Wrench
Steel shank	Figure-1	5789888	**S06F-MBRD05-OH**	●	5.0	6.0	5.7	80	2.5	13.5	9.0	–	2.5	0°	-13°	0.15	MBL **L33**	LR-S-2*3.5	CLR-13S
Carbide shank	Figure-2	5789896	**C045F-MBRD05-OH**	●		4.5	4.0			–			1.5						
	Figure-3	5789904	**C06F-MBRD05-OH**	●		6.0	5.7			18									

Minimum machining diameter : ϕ5 ~ 7.7

C-MBR type

Carbide shank
(Straight type)



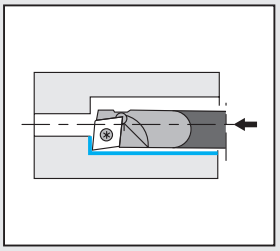
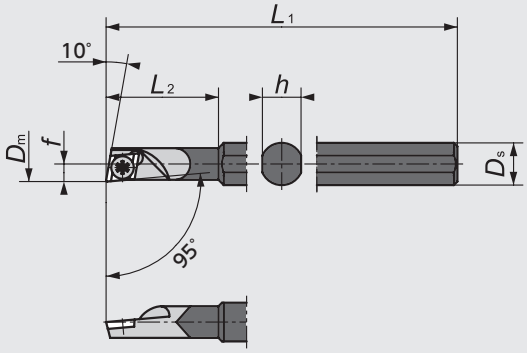


Figure-1

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using F1 type chipbreaker, use R-hand insert for R-hand holder in order to evacuate chips in the opposite direction to the feed.

C-MBR type

Carbide shank
(Stepped diameter type)



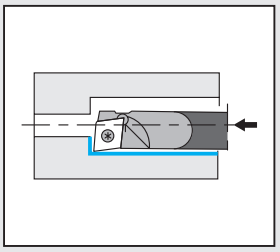
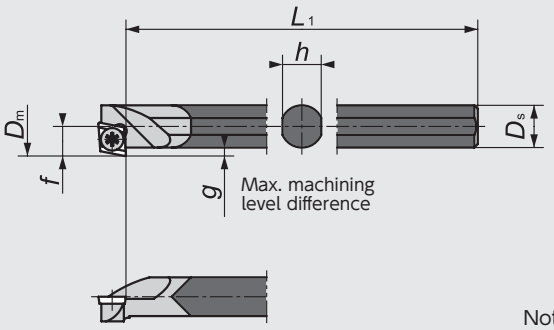


Figure-2

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using F1 type chipbreaker, use R-hand insert for R-hand holder in order to evacuate chips in the opposite direction to the feed.

C-MSBR type

Carbide shank
(Straight type)



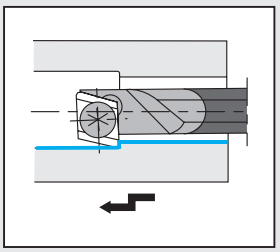


Figure-3

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using F1 type chipbreaker, use R-hand insert for R-hand holder in order to evacuate chips in the opposite direction to the feed.

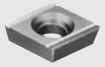
Holder dimensions

Shape		Code No.	Toolholder Part No.	Stock	Min. machining dia. (mm) D_m	Max. machining level difference (mm) g	Dimensions (mm) ※ D_s	h	L_1	f	L_2	Applicable insert	Parts: Clamping screw	Parts: Wrench
Carbide shank	Figure-1	5610175	C045F-MBR	●	5.0	—	4.5	4.0	80	2.5	—	MBL (See table below)	LR-S-2＊3.5	CLR-13S
	Figure-2	5162706	C06F-MBR	●	5.0	—	6.0	5.5	80	2.5	18			
	Figure-3	5161054	C04J-MSBR	●	5.7	1.0	4.0	3.5	110	3.2	—			
		5161047	C06J-MSBR	●	7.7		6.0	5.5		4.2	—			

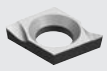
※Based on a master insert having a nose radius of 0.15mm (R=0.15mm).

Applicable insert

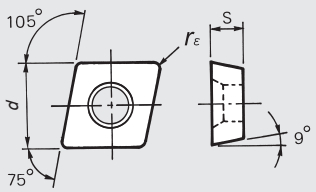
MBL type

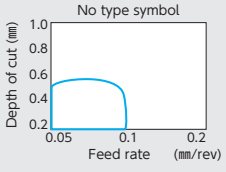


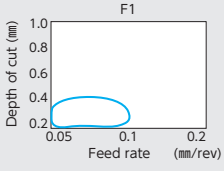
Left-hand type shown.



F1＊
Right-hand type shown.







●Left-hand type shown.

Part No.	Dimensions (mm) d	s	$r_{\varepsilon 1}$	PVD-coated micro grain carbide ZM3	Stock	TM4	Stock
MBL005FL	3.6	1.0	0.05	5161252	●	5696018	●
MBL015FL			0.15	5161245	●	5696026	●
MBL005FRF1	3.6	1.0	0.05			5789763	●
MBL015FRF1			0.15			5789771	●

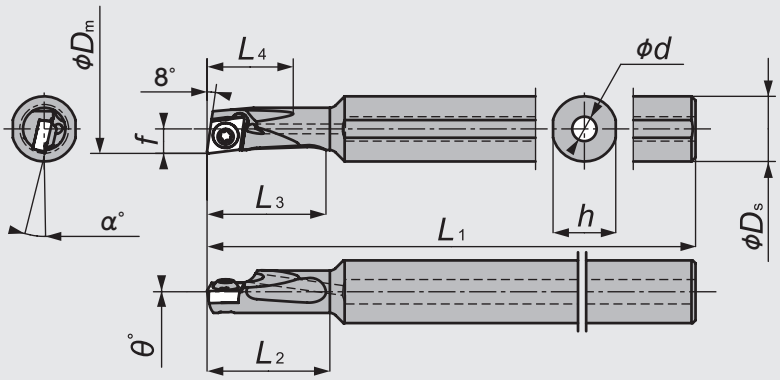
Note) When using F1 type chipbreaker, use R-hand insert for R-hand holder in order to evacuate chips in the opposite direction to the feed.□ indicates a sharp-edged product.

MOGUL BAR

Minimum machining diameter : ϕ6

S-SEXR type

Steel shank
(Thinner end type)



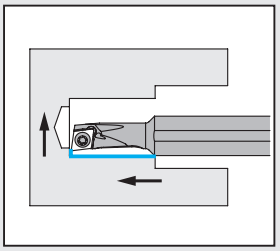
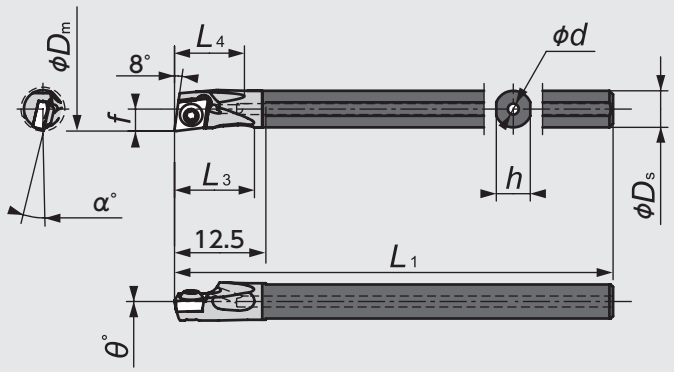


Figure-1

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using an F1 type chipbreaker, use a R-hand insert for a R-hand holder in order to evacuate chips forward.

C-SEXR type

Carbide shank
(Straight type)



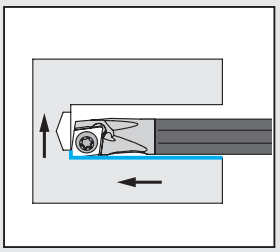
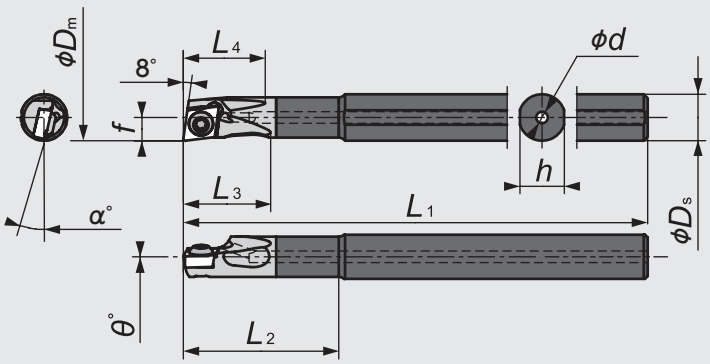


Figure-2

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using an F1 type chipbreaker, use a R-hand insert for a R-hand holder in order to evacuate chips forward.

C-SEXR type

Carbide shank
(Thinner end type)



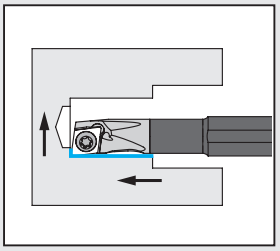


Figure-3

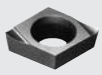
●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using an F1 type chipbreaker, use a R-hand insert for a R-hand holder in order to evacuate chips forward.

Holder dimensions

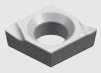
Shape		Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Min. machining dia (mm) D_m	ϕD_s	h	L_1	f	L_2	L_3	L_4	ϕd	θ	α	Standard nose radius (mm) $r_{\varepsilon 1}$	Applicable insert	Parts: Clamping screw	Parts: Wrench
Steel shank	Figure-1	5789912		S08G-SEXR$^{R}_{L}$T3D06-OH	●		6.0	8.0	7.7	90	3.0	15	15	10	3.0	0°	-13°	0.2	ERGHT301 (See table below)	LR-S-2*3.7	CLR-13S
Carbide shank	Figure-2	5789920 / 5800479		C05G-SEXR$^{R}_{L}$T3D06-OH	●	★		5.0	4.0			–	11		1.5						
Carbide shank	Figure-3	5789938 / 5800487		C06G-SEXR$^{R}_{L}$T3D06-OH	●	★		6.0	5.7			20									

Applicable insert

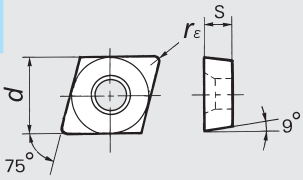
ERGH type

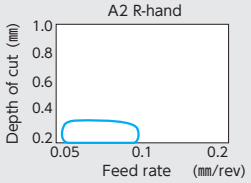


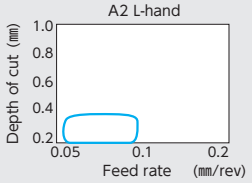
A2※1 Right-hand type shown.

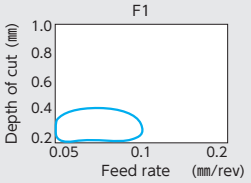


F1※2 Right-hand type shown.









●Right-hand type shown.

Part No.	Previous P/N	Dimensions (mm) ϕd	s	$r_{\varepsilon 1}$	PVD-coated micro grain carbide: ZM3 R	ZM3 Stock	ZM3 L	ZM3 Stock	VM1 R	VM1 Stock	VM1 L	VM1 Stock	TM4 R	TM4 Stock	TM4 L	TM4 Stock	Cermet: T15 R	T15 Stock	T15 L	T15 Stock	C7X R	C7X Stock	C7X L	C7X Stock
ERGHT30102F$^{R}_{L}$A2	ERGP52Y-F$^{R}_{L}$- -A2	3.97	1.6	0.2	5899158	●	5889670	●	5375050	●	5306535	●	5696034	●	5696059	●	5659602	●	5659594	●	5689930	●	5689948	●
30104F$^{R}_{L}$A2	521-F$^{R}_{L}$- -A2			0.4			5146063	●					5696067	●										
ERGHT30101F$^{R}_{L}$F1	—	3.97	1.6	0.1									5793039	●										
30102F$^{R}_{L}$F1	—			0.2									5789789	●										
30104F$^{R}_{L}$F1	—			0.4									5789797	●										

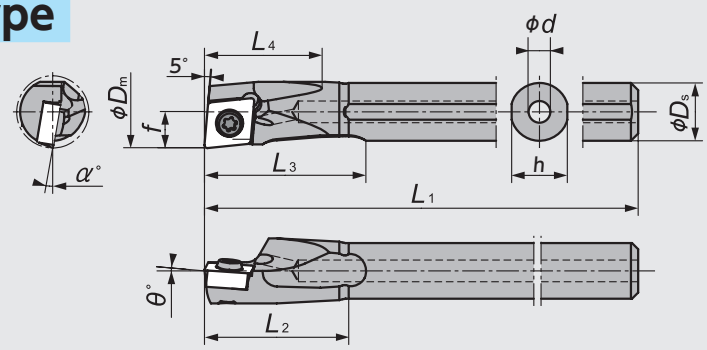
※1 The R-hand A2 type inserts work effectively for very small depths of cut.
※2 When using an F1 type chipbreaker, use a R-hand insert for a R-hand holder in order to evacuate chips forward.
□ indicates a sharp-edged product.

MOGUL BAR

Minimum machining diameter : $\phi 7 \sim 18$

S-SCLP(C) type

Steel shank



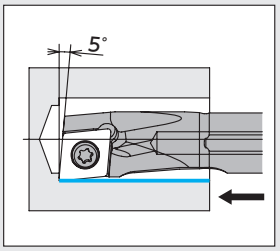
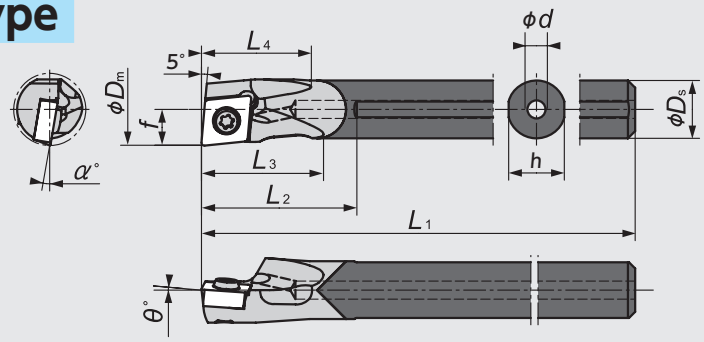


Figure-1

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.

C-SCLP(C) type

Carbide shank



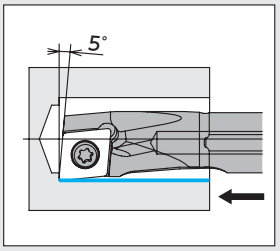
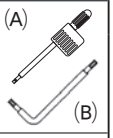


Figure-2

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.

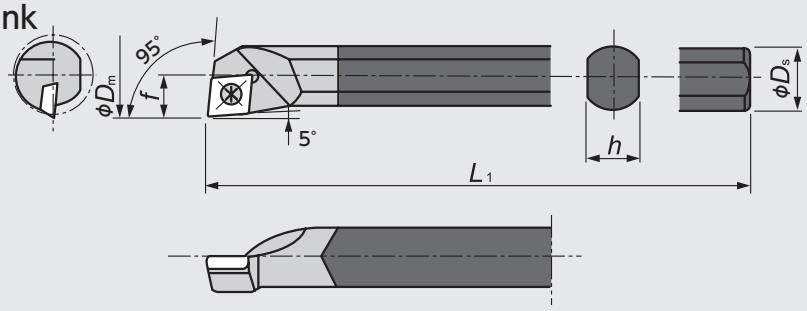
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Min. machining dia. (mm) φDm	Dimensions (mm) φDs	h	L1	f	L2	L3	L4	φd	θ	α	Standard nose radius (mm)	Applicable insert	Parts: Clamping screw	Parts: Wrench
																				 (A) (B)
Figure-1 Steel shank	5770029		S06F-SCLPR/L04D07-0H	●		7.0	6.0	5.75	80	3.5	14	17	12	2.5	+5°	−9°	0.2	CP○○0401 **F36**	LR-S-2*3.7	CLR-13S (A)
	5770037		S07G-SCLPR/L04D08-0H	●		8.0	7.0	6.75	90	4.0	16	19.5	13.5	3.0		−7°				
	5770045		S08H-SCLPR/L06D10-0H	●		10.0	8.0	7.7	100	5.0	20	22	16	3.0		−10°	0.4	CP○○0602 **F35~36**	LR-S-2.5*6	CLR-15S (A)
	5770052		S08H-SCLCR/L06D10-0H	●		10.0	8.0	7.7	100	5.0	20	22	16	3.0	0°	−13°	0.4	CC○○0602 **F33~35**	LRIS-2.5*5	CLR-15S (A)
	5770060		S10K-SCLCR/L06D12-0H	●		12.0	10.0	9.6	125	6.0	24	27.5	20	3.5		−11°				
	5770078		S12M-SCLCR/L06D14-0H	●		14.0	12.0	11.5	150	7.0	28	32.5	23	4.0		−9°				
	5770086		S16Q-SCLCR/L09D18-0H	●		18.0	16.0	15.4	180	9.0	36	42.5	30	5.0		−10°		CC○○09T3 **F33~35**	LRIS-4*8	LLR-25S-20*6.5 (B)
Figure-2 Carbide shank NEW	5770136 5800495		C06H-SCLPR/L04D07-0H	●	★	7.0	6.0	5.75	100	3.5	15.5	11.5	12	2.0	+5°	−9°	0.2	CP○○0401 **F36**	LR-S-2*3.7	CLR-13S (A)
	5770151		C07J-SCLPR/L04D08-0H	●		8.0	7.0	6.75	110	4.0	17.5	13	13.5	2.0		−7°				
	5770169 5800503		C08K-SCLPR/L06D10-0H	●	●	10.0	8.0	7.7	125	5.0	21.5	16.5	15	2.5		−10°	0.4	CP○○0602 **F35~36**	LR-S-2.5*6	CLR-15S (A)
	5770185		C08K-SCLCR/L06D10-0H	●		10.0	8.0	7.7	125	5.0	21.5	16.5	15	2.5	0°	−13°	0.4	CC○○0602 **F35~36**	LRIS-2.5*5	CLR-15S (A)
	5770193 5800511		C10M-SCLCR/L06D12-0H	●	★	12.0	10.0	9.6	150	6.0	25	20	19.5	2.5		−11°				
	5770201		C12M-SCLCR/L06D14-0H	●		14.0	12.0	11.5	150	7.0	29	23.5	22.5	3.0		−9°				

Minimum machining diameter : ϕ 8～12

C-SCLP type

Carbide shank



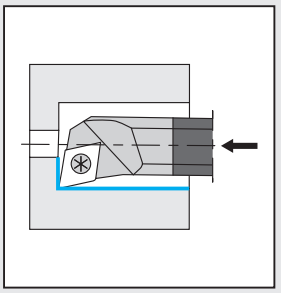
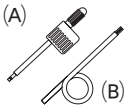


Figure-1

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.

Holder dimensions

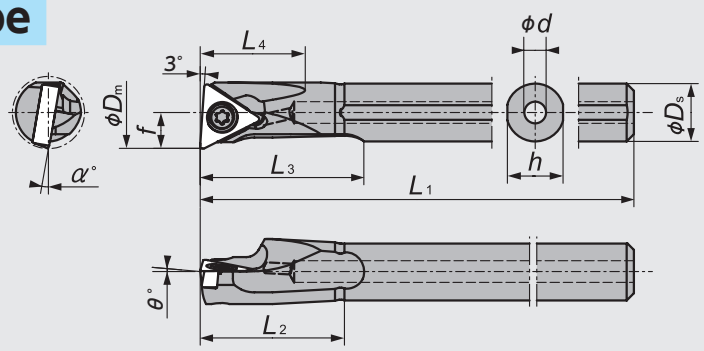
Shape	Code No.	Toolholder Part No.	Stock	Min. machining dia (mm) ϕD_m	Dimensions (mm)						Applicable insert	Parts	
					ϕD_s	h	b	L_1	f	L_2		Clamping screw	Wrench
	R		R										 (A) (B)
Figure-1 Carbide shank	5853288	C06J-SCLPR-04-N	●	8.0	6.0	5.2	—	110	4.0	—	CP○○0401 **F36**	LR-S-2*4.4	CLR-13S (A)
	5853296	C08K-SCLPR-06-N	●	10.0	8.0	7.0		125	5.0		CP○○0602 **F33～36**	LR-S-2.5*5.5	CLR-15S (A)
	5853304	C10M-SCLPR-08-N	●	12.0	10.0	9.0		150	6.0		CPGH0802 **F36**	LR-S-3*6.2	RLR-20S (B)

MOGUL BAR

Minimum machining diameter : ϕ8 ~ 18

S-STUC(P) type

Steel shank



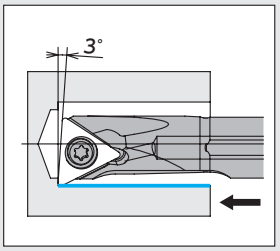
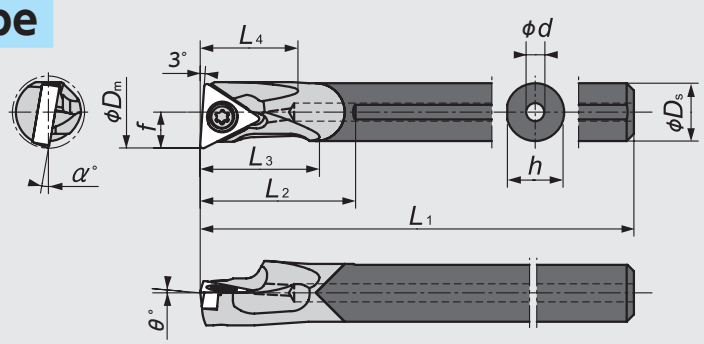


Figure-1

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using an F1 type chipbreaker, use a R-hand insert for a R-hand holder in order to evacuate chips backward.

C-STUC(P) type

Carbide shank



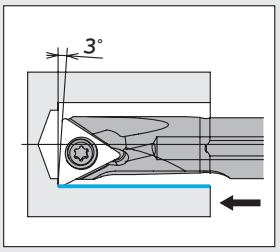


Figure-2

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using an F1 type chipbreaker, use a R-hand insert for a R-hand holder in order to evacuate chips backward.

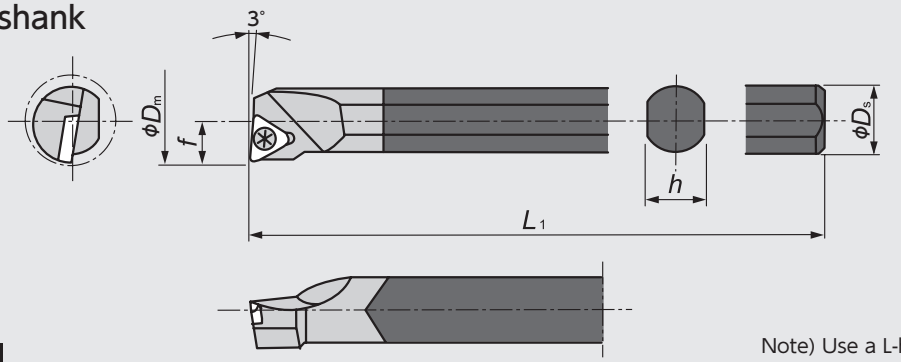
Holder dimensions

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Min. machining dia. (mm) ϕD_m	ϕD_s	h	L_1	f	L_2	L_3	L_4	ϕd	θ	α	Standard nose radius (mm)	Applicable insert	Parts: Clamping screw	Parts: Wrench
Steel shank Figure-1	5769971		S07G-STUCR/L06D08-0H	●		8.0	7.0	6.75	90	4.0	16.0	19.5	12.5	2.5	0°	−11°	0.2	TC○○0601 **F43~44**	LR-S-2*4.4	CLR-13S (A)
	5769989		S08H-STUPR/L09D10-0H	●		10.0	8.0	7.7	100	5.0	20.0	22.5	14.5	3.0	+5°	−10°	0.4	TP○○0902 **F44~45**	LR-S-2.5*4.8	CLR-15S (A)
	5769997		S10K-STUPR/L11D12-0H	●		12.0	10.0	9.6	125	6.0	24.0	27.5	18.5	3.5		−7.5°				
	5770003		S12M-STUPR/L11D14-0H	●		14.0	12.0	11.5	150	7.0	28.0	32.5	22	4.0		−5°		TP○○1103 **F22•44~45**	LR-S-3*5.8	RLR-20S (B)
	5770011		S16Q-STUPR/L11D18-0H	●		18.0	16.0	15.4	180	9.0	32.0	42.5	28.5	5.0		−3°				
Carbide shank Figure-2	5770094		C07J-STUCR/L06D08-0H	●	★	8.0	7.0	6.75	110	4.0	17.5	13.0	12.5	2.0	0°	−11°	0.2	TC○○0601 **F43~44**	LR-S-2*4.4	CLR-13S (A)
	5800529																			
	5770102		C08K-STUPR/L09D10-0H	●	★	10.0	8.0	7.7	125	5.0	21.5	16.5	14.5	2.5	+5°	−10°	0.4	TP○○0902 **F44~45**	LR-S-2.5*4.8	CLR-15S (A)
	5800537																			
	5770110		C10M-STUPR/L11D12-0H	●	★	12.0	10.0	9.6	150	6.0	25.0	20.0	17.5	2.5		−7.5°				
	5800545																			
	5770128		C12M-STUPR/L11D14-0H	●		14.0	12.0	11.5	150	7.0	29.0	23.0	21.5	3.0		−5°		TP○○1103 **F22•44~45**	LR-S-3*5.8	RLR-20S (B)
	5821814		NEW C16Q-STUPR/L11D18-0H	●		18.0	16.0	15.4	180	9.0	37.0	29.0	28.0	4.0		−3°				

Minimum machining diameter : ϕ 8～12

C-STUC(P) type

Carbide shank



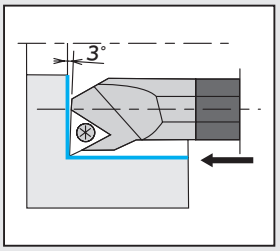


Figure-1

●Right-hand type shown.
Note) Use a L-hand insert for a R-hand holder.
Note) When using F1, F05, FG chipbreakers, use R-hand insert for R-hand toolhoder to evacuate chips backward.

Holder dimensions

Shape	Code No. R	Toolholder Part No.	Stock R	Min. machining dia. (mm) ϕD_m	Dimensions (mm) ※ ϕD_s	h	b	L_1	f	L_2	g	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5853247	**C06J-STUCR-06-N**	●	**8.0**	6.0	5.2		110	4.0			TC○○0601 **F43～44**	LR-S-2*3.7	CLR-13S
	5853262	**C08K-STUPR-08-N**	●	**10.0**	8.0	7.0	—	125	5.0	—	—	TP○○0802 **F44～45**	LR-S-2*5.5	
Carbide shank	5853270	**C10M-STUPR-09-N**	●	**12.0**	10.0	9.0		150	6.0			TP○○0902 **F44～45**	LR-S-2.5*6	CLR-15S

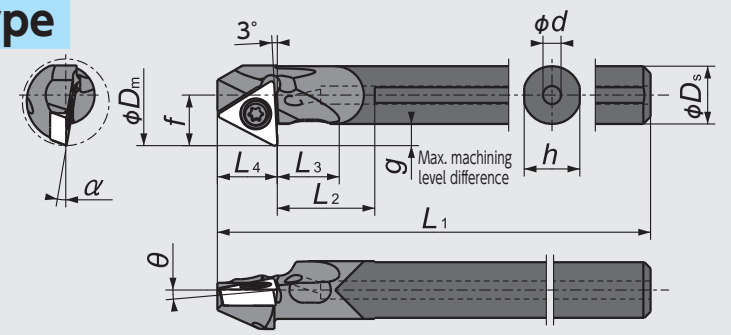
※Based on master insert having a nose radius of 0.2mm (R=0.2mm)

Boring bars and internal machining tool range

Minimum machining diameter : ϕ10 ~ 17.5

C-STZP(C) type

Carbide shank
(Coolant through)



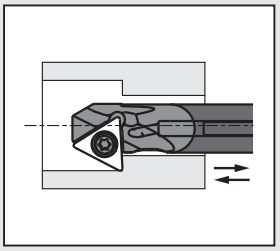
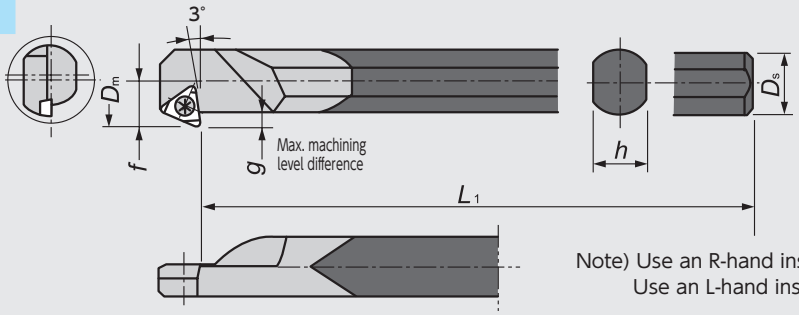


Figure-1

B-STZ type

Carbide shank



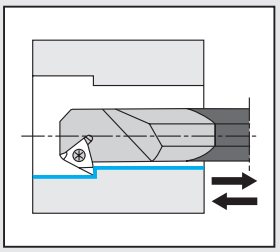


Figure-2

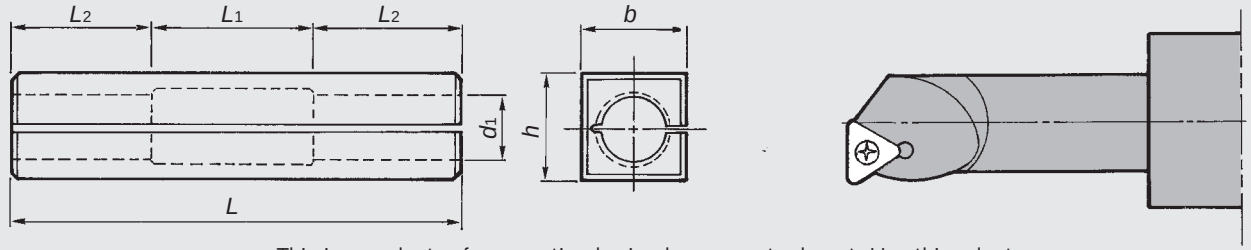
Note) Use an R-hand insert for cutting for back boring.
Use an L-hand insert for cutting for front turning.
●Right-hand type shown.

Holder dimensions

Shape	Code No. R	Toolholder Part No.	Stock R	Min. machining dia. (mm) φDm	Max. machining level difference (mm) g	Dimensions (mm) ※1 φDs	h	L1	f	L2	L3	L4	φd	θ	α	Standard nose radius (mm)	Applicable insert	Parts: Clamping screw	Parts: Wrench
Figure-1	5842851	C06H-STZCR06D10-0H	●	10.0	2.5	6.0	5.8	100	5.5	10.5	6	6	2.0	0°	−10°	0.2	TC○○0601 F43~44	LR-S-2*4	CLR-13S
	5842869	C08K-STZPR09D12-0H	●	12.0	3.0	8.0	7.7	125	7.0	13.5	8.5	8.3	2.5	+5°	−10°	0.4	TP○○0902 F44~45	LR-S-2.5*4.8	CLR-15S
	5842877	C10M-STZPR09D14-0H	●	14.0		10.0	9.6	150	8.0	18.5	12	8.3	2.5		−7°				
	5842885	C12M-STZPR11D175-0H※2	●	17.5	4.5	12.0	11.5	150	10.5	22	14.5	9.6	3.0		−5°		TP○○1103 F22•44~45	LR-S-3*5.8	RLR-20S
Figure-2	5852819	B06J-STZCR-06-N	●	10.0	2.5	6.0	5.2	110	5.5	—	—	—	—	—	—	0.2	TC○○0601 F43~44	LR-S-2*4.4	CLR-13S
	5852801	B12Q-STZPR-09-N	●	16.0	3.0	12.0	11.0	180	9.0							0.2	TP○○0902 F43~44	LR-S-2.5*6.8	CLR-15S

※1 Based on a master insert having a nose radius of 0.2mm (R=0.2mm).
※2 Applicable insert size is different from insert for B12Q-STZPR-09.

Boring bar adaptors.



This is an adaptor for mounting boring bars on a tool post. Use this adaptor especially for carbide shank bars to eliminate any possibility of breakage.

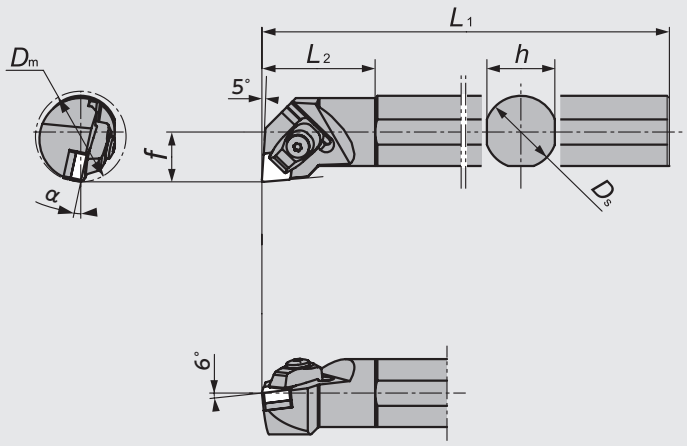
Code No.	Adaptor P/N	Stock	Dimensions (mm) h1	b	L	L1	L2	d1	Applicable holder
5764204	S06-H	●	20	20	60	20	20	6	For shank of φ6
5580717	S08-H	●	20	20	60	20	20	8	For shank of φ8
5632286	S10-H	●	20	20	60	20	20	10	For shank of φ10
5758198	S12-H	●	25	25	70	20	25	12	For shank of φ12

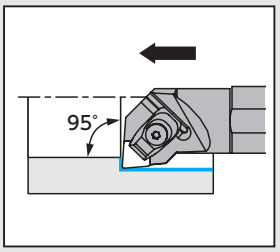
Multi-clamp holder　Minimum machining diameter：φ33～63

S-TCLN type
Clamp-on

S-WCLN type
Double clamping

S-HCLN type
Dimple clamping





●Right-hand type shown.

Holder dimensions and parts for the Multi-clamp holder

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Min. machining dia. (mm) D_m	Dimensions (mm) ※1 D_s	h	L_1	f	L_2	α	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim Wrench	Spring
5701685	5701693	S25R-TCLNR/L12	●	●	33	25	24	200	17	40	14	TC6CN Clamp-on	ACN423	AOS-6X26W AOS-6X30W※2 (For small-dia. boring bar)	FSS16-3.0 ＊8	LLR-T20	LLR-T10	ASGL6-D
5701701	5701719	S32S-TCLNR/L12	●	●	40	32	30	250	22	50	12							
5701727	5701735	S40T-TCLNR/L12	●	●	50	40	38	300	27	60	10							
5701743	5701750	S50U-TCLNR/L12	●	●	63	50	47	350	35	65	8							
5682646	5682653	S25R-WCLNR/L12	●	●	33	25	24	200	17	40	14	DC6CN Double clamping	ACN423	AOS-6X26W AOS-6X30W※2 (For small-dia. boring bar)	FSS16-3.0 ＊8	LLR-T20	LLR-T10	ASGL6-D
5682661	5682679	S32S-WCLNR/L12	●	●	40	32	30	250	22	50	12							
5682687	5682695	S40T-WCLNR/L12	●	●	50	40	38	300	27	60	10							
5682703	5682711	S50U-WCLNR/L12	●	●	63	50	47	350	35	65	8							
5701180	5701198	S25R-HCLNR/L12	●	●	33	25	24	200	17	40	14	HC6CN Dimple clamping	—	AOS-6X26W AOS-6X30W※2 (For small-dia. boring bar)	—	LLR-T20	—	ASGL6-D
5701206	5701214	S32S-HCLNR/L12	●	●	40	32	30	250	22	50	12							
5701222	5701230	S40T-HCLNR/L12	●	●	50	40	38	300	27	60	10							
5701248	5701255	S50U-HCLNR/L12	●	●	63	50	47	350	35	65	8							

※1　Based on a master insert having a nose radius of 0.8mm (R=0.8mm).
※2　AOS-6*30WH is an option for hexagonal hole type screw.

Applicable insert

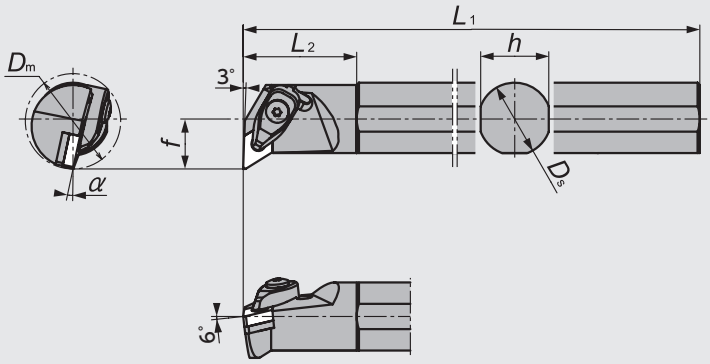
Toolholder Part No.	Applicable insert		Listed on pages
S-TCKLNR/L…	CNMN1204		F5
S-WCLNR/L…	CNMA1204		F4・16・24・25
S-HCLNR/L…	CNMX1207		F5

Multi- clamp holder
Just changing the clamps enables the holder to clamp inserts with or without holes, and dimple type inserts.

Multi-clamp holder　Minimum machining diameter : ϕ42 ~ 50

S-WDUN type
Double clamping

S-HDUN type
Dimple clamping



●Right-hand type shown.

Holder dimensions and parts for the Multi-clamp holder

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Min. machining dia. (mm) Dm	Dimensions (mm) ※1 Ds	h	L1	f	L2	α	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim Wrench	Spring
5682794	5682802	S32S-WDUNR/L15	●	●	42	32	30	250	22	50	12	DC6DN Double clamping	ADN423	AOS-6X26W AOS-6X30W※2 (For small-dia. boring bar)	FSS16-3.0 ＊8	LLR-T20	LLR-T10	ASGL6-D
5701545	5701560	S40T-WDUNR/L15	●	●	50	40	38	300	27	60	10							
5701354	5701362	S32S-HDUNR/L15	●	●	42	32	30	250	22	50	12	HC6DN Dimple clamping	—	AOS-6X26W AOS-6X30W※2 (For small-dia. boring bar)	—	LLR-T20	—	ASGL6-D
5701370	5701388	S40T-HDUNR/L15	●	●	50	40	38	300	27	60	10							

※1　Based on a master insert having a nose radius of 0.8mm (R=0.8mm).
※2　AOS-6*30WH is an option for hexagonal hole type screw.

Applicable insert

Toolholder Part No.	Applicable insert		Listed on pages
S-WDUNR/L···	DN○A1504		F6 • 17 • 25 • 26
S-HDUNR/L···	DN○X1507		F6

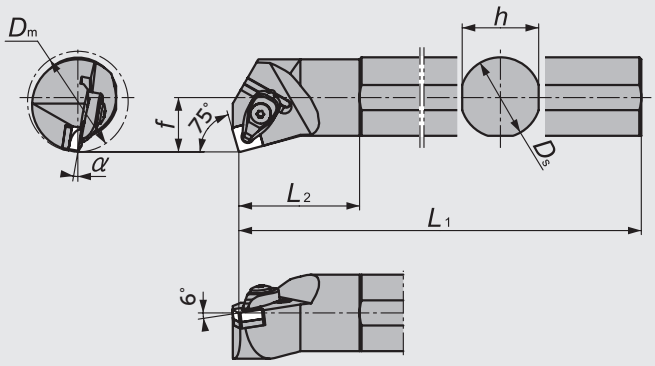
Multi- clamp holder
Just changing the clamps enables the holder to clamp inserts with or without holes, and dimple type inserts.

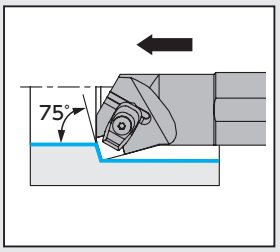
Multi-clamp holder Minimum machining diameter : φ50

S-TSKN type
Clamp-on

S-WSKN type
Double clamping

S-HSKN type
Dimple clamping





● Right-hand type shown.

Holder dimensions and parts for the Multi-clamp holder

Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Min. machining dia. (mm) Dm	Dimensions (mm) ※1 Ds	h	L1	f	L2	α	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim Wrench	Spring
5701800	5701818	S40T-TSKNR/L12	●	●	50	40	38	300	27	60	10	TC6CN Clamp-on	ASN423	AOS-6 *30W※2 (For small-dia. boring bar)	FSS16-3.0 *8	LLR-T20	LLR-T10	ASGL6-D
5682950	5682968	S40T-WSKNR/L12	●	●	50	40	38	300	27	60	10	DC6CN Double clamping	ASN423	AOS-6 *30W※2 (For small-dia. boring bar)	FSS16-3.0 *8	LLR-T20	LLR-T10	ASGL6-D
5701529	5701537	S40T-HSKNR/L12	●	●	50	40	38	300	27	60	10	HC6CN Dimple clamping	—	AOS-6 *30W※2 (For small-dia. boring bar)	—	LLR-T20	—	ASGL6-D

※1 Based on a master insert having a nose radius of 0.8mm (R=0.8mm).
※2 AOS-6*30WH is an option for hexagonal hole type screw.

Applicable insert

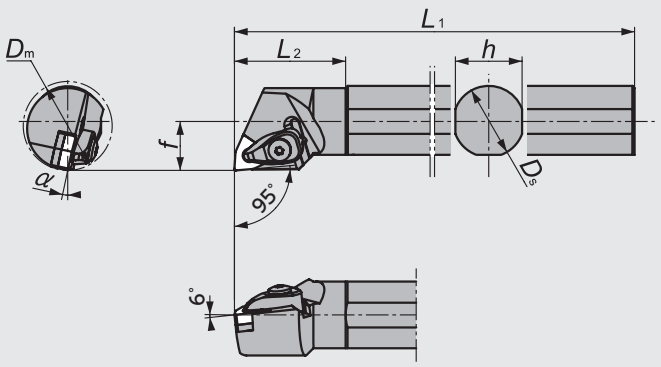
Toolholder Part No.	Applicable insert		Listed on pages
S-TSKNR/L…	SN○N1204		F8 • 9 • 18 • 28
S-WSKNR/L…	SN○A1204		F8 • 18 • 27 • 28
S-HSKNR/L…	SN○X1207		F9

Multi- clamp holder
Just changing the clamps enables the holder to clamp inserts with or without holes, and dimple type inserts.

Multi-clamp holder　Minimum machining diameter : ϕ33 ~ 50

S-WWLN type

Double clamping



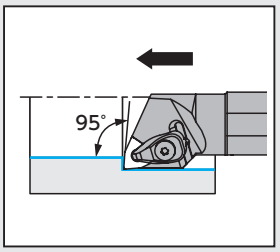
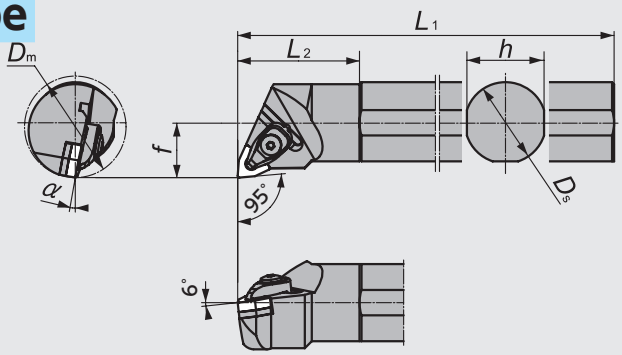


Figure-1

●Right-hand type shown.

S-WWLN-2 type

Double clamping



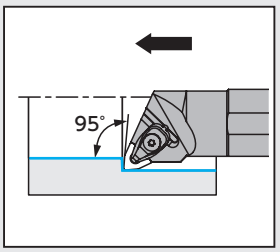


Figure-2

●Right-hand type shown.

Holder dimensions and parts for the Multi-clamp holder

Shape	Code No. R	Code No. L	Toolholder Part No.	Stock R	Stock L	Min. machining dia. (mm) Dm	Dimensions (mm) ※1 Ds	h	L1	f	L2	α	Clamp	Shim seat	Clamping screw	Retaining screw	Wrench	Shim Wrench	Spring
Figure-1	5683032	5683040	S25R-WWLNR/L08	●	●	33	25	24	200	17	40	14	DC6CN Double clamping	AWN423-W	AOS-6X26W AOS-6X30W※2 (For small-dia. boring bar)	FSS16-3.0 ＊8	LLR-T20	LLR-T10	ASGL6-D
Figure-1	5683057	5683065	S32S-WWLNR/L08	●	●	40	32	30	250	22	50	12							
Figure-1	5683073	5683081	S40T-WWLNR/L08	●	●	50	40	38	300	27	60	10							
Figure-2	5701594	5701602	S40T-WWLNR/L08-2	●	●	50	40	38	300	27	60	10							

※1　Based on a master insert having a nose radius of 0.8mm (R=0.8mm).
※2　AOS-6*30WH is an option for hexagonal hole type screw.

Applicable insert

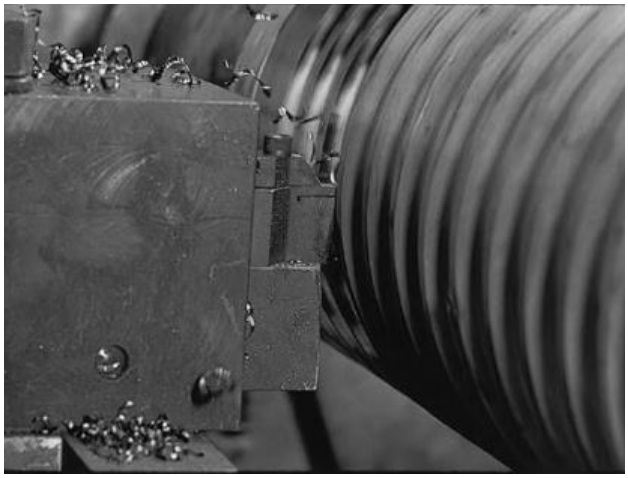
Toolholder Part No.	Applicable insert		Listed on pages
S-WWLNR/L…	WN○A0804		F12・32

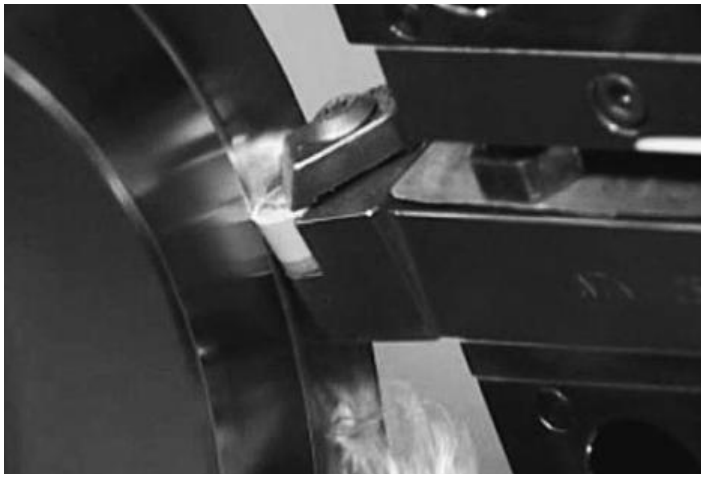
M

Original Tools for Various Applications

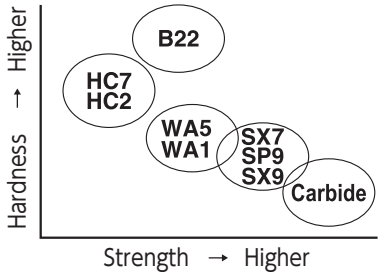
- Tools for machining steel mill rolls and heat-resistant alloys ···· M2
- Tools for bearings production ····· M6
- Tools for tube scarfing ····· M18
- Tools for V-pulleys ····· M20

Tools for Machining Mill Rolls and Heat-Resistant Alloys





Features of Tool Materials



Advantages of Ceramic Tools (for mill rolls/heat-resistant alloys)

Longer tool life!

Higher heat-resistance due to metal-free composition

Higher efficiency!

Machining at a higher cutting speeds than carbide.

Better surface finish!

Result in improved surface finish because of a lower affinity with the work materials

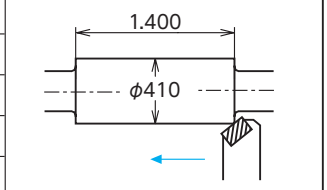
Selection guide for tool materials

		Tool material grade					
		CBN	Alumina-based	Whisker-based	Silicon-nitride-based		
		B22	HC7・HC2	WA1/WA5	SP9	SX7	SX9
Mill roll material	Forged roll (High-speed steel roll) Cr-Mo-based Carbon-based	○	○	◎			
	Cast steel roll Carbon-based	○	○	○			
	Cast iron roll Adamite Chilled Grain Ductile or special cast iron	◎	◎	◎	◎		
Heat-resistant alloy	Nickel-based heat-resistant alloys (Inconel)			◎		◎	◎
	Cobalt-based heat-resistant alloys (Stelite)			◎		◎	

Actual machining examples

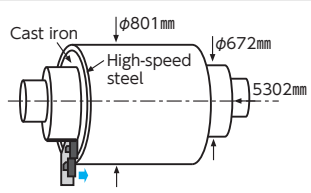
[Machining of a mill roll]

Machining of an alloy cast-iron roll

Work material : Alloy cast-iron	
Cutting speed (m/min) =40	
Feed rate (mm /rev) =0.2	
Depth of cut (mm) =20	
Cutting oil : DRY	
NTK : **HC2**	Over 43 min. per corner
Competitor : Whisker grade	20 min. per corner

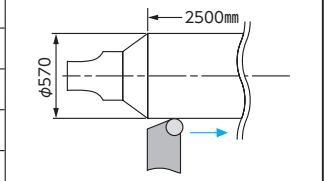
- Tool life : With the competitor's whisker-based insert, the surface being cut became overheated and the operation was ceased. With our HC2, the cutting operation continued up to 43 minutes or more on occasion. (The machined length was approx. 270 mm.)
- Chips : With the competitor's whisker-based tool, the chips were bluish and brittle/weak showing overheating, while the chips remained constant and normal when the HC2 grade was used.
- Wear : The competitor's product showed a great flank wear while HC2 remained in excellent condition.
- Overall evaluation : HC2 was proven to be superior in terms of tool life and cost.

Machining of a roll by simultaneous cutting of cast iron and high-speed steel

Work material : High-speed Cr steel	
Cutting speed (m/min) =63	
Feed rate (mm /rev) =0.15	
Depth of cut (mm) =63.5	
Cutting oil : DRY	
NTK : **HC7**	100mm
Competitor : Black ceramic	40mm

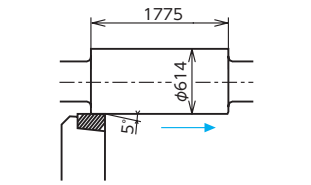
HC7 has better fracture resistance than the competitor's black ceramic, exhibiting a longer tool life.
The surface finish produced with the competitor's current product was poor, while the surface with our HC7 retained a high quality.

Machining of alloy cast-iron roll

Work material : High-Cr cast iron	
Cutting speed (m/min) =60	
Feed rate (mm /rev) =0.2	
Depth of cut (mm) =2.0	
Cutting oil : WET	
NTK : **B22**	2 passes
Competitor : CBN grade	1 passé

B22 exhibited twice longer tool life when compared with the competitor's CBN.

Roughing of high-speed roll

Work material : High-speed steel based	
Cutting speed (m/min) =11.8	
Feed rate (mm /rev) =1.0	
Depth of cut (mm) =7.0	
Cutting oil : DRY	
NTK : **WA1**	1 roll

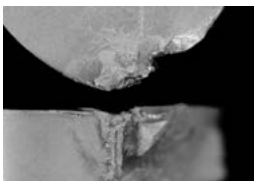
Conventionally the cutting speed was 8 m/min with a K20 carbide grade. But the cutting speed became approximately 1.5 times higher with the WA1 grade.

[Machining of heat-resistant alloys]

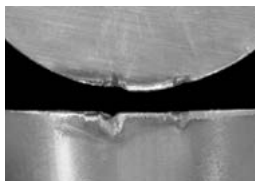
Semi-rough machining of turbine disc ●Work material : Inco 718

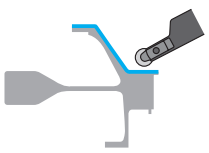
	Current	NTK
Grade	Whisker Ceramic	SX7
Shape	RPGX120700	←
Cutting speed (m/min)	240	←
Feed rate (mm/rev)	0.15	←
Depth of cut (mm)	1.50	←
Cutting oil	WET	←
Life (min)	7.0	←

Competion' s whisker Ceramic



SX7

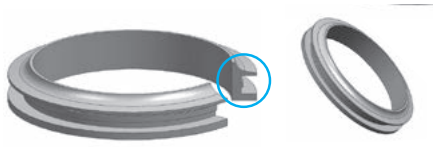


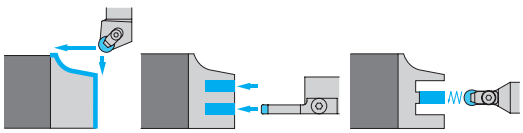


SX7, excellent in notching resistance, controlled insert chipping, on the other hand competitor's Whisker ceramic could not.

Machining of turbine disc

Inconel 718 (Gas turbine component)

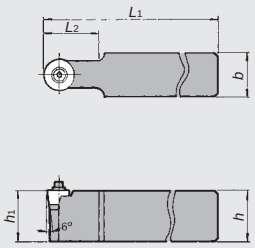




	OD turning	Grooving	Ramping
	WA1	WA1	WA1
Cutting speed (m/min)	300	300	300
Feed rate (mm/rev)	0.15	0.1	0.06
Depth of cut (mm)	3 – 4	–	2 – 3
Cutting oil	WET	WET	WET
Life (min)	20	20	20

The machin in g operation was stable when usin g WA1 for each process.

HRCD type



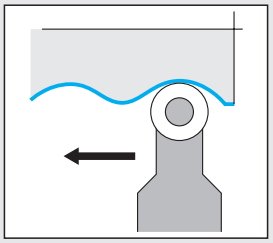
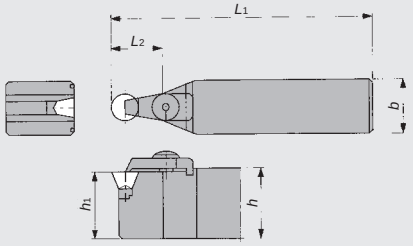


Figure-1

CRDC type



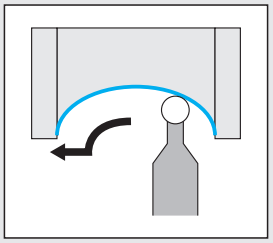
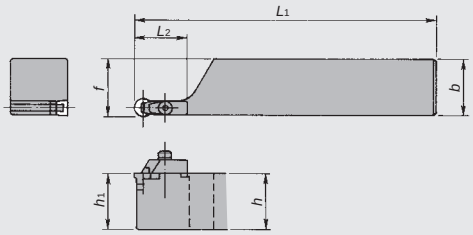


Figure-2

CRXC type



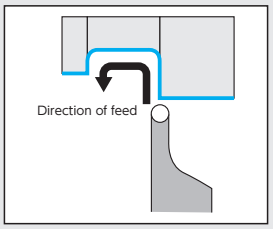


Figure-3

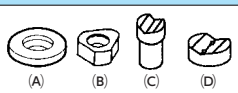
●Right-hand type shown.

Holder dimensions

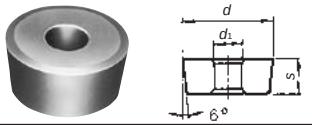
Shape	Code No. R	Code No. N	Code No. L	Holder Part No.	Stock R	Stock N	Stock L	h	b	L_1	h_1	f	L_2	Applicable insert	
Figure-1	5454921			HRCD-22	●			50	50	300	50	—	30		CDH22
	5144274			-33	●								50		CDH33
	5454947			-42									80		CDH42
	5844113			-43									80		CDH43
				-53									100		CDH53
Figure-2	5720750			CRDCN2525M06				25	25	150	25	—	20		※RCGX/RPGX0607(08)
	5478706			2525M09											※RCGX/RPGX0907(08)
	5691613			2525M12											※RCGX/RPGX1207(08)
	5911557			3225P06	●			32		170	32				※RCGX/RPGX0607(08)
	5829528			3225P09	●										※RCGX/RPGX0907(08)
	5829510			3225P12	●								25		※RCGX/RPGX1207(08)
	5634241			3232P15					32				30		RCGX/RPGX1510
Figure-3	5981469			CRXCR/L3232P09Y	●			32	32	170	32	32.7	28		RCGY090603
	5981188			3232P12Y	●								38		RCGY120603

※Both of thickness 07&08 can be used.

Parts

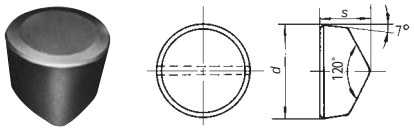
Part / Holder P/N	Cap screw	Button screw	Washer	Shim seat	Retaining screw	Spring	Clamp	Spring pin	Wrench
				 (A) (B) (C) (D)					
HRCD-22	CS0316		W120	HACDH22 (A)					LW-2.5
HRCD-33	CS0625		W110	HACDH33 (A)					LW-5
HRCD-42	1/4-20UNC＊11/4		W106	HACDH42 (A)					LWU-4
HRCD-43	1/4-20UNC＊11/2			HACDH43 (A)					
HRCD-53	3/8-16UNC＊11/2		W107	HACDH53 (A)					LWU-5
CRDCN3225P06		BS0520	WS-5	HARCGX06 (C)			HC35KR-4099	—	LW-3
CRDCN3225P09		BS0625	WS-6	HARCGX0908V (D)			HC35KR-6075	2＊8AW	LW-4
CRDCN3225P12				HARCGX1208V (D)			HC35KR-6076	2.5＊8AW	
CRXCR3232P09Y	CS0425		WS-4	HAR09Y (B)	M2＊8	ASGL4	CRN4		LW-3
CRXCR3232P12Y	CS0525		WS-5	HAR12Y (B)	M3＊8	ASGL5	CRN5		LW-4

CDH type [Inserts applicable for HRDC holders]



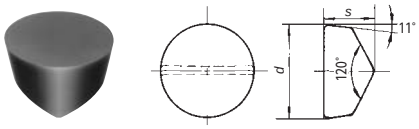
Part No.	Dimensions (mm) d	s	d_1	For machining of mill rolls HC2	Stock
CDH22PN	12.70	6.35	3.18	5455126	●
33PN	19.05	9.52	6.35	5496278	●
42PN	25.40	12.70	6.75	5444500	
43PN		19.05		5305404	
53PN	31.75	19.05	9.92	5448253	

RCGX type [Inserts applicable for CRDCN holders]



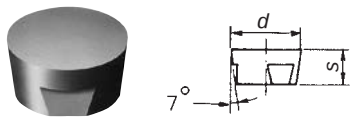
Part No.	Dimensions (mm) d	s	For machining of mill rolls HC2	Stock	HC5	Stock	For machining of heat-resistant alloys SX9	Stock	WA1	Stock	WA5	Stock
RCGX060400T00520	6.35	4.76							5661012	●	5790944	●
060700T00520		7.94							5661087	●		
0608PN		7.86			5118021	■						
090700T00520	9.525	7.94					5650130	●	5650429	●		
090700T01020									5661103	●		
090700T00820											5766027	●
0908PN		7.86	5559943	●	5118062	■						
0908TNB							5570163	●	5905674	●		
120700T00520	12.70	7.94					5650148	●	5650437	●		
120700T00820											5766035	●
120700T01020									5661111	●		
120700Z01520									5666243	●		
1208PN		7.86	5545660	●								
1208TNB							5570114	●				

RPGX type [Inserts applicable for CRDCN holders]



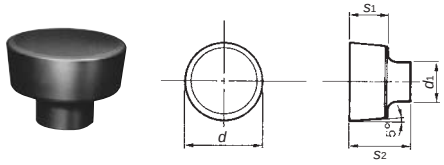
Part No.	Dimensions (mm) d	s	For machining of heat-resistant alloys SX7	Stock	SX9	Stock	WA1	Stock	WA5	Stock
RPGX060400T00520	6.35	4.76					5660956	●		
090700T00520	9.525	7.94			5650171	●	5650478	●		
090700T00820			5822291	●					5723507	●
0908TNB		7.86			5570171	●				
120700T00520	12.70	7.94			5650189	●	5650486	●		
120700T01020							5660964	●		
120700T00820			5822283	●					5751441	●
1208TNB		7.86			5570122	●				

RCGY type [Inserts applicable for CRXC holders]



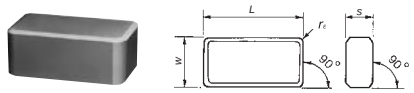
Part No.	Dimensions (mm) d	s	For machining of heat-resistant alloys WA1	Stock
RCGY090603TNB	9.525	6.35	5981477	●
120603TNB	12.70	6.35	5981451	●

RBGX type [Inserts applicable for CRXC holders]



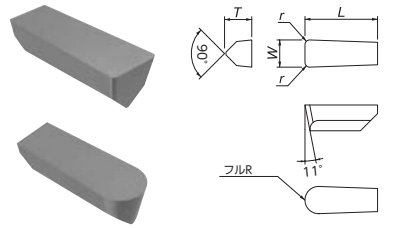
Part No.	Dimensions (mm) d	d_1	s_1	s_2	For machining of mill rolls HC2	Stock	WA1	Stock	B22	Stock
RBGX16SPN	16	8	8	13	5535331	●				
16SSN2							5971841	●		
16S									5972765	●
20SPN	20	10	10	15	5564638	●				
20SSN3										
20S									5972773	●
26SPN	26	14	10	15	5539465	●				
26SSN3							5971825	●		

LNG, LNM type [Inserts applicable for CRXC holders]



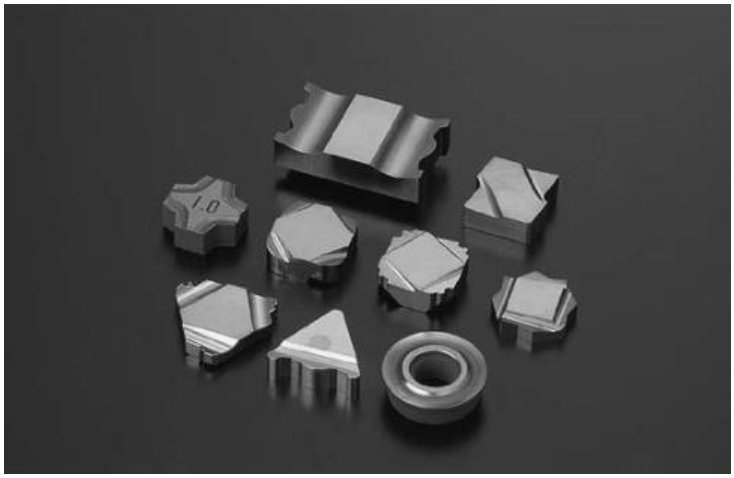
Part No.	Dimensions (mm) w	L	s	r_ε	For machining of mill rolls SP2	Stock	WA1	Stock	WA5	Stock
LNM6688PNX8	19.05	38.10	12.70	3.2					5791066	●
6688SN2	19.05	38.10	12.70	3.2			5971858	●		
6688PN9	19.05	38.10	12.70	3.2	5020003	■				

VGW type (Only inserts listed)



Part No.	Dimensions (mm) W	r	T	L	For machining of heat-resistant alloys WA1	Stock	WA5	Stock
VGW4125-2EX0001	3.18	0.8	4.75	12.7	5663323	●	5790951	●
4125-REX0001		Full R			5663489	●	5790969	●
4156-2EX0001	3.96	0.8			5663349	●	5790977	●
4156-REX0001		Full R			5663497	●	5790985	●
4187-2EX0001	4.75	0.8			5663364	●	5790993	●
4187-REX0001		Full R			5663505	●	5791009	●
6250-2EX0001	6.35	0.8	6.35	19.05	5663414	●	5791017	●
6250-REX0001		Full R			5663521	●	5791025	●
8375-2EX0001	9.525	0.8	8.56	25.4	5663463	●	5791033	●
8375-REX0001		Full R			5663562	●	5791041	●

Tools for Machining of Bearings

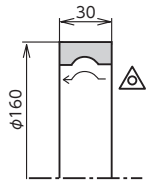


Inserts applicable for CRXC

	Features	Applications
TiC – TiN-based cermet **T15**	Very hard tool materials excellent in wear resistance, having a refined micro structure obtained by combining TiC, the main component of cermet, with TiN.	Boring, turning, facing and machining of profiles
TiN-based cermet **N40**	It is NTK that introduced nitride-based material grades to the world market. This material grade is composed mainly of titanium nitride. It has all the advantages of and higher toughness than the existing TiC-TiN based cermet grades as it has a special alloy-like structure. ● Excellent fracture resistance ● Excellent size control	Boring, turning, facing, radius inserts and grooving
TiCN-based cermet **C7X**	By a special alloying process and through a metal binding phase, C7X was developed as a tool material that remarkably improved heat resistance. It is a totally new tool material covering a wide range of cutting requirements, having both outstandingly thermal shock resistance and mechanical strength.	Machining of profiles, seal grooving and radius machining

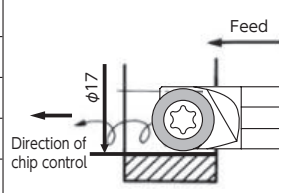
Actual machining examples

Machining of a bearing

Work material : SUJ2 (HB180)	
Cutting speed (m/min) = 180	
Feed rate (mm /rev) = 0.3	
Depth of cut (mm) = 2 ~ 3	
Cutting oil : WET	
NTK : **N40**	120 pcs/corner
Competitor' s TiC-TiN based cermet	80 pcs/corner

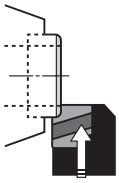
N40 exhibited 1.5 times longer tool life when compared with the competitor's cermet. General TiC-TiN based cermet tools frequently fracture in areas where there is sudden depth of cut changes, thus it has been difficult to put them into practical use due to unstable tool life. However, the N40 grade allowed a stable machining operation, exhibiting little of this type of failure.

