union materials

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EC-1803-HY

UNION CUTTING TOOLS

union materials

CERABIT

CUTTING TOOLS

- CERAMIC
- CERMET
- PCBN / PCD
- TOOL HOLDER
- MILLING CUTTER

union materials

SPEEDY SOLUTION!!

High Speed !

High Quality !

High Performance !

A22

A82

A106

A130

A178

B1

C1

D1

INTRODUCTION

Union Materials Corporation has accumulated technologies and experiences over 40 years through developing and manufacturing various high-tech materials. Including hard ferrite magnets which are awarded Best Supplier from Robert Bosch GmbH for seven times consecutively in last 18 years, Union Materials Corporation manufactures various ceramic-based parts, cutting tools and industrial ceramics for automotive, electrical & electronic engineering and machinery industry.

Union cutting tool products are advanced materials developed with high technologies through long-term experiences, continuous studies and applications to commercialization of new materials. We have attained many great achievements in the field of various cutting tools for automotive, steel mill, aerospace and machinery field.

As of March 14 2017, Union Corporation has been the largest shareholder of Union Materials Corporation. We started new era with new company name, Union Materials Corporation since September 28, 2017 in accordance with the change of major shareholder which was originally Ssangyong Cement to Union Corporation.

Union Materials Corporation firmly promises to engage in its current business activities and will endeavor to support our customers for satisfaction.

Seoul HQ Office

Daegu plant

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CERAMIC

SiC-Whisker	SW400	High Speed Steel, High Chrome Steel in medium or low speed cutting. Roughing and medium cutting with heavy interruption
	SW800	Nickel Base Alloy, Cobalt Base Alloy in high speed cutting. Roughing and finishing with continuous or light interruption
Al_2O_3+TiC(N)	ST100	Finishing for hardened steel and cast iron
	ST300	General machining for hardened steel and cast iron
	ST500	Fine finishing for hardened steel and cast iron
	ST900	Fine finishing for hardened steel and cast iron in high speed
TiN Coating	TC100	TiN coated on ST100 grade
	TC300	TiN coated on ST300 grade
AlTiN Coating	TM300	AlTiN coated on ST300 grade
TiC+Al_2O_3	SD200	Turning & Milling for ductile cast iron in finish
Al_2O_3+ZrO_2	SZ200	Medium cutting for cast iron
	SZ300	Medium cutting for high hardness cast iron
Si_3N_4	SN26	Roughing and interrupted cutting for cast iron
	SN300	Roughing and heavy interrupted cutting for cast iron
	SN400	General machining for cast iron
	SN500	Roughing for hard material in high speed
	SN600	Roughing for hard material with interrupted in high speed
	SN800 (SiAlON)	General machining for Ni-based alloy and cast iron (Dry)
	NEW SN1000 (SiAlON)	General machining for Ni-based alloy and Cobalt-based alloy
Multi Coating	NEW NC400	AlTiN/TiN coated on SN400 grade

CERMET

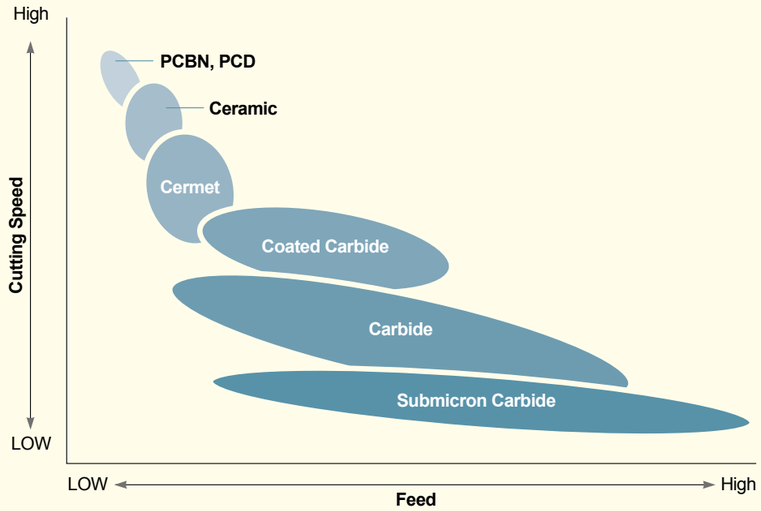
TiCN	TX510	Finishing and boring for steel
	TX515	Finishing and boring for carbon steel and alloy steel
	TX520	General machining and bearing for steel
	TX530	General application for milling
TiN Coating	TX910	TiN Coated on TX510 grade
	TX915	TiN Coated on TX515 grade
	TX920	TiN Coated on TX520 grade
	TX930	TiN Coated on TX530 grade

PCBN/PCD

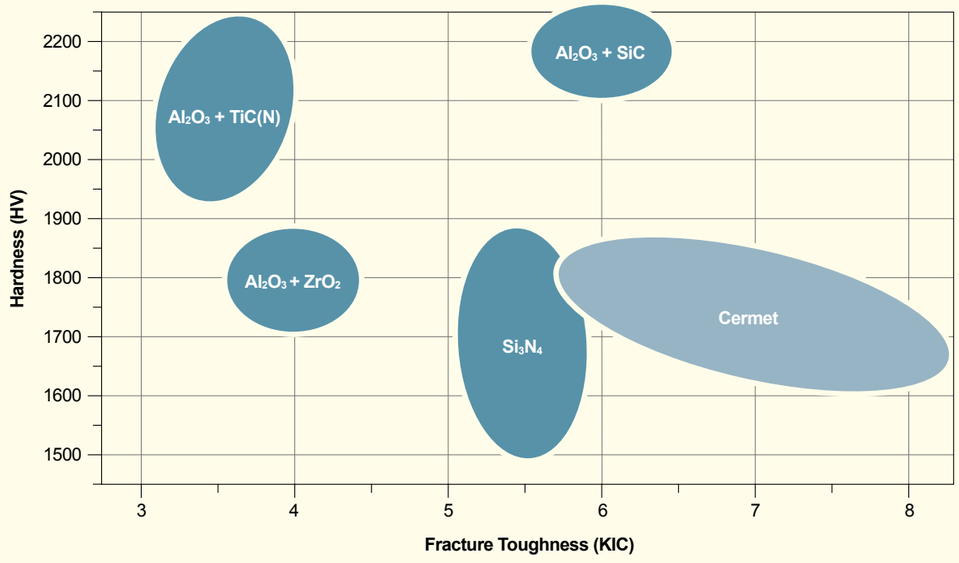
PCBN	SBN1000	Medium and finishing for cast iron
	SBN2000	Continuous cutting for hardened steel
	SBN3000	Moderately interrupted turning and finishing milling for steel
	SBN4000	Heavy interrupted cutting of hardened steel
	SBN5000	Solid PCBN for cast iron
PCD	SPD1000	Machining for extremely abrasive materials (plastic composites)
	SPD2000	General machining for aluminum alloys and copper
	SPD3000	Machining for aluminum alloys(>11% Si) and sintered carbide

GRADE INFORMATION

Application Range



Mechanical Properties



CERAMIC

Union Ceramics take pride in its outstanding wear resistance and thermal shock resistance with high speed cutting. Pure raw materials give stability and fine microstructure to the products.
Through HIP process, shaped bodies are completely condensed so that the finished goods are strong and resistant against fracture and wear.

- Improved work efficiency by increasing cutting speed on extremely higher than carbide inserts.
- Longer tool life through excellent wear resistance
- Precise cutting and superior surface roughness

Whisker	SW400	Excellent flank & notch wear in high speed cutting Al_2O_3+SiC	High Speed Steel, High Chrome Steel in medium or low speed cutting Roughing and medium cutting with heavy interruption	Tougher ⇕ Harder
Whisker	SW800	Excellent flank & notch wear in high speed cutting Al_2O_3+SiC	Nickel Base Alloy, Cobalt Base Alloy in high speed cutting Roughing and finishing with continuous or light interruption	
Al2O3 Series	ST100	Tougher alternative to ST300 High thermal shock resistance Al_2O_3+TiC	Universal grade for machining cast iron and hardened steel	Tougher ⇕ Harder
Al2O3 Series	ST300	Excellent wear resistance Al_2O_3+TiCN	A basic choice for machining hardened steel and alloy steel	
Al2O3 Series	ST500	Alternative to PCBN fine microstructure Al_2O_3+TiCN	Fine finishing for hardened steel and cast iron	
Al2O3 Series	ST900	Excellent wear and thermal shock resistance Al_2O_3+TiCN	Fine finishing for hardened steel and cast iron in high speed	
Al2O3 Series	TC100	Wear resistance improved TiN coated	Finishing for hardened steel and cast iron	
Al2O3 Series	TC300	Excellent wear resistance TiN coated	Finishing for hardened steel and cast iron	
Al2O3 Series	TM300	Excellent wear resistance & thermal shock resistance	Finishing for hardened steel and cast iron	
Al2O3 Series	SD200	High thermal shock resistance Usable with coolant TiC+Al_2O_3	Machining ductile cast iron Finishing for ductile cast iron and hard materials	Finishing for ductile cast iron
ZrO2 Series	SZ200	Toughened by zirconia High chemical stability Al_2O_3+ZrO_2	Finishing, semi-finishing of cast iron and steel	Tougher ⇕ Harder
ZrO2 Series	SZ300	Harder alternative to SZ200 Al_2O_3+ZrO_2	Finishing, semi-finishing of cast iron and steel	
Si3N4 Series	SN26	Good toughness and thermal shock resistance Well balanced wear resistance and toughness Si_3N_4	First choice for roughing with interrupted cuts Roll turning and milling of cast iron and steel	Roughing in lower speed
Si3N4 Series	SN300	Tougher alternative to SN400 Thermal shock resistance and good toughness Si_3N_4	Roughing and high speed cutting with interruption	Tougher ⇕ Harder
Si3N4 Series	SN400	Excellent wear resistance in high speed cutting Si_3N_4	First choice for roughing of cast iron High speed machining with interrupted cuts	
Si3N4 Series	SN500	Harder alternative to SN400 Improved wear resistance at high cutting speed Si_3N_4	High speed roughing for cast iron	
Si3N4 Series	SN600	Excellent wear resistance in interrupted cutting Si_3N_4	Roughing for hard material with interruption and high speed	
Si3N4 Series	SN800	Advanced grade with SiAlON contained superior edge strength SiAlON	Great performance against notch wear High speed roughing of high temperature alloy and inconel	Harder ⇕ Tougher
Si3N4 Series	SN900	Excellent thermal shock resistance and thermal conductivity SiAlON	Tough machining in Heat Resistance Super Alloy (HRSA)	
Si3N4 Series	NEW SN1000	Excellent thermal shock resistance and thermal conductivity SiAlON	Ni-based Alloy, Cobalt-based Alloy in medium or low speed cutting Roughing and Medium cutting with heavy interruption	
Si3N4 Series	NEW NC400	Excellent wear resistance & thermal shock resistance	Cast Iron in roughing and semi-finishing cutting	

GRADE INFORMATION

Physical Properties

Grade	Composition	Color	Density (g/cm^3)	Hardness (HV)	Toughness ($MPa \cdot m^{1/2}$)	Thermal Conductivity (cal/cm. sec. ℃)
SW400	Al_2O_3+SiC	Green	3.8	2,100	7.0	-
SW800	Al_2O_3+SiC	Green	3.7	2,100	7.0	-
ST100	Al_2O_3+TiC	Black	4.20	2,100	4.00	0.08
ST300	Al_2O_3+TiCN	Black	4.40	2,150	4.50	0.08
ST500	Al_2O_3+TiCN	Black	4.30	2,200	4.50	0.08
ST900	Al_2O_3+TiCN	Black	4.30	2,250	4.70	0.08
TC100	ST100+TiN PVD	Gold	4.20	2,150	4.00	-
TC300	ST300+TiN PVD	Gold	4.40	2,200	4.50	-
TM300	ST300+AlTiN PVD	Black	4.40	2,250	4.50	
SD200	TiC+Al_2O_3	Black	4.60	2,200	4.50	0.07
SZ200	Al_2O_3+ZrO_2	White	4.00	1,800	4.50	0.07
SZ300	Al_2O_3+ZrO_2	Pink	4.10	1,850	4.50	0.07
SN26	Si_3N_4	Black	3.30	1,600	5.00	0.06
SN300	Si_3N_4	Gray	3.20	1,600	6.00	0.05
SN400	Si_3N_4	Gray	3.20	1,650	6.00	0.05
SN500	Si_3N_4	Gray	3.20	1,700	6.00	0.05
SN600	Si_3N_4	Black	3.20	1,700	6.50	0.07
SN800	Si_3N_4	Black	3.20	1,900	6.00	0.04
SN1000 NEW	Si_3N_4+Al_2O_3	Black	3.3	1,800	7.00	
NC400 NEW	SN400+PVD (AlTiN/TiN)	Gold	3.2	1,650	6.00	

Choice of Ceramic Grade for Workpiece

		ST100/ST300 ST500/ST900 TC100/TC300 TM300	SD200	SZ200 SZ300	SN26 SN300/SN400 SN500/SN600 NC400	SN800 SN1000	SW400	SW800
Cast Iron	Gray Cast Iron	◎	○	◎	◎	○		
	Chilled Cast Iron	◎		◎	◎	◎		
	Ductile Cast Iron	○	◎		○	○		○
Steel	Mild Steel			○				
	Carbon Steel			○				
	Alloy Steel	◎		○		◎	○	○
	Forged Steel	◎						
	Heat Treated Steel	◎						
	High Speed Steel	◎					◎	
	High Manganese Steel	○			○	○	◎	○
	Stainless Steel							
	Heat Resistant Steel	○			○	○	○	○
	Super Alloy Steel	○			○	◎	○	◎
	Inconel					◎	○	◎

◎ : Excellent ○ : Good

Choice of Ceramic Grade for Workpiece

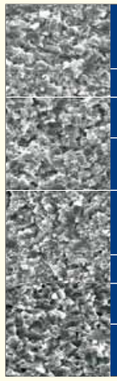
Application	Grade		Workpiece	Machining Type	Speed (V) (m/min)	Feed (f) (mm/rev)	Depth (DOC) (mm)
Turning	ST100 ST300 ST500 ST900 TC100 TC300 TM300	Gray Cast Iron	Gray Cast Iron (FC) Malleable (FCMB)	Rough Finish	150 ~ 800 200 ~ 1,200	0.2 ~ 0.5 0.3 ~ 0.5	3 ~ 6 0.1 ~ 0.5
			Chilled Cast Iron	Rough Finish	30 ~ 100 50 ~ 200	0.1 ~ 0.2 0.05 ~ 0.15	0.5 ~ 1.5 0.1 ~ 0.5
		Steel	Carbon Steel Alloy Steel Bearing Steel	Rough Finish	150 ~ 400 200 ~ 800	0.2 ~ 0.5 0.05 ~ 0.2	2 ~ 5 0.1 ~ 0.5
			Hard Steel (HRC 45≥)	Rough Finish	20 ~ 100 40 ~ 200	0.1 ~ 0.2 0.05 ~ 0.5	0.5 ~ 1.5 0.1 ~ 0.5
	SD200		Ductile Cast Iron Nodular Cast Iron	Rough Finish	100 ~ 400 200 ~ 800	0.1 ~ 0.2 0.05 ~ 0.25	1 ~ 2 0.1 ~ 0.5
	SZ200 SZ300		Gray Cast Iron (FC) Steel (HRC 45≤)	Rough Finish	200 ~ 700 300 ~ 1,200	0.2 ~ 0.4 0.05 ~ 0.3	2 ~ 5 0.1 ~ 0.5
	SN26 SN300 SN400 SN500 SN600 NC400 NEW	Gray Cast Iron	Gray Cast Iron (FC) Malleable (FCMB)	Rough Finish	150 ~ 1,100 250 ~ 1,200	0.3 ~ 0.8 0.15 ~ 0.4	< 5 < 1
			Chilled Cast Iron	Rough Finish	20 ~ 100 60 ~ 200	1.0 ~ 2.0 0.5 ~ 1.0	< 5 < 1
	SN800 SN1000 NEW		Ni-Based Alloy Non-Ferrous Metal Inconel	Rough Finish	150 ~ 250 150 ~ 450	0.2 ~ 0.4 0.1 ~ 0.2	< 5 < 1
	SW400 SW800		High temperature alloys Inconel Stellite	Rough Finish	180 ~ 360 180 ~ 450	0.1 ~ 0.25 0.1 ~ 0.30	1 ~ 3 0.5 ~ 2.0
Milling	SN26 SN300 SN400 SN500 SN600 NC400 NEW		Gray Cast Iron (FC)	Rough Finish	100 ~ 1,200 150 ~ 1,500	0.3 ~ 0.5 0.3 ~ 0.7	< 5 < 3
			Ductile Cast Iron Alloy Steel	Rough Finish	90 ~ 500 100 ~ 700	0.1 ~ 0.3 0.1 ~ 0.4	< 5 < 3
	SN800 SN1000 NEW		High temperature alloys Inconel Stellite	Finish	700 ~ 1,000	0.05 ~ 0.15 / tooth	0.5 ~ 2.5
	SW400 SW800		High temperature alloys Inconel	Rough	150 ~ 400	0.05 ~ 0.1 / tooth	1 ~ 3

GRADE INFORMATION

CERMET

A matrix of TiCN with carbide as a metal binder, Union Cermets are tougher than ceramics and harder than tungsten carbides. It shows greater wear resistance than carbide and its cutting speed is also much higher than carbide. Cermet inserts give excellent surface finish and high-speed machining.

- Four different grades for different workpiece and cutting condition.
- Ideal for high-speed finishing and milling of mild steel, carbon steel and alloy steel.
- Excellent performance in turning, grooving, boring, bearing and milling.



TX510	Excellent wear resistance Outstanding surface finish TiCN	Fine-finishing and boring for steel	Harder
TX910	TiN coating		
TX515	Wear resistance and high mechanical strength TiCN	Finishing and boring for carbon steel and alloy steel	
TX915	TiN coating		
TX520	Excellent thermal conductivity and wear resistance TiCN	The first choice for machining steel Turning, grooving, boring and bearing for steel	
TX920	TiN coating		
TX530	The toughest cermet grade TiCN	Wide range of milling for steel materials	
TX930	TiN coating		Tougher

Physical Properties

Grade	Composition	Color	Density (g/cm3)	Hardness (HRA)	Toughness (MPa·m1/2)	Thermal Conductivity (cal/cm. sec. ℃)
TX510	TiCN	Silver	6.50	93.50	7.00	0.08
TX515	TiCN	Silver	6.48	93.00	7.50	0.08
TX520	TiCN	Silver	6.53	92.50	8.00	0.09
TX530	TiCN	Silver	6.35	91.00	8.40	0.09
TX910	TX510+TiN PVD	Gold	6.50	98.50	7.00	-
TX915	TX515+TiN PVD	Gold	6.48	98.00	7.50	-
TX920	TX520+TiN PVD	Gold	6.53	97.50	8.00	-
TX930	TX530+TiN PVD	Gold	6.35	96.00	8.40	-

Choice of Ceramic Grade for Workpiece

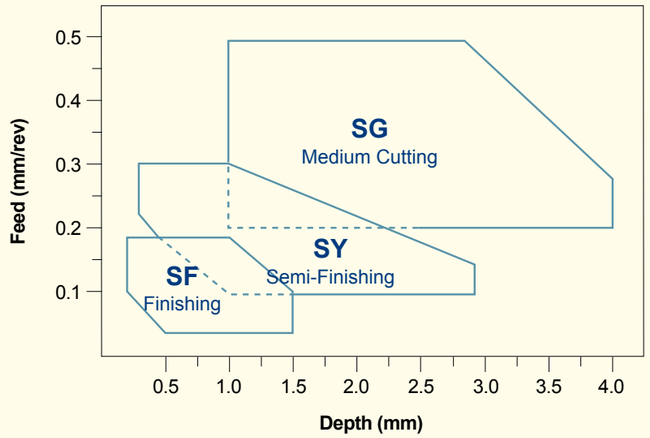
	TX510/TX910	TX515/TX915	TX520/TX920	TX530/TX930
MILD STEEL	◎	◎	◎	○
CARBON STEEL	◎	◎	◎	◎
ALLOY STEEL	○	○	○	○
FORGED STEEL	◎			
HEAT TREATED STEEL	◎			
HEAT RESISTANT STEEL		◎	◎	◎

◎ : Excellent ○ : Good

Choice of Ceramic Grade for Workpiece

Application	Grade	Workpiece	Machining Type	Speed (V) (m/min)	Feed (f) (mm/rev)	Depth (DOC) (mm)
Turning	TX510/TX910	Mild Steel, Carbon Steel, Alloy Steel	Finishing	100 ~ 600	0.03 ~ 0.3	0.1 ~ 1.5
	TX515/TX915	Mild Steel, Carbon Steel, Alloy Steel	Finishing Medium	100 ~ 500	0.03 ~ 0.3	0.1 ~ 2.0
	TX520/TX920	Bearing Steel, General Steel	Finishing Medium	100 ~ 400	0.03 ~ 0.3	0.1 ~ 2.0
Milling	TX530/TX930	Mild Steel, Carbon Steel, Alloy Steel	Medium Roughing	100 ~ 400 100 ~ 500	0.1 ~ 0.3 0.1 ~ 0.5	< 5 < 3

Choice of Chipbreaker



Chipbreaker Type	Shape	Machining Type	Characteristics
SF		Finishing	Sharp and narrow C/B Optimum for D=0.10~1.50, f=0.05~0.20 Specialized for shaft machining
SY		Semi-finishing	General performing C/B Optimum for D=0.30~2.50, f=0.10~0.30 Low carbon steel, pipe (STKM) machining
SG		Medium cutting	Wider C/B design Optimum for D=1.00~5.00, f=0.20~0.50 Low carbon steel

GRADE INFORMATION

PCBN / PCD

Union PCBN is an ultra hard cutting tool consisting of polycrystalline cubic boron nitride with metallic or ceramic binder. It is available both tip brazed and solid CBN.
Union PCD is an ultra hard cutting tool consisting of polycrystalline diamond which is tip brazed to a carbide insert according to the various applications.

- PCBN is for hardened ferrous material
- PCD is for non-ferrous material, wood and aluminum and copper alloys at extremely high speed
- Extremely hard and wear-resistant
- Dry or wet machining depending on the cutting condition

PCBN	SBN1000	Ultra high hardness Its hardness is up to 3,900 Hv Content of PCBN : 95%	Ultra cutting speed for cast iron from roughing to finishing Machining chilled cast irons and high chrome alloy steel	Harder
	SBN2000	Machining for continuos cut of hardened steel Its hardness is up to 2,700 Hv Content of PCBN : 50%	Precision finishing of hardened steel Recommeded to use for hard materials Bearing steel, forged steel and high speed steel	
	SBN3000	Best combination of wear resistance and toughness Its hardness is up to 2,700 Hv Content of PCBN : 60%	Light interrupted cut of hardened steel General purpose of turning and milling for hardened steel	
	SBN4000	Good resistance to crater and flank wear Its hardness is up to 2,900 Hv Content of PCBN : 65%	Heavy interrupted cut of hardened steel	
	SBN5000	Extreme wear resistance Solid CBN Content of PCBN : 93%	Rough machining of cast iron powder metal alloy	Tougher
PCD	SPD1000	Machining with fine surface finish Particle size : 4~5μm	Machining of aluminum and wood Gives fine surface finish in turning operation	
	SPD2000	Ultra high hardness Great wear resistance Particle size : 8~9μm	The first choice of PCD grades Turning operation of aluminum and copper alloy Machining aluminum alloy with lower percentage of Si	
	SPD3000	Machining with interruption Particle size : 15~22μm	Milling operation of aluminum alloy Machining ultra fine alloy and powder sintered metal cutting of composites	Harder

Recommended Cutting Conditions

Application	Grade		Workpiece	Speed (V) (m/min)	Feed (f) (mm/rev)	Depth (DOC) (mm)
Turning	PCBN	SBN1000	Cast iron	400 ~ 1,000	0.15 ~ 0.45	0.10 ~ 2.00
			High hardened cast iron	75 ~ 150	0.15 ~ 0.30	0.10 ~ 1.80
			Nodular cast iron roll	45 ~ 60	0.60 ~ 0.80	2.00 ~ 3.50
			Carbide roll	10 ~ 15	0.15 ~ 0.25	0.50 ~ 2.50
		SBN2000	High hardened steel (roughing)	60 ~ 140	0.15 ~ 0.40	0.70 ~ 2.30
			High hardened steel (finishing, >HRC 45)	100 ~ 140	0.10 ~ 0.20	0.10 ~ 0.75
			Hardened alloy steel (>HRC 35)	100 ~ 240	0.05 ~ 0.30	0.10 ~ 2.50
		SBN3000	Hardened steel	80 ~ 160	0.02 ~ 0.20	<0.5
			Heat resistance sintered steel	50 ~ 100	0.05 ~ 0.20	<0.5
		SBN4000	Hardened steel	120 ~ 250	0.025 ~ 0.50	0.05 ~ 0.30
			Powder metal & Sintered irons	200 ~ 400	0.025 ~ 0.20	0.05 ~ 0.20
			superalloys	200 ~ 400	0.10 ~ 0.30	0.20 ~ 2.00
		SBN5000	Cast iron	500 ~ 2,000	0.10 ~ 0.50	<0.5
			Ductile cast iron	200 ~ 600	0.10 ~ 0.40	<0.5
			Hard cast iron (HRC 59)	50 ~ 150	0.10 ~ 1.00	<0.5
	PCD	SPD1000	Plastic alloy	300 ~ 1,000	0.05 ~ 0.25	0.05 ~ 3.00
			Wood	1,000 ~ 2,500	0.10 ~ 0.50	0.20 ~ 4.50
		SPD2000	Aluminum / Zinc / Copper	600 ~ 1,000	0.05 ~ 0.25	0.05 ~ 0.30
		SPD2000	Aluminum alloy (Si 4~8%)	800 ~ 2,500	0.10 ~ 0.30	0.05 ~ 3.00
		SPD3000	(Si 9~14%)	500 ~ 1,290	0.10 ~ 0.30	0.05 ~ 3.00
		SPD3000	(Si 16~18%)	300 ~ 600	0.10 ~ 0.30	0.05 ~ 3.00
		SPD3000	Powdered Carbide Piece	50 ~ 250	0.10 ~ 0.40	0.10 ~ 4.00
			Sintered Carbide	20 ~ 40	0.05 ~ 0.20	0.02 ~ 0.45
Milling	PCBN	SBN1000	Cast iron (HB 180~230)	400 ~ 1,000	0.12 ~ 0.30	0.20 ~ 2.00
			Hardened cast iron (>HB 400)	120 ~ 240	0.12 ~ 0.30	0.20 ~ 2.00
		SBN2000	Hardened steel (>HRC 45)	120 ~ 240	0.10 ~ 0.25	0.12 ~ 1.00
			Hardened alloy steel (>HRC 35)	120 ~ 240	0.10 ~ 0.35	0.10 ~ 1.00
		SBN3000	Hardened steel (>HRC 45)	100 ~ 200	0.10 ~ 0.15	<0.5
		SBN4000	Hardened steel	150 ~ 250	0.025 ~ 0.30	0.05 ~ 0.20
	PCD	SPD3000	Aluminum alloy (<Si 14%)	300 ~ 3,000	0.10 ~ 0.25	0.12 ~ 1.00
			(>Si 15%)	100 ~ 240	0.10 ~ 0.35	0.10 ~ 1.00

Physical Properties

Grade	Contents of pCBN (%)	Particle size (μm)	Hardness (HV)
SBN1000	95	3	3,900
SBN2000	50	1	2,700
SBN3000	60	2	2,700
SBN4000	65	5	2,900
SBN5000	93	10	3,900

Grade	Particle size (μm)	Hardness (HV)
SPD1000	4 ~ 5	6,000 ~ 8,000
SPD2000	8 ~ 9	7,000 ~ 9,000
SPD3000	15 ~ 22	8,000 ~ 10,000

APPLICATION INDEX

TURNING

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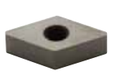
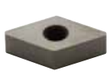
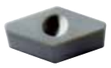
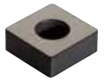
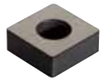
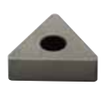
CNMX .. RD	CCGX	CCGW	CPGN	DNGA	DNMA	DNGN
 Page 29	 Page 29	 Page 30	 Page 31	 Page 32	 Page 32	 Page 33

DNGX	DNMX	DCGX	ENGN	RNGA	RNGN	RPGA
 Page 34	 Page 34	 Page 34	 Page 35	 Page 36	 Page 36	 Page 37

RPGN	RPGX .. DP	RNGX .. DP	RBGN	RCGN	SNGA	SNMA
 Page 37	 Page 38	 Page 38	 Page 39	 Page 39	 Page 40	 Page 40

SNGN	SNGX	SNMX	SNMX .. RD	SCGN	SCGX	SCGW
 Page 41	 Page 42	 Page 42	 Page 42	 Page 43	 Page 43	 Page 43

SPGN	TNGA	TNGN	TCUN	TPGN	TPUN	VNGA
 Page 44	 Page 45	 Page 46	 Page 47	 Page 48	Page 48	Page 49

VNGN	VNGX	WNGA	WNGX	CDH	F-Series	F-Series
Page 49	Page 50	Page 51	Page 51	Page 52	Page 53	Page 53

F-Series	F-Series	LNJ	SNGN3812R	RBGX	RCGX	RPGX
Page 54	Page 54	Page 55	Page 55	Page 56	Page 56	Page 57

TURNING

RXGX	SYBF	SYBR	SGF	SGR	SSF	SSR
Page 57	Page 58	Page 58	Page 59	Page 59	Page 60	Page 60

WFC	WRC	WFP	WRP
Page 61	Page 62	Page 63	Page 64

MILLING

HNEN	LNE	OEGB	OPEN	SNCN	SNCN .. ENTN	SNGN .. ING
Page 65	Page 65	Page 66	Page 66	Page 67	Page 67	Page 67

SDCN	SDCN .. T	SDCW	SEAN	SEAN .. NW	SEAN .. T	SPCN .. T
Page 68	Page 68	Page 68	Page 69	Page 69	Page 69	Page 70

SPCW	SPEN	SPHX	SPKN	SPKN .. SP	TNCN	TEKN
Page 70	Page 70	Page 71	Page 71	Page 71	Page 72	Page 72

TPKN	CNGN .. AZ	SNCN .. ZZT	SNCN .. GZ	SNCN .. KZ	SCGN .. WZ	SCGN .. XZ
Page 72	Page 73	Page 74	Page 74	Page 74	Page 75	Page 75

SCGN .. ZZ	SCGN .. MZ
Page 75	Page 76

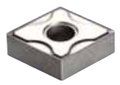
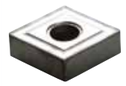
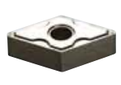
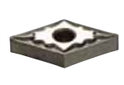
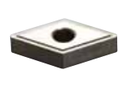
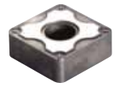
SPECIAL

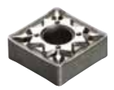
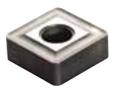
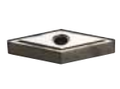
SVW	GVGN	SZT 5810	SNMX	SNGF	INGN	ENDMILL
Page 77	Page 77	Page 78	Page 78	Page 79	Page 79	Page 80

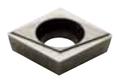
APPLICATION INDEX

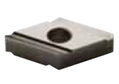
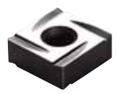
CERAMIC

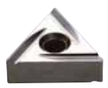
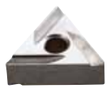
TURNING

CNMG .. SF	CNMG .. SY	CNMG .. SG	DNMG .. SF	DNMG .. SY	DNMG .. SG	SNMG .. SF
 Page 84	 Page 84	 Page 84	 Page 85	 Page 85	 Page 85	 Page 86

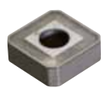
SNMG .. SY	SNMG .. SG	TNMG .. SY	TNMG .. SG	VNMG .. SG	WNMG .. SY	WNMG .. SG
 Page 86	 Page 86	 Page 87	 Page 87	 Page 87	 Page 88	 Page 88

CCMT	DCGW	CPGT	SPGT	TPGT	TPGT .. KC	TPGR
 Page 89	 Page 89	 Page 89	 Page 90	 Page 90	 Page 90	 Page 91

SPMW	DNGG	SNGG	SNGL	TNGG	TNGG .. FS	TNGG .. F
 Page 91	 Page 92	 Page 92	 Page 92	 Page 93	 Page 93	 Page 93

TNMG .. 2G	TNMG .. RM
 Page 94	 Page 94

MILLING

SDCN	SDKN	SDEN	SDEW	SNK	SEHW	SEKN
 Page 95	 Page 95	 Page 95	 Page 96	 Page 96	 Page 96	 Page 97

SEKN .. R	SPKN	TEKN	TPKN	YCE	XCET
 Page 97	 Page 97	 Page 98	Page 98	Page 99	Page 99

SPECIAL

BSN	BTN	GBF	INGN	RBAR	SBAR
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PCBN·PCD

PCBN

CNGA	CCGW	DNGA	DCGW	SNGA	SNGN	SCGW	TNGA
Page 108	Page 108	Page 108	Page 108	Page 109	Page 109	Page 109	Page 109

TCGW	TPGN	TPGB	TPGW	VNGA	VBGW	VCGW	SCGW .. FS
Page 110	Page 110	Page 110	Page 110	Page 111	Page 111	Page 111	Page 111

CNGA	CCGW	DCGW	SNGA	SCGW	DNGA	TNGA	TPGW
Page 112	Page 112	Page 112	Page 112	Page 113	Page 113	Page 113	Page 113

VNGA	VBGW	RCGX	RNGN	RPGN	CNGN	RNGN	SNGN
Page 114	Page 114	Page 115	Page 115	Page 115	Page 116	Page 116	Page 116

TNGN	CNGA	RNGA	SNGA	TNGA
Page 116	Page 117	Page 117	Page 117	Page 117

PCD

CNGA	CCGW	CPGW	DNGA	DCGW	SNGA	SNGN	SCGW
Page 118	Page 118	Page 118	Page 118	Page 119	Page 119	Page 119	Page 119

SPGN	SPGW	TNGA	TBGW	TCGW	TPGN	TPGB	TPGW
Page 120	Page 120	Page 120	Page 120	Page 121	Page 121	Page 121	Page 122

TPGT	VNGA	VBGW	VCGW
Page 122	Page 122	Page 122	Page 123

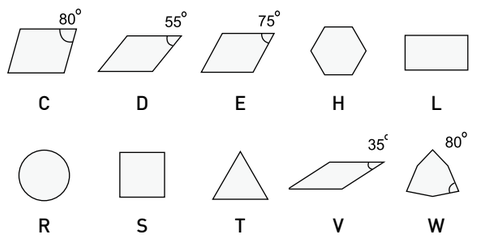
SPECIAL

NOTCH BITE	SFE .. 1C	SFE .. 2C	SBE .. 1C	SBE .. 2C
Page 124	Page 125	Page 125	Page 126	Page 126

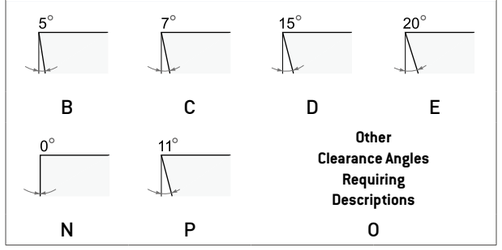
IDENTIFICATION SYSTEM

		1	2	3	4	5	6	7	8	9	10	11	12
ISO	TURNING	S	N	G	N	12	04	08	E040				
ASA		S	N	G	N	4	3	2					
	MILLING	S	P	K	N	4	3			E	D	T	R

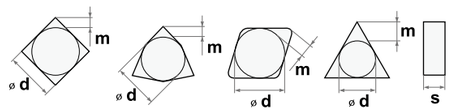
1 Shape



2 Clearance Angle



3 Tolerance

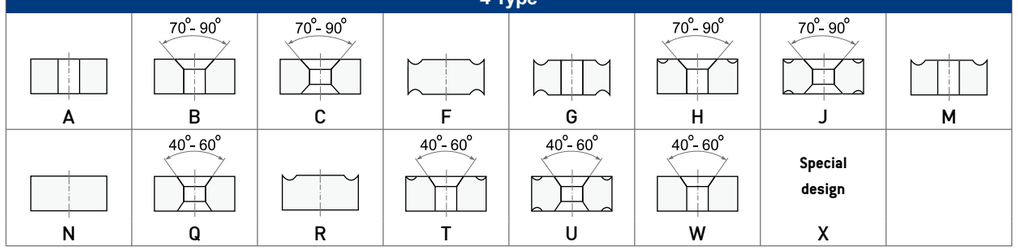


*See tables below

Symbol	d(mm)	m(mm)	s(mm)
A	±0.025	±0.005	±0.025
C	±0.025	±0.013	±0.025
E	±0.025	±0.025	±0.025
F	±0.013	±0.005	±0.025
G	±0.025	±0.025	±0.130
H	±0.013	±0.013	±0.025
J	*	±0.005	±0.025
K	*	±0.013	±0.025
L	*	±0.025	±0.025
M	*	*	±0.127
U	*	*	±0.127
N	*	*	±0.025

IC (mm)	D		C, E, H, O, S, T, R, W			
	d(mm)	m(mm)	d(mm)		m(mm)	
	M, N	M, N	J,K,L, M,N	U	M, N	U
5.56	±0.05	±0.11	±0.05	±0.08	±0.08	±0.13
6.35	±0.05	±0.11	±0.05	±0.08	±0.08	±0.13
7.94	±0.05	±0.11	±0.05	±0.08	±0.08	±0.13
9.52	±0.05	±0.11	±0.05	±0.08	±0.08	±0.13
12.70	±0.08	±0.15	±0.08	±0.13	±0.13	±0.20
15.87	±0.10	±0.18	±0.10	±0.18	±0.15	±0.27
19.05	±0.10	±0.18	±0.10	±0.18	±0.15	±0.27
25.40	-	-	±0.13	±0.25	±0.18	±0.38

4 Type



5 Cutting Edge Length

Diameter of inscribed circle	ASA		ISO						
	over 6.35 (IC)	over 5.56 (IC)	R	W	V	D	C	S	T
3.969	-	5	03	02	-	04	03	03	06
4.762	-	6	04	03	-	05	04	04	08
5.556	-	7	05	03	09	06	05	05	09
6.350	2	(8)	06	04	11	07	06	06	11
7.938	-	0	07	05	13	09	08	07	13
9.525	3	-	09	06	16	11	09	09	16
12.700	4	-	12	08	22	15	12	12	22
15.875	5	-	15	10	27	19	16	15	27
19.050	6	-	19	13	33	23	19	19	33
22.225	7	-	22	-	38	27	22	22	38
25.400	8	-	25	-	44	31	25	25	44
31.750	0	-	31	-	54	38	32	31	55

6 Thickness

Thickness(mm)	ISO	ASA	
		Over 6.35(IC)	Over 5.56(IC)
1.59	01	-	2
2.38	02	-	3
3.18	03	2	4
3.97	T3	-	5
4.76	04	3	6
5.56	05	-	-
6.35	06	4	-
7.94	07	5	-
9.52	09	6	-
12.70	12	8	-

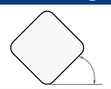
7 Nose-Radius

(mm)	ISO	ASA
Sharp	00	O
0.2	02	Y
0.4	04	1
0.8	08	2
1.2	12	3
1.6	16	4
2.0	20	5
2.4	24	6
2.8	28	7
3.2	32	8

8 Shape and Corner

Detailed edge preparations refer to the next page.

9 Land Angle

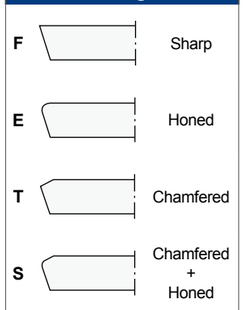


A	45°
D	60°
E	75°
F	85°
P	90°

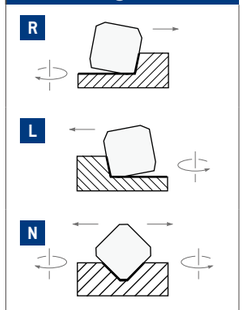
10 Relief Angle for Land

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

11 Edge



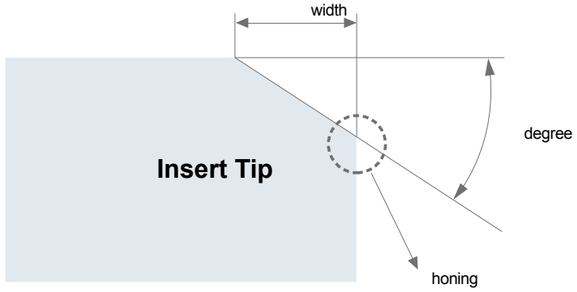
12 Cutting Direction



IDENTIFICATION SYSTEM

8 Chamfer Specification

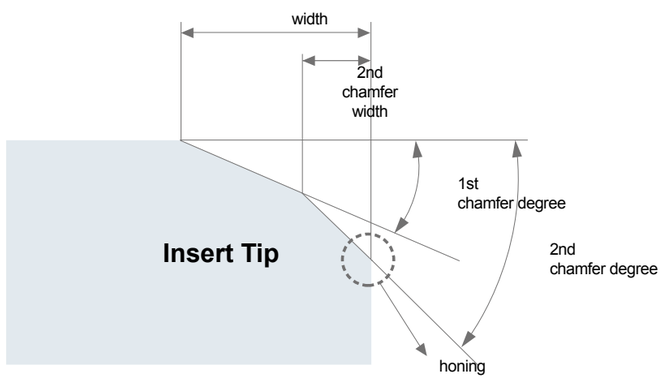
1 Mono chamfer



ISO S N G N 1 2 0 4 0 8 **E 0 4 0**

Chamfer Degree (°)	Chamfer Width (mm)		Honing (μm)
E : 20 F : 25 G : 30	01 : 0.05 02 : 0.10 03 : 0.15 04 : 0.20	10 : 0.50 20 : 1.00 40 : 2.00	0 : No Honing 1 : 10 2 : 20 3 : 30

2 Double chamfer



ISO S N G N 1 9 0 7 1 6 **X 5 4 2**

1st Chamfer Degree (°)	1st Chamfer Width (mm)		2nd Chamfer Width(mm)×Degree		Honing (μm)
W : 10 X : 15	3 : 1.00 4 : 1.20 5 : 1.50 6 : 2.00	A : 0.75 B : 1.25 D : 2.30	3 : 0.20×25 4 : 0.10×30 5 : 0.20×30	A : 0.15×30 B : 0.45×25	0 : No Honing 1 : 10 2 : 20 3 : 30 5 : 50

CERAMIC INSERT

Union Ceramic Cutting Tool is an inorganic material, die-pressed and sintered using very fine and pure raw materials with fine microstructure.
Since the Union ceramic inserts are prepared by HIP process to condense completely, it has high thermal shock resistance, excellent fracture toughness and distinguished wear resistance through HIP.

CERMET INSERT

Union Cermet Cutting Tool is a composite between titanium carbide or titanium nitride with carbide-metal binder. Since the toughness of the cermet is higher than that of ceramic and the hardness of the cermet is harder than that of the tungsten carbide, cermet cutting tool shows high wear resistance and excellent surface finish under high speed cutting.

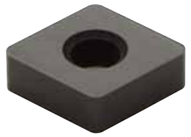
PCBN/PCD INSERT

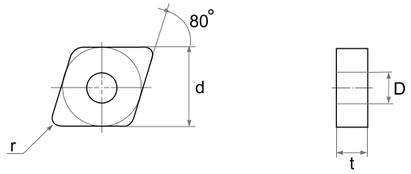
Union PCBN is an ultra hard cutting tool material consisting of polycrystalline cubicboron nitride with metallic or ceramic binder.
It is available both tip brazed and solid PCBN. Primarily used to machine hardened ferrous materials.
Union PCD is an ultra hard cutting tool material consisting of polycrystalline diamond which is tip brazed to a carbide insert according to the various applications.
It is used for non-ferrous material, wood, aluminum and copper alloys at extremely high speed.