Bearing machining (GB breaker)

Work material : SUJ2	
Cutting speed (m/min) = 65	
Feed rate (mm /rev) = 1.2	
Depth of cut (mm) = 0.7	
Cutting oil : DRY	
NTK : **N40**	3,000 pcs/corner
Competitor' s carbide tool	20 min. per corner

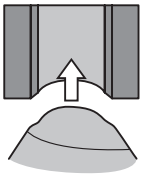
N40 exhibited 1.5 times longer tool life when compared with the competitor' s carbide. It was also possible to increase the feed rate 5 times the original setting, resulting in great improvement in machining efficiency.

R-chamfering of a bearing

Work material : SUJ2	
Cutting speed (m/min) = 110	
Feed rate (mm /rev) = 0.2	
Cutting oil : DRY	
NTK : **C7X**	2,600 pcs/corner

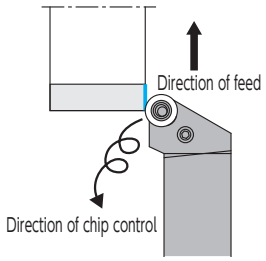
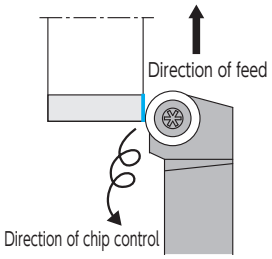
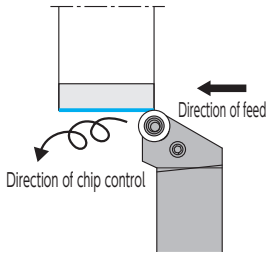
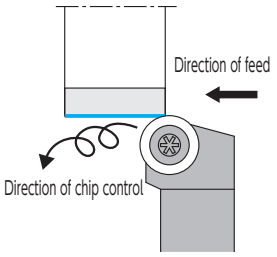
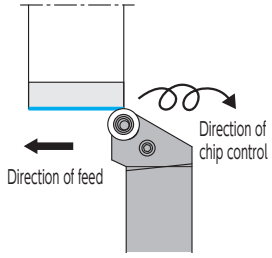
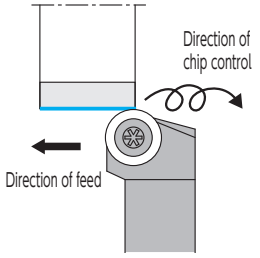
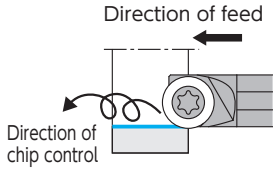
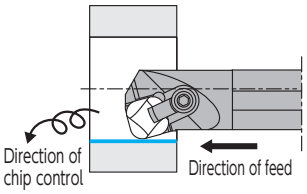
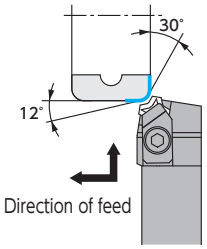
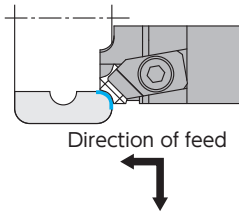
C7X was evaluated in an operation to produce a radius on a bearing component.
No thermal cracking was evident on the cutting edge of C7X. The growth of the wear on the major flank was also very limited.

Grooving of a bearing

Work material : SUJ2	
Cutting speed (m/min) = 65	
Feed rate (mm /rev) = 0.15	
Cutting oil : DRY	
NTK : **C7X**	10,000 pcs/corner

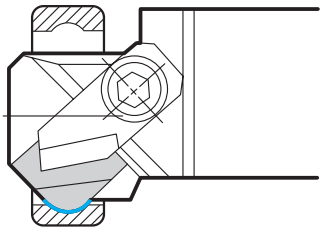
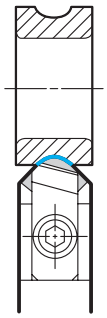
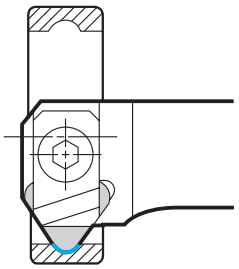
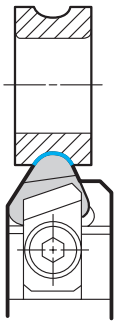
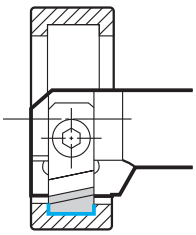
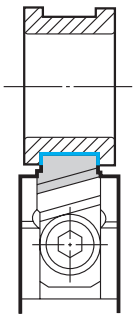
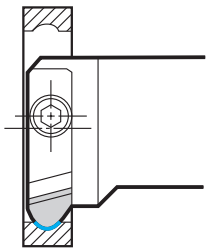
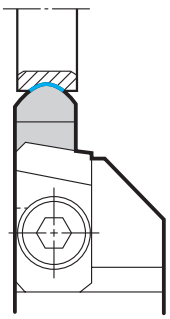
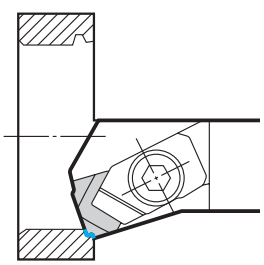
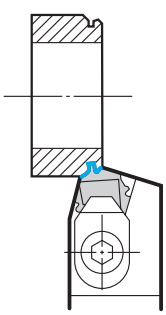
In this process, thermal concentration is produced on one area of the insert, where the radius and chamfer operations overlap.. Thus, fracture and chipping due to thermal shock often occurs. But with C7X, which is highly resistant to thermal shock, no thermal cracking was seen on these areas, achieving stable tool life.

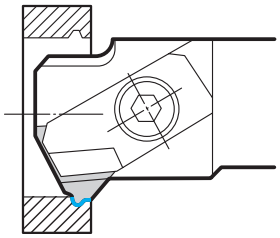
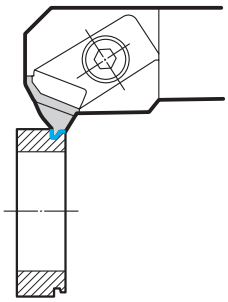
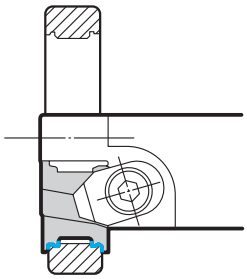
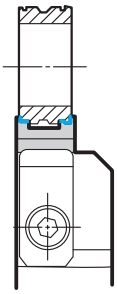
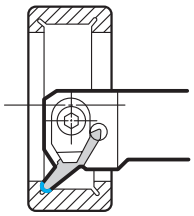
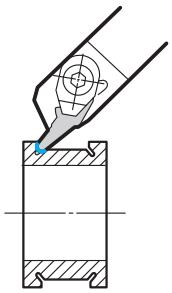
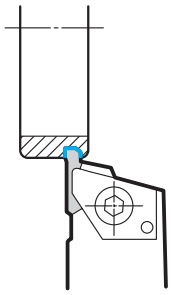
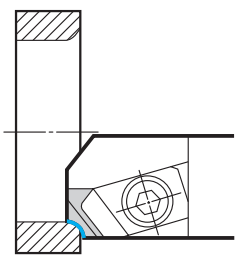
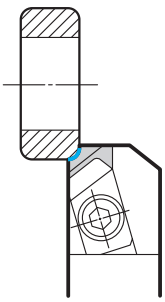
Application example with standard type inserts

Process and holder type	Application example with standard type inserts
Face turning PRFP type SRF type	●PRFP-B  ●SRF-B  It is so designed that chips flow in the opposite direction to the feed.
OD turning PRGP type PRGN type SRG type	●PRGP-F  ●SRG-F  It is so designed that the chips flow in the same direction as the feed.
	●PRGP-B  ●SRG-B  It is so designed that the chips flow in the opposite direction to the feed
Boring bar S-SRC type C-SRC type BBR type	●S : Steel shank ●C : Carbide shank  ●BBR  It is so designed that chips flow in the same direction as the feed.
Radius machining CBS type CBU type CBN type CBG type	●CBS-F・B ●CBS-F  ●CBU-B ●CBN-B 

Tools for Machining of Bearings

Tools available on production to order basis

	Tools available on production to order basis	
	Outer race	Inner race
Machining of raceways KSN type KTN type KSP type KV type	●KSN 	●KSN 
	●KTN 	●KTN 
	●KSP 	●KSP 
	●KV 	●KV 
Seal grooving SSN type	●SSN 	●SSN 

	Tools available on production to order basis	
	Outer race	Inner race
Seal grooving STN type SV type	●STN 	●STN 
	●SV 	●SV 
Clearance grooving FD type	●FD 	●FD 
Shaped grooving GTMA type	●GTMA 	
Radius machining BSGN type	●BSGN 	●BSGN 

Holders for machining of bearings (Holders for radius machining)

CBG···F type

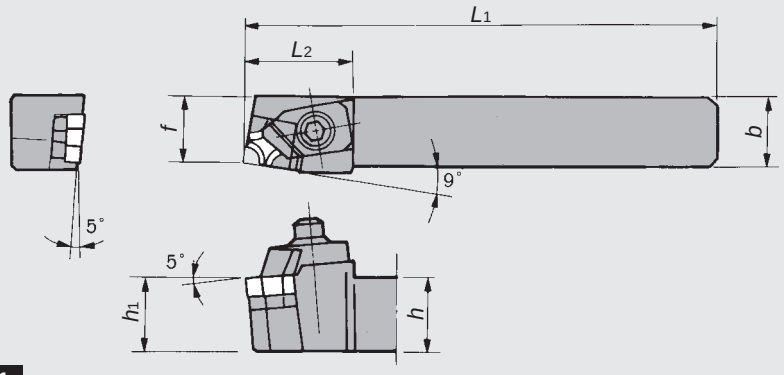
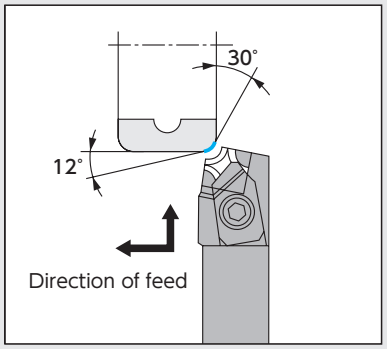


Figure-1



(Insert with θ = 21 mounted)

●Right-hand type shown.

CBS···B type

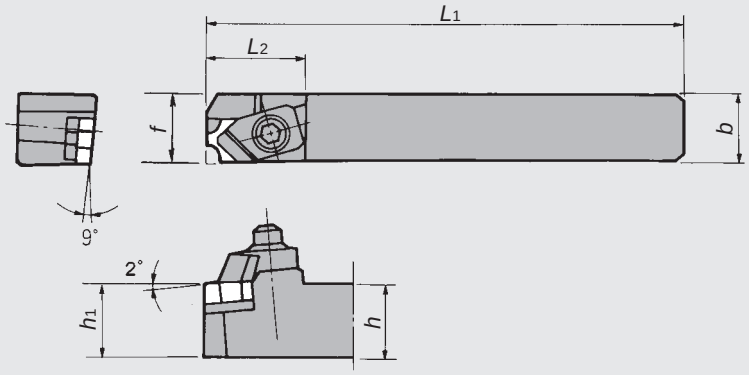
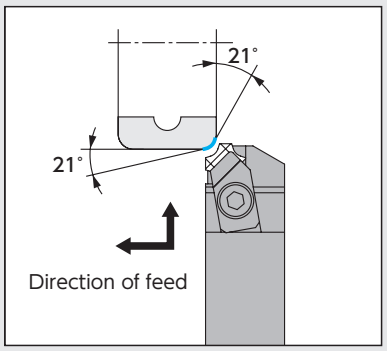


Figure-2



(Insert with θ = 21 mounted)

●Right-hand type shown.

CBS···F type

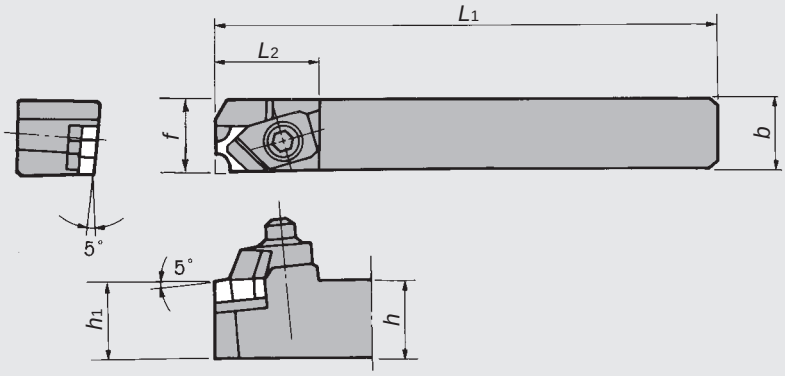
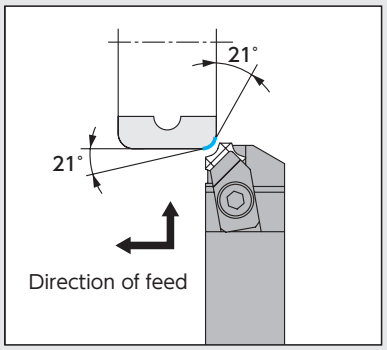


Figure-3



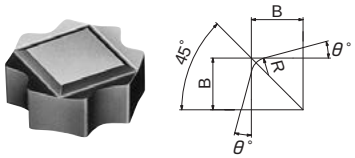
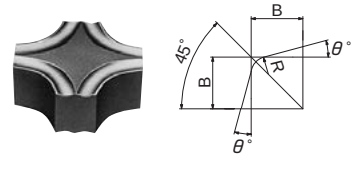
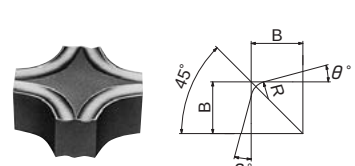
(Insert with θ = 21 mounted)

●Right-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder P/N	Stock R	Stock L	h	b	L_1	h_1	f	L_2	Applicable insert		Cap screw	Washer	Shim seat	Retaining screw	Clamp	Wrench
Figure-1	5745286		CBG$^{R}_{L}$20K43F	●		20	20	125	20	20	30		BSMF43□□T (See table below)	CS0625	WS-6	ABS42	M3＊8	CB$^{R}_{L}$4	LW-5
	5745302		25M43F	●		25	25	150	25	25	30								
Figure-2			CBS$^{R}_{L}$16K32B			16	16	125	16	16	23	BSMF32 (See table below)		CS0520	WS-5	ABS32	M2＊6	CB$^{R}_{L}$3	LW-4
	5745021	5745039	20K43B	●	●	20	20	125	20	20	28	BSMF43 (See table below)	BSMF43 (See table below)	CS0625	WS-6	ABS42	M3＊8	CB$^{R}_{L}$4	LW-5
			25M43B			25	25	150	25	32	28								
			25M53B			25	25	150	25	32	35	BSGF53				ABS52	M4＊10	CB$^{R}_{L}$5	
Figure-3	5745070		CBS$^{R}_{L}$16K32F	●		16	16	125	16	16	23	BSMF32 (See table below)		CS0520	WS-5	ABS32	M2＊6	CB$^{R}_{L}$3	LW-4
	5745104	5745112	20K43F	●	●	20	20	125	20	20	28	BSMF43 (See table below)	BSMF43 (See table below)	CS0625	WS-6	ABS42	M3＊8	CB$^{R}_{L}$4	LW-5
	5745120		25M43F	●		25	25	150	25	25	28								
	5745153	5745146	25M53F	●	●	25	25	150	25	25	35	BSGF53				ABS52	M4＊10	CB$^{R}_{L}$5	

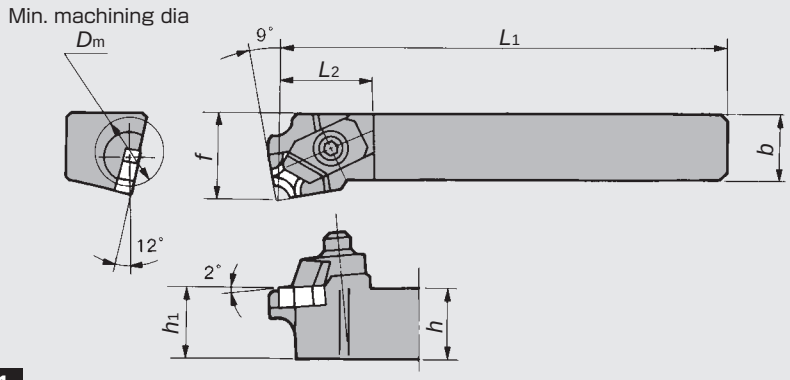
BSMF type

Shape	Part No.	Dimensions (mm) R	θ	B	Inscribed circle	Thickness	Cermet T15	Stock	Cermet N40	Stock
	BSMF3206D20EM	0.6	15°	2.0	9.525	3.18				
	3206H20EM	0.6	18°	2.0					5531629	●
	4315H29EM	1.5	18°	2.9	12.70	4.76	5521182	●		
	4320H26EM	2.0	18°	2.6					5486873	●
	4330H33EM	3.0	18°	3.3			5509476	●		
	BSMF4308D34EN	0.8	15°	3.4	12.70	4.76			5903315	●
	4310H30EN	1.0	18°	3.0					5802962	●
	4312D29EN	1.2	15°	2.9					5453246	●
	4317D29EN	1.7	15°	2.9					5467972	●
	4320H26EN	2.0	18°	2.6					5480322	●
	4330H37EN	3.0	18°	3.7					5486477	●
	4335H39EN	3.5	18°	3.9					5531637	●
	BSMF4206T20EN	0.6	21°	2.0	12.70	3.18			5779962	●
	4210T30EN	1.0	21°	3.0						
	4216T35EN	1.6	21°	3.5						
	4221T35EN	2.1	21°	3.5						
	4306T20EN	0.6	21°	2.0	12.70	4.76			5780002	●
	4310T30EN	1.0	21°	3.0					5779970	●
	4316T35EN	1.6	21°	3.5					5779988	●
	4321T35EN	2.1	21°	3.5					5779996	●

Holders for machining of bearing (internal radius machining)

CBN···B type

Minimum machining diameter: From ϕ15



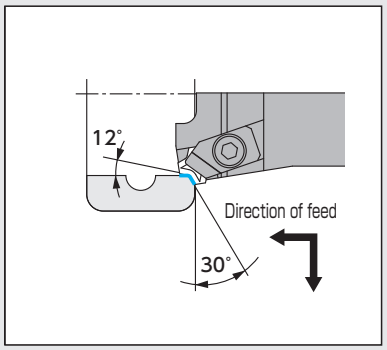
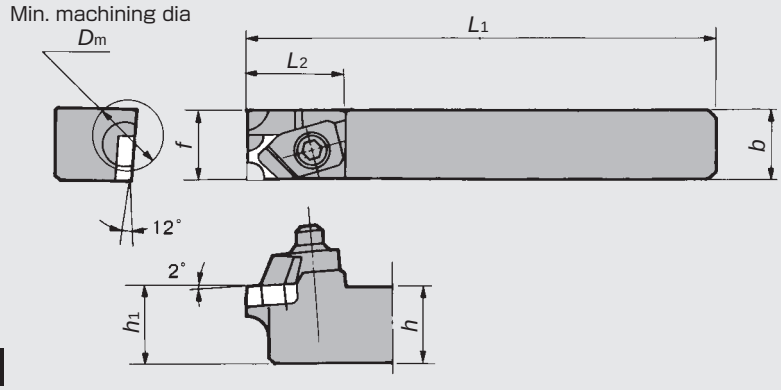


Figure-1

●Right-hand type shown.

CBU···B type

Minimum machining diameter: From ϕ15



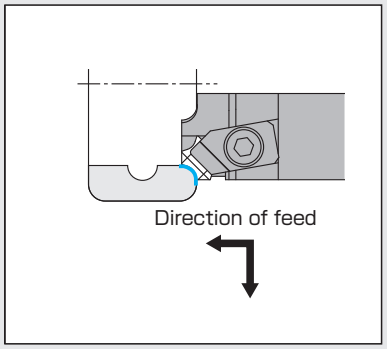


Figure-2

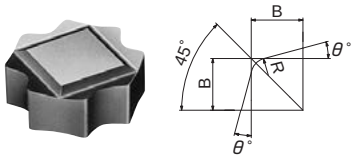
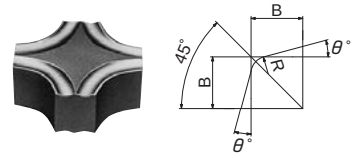
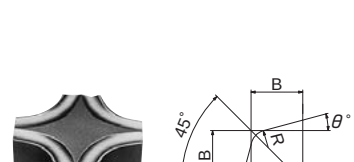
●Right-hand type shown.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder P/N	Stock R	Stock L	Min. machining dia. (mm) Dm	Dimensions (mm) h	b	L1	h1	f	L2	Applicable insert		Cap screw	Washer	Clamp	Wrench
Figure-1			CBNR/L20K42B			15	20	20	125	20	25	28		BSMF42□□T M13	CS0625	WS-6	CBR/L4	LW-5
			25M42B			15	25	25	150	25	32	28						
	5745328		20K43B	●		20	20	20	125	20	25	28		BSMF43□□T M13				
	5745344		25M43B	●		20	25	25	150	25	32	28						
Figure-2	5745203		CBUR/L20K42B	●		15	20	20	125	20	20	28		BSMF42 M13	CS0625	WS-6	CBR/L4	LW-5
			25M42B			15	25	25	150	25	25	28						
	5745161		20K43B	●		20	20	20	125	20	20	28	BSMF43 M13	BSMF43 M13				
	5745187		25M43B	●		20	25	25	150	25	25	28						

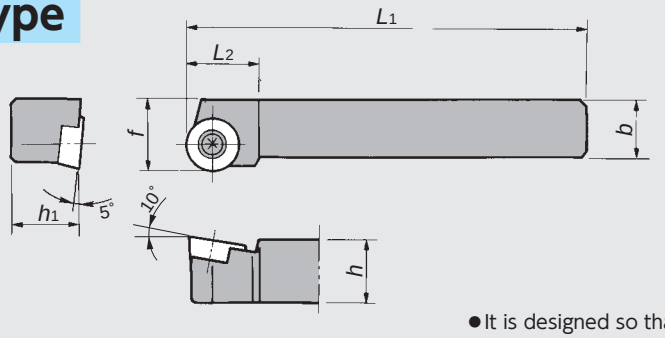
Applicable inserts

BSMF type

Shape	Part No.	Dimensions (mm)					Cermet			
		R	θ	B	Inscribed circle	Thickness	T15	Stock	N40	Stock
	**BSMF3206D20EM**	0.6	15°	2.0	9.525	3.18				
	3206H20EM	0.6	18°	2.0					5531629	●
	4315H29EM	1.5	18°	2.9	12.70	4.76	5521182	●		
	4320H26EM	2.0	18°	2.6					5486873	●
	4330H33EM	3.0	18°	3.3			5509476	●		
	**BSMF4308D34EN**	0.8	15°	3.4	12.70	4.76			5903315	●
	4310H30EN	1.0	18°	3.0					5802962	●
	4312D29EN	1.2	15°	2.9					5453246	●
	4317D29EN	1.7	15°	2.9					5467972	●
	4320H26EN	2.0	18°	2.6					5480322	●
	4330H37EN	3.0	18°	3.7					5486477	●
	4335H39EN	3.5	18°	3.9					5531637	●
	**BSMF4206T20EN**	0.6	21°	2.0	12.70	3.18			5779962	●
	4210T30EN	1.0	21°	3.0						
	4216T35EN	1.6	21°	3.5						
	4221T35EN	2.1	21°	3.5						
	4306T20EN	0.6	21°	2.0	12.70	4.76			5780002	●
	4310T30EN	1.0	21°	3.0					5779970	●
	4316T35EN	1.6	21°	3.5					5779988	●
	4321T35EN	2.1	21°	3.5					5779996	●

Holders for turning (Screw-on type)

SRF···B type



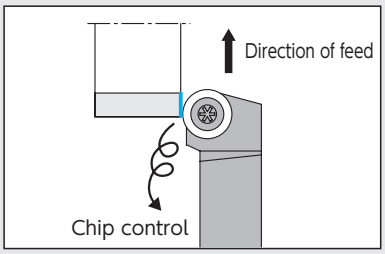
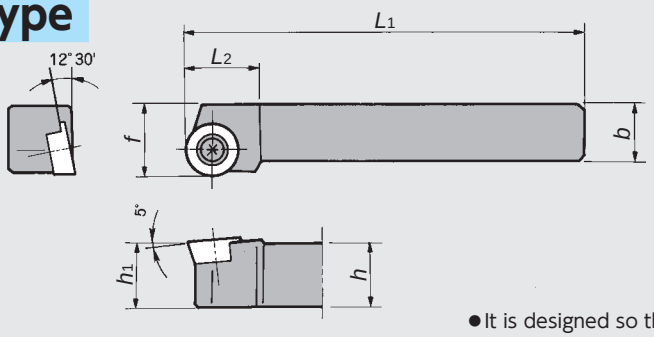


Figure-1

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

SRG···B type



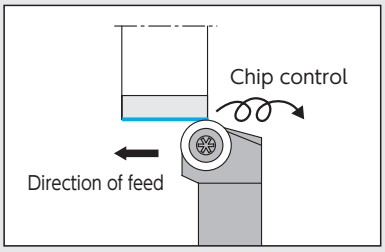
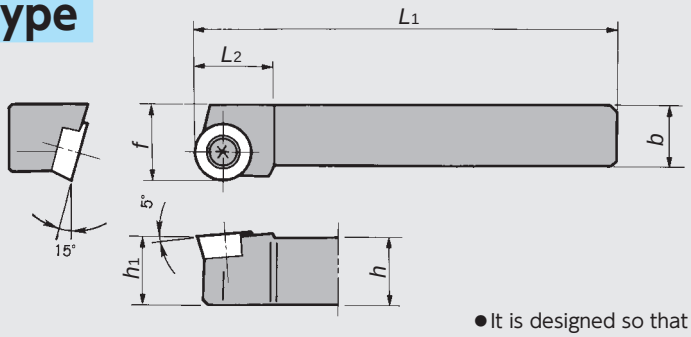


Figure-2

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

SRG···F type



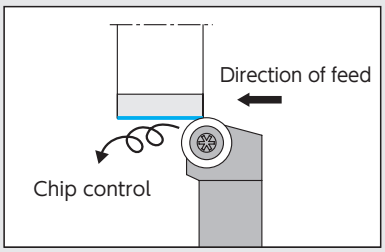


Figure-3

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder P/N	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Applicable insert	Clamping screw	Wrench
Figure-1			SRF$^{R}_{L}$20K16B			20	20	125	20	25	20	RPMT1604M0GB	LRIS-5＊10	LLR-28S
			25M20B			25	25	150	25	32	25	RPMT2004M0GB		
Figure-2	5744925		SRG$^{R}_{L}$20K16B	●		20	20	125	20	25	20	RPMT1604M0GB	LRIS-5＊10	LLR-28S
			25M20B			25	25	150	25	32	25	RPMT2004M0GB		
Figure-3	5744883	5744891	SRG$^{R}_{L}$20K16F	●	●	20	20	125	20	25	20	RPMT1604M0GB	LRIS-5＊10	LLR-28S
	5744909		25M20F	●		25	25	150	25	32	25	RPMT2004M0GB		

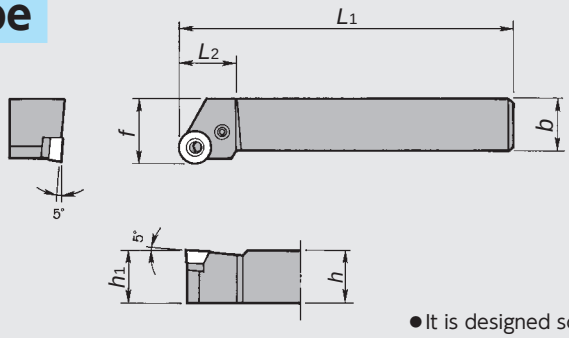
Applicable inserts

RPMT type

Shape	Part No.	Dimensions (mm) Inscribed circle	Dimensions (mm) Thickness	Cermet N40	Stock	Cermet C7X	Stock
	RPMT1604M0GB	16.0	4.76	5779947	●	5641121	●
	2004M0GB	20.0	4.76	5779954	●	5641139	●

Holders for turning (Lever-locking type)

PRFP···B type



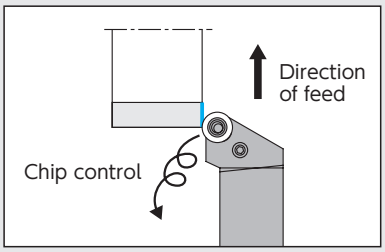
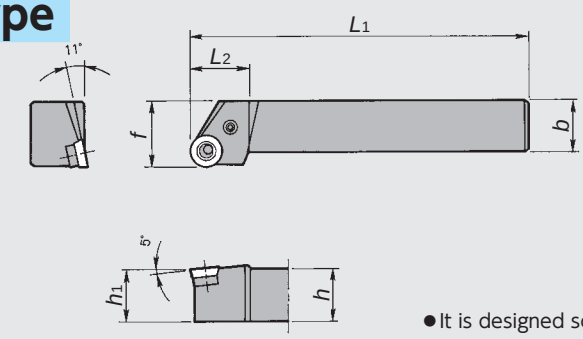


Figure-1

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

PRGP···B type



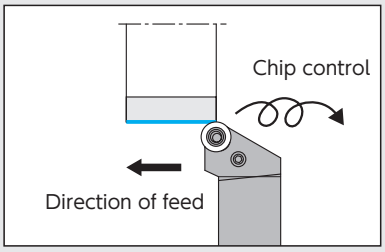
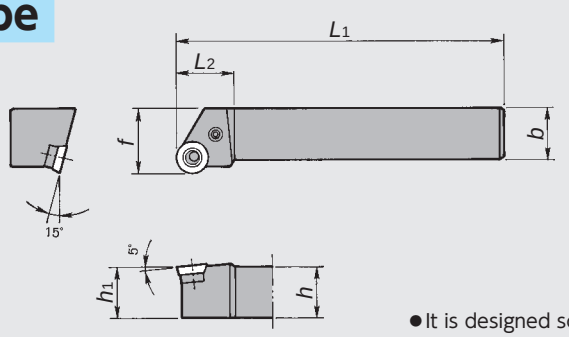


Figure-2

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

PRGP···F type



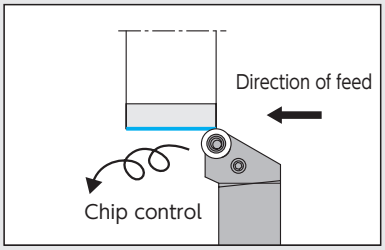


Figure-3

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder P/N	Stock R	Stock L	Dimensions (mm) h	b	L_1	h_1	f	L_2	Applicable insert	Shim seat	Lever	Clamping screw	Spring	Wrench
Figure-1	5905906		PRFPR/L20K1203B	●		20	20	125	20	25	22	RPMX1203M0GB	ELSR42C	LCL4C	LCS3	LSP3	LW-2.5
	5905997		25M1203B	●		25	25	150	25	32	22						
Figure-2	5905989		PRGPR/L20K1203B	●		20	20	125	20	25	22	RPMX1203M0GB	ELSR42C	LCL4C	LCS3	LSP3	LW-2.5
	5905963		25M1203B	●		25	25	150	25	32	22						
Figure-3	5905948		PRGPR/L20K1203F	●		20	20	125	20	25	22	RPMX1203M0GB	ELSR42C	LCL4C	LCS3	LSP3	LW-2.5
	5905922		25M1203F	●		25	25	150	25	32	22						

Applicable inserts

RPMX type

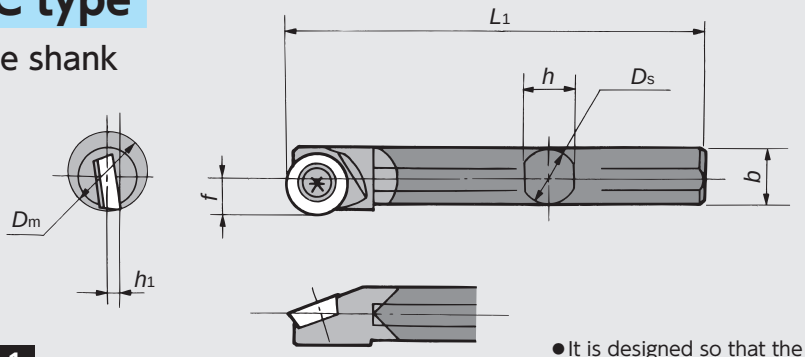
Shape	Part No.	Dimensions (mm) Inscribed circle	Dimensions (mm) Thickness	Cermet N40	Stock	Cermet C7X	Stock
	RPMX1203M0GB	12.0	3.18	5909718	●	5641154	●

※The screw head shape differs between the RPMX and RPMT. Use the PRMX for the lever locking type.

Boring bars (Screw-on type)

C-SRC type

Carbide shank



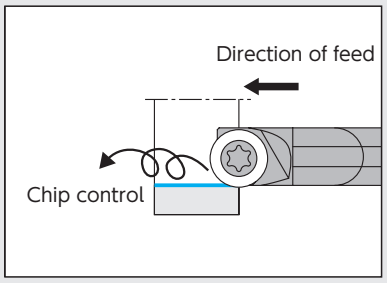


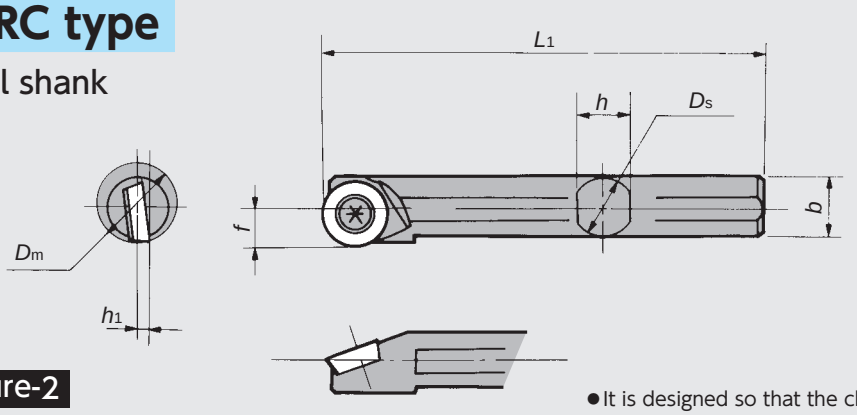
Figure-1

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

Note) Only the holder marked with an asterisk (*) have an effective machining depth of 11 mm (L2 = 11 mm).

S-SRC type

Steel shank



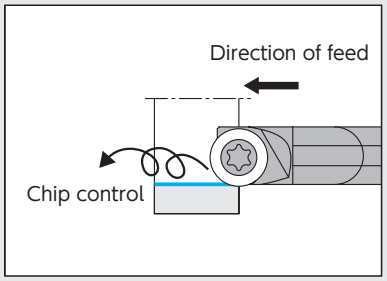


Figure-2

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

Holder dimensions

Shape	Code No. R	Code No. L	Toolholder P/N	Stock R	Stock L	Ds	h	L1	f	b	h1	Dm	Min. machining dia.	Applicable insert	Clamping screw	Wrench
Figure-1	5811385		C08K-SRC$^{R}_{L}$06F	●		8	7	125	4.0	7.5	1.0	8		RPMT0602M0GB	LRIS-2.2＊6	CLR-13S (C)
	5744701		-SRC$^{R}_{L}$08F	●		8	7	125	4.5	7.5	0.8	10		RPMT0802M0GB	LRIS-3＊6	RLR-20S (B)
	5744727		C10M-SRC$^{R}_{L}$10F	●		10	9	150	5.5	9.5	1.2	12		RPMT10T2M0GB	LRIS-4＊6	LLR-25S (A)
			C12M-SRC$^{R}_{L}$12F			12	11	150	6.5	11.5	1.5	15		RPMT1203M0GB	LRIS-4＊8	
Figure-2	5744750		S08K-SRC$^{R}_{L}$08F	●		8	7	125	4.5	7.5	0.3	10		RPMT0802M0GB	LRIS-3＊6	RLR-20S (B)
	5744784		S10M-SRC$^{R}_{L}$10F	●		10	9	150	5.5	9.5	1.2	12		RPMT10T2M0GB	LRIS-4＊6	LLR-25S (A)
	5744800		S12M-SRC$^{R}_{L}$12F	●		12	11	150	6.5	11.5	1.5	15		RPMT1203M0GB	LRIS-4＊8	
	5744826		S16Q-SRC$^{R}_{L}$16F	●		16	15	180	8.5	15.5	2.0	20		RPMT1604M0GB	LRIS-5＊10	LLR-28S (A)
	5744842		S20Q-SRC$^{R}_{L}$20F	●		20	19	180	10.5	19.5	2.0	25		RPMT2004M0GB	—	
	5744867		S25Q-SRC$^{R}_{L}$20F	●		25	24	180	13.0	24.5	2.0	30			—	

Applicable inserts

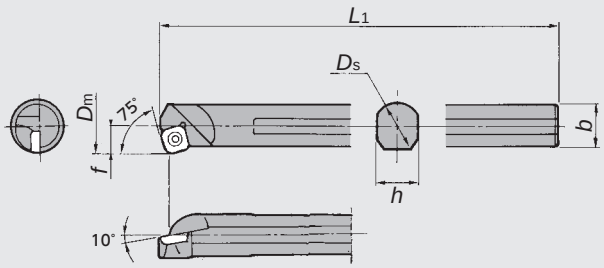
RPMT type

Shape	Part No.	Dimensions (mm) Inscribed circle	Dimensions (mm) Thickness	Cermet N40	Stock	Cermet C7X	Stock
	RPMT0602M0GB	6.0	2.38	5827217	●	5641089	●
	0802M0GB	8.0	2.38	5779913	●	5641097	●
	10T2M0GB	10.0	2.78	5779921	●	5641105	●
	1203M0GB	12.0	3.18	5779939	●	5641113	●
	1604M0GB	16.0	4.76	5779947	●	5611121	●
	2004M0GB	20.0	4.76	5779954	●	5641139	●

Tools for Bearings (for boring)

BBR type

Screw-on type
Steel shank
Minimum machining diameter : ϕ15 - 20
Hole provided



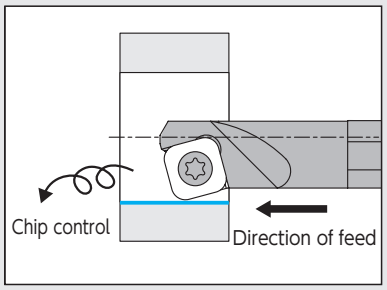
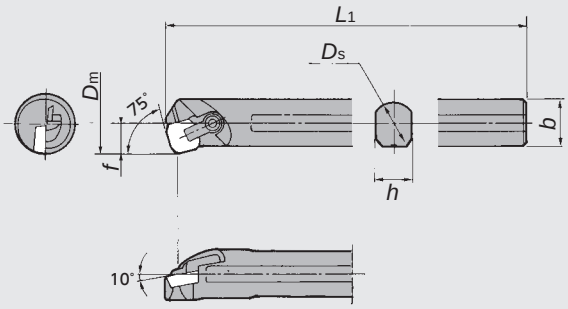


Figure-1

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

BBR type

Clamp-on type
Steel shank
Minimum machining diameter : ϕ25 - 30
Hole not provided



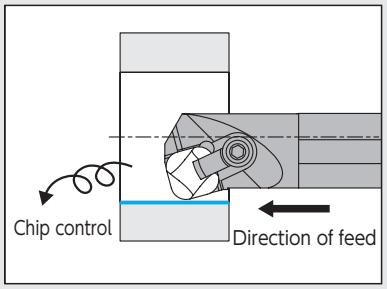


Figure-2

- Right-hand type shown.
- It is designed so that the chips flow opposite to the direction of feed.

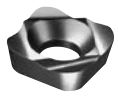
Holder dimensions

Shape	Code No.	Toolholder P/N	Stock R	Stock L	Dimensions (mm) D_s	h	b	L_1	f	Min. machining dia. D_m	Applicable insert			Clamping screw	Clamp	Double screw	Wrench
Figure-1	5526801	**BBR1532**	●		12	11	11.5	150	7.5	15	SPMH326LH1 SPMH328LH1	—	—	LR-S-4＊5.8	—	—	RLR-20S
	5526819	**2032**	●		16	15	15.5	150	10	20							
Figure-2	5526827	**BBR2543**	●		20	19	19.5	150	12.5	25	—	SPMR4310TL-H2	SPMN4310TN	—	AM-612L-9	WS0616	LW-3
	5534102	**3043**	●		25	24	24.5	180	15.0	30							

※If burring on exit is an issue, please use SPMH328LH1.

Applicable inserts

SPMH type

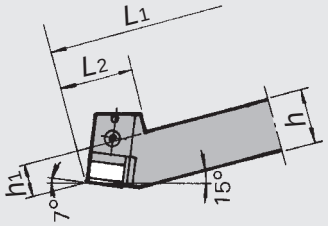
Shape	Part No. Metric system	Part No. Inch system	Dimensions (mm) Inscribed circle	Thickness	Nose radius	Cermet T15	Stock
	**SPMH090324TLBH1**	**SPMH326-TLB-H1**	9.525	3.18	2.4	5657614	●
	090332TLAH1	**328-TLA-H1**	9.525	3.18	3.2	5661541	●

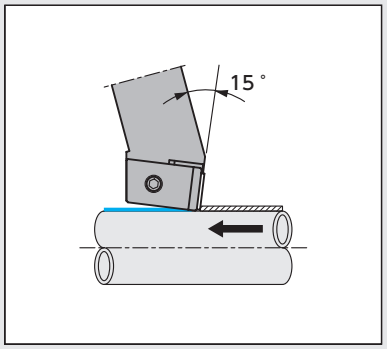
SPM type

Shape	Part No. Metric system	Part No. Inch system	Dimensions (mm) Inscribed circle	Thickness	Nose radius	Cermet T15	Stock
	SPMN120440TN	**SPMN4310TN**	12.70	4.76	4.0	5530373	●
	SPMR120440TLH2	**SPMR4310TL--H2**	12.70	4.76	4.0	5657606	●

ATS type

HN59ATS (Right-handed)
HN60ATS (Left-handed)





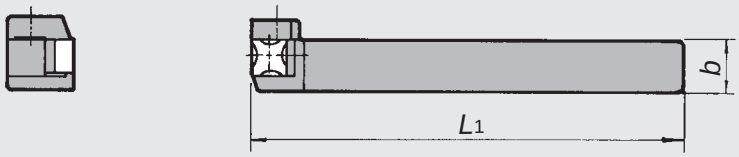
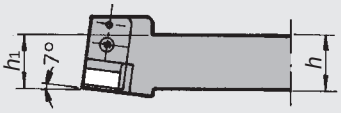


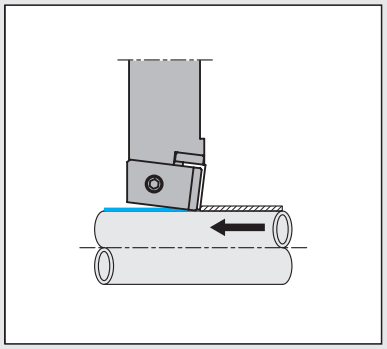
Figure-1

●Right-hand type (60) shown.

BTS type

HN59BTS (Right-handed)
HN60BTS (Left-handed)





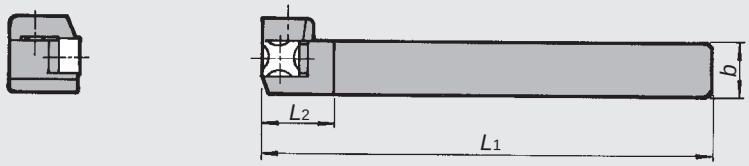


Figure-2

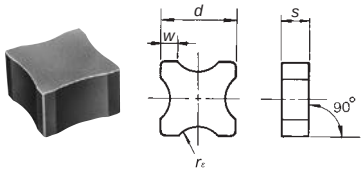
●Right-hand type (60) shown.

Holder dimensions

Shape	Code No. 59	Code No. 60	Toolholder P/N	Stock 59	Stock 60	Dimensions (mm) h	b	L_1	h_1	L_2	Applicable insert	Shim seat	Retaining screw	Clamp	Double screw	Wrench
Figure-1	5350574		HN59/60ATS-33E			19	19	160	12.5	26	TSN45-□□ **M19**	ASN423 AZT659D	M3＊5.5 M3＊8	HC59/60TS-4	WS0620	LW-3
			-44E	●		25	25	160	18.5	26						
			-44E-5			25	25	160	18.5	26	TSN55-□□ **M19**	ASN522 HAZT1255A	M3＊8 M4＊5.5			
Figure-2			HN59/60BTS-33E			19	19	160	19	25	TSN45-□□ **M19**	ASN423 AZT659D	M3＊5.5 M3＊8	HC59/60TS-4	WS0620	LW-3
			-44E			25	25	160	25	25						
			-44E-5			25	25	160	25	25	TSN55-□□ **M19**	ASN522 HAZT1255A	M3＊8 M4＊5.5			

Applicable inserts

TSN type

Shape	Part No.	Dimensions (mm)				Cermet	
		r_ε	w	d	s	CX3※	Stock
	**TSN45-10**	10	2.10	12.70	7.94	5125323	●
	-12	12				5119987	●
	-14	14				5123914	●
	-16	16				5119995	●
	-18	18				5124839	●
	-20	20				5120001	●
	-25	25				5120027	●
	-30	30				5120019	●
	-35	35				5123922	●
	-40	40				5123948	●
	-50	50				5123906	●
	-60	60					
	-70	70					
	TSN55-15	15	3.20	15.875	7.94		
	-20	20				5270244	●
	-25	25				5270251	●
	-30	30				5270269	●
	-35	35				5144936	●
	-40	40				5271218	●
	-45	45				5144944	●
	-70	70					

※CX3 is an alumina-based ceramic similar to HC1.

Actual machining example

Tube scarfing

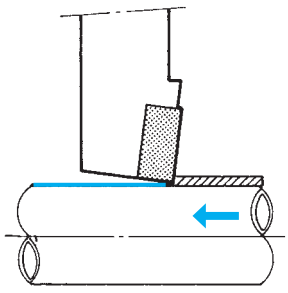
Work material : SPHT4

Cutting speed (m/min) = 70

Depth of cut (mm) = 3.0

Width of cutting (mm) = 5.0

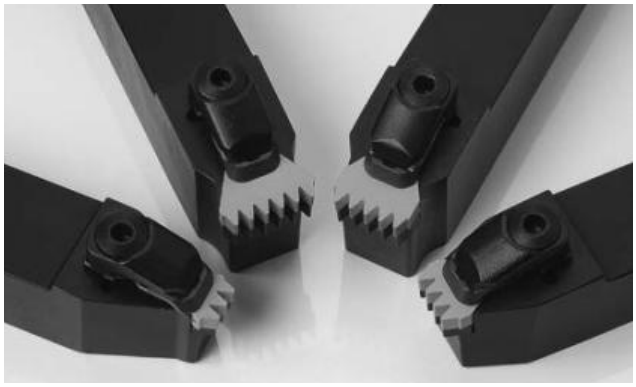
Cutting oil : DRY

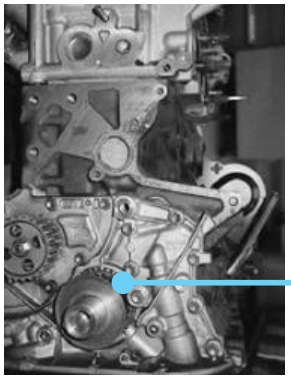


NTK : **CX3**	70 min./corner
Competitor's black ceramic grade	30 min./corner

CX3 exhibited a tool life more than double that of the competitor's black ceramic tool.

1. Features and applications of V-pulleys





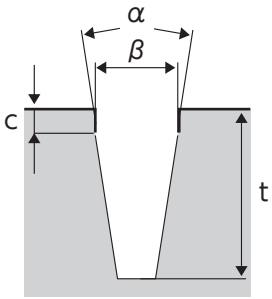
A V-pulley is a rotary component that can rotate on a shaft and has vee shaped grooves around the circumference which are rotated by the force of a matching belt installed around the pulley. Combinations of such pulleys can generate a driving force greater than originally applied.

⟨Major applications⟩

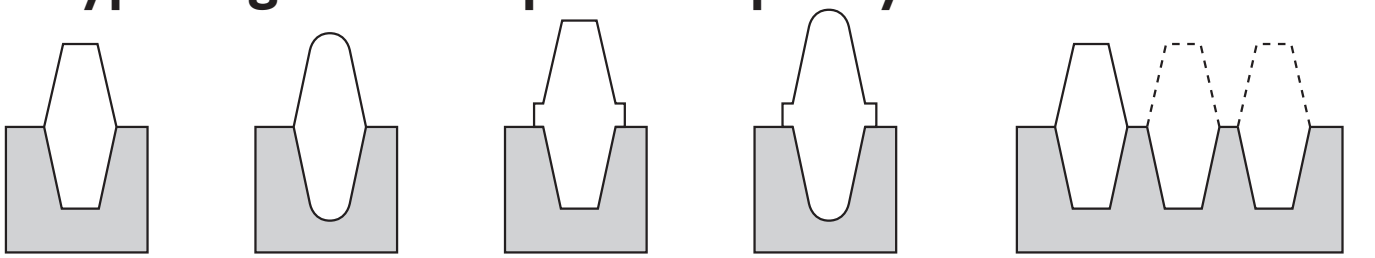
- Engines, transmissions and other automobile parts
- Various machine tools including NC lathes
- Air conditioning units, power tools and home electric appliances
- Sewing machines, elevators and others

2. Shapes and specifications/dimensions of V-pulleys

Main dimensions of V-pulley / V-belt shape code (ISO/DIN/JIS)		α(°, ′)	β (mm)	c (mm)	t (mm)
SPZ	ISO	32° / 34° / 36° / 38° (±30′)	8.5	2	11
	DIN	34° / 38° (± 1°)	8.5	2	11+0.6/0
	JIS	32° / 34° / 36° / 38° (±30′)	8.5	2	11
SPA	ISO	32° / 34° / 36° / 38° (±30′)	11	2.75	13.75
	DIN	34° / 38° (± 1°)	11	2.8	13.8+0.6/0
	JIS	32° / 34° / 36° / 38° (±30′)	11	2.75	13.75
SPB	ISO	32° / 34° / 36° / 38° (±30′)	14	3.5	17.5
	DIN	34° / 38° (± 1°)	14	3.5	17.5+0.6/0
	JIS	32° / 34° / 36° / 38° (±30′)	14	3.5	17.5
SPC	ISO	32° / 34° / 36° / 38° (±30′)	19	4.8	23.8
	DIN	34° / 38° (± 1°)	19	4.8	23.8+0.6/0
	JIS	32° / 34° / 36° / 38° (±30′)	19	4.8	23.8

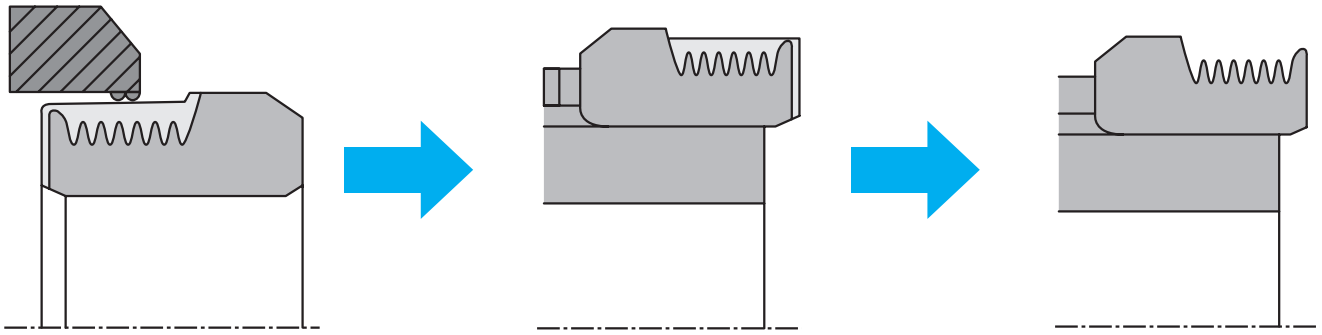


3. Typical groove shapes of V-pulleys



Flat-bottom type groove | Round-bottom type groove | Flat-bottom type groove with angle | Round-bottom type groove with angle | Multi-groove type (2-grooved, 3-grooved ...)

4. Typical tooling for V-pulley machining (Poly-groove type)



Roughing of OD and end face/
Roughing of ID, Finishing

Roughing of OD and end face/Finishing of end face, Rough grooving/Chamfering

One pass grooving with a multi-groove type tool or grooving in several passes

Work material : Mainly materials equivalent to cast iron FC230 – FC250

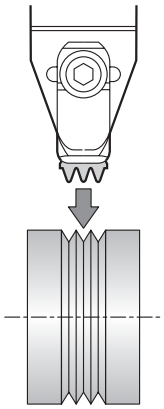
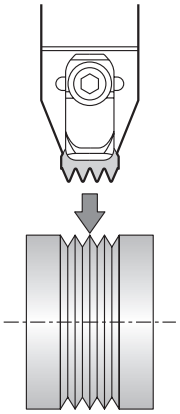
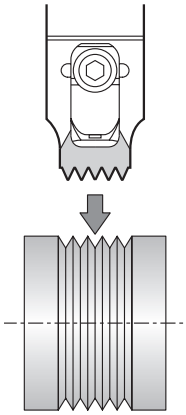
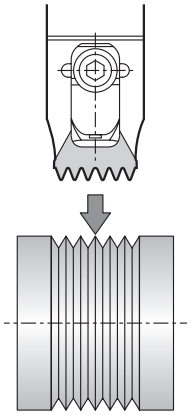
Recommended tool materials : Silicon nitride-based ceramic grades for roughing of outside and end faces Silicon nitride-based or alumina-based ceramic grades for finishing of outside and end faces Multi-groove type inserts of carbide or alumina-based ceramic grades are recommended.

"HW2" has been selected for multi-groove type inserts

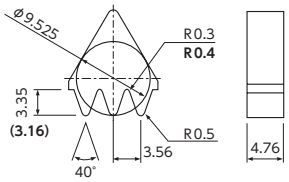
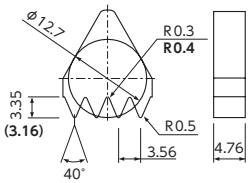
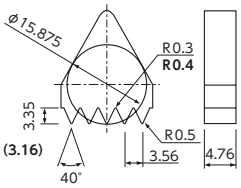
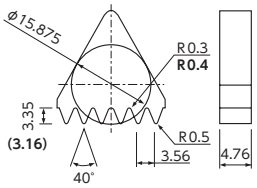
Guidelines for cutting conditions : V_c=300 ~ 600m/min f =0.05 ~ 0.15mm /rev

DRY (for HW2, it is recommended to use the insert after removing component outer skin.)

5. Other tooling for V-pulley machining (Poly-groove type)

3 grooves	4 grooves	5 grooves	6 grooves
			

Typical insert shapes

PTM33K30504ENB HW2	PTM43K40504ENB HW2	PTM53K50504ENB HW2	PTM53K60504ENB HW2
			

MEMO

N

Indexable End Milling Tools

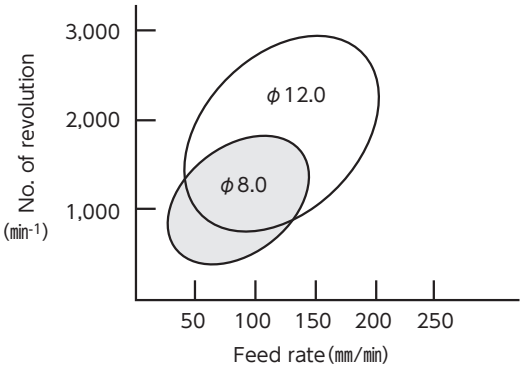
- List of Indexable end milling holders and inserts ···· N5
- RCL type rectangular tooth chamfering type ···· N7

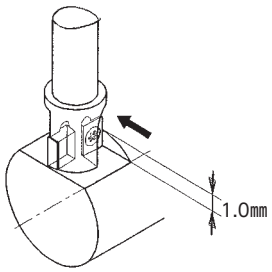
Small diameter indexable end milling tools

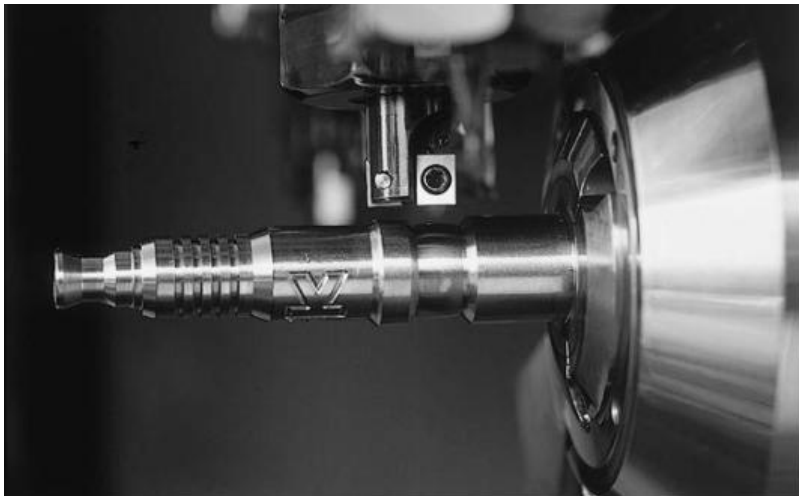
Features

- Using PVD-coated carbide grade inserts allows for cutting at three to five times higher speed than conventional high-speed steel (HSS) end milling tools.
- The REZ type allows for shoulder milling at right angles (90 degree)
- Surface finish can be improved; to 5 micron Rz (JIS) with the NTK conventional type and to 1 micron Rz (JIS) with the NTK wiper style inserts.
- Using inserts having a center cutting edge enables deep grooving and taper machining in addition to normal D-cutting.

Recommended cutting conditions (SUS304)







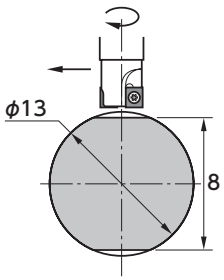
Work material : SUS304
Work diameter : φ8.0 and φ12.0
Depth of cut : 1.0mm
Insert part No. : ZM3CZH0402CFR-070
Holder part No. : REZ100CZR141
Note) The smaller the work diameter becomes, the greater the chances of chatter under machining becomes. If chatter occurs, check and adjust the cutting speed and/or feed rate.

Actual examples

End milling with ZM3 indexable end milling tool

	Current tool	NTK
Insert P/N	Standard shape	CZH0402CFR-070
Material grade	Competitor's PVD-coated carbide	ZM3
No. of revolution (min⁻¹)	1,200	←
Cutting speed (m/min)	38	←
Feed rate (mm/min)	36	72
Depth of cut (mm)	2.5	←
Cutting oil	WET	←
Life (pcs/corner)	200	1,200

Work piece	Plug
Material	SUS304

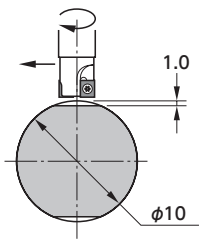


- The current tool wore quickly and dimensional stability was poor.
- To prevent wear the feed was doubled for the NTK' product,(36 mm/min to 72 mm/min) reducing wear through lower contact time.
- Both longer tool life and reduced cycle time were achieved.

End milling (D-cutting) with ZM3 end milling tool

	Current tool	NTK
Insert P/N	Solid end mill (N.O.B:4)	CZH0402CFR-070 (N.O.B:2)
Material grade	Competitor's PVD-coated carbide	ZM3
No. of revolution (min⁻¹)	2,500	1,500
Cutting speed (m/min)	78.5	47.1
Feed rate (mm/min)	100	200
Depth of cut (mm)	1.0	1.0
Cutting oil	WET	←
Life (pcs/corner)	5,000	8,000

Work piece	Shaft
Material	SUS430



- The conventional current solid end mill required regrinding to achieve the required result.
- Efficiency was doubled with NTK and tool life improved by 60%, resulting in significant cost reduction.

【Recommended Cutting Conditions】

Work material	Cutting speed (m/min)	Axial feed rate (mm / t)	Depth of cut (mm)	Cutting Width (mm)
Stainless steel / Steel	40 ~ 60	~ 0.05	~ 1.5	below 50% of the cutter diameter
Nonferrous metal (Aluminum, brass)	80 ~ 120	~ 0.05	~ 3.0	below 50% of the cutter diameter

Effects of mounting an insert having a center cutting edge

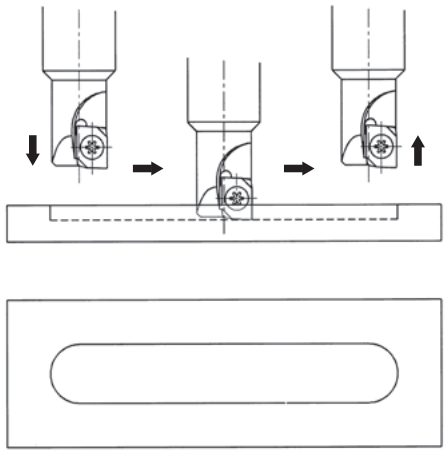
①By mounting an insert with a center cutting edge, it is possible to use a single-blade type, indexable end milling tool to plunge cut and then feed as shown in (1) (left below.)

②By mounting an insert having a center cutting edge, it is possible for a single-blade type indexable end milling tool to perform taper machining, as shown in (2) (right below.)

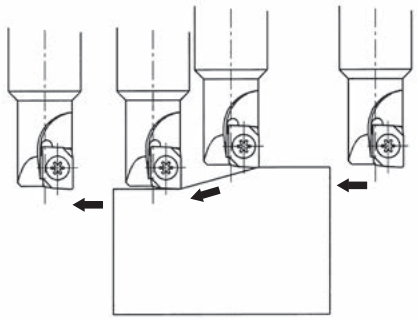
③As the wiper function is provided at the tip end of the cutting edge, excellent surface finish can be produced.

Machining examples

Example (1)



Example (2)



Cautions

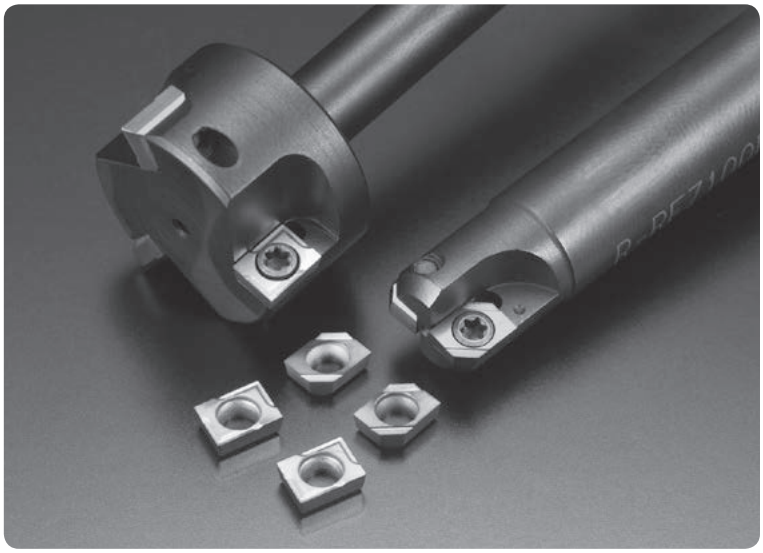
①It is possible to mount inserts having a center cutting edge on a two-blade or three-blade type end milling tool, however, plunge cutting is not possible. On the other hand, the surface finish of the cut surface may be improved.

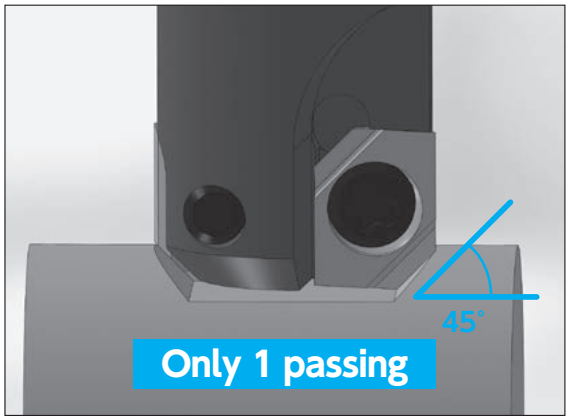
②In the cases of taper machining using a single-blade type end milling tool with an insert having a center cutting edge, program carefully by taking the effective length of the cutting edge (4.0 mm) into consideration.

Indexable End Milling Tools

Features

- New insert for machining chamfered surface finish has been line up
- Low cutting force with chipbreaker ! Good surface finish with wiper insert
- Stocked variety insert





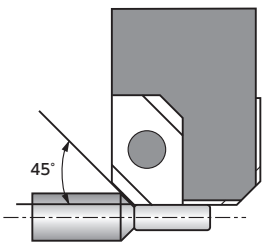
Recommencled cutting conditions

Work material	Cutting speed (mm/min)	Traversing feed rate (mm/t)	Depth of cut (mm)	Width of cut (mm) a_p
Stainless / Steel	40 ~ 60	~ 0.05	~ 1.5	-50% of cutter diameter
Non-ferrous metals	80 ~ 120	~ 0.05	~ 3.0	-50% of cutter diameter

Case study

Chamfered surface finish insert

Work material	: S45C
Cutting speed (m/min)	: 95
Feed (mm/min)	: 0.14
Depth of cut (mm)	: 1.0
Coolant	: WET

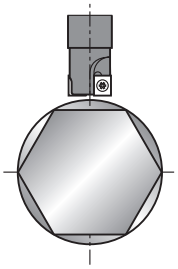


QM3-C45 type	700 pcs/corner + α
Comp. solid endmill	500 pcs/corner

NTK insert achieved longer tool life.

BL chipbreaker

Work material	: SUS304
Cutting speed (m/min)	: 75
Speed (min^{-1})	: 1,200
Feed (mm/min)	: 70
Depth of cut (mm)	: ~ 1.25
Coolant	: WET



BL chipbreaker	300 pcs/corner
NTK non chipbreaker	200 pcs/corner

NTK Endmill insert with chipbreaker offered good surface of workmaterial with good sharpness, stable machining.

Small diameter indexable end milling tools

REZ type

〈D cutting = lead angle 90 type end milling tool〉

NEW 〈D cutting = lead angle 45 type end milling tool〉

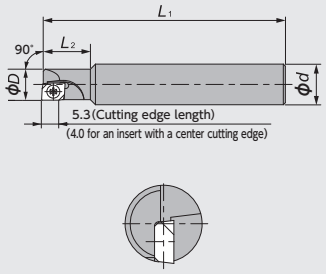


Figure-1

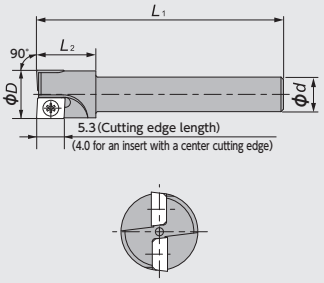


Figure-2

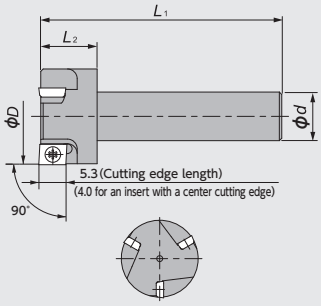


Figure-3

● Right-hand type shown.

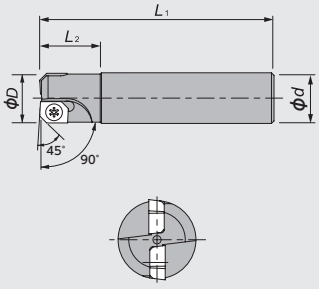


Figure-4

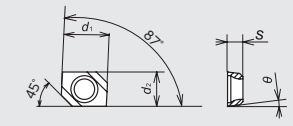
Holder dimensions

Shape	Code No.	Toolholder P/N	Stock R	Stock L	No. of blades	Dimensions (mm) ϕD	ϕd	L_1	L_2	Applicable insert	Part: Clamping screw	Part: Wrench
Figure-1	5276498	**REZ080C1R212**	●		1	8	10	60	12	CZH04□□CFR□□□※1	FS102-2.2*4.0	T-07
	5285812	**100C1R218**	●					75		CZH05□□CFR□□□		
Figure2	5520317	**REZ100B2R329**	●		2	10	5	40	10	CZH04□□CFR□□□※1	FS102-2.2*4.3	
	5120936	**100C2R133**	●				6	50	12			
	5120951	**100C2R132**	●				7					
	5137971	**100C2R141**	●				10					
	5355458	**120C2R141**	●			12						
	5355466	**140C2R141**	●			14						
Figure-3	5520325	**REZ150B3R330**	●		3	15	5	40	10			
	5496088	**200M3R319**	●			20	7	50	12			
	5496096	**200M3R320**	●				10					
NEW Figure-4	5880281	**REZ100C2R461**	●		2	10	10	50	12	CZH0400CFR-C45 CZH04□□CFR□□□		
	5880299	**100C2R466**	●				7					

Note) Use over an extended period may cause wear on clamp threads, resulting in insufficient clamping force. To avoid this, please replace the screw on a regular basis.

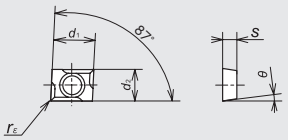
※1 Please don't maunt D cut 45° taper insert CZH0400CFR-C45. The holder will interfere the work piece.

Applicable inserts



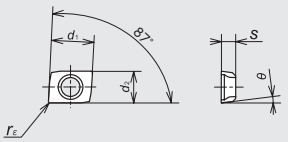
with chipbreaker without wiper

Figure-1



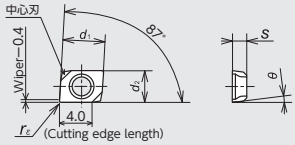
with chipbreaker

Figure-2



with center edge without wiper

Figure-3



with center edge with wiper

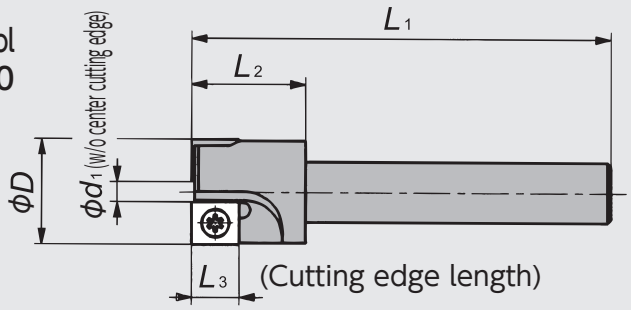
Figure-4

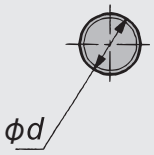
Shape	Part No.	Dimensions (mm) d_1	d_2	s	θ	C or $r_{\varepsilon 1}$	PVD-coated micro-grain carbide ZM3	Stock	TM4	Stock	DT4	Stock	QM3	Stock	DM4	Stock
NEW Figure-1	**CZH0400CFR-C45** ※2	5.56	4.20	1.88	7°	C1.35					5880315	●	5880307	●		
Figure-2	**CZH04005CFR-BL**	5.56	4.20	1.88	7°	0.05			5819008	●					NEW 5900907	●
	0402CFR-BL					0.2			5818984	●					NEW 5900915	●
Figure-3	**CZH04005CFR-070**	5.56	4.20	1.88	7°	0.05	5230479	●	—	—	5849815	●				
	0402CFR-070					0.2	5120944	●	—	—	5849823	●				
Figure-4	**CZH04005CFR-140**	5.56	4.20	1.88	7°	0.05	5310883	●	—	—	5849831	●				
	0402CFR-140					0.2	5310958	●	—	—	5849849	●				
	CZH05005CFR-141	5.28	5.56	2.18	10°	0.05	5310925	●	—	—						
	0502CFR-141					0.2	5310909	●	—	—						

※2 Please use REZ100C2R461/R466. the peculiar holder.

REL type

Standard type end milling tool
Cutter diameter : ϕ10





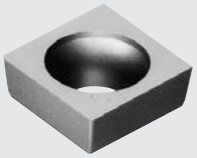
●Right-hand type shown.

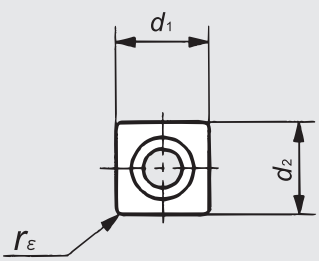
Holder dimensions

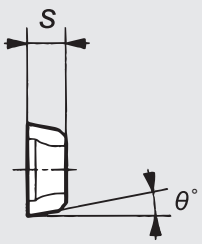
Code No.	Toolholder P/N	Stock R	Stock L	No. of blades	Dimensions (mm) ϕD	ϕd	ϕd1	L1	L2	L3	Applicable insert	Part: Clamping screw	Part: Wrench
5092358	**REL100C2R107**	●		2	10	7	(1.2)	50	12	5.3	CLH04 ☐ CFN-045 (See table below)	FSI02-2.2*4.3	T-07
5092374	**100C2R106**	●				10							

Applicable inserts

CLH type







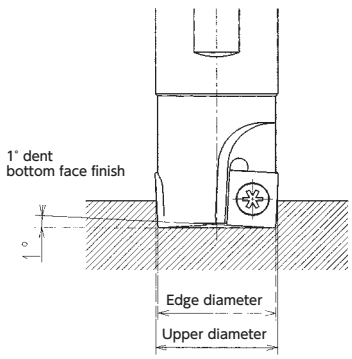
●Right-hand type insert with center cutting edge shown.

Part No.	Dimensions (mm) d1	d2	s	θ	rε	PVD-coated micro grain carbide ZM3	Stock
CLH04005CFN-045	5.56	4.20	1.88	7°	0.05	5101894	●
0402CFN-045					0.2	5066535	●

Precaution for using REL type

When using the REL type end milling tool, tapering will occur on the side machined area of the work piece by the following amount:

Depth of cut (mm)	Top face machining dia – Bottom face machining dia (mm)
2	0.05
3	0.08
4	0.12
5	0.15



RCL type rectangular tooth chamfering type

Features

- Cycle time can be reduced by using micro-grain carbide grade inserts. (Compared with the high-speed steel (HSS) end milling tools).
- Improved surface finish

①Cutter diameter and machining conditions

Cutter diameter	Recommended module	Recommended feed rate
ϕ14	2.25 or less	0.3㎜ /rev or less
ϕ12	2.15 or less	0.3㎜ /rev or less

If the recommended module or the recommended feed rate is exceeded, the clamping screw should be re-tightened at least once or twice a day to prevent loss of secure clamping.

Precautions

①When mounting the end milling tool, ensure a minimum amount of overhang from the chuck to the tool nose in order to prevent run out during machining (Target value: approx. 20 mm)

②As is probably known, gear tooth chamfering applies shock loading due to interrupted cutting. For this reason, the holder and clamping screw may deteriorate quicker than normal. Therefore, we request that you replace the holder and clamping screw periodically with new ones for safer and more stable operation.

③In addition, please re-tighten the clamping screw regularly to avoid loss of clamping force during machining.

【Actual examples】

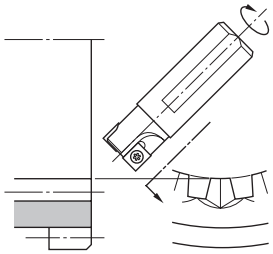
Gear tooth chamfering on sleeve

Work material : SCM415

Cutting speed(m/min)=154

No. of revolutions(min^{-1})=3,500

Cutting oil : WET



NTK : **ZM3** 2-insert	2,000 pcs
Competitor's PVD-coated carbide Single insert	200 pcs

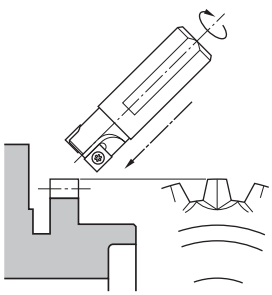
Gear chamfering on speed gear

Work material : SCr420 (HB140 ～ 230)

Cutting speed(m/min)=42

No. of revolutions (min^{-1})=955

Cutting oil : WET



NTK : **ZM3** 2-insert	1,500 pcs
SKH55 Solid	100 pcs

RCL type Gear tooth chamfering type

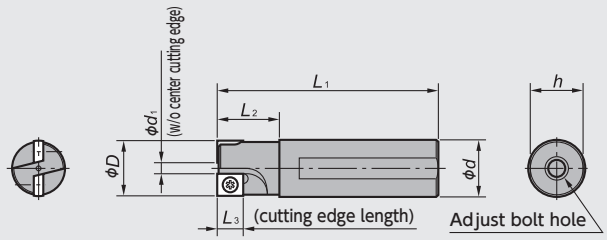


Figure-1

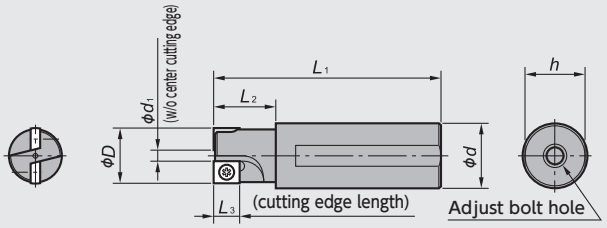


Figure-2

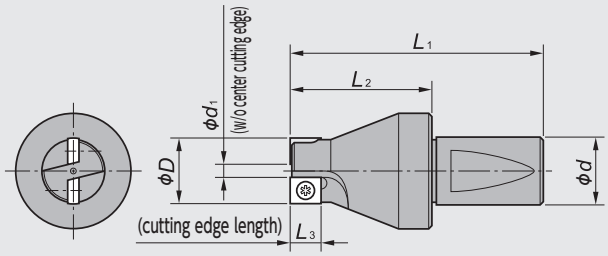


Figure-3

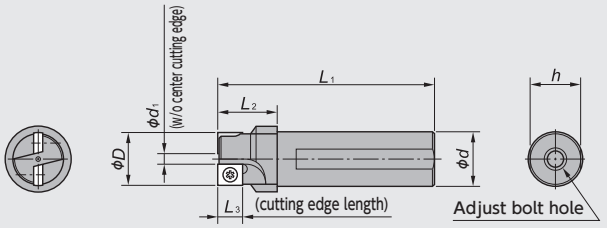


Figure-4

●Right-hand type shown.

Holder dimensions

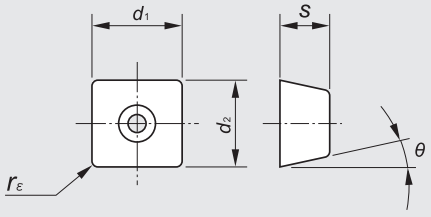
Shape	Code No.	Toolholder P/N	Stock R	Stock L	Dimensions (mm) ϕD	ϕd	ϕd1	h	L1	L2	L3	Adjust bolt hole	Applicable insert	Part: Clamping screw	Part: Wrench
Figure-1	5025952	RCL120D2R050	●		12	12	(ϕ3)	11	60	15	(5)	M4＊20L	CLH0402C□□□-004 (See table below)	FS101-2.5＊5	CLR-15S (A)
	5025945	L050		●											
	5005046	RCL140D2R021	●		14	14	(ϕ4)	13	55		(6)	M6＊20L	CLH050□CFN (See table below)		
	5005053	L021		●											
Figure-2	5034913	RCL120D2R059	●		12	14	(ϕ3)	13	55	15	(5)	M6＊20L	CLH0402C□□□-004 (See table below)	FS101-2.5＊5	CLR-15S (A)
	5034921	L059		●											
Figure-3	5005236	RCL140Z2R020	●		14	14	(ϕ4)	—	54	30	(6)	—	CLH050□CFN (See table below)	FS101-2.5＊5	CLR-15S (A)
	5005228	L020		●											
Figure-4	5051792	RCL100D2R066	●		10	10	(ϕ3)	9.5	60	18	(5)	M4＊20L	CLH0402C□□□-035 (See table below)	FS104-2.0＊4.3	T-06 (B)
	5051784	L066		●											

Applicable inserts

CLH type

【Cutting edge process】

FN	Sharp edge
TNB	T00525



Part No.	Dimensions (mm) d1	d2	s	θ	rε	PVD-coated micro grain carbide ZM3	Stock	DM4	Stock
CLH0402CFN-035	5.56	4.20	1.88	7°	0.2	5051750	●	5846951	●
CTNB035						5084819	●	5847744	●
CFN-004	5.56	4.76	1.88	7°	0.2	5027123	●	5847736	●
CTNB004						5019351	●	5827381	●
CLH0502CFN	6.35	5.56	2.18	11°	0.2	5992201	●	5847710	●
CLH0504CFN					0.4	5996186	●	5847702	●

P

Milling Cutters for Machining Centers

- Cutters for machining of aluminum ···· P2
- Cutters for machining of cast iron and heat-resistant alloys ··P18
- Arbor specification table for NTK milling cutters ··P32

※ Please refer to page **Q22** for technical data.

The Experts in High Speed Milling of Aluminum Components, Leading

Four types of cutter are available to accommodate your specific needs and requirements.

SFC
Super Feed Cutter

Please refer to page P4.

HPC
High Performance Cutter

Please refer to page P10.

ALWC
Aluminum Light Weight Cutter

Please refer to page P10.

HSC
High Speed Cutter

Please refer to page P14.

to Higher Efficiency in Production and Further Cost Reduction!!

Highly Efficient Machining

Multi-edge specifications can bring about efficient machining.

Various Types of Insert Shape

Many different insert shapes are available for a wide range of applications, enabling one single milling cutter to work in many varied operations. High-quality surface finish and machining with lower cutting forces allow controlled deflection of parts and excellent burr control.

Smaller Diameters

The minimum diameter available for this series is ϕ20.

Decreasing Running Costs

For the HPC and ALWC series, lower cost inserts are available as standard. In addition for the SFC series, we offer reconditioned inserts which are priced very reasonably.

Higher Accuracy

SFC Series

Fixed type/Adjustable type

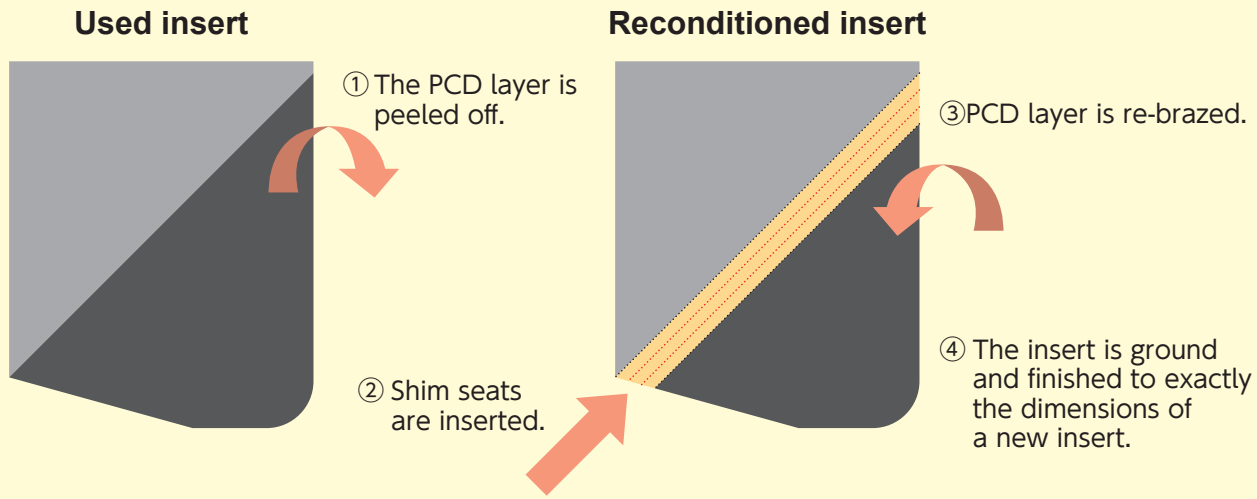
〈Outline〉

The SFC series is lighter in weight, having an aluminum body. The machining diameters range from ϕ63 up to ϕ250 as standard. Dedicated PCD inserts allow high efficiency production and longer tool life.

Features

- **Multi-edge specifications**
  High efficiency machining and reduced running cost
- **Reconditioned insert service**
  Used inserts are collected and reconditioned for reuse as an aid to environmentally friendly production. We offer reconditioned inserts which have the same production performance as new at reasonable prices. (Both new and reconditioned inserts have the exactly same dimensions but differ only in the PCD cutting edge length.) *Recycling is optional.
- **A wide variety of insert shapes.**
  You can select the inserts most suitable for your particular application and requirements from our extensive range. This brings many and varied solutions to your production.
- **A larger, stronger brazed area.**
  As the brazed area is larger and has higher brazing strength, you can use the cutter for machining operations where depth of cut is relatively high.

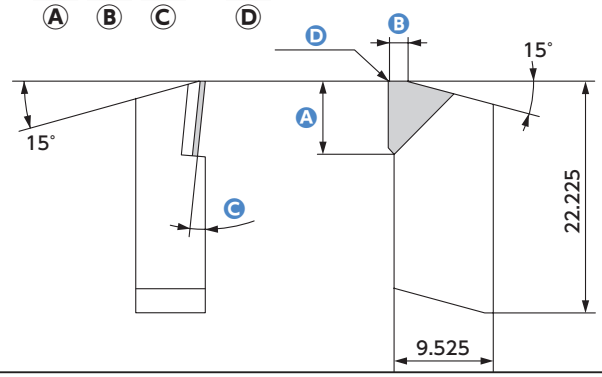
What is a reconditioned insert?



★Please return used inserts for the renewal process to NTK.
★As we supply both new and reconditioned inserts from stock without discrimination, we can offer such mixed (new and reground inserts) supply at reasonable prices.

Insert selection guide for SFC

HCD55 15 00 R 04 B
Ⓐ Ⓑ Ⓒ Ⓓ



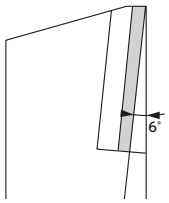
Ⓐ : Length of cutting edge
Ⓑ : Length of wiper
Ⓒ : A.R. (Axial rake)
Ⓓ : Nose radius

15 and 08 indicate types without wiper.
※21 and 40 for (B) indicate types with an arced wiper.

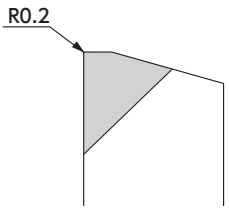
Basic shape
①HCD551500R04B

For burr control

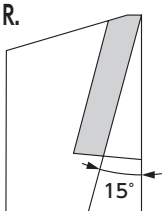
Ⓒ Select an insert having a larger A. R. (Axial rake)
0° ⇒ 6°
HCD551506R04B



Ⓓ Select an insert having a smaller nose radius.
R0.4 ⇒ R0.2
HCD551506R02B

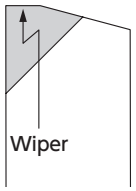


Ⓒ Select an insert having a even larger A. R.
6° ⇒ 15°
HCD301515R02N
HCD301515R04N

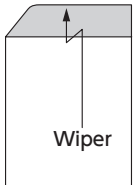


For better surface finish

Ⓑ Select an insert having an arced wiper
HCD552106R02B
HCD552106R04B
HCD552106R12B

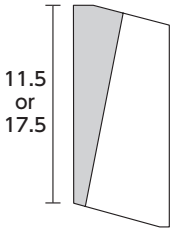


Ⓑ Select an insert with a wiper
HCD254006R32N



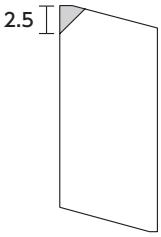
For greater depth of cut

Ⓐ Select an insert with a longer cutting edge
5.5㎜ ⇒11.5㎜,17.5㎜
HCD121500R04B
HCD191500R04B
HCD121506R02B
HCD121506R04B
HCD122106R04B



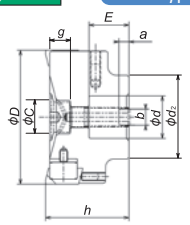
For lower depth of cut and for lower cost

Ⓐ Select an insert with a shorter cutting edge
5.5㎜ ⇒2.5㎜
HCD280800R04N



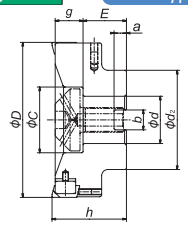
Cutters for machining of aluminum components

Figure-1 Fixed type



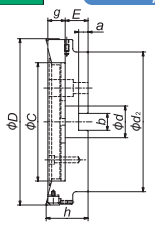
A.R. 0～+15° R.R. +5°

Figure-2 Fixed type



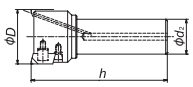
A.R. 0～+15° R.R. +5°

Figure-3 Fixed type



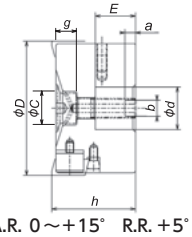
A.R. 0～+15° R.R. +5°

Figure-4 Adjusting type



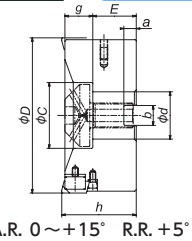
A.R. 0～+15° R.R.0°

Figure-5 Adjusting type



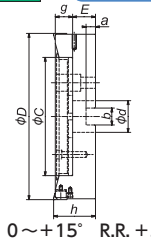
A.R. 0～+15° R.R. +5°

Figure-6 Adjusting type



A.R. 0～+15° R.R. +5°

Figure-7 Adjusting type



A.R. 0～+15° R.R. +5°

※Please use the dedicated clamping bolt supplied in the package.

Body for SFC

	Shape	Code No.	Part No.	Stock	No. of blades	Dimensions (mm)									Weight (kg)	Allowable revolution (min⁻¹)
						φD	h	φd	E	a	b	φd₂	φC	g		
Fixed type	Figure-1	5645205	**JSF-063-06-RH/NS-S**※1	◉	6	63	40	22.0	20	6	10	44	20	12.1	0.77	20,000
		5612569	**JSF-080-08-RH/NS**	◉	8	80	50	25.4	24	6	9.6	50	20	12.4	0.55	18,000
	Figure-2	5612544	**JSF-100-12-RH/NS**	◉	12	100	60	31.75	32	8	12.8	60	28	14.4	0.94	16,000
		5645478	**JSF-125-15-RH/NS30**		15	125	60	31.75	35	8	12.8	80	53	22.4	1.40	15,000
		5612551	**JSF-125-15-RH/NS**					38.1		10	16.13				1.37	
		5636931	**JSF-160-18-RH/NS**		18	160	60	50.8	38	11	19	120	63	19.4	3.18	13,000
	Figure-3	5635719	**JSF-200-24-RH/NS**		24	200	63	47.625	—	14	25.4	160	139.7	26	4.22	11,000
		5635727	**JSF-250-30-RH/NS**		30	250	63	47.625	—	14	25.4	210	177.8	26	6.58	10,000
Adjustable type	Figure-4	5711676	**JSF-050-05-RHT32**※1		5	50	125	—	—	—	—	32	—	—	0.8	18,000
	Figure-5	5645197	**JSF-063-06-RH-S**※1	◉	6	63	40	22.0	20	6	10.4	—	20	12.1	0.95	20,000
		5897475	**JSF-063-08-RH** NEW	◉	8	63	40	22.0	20	6	10.4	—	20	12.1	0.45	20,000
		5592795	**JSF-080-08-RH**	◉	8	80	50	25.4	24	6	9.6	—	20	12.4	0.63	20,000
		5885728	**JSF-080-10-RH** NEW	◉	10	80	50	25.4	24	6	9.6	—	20	12.4	0.63	20,000
	Figure-6	5589841	**JSF-100-12-RH**	◉	12	100	60	31.75	32	8	12.8	—	28	14.4	1.13	18,000
		5916788	**JSF-100-14-RH-S**※1 NEW	◉	14	100	60	31.75	32	8	12.8	—	28	14.4	2.2	18,000
		5645460	**JSF-125-15-RH30**		15	125	60	31.75	35	8	12.8	—	53	22.4	2.36	16,000
		5589833	**JSF-125-15-RH**					38.1		10	16.0				2.31	
		5918099	**JSF-125-18-RH-S**※1 NEW	◉	18	125	60	38.1	35	10	16	—	53	22.4	3.44	16,000
		5625454	**JSF-160-18-RH**	◉	18	160	60	50.8	38	11	19	—	63	19.1	3.20	15,000
	Figure-7	5664362	**JSF-200-24-RH**		24	200	63	47.625	—	14	25.45	—	139.7	26	4.21	13,000
		5664370	**JSF-250-30-RH**		30	250	63	47.625	—	14	25.45	—	177.8	26	6.57	12,000

◉ : Semi-Standard Stock
※1 The part number has a steel body.
※2 JSF-050-05-RHT32 is a shank type.
※3 the weight includes parts (insert, wedge, clamp bolt,etc)

■Torque required for the clamping bolts (N·m)…φ63 : 35× 1 bolt, φ80 : 50× 1 bolt, φ100 : 60× 1 bolt, φ125/160 : 80× 1 bolt, φ200/250 : 20× 4 bolt

Body parts

Body Part No.	Wedge	Axial setscrew	Wedge setscrew	Balancing screw	Handle (optional)	4 mm-Hex screwdriver(optional)	Clamping bolt For internal lubrication	Weight of clamping bolt
JSF-050-05-RHT32	HDW-M5S (5799044)	Body Part No. Adjusting type SWS-M5-15 (5613898)	Body Part No. LS103 (5613906)	—	Body Part No. 2814HS (5441142)	Body Part No. U104-40 (5441126) Screwdriver for axial set screw	—	—
JSF-063-06/08-RH-S/NS-S	Body Part No. HDWM5-EU4DD (5628656)			Body Part No. BSM55 (5613914)			SALS-063 (5636881)	45g
JSF-080-08/10-RH/NS							RTS-M12 (5592803)	46.5g
JSF-100-12/14-RH/NS							RTS-M16 (5592829)	100g
JSF-125-15/18-RH/NS							RTS-M20 (5592811)	253g
JSF-125-15-RH30/NS30							RTS-M16-125 (5647862)	260g
JSF-160-18-RH/NS		Fixed type NSWS-M5-15 (5614680)					RTS-M24 (5627351)	364g
JSF-200-24-RH/NS	Sales quantity 1pc/case	Sales quantity 10pcs/case	Sales quantity 10pcs/case	Sales quantity 10pcs/case	Sales quantity 1pc/case	Sales quantity 1pc/case	SSP08 (5635123)	720g
JSF-250-30-RH/NS							SSP10 (5635115)	1170g

■For setting wedges
4N・m torque-wrench (optional)
2850F3.8 (5674379)
Sales quantity 1pc/case

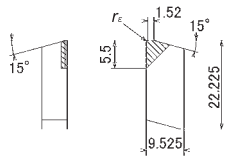
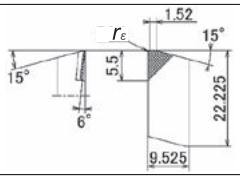
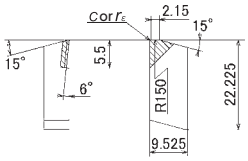
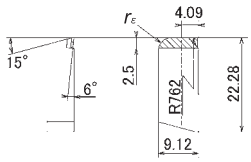
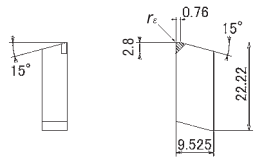
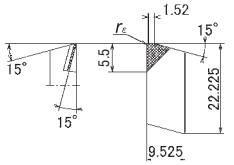
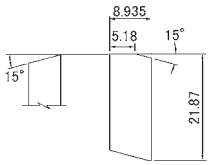
■For torque-wrench
2.5tip bit (optional)
2859H2.5 (5613922)
Sales quantity 1pc/case

■One off clamping bolt as listed above
Sales quantity 1pc/case

※We recommend the use of the above torque-wrench for tightening wedges. Tightening wedges with excessive torque may cause thread damage

Blended insert supply for SFC

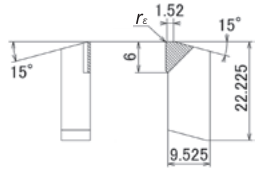
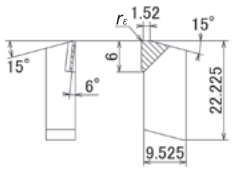
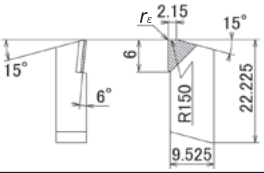
※Always return the used inserts to NTK

Shape	Code No.	P/N (Code No.)	Corner angle	Cutting edge length(mm)	A.R.	r_ε	Wiper width	Stock
	5630223	**PD1 HCD551500R04B**		5.5				●
	5639273	**PD1 HCD121500R04B**		11.5	0°	0.4		●
	5639281	**PD1 HCD191500R04B**		17.5			None	●
	5703061	**PD1 HCD551506R02B**		5.5		0.2		●
	5634803	**PD1 HCD551506R04B**				0.4		●
	5844204	**PD1 HCD551506R08B**				0.8		●
	5703970	**PD1 HCD121506R02B**		11.5		0.2		●
	5703962	**PD1 HCD121506R04B**				0.4		●
	5662697	**PD1 HCD552106R02B**		5.5		0.2		●
	5630298	**PD1 HCD552106R04B**				0.4		●
	5889357	**PD1 HCD552106R08B**			+6°	0.8		●
	5639299	**PD1 HCD552106R12B**				1.2		●
	5782966	**PD1 HCD552106C05B**		5.5		C0.5		●
	5639257	**PD1 HCD122106R04B**		11.5		0.4	Provided	●
	5630231	**PD1 HCD254006R32N** Wiper insert	0°	2.5		3.2		●
	5643473	**PD1 HCD280800R04N**		2.8	0°	0.4		●
	5662689	**PD1 HCD301515R02N**		5.5	+15°	0.2	None	●
	5634795	**PD1 HCD301515R04N**				0.4		●
	5636337	**KM3 HCD228500R00N** Dummy carbide insert. ※Not for actual cutting only used for balance adjustment.		–	0°			●

※Inserts for machining two different work materials simultaneously are available and for cavity removal. Please contact us for more information.

Inserts for SFC (Non-returnable)

※Return of used inserts is not required for the products listed below.

Shape	Code No.	P/N (Code No.)	Corner angle	Cutting edge length(mm)	A.R.	r_ε	Wiper width	Stock
	5697115	**PD1 HCA551500R04**		6				●
	5697081	**PD1 HCA121500R04**		12	0°			●
	5697107	**PD1 HCA191500R04**		19		0.4	None	●
	5697032	**PD1 HCA551506R04**	0°	6	+6°			●
	5697123	**PD1 HCA552106R02**				0.2		●
	5697131	**PD1 HCA552106R04**				0.4	Provided	●
	5697099	**PD1 HCA122106R04**		12				●

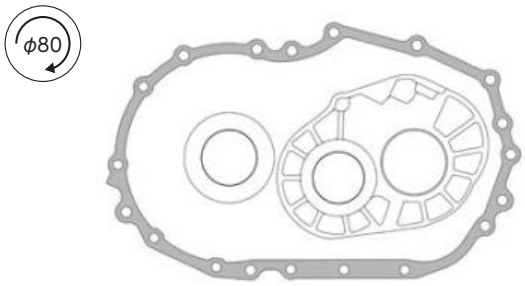
Cutters for machining of aluminum components

Actual examples of machining with the SFC

Machining of transmission case

●Work material : ADC12
●Surface finish required : Max. 12.5S
●Machine : Vertical machining center

	Current tool	NTK
Material grade	Competitor's PCD	**PD1**
Cutter specification	ϕ80× 6 blades	ϕ80× 8 blades
Cutting speed (m/min)	Roughing : 700 Finishing : 2,000	Roughing : 1,500 Finishing : 2,000
No. of revolutions (min^{-1})	Roughing : 2,785 Finishing : 7,958	Roughing : 5,971 Finishing : 7,958
Feed rate per blade (mm/t)	Roughing : 0.17 Finishing : 0.08	Roughing : 0.15 Finishing : 0.08
Table feed rate (mm/min)	Roughing : 2,785 Finishing : 3,979	Roughing : 7,165 Finishing : 5,305
Depth of cut (mm)	Roughing : 2.0 Finishing : 0.5	←
Cutting oil	Internal coolant	←
Life (pcs/corner)	10,000	**15,000**

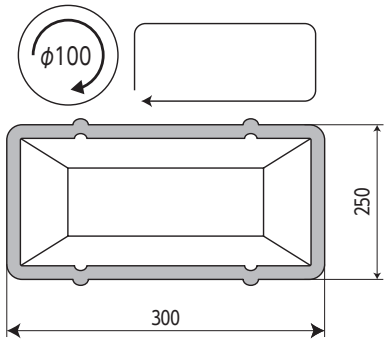


The cycle time was reduced by 10 seconds for roughing and by 3 seconds for finishing. The tool life was 1.5 times higher than the competitor's product.

Machining of oil pan

●Work material : ADC12
●Surface finish required : Max. 6.3S
●Machine : Vertical machining center

	Current tool	NTK
Material grade	Competitor's PCD	**PD1**
Cutter specification	ϕ100× 8 blades	ϕ100×12blades
Cutting speed (m/min)	2,513	←
No. of revolutions (min^{-1})	8,000	←
Feed rate per blade (mm/t)	0.063	←
Table feed rate (mm/min)	4,000	6,000
Depth of cut (mm)	1～3 (for roughing)	←
Cutting oil	Internal coolant	←
Life (pcs/corner)	15,000	**15,000**



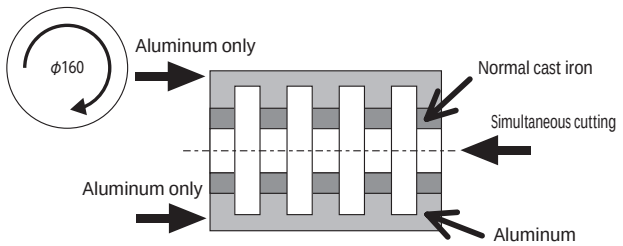
The machining efficiency was improved by 50%.
The surface finish was 1.8S compared with 5S with the competitor's product.

Machining of lower block

●Work material : ADC12, Die-cast normal cast iron (FC250)
●Surface finish required : Max. 6.35S
●Machine : Horizontal machining center

	Existing tool	NTK
Material grade	Competitor's PCD	**PD1**(wiper) (leading edge)
Cutter specification	ϕ160×10 blades	ϕ160×18blades
Cutting speed (m/min)	452	Aluminum only : 1,760 Simultaneous : 251
No. of revolutions (min^{-1})	900	Aluminum only : 3,500 Simultaneous : 500
Feed rate per blade (mm/t)	0.06	Aluminum only : 0.10 Simultaneous : 0.24
Table feed rate (mm/min)	550	Aluminum only : 6,300 Simultaneous : 2,200
Depth of cut (mm)	0.3	←
Cutting oil	External coolant	Internal through coolant
Life (pcs/corner)	150	**1,500**

The machining efficiency was increased approximately 5 times with 10 times longer tool life.

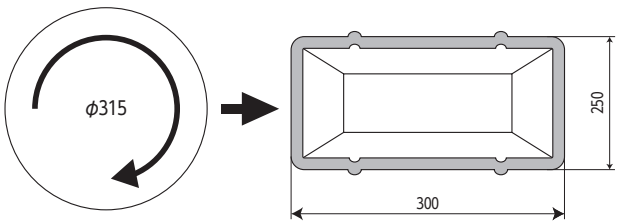


With the competitor's product, two passes of simultaneous bi-metal cutting were carried out while two passes for aluminum and one pass for simultaneous bi-metal cutting were performed by NTK's SFC.

Machining of oil pan

●Work material : ADC12
●Surface finish required : Max. 12.5S
●Machine : Vertical machining center

	Existing tool	NTK
Material grade	Competitor's PCD	**PD1**
Cutter specification	ϕ315×18 blades	ϕ315×36blades
Cutting speed (m/min)	4,750	←
No. of revolutions (min^{-1})	4,800	←
Feed rate per blade (mm/t)	0.04	0.046
Table feed rate (mm/min)	3,500	8,000
Depth of cut (mm)	2.5 (for roughing) + 0.5 (for finishing)	2.8 (for roughing) + 0.2 (for finishing)
Cutting oil	DRY	←
Life (pcs/corner)	30,000	**30,000**



The larger the diameter of the cutter, the greater the advantage of the multi-blade design becomes. Although the number of blades in the SFC is high, no presetting is required as this is a fixed type cutter. The cycle time was reduced by 11 seconds.

Procedure for presetting/setting the inserts in the adjustable type SFC

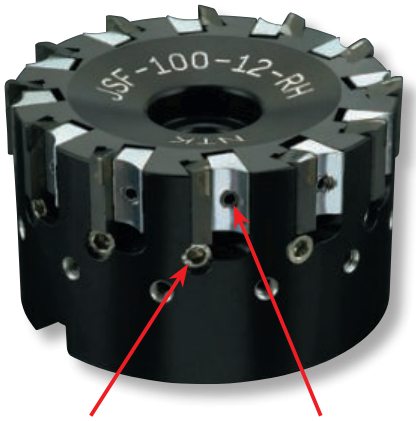
■ Be sure to clean all insert pockets prior to the following steps

●Step 1: Pre-clamping
Install each insert, then, lightly clamp the wedge by 1 N·m with the wedge set screw.

●Step 2: Adjusting run out (Rough adjustment)
By turning the axial set screw, set the height of the cutting edge at a level 0.1 mm lower than that indicated on the drawing.

●Step 3: Clamping
Tighten the wedge by 4 N·m.

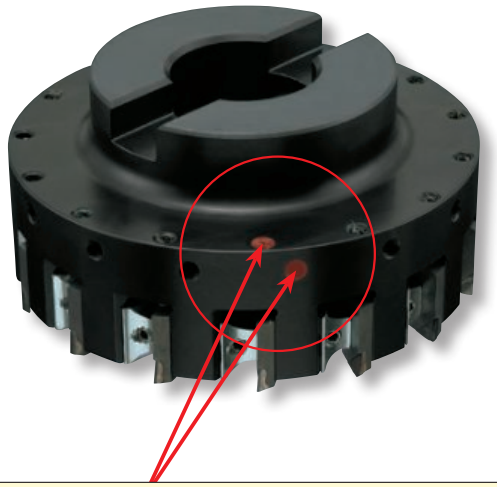
●Step 4: Adjusting run out (Finishing adjustment)
For the final adjustment, set the height of the cutting edge of every insert at a level 0.05 mm lower than that indicated on the drawing.



■Caution
※To set inserts into a fixed type SFC, you only have to tighten the wedge set screws at N·m by using the optional 2.5mm–Hex torque-wrench (2859H2.5).

Notes on Fixed type SFC

No need for pre-setting
Not need for cutting edge adjustment!
(The only step required is unclamping and clamping with the clamping bolt.)



【Note】
The holes for the axial setscrews and balance adjusting screws are filled with a special material, thus, no screwdrivers and hex-wrenches can be inserted in them.
※The color of the special material is different from the color of the actual product body.

HPC and ALWC Series Fixed type/Adjustable type

HPC (steel body) ϕ20 – ϕ100

Figure-2: Shank type

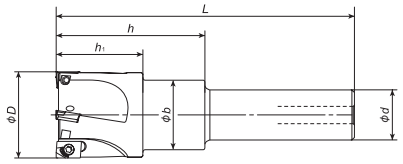
Figure-1: Small diameter type

Figure-3: Shell type

ALWC (aluminum body) ϕ20 – ϕ125

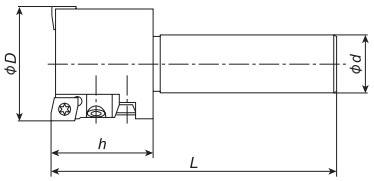
Figure-3: Shell type

Figure-1 Small diameter type



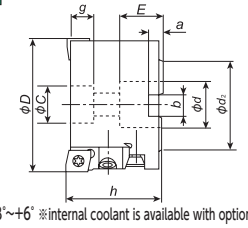
A.R.+9° R.R.+4° ※Internal coolant supply available

Figure-2 Shank type



A.R.+6° R.R.−3°~+6° ※Internal coolant supply available

Figure-3 Shell type



A.R.+6° R.R.−3°~+6° ※internal coolant is available with optional clamp bolt

Features

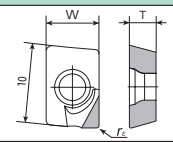
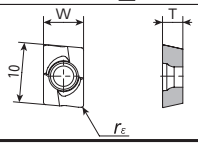
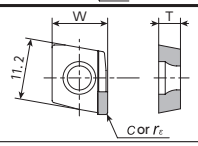
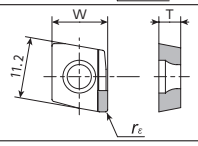
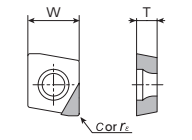
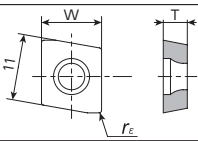
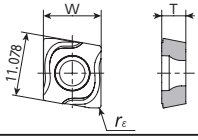
- **A wide range of sizes.**
  The diameters range from ϕ20-ϕ100 for the HPC series, and ϕ80-ϕ125 for the ALWC as standard.
- **Same inserts for HPC and ALWC**
  For ϕ40 to ϕ125, HPC and ALWC share the same types of inserts.
- **High rigidity (HPC)**
  The material for the HPC body is steel, achieving very high reliability.
- **Reduced main spindle load (ALWC)**
  With the aluminum body, ALWC can reduce load to the main spindle unit.

HPC/ALWC Body

	Shape	Code No.	Part No.	Stock	No. of blades	Dimensions (mm)													Weight (kg)	Allowable no. of revolutions (min⁻¹)	P/N of applicable insert
						φD	h	φd	L	h1	E	φb	a	b	φd2	φc	g			
HPC	Figure-1	5520341	RD020T20070R03	●	3	20	30	20	100	30	—	—	—	—	—	—	—	0.23	18,000	HDA type
		5520333	RD025T25070R03	●	3	25	40	25	110	40	—	—	—	—	—	—	—	0.37		
		5518519	RD030T20060R04	●	4	30	60	20	120	35	—	25	—	—	—	—	—	0.33		
		5518501	RD032T20060R04	●	4	32					—	26	—	—	—	—	—	0.36		
		5518493	RD035T20060R04	●	4	35					—	28	—	—	—	—	—			
	Figure-2 Fixed type	5449384	RA040T20060R04K	●	4	40	45	20	105	—	—	—	—	—	—	—	—	0.45	18,000	HAL type HAT type HRT type HAN type HLA type
		5449400	RA040T25080R04K	●				25	125	—	—	—	—	—	—	—	—	0.6		
		5449442	RA050T20060R05K	●	5	50	45	20	105	—	—	—	—	—	—	—	—	0.6		
		5449467	RA050T25080R05K	●				25	125	—	—	—	—	—	—	—	—	0.75		
		5449483	RA050T32080R05K	●				32		—	—	—	—	—	—	—	—	0.9		
	Figure-3 Fixed type	5449509	RA050C22.00R05K	●	5	50	45	22	—	—	20	—	6.3	10.4	42	18	11	0.4	18,000	
		5449525	RA063C22.00R06K	●	6	63			—	—		—						0.73		
		5477252	RA080A25.40R07K	●	7	80	43	25.4	—	—	26	—	6	9.5	50	38.9	15	0.95	15,000	
		5486212	RA100A31.75R09K		9	100	45	31.75	—	—	32	—	8	12.7	60	61	11	1.6	10,000	
	Figure-2 Adjustable type	5441050	RA040T20060R04	◉	4	40	45	20	105	—	—	—	—	—	—	—	—	0.45	18,000	
		5441043	RA040T25080R04	◉				25	125	—	—	—	—	—	—	—	—	0.6		
		5441035	RA050T20060R05	◉	5	50	45	20	105	—	—	—	—	—	—	—	—	0.6		
		5441027	RA050T25080R05	◉				25	125	—	—	—	—	—	—	—	—	0.75		
		5441019	RA050T32080R05	◉				32		—	—	—	—	—	—	—	—	0.9		
	Figure-3 Adjustable type	5441001	RA050C22.00R05	◉	5	50	45	22	—	—	20	—	6.3	10.4	42	18	11	0.4	18,000	
		5440995	RA063C22.00R06	◉	6	63			—	—		—						0.73		
		5456223	RA080A25.40R07	◉	7	80	43	25.4	—	—	26	—	6	9.5	50	38.9	15	0.95	15,000	
		5486220	RA100A31.75R09	◉	9	100	45	31.75	—	—	32	—	8	12.7	60	61	11	1.6	10,000	
ALWC	Figure-3 Fixed type	5608476	RS080A25.40R06K		6	80	48	25.4	—	—	24	—	6	9.5	50	20	13	0.5	14,000	
		5608427	RS080A25.40R07K		7				—	—		—								
		5608435	RS100A31.75R08K		8	100	58	31.75	—	—	32	—	8	12.4	60	28	15	0.84	12,500	
		5608443	RS125A38.10R10K		10	125		38.1	—	—	35	—	10	12.7	80	53	21	1.27	11,000	
	Figure-3 Adjustable type	5608518	RS080A25.40R06		6	80	48	25.4	—	—	24	—	6	9.5	50	20	13	0.5	14,000	
		5608450	RS080A25.40R07		7				—	—		—								
		5684907	RS080C27.00R06		6			27.0	—	—		—	7	12.4						
		5608500	RS100A31.75R08		8	100	58	31.75	—	—	32	—	8	12.7	60	28	15	0.84	12,500	
		5661632	RS100C32.00R08					32	—	—		—		14.4						
		5608468	RS125A38.10R10		10	125		38.1	—	—	35	—	10	15.9	80	53	21	1.27	11,000	
		5661608	RS125C40.00R10					40	—	—		—	9	16.4						

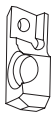
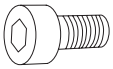
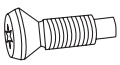
● : Stock
◉ : Semi-Standard Stock

Inserts for HPC/ALWC

Shape	Code No.	Part No.	Corner angle	w	T	Cutting edge length (mm)	A.R.※	R.R.※	r_ε	Wiper	PCD PD1	PVD-coated micro grain carbide TM1	Applicable body
	5518485	**PD1 HDA4015R04**	0°	6.7	3.4	4.0	+9°	+4°	0.4	Provided	●		Figure-1
	5722350	**TM1 HDA4505R04** W/chipbreaker		6.7	3.4	Min.5.0						●	
	5461041	**PD1 HAL3515R04**		10	4.0	3.5	+6°	0°	0.4		●		Figure-2 Figure-3
	5889480	**PD1 HAL3515C05**							C0.5		●		
	5733977	**PD1 HRL3515R04** Regrindable				Min.3.5			0.4		●		
	5461058	**PD1 HAT6021R04**				6.0					●		
	5889498	**PD1 HAT6021C05**							C0.5		●		
	5471164	**PD1 HRT6021R04** Regrindable		10.2		Min.6.0			0.4		●		
	5722368	**TM1 HAN9521R04N**		10				−3°				●	
	5722376	**TM1 HLA8521R04**		10.078				+6°				●	

※angles on cutters

HPC/ALWC Body accessories

		Cartridge Sales quantity 1pc/case	Axial setscrew Sales quantity 10pcs/case	Cartridge setscrew Sales quantity 10pcs/case	Insert clamping screw Sales quantity 10pcs/case	Handle (optional) Sales quantity 1pc/case	Torx screwdriver (optional) Sales quantity 1pc/case	Hex- screwdriver (optional) Sales quantity 1pc/case	Clamping bolt (optional) Sales quantity 1pc/case
HPC	**RD020T20070R03**				Part No. FS10306A (5519350) Part No. FS10307A (5490602)	Part No. 2814HS (5441142)	Part No. U107T10 (5519343)		
	RD025T25070R03								
	RD030T20060R04								
	RD032T20060R04								
	RD035T20060R04								
	RA040T20060R04/K	Part No. RA06P03NC (5440987) 	Part No. CS0510A (5440961)	Part No. CS0510T (5804273) 	Part No. FS1035104A (5440953) 	Part No. 2814HS (5441142)	Part No. U107T15 (5441134) 〈Torx〉	Part No. U104-40 (5441126) 〈Hex〉	
	RA040T25080R04/K								
	RA050T20060R05/K								
	RA050T25080R05/K								
	RA050T32080R05/K								
	RA050C22.00R05/K								Part No. CS1040A (5443726)
	RA063C22.00R06/K								
	RA080A25.40R07/K								MBC-M12 (5484985)
	RA100A31.75R09/K								MBC-M16 (5484993)
ALWC	**RS080A25.40R06/K**		Part No. CS0514A (5609433)						Part No. RTS-M12 (5592803) 46.5g
	RS080A25.40R07/K								
	RS100A31.75R08/K								RTS-M16 (5592829) 100g
	RS125A38.10R10/K								RTS-M20 (5592811) 253g

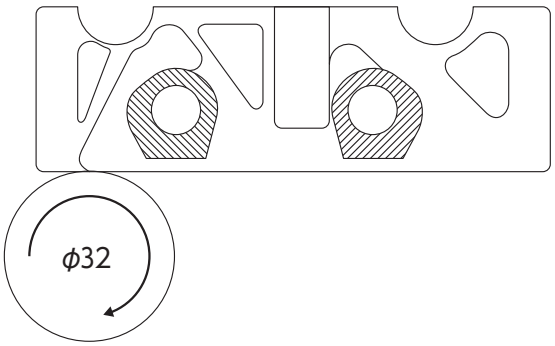
Cutters for machining of aluminum components

Actual examples of machining with HPC/ALWC

Machining of rocker shaft holder

●Work material : ADC12
●Surface finish required : 12.5S
●Roughness of surface to be machined : 1.5S

	Current tool	NTK
Insert material grade	Competitor's carbide (φ32× 2 pcs)	**PD1** (φ32× 4 pcs)
Cutting speed (m/min)	600	800
No. of revolutions (min⁻¹)	6,000	8,000
Feed rate per blade (mm/t)	0.025	0.05
Table feed rate (mm/min)	300	1,600
Depth of cut (mm)	MAX1.0	←
Cutting oil	WET(through coolant)	←
Life (pcs/corner)	8,000	**15,000(still cuuting)**

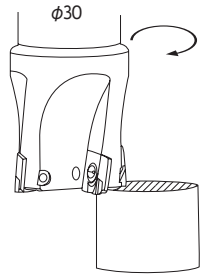


The total cycle time was reduced by 3 minutes.

Machining of under holder

●Work material : A7000 type
●Surface finish required : 12.5S
●Roughness of surface to be machined : 6S

	Current tool	Current tool	NTK
Insert material grade	Competitor's carbide (φ32×3pcs)	Competitor's carbide: 3 pcs PCD: 1 pc (φ50×4pcs)	**PD1** (φ30×4pcs)
Cutting speed (m/min)	700	785	750
No. of revolutions (min⁻¹)	7,000	5,000	8,000
Feed rate per blade (mm/t)	0.1		←
Table feed rate (mm/min)	2,100	2,000	3,200
Depth of cut (mm)	d=3,d=3,d=1.5 3 PASS	d=0.4 1 PASS	a_p=3,d=3,d=1.5 3 PASS
Cutting oil	WET (External coolant)		←
Life (pcs/corner)	2,500	10,000	**24,000 (still cutting)**

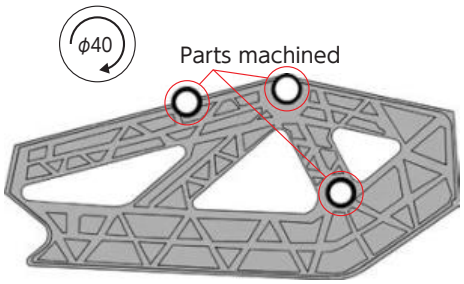


Burrs free machining.
As the tool performance was excellent, cutters of φ32 and φ50 were replaced with our single φ30 cutter.

Machining of rail frame (for motor bikes)

●Work material : W2K
●Machine : Compact type machining center (BT30)

	Existing tool	NTK
Insert material grade	Competitor's PCD	**PD1**
Cutter specification	φ40× 3 blades Steel body	φ40× 4 blades
Cutting speed (m/min)	314	753
No. of revolutions (min⁻¹)	2,500	6,000
Feed rate per blade (mm/t)	0.08	0.05
Table feed rate (mm/min)	600	1,200
Depth of cut (mm)	2~4 (Machining several times)	←
Cutting oil	WET	←
Life (pcs/corner)	10~20	**30,000**

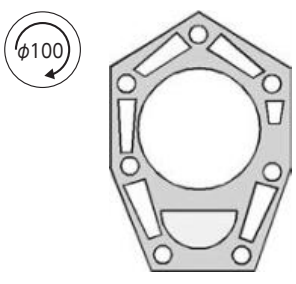


Tool life and efficiency were both improved greatly.

Machining of transfer case

●Work material : ADC12
●Surface finish required :1.6a
●Machine : Machining center (BT40)

	Existing tool	NTK
Insert material grade	Competitor's PCD	**PD1**
Cutter specification	φ100× 6 blades	φ80× 7 blades
Cutting speed (m/min)	1,885~2,200	2,510
No. of revolutions (min⁻¹)	6,000~7,000	10,000
Feed rate per blade (mm/t)	Roughing : 0.12 (mm/t) 4,320~5,040 (mm/min)	Roughing : 0.142 (mm/t) 9,940 (mm/min)
	Finishing : 0.1 (mm/t) 3,600~4,200 (mm/min)	Finishing : 0.1 (mm/t) 7,000 (mm/min)
Depth of cut (mm)	Roughing : 3.0 Finishing : 0.5	←
Life (pcs/corner)	100	**20,000**



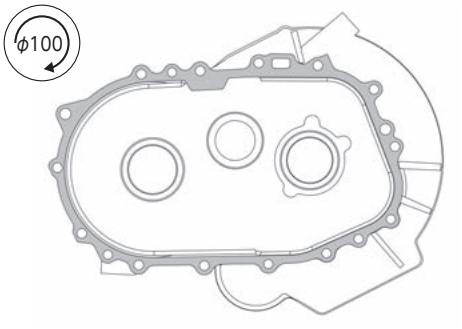
Tool life determined by: burring

Tool life and efficiency were both improved greatly.