C E R A M I C

TURNING INSERT

CNGA

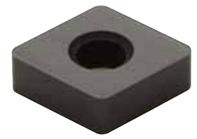


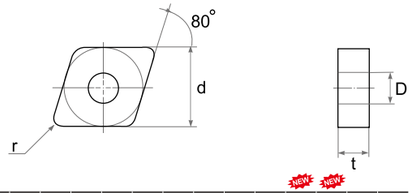


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	D																			
CNGA 120404	CNGA 431	12.70	4.76	0.4	5.16	●	●	●	●		●	●			●					●	●			
CNGA 120408	CNGA 432	12.70	4.76	0.8	5.16	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CNGA 120412	CNGA 433	12.70	4.76	1.2	5.16	●	●				●	●	●		●	●	●	●	●	●	●	●	●	●
CNGA 120416	CNGA 434	12.70	4.76	1.6	5.16	●	●					●			●	●	●			●	●	●	●	●
CNGA 120704	CNGA 451	12.70	7.94	0.4	5.16																			
CNGA 120708	CNGA 452	12.70	7.94	0.8	5.16	●	●						●		●	●								
CNGA 120712	CNGA 453	12.70	7.94	1.2	5.16	●	●	●					●		●	●				●	●		●	●
CNGA 120716	CNGA 454	12.70	7.94	1.6	5.16	●							●		●	●				●	●			
CNGA 160608	CNGA 542	15.87	6.35	0.8	6.35										●									
CNGA 160612	CNGA 543	15.87	6.35	1.2	6.35										●	●	●					●	●	●
CNGA 160616	CNGA 544	15.87	6.35	1.6	6.35	●											●					●		
CNGA 160708	CNGA 552	15.87	7.94	0.8	6.35	●	●																	
CNGA 160712	CNGA 553	15.87	7.94	1.2	6.35	●	●									●								
CNGA 160716	CNGA 554	15.87	7.94	1.6	6.35											●								
CNGA 190608	CNGA 642	19.05	6.35	0.8	7.93	●									●	●				●	●			
CNGA 190612	CNGA 643	19.05	6.35	1.2	7.93										●							●	●	
CNGA 190616	CNGA 644	19.05	6.35	1.6	7.93	●	●																	
CNGA 190712	CNGA 653	19.05	7.94	1.2	7.93																			
CNGA 190716	CNGA 654	19.05	7.94	1.6	7.93	●																		

TURNING INSERT

CNMA

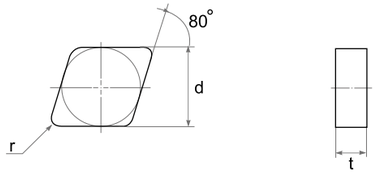




Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	D																			
CNMA 120408	**CNMA 432**	12.70	4.76	0.8	5.16											●	●					●		
CNMA 120412	**CNMA 433**	12.70	4.76	1.2	5.16											●	●	●	●	●	●	●		
CNMA 120416	**CNMA 434**	12.70	4.76	1.6	5.16											●	●	●	●	●	●	●		
CNMA 160612	**CNMA 543**	15.87	6.35	1.2	6.35												●		●			●		
CNMA 160616	**CNMA 544**	15.87	6.35	1.6	6.35												●		●			●		

TURNING INSERT

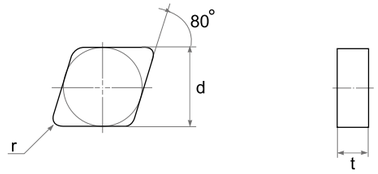
CNGN



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
CNGN 090304	**CNGN 321**	9.52	3.18	0.4		●																	
CNGN 090308	**CNGN 322**	9.52	3.18	0.8			●											●	●	●			
CNGN 090312	**CNGN 323**	9.52	3.18	1.2														●	●	●			
CNGN 120304	**CNGN 421**	12.70	3.18	0.4	●																		
CNGN 120308	**CNGN 422**	12.70	3.18	0.8	●																		
CNGN 120312	**CNGN 423**	12.70	3.18	1.2	●																		
CNGN 120404	**CNGN 431**	12.70	4.76	0.4	●	●					●	●											
CNGN 120408	**CNGN 432**	12.70	4.76	0.8	●	●	●	●	●	●	●	●	●	●		●	●		●	●	●	●	●
CNGN 120412	**CNGN 433**	12.70	4.76	1.2	●	●	●	●			●	●		●		●	●	●	●	●	●	●	●
CNGN 120416	**CNGN 434**	12.70	4.76	1.6	●	●	●				●			●		●	●	●	●	●	●	●	●
CNGN 120704	**CNGN 451**	12.70	7.94	0.4																		●	●
CNGN 120708	**CNGN 452**	12.70	7.94	0.8										●	●				●	●			
CNGN 120712	**CNGN 453**	12.70	7.94	1.2	●	●					●	●		●		●	●		●	●	●	●	●
CNGN 120716	**CNGN 454**	12.70	7.94	1.6	●	●					●	●		●		●	●		●	●	●	●	●
CNGN 160608	**CNGN 542**	15.87	6.35	0.8																			
CNGN 160612	**CNGN 543**	15.87	6.35	1.2	●											●					●	●	●
CNGN 160616	**CNGN 544**	15.87	6.35	1.6	●																		
CNGN 160708	**CNGN 552**	15.87	7.94	0.8	●							●											
CNGN 160712	**CNGN 553**	15.87	7.94	1.2	●	●	●							●		●	●				●		
CNGN 160716	**CNGN 554**	15.87	7.94	1.6	●	●	●				●		●	●	●	●					●		
CNGN 160720	**CNGN 555**	15.87	7.94	2.0	●									●	●								
CNGN 190612	**CNGN 643**	19.05	6.35	1.2	●	●																	
CNGN 190616	**CNGN 644**	19.05	6.35	1.6	●	●																	
CNGN 190712	**CNGN 653**	19.05	7.94	1.2	●	●																	
CNGN 190716	**CNGN 654**	19.05	7.94	1.6	●	●																	
CNGN 190720	**CNGN 655**	19.05	7.94	2.0	●																		
CNGN 250724	**CNGN 856**	25.40	7.94	2.4	●																		
CNGN 250924	**CNGN 866**	25.40	9.52	2.4	●	●	●							●									

TURNING INSERT

CNMN

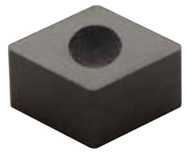


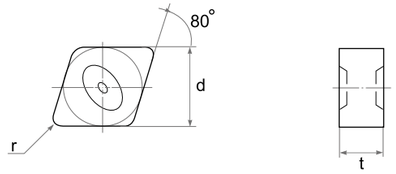
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
CNMN 120412	**CNMN 433**	12.70	4.76	1.2												●			●	●	●		
CNMN 120416	**CNMN 434**	12.70	4.76	1.6												●			●	●	●		

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

TURNING INSERT

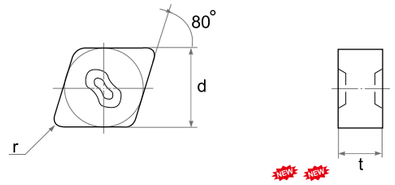
CNGX





Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
CNGX 120412	**CNGX 433**	12.70	4.76	1.2											●	●					●		
CNGX 120416	**CNGX 434**	12.70	4.76	1.6												●					●		
CNGX 120708	**CNGX 452**	12.70	7.94	0.8	●	●									●								
CNGX 120712	**CNGX 453**	12.70	7.94	1.2	●	●									●	●	●				●		
CNGX 120716	**CNGX 454**	12.70	7.94	1.6	●	●									●	●	●	●			●		
CNGX 160708	**CNGX 552**	15.87	7.94	0.8											●								
CNGX 160712	**CNGX 553**	15.87	7.94	1.2											●	●	●				●		
CNGX 160716	**CNGX 554**	15.87	7.94	1.6											●	●					●		

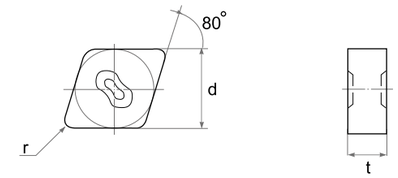
CNVX



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
CNVX 120412	**CNVX 433**	12.70	4.76	1.2												●					●		
CNVX 120416	**CNVX 434**	12.70	4.76	1.6												●					●		
CNVX 120708	**CNVX 452**	12.70	7.94	0.8	●							●			●								
CNVX 120712	**CNVX 453**	12.70	7.94	1.2	●	●						●			●	●	●	●	●	●	●		
CNVX 120716	**CNVX 454**	12.70	7.94	1.6		●		●				●			●	●	●	●	●	●	●		

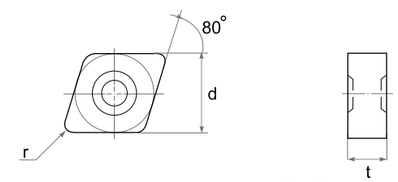
TURNING INSERT

CNMX



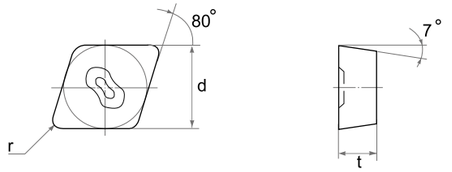
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
CNMX 120712	**CNMX 453**	12.70	7.94	1.2												●	●	●			●		
CNMX 120716	**CNMX 454**	12.70	7.94	1.6												●	●	●	●	●	●		

CNMX .. RD



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
CNMX 120716 RD	**CNMX 454 RD**	12.7	7.94	1.6												●	●				●		

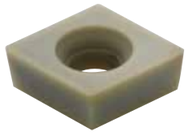
CCGX

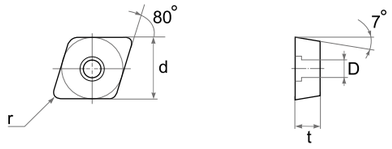


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
CCGX 120608	**CCGX 442**	12.70	6.35	0.8												●					●		
CCGX 120612	**CCGX 443**	12.70	6.35	1.2												●	●	●	●	●	●		
CCGX 120616	**CCGX 444**	12.70	6.35	1.6												●					●		

TURNING INSERT

CCGW

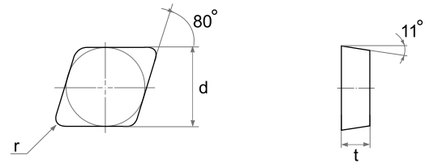




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO		d	t	r	D																		
CCGW 09T304		9.52	3.97	0.4	4.40							●				●	●					●	
CCGW 09T308		9.52	3.97	0.8	4.40							●				●	●		●			●	
CCGW 09T312		9.52	3.97	1.2	4.40											●	●		●			●	
CCGW 120408		12.70	4.76	0.8	5.50												●					●	
CCGW 120412		12.70	4.76	1.2	5.50												●					●	

TURNING INSERT

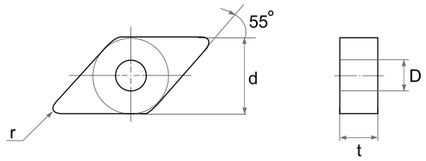
CPGN



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
CPGN 090304	**CPGN 321**	9.52	3.18	0.4																		●	●
CPGN 090308	**CPGN 322**	9.52	3.18	0.8																		●	●
CPGN 120408	**CPGN 432**	12.70	4.76	0.8	●																	●	●
CPGN 120412	**CPGN 433**	12.70	4.76	1.2																			
CPGN 120416	**CPGN 434**	12.70	4.76	1.6																			

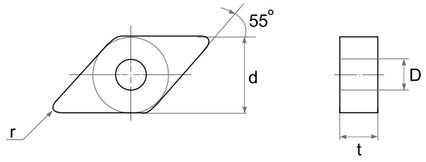
TURNING INSERT

DNGA



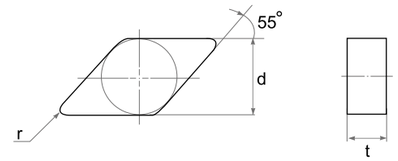
Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	D																			
DNGA 150404	**DNGA 431**	12.70	4.76	0.4	5.16	●	●		●		●													
DNGA 150408	**DNGA 432**	12.70	4.76	0.8	5.16	●	●	●	●	●	●				●	●	●					●	●	●
DNGA 150412	**DNGA 433**	12.70	4.76	1.2	5.16	●	●	●	●							●	●	●		●	●	●	●	●
DNGA 150416	**DNGA 434**	12.70	4.76	1.6	5.16	●									●								●	●
DNGA 150604	**DNGA 441**	12.70	6.35	0.4	5.16	●	●	●	●			●		●										
DNGA 150608	**DNGA 442**	12.70	6.35	0.8	5.16	●	●	●	●			●			●		●					●		
DNGA 150612	**DNGA 443**	12.70	6.35	1.2	5.16	●	●	●	●						●		●	●		●	●	●		
DNGA 150616	**DNGA 444**	12.70	6.35	1.6	5.16	●	●	●																
DNGA 150704	**DNGA 451**	12.70	7.94	0.4	5.16	●	●																	
DNGA 150708	**DNGA 452**	12.70	7.94	0.8	5.16	●	●								●	●	●	●				●		
DNGA 150712	**DNGA 453**	12.70	7.94	1.2	5.16	●	●								●		●	●	●		●	●	●	
DNGA 150716	**DNGA 454**	12.70	7.94	1.6	5.16																			
DNGA 190608	**DNGA 542**	15.87	6.35	0.8	6.35	●	●																	
DNGA 190612	**DNGA 543**	15.87	6.35	1.2	6.35	●	●								●	●		●			●	●	●	
DNGA 190616	**DNGA 544**	15.87	6.35	1.6	6.35	●																		

DNMA



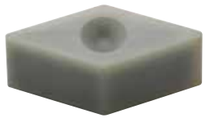
Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	D																			
DNMA 150612	**DNMA 443**	12.70	6.35	1.2	5.16											●	●					●		
DNMA 150616	**DNMA 444**	12.70	6.35	1.6	5.16												●					●		

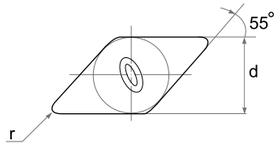
DNGN



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
DNGN 150404	**DNGN 431**	12.70	4.76	0.4																			
DNGN 150408	**DNGN 432**	12.70	4.76	0.8	●					●						●					●	●	●
DNGN 150412	**DNGN 433**	12.70	4.76	1.2	●						●			●		●					●	●	●
DNGN 150416	**DNGN 434**	12.70	4.76	1.6																		●	●
DNGN 150604	**DNGN 441**	12.70	6.35	0.4																			
DNGN 150608	**DNGN 442**	12.70	6.35	0.8	●			●								●				●	●	●	
DNGN 150612	**DNGN 443**	12.70	6.35	1.2	●	●		●								●				●	●	●	
DNGN 150616	**DNGN 444**	12.70	6.35	1.6																			
DNGN 150704	**DNGN 451**	12.70	7.94	0.4	●	●																	
DNGN 150708	**DNGN 452**	12.70	7.94	0.8	●	●	●	●				●	●	●	●					●	●		
DNGN 150712	**DNGN 453**	12.70	7.94	1.2	●	●	●	●				●	●	●	●	●				●	●	●	
DNGN 150716	**DNGN 454**	12.70	7.94	1.6	●	●						●		●	●	●				●	●	●	

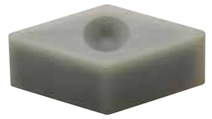
DNGX

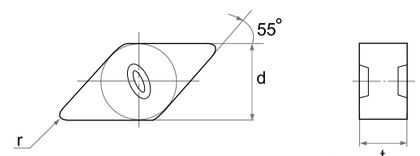




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
DNGX 120708	**DNGX 352**	10.00	7.94	0.8								●				●					●		
DNGX 120712	**DNGX 353**	10.00	7.94	1.2								●			●	●	●	●	●	●	●		
DNGX 120716	**DNGX 354**	10.00	7.94	1.6								●			●	●	●				●		
DNGX 150708	**DNGX 452**	12.70	7.94	0.8																			
DNGX 150712	**DNGX 453**	12.70	7.94	1.2								●			●	●					●		
DNGX 150716	**DNGX 454**	12.70	7.94	1.6											●	●	●	●	●	●	●		

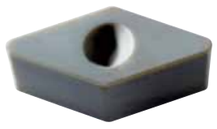
DNMX

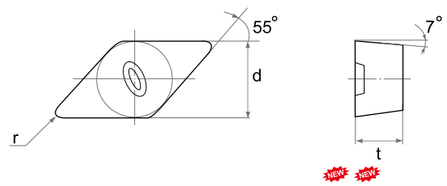




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
DNMX 120708	**DNMX 352**	10.00	7.94	0.8													●						
DNMX 120712	**DNMX 353**	10.00	7.94	1.2												●	●				●		
DNMX 120716	**DNMX 354**	10.00	7.94	1.6												●	●	●			●		

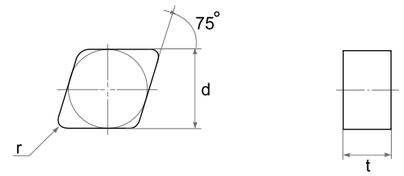
DCGX





Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
DCGX 150612	**DCGX 443**	12.70	6.35	1.2												●		●			●		
DCGX 150616	**DCGX 444**	12.70	6.35	1.6												●		●			●		

ENGN



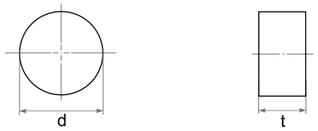
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
ENGN 130404	**ENGN 431**	12.70	4.76	0.4																			
ENGN 130408	**ENGN 432**	12.70	4.76	0.8		●									●		●				●		
ENGN 130412	**ENGN 433**	12.70	4.76	1.2		●									●		●				●		
ENGN 130704	**ENGN 451**	12.70	7.94	0.4	●	●																	
ENGN 130708	**ENGN 452**	12.70	7.94	0.8	●	●	●	●				●	●		●	●	●				●		
ENGN 130712	**ENGN 453**	12.70	7.94	1.2	●	●	●	●							●	●	●			●	●	●	●
ENGN 130716	**ENGN 454**	12.70	7.94	1.6	●	●					●				●	●	●				●		

TURNING INSERT

RNGA

Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t	D																			
RNGA 120400	**RNGA 430**	12.70	4.76	5.16	●	●																	
RNGA 120700	**RNGA 450**	12.70	7.94	5.16	●	●																●	●

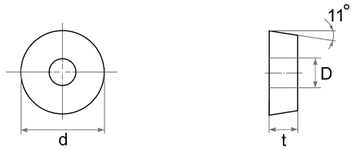
RNGN



Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t																			
RNGN 060300	**RNGN 220**	6.35	3.18		●																	
RNGN 060400	**RNGN 230**	6.35	4.76	●		●																
RNGN 090300	**RNGN 320**	9.52	3.18	●		●							●	●								
RNGN 090400	**RNGN 330**	9.52	4.76	●	●	●				●			●					●	●		●	●
RNGN 120300	**RNGN 420**	12.70	3.18										●					●	●			
RNGN 120400	**RNGN 430**	12.70	4.76	●	●	●			●	●	●		●	●	●	●	●	●	●	●	●	●
RNGN 120600	**RNGN 440**	12.70	6.35																			
RNGN 120700	**RNGN 450**	12.70	7.94	●	●	●	●	●	●		●	●	●	●	●			●	●	●	●	●
RNGN 150700	**RNGN 550**	15.87	7.94	●									●	●								
RNGN 190600	**RNGN 640**	19.05	6.35	●	●								●					●	●			
RNGN 190700	**RNGN 650**	19.05	7.94	●	●	●					●			●				●	●		●	●
RNGN 250700	**RNGN 850**	25.40	7.94	●		●	●				●	●	●	●								
RNGN 250900	**RNGN 860**	25.40	9.52																			
RNGN 320900	**RNGN 106**	31.75	9.52	●																		
RNGN 0807M0		8.00	7.94	●																		
RNGN 1007M0		10.00	7.94	●																		
RNGN 1207M0		12.00	7.94	●																		

TURNING INSERT

RPGA



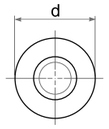
Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t																			
RNGA 120400	**RNGA 430**	12.70	4.76	●																		
RNGA 120700	**RNGA 450**	12.70	7.94	●																		

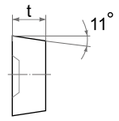
RPGN

Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t																			
RPGN 090300	**RPGN 320**	9.52	3.18	●	●													●	●			
RPGN 090400	**RPGN 330**	9.52	4.76	●	●	●																
RPGN 120300	**RPGN 420**	12.70	3.18																			
RPGN 120400	**RPGN 430**	12.70	4.76	●	●										●			●	●	●	●	●
RPGN 120700	**RPGN 450**	12.70	7.94	●	●													●	●			
RPGN 150700	**RPGN 550**	15.87	7.94																			
RPGN 190700	**RPGN 650**	19.05	7.94		●																	

TURNING INSERT

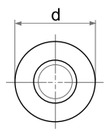
RPGX .. DP

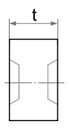




Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t																			
RPGX 1204 DP	**RPGX 43 DP**	12.70	4.76															●	●			
RPGX 1207 DP	**RPGX 45 DP**	12.70	7.94															●	●			

RNGX .. DP

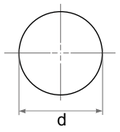




Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t																			
RNGX 1207 DP	**RNGX 45 DP**	12.70	7.94														●	●	●			

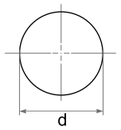
TURNING INSERT

RBGN



Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800 NEW	SN1000 NEW	NC400	SW400	SW800
ISO	ASA	d	t																			
RBGN 060300	**RBGN 220**	6.35	3.18		●																	
RBGN 060400	**RBGN 230**	6.35	4.76		●																	
RBGN 090300	**RBGN 320**	9.52	3.18	●																		
RBGN 090400	**RBGN 330**	9.52	4.76	●																		
RBGN 120400	**RBGN 430**	12.70	4.76	●	●	●									●					●		
RBGN 120600	**RBGN 440**	12.70	6.35	●																		
RBGN 120700	**RBGN 450**	12.70	7.94	●	●									●	●			●	●	●		
RBGN 0604M0		6.00	4.76		●																	
RBGN 0804M0		8.00	4.76		●																	
RBGN 1007M0		10.00	7.94	●												●						
RBGN 1207M0		12.00	7.94																			
RBGN 1607M0		16.00	7.94																			

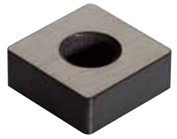
RCGN

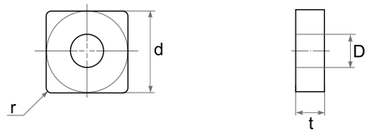


Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800 NEW	SN1000 NEW	NC400	SW400	SW800
ISO		d	t																			
RCGN 060400		6.35	4.76	●	●													●	●			
RCGN 060600		6.35	6.35	●	●	●							●					●	●			
RCGN 060700		6.35	7.94	●	●	●					●							●	●			
RCGN 070400		7.94	4.76		●																	
RCGN 090700		9.52	7.94	●	●	●							●					●	●			
RCGN 120700		12.70	7.94	●	●	●					●		●					●	●			
RCGN 151000		15.87	10.00	●	●	●					●		●					●	●			
RCGN 191000		19.05	10.00	●	●	●					●		●					●	●			
RCGN 251200		25.40	12.70	●	●	●					●		●					●	●			

TURNING INSERT

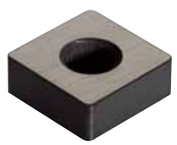
SNGA

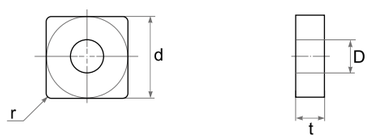




Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	D																			
SNGA 090304	SNGA 321	9.52	3.18	0.4	3.81	●	●																	
SNGA 090308	SNGA 322	9.52	3.18	0.8	3.81	●	●																	
SNGA 090312	SNGA 323	9.52	3.18	1.2	3.81	●	●																	
SNGA 090404	SNGA 331	9.52	4.76	0.4	3.81																			
SNGA 090408	SNGA 332	9.52	4.76	0.8	3.81																			
SNGA 090412	SNGA 333	9.52	4.76	1.2	3.81																			
SNGA 090416	SNGA 334	9.52	4.76	1.6	3.81												●					●		
SNGA 120404	SNGA 431	12.70	4.76	0.4	5.16	●		●				●			●									
SNGA 120408	SNGA 432	12.70	4.76	0.8	5.16	●	●	●			●	●			●	●		●		●	●		●	●
SNGA 120412	SNGA 433	12.70	4.76	1.2	5.16	●	●	●				●	●		●	●	●		●	●	●	●		
SNGA 120416	SNGA 434	12.70	4.76	1.6	5.16	●						●			●				●	●	●			
SNGA 120708	SNGA 452	12.70	7.94	0.8	5.16	●																		
SNGA 120712	SNGA 453	12.70	7.94	1.2	5.16	●									●	●					●			
SNGA 120716	SNGA 454	12.70	7.94	1.6	5.16	●							●		●	●				●	●			
SNGA 150608	SNGA 542	15.87	6.35	0.8	6.35		●																	
SNGA 150612	SNGA 543	15.87	6.35	1.2	6.35	●	●																	
SNGA 150616	SNGA 544	15.87	6.35	1.6	6.35		●																	
SNGA 190612	SNGA 643	19.05	6.35	1.2	7.94	●									●	●								
SNGA 190616	SNGA 644	19.05	6.35	1.6	7.94																			

SNMA

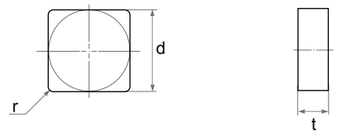




Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	D																			
SNMA 120408	SNMA 432	12.70	4.76	0.8	5.16												●		●			●		
SNMA 120412	SNMA 433	12.70	4.76	1.2	5.16											●	●		●	●	●	●		
SNMA 120416	SNMA 434	12.70	4.76	1.6	5.16											●	●					●		
SNMA 150616	SNMA 544	15.87	6.35	1.6	6.35											●	●					●		

TURNING INSERT

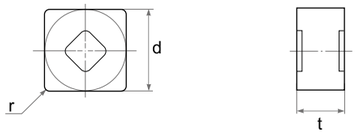
SNGN



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SNGN 090304	SNGN 321	9.52	3.18	0.4	●	●																	
SNGN 090308	SNGN 322	9.52	3.18	0.8	●	●	●				●			●		●					●		
SNGN 090312	SNGN 323	9.52	3.18	1.2	●	●																	
SNGN 090404	SNGN 331	9.52	4.76	0.4																			
SNGN 090408	SNGN 332	9.52	4.76	0.8	●											●					●		
SNGN 090412	SNGN 333	9.52	4.76	1.2								●				●					●		
SNGN 120404	SNGN 431	12.70	4.76	0.4	●									●									
SNGN 120408	SNGN 432	12.70	4.76	0.8	●	●	●	●	●	●	●			●	●	●			●	●	●	●	●
SNGN 120412	SNGN 433	12.70	4.76	1.2	●	●	●	●	●		●		●	●	●	●		●	●	●	●	●	●
SNGN 120416	SNGN 434	12.70	4.76	1.6	●	●			●		●		●	●	●	●	●		●	●	●	●	●
SNGN 120420	SNGN 435	12.70	4.76	2.0	●									●	●	●	●				●		
SNGN 120604	SNGN 441	12.70	6.35	0.4																			
SNGN 120608	SNGN 442	12.70	6.35	0.8	●																		
SNGN 120612	SNGN 443	12.70	6.35	1.2	●																		
SNGN 120616	SNGN 444	12.70	6.35	1.6	●																		
SNGN 120704	SNGN 451	12.70	7.94	0.4		●										●					●		
SNGN 120708	SNGN 452	12.70	7.94	0.8	●	●	●	●				●		●	●	●					●	●	●
SNGN 120712	SNGN 453	12.70	7.94	1.2	●	●	●	●			●	●		●	●	●	●	●	●		●	●	●
SNGN 120716	SNGN 454	12.70	7.94	1.6	●	●	●	●			●	●	●	●	●	●	●	●	●		●	●	●
SNGN 120720	SNGN 455	12.70	7.94	2.0	●	●	●				●	●		●	●	●					●		
SNGN 150404	SNGN 531	15.87	4.76	0.4		●																	
SNGN 150408	SNGN 532	15.87	4.76	0.8		●																	
SNGN 150412	SNGN 533	15.87	4.76	1.2	●							●				●	●					●	
SNGN 150416	SNGN 534	15.87	4.76	1.6	●											●							
SNGN 150708	SNGN 552	15.87	7.94	0.8	●																		
SNGN 150712	SNGN 553	15.87	7.94	1.2	●	●					●	●		●	●	●						●	
SNGN 150716	SNGN 554	15.87	7.94	1.6	●							●	●	●	●	●	●	●				●	
SNGN 190608	SNGN 642	19.05	6.35	0.8																			
SNGN 190612	SNGN 643	19.05	6.35	1.2	●									●		●				●	●	●	
SNGN 190616	SNGN 644	19.05	6.35	1.6	●									●						●	●		●	●
SNGN 190712	SNGN 653	19.05	7.94	1.2	●																		
SNGN 190716	SNGN 654	19.05	7.94	1.6	●	●	●	●			●	●		●		●				●	●	●	
SNGN 190720	SNGN 655	19.05	7.94	2.0	●							●		●									
SNGN 250720	SNGN 854	25.40	7.94	2.0	●									●									
SNGN 250724	SNGN 856	25.40	7.94	2.4	●	●								●	●								
SNGN 250924	SNGN 866	25.40	9.52	2.4	●		●	●				●		●	●	●					●	●	●

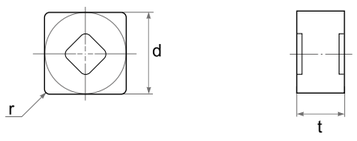
TURNING INSERT

SNGX



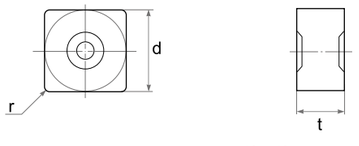
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SNGX 120408	**SNGX 432**	12.70	4.76	0.8												●					●		
SNGX 120412	**SNGX 433**	12.70	4.76	1.2												●					●		
SNGX 120416	**SNGX 434**	12.70	4.76	1.6												●					●		
SNGX 120708	**SNGX 452**	12.70	7.94	0.8	●										●		●						
SNGX 120712	**SNGX 453**	12.70	7.94	1.2	●	●									●	●	●		●	●	●		
SNGX 120716	**SNGX 454**	12.70	7.94	1.6											●	●	●	●	●	●	●		
SNGX 150708	**SNGX 552**	15.87	7.94	0.8	●	●									●		●						
SNGX 150712	**SNGX 553**	15.87	7.94	1.2	●	●									●		●		●	●			
SNGX 150716	**SNGX 554**	15.87	7.94	1.6											●	●	●				●		

SNMX



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SNMX 120712	**SNMX 453**	12.70	7.94	1.2											●	●	●	●	●	●	●		
SNMX 120716	**SNMX 454**	12.70	7.94	1.6												●					●		

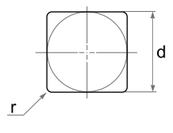
SNMX .. RD

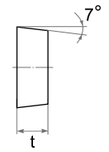


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SNMX 120716 RD	**SNMX 454 RD**	12.70	7.94	1.6											●			●					

TURNING INSERT

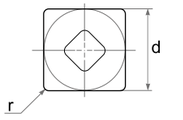
SCGN

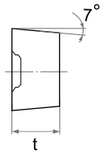




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SCGN 090412	**SCGN 333**	9.52	4.76	1.2	●											●					●		
SCGN 090416	**SCGN 334**	9.52	4.76	1.6	●											●					●		
SCGN 120404	**SCGN 431**	12.70	4.76	0.4		●																	
SCGN 120408	**SCGN 432**	12.70	4.76	0.8	●	●																	
SCGN 120412	**SCGN 433**	12.70	4.76	1.2									●		●	●		●	●	●	●		
SCGN 120416	**SCGN 434**	12.70	4.76	1.6	●	●																	

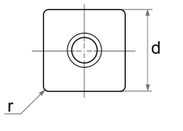
SCGX

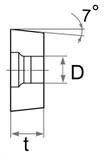




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SCGX 120408	**SCGX 432**	12.70	4.76	0.8														●					
SCGX 120616	**SCGX 444**	12.70	6.35	1.6																			
SCGX 120716	**SCGX 454**	12.70	7.94	1.6																			

SCGW

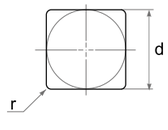


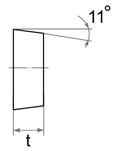


Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	d	t	r	D																			
SCGW 09T304	9.52	3.97	0.4	4.40												●					●		
SCGW 09T308	9.52	3.97	0.8	4.40												●					●		
SCGW 120408	12.70	4.76	0.8	5.50												●					●		

TURNING INSERT

SPGN

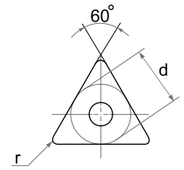


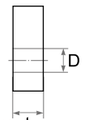


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SPGN 090304	SPGN 321	9.52	3.18	0.4	●	●								●									
SPGN 090308	SPGN 322	9.52	3.18	0.8	●	●					●				●	●	●				●	●	●
SPGN 090312	SPGN 323	9.52	3.18	1.2	●																		
SPGN 120304	SPGN 421	12.70	3.18	0.4	●	●																	
SPGN 120308	SPGN 422	12.70	3.18	0.8	●	●				●		●		●		●					●		
SPGN 120312	SPGN 423	12.70	3.18	1.2	●	●					●			●		●		●			●		
SPGN 120404	SPGN 431	12.70	4.76	0.4																			
SPGN 120408	SPGN 432	12.70	4.76	0.8	●	●	●							●		●					●	●	●
SPGN 120412	SPGN 433	12.70	4.76	1.2	●	●					●			●	●	●	●	●	●	●	●	●	●
SPGN 120416	SPGN 434	12.70	4.76	1.6	●	●					●				●	●	●				●	●	●
SPGN 150408	SPGN 532	15.87	4.76	0.8																			
SPGN 150412	SPGN 533	15.87	4.76	1.2		●									●								
SPGN 190412	SPGN 633	19.05	4.76	1.2	●																		
SPGN 190416	SPGN 634	19.05	4.76	1.6	●	●										●	●				●		

TURNING INSERT

TNGA



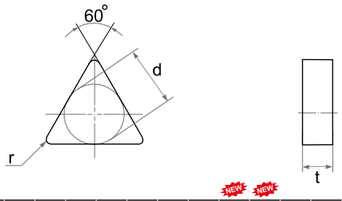


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	D																			
TNGA 110304	TNGA 221	6.35	3.18	0.4	2.26	●	●																	
TNGA 110308	TNGA 222	6.35	3.18	0.8	2.26	●	●																	
TNGA 160304	TNGA 321	9.52	3.18	0.4	3.81	●	●																	
TNGA 160308	TNGA 322	9.52	3.18	0.8	3.81	●	●						●		●									
TNGA 160312	TNGA 323	9.52	3.18	1.2	3.81	●	●																	
TNGA 160404	TNGA 331	9.52	4.76	0.4	3.81	●	●	●	●		●	●			●	●	●	●		●	●	●		
TNGA 160408	TNGA 332	9.52	4.76	0.8	3.81	●	●	●	●		●	●		●	●	●	●	●		●	●	●	●	●
TNGA 160412	TNGA 333	9.52	4.76	1.2	3.81	●	●	●	●			●		●	●	●	●	●		●	●	●		
TNGA 160416	TNGA 334	9.52	4.76	1.6	3.81	●	●	●					●		●	●	●	●		●	●	●		
TNGA 220404	TNGA 431	12.70	4.76	0.4	5.16	●	●								●									
TNGA 220408	TNGA 432	12.70	4.76	0.8	5.16	●	●								●		●			●	●	●		
TNGA 220412	TNGA 433	12.70	4.76	1.2	5.16	●	●								●		●			●	●	●		
TNGA 220416	TNGA 434	12.70	4.76	1.6	5.16	●	●						●		●		●					●		
TNGA 220708	TNGA 452	12.70	7.94	0.8	5.16	●	●																	
TNGA 220712	TNGA 453	12.70	7.94	1.2	5.16	●																		
TNGA 270608	TNGA 542	15.87	6.35	0.8	6.35		●																	
TNGA 270612	TNGA 543	15.87	6.35	1.2	6.35		●																	
TNGA 330924	TNGA 666	19.05	9.52	2.4	7.94		●																	

PART. A
TURNING & MILLING
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

TURNING INSERT

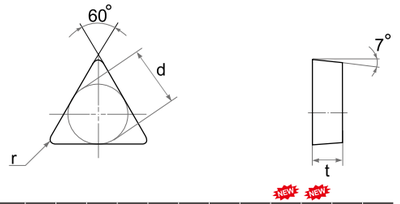
TNGN



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
TNGN 110304	**TNGN 221**	6.35	3.18	0.4	●	●								●									
TNGN 110308	**TNGN 222**	6.35	3.18	0.8	●	●						●		●	●								
TNGN 160404	**TNGN 331**	9.52	4.76	0.4	●	●					●	●		●									
TNGN 160408	**TNGN 332**	9.52	4.76	0.8	●	●	●	●	●	●	●	●		●	●	●		●			●		
TNGN 160412	**TNGN 333**	9.52	4.76	1.2	●	●	●	●	●					●	●	●					●	●	●
TNGN 160416	**TNGN 334**	9.52	4.76	1.6	●	●	●	●			●			●	●	●					●		
TNGN 160704	**TNGN 351**	9.52	7.94	0.4	●																		
TNGN 160708	**TNGN 352**	9.52	7.94	0.8	●	●					●				●								
TNGN 160712	**TNGN 353**	9.52	7.94	1.2	●	●						●		●	●								
TNGN 160716	**TNGN 354**	9.52	7.94	1.6	●	●								●									
TNGN 220404	**TNGN 431**	12.70	4.76	0.4	●																		
TNGN 220408	**TNGN 432**	12.70	4.76	0.8	●	●								●		●			●		●	●	●
TNGN 220412	**TNGN 433**	12.70	4.76	1.2	●	●								●		●			●		●	●	●
TNGN 220416	**TNGN 434**	12.70	4.76	1.6		●								●		●					●	●	●
TNGN 220708	**TNGN 452**	12.70	7.94	0.8	●																		
TNGN 220712	**TNGN 453**	12.70	7.94	1.2		●																	
TNGN 220716	**TNGN 454**	12.70	7.94	1.6		●																	
TNGN 270608	**TNGN 542**	15.87	6.35	0.8	●	●																	
TNGN 270612	**TNGN 543**	15.87	6.35	1.2	●	●																	
TNGN 270616	**TNGN 544**	15.87	6.35	1.6		●													●				
TNGN 330924	**TNGN 666**	19.05	9.52	2.4		●																	
TNGN 440932	**TNGN 868**	25.40	9.52	3.2	●	●								●									

TURNING INSERT

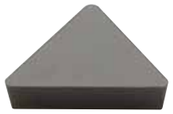
TCUN

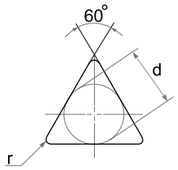


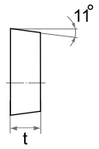
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
TCUN 160408	**TCUN 332**	9.52	4.76	0.8		●									●	●							
TCUN 160412	**TCUN 333**	9.52	4.76	1.2		●									●	●					●		
TCUN 160416	**TCUN 334**	9.52	4.76	1.6		●									●								

TURNING INSERT

TPGN

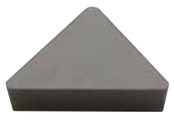


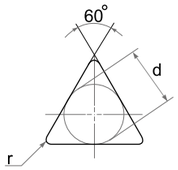


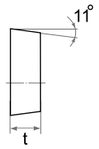


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
TPGN 090204	**TPGN 731**	5.56	2.38	0.4		●																	
TPGN 090208	**TPGN 732**	5.56	2.38	0.8		●																	
TPGN 110304	**TPGN 221**	6.35	3.18	0.4	●	●				●	●			●		●					●		
TPGN 110308	**TPGN 222**	6.35	3.18	0.8	●	●					●			●	●	●			●	●	●	●	●
TPGN 160304	**TPGN 321**	9.52	3.18	0.4	●	●	●			●	●	●		●		●					●		
TPGN 160308	**TPGN 322**	9.52	3.18	0.8	●	●				●	●	●		●	●	●	●		●	●	●	●	●
TPGN 160312	**TPGN 323**	9.52	3.18	1.2	●	●										●	●				●	●	●
TPGN 160404	**TPGN 331**	9.52	4.76	0.4	●		●																
TPGN 160408	**TPGN 332**	9.52	4.76	0.8	●	●													●	●			
TPGN 160412	**TPGN 333**	9.52	4.76	1.2	●														●	●			
TPGN 160416	**TPGN 334**	9.52	4.76	1.6	●																		
TPGN 220404	**TPGN 431**	12.70	4.76	0.4	●	●																	
TPGN 220408	**TPGN 432**	12.70	4.76	0.8	●	●								●								●	●
TPGN 220412	**TPGN 433**	12.70	4.76	1.2	●	●									●	●					●		
TPGN 220416	**TPGN 434**	12.70	4.76	1.6	●	●	●																
TPGN 220712	**TPGN 453**	12.70	7.94	1.2																			
TPGN 220716	**TPGN 454**	12.70	7.94	1.6																			
TPGN 271232	**TPGN 588**	15.87	12.70	3.2		●																	

TPUN



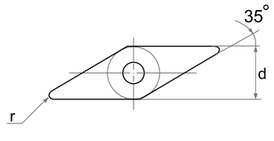


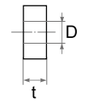


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
TPUN 110308	**TPUN 222**	6.35	3.18	0.8												●					●		
TPUN 110312	**TPUN 223**	6.35	3.18	1.2												●					●		

TURNING INSERT

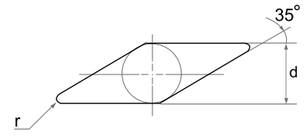
VNGA

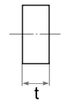




Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	D																			
VNGA 160404	**VNGA 331**	9.52	4.76	0.4	3.81	●	●	●			●				●									
VNGA 160408	**VNGA 332**	9.52	4.76	0.8	3.81	●	●	●	●	●	●			●	●	●	●	●		●	●	●		
VNGA 160412	**VNGA 333**	9.52	4.76	1.2	3.81	●	●	●	●					●	●	●	●	●				●		
VNGA 160604	**VNGA 341**	9.52	6.35	0.4	3.81	●	●																	
VNGA 160608	**VNGA 342**	9.52	6.35	0.8	3.81	●	●																	
VNGA 160612	**VNGA 343**	9.52	6.35	1.2	3.81	●	●																	
VNGA 220404	**VNGA 431**	12.70	4.76	0.4	5.16	●	●																	
VNGA 220408	**VNGA 432**	12.70	4.76	0.8	5.16	●	●										●					●		
VNGA 220412	**VNGA 433**	12.70	4.76	1.2	5.16	●	●										●					●		
VNGA 220424	**VNGA 436**	12.70	4.76	2.4	5.16																		●	●

VNGN

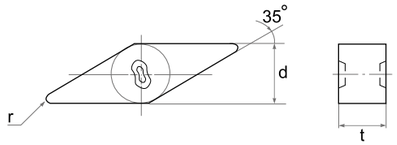




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
VNGN 160404	**VNGN 331**	9.52	4.76	0.4		●																	
VNGN 160408	**VNGN 332**	9.52	4.76	0.8		●																	
VNGN 160704	**VNGN 351**	9.52	7.94	0.4		●																	
VNGN 160708	**VNGN 352**	9.52	7.94	0.8		●																	
VNGN 160712	**VNGN 353**	9.52	7.94	1.2																			
VNGN 160716	**VNGN 354**	9.52	7.94	1.6																			

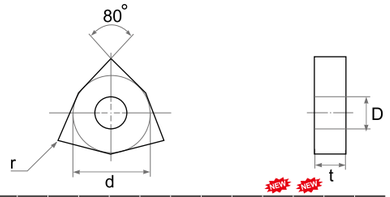
TURNING INSERT

VNGX



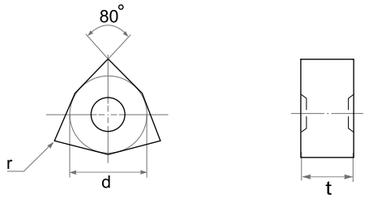
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
VNGX 160708	**VNGX 352**	9.52	7.94	0.8		●						●				●					●		
VNGX 160712	**VNGX 353**	9.52	7.94	1.2		●						●				●		●			●		
VNGX 160716	**VNGX 354**	9.52	7.94	1.6												●					●		

WNGA



Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	D																			
WNGA 080404	**WNGA 431**	12.70	4.76	0.4	5.16	●	●	●																
WNGA 080408	**WNGA 432**	12.70	4.76	0.8	5.16	●	●	●							●	●	●	●	●	●	●	●	●	●
WNGA 080412	**WNGA 433**	12.70	4.76	1.2	5.16	●	●	●							●	●	●	●	●	●	●	●		

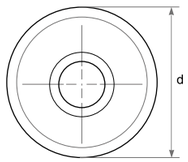
WNGX

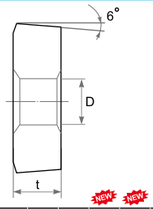


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
WNGX 080708	**WNGX 452**	12.70	7.94	0.8												●					●		
WNGX 080712	**WNGX 453**	12.70	7.94	1.2										●		●	●	●	●	●	●		
WNGX 080716	**WNGX 454**	12.70	7.94	1.6												●					●		

ROLL TURNING INSERT

CDH

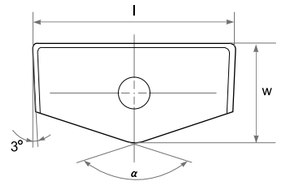


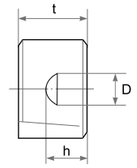


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	D																			
CDH 120600	**CDH 22**	12.70	6.35	3.18	●	●	●																
CDH 120900	**CDH 23**	12.70	9.52	3.18	●																		
CDH 190900	**CDH 33**	19.05	9.52	6.35	●	●	●	●						●									
CDH 191200	**CDH 34**	19.05	12.70	6.35	●																		
CDH 251200	**CDH 42**	25.40	12.70	6.75	●	●	●					●		●									
CDH 251900	**CDH 43**	25.40	19.05	6.75	●							●		●									
CDH 320900	**CDH 515**	31.75	9.52	10.00	●	●						●		●	●								
CDH 321900	**CDH 53**	31.75	19.05	10.00	●	●	●	●				●		●	●								
CDH 381100		38.10	11.11	9.93	●																		

ROLL TURNING INSERT

F-Series





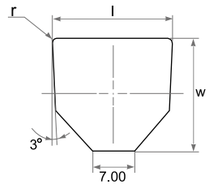
Type	Dimensions (mm)						ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	w	t	D	h	α																			
F 13941	32.00	19.05	12.00	6.50	6.00	120°	●	●						●		●	●								
F 10537	44.50	25.40	14.20	6.50	7.00	120°	●	●						●		●	●								

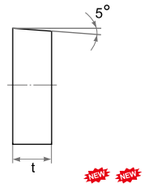
F-Series

Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	w	t	D																			
F 10537 V	44.00	26.00	15.00	5.00	●	●						●											

ROLL TURNING INSERT

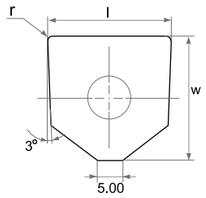
F-Series

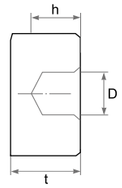




Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	l	t	r	w																			
F 250723	25.00	7.94	1.20	23.00		●																	

F-Series

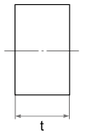




Type	Dimensions (mm)						ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	l	t	r	w	D	h																			
F 251425	25.00	14.40	2.40	25.40	9.17	10.00										●									
F251425 H65	25.40	14.40	2.40	25.40	6.50	10.00										●									

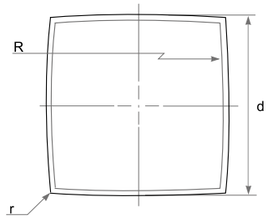
ROLL TURNING INSERT

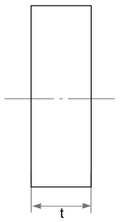
LNJ



Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	l	w	t	r																			
LNJ 5464	25.40	15.87	9.52	1.6	●	●																	
LNJ 5568	31.75	15.87	9.52	3.2										●									
LNJ 6588	31.75	19.05	12.70	3.2	●	●	●	●				●		●	●								
LNJ 6688	38.10	19.05	12.70	3.2	●	●	●	●				●		●	●					●	●		●	
LNJ 6898	48.10	21.05	12.70	3.2										●									

SNGN3812R

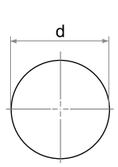


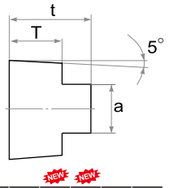


Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	d	t	r	R																			
SNGN 3812R	38.10	12.70	0.4	114	●	●	●																

ROLL TURNING INSERT

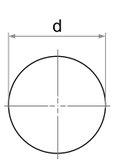
RBGX

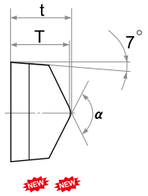




Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO		d	t	T	a																			
RBGX 06T		6.00	5.00	3.00	3.00	●	●																	
RBGX 08T		8.00	6.50	4.00	4.00	●	●																	
RBGX 10T		10.00	9.00	6.00	6.00		●																	
RBGX 12T		12.00	9.00	6.00	6.00	●	●																	
RBGX 16T		16.00	13.00	8.00	8.00	●	●																	
RBGX 20T		20.00	15.00	10.00	10.00	●	●	●	●															
RBGX 26T		26.00	15.00	10.00	14.00	●	●																	

RCGX

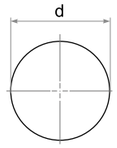


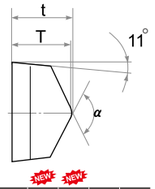


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t	T	α																			
RCGX 060400	**RCGX 102**	6.35	4.76	4.57	120°	●	●													●	●		●	●
RCGX 060600	**RCGX 102**	6.35	6.35	6.20	120°	●	●	●	●											●	●			
RCGX 060700	**RCGX 102**	6.35	7.94	7.70	120°	●	●	●	●						●					●	●			
RCGX 090700	**RCGX 103**	9.52	7.94	7.70	120°	●	●	●	●		●				●					●	●		●	●
RCGX 120700	**RCGX 104**	12.70	7.94	7.70	120°	●	●	●	●		●				●					●	●		●	●
RCGX 151000	**RCGX 105**	15.87	10.00	9.77	120°	●	●	●	●						●					●	●			
RCGX 191000	**RCGX 106**	19.05	10.00	9.77	120°	●	●	●	●						●					●	●			
RCGX 251200	**RCGX 108**	25.40	12.00	11.85	140°	●	●	●	●						●					●	●			

ROLL TURNING INSERT

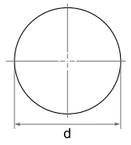
RPGX

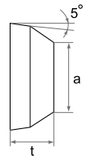




Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t	T	α																			
RPGX 060400	**RPGX 102**	6.35	4.76	4.57	120°																		●	●
RPGX 090700	**RPGX 103**	9.52	7.94	7.70	120°															●	●		●	●
RPGX 120700	**RPGX 104**	12.70	7.94	7.70	120°															●	●		●	●

RXGX

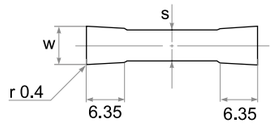


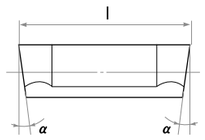


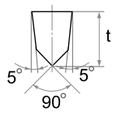
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO		d	t	a																			
RXGX 1207M0		12.00	7.94	6.90		●						●											
RXGX 1608M0		16.00	8.00	9.50		●						●											
RXGX 2508M0		25.00	8.00	18.20	●							●											

GROOVING INSERT

SYBF

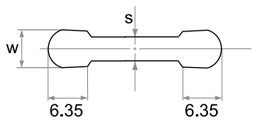


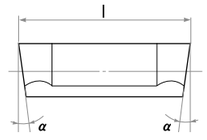


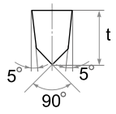


Type	Dimensions (mm)					ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	w	t	s	α																			
SYBF 3228	28.58	3.18	6.35	2.69	5.0°	●	●																	
SYBF 4828	28.58	4.78	6.35	3.66	5.0°	●	●																	
SYBF 5528	28.58	5.54	6.35	3.66	5.0°																			
SYBF 6428	28.58	6.35	8.56	5.13	7.0°	●	●																	
SYBF 7928	28.58	7.93	8.56	5.13	7.0°	●	●																	
SYBF 9528	28.58	9.53	8.56	6.99	7.0°																			

SYBR



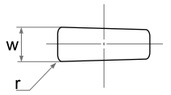


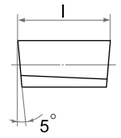


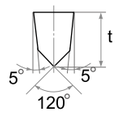
Type	Dimensions (mm)					ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	w	t	s	α																			
SYBR 3228	28.58	3.18	6.35	2.69	5.0°	●	●																	
SYBR 4828	28.58	4.78	6.35	3.66	5.0°	●	●																	
SYBR 5528	28.58	5.54	6.35	3.66	5.0°																			
SYBR 6428	28.58	6.35	8.56	5.13	7.0°	●	●																	
SYBR 7928	28.58	7.93	8.56	5.13	7.0°	●	●																	
SYBR 9528	28.58	9.53	8.56	6.99	7.0°																			

GROOVING INSERT

SGF

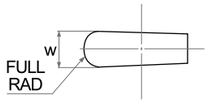


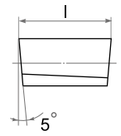


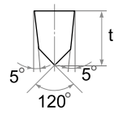


Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	w	t	r																			
SGF 4012	12.00	4.00	5.00	0.50	●	●						●				●					●		
SGF 5012	12.00	5.00	5.00	0.80	●	●						●				●					●		
SGF 6015	15.00	6.00	7.50	0.80	●	●						●											
SGF 7015	15.00	7.00	7.50	0.80	●	●						●											
SGF 8015	15.00	8.00	7.50	0.80	●	●						●											
SGF 1015	15.00	10.00	7.50	0.80	●	●						●											

SGR



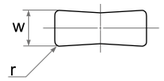


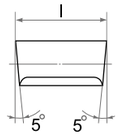


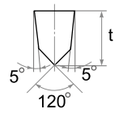
Type	Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	w	t																			
SGR 4012	12.00	4.00	5.00	●	●						●				●					●		
SGR 5012	12.00	5.00	5.00	●	●						●				●					●		
SGR 6015	15.00	6.00	7.50	●	●						●											
SGR 7015	15.00	7.00	7.50	●	●						●											
SGR 8015	15.00	8.00	7.50	●	●						●											
SGR 1015	15.00	10.00	7.50	●	●						●											

GROOVING INSERT

SSF

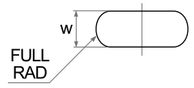


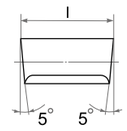


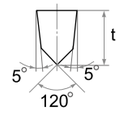


Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	w	t	r																			
SSF 4012	12.00	4.00	5.00	0.80	●	●						●											
SSF 5012	12.00	5.00	5.00	0.80	●	●						●											
SSF 6015	15.00	6.00	7.50	0.80	●	●						●											
SSF 7015	15.00	7.00	7.50	0.80	●	●																	
SSF 8015	15.00	8.00	7.50	0.80	●	●																	
SSF 1015	15.00	10.00	7.50	0.80	●	●																	

SSR





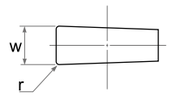


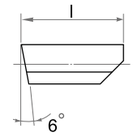
Type	Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	w	t																			
SSR 4012	12.00	4.00	5.00	●	●						●				●					●		
SSR 5012	12.00	5.00	5.00	●	●						●				●					●		
SSR 6015	15.00	6.00	7.50	●	●						●											
SSR 7015	15.00	7.00	7.50	●	●						●											
SSR 8015	15.00	8.00	7.50	●	●						●											
SSR 1015	15.00	10.00	7.50	●	●						●											

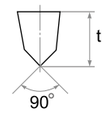
PART. A
TURNING & MILLING

GROOVING INSERT

WFC





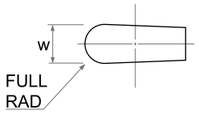


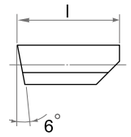
Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	w	t	r																			
WFC 094050-A	12.70	2.388	4.75	0.40																			
WFC 094050-B	12.70	2.388	4.75	0.80																			
WFC 125050-A	12.70	3.175	4.75	0.40																			
WFC 125050-B	12.70	3.175	4.75	0.80																			
WFC 156050-A	12.70	3.962	4.75	0.40																			
WFC 156050-B	12.70	3.962	4.75	0.80																			
WFC 187050-A	12.70	4.750	4.75	0.40																			
WFC 187050-B	12.70	4.750	4.75	0.80																			
WFC 218075-A	19.05	5.537	6.35	0.40																			
WFC 218075-B	19.05	5.537	6.35	0.80																			
WFC 250075-A	19.05	6.350	6.35	0.40																			
WFC 250075-B	19.05	6.350	6.35	0.80																			
WFC 250075-C	19.05	6.350	6.35	1.20																			
WFC 281075-A	19.05	7.137	6.35	0.40																			
WFC 281075-B	19.05	7.137	6.35	0.80																			
WFC 281075-C	19.05	7.137	6.35	1.20																			
WFC 312100-A	25.40	7.925	8.56	0.40																			
WFC 312100-B	25.40	7.925	8.56	0.80																			
WFC 312100-C	25.40	7.925	8.56	1.20																			
WFC 312100-D	25.40	7.925	8.56	1.60																			
WFC 344100-A	25.40	8.738	8.56	0.40																			●
WFC 344100-B	25.40	8.738	8.56	0.80																			
WFC 344100-C	25.40	8.738	8.56	1.20																			
WFC 344100-D	25.40	8.738	8.56	1.60																			
WFC 375100-A	25.40	9.525	8.56	0.40																			
WFC 375100-B	25.40	9.525	8.56	0.80																			
WFC 375100-C	25.40	9.525	8.56	1.20																			
WFC 375100-D	25.40	9.525	8.56	1.60																			●

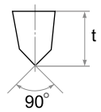
*The above inserts WFC Series are available only Whisker grade.

GROOVING INSERT

WRC





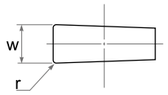


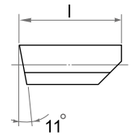
Type	Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	l	w	t																			
WRC 094050	12.70	2.388	4.75																			
WRC 125050	12.70	3.175	4.75																			●
WRC 156050	12.70	3.962	4.75																			
WRC 187050	12.70	4.750	4.75																			
WRC 218075	19.05	5.537	6.35																			
WRC 250075	19.05	6.350	6.35																			
WRC 281075	19.05	7.137	6.35																			
WRC 312100	25.40	7.925	8.56																			
WRC 344100	25.40	8.738	8.56																			
WRC 375100	25.40	9.525	8.56																			

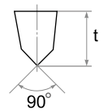
*The above inserts WRC Series are available only Whisker grade.

GROOVING INSERT

WFP







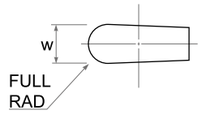
Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	l	w	t	r																			
WFP 094050-A	12.70	2.388	4.75	0.40																			●
WFP 094050-B	12.70	2.388	4.75	0.80																			
WFP 125050-A	12.70	3.175	4.75	0.40																			●
WFP 125050-B	12.70	3.175	4.75	0.80																			●
WFP 156050-A	12.70	3.962	4.75	0.40																			●
WFP 156050-B	12.70	3.962	4.75	0.80																			●
WFP 187050-A	12.70	4.750	4.75	0.40																		●	●
WFP 187050-B	12.70	4.750	4.75	0.80																		●	●
WFP 218075-A	19.05	5.537	6.35	0.40																		●	●
WFP 218075-B	19.05	5.537	6.35	0.80																			
WFP 250075-A	19.05	6.350	6.35	0.40																		●	●
WFP 250075-B	19.05	6.350	6.35	0.80																		●	●
WFP 250075-C	19.05	6.350	6.35	1.20																		●	●
WFP 281075-A	19.05	7.137	6.35	0.40																		●	●
WFP 281075-B	19.05	7.137	6.35	0.80																			
WFP 281075-C	19.05	7.137	6.35	1.20																			
WFP 312100-A	25.40	7.925	8.56	0.40																			●
WFP 312100-B	25.40	7.925	8.56	0.80																			●
WFP 312100-C	25.40	7.925	8.56	1.20																			●
WFP 312100-D	25.40	7.925	8.56	1.60																			
WFP 344100-A	25.40	8.738	8.56	0.40																			
WFP 344100-B	25.40	8.738	8.56	0.80																			
WFP 344100-C	25.40	8.738	8.56	1.20																			
WFP 344100-D	25.40	8.738	8.56	1.60																			
WFP 375100-A	25.40	9.525	8.56	0.40																			
WFP 375100-B	25.40	9.525	8.56	0.80																			●
WFP 375100-C	25.40	9.525	8.56	1.20																			
WFP 375100-D	25.40	9.525	8.56	1.60																			●

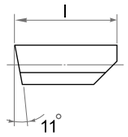
*The above inserts WFP Series are available only Whisker grade.

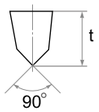
PART. A
TURNING & MILLING
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

GROOVING INSERT

WRP





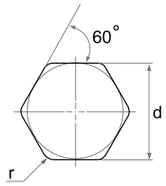


Type	Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	l	w	t																			
WRP 094050	12.70	2.388	4.75																			
WRP 125050	12.70	3.175	4.75																			●
WRP 156050	12.70	3.962	4.75																			●
WRP 187050	12.70	4.750	4.75																			●
WRP 218075	19.05	5.537	6.35																		●	●
WRP 250075	19.05	6.350	6.35																		●	●
WRP 281075	19.05	7.137	6.35																		●	●
WRP 312100	25.40	7.925	8.56																		●	●
WRP 344100	25.40	8.738	8.56																			
WRP 375100	25.40	9.525	8.56																			●

*The above inserts WRP Series are available only Whisker grade.

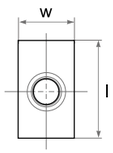
MILLING INSERT

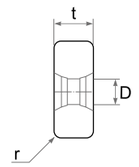
HNEN



Type	Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	d	t	r																			
HNEN 090520	16.20	5.56	2.0											●	●					●		
HNEN 090530	16.20	5.56	3.0											●	●					●		
HNEN 0905 ANSN	15.87	5.64	0.8											●	●		●			●		

LNE

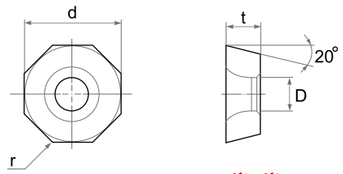




Type	Dimensions (mm)					ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	l	w	t	D	r																			
LNE 040904	15.87	9.52	4.76	4.41	0.4											●	●					●		
LNE 040908	15.87	9.52	4.76	4.41	0.8											●	●					●		
LNE 040912	15.87	9.52	4.76	4.41	1.2											●	●					●		
LNE 1007	15.67	9.52	6.35	4.10	1.2											●	●					●		

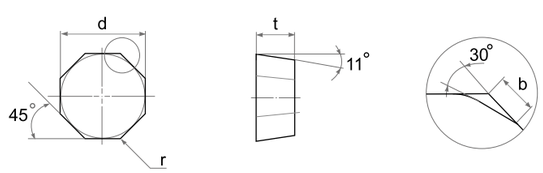
MILLING INSERT

OEGB



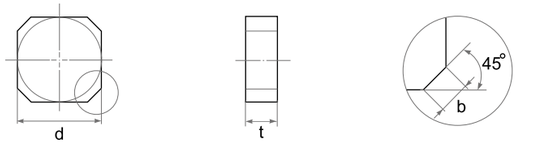
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO		d	t	r																			
OEGB 070408		15.87	4.76	0.8												●					●		
OEGB 070416		15.87	4.76	1.6											●	●		●			●		
OEGB 070516		15.87	5.13	1.6											●	●					●		

OPEN



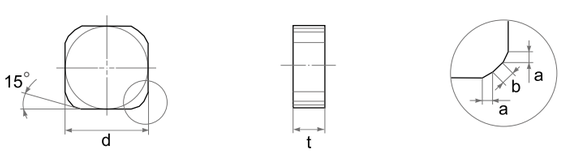
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO		d	t	r	b																		
OPEN 050408 TR		13.97	4.76	0.80	2.10											●					●		
OPEN 050608 TR		13.97	6.35	0.80	2.10											●		●			●		

SNCN



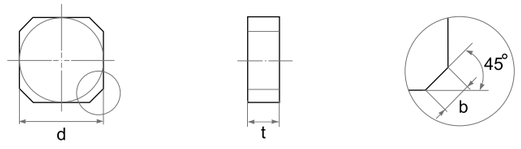
Type			Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA		d	t	b																			
SNCN 1204 AN	**SNCN 43 AN**		12.70	4.76	2.50												●					●		
SNCN 1204 ZN	**SNCN 43 ZN**		12.70	4.76	1.10												●					●		

SNCN .. ENTN



Type			Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA		d	t	a	b																			
SNCN 1204 ENTN	**SNCN 43 ENTN**		12.70	4.76	1.40	1.00										●	●	●					●		
SNCN 1504 ENTN	**SNCN 53 ENTN**		15.87	4.76	1.40	1.00										●	●	●					●		

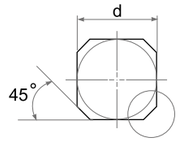
SNGN .. ING

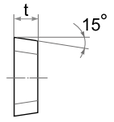


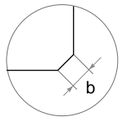
Type			Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA		d	t	b																			
SNGN 1204 ING	**SNGN 43 ING**		12.70	4.76	1.50											●	●					●		
SNGN 1904 ING	**SNGN 63 ING**		19.05	4.76	2.50											●	●					●		

MILLING INSERT

SDCN

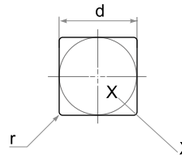


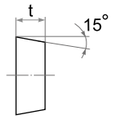




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	b																			
SDCN 1203 AETN 12	**SDCN 42 AETN 12**	12.70	3.18	1.2												●					●		
SDCN 1203 AETN	**SDCN 42 AETN**	12.70	3.18	2.0												●					●		
SDCN 1504 AETN	**SDCN 53 AETN**	15.87	4.76	2.0												●					●		

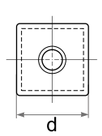
SDCN .. T

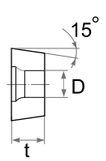




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SDCN 120408 T20	**SDCN 432 T20**	12.70	4.76	0.8												●					●		
SDCN 120412 T20	**SDCN 433 T20**	12.70	4.76	1.2												●					●		

SDCW

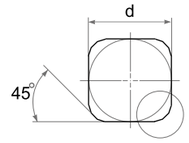


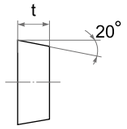


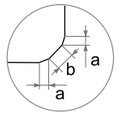
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	D																			
SDCW 1204 PDSR	**SDCW 43 PDSR**	12.70	4.76	4.40												●		●			●		

MILLING INSERT

SEAN

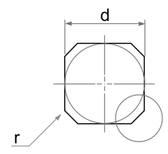


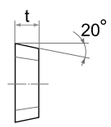


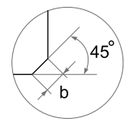


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	a	b																			
SEAN 1203 AFTN	**SEAN 42 AFTN**	12.70	3.18	0.50	1.80										●	●	●					●		
SEAN 1504 AFTN	**SEAN 53 AFTN**	12.70	4.76	0.70	2.00										●	●	●					●		

SEAN .. NW

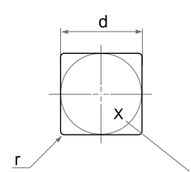


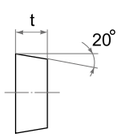


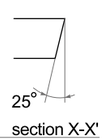


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	b	r																			
SEAN 1203 NWAFTN	**SEAN 42 NWAFTN**	12.70	3.18	2.40	0.4										●									
SEAN 1204 AFTNW25	**SEAN 43 AFTNW25**	12.70	4.76	2.50	1.2												●					●		

SEAN .. T



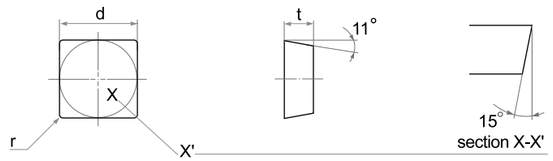




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SEAN 120412 T25	**SEAN 433 T25**	12.70	4.76	1.2												●			●		●		
SEAN 120416 T25	**SEAN 434 T25**	12.70	4.76	1.6												●			●		●		

MILLING INSERT

SPCN .. T

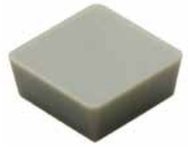


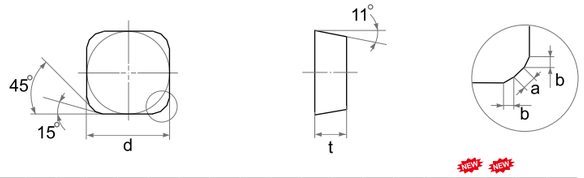
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SPCN 120412 T15	**SPCN 433 T15**	12.70	4.76	1.2												●					●		
SPCN 120416 T15	**SPCN 434 T15**	12.70	4.76	1.6												●					●		

SPCW

Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	D																			
SPCW 10T3ZX	**SPCW 10T3ZX**	10.00	3.97	3.52												●					●		

SPEN

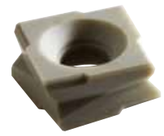


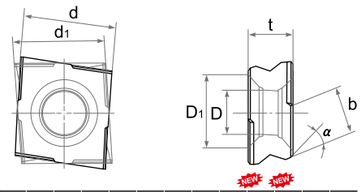


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	a	b																			
SPEN 1206 APTN	**SPEN 44 APTN**	12.70	6.35	1.20	1.20												●		●			●		

MILLING INSERT

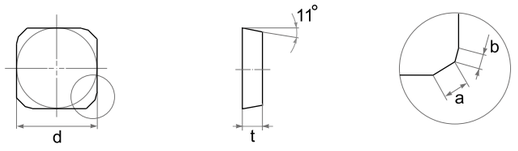
SPHX





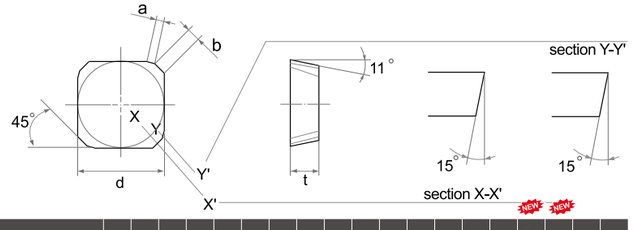
Type		Dimensions (mm)						ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600 NEW	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO		d	d1	t	D	D1	α	b																		
SPHX 1205NR 480T		11.67	11.33	5.50	5.10	8.41	45	8.0											●		●			●		
SPHX 1205NL 480T		11.67	11.33	5.50	5.10	8.41	45	8.0																		
SPHX 1205ER 855T		12.09	11.33	5.50	5.10	8.41	35	5.50											●		●			●		
SPHX 1205EL 855T		12.09	11.33	5.50	5.10	8.41	35	5.50											●					●		
SPHX 15T6NR 880T		14.58	14.33	6.60	6.10	10.18	45	8.80											●		●			●		
SPHX 15T6ER 865T		15.50	14.33	6.60	6.10	10.18	35	6.50											●		●			●		

SPKN



Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	a	b																			
SPKN 1203 EDTR	**SPKN 42 EDTR**	12.70	3.18	1.40	1.00												●	●					●	●
SPKN 1504 EDTR	**SPKN 53 EDTR**	15.87	4.76	1.40	1.00												●	●					●	●

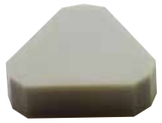
SPKN .. SP

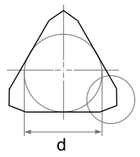


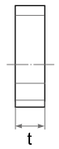
Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	a	b																			
SPKN 1204SP EDTR	**SPKN 43SP EDTR**	12.70	4.76	1.10	1.30												●					●		

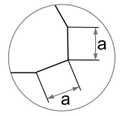
MILLING INSERT

TNCN



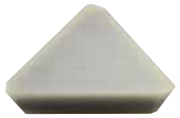


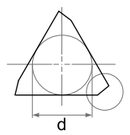


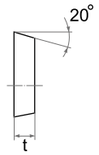


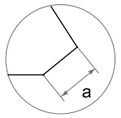
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	ASA	d	t	a																			
TNCN 2204 ANT	**TNCN 43 ANT**	12.70	4.76	2.60											●	●					●		

TEKN



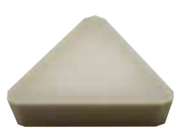


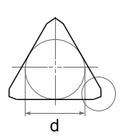


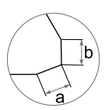


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	ASA	d	t	a																			
TEKN 1603 PFTR	TEKN 32 PFTR	9.52	3.18	1.40											●	●					●		
TEKN 2204 PFTR	TEKN 43 PFTR	12.70	4.76	2.10											●	●					●		

TPKN



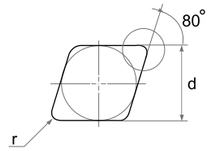


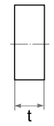


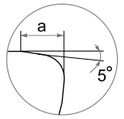
Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	ASA	d	t	a	b																			
TPKN 1603 PDTR	**TPKN 32 PDTR**	9.52	3.18	1.20	1.00										●	●	●					●		
TPKN 2204 PDTR	**TPKN 43 PDTR**	12.70	4.76	1.40	0.70										●	●	●					●		

WIPER(ZZ) INSERT

CNGN .. AZ







Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	ASA	d	t	r	a																			
CNGN 1204 AZ	**CNGN 43 AZ**	12.70	4.76	1.0	1.60		●										●					●		

ADVANTAGE OF WIPER INSERT

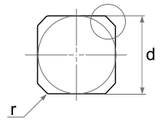
f : feed (mm)
r : corner radius
r_w : wiper radius (large radius)
R_a : surface finish

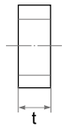
Wiper Insert

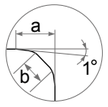
Standard Insert

WIPER INSERT

SNCN .. ZZT

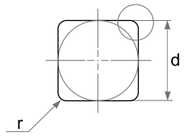



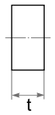


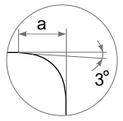


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	a	b																			
SNCN 0904 ZZT	**SNCN 33 ZZT**	9.52	4.76	1.30	1.10												●	●				●		
SNCN 1204 ZZT	**SNCN 43 ZZT**	12.70	4.76	3.25	1.10		●										●	●				●		

SNCN .. GZ

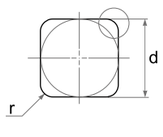



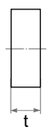


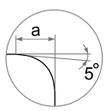


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	a																			
SNCN 0904 GZ	**SNCN 33 GZ**	9.52	4.76	0.8	1.00												●					●		

SNCN .. KZ

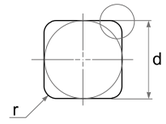


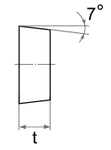


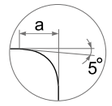
Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	a																			
SNCN 1204 KZ	**SNCN 43 KZ**	12.70	4.76	1.2	1.80												●					●		

WIPER INSERT

SCGN .. WZ

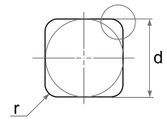



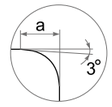




Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	a																			
SCGN 0904 WZ	**SCGN 33 WZ**	9.52	4.76	0.8	1.60												●					●		
SCGN 1204 WZ	**SCGN 43 WZ**	12.70	4.76	0.8	1.60												●					●		

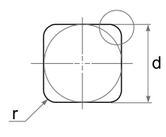
SCGN .. XZ

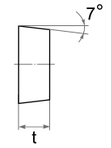



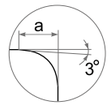


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	a																			
SCGN 0904 XZ	**SCGN 33 XZ**	9.52	4.76	0.8	1.20												●					●		
SCGN 1204 XZ	**SCGN 43 XZ**	12.70	4.76	0.8	1.20												●					●		

SCGN .. ZZ

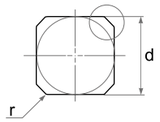


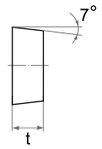


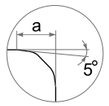
Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	a																			
SCGN 0904 ZZ	**SCGN 33 ZZ**	9.52	4.76	0.8	1.00												●					●		
SCGN 1204 ZZ	**SCGN 43 ZZ**	12.70	4.76	0.8	1.00												●					●		

WIPER INSERT

SCGN .. MZ



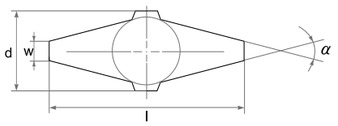


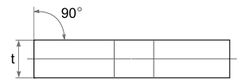


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r	a																			
SCGN 0904 MZ	**SCGN 33 MZ**	9.52	4.76	0.8	1.80												●					●		
SCGN 1204 MZ	**SCGN 43 MZ**	12.70	4.76	0.8	1.80												●					●		

SPECIAL INSERT

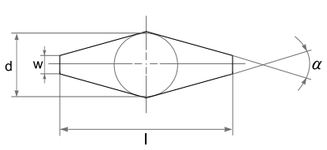
SVW

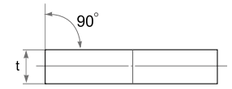




Type	Dimensions (mm)					ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	α	d	t	w																			
SVW 38260	26.00	38°	11.5	7.94	2.23								●											
SVW 38320	32.00	38°	14.5	7.94	3.22								●											
SVW 34400	40.00	34°	18.5	7.94	5.07								●											

GVGN

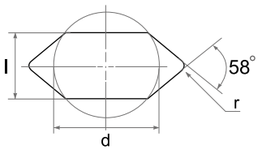




Type	Dimensions (mm)					ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	l	α	d	t	w																			
GVGN 38320	32.00	38°	13.46	7.94	3.22								●											
GVGN 38335	33.50	38°	13.28	8.00	3.06								●											
GVGN 36340	34.00	36°	13.59	7.94	3.25								●											
GVGN 38360	36.00	38°	17.38	7.94	5.98								●											
GVGN 34360	36.00	34°	17.42	7.94	7.22								●											

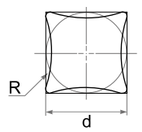
SPECIAL INSERT

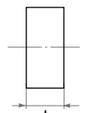
SZT 5810



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO		d	l	t	r																		
SZT 581004		14.70	10.00	7.94	0.4	●	●																
SZT 581008		14.70	10.00	7.94	0.8	●	●																
SZT 581012		14.70	10.00	7.94	1.2	●	●																

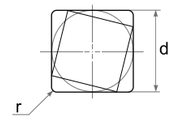
SNMX

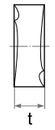




Type	Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	d	t	R																			
SNMX 121007	12.70	10.00	7.0								●											
SNMX 121009	12.70	10.00	9.0								●											
SNMX 121012	12.70	10.00	12.0								●											
SNMX 121015	12.70	10.00	15.0								●											
SNMX 121020	12.70	10.00	20.0								●											
SNMX 121025	12.70	10.00	25.0								●											
SNMX 121030	12.70	10.00	30.0								●											
SNMX 121040	12.70	10.00	40.0								●											
SNMX 121050	12.70	10.00	50.0								●											

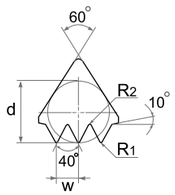
SNGF

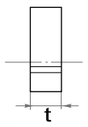




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SNGF 120412	**SNGF 433**	12.70	4.76	1.2												●					●		

INGN

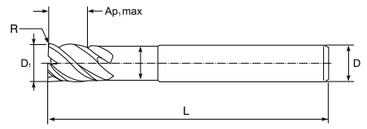




Type	Dimensions (mm)					ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	d	t	w	R_1	R_2																			
INGN 160435 F303	9.52	4.76	3.56	0.5	0.3								●											
INGN 160435 F304	9.52	4.76	3.56	0.5	0.4								●											
INGN 220435 F403	12.70	4.76	3.56	0.5	0.3								●											
INGN 220435 F404	12.70	4.76	3.56	0.5	0.4								●											

SPECIAL INSERT

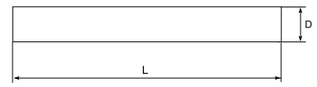
ENDMILL (FINISHED)



Type	Flute	Mill Diameter x Corner R	Length of Cut	Effective Length	Neck Diameter	Overall Length	Shank Diameter	SN1000	SW800
	F	ø D_1xR	L_1	L_2	ø d_2	L	øD		
SYC 6040 R0.5	4	ø6 X R 0.5	4.5	12	5.8	60	ø6		●
SYC 8040 R1.0	4	ø8 X R 1.0	6	16	7.7	60	ø8		●
SYC 10040 R1.25	4	ø10 X R 1.25	7.5	20	9.7	65	ø10	●	●
SYC 12040 R1.5	4	ø12 X R 1.5	9	24	11.7	70	ø12		●
SYC 6060 R0.5	6	ø6 X R 0.5	4.5	12	5.8	60	ø6		●
SYC 8060 R1.0	6	ø8 X R 1.0	6	16	7.7	60	ø8		●
SYC 10060 R1.25	6	ø10 X R 1.25	7.5	20	9.7	65	ø10	●	●
SYC 12060 R1.5	6	ø12 X R 1.5	9	24	11.7	70	ø12		●

SPECIAL INSERT

ENDMILL (BLANK)

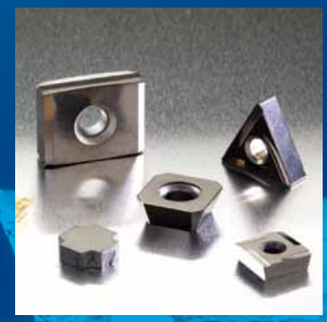


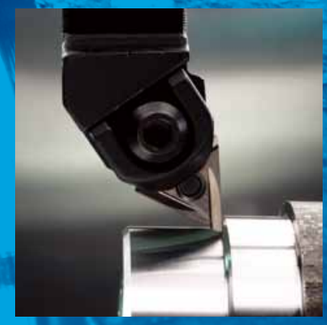
Type	Dimensions (mm)		SN1000	SW800
	D	L		
ROD 060-600S	6	60		
ROD 080-600S	8	60		
ROD 100-650S	10	65		
ROD 100-720S	10	72	●	●
ROD 120-700S	12	70		
ROD 140-850S	14	85		
ROD 160-900S	16	90		
ROD 180-1000S	18	100		
ROD 200-1050S	20	105		

* Remarks : Available upon customer request

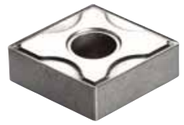
PART. A
TURNING & MILLING
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

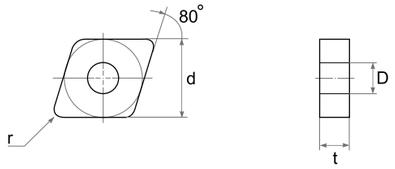
CERMET



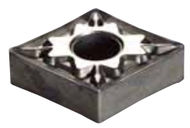


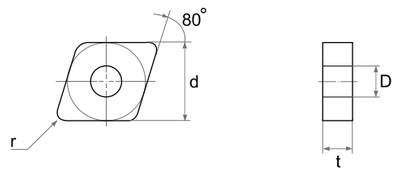
CNMG



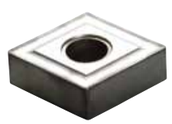


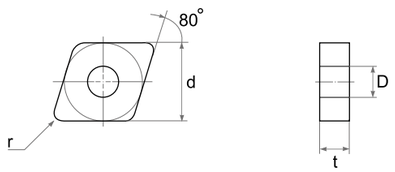
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
CNMG 120404SF	**CNMG 431SF**	12.70	4.76	0.4	5.16	●	●	●					
CNMG 120408SF	**CNMG 432SF**	12.70	4.76	0.8	5.16	●	●	●				●	
CNMG 120412SF	**CNMG 433SF**	12.70	4.76	1.2	5.16								





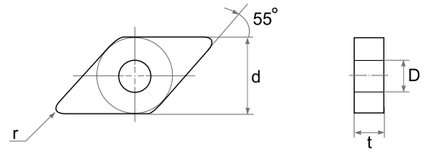
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
CNMG 120404SY	**CNMG 431SY**	12.70	4.76	0.4	5.16	●	●	●	●			●	
CNMG 120408SY	**CNMG 432SY**	12.70	4.76	0.8	5.16		●	●	●			●	
CNMG 120412SY	**CNMG 433SY**	12.70	4.76	1.2	5.16		●	●				●	



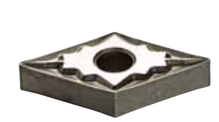


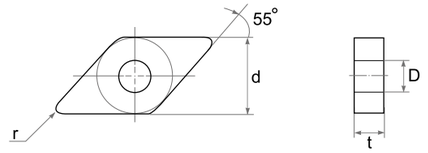
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
CNMG 120404SG	**CNMG 431SG**	12.70	4.76	0.4	5.16	●	●	●					
CNMG 120408SG	**CNMG 432SG**	12.70	4.76	0.8	5.16	●	●	●					
CNMG 120412SG	**CNMG 433SG**	12.70	4.76	1.2	5.16			●			●		

DNMG

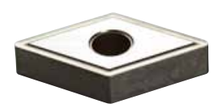


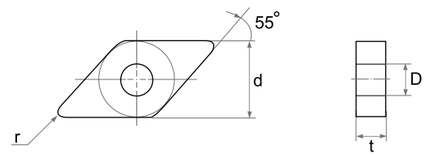
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
DNMG 150404SF	**DNMG 431SF**	12.70	4.76	0.4	5.16		●	●				●	
DNMG 150408SF	**DNMG 432SF**	12.70	4.76	0.8	5.16	●	●	●				●	
DNMG 150412SF	**DNMG 433SF**	12.70	4.76	1.2	5.16		●	●					●
DNMG 150604SF	**DNMG 441SF**	12.70	6.35	0.4	5.16		●	●					
DNMG 150608SF	**DNMG 442SF**	12.70	6.35	0.8	5.16		●	●					
DNMG 150612SF	**DNMG 443SF**	12.70	6.35	1.2	5.16		●						





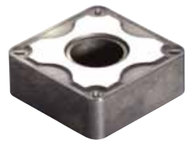
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
DNMG 150404SY	**DNMG 431SY**	12.70	4.76	0.4	5.16		●	●				●	
DNMG 150408SY	**DNMG 432SY**	12.70	4.76	0.8	5.16		●	●				●	
DNMG 150412SY	**DNMG 433SY**	12.70	4.76	1.2	5.16		●	●					●
DNMG 150604SY	**DNMG 441SY**	12.70	6.35	0.4	5.16		●	●					
DNMG 150608SY	**DNMG 442SY**	12.70	6.35	0.8	5.16		●	●					
DNMG 150612SY	**DNMG 443SY**	12.70	6.35	1.2	5.16		●	●					

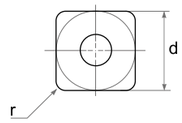


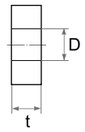


Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
DNMG 150404SG	**DNMG 431SG**	12.70	4.76	0.4	5.16		●	●					
DNMG 150408SG	**DNMG 432SG**	12.70	4.76	0.8	5.16		●	●					
DNMG 150412SG	**DNMG 433SG**	12.70	4.76	1.2	5.16		●	●					●
DNMG 150604SG	**DNMG 441SG**	12.70	6.35	0.4	5.16		●	●					
DNMG 150608SG	**DNMG 442SG**	12.70	6.35	0.8	5.16		●	●					
DNMG 150612SG	**DNMG 443SG**	12.70	6.35	1.2	5.16		●						

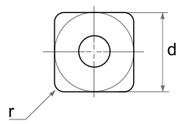
SNMG

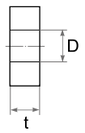




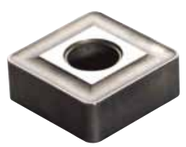


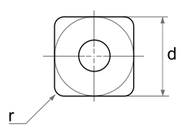
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SNMG 120404SF	**SNMG 431SF**	12.70	4.76	0.4	5.16		●	●					
SNMG 120408SF	**SNMG 432SF**	12.70	4.76	0.8	5.16		●	●			●		
SNMG 120412SF	**SNMG 433SF**	12.70	4.76	1.2	5.16		●	●					

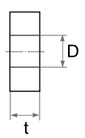




Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SNMG 120404SY	**SNMG 431SY**	12.70	4.76	0.4	5.16		●	●	●			●	
SNMG 120408SY	**SNMG 432SY**	12.70	4.76	0.8	5.16		●	●				●	
SNMG 120412SY	**SNMG 433SY**	12.70	4.76	1.2	5.16		●	●					

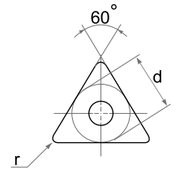


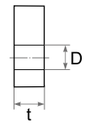




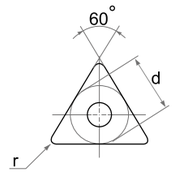
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SNMG 120404SG	**SNMG 431SG**	12.70	4.76	0.4	5.16		●	●					
SNMG 120408SG	**SNMG 432SG**	12.70	4.76	0.8	5.16		●	●					
SNMG 120412SG	**SNMG 433SG**	12.70	4.76	1.2	5.16		●	●					

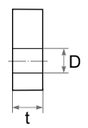
TNMG





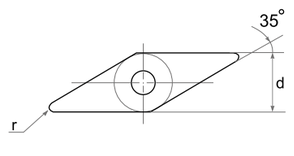
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TNMG 160404SY	**TNMG 331SY**	9.52	4.76	0.4	3.81		●	●					
TNMG 160408SY	**TNMG 332SY**	9.52	4.76	0.8	3.81								
TNMG 160412SY	**TNMG 333SY**	9.52	4.76	1.2	3.81		●	●					

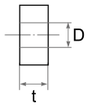




Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TNMG 160404SG	**TNMG 331SG**	9.52	4.76	0.4	3.81		●	●					
TNMG 160408SG	**TNMG 332SG**	9.52	4.76	0.8	3.81		●	●					
TNMG 160412SG	**TNMG 333SG**	9.52	4.76	1.2	3.81		●	●					

VNMG

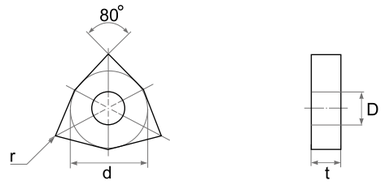




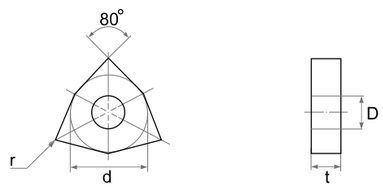
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
VNMG 160404SG	**VNMG 331SG**	9.52	4.76	0.4	3.81		●	●			●	●	
VNMG 160408SG	**VNMG 332SG**	9.52	4.76	0.8	3.81		●	●				●	

TURNING INSERT

WNMG



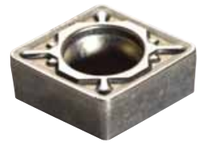
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
WNMG 080404SY	**WNMG 431SY**	12.70	4.76	0.4	5.16		●	●			●	●	
WNMG 080408SY	**WNMG 432SY**	12.70	4.76	0.8	5.16		●	●			●	●	

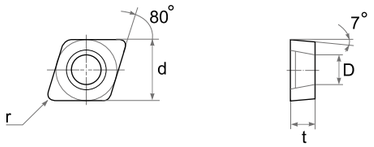


Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
WNMG 080404SG	**WNMG 431SG**	12.70	4.76	0.4	5.16		●	●			●		
WNMG 080408SG	**WNMG 432SG**	12.70	4.76	0.8	5.16		●	●					
WNMG 080412SG	**WNMG 433SG**	12.70	4.76	1.2	5.16		●	●					

TURNING INSERT

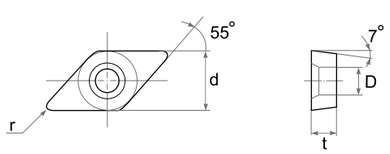
CCMT





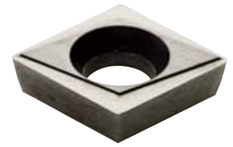
Type	Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
CCMT 09T304	9.52	3.97	0.4	4.40	●	●	●			●		
CCMT 09T308	9.52	3.97	0.8	4.40	●	●	●					