Machining of converter housing

●Work material : ADC12
●Standard for surface roughness : Max. 12.5S
●Machine : Horizontal machining center

	Existing tool	NTK
material grade	Competitor's PCD	**PD1**
Cutter specification	φ100× 9 blades	φ100× 8 blades
Cutting speed (m/min)	3,140	←
No. of revolutions (min⁻¹)	10,000	←
Feed rate per blade (mm/t)	0.167	0.188
Table feed rate (mm/min)	15,000	←
Depth of cut (mm)	1.2	←
Cutting oil	External coolant	←
Life (pcs/corner)	20,000	**20,000**

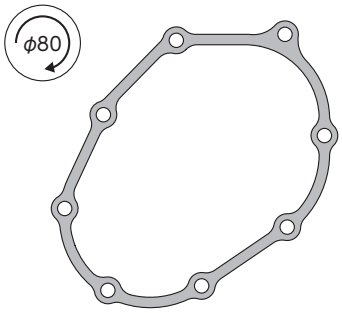


The load factor for the spindle motor was reduced by 20%

Machining of transfer case

●Work material : ADC12
●Standard for surface roughness : Max.6.3S

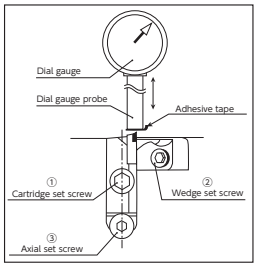
	Existing tool	NTK
material grade	Competitor's PCD	**PD1**
Cutter specification	φ80× 6 blades	φ80× 7 blades
Cutting speed (m/min)	3,014	←
No. of revolutions (min⁻¹)	12,000	←
Feed rate per blade (mm/t)	0.1	←
Table feed rate (mm/min)	7,200	8,400
Depth of cut (mm)	1～4 (down gate)	←
Cutting oil	Internal coolant	←
Life (pcs/corner)	20,000	**20,000**



The machining efficiency was improved by 17%.

Insert Presetting and PCD Damage Preventive Measures for HSC, HPC and AWLC

■Be sure to clean all the insert pockets before carrying out the following steps:



●Step1: Preventative measures against insert chipping
Attach a piece of adhesive tape (preferably, a tape low in adhesion) to the end of a dial gauge's probe.

●Step2: Mounting inserts
For HPC and ALWC: First, install the cartridges to the body, then, tighten each insert with the insert clamping screw at 3 N·m.
【Caution: If you mount inserts in a cartridge first, it's not possible to install the cartridges to the body.】
For HSC: Remove the wedges from all the cutting edges of the inserts. After installing inserts, mount each by tightening the cartridge set screw first ant then the wedge set screw.

●Step3: Temporary tightening (using a torque-wrench)
Tighten set screw (1) first, and then, setscrew (3) at 4 N·m. For HPC and ALWC, as set screw (3) is not provided, skip tightening set screw (3).

●Step4: Setting
While watching the reading on the dial gauge, rotate set screw (2) so that the insert with the highest cutting edge is lifted by +0.03 mm. Next, with this position as the reference, set the cutting edges of all other inserts with variations in run out to stay within +/- 5 microns (10 microns in terms of range).

●Step5
Remove the probe from the dial gauge.

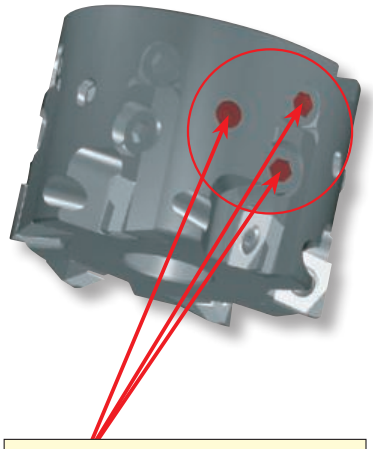
●Step6: Tightening set screws (using a torque wrench)
For HSC, tighten set screw (1) at 10 N·m, then, setscrew (3) at 6 N·m.
For HPC and ALWC, tighten set screw (1) at 8 N·m. Skip tightening set screw (3) for HPC and ALWC as a set screw (3) is not provided for HPC and ALWC.

■Supplemental explanation
1. Even after the set screws have been tightened, the run out of the cutting edges should stay within approximately +/- 10 microns (20 microns in terms of range).
2. In the above case, NTK standard inserts (excluding some of them; see the note below for details.) and re-ground NTK inserts will not affect the tool life and surface finish.
※Note: To use ZT8489R or ZT8490R for HSC for machining operations that require high surface quality, NTK recommends that a special wiper insert be built into the tool.

HPC and ALWC Fixed Type

No need for pre-setting

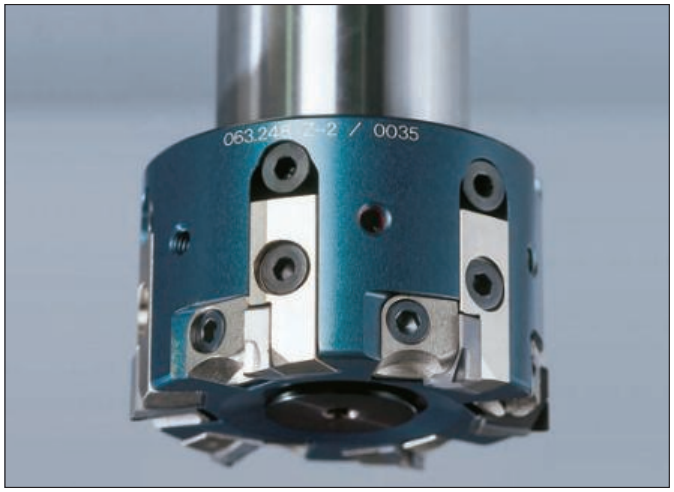
No need for cutting edge adjustments!
(The only requirement is clamping and unclamping of the inserts with the clamping bolt)



【Note】
The holes for the axial setscrews and balance adjusting screws are filled with a special material, thus, no screwdrivers and hex-wrenches can be inserted in them.
※The color of the special material is different from the color of the actual product body.

HSC Series

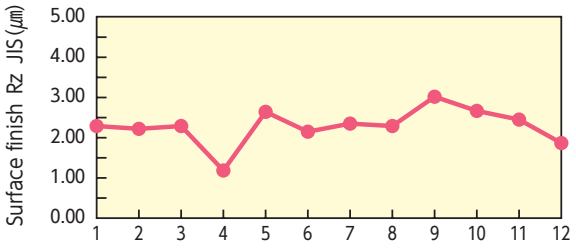
Fixed type/Adjustable type



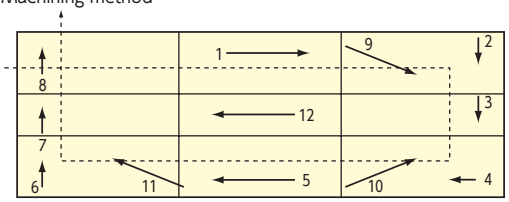
Features

- **High reliablility**
  Sales performance more than a decade
- **Low cutting force**
  Feasible by good balancing among A.R, R.R and number of inserts
- **Wide range of line-up**
  Standard cutter diameter from 80mm to 250mm
  Standard inserts with 8 kinds of configuration

Surface finish

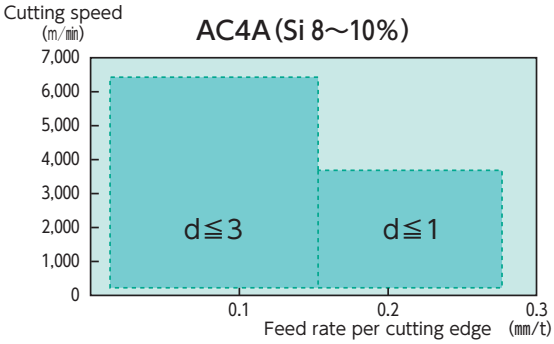


Machining method



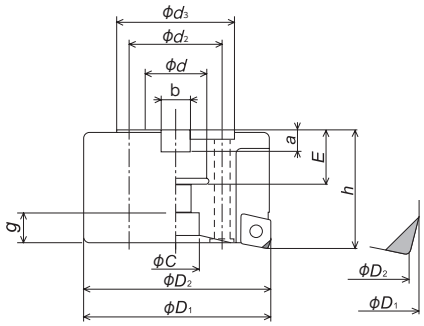
Cutting conditions
Work material : AC4A Cutter used : 80,6 blades
No. of revolutions : 10,000 min-1 (rpm)
Table feed rate : 3,000 mm/min Depth of cut : 2.0 mm, WET

Operating ranges



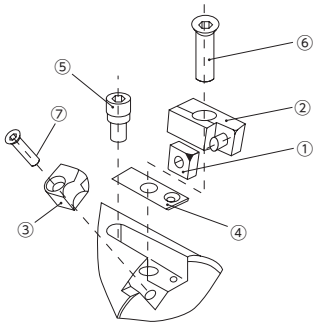
Drawing

A.R.+6° R.R.+6°



※The drawing shows a right-handed cutter and its parts.

Names of parts



①Throw-away insert
②Cartridge
③Wedge
④Thrust pad
⑤Axial set screw
⑥Cartridge set screw
⑦Wedge set screw

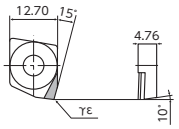
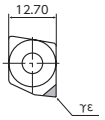
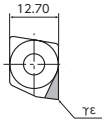
HSC body

Code No.	Part No. (Product name)	Stock	No.of blades	Dimensions (mm)											Weight (kg)	Allowable no. of revolutions (min⁻¹)	Part No. of applicable insert
				ϕD_1	ϕD_2	h	ϕd	E	a	b	ϕd_2	ϕd_3	ϕc	g			
5203096	**63.248Z-2** (1D-HSC-MK08006RJ)	◉	6	80	78.3	52	25.40	22.2	6	9.6	–	50	19.5	11	0.75	20,000	Refer to the above table (Inserts dedicated for HSC)
5218268	**64.113Z-2** (1D-HSC-MK10006RJ)		6	100	98.3	65	31.75	31.0	8	12.8	–	58	27	15	1.00	20,000	
5218169	**64.026Z-2** (1D-HSC-MK10008RJ)	◉	8												1.10		
5218276	**64.116Z-2** (1D-HSC-MK12508RJ)	◉	8	125	123.3	65	38.10	34.5	10	16.0	–	70	56	26	1.80	16,000	
5218284	**64.118Z-2** (1D-HSC-MK12510RJ)	◉	10												0.36		
5302278	**67.688Z-1** (1D-HSC-MK16010RJ)	◉	10	160	158.3	65	50.80	38.0	11	19.0	–	104	70	22.5	2.90	12,500	
5309810	**66.934Z-1** (1D-HSC-MK16012RJ)		12												3.00		
5576137	**65.750Z-1** (1D-HSC-MK20012RJ)		12	200	198.3	65	47.625	–	14	25.4	101.6	130	–	–	4.40	10,000	
5309836	**65.751Z-1** (1D-HSC-MK20016RJ)		16												4.60		
5503891	**65.752Z-1** (1D-HSC-MK25016RJ)		16	250	248.3	65	47.625	–	14	25.4	101.6	130	–	–	6.90	8,000	
5553789	**65.753Z-1** (1D-HSC-MK25020RJ)		20												7.10		

■10N・m≒1kgf・m ◉ : About 2weeks

■Excessive clamping torque may damage the cutters. Tightening with excessive torque may cause damage to the screws, wedges, helical inserts

Inserts dedicated for HSC

Shape	Code No.	Part No.	Corner angle θ	Cutting edge length (mm)	r_ε (mm)	A.R.	R.R.	Wiper width	Stock
	5371968	**PD1 KH4RE-04B-003**	15°	6.0	0.4	+6°	+6°	1.4	●
	5386479	**PD1 ZT8490R** angular type		5.0				–	●
	5308614	**PD1 KH4RP-02S**	0°	3.0	0.2			1.6	●
	5416227	**PD1 KH4RP-04S-012**		4.0	0.4				●
	5309778	**PD1 KH4RP-04B**		6.0					●
	5371976	**PD1 KH4RP-04B-002**						2.1	●
	5386461	**PD1 ZT8489R**		5.0				–	●
	5332614	**PD1 KH4REW02** Wiper insert	15°	2.0	0.2		0°	5.0	●

Note) The depth of cut should be limited to a maximum of 2/3 the length of the cutting edge. ● : Stocked item

HSC body accessories

Part No. (Product name)	Cartridge Sales quantity 1pc/case	Wedge Sales quantity 1pc/case	Thrust pad Sales quantity 1pc/case	Axial setscrew Sales quantity 10pcs/case	Cartridge setscrew Sales quantity 10pcs/case	Wedge setscrew Sales quantity 10pcs/case	Camping bolt Sales quantity 1pc/case		
							For internal lubrication		Qty
1D-HSC-MK08006RJ	P/N MKH 1NR 02 **5324058**	P/N MKL 1R 01 **5331301**	P/N AU 32 13R **5331301**	P/N ST 5R 01B **5218219**	P/N BS 6R 01 **5218201**	P/N BS 5R 02 **5218235**	**5331319**	**FAS 080 27A**	1pc
1D-HSC-MK10006RJ							**5331327**	**FAS 100 32A**	1pc
1D-HSC-MK10008RJ								**FAS 100 32A**	1pc
1D-HSC-MK12508RJ							**5331293**	**FAS 125 40A**	1pc
1D-HSC-MK12510RJ								**FAS 125 40A**	1pc
1D-HSC-MK16010RJ							**5331285**	**FAS 160 50A**	1pc
1D-HSC-MK16012RJ								**FAS 160 50A**	1pc
1D-HSC-MK20012RJ				T-handle hex-wrench: P/N SW 4 X60 **5328323** Sales quantity 1pc/case			**5615315** ※Mounting screw K103788 / M6×20 Sales quantity 4pcs/case	**71. 857E-2**	4 pcs (commercially available)
1D-HSC-MK20016RJ								**71. 857E-2**	4 pcs (commercially available)
1D-HSC-MK25016RJ								**71. 857E-2**	4 pcs (commercially available)
1D-HSC-MK25020RJ								**71. 857E-2**	4 pcs (commercially available)

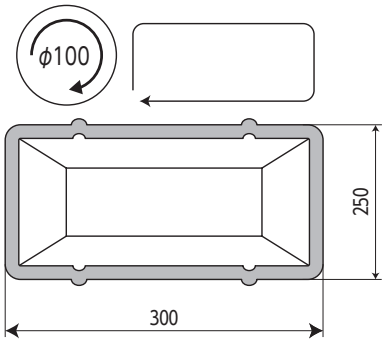
Cutters for machining of aluminum components

Actual examples of machining with HSC

Machining of oil pan

●Work material : ADC12
●Surface finish required : Max. 12.5S
●Machine : Vertical type machining center

	Initial use of HSC	NTK
Insert material grade	ZT8076R-E1	**PD1**
Cutter specification	ϕ100× 8 blades	←
Cutting speed (m/min)	4,712	←
No. of revolution (min⁻¹)	15,000	←
Feed rate per blade (mm/t)	0.0583	←
Table feed rate (mm/min)	7,000	←
Depth of cut (mm)	1.5-4.0(down gate)	←
Cutting oil	Internally supplied	←
Surface roughness	4S	←
Life (pcs/corner)	6,600	**34,000**

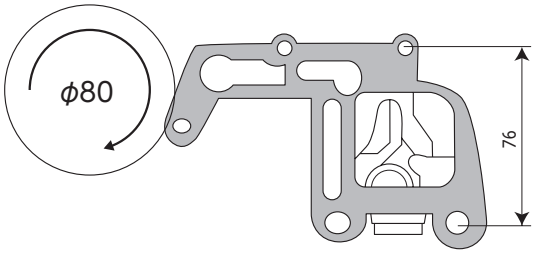


As the machining allowance for roughing was large, chipping was caused to the inserts. By taking measures to strengthen the insert edge , the tool life became approximately 5 times longer.

Machining of water passage

●Work material : Equivalent to ADC12
●Surface finish required : Max. 12.5S
●Surface levelness : Max. 0.08

	Existing tool	NTK
Insert material grade	Competitor's carbide	**PD1**
Cutter specification	ϕ80× 5 blades	ϕ80× 6 blades
Cutting speed (m/min)	1,633	2,512
No. of revolution (min⁻¹)	6,500	10,000
Feed rate per blade (mm/t)	0.028~0.07	0.032~0.08
Table feed rate (mm/min)	910~2,275	1,920~4,800
Depth of cut (mm)	0.5	←
Cutting oil	Externally supplied	Internally supplied
Surface roughness	6.3S	3.8S
Surface levelness (mm)	0.01or less	0.001or less
Total cycle time (sec)	86	82
Life (pcs/corner)	Approx. 1 month	←

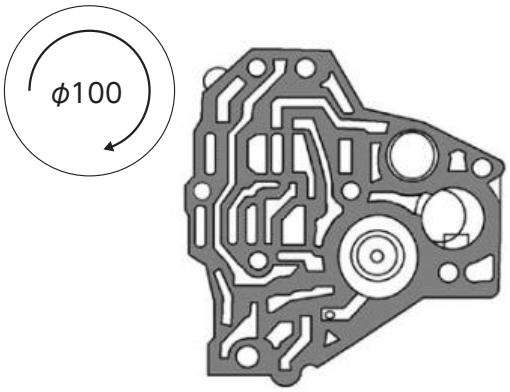


The replacement interval for both tools is once a month. However, the machining efficiency of the NTK's HSC was approximately 2.1 times higher, making the tool life double.

Machining of automatic transmission components

●Work material : ADC12

	Existing tool	NTK
Insert material grade	Competitor's PCD	**PD1**
Cutter specification	ϕ100× 6 blades	ϕ100× 8 blades
Cutting speed (m/min)	2,513	←
No. of revolutions (min⁻¹)	8,000	←
Feed rate per blade (mm/t)	0.05	←
Table feed rate (mm/min)	2,400	3,200
Depth of cut (mm)	0.2	←
Cutting oil	WET	←
Life (pcs/corner)	2,000	**10,000**

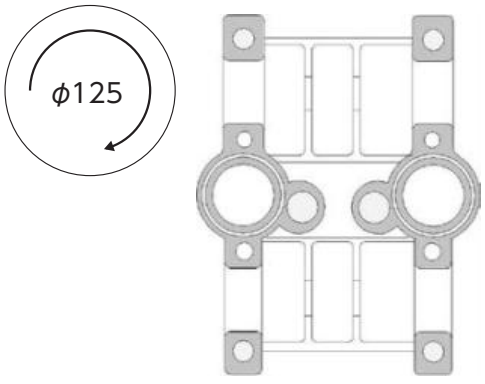


Uneven faces on the machined work pieces were few and the tool life was improved greatly.

Machining of cam holder

●Work material : ADC12
●Machine : Machining center(BT30)

	Existing tool	NTK
Insert material grade	Newly established line	**PD1**
Cutter specification		ϕ125×10blades
Cutting speed (m/min)		1,570
No. of revolutions (min⁻¹)		4,000
Feed rate per blade (mm/t)		0.07
Table feed rate (mm/min)		2,800
Depth of cut (mm)		1.0
Cutting oil		WET
Life (pcs/corner)		**24,000**



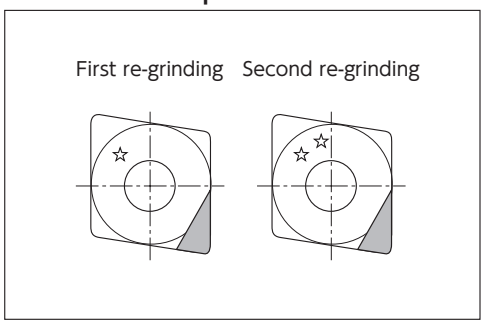
The operation single-pass by HSC with ϕ125.

Re-grinding inserts dedicated for HSC

- For the first re-grinding operation, grind both the end-cutting edge and side cutting edge by 0.2 mm and assign a mark designating the first regrind.
- For the second re-grinding operation, further grind by 0.2 mm (a total of 0.4 mm from the initial product) and assign a mark designating the second regrind.
- Only equip cutters wholly with inserts with the same number of regrinds.
- In order to prevent problems such as deterioration of brazing strength and interference with the flank, limit the total amount of re-grinding to 0.4 mm for both the end cutting edge and side cutting edge.
- Before re-grinding inserts, please contact NTK for safety precautions.

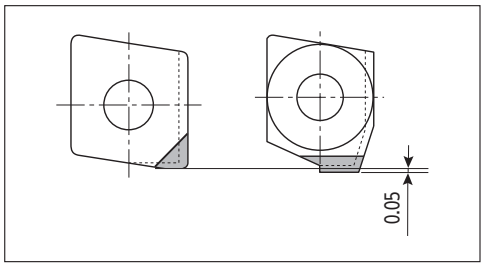
Note) When using re-ground inserts, pay careful attention to reduction in the diameter of the cutter and to the correction of axial dimensions.

<Sample marks>



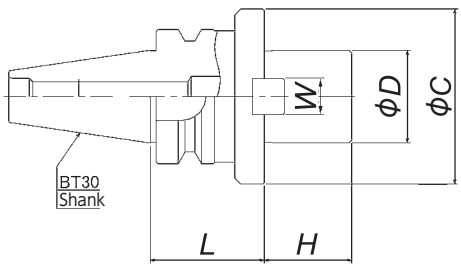
Method of combining inserts for the HSC

When mounting a finishing wiper insert to a cutter, set the position of its cutting edge around +0.05 mm lower than the other inserts.



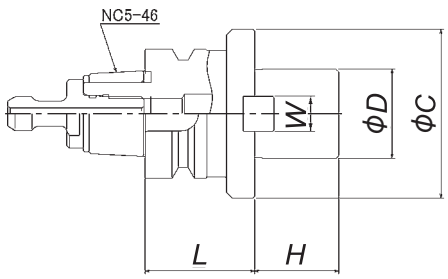
Arbors

BT30type



※Internal coolant supply available

NC5type



※Internal coolant supply available

Code No.	Part No.	Stock	ϕD (mm)	L (mm)	H (mm)	ϕC (mm)	W (mm)	Weight (kg)	Clamping bolt (optional)
5649199	**BT30-FMNC22-32**	●	22	32	18	46	10.4	0.6	SALS-063
5612502	**BT30-FMNA25.4-40**	●	25.4	40	22	50	9.5	0.7	RTS-M12
5612510	**BT30-FMNA31.75-39**	●	31.75	39	30	60	12.7	0.8	RTS-M16
5649207	**NC5-46-FMNC22-32F**	●	22	32	18	46	10.4	0.6	SALS-063
5612528	**NC5-46-FMNA25.4-40F**	●	25.4	40	22	50	9.5	0.7	RTS-M12
5612536	**NC5-46-FMNA31.75-39F**	●	31.75	39	30	60	12.7	0.8	RTS-M16

For BT30 type, use pull-stud bolts suitable for the machine.
For NC5 type, pull-stud bolts for FUNAC are supplied as standard.

● : Standard stock

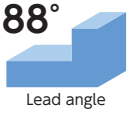
Super low cutting force milling cutter

Features

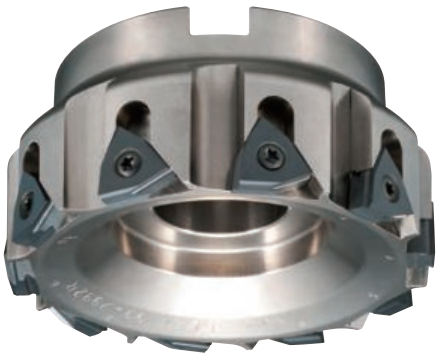
FU-HA MILL

Stable gray cast iron milling with lower cutting force !

- Maximizes ceramic insert potential and can mill faster than 1,000m/min !



A.R. 5°
R.R. 4° , 7° , 10°



P20

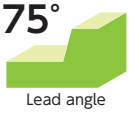
HCC High-Speed Ceramic Milling Cutters

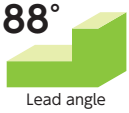
Primary use is with ceramic grade inserts in mind, the HCC can enhance the advantageous properties of ceramic grade inserts through high-speed machining. The series can lead to a much reduced cycle time and highly stable operation. We offer a range of 5 series, JXTM, JFDX, JSDW, JQTE/JATS, and JR.

Features

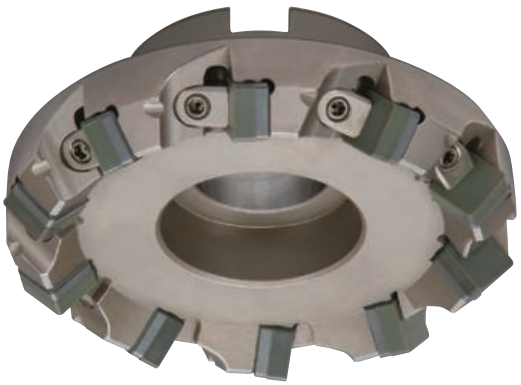
JFDX Series

- Extremely economical as SNGN1204 style inserts with 8 cutting edges can be used !
- Capable of producing excellent surface finish, by utilising inserts with a chipbreakers and wiper facets !





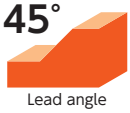
A.R.-6°
R.R.-10°

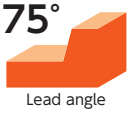


P22

JSDW Series

- Reduces cutting force greatly with positive rake SDCW inserts !
- Can also use cermet grade inserts !





A.R.+12°
R.R.0°

P24

JXTM Series

- Offers high efficiency machining due to the multi-blade design and possibility for greater depth of cut !
- Offers a reduction in cutting force via our special chipbreaker design !

Lead angle

A.R.–4°
R.R.0°

P25

JQTE/JQTS Series

- Ceramic milling cutter capable of shoulder milling now released !
- Accommodates from ϕ20 up to ϕ63 cutters !

Lead angle

P26

P26

JR Series

- The cutters exclusively for use with round insert shapes ideal for heavy duty cutting !

P29

P28

P28

FU-HA MILL

Features

- *Stable gray cast iron milling with lower cutting force*
- *Maximizes ceramic insert potential and can mill faster than 1,000m/min*

WATCH ON YouTube

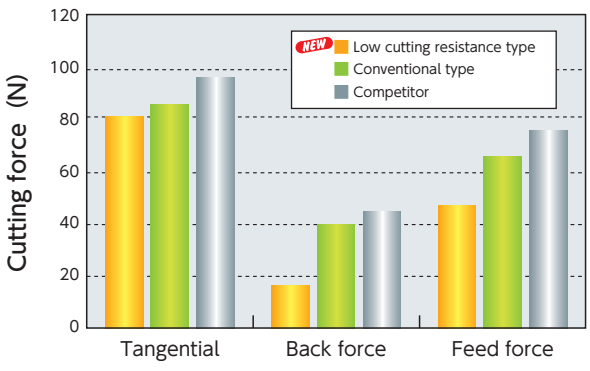
Thanks to lower cutting forces, work piece chipping is reduced Apply up to Ap 6mm

Available cutter dia. ϕ63 - ϕ160

Silicon Nitride grade is the best choice for roughing cast iron with scale. Tool pressure is reduced because of the sharper cutting edge and the ground-in chipbreaker

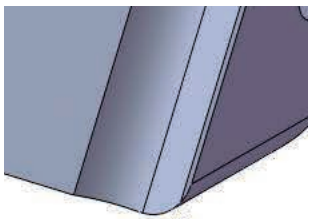
Very cost efficient with a unique 6 cutting edge design

Thanks to low-cutting resistance, over machine load is avoided

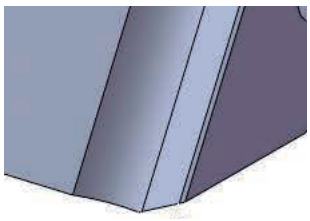


Cutting condition

v_c=800m/min f_z=0.10mm/t a_p=3.0mm a_e=80.0mm



【Radius type】

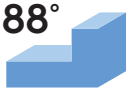


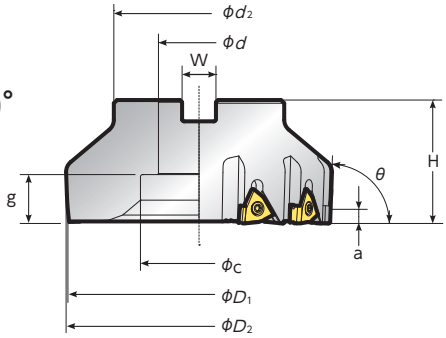
【Chamfered type】

Two edge preparation are available.
Radius type is good for high feed milling.
Chamfered type is with excellent edge sharpness.

Cycle time reduction with single pass and achieve longer tool life.
Lesser machine horsepower required.

A. R. +5°
R. R. +4°, +7°, +10°





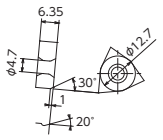
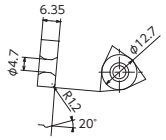
JWNXM type milling body

θ	Code No.	Part number	Stock	No. of inserts	Dimensions (mm)										Weight (kg)	Rake angle (°)		Centering location type
					ϕD1	ϕD2	H	a※1	a※2	ϕd1	W	ϕd2	ϕc	g		A.R.	R.R.	
88°	5851415	JWNXM063C2200R06	●	6	63	63	50	5.5	4.5	22	10.4	60	18	15.5	0.9	+5	+4	FMC
	5851423	080A2540R08	●	8	80	80				25.4	9.5		36	15	1.1		+7	FMA
	5851431	100A3175R10	●	10	100	100				31.75	12.7	80	50	18	1.8		+10	
	5851449	125A3810R12	●	12	125	125	58			38.1	15.9		55	23	3			
	5851456	160A5080R16	●	16	160	160	60			50.8	19.0	100	72	22	4.9			

※1 Dimension when set the insert 「WNX44-C10T01020」
※2 Dimension when set the insert 「WNX44-R12T01020」

Parts	
Clamping Screw FSI 26-4.0×12-LH 5861935 Sales quantity 10pcs/case	Wrench LLR-T15 5701909 Sales quantity 5pcs/case

Insert

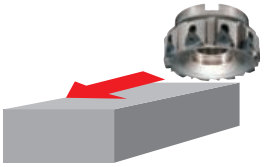
Shape	Dimensions (mm)	Part number	C or r_ε	Grade	
		WNX44-C10T01020	C1.0	SX6	●
				SP9	●
		WNX44-R12T01020	R1.2	SX6	●
				SP9	●

● : New standard stock items

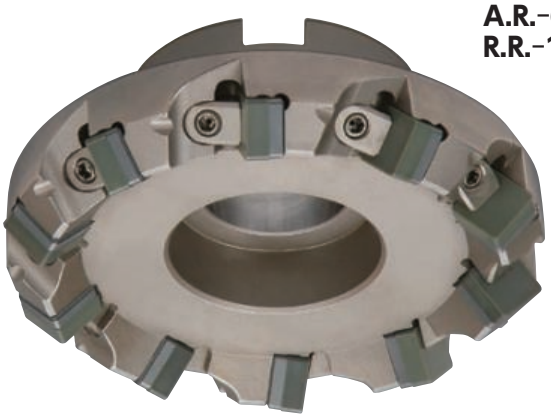
Recommended cutting conditions

Grade	Work material	Cutting speed (m/min)	Feed (mm/t)	Depth of cut (mm)
	K	400 500 600 700 800 900 1000 1100 1200 1300 1400	0.05 0.1 0.15 0.2 0.25 0.3	
SX6	Gray cast iron			~6 (mm)
SP9	Ductile cast iron			

Case study

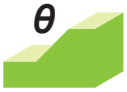
Transmission case ●Work material : FC230			
	current tool	NTK	
Holder	Competitor	JWNXM125A3810R12	
Insert	Ceramic insert	SX6 WNX44-R12T01020	
Cutting speed (m/min)	500	←	
Feed pertooth (mm/t)	0.13	←	As for competitor's milling cutter, weneeded to change inserts to new ones due to the wearprogress and lower clamping force of work material after machining 60 pcs. This was caused by increasing sutting force. NTK NEW Milling cutter "FU-HA MILL" achieved 2 times longer competitor's. Low cutting force avoided the problem occurred by competitor's milling cutter.
Depth of cut (mm)	1	←	
Coolant	DRY	←	
Tool life (pcs/coner)	60	120	

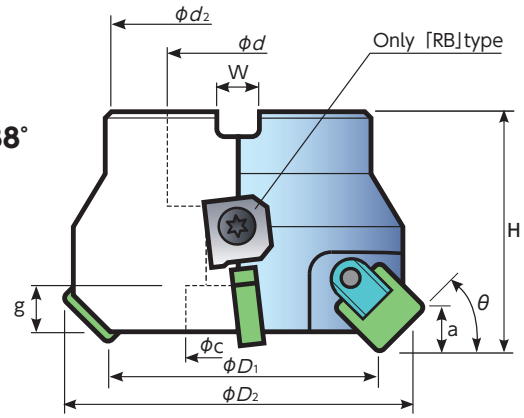
JFDX Series



A.R.-6°
R.R.-10°

θ : 45° • 75° • 88°

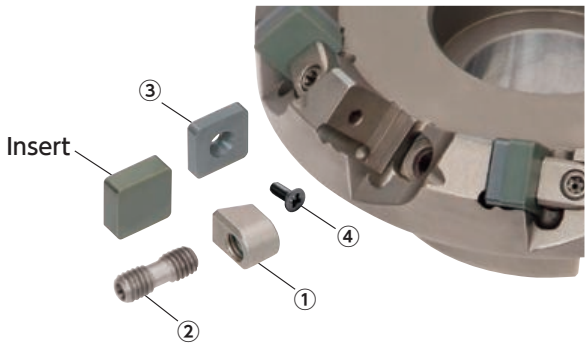




JFDX body

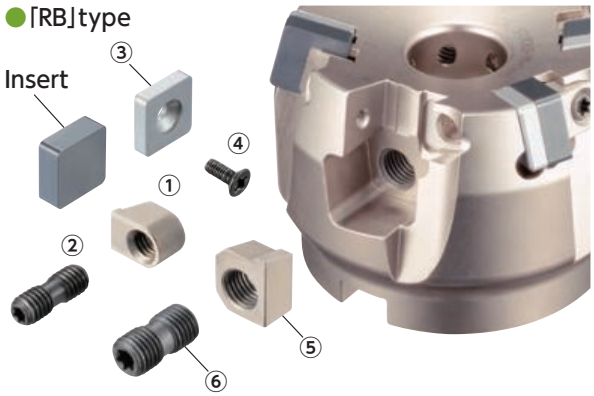
θ	Code No.	Part No.	Stock	N.O.B	Dimensions (mm)									Weight (kg)
					ϕD1	ϕD2	H	a	ϕd	W	ϕd2	ϕc	g	
45°	5727458	JFDX063-45-06R	●	6	63	72	50	8	22	10.4	58	18	10.5	0.93
	5727441	JFDX080-45-08R	●	8	80	95	50	8	25.4	9.5	62	36	10.5	1.21
	5727433	JFDX100-45-10R	●	10	100	120	50	8	31.75	12.7	62	45	8.5	1.66
	5727425	JFDX125-45-12R	●	12	125	146	58	8	38.1	15.9	83	55	13.5	2.80
75°	5729884	JFDX063-75-06R	●	6	63	70	50	12	22	10.4	58	18	18.5	0.79
	5909767	JFDX063-75-06RB		6	63	70	50	12	22	10.4	58	18	18.5	0.97
	5729892	JFDX080-75-08R	●	8	80	87	50	12	25.4	9.5	62	36	15.5	1.06
	5909775	JFDX080-75-08RB		8	80	87	50	12	25.4	9.5	62	36	15.5	1.36
	5729900	JFDX100-75-10R	●	10	100	107	50	12	31.75	12.7	62	45	16.5	1.39
	5909791	JFDX100-75-10RB		10	100	107	50	12	31.75	12.7	62	45	16.5	1.83
	5729918	JFDX125-75-12R	●	12	125	132	58	12	38.1	15.9	83	55	21.5	2.56
	5909809	JFDX125-75-12RB		12	125	132	58	12	38.1	15.9	83	55	21.5	3.34
	5766894	JFDX160-75-16R		16	160	166	60	12	50.8	19	100	72	20.5	4.1
	5909817	JFDX160-75-16RB		16	160	166	60	12	50.8	19	100	72	20.5	5.47
88°	5729926	JFDX063-88-06R	●	6	63	64	50	12	22	10.4	58	18	13	0.79
	5729934	JFDX080-88-08R	●	8	80	81	50	12	25.4	9.5	62	36	13.5	1.03
	5729942	JFDX100-88-10R	●	10	100	101	50	12	31.75	12.7	62	45	16.5	1.38
	5729959	JFDX125-88-12R	●	12	125	126	58	12	38.1	15.9	83	55	21.5	2.61
	5766498	JFDX160-88-16R		16	160	156	60	12	50.8	19	100	72	20.5	4.1

※[RB] type has only 1 height adjustable pocket.



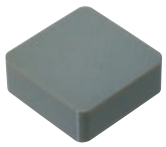
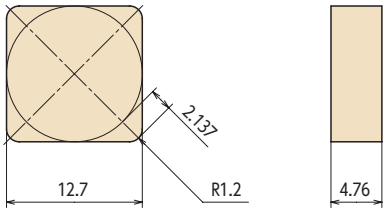
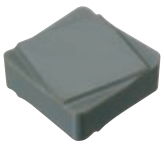
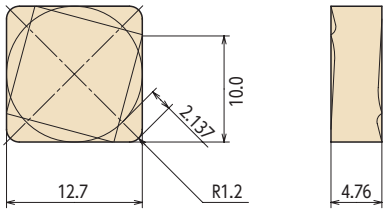
Parts				
① Clamp	② Clamping screw	③ Shim seat	④ Shim screw	Wrench
	T15			T15
HLW175	WS0616-T15	ASN423	M3×8	T-15A
5768536	5779483	5060827	5225453	5757588
Sales quantity 1pc/case	Sales quantity 10pcs/case	Sales quantity 10pcs/case	Sales quantity 10pcs/case	Sales quantity 5pcs/case

● [RB] type



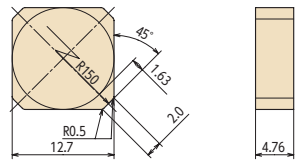
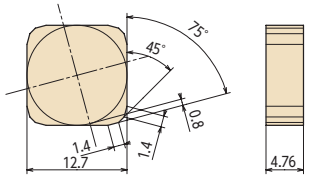
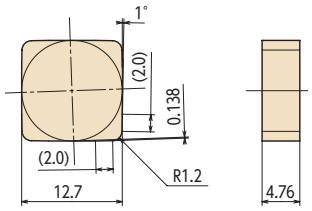
Parts		
⑤ Wedge	⑥ Double screw	Wrench
		T25
HLW177	WS0816-T25	LLR-T25
5795638	5798004	5662143
Sales quantity 1pc/case	Sales quantity 10pcs/case	Sales quantity 5pcs/case

Applicable inserts

Shape	Dimensions	Part No.	Material grade
		Standard product **SNGN 120412 T02020**	**SX6** ● **SP9** ●
		With chipbreaker **SNGF 120412 TRC-C**	**SX6** ● **SP9** ●

Ceramic wiper inserts

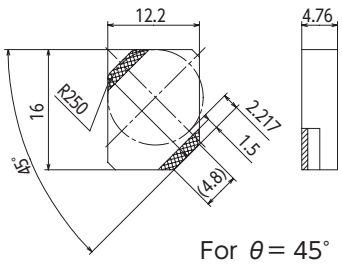
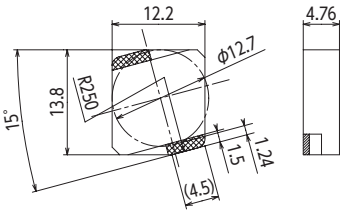
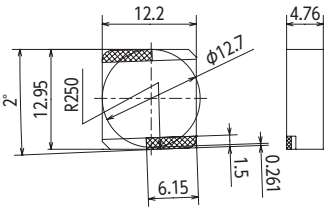
※When using ceramic wiper inserts, please put all the same inserts in all pockets on a cutter.

SNGN 1204 ANTW	SNGN 1204 ENT01025	SNEN 1204 ZNT01025	Material grade
 For θ = 45°	 For θ = 75°	 For θ = 88°	**SX6** ● **SP9** ●

● : Standard stock

CBN wiper inserts

※※ Use 1 or 2 inserts on a cutter.

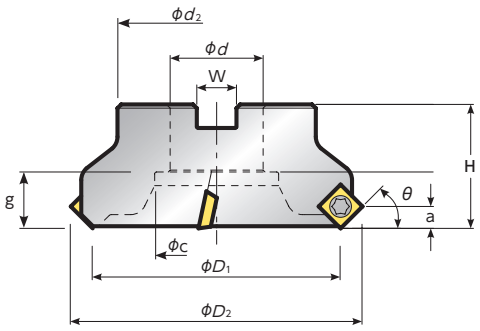
FDX 1204-45-50R	FDX 1204-75-50R	FDX 1204-88-50R	Material grade
 For θ = 45°	 For θ = 75°	 For θ = 88°	**B30** ● **B52** ●

Recommended cutting conditions				
Insert material grade	Work material	Cutting speed (m/min)	Feed rate (mm/tooth)	Depth of cut (mm)
	K	400 500 600 700 800 900 1000 1100	0.05 0.1 0.15 0.2 0.25 0.3	
SX6	Normal cast iron			~ 6 (mm)
SP9	Ductile cast iron			

JSDW Series

A.R.12°
R.R.0°

θ : 45° • 75°

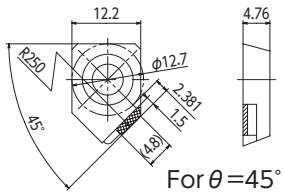
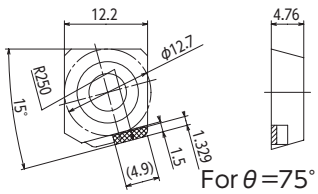


JSDW body

θ	Code No.	Part No.	Stock	N.O.B	Dimensions (mm)									Weight (kg)
					ϕD1	ϕD2	H	a	ϕd	W	ϕd2	ϕc	g	
45°	5729967	JSDW080-45-06R	●	6	80	95.0	50	6.6	25.4	9.5	62	36	18	1.10
	5729975	JSDW100-45-07R	●	7	100	120.4	50	6.6	31.75	12.7	58	45	16	1.39
	5729983	JSDW125-45-08R	●	8	125	145.8	58	6.6	38.1	15.9	79	55	21	2.55
75°	5729991	JSDW063-75-04R	●	4	63	70.6	50	9.1	22	10.4	58	18	14	0.82
	5730007	JSDW080-75-05R	●	5	80	83.3	50	9.1	25.4	9.5	62	36	15.5	1.04
	5730015	JSDW100-75-06R	●	6	100	108.7	50	9.1	31.75	12.7	58	45	16.5	1.33
	5730106	JSDW125-75-07R	●	7	125	134.1	58	9.1	38.1	15.9	79	55	21.5	2.54
	5784152	JSDW160-75-10R		10	160	165	68	9.1	50.8	19	100	72	28.5	4.0

Parts	
Clamping screw	Wrench
	T20
FSI21-5.0＊12.45 **5768084** Sales quantity 10pcs/case	T-20 **5286984** Sales quantity 10pcs/case

CBN wiper inserts

SDW1204-45-50R	SDW1204-75-50R	Material grade
 For θ=45°	 For θ=75°	B30 ● B52 ●

Applicable inserts

Figure-1

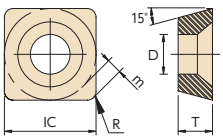


Figure-2 Wiper for θ=45

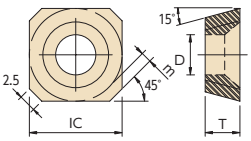
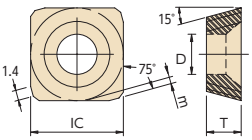


Figure-3 Wiper for θ=75



Shape		Part No.	Dimensions (mm)						SX6	SP9	C7X (Cermet)	DM4 (微粒子超硬)
			IC	T	R	D	m(θ=45°)	m(θ=75°)				
	Fig.-1	SDCW120408T01020	12.7	4.76	0.8	5.5	2.301	1.249	●	●		
		SDCW120408TNCE-Z	12.7	4.76	0.8	5.5	2.301	1.249			●	
	Fig.-2	SDCW1204AET01020	12.7	4.76	—	5.5	1.430		●	●		
		SDCW43AETNCEE02	12.7	4.76	—	5.5	1.430				●	●
	Fig.-3	SDCW1204EETR	12.7	4.76	—	5.5	0.921	0.921	●	●	●	●

● : Standard stock

Recommended cutting conditions

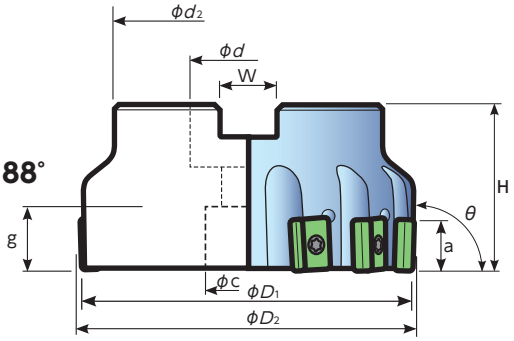
Insert material grade	Work material K • P	Cutting speed (m/min) 100 200 300 400 500 600 700 800 1000 1200 1400	Feed rate (mm/tooth) 0.05 0.1 0.15 0.2 0.25 0.3	Depth of cut (mm)
SX6	Normal cast iron			～6 (mm)
SP9	Ductile cast iron			
DM4	Ductile cast iron			
DM4	Steel			～4 (mm)

JXTM Series

A.R.-4°
R.R.0°

θ : 88°

12.5



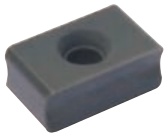
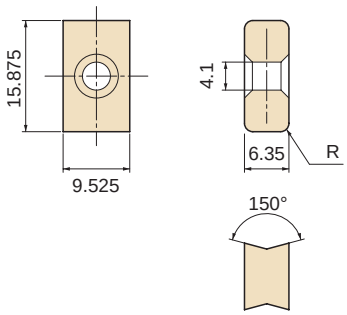
JXTM body

θ	Code No.	Part No.	Stock	N.O.B	Dimensions (mm)									Weight (kg)
					ϕD1	ϕD2	H	a	ϕd	W	ϕd2	ϕc	g	
88°	5729652	**JXTM080-88-10R**	●	10	80	83	50	14	25.4	9.5	58	36	14	1.1
	5729660	**JXTM100-88-13R**	●	13	100	103	50	14	31.75	12.7	77	50	17	1.8
	5729678	**JXTM125-88-16R**	●	16	125	128	58	14	38.1	15.9	77	55	22	3.1

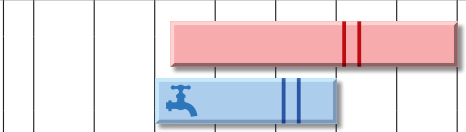
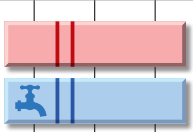
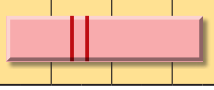
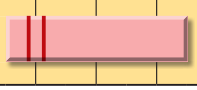
Parts	
Clamping screw	Wrench
LRIS-4＊12 **5684105** Sales quantity 10pcs/case	LLR-25S **5364930** Sales quantity 10pcs/case

Screwdrivers (optional)		
Replacement bit	Handle with magnet	Handle & replacement bit
HLR-25S **5485214** Sales quantity 1pc/case	XX2815-04 **5485172** Sales quantity 1pc/case	XX2815-04-25S **5485255** Sales quantity 1pc/case

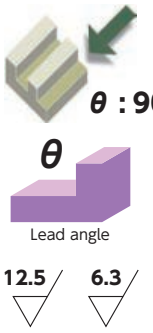
Applicable inserts

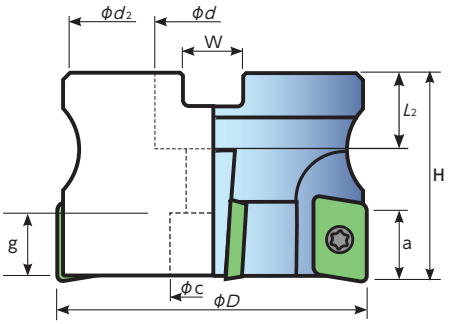
Shape	Dimensions	Part No.	R	Material grade	
		**LNX 324-08T01020**	0.8	**SX6**	●
				SP9	●
		LNX 324-12T01020	1.2	**SX6**	●
				SP9	●
		LNX 324-16T01020	1.6	**SX6**	●
				SP9	●

● : Standard stock

Recommended cutting conditions				
Insert material grade	Work material	Cutting speed (m/min)	Feed rate (mm/tooth)	Depth of cut (mm)
	K	400 500 600 700 800 900 1000 1100	0.05 0.1 0.15 0.2 0.25 0.3	
SX6	Normal cast iron			~ 8 (mm)
SP9	Ductile cast iron			

JQTS Series (shell type)





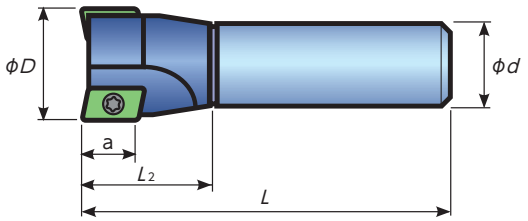
JQTS body

θ	Code No.	Part No.	Stock	N.O.B	Dimensions (mm)									Weight (kg)	A.R.	R.R.
					ϕD	H	L_2	a	ϕd	W	$ϕd_2$	ϕc	g			
90°	5730155	**JQTS040-90-4R**	●	4	40	40	18	14	16	8.4	35	12	4.2	0.2	+6°	−13°
	5730189	**JQTS050-90-5R**	●	5	50	40	22	14	22	10.4	45	18	10.7	0.32	+6°	−13°
	5730197	**JQTS063-90-6R**	●	6	63	50	22	14	22	10.4	58	18	14.5	1.40	+6°	−12°
	5765573	**JQTS080-90-8R**		8	80	50	25	14	25.4	9.5	58	36	17	1.9	+6°	−12°

Parts	
Clamping screw	Wrench
T15	T15
FSI22-4.0＊11 **5768163** Sales quantity 10pcs/case	T-15A **5757588** Sales quantity 10pcs/case

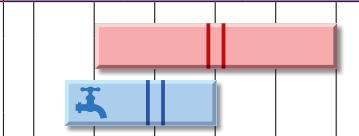
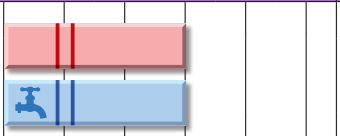
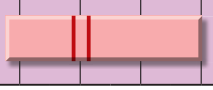
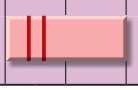
Parts	
Clamping screw	Wrench
T15	T15
For 20&25: FSI23-4.0*7 **5768171** For 32&40: FSI22-4.0*11 **5768163** Sales quantity 10pcs/case	T-15A **5757588** Sales quantity 10pcs/case

JQTE Series (shank type)

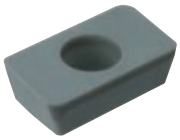
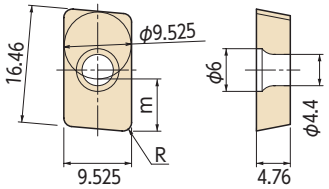
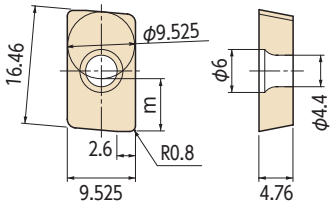


JQTE body

θ	Code No.	Part No.	Stock	N.O.B	Dimensions (mm)					Weight (kg)	A.R.	R.R.
					ϕD	L	L_2	a	ϕd			
90°	5730114	**JQTE020-90-1R**	●	1	20	100	30	14	20	0.22	+3°	−8°
	5730122	**JQTE025-90-2R**	●	2	25	100	30	14	25	0.32	+6°	−13°
	5730130	**JQTE032-90-3R**	●	3	32	110	35	14	32	0.53	+6°	−13°
	5730148	**JQTE040-90-4R**	●	4	40	110	37	14	32	0.64	+6°	−13°

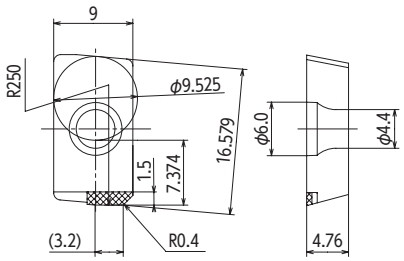
Recommended cutting conditions				
Insert material grade	Work material	Cutting speed (m/min)	Feed rate (mm/tooth)	Depth of cut (mm)
	K	400 500 600 700 800 900 1000 1100	0.05 0.1 0.15 0.2 0.25 0.3	
SX6	Normal cast iron			～8 (mm)
SP9	Ductile cast iron			

Applicable inserts

Shape	Dimensions	Part No.	R	m	Material grade
		**APCW 160408 T01020**	0.8	7.314	**SX6** ● **SP9** ●
		APCW 160412 T01020	1.2	7.278	**SX6** ● **SP9** ●
		APCW 160420 T01020	2.0	7.205	**SX6** ● **SP9** ●
		Wiper **APCW 1604 PDTR**	—	7.163	**SX6** ● **SP9** ●

● : Standard stock

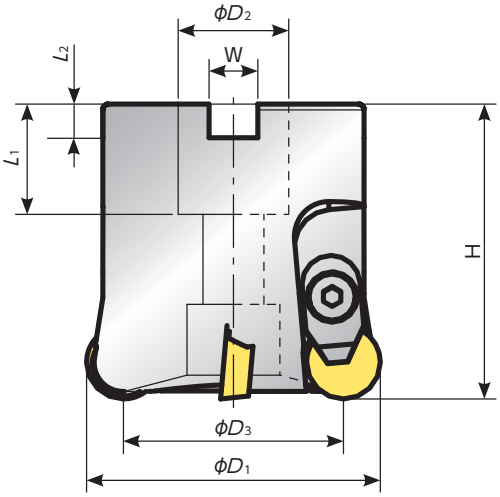
CBN wiper inserts

Dimensions	Part No.	Material grade
	**APCW 1604 PDSRCE**	**B30** ● **B52** ●

JR Series

JRPMW

A.R.+5°
R.R.−2° 30' ～−5°



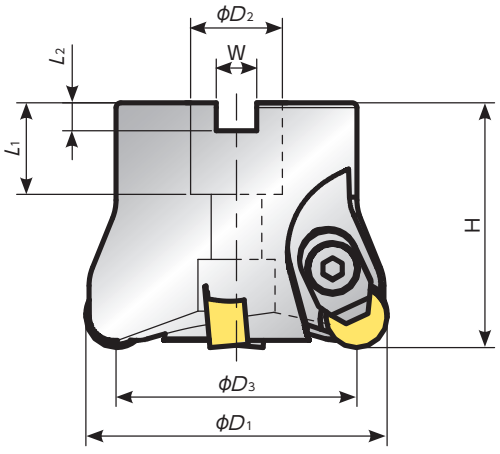
Shell type (for positive inserts) body

Code No.	Cutter P/N	Stock	N.O.B	ϕD1	ϕD3	Dimensions (mm)					Shim seat	Shim screw	Clamp	Clamping screw	Applicable insert	A.R.	R.R.	Weight (kg)
						H	ϕD2	W	L1	L2								
5719935	**JRPMW050S220R04**	●	4	50	37.3	50	22	10.4	20	6.3	ARP42A **5660659** Sales quantity 10pcs/case	M3*8 **5225453** Sales quantity 10pcs/case	AMS-5T **5060132** Sales quantity 1pc/case	AOB-5S-T25 **5660667** Sales quantity 10pcs/case	RPGN 1204	+5°	+5°	0.35
5726096	**JRPMW063S220R04**	●	4	63	50.3	50	22	10.4	20	6.3						+5°	+5°	0.55
5719943	**JRPMW080S254R05**	●	5	80	67.3	50	25.4	9.5	25	6.0						+5°	+2° 30'	0.87

● : Standard stock

JRNMW

A.R.-5°
R.R.-10°



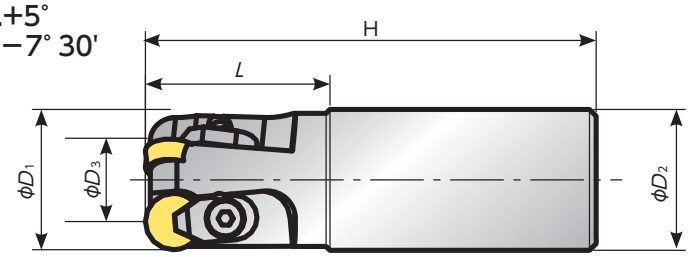
Shell type (for negative inserts) body

Code No.	Cutter P/N	Stock	N.O.B	ϕD1	ϕD3	Dimensions (mm)					Clamp	Clamping screw	Applicable insert	Weight (kg)
						H	ϕD2	W	L1	L2				
5719950	**JRNMW050S220R03**	●	3	50	37.3	50	22	10.4	20	6.3	AMS-6T **5060116** Sales quantity 1pc/case	AOB-6S-T30 **5660683** Sales quantity 10pcs/case	RNGN 1207	0.42
5719968	**JRNMW063S220R04**	●	4	63	50.3									0.55
5719976	**JRNMW080S254R05**	●	5	80	67.3		25.4	9.5	25	6.0				0.85

● : Standard stock

JRPMW

A.R.+5°
R.R.−7° 30'



Shell type (for positive inserts) body

Code No.	Cutter P/N	Stock	N.O.B	ϕD_1	ϕD_2	ϕD_3	H	L_2	Clamp	Clamping screw	Applicable insert	Weight (kg)
5720719	**JRPMW032E250R03**	●	3	32	25	19.3	120	40	AMS-5T **5060132** Sales quantity 1pc/case	AOB-5S-T25 **5660667** Sales quantity 10pcs/case	RPGN1204	0.42
5719919	**JRPMW032E320R03**	●		32	32	19.3						0.60
5719927	**JRPMW040E320R03**	●		40	32	27.3						0.72

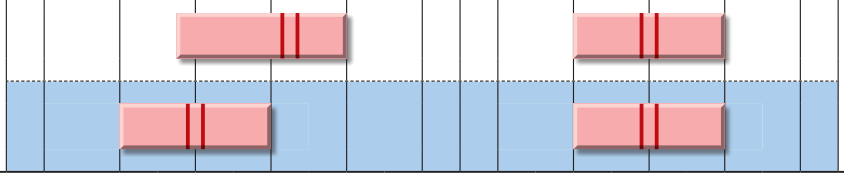
● : Standard stock

Applicable inserts

Shape	NTK Part No.		Inscribed circle (mm)	Thickness (mm)	Nose radius (mm)	Material grade		
	P/N for metric type	Cutting edge process				SX7	SX9	WA1
	RNGN 120700	E002※	12.7	7.94	—		●	
		E004				●		
		T00520					●	●
		T00820				●		
		T01020						●
		T02020						
	RPGN 120400	E004	12.7	4.76	—	●		
		EX0004※					●	
		T00520						●
		T00820				●		
		T01020					●	●

※E002・EX0004 : Round honing

● : Standard stock

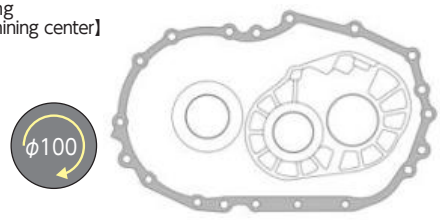
Recomended cutting conditions				
Insert material grade	Work material	Cutting speed (m/min)	Feed rate (mm/tooth)	Depth of cut (mm)
	S	400 600 800 1000 1200 1400	0.05 0.08 0.10 0.12 0.15	
SX7 / SX9	Heat-resistant alloy			～4 (mm)
WA1				

Cutters for machining of cast iron and heat-resistant alloy components

Machining of transmission case ●Work material : FCA250

		Existing tool	NTK
Holder		Competitor's cutter (φ100×6blades)	JFDX100-88-10R
Insert		Competitor's carbide grade (Triangle, positive)	SX6 SNGN1204012T02020
Cutting speed	(m/min)	200	1000
No. of revolutions	(min⁻¹)	637	3185
Feed rate per blade	(mm/t)	0.17	0.05
Feed rate	(mm/min)	650	1593
Depth of cut	(mm)	0.5	←
Cutting oil		Residual WET	←
Life	(pcs/corner)	35	110
Machining time	(min)	1.9	**0.8**

Tooling
【Machining center】

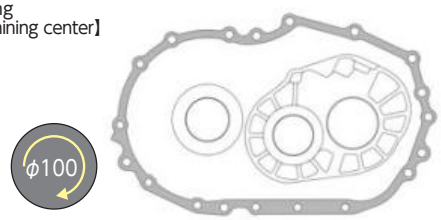


High-speed machining with the HCC reduced the cycle time significantly compared with the competitor's carbide tooling, enabling the tool life to be three times longer.

Machining of transmission case cover ●Work material : FC250

		Existing tool	NTK
Holder		Competitor's cutter (φ100×6blades)	JFDX100-88-10R
Insert		Competitor's carbide grade (Triangle, positive)	SX6 SNGN1204012T02020
Cutting speed	(m/min)	120	600
No. of revolutions	(min⁻¹)	382	1910
Feed rate per blade	(mm/t)	0.1	0.05
Feed rate	(mm/min)	229	955
Depth of cut	(mm)	3	←
Cutting oil		DRY	←
Machining time	(min)	5.4	**1.3**

Tooling
【Machining center】

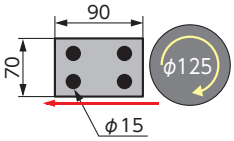


High-speed machining with the HCC reduced the cycle time significantly compared with the competitor's carbide tool.

Machining of unit ●Work material : FC270

		Existing tool	NTK
Holder		Competitor's cutter (φ125×8blades)	JFDX125-45-12R
Insert		Competitor's carbide grade (Square, positive)	SX6 SNGN1204012T02020
Cutting speed	(m/min)	137	800
No. of revolutions	(min⁻¹)	350	2038
Feed rate per blade	(mm/t)	0.20	0.057
Feed rate	(mm/min)	560	1400
Depth of cut	(mm)	1.5 ×3PASS	←
Cutting oil		WET	DRY
Life	(pcs/corner)	264	360
Machining time	(min)	0.40	**0.15**

Tooling
【Machining center】

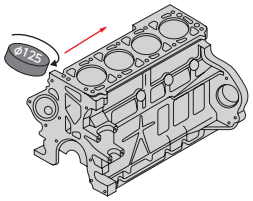


High-speed machining with the HCC reduced the cycle time significantly when compared with the competitor's carbide tool. (By single pass machining piece time was reduced from 0.40 to 0.15 min.) With the tool life 1.4 times longer and the increased number of cutting edges on the negative inserts, the total cost also will be reduced.

Machining of cylinder block ●Work material : FC250

		Existing tool	NTK
Holder		Competitor's cutter (φ125×12blades)	JFDX125-45-12R
Insert		Competitor's solid CBN	SX6 SNGN120412T02020
Cutting speed	(m/min)	703	←
No. of revolutions	(min⁻¹)	1400	←
Feed rate per blade	(mm/t)	0.1	←
Feed rate	(mm/min)	2464	←
Depth of cut	(mm)	2 + 2 + 1 (cutting 3 times)	←
Cutting oil		Residual WET	←
Life	(pcs/corner)	50	**60**

Tooling
【Machining center】



The combined use of the HCC and the ceramic grade SX6 prolonged the tool life by 20% compared with the competitor's carbide tool. By changing the insert material grade from CBN to ceramic, a significant cost reduction resulted.