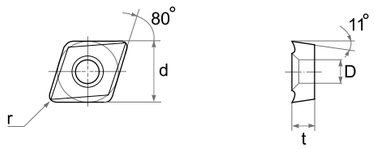
DCGW



Type	Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
DCGW 090304	8.50	3.18	0.4	3.60			●					
DCGW 11T304	9.52	3.97	0.4	4.40			●					

CPGT

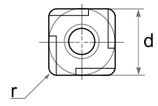


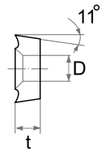


Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
CPGT 090304	**CPGT 321**	9.52	3.18	0.4	4.50	●	●	●					
CPGT 090308	**CPGT 322**	9.52	3.18	0.8	4.50	●	●	●					

TURNING INSERT

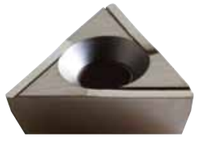
SPGT

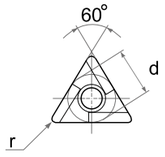


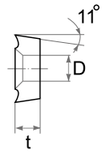


Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SPGT 090304R/L	**SPGT 321R/L**	9.52	3.18	0.4	3.40	●	●						
SPGT 090308R/L	**SPGT 322R/L**	9.52	3.18	0.8	3.40	●	●						

TPGT

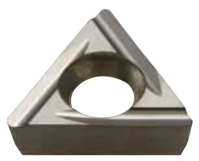


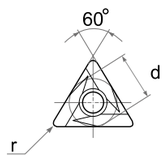


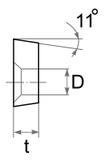


Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TPGT 110302R/L	**TPGT 2205R/L**	6.35	3.18	0.2	3.56	●	●	●					
TPGT 110304R/L	**TPGT 221R/L**	6.35	3.18	0.4	3.56	●	●	●					
TPGT 110308R/L	**TPGT 222R/L**	6.35	3.18	0.8	3.56	●	●						
TPGT 160304R/L	**TPGT 321R/L**	9.52	3.18	0.4	4.46	●	●	●					
TPGT 160308R/L	**TPGT 322R/L**	9.52	3.18	0.8	4.46	●	●	●					
TPGT 160404R/L	**TPGT 331R/L**	9.52	4.76	0.4	4.40	●	●	●					
TPGT 160408R/L	**TPGT 332R/L**	9.52	4.76	0.8	4.40	●	●	●					

TPGT .. KC





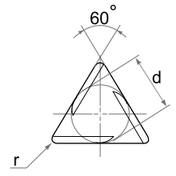


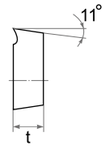
Type	Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TPGT 110304KC	6.35	3.18	0.4	3.56			●					

PART. A
TURNING & MILLING

TURNING INSERT

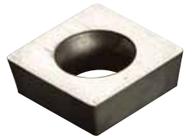
TPGR

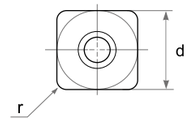


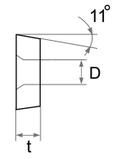


Type	Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO	d	t	r	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TPGR 110302R/L	6.35	3.18	0.2		●						
TPGR 110304R/L	6.35	3.18	0.4		●						
TPGR 110308R/L	6.35	3.18	0.8								
TPGR 160302R/L	9.52	3.18	0.2		●						
TPGR 160304R/L	9.52	3.18	0.4		●		●				
TPGR 160308R/L	9.52	3.18	0.8		●						
TPGR 220404K-R/L	12.70	4.76	0.4		●		●				
TPGR 220408K-R/L	12.70	4.76	0.8		●						
TPGR 220412K-R/L	12.70	4.76	1.2		●						

SPMW





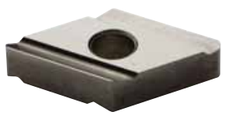


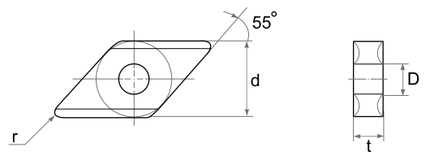
Type	Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SPMW 090304HS	9.52	3.18	0.4	3.4		●	●					
SPMW 090308HS	9.52	3.18	0.8	3.4		●	●					
SPMW 090304HL	9.52	3.18	0.4	4.6		●	●					
SPMW 090308HL	9.52	3.18	0.8	4.6		●	●					

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

TURNING INSERT

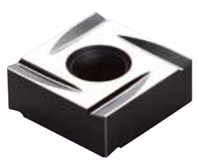
DNGG

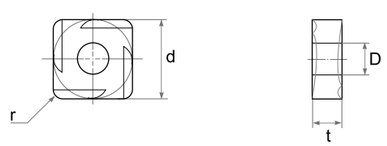




Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
DNGG 150404R/L	**DNGG 431R/L**	12.70	4.76	0.4	5.16		●	●				●	
DNGG 150408R/L	**DNGG 432R/L**	12.70	4.76	0.8	5.16		●	●					
DNGG 150604R/L	**DNGG 441R/L**	12.70	6.35	0.4	5.16		●	●					
DNGG 150608R/L	**DNGG 442R/L**	12.70	6.35	0.8	5.16		●	●					

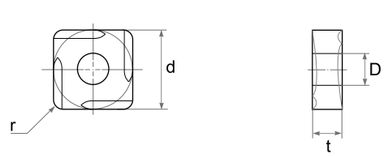
SNGG





Type		Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SNGG 120404R/L	**SNGG 431R/L**	12.70	4.76	0.4		●	●					
SNGG 120408R/L	**SNGG 432R/L**	12.70	4.76	0.8		●	●					
SNGG 120412R/L	**SNGG 433R/L**	12.70	4.76	1.2								

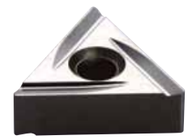
SNGL

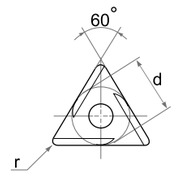


Type		Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO		d	t	r	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SNGL 070204R/L		7.14	2.38	0.4	●							

TURNING INSERT

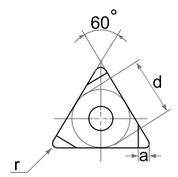
TNGG





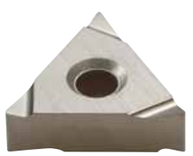
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TNGG 160402R/L	**TNGG 3302R/L**	9.52	4.76	0.2	3.81		●	●	●				
TNGG 160404R/L	**TNGG 331R/L**	9.52	4.76	0.4	3.81	●	●	●	●				
TNGG 160408R/L	**TNGG 332R/L**	9.52	4.76	0.8	3.81	●	●	●					
TNGG 220404R/L	**TNGG 431R/L**	12.70	4.76	0.4	5.16		●	●					
TNGG 220408R/L	**TNGG 432R/L**	12.70	4.76	0.8	5.16		●	●					

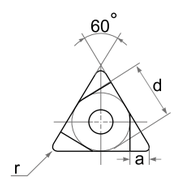
TNGG .. FS



Type		Dimensions (mm)					Cermet (TiCN)				Cermet (PVD)			
ISO		d	t	r	D	a	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TNGG 160402R/L-FS		9.52	4.76	0.2	3.81	1.28		●	●					
TNGG 160404R/L-FS		9.52	4.76	0.4	3.81	1.28		●	●				●	
TNGG 160408R/L-FS		9.52	4.76	0.8	3.81	1.28		●	●					

TNGG .. F

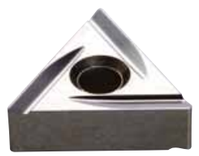


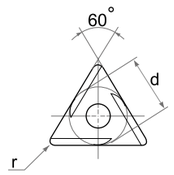


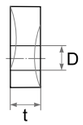
Type		Dimensions (mm)					Cermet (TiCN)				Cermet (PVD)			
ISO		d	t	r	D	a	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TNGG 160402R/L-F		9.52	4.76	0.2	3.81	2.50		●	●					
TNGG 160404R/L-F		9.52	4.76	0.4	3.81	2.50		●	●				●	
TNGG 160408R/L-F		9.52	4.76	0.8	3.81	2.50		●	●					

TURNING INSERT

TNMG .. 2G

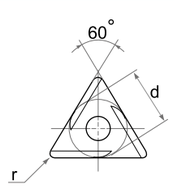


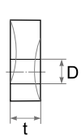




Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TNMG 160404R/L 2G	**TNMG 331R/L 2G**	9.52	4.76	0.4	3.81	●	●	●	●			●	
TNMG 160408R/L 2G	**TNMG 332R/L 2G**	9.52	4.76	0.8	3.81		●	●				●	

TNMG .. RM

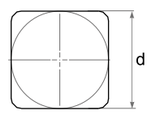


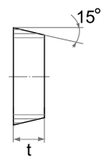


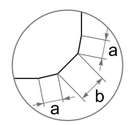
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TNMG 160404 RM	**TNMG 331 RM**	9.52	4.76	0.4	3.81		●	●					

MILLING INSERT

SDCN

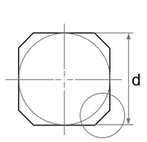


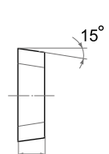


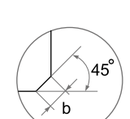


Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	a	b	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SDCN 1203MT	**SDCN 42MT**	12.70	3.18	0.50	1.40			●	●				
SDCN 1504MT	**SDCN 53MT**	15.87	4.76	0.50	1.40				●				

SDKN

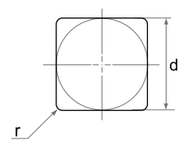


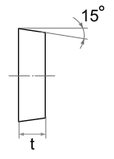




Type		Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	r	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SDKN 1203AETN	**SDKN 42AETN**	12.70	3.18	2.00			●	●				
SDKN 1504AETN	**SDKN 53AETN**	15.87	4.76	2.00			●	●				

SDEN

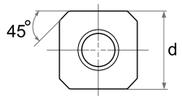


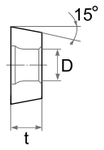


Type	Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO	d	t	r	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SDEN 150404FN	15.87	4.76	0.4			●	●				

MILLING INSERT

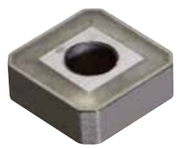
SDEW

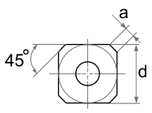


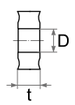


Type		Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SDEW 1204AZT	**SDEW 43AZT**	12.70	4.76	5.20			○	●				

SNK

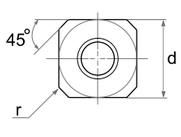


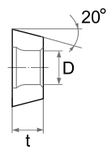




Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	D	a	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SNK 0903AEN	**SNK 32AEN**	9.52	3.18	3.81	1.40		●						

SEHW

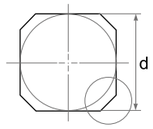


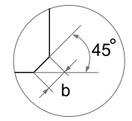


Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	D	r	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SEHW 120408AE	**SEHW 432AE**	12.70	4.76	5.50	0.8				●				●

MILLING INSERT

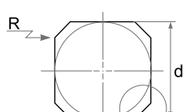
SEKN

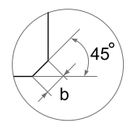




Type		Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	b	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SEKN 1203 AFTN	**SEKN 42 AFTN**	12.70	3.18	2.00		●	●	●				●
SEKN 1504 AFTN	**SEKN 53 AFTN**	15.87	4.76	2.00			●	●				●

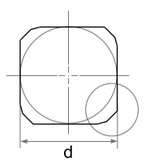
SEKN .. R

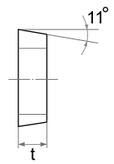


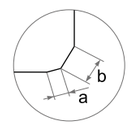


Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	b	R	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SEKN 120308 AFTN	**SEKN 432 AFTN**	12.70	3.18	2.00	0.8			●	●				
SEKN 150408 AFTN	**SEKN 532 AFTN**	15.87	4.76	2.00	0.8								

SPKN



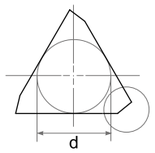


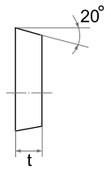


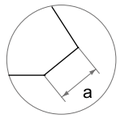
Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	a	b	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
SPKN 1203EDTR/L	**SPKN 42EDTR/L**	12.70	3.18	1.00	1.40			●	●				
SPKN 1504EDTR/L	**SPKN 53EDTR/L**	15.87	4.76	1.00	1.40			●	●				

MILLING INSERT

TEKN

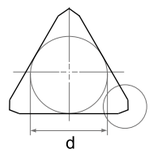



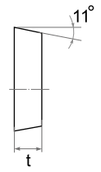


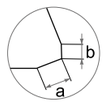


Type		Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	a	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TEKN 1603PETR/L	**TEKN 32PETR/L**	9.52	3.18	1.40			○	●				
TEKN 2204PETR/L	**TEKN 43PETR/L**	12.70	4.76	2.00			○	●				
TEKN 1603PEER/L	**TEKN 32PEER/L**	9.52	3.18	1.40			○	●				
TEKN 2204PEER/L	**TEKN 43PEER/L**	12.70	4.76	2.00			○	●				

TPKN

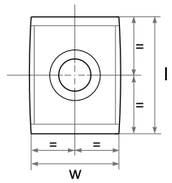


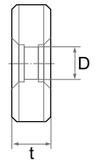


Type		Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	ASA	d	t	a	b	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
TPKN 1603PDTR/L	**TPKN 32PDTR/L**	9.52	3.18	1.20	1.00			●	●				
TPKN 2204PDTR/L	**TPKN 43PDTR/L**	12.70	4.76	1.40	0.70			●	●				

MILLING INSERT

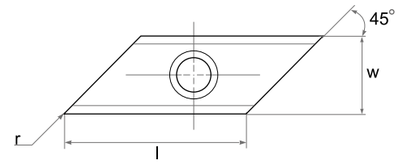
YCE

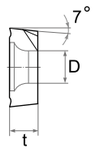





Type	Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	l	w	t	D	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
YCE 434-01	19.05	14.29	6.35	5.25		●	●					

XCET

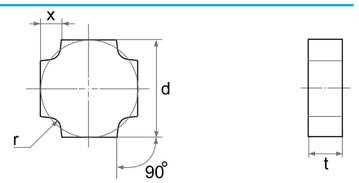





Type	Dimensions (mm)					Cermet (TiCN)				Cermet (PVD)			
ISO	l	w	t	D	r	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
XCET 310404 ER	22.00	12.70	4.50	5.60	0.4			●				●	
XCET 310408 ER	22.00	12.70	4.50	5.60	0.8			●					

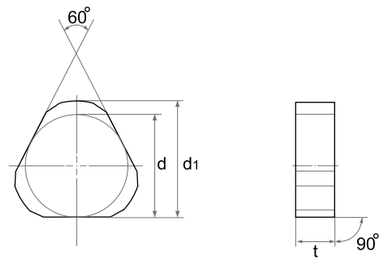
SPECIAL INSERT

BSN



Type	Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	d	x	t	r	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
BSN 090306	9.52	2.00	3.18	0.6			●					
BSN 090310	9.52	2.57	3.18	1.0			●					
BSN 120406	12.70	2.14	4.76	0.6			●					
BSN 120410	12.70	2.40	4.76	1.0			●					
BSN 120415	12.70	3.00	4.76	1.5	●		●					
BSN 120420	12.70	3.45	4.76	2.0			●					
BSN 150525	15.87	4.00	5.56	2.5			●					
BSN 150530	15.87	4.70	5.56	3.0			●					

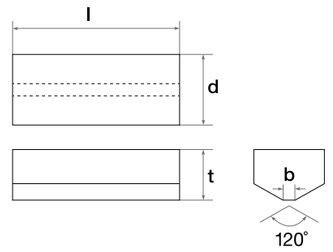
BTN



Type	Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO	d	d_1	t	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
BTN 1464	12.70	14.60	4.76			●					
BTN 1714	15.87	17.10	4.76	●	●	●					
BTN 2116	19.05	21.10	6.00			●					
BTN 2416	22.22	24.10	6.00			●					
BTN 2718	25.40	27.10	8.80			●					

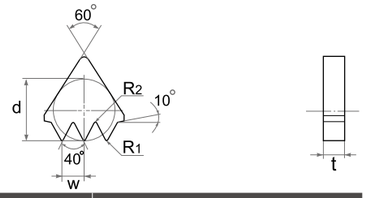
SPECIAL INSERT

GBF



Type	Dimensions (mm)				Cermet (TiCN)				Cermet (PVD)			
ISO	d	l	t	b	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
GBF 127250 B	12.70	25.00	8.00	2.3			●					
GBF 150250 B	15.00	25.00	9.50	2.3			●					
GBF 200300 B	20.00	30.00	9.50	2.5			●					

INGN



Type	Dimensions (mm)					Cermet (TiCN)				Cermet (PVD)			
ISO	d	t	w	R_1	R_2	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
INGN 160435 F303	9.52	4.76	3.56	0.5	0.3			●					
INGN 160435 F304	9.52	4.76	3.56	0.5	0.4			●				●	
INGN 220435 F403	12.70	4.76	3.56	0.5	0.3								
INGN 220435 F404	12.70	4.76	3.56	0.5	0.4								

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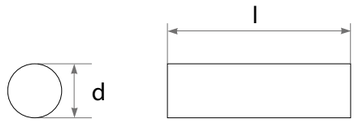
RBAR



Type	Dimensions (mm)		Cermet (TiCN)				Cermet (PVD)			
ISO	d	l	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
RBAR 2230 B	30.8	22.8				●				
RBAR 2507 B	7.8	25.8				●				
RBAR 2508 B	8.8	25.8				●				
RBAR 2509 B	9.8	25.8				●				
RBAR 2510 B	10.8	25.8				●				
RBAR 2511 B	11.8	25.8				●				
RBAR 2512 B	12.8	25.8				●				
RBAR 2513 B	13.8	25.8				●				
RBAR 2514 B	14.8	25.8				●				
RBAR 2515 B	15.8	25.8				●				
RBAR 2516 B	16.8	25.8				●				
RBAR 2517 B	17.8	25.8				●				
RBAR 2518 B	18.8	25.8				●				
RBAR 2519 B	19.8	25.8				●				
RBAR 2520 B	20.8	25.8				●				
RBAR 2521 B	21.8	25.8				●				
RBAR 2525 B	25.8	25.8				●				
RBAR 2530 B	30.8	25.8				●				
RBAR 2535 B	35.8	25.8				●				
RBAR 2640 B	40.8	26.8				●				
RBAR 2950 B	50.8	29.8				●				
RBAR 3007 B	7.8	30.8				●				
RBAR 3008 B	8.8	30.8				●				
RBAR 3009 B	9.8	30.8				●				
RBAR 3010 B	10.8	30.8				●				
RBAR 3011 B	11.8	30.8				●				
RBAR 3012 B	12.8	30.8				●				
RBAR 3013 B	13.8	30.8				●				
RBAR 3014 B	14.8	30.8				●				
RBAR 3016 B	16.8	30.8				●				
RBAR 3017 B	17.8	30.8				●				
RBAR 3018 B	18.8	30.8				●				
RBAR 3019 B	19.8	30.8				●				
RBAR 3025 B	25.8	30.8				●				
RBAR 3040 B	40.8	30.8				●				
RBAR 3045 B	45.8	30.8				●				
RBAR 3050 B	50.8	30.8				●				
RBAR 3507 B	7.8	35.8				●				

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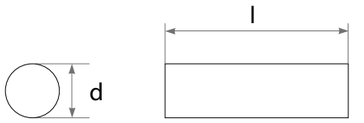
RBAR



Type	Dimensions (mm)		Cermet (TiCN)				Cermet (PVD)			
ISO	d	l	TX510	TX515	TX520	TX530	TX910	TX915	TX920	TX930
RBAR 3508 B	8.8	35.8				●				
RBAR 3509 B	9.8	35.8				●				
RBAR 3510 B	10.8	35.8				●				
RBAR 3511 B	11.8	35.8				●				
RBAR 3512 B	12.8	35.8				●				
RBAR 3513 B	13.8	35.8				●				
RBAR 3514 B	14.8	35.8				●				
RBAR 3515 B	15.8	35.8				●				
RBAR 3516 B	16.8	35.8				●				
RBAR 3517 B	17.8	35.8				●				
RBAR 3518 B	18.8	35.8				●				
RBAR 3519 B	19.8	35.8				●				
RBAR 3520 B	20.8	35.8				●				
RBAR 3521 B	21.8	35.8				●				
RBAR 3523 B	23.8	35.8				●				
RBAR 3525 B	25.8	35.8				●				
RBAR 3526 B	26.8	35.8				●				
RBAR 3530 B	30.8	35.8				●				
RBAR 3535 B	35.8	35.8				●				
RBAR 3540 B	40.8	35.8				●				
RBAR 3550 B	50.8	35.8				●				
RBAR 3555 B	55.8	35.8				●				
RBAR 3560 B	60.8	35.8				●				
RBAR 3565 B	65.8	35.8				●				
RBAR 3570 B	70.8	35.8				●				
RBAR 4030 B	30.8	40.8				●				
RBAR 4042 B	42.8	40.8				●				
RBAR 4045 B	45.8	40.8				●				
RBAR 4050 B	50.8	40.8				●				
RBAR 4060 B	60.8	40.8				●				
RBAR 4070 B	70.8	40.8				●				
RBAR 4080 B	80.8	40.8				●				
RBAR 4090 B	90.8	40.8				●				
RBAR 5055 B	55.8	50.8				●				
RBAR 5060 B	60.8	50.8				●				

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

BLANK

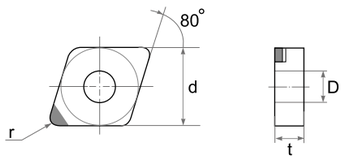
SBAR

Type	Dimensions (mm)			Cermet (TiCN)				Cermet (PVD)			
ISO	l	w	t	TX510	TX510	TX510	TX510	TX910	TX915	TX920	TX930
SBAR 040825	26.11	8.89	5.30			●					
SBAR 041608	16.67	4.75	8.10			●					
SBAR 050518	18.01	5.15	5.00			●					
SBAR 050620	22.35	4.95	6.30			●					
SBAR 056440	47.31	6.78	5.50			●					
SBAR 060331	34.75	5.94	6.35			●					
SBAR 121985	19.10	12.67	8.50			●					
SBAR 122025	25.50	1.40	2.20			●					
SBAR 122525	25.50	1.40	2.70			●					
SBAR 1295632	12.90	5.60	3.20			●					
SBAR 151985	19.10	15.30	8.50			●					
SBAR 163025	29.82	3.47	1.60			●					
SBAR 163315	15.62	3.41	1.60			●					
SBAR 163815	16.67	4.75	1.60			●					
SBAR 173815	15.06	3.69	1.70			●					
SBAR 203530	29.59	3.44	2.00			●					
SBAR 204035	34.53	3.94	2.00			●					
SBAR 704035	34.78	3.97	7.00			●					
SBAR 224816	16.67	4.72	2.20			●					
SBAR 255022	22.18	4.92	2.50			●					
SBAR 256035	34.49	5.89	2.50			●					
SBAR 306035	34.75	6.00	3.00			●					
SBAR 324850	3.60	5.10	50.00			●					
SBAR 326650	3.60	7.00	50.00			●					
SBAR 345022	22.35	4.95	3.40			●					
SBAR 327025	24.44	7.09	3.35			●					
SBAR 325075	71.94	14.39	3.20			●					
SBAR 327050	50.00	7.00	3.20			●					
SBAR 368950	50.40	8.92	3.60			●					
SBAR 328550	50.03	8.85	3.20			●					
SBAR 607050	50.40	8.92	6.50			●					
SBAR 638232	32.72	8.99	6.30			●					
SBAR 202525	25.40	2.70	2.20			●					
SBAR 224035	34.53	3.94	2.20			●					
SBAR 368232	32.72	8.99	3.60			●					

MEMO

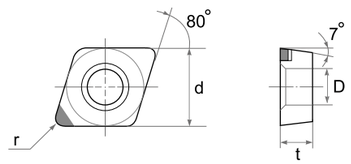
PCBN / PCD

CNGA



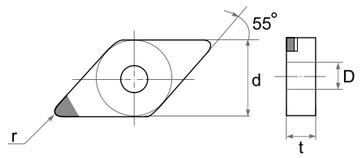
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
CNGA 120402 R1	**CNGA 4302 R1**	12.70	4.76	0.2	5.16				
CNGA 120404 R1	**CNGA 431 R1**	12.70	4.76	0.4	5.16	●	●		
CNGA 120408 R1	**CNGA 432 R1**	12.70	4.76	0.8	5.16	●	●	●	●
CNGA 120412 R1	**CNGA 433 R1**	12.70	4.76	1.2	5.16	●	●	●	●

CCGW



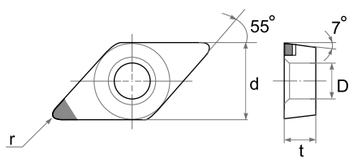
Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
CCGW 060202 R1		6.35	2.38	0.2	2.80		●		
CCGW 060204 R1		6.35	2.38	0.4	2.80	●	●		
CCGW 060208 R1		6.35	2.38	0.8	2.80				
CCGW 09T304 R1		9.52	3.97	0.4	4.40	●	●	●	●
CCGW 09T308 R1		9.52	3.97	0.8	4.40	●	●	●	●

DNGA



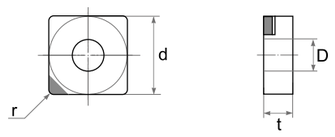
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
DNGA 150404 R1	**DNGA 431 R1**	12.70	4.76	0.4	5.16	●	●	●	
DNGA 150408 R1	**DNGA 432 R1**	12.70	4.76	0.8	5.16	●	●	●	●
DNGA 150412 R1	**DNGA 433 R1**	12.70	4.76	1.2	5.16	●	●	●	●
DNGA 150604 R1	**DNGA 441 R1**	12.70	6.35	0.4	5.16	●	●	●	
DNGA 150608 R1	**DNGA 442 R1**	12.70	6.35	0.8	5.16	●	●	●	●
DNGA 150612 R1	**DNGA 443 R1**	12.70	6.35	1.2	5.16	●	●	●	●

DCGW



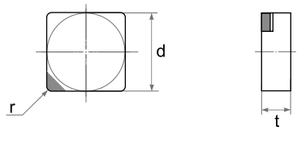
Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
DCGW 070202 R1		6.35	2.38	0.2	2.80		●		
DCGW 070204 R1		6.35	2.38	0.4	2.80	●	●	●	
DCGW 070208 R1		6.35	2.38	0.8	2.80	●	●	●	●
DCGW 11T302 R1		9.52	3.97	0.2	4.40		●		
DCGW 11T304 R1		9.52	3.97	0.4	4.40	●	●	●	
DCGW 11T308 R1		9.52	3.97	0.8	4.40	●	●	●	●

SNGA



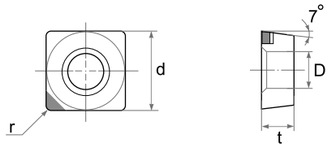
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
SNGA 090304 R1	**SNGA 321 R1**	9.52	3.18	0.4	3.81				
SNGA 120404 R1	**SNGA 431 R1**	12.70	4.76	0.4	5.16	●	●		
SNGA 120408 R1	**SNGA 432 R1**	12.70	4.76	0.8	5.16	●	●	●	●
SNGA 120412 R1	**SNGA 433 R1**	12.70	4.76	1.2	5.16	●	●	●	●

SNGN



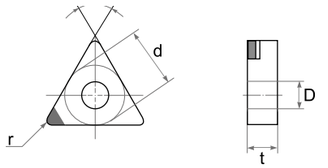
Type		Dimensions (mm)							
ISO	ASA	d	t	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000	
SNGN 090304 R1	**SNGN 321 R1**	9.52	3.18	0.4					
SNGN 090308 R1	**SNGN 322 R1**	9.52	3.18	0.8					
SNGN 090312 R1	**SNGN 323 R1**	9.52	3.18	1.2					
SNGN 120404 R1	**SNGN 431 R1**	12.70	4.76	0.4	●	●			
SNGN 120408 R1	**SNGN 432 R1**	12.70	4.76	0.8	●	●	●	●	
SNGN 120412 R1	**SNGN 433 R1**	12.70	4.76	1.2	●	●	●	●	

SCGW



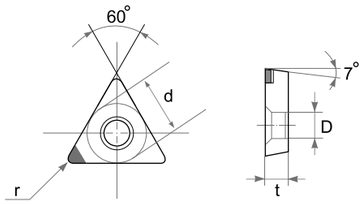
Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
SCGW 09T304 R1		9.52	3.97	0.4	4.40	●	●		
SCGW 09T308 R1		9.52	3.97	0.8	4.40	●	●	●	●

TNGA



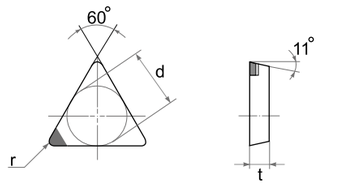
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
TNGA 160402 R1	**TNGA 3302 R1**	9.52	4.76	0.2	3.81	●	●		
TNGA 160404 R1	**TNGA 331 R1**	9.52	4.76	0.4	3.81	●	●		
TNGA 160408 R1	**TNGA 332 R1**	9.52	4.76	0.8	3.81	●	●	●	●
TNGA 160412 R1	**TNGA 333 R1**	9.52	4.76	1.2	3.81	●	●		

TCGW



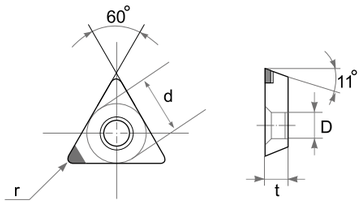
Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
TCGW 090204 R1		5.56	2.38	0.4	2.50	●	●		
TCGW 090208 R1		5.56	2.38	0.8	2.50	●	●	●	●
TCGW 110202 R1		6.35	2.38	0.2	2.80		●		
TCGW 110204 R1		6.35	2.38	0.4	2.80	●	●		
TCGW 110208 R1		6.35	2.38	0.8	2.80	●	●	●	●
TCGW 16T304 R1		9.52	3.97	0.4	4.40	●	●		
TCGW 16T308 R1		9.52	3.97	0.8	4.40	●	●	●	●

TPGN



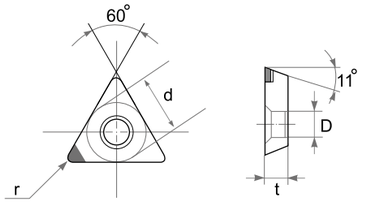
Type		Dimensions (mm)						
ISO	ASA	d	t	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000
TPGN 110304 R1	**TPGN 221 R1**	6.35	3.18	0.4	●	●		
TPGN 110308 R1	**TPGN 222 R1**	6.35	3.18	0.8	●	●	●	●
TPGN 110312 R1	**TPGN 223 R1**	6.35	3.18	1.2				
TPGN 160304 R1	**TPGN 321 R1**	9.52	3.18	0.4	●	●		
TPGN 160308 R1	**TPGN 322 R1**	9.52	3.18	0.8	●	●	●	●
TPGN 160312 R1	**TPGN 323 R1**	9.52	3.18	1.2				

TPGB



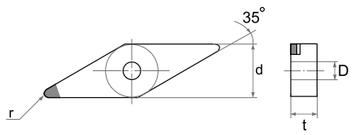
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
TPGB 080202 R1	**TPGB 6302 R1**	4.76	2.38	0.2	2.40				
TPGB 090204 R1	**TPGB 731 R1**	5.56	2.38	0.4	2.50	●	●		
TPGB 110302 R1	**TPGB 2202 R1**	6.35	3.18	0.2	3.30				
TPGB 110304 R1	**TPGB 221 R1**	6.35	3.18	0.4	3.30				
TPGB 110308 R1	**TPGB 222 R1**	6.35	3.18	0.8	3.30				

TPGW



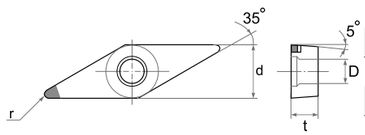
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
TPGW 160304 R1	**TPGW 321 R1**	9.52	3.18	0.4	4.40				
TPGW 160308 R1	**TPGW 322 R1**	9.52	3.18	0.8	4.40				

VNGA



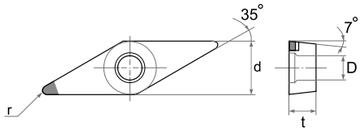
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VNGA 160404 R1	**VNGA 331 R1**	9.52	4.76	0.4	3.18	●	●		
VNGA 160408 R1	**VNGA 332 R1**	9.52	4.76	0.8	3.18	●	●	●	●

VBGW



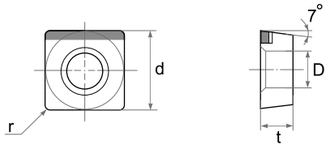
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VBGW 110302 R1	**VBGW 2202 R1**	6.35	3.18	0.2	2.80				
VBGW 110304 R1	**VBGW 221 R1**	6.35	3.18	0.4	2.80				
VBGW 160404 R1	**VBGW 331 R1**	9.52	4.76	0.4	4.40	●	●		
VBGW 160408 R1	**VBGW 332 R1**	9.52	4.76	0.8	4.40	●	●	●	●

VCGW



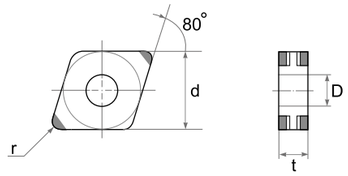
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VCGW 110302 R1	**VCGW 2202 R1**	6.35	3.18	0.2	2.80				
VCGW 110304 R1	**VCGW 221 R1**	6.35	3.18	0.4	2.80				
VCGW 160404 R1	**VCGW 331 R1**	9.52	4.76	0.4	4.40	●	●		
VCGW 160408 R1	**VCGW 332 R1**	9.52	4.76	0.8	4.40	●	●	●	●

SCGW .. FS



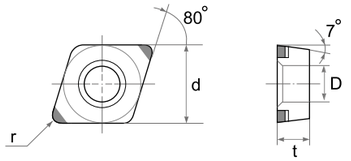
Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
SCGW 09T304 FS		9.52	3.97	0.4	4.40	●			
SCGW 09T308 FS		9.52	3.97	0.8	4.40				
SCGW 120404 FS		12.70	4.76	0.4	5.60				
SCGW 120408 FS		12.70	4.76	0.8	5.60	●			

CNGA



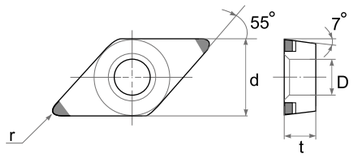
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
CNGA 120404 M1	**CNGA 431 M1**	12.70	4.76	0.4	5.16				
CNGA 120404 M2	**CNGA 431 M2**	12.70	4.76	0.4	5.16			●	●
CNGA 120404 M4	**CNGA 431 M4**	12.70	4.76	0.4	5.16				
CNGA 120408 M1	**CNGA 432 M1**	12.70	4.76	0.8	5.16				
CNGA 120408 M2	**CNGA 432 M2**	12.70	4.76	0.8	5.16			●	●
CNGA 120408 M4	**CNGA 432 M4**	12.70	4.76	0.8	5.16				

CCGW



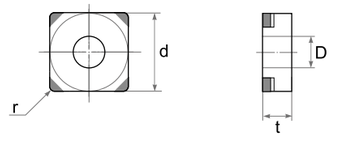
Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
CCGW 09T304 M1		9.52	3.97	0.4	4.40				
CCGW 09T304 M2		9.52	3.97	0.4	4.40			●	●
CCGW 09T308 M1		9.52	3.97	0.8	4.40				
CCGW 09T308 M2		9.52	3.97	0.8	4.40			●	●

DCGW



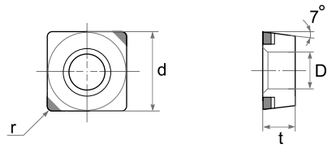
Type	Dimensions (mm)							
ISO	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
DCGW 11T302 M1	9.52	3.97	0.2	4.40				
DCGW 11T302 M2	9.52	3.97	0.2	4.40				
DCGW 11T304 M1	9.52	3.97	0.4	4.40				
DCGW 11T304 M2	9.52	3.97	0.4	4.40			●	●
DCGW 11T308 M1	9.52	3.97	0.8	4.40				
DCGW 11T308 M2	9.52	3.97	0.8	4.40			●	●

SNGA



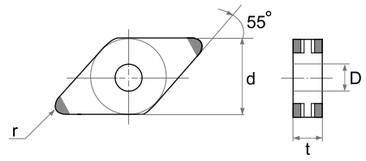
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
SNGA 120404 M1	**SNGA 431 M1**	12.70	4.76	0.4	5.16				
SNGA 120404 M2	**SNGA 431 M2**	12.70	4.76	0.4	5.16				
SNGA 120404 M4	**SNGA 431 M4**	12.70	4.76	0.4	5.16				
SNGA 120408 M1	**SNGA 432 M1**	12.70	4.76	0.8	5.16				
SNGA 120408 M2	**SNGA 432 M2**	12.70	4.76	0.8	5.16			●	●
SNGA 120408 M4	**SNGA 432 M4**	12.70	4.76	0.8	5.16			●	●

SCGW



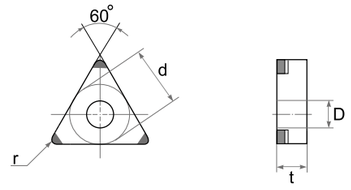
Type	Dimensions (mm)							
ISO	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
SCGW 09T304 M1	9.52	3.97	0.4	4.40				
SCGW 09T304 M2	9.52	3.97	0.4	4.40				
SCGW 09T308 M1	9.52	3.97	0.8	4.40				
SCGW 09T308 M2	9.52	3.97	0.8	4.40				

DNGA



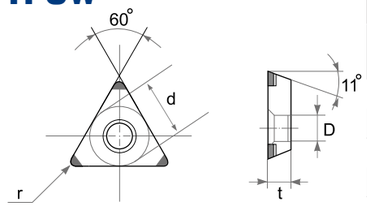
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
DNGA 150404 M1	**DNGA 431 M1**	12.70	4.76	0.4	5.16				
DNGA 150404 M2	**DNGA 431 M2**	12.70	4.76	0.4	5.16				
DNGA 150404 M4	**DNGA 431 M4**	12.70	4.76	0.4	5.16				
DNGA 150408 M1	**DNGA 432 M1**	12.70	4.76	0.8	5.16				
DNGA 150408 M2	**DNGA 432 M2**	12.70	4.76	0.8	5.16			●	●
DNGA 150408 M4	**DNGA 432 M4**	12.70	4.76	0.8	5.16			●	●
DNGA 150604 M1	**DNGA 441 M1**	12.70	6.35	0.4	5.16				
DNGA 150604 M2	**DNGA 441 M2**	12.70	6.35	0.4	5.16				
DNGA 150604 M4	**DNGA 441 M4**	12.70	6.35	0.4	5.16				
DNGA 150608 M1	**DNGA 442 M1**	12.70	6.35	0.8	5.16				
DNGA 150608 M2	**DNGA 442 M2**	12.70	6.35	0.8	5.16				
DNGA 150608 M4	**DNGA 442 M4**	12.70	6.35	0.8	5.16				

TNGA



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
TNGA 160404 M1	**TNGA 331 M1**	9.52	4.76	0.4	3.81				
TNGA 160404 M3	**TNGA 331 M3**	9.52	4.76	0.4	3.81				
TNGA 160408 M1	**TNGA 332 M1**	9.52	4.76	0.8	3.81				
TNGA 160408 M3	**TNGA 332 M3**	9.52	4.76	0.8	3.81			●	●

TPGW

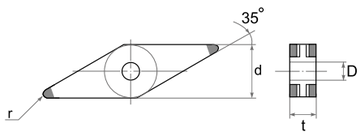


Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
TPGW 160304 M1	**TPGW 321 M1**	9.52	3.18	0.4	4.40				
TPGW 160304 M3	**TPGW 321 M3**	9.52	3.18	0.4	4.40				
TPGW 160308 M1	**TPGW 322 M1**	9.52	3.18	0.8	4.40				
TPGW 160308 M3	**TPGW 322 M3**	9.52	3.18	0.8	4.40			●	●

PCBN

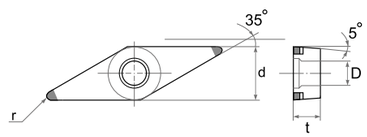
MINI TIP

VNGA



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VNGA 160404 M1	**VNGA 331 M1**	9.52	4.76	0.4	3.18				
VNGA 160404 M2	**VNGA 331 M2**	9.52	4.76	0.4	3.18				
VNGA 160404 M4	**VNGA 331 M4**	9.52	4.76	0.4	3.18				
VNGA 160408 M1	**VNGA 332 M1**	9.52	4.76	0.8	3.18				
VNGA 160408 M2	**VNGA 332 M2**	9.52	4.76	0.8	3.18			●	●
VNGA 160408 M4	**VNGA 332 M4**	9.52	4.76	0.8	3.18			●	●

VBGW

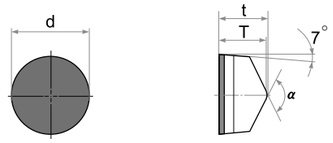


Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VBGW 160404 M1	**VBGW 331 M1**	9.52	4.76	0.4	4.40				
VBGW 160404 M2	**VBGW 331 M2**	9.52	4.76	0.4	4.40			●	●
VBGW 160408 M1	**VBGW 332 M1**	9.52	4.76	0.8	4.40				
VBGW 160408 M2	**VBGW 332 M2**	9.52	4.76	0.8	4.40			●	●

PCBN

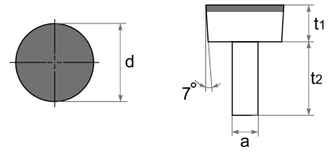
FULL FACE

RCGX



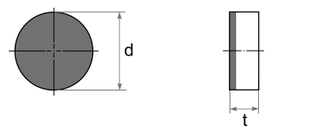
Type		Dimensions (mm)							
ISO	ASA	d	t	T	α	SBN 1000	SBN 2000	SBN 3000	SBN 4000
RCGX 060600 F	**RCGX 102 F**	6.35	6.35	6.20	120°	●			
RCGX 090700 F	**RCGX 103 F**	9.52	7.94	7.70	120°	●			
RCGX 120700 F	**RCGX 104 F**	12.70	7.94	7.70	120°	●			

RCGX



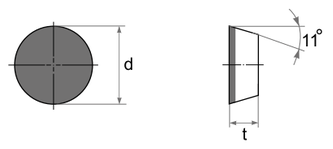
Type	Dimensions (mm)							
ISO	d	t_1	t_2	a	SBN 1000	SBN 2000	SBN 3000	SBN 4000
RCGX 060D F	6.35	5.00	8.35	3.00	●			
RCGX 090D F	9.52	6.00	20.00	4.00	●			
RCGX 120D F	12.70	6.00	20.00	5.88	●			

RNGN



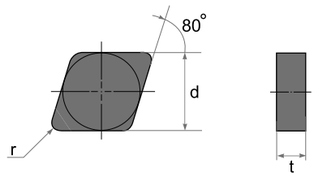
Type		Dimensions (mm)					
ISO	ASA	d	t	SBN 1000	SBN 2000	SBN 3000	SBN 4000
RNGN 090300 F	**RNGN 320 F**	9.52	3.18	●			
RNGN 120400 F	**RNGN 430 F**	12.70	4.76	●			

RPGN



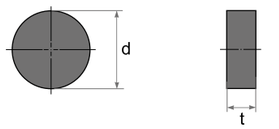
Type		Dimensions (mm)					
ISO	ASA	d	t	SBN 1000	SBN 2000	SBN 3000	SBN 4000
RPGN 090300 F	**RPGN 320 F**	9.52	3.18	●			
RPGN 120300 F	**RPGN 420 F**	12.70	3.18	●			
RPGN 120400 F	**RPGN 430 F**	12.70	4.76	●			

CNGN



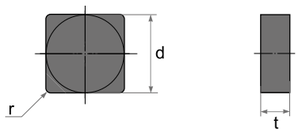
Type		Dimensions (mm)			
ISO	ASA	d	t	r	SBN 5000
CNGN 090308S	**CNGN 322S**	9.52	3.18	0.8	
CNGN 090312S	**CNGN 323S**	9.52	3.18	1.2	
CNGN 090316S	**CNGN 324S**	9.52	3.18	1.6	
CNGN 120408S	**CNGN 432S**	12.70	4.76	0.8	●
CNGN 120412S	**CNGN 433S**	12.70	4.76	1.2	●
CNGN 120416S	**CNGN 434S**	12.70	4.76	1.6	●

RNGN



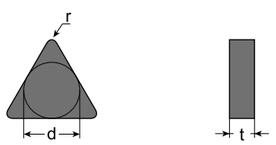
Type		Dimensions (mm)		
ISO	ASA	d	t	SBN 5000
RNGN 090300S	**RNGN 320S**	9.52	3.18	●
RNGN 120300S	**RNGN 420S**	12.70	3.18	●
RNGN 120400S	**RNGN 430S**	12.70	4.76	●

SNGN



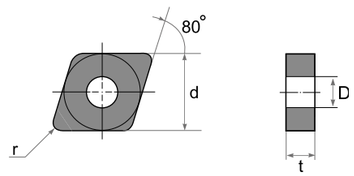
Type		Dimensions (mm)			
ISO	ASA	d	t	r	SBN 5000
SNGN 090308S	**SNGN 322S**	9.52	3.18	0.8	●
SNGN 090312S	**SNGN 323S**	9.52	3.18	1.2	●
SNGN 090316S	**SNGN 324S**	9.52	3.18	1.6	
SNGN 120308S	**SNGN 422S**	12.70	3.18	0.8	
SNGN 120312S	**SNGN 423S**	12.70	3.18	1.2	
SNGN 120316S	**SNGN 424S**	12.70	3.18	1.6	
SNGN 120408S	**SNGN 432S**	12.70	4.76	0.8	●
SNGN 120412S	**SNGN 433S**	12.70	4.76	1.2	●
SNGN 120416S	**SNGN 434S**	12.70	4.76	1.6	●

TNGN



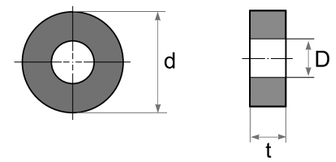
Type		Dimensions (mm)			
ISO	ASA	d	t	r	SBN 5000
TNGN 110308S	**TNGN 222S**	6.35	3.18	0.8	●
TNGN 110312S	**TNGN 223S**	6.35	3.18	1.2	●
TNGN 160408S	**TNGN 332S**	9.52	4.76	0.8	●
TNGN 160412S	**TNGN 333S**	9.52	4.76	1.2	●
TNGN 160416S	**TNGN 334S**	9.52	4.76	1.6	

CNGA



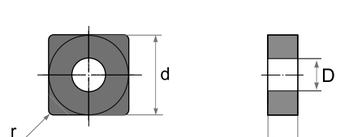
Type		Dimensions (mm)				
ISO	ASA	d	t	r	D	SBN 5000
CNGA 090308	**CNGA 322**	9.52	3.18	0.8	3.81	
CNGA 090312	**CNGA 323**	9.52	3.18	1.2	3.81	
CNGA 090316	**CNGA 324**	9.52	3.18	1.6	3.81	
CNGA 120408	**CNGA 432**	12.7	4.76	0.8	5.16	●
CNGA 120412	**CNGA 433**	12.7	4.76	1.2	5.16	●
CNGA 120416	**CNGA 434**	12.7	4.76	1.6	5.16	●

RNGA



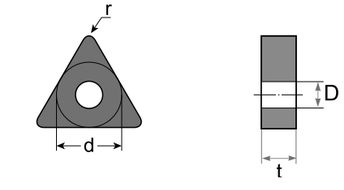
Type		Dimensions (mm)				
ISO	ASA	d	t	r	D	SBN 5000
RNGA 060300	**RNGA 060300**	6.35	3.18	-	2.26	
RNGA 060400	**RNGA 060400**	6.35	4.76	-	2.26	
RNGA 090300	**RNGA 090300**	9.52	3.18	-	3.81	
RNGA 120300	**RNGA 120300**	12.7	3.18	-	5.16	
RNGA 120400	**RNGA 120400**	12.7	4.76	-	5.16	●

SNGA



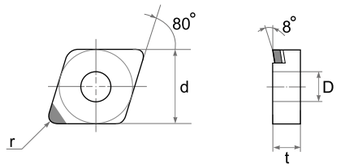
Type		Dimensions (mm)				
ISO	ASA	d	t	r	D	SBN 5000
SNGA 090308	**SNGA 322**	9.52	3.18	0.8	3.81	
SNGA 090312	**SNGA 323**	9.52	3.18	1.2	3.81	
SNGA 090316	**SNGA 324**	9.52	3.18	1.6	3.81	
SNGA 120308	**SNGA 422**	9.52	3.18	0.8	5.16	
SNGA 120312	**SNGA 423**	9.52	3.18	1.2	5.16	
SNGA 120316	**SNGA 424**	9.52	3.18	1.6	5.16	
SNGA 120408	**SNGA 432**	12.7	4.76	0.8	5.16	●
SNGA 120412	**SNGA 433**	12.7	4.76	1.2	5.16	●
SNGA 120416	**SNGA 434**	12.7	4.76	1.6	5.16	●

TNGA



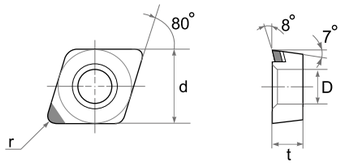
Type		Dimensions (mm)				
ISO	ASA	d	t	r	D	SBN 5000
TNGA 110308	**TNGA 222**	6.35	3.18	0.8	2.26	
TNGA 110312	**TNGA 223**	6.35	3.18	1.2	2.26	
TNGA 110316	**TNGA 224**	6.35	3.18	1.6	2.26	
TNGA 160408	**TNGA 332**	9.52	4.76	0.8	3.81	●
TNGA 160412	**TNGA 333**	9.52	4.76	1.2	3.81	●
TNGA 160416	**TNGA 334**	9.52	4.76	1.6	3.81	●

CNGA



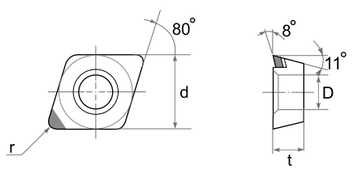
Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
CNGA 120404 R1	**CNGA 431 R1**	12.70	4.76	0.4	5.16		●	
CNGA 120408 R1	**CNGA 432 R1**	12.70	4.76	0.8	5.16	●	●	
CNGA 120412 R1	**CNGA 433 R1**	12.70	4.76	1.2	5.16			

CCGW



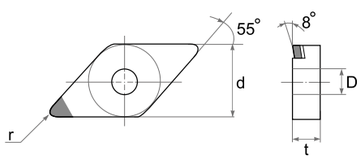
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
CCGW 060202 R1	6.35	2.38	0.2	2.80			
CCGW 060204 R1	6.35	2.38	0.4	2.80		●	
CCGW 060208 R1	6.35	2.38	0.8	2.80		●	
CCGW 09T302 R1	9.52	3.97	0.2	4.40			
CCGW 09T304 R1	9.52	3.97	0.4	4.40	●	●	
CCGW 09T308 R1	9.52	3.97	0.8	4.40		●	
CCGW 120404 R1	12.70	4.76	0.4	5.50		●	
CCGW 120408 R1	12.70	4.76	0.8	5.50		●	
CCGW 120412 R1	12.70	4.76	1.2	5.50			

CPGW



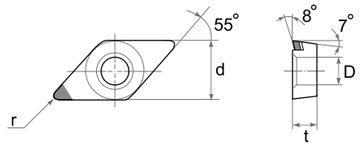
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
CPGW 080204 R1	7.94	2.38	0.4	3.40			
CPGW 080208 R1	7.94	2.38	0.8	3.40			
CPGW 080212 R1	7.94	2.38	1.2	3.40			
CPGW 090304 R1	9.525	3.18	0.4	4.40			
CPGW 090308 R1	9.525	3.18	0.8	4.40			
CPGW 090312 R1	9.525	3.18	1.2	4.40			

DNGA



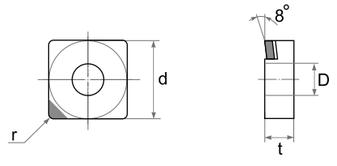
Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
DNGA 150404 R1	**DNGA 431 R1**	12.70	4.76	0.4	5.16	●	●	
DNGA 150408 R1	**DNGA 432 R1**	12.70	4.76	0.8	5.16	●	●	
DNGA 150412 R1	**DNGA 433 R1**	12.70	4.76	1.2	5.16		●	
DNGA 150604 R1	**DNGA 441 R1**	12.70	6.35	0.4	5.16	●	●	
DNGA 150608 R1	**DNGA 442 R1**	12.70	6.35	0.8	5.16	●	●	
DNGA 150612 R1	**DNGA 443 R1**	12.70	6.35	1.2	5.16		●	

DCGW



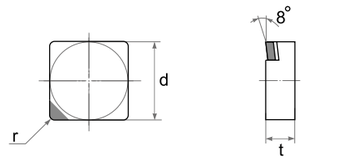
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
DCGW 070202 R1	6.35	2.38	0.2	2.80			
DCGW 070204 R1	6.35	2.38	0.4	2.80	●	●	
DCGW 070208 R1	6.35	2.38	0.8	2.80		●	
DCGW 11T302 R1	9.52	3.97	0.2	4.40			
DCGW 11T304 R1	9.52	3.97	0.4	4.40	●	●	
DCGW 11T308 R1	9.52	3.97	0.8	4.40		●	

SNGA



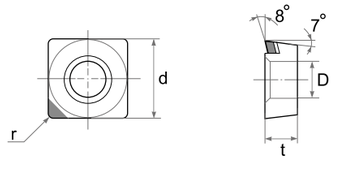
Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
SNGA 120404 R1	**SNGA 431 R1**	12.70	4.76	0.4	5.16	●	●	
SNGA 120408 R1	**SNGA 432 R1**	12.70	4.76	0.8	5.16		●	
SNGA 120412 R1	**SNGA 433 R1**	12.70	4.76	1.2	5.16			

SNGN



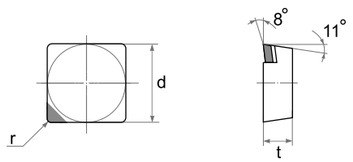
Type		Dimensions (mm)					
ISO	ASA	d	t	r	SPD 1000	SPD 2000	SPD 3000
SNGN 120404 R1	**SNGN 431 R1**	12.70	4.76	0.4	●	●	
SNGN 120408 R1	**SNGN 432 R1**	12.70	4.76	0.8		●	
SNGN 120412 R1	**SNGN 433 R1**	12.70	4.76	1.2			

SCGW



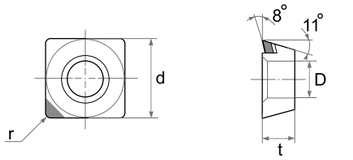
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
SCGW 09T304 R1	9.52	3.97	0.4	4.40	●	●	
SCGW 09T308 R1	9.52	3.97	0.8	4.40		●	
SCGW 09T312 R1	9.52	3.97	1.2	4.40			
SCGW 120402 R1	12.70	4.76	0.2	5.50			
SCGW 120404 R1	12.70	4.76	0.4	5.50	●	●	
SCGW 120408 R1	12.70	4.76	0.8	5.50		●	

SPGN



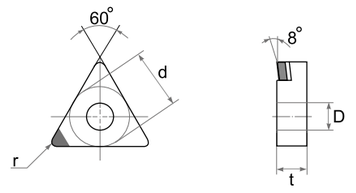
Type		Dimensions (mm)					
ISO	ASA	d	t	r	SPD 1000	SPD 2000	SPD 3000
SPGN 090304 R1	**SPGN 321 R1**	9.52	3.18	0.4			
SPGN 090308 R1	**SPGN 322 R1**	9.52	3.18	0.8		●	
SPGN 120304 R1	**SPGN 421 R1**	12.70	3.18	0.4			
SPGN 120308 R1	**SPGN 422 R1**	12.70	3.18	0.8		●	

SPGW



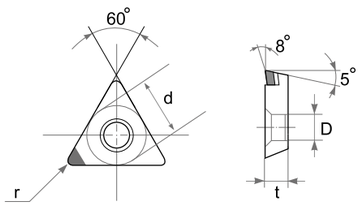
Type		Dimensions (mm)					
ISO	ASA	d	t	r	SPD 1000	SPD 2000	SPD 3000
SPGW 090302 R1	**SPGW 3202 R1**	9.52	3.18	0.2			
SPGW 090304 R1	**SPGW 321 R1**	9.52	3.18	0.4			
SPGW 090308 R1	**SPGW 322 R1**	9.52	3.18	0.8			

TNGA



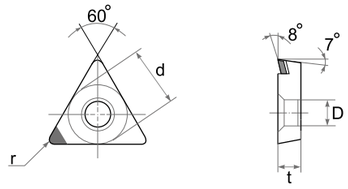
Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
TNGA 160402 R1	**TNGA 3302 R1**	9.52	4.76	0.2	3.81		●	
TNGA 160404 R1	**TNGA 331 R1**	9.52	4.76	0.4	3.81	●	●	
TNGA 160408 R1	**TNGA 332 R1**	9.52	4.76	0.8	3.81		●	
TNGA 160412 R1	**TNGA 333 R1**	9.52	4.76	1.2	3.81			

TBGW



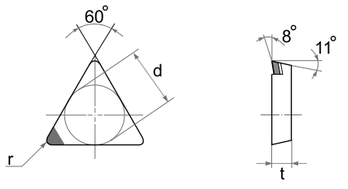
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
TBGW 060102 R1	3.97	1.59	0.2	2.80			
TBGW 060104 R1	3.97	1.59	0.4	2.80			

TCGW



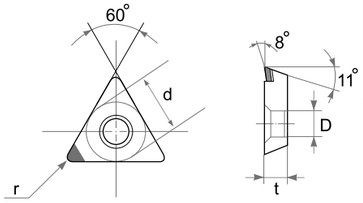
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
TCGW 090202 R1	5.56	2.38	0.2	2.5			
TCGW 090204 R1	5.56	2.38	0.4	2.5	●	●	
TCGW 090208 R1	5.56	2.38	0.8	2.5		●	
TCGW 110202 R1	6.35	2.38	0.2	2.8			
TCGW 110204 R1	6.35	2.38	0.4	2.8	●	●	
TCGW 110208 R1	6.35	2.38	0.8	2.8		●	
TCGW 16T302 R1	9.52	3.97	0.2	4.4			
TCGW 16T304 R1	9.52	3.97	0.4	4.4	●	●	
TCGW 16T308 R1	9.52	3.97	0.8	4.4		●	

TPGN



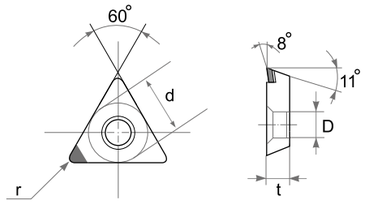
Type		Dimensions (mm)					
ISO	ASA	d	t	r	SPD 1000	SPD 2000	SPD 3000
TPGN 090204 R1	**TPGN 721 R1**	5.56	2.38	0.4			
TPGN 090208 R1	**TPGN 732 R1**	5.56	2.38	0.8			
TPGN 110302 R1	**TPGN 2202 R1**	6.35	3.18	0.2	●	●	●
TPGN 110304 R1	**TPGN 221 R1**	6.35	3.18	0.4	●	●	●
TPGN 110308 R1	**TPGN 222 R1**	6.35	3.18	0.8	●	●	●
TPGN 160302 R1	**TPGN 3202 R1**	9.52	3.18	0.2	●	●	●
TPGN 160304 R1	**TPGN 321 R1**	9.52	3.18	0.4	●	●	●
TPGN 160308 R1	**TPGN 322 R1**	9.52	3.18	0.8	●	●	●

TPGB



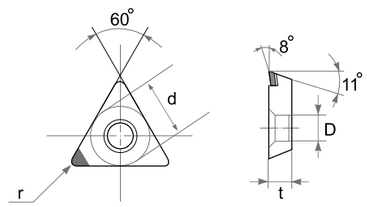
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
TPGB 080204 R1	4.76	2.38	0.4	2.40			
TPGB 080208 R1	4.76	2.38	0.8	2.40			
TPGB 090204 R1	5.56	2.38	0.4	2.50			
TPGB 090208 R1	5.56	2.38	0.8	2.50			
TPGB 110304 R1	6.35	3.18	0.4	3.30		●	
TPGB 110308 R1	6.35	3.18	0.8	3.30		●	

TPGW



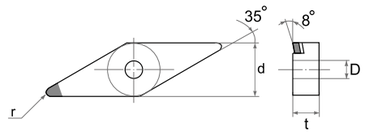
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
TPGW 080202 R1	4.76	2.38	0.2	2.40		•	
TPGW 080204 R1	4.76	2.38	0.4	2.40		•	
TPGW 110302 R1	6.35	3.18	0.2	3.30			
TPGW 110304 R1	6.35	3.18	0.4	3.30		•	
TPGW 110308 R1	6.35	3.18	0.8	3.30			
TPGW 160404 R1	9.52	4.76	0.4	3.81			
TPGW 160408 R1	9.52	4.76	0.8	3.81			

TPGT



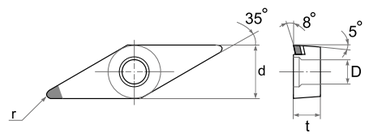
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
TPGT 110302 R1	6.35	3.18	0.2	3.40			
TPGT 110304 R1	6.35	3.18	0.4	3.40			

VNGA



Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
VNGA 160404 R1	**VNGA 331 R1**	9.52	4.76	0.4	3.18	•	•	
VNGA 160408 R1	**VNGA 332 R1**	9.52	4.76	0.8	3.18		•	

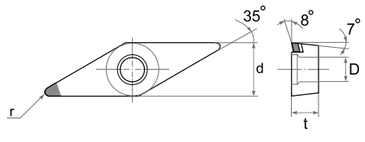
VBGW



Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
VBGW 110302 R1	**VBGW 2202 R1**	6.35	3.18	0.2	3.40			
VBGW 110304 R1	**VBGW 221 R1**	6.35	3.18	0.4	3.40			
VBGW 110308 R1	**VBGW 222 R1**	6.35	3.18	0.8	3.40			
VBGW 160402 R1	**VBGW 3302 R1**	9.52	4.76	0.2	4.40			
VBGW 160404 R1	**VBGW 331 R1**	9.52	4.76	0.4	4.40	•	•	
VBGW 160408 R1	**VBGW 332 R1**	9.52	4.76	0.8	4.40		•	
VBGW 160412 R1	**VBGW 333 R1**	9.52	4.76	1.2	4.40			

PART. A
TURNING & MILLING
PCD
STANDARD

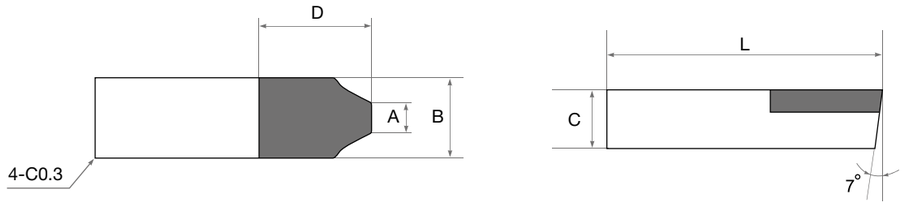
VCGW



Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
VCGW 110302 R1	**VCGW 2202 R1**	6.35	3.18	0.2	2.80	•		
VCGW 110304 R1	**VCGW 221 R1**	6.35	3.18	0.4	3.40	•		
VCGW 110308 R1	**VCGW 222 R1**	6.35	3.18	0.8	3.40			
VCGW 160404 R1	**VCGW 331 R1**	9.52	4.76	0.4	4.40			
VCGW 160408 R1	**VCGW 332 R1**	9.52	4.76	0.8	4.40			
VCGW 160412 R1	**VCGW 333 R1**	9.52	4.76	1.2	4.40			

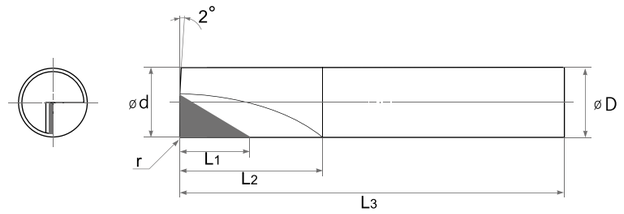
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

NOTCH BITE



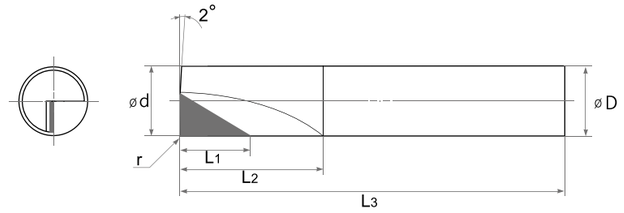
Type	Dimensions (mm)					SBN1000	SPD3000
	A	B	C	D	L		
BITE SD-10	0.80	3.0	2.50	4.0	8.6		
BITE SD-13	0.80	3.5	3.50	4.5	11.5		
BITE SD-16	1.00	5.0	4.00	6.0	14.4		
BITE SD-19	1.00	6.0	4.50	8.0	16.5		
BITE SD-22	1.20	10.0	6.00	10.0	21.0		
BITE SD-25	1.60	10.0	6.00	10.0	24.0		
BITE SD-29	1.70	11.3	6.00	10.0	28.5		
BITE SD-32	1.70	11.3	6.00	10.0	30.0		
BITE SD-35	2.02	12.5	6.00	10.0	33.0		
BITE SD-38	2.39	15.0	6.50	10.0	36.0		
BITE SD-51	4.28	20.0	8.00	10.0	49.0		
BITE SD-57	2.92	22.0	8.00	10.0	56.0		

SFE .. 1C



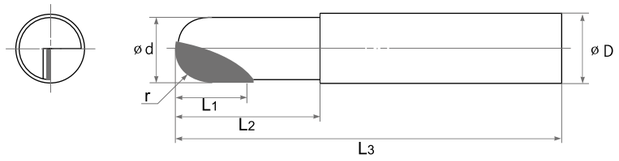
Type	Dimensions (mm)						PCBN				PCD		
ISO	d	D	L_1	L_2	L_3	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000	SPD 1000	SPD 2000	SPD 3000
SFE 250-1C	2.0	4.0	4.0	10.0	50.0	0.15						●	
SFE 280-1C	2.0	4.0	4.0	10.0	80.0	0.15							
SFE 350-1C	3.0	4.0	4.0	10.0	50.0	0.15						●	
SFE 380-1C	3.0	4.0	4.0	10.0	80.0	0.15							
SFE 450-1C	4.0	4.0	6.0	12.0	50.0	0.20						●	
SFE 480-1C	4.0	4.0	6.0	12.0	80.0	0.20							
SFE 650-1C	6.0	6.0	6.0	16.0	50.0	0.20						●	
SFE 6100-1C	6.0	6.0	6.0	16.0	100.0	0.20							
SFE 860-1C	8.0	8.0	7.0	16.0	60.0	0.40						●	
SFE 8120-1C	8.0	8.0	7.0	16.0	120.0	0.40							
SFE 1070-1C	10.0	10.0	7.0	16.0	70.0	0.40						●	
SFE 10120-1C	10.0	10.0	7.0	16.0	120.0	0.40							

SFE .. 2C



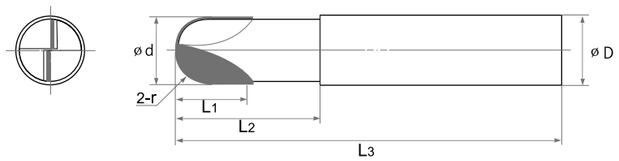
Type	Dimensions (mm)						PCBN				PCD		
ISO	d	D	L_1	L_2	L_3	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000	SPD 1000	SPD 2000	SPD 3000
SFE 650-2C	6.0	6.0	4.0	12.0	50.0	0.20						●	
SFE 680-2C	6.0	6.0	6.0	16.0	80.0	0.20							
SFE 860-2C	8.0	8.0	7.0	16.0	60.0	0.20						●	
SFE 8120-2C	8.0	8.0	9.0	20.0	120.0	0.40							
SFE 1070-2C	10.0	10.0	9.0	20.0	70.0	0.40						●	
SFE 10120-2C	10.0	10.0	12.0	25.0	120.0	0.80							
SFE 1270-2C	12.0	12.0	12.0	25.0	70.0	0.80						●	
SFE 12120-2C	12.0	12.0	16.0	30.0	120.0	1.00							
SFE 16100-2C	16.0	16.0	16.0	25.0	100.0	0.80						●	
SFE 16150-2C	16.0	16.0	20.0	30.0	150.0	1.00							
SFE 18100-2C	18.0	18.0	20.0	30.0	100.0	0.80						●	
SFE 18200-2C	18.0	18.0	24.0	35.0	200.0	1.20							
SFE 20100-2C	20.0	20.0	24.0	35.0	100.0	0.80							
SFE 20200-2C	20.0	20.0	28.0	40.0	200.0	1.20							

SBE .. 1C



Type	Dimensions (mm)						PCBN				PCD		
ISO	d	D	L_1	L_2	L_3	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000	SPD 1000	SPD 2000	SPD 3000
SBE 250-1C	2.0	4.0	4.0	12.0	50.0	1.0							
SBE 280-1C	2.0	4.0	4.0	16.0	80.0	1.0							
SBE 350-1C	3.0	4.0	4.0	16.0	50.0	1.5						●	
SBE 380-1C	3.0	4.0	6.0	30.0	80.0	1.5							
SBE 450-1C	4.0	4.0	4.0	16.0	50.0	2.0						●	
SBE 480-1C	4.0	4.0	6.0	40.0	80.0	2.0							
SBE 650-1C	6.0	6.0	6.0	20.0	50.0	3.0						●	
SBE 6100-1C	6.0	6.0	8.0	50.0	100.0	3.0							
SBE 860-1C	8.0	8.0	8.0	30.0	60.0	4.0						●	
SBE 8120-1C	8.0	8.0	10.0	60.0	120.0	4.0							
SBE 1080-1C	10.0	10.0	10.0	30.0	80.0	5.0						●	
SBE 10160-1C	10.0	10.0	12.0	60.0	160.0	5.0							
SBE 12100-1C	12.0	12.0	12.0	40.0	100.0	6.0							
SBE 12200-1C	12.0	12.0	16.0	80.0	200.0	6.0							
SBE 16160-1C	16.0	16.0	16.0	60.0	160.0	8.0							
SBE 16250-1C	16.0	16.0	20.0	100.0	250.0	8.0							

SBE .. 2C



Type	Dimensions (mm)						PCBN				PCD		
ISO	d	D	L_1	L_2	L_3	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000	SPD 1000	SPD 2000	SPD 3000
SBE 650-2C	6.0	6.0	6.0	20.0	50.0	3.0							
SBE 6100-2C	6.0	6.0	8.0	50.0	100.0	3.0							
SBE 860-2C	8.0	8.0	8.0	30.0	60.0	4.0						●	
SBE 8120-2C	8.0	8.0	10.0	60.0	120.0	4.0							
SBE 1080-2C	10.0	10.0	10.0	30.0	80.0	5.0						●	
SBE 10160-2C	10.0	10.0	12.0	60.0	160.0	5.0							
SBE 12100-2C	12.0	12.0	12.0	40.0	100.0	6.0							
SBE 12200-2C	12.0	12.0	16.0	80.0	200.0	6.0							

SPECIAL

PCD ENDMILL

SPECIAL

PCD DRILL / GUN REAMER

PART. A
TURNING & MILLING
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

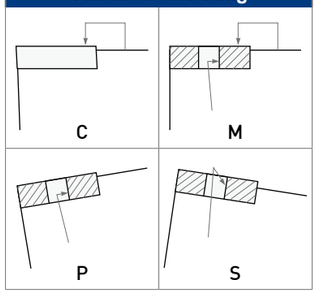
TOOL HOLDER

APPLICATION INDEX

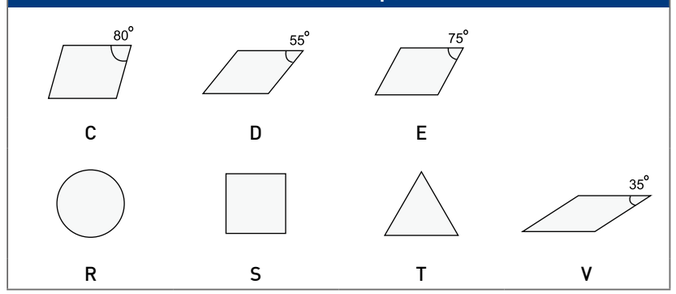
IDENTIFICATION SYSTEM

C	C	L	N	R	25	25	M	12	-	A	7
1	2	3	4	5	6	7	8	9		10	11

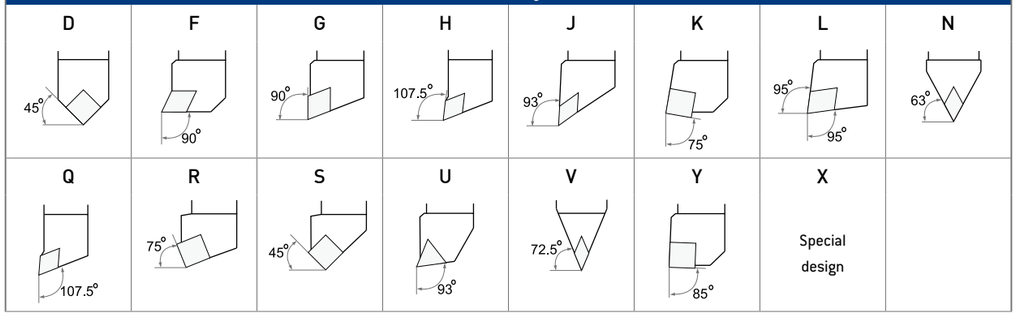
1 Method of Holding



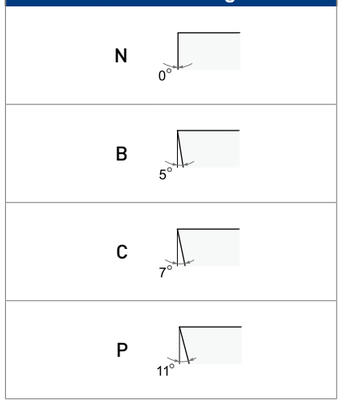
2 Insert Shape



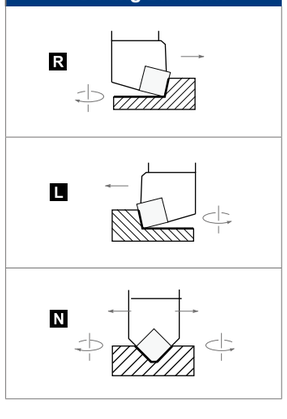
3 Tool Style



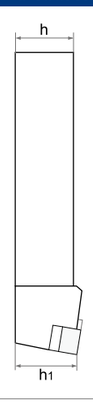
4 Clearance Angle



5 Cutting Direction



6 Tool Height (h=h1)

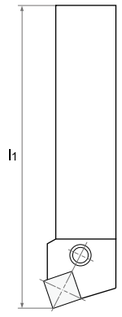


	h (mm)
12	12
16	16
20	20
25	25
32	32
40	40
50	50

7 Tool Width (d)

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

8 Tool Length (l_1)

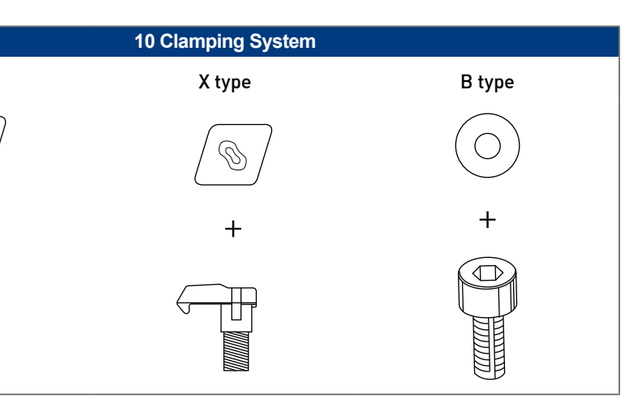


	l_1 (mm)
D	60
E	70
F	80
H	100
K	125
M	150
N	160
P	170
R	200
S	250
T	300
U	350

9 Insert Size

d (mm)	R, S	T (60°)	C (80°)	E (75°)	D (55°)	V (35°)
5.56		09				
6.35	06	11				
7.94	07	13				
9.52	09	16	09		11	16
12.70	12	22	12	13	15	22
15.87	15	27	16		19	
19.05	19	33	19		23	
25.40	25	44	25		31	

10 Clamping System

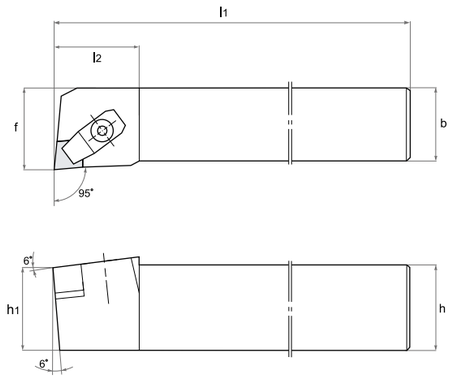


11 Insert Thickness

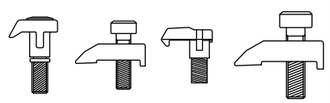
Index	S (mm)
3	3.18
4	4.76
6	6.35
7	7.94
9	9.52

EXTERNAL TOOLHOLDER

CCLN



Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h_1)	b	l_1	l_2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CCLNR/L 2525M12-A4	25	25	150	35	32	●	●	CNGN1204	UH1	SHCN4A	BM510	LW4
CCLNR/L 2525M12-A7	25	25	150	35	32	●	●	CNGN1207	UH1	SHCN4A	BM510	LW4
CCLNR/L 2525M12-X7	25	25	150	35	32	●	●	CNG(V)X1207	UH5	SHCN4A	BM510	LW4
CCLNR/L 3225P12-A4	32	25	170	35	32	●	●	CNGN1204	UH1	SHCN4A	BM510	LW4
CCLNR/L 3225P12-A7	32	25	170	35	32	●	●	CNGN1207	UH1	SHCN4A	BM510	LW4
CCLNR/L 3225P12-X7	32	25	170	35	32	●	●	CNG(V)X1207	UH5	SHCN4A	BM510	LW4
CCLNR/L 3225P16-X7	32	25	170	35	32	●		CNG(V)X1607	UH5	SHCN5A	FM510	LW4
CCLNR/L 3225P16-A7	32	25	170	35	32			CNGN1607	UH1	SHCN5A	FM510	LW4
CCLNR/L 4040S19-A7	40	40	250	60	50			CNGN1907	UH4	SHCN6A	FM615	LW6
CCLNR/L 5050T25-A9	50	50	300	65	60			CNGN2509	UH25	SHCN8	FM815	LW6

Spare parts											
Clamp & Clamp Screw				Shim				Shim Screw				Wrench	
													
UH1	UH4	UH5	UH25	SHCN4A	SHCN5A	SHCN6A	SHCN8	BM510	FM510	FM615	FM815	LW4	LW6

CNGN	CNGX	CNVX
		
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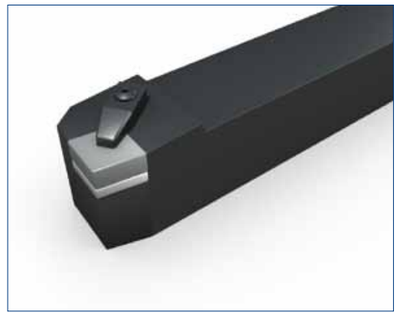
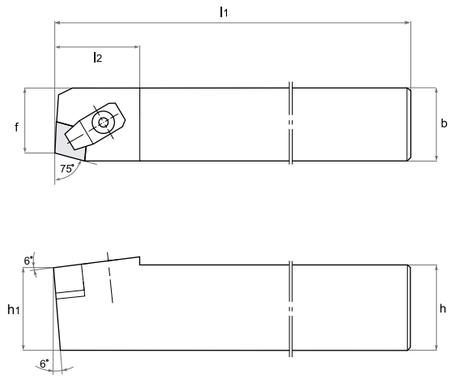
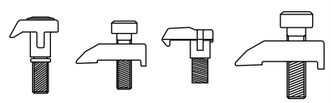
EXTERNAL TOOLHOLDER

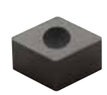
CCBN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h_1)	b	l_1	l_2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CCBNR/L 2525M12-A4	25	25	150	35	22		●	CNGN1204	UH1	SHCN4A	BM510	LW4
CCBNR/L 2525M12-A7	25	25	150	35	22	●		CNGN1207	UH1	SHCN4A	BM510	LW4
CCBNR/L 2525M12-X7	25	25	150	35	22			CNG(V)X1207	UH5	SHCN4A	BM510	LW4
CCBNR/L 3225P12-A4	32	25	170	35	22			CNGN1204	UH1	SHCN4A	BM510	LW4
CCBNR/L 3225P12-A7	32	25	170	35	22			CNGN1207	UH1	SHCN4A	BM510	LW4
CCBNR/L 3225P12-X7	32	25	170	35	22			CNG(V)X1207	UH5	SHCN4A	BM510	LW4
CCBNR/L 3225P16-A7	32	25	170	35	27			CNGN1607	UH1	SHCN5A	FM510	LW4
CCBNR/L 3225P16-X7	32	25	170	35	27			CNG(V)X1607	UH5	SHCN5A	FM510	LW4
CCBNR/L 4040S19-A7	40	40	250	60	36			CNGN1907	UH4	SHCN6A	FM615	LW6
CCBNR/L 5050T25-A9	50	50	300	65	45			CNGN2509	UH25	SHCN8	FM815	LW6

Spare parts											
Clamp & Clamp Screw				Shim				Shim Screw				Wrench	
													
UH1	UH4	UH5	UH25	SHCN4A	SHCN5A	SHCN6A	SHCN8	BM510	FM51	FM615	FM815	LW4	LW6

CNGN	CNGX	CNVX
		
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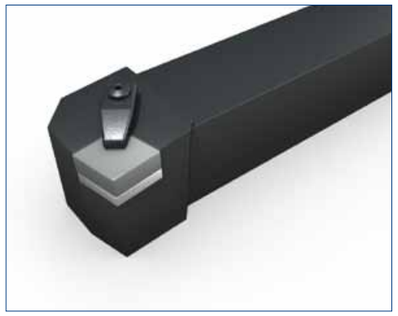
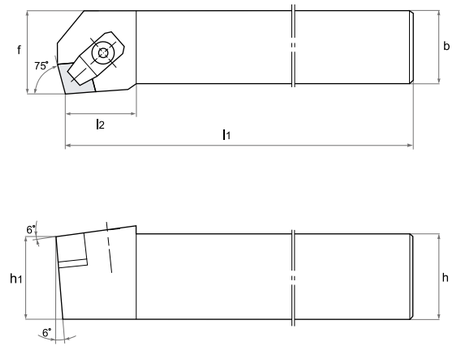
EXTERNAL TOOLHOLDER

CCKN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h_1)	b	l_1	l_2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CCKNR/L 2525M12-A4	25	25	150	29	32			CNGN1204	UH1	SHCN4A	BM510	LW4
CCKNR/L 2525M12-A7	25	25	150	29	32	●	●	CNGN1207	UH1	SHCN4A	BM510	LW4
CCKNR/L 2525M12-X7	25	25	150	29	32	●	●	CNG(V)X1207	UH5	SHCN4A	BM510	LW4
CCKNR/L 3225P12-A4	32	25	170	29	32			CNGN1204	UH1	SHCN4A	BM510	LW4
CCKNR/L 3225P12-A7	32	25	170	29	32		●	CNGN1207	UH1	SHCN4A	BM510	LW4
CCKNR/L 3225P12-X7	32	25	170	29	32	●	●	CNG(V)X1207	UH5	SHCN4A	BM510	LW4

Spare parts				
Clamp & Clamp Screw		Shim	Shim Screw	Wrench
				
UH1	UH5	SHCN4A	BM510	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

CNGN	CNGX	CNVX
		
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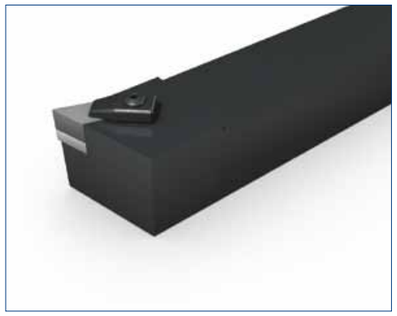
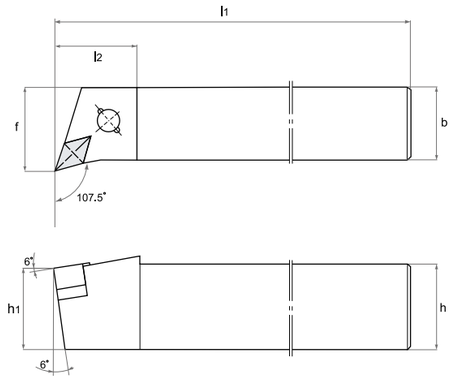
EXTERNAL TOOLHOLDER

CDHN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h_1)	b	l_1	l_2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CDHNR/L 2525M15-A4	25	25	150	33	32	●		DNGN1504	UH1	SHDN4A	BM510	LW4
CDHNR/L 2525M15-A7	25	25	150	33	32	●	●	DNGN1507	UH1	SHDN4A	BM510	LW4
CDHNR/L 2525M12-X7	25	25	150	30	32			DNGX1207	UH5	SHDN3A	TM3507	LW4
CDHNR/L 2525M15-X7	25	25	150	33	32			DNGX1507	UH5	SHDN4A	BM510	LW4
CDHNR/L 3225P15-A4	32	25	170	33	32			DNGN1504	UH1	SHDN4A	BM510	LW4
CDHNR/L 3225P15-A7	32	25	170	33	32			DNGN1507	UH1	SHDN4A	BM510	LW4
CDHNR/L 3225P12-X7	32	25	170	30	32			DNGX1207	UH5	SHDN3A	TM3507	LW4
CDHNR/L 3225P15-X7	32	25	170	33	32			DNGX1507	UH5	SHDN4A	BM510	LW4

Spare parts						
Clamp & Clamp Screw		Shim		Shim Screw		Wrench
						
UH1	UH5	SHDN3A	SHDN4A	TM3507	BM510	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

DNGN	DNGX
	
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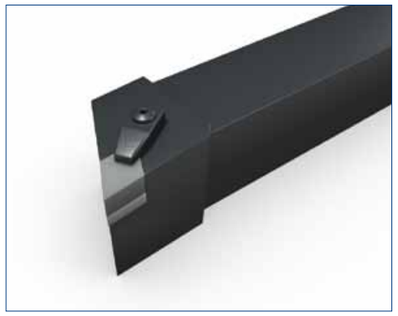
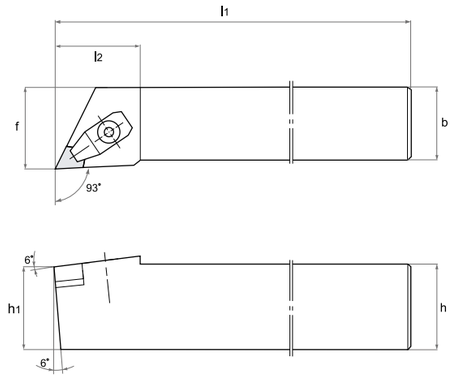
EXTERNAL TOOLHOLDER

CDJN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CDJNR/L 2525M15-A4	25	25	150	38	32	●		DNGN1504	UH1	SHDN4A	BM510	LW4
CDJNR/L 2525M15-A7	25	25	150	38	32	●	●	DNGN1507	UH1	SHDN4A	BM510	LW4
CDJNR/L 2525M12-X7	25	25	150	38	32	●	●	DNGX1207	UH5	SHDN3A	TM3507	LW4
CDJNR/L 2525M15-X7	25	25	150	38	32		●	DNGX1507	UH5	SHDN4A	BM510	LW4
CDJNR/L 3225P15-A4	32	25	170	38	32			DNGN1504	UH1	SHDN4A	BM510	LW4
CDJNR/L 3225P15-A7	32	25	170	38	32	●	●	DNGN1507	UH1	SHDN4A	BM510	LW4
CDJNR/L 3225P12-X7	32	25	170	38	32		●	DNGX1207	UH5	SHDN3A	TM3507	LW4
CDJNR/L 3225P15-X7	32	25	170	38	32	●		DNGX1507	UH5	SHDN4A	BM510	LW4

Spare parts						
Clamp & Clamp Screw		Shim		Shim Screw		Wrench
						
UH1	UH5	SHDN3A	SHDN4A	TM3507	BM510	LW4

DNGN	DNGX
	
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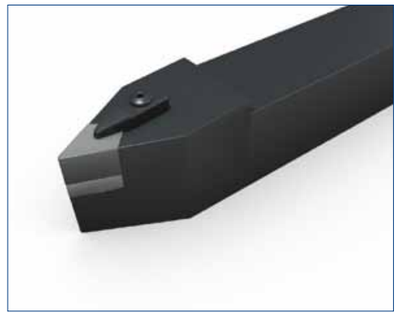
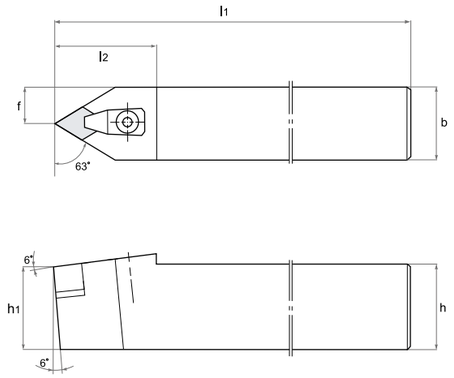
CDNN





Type	Dimensions (mm)					Stock	Insert	Spare Parts			
	h(h1)	b	l1	l2	f			Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CDNNN 2525M15-A4	25	25	150	40	12.5		DNGN1504	UH1	SHDN4A	BM510	LW4
CDNNN 2525M15-A7	25	25	150	40	12.5		DNGN1507	UH1	SHDN4A	BM510	LW4
CDNNN 4025M15-A7	40	25	150	40	12.5		DNGN1507	UH1	SHDN4A	BM510	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
UH1	SHDN4A	BM510	LW4

DNGN

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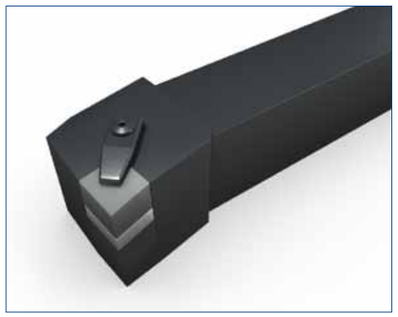
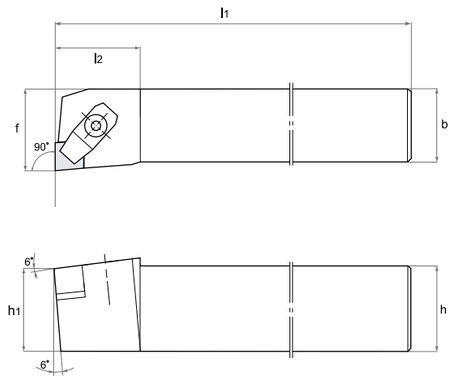
EXTERNAL TOOLHOLDER