Machining of test piece ●Work material : Inconel 718

		Existing tool	NTK
Holder		—	JQTE025-90-2R
Insert		—	SX9 APCW160420E004
Cutting speed	(m/min)	—	800
No. of revolutions	(min⁻¹)	—	10191
Feed rate per blade	(mm/t)	—	0.08
Feed rate	(mm/min)	—	1630
Depth of cut	(mm)	—	1×30PASS
Cutting oil		—	DRY
Life	(pcs/corner)	—	—
Machining time	(sec)	—	**65**

Tooling
【Machining center】

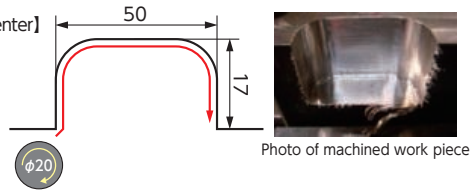


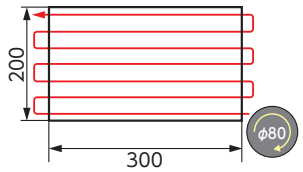
Photo of machined work piece

The high-speed machining with the HCC reduced the machining time significantly compared with the carbide tools. (An estimated machining time with a carbide tool is approx. 6 minutes per unit area, assuming that [Vc = 30 m/min, fz = 0.2 mm/tooth, ap = 2.0 mm, with the same number of blades].)

Machining of block ●Work material : SKD material (HRC63)

		Existing tool	NTK
Holder		Competitor's end milling cutter (φ16×4blades)	JRPMW080S254R05
Insert		—	HC4 RPGN120400Z02025
Cutting speed	(m/min)	70	80
No. of revolutions	(min⁻¹)	1400	318
Feed rate per blade	(mm/t)	0.16	0.3
Feed rate	(mm/min)	896	477
Depth of cut	(mm)	1.5	0.3
Width of cutting	(mm)	0.32	24.0
Cutting oil		DRY	←
Machining time	(min)	232.9	**43.6**

Tooling
【Machining center】



The use of our HCC reduced the cycle time significantly compared with the competitor's end milling tool. (reduced to approximately 1/5) A larger cutting area enables stabilized machining operations, preventing fractures.

Machine power requirements ～Quick Check Table～

Calculation

※Assuming that normal cast iron is machined at a cutting speed of 800 m/min (v_c = 800 m/min)

Required mechanical power(kW) = ○○% × ○○kW

Width of cutting a_e = __ % of the cutter diameter

The value __ kW determined from the applicable table below

〈Example of calculation〉
Cutter used : JFDXϕ100−10 blades Width of cutting a_e=30mm→This is 30% of the cutter diameter
Cutting conditions : v_c=800m/min f =0.2mm/tooth and a_p=3.0mm→ The value 40 kW in the table (JFEDX ϕ100 x 10 blades) is located.

→ The required power (kW)=30% ×40kW=12kW

JFDX Series

JFDXϕ63 - 6blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	4	6	7	9
2	7	11	14	17
3	11	16	22	26
4	14	22	29	35

JFDXϕ80 - 8blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	6	9	12	14
2	12	18	24	29
3	18	27	35	43
4	23	36	47	57

JFDXϕ100 - 10blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	9	13	18	21
2	17	27	35	42
3	26	40	53	64
4	35	54	70	85

JFDXϕ125 - 12blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	12	19	25	30
2	24	37	49	59
3	36	56	73	89
4	48	74	98	118

JFDXϕ160 - 16blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	21	32	42	50
2	41	63	83	100
3	62	95	125	151
4	82	127	166	201

JSDW Series

JSDWϕ63 - 4blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	3	4	6	7
2	6	9	12	14
3	9	13	18	22
4	12	18	24	29

JSDWϕ80 - 6blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	5	8	11	13
2	11	16	22	26
3	16	24	33	39
4	21	32	43	52

JSDWϕ100 - 7blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	7	10	14	17
2	14	20	27	33
3	20	31	41	50
4	27	41	55	66

JSDWϕ125 - 8blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	8	13	17	20
2	17	25	34	41
3	25	38	51	61
4	33	50	68	82

JSDWϕ160 - 10blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
1	12	18	24	29
2	24	36	49	59
3	36	54	73	88
4	48	72	97	117

JXTM Series

JXTMϕ80 - 10blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
5	36	55	76	93
6	43	66	91	111
7	50	76	106	130
8	57	87	121	148

JXTMϕ100 - 13blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
5	61	93	130	159
6	73	112	156	190
7	85	131	182	222
8	97	149	208	254

JXTMϕ125 - 16blades

Depth of cut (mm)	Feed rate per blade (mm/t) 0.1	0.2	0.3	0.4
5	93	143	198	242
6	111	171	238	291
7	130	200	277	339
8	148	228	317	387

Unit : kW

Tips for utilizing the above tables

① The assumption is that normal cast iron is machined at a cutting speed of 800 m/min (v_c = 800 m/min), with the cutter diameter shown as the width of cut (a_e = 100% of the cutter diameter).
② The required power becomes approximately half (50%) if the cutting width a_e or depth of cut a_p is halved. (The power is proportional to a_e or a_p.)
③ The required power is reduced to approximately 60% if the number of blades is halved.
④ Machines that have an output of 22 kW or greater are recommended.

※Please make use of the above tables, understanding that they are approximations as only a guide.

Arbor specification table for NTK milling cutters.

Cutters for machining of aluminum components
SFC, HPC, ALWC, HSC

Tool		Applicable standard allowing cutter installation	
		Standard for counter lock type	Counter lock diameter
SFC	ϕ50	Sleeve with grip diameter of ϕ32	Shank diameter: ϕ32
	ϕ63	FMC	ϕ22.0
	ϕ80	FMA	ϕ25.4
	ϕ100	FMA	ϕ31.75
	ϕ125	FMA	ϕ38.1
	ϕ125	FMA	ϕ31.75
	ϕ160	FMA	ϕ50.8
	ϕ200	FMA	ϕ47.625
	ϕ250	FMA	ϕ47.625
HPC ALWC	ϕ50	FMC	ϕ22.0
	ϕ63	FMC	ϕ22.0
	ϕ80	FMA	ϕ25.4
	ϕ80	FMC	ϕ27.0
	ϕ100	FMA	ϕ31.75
	ϕ100	FMC	ϕ32.0
	ϕ125	FMA	ϕ38.1
	ϕ125	FMC	ϕ40.0
HSC	ϕ80	FMA	ϕ25.4
	ϕ100	FMA	ϕ31.75
	ϕ125	FMA	ϕ38.1
	ϕ160	FMA	ϕ50.8
	ϕ200	FMA	ϕ47.625
	ϕ250	FMA	ϕ47.625

…indicates a shank-type body.

Cutters for machining of cast iron and heat-resistant alloy components
FU-HA MILL, HCC

Tool		Applicable standard allowing cutter installation	
		Standard for counter lock type	Counter lock diameter
JWNXM	ϕ63	FMC	ϕ22.0
	ϕ80	FMA	ϕ25.4
	ϕ100	FMA	ϕ31.75
	ϕ125	FMA	ϕ38.1
	ϕ160	FMA	ϕ50.8
JFDX	ϕ63	FMC	ϕ22.0
	ϕ80	FMA	ϕ25.4
	ϕ100	FMA	ϕ31.75
	ϕ125	FMA	ϕ38.1
JSDW	ϕ63	FMC	ϕ22.0
	ϕ80	FMA	ϕ25.4
	ϕ100	FMA	ϕ31.75
	ϕ125	FMA	ϕ38.1
JXTM	ϕ80	FMA	ϕ25.4
	ϕ100	FMA	ϕ31.75
	ϕ125	FMA	ϕ38.1
JQTS	ϕ40	SMA-16, SM1-16	ϕ16.0
	ϕ50	FMC	ϕ22.0
	ϕ63	FMC	ϕ22.0
JQTE	ϕ20	Sleeve with grip diameter of ϕ20	Shank diameter : ϕ20
	ϕ25	Sleeve with grip diameter of ϕ25	Shank diameter : ϕ25
	ϕ32	Sleeve with grip diameter of ϕ32	Shank diameter : ϕ32
	ϕ40	Sleeve with grip diameter of ϕ32	Shank diameter : ϕ32
JRPMW	ϕ32	Sleeve with grip diameter of ϕ25	Shank diameter : ϕ25
	ϕ32	Sleeve with grip diameter of ϕ32	Shank diameter : ϕ32
	ϕ40	Sleeve with grip diameter of ϕ32	Shank diameter : ϕ32
	ϕ50	FMC	ϕ22.0
	ϕ63	FMC	ϕ22.0
	ϕ80	FMA	ϕ25.4

…indicates a shank-type body.

⚠ DANGER

Be sure to observe the following precautions in order to use NTK cutters safely:

For NTK cutter series in general

■If a cutter body has been inadvertently damaged, be sure to scrap or dispose of the body. If a damaged cutter body is used, it could break during rotation.

■Always observe the following to avoid a cutter and its parts from breakage and flying apart during rotation.

- Always use the manufacturer's genuine cutter parts (screws, wedges, cartridges, etc.). Provided that these genuine parts are used, there is no need to re-balance the cutter ever after part replacement (except for thrust pads). (Even when genuine parts are used, do not mix parts of different part nos. Otherwise, an out of balance situation may result.)
- As the HPC and HCC series cutter bodies are made of steel, it is possible to use them with a decreased number of blades, because those cutters can keep their balance under such a condition. However, before using a cutter with a decreased number of blades, always remove its parts (screws, wedges and cartridges and the likes) from the empty locations where no inserts are mounted.
- Periodically inspect the cutter body and its parts for any deformation or wear. If deformed or worn, be sure to replace them.
- Always use the cutter under the appropriate cutting condition. Cutters for machining aluminum components, in particular, should be used at a feed rate per blade of 0.3 mm/tooth or less (fz = 0.3 mm/tooth or lower), and at a rotation speed of the maximum speed or lower as indicated on the cutter body and in the catalog.

■Always use machines having sufficient guarding against the likelihood of flying debris.

■If vibration, abnormal operating sounds or other unusual events occur during use, be sure to confirm countermeasures and safe operation.

■Use chucks and jigs strong enough for purpose.

For the NTK cutter series for machining of aluminum components

■When installing a cutter other than a HPC series, please refer to the "Table of clamping torque for installtion to arbor" contained in this catalogue for the correct torque required to tighten the clamping bolt.

- Excessive tightening may not only damage the cutter, but may damage the screws, wedges, helical inserts and/or other parts.
- 10N・m ≒ 1 kgf・m

■Strictly observe the following precautions to maintain the dynamic balance of the cutter body:

- Keep hands away from the screw holes, Loctites, and screws located on the outermost surface of the cutter body.
- Use the manufacturer's genuine inserts.
- Setting the cutter body without the necessary parts or inserts unbalances the body, resulting in a dangerous imbalance.
- For HSC cutters, up to two wiper inserts may be mounted and they should be mounted symmetrically.
- Use arbors and holders that have been adjusted for a balance grade of G2.5 or less.
- To check for the allowable rotation speed, confirm the maximum rotation speed of the arbor with the arbor manufacture before use.

■Before mounting inserts, please refer to and follow the instructions in "Pre-setting inserts and chip prevention measures for PCD inserts" on page P13 and "Re-grinding of inserts" on page P17.

- It is particularly important to use the specified/appropriate clamping torque and to prevent stress concentration on the cutter body.

■Only aluminum alloys or other non ferrous metals can be used as work pieces. Steels, cast irons cannot be machined.

⚠ WARNING

For the NTK cutter series for machining of aluminum components

- Always use the recommended coolant pressure (2 MPa).
- Do not use re-brazed inserts.

MEMO

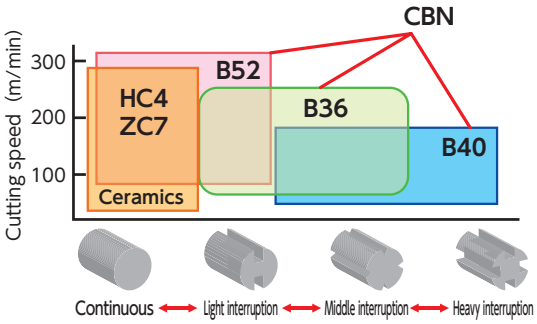
Technical Data

- Technical data for machining of hardened steels ·· Q2
- Technical data for machining of heat-resistant alloy by cermics ·· Q4
- Tooling terminology ····· Q14
- Calculations and troubleshooting case studies ·· Q18
- Approximate data conversions for Brinell hardness scale ·· Q30
- Symbols used for machining, SI unit conversion table ·· Q31
- Changes in JIS Surface Roughness Standards ·· Q32
- Insert nose radius tool compensation ·· Q34
- Wrench specifications ····· Q36
- List of screws and wrenches for screw type holders ·· Q37
- Materials and grades comparison table by cutting tool manufacturer ·· Q38
- Corresponding table for metal materials and symbols ·· Q40
- Ordinary tolerances for shape and position accuracy ·· Q42
- Useful tips ····· Q43
- List of automatic lathes ····· Q46
- Recommended Cutting Parameter Chart ·· Q52

Machining of hardened steels

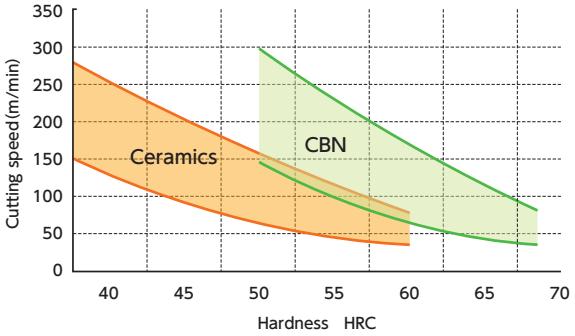
Selection guide of NTK insert for hardened steels machining

Application map



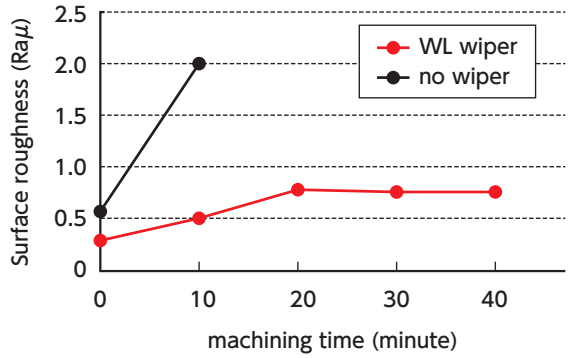
Recommended cutting speed

[Recommended cutting speed by workpiece hardness (continuous cutting)]



Effect of wiper flat on cutting edge

CNGA120412WL vc=100m/min f=0.1㎜/rev ap=0.5㎜

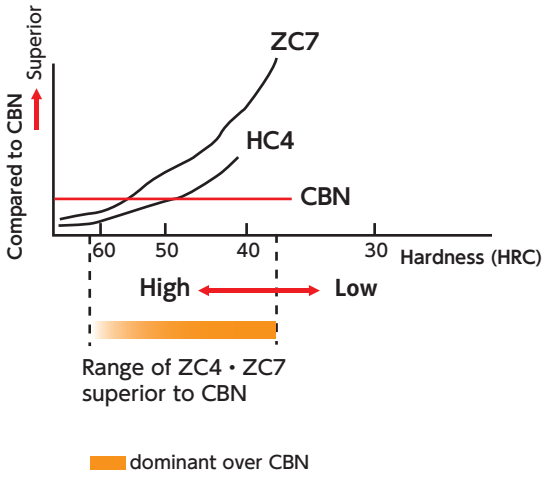


Recommended depth of cut and feed rate

[Recommended depth of cut and feed rate by corner R dimension]

corner R	depth of cut (㎜)	feed rate (㎜/rev)
R0.4	0.15	0.05～0.08
R0.8	0.3	0.08～0.10
R1.2	0.4	0.10～0.13
R1.6	0.5	0.13～0.16
R6.35	2.0	0.16～0.25

Superiority of ceramics



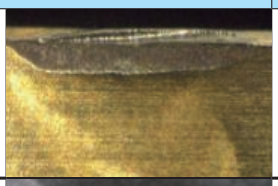
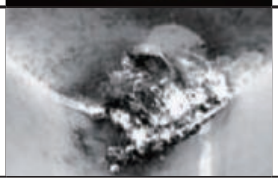
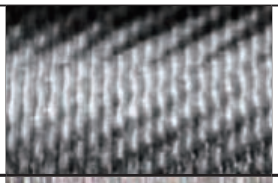
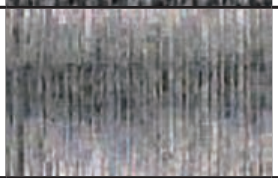
Chip control

"ZC7" with "AG chipbreaker" solves rough surface and machine stop caused by poor chip control, which enables long-time coutinuously operation.

w/o chipbreaker	AG chipbreaker

Work material : SCM415 Carburized and quenched HRC50
Insert : ZC7 CNGA(G)120408
v_c=150m/min f=0.2㎜/rev a_p=0.2㎜

Potentional problem and action required ~ Machining of hardened steels by ceramics ~

	Case		Possible cause	Action required
Insert	VB wear		●Cutting speed is too high ●Feed rate is too low ●Unproper nose radius	●Decrease cutting speed ●Increase feed rate ●Enlarge nose radius
	Wear on face		●Unproper cutting condition ●Unproper honed edge	●Decrease cutting speed ●Reduce angle of honed edge
	Flaking		●Unproper cutting condition ●Unproper honed edge	●Reduce honed edge ●Use insert without round honing ●Decrease feed rate ●Increase cutting speed
	Fructure		●Unproper cutting condition ●Unproper honed edge ●Use of coolant	●Decrease feed rate ●Enlarge honed edge ●Put round honing on edge ●Stop coolant
Workpiece	Chattering		●Too high cutting force ●Shortage of workpiece and/or tool rigidity ●Cutting speed is too low	●Decrease feed rate ●Reduce honed edge ●Enlarge relief angle ●Shorten the length of tool overhang ●Increase cutting speed
	Surfacefinish		●Feed rate is too high ●Nose radius is too small ●Wear of insert	●Decrease feed rate ●Enlarge nose radius ●Use insert with wiper flat ●Decrease cutting speed

Solutions for Aerospace Industry

SX7 SiAlON Ceramic

Features

- Can run at same cutting condition vs whisker ceramics
- Better notching resistance compared to whisker ceramics
- No need to program ramping when compared to whisker ceramics
- Better flank wear resistance compared to competitor's SiAlON ceramics
- Best grade for pre-machined Waspaloy
- Best grade for high-speed milling

	SX5
Notching	○
Flank Wear	
Toughness	○
Heat Shock	

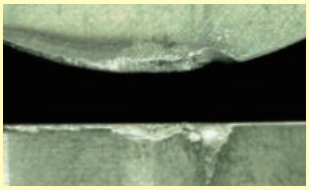
Recommended Work Materials

- Inco 718
- Waspaloy
- Inco 625
- Udimet 720

Recommended Applications

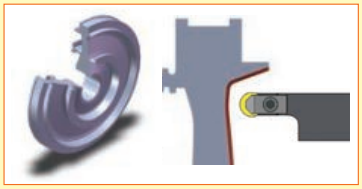
- Semi-Finish
- Milling
- Profiling

Profiling of Inco 718



Competitor's Whisker Ceramic

SX7



Turbine Disk

Tool Life : 4.5min
RCGX120700, v_c = 240m/min , f = 0.15mm/rev, a_p = 1.00mm, WET
Inco 718 (pre-machined)

SX5 SiAlON Ceramic ※受注生産品

Features

- Best grade for scale and interruptions
- Best grade for machining high-cobalt alloys

Recommended Work Materials

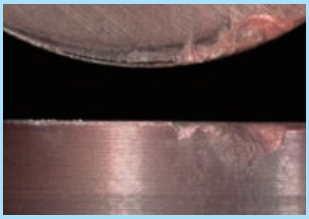
- Waspaloy
- 718Plus
- Udimet 720
- Rene 41

Recommended Applications

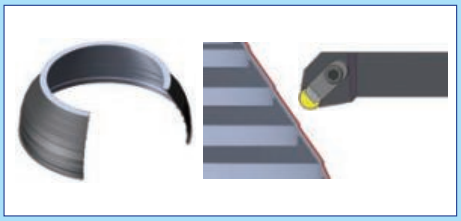
- Rough Turning with scale and interruptions

Rough Turning of Waspaloy with Scale

Competitor's Whisker Ceramic



SX5



turbine case

Tool Life : 2.0min
RNGN190700, v_c = 285m/min , f = 0.30mm/rev, a_p = 3.80mm, WET
Waspaloy with Scale

WA5, WA1 Whisker-Reinforced Ceramic

Features

- Versatile grade for machining of high temperature alloys
- Better flank wear resistance compared to SiAlON ceramics
- Better notching resistance compared to competitor's whisker ceramics

SX7	SX9	WA5
◎	◎	
○		◎
	◎	
◎	◎	

Recommended Work Materials

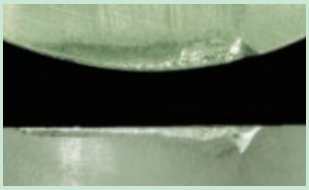
- Inco 718
- Inco 625

Recommended Applications

- Semi-Finish
- Profiling
- Grooving

Profiling of Inco 718

Competitor's Whisker Ceramic



WA5

Turbine Case

Tool Life : 5.0min
RPGX120700, v_c = 240m/min, f = 0.15mm/rev, a_p = 1.00mm, WET
Inco 718 (pre-machined)

SX9 SiAlON Ceramic

Features

- Tougher when compared to whisker ceramics
- Extreme toughness makes higher feed and heavier DOC machining possible
- Best grade for machining Inco 718 with scale

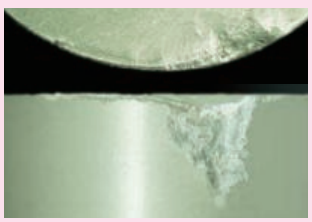
Recommended Work Materials

- Inco 718
- Inco 706
- Inco 713

Recommended Applications

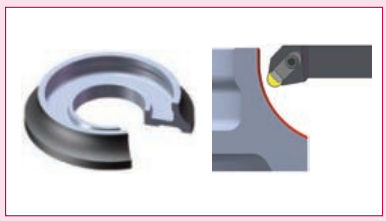
- Rough turning with scale
- Milling

Rough Turning of Inco 718 with Scale



Competitor's Whisker Ceramic

SX9



Cover Shield

Tool Life : 3.0min
RNGN190700, v_c = 240m/min, f = 0.25mm/rev, a_p = 3.80mm, WET
Inco 718 with Scale

Choosing the most suitable ceramic inserts

1) Selecting insert shapes that offer the highest edge strength

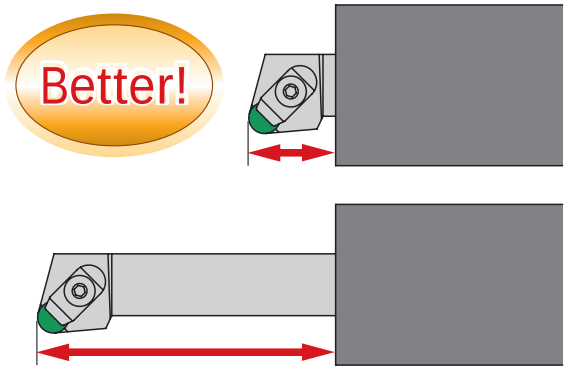
Choose the insert that has the highest edge strength as much as possible.

2) Selecting inserts with the largest corner radius possible

The greater the corner radius of an insert is, the higher the strength of the cutting edge and the longer the life of the insert becomes. However, please note that the greater the corner radius, the greater the cutting pressure.
In the case of machining of general heat-resistant alloys, inserts **RNGN1207** are used for rough machining while **CNGN1204** inserts are used for finishing.

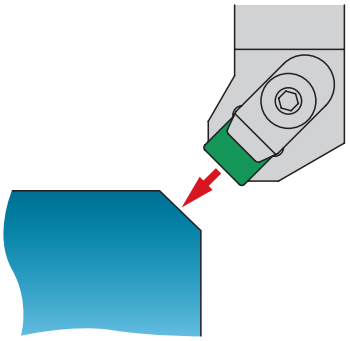
3) Minimizing the tool overhang

If the amount of the tool overhang is too long, chatter and insert fracture can occur.



4) Countermeasures against insert fracture

Before starting the main cut, it is advisable to chamfer the corners of the work pieces.
This is to ensure the subsequent inserts enter clean, true running material, so eliminating premature insert breakage.



5) Avoid leaving the insert to dwell on the workpiece

Be careful not to dwell. If the insert remains in contact with the workpiece with zero feed, the insert can wear significantly.

6) Coolant

When turning with **WA5**, **WA1**, **SX9**, **SX7**, **ZM3** or **QM3**, a significant supply of coolant is advisable. In the cases of heavy-duty interrupted turning, good results may be obtained with the cutting oil supply stopped to avoid thermal shock.
When **milling** with **WA5**, **WA1**, **SX9**, **SX7**, always machine without coolant.

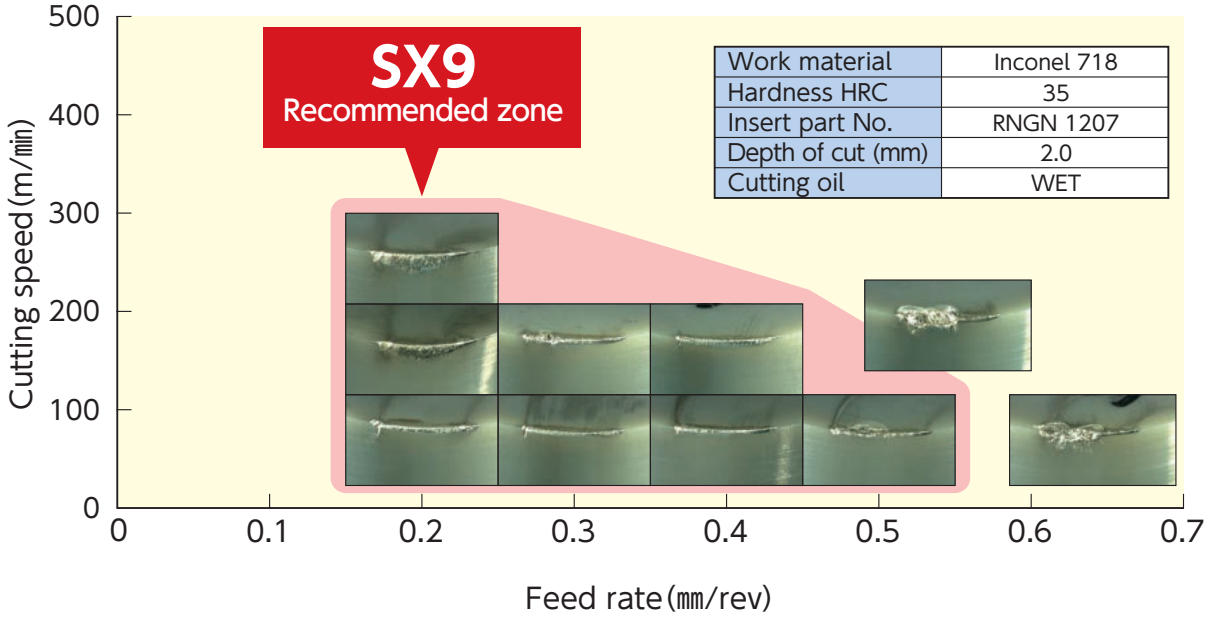
7) Cutting edge treatment

For machining of heat-resistant alloys, the insert edge condition is generally light . However, in some cases the addition of a honed edge produces better resistant to wear, especially to boundary wear.

A cutting condition suitable for turning of nickel-based heat-resistant alloys

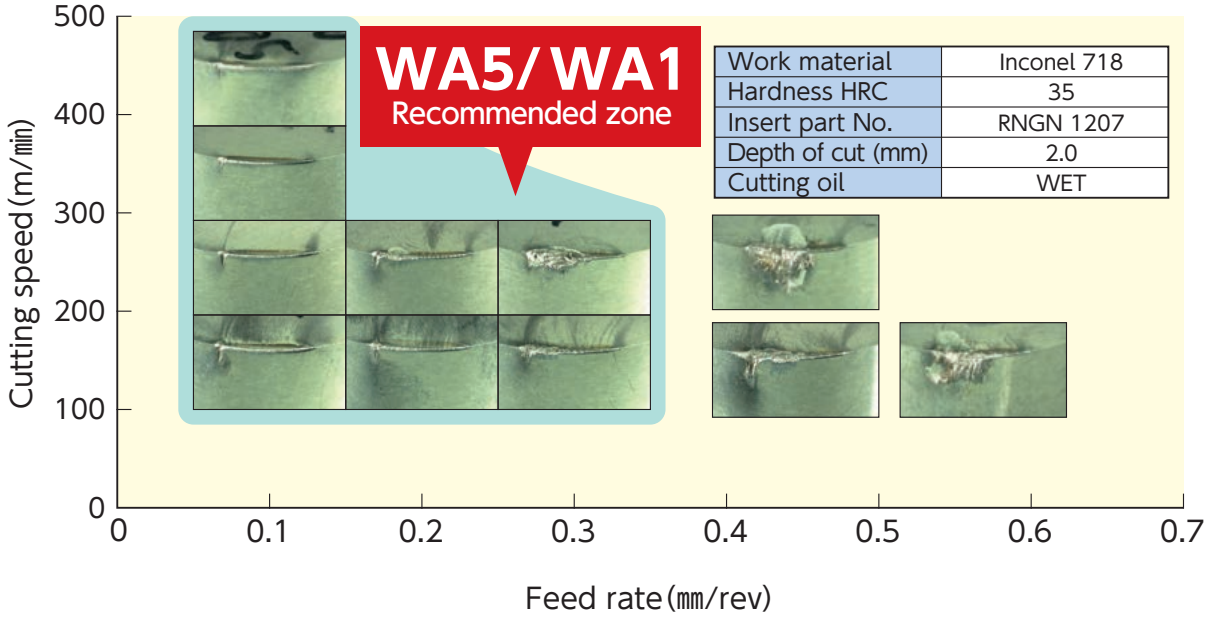
● SX9

The wear resistance of **SX9** becomes lower at higher cutting speed, but improves at a higher feed rates.



● WA5 / WA1

Whisker-based ceramic inserts tend to fracture at a high feed rates, however their wear resistance becomes higher at higher cutting speeds



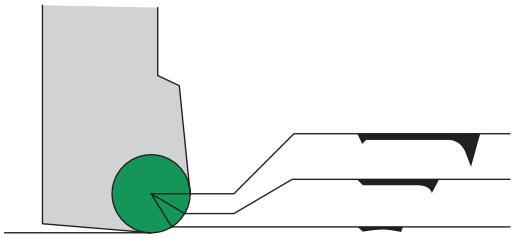
Technical Data of Machining Heat-Resistant Alloy with Ceramic Cutting Tools

How to use ceramic inserts and increase their fracture resistance.
In many sites where heat-resistant alloys are machined, we often find that the progression of "boundary wear" on inserts results in fracture.
In this section, several ways are introduced to make the life of cutting tools longer by decreasing the boundary wear.

1) Depth of cut

As shown in the figure at the right, the greater the depth of cut becomes, the greater the amount of wear, especially the amount of boundary wear becomes.

In order to make the life of cutting tools longer by decreasing the amount of boundary wear, it is necessary to control the depth of cut.



Recommended depth of cut

Size of round insert	Max. depth of cut
ϕ6.35mm	1.5mm or less
ϕ9.525mm	2.3mm or less
ϕ12.7mm	3.2mm or less
ϕ25.4mm	6.4mm or less

The most appropriate depth of cut is 5 – 15% of the insert diameter.

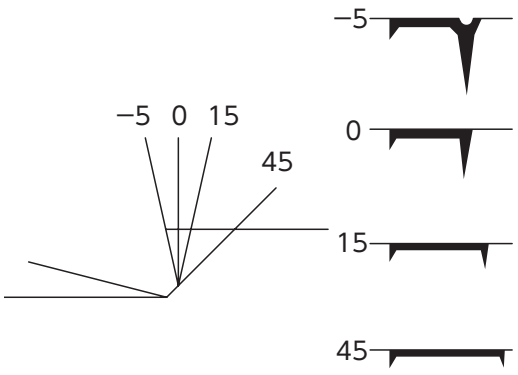
*Nose radius	Max. depth of cut
0.8	0.2mm
1.2	0.3mm
1.6	0.4mm
2.4	0.6mm

*With the 0-degree lead angle

2) Lead angle

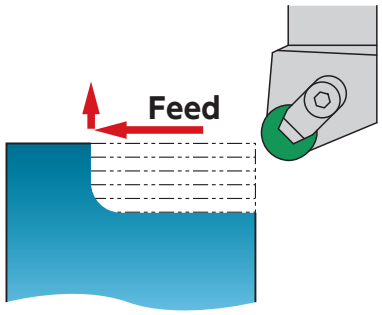
In the machining of heat-resistant alloys, there is a tendency for wear to be reduced when a large lead angle is used. Furthermore, the larger the lead angle the lower the bounder wear, the longer the tool life and the better the surface finish on the work become, because the cutting resistance is distributed over a wider area on the insert.
In addition, the larger the lead angle the better the chip control becomes. In the case of **SX9** with its excellent fracture resistance, the wear becomes less as the feed rate is raised, and machining time can be shortened.

● Influence of lead angle on the form of wear



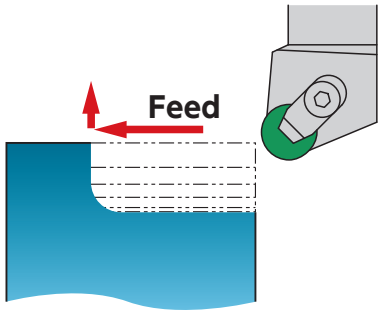
3) Effective method for rough machining

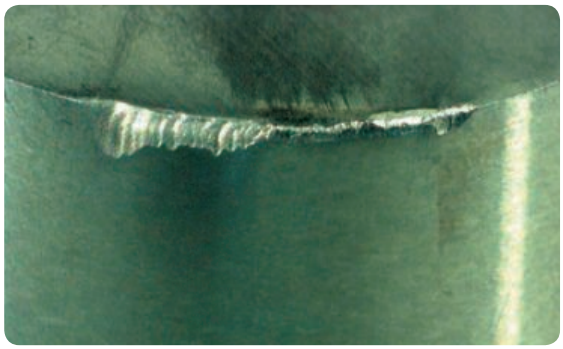
With a constant depth of cut



If rough machining is repeated with a constant depth of cut, as shown above, boundary notch wear progresses within a short period of time, making the tool life significantly shorter.
The following two machining methods are effective for prolonging the tool life by controlling the boundary notch wear:

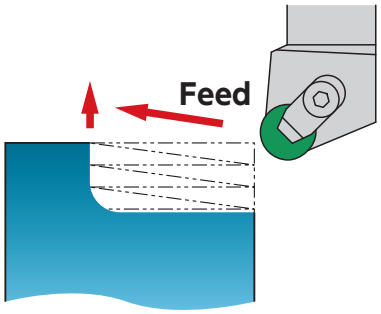
Machining by changing the depth of cut





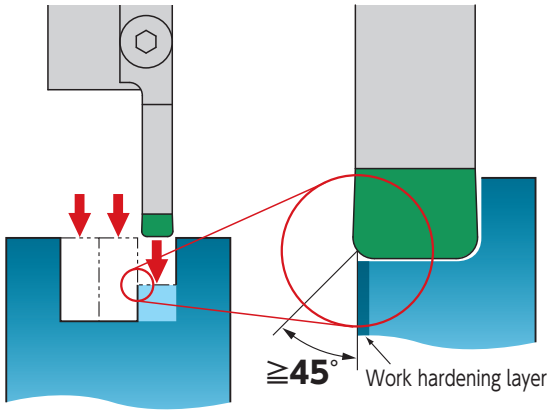
Rough machining with a different depth of cut each pass can cause the boundary notch wear to happen at different contact points, thus the boundary notch wear is spread over a larger area.

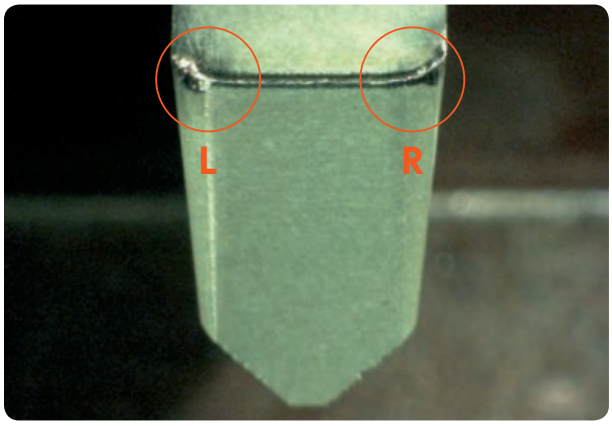
Machining by ramping



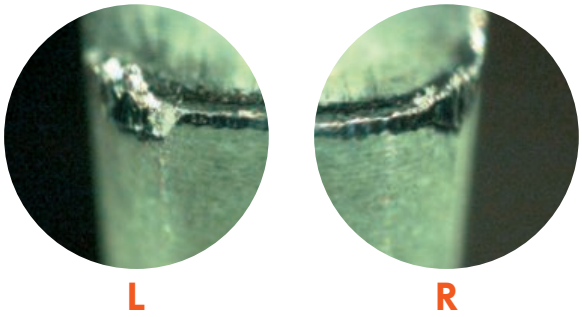
By ramping the insert into cut, the wear is distributed all over the cutting edge as the depth of cut is changed continuously.
This method is most suitable for roughing of heat-resistant alloys.

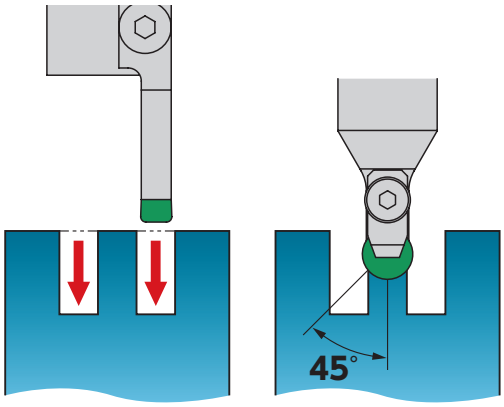
4) Effective method for grooving

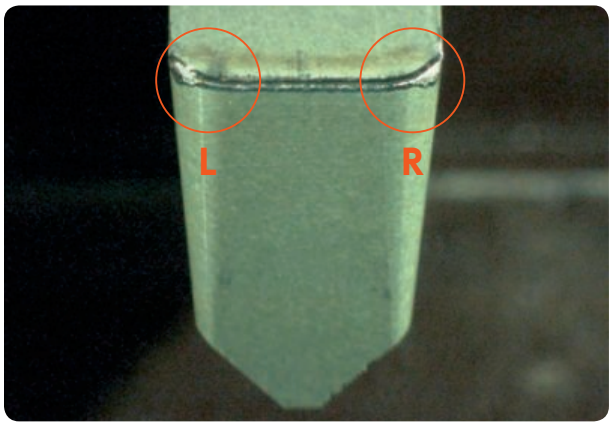




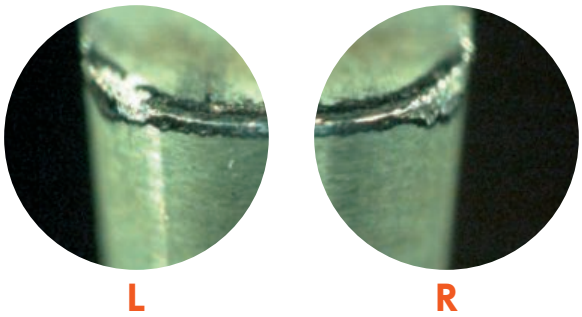
When grooving operations are carried out as shown above, the corner of the insert will strike the area where work hardening has occurred. Grooving in this way may make the tool life unstable, causing chipping or boundary notch wear, as shown in the photo "L". The following figures describe a better grooving method:



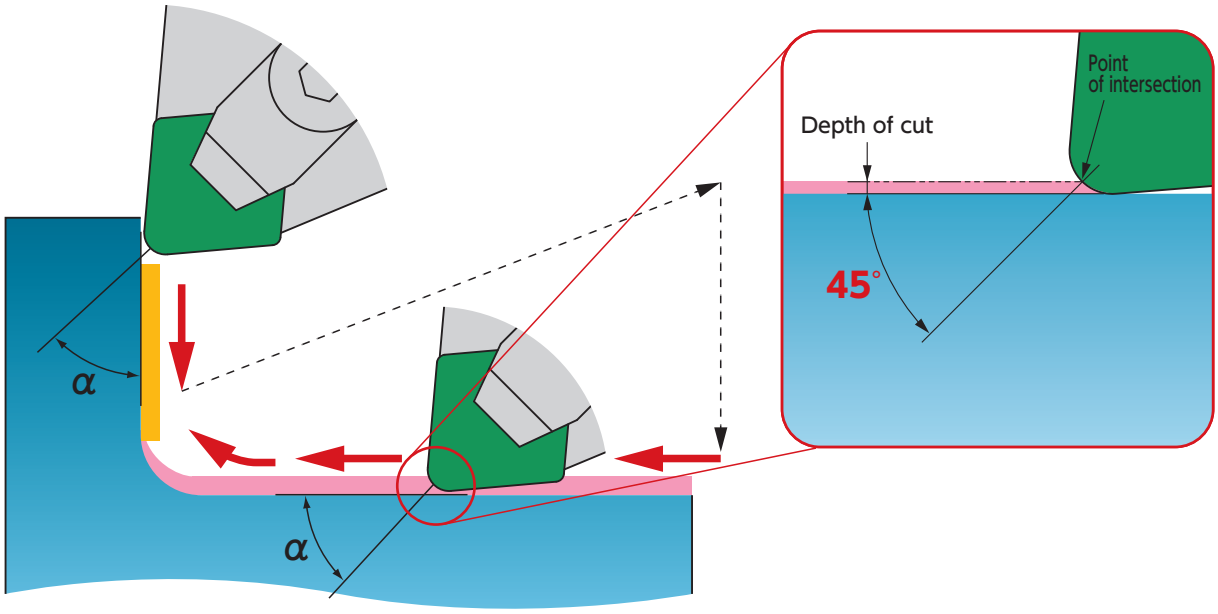


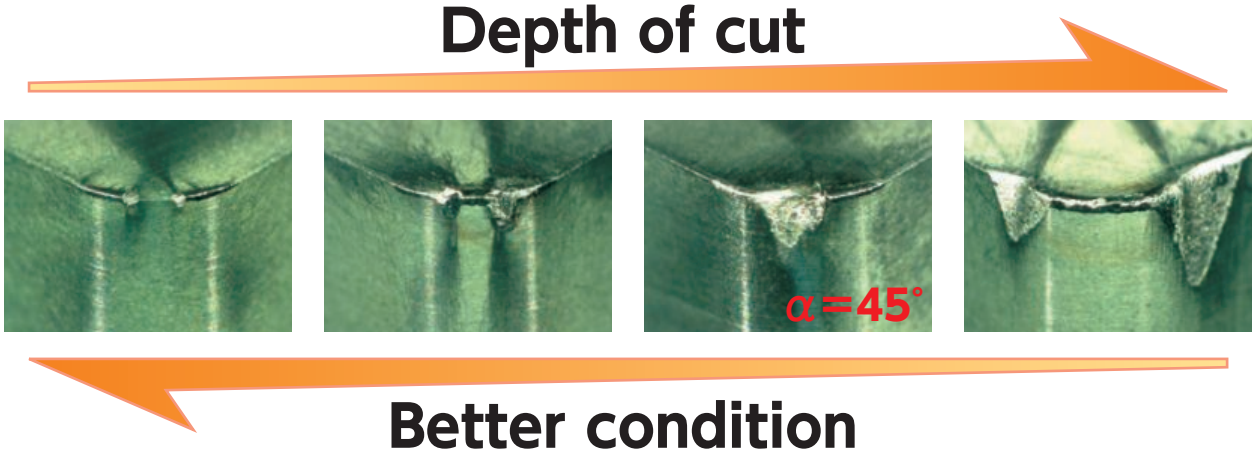


As illustrated above, grooving on each side first does not cause abnormal wear on the corner of the insert (photo "R"). Then, cut and remove the remaining center area. We recommend that RCGX-shape inserts, the strength of which is the higher, be used for this.



5) Effective method for finishing





First, cut and remove as much material as possible during the roughing operation. Then, set the depth of cut for finishing so that the depth becomes less as shown in the illustration above.
This way will stabilize the tool life, decreasing boundary notch wear and avoid overlap of areas where boundary notch wear tends to occur during facing or outside diameter machining.

α=45°

Nose radius		Depth of cut	
(mm)	(Inch)	(mm)	(Inch)
0.4	0.0157	0.12	0.0047
0.8	0.0315	0.23	0.0091
1.2	0.0472	0.35	0.0138
1.6	0.0630	0.47	0.0185
2.0	0.0787	0.59	0.0232
2.4	0.0945	0.70	0.0276
3.2	0.1260	0.94	0.0370

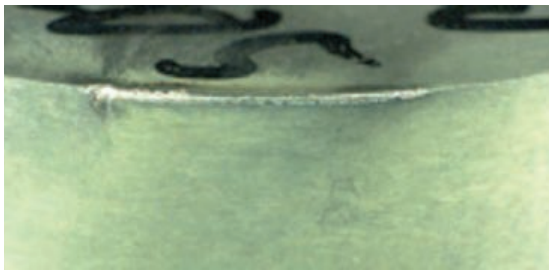
Method for increasing the wear resistance of ceramic inserts

● WA5 / WA1

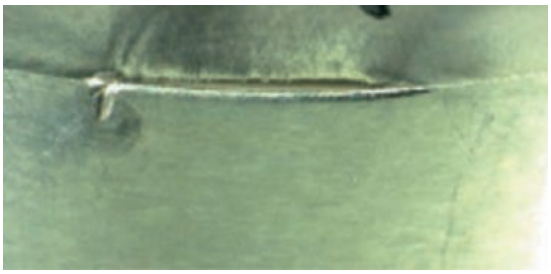
Cutting speed

A higher cutting speed increases the wear resistance, significantly decreasing the boundary notch wear.

500m/min



100m/min

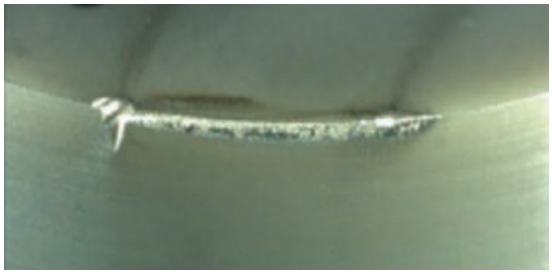


● SX9

1) Cutting speed

A lower cutting speed increases the wear resistance.

100m/min

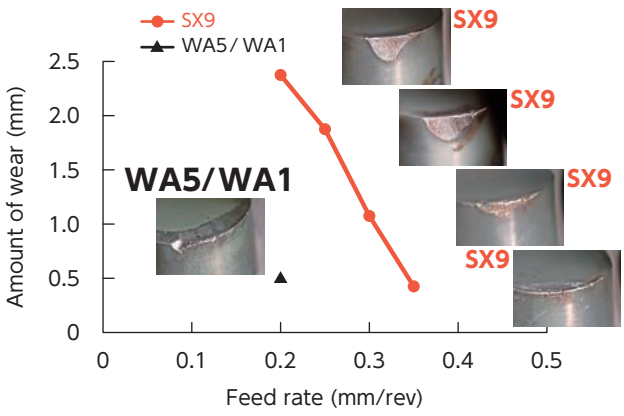


400m/min

2) Feed rate

The wear resistance of **SX9** increases with a higher feed rate. As **SX9** excels in fracture resistance, fracture may not occur if a higher feed rate is used. Thus, it is possible to make the cycle time shorter, productivity better with less production cost.

Feed rate vs. wear on **SX9**



■Cutting conditions

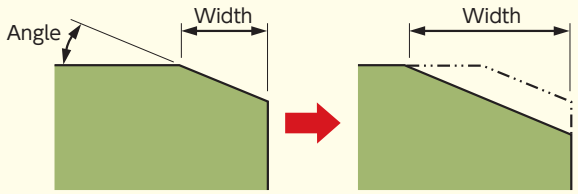
Work material : Inconel 718
Insert Part No. : **RNGN120700**
Cutting speed : 250 m/min (constant)
Depth of cut : 2 mm
Cutting oil : WET

Troubleshooting

Flaking

Countermeasures

- Decrease the feed rate.
- Change the treatment of the cutting edge so that the width is slightly increased.



Fracture

Countermeasures

- Decrease the cutting speed and feed rate.
- Change the insert to the one that is higher in strength.

If the hardness of the work material is not known, it would take quite a long time before determining the most suitable cutting conditions. Generally, it is effective to decrease the cutting speed when handling a harder work material.

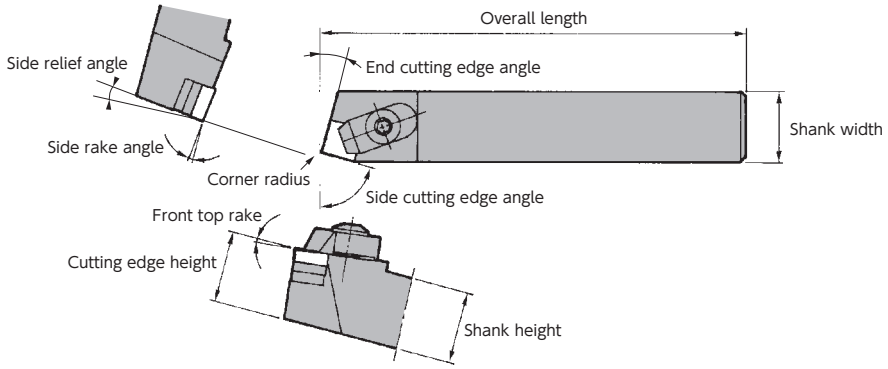
Countermeasures for chatter

In many cases of machining of nickel-based heat-resistant alloys, it is common to have chatter marks due to an increased cutting pressure. Chatter may easily occur especially when a holder with a long overhang is used for profiling, grooving or cutting a thin-walled material or when a machine having low rigidity is used, making abnormal wear or sudden fracture on the inserts occur.
Generally, chatter would become less significant or would not occur if the cutting speed is raised and feed rate is lowered. The following countermeasures also are effective:

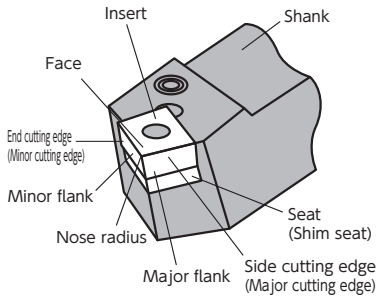
- Change the insert grade to WA5/WA1 from SX9 and increase the cutting speed.
- Change the insert to a smaller diameter or smaller nose radius.
- Change to sharper edge condition.
- Change to a positive-type insert.
- Make the lead angle smaller.
- Make the overhang shorter.
- Change the holder to a type using vibration proofed material.

Turning tool terminology

Toolholder part names



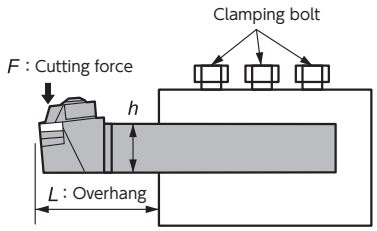
Part names of a cutting tool



Holder rigidity

Toolholder deflection

$$\delta = \frac{4 \times F \times L^3}{E \times b \times h^3} = \frac{4 \times k_c \times f \times L^3}{E \times b \times h^3}$$

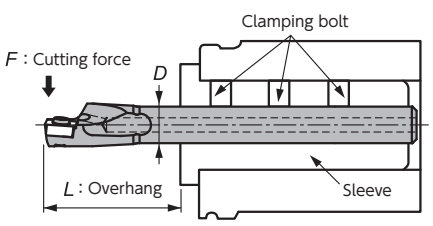


Symbol	Term	Unit
δ	Deflection amount	mm
b	Shank width	mm
h	Shank height	mm
E	Young's modulus	N/mm²
a_p	Depth of cut	mm
f	Feed amount	mm/rev
k_c	Specific cutting force	N/mm²
L	Overhang	mm
F	Cutting force	N

($F = k_c \times a_p \times f$)

Boring bar deflection

$$\delta = \frac{64 \times F \times L^3}{3 \times E \times \pi \times D^4} = \frac{64 \times k_c \times a_p \times f \times L^3}{3 \times E \times \pi \times D^4}$$



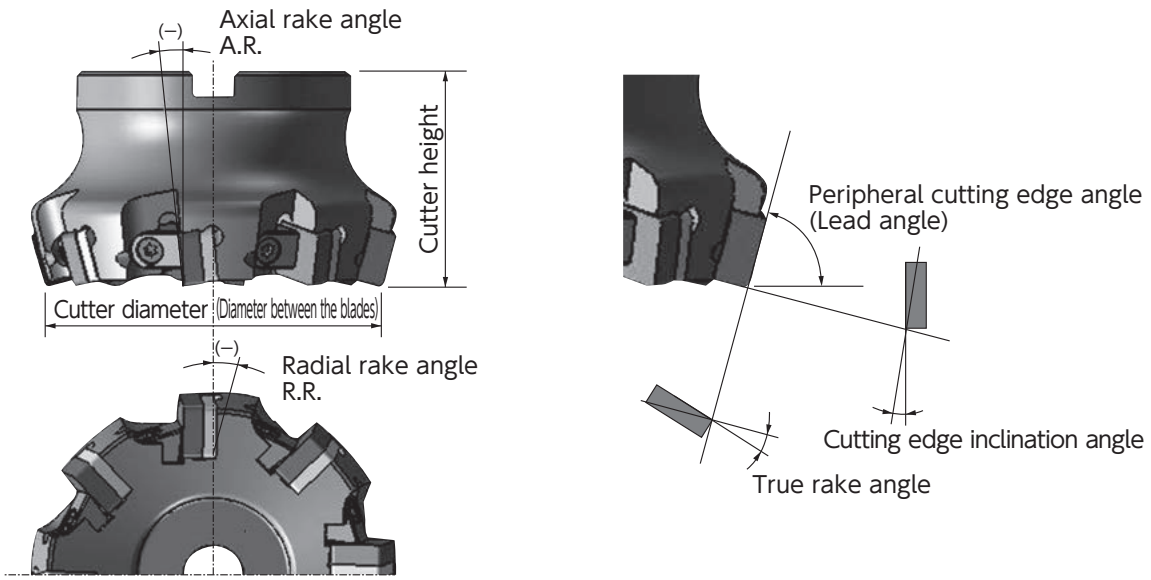
Symbol	Term	Unit
δ	Deflection amount	mm
D	Shank width	mm
E	Young's modulus	N/mm²
a_p	Depth of cut	mm
f	Feed amount	mm/rev
k_c	Specific cutting force	N/mm²
L	Overhang	mm
F	Cutting force	N

($F = k_c \times a_p \times f$)

An important factor in improving the rigidity of a toolholder is to ensure the overhang of the tool shank is as short as possible.

Milling cutter terminology

Milling cutter terminology



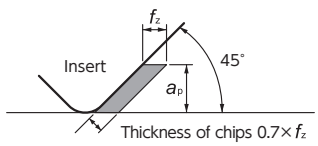
Functions of each cutting edge angle

Name	Function	Effects
Radial rake angle: R.R.	Controls the direction of chip evacuation and cutting force	Negative (−): Excels in chip control performance
Axial rake angle: A.R.	Controls the direction of chip evacuation and cutting force	Positive (+): Excels in cutting performance and deposition resistance
Lead angle	Controls the thickness and evacuation direction of chips	Larger lead angles decrease the thickness of chips and relieves cutting load
True rake angle	Actual rake angle	Larger angles excels in cutting performance and deposition resistance, but lowers the cutting edge strength Lesser angles ncrease the cutting edge strength but lowers the deposition resistance
Cutting edge tilt angle	Controls the direction of chip evacuation	Larger angles excel in chip control performance and relieves cutting load, but lowers the strength of the insert corner

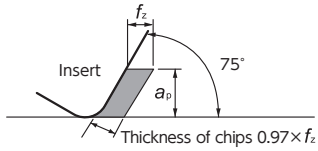
Functions of each angle

《Lead angle》: Relationship of this angle and chip thickness

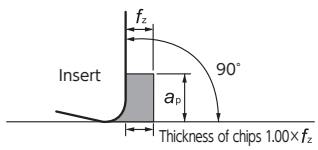
Lead angle : 45 degrees



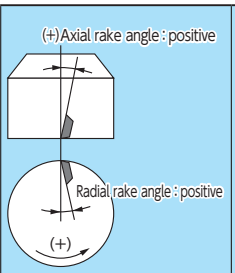
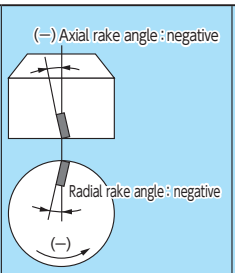
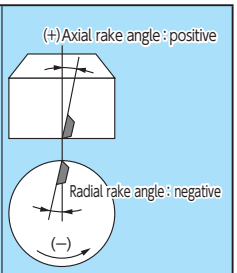
Lead angle : 75 degrees



Lead angle : 90 degrees



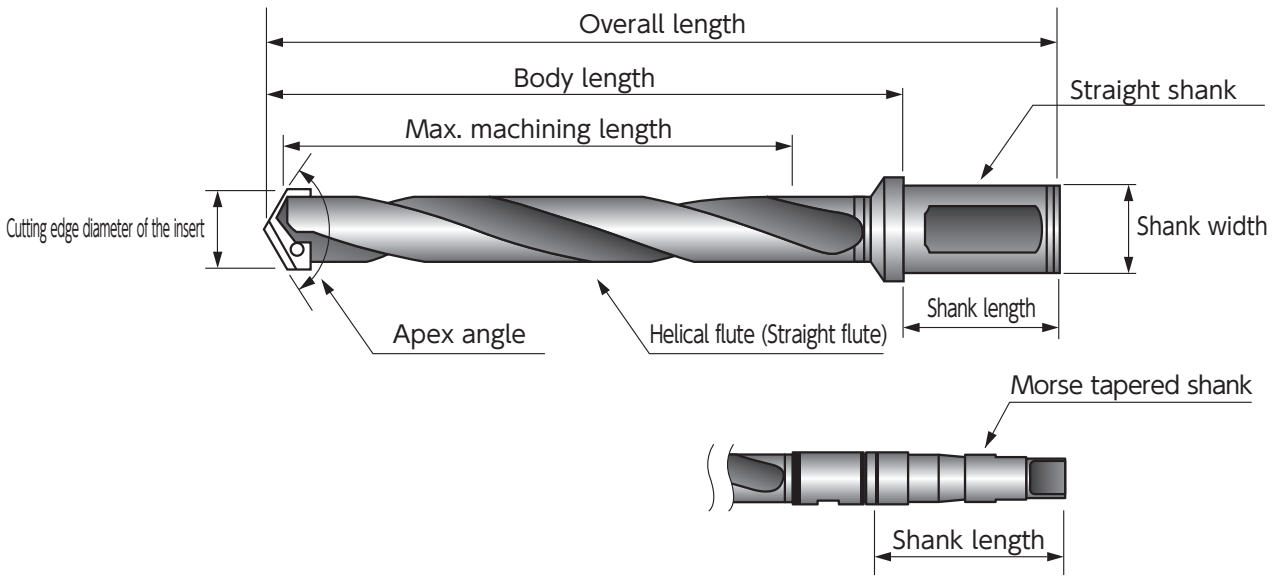
《Rake angle》: Combinations and the characteristic

Combinations of the angles for basic cutting edge shapes		 Double-positive cutting edge shape (DP edge shape)	 Double-negative cutting edge shape (DN edge shape)	 Negative-positive cutting edge shape (NP edge shape)
Radial rake angle (R.R.)		Positive (+)	Negative (–)	Negative (–)
Axial rake angle (A.R.)		Positive (+)	Negative (–)	Positive (+)
Insert specification		Positive (single side used)	Negative (both sides used)	Positive (single side used)
Work material	Steel	●	–	●
	Cast iron	–	●	●
	Aluminum alloy	●	–	–

Drill terminology

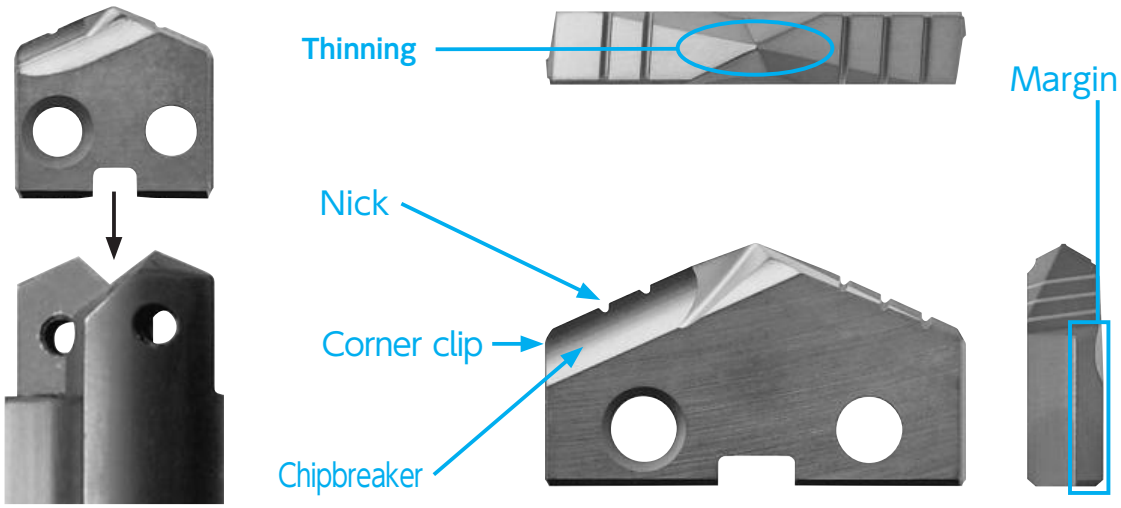
Drill terminology

《Drill holder》



《Drilling insert》

[Structure of a indexable drill insert]



Selective use of guided holders

Type	Features
1. Chrome-bush guide	●First choice for general deep hole drilling ●Superior lubrication to carbide guide ●Ideal choice for seizure prevention on guide portion at deep hole drilling
2. Thermal sprayed carbide type	●Superior wear resistance to chrome guide
3. Brazed carbide type	●More resistant to wear than the thermal sprayed carbide type ●Re-brazing is possible ●Applicable for diameters of Φ15 and over
4. Carbide clamped with screws	●Easy to replace pads ※Please send the holder to NTK to change the pad. NTK assembles and regrinds it. ●Applicable for diameters of Φ24 and over

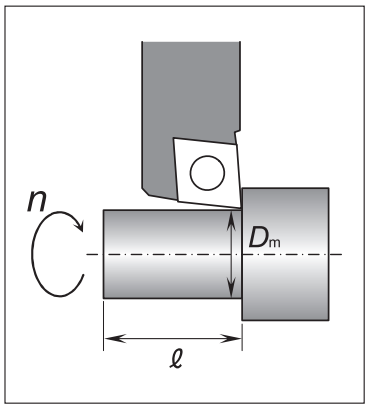
Keys: ◎: Excellent O: Good △: Acceptable X: Unacceptable

	Chrome-bush guide	Thermal sprayed carbide	Brazed carbide	Carbide clamped with screws
Low friction	◎	○	○	○
Wear resistance	△	○	◎	◎
Repeated used	○	○	○	◎
Dimensional accuracy	○	○	○	△

※Holders are designed specially for actual insert diameter.
Inserts with different diameters can't be put on the holders.
※You can decide the length of guide area and number of coolant holes.
(around 30mm to 50mm for deep hole drilling)
※Reuse may be impossible in case of big damage on the holders.