CEFN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CEFNR/L 2525M13-A7	25	25	150	29	32			ENGN1307	UH1	SHEN4A	BM510	LW4
CEFNR/L 3225P13-A7	32	25	170	29	32			ENGN1307	UH1	SHEN4A	BM510	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
UH1	SHEN4A	BM510	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

ENGN

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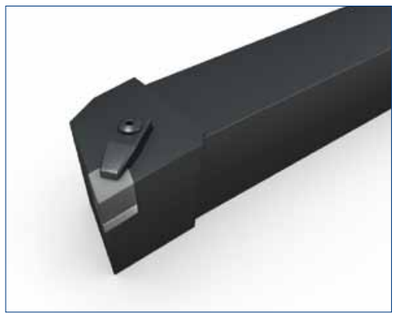
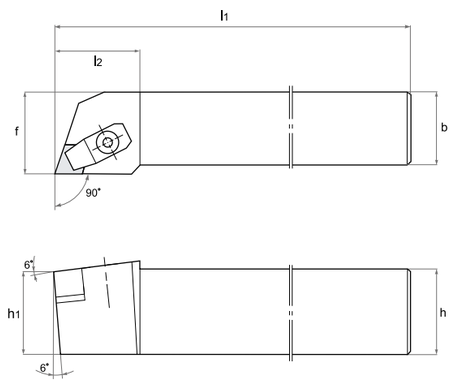
EXTERNAL TOOLHOLDER

CEGN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CEGNR/L 2525M13-A7	25	25	150	23	32			ENGN1307	UH1	SHEN4A	BM510	LW4
CEGNR/L 3225P13-A7	32	25	170	23	32	●	●	ENGN1307	UH1	SHEN4A	BM510	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
UH1	SHEN4A	BM510	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

ENGN

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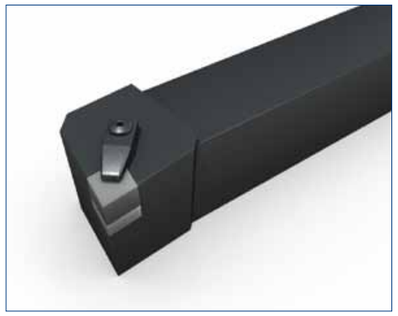
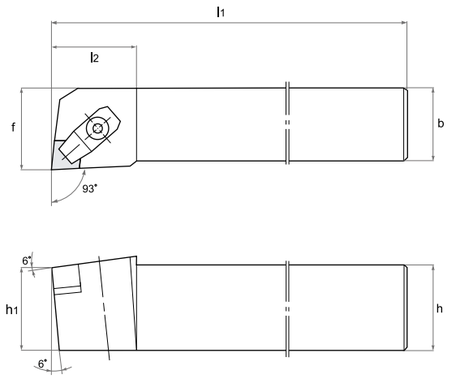
EXTERNAL TOOLHOLDER

CEJN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CEJNR/L 2525M13-A7	25	25	150	30	32	●	●	ENGN1307	UH1	SHEN4A	BM510	LW4
CEJNR/L 3225P13-A7	32	25	170	30	32			ENGN1307	UH1	SHEN4A	BM510	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
UH1	SHEN4A	BM510	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

ENGN

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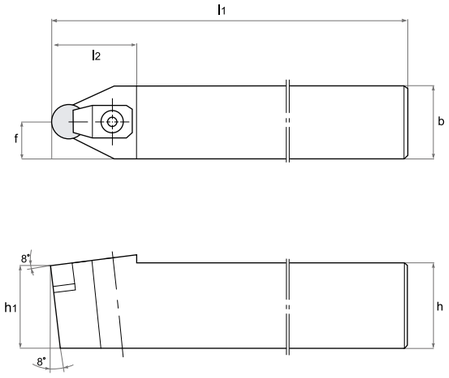
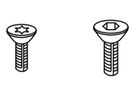
PART. A
TURNING & MILLING

EXTERNAL TOOLHOLDER

CRDN



Type	Dimensions (mm)					Stock	Insert	Spare Parts			
	h(h1)	b	l1	l2	f			Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CRDNN 2525M09-A4	25	25	150	32	12.5	●	RNGN0904	UH1	SHRN3A	TM3507	LW4
CRDNN 2525M09-A7	25	25	150	32	12.5	●	RNGN0907	UH1	SHRN3A	TM3507	LW4
CRDNN 2525M12-A4	25	25	150	32	12.5		RNGN1204	UH1	SHRN4A	BM510	LW4
CRDNN 2525M12-A7	25	25	150	32	12.5	●	RNGN1207	UH1	SHRN4A	BM510	LW4
CRDNN 2525M12-X7	25	25	150	32	12.5		RNGX1207	UH5	SHRN4A	BM510	LW4
CRDNN 3225P12-A4	32	25	170	32	12.5		RNGN1204	UH1	SHRN4A	BM510	LW4
CRDNN 3225P12-A7	32	25	170	32	12.5	●	RNGN1207	UH1	SHRN4A	BM510	LW4
CRDNN 3225P12-X7	32	25	170	32	12.5		RNGX1207	UH5	SHRN4A	BM510	LW4
CRDNN 3225P15-A7	32	25	170	32	12.5		RNGN1507	UH1	SHRN5A	BM510	LW4
CRDNN 3225P19-A7	32	25	170	32	12.5	●	RNGN1907	UH4	SHRN6	FM512	LW6

Spare parts										
Clamp & Clamp Screw			Shim				Shim Screw			Wrench	
											
UH1	UH4	UH5	SHRN3A	SHRN4A	SHRN5A	SHRN6	BM510	TM3507	FM512	LW4	LW6

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

RNGN

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RNGX .. DP

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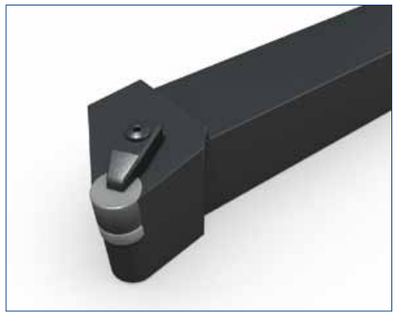
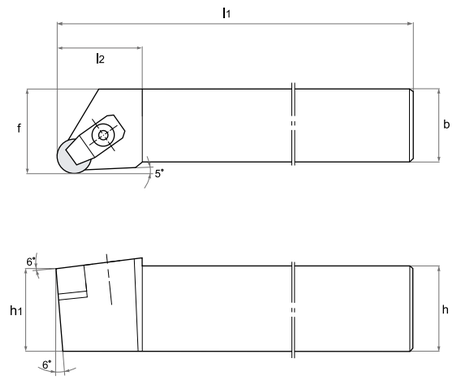
EXTERNAL TOOLHOLDER

CRGN





Type	Dimensions (mm)					Stock	Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CRGNR/L 2525M09-A4	25	25	150	32	32		RNGN0904	UH1	SHRN3A	TM3507	LW4
CRGNR/L 2525M09-A7	25	25	150	32	32	●	RNGN0907	UH1	SHRN3A	TM3507	LW4
CRGNR/L 2525M12-A4	25	25	150	35	32	●	RNGN1204	UH1	SHRN4A	BM510	LW4
CRGNR/L 2525M12-A7	25	25	150	35	32	●	RNGN1207	UH1	SHRN4A	BM510	LW4
CRGNR/L 2525M12-X7	25	25	150	35	32	●	RNGX1207	UH5	SHRN4A	BM510	LW4
CRGNR/L 3225P12-A4	32	25	170	35	32	●	RNGN1204	UH1	SHRN4A	BM510	LW4
CRGNR/L 3225P12-A7	32	25	170	35	32	●	RNGN1207	UH1	SHRN4A	BM510	LW4
CRGNR/L 3225P12-X7	32	25	170	35	32		RNGX1207	UH5	SHRN4A	BM510	LW4
CRGNR/L 3225P15-A7	32	25	170	37	32	●	RNGN1507	UH1	SHRN5A	BM510	LW4
CRGNR/L 3225P19-A7	32	25	170	45	32	●	RNGN1907	UH4	SHRN6	FM512	LW6

Spare parts										
Clamp & Clamp Screw			Shim				Shim Screw			Wrench	
											
UH1	UH4	UH5	SHRN3A	SHRN4A	SHRN5A	SHRN6	BM510	TM3507	FM512	LW4	LW6

RNGN

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RNGX .. DP

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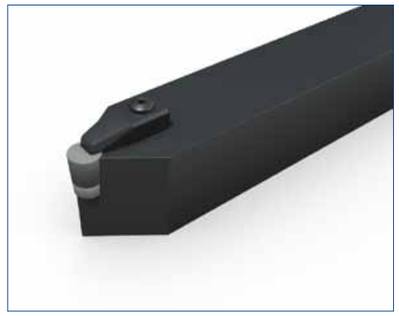
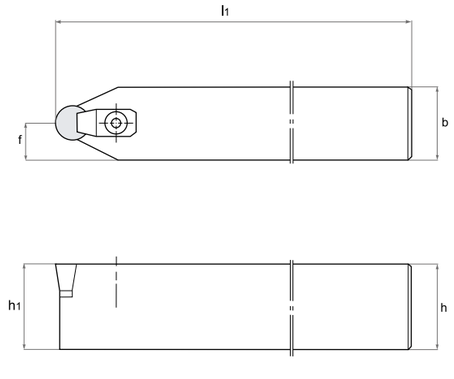
EXTERNAL TOOLHOLDER

CRDB





Type	Dimensions (mm)				Stock	Insert	Spare Parts			
	h(h1)	b	l1	f			Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CRDBN 2525M12-A	25	25	150	12.5	●	RBGX12T	UH1	SHRB12	SH3015	LW4
CRDBN 2525M16-A	25	25	150	12.5	●	RBGX16T	UH1	SHRB16	SH3515	LW4
CRDBN 3232P12-A	32	32	170	16	●	RBGX12T	UH1	SHRB12	SH3015	LW4
CRDBN 3232P16-A	32	32	170	16	●	RBGX16T	UH1	SHRB16	SH3515	LW4
CRDBN 3232P20-A	32	32	170	16		RBGX20T	UH4	SHRB20	SH5015	LW6
CRDBN 3232P26-A	32	32	170	16		RBGX26T	UH4	SHRB26	SH6015	LW6

Spare parts										
Clamp & Clamp Screw		Shim				Shim Screw				Wrench	
											
UH1	UH4	SHRB12	SHRB16	SHRB20	SHRB26	SH3015	SH3515	SH5015	SH6015	LW4	LW6

RBGX

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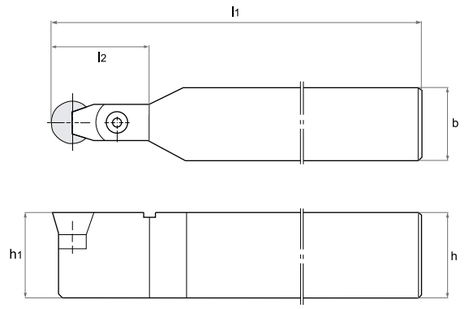
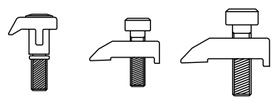
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

CRDC



Type	Dimensions (mm)				Stock	Insert	Spare Parts			
	h(h1)	b	l1	l2			Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CRDCN 3225P06-A4	32	25	170	20	●	RCGX0604	CLRC6	SHRC102	-	LW3
CRDCN 3225P06-A6	32	25	170	20	●	RCGX0606	CLRC6	SHRC102	-	LW3
CRDCN 3225P06-A7	32	25	170	20	●	RCGX0607	CLRC6	SHRC102	-	LW3
CRDCN 3225P09-A7	32	25	170	20	●	RCGX0907	CLRC9	SHRC103	FM315	LW4
CRDCN 3225P12-A7	32	25	170	20	●	RCGX1207	UH1	SHRC104	FM415	LW4
CRDCN 5040T12-A7	50	40	300	30	●	RCGX1207	UH1	SHRC104	FM415	LW4
CRDCN 5040T15-A10	50	40	300	35	●	RCGX1510	UH1	SHRC105	FM415	LW4
CRDCN 5040T19-A10	50	40	300	45		RCGX1910	UH4	SHRC106	FM415	LW6
CRDCN 5040T25-A12	50	40	300	50		RCGX2512	UH25	SHRC108	FM615	LW6

Spare parts									
Clamp & Clamp Screw			Shim			Shim Screw		Wrench		
									
CLRC6		CLRC9	SHRC102	SHRC103	SHRC104	FM210	FM315	LW3	LW4	LW6
UH1	UH4	UH25	SHRC105	SHRC106	SHRC108	FM415	FM615			

RCGX

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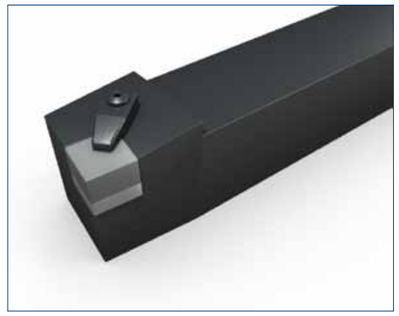
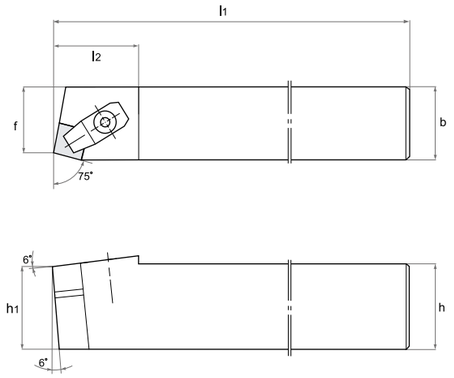
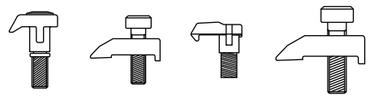
CSBN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSBNR/L 2525M12-A4	25	25	150	34	22	●	●	SNGN1204	UH1	SHSN4A	BM510	LW4
CSBNR/L 2525M12-A7	25	25	150	34	22	●	●	SNGN1207	UH1	SHSN4A	BM510	LW4
CSBNR/L 2525M12-X7	25	25	150	34	22	●		SNGX1207	UH5	SHSN4A	BM510	LW4
CSBNR/L 2525M15-A7	25	25	150	34	22			SNGN1507	UH1	SHSN5A	FM512	LW4
CSBNR/L 2525M15-X7	25	25	150	40	22			SNGX1507	UH5	SHSN5A	FM512	LW4
CSBNR/L 3225P12-A7	32	25	170	34	22	●	●	SNGN1207	UH1	SHSN4A	BM510	LW4
CSBNR/L 3225P12-X7	32	25	170	34	22	●		SNGX1207	UH5	SHSN4A	BM510	LW4
CSBNR/L 3225P15-A7	32	25	170	40	22	●		SNGN1507	UH1	SHSN5A	FM512	LW4
CSBNR/L 3225P15-X7	32	25	170	40	22			SNGX1507	UH5	SHSN5A	FM512	LW4
CSBNR/L 4040S19-A7	40	40	250	54	35			SNGN1907	UH4	SHSN6A	FM612	LW6
CSBNR/L 5050T25-A9	50	50	300	65	45			SNGN2509	UH25	SHSN8	FM815	LW6

Spare parts												
Clamp & Clamp Screw				Shim		Shim Screw			Wrench			
												
UH1	UH4	UH5	UH25	SHSN4A	SHSN5A	BM510	FM512	FM612	LW4	LW6		
				SHSN6A	SHSN8		FM815					

SNGN

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SNGX

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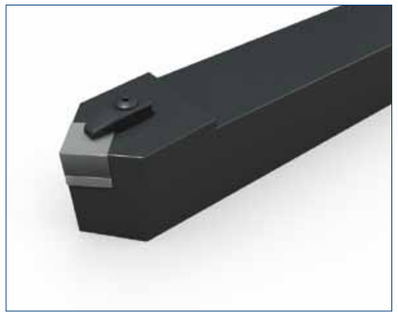
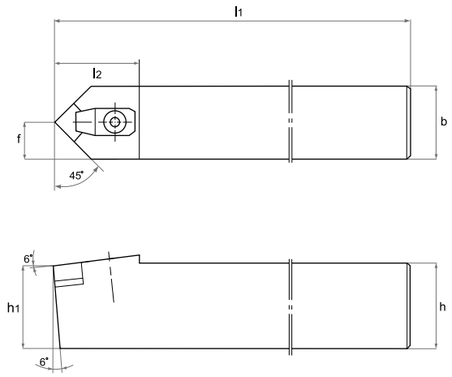
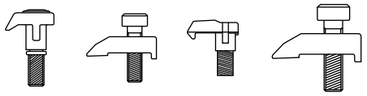
EXTERNAL TOOLHOLDER

CSDN





Type	Dimensions (mm)					Stock	Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSDNN 2525M12-A4	25	25	150	35	12.5	●	SNGN1204	UH1	SHSN4A	BM510	LW4
CSDNN 2525M12-A7	25	25	150	35	12.5	●	SNGN1207	UH1	SHSN4A	BM510	LW4
CSDNN 2525M12-X7	25	25	150	35	12.5		SNGX1207	UH5	SHSN4A	BM510	LW4
CSDNN 2525M15-A7	25	25	150	38	12.5		SNGN1507	UH1	SHSN5A	FM512	LW4
CSDNN 2525M15-X7	25	25	150	38	12.5		SNGX1507	UH5	SHSN5A	FM512	LW4
CSDNN 3225P12-A7	32	25	170	35	12.5	●	SNGN1207	UH1	SHSN4A	BM510	LW4
CSDNN 3225P12-X7	32	25	170	35	12.5		SNGX1207	UH5	SHSN4A	BM510	LW4
CSDNN 3225P15-A7	32	25	170	38	12.5	●	SNGN1507	UH1	SHSN5A	FM512	LW4
CSDNN 3225P15-X7	32	25	170	38	12.5		SNGX1507	UH5	SHSN5A	FM512	LW4
CSDNN 4040S19-A7	40	40	250	60	20	●	SNGN1907	UH4	SHSN6A	FM612	LW6
CSDNN 5050T25-A9	50	50	300	60	25	●	SNGN2509	UH25	SHSN8	FM815	LW6

Spare parts									
Clamp & Clamp Screw				Shim		Shim Screw			Wrench	
										
UH1	UH4	UH5	UH25	SHSN4A	SHSN5A	BM510	FM512	FM612	LW4	LW6
				SHSN6A	SHSN8		FM815			

SNGN	SNGX
	
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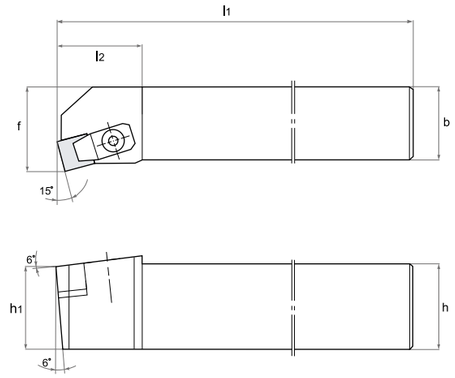
CSKN



Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSKNR/L 2525M12-A4	25	25	150	34	32			SNGN1204	UH1	SHSN4A	BM510	LW4
CSKNR/L 2525M12-A7	25	25	150	34	32	●	●	SNGN1207	UH1	SHSN4A	BM510	LW4
CSKNR/L 2525M12-X7	25	25	150	34	32	●	●	SNGX1207	UH5	SHSN4A	BM510	LW4
CSKNR/L 2525M15-A7	25	25	150	40	32			SNGN1507	UH1	SHSN5A	FM512	LW4
CSKNR/L 2525M15-X7	25	25	150	40	32			SNGX1507	UH5	SHSN5A	FM512	LW4
CSKNR/L 3225P12-A7	32	25	170	34	32			SNGN1207	UH1	SHSN4A	BM510	LW4
CSKNR/L 3225P12-X7	32	25	170	34	32		●	SNGX1207	UH5	SHSN4A	BM510	LW4
CSKNR/L 3225P15-A7	32	25	170	40	32	●	●	SNGN1507	UH1	SHSN5A	FM512	LW4
CSKNR/L 3225P15-X7	32	25	170	40	32			SNGX1507	UH5	SHSN5A	FM512	LW4

Spare parts							
Clamp & Clamp Screw		Shim		Shim Screw		Wrench	
							
UH1	UH5	SHSN4A	SHSN5A	BM510	FM512	LW4	

SNGN	SNGX
	
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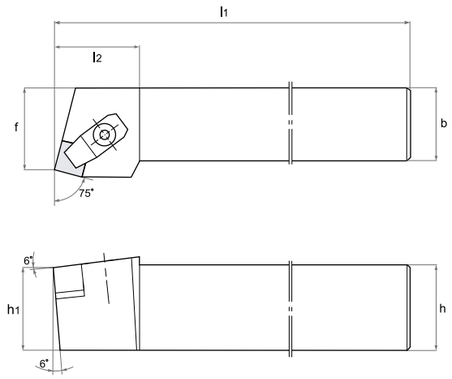
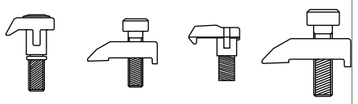
EXTERNAL TOOLHOLDER

CSRN



Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSRNR/L 2525M12-A4	25	25	150	32	27	●	●	SNGN1204	UH1	SHSN4A	BM510	LW4
CSRNR/L 2525M12-A7	25	25	150	32	27	●	●	SNGN1207	UH1	SHSN4A	BM510	LW4
CSRNR/L 2525M12-X7	25	25	150	32	27	●		SNGX1207	UH5	SHSN4A	BM510	LW4
CSRNR/L 2525M15-A7	25	25	150	34	27			SNGN1507	UH1	SHSN5A	FM512	LW4
CSRNR/L 2525M15-X7	25	25	150	34	27			SNGX1507	UH5	SHSN5A	FM512	LW4
CSRNR/L 3225P12-A7	32	25	170	32	27			SNGN1207	UH1	SHSN4A	BM510	LW4
CSRNR/L 3225P12-X7	32	25	170	32	27			SNGX1207	UH5	SHSN4A	BM510	LW4
CSRNR/L 3225P15-A7	32	25	170	34	27	●	●	SNGN1507	UH1	SHSN5A	FM512	LW4
CSRNR/L 3225P15-X7	32	25	170	34	27	●		SNGX1507	UH5	SHSN5A	FM512	LW4
CSRNR/L 4040S19-A7	40	40	250	54	43			SNGN1907	UH4	SHSN6A	FM612	LW6
CSRNR/L 5050T25-A9	50	50	300	70	53			SNGN2509	UH25	SHSN8	FM815	LW6

Spare parts									
Clamp & Clamp Screw				Shim		Shim Screw		Wrench	
									
UH1	UH4	UH5	UH25	SHSN4A SHSN6A	SHSN5A SHSN8	BM510	FM512 FM815	FM612	LW4	LW6

SNGN

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SNGX

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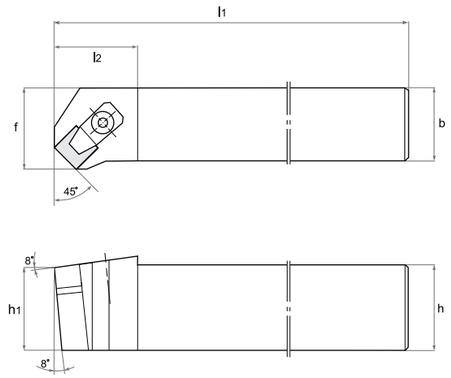
EXTERNAL TOOLHOLDER

CSSN



Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSSNR/L 2525M12-A4	25	25	150	35	32			SNGN1204	UH1	SHSN4A	BM510	LW4
CSSNR/L 2525M12-A7	25	25	150	35	32	●	●	SNGN1207	UH1	SHSN4A	BM510	LW4
CSSNR/L 2525M12-X7	25	25	150	35	32		●	SNGX1207	UH5	SHSN4A	BM510	LW4
CSSNR/L 2525M15-A7	25	25	150	37	32	●		SNGN1507	UH1	SHSN5A	FM512	LW4
CSSNR/L 2525M15-X7	25	25	150	37	32			SNGX1507	UH5	SHSN5A	FM512	LW4
CSSNR/L 3225P12-A7	32	25	170	35	32	●		SNGN1207	UH1	SHSN4A	BM510	LW4
CSSNR/L 3225P12-X7	32	25	170	35	32			SNGX1207	UH5	SHSN4A	BM510	LW4
CSSNR/L 3225P15-A7	32	25	170	37	32			SNGN1507	UH1	SHSN5A	FM512	LW4
CSSNR/L 3225P15-X7	32	25	170	37	32			SNGX1507	UH5	SHSN5A	FM512	LW4

Spare parts									
Clamp & Clamp Screw				Shim		Shim Screw		Wrench	
									
UH1	UH5	SHSN4A	SHSN5A	BM510	FM512	LW4			

SNGN

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SNGX

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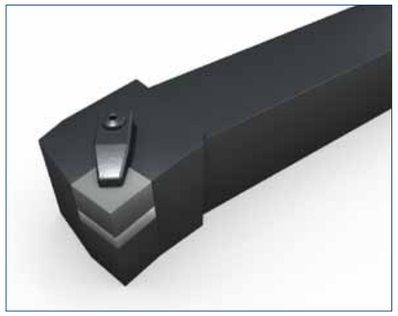
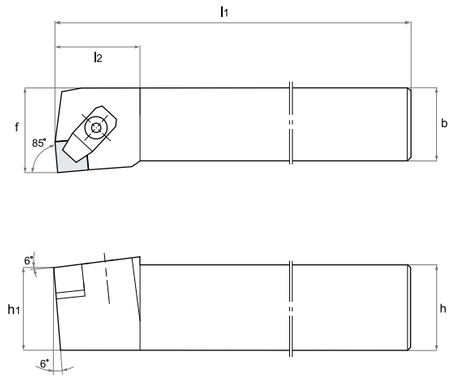
EXTERNAL TOOLHOLDER

CSYN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSYNR/L 2525M12-A4	25	25	150	27	32	●		SNGN1204	UH1	SHSN4A	BM510	LW4
CSYNR/L 2525M12-A7	25	25	150	27	32	●		SNGN1207	UH1	SHSN4A	BM510	LW4
CSYNR/L 2525M12-X7	25	25	150	27	32			SNGX1207	UH5	SHSN4A	BM510	LW4
CSYNR/L 2525M15-A7	25	25	150	27	32			SNGN1507	UH1	SHSN5A	FM512	LW4
CSYNR/L 2525M15-X7	25	25	150	27	32			SNGX1507	UH5	SHSN5A	FM512	LW4
CSYNR/L 3225P12-A7	32	25	170	27	32			SNGN1207	UH1	SHSN4A	BM510	LW4
CSYNR/L 3225P12-X7	32	25	170	27	32			SNGX1207	UH5	SHSN4A	BM510	LW4
CSYNR/L 3225P15-A7	32	25	170	27	32			SNGN1507	UH1	SHSN5A	FM512	LW4
CSYNR/L 3225P15-X7	32	25	170	27	32			SNGX1507	UH5	SHSN5A	FM512	LW4

Spare parts						
Clamp & Clamp Screw		Shim		Shim Screw		Wrench
						
UH1	UH5	SHSN4A	SHSN5A	BM510	FM512	LW4

SNGN

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SNGX

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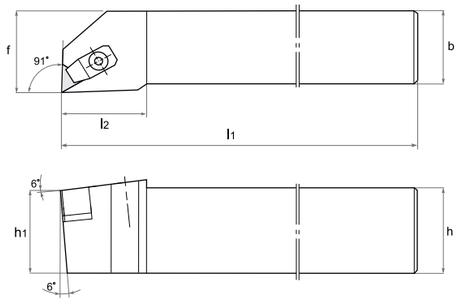
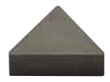
EXTERNAL TOOLHOLDER

CTFN



Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CTFNR/L 2525M16-A4	25	25	150	29	32			TNGN1604	UH1	SHTN3A	BM408	LW4
CTFNR/L 2525M16-A7	25	25	150	29	32			TNGN1607	UH1	SHTN3A	BM408	LW4
CTFNR/L 2525M22-A4	25	25	150	32	32			TNGN2204	UH1	SHTN4	FM410	LW4
CTFNR/L 2525M22-A7	25	25	150	32	32	●		TNGN2207	UH1	SHTN4	FM410	LW4
CTFNR/L 3225P16-A4	32	25	170	29	32			TNGN1604	UH1	SHTN3A	BM408	LW4
CTFNR/L 3225P16-A7	32	25	170	29	32			TNGN1607	UH1	SHTN3A	BM408	LW4
CTFNR/L 3225P22-A4	32	25	170	32	32			TNGN2204	UH1	SHTN4	FM410	LW4
CTFNR/L 3225P22-A7	32	25	170	32	32			TNGN2207	UH1	SHTN4	FM410	LW4

Spare parts					
Clamp & Clamp Screw	Shim		Shim Screw		Wrench
					
UH1	SHTN3A	SHTN4A	BM408	FM410	LW4

TNGN

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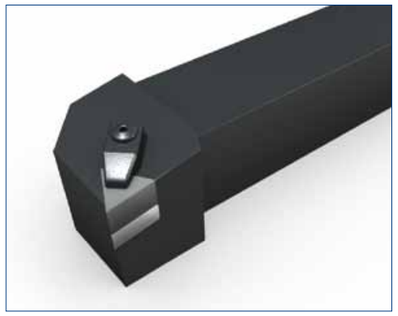
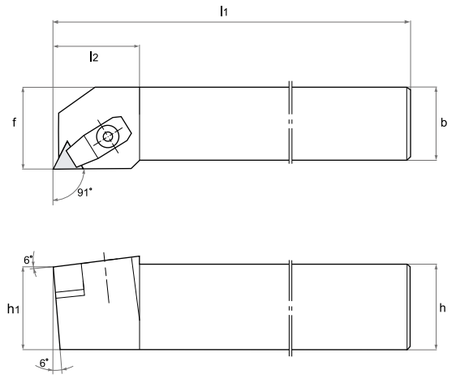
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

EXTERNAL TOOLHOLDER

CTGN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CTGNR/L 2525M16-A4	25	25	150	26	32	●	●	TNGN1604	UH1	SHTN3A	BM408	LW4
CTGNR/L 2525M16-A7	25	25	150	26	32		●	TNGN1607	UH1	SHTN3A	BM408	LW4
CTGNR/L 2525M22-A4	25	25	150	26	32	●		TNGN2204	UH1	SHTN4	FM410	LW4
CTGNR/L 2525M22-A7	25	25	150	26	32			TNGN2207	UH1	SHTN4	FM410	LW4
CTGNR/L 3225P16-A4	32	25	170	26	32	●	●	TNGN1604	UH1	SHTN3A	BM408	LW4
CTGNR/L 3225P16-A7	32	25	170	26	32			TNGN1607	UH1	SHTN3A	BM408	LW4
CTGNR/L 3225P22-A4	32	25	170	26	32			TNGN2204	UH1	SHTN4	FM410	LW4
CTGNR/L 3225P22-A7	32	25	170	26	32			TNGN2207	UH1	SHTN4	FM410	LW4

Spare parts					
Clamp & Clamp Screw	Shim		Shim Screw		Wrench
					
UH1	SHTN3A	SHTN4A	BM408	FM410	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

TNGN

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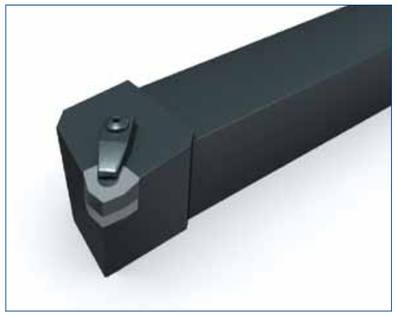
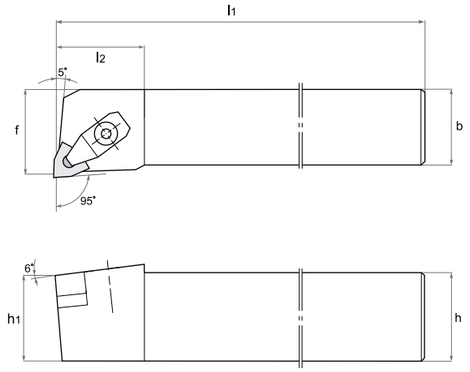
EXTERNAL TOOLHOLDER

CWLN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CWLNR/L 2525M08-X7	25	25	150	28	32	●	●	WNGX0807	UH5	SHWN4A	TM4010	LW4
CWLNR/L 3225M08-X7	32	25	150	28	32	●	●	WNGX0807	UH5	SHWN4A	TM4010	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
UH5	SHWN4A	TM4010	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

WNGX

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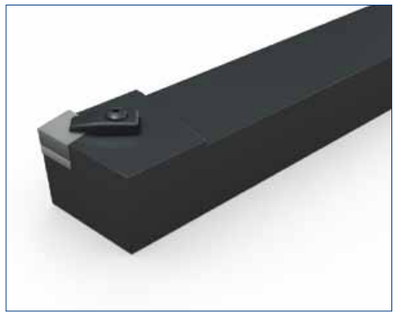
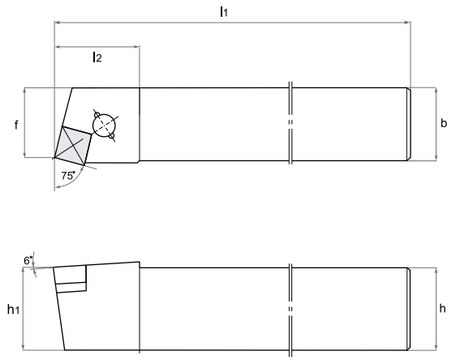
EXTERNAL TOOLHOLDER

CSRC





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h_1)	b	l_1	l_2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSRCR/L 2525M12-A4	25	25	150	32	27	●		SCGN1204	UH1	SHSC4A	SP3	LW4
CSRCR/L 3225P12-A4	32	25	170	32	27			SCGN1204	UH1	SHSC4A	SP3	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
UH1	SHSC4A	SP3	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

SCGN

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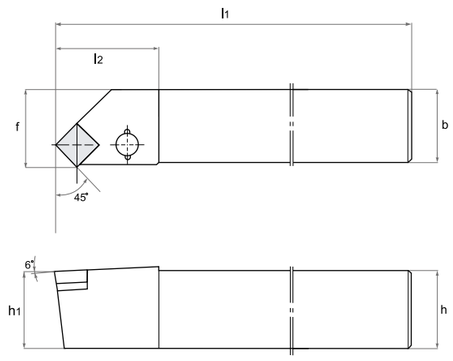
EXTERNAL TOOLHOLDER

CSSC



Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h_1)	b	l_1	l_2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSSCR/L 2525M12-A4	25	25	150	35	32	●		SCGN1204	UH1	SHSC4A	SP3	LW4
CSSCR/L 2525M12-A6	25	25	150	35	32			SCGN1206	UH1	SHSC4A	SP3	LW4
CSSCR/L 3225P12-A4	32	25	170	35	32			SCGN1204	UH1	SHSC4A	SP3	LW4
CSSCR/L 3225P12-A6	32	25	170	35	32			SCGN1206	UH1	SHSC4A	SP3	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
UH1	SHSC4A	SP3	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

SCGN

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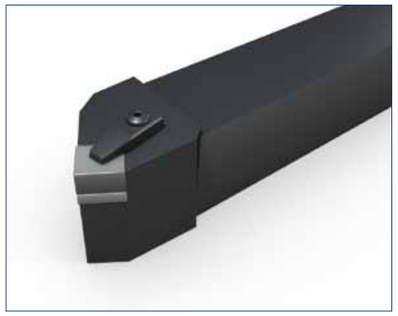
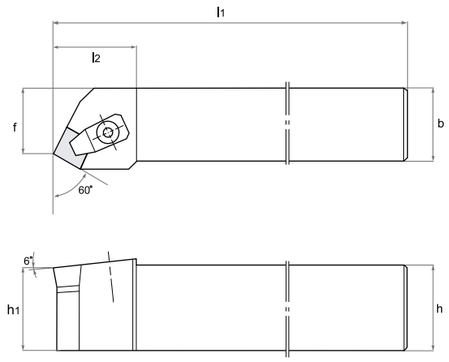
EXTERNAL TOOLHOLDER

CSTP





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSTPR/L 2020K09-A3	20	20	125	24	17			SPGN0903	UH1	SHSC3A	SP3	LW4
CSTPR/L 2020K12-A3	20	20	125	30	17			SPGN1203	UH1	SHSC4A	SP3	LW4
CSTPR/L 2020K12-A4	20	20	125	30	17			SPGN1204	UH1	SHSC4A	SP3	LW4
CSTPR/L 2525M12-A3	25	25	150	30	22			SPGN1203	UH1	SHSC4A	SP3	LW4
CSTPR/L 2525M12-A4	25	25	150	30	22			SPGN1204	UH1	SHSC4A	SP3	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
UH1	SHSC3A SHSC4A	SP3	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
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SPGN

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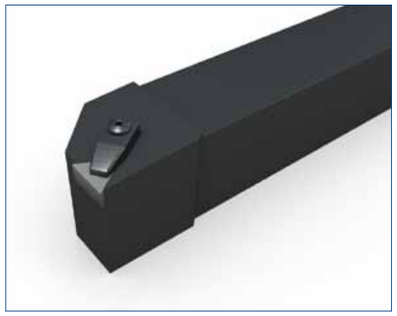
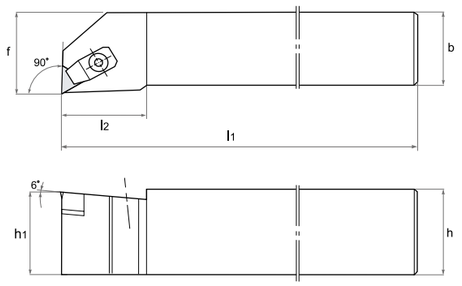
EXTERNAL TOOLHOLDER

CTFP





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CTFPR/L 2020K16-A3	20	20	125	20	25			TPGN1603	UH1	SHTC3A	SP3	LW4
CTFPR/L 2525M16-A3	25	25	150	20	32			TPGN1603	UH1	SHTC3A	SP3	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
UH1	SHTC3A	SP3	LW3 LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

TPGN

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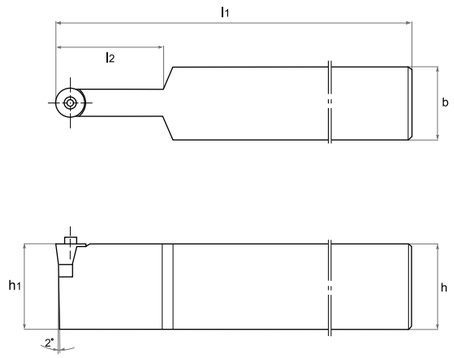
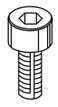
HRCD



Type	Dimensions (mm)				Stock	Insert	Spare Parts		
	h(h1)	b	l1	l2			Clamp & Clamp Screw	Shim	Wrench
HRCD 2525M12-B6	25	25	150	15	●	CDH1206	HB 2	SHCD22	LW2.5
HRCD 2525M19-B9	25	25	150	15	●	CDH1909	HB 3	SHCD33	LW5
HRCD 3225R19-B9	32	25	200	38	●	CDH1909	HB 3	SHCD33	LW5
HRCD 4035S19-B9	40	35	250	45	●	CDH1909	HB 3	SHCD33	LW5
HRCD 4035S32-B19	40	35	250	45		CDH3219	HB 5	SHCD53	LW6
HRCD 5050T32-B19	50	50	300	50		CDH3219	HB 5	SHCD53	LW6

Spare parts								
Clamp & Clamp Screw			Shim			Wrench		
								
HB2	HB3	HB5	SHCD22	SHCD33	SHCD53	LW2.5	LW5	LW6

CDH

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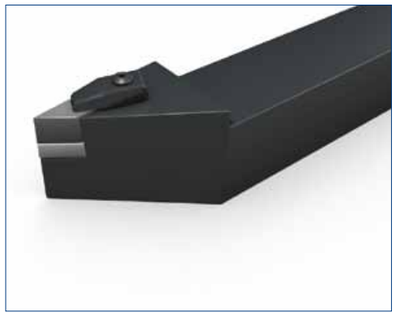
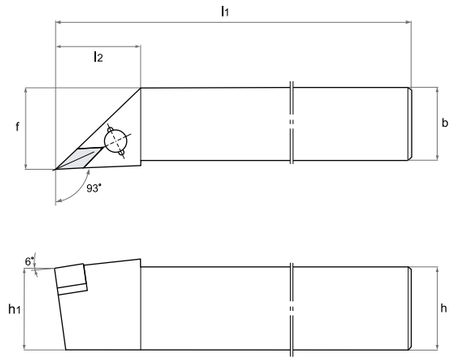
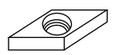
CVJN





Type	Dimensions (mm)					Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	f	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CVJNR/L 2525M16-A4	25	25	150	41	32	●	●	VNGN1604	SM4	SHVN3A	TM412	LW4
CVJNR/L 2525M16-X7	25	25	150	41	32	●	●	VNGX1607	SM4	SHVN3A	TM412	LW4
CVJNR/L 3225P16-X7	32	25	170	41	32	●		VNGX1607	SM4	SHVN3A	TM412	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
SM4	SHVN3A	TM412	LW4

VNGN

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VNGX

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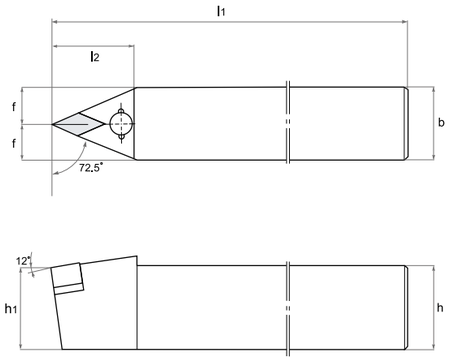
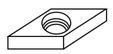
EXTERNAL TOOLHOLDER

CVVN



Type	Dimensions (mm)					Stock	Insert	Spare Parts			
	h(h1)	b	l1	l2	f			Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CVVNN 2525M16-A4	25	25	150	45	12.5		VNGN1604	SM4	SHVN3A	TM412	LW4
CVVNN 2525M16-X7	25	25	150	45	12.5		VNGX1607	SM4	SHVN3A	TM412	LW4
CVVNN 3225P16-X7	32	25	170	45	12.5	●	VNGX1607	SM4	SHVN3A	TM412	LW4

Spare parts			
Clamp & Clamp Screw	Shim	Shim Screw	Wrench
			
SM4	SHVN3A	TM412	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

VNGN

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VNGX

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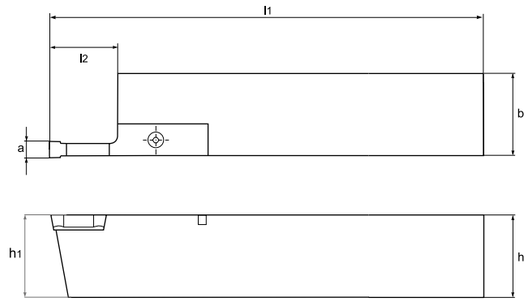
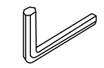
CSBF



Type	Dimensions (mm)					Stock		Insert	Spare Parts	
	a	h(h1)	b	l1	l2	R	L		Clamp & Clamp Screw	Wrench
CSBF 5040P3228R/L	3.18	50	40	170	19			SYBF3228	SGD3 / BM518	LW3
CSBF 5040P4828R/L	4.78	50	40	170	19			SYBF4828	SGD4 / BM518	LW4
CSBF 5040P5528R/L	5.54	50	40	170	19			SYBF5528	SGD4 / BM518	LW4
CSBF 5040P6428R/L	6.35	50	40	170	19			SYBF6428	SGD6 / BM618	LW4
CSBF 5040P7928R/L	7.93	50	40	170	19			SYBF7928	SGD6 / BM618	LW4
CSBF 5040P9528R/L	9.52	50	40	170	19			SYBF9528	SGD9 / BM1018	LW5

Spare parts									
Clamp & Clamp Screw							Wrench		
									
SGD3	SGD4	SGD6	SGD9	BM518	BM618	BM1018	LW3	LW4	LW5

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

SYBF

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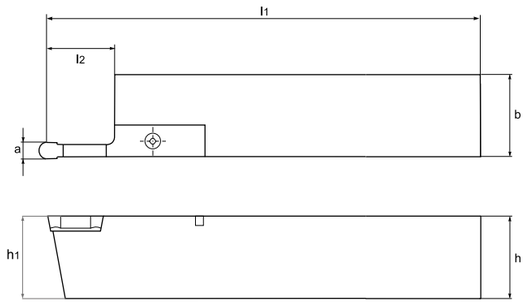
CSBR



Type	Dimensions (mm)					Stock		Insert	Spare Parts	
	a	h(h1)	b	l1	l2	R	L		Clamp & Clamp Screw	Wrench
CSBR 5040P3228R/L	3.18	50	40	170	19			SYBR3228	SGD3 / BM518	LW3
CSBR 5040P4828R/L	4.78	50	40	170	19			SYBR4828	SGD4 / BM518	LW4
CSBR 5040P5528R/L	5.54	50	40	170	19			SYBR5528	SGD4 / BM518	LW4
CSBR 5040P6428R/L	6.35	50	40	170	19			SYBR6428	SGD6 / BM618	LW4
CSBR 5040P7928R/L	7.93	50	40	170	19			SYBR7928	SGD6 / BM618	LW4
CSBR 5040P9528R/L	9.52	50	40	170	19			SYBR9528	SGD9 / BM1018	LW5

Spare parts									
Clamp & Clamp Screw							Wrench		
									
SGD3	SGD4	SGD6	SGD9	BM518	BM618	BM1018	LW3	LW4	LW5

SYBR

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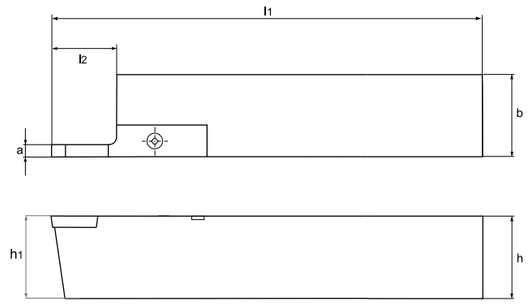
CSGF



Type	Dimensions (mm)					Stock		Insert	Spare Parts	
	a	h(h1)	b	l1	l2	R	L		Clamp & Clamp Screw	Wrench
CSGF 3225P4012R/L	4.0	32	25	170	19	●		SGF4012	SGL4 / BM518	LW3
CSGF 3225P5012R/L	5.0	32	25	170	19	●		SGF5012	SGL5 / BM518	LW4
CSGF 3225P6015R/L	6.0	32	25	170	19	●	●	SGF6015	SGL5 / BM518	LW4
CSGF 3225P7015R/L	7.0	32	25	170	19	●		SGF7015	SGL7 / BM618	LW5
CSGF 3225P8015R/L	8.0	32	25	170	19	●	●	SGF8015	SGL8 / BM618	LW5
CSGF 3225P1015R/L	10.0	32	25	170	19			SGF1015	SGL8 / BM618	LW5

Spare parts									
Clamp & Clamp Screw							Wrench		
									
SGL4	SGL5	SGL7	SGL8	BM518	BM618		LW3	LW4	LW5

SGF

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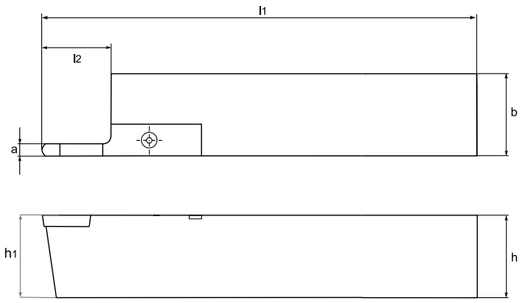
EXTERNAL TOOLHOLDER

CSGR



Type	Dimensions (mm)					Stock		Insert	Spare Parts	
	a	h(h1)	b	l1	l2	R	L		Clamp & Clamp Screw	Wrench
CSGR 3225P4012R/L	4.0	32	25	170	19		●	SGR4012	SGL4 / BM518	LW3
CSGR 3225P5012R/L	5.0	32	25	170	19	●		SGR5012	SGL5 / BM518	LW4
CSGR 3225P6015R/L	6.0	32	25	170	19			SGR6015	SGL5 / BM518	LW4
CSGR 3225P7015R/L	7.0	32	25	170	19			SGR7015	SGL7 / BM618	LW5
CSGR 3225P8015R/L	8.0	32	25	170	19			SGR8015	SGL8 / BM618	LW5
CSGR 3225P1015R/L	10.0	32	25	170	19			SGR1015	SGL8 / BM618	LW5

Spare parts								
Clamp & Clamp Screw						Wrench		
								
SGL4	SGL5	SGL7	SGL8	BM518	BM618	LW3	LW4	LW5

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

SGR

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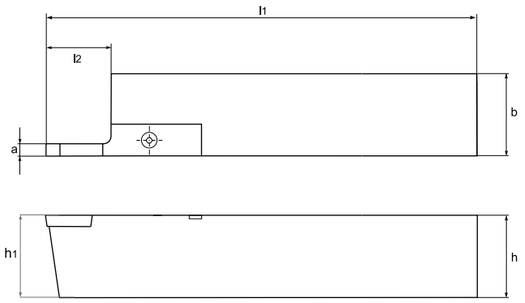
EXTERNAL TOOLHOLDER

CSSF



Type	Dimensions (mm)					Stock		Insert	Spare Parts	
	a	h(h1)	b	l1	l2	R	L		Clamp & Clamp Screw	Wrench
CSSF 3225P4012R/L	4.0	32	25	170	19	●	●	SSF4012	SGL4 / BM518	LW3
CSSF 3225P5012R/L	5.0	32	25	170	19	●		SSF5012	SGL5 / BM518	LW4
CSSF 3225P6015R/L	6.0	32	25	170	19	●		SSF6015	SGL5 / BM518	LW4
CSSF 3225P7015R/L	7.0	32	25	170	19			SSF7015	SGL7 / BM618	LW5
CSSF 3225P8015R/L	8.0	32	25	170	19			SSF8015	SGL8 / BM618	LW5
CSSF 3225P1015R/L	10.0	32	25	170	19			SSF1015	SGL8 / BM618	LW5

Spare parts								
Clamp & Clamp Screw						Wrench		
								
SGL4	SGL5	SGL7	SGL8	BM518	BM618	LW3	LW4	LW5

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

SSF

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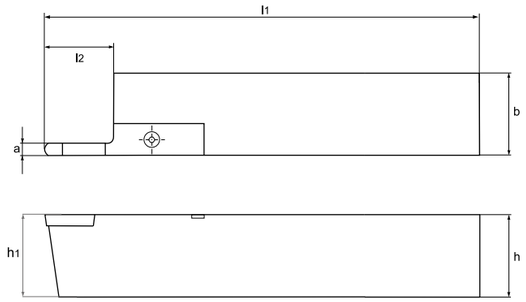
EXTERNAL TOOLHOLDER

CSSR



Type	Dimensions (mm)					Stock		Insert	Spare Parts	
	a	h(h1)	b	l1	l2	R	L		Clamp & Clamp Screw	Wrench
CSSR 3225P4012R/L	4.0	32	25	170	19			SSR4012	SGL4 / BM518	LW3
CSSR 3225P5012R/L	5.0	32	25	170	19	●		SSR5012	SGL5 / BM518	LW4
CSSR 3225P6015R/L	6.0	32	25	170	19	●		SSR6015	SGL5 / BM518	LW4
CSSR 3225P7015R/L	7.0	32	25	170	19			SSR7015	SGL7 / BM618	LW5
CSSR 3225P8015R/L	8.0	32	25	170	19	●		SSR8015	SGL8 / BM618	LW5
CSSR 3225P1015R/L	10.0	32	25	170	19			SSR1015	SGL8 / BM618	LW5

Spare parts								
Clamp & Clamp Screw						Wrench		
								
SGL4	SGL5	SGL7	SGL8	BM518	BM618	LW3	LW4	LW5

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

SSR

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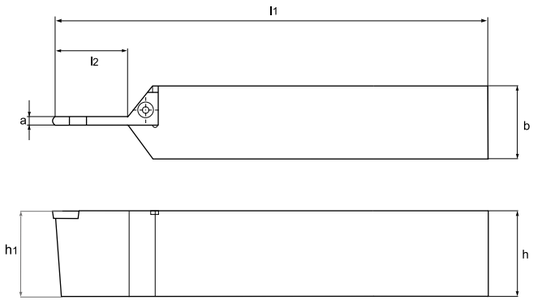
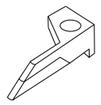
CSSR .. N



Type	Dimensions (mm)					Stock	Insert	Spare Parts	
	a	h(h1)	b	l1	l2			Clamp & Clamp Screw	Wrench
CSSR 4040R4012.N5	4.0	40	40	200	5		SSR4012	GRW4012 / BM518	LW3
CSSR 5040P4012.N19	4.0	50	40	170	19		SSR4012	GRW4012 / BM518	LW3

Spare parts		
Clamp & Clamp Screw		Wrench
		
GRW4012	BM518	LW4

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

SSR

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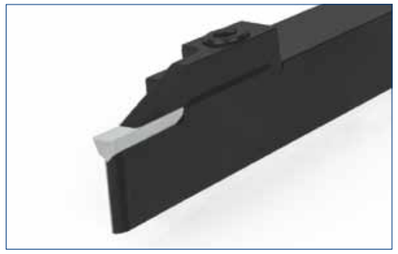
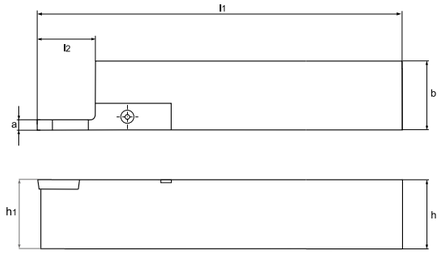
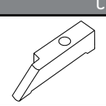
EXTERNAL TOOLHOLDER

CWF/R



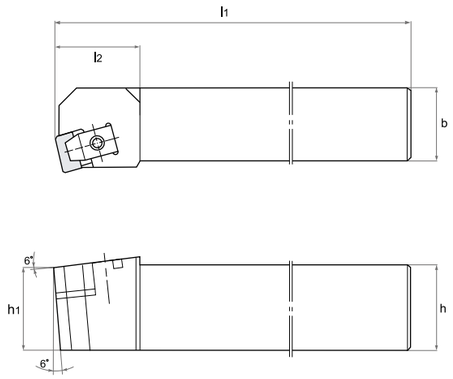


Type	Dimensions (mm)					Stock		Insert	Spare Parts		
	a	h(h1)	b	l1	l2	R	L		Clamp & Clamp Screw	Spring	Wrench
CWF/R 2525M094050R/L	2.3	25	25	150	19			WFP094050 WRP094050 WFC094050 WRC094050	WGL2.3 R/L & WCB6	WCS6	LW5
CWF/R 2525M125050R/L	3.1	25	25	150	19	•	•	WFP125050 WRP125050 WFC125050 WRC125050	WGL3.1 R/L & WCB6	WCS6	LW5
CWF/R 2525M156050R/L	3.9	25	25	150	19	•	•	WFP156050 WRP156050 WFC156050 WRC156050	WGL3.9 R/L & WCB6	WCS6	LW5
CWF/R 2525M187050R/L	4.7	25	25	150	19	•	•	WFP187050 WRP187050 WFC187050 WRC187050	WGL4.7 R/L & WCB6	WCS6	LW5
CWF/R 2525M218075R/L	5.5	25	25	150	29	•		WFP218075 WRP218075 WFC218075 WRC218075	WGL5.5 R/L & WCB6	WCS6	LW5
CWF/R 2525M250075R/L	6.3	25	25	150	29	•	•	WFP250075 WRP250075 WFC250075 WRC250075	WGL6.3 R/L & WCB6	WCS6	LW5
CWF/R 2525M281075R/L	7.1	25	25	150	29			WFP281075 WRP281075 WFC281075 WRC281075	WGL7.1 R/L & WCB6	WCS6	LW5
CWF/R 2525M312100R/L	7.9	25	25	150	38			WFP312100 WRP312100 WFC312100 WRC312100	WGL7.9 R/L & WCB6	WCS6	LW5
CWF/R 2525M344100R/L	8.7	25	25	150	38			WFP344100 WRP344100 WFC344100 WRC344100	WGL8.7 R/L & WCB6	WCS6	LW5
CWF/R 2525M375100R/L	9.5	25	25	150	38			WFP375100 WRP375100 WFC375100 WRC375100	WGL9.5 R/L & WCB6	WCS6	LW5

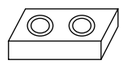
Spare parts			
Clamp & Clamp Screw	Spring	Wrench	
			
WGL2.3 R/L ~WGL9.5 R/L	WCB6	WCS6	LW5

SPECIAL TOOLHOLDER

CLKN



Type	Dimensions (mm)				Stock		Insert	Spare Parts			
	h(h1)	b	l1	l2	R	L		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CLKNR/L 6060V65-A	60	60	400	70			LNJ6588	UH25	SHLJ65	BM510	LW6
CLKNR/L 6060V66-A	60	60	400	70			LNJ6688	UH25	SHLJ66	BM510	LW6

Spare parts				
Clamp & Clamp Screw	Shim		Shim Screw	Wrench
				
UH25	SHLJ65	SHLJ66	BM510	LW6

LNJ

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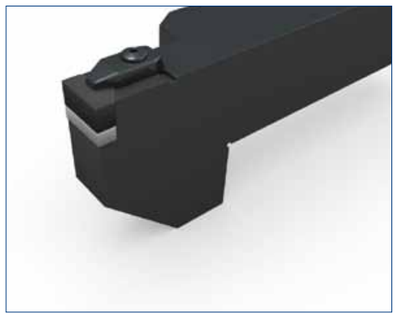
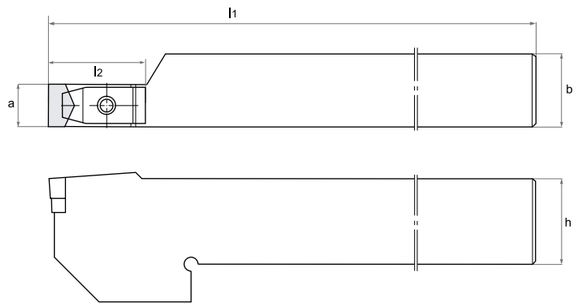
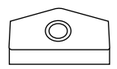
SPECIAL TOOLHOLDER

CFLN





Type	Dimensions (mm)					Stock	Insert	Spare Parts			
	a	h(h1)	b	l1	l2	R		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CFLNN 6060U44-A	14	60	60	350	80		F10537	UH25	SHF10	BM510	LW6
CFLNN 5050T32-A	12	50	50	300	75		F13941	UH25	SHF13	BM510	LW6
CFLNN 4040R25-A	7	40	40	200	40		F250723	UH4	SHF25	BM510	LW4

Spare parts						
Clamp & Clamp Screw		Shim			Shim Screw	Wrench
						
UH4	UH25	SHF10	SHF13	SHF25	BM510	LW8

F-Series

Page 53

F-Series

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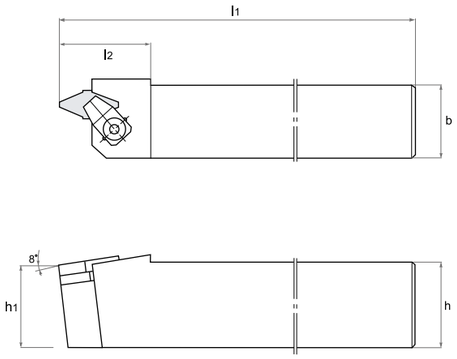
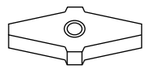
SPECIAL TOOLHOLDER

CSVN



Type	Dimensions (mm)				Stock	Insert	Spare Parts			
	h(h1)	b	l1	l2	R		Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CSVNN 3232P38-A7-26	32	32	170	38		SVW38260	UH1	SHSV3826	FM510	LW4
CSVNN 3232P38-A7-32	32	32	170	40		SVW38320	UH1	SHSV3832	FM510	LW4
CSVNN 3232P34-A7-40	32	32	170	50		SVW34400	UH1	SHSV3440	FM510	LW4

Spare parts					
Clamp & Clamp Screw	Shim			Shim Screw	Wrench
					
UH1	SHSV3826	SHSV3832	SHSV3440	FM510	LW4

SVW

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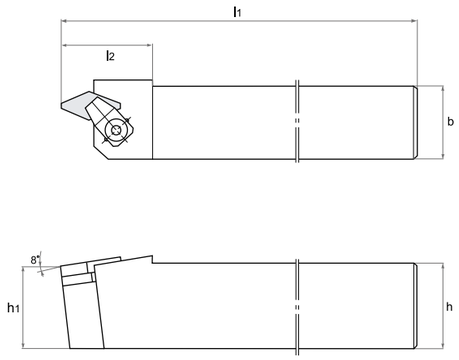
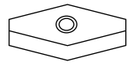
SPECIAL TOOLHOLDER

CGVN



Type	Dimensions (mm)				Stock	Insert	Spare Parts			
	h(h1)	b	l1	l2			Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CGVNN 3232P38-A7-32	32	32	170	48		GVGN38320	UH1	SHGV3832	FM510	LW4
CGVNN 3232P38-A7-33	32	32	170	46		GVGN38335	UH1	SHGV3833	FM510	LW4
CGVNN 3232P36-A7-34	32	32	170	49		GVGN36340	UH1	SHGV3634	FM510	LW4
CGVNN 3232P38-A7-36	32	32	170	44		GVGN38360	UH1	SHGV3836	FM510	LW4
CGVNN 3232P34-A7-36	32	32	170	44		GVGN34360	UH1	SHGV3436	FM510	LW4

Spare parts							
Clamp & Clamp Screw	Shim			Shim Screw	Wrench		
							
UH1	SHGV3832	SHGV3833	SHGV3634	FM510	LW4		
	SHGV3836	SHGV3436					

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

GVGN

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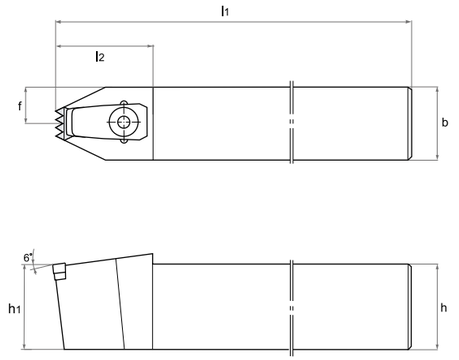
SPECIAL TOOLHOLDER

CINN



Type	Dimensions (mm)					Stock	Insert	Spare Parts			
	h(h1)	b	l1	l2	f			Clamp & Clamp Screw	Shim	Shim Screw	Wrench
CINNN 2525M09-A4-F3	25	25	150	30	12.5	●	INGN160435F3	UH1	SHIN33F3	TM3008	LW4
CINNN 2525M12-A4-F4	25	25	150	34	12.5	●	INGN220435F4	UH1	SHIN43F4	TM4010	LW4
CINNN 3225P09-A4-F3	32	25	170	30	12.5		INGN160435F3	UH1	SHIN33F3	TM3008	LW4
CINNN 3225P12-A4-F4	32	25	170	34	12.5		INGN220435F4	UH1	SHIN43F4	TM4010	LW4

Spare parts							
Clamp & Clamp Screw	Shim		Shim Screw		Wrench		
							
UH1	SHIN33F3	SHIN43F4	TM3008	TM4010	LW4		

CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

INGN

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INGN

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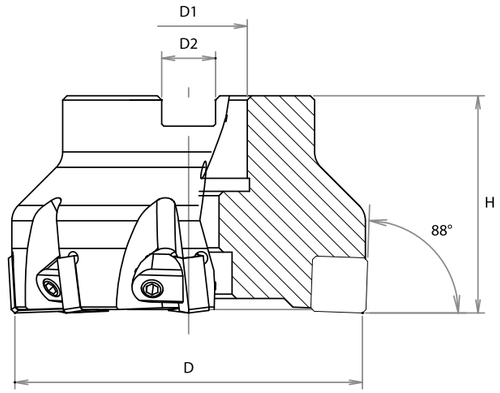
MILLING CUTTER

APPLICATION INDEX

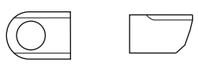
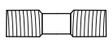
SFKN .. 88

Axial rake angle : -7°

Radial rake angle
D40 : -12°
D50~125 : -10°



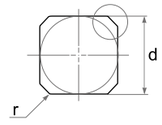
Type	Dimensions (mm)				⚙	Insert
	D	D_1	D_2	H		
SFKN 040-04-88 N4	40	16	8.4	40	4	SNCN 0904 ZZT
SFKN 050-05-88 N4	50	22	10.4	40	5	
SFKN 063-06-88 N4	63	22	10.4	40	6	SNCN 1204 ZZT SNCN 1204 ZN
SFKN 080-08-88 N4A	80	25.4	9.5	50	8	
SFKN 080-08-88 N4	80	27	12.4	50	8	
SFKN 100-10-88 N4A	100	31.75	12.7	50	10	
SFKN 100-10-88 N4	100	32	14.4	50	10	
SFKN 125-12-88 N4A	125	38.1	15.9	63	12	
SFKN 125-12-88 N4	125	40	16.4	63	12	

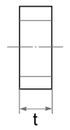
Dimensions (mm)	Spare parts		
D	Wedge	Wedge Screw	Wrench
			
40 - 50	SSW9	WS6 (M6)	LW3
63 - 125	SSW10	WS6 (M6)	LW3

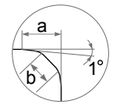
Recommended Cutting Condition for Gray Cast Iron

Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)	Surface Quality Ra(μm)
Roughing	190~210	800~2,000	0.08~0.15	2.0~5.0	6.3~12.5
Roughing	220~240	500~1,500	0.08~0.15	2.0~5.0	6.3~12.5
Roughing	250~280	300~1,200	0.08~0.15	2.0~5.0	6.3~12.5

SNCN .. ZZT

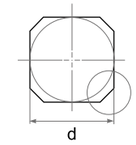


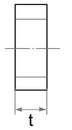


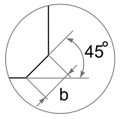


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t	a	b																			
SNCN 0904 ZZT	**SNCN 33 ZZT**	9.52	4.76	1.30	1.10												●	●		●	●			
SNCN 1204 ZZT	**SNCN 43 ZZT**	12.70	4.76	3.25	1.10												●	●		●	●			

SNCN .. ZN



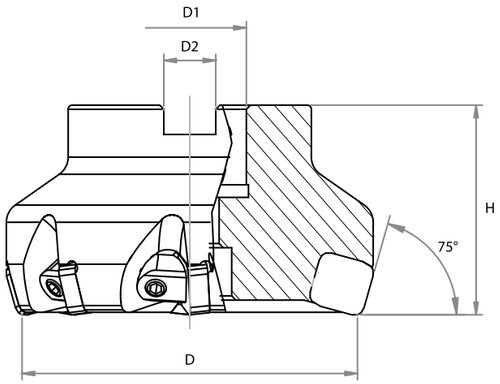




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t	b																			
SNCN 1204 ZN	**SNCN 43 ZN**	12.70	4.76	1.10												●							

FACE MILLING CUTTER

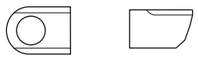
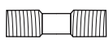
SFKN .. 75



Axial rake angle : -6°

Radial rake angle : -10°

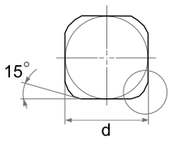
Type	Dimensions (mm)				⚙	Insert
	D	D_1	D_2	H		
SFKN 050-05-75 N4	50	22	10.4	40	5	SNCN 1204 ENTN SNGN 1204
SFKN 063-06-75 N4	63	22	10.4	40	6	
SFKN 080-08-75 N4A	80	25.4	9.5	50	8	
SFKN 080-08-75 N4	80	27	12.4	50	8	
SFKN 100-10-75 N4A	100	31.75	12.7	50	10	
SFKN 100-10-75 N4	100	32	14.4	50	10	
SFKN 125-12-75 N4A	125	38.1	15.9	63	12	
SFKN 125-12-75 N4	125	40	16.4	63	12	

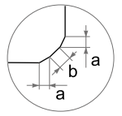
Dimensions (mm)	Spare parts		
D	Wedge	Wedge Screw	Wrench
			
50	SSW10	WS6 (M6)	LW3
63 - 125	SSW10	WS6 (M6)	LW3

Recommended Cutting Condition for Gray Cast Iron

Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)	Surface Quality Ra(μm)
Roughing	190~210	800~2,000	0.10~0.20	2.0~5.0	6.3~12.5
Roughing	220~240	500~1,500	0.10~0.20	2.0~5.0	6.3~12.5
Roughing	250~280	300~1,200	0.10~0.20	2.0~5.0	6.3~12.5

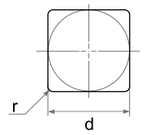
SNCN .. ENTN

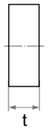




Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t	a	b																NEW	NEW		
SNCN 1204 ENTN	**SNCN 43 ENTN**	12.70	4.76	1.40	1.00										●	●	●							

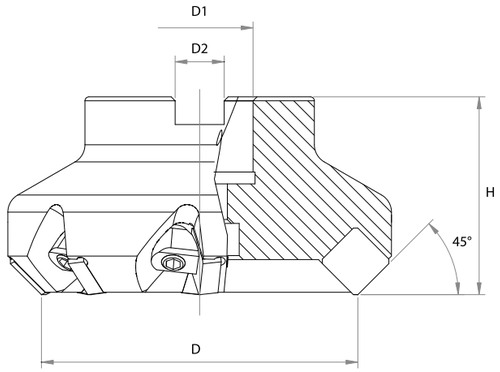
SNGN





Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t	r																NEW	NEW		
SNGN 120412	**SNGN 433**	12.70	4.76	1.2												●							
SNGN 120416	**SNGN 434**	12.70	4.76	1.6												●							

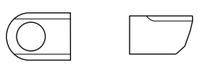
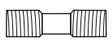
SFKN .. 45



Axial rake angle : -6°

Radial rake angle : -12°

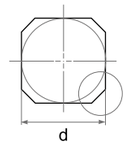
Type	Dimensions (mm)				⚙	Insert
	D	D_1	D_2	H		
SFKN 050-05-45 N4	50	22	10.4	40	5	SNCN 1204 AN SNCN 1204 ZN SNGN 1204 □ □
SFKN 063-06-45 N4	63	22	10.4	40	6	
SFKN 080-08-45 N4A	80	25.4	9.5	50	8	
SFKN 080-08-45 N4	80	27	12.4	50	8	
SFKN 100-10-45 N4A	100	31.75	12.7	50	10	
SFKN 100-10-45 N4	100	32	14.4	50	10	
SFKN 125-12-45 N4A	125	38.1	15.9	63	12	
SFKN 125-12-45 N4	125	40	16.4	63	12	

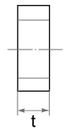
Dimensions (mm)	Spare parts		
D	Wedge	Wedge Screw	Wrench
			
50	SSW9	WS6 (M6)	LW3
63 - 125	SSW10	WS6 (M6)	LW3

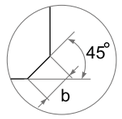
Recommended Cutting Condition for Gray Cast Iron

Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)	Surface Quality Ra(μm)
Roughing	190~210	800~2,000	0.15~0.30	2.0~5.0	3.2~12.5
Roughing	220~240	500~1,500	0.15~0.30	2.0~5.0	3.2~12.5
Roughing	250~280	300~1,200	0.15~0.30	2.0~5.0	3.2~12.5

SNCN

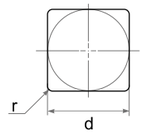


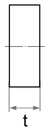




Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	b																			
SNCN 1204 AN	**SNCN 43 AN**	12.70	4.76	2.50												●							
SNCN 1204 ZN	**SNCN 43 ZN**	12.70	4.76	1.10												●							

SNGN





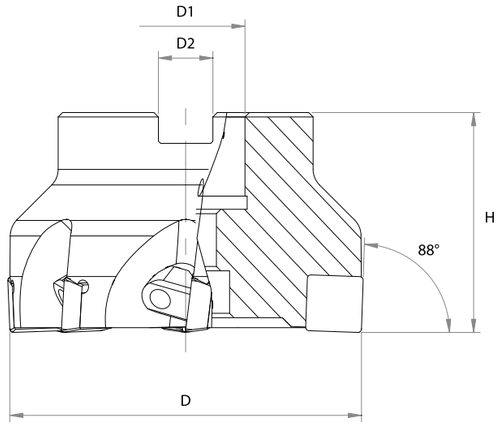
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SNGN 120412	**SNGN 433**	12.70	4.76	1.2												●							
SNGN 120416	**SNGN 434**	12.70	4.76	1.6												●							

FACE MILLING CUTTER

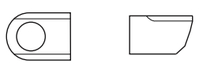
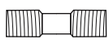
SFKP .. 88

Axial rake angle : +7°

Radial rake angle : +3°



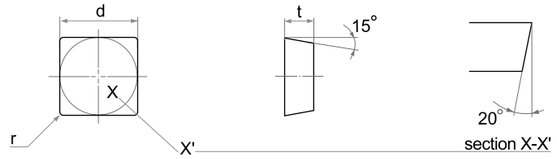
Type	Dimensions (mm)					Insert
	D	D_1	D_2	H	⚙	
SFKP 050-05-88 N4	50	22	10.4	40	5	SDCN 1204 □□ T20
SFKP 063-06-88 N4	63	22	10.4	40	6	
SFKP 080-08-88 N4A	80	25.4	9.5	50	8	
SFKP 080-08-88 N4	80	27	12.4	50	8	
SFKP 100-10-88 N4A	100	31.75	12.7	50	10	
SFKP 100-10-88 N4	100	32	14.4	50	10	
SFKP 125-12-88 N4A	125	38.1	15.9	63	12	
SFKP 125-12-88 N4	125	40	16.4	63	12	

Dimensions (mm)	Spare parts		
D	Wedge	Wedge Screw	Wrench
			
50	SSW9	WS6 (M6)	LW3
63 - 125	SSW10	WS6 (M6)	LW3

Recommended Cutting Condition for Gray Cast Iron

Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)	Surface Quality Ra(μm)
Roughing	190~210	800~2,000	0.08~0.15	2.0~5.0	6.3~12.5
Roughing	220~240	500~1,500	0.08~0.15	2.0~5.0	6.3~12.5
Roughing	250~280	300~1,200	0.08~0.15	2.0~5.0	6.3~12.5

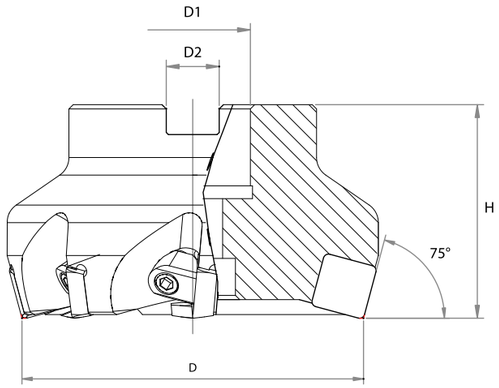
SDCN .. T



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SDCN 120408 T20	**SDCN 432 T20**	12.70	4.76	0.8												●							
SDCN 120412 T20	**SDCN 433 T20**	12.70	4.76	1.2												●							

FACE MILLING CUTTER

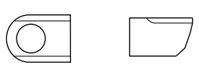
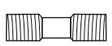
SFKP .. 75



Axial rake angle : +5°

Radial rake angle : 0°

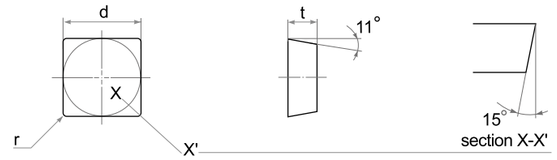
Type	Dimensions (mm)					Insert
	D	D_1	D_2	H	⚙	
SFKP 050-05-75 N4	50	22	10.4	40	5	
SFKP 063-06-75 N4	63	22	10.4	40	6	
SFKP 080-08-75 N4A	80	25.4	9.5	50	8	
SFKP 080-08-75 N4	80	27	12.4	50	8	SPCN 1204 □□ T15 SPKN 1204SP EDTR
SFKP 100-10-75 N4A	100	31.75	12.7	50	10	
SFKP 100-10-75 N4	100	32	14.4	50	10	
SFKP 125-12-75 N4A	125	38.1	15.9	63	12	
SFKP 125-12-75 N4	125	40	16.4	63	12	

Dimensions (mm)	Spare parts		
D	Wedge	Wedge Screw	Wrench
			
50	SSW9	WS6 (M6)	LW3
63 - 125	SSW10	WS6 (M6)	LW3

Recommended Cutting Condition for Gray Cast Iron

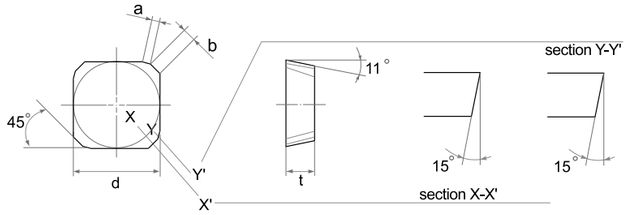
Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)	Surface Quality Ra(μm)
Roughing	190~210	800~2,000	0.10~0.20	2.0~5.0	3.2~12.5
Roughing	220~240	500~1,500	0.10~0.20	2.0~5.0	3.2~12.5
Roughing	250~280	300~1,200	0.10~0.20	2.0~5.0	3.2~12.5

SPCN .. T



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	ASA	d	t	r																			
SPCN 120412 T15	**SPCN 433 T15**	12.70	4.76	1.2												●							
SPCN 120416 T15	**SPCN 434 T15**	12.70	4.76	1.6												●							

SPKN .. SP

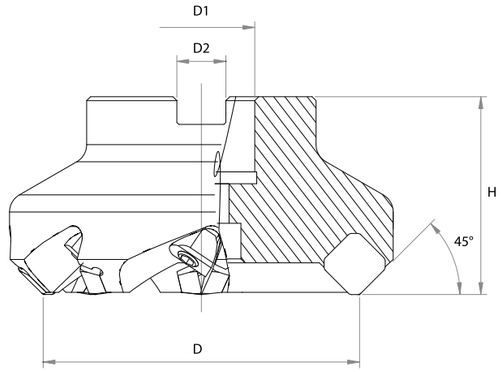


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 (NEW)	NC400 (NEW)	SW400	SW800
ISO	ASA	d	t	a	b																			
SPKN 1204SP EDTR	**SPKN 43SP EDTR**	12.70	4.76	1.10	1.30												●							

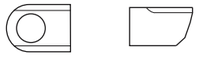
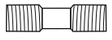
SFKP .. 45

Axial rake angle : +19°

Radial rake angle : -6°



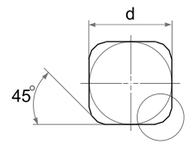
Type	Dimensions (mm)					Insert
	D	D_1	D_2	H	⚙	
SFKP 050-05-45 N4	50	22	10.4	40	5	SEAN 1204 AFTN W25 SEAN 1204 □T25
SFKP 063-06-45 N4	63	22	10.4	40	6	
SFKP 080-08-45 N4A	80	25.4	9.5	50	8	
SFKP 080-08-45 N4	80	27	12.4	50	8	
SFKP 100-10-45 N4A	100	31.75	12.7	50	10	
SFKP 100-10-45 N4	100	32	14.4	50	10	
SFKP 050-05-45 N3	50	22	10.4	40	5	SEAN 1203 NWAFTN SEAN 1203 AFTN
SFKP 063-06-45 N3	63	22	10.4	40	6	
SFKP 080-08-45 N3A	80	25.4	9.5	50	8	
SFKP 080-08-45 N3	80	27	12.4	50	8	
SFKP 100-10-45 N3A	100	31.75	12.7	50	10	
SFKP 100-10-45 N3	100	32	14.4	50	10	

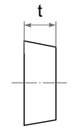
Dimensions (mm)	Spare parts		
D	Wedge	Wedge Screw	Wrench
			
50	SSW9	WS6 (M6)	LW3
63 - 100	SSW10	WS6 (M6)	LW3

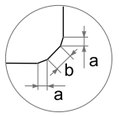
Recommended Cutting Condition for Gray Cast Iron

Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)	Surface Quality Ra(μm)
Roughing	190~210	800~2,000	0.15~0.30	2.0~5.0	6.3~12.5
Roughing	220~240	500~1,500	0.15~0.30	2.0~5.0	6.3~12.5
Roughing	250~280	300~1,200	0.15~0.30	2.0~5.0	6.3~12.5

SEAN

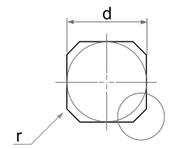


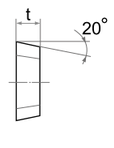


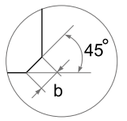


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	a	b																			
SEAN 1203 AFTN	**SEAN 42 AFTN**	12.70	3.18	0.50	1.80										●	●	●							

SEAN .. NW

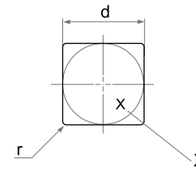


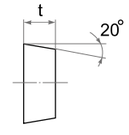


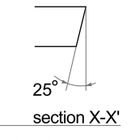


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	b	r																			
SEAN 1203 NWAFTN	**SEAN 42 NWAFTN**	12.70	3.18	2.40	0.4										●									
SEAN 1204 AFTNW25	**SEAN 43 AFTNW25**	12.70	4.76	2.50	1.2												●							

SEAN .. T





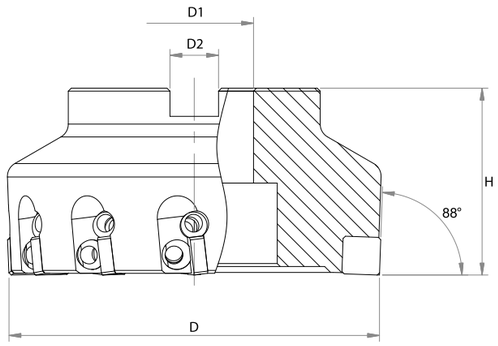


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	a																			
SEAN 120412 T25	**SEAN 433 T25**	12.70	4.76	1.2												●					●		
SEAN 120416 T25	**SEAN 434 T25**	12.70	4.76	1.6												●					●		

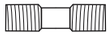
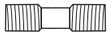
SFAN .. 88

Axial rake angle : -7°

Radial rake angle : -10°



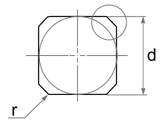
Type	Dimensions (mm)					Insert
	D	D_1	D_2	H	⚙	
SFAN 063-06-88 N4	63	22	10.4	40	6	SNCN 1204 ZZT SNCN 1204 ZN
SFAN 080-08-88 N4A	80	25.4	9.5	50	8	
SFAN 080-08-88 N4	80	27	12.4	50	8	
SFAN 100-10-88 N4A	100	31.75	12.7	50	10	
SFAN 100-10-88 N4	100	32	14.4	50	10	
SFAN 125-12-88 N4A	125	38.1	15.9	63	12	
SFAN 125-12-88 N4	125	40	16.4	63	12	

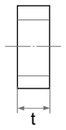
Dimensions (mm)	Spare parts				
D	Wedge	Wedge Screw	Adjust Wedge	Adjust Wedge Screw	Wrench
					
63 - 125	SW16	WS6 (M6)	SAW 20	WS6 (M6)	LW3

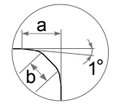
Recommended Cutting Condition for Gray Cast Iron

Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)	Surface Quality Ra(μm)
Roughing	190~210	800~2,000	0.08~0.15	2.0~5.0	6.3~12.5
Roughing	220~240	500~1,500	0.08~0.15	2.0~5.0	6.3~12.5
Roughing	250~280	300~1,200	0.08~0.15	2.0~5.0	6.3~12.5
Finishing	190~210	200~900	0.05~0.10	0.1~0.5	0.8
Finishing	220~240	200~700	0.05~0.10	0.1~0.5	0.8
Finishing	250~280	200~500	0.05~0.10	0.1~0.5	0.8

SNCN .. ZZT

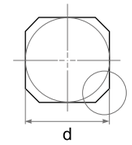


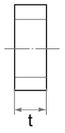


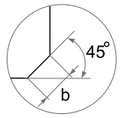


Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t	a	b																			
SNCN 1204 ZZT	**SNCN 43 ZZT**	12.70	4.76	3.25	1.10		●										●	●		●	●			

SNCN .. ZN







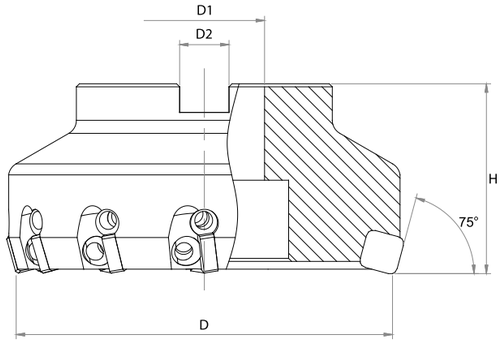
Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t	b																			
SNCN 1204 ZN	**SNCN 43 ZN**	12.70	4.76	1.10												●							

FACE MILLING CUTTER

SFAN .. 75

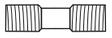
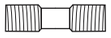
Axial rake angle : -6°

Radial rake angle : -10°



Type	Dimensions (mm)				
	D	D_1	D_2	H	⚙
SFAN 063-06-75 N4	63	22	10.4	40	6
SFAN 080-08-75 N4A	80	25.4	9.5	50	8
SFAN 080-08-75 N4	80	27	12.4	50	8
SFAN 100-10-75 N4A	100	31.75	12.7	50	10
SFAN 100-10-75 N4	100	32	14.4	50	10
SFAN 125-12-75 N4A	125	38.1	15.9	63	12
SFAN 125-12-75 N4	125	40	16.4	63	12

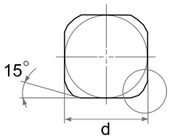
Insert: SNCN 1204 ENTN, SNGN 1204 □

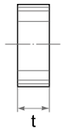
Dimensions (mm)	Spare parts				
D	Wedge	Wedge Screw	Adjust Wedge	Adjust Wedge Screw	Wrench
					
63 - 125	SW16	WS6 (M6)	SAW 20	WS6 (M6)	LW3

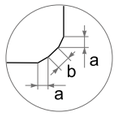
Recommended Cutting Condition for Gray Cast Iron

Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)	Surface Quality Ra(μm)
Roughing	190~210	800~2,000	0.08~0.15	2.0~5.0	6.3~12.5
Roughing	220~240	500~1,500	0.08~0.15	2.0~5.0	6.3~12.5
Roughing	250~280	300~1,200	0.08~0.15	2.0~5.0	6.3~12.5
Finishing	190~210	200~900	0.08~0.15	0.1~0.5	0.8
Finishing	220~240	200~700	0.08~0.15	0.1~0.5	0.8
Finishing	250~280	200~500	0.08~0.15	0.1~0.5	0.8

SNCN .. ENTN

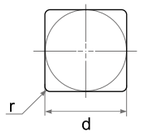


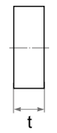




Type		Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	a	b																			
SNCN 1204 ENTN	**SNCN 43 ENTN**	12.70	4.76	1.40	1.00										●	●	●							

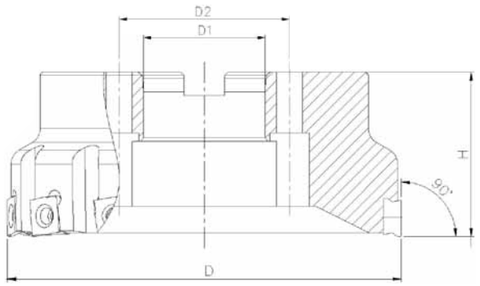
SNGN





Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SNGN 120412	**SNGN 433**	12.70	4.76	1.2		●										●							
SNGN 120416	**SNGN 434**	12.70	4.76	1.6		●										●							

SFSX .. 00 .. EC

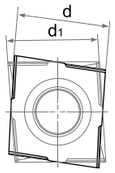


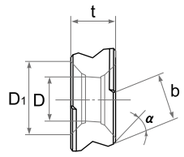
Type	Dimensions (mm)				⚙	Insert
	D	D_1	D_2	H		
SFSX 050-05-00-A5EC	50	22		40	5	
SFSX 050-05-00-A5ECA	50.8	19.05		44.5	5	
SFSX 063-07-00-A5EC	63	22	-	40	7	
SFSX 063-07-00-A5ECA	63.5	19.05		44.5	7	
SFSX 080-08-00-A5EC	80	27	-	50	8	
SFSX 080-08-00-A5ECA	76.2	25.4		44.5	8	
SFSX 100-12-00-A5EC	100	32	-	50	12	
SFSX 100-12-00-A5ECA	101.6	38.1		44.5	12	
SFSX 125-15-00-A5EC	125	40	-	63	15	
SFSX 125-15-00-A5ECA	127.0	38.1		60.5	15	
SFSX 160-18-00-A5EC	160	40	66.7	63	18	
SFSX 160-18-00-A5ECA	152.4	50.8		60.5	18	
SFSX 200-24-00-A5EC	200	60		63	24	
SFSX 200-24-00-A5ECA	203.2	63.5		60.5	24	
SFSX 250-30-00-A5EC	250	60		63	30	
SFSX 250-30-00-A5ECA	254.0	63.5		60.5	30	
SFSX 080-06-00-AT6EC	80	27	-	50	6	
SFSX 080-06-00-AT6ECA	76.2	25.4		44.5	6	
SFSX 100-08-00-AT6EC	100	32	-	50	8	
SFSX 100-08-00-AT6ECA	101.6	31.75		44.5	8	
SFSX 125-10-00-AT6EC	125	40	-	63	10	
SFSX 125-10-00-AT6ECA	127	38.1		60.5	10	
SFSX 160-14-00-AT6EC	160	40	66.7	63	14	
SFSX 160-14-00-AT6ECA	152.4	50.8		60.5	14	

SPHX1205 NR

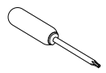
SPHX15T6 NR

SPHX





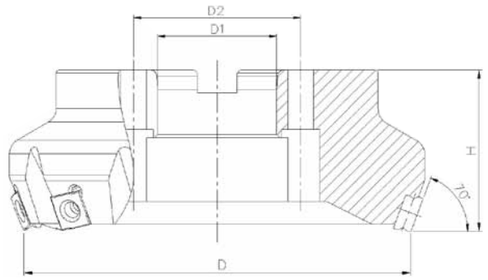
Type	Dimensions (mm)							ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	d	t	a	b	t	a	b																			
SPHX 1205NR 480T	11.67	11.33	5.50	5.10	8.41	45	8.0												●		●					
SPHX 1205NL 480T	11.67	11.33	5.50	5.10	8.41	45	8.0																			
SPHX 15T6NR 880T	14.58	14.33	6.60	6.10	10.18	45	8.80												●		●					