Calculations used for turning

Calculating the cutting speed



Calculating the cutting speed from the rotation speed

$$v_c\ (m/min) = \frac{\pi \times D_m \times n}{1000}$$

Calculating a revolution speed from the cutting speed

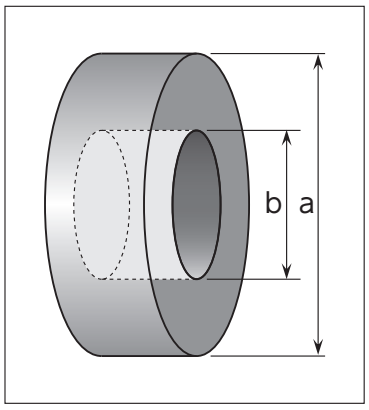
$$n\ (min^{-1}) = \frac{1000 \times v_c}{\pi \times D_m}$$

v_c : Cutting speed (m/min)
D_m : Machining diameter (mm)
n : Speed of revolution (min^{-1})
π : Circular constant (3.14)

Example : Obtaining a cutting speed for machining a work piece of 200 mm diameter at the revolution speed of 1,000 min^{-1}:

$$v_c = \frac{\pi \times 200 \times 1000}{1000} = \underline{628\ (m/min)}$$

Calculating the cutting time



Calculating the cutting time for OD (ID) machining

$$T\ (min) = \frac{\ell}{f \times n}$$

T : Cutting time (min)
ℓ : Cutting length (mm)
f : Feed amount (mm/rev)
n : Speed of revolution (min^{-1})

Calculating a cutting time for facing

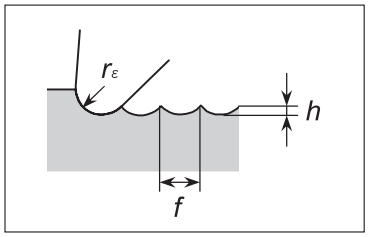
$$T\ (min) = \frac{\pi \times (a^2 - b^2)}{4000 \times v_c \times f}$$

T : Cutting time (min)
v_c : Cutting speed (m/min)
f : Feed amount (mm/rev)
π : Circular constant (3.14)

Example : Obtaining a cutting time for machining of work to be cut 100 mm long at the revolution speed of 1,000 min^{-1} and at a feed rate of 0.1 mm/rev:

$$T = \frac{100}{0.1 \times 1000} = \underline{1\ (min)}$$

Calculating the theoretical surface roughness



$$h\ (\mu m) = \frac{f^2}{8\, r_\varepsilon} \times 1000$$

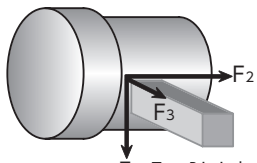
h : Theoretical surface roughness (μm)
f : Feed amount (mm/rev)
r_ε : Nose radius (mm)

Example : Obtaining the theoretical surface roughness when machining with an insert having 0.8 mm nose radius at a feed rate of 0.1 mm/rev:

$$h = \frac{0.1^2}{8 \times 0.8} \times 1000 = \underline{1.56\ (\mu m)}$$

【Guidelines for actually finished surface roughness】
Steel type work: Theoretical surface roughness × 1.5 to 3
Cast iron type work: Theoretical surface roughness × 3 to 5

Calculating the cutting force



F1 : Principal cutting force
F2 : Feed force
F3 : Thrust force

$$F_{(N)} = k_c \times a_p \times f$$

F : Cutting force (N)
k_c : Specific cutting force (N/mm²) *See the table below.
a_p : Depth of cut (mm)
f : Feed amount (mm/rev)

Example : Calculating the cutting force for grey cast iron cut at the feed rate of 0.2 mm/rev and with a depth of cut of 3 mm:

$$F = 1800 \times 3 \times 0.2 = \underline{1080\,(N)}$$

Calculating the power required

$$P_{c\,(kW)} = \frac{v_c \times f \times a_p \times k_c}{60 \times 10^3 \times \eta}$$

P_c : Required power (kW)
v_c : Cutting speed (m/min)
f : Feed amount (mm/rev)
a_p : Depth of cut (mm)
k_c : Specific cutting force (N/mm²) *See the table below.
η : Mechanical efficiency (0.7 ~ 0.8)

Example : Calculating the cutting power for the machining of grey cast iron at a cutting speed of 700 m/min. feed rate of 0.4 mm/rev and with a depth of cut of 2 mm (with 0.8 set as the mechanical efficiency):

$$P_c = \frac{700 \times 0.4 \times 2 \times 1400}{60 \times 10^3 \times 0.8} = \underline{16.33\,(kW)}$$

Specific cutting force

Work material		Tensile strength or hardness	Specific cutting force (N/mm²) "k_c" to cutting feed rate (mm/rev)				
			0.1mm/rev	0.2mm/rev	0.3mm/rev	0.4mm/rev	0.6mm/rev
Soft steel		520	3610	3100	2720	2500	2280
Medium steel		620	3080	2700	2570	2450	2300
Hard steel		720	4500	3600	6250	2950	2640
Tool steel	SKD	670	3040	2800	2630	2500	2400
		770	3150	2850	2620	2450	2340
Cr-Mo steel	SCM	600	3610	3200	2880	2700	2500
		730	4500	3900	3400	3150	2850
Alloy steel	SNCM	900	3070	2650	2350	2200	1980
		HB350	3310	2900	2580	2400	2200
Grey cast iron	FC	HB200	2110	1800	1600	1400	1330

Calculating the volume of chips produced

$$Q_{(cm^3/min)} = v_c \times f \times a_p$$

Q : Volume of evacuated chips (cm³/min)
v_c : Cutting speed (m/min)
a_p : Depth of cut (mm)
f : Feed amount (mm/rev)

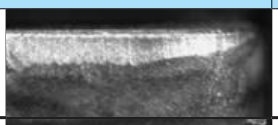
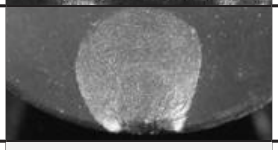
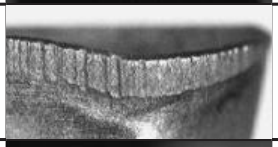
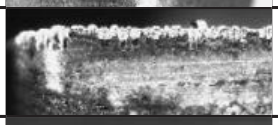
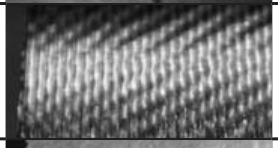
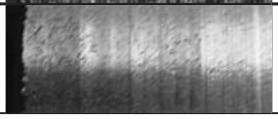
Example : Obtaining the volume of chips evacuated per minute for machining at a cutting speed of 700 m/min, feed of 0.4 mm/rev and a depth of cut of 2mm

$$Q = 700 \times 0.4 \times 2 = \underline{560\,(cm^3/min)}$$

Troubleshooting for turning

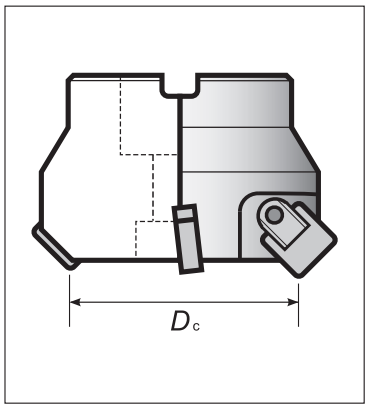
Corrective measures / Possible cause / Type of problem			Material/grade selection: Change to a harder material/grade	Material/grade selection: Change to a tougher material/grade	Material/grade selection: Change to a material/grade more resistant to thermal shock	Material/grade selection: Change to a material/grade more resistant to deposition	Cutting conditions: Cutting speed (Decrease ↘ / Increase ↗)	Cutting conditions: Feed rate (Decrease ↘ / Increase ↗)	Cutting conditions: Depth of cut (Decrease ↘ / Increase ↗)	Cutting conditions: Coolant: Use non-water-soluble type	Cutting conditions: Coolant: Review dry or wet operation	Tool shape: Review the type of chipbreaker	Tool shape: Rake angle (Decrease ↘ / Increase ↗)	Tool shape: Nose radius of the insert	Tool shape: Side cutting edge angle	Tool shape: Cutting edge strength, honing	Tool shape: Improve the accuracy of insert	Tool shape: Improve the rigidity of the holder	Machine/installation: Improve the installation accuracy of the cutting tool	Machine/installation: Review the overhang of the cutting tool	Machine/installation: Prevent vibration of the machine, improve the machine rigidity
Short tool life	Excessive insert wear	Unsuitable tool material/grade	●																		
		Unsuitable cutting edge shape										●	↗	↗	↗	↘					
		Improper cutting conditions					↘	↗			Wet										
	Fracture/chipping of the cutting edge	Unsuitable tool material/grade		●																	
		Improper cutting conditions						↘	↘												
		Insufficient cutting edge strength										●		↗		↗					
		Thermal shock			●		↘	↘	↘	●	Dry										
		Built-up edge				●	↗	↗		●	Wet										
		Insufficient toughness																●	●	●	●
Poor dimensional accuracy	Variation in dimensions during cutting	Improper accuracy of insert															●				
		Clearance/relief of the work/tool										●	↗	↘	↘	↘		●	●	●	●
	Need for offsetting during cutting	Increased flank wear	●											↗							
		Built-up edge				●	↗														
		Improper cutting conditions					↘	↗													
Poor surface finish	Poor surface roughness	Deposition					↗			●	Wet										
		Unsuitable cutting edge shape										●		↗							
		Chatter					↘	↘	↘									●	●	●	●
Heat	Deterioration in tool life/accuracy due to excessive heat generation	Improper cutting conditions					↘	↘	↘												
		Unsuitable cutting edge shape										●	↗			↘					
Burring, chipping, scuffing	Burring	Boundary wear	●																		
		Improper cutting conditions					↘	↓↑			Wet										
		Unsuitable cutting edge shape										●	↗	↘	↘	↘					
	Chipping	Improper cutting conditions						↘	↘												
		Unsuitable cutting edge shape										●	↗	↗	↗	↘					
		Vibration																●	●	●	●
	Scuffing	Unsuitable tool material/grade				●															
		Improper cutting conditions					↗			●	Wet										
		Unsuitable cutting edge shape										●	↗			↘					
		Vibration																●	●	●	●
Chip control	Elongated chips	Improper cutting conditions					↘	↗	↗		Wet										
		Chipbreaker's effective chip control range										●									
		Unsuitable cutting edge shape												↘	↘						

Troubleshooting case studies: Turning

	Case/Symptom		Possible causes	Corrective measures
Insert	VB wear		●The material / grade is too soft ●Cutting speed is too high ●Relief angle is too small	●Use a coated grade ●Choose a material/grade highly resistant to wear ●Decrease the cutting speed
	Wear on face		●High temperature causes chemical reactions between the insert material and chips	●Use a coated grade ●Decrease both of the cutting speed and feed rate ●Widen the rake angle
	Flank boundary wear		●The work surface is too hard ●Boundary area has been oxidized ●Burrs, caused by chips in the sheared form, have been cut	●Widen the side cutting edge angle ●Make the nose radius larger so that cutting is performed within the radius ●Use a round insert
	Chipping/ fracture		●Feed rate is too high ●Chips have become trapped ●Chatter resulting in vibration	●Enlarge the honed edge ●Make the nose radius larger ●Narrow the rake angle to secure the cutting edge strength
	Flaking		●This is due compressive forces being applied to the cutting edge due to elastic deformation in the area being cut ●This occurs when deposited/adhered material is peeled off	●Change the cutting conditions by checking the cutting edge ●Choose a material/grade highly resistant to fracture ●Increase the coolant rate and pressure ●Improve the run-out of the main spindle of the machine
	Plastic deformation		●High cutting force and excessive heat is applied to the cutting edge	●Choose a material/grade highly resistant to wear ●Decrease both of the cutting speed and feed rate ●Make the nose radius larger ●Use coolant
	Built-up edge		●This occurs because the cutting temperature is lower than the recrystallization temperature of the work material	●Increase the cutting speed ●Use coolant with excellent lubrication performance ●Change to a grade with less affinity to the work material
	Deposition		●The deposition is caused to the face by a chemical reactions of the work material due to heat generation	●Increase the cutting speed ●Widen the relief angle ●Hone the face with a mirror-like-surface finish ●Change to a grade with less affinity to the work material
	Clamping crack		●The insert was clamped under improper seating condition	●Clean the clamping areas and install the insert in the recommended way ●Tighten to the specified torque
Work piece	Chipping		●The feed rate is too high ●An unsuitable insert is selected	●Decrease the feed rate ●Use a smaller edge preparation ●Change to a grade highly resistant to boundary wear ●Change the cutting edge angle of the holder
	Burring		●The feed rate is incorrect ●The shape of insert is not suitable	●Decrease the feed rate ●Use a smaller edge preparation
	Chatter mark		●The cutting force is too great ●The rigidity of the work piece and cutting tool is insufficient	●Decrease the feed rate ●Use a smaller edge preparation ●Ensure tool overhang is minimised ●Change the cutting edge angle of the holder
	Gouging		●Vibration of the cutting edge due to deposition/built-up edge	●Increase the cutting speed ●Use cutting oil excellent in lubrication performance ●Change to a grade with less affinity to the work material

Calculations for milling processes

Calculating the cutting speed



Calculating the cutting speed from the rotation speed

$$v_c\ (\text{m/min}) = \frac{\pi \times D_c \times n}{1000}$$

Calculating the revolution speed from the cutting speed

$$n\ (\text{min}^{-1}) = \frac{1000 \times v_c}{\pi \times D_c}$$

v_c : Cutting speed (m/min)
D_c : Cutter diameter (mm)
n : Speed of revolution (min^{-1})
π : Circular constant (3.14)

Example : Obtaining the cutting speed for machining with a cutter of 200 mm diameter at the revolution speed of 1,000 min^{-1}:

$$v_c = \frac{\pi \times 200 \times 1000}{1000} = \underline{628\ (\text{m/min})}$$

Calculating the feeding speed and feed rate

Calculating the feed rate per blade

$$f_z\ (\text{mm/t}) = \frac{v_f}{z \times n}$$

Calculating the feeding speed per minute

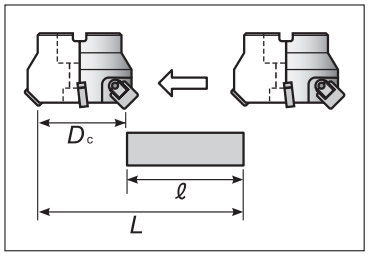
$$v_f\ (\text{mm/min}) = f_z \times z \times n$$

f_z : In-feed amount per blade (mm/t)
v_f : Feed rate (mm/min)
z : Number of blades
n : Speed of revolution (min^{-1})

Example : Obtaining the feed rate for milling with a 10-blade cutter at the in-feed amount of 0.2 mm/t and the revolution speed of 1,000 min^{-1}

$$v_f = 0.2 \times 10 \times 1000 = \underline{2000\ (\text{mm/min})}$$

Calculating the machining time



$$T\ (\text{min}) = \frac{L}{v_f}$$

T : Cutting time (min)
L : Total length of table feed ($\ell + D_c$)
v_f : Feed rate (mm/min)

Example : Obtaining the machining time for milling 200 mm on a work piece fed at the rate of 1,000 mm/min:

$$T = \frac{200}{1000} = \underline{0.2\ (\text{min})}$$

Calculating the cutting power

$$P_c\ (\text{kW}) = \frac{a_e \times a_p \times v_f \times k_c}{60 \times 10^6 \times \eta}$$

P_c : Required power (kW)
a_e : Cutting length (mm)
a_p : Depth of cut (mm)
v_f : Feed rate (mm/min)
k_c : Specific cutting force (N/mm²) *See the table below.
η : Mechanical efficiency (0.7 ~ 0.8)

Example : Calculating the required power for machining grey cast iron for a length of 150 mm, at a feed rate of 1,100 mm/min and with a depth of cut of 3 mm (with 0.8 set as the mechanical efficiency and 0.2 mm as the feed par tooth/blade)

$$P_c = \frac{150 \times 3 \times 1100 \times 1400}{60 \times 10^6 \times 0.8} = 14.44\,(\text{kW})$$

Specific cutting force

Work material		Tensile strength or hardness	Specific cutting force (N/mm²) "k_c" to cutting feed amount (mm/rev)				
			0.1mm/t	0.2mm/t	0.3mm/t	0.4mm/t	0.6mm/t
Soft steel		520	2200	1950	1820	1700	1580
Medium steel		620	1980	1800	1730	1600	1570
Hard steel		720	2520	2200	2040	1850	1740
Tool steel	SKD	670	1980	1800	1730	1700	1600
		770	2030	2030	1800	1750	1700
Cr-Mo steel	SCM	600	2180	2000	1860	1800	1670
		730	2540	2250	2140	2000	1800
Alloy steel	SNCM	900	2000	1800	1680	1600	1500
		HB350	2100	1900	1760	1700	1530
Grey cast iron	FC	HB200	1750	1400	1240	1050	970
Aluminum alloy	AC, ADC	160	580	480	400	350	320

※For power required for NTK HCC, please refer to page P31.

Calculating the volume of evacuated chips

$$Q\ (\text{cm}^3/\text{min}) = a_e \times a_p \times v_f$$

Q : Volume of evacuated chips (cm³/min)
a_e : Cutting length (mm)
a_p : Depth of cut (mm)
v_f : Feed rate (mm/min)

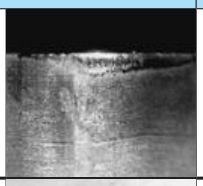
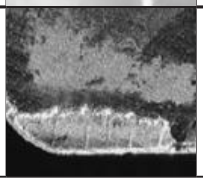
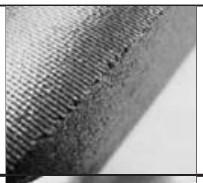
Example : Obtaining the volume of chips evacuated per minute for machining at a cutting speed of 1100 m/min, cutting length of 150mm, and with a 3 mm depth of cut:

$$Q = 150 \times 3 \times 1100 = 495\,(\text{cm}^3/\text{min})$$

Troubleshooting for milling

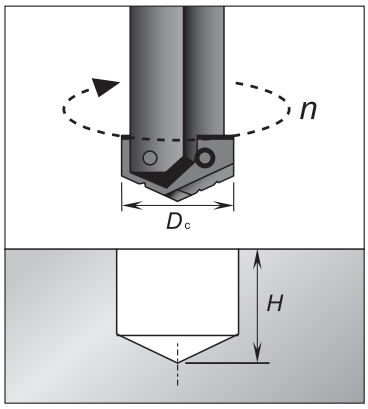
Type of problem / Possible cause / Corrective measures			Material/grade selection				Cutting conditions							Tool shape							
			Change to a harder material/grade	Change to a tougher material/grade	Change to a material/grade more resistant to thermal shock	Change to a material/grade more resistant to deposition	Cutting speed (Decrease ↘ / Increase ↗)	Feed rate	Depth of cut	Review cutter diameter and cutting width	Review tool path	Coolant: Wet	Coolant: Dry	Relief angle of insert (Decrease ↘ / Increase ↗)	Nose radius of cutting edge	Cutting edge strength, honing	Number of teeth/blades	Enlarge the chip pocket	Check the wiper shape	Improve accuracy of cutting edge run-out	Improve rigidity of tool
Damaged or broken cutting edge of the insert	Increased flank wear	Improper cutting conditions					↘					●									
		Unsuitable cutting edge shape	●											↗		↘			●		
	Increased wear on face	Improper cutting conditions					↘	↘	↘			●									
		Unsuitable cutting edge shape	●											↗	↗	↘					
	Fracture/ chipping on cutting edge	Improper cutting conditions						↘	↘		●										
		Unsuitable cutting edge shape		●										↘	↗	↗			●	●	●
	Thermal shock	Improper cutting conditions					↘	↘	↘				●								
		Unsuitable cutting edge shape			●									↗		↘					
	Built-up edge	Improper cutting conditions					↗	↗				●									
		Unsuitable cutting edge shape				●								↗		↘					
Machining accuracy	Poor surface finish	Improper cutting conditions					↗	↘	↘			●									
		Unsuitable cutting edge shape	●			●										↘	↘		●	●	
	Burring	Improper cutting conditions						↓↑	↘	●	●										
		Unsuitable cutting edge shape												↗	↘	↘			●		
	Chipping	Improper cutting conditions						↘	↘		●										
		Unsuitable cutting edge shape												↗	↗	↘	↗		●		
	Poor flatness and parallelism	Improper cutting conditions						↘	↘			●		↗	↘	↘	↘		●	●	●
Others	Increased chatter/ vibration	Improper cutting conditions					↘	↘	↘	●	●			↗	↘	↘	↘				
	Poor chip evacuation	Improper cutting conditions					↗	↘		●		●	●								
		Unsuitable tool/blade edge shape												↗			↘	●			

Troubleshooting case studies: Milling

	Case/Symptom		Possible causes	Corrective measures
Insert	VB wear		●Cutting speed is too high. ●Feed rate is too low. ●The shape of the insert is not suitable. ●The material / grade of the insert is not suitable.	●Decrease the cutting speed. ●Increase the feed rate. ●Make the nose radius larger. ●Change to a grade highly resistant to boundary wear.
	Boundary wear		●The material / grade of the inserts is not suitable. ●The shape of the cutter is not suitable ●The shape of insert is not suitable.	●Change to a grade highly resistant to boundary wear. ●Widen the rake angle. ●Change the Insert shape to a different one.
	Chipping / fracture		●The cutting speed is incorrect. ●The shape of the cutter is not suitable ●The shape of insert is not suitable.	●Decrease the feed rate and depth of cut in order to reduce the cutting force. ●Use a smaller edge preparation. ●Prepare the cutting edge to give it a round honing. ●Change to a grade highly resistant to fracture.
	Thermal crack		●The cutting conditions are incorrect ●The material / grade of insert is not suitable	●Decrease the cutting speed. ●Change to dry cutting from wet cutting. ●Use a material / grade highly resistant to thermal shock
Work piece	Chipping		●The feed rate is too high. ●An unsuitable insert is selected. ●The shape of the cutter is not suitable.	●Decrease the feed rate. ●Use a smaller edge preparation ●Change to a grade highly resistant to boundary wear. ●Set the lead angle at 45 degrees.
	Burring		●The feed rate is incorrect. ●The shape of insert is not suitable. ●The shape of the cutter is not suitable.	●Adjust the feed rate. ●Use a smaller edge preparation. ●Make the lead angle narrower.

Calculations used for drilling

Calculating the cutting speed



Calculating the cutting speed from the rotation speed:

$$v_{c\,(m/min)} = \frac{\pi \times D_c \times n}{1000}$$

v_c : Cutting speed (m/min)
D_c : Diameter (mm)
n : Speed of revolution (min^{-1})
π : Circular constant (3.14)

Calculating the speed of revolution from the cutting speed:

$$n_{(min^{-1})} = \frac{1000 \times v_c}{\pi \times D_c}$$

Example : Obtaining a cutting speed for drilling with a 20 mm diameter drill at a revolution speed of 1,000 min^{-1}:

$$v_c = \frac{\pi \times 20 \times 1000}{1000} = \underline{62.8\,(m/min)}$$

Calculating the feed rate

$$v_{f\,(mm/min)} = f \times n$$

v_f : Feed rate (mm/min)
f : Feed amount (mm/rev)
n : Speed of revolution (min^{-1})

Example : Obtaining the feed rate for drilling at feed rate of 0.2 mm/rev and revolution speed of 1,000 min^{-1}:

$$v_f = 0.2 \times 1000 = \underline{200\,(mm/min)}$$

Calculating the cutting time

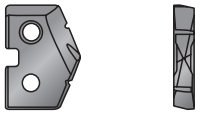
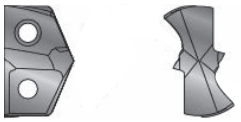
$$T_{(min)} = \frac{H}{v_f}$$

T : Cutting time (min)
H : Depth of the hole (mm)
v_f : Feed rate (mm/min)

Example : Obtaining the cutting time for drilling a 100 mm deep hole at a feed rate of 200 mm/min:

$$T = \frac{100}{200} = \underline{0.5\,(min)}$$

Calculating the cutting power and thrust

	GEN2 Standard	GEN3
Insert shape		
Cutting power (kW)	$P_c = \frac{n \times f \times D_c^2 \times k_c}{240442.4}$	$P_c = \frac{n \times f \times D_c^2 \times k_c}{218604.8}$
Thrust (kN)	$T = 0.1366 \times f \times D_c \times k_c$	$T = 0.1571 \times f \times D_c \times k_c$

Specific cutting forceforce

Work material		Hardness of work material	Specific cutting force (N/mm²)
Carbon steel and alloy steel	S○○C SCr SCM SNCM etc…	HB 85 ~ 200	5.45
		HB200 ~ 275	6.48
		HB275 ~ 375	6.89
		HB375 ~ 425	7.93
Heat-resistant alloy	Term	—	9.93
Stainless steel	SUS	HB137 ~ 275	6.48
		HRC30 ~ 40	7.45
Grey cast iron	FC	HB200 ~ 275	5.45
Copper alloy		HRB20 ~ 80	2.96
		HRB80 ~ 100	4.96
Titanium alloy		—	4.96
Aluminum alloy	AC, ADC	—	1.52

P_c : Required power (kW)
T : Thrust (kN)
n : Speed of revolution (min^{-1})
f : Feed amount (mm/rev)
D_c : Diameter of drilling tool (mm)
k_c : Specific cutting force (N/mm^2) *See the table at the left.

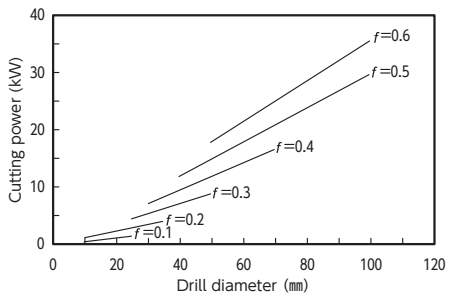
Example : Obtaining the thrust and power required for drilling grey cast iron with a 20 mm-diameter GEN drill at a revolution speed of 800 min^{-1} and in-feed rate of 0.3 mm/rev:

$$P_c = \frac{800 \times 0.3 \times 20^2 \times 5.45}{240442.4} = \underline{2.18\,(kW)}$$

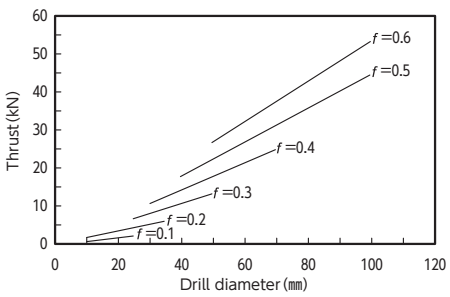
$$T = 0.1366 \times 0.3 \times 20 \times 5.45 = \underline{4.467\,(kN)}$$

Referential values (of the cutting power and thrust)

■ Cutting power (kW)



■ Thrust (kN)

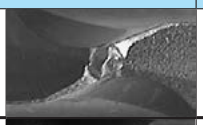
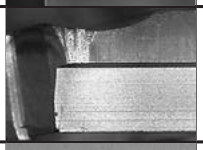
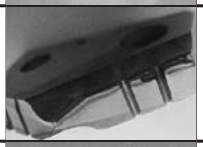


Work material : SCM420 (HB200)
Cutting speed : v_c =70m/min
Coolant : internally supplied

Troubleshooting for drilling

Type of problem / Possible cause / Corrective measures			Cutting conditions: Cutting speed ↘ Decrease	Cutting conditions: Cutting speed ↗ Increase	Cutting conditions: Feed rate ↘ Decrease	Cutting conditions: Feed rate ↗ Increase	Cutting conditions: Decrease the feed rate for the in-feed of the cutting edge	Cutting conditions: Decrease the feed rate for exiting from a through hole	Cutting conditions: Provide step feed	Cutting conditions: Improve the accuracy and depth of pilot holes	Cutting conditions: Tool shape: Increase the density	Cutting conditions: Tool shape: Increase the supply rate	Cutting conditions: Tool shape: Decrease the supply pressure	Tool shape: Chisel width ↘ Decrease	Tool shape: Width of hone ↘ Decrease	Tool shape: Center thickness ↗ Increase	Tool shape: Shorten the fluted groove length	Tool shape: Use a drilling tool with internal coolant supply	Tool shape: Use an X-thinning type	Machine/installation: Improve the installation accuracy of the drilling tool	Machine/installation: Review the overhang of the drilling tool	Machine/installation: Level the work surface to be cut	Machine/installation: Improve the rigidity of the workpiece	Machine/installation: Prevent vibration of the machine, improve the machine rigidity
Poor tool life	Drill breakage	Improper drilling rigidity				↗										↗	●							
		Improper cutting conditions		↘																				
		Greater run-out of holder																			●			●
		Slanted work surface																					●	
	Chipping on peripheral cutting edge	Improper cutting conditions		↘					●															
		Greater run-out of holder																		●				●
		Chatter/vibration													↘						●			● ●
	Greater wear on peripheral cutting edge/margin	Improper cutting conditions	↘																					
		Cutting heat at the drilling point too high									●	●							●					
		Poor run-out accuracy																			●			
	Chipping on chisel	Width of chisel too wide												↘										
		Poor performance in biting/in-feed			●																			
		Chattering/vibration													↘							●		● ●
Poor dimensional accuracy of hole	Larger hole diameter	Insufficient rigidity of drill														↗	●							
		Unsuitable drilling tool shape																						
	Smaller hole diameter	Cutting heat at the drilling point too high									●	●							●					
		Improper cutting conditions	↘																					
		Unsuitable drilling tool shape																						
	Poor geometric straightness	Insufficient rigidity of drill														↗	●							
		Greater run-out of holder																			●			●
		Insufficient guiding performance							●															
	Poor positioning accuracy, roundness and surface finish of hole	Insufficient rigidity of drill														↗	●							
		Poor performance when in-feed																		●				
		Improper cutting conditions			●																			
		Greater run-out of holder																			●			●
Burring	Burring at exit	Unsuitable drilling tool shape													↘									
		Improper cutting conditions				●																		
Chip control	Elongated chips	Improper cutting conditions		↗					●															
		Insufficient chip evacuation										●	●			↘		●						
	Jammed chips	Improper cutting conditions	↘	↘					●															
		Insufficient chip evacuation										●	●			↘		●						

Troubleshooting case studies: Drilling

	Case/Symptom		Possible causes	Corrective measures
Insert	Chisel wear		● The hardness of the work material is too high. ● Excessive feed ● Run-out of the main spindle of the machine	● Change to a grade highly resistant to heat or a coated type. ● Adjust to high cutting speed and low feed rate conditions ● Correct the run-out of the machine's main spindle.
	Nose wear		● The work material is one of those which promote abrasion. ● Run-out of the main spindle of the machine	● Change to a grade highly resistant to wear or a coated type. ● Adjust so that a low cutting speed and high feed rate are used ● Correct the run-out of the machine's main spindle.
	Margin wear		● Excessive heat ● Deposition ● Insufficient coolant supply ● Run-out of the main spindle of the machine	● Adjust so that a low cutting speed and high feed rate are used ● Change to a grade highly resistant to heat or a coated type. ● Increase the coolant feed rate. ● Correct the run-out of the machine's main spindle.
	Margin wear		● Excessive heat ● Jammed chips ● Insufficient coolant supply	● Adjust so that a low cutting speed and high feed rate are used ● Change to a grade highly resistant to wear or a coated type. ● Increase the coolant feed rate.
	Chipping on cutting edge		● Deposition is caused to the cutting edge. ● Insufficient strength of the insert ● Jammed chips ● Run-out of the main spindle of the machine	● Change the cutting conditions by checking the cutting edge. ● Change to a grade highly resistant to fracture. ● Increase the coolant feed rate and pressure. ● Correct the run-out of the machine's main spindle.
	Fractured cutting edge		● There is a pilot hole. ● The hardness of the work material is too high. ● The angle for centering is too acute.	● Decrease the feed rate at the entrance of the pilot hole. ● Change the insert grade to a stronger one. ● Carry out centering with an insert whose apex angle is 132 degrees or greater.
	Deposition on cutting edge		● The density of the coolant is too high. ● Insufficient lubrication due to mist or dry cutting condition ● The hardness of the work material is too high.	● Check the coolant density. ● Adjust so that a high cutting speed and low feed rate are used ● Internally supply coolant of a water-soluble type. ● Use a coated insert of a grade highly resistant to deposition.
Holder	Breakage		● Excessive torque ● Excessive feed ● Jammed chips	● Decrease the settings for cutting. ● Provide stepped feed. ● Increase the coolant feed rate and pressure.
	Warped slit		● Excessive feed	● Lower the feed rate. ● Use a holder of a larger diameter.
	Entangled chips		● Improper cutting conditions ● The shape of the chipbreaker is not suitable.	● Adjust so that a low cutting speed and high feed rate are used ● Use a HI-chipbreaker.
	Wear on side surfaces		● Jammed chips ● The cutting speed is too high. ● The clearance between the drill bush and holder is insufficient.	● Decrease the cutting speed. ● Review the clearance between the drill bush and holder.
	Wear		● Wear due to contact with work materials and chips	● Replace the holder with a new one periodically. (guideline: every 100th replacement insert)
Work piece	Spiral shaped gouges on inner surface		● The holder is too long. ● Run-out of the main spindle of the machine ● Run out at the time of engagement	● Optimize the holder length. ● Correct the run-out of the machine' s main spindle. ● Decrease the settings for in-feed/engagement. ● Use a notch-point type insert.
	Scratches on inside surface		● Deposition ● Poor chip evacuation ● Insufficient coolant feed rate and pressure	● Decrease the cutting speed. ● Use a HI-chipbreaker. ● Increase the coolant feed rate and pressure.
	Burrs at the exit of hole		● The hardness of the work material is low. ● The corner clip is not suitable. ● The feed rate at the exit is too high.	● Decrease the feed rate for exiting from the hole. ● Use a CR chipbreaker.

Approximate data conversions of Brinell hardness.

Brinell hardness, 10 mm balls, 3000 kgf load		Vickers Hardness (HV)	Rockwell hardness			Shore hardness	Tensile strength Kgf/mm2 [N/m2] Approximate value MPa(1)
Standard ball	Tungsten carbide tall		Scale A Load : 60 kgf brale indenter (HRA)	Scale B Load : 100 kgf Diameter 1/16" indenter (HRB)	Scale C Load : 150 kgf brale indenter (HRC)		
–	–	940	85.6	–	68	97	
–	–	920	85.3	–	67.5	96	
–	–	900	85	–	67	95	
–	(767)	880	84.7	–	66.4	93	
–	(757)	860	84.4	–	65.9	92	
–	(745)	840	84.1	–	65.3	91	
–	(733)	820	83.8	–	64.7	90	
–	(722)	800	83.4	–	64	88	
–	(710)	780	83	–	63.3	87	
–	(698)	760	82.6	–	62.5	86	
–	(684)	740	82.2	–	61.8	84	
–	(670)	720	81.8	–	61	83	
–	(656)	700	81.3	–	60.1	81	
–	(647)	690	81.1	–	59.7	–	
–	(638)	680	80.8	–	59.2	80	
–	630	670	80.6	–	58.8	–	
–	620	660	80.3	–	58.3	79	
–	611	650	80	–	57.8	–	
–	601	640	79.8	–	57.3	77	
–	591	630	78	–	56.8	–	
–	582	620	79.2	–	56.3	75	
–	573	610	78.9	–	55.7	–	
–	564	600	78.6	–	55.2	74	
–	554	590	78.4	–	54.7	–	
–	545	580	78	–	54.1	72	
–	535	570	77.8	–	53.6	–	
–	525	560	77.4	–	53	71	
–	517	550	77	–	52.3	–	
–	507	540	76.7	–	51.7	69	
–	497	530	76.4	–	51.1	–	
–	488	520	76.1	–	50.5	67	
–	479	510	75.7	–	49.8	–	
–	471	500	75.3	–	49.1	66	
–	460	490	74.9	–	48.4	–	
–	452	480	74.5	–	47.7	64	
–	442	470	74.1	–	46.9	–	
–	433	460	73.6	–	46.1	62	
–	425	450	73.3	–	45.3	–	
–	415	440	72.8	–	44.5	59	
–	405	430	72.3	–	43.6	–	

Brinell hardness, 10 mm balls, 3000 kgf load		Vickers Hardness (HV)	Rockwell hardness			Shore hardness	Tensile strength Kgf/mm2 [N/m2] Approximate value MPa(1)
Standard ball	Tungsten carbide tall		Scale A Load : 60 kgf brale indenter (HRA)	Scale B Load : 100 kgf Diameter 1/16" indenter (HRB)	Scale C Load : 150 kgf brale indenter (HRC)		
–	397	420	71.8	–	42.7	57	
–	388	410	71.4	–	41.8	–	
–	379	400	70.8	–	40.8	55	
–	369	390	70.3	–	39.8	–	
-	360	380	69.8	(110.0)	38.8	52	
–	350	370	69.2	–	37.7	–	
–	341	360	68.7	–	36.6	50	
–	331	350	62.1	–	35.5	–	
–	322	340	67.6	–	34.4	47	
–	313	330	67	–	33.3	–	
247	247	260	62.4	(101.0)	24	37	825
243	243	255	62	–	23.1	–	805
238	238	250	61.6	99.5	22.2	36	795
233	233	245	61.2	–	21.3	–	780
228	228	240	60.7	98.1	20.3	34	765
219	219	230		96.7	(18.0)	33	730
209	209	220		95	(15.7)	32	695
200	200	210		93.4	(13.4)	30	670
190	190	200		91.5	(11.0)	29	635
181	181	190		89.5	(8.5)	28	605
171	171	180		87.1	(6.0)	26	580
162	162	170		85	(3.0)	25	545
152	152	160		81.7	(0.0)	24	515
143	143	150		78.7		22	490
133	133	140		75		21	455
124	124	130		71.2		20	425
114	114	120		66.7		–	390
105	105	110		62.3		–	–
95	95	100		56.2		–	–
90	90	95		52		–	–
86	86	90		48		–	–
81	81	85		41		–	–

(1)1MPa=1N/㎟
(2)This table is an excerpt from the JIS Iron and Steel Handbook.
(3)Values in parentheses in the above table are not usually used.

Symbols used for machining, SI unit conversion table

Symbols used for cutting

Turning

Item	New symbol	Old symbol	Unit
Cutting speed	v_c	v	m/min
Feed rate	f	f	mm/rev
Depth of cut	a_p	d	mm
Width of cutting edge	W	W	mm
Diameter of work	D_m	D	mm
Cutting power	P_c	P_{kw}	kW
Specific cutting force	k_c	k_s	MPa
Theoretical surface finish	h	R_z	μm
Nose radius	r_ε	R	mm
Revolution speed	n	N	min^{-1}

Milling

Item	New symbol	Old symbol	Unit
Cutting speed	v_c	v	m/min
Feeding speed	v_f	F	mm/min
In-feed rate per blade	f_z	f	mm/t
Feed rate	f	f	mm/rev
Number of blades	z	z	piece
Axial depth of cut	a_p	d	mm
Radial depth of cut	a_e	w	mm
Pick feed	P_f	P_f	mm
Cutting power	P_c	P_{kw}	kW
Specific cutting force	k_c	K_s	MPa
Vol of evacuated chips	Q	Q	cm^3/min
Revolution speed	n	N	min^{-1}

Drilling

Item	New symbol	Old symbol	Unit
Cutting speed	v_c	v	m/min
Feeding speed	v_f	F	mm /min
Feed rate	f	f	mm /rev
Diameter	D_c	$D\,(D_s)$	mm
Cutting power	P_c	P_{kw}	kW
Specific cutting force	k_c	K_s	MPa
Drilling depth	H	d	mm
Revolution speed	n	N	min^{-1}

SI unit conversion table (SI units are indicated in bold line columns.) (The tables below are excerpts from the JIS Iron and Steel Handbook)

Force

N	kgf
1	1.01972×10^{-1}
9.80665	1
1×10^{-5}	1.01972×10^{-6}

Stress

1Pa=1N/m^2,1MPa=1N/mm^2

Pa or N/m^2	MPa or N/mm^2	kgf/mm^2	kgf/cm^2	kgf/m^2
1	1×10^{-6}	1.01972×10^{-7}	1.01972×10^{-5}	1.01972×10^{-1}
1×10^{6}	1	1.01972×10^{-1}	1.01972×10	1.01972×10^{5}
9.80665×10^{6}	9.80665	1	1×10^{2}	1×10^{6}
9.80665×10^{4}	9.80665×10^{-2}	1×10^{-2}	1	1×10^{4}
9.80665	9.80665×10^{-6}	1×10^{-6}	1×10^{-4}	1

Pressure

1Pa=1N/m^2

Pa	kPa	MPa	bar	kgf/cm^2
1	1×10^{-3}	1×10^{-6}	1×10^{-5}	1.01972×10^{-5}
1×10^{3}	1	1×10^{-3}	1×10^{-2}	1.01972×10^{-2}
1×10^{6}	1×10^{3}	1	1×10	1.01972×10
1×10^{5}	1×10^{2}	1×10^{-1}	1	1.01972
9.80665×10^{4}	9.80665×10	9.80665×10^{-2}	9.80665×10^{-1}	1

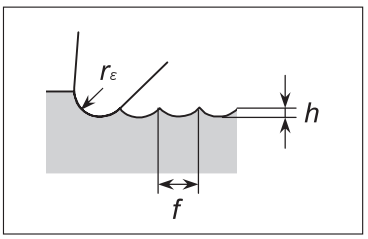
Changes in JIS Surface Roughness Standards

			JIS B0601 (2001) ISO 4287 (1997) / ISO 1302 (2002)	JIS B0601 (1994) JIS B0031 (1982)
Cross-section curve			No filter, digital signal	No filter, digital signal
	Evaluation length		Shape length	—
	Maximum height		Pt	—
	10-point average roughness		—	—
Roughness curve			Phase correction, band λs-λc	Phase correction, short wavelength λc
	Evaluation length		Determine individually for each standard length λc.	Average for ℓn, calculated for each standard length λc
	Maximum height		Maximum height **Rz**	Maximum height Ry
	Set standard length based on height parameters Rz, Rmax, and Ry.	0.25mm	0.1 ~ 0.5μm	0.1 ~ 0.5μm
		0.8mm	0.5 ~ 10μm	0.5 ~ 10μm
		2.5mm	10 ~ 50μm	10 ~ 50μm
	Dimension indicated in drawing		U 0.008 – 2.5/Rz 1.5 L – 2.5/Rz 0.7	Ry = 1.6 ~ 0.8 λc 0.25
	10-point average roughness		**Rz_{JIS}**	Rz
	Center line average roughness		Ra_{75}	Ra75
	Arithmetic average roughness		Arithmetic average roughness **Ra**	Arithmetic average roughness Ra
	Set standard length based on height parameters Rz, Rmax, and Ry.	0.25mm	0.1 ~ 0.5μm	0.1 ~ 0.5μm
		0.8mm	0.5 ~ 10μm	0.5 ~ 10μm
		2.5mm	10 ~ 50μm	10 ~ 50μm
	Dimension indicated in drawing		U "2RC" – 0.8/Ra75 3.1 L "2RC" – 0.8/Ra75 1.5	1.6 ~ 3.2

Theoretical surface roughness

The theoretical surface roughness for lathe machining is the minimum value which can be obtained under the set machining conditions, and can be expressed by the following formula.

$$h_{(\mu m)} = \frac{f^2}{8\,r_\varepsilon} \times 1000$$



h : Theoretical surface roughness (μm)
f : Feed amount (mm/rev)
r_ε : Nose radius (mm)

Actual surface roughness

- When machining steel: Theoretical surface roughness x 1.5-3
- When machining cast iron: Theoretical surface roughness x 3-5

Surface finish improvement measures

- Increase the nose radius.
- Adjust the cutting speed and/or feed amount.
- Use a wiper insert.
- Change the material and/or shape of the insert

Relationship with triangle symbols

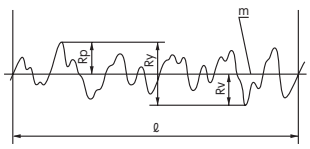
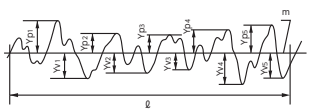
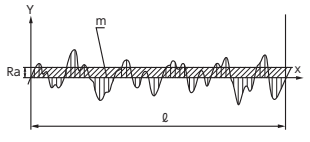
Arithmetic average roughness Ra (μm)	Maximum height Rz (μm)	10-point average roughness Rz_{JIS} (μm)	※ (Triangle symbol)
0.025	0.1	0.1	▽▽▽▽
0.05	0.2	0.2	
0.1	0.4	0.4	
0.2	0.8	0.8	
0.4	1.6	1.6	▽▽▽
0.8	3.2	3.2	
1.6	6.3	6.3	
3.2	12.5	12.5	▽▽
6.3	25	25	
12.5	50	50	▽
25	100	100	

- Examples of reading
  (i) When Ra = 1.6μm ➡ 1.6μm Ra
  (ii) When Rz = 6.3μm ➡ 6.3μm Rz
  (iii) When Rz_{JIS} = 6.3μm ➡ 6.3μm Rz_{JIS}

※The finishing symbols (triangle symbol ▽ and symbol ~) are no longer used in JIS pursuant to the 1994 revision.

JIS B0601 (1982) JIS B0031 (1982)	JIS B0601 (1970) JIS B0031 (1970)	JIS B0601 (1970)
No filter, analog signal	No filter, analog signal	No filter, analog signal
One standard length	One standard length	One standard length
Rmax	Rmax (S indication)	Hmax (S)
Rz	Rz (Z indication)	—
2RC, short wavelength cut-off λc	2RC, short wavelength cut-off λc	—
One measured length ≧ 3λc	One measured length ≧ 3λc	—
—	—	—
0.8μm or less	0.8μm or less	Select from 0.3, 1, 3, 5 and 10mm
0.8 ~ 6.3μm	0.8 ~ 6.3μm	Select from 0.3, 1, 3, 5 and 10mm
6.3 ~ 25μm	6.3 ~ 25μm	Select from 0.3, 1, 3, 5 and 10mm
Rmax = 1.6 Rmax = 0.8	Surface symbol or triangle symbol 1.6S 0.25 Upper limit 0.8S 0.25 Lower limit	Triangle symbol 0.8S or less ▽▽▽ 1.5S ~ 6S ▽▽ 12S ~ 25S ▽ 35S or higher
—	—	—
Ra	Ra ("a" indication)	—
—	—	—
—	—	—
Ra shall be 12.5μm or less.	λc shall be 0.8 mm.	—
12.5 ~ 100μm	—	—
3.2 1.6	Surface symbol or triangle symbol 0.2a or less ▽▽▽ 0.4a ~ 1.6a ▽▽ 3.2a ~ 6.3a ▽ 12.5a to 25a or more	—

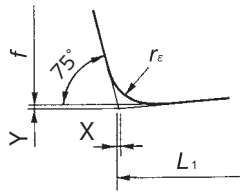
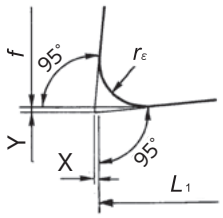
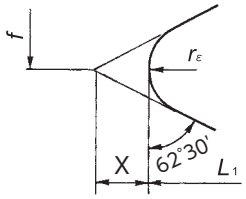
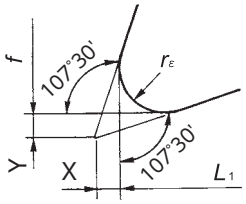
Obtaining the surface roughness

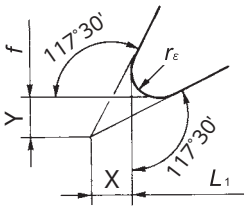
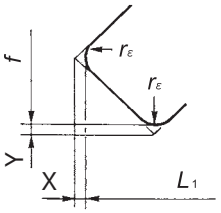
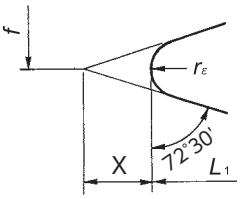
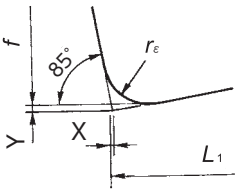
Type	New symbol JIS B0601:'01	Old symbol JIS B0601:'94	Calculation	Obtaining method (example)
Max. height (Peak)	Rz	Ry	The addition of the max. value for the depth Rv and the max. height Rp on the roughness curve for the reference length: $Rz = Rp + Rv$	
Average roughness of 10 points	Rz_{JIS}	Rz	The addition of the average of the maximum to fifth highest vales and the average of the deepest to the fifth deepest values on the roughness curve for the reference length: $Rz_{JIS} = \frac{(Yp1+Yp2+Yp3+Yp4+Yp5)+(Yv1+Yv2+Yv3+Yv4+Yv5)}{5}$	
Arithmetic average of roughness	Ra	Ra	The average of absolute values on the roughness curve f (x) for the reference length: $Ra = \frac{1}{\ell}\int_0^{\ell}\{f(x)\}$	

Conditions for measuring R parameters

Non-cyclic wave form (random wave form)		Settings for measuring	
Range of Ra (μm)	Range of Rz (μm)	Reference length ℓr (mm) = cut-off λc (mm)	Evaluated length ℓn (mm) = ℓr × 5
0.006 < Ra ≦ 0.2	0.025 < Rz ≦ 0.1	0.08	0.4
0.02 < Ra ≦ 0.1	0.1 < Rz ≦ 0.5	0.25	1.25
0.1 < Ra ≦ 2	0.5 < Rz ≦ 10	0.8	4
2 < Ra ≦ 10	10 < Rz ≦ 50	2.5	12.5
10 < Ra ≦ 80	50 < Rz ≦ 200	8	40

Cutting edge positional dimension list for each nose radius

Edge code	Shape of the edge	Dimensions (mm) r_ε	X	Y
K	80 degree rhombic insert (100° corner) 	0.4	0.007	0.028
		0.8	0.015	0.055
		1.2	0.022	0.083
		1.6	0.029	0.110
		2.4	0.044	0.165
L	80 degree rhombic insert [Type 31] 	0.4	0.040	0.040
		0.8	0.079	0.079
		1.2	0.119	0.119
		1.6	0.159	0.159
		2.4	0.238	0.238
P	55 degree rhombic insert 	0.4	0.463	—
		0.8	0.925	—
		1.2	1.389	—
		1.6	1.851	—
		2.4	2.776	—
Q	55 degree rhombic insert 	0.4	0.211	0.211
		0.8	0.422	0.422
		1.2	0.633	0.633
		1.6	0.844	0.844
		2.4	1.265	1.265

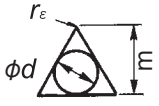
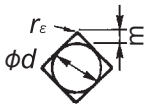
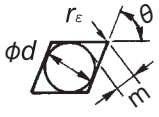
Edge code	Shape of the edge	Dimensions (mm) r_ε	X	Y
Q	35 degree rhombic insert 	0.4	0.537	0.537
		0.8	1.073	1.073
		1.2	1.610	1.610
		1.6	2.146	2.146
		2.4	3.218	3.218
S	Square insert [Type 12] 	0.4	0.164	0.164
		0.8	0.329	0.329
		1.2	0.493	0.493
		1.6	0.658	0.658
		2.4	0.986	0.986
V	35 degree rhombic insert 	0.4	0.923	—
		0.8	1.846	—
		1.2	2.769	—
		1.6	3.692	—
		2.4	5.538	—
Y	Square insert [Type 17] 	0.4	0.003	0.033
		0.8	0.006	0.066
		1.2	0.009	0.099
		1.6	0.012	0.132
		2.4	0.017	0.132

※The above values of X and Y in this list are based on a rake angle of 0 degrees. Therefore, these values slightly differ from actual ones.
"[Type _ _]" denotes the type number of a standard C-type holder.

Determining the position of the insert nose

Calculating the position of the nose

(mm)

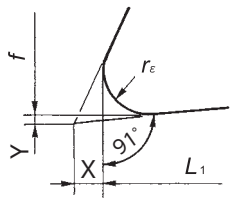
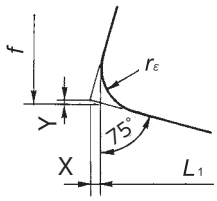
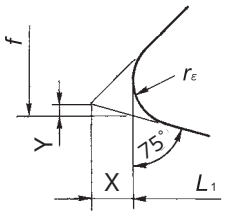
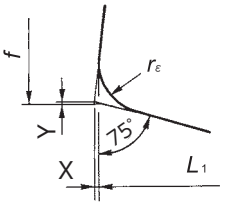
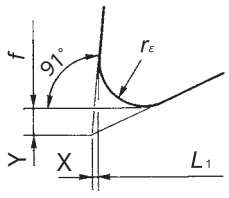
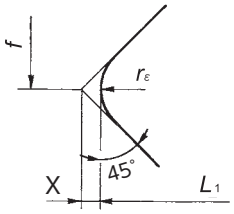
Shape	Calculation expression
Triangular 	$m=\frac{3}{2}d-r_\varepsilon$
Square 	$m=(\sqrt{2}-1)\times\left(\frac{d}{2}-r_\varepsilon\right)$
Rhombic 	$m=\left(\frac{1}{\sin\frac{\theta}{2}}-1\right)\times\left(\frac{d}{2}-r_\varepsilon\right)$

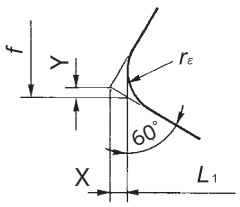
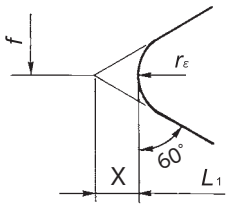
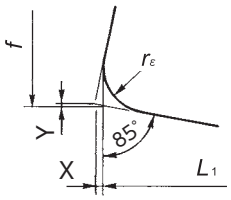
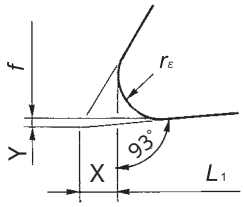
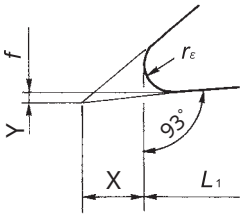
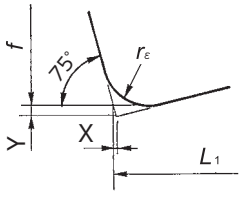
Values of "ϕd" and "r_ε" used to calculate "m"

(mm)

Inscribed circle code		Calculation value (ϕd)
—	5	3.97
—	6	4.76
—	7	5.56
2	8	6.35
—	0	7.94
3	—	9.525
4	—	12.70
5	—	15.875
6	—	19.05
8	—	25.40

Nose code	Nominal value	Calculation value (r_ε)
Y	0.2	0.2032
1	0.4	0.3969
2	0.8	0.7938
3	1.2	1.1906
4	1.6	1.5875
6	2.4	2.3812

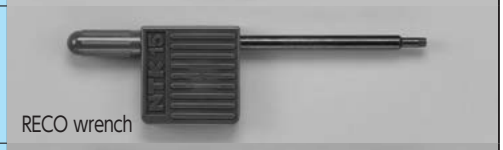
Edge code	Shape of the edge	Dimensions (mm)		
		r_ε	X	Y
A (G)	Triangular insert [Type 21, 22] 	0.4	0.283	0.012
		0.8	0.567	0.024
		1.2	0.850	0.036
		1.6	1.134	0.048
		2.4	1.701	0.072
B (R)	Square insert [Type 11, 16] 	0.4	0.089	0.024
		0.8	0.178	0.048
		1.2	0.268	0.072
		1.6	0.357	0.096
		2.4	0.535	0.143
	Triangular insert [Type 23] 	0.4	0.370	0.099
		0.8	0.740	0.198
		1.2	1.110	0.297
		1.6	1.480	0.397
		2.4	2.219	0.595
	80 degree rhombic insert 	0.4	0.028	0.007
		0.8	0.055	0.015
		1.2	0.083	0.022
		1.6	0.110	0.029
		2.4	0.165	0.044
C (F)	Triangular insert [Type 25] 	0.4	0.012	0.283
		0.8	0.024	0.567
		1.2	0.036	0.850
		1.6	0.048	1.134
		2.4	0.072	1.701
D	Square insert [Type 14] 	0.4	0.164	—
		0.8	0.329	—
		1.2	0.493	—
		1.6	0.658	—
		2.4	0.986	—

Edge code	Shape of the edge	Dimensions (mm)		
		r_ε	X	Y
E (T)	Square insert [Type 13] 	0.4	0.145	0.043
		0.8	0.291	0.084
		1.2	0.436	0.168
		1.6	0.581	0.252
		2.4	0.872	0.503
	Triangular insert [Type 24] 	0.4	0.397	—
		0.8	0.794	—
		1.2	1.191	—
		1.6	1.587	—
		2.4	2.381	—
H	Square insert 	0.4	0.033	0.003
		0.8	0.066	0.006
		1.2	0.099	0.009
		1.6	0.132	0.012
		2.4	0.089	0.017
J	55 degree rhombic insert 	0.4	0.344	0.039
		0.8	0.687	0.079
		1.2	1.031	0.118
		1.6	1.375	0.157
		2.4	2.062	0.236
	35 degree rhombic insert 	0.4	0.839	0.065
		0.8	1.679	0.131
		1.2	2.518	0.196
		1.6	3.357	0.261
		2.4	5.036	0.392
K	Square insert [Type 15] 	0.4	0.024	0.089
		0.8	0.048	0.178
		1.2	0.072	0.268
		1.6	0.096	0.357
		2.4	0.143	0.535

Wrench specifications

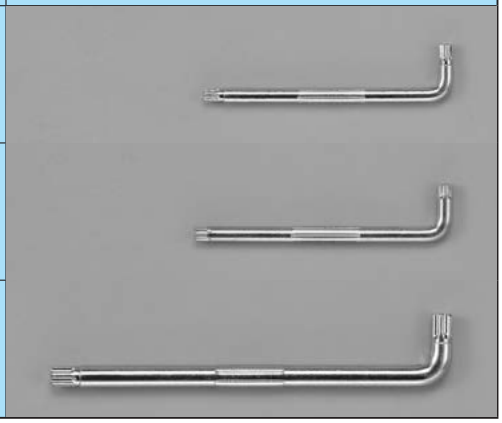
◆The wrenches below among L-shaped wrenches can be supplied as options.

Standard part

Part No.	Shape
CLR-13S Previous P/N RLR-13S	RECO wrench
CLR-15S Previous P/N RLR-15S	 RECO wrench
RLR-20S	
LLR-25S	
LLR-25S-20＊65	
LLR-28S	

Optional part

〈LLR type〉

Part No.	Shape
LLR-13S	
LLR-15S	
LLR-20S	

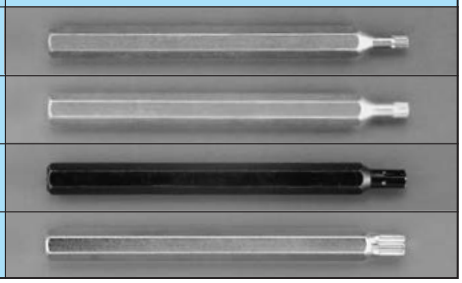
● RECO wrenches can be disassembled to dispose of each part separately.

※Do not disassemble except for disposal purpose.

◆To further improve your operation, screwdriver-type wrenches are also available.

〈Screwdriver type〉

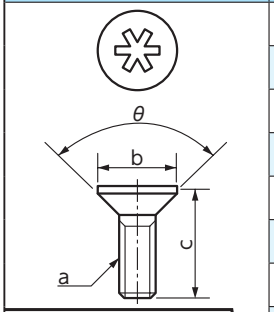
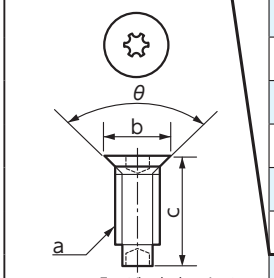
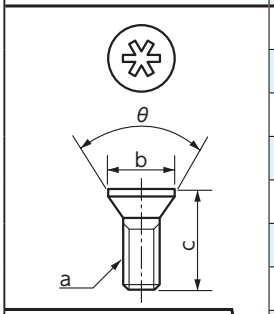
Part No.	Handle with magnet
XX2815-04	

Part No.	Changeable bits
HLR-13S	
HLR-15S	
HLR-20S	
HLR-25S	

〈Combinations and the part numbers〉

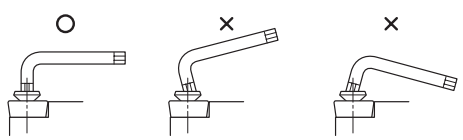
Part No.	Description
XX2815-04-13S	Handle with bit (HLR-13S)
XX2815-04-15S	Handle with bit (HLR-15S)
XX2815-04-20S	Handle with bit (HLR-20S)
XX2815-04-25S	Handle with bit (HLR-25S)

List of screws and wrenches for screw type holders

Clamping screw				Dimensions (mm)			Angle (degrees)	Standard wrench		
Shape	Code	Part No.	Stock	a	b	c	θ	Code	Part No.	Stock
	5704739	**LR-S-2*3.5**	○	M2×P0.4	3.1	3.5	82	5681994	**CLR-13S**	●
	5907704	**LR-S-2*3.7**	●	M2×P0.4	3.1	3.7	82			
	5907712	**LR-S-2*4.4**	●	M2×P0.4	3.1	4.4	82			
	5907720	**LR-S-2*5.5**	●	M2×P0.4	3.0	5.5	90			
	5907738	**LR-S-2.5*4.8**	●	M2.5×P0.45	3.6	4.8	82	5681978	**CLR-15S**	●
	5704747	**LR-S-2.5*5.5**	○	M2.5×P0.45	3.6	5.5	82			
	5907746	**LR-S-2.5*6**	●	M2.5×P0.45	3.5	6.0	90			
	5907753	**LR-S-2.5*6.8**	●	M2.5×P0.45	3.5	6.8	90			
	5773619	**LR-S-3*5.8**	○	M3×P0.5	4.1	5.8	90	5485164	**RLR-20S**	●
	5907761	**LR-S-3*6.2**	●	M3×P0.5	5.2	6.2	82			
	5907779	**LR-S-3*7.8**	●	M3×P0.5	4.0	7.8	90			
	5907787	**LR-S-4*5.8**	●	M4×P0.7	5.8	6.0	82			
	5907795	**LR-S-4*9**	○	M4×P0.7	5.8	9.0	82			
Front/back clamping type	5116991	**LR-S-4*10PW**	●	M4×P0.7	5.8	10.0	90	5681978	**CLR-15S**	●
	5534029	**LRIS-2*6**	○	M2×P0.4	2.6	6.0	60	5681994	**CLR-13S**	●
	5907803	**LRIS-2.2*6**	●	M2.2×P0.45	3.15	6.0	60			
	5989181	**LRIS-2.5*5**	●	M2.5×P0.45	3.6	5.0	60	5681978	**CLR-15S**	●
	5907811	**LRIS-2.5*7**	●	M2.5×P0.45	3.6	7.0	60			
	5907829	**LRIS-3*6**	○	M3×P0.5	4.0	6.0	60	5485164	**RLR-20S**	●
	5428156	**LRIS-3*8**	●	M3×P0.5	4.2	8.0	60			
	5477328	**LRIS-4*5**	●	M4×P0.7	5.85	5.0	60	5364930 5794698	**LLR-25S** **LLR-25S-20*65**	● ●
	5907837	**LRIS-4*6**	○	M4×P0.7	5.85	6.0	60			
	5977566	**LRIS-4*8**	●	M4×P0.7	5.85	8.0	60			
	5907845	**LRIS-4*10**	●	M4×P0.7	5.85	10.0	60			
	5684105	**LRIS-4*12**	●	M4×P0.7	5.85	12.0	60			
	5907852	**LRIS-5*10**	○	M5×P0.8	7.0	9.5	60	5364948	**LLR-28S**	●
front/back clamping type	5116983	**LRIS-4*10PW**	●	M4×P0.7	5.7	10.0	60	5681978	**CLR-15S**	●
	5090576	**LRIS-4*12PW**	●	M4×P0.7	5.7	12.0	60			

Cautions to be observed during the tightening process

- Before starting tightening, make sure there is no deformation at the tip end portion of the wrench and the wrench hole of the screw.
- The wrench should be vertically aligned to the screw before it is tightened, as shown below.



- Please exercise precautions because a clamping torque exceeding the guaranteed torque may result in breakage of the wrench.

※Please order wrenches and bits by the unit of 5.
※Please order clamping screws by the unit of 10.

Guaranteed tightening torque of the wrench

Wrench/bit P/N	Guaranteed tightening torque (N·m)
CLR LLR HLR **13S**	0.7
〃 **15S**	1.4
RLR LLR HLR **20S**	3.0
LLR HLR **25S**	5.0
〃 **28S**	7.0

Materials and grade comparison table by cutting tool manufacturer

CBN

Classification	NTK	Sumitomo	Tungalloy	Mitsubishi materials	Kyocera
K (for cast iron)	B16 B23 B30	BN500 BN600 BN700 BNS800	BX930 BX950 BX90S BXC90	MB710 MB730 MBS140	KBN900 KBN60M
H (for hardened materials)	B52 B36 B40	BNX10 BNC80 BNC160 BNC200 BN250 BNX10 BNX20 BNC300 BN300 BNX25	BX310 BXC30 BX330 BXC50 BXA30 BXA40 BX360 BX380 BX530	MBC010 MBC020 MB810 MB825 MB8025 MB835 MB820	KBN510 KBN10C KBN10M KBN25C KBN525 KBN900 KBN25M KBN25C KBN05M KBN30M KBN35M

Ceramic

Classification	NTK	Sumitomo	Tungalloy	Kyocera	Nippon Tungsten
K (for cast iron)	HC1 HW2 SE1 HC2 HC6 HC7 ZC7 WA1 SX6 SX9 SP9	NB90S NB90M NS260C NS260 WX120	LX11 LX21 WG300 FX105 CX710	KA30 A65 A66N PT600M KT66 KS6000	NPC-H2 NPC-A2 NX NXA Whiskal Win
S (for heat-resistant alloy)	WA1 SX9 WA5 SX7	WX120	WG300		Whiskal Win
H (for hardened materials)	HC4 HC7 ZC7 WA1 WA5	NB100C	LX11	A65 A66N KT66 PT600T	NPC-A2 Win

Cermet

Classification	NTK	Sumitomo	Tungalloy	Mitsubishi materials	Kyocera
P (for steel)	T15 Z15 Q15 C7X C7Z N40	T110A T2000Z T1200A T3000Z T250A	NS520 GT720 NS710 NS720 AT530 NS730 NS530 GT530 GT730 GT520 NS740	NX2525 AP25N NX3035 UP35N NX4545 VP45N	TN30 PV30 TN60 TN6010 PV60 TN6020 TN90 PV7020 PV90 PV7010 TN100M
M (for stainless steel)	T15 C7X N40	T110A T2000Z T1200A T3000Z T250A	NS520 GT720 AT530 GT730 GT530 NS530 NS730 NS740	NX2525 AP25N NX3035 NX4545	TN60 TN6020 PV60 PV7020 TN90 TN100M PV90
K (for cast iron)	T15	T110A T2000Z T1200A	NS520 AT520 NS530 GT720 GT520 GT730 NS730 GT530	NX1010 NX2525 AP25N	TN30 TN6010 PV30 TN6020 TN60 PV7005 PV60 PV7020

PVD-coated materials

Classification	NTK	Sumitomo	Tungalloy	Mitsubishi materials	Kyocera	Sandvik
P (for steel)	TM1 VM1 ZM3 DT4 QM3 DM4 TM4	AC530U ACZ150 ACZ310 AC520U ACZ330 ACP200 ACP300	AH710 GH330 AH730 AH140 AH120 AH740	VP10MF VP20MF VP15TF UP20M VP20RT VP30RT	PR915 PR1005 PR930 PR1025 PR1115 PR1225	GC1010 GC2145 GC1020 GC4125 GC1025 GC1120 GC1030 GC1125
M (for stainless steel)	TM1 VM1 DT4 DM4 ZM3 QM3 TM4	AC510U AC520U AC530U ACZ150 EH150Z EH520Z ACP200 ACP300	AH710 GH330 GH730 SH730 AH730 AH120 AH140	VP10MF VP20MF VP15TF UP20M	PR915 PR1025 PR1225 PR930 PR1125	GC1005 GC1105 GC1020 GC2030 GC1025 GC4125 GC1120 GC1125 GC2035 GC2145
K (for cast iron)	DM4 QM3	EH10Z EH20Z ACZ310 EH510Z AC510U ACK300	AH110 GH110 AH120	VP05RT VP10RT VP15TF	PR905	GC1010 GC1020 GC1120 GC1425

CVD-coated materials

Classification	NTK	Sumitomo	Tungalloy	Mitsubishi materials	Kyocera	Sandvik
P (for steel)	CP5 CP7	AC700G AC820P AC2000 AC830P AC3000 AC630M	T9005 T9015 T9025 T9035 T3130	UE6005 UE6110 UE6010 UC6010 UE6020 F7030 UH6400 UE6035	CA5505 CA5515 CA5025 CA5525 CR9025 CA5535	GC4205 GC4215 GC3115 GC4225 GC4220 GC2015 GC1515 GC1515 GC4235 GC4230 GC2025 GC2135 GC235
M (for stainless steel)	CP5	AC610M AC630M	T9015 T3130 T6020 T9025 T6030	US7020 UC7020 F7030 US735	CA6515 CA6525	GC2015 GC2025 GC2040 GC2135 GC235
K (for cast iron)	CP1 CP5	AC410K AC300G AC700G AC820P	T5010 T5105 T5020 T1015 T5115 T5125	UC5115 UC5005 UE6010	CA4010 CA5505 CA4115 CA4120	GC3205 GC3210 GC3205 GC3210 GC3115 GC3215 K20W K20D K15W GC3040

The data above is based on estimations from the respective competitors' catalogs and other documents. Therefore, the listed data is not always the latest data nor was it approved by these manufacturers.

Corresponding table for metal materials and symbols

ISO	Country / Standard	Japan JIS	U.S.A. AISI / SAE	Germany DIN
M Stainless steel		**Ferrite/Martensite**		
		SUS403	403	X6Cr13
				X7Cr14
		SUS416	416	X12CrS13
		SUS430	430	X6Cr17
		SUS410	410	X10Cr13
		SUS420J2		X46Cr13
			405	X6CrAL13
			420	X20Cr13
		SUS431	431	X19CrNi17-2
		SUS430F	430F	X14CrMoS17
		SUS434	434	X6CrMoS17-2
		SCS5	CA6-	X3CrNiMo13-4
		SUS405	405	X10CrAL13
		SUH4	HNV6	X85CrMoV18-2
		SUH446	446	X10CrAL2-4
		SUH35,SUH36	EV8	X53CrMnNiN21-9
			S44400	X1CrMoTi18-2
				X20CrMoV12-1
			630	X5CrNiCuNb16-4
		Austenite		
			304L	X2CrNi19-11
		SUS304	304	X5CrNi18-10
		SUS303	303	X8CrNiS18-9
		SUS304L		
		SCS19	304L	X2CrNi19-11
		SUS301	301	X9CrNi18-8
		SUS304LN	304LN	X2CrNi18-10
		SUS316	316	X5CrNiMo17-2-2
		SUS316LN	316LN	X2CrNiMoN17-13-3
			316L	X2CrNiMoN17-12-2
		SCS16	316L	X2CrNiMo18-14-3
		SUS316L		
		SUS317L	317L	X2CrNiMo18-15-4
			UNS	X1NiCrMoCu25-20-5
			V 0890A	
		SUS321	321	X6CrNiTi18-10
		SUS347	347	X10CrNiNb18-10
			316Ti	X6CrNiMoTi17-12-2
			318	X10CrNiMoNb 18-12
		SUH309	309	X15CrNiSi20-12
		SUH310	310S	X8CrNi25-21
		SCS17	308	X2CrNiMoN17-11-2
			17-7PH	X7CrNiAL 17-7
			N08028	X1NiCrMoCu31-27-4
		Austenite/Ferrite (2 phase)		
			S31500	X2CrNiN23-4
			S32900	X8CrNiMo27-5
			S32304	X2CrNiN23-4
			S31803	X2CrNiMoN22-53
H Hardened material		SCr430H	5130H	34Cr4
		SCr435H	5135H	37Cr4
		SCM435H	4135H	34CrMo4
		SCM440H	4140H	42CrMo4

ISO	Country / Standard	Japan JIS	U.S.A. AISI / SAE	Germany DIN
K Castings		**Malleable cast iron**		
		FCMB310	–	–
		FCMW330	32510	EN-GJMB350-10
		FCMW370	40010	EN-GJMB450-6
		FCMW490	50005	EN-GJMB550-4
		FCMP540	70003	
		FCMP590	A220-70003	EN-GJMB650-2
		FCMP690	A220-80002	EN-GJMB700-2
		Grey cast iron		
		FC100	No 20 B	EN-GJL-100
		FC150	No 25 B	EN-GJL-150
		FC200	No 30 B	EN-GJL-200
		FD250	No 35 B	EN-GJL-250
		–	No 40 B	–
		FC300	No 45 B	EN-GJL-300
		FC350	No 50 B	EN-GJL-350
		–	No 55 B	EN-JLZ
		–	A436 Type 2	GGL-NiCr20-2
		Ductile cast iron		
		FCD400	60-40-18	EN-GJL-400-15
		–	–	EN-GJL-400-18-LT
		FCD500	80-55-06	EN-GJL-500-7
		–	A43D2	EN-GJSA-500
		FCD600	–	EN-GJS-600-3
		FCD700	100-70-03	EN-GJS-700-2
N Nonferrous materials		C4BS	SC64D	G-AlSi9MGWA
		AC4A	GD-AlSi12	G-ALMG5
		A5052	356.1	
		A6061	A413.0	GD-AlSi12
		A7075	A380.1	GD-AlSi8Cu3
		ADC12	A413.1	G-AlSi12(Cu)
			A413.2	G-AlSi12
			A360.2	G-AlSi10Mg(Cu)
S Heat-resistant alloy		**Heat-resistant alloy**		
		SUH330	330	X12NiCrSi36 16
		SCH15		G-X40NiCrSi36-18
			5390A	
			5666	NiCr22Mo9Nb
				NiCr20Ti
			5660	NiFe35Cr14MoTi
			5391	S-NiCr13A16MoNb
			5383	NiCr19Fe19NbMo
			4676	NiCu30AL3Ti
				NiCr20TiAk
			AMS 5399	NiCr19Co11MoTi
			AMS 5544	NiCr19Fe19NbMo
			AMS 5397	NiCo15Cr10MoAl
			5537C	CoCr20W15Ni
			AMS 5772	CoCr22W14Ni
		Titanium alloy		
			AMS R54520	TiAl5Sn2.5
			AMS R56400	TiAl6V4
			AMS R56401	TiAl6V4ELl
				TiAl4Mo4Sn4Si0.5

ISO	Country / Standard	Japan JIS	U.S.A. AISI / SAE	Germany DIN
P Steel		**Carbon steel**		
		STKM12A;C	A570.36	S235JRG2
			1115	GC16E
			A573-8165	S235J2G3
			1015	C15
			1020	C22
		SUM22	1213	11SMn30
		SUM22L	12L13	11SMnPb30
				10SPb20
			1215	11SMn37
			12L14	11SMnPb37
		S15C	1015	Ck15E
		S25C	1025	Ck25E
			A572-60	S380N
			A572-60	17MnV7
			1035	C35
			1045	C45
			1040	35S20
			1039	40Mn4
		SMn438(H)	1335	36Mn5
		SCMn1	1330	28Mn6
		S35C	1035	C35G
		S45C	1045	C45E
		S50C	1050	C53G
			1055	C55
			1060	C60E
		S55C	1055	C55E
		S58C	1060	C60E
			1095	C101E
		SK3	W1	C101u
		SUP4	W210	C105W1
		High alloy steel		
			ASTMA353	X8Ni9
			2515	12Ni19
				14NiCrMo13
		SKD1	D3	X210Cr12
		SKD61	H13	X40CrMo134
		SKD12	A2	X100CrMoV51
		SKD2		X210CrW12
			S1	45WCrV7
		SKD5	H21	X30WCrV93
				X30WCrV9
				X165CrMoV12
		SUH1	HW3	X45GrSi93
		SUH3	D3	S6-5-2
		SKH51	M2	S6-5-2
		SKH55	M35	S6-5-2-5
			M7	S6-9-2
			HNV3	X210Cr12G

ISO	Country / Standard	Japan JIS	U.S.A. AISI / SAE	Germany DIN
P Steel		**Low alloy steel**		
		SM400A;B;C	A573-81	S275J2G3
		SM490A;B;C;YA;YB		S355J2G3+C2
			5120	DS355J2G3
			9255	55Si7
			9262	S340MGC
		SUJ2	52100	100Cr6
			ASTM	16Mo3
			4520	16Mo5
			ASTM	14Ni6
		SNCM220(H)	8620	21NiCrMo2
		SNCM240	8740	40NiCrMo22
				17CrNiMo6
		SCr415(H)	5015	15Cr3
		SCr440	5140	42Cr4
		SUP9(A)	5155	55Cr3
		SCM415(H)		15CrMo5
		SNCM240	8740	40NiCrMo8-4
		SCr415(H)	5015	15Cr3
			ASTMA182	13CrMo5
			ASTMA182	13CrMo4-5
				14MoV63
				31CrMo12
				39CrMoV13
			L1	41CrS4
			8620	22Mo4
				50CoMo4
				16MnCr5
				31NiCrMo14
			L6	50NiCr13
		SNC236	3135	36NiCr6
		SNC415(H)	3415	14NiCr10
		SNC815(H)	3415;3310	14NiCr14
			9255	
			9840	36CrNiMo4
			4340	34CrNiMo6
		SCr430(H)	5132	34Cr4
		SCr440(H)	5140	41Cr4
			5115	16MnCr5
		SCM420;SCM430	4130	25CrMo4
		SCM432;SCCRM3	4137;4135	34CrMo4
		SCM440	4140;4142	41CrMo4
		SCM440(H)	4140	42CrMo4
				32CrMo12
		SUP10	6150	51CrV4
				41CrMo7
			L3	100Cr6
		SKS31		105WCr6
		SKS2,SKS3		
		SKT4	L6	55NiCrMoV6
		Cast steel		
		SEMnH1		
		SCMnH/1		G-X120Mn12

Ordinary Tolerances for Shape and Position Accuracy (Machining)

(Excerpted from JIS B 0419-1991)

No.	Drawing symbol	Type	Ordinary tolerance (machining)	Remarks
1	—	Linearity	0.05/500	Does not apply to thin items where L/t≧20.
2	▱	Flatness	0.10/500	Does not apply to thin items where L/t≧20.
3	○	Roundness	0.05 up to ϕ500 0.10 for ϕ500 or more	Does not apply to thin items where D/t≧10 mp. Does not apply to drill holes.
4	⌭	Cylindricity	0.20/300	Does not apply to thin items where D/t≧10 mp. Does not apply to drill holes.
5	⌒	Profile of a line	0.5	Includes slotter machining with marking standard
6	⌓	Profile of a plane	0.5	Includes slotter machining with marking standard
7	//	Parallelism	0.20/300	Includes slotter machining with marking standard Does not apply to machining of drill holes or tap holes
8	⊥	Perpendicularity	0.20/300	Includes slotter machining with marking standard Does not apply to machining of drill holes or tap holes
9	∠	Gradient	1.0/100	Equivalent to ordinary angle tolerance (±0.5°)
10	⌖	Position	ϕ1.0/300	Includes drill holes and tap holes with marking standard
11	◎	Concentricity	0.1	Applies to lathe turning and boring. Does not apply to drill and tap holes.
12	⌯	Symmetry	0.3/300	Includes machining with marking standard.
13	↗	Run out	0.3	
14	⌭	Level difference	0.1	
15	⌒	Waviness	0.1	Measurement length shall be 80 mm or less.

Notes : (1)*This indicates the accuracy which is ordinarily expected when a shape tolerance is not otherwise indicated in the drawing. The tolerance value does not simply indicate the machine tool accuracy. It has been set to 2 - 3 times the machine tool accuracy with consideration for machining warp, heat deformation, marking accuracy, and other factors.
(2)As a general rule, applies to finished surfaces of ▽▽ or more, and does not apply to parts which are welded or heat treated after machining.
(3)The subject dimension ranges are diameter 50 – 1000 mm and length 50 – 5000 mm.
(4)If the part dimensions exceed the standard dimensions (for example 500 mm for diameter), in general a multiplier of (Part dimension / Standard dimension) is applied to the value of the ordinary tolerance. However if the part dimension is smaller than the standard dimensions, the value in the above table is used without correction.

Ordinary dimension tolerances

(Excerpted from JIS B 0405-1991)

Type	Tolerance grade		Standard dimensions category and tolerance (units:mm)							
	Symbol	Explanation	0.5 to 3(1)	More than 3 to 6	More than 6 to 30	More than 30 to 120	More than 120 to 400	More than 400 to 1000	More than 1000 to 2000	More than 2000 to 4000
			Tolerance							
Tolerance for length dimensions (except chamfered parts)	f	Fine	±0.05	±0.05	±0.1	±0.15	±0.2	±0.3	±0.5	—
	m	Medium	±0.1	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2
	c	Coarse	±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3	±4
	v	Very coarse	—	±0.5	±1	±1.5	±2.5	±4	±6	±8
Tolerance for length dimensions of chamfered parts	f	Fine	±0.2	±0.5	±1					
	m	Medium								
	c	Coarse	±0.4	±1	±2					
	v	Very coarse								

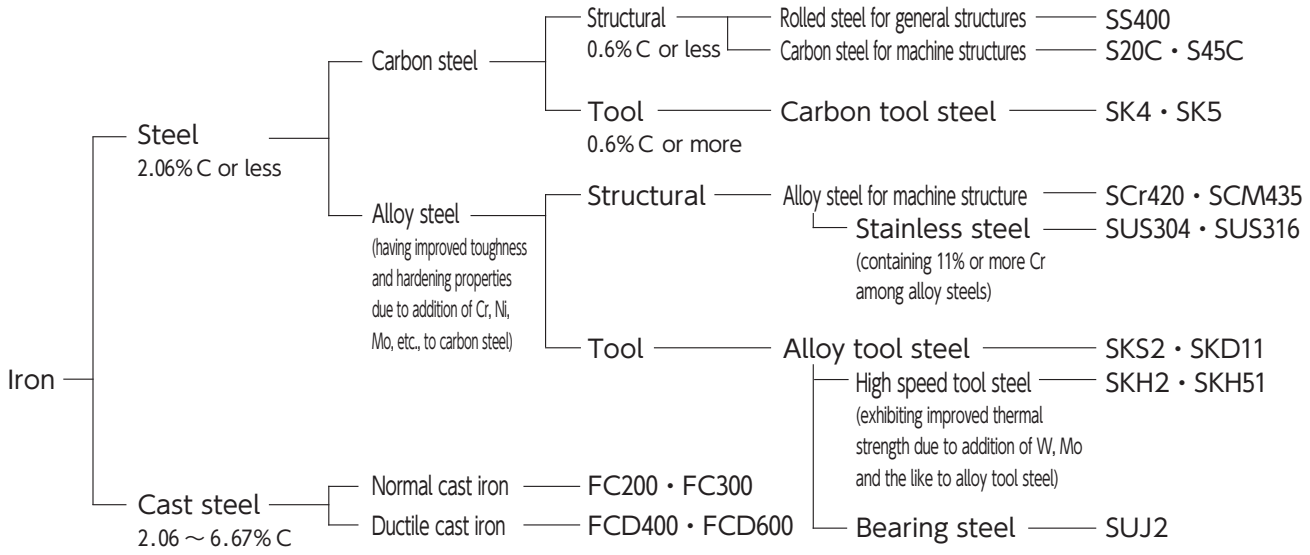
Tolerance for angles	Tolerance grade		Length category of shorter edge of subject angle (units:mm)				
	Symbol	Explanation	10 or smaller	More than 10 to 50	More than 50 to 120	More than 120 to 400	More than 400
			Tolerance				
	f	Fine	±1°	±30'	±20'	±10'	±5'
	m	Medium					
	c	Coarse	±1° 30'	±1°	±30'	±15'	±10'
	v	Very coarse	±3°	±2°	±1°	±30'	±20'

Note(1) : For standard dimensions smaller than 0.5mm, the tolerance shall be indicated individually following each standard dimension.

Useful tips

Classification of iron

Iron and carbon Iron contains carbon (C) which is the hard and basic element making up diamond. The higher the content of carbon in the iron becomes, the harder the iron gets while the lower the carbon content, the softer and tougher the iron becomes. In this way, the characteristics of iron change greatly depending on the content of carbon in it.



Standards for carbon steels

Generally, carbon steel containing 0.6%C or less carbon is used as structural materials while that containing 0.6%C or higher carbon is used as materials for tools. Therefore, it is largely categorized into structural carbon steel and tool carbon steel based on the applications as follows:

Example of symbol	Steel type		Typical steel code	Application
0.6%C or less	Structural	Rolled steel for general structures	SS400	Used as structural materials for buildings, bridges, ships, railway vehicles and other structures
		Carbon steel for machine structures	S30C	Used as structural materials for machines and equipment including shafts and gears, with higher reliability than the above steel for general structures
0.6%C or higher	Tool	Carbon steel for tools	SK1	High-carbon steel with less impurities; The steels with lower carbon content is used for pressing and stamping dies while those with higher carbon content are used for cutting tools including bits and blades.

○Material designation code for rolled steel for general structures

(Example) S S 400 — Minimum tensile strength (N/mm²)

Capital letter of Steel

Symbol indicating the application (Structural)

○Material designation code for carbon steel for machine structures

(Example) S 30 C — Indicates the element symbol (Carbon)

Capital letter of Steel

Value indicating the product of typical carbon content (percentage) multiplied by 100

○Material designation code for carbon steel for tools

(Example) S K 1 — The 7-scale number indicating a standardized carbon content ranging from 1.5% to 0.6%; the smaller the number, the higher the carbon content.

Capital letter of Steel

The symbol indicating the tool steel

Standards for alloy steels

Steel type	Element added to carbon steel and its content(%)			Feature	Application
	Ni (Nickel)	Cr (Chromium)	Mo (Molybdenum)		
Chromium steel (SCr)	—	0.9 ~ 1.2	—	Has better quenching characteristics in addition to improved mechanical properties through tempering; The toughness further improves when quickly cooled during tempering. The tensile strength is 800 N/㎟ or higher.	Bolts, shafts, keys
Cr-Mo steel (SCM)	—	0.9 ~ 1.5	0.15 ~ 0.3	An alloy steel for which lowering the hardness by quenching and tempering has been improved; easily processed at high temperature and highly weldable and malleable. The tensile strength is 850 N/㎟ or higher.	Bolt, shafts, pins, gears and fittings
Ni-Cr steel (SNC)	1.0 ~ 3.5	0.5 ~ 1.0	—	Improved toughness due to the addition of Ni and better in quenching characteristics due to Cr. Quickly cooled to avoid brittleness, instead of gradual cooling. The tensile strength is 750 N/㎟.	Bolts, pins, shafts, gears and crank shafts
Ni-Cr-Mo steel (SNCM)	0.4 ~ 3.5	0.4 ~ 3.5	0.15 ~ 0.7	Exhibits better quenching characteristics because of the addition of Mo to Ni-Cr steel. High in toughness as brittleness caused by tempering has been improved. The tensile strength is 850 N/㎟.	Shafts, gears, crank shafts and vanes/ blades of turbines

○Material designation code for alloy steel for machine structures

(Example) S CM 4 20 H
- S — Capital letter of Steel
- CM — Symbols of major elements added
- 4 — Code indicating the content of major elements added
- 20 — Typical value of carbon content
- H — Denotes quenching guaranteed.

Standards for stainless steels

Stainless steel is actually corroded !

Though the name, stainless steel, means free of rusty stains, the surface of stainless steel is covered with a substance chromium dioxide (Cr_2O_2), which means it is actually corroded Stainless steel always contains 11% or more chromium, which is necessary to cover the material entirely.

	Base	Structure	Suffix following SUS	Feature	Application
Chromium alloy steel	Ferrite	18Cr	430	A general-purpose steel type excellent in corrosion resistance	Building interior and home tools/appliances
	Martensite	18Cr-1C	440C	The hardest of all the stainless steels and heat-resistant steels	Nozzles, bearings
Cr-Ni alloy steel	Austenite	18Cr-8Ni	304	The most frequently used type as stainless steel and heat-resistant steel	Food-related equipment, nuclear power-related and general chemical facilities
		18Cr-12Ni -2.5Mo	316	More resistant to various substances including sea water than SUS304	For materials required to be resistant to pitting corrosion

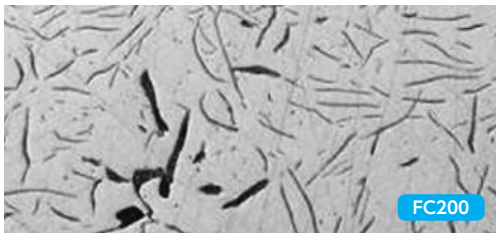
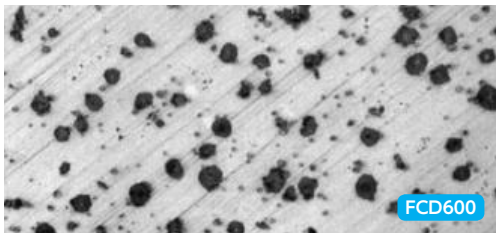
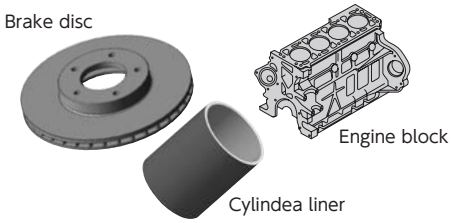
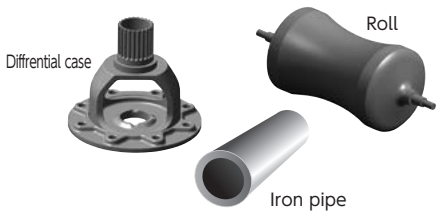
○Material designation code for stainless steel SUS4

(Example) SUS 4 10 L-B — Shape (Bar)
- SUS — Code indicating stainless steel
- 4 — Alloy type
  - 2 Cr-Ni-Mn alloys
  - 3 Cr-Ni alloys
  - 4 Chromium alloys
  - 5 Alloy s containing 5% of chromium
  - 6 High-temperature, high-strength alloys
- 10 — There are no coding rules for these two digits.
- L-B — Symbol indicating property or element added
  - L Least carbon
  - S Low carbon
  - F Free-cutting steel
  - Se Se added
  - N Nitride added
  - A,B,C High in carbon content in this order among the similar types
  - J Japan-specific steel type
  - XM Steel type similar to U.S. standard

Standard for cast irons

Cast iron is an alloy containing carbon and silicon as the major components, iron is called cast iron when the carbon content is 2.06% or higher. The cast iron is categorized into gray cast iron, ductile cast iron, malleable cast iron, special cast iron and so on depending on the content ratio of such component elements. Cast iron is a collective name for these. Generally, cast iron means gray cast iron as it is most widely used.

Outline

	Gray cast iron《FC》	Ductile cast iron《FCD》
Structure		
Feature	As the graphite shape looks like a thin flower-petal like flake, this iron is called "flake graphite cast iron." As it is excellent in damping capacity, wear resistance and the likes, it is frequently used for abrasion resistant components including bearings, gears, and, brake discs.	As the graphite shape is spherical, this iron is called "spheroidal graphite cast iron." Since ductile cast iron has strength and toughness several times higher than gray cast iron, it is mostly used for automotive parts and iron pipes for which strength is especially required.
Codes categorized by JIS	FC100 ~ FC350	FCD300 ~ FCD800
Strength	Low	High
Brittleness	Brittle	Tough
Workabillity	Good	Poor
Damping capasity	High	Low
Shape of graphite	Flake graphite	Spheroidal graphite
Representative products		

Mechanical properties (The data below are excerpts from JIS G 5501 and G 5502.)

	Code	Tensile strength	Proof tress at 0.2%	Elongation	Brinell hardness
		N/㎟	N/㎟	%	HB
Gray cast iron	FC100	100 or higher	—	—	201 or lower
	FC150	150 or higher	—	—	212 or lower
	FC200	200 or higher	—	—	223 or lower
	FC250	250 or higher	—	—	241 or lower
	FC300	300 or higher	—	—	262 or lower
	FC350	350 or higher	—	—	277 or lower
Ductile cast iron	FCD350	350 or higher	220 or higher	22 or higher	150以下
	FCD400	400 or higher	250 or higher	18 or higher	130 ~ 180
	FCD450	450 or higher	280 or higher	10 or higher	140 ~ 210
	FCD500	500 or higher	320 or higher	7 or higher	150 ~ 230
	FCD600	600 or higher	370 or higher	3 or higher	170 ~ 270
	FCD700	700 or higher	420 or higher	2 or higher	180 ~ 300
	FCD800	800 or higher	480 or higher	2 or higher	200 ~ 330

Auto Lathe Machine List

Citizen Machinery Co., Ltd. (Citizen Machinery Miyano Co., Ltd.)

Cincom products

Machine name	Cutting tool shank (Gang) (Height × width × length)	No. of tools	Cutting tool shank (Turret) (Height × width × length)	No. of tools	Type of hand	Diameter of sleeve	Max. work diameter
A12	10×10×100	5			R	φ19.05/φ20	φ12
A16	10×10×100	5			R	φ19.05/φ20	φ16
A20	12(13)×12(13)×120※1	5～7			R	φ25.4	φ20
A25	12(13)×12(13)×120	5/6			R	φ25.4	φ25
A32	16×16×150				R	φ25.4	φ32
B12,B12E	10×10×100	5			R	φ19.05/φ20	φ12
B16E	10×10×10	5			R	φ19.05/φ20	φ16
B20	12(13)×12(13)×120	6			R	φ19.05/φ20	φ20
BL12	10×10×60～120	5			R	φ20(φ19.05)	φ12
BL20	12(13)×12(13)×120	7			R	φ20(φ19.05)	φ20
BL25	12(13)×12(13)×120	7			R	φ20(φ19.05)	φ25
C12	10×10×120	6			R	φ19.05	φ12
C16	10×10×120	6			R	φ19.05	φ16
C32	16×16×130	5			R	φ25.4	φ32
E32			16(19)×16(13)×90	20	R	φ25.4	φ32
F10			10×10×60	10	R	φ19.05	φ10
F12			10×10×60	10	R	φ19.05	φ12
F16			10×10×60	10	R	φ19.05	φ16
F20			16(19)×16(13)×90	10	R	φ25.4	φ20
F25			16(19)×16(13)×90	10	R	φ25.4	φ25
FL25			16×16×90	12	R	φ16	φ25
FL42			16×16×90	12	R	φ16	φ42
G10			10×10×60	8	R	–	φ10
G16			10×10×60	8	R	–	φ16
G32			16(19)×16(13)×90	10	R	–	φ32
K12,K12E	10×10×100	7			R	φ20	φ12
K16,K16E	12×12×100	6			R	φ20	φ16
L10	8×8×100～130	5			R	φ15.875	φ10
L12	10×10×10	6			R	φ19.05	φ20
L16,L16E	12(10)×12(10)×130	7			R	φ19.05	φ16
L20,L20E	12×12×130	7			R	φ19.05	φ20
L25	16×16×130	5			R	φ25.4	φ25
L32	16×16×130	5			R	φ25.4	φ32
$M_2$12,$M_3$12	10×10×120	5	10×10×60	10	R	φ19.05	φ12
$M_2$16,$M_3$16,$M_4$16	10×10×120	5	10×10×60	10	R	φ19.05	φ16
$M_2$20,$M_3$20	12×12×130	5	16×16×90	10	R	φ25.4	φ20
$M_2$32,$M_3$32,$M_4$32	16×16×130	5	16×16×90	10	R	φ25.4	φ32
M20	13(12)×13(12)×150		10×10×60	10	R	φ19.05	φ20
MSL12	10×10×120				R	–	φ12
R04	8×8×120	7			R	φ15.875	φ4
R07	8×8×120	5			R	φ15.875	φ7
RL02	16×16×60～150	max6※2			L	φ16/φ20	φ25
RL21	10(12)×10(12)×90				R	φ19.05	φ35

※1 : Tools with shank size of 16 x 16 x 120 as a set of 7 is also available
※2 : The total number including the sleeves; up to six tools available with the φ16 sleeve.

Miyano products

Machine name	Shank (Turret)	No. of tools 上/下	Type of hand	Diameter of sleeve	Max. work diameter
ABX-51TH3	20×20×100	12+12/12	R	ϕ25	ϕ51
ABX-64TH3	20×20×100	12+12/12	R	ϕ25	ϕ64
ABX-51THY	20×20×100	12+12/12	R	ϕ20、25、40	ϕ51
ABX-64THY	20×20×100	12+12/12	R	ϕ20、25、40	ϕ64
ABX-51SYY	20×20×100	12/12	R	ϕ20、25、40	ϕ51
ABX-64SYY	20×20×100	12/12	R	ϕ20、25、40	ϕ64
ABX-51SY	20×20×100	12/12	R	ϕ25	ϕ51
ABX-64SY	20×20×100	12/12	R	ϕ25	ϕ64
BNA-34C	20×20×100	8(16)/−	R	ϕ25	ϕ34
BNA-42C	20×20×100	8(16)/−	R	ϕ25	ϕ42
BNA-34S	20×20×100	8(16)/−	R	ϕ25	ϕ34
BNA-42S	20×20×100	8(16)/−	R	ϕ25	ϕ42
BNA-34DHY	20×20×100	8(16)/6	R	ϕ25	ϕ34
BNA-42DHY	20×20×100	8(16)/6	R	ϕ25	ϕ42
BNA-34MSY	20×20×100	8(16)/−	R	ϕ25	ϕ34
BNA-42MSY	20×20×100	8(16)/−	R	ϕ25	ϕ42
BNC-34C5	20×20×100	8/−	R	ϕ25	ϕ34
BNC-34S6	20×20×100	8/−	R	ϕ25	ϕ34
BNC-42C5	20×20×100	8/−	R	ϕ25	ϕ42
BNC-42S6	20×20×100	8/−	R	ϕ25	ϕ42
BND-51C2/S2/SY2	20×20×100	12/−	R	ϕ25	ϕ51
BNE-34S5/SY5	20×20×100	12/12	R	ϕ25	ϕ34
BNE-42S6/SY6	20×20×100	12/12	R	ϕ25	ϕ42
BNE-51S5/SY5	20×20×100	12/12	R	ϕ25	ϕ51
BNE-51S6/SY6	20×20×100	12/12	R	ϕ25	ϕ51
BNJ-34S3/SY3	20×20×100	12/6	R	ϕ25	ϕ34
BNJ-42S3/SY3	20×20×100	12/6	R	ϕ25	ϕ42
BNJ-51SY3	20×20×100	12/6	R	ϕ25	ϕ51
BNX-42SY	20×20×100	12/−	R	ϕ25	ϕ42
BX-20S	16×16×100	8/−	R	ϕ20	ϕ20
BX-26S	16×16×100	10/−	R	ϕ20	ϕ26
BX-26T	16×16×100	8/−	R	ϕ20	ϕ26

※On the side of sub-spindle, left hand tools are usable with inversion.

Ocean Cincom products

Machine name	Cutting tool shank (Gang) (Height × width × length)	No. of tools	Type of hand	Diameter of sleeve	Max. work diameter
RL01	10×10×60 ～ 120	4※1	L	ϕ16/ϕ20	ϕ12
RL03	10×10×100※2 12×12×100 16×16×100	max5	L	ϕ20	collet chuck static type ϕ35 pull type ϕ40
GN-3200	10×10×100※2 12×12×100 16×16×101	max5	L	ϕ20	collet chuck static type ϕ35 pull type ϕ40
GN-3200W	10×10×100※2 12×12×100 16×16×102	max10	L	ϕ20	collet chuck static type ϕ35 pull type ϕ40
GN-4200	10×10×100※2 12×12×100 16×16×103	max6	L	ϕ20	collet chuck static type ϕ35 pull type ϕ40

※1 : The total number including the sleeves
※2 : Selectable shank size

Star Micronics Co., Ltd.

Machine name	Cutting tool shank (Gang) (Height × width × length)	No. of tools	Cutting tool shank (Turret) (Height × width × length)	No. of tools	Type of hand	Diameter of sleeve	Max. work diameter
ECAS-12	10×10×95～150	6			R	φ22	φ13
ECAS-20	12(16)×12(16)×80～144	6			R	φ22	φ20
ECAS-20T			12(16)×12(16)×80	8 stations×3 turrets (Max. 3 tools per station)	R	φ22	φ20
ECAS-32T	16×16×80～120	4	16×16×60～78	10 stations×2 turrets (Max. 2 tools per station)	R	φ22/32	φ32
JNC-10			8×8×65	6	L	–	φ10
JNC-16			10×10×80	6	L	–	φ16
JNC-25/32			16×16×78～120	10 stations×1 turret	R	φ22	φ25/φ32
KJR-16B/25B			16×16×78	12/16 stations×1 turret	R	φ22	φ16/φ25
KNC-16/20			16×16×68	16 stations×1 turret	R	φ22	φ16/φ20
KNC-25Ⅱ/32Ⅱ			16×16×78	20 stations×1 turret	R	φ22/32	φ25/φ32
RNC-10/16	10×10×80～120	5			R	φ22	φ10/φ16
RNC-16Ⅱ/16BⅡ	10×10×80～120	5			R	φ22	φ16
SA-16R	10×10×95～120	6			R	φ22	φ16
SB-12Ⅱ/12R/16Ⅱ	12(10)×12(10)×95～130	6(7)			R	φ22	φ12/φ13/φ16
SB-16/16R	12(10)×12(10)×95～130	6(7)			R	φ22	φ16
SB-20/20R	12(10)×12(10)×95～130	6(7)			R	φ22	φ20
SR-20J	12×12×100～135	6			R	φ22	φ20
SR-20RIV	12×12×100～130	7			R	φ22	φ20
SC-20	12×12×95～130	6			R	φ22	φ20
SE-12/12B·16/16B	10×10×95～120	5			R	φ22	φ13/φ16
SF-25			16×16×73～98	10 stations (Max. 2 tools per station)	R	φ22/32	φ25
SG-42			16(20)×16(20)×84～88	10 stations (Max. 2 tools per station)	R	φ22/32	φ42
SH-7	8×8×95～120	5			R	φ22	φ7
SH-12/16	10×10×95～120	5			R	φ22	φ13/φ16
SI-12/12C	10×10×80～130	6			R	φ22	φ13
SR-16/20	12×12×95～120	5			R	φ22	φ16/φ20
SR-32	16×16×100～135	6			R	φ22	φ32
SR-20R/20RⅡ/20RⅢ	12×12×100～135	6			R	φ22	φ20
SR-10J	8× 8×67～110	6			R	φ16	φ10
SR-25J/32J	16×16×95～155	6			R	φ22/32	φ25/φ32
SST-16	12×12×95～115	5			R	φ22	φ16
ST-20		5	12(16)×12(16)×80	8 stations×3 turrets (Max. 3 tools per station)	R	φ22	φ20
ST-38			16×16×85	10 stations×3 turrets (Max. 2 tools per station)	R	φ22/32	φ38
SV-12/20	12×12×95～135	4	12×12×70～78	8 stations (Max. 3 tools per station)	R	φ22	φ13/φ20
	16×16×95～135	5	16×16×65～70	8 stations (1 tool per station)	R		
SV-32	16×16×95～135	4	16×16×80～88	10 stations (Max. 2 tools per station)	R	φ22/32	φ32
SV-32J/32JⅡ	16×16×95～135	4	16×16×65～70	8 stations×1 turret	R	φ22/32	φ32
SV-38R	16×16+20×20	4+1	16(20)×16(20)×84～88	10 stations (Max. 2 tools per station)	R	φ22/32	φ38
SW-7	8×8×80～120	6			R		φ7
SW-12RⅡ	10×10				R	φ16	φ13
SW-20	12(16)×12(16)×80～144	6			R	φ22	φ20

Tsugami Corporation

Machine name	Cutting tool shank (Gang) (Height × width × length)	No. of tools	Cutting tool shank (Turret) (Height × width × length)	No. of tools	Type of hand	Diameter of sleeve	Max. work diameter
P013H/P014H	8×8×100～120	6	–	–	R	φ16	φ1
P033H/P034H	8×8×100～120	6	–	–	R	φ16	φ3
B007-Ⅲ	7(8)(10)×7(8)(10)×85	8	–	–	R	φ25	φ7
B073-Ⅱ	8×8×85	9	–	–	R	φ20	φ7
B074/B07-V	8×8×85	9	–	–	R	φ20	φ7
B0123/B0124/B0125/B0126	12×12×85	9	–	–	R	φ20	φ20
B012F/B012-V/BE12-V	12×12×85	9	–	–	R	φ20	φ12
B020M-Ⅱ/SS20M/SS20M-5AX	10×10×46 attachable to tool spindle	2	BT15 tool spindle	24 tools	R	φ20	φ20
B016MF	12×12×85	9	–	–	R	φ20	φ16
B018-Ⅲ	12×12×85	9	–	–	R	φ20	φ18
B0203/B0204/B0205/ B0205-Ⅱ/B0205-Ⅲ/B0206-Ⅱ	12×12×85	9	–	–	R	φ20	φ20
B020F/B020-V/BE20-V	12×12×85	9	–	–	R	φ20	φ20
B026-V	12(16)×12(16)×85	6	–	–	R	φ25	φ26
B0265/B0266-Ⅱ	16×16×100	12	–	–	R	φ25	φ26
B0325/B0326-Ⅱ	16×16×100	12	–	–	R	φ25	φ32
B038T	16×16×125	3	20×20×125	8 stations	R	φ25/φ32	φ38
B0385/B0385L	16×16×125	8	–	–	R	φ32	φ38
BA20-Ⅲ	12×12×85	6	–	–	R	φ25	φ20
BA26-Ⅲ	12(16)×12(16)×85	6	–	–	R	φ25	φ26
BC18	12×12×85	10	–	–	R	φ25	φ18
BC25	12×12×85	10	–	–	R	φ10/φ25	φ25
BE18	12×12×85	9	–	–	R	φ20	φ18
BH20/BH20Z	12×12×85	4	12×12×85	12 stations	R	φ25/φ32	φ20
BH38	16×16×125	7	20×20×125	12 stations	R	φ25/φ32	φ38
BM07	8×8×85	9	–	–	R	φ20	φ7
BM163/BM164/BM165	12×12×85	9	–	–	R	φ20	φ16
BM20-V	12×12×85	9	–	–	R	φ20	φ20
BN12-Ⅲ	12×12×85	7	–	–	R	φ20	φ12
BN20-Ⅲ	12(16)×12(16)×85	7	–	–	R	φ20	φ20
BS12-V	12×12×85	8or12	–	–	R	φ20/φ25	φ12
BS18-Ⅲ	12×12×85	7or10	–	–	R	φ14/φ25	φ18
BS20-V	12×12×85	8or12	–	–	R	φ20/φ25	φ20
BS26 (ABC)-V	16×16×100	7or10	–	–	R	φ16/φ25	φ26
BS32C-V	16×16×100	6	–	–	R	φ16/φ25	φ32
BU12	12×12×85	4	12×12×80	8 stations	R	φ20	φ51
BU20	12×12×85	4	12×12×80	8 stations	R	φ20	φ20
BU26	16×16×100	7	20×20×80	8 stations	R※	φ20/φ32	φ26
BU38	16×16×100	7	20×20×80	8 stations	R※	φ20/φ32	φ38
BW07-Ⅲ	12×12×85	7	–	–	R	φ20	φ7
BW12-Ⅲ	12×12×85	7	–	–	R	φ20	φ12
BW20-Ⅲ	12(16)×12(16)×85	7	–	–	R	φ20	φ20
C004-Ⅲ	13×13×60～100	6～8	–	–	R/L	～φ10	φ120
C150	10×10×60～100	4～6	–	–	R/L	～φ8	φ80
C180	12×12×60～100	4～6	–	–	R/L	～φ10	φ120
C220	13×13×60～100	6～8	–	–	R/L	～φ10	φ120
C300-Ⅲ	16×16×100～130	6～10	–	–	R/L	～φ14	φ170
CH154	12×12×60～100	～16	–	–	R/L	～φ10	φ15
M06J/M06SY/M06JC	–	–	(M06JC) 20×20×125 (M06J/M06SY) 25×25×150	(M06J/M06JC)8 stations (M06SY)12 stations	R	φ32/φ40	φ260
M08J/M08SY/ M08D/M08SD	–	–	25×25×150	(M08J)8 stations (M08SY/M08D/M08SD) 12 stations	R	φ32/φ40	φ280
M34J	–	–	20×20×125	12 stations	R	φ20/φ32	φ34
M42J/M42D/M42SD	–	–	20×20×125	12 stations	R	φ25/φ32	φ42
M50SY-Ⅲ	–	–	20×20×100	12 stations	R	φ32	φ51
M50J	–	–	20×20×100	12 stations	R	φ20/φ32	φ51
MB25	–	–	20×20×80	2×8 stations	R	φ20/φ32	φ25
MB35-Ⅲ	–	–	20×20×80	2×8 stations	R	φ20/φ32	φ35
MB38-Ⅲ	–	–	20×20×80	2×8 stations	R※	φ20/φ32	φ38
MB50-Ⅲ	–	–	20×20×80	2×8 stations	R	φ20/φ32	φ50
MU26	–	–	20×20×80	2×8 stations	R	φ20/φ32	φ26
MU38	–	–	20×20×80	2×8 stations	R	φ20/φ32	φ38
NU50-Ⅲ	–	–	20×20×100	12 stations	R	φ20/φ32	φ51
S205/S206	12(16)×12(16)×100	8	–	–	R	φ20/φ22	φ20
SS20	16×16×100	8	–	–	R	φ20/φ22	φ20
SS207/SS207-5AX	12(16)×12(16)×100	8	–	–	R	φ20/φ22 Back/Front	φ20
SS26	16×16×100	7	–	–	R	φ20/φ22	φ26
SS267/SS267-5AX	16×16×100	8	–	–	R	φ25	φ26
SS32/SS32L	16×16×100	7	–	–	R	φ20/φ22	φ32
SS327/SS327-5AX	16×16×100	8	–	–	R	φ25	φ32
TMA8-Ⅳ/TMA8J	20×20×100 attachable to tool spindle	–	KM40 tool spindle	30 tools	R	–	φ220
TMB2	–	–	20×20×125	16 stations	R	φ32	φ51
TMU1	–	–	20×20×125	16 stations	R	φ32	φ38

※Left-hand used on sub-spindle side. (Note) In some cases, left-hand type should be used even with the indication of right-hand.

Nomura VTC Automatic Lathe Co., Ltd.

Machine name	Cutting tool shank (Gang) (Height × width × length)	No. of tools	Type of hand	Diameter of sleeve	No. of tools	Max. work diameter
NS-P1053A	9.5×9.5×130	5	R	–		φ10
NN-10C	10×10×130	6	R	φ17		φ10
NN-10E	10×10×130	6	R	φ16	5	φ10
NN-10C2	10×10×130	6	R	φ17		φ10
NN-10CS	10×10×130	6	R	φ17	4	φ10
NN-10CS (No rotary tools)	10×10×130	5	R	φ17	4	φ10
NN-10SⅡ	10×10×130	5	R	φ23		φ10
NN-10T	10×10×130	7	R	φ23		φ10
NN-10SB5	10×10×130	5	R	φ23		φ10
NN-16SB5	10×10×130	5	R	φ23		φ16
NN-16SB6type1	12.7×12.7×130	5	R	φ17(φ22)	4(3)	φ16
NN-16SB6type2	12.7×12.7×130	5	R	φ17(φ22)	4(3)	φ16
NN-16SB6type2.5	12.7×12.7×130	5	R	φ17(φ22)	5	φ16
NN-16SB6type3	12.7×12.7×130	5	R	φ17(φ22)	4(3)	φ16
NN-16HⅢ	12×12×130	6	R	φ23		φ16
NN-20HⅢ	12×12×130	6	R	φ23		φ20
NN-16UⅢ	12×12×130	5	R	φ23		φ16
NN-20UⅢ	12×12×130	5	R	φ23		φ20
NN-20CS	12.7×12.7×130	5(6)	R	φ22	4	φ20(Φ25)
NN-20U5	12.7×12.7×130	5(6)	R	φ22	4	φ20(Φ25)
NN-16UB5	12×12×130	5	R	φ23		φ16
NN-20UB5	12×12×130	5	R	φ23		φ20
NN-20UB7	12×12×130	6	R	φ23		φ20
NN-20UB8	12.7×12.7×130	5(6)	R	φ22	4	φ20(φ25)
NN-20YB	12×12×130	8	R	φ23		φ20
NN-25YB/32YB	16×16×130	8	R	φ23/φ32		φ25
NN-32YB2	16×16×130	5	R	φ22/φ32	4	φ32
NN-16J	12.7×12.7×130	6	R	φ23		φ16
NN-20J	12.7×12.7×130	6	R	φ23		φ20
NN-20J2	12.7×12.7×130	6	R	φ22	4	φ20

※The data listed above was approved by the respective companies.
※The companies are listed in the order of Japanese alphabets.

MEMO

SS Tools Front Turning Recommended Cutting Condition

Material classification		JIS Common grade	Equivalent grade	NTK Recommended grade 1	NTK Recommended grade 2	area	Recommended chipbreaker	Cutting speed (m/min)	feed speed (mm/rev)
Low carbon steel		S10C S15C S20C		DM4 QM3	DT4 TM4 C7Z	Ultra precision finish	AMX, KHG	80 (50-130) carbide 180 (120-250) cermet	0.04 (0.01-0.12)
						finish	AM3, AT, AZ7 CL, S, UL		
						middle cut	AM3, CL, S, ZP		
Carbon steel		S30C S40C S45C S50C S55C		DM4 QM3	TM4 C7X C7Z	Ultra precision finish	AMX, KHG	90 (50-150) carbide 180 (120-250) cermet	0.04 (0.01-0.12)
						finish	AM3, AT, AZ7 CL, S, UL		
						middle cut	CL, AM3, S		
Alloy steel	Chrome steel	SCr415 SCr430 SCr435 SCr440		DM4 QM3	TM4 DT4 C7X C7Z	Ultra precision finish	AMX, KHG	90 (50-150) carbide 180 (120-250) cermet	0.04 (0.01-0.12)
						finish	AM3, CL, S, UL, ZP ZR		
	Chrome molybdenum steel	SCM415 SCM430 SCM435 SCM440				middle cut	AM1, AM3, CL, Z5, ZP, ZR		
Stainless steel	Austentic	SUS303	ASK-8000	DT4 VM1	TM1 TM4	Ultra precision finish	KHG, UHG	90 (50-180) carbide	0.04 (0.01-0.12)
						finish	AM3, AZ7, CL, S, U/U1, UL		
						middle cut	AM3, CL, S, U/U1		
		SUS304 SUS316 SUS316F		DM4 QM3	TM4	Ultra precision finish	AMX, KHG,UHG	70 (40-100) carbide	0.04 (0.01-0.12)
						finish	U/U1, S		
						middle cut	CL, S		
	Ferritic	SUS430 SUS430F	DHS-1	DT4 VM1	TM1 ZM3	Ultra precision finish	KHG,UHG	90 (50-180) carbide	0.04 (0.01-0.12)
						finish	S, U/U1		
						middle cut	CL, S		
	Martensitic	SUS420J2 SUS420F		DT4 VM1	TM4 ZM3	Ultra precision finish	AMX, KHG, UHG	70 (30-120) carbide	0.04 (0.01-0.12)
						finish	AZ7, CL, S, U/U1, U2 UL, ZP		
						middle cut	CL, S		
		SUS440A SUS440B SUS440C SUS440F		DM4 QM3	DT4 TM4	Ultra precision finish	AMX, KHG	60 (30-100) carbide	0.04 (0.01-0.12)
						finish	CL, S, UL, ZP		
						middle cut	CL, S, UL, ZP		
	Precipitation hardened	SUS630							

Material classification	JIS Common grade	Equivalent grade	NTK Recommended grade 1	NTK Recommended grade 2	area	Recommended chipbreaker	Cutting speed (m/min)	feed speed (mm/rev)
Sulfurate free-cutting steel	SUM22L SUM23L SUM24L	SF20T	DT4 VM1	TM1 C7X C7Z	Ultra precision finish	KHG, UHG	100(50-200) carbide 180(120-250) cermet	0.04 (0.01-0.12)
					finish	AM3, AZ7, S, ZR		
					middle cut	AM3, S, UL, ZR		
	SUM22 SUM23		DT4 TM1	ZM3 C7X C7Z	Ultra precision finish	KHG, UHG		0.04 (0.01-0.12)
					finish	AM3, AZ7, S, ZR		
					middle cut	AM3, S, ZR		
High carbon chromic bearing steel	SUJ2 SUJ3		DM4 TM4	QM3 C7X C7Z	Ultra precision finish	AMX, KHG	90(50-180) carbide 180(120-250) cermet	0.04 (0.01-0.12)
					finish	AT, CL, S, UL, U2, ZP		
					middle cut	AT, CL, S, ZP		
Electromagnetic soft iron	SUY-0 SUY-1 SUY-2	ELCH2 ELCH2S ME1F MES3F	DM4 QM3	TM1	Ultra precision finish	KHG	100(50-200) carbide	0.04 (0.01-0.12)
					finish	CL, S, ZP		
					middle cut	CL, S, ZP		
Electromagnetic stainless steel		KM35FL KM57	DM4 QM3	TM4	Ultra precision finish	AMX, KHG	90(50-150) carbide	0.04 (0.01-0.12)
					finish	AM3, CL, S, UL, ZP		
					middle cut	AM3, CL, S, UL, ZP		
True titanium			TM1	TM4 ZM3	Ultra precision finish	AMX, KHG	100(50-150) carbide	0.04 (0.01-0.12)
					finish	AT, CL, S, UL		
					middle cut	AT, CL, S		
Titanium Alloy	6Al-4V 6Al-4VELI		DM4 DT4	TM1	Ultra precision finish	KHG	70(50-100) carbide	0.04 (0.01-0.12)
					finish	AT, CL, S		
					middle cut	AT, CL, S		
Aluminum Alloy	A6061		PD1	KM1 TM4	Ultra precision finish	CL, U/U1 without chipbreaker	carbide 100(50-200) PCD 200(100-350)	0.04 (0.01-0.12)
					finish			
					middle cut			

*Cutting speed (m/min) is listed as meaning of "Recommended speed (Lowest-Highest)."
*Feed rate (mm/rev) is listed as meaning of "Recommended feed rate (Lowest-Highest)."

SS Tools Back Turning Recommended Cutting Condition

Material classification		JIS Common grade	Equivalent grade	CSV Type(～φ5)			TBDP/TBMH/TBP/TBPA/TBPS/ TBVC Type(φ5～φ20)			TB32 Type(φ10～)			TB42 43Type(φ20～)		
				Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)
Low carbon steel		S10C S15C S20C		DT4 VM1	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DM4 DT4 QM3 ZM3	80 (50–130) carbide	X0.02 (0.01–0.04) Z0.04 (0.02–0.08)	ZM3	80 (50–150) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)	ZM3	80 (50–150) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.15)
Carbon steel		S30C S40C S45C S50C S55C		VM1 DT4	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DM4 QM3 TM4 ZM3	90 (50–150) carbide	X0.02 (0.01–0.04) Z0.04 (0.02–0.08)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.15)
Alloy steel	Chrome steel	SCr415 SCr430 SCr435 SCr440		VM1 DT4	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DM4 QM3 DT4 TM4	90 (50–150) carbide	X0.02 (0.01–0.04) Z0.04 (0.02–0.08)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.15)
	Chrome molybdenum steel	SCM415 SCM430 SCM435 SCM440													
Stainless steel	Austentic	SUS303	ASK-8000	DT4 VM1	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DT4 TM4 ZM3	90 (50–180) carbide	X0.02 (0.01–0.04) Z0.04 (0.02–0.08)	ZM3	90 (50–200) 超硬	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)	ZM3	90 (50–200) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)
		SUS304 SUS316 SUS316F		DT4 VM1	50 (30–70) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DM4 QM3 DT4 ZM3	70 (40–100) carbide	X0.02 (0.01–0.03) Z0.03 (0.02–0.06)	ZM3	70 (40–100) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)	ZM3	70 (40–100) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)
	Ferritic	SUS430 SUS430F	DHS-1	DT4 VM1	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DT4 VM1 ZM3	90 (50–180) carbide	X0.02 (0.01–0.04) Z0.04 (0.02–0.08)	ZM3	90 (50–200) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)	ZM3	90 (50–200) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)
	Martensitic	SUS420J2 SUS420F		DT4 VM1	50 (30–70) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DT4 VM1 ZM3	70 (40–100) carbide	X0.02 (0.01–0.03) Z0.03 (0.02–0.06)	ZM3	70 (40–100) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)	ZM3	70 (40–100) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)
		SUS440A SUS440B SUS440C SUS440F		DT4 VM1	40 (30–60) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DM4 DT4 QM3	60 (40–80) carbide	X0.02 (0.01–0.03) Z0.03 (0.02–0.06)	ZM3	60 (40–80) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)	ZM3	60 (40–80) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)
	Precipitation hardened	SUS630													

Material classification	JIS Common grade	Equivalent grade	CSV Type (～φ5)			TBDP/TBMH/TBP/TBPA/TBPS/ TBVC Type (φ5～φ20)			TB32 Type (φ10～)			TB42 43Type (φ20～)		
			Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)
Sulfurate free-cutting steel	SUM22L SUM23L SUM24L	SF20T	DT4 VM1	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	VM1 ZM3	100 (50–200) carbide	X0.02 (0.01–0.04) Z0.05 (0.02–0.1)	ZM3 Z15	100 (50–200) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)	ZM3 Z15	100 (50–200) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.15)
	SUM22 SUM23		DT4 VM1	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	VM1 TM4 ZM3	90 (50–180) carbide	X0.02 (0.01–0.04) Z0.05 (0.02–0.1)	ZM3 Z15	90 (50–200) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)	ZM3 Z15	90 (50–200) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.15)
High carbon chromic bearing steel	SUJ2 SUJ3		DT4 VM1	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DM4 TM4 QM3 ZM3	90 (50–150) carbide	X0.02 (0.01–0.04) Z0.04 (0.02–0.08)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)
Electromagnetic soft iron	SUY–0 SUY–1 SUY–2	ELCH2 ELCH2S ME1F MES3F	DT4 VM1	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DM4 QM3 DT4	100 (50–200) carbide	X0.02 (0.01–0.04) Z0.04 (0.02–0.08)	ZM3	100 (50–200) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)	ZM3	100 (50–200) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)
Electromagnetic stainless steel		KM35FL KM57	DT4 VM1	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DM4 DT4 TM4 ZM3	90 (50–150) carbide	X0.02 (0.01–0.04) Z0.04 (0.02–0.08)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)
True titanium			DT4 VM1	60 (30–90) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DT4 TM4 ZM3	90 (50–150) carbide	X0.02 (0.01–0.04) Z0.05 (0.02–0.1)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.12)	ZM3	90 (50–150) carbide	X0.03 (0.01–0.05) Z0.08 (0.04–0.15)
Titanium Alloy	6Al–4V 6Al–4VELI		DT4 VM1	50 (30–70) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	DM4 DT4 QM3	70 (40–100) carbide	X0.02 (0.01–0.03) Z0.03 (0.02–0.06)	ZM3	70 (40–100) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)	ZM3	70 (40–100) carbide	X0.03 (0.01–0.05) Z0.05 (0.04–0.08)
Aluminum Alloy	A6061		DT4 VM1	60 (30–100) carbide	X0.02 (0.01–0.03) Z0.03 (0.01–0.04)	PD1 KM1 ZM3	100 (50–200) carbide 200 (100–350) PCD	X0.03 (0.01–0.05) Z0.1 (0.02–0.15)	ZM3	100 (50–200) carbide	X0.05 (0.01–0.07) Z0.1 (0.04–0.2)	ZM3	100 (50–200) carbide	X0.05 (0.01–0.07) Z0.15 (0.04–0.25)

*Cutting speed (m/min) is listed as meaning of “Recommended speed (Lowest-Highest).”
*Feed rate (mm/rev) is listed as meaning of “Recommended feed rate (Lowest-Highest).”
*Please refer to page **H36**, “Selection guide for back turning tools,”for available depth of cut.

SS Tools Cut-off Recommended Cutting Condition

Material classification		JIS Common grade	Equivalent grade	CSV Type (～φ5)			CTP/CTPA/CTPS/CTPW Type (φ5～φ20)			CTDP/CTV/NTG/NTGW Type (φ10～)		
				Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)
Low carbon steel		S10C S15C S20C		DT4 VM1	60 (30-90) carbide	0.03 (0.01-0.05)	DT4 QM3 ZM3	80 (50-130) carbide	0.04 (0.02-0.06)	DM4 QM3 ZM3	80 (50-150) carbide	0.08 (0.04-0.12)
Carbon steel		S30C S40C S45C S50C S55C		VM1 DT4	60 (30-90) carbide	0.03 (0.01-0.05)	QM3 DT4 ZM3	90 (50-150) carbide	0.04 (0.02-0.06)	DM4 QM3 ZM3	90 (50-150) carbide	0.08 (0.04-0.12)
Alloy steel	Chrome steel	SCr415 SCr430 SCr435 SCr440		VM1 DT4	60 (30-90) carbide	0.03 (0.01-0.05)	QM3 DT4 ZM3	90 (50-150) carbide	0.04 (0.02-0.06)	DM4 QM3 ZM3	90 (50-150) carbide	0.08 (0.04-0.12)
	Chrome molybdenum steel	SCM415 SCM430 SCM435 SCM440										
Stainless steel	Austentic	SUS303	ASK-8000	DT4 VM1	60 (30-90) carbide	0.03 (0.01-0.05)	DT4 ZM3	90 (50-180) carbide	0.04 (0.02-0.06)	TM4 ZM3	90 (50-200) carbide	0.08 (0.04-0.12)
		SUS304 SUS316 SUS316F		DT4 VM1	50 (30-70) carbide	0.02 (0.01-0.03)	QM3 DT4 ZM3	70 (40-100) carbide	0.03 (0.02-0.05)	QM3 DM4 TM4	70 (40-100) carbide	0.05 (0.03-0.08)
	Ferritic	SUS430 SUS430F	DHS-1	DT4 VM1	60 (30-90) carbide	0.03 (0.01-0.05)	DT4 VM1 ZM3	90 (50-180) carbide	0.04 (0.02-0.06)	DM4 TM4 ZM3	90 (50-200) carbide	0.08 (0.04-0.12)
	Martensitic	SUS420J2 SUS420F		DT4 VM1	50 (30-70) carbide	0.02 (0.01-0.03)	VM1 ZM3	70 (40-100) carbide	0.03 (0.02-0.05)	ZM3 QM3	70 (40-100) carbide	0.05 (0.03-0.08)
		SUS440A SUS440B SUS440C SUS440F		DT4 VM1	40 (30-60) carbide	0.03 (0.01-0.05)	DT4 QM3	60 (40-80) carbide	0.03 (0.02-0.05)	DM4 QM3	60 (40-80) carbide	0.05 (0.03-0.08)
	Precipitation hardened	SUS630										

Material classification	JIS Common grade	Equivalent grade	CSV Type (～φ5)			CTP/CTPA/CTPS/CTPW Type (φ5～φ20)			CTDP/CTV/NTG/NTGW Type (φ10～)		
			Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)	Recommended grade	Cutting speed (m/min)	feed speed (mm/rev)
Sulfurate free-cutting steel	SUM22L SUM23L SUM24L	SF20T	DT4 VM1	60 (30-90) carbide	0.03 (0.01-0.05)	VM1 ZM3	100 (50-200) carbide	0.05 (0.03-0.08)	QM3 ZM3	100 (50-200) carbide	0.08 (0.04-0.12)
	SUM22 SUM23		DT4 VM1	60 (30-90) carbide	0.03 (0.01-0.05)	VM1 ZM3	90 (50-180) carbide	0.05 (0.03-0.08)	QM3 ZM3	90 (50-200) carbide	0.08 (0.04-0.12)
High carbon chromic bearing steel	SUJ2 SUJ3		DT4 VM1	60 (30-90) carbide	0.03 (0.01-0.05)	TM4 QM3 ZM3	90 (50-150) carbide	0.05 (0.03-0.08)	TM4 QM3 ZM3	90 (50-150) carbide	0.08 (0.04-0.12)
Electromagnetic soft iron	SUY-0 SUY-1 SUY-2	ELCH2 ELCH2S ME1F MES3F	DT4 VM1	60 (30-90) carbide	0.03 (0.01-0.05)	QM3 DT4	100 (50-200) carbide	0.05 (0.03-0.08)	DM4 QM3	100 (50-200) carbide	0.08 (0.04-0.12)
Electromagnetic stainless steel		KM35FL KM57	DT4 VM1	60 (30-90) carbide	0.03 (0.01-0.05)	DT4 TM4 ZM3	90 (50-150) carbide	0.05 (0.03-0.08)	DM4 QM3 ZM3	90 (50-150) carbide	0.08 (0.04-0.12)
True titanium			DT4 VM1	60 (30-90) carbide	0.03 (0.01-0.05)	DT4 TM4 ZM3	90 (50-150) carbide	0.05 (0.03-0.08)	TM4 ZM3	90 (50-150) carbide	0.08 (0.04-0.12)
Titanium Alloy	6Al-4V 6Al-4VELI		DT4 VM1	50 (30-70) carbide	0.02 (0.01-0.03)	DT4 QM3	70 (40-100) carbide	0.03 (0.02-0.05)	TM4 QM3	70 (40-100) carbide	0.05 (0.03-0.08)
Aluminum Alloy	A6061		DT4 VM1	60 (30-100) carbide	0.03 (0.01-0.05)	PD1 KM1 ZM3	100 (50-200) carbide 200 (100-350) PCD	0.05 (0.03-0.08)	TM4 ZM3	100 (50-200) carbide	0.1 (0.05-0.2)

*Cutting speed (m/min) is listed as meaning of "Recommended speed (Lowest-Highest)."
*Feed rate (mm/rev) is listed as meaning of "Recommended feed rate (Lowest-Highest)."

SS Tools Grooving Recommended Cutting Condition

CSV, GTG, GTM, GTMH, GTMT, GTMX, GTPS, SBG

Material classification		JIS Common grade	Equivalent grade	NTK Recommended grade		Cutting speed (m/min)	①feed speed at grooving (mm/rev) ②feed speed at cross cutting (mm/rev) ③Depth of cut at cross cutting (mm)			
				1	2		groove width			
							0.25 ~ 0.5	0.5 ~ 1.0	1.0 ~ 2.0	2.0 or more
Low carbon steel		S10C S15C S20C		DM4 QM3	VM1 DT4 ZM3 C7Z	80 (50-130) carbide 180 (120-250) cermet	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.07 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.08 ②0.03 ~ 0.06 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
Carbon steel		S30C S40C S45C S50C S55C		DM4 QM3	VM1 DT4 ZM3 C7Z	90 (50-150) carbide 180 (120-250) cermet	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.07 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.08 ②0.03 ~ 0.06 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
Alloy steel	Chrome steel	SCr415 SCr430 SCr435 SCr440		DM4 QM3	VM1 C7Z	90 (50-150) carbide 180 (120-250) cermet	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
	Chrome molybdenum steel	SCM415 SCM430 SCM435 SCM440				90 (50-150) carbide 180 (120-250) cermet	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
Stainless steel	Austentic	SUS303	ASK-8000	DT4	TM4 ZM3	90 (50-180) carbide	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
		SUS304 SUS316 SUS316F		DM4 DT4	QM3 VM1 ZM3	70 (40-100) carbide	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
	Ferritic	SUS430 SUS430F	DHS-1	DT4 VM1	TM4 ZM3	90 (50-180) carbide	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
	Martensitic	SUS420J2 SUS420F		DT4 TM4	DM4 QM3 VM1	70 (30-120) carbide	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
		SUS440A SUS440B SUS440C SUS440F		DM4 QM3	DT4	60 (30-100) carbide	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
	Precipitation hardened	SUS630					①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2

Material classification	JIS Common grade	Equivalent grade	NTK Recommended grade		Cutting speed (m/min)	①feed speed at grooving (mm/rev) ②feed speed at cross cutting (mm/rev) ③Depth of cut at cross cutting (mm)			
			1	2		groove width			
						0.25 ~ 0.5	0.5 ~ 1.0	1.0 ~ 2.0	2.0 or more
Sulfurate free-cutting steel	SUM22L SUM23L SUM24L	SF20T	DM4 DT4 VM1	QM3 ZM3	100 (50-200) carbide 180 (120-250) cermet	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.07 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.08 ②0.03 ~ 0.06 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
	SUM22 SUM23		DM4 DT4	ZM3		①0.005 ~ 0.03 ①0.03 ~ 0.05 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.07 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.08 ②0.03 ~ 0.06 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
High carbon chromic bearing steel	SUJ2 SUJ3		DM4 DT4	QM3 VM1 C7Z	90 (50-180) carbide 180 (120-250) cermet	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.07 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.08 ②0.03 ~ 0.06 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
Electromagnetic soft iron (純鉄)	SUY-0 SUY-1 SUY-2	ELCH2 ELCH2S ME1F MES3F	DM4 QM3	DT4 VM1	100 (50-200) carbide	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.07 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.08 ②0.03 ~ 0.06 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
Electromagnetic stainless steel		KM35FL KM57	DM4 QM3	DT4 VM1	90 (50-150) carbide	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
True titanium			DM4 QM3	DT4 VM1	100 (50-150) carbide	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
Titanium Alloy	6Al-4V 6Al-4VELI		DT4	ZM3	70 (50-100) carbide	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.06 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.07 ②0.02 ~ 0.05 ③max. 0.2	①0.03 ~ 0.2 ②0.03 ~ 0.06 ③max. 0.2
Aluminum Alloy	A6061		PD1	KM1	carbide 100 (50-200) PCD 200 (100-350)	①0.005 ~ 0.03 ②0.002 ~ 0.005 ③max. 0.2 (Cross cutting is impossible with below 0.4mm groove width)	①0.02 ~ 0.07 ②0.005 ~ 0.01 ③max. 0.2	①0.03 ~ 0.08 ②0.03 ~ 0.06 ③max. 0.2	①0.05 ~ 0.25 ②0.04 ~ 0.1 ③max. 0.5

*Cutting speed (m/min) is listed as meaning of "Recommended speed (Lowest-Highest)."
*Feed rate (mm/rev) is listed as a range of the recommended.
*Please refer to page **I32** for FGV type.

GTV, GEV, GVMB, GVMN, GVW, GWP, TWG

Material classification		JIS Common grade	Equivalent grade	NTK Recommended grade		Cutting speed (m/min)	①feed speed at grooving (mm/rev) ②feed speed at cross cutting (mm/rev) ③Depth of cut at cross cutting (mm)			
				1	2		groove width			
							2.0 ~ 3.0	3.0 ~ 4.0	4.0 ~ 5.0	5.0 or more
Low carbon steel		S10C S15C S20C		QM3	TM1 N40 C7X	80 (50-130) carbide 180 (120-250) cermet	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
Carbon steel		S30C S40C S45C S50C S55C		QM3	TM1 N40 C7X	90 (50-150) carbide 180 (120-250) cermet	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5
Alloy steel	Chrome steel	SCr415 SCr430 SCr435 SCr440		QM3	TM1 N40 C7X	90 (50-150) carbide 180 (120-250) cermet	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5
	Chrome molybdenum steel	SCM415 SCM430 SCM435 SCM440				90 (50-150) carbide 180 (120-250) cermet	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5
Stainless steel	Austentic	SUS303	ASK-8000	QM3	TM1	90 (50-180) carbide	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
		SUS304 SUS316 SUS316F		QM3	TM1	70 (40-100) carbide	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
	Ferritic	SUS430 SUS430F	DHS-1	QM3	TM1	90 (50-180) carbide	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
	Martensitic	SUS420J2 SUS420F		QM3	TM1	70 (30-120) carbide	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
		SUS440A SUS440B SUS440C SUS440F		QM3	TM1	60 (30-100) carbide	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
	Precipitation hardened	SUS630					①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5

Material classification	JIS Common grade	Equivalent grade	NTK Recommended grade		Cutting speed (m/min)	①feed speed at grooving (mm/rev) ②feed speed at cross cutting (mm/rev) ③Depth of cut at cross cutting (mm)			
			1	2		groove width			
						2.0 ~ 3.0	3.0 ~ 4.0	4.0 ~ 5.0	5.0 or more
Sulfurate free-cutting steel	SUM22L SUM23L SUM24L	SF20T	QM3	TM1	100 (50-200) carbide 180 (120-250) cermet	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5
	SUM22 SUM23		QM3	TM1		①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.3 ②0.03 ~ 0.15 ③max. 3.5
High carbon chromic bearing steel	SUJ2 SUJ3		QM3	TM1 N40 C7X	90 (50-180) carbide 180 (120-250) cermet	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
Electromagnetic soft iron (純鉄)	SUY-0 SUY-1 SUY-2	ELCH2 ELCH2S ME1F MES3F	QM3	TM1	100 (50-200) carbide	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
Electromagnetic stainless steel		KM35FL KM57	QM3	TM1	90 (50-150) carbide	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
True titanium			QM3	TM1	100 (50-150) carbide	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
Titanium Alloy	6Al-4V 6Al-4VELI		QM3	TM1	70 (50-100) carbide	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5
Aluminum Alloy	A6061		PD1	KM1	carbide 100 (50-200) PCD 200 (100-350)	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5	①0.04 ~ 0.2 ②0.03 ~ 0.15 ③max. 3.5

*Cutting speed (m/min) is listed as meaning of "Recommended speed (Lowest-Highest)."
*Feed rate (mm/rev) is listed as a range of the recommended.
*Please refer to page **I32** for FGV type.

GTPA

Material classification	JIS Common grade	Equivalent grade	NTK Recommended grade		Cutting speed (m/min)	①feed speed at grooving (mm/rev) ②feed speed at cross cutting (mm/rev) ③Depth of cut at cross cutting (mm)	
			1	2		groove width	
						2.0	2.5
Aluminum Alloy	A6061		PD1	KM1	carbide 100 (50-200) PCD 200 (100-350)	①0.05 ~ 0.15 ②0.05 ~ 0.15 ③max. (groove width×0.8)	①0.05 ~ 0.15 ②0.05 ~ 0.15 ③max. (groove width×0.8)

*Cutting speed (m/min) is listed as meaning of "Recommended speed (Lowest-Highest)."
*Feed rate (mm/rev) is listed as a range of the recommended.

SS Tools Threading Recommended Cutting Condition

Material classification		JIS Common grade	Equivalent grade	NTK Recommended grade		Cutting speed (m/min)
				1	2	
Low carbon steel		S10C S15C S20C		QM3 ZM3 C7X	VM1	50
Carbon steel		S30C S40C S45C S50C S55C		QM3 ZM3 C7X	VM1	50
Alloy steel	Chrome steel	SCr415 SCr430 SCr435 SCr440		QM3 ZM3 C7X	VM1	50
	Chrome molybdenum steel	SCM415 SCM430 SCM435 SCM440				
Stainless steel	Austentic	SUS303	ASK-8000	VM1 ZM3	QM3	50
		SUS304 SUS316 SUS316F		VM1 ZM3	QM3	40
	Ferritic	SUS430 SUS430F	DHS-1	VM1 ZM3	QM3	50
	Martensitic	SUS420J2 SUS420F		VM1 ZM3	QM3	50
		SUS440A SUS440B SUS440C SUS440F		VM1 ZM3 QM3		50
	Precipitation hardened	SUS630				
Sulfurate free-cutting steel		SUM22L SUM23L SUM24L	SF20T	VM1 ZM3	QM3	50
		SUM22 SUM23		VM1 ZM3	QM3	50
High carbon chromic bearing steel		SUJ2 SUJ3		VM1 ZM3	QM3	50
Electromagnetic soft iron		SUY-0 SUY-1 SUY-2	ELCH2 ELCH2S ME1F MES3F	VM1 ZM3	QM3	60
Electromagnetic stainless steel			KM35FL KM57	VM1 ZM3	QM3	60
True titanium				VM1 ZM3	KM3	50
Titanium Alloy		6Al-4V 6Al-4VELI		ZM3 VM1	KM3	40
Aluminum Alloy		A6061		KM3 ZM3	VM1	60

*Please refer to **J7**(for OD), **J19**(for ID) for information of number of pass and depth of cut.
*Feed is equal to pitch.

(Reference)

①Calculating revolution speed

$$n = \frac{v_c \times 1000}{\pi \times (\text{nominal diameter})}$$

n : Revolution speed(min^{-1})
v_c : Cutting speed(m/min)
π : Circular constant(3.14)

②Calculating feed speed per minute

$v_f = n \times (\text{pitch})$

Example : SUS303, M10×P1.5, v_c=50

$$n = \frac{50 \times 1000}{\pi \times M10} = 1592$$

$v_f = 1592 \times P1.5 = 2388$

v_f : Feed speed(mm/min)
n : Revolution speed(min^{-1})

Inperfect thread can be generated under the condition over Vf = 2000(mm/min).
Then threading with lower revolution speed is recommended.

SS Tools ID Turning Recommended Cutting Condition

Material classification		JIS Common grade	Equivalent grade	Machining diameter ～φ6					Machining diameter φ6～				
				NTK Recommended grade		Cutting speed (m/min)	Depth of cut a_p(mm)	feed speed (mm/rev)	NTK Recommended grade		Cutting speed (m/min)	Depth of cut a_p(mm)	feed speed (mm/rev)
				1	2				1	2			
Low carbon steel		S10C S15C S20C		VM1	TM4 ZM3	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	TM1 ZM3	QM3 C7Z	90 (50-150) carbide 180 (120-250) cermet	0.50 (0.10-2.0)	0.04 (0.01-0.12)
Carbon steel		S30C S40C S45C S50C S55C		VM1	TM4 ZM3	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	TM1 ZM3	QM3 C7Z	90 (50-150) carbide 180 (120-250) cermet	0.50 (0.10-2.0)	0.04 (0.01-0.12)
Alloy steel	Chrome steel	SCr415 SCr430 SCr435 SCr440		VM1	TM4 ZM3	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	TM1 ZM3	QM3 C7Z	90 (50-150) carbide 180 (120-250) cermet	0.50 (0.10-2.0)	0.04 (0.01-0.12)
	Chrome molybdenum steel	SCM415 SCM430 SCM435 SCM440									90 (50-150) carbide 180 (120-250) cermet		
Stainless steel	Austentic	SUS303	ASK-8000	TM4	ZM3 VM1	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	DT4 TM1	TM4	90 (50-180)	0.50 (0.10-2.0)	0.04 (0.01-0.12)
		SUS304 SUS316 SUS316F		TM4	ZM3 VM1	50 (20-70)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	DT4 TM1	TM4	70 (40-100)	0.50 (0.10-2.0)	0.04 (0.01-0.12)
	Ferritic	SUS430 SUS430F	DHS-1	TM4	ZM3 VM1	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	DT4 TM1	TM4	90 (50-180)	0.50 (0.10-2.0)	0.04 (0.01-0.12)
	Martensitic	SUS420J2 SUS420F		TM4	ZM3 VM1	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	DT4 TM1	TM4	90 (50-180)	0.50 (0.10-2.0)	0.04 (0.01-0.12)
		SUS440A SUS440B SUS440C SUS440F		TM4	ZM3 VM1	50 (20-70)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	DT4 TM1	TM4	70 (40-100) carbide	0.50 (0.10-2.0)	0.04 (0.01-0.12)
	Precipitation hardened	SUS630											

Material classification	JIS Common grade	Equivalent grade	Machining diameter ～φ6 NTK Recommended grade 1	2	Cutting speed (m/min)	Depth of cut a_p(mm)	feed speed (mm/rev)	Machining diameter φ6～ NTK Recommended grade 1	2	Cutting speed (m/min)	Depth of cut a_p(mm)	feed speed (mm/rev)
Sulfurate free-cutting steel	SUM22L SUM23L SUM24L	SF20T	VM1	TM4 ZM3	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	VM1	TM1 DT4	100 (50-200) carbide 180 (120-250) cermet	0.50 (0.10-2.0)	0.04 (0.01-0.12)
	SUM22 SUM23		VM1	TM4 ZM3	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	DT4 TM4	ZM3		0.50 (0.10-2.0)	0.04 (0.01-0.12)
High carbon chromic bearing steel	SUJ2 SUJ3		TM4	VM1 ZM3	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	DT4 TM4	QM3 C7X C7Z	90 (50-180) carbide 180 (120-250) cermet	0.50 (0.10-2.0)	0.04 (0.01-0.12)
Electromagnetic soft iron (純鉄)	SUY-0 SUY-1 SUY-2	ELCH2 ELCH2S ME1F MES3F	VM1	TM4 ZM3	80 (50-100)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	QM3	DT4 TM1 TM4	100 (50-200) carbide	0.50 (0.10-2.0)	0.04 (0.01-0.12)
Electromagnetic stainless steel		KM35FL KM57	VM1	TM4	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	QM3	DT4 TM4	90 (50-150) carbide	0.50 (0.10-2.0)	0.04 (0.01-0.12)
True titanium			TM4	ZM3 VM1	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	TM1	DT4 TM4	100 (50-150) carbide	0.50 (0.10-2.0)	0.04 (0.01-0.12)
Titanium Alloy	6Al-4V 6Al-4VELI		TM4	ZM3 VM1	50 (30-70)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	DT4	TM1	70 (50-100) carbide	0.50 (0.10-2.0)	0.04 (0.01-0.12)
Aluminum Alloy	A6061		TM4	ZM3	60 (30-90)	0.08 (0.05-0.10)	0.05 (0.03-0.07)	PD1	KM1 ZM3	100 (50-200) carbide 200 (100-350) PCD	0.50 (0.10-2.0)	0.04 (0.01-0.12)

*Cutting speed (m/min) is listed as meaning of "Recommended speed (Lowest-Highest)."
*Feed rate (mm/rev) is listed as meaning of "Recommended feed rate (Lowest-Highest)."

MEMO

R

Index

Part No. Index. (Alphabetical order)

(○ represents a number and □ represents a letter)

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131N-○○	O60	Insert
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132A-○○	O62	Insert
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151N-○○-SR	O51	Insert
151T-○○	O35	Insert
151T-○○-FB	O48	Insert
151T-○○-SP	O51	Insert
152A-○○	O39	Insert
152H-○○-SR	O51	Insert
152N-○○	O39	Insert
152N-○○-118	O50	Insert
152T-○○	O43	Insert
152T-○○-FB	O48	Insert
153A-○○	O39	Insert
153N-○○	O39	Insert
153N-○○-118	O48	Insert
153T-○○	O41	Insert
153T-○○-FB	O48	Insert
154N-○○	O43	Insert
154T-○○	O43	Insert
154T-○○-FB	O48	Insert
15YA-○○	O31	Insert
15YN-○○	O31	Insert
15YN-○○-SR	O51	Insert
15YT-○○	O31	Insert
15YT-○○-FB	O48	Insert
15ZA-○○	O33	Insert
15ZN-○○	O33	Insert
15ZN-○○-SR	O51	Insert
15ZT-○○	O33	Insert
15ZT-○○-FB	O48	Insert
15ZT-○○-SP	O51	Insert
180A-○○	O58	Insert
180N-○○	O58	Insert
180T-○○	O58	Insert
181A-○○	O60	Insert
181N-○○	O60	Insert
181T-○○	O60	Insert
182A-○○	O62	Insert
182N-○○	O62	Insert
182T-○○	O62	Insert
18YA-○○	O56	Insert
18YN-○○	O56	Insert
18YT-○○	O56	Insert
18ZA-○○	O57	Insert
18ZN-○○	O57	Insert
18ZT-○○	O57	Insert
1C20A-○○	O59	Insert
1C20T-○○	O59	Insert
1C21A-○○	O61	Insert
1C21T-○○	O61	Insert
1C22A-○○	O63	Insert
1C22T-○○	O63	Insert
1C23A-○○	O64	Insert
1C23T-○○	O64	Insert
1C2YA-○○	O56	Insert
1C2YT-○○	O56	Insert
1C2ZA-○○	O57	Insert
1C2ZT-○○	O57	Insert
1C30A-○○	O59	Insert
1C31A-○○	O61	Insert
1C32A-○○	O63	Insert
1C3YA-○○	O56	Insert
1C3ZA-○○	O57	Insert
1C50A-○○	O59	Insert
1C50T-○○	O59	Insert
1C51A-○○	O61	Insert
1C51T-○○	O61	Insert
1C52A-○○	O63	Insert
1C52T-○○	O63	Insert

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(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
1C53A-○○	O64	Insert
1C53T-○○	O64	Insert
1C5YA-○○	O56	Insert
1C5YT-○○	O56	Insert
1C5ZA-○○	O57	Insert
1C5ZT-○○	O57	Insert
1D-HSC-MK○○○○○RJ	P15	Cutter
2＊8AW	M4	Part
2.5＊8AW	M4	Part
2100○S-○○FMS	O34	Holder
2100○S-○○M	O34	Holder
2101○S-○○FMS	O36	Holder
2102○S-○○FMS	O38	Holder
2103○S-○○FMS	O40	Holder
210Y0S-○○FMS	O30	Holder
210Y0S-○○M	O22	Holder
210Z0S-○○FMS	O32	Holder
210Z0S-○○M	O22	Holder
2200○S-○○○□	O32	Holder
2200○S-20FMS	O32	Holder
2201○S-○○○□	O34	Holder
2201○S-25FMS	O34	Holder
2202○S-○○○□	O38	Holder
2202○S-32FMS	O38	Holder
22030S-○○○□	O40	Holder
22030S-40FMS	O38	Holder
22040S-○○○□	O42	Holder
22040S-40FMS	O42	Holder
22050S-○○○□	O44	Holder
22050S-50FMSW	O44	Holder
22070S-○○○□	O46	Holder
220Y0S-○○○□	O30	Holder
220Y0S-20FMS	O30	Holder
220Z0S-○○○□	O32	Holder
220Z0S-20FMS	O32	Holder
22570S-50FMSW	O46	Holder
23000S-22M	O34	Holder
2301○H-003M	O36	Holder
2301○H-25FMS	O36	Holder
2302○H-004M	O38	Holder
2302○H-32FMS	O38	Holder
23030H-004M	O40	Holder
23030H-40FMS	O40	Holder
230Y0S-22M	O30	Holder
230Z0S-22M	O32	Holder
2400○H-002M	O34	Holder
2400○H-20FMS	O34	Holder
2401○H-003M	O36	Holder
2401○H-25FMS	O36	Holder
2402○H-004M	O38	Holder

Part No.	Listed on	Part name
2402○H-32FMS	O38	Holder
24030H-004M	O40	Holder
24030H-40FMS	O40	Holder
24040H-005M	O42	Holder
24040H-40FMS	O42	Holder
24050H-005M	O44	Holder
24070H-005M	O44	Holder
240Y0H-002M	O30	Holder
240Y0H-20FMS	O30	Holder
240Z0H-002M	O32	Holder
240Z0H-20FMS	O32	Holder
24530S-40FMS	O40	Holder
24540S-40FMSW-70	O42	Holder
24550S-50FMSW	O44	Holder
24570S-50FMSW	O46	Holder
2500○H-002M	O34	Holder
2500○H-20FMS	O34	Holder
2501○H-003M	O36	Holder
2501○H-25FMS	O36	Holder
2502○H-004M	O38	Holder
2502○H-32FMS	O38	Holder
25030S-004M	O40	Holder
25030S-40FMS	O40	Holder
25040S-005M	O42	Holder
25040S-40FMS	O42	Holder
25050S-005M	O44	Holder
25070S-005M	O44	Holder
250Y0H-002M	O30	Holder
250Y0H-20FMS	O30	Holder
250Z0H-002M	O32	Holder
250Z0H-20FMS	O32	Holder
2600○H-20FMS	O34	Holder
26010S-25FMS	O36	Holder
26020S-32FMS	O38	Holder
26040S-40FMS	O42	Holder
260Y0S-20FMS	O30	Holder
260Z0S-20FMS	O32	Holder
26500S-20FMS	O34	Holder
27000S-20FMS	O34	Holder
27010S-25FMS	O36	Holder
27020S-32FMS	O38	Holder
27030S-004M	O40	Holder
27030S-40FMS	O40	Holder
27040S-005M	O42	Holder
27040S-40FMS	O42	Holder
27050S-005M	O44	Holder
27070S-005M	O46	Holder
270Y0S-20FMS	O30	Holder
270Z0S-20FMS	O32	Holder
27550S-50FMSW	O44	Holder

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(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
27570S-50FMSW	O46	Holder
2814HS	P6 ,etc	Part
29000S-20FMS	O34	Holder
29010S-25FMS	O36	Holder
29020S-32FMS	O38	Holder
29030S-004M	O40	Holder
29030S-40FMS	O40	Holder
29040S-005M	O42	Holder
29040S-40FMS	O42	Holder
29050S-005M	O44	Holder
29070S-005M	O46	Holder
290Y0S-20FMS	O30	Holder
290Z0S-20FMS	O32	Holder
2T-2SRM	O32 ,etc	Part
2T-3SRM	O36 ,etc	Part
2T-4SRM	O38 ,etc	Part
2T-5SRM	O42 ,etc	Part
2T-6SRM	O44 ,etc	Part
3/8-16UNC＊11/2	M4	Part
433T-○○	O64	Insert
434T-○○	O43	Insert
435T-○○	O45	Insert
436T-○○	O45	Insert
437T-○○	O47	Insert
438T-○○	O47	Insert
450H-○○	O35	Insert
450H-○○-118	O50	Insert
451H-○○	O37	Insert
451H-○○-118	O50	Insert
452H-○○	O39	Insert
452H-○○-118	O50	Insert
453H-○○	O41	Insert
453H-○○-118	O50	Insert
453T-○○	O41	Insert
454H-○○	O43	Insert
454H-○○-118	O50	Insert
454T-○○	O65	Insert
455H-○○	O45	Insert
455H-○○-118	O50	Insert
456H-○○	O45	Insert
456H-○○-118	O50	Insert
457H-○○	O47	Insert
457H-○○-118	O50	Insert
458H-○○	O47	Insert
458H-○○-118	O50	Insert
45YH-○○	O31	Insert
45ZH-○○	O33	Insert
4C20H-○○	O35	Insert
4C21H-○○	O37	Insert
4C22H-○○	O39	Insert
4C2YH-○○	O31	Insert
4C2ZH-○○	O33	Insert
5C112H-○○	O85	Insert
5C113H-○○	O86	Insert
5C114H-○○	O87	Insert
5C115H-○○	O88	Insert
5C116H-○○	O89	Insert
5C117H-○○	O90	Insert
5C118H-○○	O91	Insert
5C120H-○○	O92	Insert
5C122H-○○	O93	Insert
5C124H-○○	O94	Insert
5C126H-○○	O95	Insert
5C129H-○○	O96	Insert
5C212H-○○	O85	Insert
5C213H-○○	O86	Insert
5C214H-○○	O87	Insert
5C215H-○○	O88	Insert
5C216H-○○	O89	Insert
5C217H-○○	O90	Insert
5C218H-○○	O91	Insert
5C220H-○○	O92	Insert
5C222H-○○	O93	Insert
5C224H-○○	O94	Insert
5C226H-○○	O95	Insert
5C229H-○○	O96	Insert
60312□-20FM	O85	Holder
60313□-20FM	O86	Holder
60314□-20FM	O87	Holder
60315□-20FM	O88	Holder
60316□-20FM	O89	Holder
60317□-20FM	O90	Holder
60318□-25FM	O91	Holder
60320□-25FM	O92	Holder
60322□-25FM	O93	Holder
60324□-25FM	O94	Holder
60326□-32FM	O95	Holder
60329□-32FM	O96	Holder
60512□-20FM	O85	Holder
60513□-20FM	O86	Holder
60514□-20FM	O87	Holder
60515□-20FM	O88	Holder
60516□-20FM	O89	Holder
60517□-20FM	O90	Holder
60518□-25FM	O91	Holder
60520□-25FM	O92	Holder
60522□-25FM	O93	Holder
60524□-25FM	O94	Holder
60526□-32FM	O95	Holder
60529□-32FM	O96	Holder

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(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
60712□-20FM	O85	Holder
60713□-20FM	O86	Holder
60714□-20FM	O87	Holder
60715□-20FM	O88	Holder
60716□-20FM	O89	Holder
60717□-20FM	O90	Holder
60718□-25FM	O91	Holder
60720□-25FM	O92	Holder
60722□-25FM	O93	Holder
60724□-25FM	O94	Holder
60726□-32FM	O95	Holder
60729□-32FM	O96	Holder
63.○○○Z-○	P15	Cutter
64.○○○Z-○	P15	Cutter
65.○○○Z-○	P15	Cutter
66.○○○Z-○	P15	Cutter
67.○○○Z-○	P15	Cutter
7247-IP7-10	O99 ,etc	Part
724-IP7-10	O30 ,etc	Part
72556-IP8-10	O34 ,etc	Part
72567-IP8-10	O34 ,etc	Part
7375-IP9-10	O36 ,etc	Part
739-IP9-10	O36 ,etc	Part
7495-IP15-10	O38 ,etc	Part
7514-IP20-10	O40 ,etc	Part
7619-IP25-10	O44 ,etc	Part
8IP-15	O52 ,etc	Part
8IP-20	O52 ,etc	Part
8IP-25	O42 ,etc	Part
8IP-7	O42 ,etc	Part
8IP-8	O42 ,etc	Part
8IP-9	O42 ,etc	Part
A		
ABS○○	M11	Part
ACN422	G7 ,etc	Part
ACN423	G7 ,etc	Part
ADN422	G11 ,etc	Part
ADN423	G11 ,etc	Part
AM-612L-9	M17	Part
AMS-5T	P28 ,etc	Part
AOB-5＊14	I24 ,etc	Part
AOB-5＊16	I24 ,etc	Part
AOB-5C	I31 ,etc	Part
AOB-5S-T25	P28 ,etc	Part
AOB-6C	I36 ,etc	Part
AOB-6S-T30	P28	Part
AOS-5＊16	I26 ,etc	Part
AOS-5＊20	I26 ,etc	Part
AOS-5＊25	I11	Part
AOS-5＊26W	G23 ,etc	Part
AOS-6＊26W	L41	Part
AOS-6＊30	I16 ,etc	Part
AOS-6＊30W	G7 ,etc	Part
APCW1604	P27	Insert
ARN42	G14	Part
ARP42A	P28	Part
ASG-5	H50	Part
ASG-6	I16 ,etc	Part
ASGL4	G29 ,etc	Part
ASGL5	G29 ,etc	Part
ASGL5-D	G23 ,etc	Part
ASGL6-D	G17 ,etc	Part
ASN○○○	G17 ,etc	Part
ATN○○○	G23 ,etc	Part
AU 32 13R	P15	Part
AVN323	G27	Part
AWN423-W	G28	Part
AZT659D	M18	Part
B		
B○○□-STZCR-○○	L40	Holder
B○○□-STZPR-○○	L40	Holder
BBR○○○○	M17	Holder
BG○○	I30	Holder
BG○○-○○S	I30	Holder
BS○○○○	G29 ,etc	Part
BS○R○○	P6	Part
BS0520	H74	Part
BS0620	H74	Part
BS0829W	G7 ,etc	Part
BS0835W	G7 ,etc	Part
BSGF53	M11	Insert
BSM55	P6	Part
BSMF○○	M11 ,etc	Insert
BT○○-FMNA○○-○○	P17	Arbor
BT○○-FMNC○○-○○	P17	Arbor
C		
C○○□-MBR	L32	Holder
C○○□-MBRD○○-OH	L32	Holder
C○○□-MSBR	L33	Holder
C○○□-SCLC□○○□○○-OH	L36	Holder
C○○□-SCLP□○○□○○-OH	L36	Holder
C○○□-SCLP-○○	L37	Holder
C○○□-SEXR□○□○○-OH	L35	Holder
C○○□-SRC○○F	M16	Holder
C○○□-STUC□○○□○○-OH	L38	Holder
C○○□-STUP□○○□○○-OH	L38	Holder
C○○□-STZC□○○-OH	L40	Holder

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(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
C○○□-STZP□○○-OH	L40	Holder
C11-○○	G19	Holder
C12-○○	G17	Holder
C13-○○	G19	Holder
C14M-○○	G17	Holder
C15-○○	G21	Holder
C16-○○	G19	Holder
C17-○○	G21	Holder
C21-○○	G23	Holder
C22-○○	G23	Holder
C23-○○	G24	Holder
C24-○○	G24	Holder
C25-○○	G25	Holder
C31-○○	G7	Holder
C54M-○○	G14	Holder
C55-○○	G14	Holder
CB○	M11 ,etc	Part
CBG○○□○○□	M11	Holder
CBN○○□○○□	M12	Holder
CBS○○□○○□	M11	Holder
CBU○○□○○□	M11	Holder
CC○○0602	F33・F34・F35	Insert
CC○○0602PD	F20	Insert
CC○○09T3	F33・F34・F35	Insert
CC○○09T3PD	F20	Insert
CC08M□	G7 ,etc	Part
CC08W□	G7 ,etc	Part
CCBN□2525M12	G9	Holder
CCET06020○○KHG	F34	Insert
CCET09T30○○KHG	F34	Insert
CCKN□2525M12	G9	Holder
CCLN12	G7	Holder
CDH○○	M4	Insert
CDH○○PN	M5	Insert
CDJN○○○○□○○	G11	Holder
CH-FGV○○○○	I34	Holder
CH-GTT○○□○○	H53	Holder
CH-LBML○○○○H	L6	Holder
CH-SDUC○○□○○	H19	Holder
CH-STUC○○□○○	H28	Holder
CH-SVUP○○□○○	H27	Holder
CH-SVXCL○○	A42・H46	Holder
CH-TBPA○○	H44	Holder
CLH04○○	N6	Insert
CLH05○○	N8	Insert
CLR-13S	Q36・Q37	Part
CLR-15S	Q36・Q37	Part
CNGA1204○○	F4・F25	Insert
CNGA1204○○PQ	F16	Insert
CNGA1204○○PQW	F16	Insert

Part No.	Listed on	Part name
CNGG○○○	F4・F24	Insert
CNGN○○○	F5	Insert
CNGX1207○○	F5	Insert
CNMA○○○PQ	F16	Insert
CNMG○○○	F24・F25	Insert
CNMN○○○	F5	Insert
COUP-M10＊1	L14	Part
COUP-R1/8	L14	Part
CPR/L○	I11	Part
CPGB080204TN	F36	Insert
CPGD031-TN	F36	Insert
CPGH○○○	F36	Insert
CPGM○○○	F36	Insert
CPGP○○○	F36	Insert
CPGT0602○○	F35	Insert
CPGT09T3○○	F35	Insert
CPMH0602○○	F36	Insert
CPMH0802○○	F36	Insert
CPMH0903○○	F36	Insert
CPMM○○○	F36	Insert
CPMP○○○	F36	Insert
CRDCN○○	M4	Holder
CRDNN○○	G14	Holder
CRGN○○	G14	Holder
CRN4	M4	Part
CRN5	M4	Part
CRXC○○	M4	Holder
CS03○○	M4	Part
CS04○○	M4	Part
CS0415	H91	Part
CS05○○	M4 ,etc	Part
CS0515	H91	Part
CS0516LSH	H73	Part
CS0520	H77	Part
CS0520W	I24	Part
CS06○○	M4 ,etc	Part
CS0625W	I24	Part
CS1040A	P11	Part
CSDNN○○	G17	Holder
CSHN○○	G19	Holder
CSSN○○	G17	Holder
CSV○○	H81 ,etc	Holder
CSV○○GX	H81 ,etc	Holder
CSV○○GXNC	H81 ,etc	Holder
CSV○○NC	H81 ,etc	Holder
CSVB11F	H82 ,etc	Insert
CSVC11F	H83 ,etc	Insert
CSVF11F	H82 ,etc	Insert
CSVG11F	H83 ,etc	Insert
CSVT11F	H83 ,etc	Insert

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(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
CTDP○○	H73 ,etc	Holder
CTP○○	H63	Holder
CTPR/L○○H-OH	A17・H63	Holder
CTPA○○	H67 ,etc	Holder
CTPAL○○□□-SUB	H67	Holder
CTPAR○○□□-SUB	H67	Holder
CTPL○○□□-SUB	H62	Holder
CTPR○○□□-SUB	H62	Holder
CTPS○○	H84 ,etc	Holder
CTPW○○	H70	Holder
CTPX○○	H65 ,etc	Insert
CTV○○	H71 ,etc	Holder
CTVN○○K2	H71	Holder
CVR/L○	I26	Part
CVSR/L○	I26	Part
CZH○○	N5	Insert
D		
DC○○0702	F21・F37・F38・F39	Insert
DC○○11T3	F21・F37・F38・F39	Insert
DC5TN	G23 ,etc	Part
DC6CN	G7 ,etc	Part
DC6DN	G11 ,etc	Part
DC6VN	G27	Part
DCET0702○○	F38	Insert
DCET11T3○○	F38	Insert
DCGW0702○○	F21	Insert
DCGW11T3○○	F21	Insert
DNGA○○○	F6・F17・F26	Insert
DNGG○○○	F26	Insert
DNGN○○○	F6	Insert
DNGX1507○○	F6	Insert
DNMA○○○PQ	F17	Insert
DNMG○○○	F25・F26	Insert
DPGT0702○○	F39	Insert
DS-FGV○○	I34	Holder
DS-GTT○○	H53	Holder
DS-LBMBL○○	L6	Holder
DS-PTX○○-33	H13・H31	Holder
DS-SCLL○○	H13	Holder
DS-SDU○○	H13・H21	Holder
DS-SDX○○	H21	Holder
DS-STT○○	J15	Holder
DS-SVVPN○○	H13	Holder
DS-SVXL○○	H25	Holder
DS-SVXPL○○	H27	Holder
DS-TBP○○	H43	Holder
DS-TTP○○	J10	Holder

Part No.	Listed on	Part name
E		
ELSR42C	M15	Part
ENGN○○○	F6	Insert
ERGHT301○○	F41	Insert
ERGP52	F41	Insert
F		
FAS○○○○○A	P15	Part
FBV40R○D8AM3	I35	Insert
FDX1204-○○-50R	P23	Insert
FGV○○○□B○○D6	I35	Insert
FGV○○○○	I34	Holder
FSI01-2.5＊5	N8	Part
FSI02-2.2＊4.0	N5	Part
FSI02-2.2＊4.3	N6	Part
FSI03○○A	P11	Part
FSI04-2.0＊4.3	N8	Part
FSI17-2.2＊6.0	J25	Part
FSI21-5.0＊12.45	P24	Part
FSI22-4.0＊11	P26	Part
FSI23-4.0＊7	P26	Part
FSI26-4.0＊12-LH	P21	Part
FSS10-5.0＊14	I19	Part
FSS15-3.0＊12	G7 ,etc	Part
FSS16-3.0＊8	L41	Part
FSS25-5.0＊10	I19	Part
G		
GEV○○○N(04)	I21	Insert
GFV○○-6	I36	Holder
GFV600N○○	I36	Insert
GKV○○	I20	Holder
GKWP○○	A33・I25	Holder
GSV○○	I36	Holder
GTG10○○	I30	Insert
GTG14○○	I30	Insert
GTG20○○	I30	Insert
GTM32○○	I15	Insert
GTM43○○	I17	Insert
GTMA43○○J	I17	Insert
GTMH32○○	I12・I13・I14・I15	Insert
GTMH32○○GX	A6・I12	Insert
GTMH32○○J	I15	Insert
GTMH32○○VT	I13	Insert
GTMT43○○	I16	Insert
GTMX32○○	I13	Insert
GTMX43○○J	I18	Insert
GTPA○○	I27	Holder
GTPA○○FRN01	I27	Insert

Part No. Index. (Alphabetical order)

(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
GTPS○○○FR	I37	Insert
GTT○○□○○	H53	Holder
GTTR○○H00-OH	A16・I8	Holder
GTV○○○□	I21	Insert
GTV○○-○□	I20	Holder
GTVW○○-○	I26	Holder
GTWP○○○	A32・I24	Holder
GVGN○○○○○□	I22	Insert
GVMB○○○○○□	I22	Insert
GVMN○○○○○□	I22	Insert
GVW○○○	I26	Insert
GWPG○○○-GV	I25	Insert
GWPG○○○-GW	I25	Insert
GWPM○○○-GW	I25	Insert
H		
HACDH○○	M4	Part
HAL3515R04	P11	Insert
HAN9521R04	P11	Insert
HAR○○Y	M4	Part
HARCGX○○	M4	Part
HAT6021R04	P11	Insert
HAZT1255A	M18	Part
HC35KR-○○	M4	Part
HC59/60TS-4	M18	Part
HC6CN	G7 ,etc	Part
HC6DN	G11 ,etc	Part
HC6SN	G17	Part
HCA○○○○□○○	P7	Insert
HCD○○○○□○○	P7	Insert
HCLN○○○○□○○	G7	Holder
HDA○○○○□○○	P11	Insert
HDHN○○○○□○○	G13	Holder
HDJN○○○○□○○	G11	Holder
HDNNN○○○○□○○	G13	Holder
HDWM5-EU4DD	P6	Part
HLA8521R04	P11	Insert
HLR-25S	P36・P37	Part
HLW175	P22	Part
HN○○/○○□□□-○○□	M18	Holder
HOSE-CN-CN-○○○	A22・L12	Part
HOSE-R1/8-CN-○○○	A22・L12	Part
HOSE-ST-M8	L14	Part
HOSE-AN-M8	L14	Part
HRCD-○○	M4	Holder
HRT6021R04	P11	Insert
HSDNN○○○○□○○	G17	Holder
HSSN○○○○□○○	G17	Holder
HVJN○○○○□○○	G27	Holder
HVPN○○○○□○○	G27	Holder
HVVNN○○○○□○○	G27	Holder
HY-NBH○○○○○□	L18	Holder
HY-NBH○○○○○□-OH	A20・L10	Holder
J		
JFDX○○○	P22	Cutter
JOINT-ST-R1/8	A23・L13	Part
JOINT-AN-R1/8	A23・L13	Part
JQTE○○○	P26	Cutter
JQTS○○○	P26	Cutter
JRNMW○○○	P28	Cutter
JRPMW○○○E	P28	Cutter
JRPMW○○○S	P28	Cutter
JSDW○○○	P24	Cutter
JSF-○○○-○○	P6	Cutter
JWNXM○○○	A41・P21	Cutter
JXTM○○○	P25	Cutter
K		
KBR○○○○PB	L27	Insert
KH4□□	P15	Insert
KTN○○J	H76	Insert
KTNW○○J	H76	Insert
KTR○○J○○D	H77	Insert
KTRW○○JS○○D	H76	Insert
L		
LBM○○○○	L7	Insert
LBMAR○○	L6	Holder
LBMC○○	L7	Insert
LBMD○○	L7	Insert
LBME○○	L7	Insert
LCL3	G23 ,etc	Part
LCL33N	H31	Part
LCL3C	G15	Part
LCL4	G7 ,etc	Part
LCL4C	G15 ,etc	Part
LCS2	G15	Part
LCS3	G15 ,etc	Part
LCS33	H31	Part
LCS4	H31	Part
LCS4CA	H31	Part
LLR-25S	Q36・Q37	Part
LLR-28S	Q36・Q37	Part
LLR-T10	L41	Part
LLR-T15	G23 ,etc	Part
LLR-T20	L41	Part
LNM○○○○	M5 ,etc	Insert
LNX○○○	P25	Insert
LRIS-2＊6	Q37 ,etc	Part

Part No. Index. (Alphabetical order)

(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
LRIS-2.2＊6	Q37 ,etc	Part
LRIS-2.5＊5	Q37 ,etc	Part
LRIS-2.5＊7	Q37 ,etc	Part
LRIS-3＊6	Q37 ,etc	Part
LRIS-3＊8	Q37 ,etc	Part
LRIS-4＊10	Q37 ,etc	Part
LRIS-4＊10PW	Q37 ,etc	Part
LRIS-4＊12	Q37 ,etc	Part
LRIS-4＊12PW	Q37 ,etc	Part
LRIS-4＊5	Q37 ,etc	Part
LRIS-4＊6	Q37 ,etc	Part
LRIS-4＊8	Q37 ,etc	Part
LRIS-5＊10	Q37 ,etc	Part
LR-S-2＊3.5	Q37 ,etc	Part
LR-S-2＊3.7	Q37 ,etc	Part
LR-S-2＊4.4	Q37 ,etc	Part
LR-S-2＊5.5	Q37 ,etc	Part
LR-S-2.5＊4.8	Q37 ,etc	Part
LR-S-2.5＊5.5	Q37 ,etc	Part
LR-S-2.5＊6	Q37 ,etc	Part
LR-S-2.5＊6.8	Q37 ,etc	Part
LR-S-3＊5.8	Q37 ,etc	Part
LR-S-3＊6.2	Q37 ,etc	Part
LR-S-3＊7.8	Q37 ,etc	Part
LR-S-4＊10PW	Q37 ,etc	Part
LR-S-4＊5.8	Q37 ,etc	Part
LR-S-4＊9	Q37 ,etc	Part
LS103	P6	Part
LSC42	G7	Part
LSD42	G11	Part
LSP3	G15 ,etc	Part
LSP4	G7 ,etc	Part
LSR32C	G15	Part
LSR42	G15	Part
LSR42C	G15	Part
LSS42	G17 ,etc	Part
LST317	G23	Part
LW-2	G7 ,etc	Part
LW-2.5	G7 ,etc	Part
LW-2.5	H31	Part
LW-2.5S	H71	Part
LW-3	G7 ,etc	Part
LW-4	G7 ,etc	Part
LW-4＊104	L11	Part
LW-5	H73 ,etc	Part
LWU-4	M4	Part
LWU-5	M4	Part
M		
M2＊6	M11 ,etc	Part
M2＊8	M11 ,etc	Part
M3＊12	G7 ,etc	Part
M3＊5.5	M18 ,etc	Part
M3＊8	M18 ,etc	Part
M4＊10	M11	Part
M4＊5.5	M18	Part
M4＊8	M18	Part
MBC-M12	P11	Part
MBC-M16	P11	Part
MBL○○○	L33	Insert
MKH 1NR 02	P15	Part
MKL 1R 01	P15	Part
N		
NBH○○○○○□	L22・L23	Holder
NBH○○○○○□K-MET	L23	Holder
NBPR○	L27	Holder
NC5-46-FMNA25.4-40F	P17	Arbor
NC5-46-FMNA31.75-39F	P17	Arbor
NC5-46-FMNC22-32F	P17	Arbor
NGBBR○○○○	I18	Holder
NGTA○○○○	I11	Holder
NGTB○○○○	I11・I16	Holder
NGTN○○○○	I11・I16	Holder
NTG○○○○	H77	Holder
NTGW○○○○	H76	Holder
NTTB○○○○	J15	Holder
P		
PCLN○○○○□43	G7 ,etc	Holder
PCLN○○○○X43N	H32	Holder
PDJN○○○○□43	G11 ,etc	Holder
PLUG-RC1/8	A23・L13	Part
PRFP○○□	M15	Holder
PRGC○○○○□○○	G15	Holder
PRGN○○○○□○○	G15	Holder
PRGP○○□○○○○	M15	Holder
PRXC○○○○□○○	G15	Holder
PSBN○○○○□○○	G19	Holder
PSDNN○○○○□○○	G17	Holder
PSKN○○○○□○○	G21	Holder
PTAN○○○○□○○	H31	Holder
PTLN○○○○□○○	G23 ,etc	Holder
PTXN○○○○□○○	H31	Holder
R		
RA○○○□○○	P10	Cutter
RA06P03NC	P11	Part
RBGX○○□	M5	Insert
RCGX09○○	M5 ,etc	Insert

Part No. Index. (Alphabetical order)

(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
RCGX12○○	M5 ,etc	Insert
RCGY09○○	M5 ,etc	Insert
RCGY12○○	M5 ,etc	Insert
RCL○○○□	N8	Holder
RCMX12	F41	Insert
RCMX32	G15	Insert
RCMX43	G15 ,etc	Insert
RD○○○□	P10	Cutter
REL○○○□	N6	Holder
REZ○○○□	N5	Holder
RLR-20S	Q36・Q37	Part
RNGN○○○	F7・F18	Insert
RNMG○○○	F26	Insert
RNMN○○○	G15 ,etc	Insert
RPGN○○○	F13	Insert
RPGX○○○	F14 ,etc	Insert
RPMT0602	M16 ,etc	Insert
RPMT0802	M16 ,etc	Insert
RPMT10T2	M16 ,etc	Insert
RPMT1203	M16 ,etc	Insert
RPMT1604	F41	Insert
RPMT2004	F41	Insert
RPMX1203	F41	Insert
RS○○○	P10・P11	Cutter
RTS-M○○	P6 ,etc	Part
S		
S○○□**-BGR**○○□○○	I34	Holder
S○○□**-HCLN**○○	L41	Holder
S○○□**-HDUN**○○	L42	Holder
S○○□**-HSKN**○○	L43	Holder
S○○□**-MBRD**○○**-OH**	L32	Holder
S○○□**-SCLC**□○○□○○**-OH**	L36	Holder
S○○□**-SCLP**□○○□○○**-OH**	L36	Holder
S○○□**-SEXR**□□○□○○**-OH**	L34	Holder
S○○□**-SRC**○○□	M16 ,etc	Holder
S○○□**-STUC**□○○□○○**-OH**	L39	Holder
S○○□**-STUP**□○○□○○**-OH**	L38	Holder
S○○□**-TCLN**○○	L41	Holder
S○○□**-TSKN**○○	L43	Holder
S○○□**-TWGR**○○	I19	Holder
S○○□**-WCLN**○○	L41	Holder
S○○□**-WDUN**○○	L42	Holder
S○○□**-WSKN**○○	L43	Holder
S○○□**-WWLN**○○	L44	Holder
SALS-063	P6 ,etc	Part
SBB○○○□□○○○	L24	Insert
SBB○○○□□○○○**-S**	L24	Insert
SBFB○○○	L24	Insert
SBFS○○○	L24	Insert
SBG○○○○	I28	Insert
SBT○○○	J18	Insert
SCAC○○○○	H17	Holder
SCJ-M6-○○	L12	Part
SCJ-R1/8-○○	L12	Part
SCJ-R1/8-○○**-L**	A23	Part
SCLC○○○○	H17	Holder
SCLCR○○○○□○○□**-F02OH**	A15・H16	Holder
SCMT○○	F42	Insert
SDCW1204○○	P24	Insert
SDCW43	P24	Insert
SDEW0602	F42	Insert
SDJC○○○○	H19	Holder
SDJCR○○○○□○○□**-F02OH**	A15・H18	Holder
SDK○○	F42	Insert
SDKN1203	F42	Insert
SDKN1504	F42	Insert
SDNCN○○**-X**○○	H21	Holder
SDQC○○**-X**○○	H19	Holder
SDW1204	P24	Insert
SDXC○○○○	H19	Holder
SEK42	F42	Insert
SEKN1203	F42	Insert
SFG○○○□○○○□	I28	Insert
SHFB○○○○	L20	Insert
SHFS○○○○	L20	Insert
SNEN1204	P23	Insert
SNGA○○○	F8・F9	Insert
SNGA○○○**PE**	F18	Insert
SNGF1204○○	P23	Insert
SNGG○○○	F27・F28	Insert
SNGN○○○	F8・F9	Insert
SNGX1207○○	F9	Insert
SNMA○○○	F8	Insert
SNMA○○○**PE**	F18	Insert
SNMG○○○	F27	Insert
SNMN○○○	F9・F18	Insert
SPGN○○○	F13・F22・F42	Insert
SPGR○○○	F42	Insert
SPMH0903○○	M17 ,etc	Insert
SPMH326	M17 ,etc	Insert
SPMH328	F42	Insert
SPMN1204○○	F42	Insert
SPMN1904○○	F42	Insert
SPMN4310	M17 ,etc	Insert
SPMN632	F42	Insert
SPMR1204○○	M17 ,etc	Insert
SPMR4310	M17 ,etc	Insert
SPR1/8	A15	Part
SR○○	J24	Insert

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(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
SR08	G7 ,etc	Part
SR-16-○○○	H76・H77	Part
SRF○○□○○□	M14 ,etc	Holder
SRG○○□○○□	M14 ,etc	Holder
SR-M5＊6	L25	Part
SS○○○○□	L21 ,etc	Part
SS04045FS	L16	Part
SS0406F	L16	Part
SS0605SC	L11	Part
SS0806F	L11	Part
SS0811R-OH	L11	Part
SS0806F-OH	L11	Part
SS-DSU-B8L23	H91	Holder
SS-DSU-L23	H91	Holder
SS-DSU-SK	H91	Holder
SSP○○	P6	Part
SSP○○○N○○○○H	A24・K2	Insert
SSP○○○N○○○○S	A24・K2	Insert
ST 5R B01B	P15	Part
STAC○○	H28	Holder
STTN○○○○	J15	Holder
SVAC○○○○	H54	Holder
SVJC○○○○	H23	Holder
SVQC○○○○	H25	Holder
SVQP○○○○	H27	Holder
SVVC○○○○	H25	Holder
SVXC○○○○	H23	Holder
SVXP○○○○	H27	Holder
SW 4＊60	P15	Part
SWS-M5-15	P6	Part
T		
T-07	N5・N6	Part
T-15A	P22 ,etc	Part
T-20	P24	Part
TB○○	H50	Holder
TB○○○○	H51	Insert
TBDP○○○	H49	Holder
TBDP○○○	H49	Insert
TBGE521	F14	Insert
TBGE522	F43	Insert
TBGN0601○○	F43・F12・F22	Insert
TBMH32○○○	H53	Insert
TBP○○	H43	Holder
TBP¾○○H-OH	A16・H42	Holder
TBP72FR○○○-BM	H43	Insert
TBPA○○	H45	Insert
TBPA70FR○○○-BM	H45	Insert
TBPS60FR○○	H84	Insert
TBT○○□	H50	Holder

Part No.	Listed on	Part name
TBVC11FR○○	H46	Insert
TBVCR○○	H46	Holder
TC○○0902	F43・F44	Insert
TC○○1102	F43・F44	Insert
TC5TN	G23 ,etc	Part
TC6CN	G7 ,etc	Part
TCBN○○○○	G9	Holder
TCGB0601○○	F44	Insert
TCGD521	F44	Insert
TCGD52Y	F44	Insert
TCGH0601○○	F43	Insert
TCGP521	F43	Insert
TCGP52Y	F43	Insert
TCGT0902○○	F43	Insert
TCGT1102○○	F43	Insert
TCGT16T3○○	F43	Insert
TCGW06○○	F44	Insert
TCGW0902○○	F44	Insert
TCLN○○○○	G7	Holder
TCMT1102○○	F43	Insert
TCMT16T3○○	F43	Insert
TEEN2204PFTR	F45	Insert
TF33○○	H29	Insert
TFD○○	F40	Insert
TFT○○	H29	Holder
TFT09	F46	Insert
TFT11	F46	Insert
TFV11	F49	Insert
TGC10T○○	J20	Holder
TMN○○	J20	Insert
TNEG1604○○	F30	Insert
TNGA○○○	F10・F19・F30	Insert
TNGA○○○PH	F19	Insert
TNGA○○○TN	F30	Insert
TNGG○○○	F29・F30	Insert
TNGN○○○	F10・F11	Insert
TNMA○○○	F10・F19	Insert
TNMA○○○PH	F19	Insert
TNMG○○○	F29・F30	Insert
TNMN○○○	F11・F19	Insert
TNMN○○○STN	F19	Insert
TNMN333STNF	F11	Insert
TORX-T○○	H76	Part
TPGB0802○○	F45	Insert
TPGB0902○○	F45	Insert
TPGD○○○	F45	Insert
TPGE○○○	F14・F45	Insert
TPGH○○○	F44・F45	Insert
TPGN○○○	F14・F45	Insert
TPGN○○○PT	F22	Insert

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(○ represents a number and □ represents a letter)

Part No.	Listed on	Part name
TPGP○○○	F44・F45	Insert
TPGR○○○	F44・F45	Insert
TPGS731	F45	Insert
TPGW1103○○PT	F22	Insert
TPKN1603PDTR	F45	Insert
TPKN2204PDTR	F45	Insert
TSDNN○○○○□○○	G17	Holder
TSN○○-○○	M19	Insert
TSSN○○○○□○○	G17	Holder
TTFN○○○○□○○	G25	Holder
TTGN○○○○□○○	G23	Holder
TTMA4360	J15	Insert
TTMH3260	J15	Insert
TTP(S)○○F○□	J11	Insert
TTP○○	J10	Holder
TTP○○□○□	J11	Insert
TW○○	J23	Insert
TWC○□○○	J24	Cutter
TWG○○○○□	I19	Holder
TWG○○○○○	I19	Insert
U		
U104-40	P6 ,etc	Part
U107T○○	P11	Part
V		
VBGT○○○	F47	Insert
VBGW○○○	F23	Insert
VBMT○○○	F47	Insert
VCET○○○	F47	Insert
VCGT○○○	F47・F48	Insert
VCGT1303○F2M	H54	Insert
VCGW1103○○H	F48	Insert
VCGW1103○○PD	F23	Insert
VCGW1604○○PD	F23	Insert
VCMT1103○○T□AS	F47・F48	Insert
VCMW1103○○	F23	Insert
VGW○○	M5 ,etc	Insert
VNGA○○○	F12	Insert
VNGA○○○PQ	F20	Insert
VNGG○○○	F31	Insert
VNMA○○○	F12	Insert
VNMG○○○	F31	Insert
VPET○○○	F48	Insert
VPGT1103○○	F48	Insert
W		
W○○○	G29 ,etc	Part
WCBN○○○○□○○	G9	Holder
WCGT0402○○	F49	Insert
WCLN○○○○□○○	G7	Holder
WDHN○○○○□○○	G13	Holder
WDJN○○○○□○○	G11	Holder
WDNNN○○○○□○○	G13	Holder
WNGA○○○	F12	Insert
WNGG○○○	F32	Insert
WNMG○○○	F32	Insert
WNX44-C10T010120	A41・P21	Insert
WNX44-R10T010120	A41・P21	Insert
WS0616	M17 ,etc	Part
WS0616-T15	P22	Part
WS0620	M18 ,etc	Part
WS-4	G29 ,etc	Part
WS-5	G29 ,etc	Part
WS-6	G29 ,etc	Part
WSDNN○○○○□○○	G17	Holder
WSSN○○○○□○○	G17	Holder
WTFN○○○○□○○	G25	Holder
WTGN○○○○□○○	G23	Holder
WVJN○○○○□○○	G27	Holder
WVPN○○○○□○○	G27	Holder
WVVNN○○○○□○○	G27	Holder
WWLN○○○○□○○	G29	Holder
X		
XX2815-04-○○□	Q36	Part
Y		
Y-GTPA○○	I27	Holder
Y-GTPA○○-OH	A17・I27	Holder
Y-GTT○○□	I11	Holder
Y-GTT○○□-OH	A17・H53・I11	Holder
Y-SDJCR○○○○□	H21	Holder
Y-SDJCR○○□○○-OH	A15・H21	Holder
Y-SDNCN○○○○□	H21	Holder
Y-SVXCL12-11S	H23	Holder
Y-TBP○○	H43	Holder
Y-TBP○○□-OH	A16・H43	Holder
Z		
ZT○○○○□	P15	Insert

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