Dimensions (mm)	Spare parts	
D	Screw	Wrench
		
50 - 250 (SPHX1205 NR)	C94010	T15
80 - 160 (SPHX15T6 NR)	C95012	T20

Recommended Cutting Conditions

Process	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm) max
Gray Cast Irons	500~1,400	0.15~0.25	~5.0
Ductile Cast Irons	450~900	0.10~0.20	~3.0

SFSX .. 70 .. EC

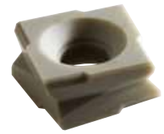


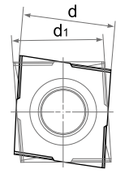
Type	Dimensions (mm)				⚙	Insert
	D	D_1	D_2	H		
SFSX 050-05-70-A5EC	50	22		40	5	
SFSX 050-05-70-A5ECA	50.8	19.05		44.5	5	
SFSX 063-07-70-A5EC	63	22	-	40	7	
SFSX 063-07-70-A5ECA	63.5	19.05		44.5	7	
SFSX 080-08-70-A5EC	80	27	-	50	8	
SFSX 080-08-70-A5ECA	76.2	25.4		44.5	8	
SFSX 100-12-70-A5EC	100	32	-	50	12	
SFSX 100-12-70-A5ECA	101.6	38.1		44.5	12	
SFSX 125-15-70-A5EC	125	40	-	63	15	
SFSX 125-15-70-A5ECA	127.0	38.1		60.5	15	
SFSX 160-18-70-A5EC	160	40	66.7	63	18	
SFSX 160-18-70-A5ECA	152.4	50.8	101.6	60.5	18	
SFSX 200-24-70-A5EC	200	60	101.6	63	24	
SFSX 200-24-70-A5ECA	203.2	63.5	101.6	60.5	24	
SFSX 250-30-70-A5EC	250	60	101.6	63	30	
SFSX 250-30-70-A5ECA	254.0	63.5	101.6	60.5	30	
SFSX 080-07-70-AT6EC	80	27	-	50	7	
SFSX 080-07-70-AT6ECA	76.2	25.4		44.5	7	
SFSX 100-09-70-AT6EC	100	32	-	50	9	
SFSX 100-09-70-AT6ECA	101.6	31.75		44.5	9	
SFSX 125-12-70-AT6EC	125	40	-	63	12	
SFSX 125-12-70-AT6ECA	127	38.1		60.5	12	
SFSX 160-16-70-AT6EC	160	40	66.7	63	16	
SFSX 160-16-70-AT6ECA	152.4	50.8	-	60.5	16	

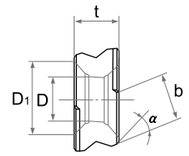
SPHX1205 ER

SPHX15T6 ER

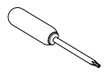
SPHX







Type	Dimensions (mm)							ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	d	d_1	t	D	D_1	α	b																			
SPHX 1205ER 855T	12.09	11.33	5.50	5.10	8.41	35	5.50												●		●					
SPHX 1205EL 855T	12.09	11.33	5.50	5.10	8.41	35	5.50												●							
SPHX 15T6ER 865T	15.50	14.33	6.60	6.10	10.18	35	6.50												●		●					

Dimensions (mm)	Spare parts	
D	Screw	Wrench
		
50 - 250 (SPHX1205 ER)	C94010	T15
80 - 160 (SPHX15T6 ER)	C95012	T20

Recommended Cutting Conditions

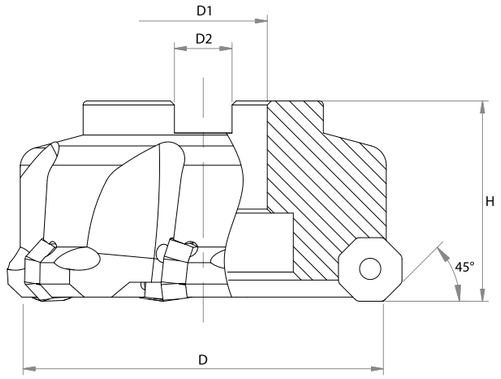
Process	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm) max
Gray Cast Irons	500~1,400	0.15~0.25	~5.0
Ductile Cast Irons	450~900	0.10~0.20	~3.0

FACE MILLING CUTTER

SFSP .. OT

Axial rake angle : +3°

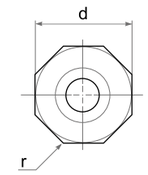
Radial rake angle : +7°

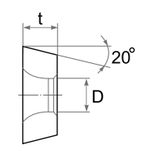


Type	Dimensions (mm)				⚙	Insert
	D	D_1	D_2	H		
SFSP 063-05-45-A4 OT	63	22	10.40	40	5	OEGB 0704
SFSP 080-06-45-A4 OT	80	27	12.40	50	6	
SFSP 100-07-45-A4 OT	100	32	14.40	50	7	

Dimensions (mm)	Spare parts	
D	Screw	Wrench
		
63 - 100	SWS 21480072	T20

OEGB





Type	Dimensions (mm)				ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	d	t	D	r																			
OEGB 070408	15.87	4.76	5.18	0.8												●							
OEGB 070416	15.87	4.76	5.18	1.6											●	●							

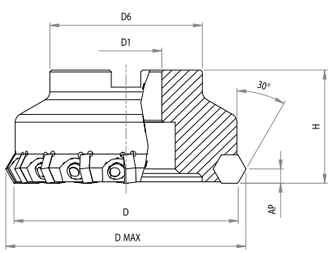
SFKN .. HX

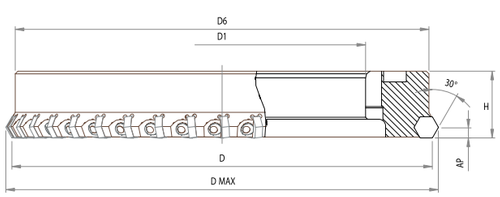
D : 80~200

Axial rake angle : -6°

Radial rake angle : -7°

D : 250~315

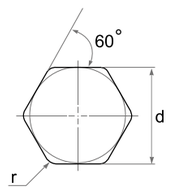




Type	Dimensions (mm)						AP max	Insert
	D	D(max)	D_1	D_6	H			
SFKN 080-08-30 N5HXA	80	88.7	25.4	52	50	8	8	HNEN 090520 HNEN 090530 HNEN 090508 ANSN
SFKN 080-08-30 N5HX	80	88.7	27	58	50	8	8	
SFKN 100-10-30 N5HXA	100	108.7	31.75	60	50	10	8	
SFKN 100-10-30 N5HX	100	108.7	32	60	50	10	8	
SFKN 125-16-30 N5HXA	125	133.7	38.1	80	63	16	8	
SFKN 125-16-30 N5HX	125	133.7	40	85	63	16	8	
SFKN 160-20-30 N5HXA	160	168.7	50.8	99	63	20	8	
SFKN 160-20-30 N5HX	160	168.7	40	85	63	20	8	
SFKN 200-26-30 N5HXA	200	208.7	47.625	128.57	63	26	8	
SFKN 200-26-30 N5HX	200	208.7	60	140	63	26	8	
SFKN 250-30-30 N5HXA	250	258.7	160.02	-	50	30	8	
SFKN 315-40-30 N5HXA	315	323.7	215.02	-	50	40	8	

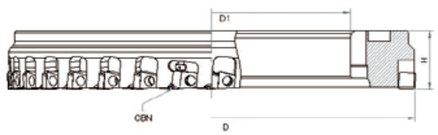
Dimensions (mm)	Spare parts		
D	Wedge	Wedge Screw	Wrench
			
80 - 315	DT-SW16	WS6	LW3

HNEN



Type	Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	d	t	r															NEW	NEW			
HNEN 090520	16.20	5.56	2.0											●	●							
HNEN 090530	16.20	5.56	3.0											●	●							
HNEN 090508 ANSN	15.87	5.64	0.8											●	●			●	●			

SFKP .. MF



Type	Dimensions (mm)			⚙		Insert
	D	D1	H	Ceramic	CBN	
SFKP 250-20-00 N4MF	250	160.02	50	18	2	SPCN120412(Ceramic)+CBN(Wiper)
SFKP 315-32-00 N4MF	315	215.02	50	28	4	SPCN120412(Ceramic)+CBN(Wiper)

Dimensions (mm)	Spare parts			
D	Wedge	Adjust Screw	Wedge Screw	Wrench
				
250 - 315	DT-DW01	AJM 5F	WS8	LW4

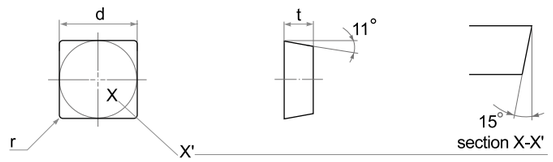
Recommended Cutting Condition for Gray Cast Iron

Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)
Finishing	190~210	200~800	0.08~0.15	0.1~0.5
Finishing	220~240	200~600	0.08~0.15	0.1~0.5
Finishing	250~280	200~400	0.08~0.15	0.1~0.5

Recommended Cutting Condition for Ductile Cast Iron

Process	Tensile Strength	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)
Finishing	400~500	300~600	0.08~0.15	0.1~0.5
Finishing	500~700	200~500	0.08~0.15	0.1~0.5

SPCN .. T



Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW!	NC400 NEW!	SW400	SW800
ISO	ASA	d	t	r																			
SPCN 120412 T15	**SPCN 433 T15**	12.70	4.76	1.2												●							

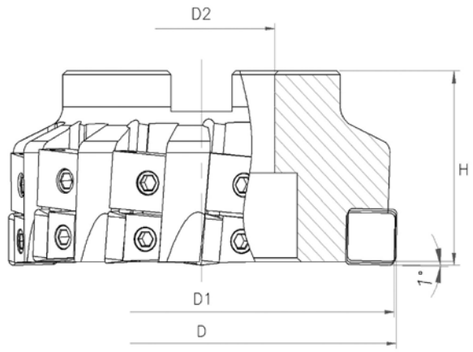
SPCN .. T

Type		Dimensions (mm)					PCBN	
ISO	ASA	d	D1	t	a	r	SBN1000	SBN2000
SPC 1206 ZZR2X	**SPC 44 ZZR2X**	12.70	14.50	6.35	7.80	2.0	●	

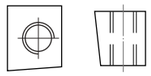
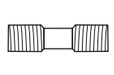
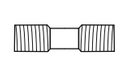
SFMS (MULTI-STEP) .. LRF

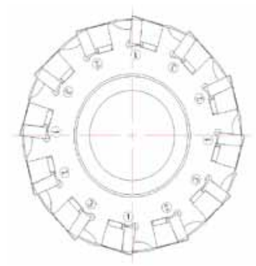
Axial rake angle : +5°

Radial rake angle : +6°



Type	Dimensions (mm)				Insert per set	⚙	Insert
	D	D_1	D_2	H			
SFMS 80-09-P4N.LRF	76.20	75.20	25.40	47.60	3	9	SPCN 1204□□T15
SFMS 100-12-P4N.LRF	101.60	100.60	38.10	47.60	3	12	
SFMS 125-15-P4N.LRF	127.00	126.00	38.10	47.60	3	15	
SFMS 160-18-P4N.LRF	152.40	151.40	50.80	47.60	3	18	

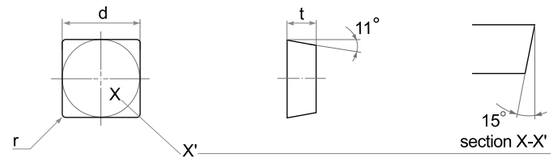
Dimensions (mm)	Spare parts				
D	Wedge	Wedge Screw	ADJ Wedge	ADJ Wedge Screw	Wrench
					
80 - 160	DT-SW14	WS6	DT-SW15	WS6	LW3



Recommended Cutting Condition for Gray Cast Iron

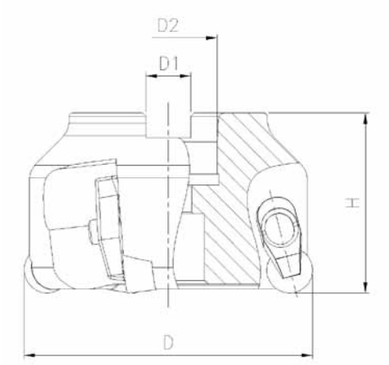
Process	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm)	Surface Quality Ra(μm)
Light Rough & Finish	190~310	240~1,200	0.08~0.60	2.0~3.80	6.3~12.5

SPCN .. T

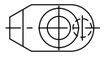


Type		Dimensions (mm)			ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000 NEW	NC400 NEW	SW400	SW800
ISO	ASA	d	t	r																			
SPCN 120412 T15	**SPCN 433 T15**	12.70	4.76	1.2												●							
SPCN 120416 T15	**SPCN 434 T15**	12.70	4.76	1.6												●							

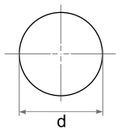
SFCN .. 00 .. R

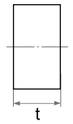


Type	Dimensions (mm)				⚙	Insert
	D	D_1	D_2	H		
SFCN 050-04-00 R4	50	10.4	22	50	4	RNGN 120400
SFCN 050-04-00 R4A	50.8	7.9	19.05	50	4	
SFCN 063-04-00 R4	63	10.4	22	50	4	
SFCN 063-04-00 R4A	63.5	7.9	19.05	50	4	
SFCN 080-05-00 R4	80	12.4	27	50	5	
SFCN 080-05-00 R4A	76.2	9.5	25.4	50	5	
SFCN 100-06-00 R4	100	14.4	32	50	6	
SFCN 100-06-00 R4A	101.6	12.7	31.75	50	6	
SFCN 050-04-00 R7	50	10.4	22	50	4	RNGN 120700
SFCN 050-04-00 R7A	50.8	7.9	19.05	50	4	
SFCN 063-04-00 R7	63	10.4	22	50	4	
SFCN 063-04-00 R7A	63.5	7.9	19.05	50	4	
SFCN 080-05-00 R7	80	12.4	27	50	5	
SFCN 080-05-00 R7A	76.2	9.5	25.4	50	5	
SFCN 100-06-00 R7	100	14.4	32	50	6	
SFCN 100-06-00 R7A	101.6	12.7	31.75	50	6	

Dimensions (mm)	Spare parts			
D	Clamp	Clamp Screw	Spring	Wrench
				
50 - 100	AMS6T	AOB-6S	SP5	LW3

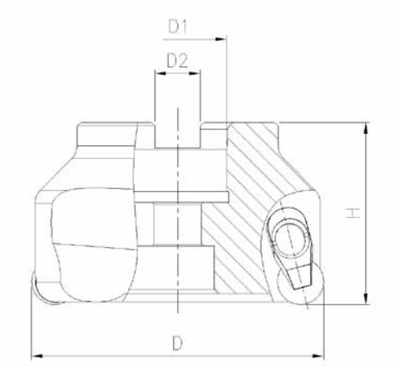
RNGN



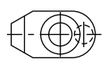


Type		Dimensions (mm)		Grade			
ISO	ASA	d	t	SW400	SW800	SN800	SN1000
RNGN 120400	**RNGN 43**	12.7	4.76	●	●	●	●
RNGN 120700	**RNGN 45**	12.7	7.94	●	●	●	●

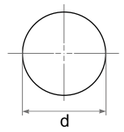
SFCP .. 00 .. R

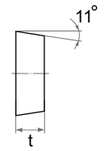


Type	Dimensions (mm)				⚙	Insert
	D	D_1	D_2	H		
SFCP 050-04-00 R4	50	10.4	22	50	4	RPGN 120400
SFCP 050-04-00 R4A	50.8	7.9	19.05	50	4	
SFCP 063-04-00 R4	63	10.4	22	50	4	
SFCP 063-04-00 R4A	63.5	7.9	19.05	50	4	
SFCP 080-05-00 R4	80	12.4	27	50	5	
SFCP 080-05-00 R4A	76.2	9.5	25.4	50	5	
SFCP 100-06-00 R4	100	14.4	32	50	6	
SFCP 100-06-00 R4A	101.6	12.7	31.75	50	6	

Dimensions (mm)	Spare parts			
D	Clamp	Clamp Screw	Spring	Wrench
				
50 - 100	AMS6T	A0B-6S	SP5	LW3

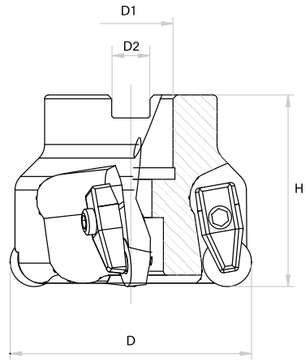
RPGN





Type		Dimensions (mm)		Grade			
ISO	ASA	d	t	SW400	SW800	SN800	SN1000
RPGN120400	**RPGN 43**	12.7	4.76		●	●	●

SFXN



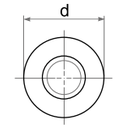
Type	Dimensions (mm)					Insert
	D	D_1	D_2	H	⚙	
SFXN 050-03-00 RX7A	50	19.05	7.9	50	3	RNGX 1207 DP
SFXN 050-03-00 RX7	50	22	10.4	50	3	
SFXN 063-04-00 RX7A	63	19.05	12.7	50	4	
SFXN 063-04-00 RX7	63	22	10.4	50	4	
SFXN 080-05-00 RX7A	80	25.4	9.5	50	5	
SFXN 080-05-00 RX7	80	27	12.4	50	5	
SFXN 100-06-00 RX7A	100	31.75	12.7	50	6	
SFXN 100-06-00 RX7	100	32	14.4	50	6	

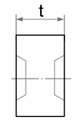
Dimensions (mm)	Spare parts			
D	Clamp	Screw	Spring	Wrench
				
50 - 100	SCL 5M	SLS4	SP4	LW3

Recommended Cutting Conditions

Work - Piece	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm) max
Iron-base, Heat-resistant alloys	135~328	300~900	0.05~0.13	6.35
Cobalt-base, Heat-resistant alloys	150~425	270~1,200	0.05~0.13	6.35
Nickel base, Heat-resistant alloys	140~475	270~1,200	0.05~0.13	6.35
PH Stainless steels	135~450	520~700	0.08~0.10	6.35

RNGX .. DP

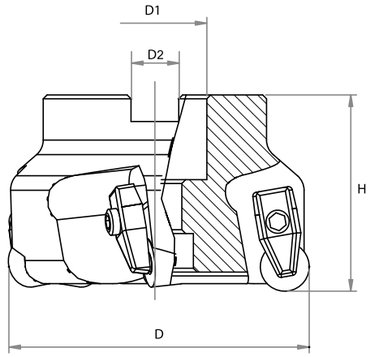




Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t																			
RNGX 1207 DP	**RNGX 45 DP**	12.70	7.94												●		●	●	●			

FACE MILLING CUTTER

SFXP



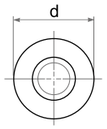
Type	Dimensions (mm)					Insert
	D	D_1	D_2	H	⚙	
SFXP 050-03-00 RP4A	50	19.05	7.9	50	3	RPGX 1204 DP
SFXP 050-03-00 RP4	50	22	10.4	50	3	
SFXP 050-04-00 RP4A	50	19.05	7.9	50	4	
SFXP 050-04-00 RP4	50	22	10.4	50	4	
SFXP 063-04-00 RP4A	63	19.05	7.9	63	4	
SFXP 063-04-00 RP4	63	22	10.4	63	4	
SFXP 080-05-00 RP4A	80	25.4	9.5	50	5	
SFXP 080-05-00 RP4	80	27	12.4	50	5	
SFXP 100-06-00 RP4A	100	31.75	12.7	50	6	
SFXP 100-06-00 RP4	100	32	14.4	50	6	

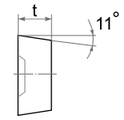
Dimensions (mm)	Spare parts			
D	Clamp	Screw	Spring	Wrench
				
50 - 100	SCL 5M	SLS4	SP4	LW3

Recommended Cutting Conditions

Work - Piece	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm) max
Iron-base, Heat-resistant alloys	135~328	300~900	0.05~0.13	6.35
Cobalt-base, Heat-resistant alloys	150~425	270~1,200	0.05~0.13	6.35
Nickel base, Heat-resistant alloys	140~475	270~1,200	0.05~0.13	6.35
PH Stainless steels	135~450	520~700	0.08~0.10	6.35

RPGX .. DP

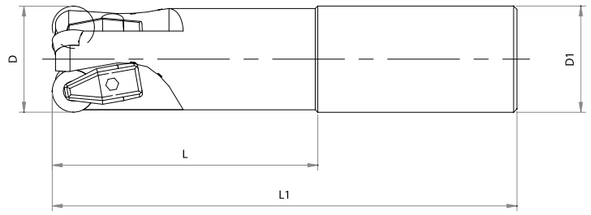




Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800	SN1000	NC400	SW400	SW800
ISO	ASA	d	t															NEW	NEW			
RPGX 1204 DP	**RPGX 43 DP**	12.70	4.76												●			●	●			

BALL ENDMILL

SEXP



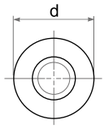
Type	Dimensions (mm)					Insert
	D	D_1	L	L_1	⚙	
SEXP 032-02-80140 X4	32	32	80	140	2	
SEXP 032-03-40100 X4A	32	31.75	40	100	3	
SEXP 032-03-40100 X4	32	32	40	100	3	
SEXP 032-03-80140 X4A	32	31.75	80	140	3	
SEXP 032-03-80140 X4	32	32	80	140	3	RPGX 1204 DP
SEXP 038-03-50100 X4A	38	38.1	50	100	3	
SEXP 038-03-50100 X4	38	32	50	100	3	
SEXP 038-03-90140 X4A	38	38.1	90	140	3	
SEXP 038-03-90140 X4	38	32	90	140	3	

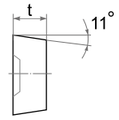
Dimensions (mm)	Spare parts			
D	Clamp	Screw	Spring	Wrench
				
32 - 38	SCL 5M	SLS4	SP4	LW3

Recommended Cutting Conditions

Work - Piece	Hardness (HB)	Cutting Speed Vc(m/min)	Feed fz(mm/z)	Depth ap(mm) max
Iron-base, Heat-resistant alloys	135~328	300~900	0.05~0.13	6.35
Cobalt-base, Heat-resistant alloys	150~425	270~1,200	0.05~0.13	6.35
Nickel base, Heat-resistant alloys	140~475	270~1,200	0.05~0.13	6.35
PH Stainless steels	135~450	520~700	0.08~0.10	6.35

RPGX .. DP

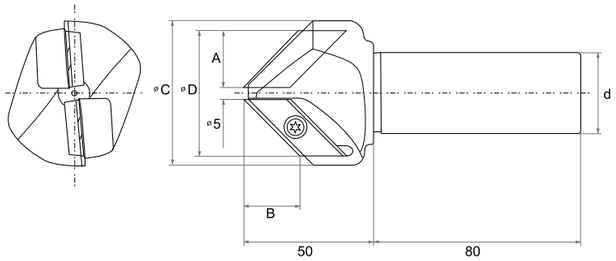




Type		Dimensions (mm)		ST100	ST300	ST500	ST900	TC300	TM300	SD200	SZ200	SZ300	SN26	SN300	SN400	SN500	SN600	SN800 NEW	SN1000 NEW	NC400	SW400	SW800
ISO	ASA	d	t																			
RPGX 1204 DP	**RPGX 43 DP**	12.70	4.76												●			●	●			

CHAMFER CUTTER

CSC

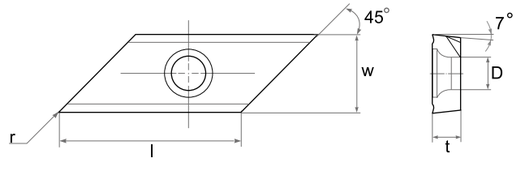


Type	Dimensions (mm)							Insert	Spare parts	
	θ	A	B	ØC	ØD	d	⚙		Screw	Wrench
CSC 0503 1R-30	30°	15.5	20.5	40	36.0	32.0	1	XCET 310404ER	SDT050	T-20
CSC 0503 1R-30-A	30°	15.5	20.5	40	36.0	25.4	1			
CSC 0503 1R-30-A-2F	30°	15.5	26.0	47	43.0	25.4	2			
CSC 0503 1R-41-A	41°	20.5	20.5	56	46.0	25.4	2			
CSC 0503 1R-45	45°	22.0	20.5	56	46.0	32.0	2			
CSC 0503 1R-45-A	45°	22.0	20.5	56	46.0	25.4	2			
CSC 0503 1R-60	60°	26.5	15.0	72	55.0	32.0	2			
CSC 0503 1R-60-A	60°	26.5	15.0	72	55.0	25.4	2			

Recommended Cutting Conditions

Work piece	Carbon Steel (S55C) Stainless Steel 250HB ≥ Cast Iron (FC250)	Alloy Steel (SCM440) 300HB ≥ High Alloy Steel (SKD61) 300HB ≥
Feed (mm/tooth)	0.1~0.25	0.1~0.2
rpm	3000(1000~7000)	

XCET



Type	Dimensions (mm)					Grade		
ISO	l	w	t	D	r	TX515	TX520	SCW200
XCET 310404 ER	22.00	12.70	4.50	5.60	0.4		●	●
XCET 310408 ER	22.00	12.70	4.50	5.60	0.8		●	

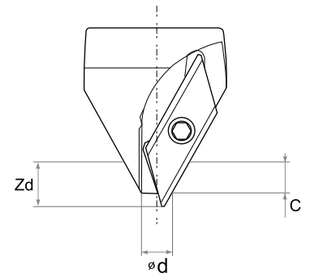
*SCW200 is a coated carbide grade for P20 range machining.

TECHNICAL DATA

30° Chamfer

Hole Dia Ød	Dimensions (mm)							
	0.5	1	1.5	2	2.5	3	3.5	4
5	0.8	1.3	1.8	2.3	2.8			
6	1.7	2.2	2.7	3.2	3.7			
6.8	2.4	2.9	3.4	3.9	4.4			
8	3.4	3.9	4.4	4.9	5.4			
8.5	3.8	4.3	4.8	5.3	5.8			
10	5.1	5.6	6.1	6.6	7.1	7.6	8.1	8.6
10.2	5.3	5.8	6.3	6.8	7.3	7.8	8.3	8.8
12	6.9	7.4	7.9	8.4	8.9	9.4	9.9	10.4
16	10.3	10.8	11.3	11.8	12.3	12.8	13.3	13.8
17.5	11.6	12.1	12.6	13.1	13.6	14.1	14.6	15.1
20	13.7	14.2	14.7	15.2	15.7	16.2	16.7	17.2
21	14.6	15.1	15.6	16.1	16.6	17.1	17.6	18.1
24	17.2	17.7	18.2	18.7	19.2	19.7	20.2	20.7
30	22.4	22.9	23.4	23.9	24.4	24.9	25.4	
33	24.9	25.4						

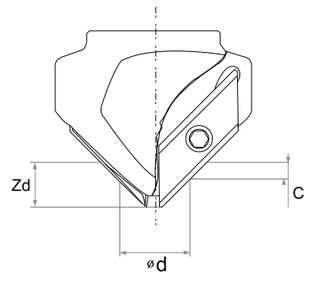
CSC 05031R-30



45° Chamfer

Hole Dia Ød	Dimensions (mm)						
	0.5	1	1.5	2	3	4	5
5	0.7	1.2	1.7	2.2	3.2		
6	1.2	1.7	2.2	2.7	3.7		
6.8	1.6	2.1	2.6	3.1	4.1		
8	2.2	2.7	3.2	3.7	4.7		
8.5	2.4	2.9	3.4	3.9	4.9		
10	3.2	3.7	4.2	4.7	5.7	6.7	7.7
10.2	3.3	3.8	4.3	4.8	5.8	6.8	7.8
12	4.2	4.7	5.2	5.7	6.7	7.7	8.7
14	5.2	5.7	6.2	6.7	7.7	8.7	9.7
16	6.2	6.7	7.2	7.7	8.7	9.7	10.7
17.5	6.9	7.4	7.9	8.4	9.4	10.4	11.4
20	8.2	8.7	9.2	9.7	10.7	11.7	12.7
21	8.7	9.2	9.7	10.2	11.2	12.2	13.2
24	10.2	10.7	11.2	11.7	12.7	13.7	14.7
30	13.2	13.7	14.2	14.7	15.7	16.7	17.7
33	14.7	15.2	15.7	16.2	17.2	18.2	19.2
36	16.2	16.7	17.2	17.7	18.7	19.7	
42	19.2	19.7	20.2				

CSC 05031R-45



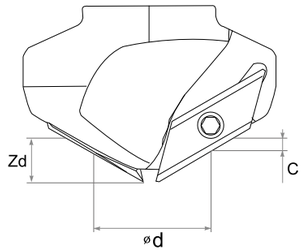
CHAMFER CUTTER

TECHNICAL DATA

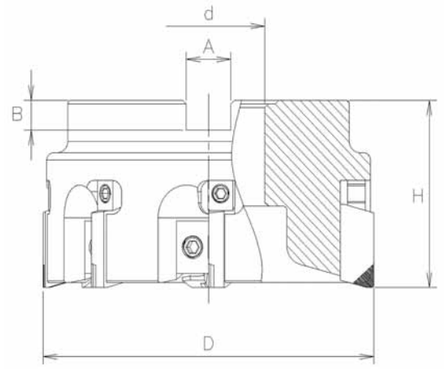
60° Chamfer

Hole Dia Ød	Dimensions (mm)						
	0.5	1	1.5	2	2.5	3	3.5
5	0.6	1.1	1.6	2.1			
6	0.9	1.4	1.9	2.4			
6.8	1.1	1.6	2.1	2.6			
8	1.4	1.9	2.4	2.9			
8.5	1.6	2.1	2.6	3.1			
10	2.0	2.5	3.0	3.5	4.0	4.5	5.0
10.2	2.1	2.6	3.1	3.6	4.1	4.6	5.1
12	2.6	3.1	3.6	4.1	4.6	5.1	5.6
16	3.7	4.2	4.7	5.2	5.7	6.2	6.7
17.5	4.2	4.7	5.2	5.7	6.2	6.7	7.2
20	4.9	5.4	5.9	6.4	6.9	7.4	7.9
21	5.2	5.7	6.2	6.7	7.2	7.7	8.2
24	6.1	6.6	7.1	7.6	8.1	8.6	9.1
30	7.8	8.3	8.8	9.3	9.8	10.3	10.8
33	8.7	9.2	9.7	10.2	10.7	11.2	11.7
36	9.5	10.0	10.5	11.0	11.5	12.0	12.5
38	10.1	10.6	11.1	11.6	12.1	12.6	13.1
42	11.2	11.7	12.2	12.7	13.2	13.7	14.2
46	12.4	12.9	13.4	13.9	14.4		
48	13.0	13.5	14.0	14.5			
52	14.1						

CSC 05031R-60

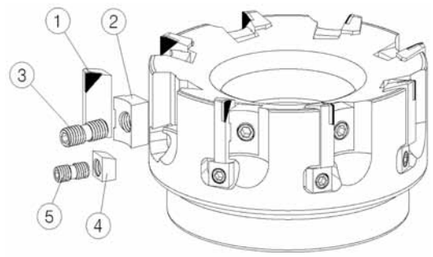


HPA - I



Type	Dimensions (mm)					⚙	Weight (kg)	Insert	Arbor
	ØD	Ød	A	B	H				
HPA 025R-I09	63	22	10	6	50	6	0.5	HPA-I09	FMA 22
HPA 03R-I09	80	25.4	9.5	6	50	8	0.7		FMA 25.4
HPA 04R-I09	100	31.75	12.7	8	63	10	1.4		FMA 31.75
HPA 05R-I09	125	38.1	15.9	10	63	12	1.8		FMA 38.1
HPA 06R-I09	160	50.8	19.05	11	63	14	2.4		FMA 50.8
HPA 08R-I09	200	47.625	25.4	14	63	16	3.5		FMA 47.625
HPA 10R-I09	250	47.625	25.4	14	63	18	4.8		FMA 47.625

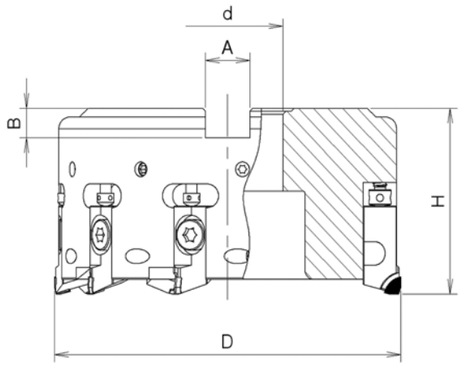
COMPONENT



Spare parts				
① Insert	② Wedge	③ Wedge Screw	④ Adjust Wedge	⑤ Adjust Wedge Screw
				
HPA-I09	DT-ST01	WS6-16	DT-ST02	WS5-11

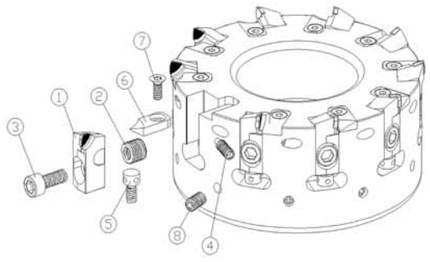
ALUMINUM CUTTER

HPA - H



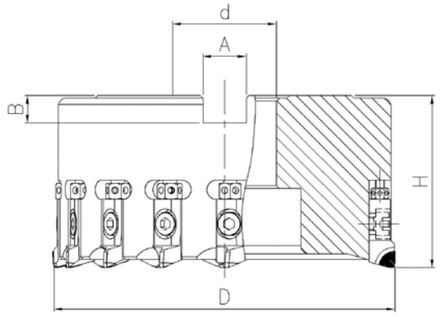
Type	Dimensions (mm)					⚙	Weight (kg)	Insert	Arbor
	ØD	Ød	A	B	H				
HPA 02R-H10	50	16	8	6.2	50	4	0.4	ROUGH HPA 10CA-R WIPER HPA 10CA-W	FMA 16
HPA 025R-H10	63	22	10	6	50	4	0.5		FMA 22
HPA 03R-H10	80	25.4	9.5	6	50	6	0.7		FMA 25.4
HPA 04R-H10	100	31.75	12.7	8	50	7	2.2		FMA 31.75
HPA 05R-H10	125	38.1	15.9	10	63	10	1.4		FMA 38.1
HPA 06R-H10	160	50.8	19.05	11	63	12	2.5		FMA 50.8
HPA 08R-H10	200	47.625	25.4	14	63	14	3.5		FMA 47.625
HPA 10R-H10	250	47.625	25.4	14	63	18	4.9		FMA 47.625

COMPONENT



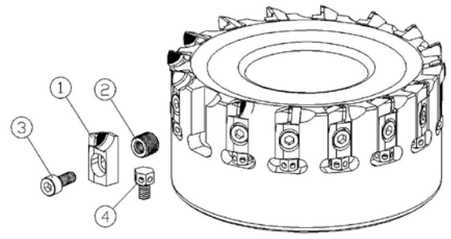
Spare parts				
① Cartridge	① Cartridge	② Double Screw	③ Clamp Screw	④ Side Clamp Screw
				
HPA 10CA-R	HPA 10CA-W	H10S	M6×15	M6×16
⑤ Adjust Screw	⑥ Chip Cover	⑦ Chip Cover Screw	⑧ Balancing Screw	
				
AJM 5F	HC-R/L	M4×10	M6×10	

HPA - M



Type	Dimensions (mm)					⚙	Weight (kg)	Insert	Arbor
	ØD	Ød	A	B	H				
HPA 03R-M10	80	25.4	9.5	6	50	10	0.8	ROUGH HPA 08CA-R WIPER HPA 08CA-W	FMA 25.4
HPA 04R-M10	100	31.75	12.7	8	50	12	1.2		FMA 31.75
HPA 05R-M10	125	38.1	15.9	10	63	14	2.2		FMA 38.1
HPA 06R-M10	160	50.8	19.05	11	63	18	2.8		FMA 50.8
HPA 08R-M10	200	47.625	25.4	14	63	24	4.5		FMA 47.625
HPA 10R-M10	250	47.625	25.4	14	63	30	7		FMA 47.625

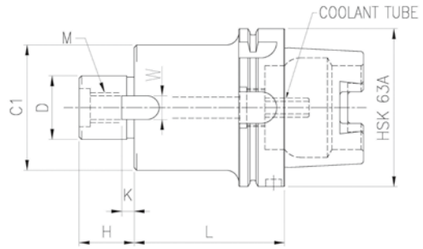
COMPONENT



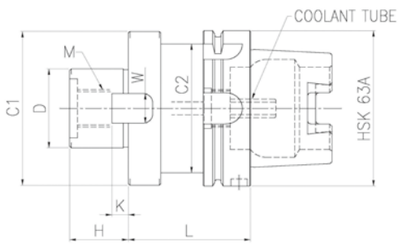
Spare parts				
① Cartridge	① Cartridge	② Double Screw	③ Clamp Screw	④ Adjust Screw
				
HPA 08CA-R	HPA 08CA-W	H10?	M5×12	AJM 5F

ALUMINUM CUTTER

ARBOR



Model A

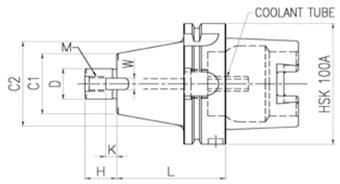


Model B

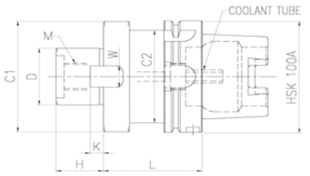
Type	Dimensions (mm)							M	Weight (kg)	Model	Cutter
	D	L	H	C_1	C_2	W	K				
HSK 63A-FMA22-50	22	50	19	50	50	9.5	5	M10	1.2	A	HPA 025R
HSK 63A-FMA25.4-60	25.4	60	22	50	50	9.5	5	M12	1.3	A	HPA 03R
HSK 63A-FMA25.4-90	25.4	90	22	50	50	9.5	5	M12	1.9	A	HPA 03R
HSK 63A-FMA25.4-120	25.4	120	22	50	50	9.5	5	M12	2.3	A	HPA 03R
HSK 63A-FMA31.75-60	31.75	60	30	60	53	12.7	7	M16	1.7	B	HPA 04R
HSK 63A-FMA31.75-90	31.75	90	30	60	53	12.7	7	M16	2.5	B	HPA 04R
HSK 63A-FMA31.75-120	31.75	120	30	60	53	12.7	7	M16	3.3	B	HPA 04R
HSK 63A-FMA38.1-60	38.1	60	34	80	53	15.9	9	M20	2.1	B	HPA 05R
HSK 63A-FMA38.1-90	38.1	90	34	80	53	15.9	9	M20	3	B	HPA 05R
HSK 63A-FMA38.1-120	38.1	120	34	80	53	15.9	9	M20	4.4	B	HPA 05R

ALUMINUM CUTTER

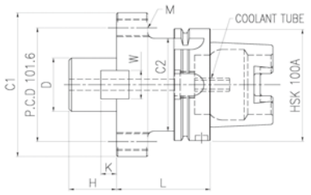
ARBOR



Model A



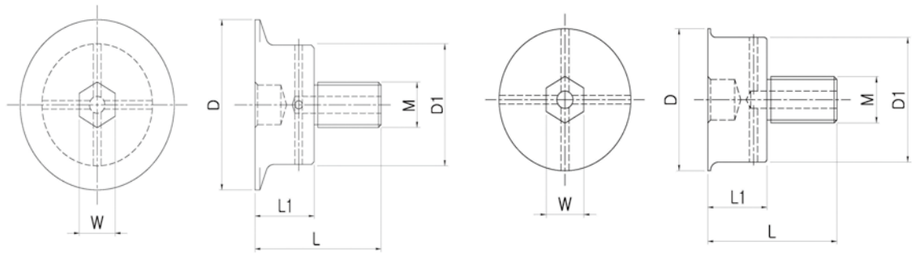
Model B



Model C

Type	Dimensions (mm)							M	Weight (kg)	Model	Cutter
	D	L	H	C_1	C_2	W	K				
HSK 100A-FMA25.4-75	25.4	75	22	50	70	9.5	5	M12	3.2	A	HPA 03R
HSK 100A-FMA25.4-105	25.4	105	22	50	70	9.5	5	M12	3.9	A	HPA 03R
HSK 100A-FMA25.4-135	25.4	135	22	50	70	9.5	5	M12	4.6	A	HPA 03R
HSK 100A-FMA31.75-75	31.75	75	30	60	70	12.7	7	M16	3.5	A	HPA 04R
HSK 100A-FMA31.75-105	31.75	105	30	60	70	12.7	7	M16	4.3	A	HPA 04R
HSK 100A-FMA31.75-135	31.75	135	30	60	70	12.7	7	M16	5.1	A	HPA 04R
HSK 100A-FMA38.1-75	38.1	75	34	80	80	15.9	9	M20	4.4	A	HPA 05R
HSK 100A-FMA38.1-105	38.1	105	34	80	80	15.9	9	M20	5.7	A	HPA 05R
HSK 100A-FMA38.1-135	38.1	135	34	80	80	15.9	9	M20	7.0	A	HPA 05R
HSK 100A-FMA50.8-75	50.8	75	36	99	83	19.05	10	M24	5.7	B	HPA 06R
HSK 100A-FMA50.8-105	50.8	105	36	99	83	19.05	10	M24	7.7	B	HPA 06R
HSK 100A-FMA50.8-135	50.8	135	36	99	83	19.05	10	M24	9.7	B	HPA 06R
HSK 100A-FMA47.625-75	47.625	75	38	128.57	83	25.4	12.5	M16		C	HPA 08R

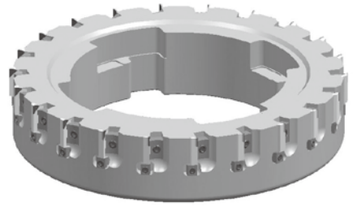
MOUNT'G BOLT

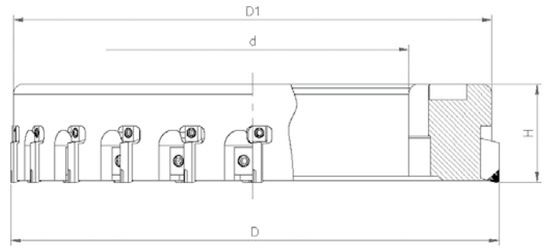


Model A　　Model B

Type	Dimensions (mm)					M	Model	Cutter	Arbor
	D	D_1	L	L_1	W				
ICM-M10	28	16.5	41	11	8	M10	A	HPA 025R-I09	FMA 22
HCM-M10	25	18	43	10	8	M10	B	HPA 025R-H10	
ICM-M12	44	26	42	15.4	10	M12	A	HPA 03R-I09	FMA 25.4
HCM-M12	40	34	47.5	25.5	12	M12	B	HPA 03R-H10	
ICM-M16	60	43	49	23	14	M16	A	HPA 04R-I09	FMA 31.75
HCM-M16	49	43	48	22	14	M16	B	HPA 04R-H10	
ICM-M20	79	53.6	58.8	27.8	14	M20	A	HPA 05R-I09	FMA 38.1
HCM-M20	60	54	63	32	14	M20	B	HPA 05R-H10	
ICM-M24	110	65	60	22	17	M24	A	HPA 06R-I09	FMA 50.8
HCM-M24	71	65	60	22	17	M24	B	HPA 06R-H10	

QCB - I



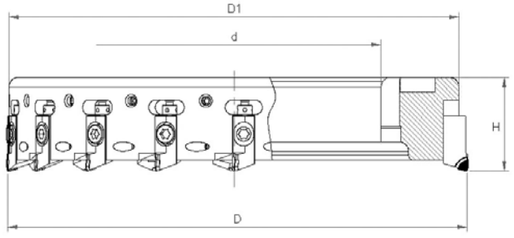


Type	Dimensions (mm)				⚙	Insert
	D	D_1	d	H		
QCB D200-I09	200	195	120.02	50	18	HPA-I09
QCB D250-I09	250	245	160.02	50	22	
QCB D315-I09	315	310	215.02	50	28	

Spare parts				
① Insert	② Wedge	③ Wedge Screw	④ Adjust Wedge	⑤ Adjust Wedge Screw
				
HPA-I09	DT-ST01	WS6-16	DT-ST02	WS5-11

ALUMINUM CUTTER

QCB - H

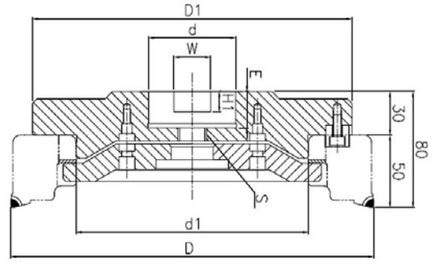


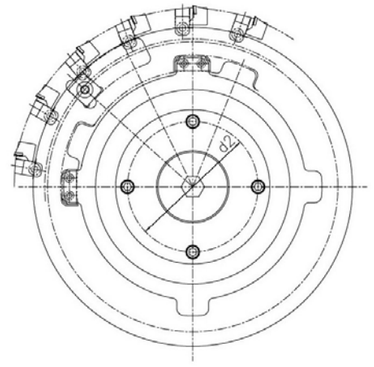
Type	Dimensions (mm)				⚙	Insert
	D	D_1	d	H		
QCB D200-H10	200	195	120.02	50	14	HPA 10CA-R HPA 10CA-W
QCB D250-H10	250	245	160.02	50	18	
QCB D315-H10	315	310	215.02	50	22	

Spare parts				
① Cartridge	① Cartridge	② Double Screw	③ Clamp Screw	④ Side Clamp Screw
				
HPA 10CA-R	HPA 10CA-W	H108	M6×15	M6×16
⑤ Adjust Screw	⑥ Chip Cover	⑦ Chip Cover Screw	⑧ Balancing Screw	
				
AJM 5F	HC-R/L	M4×10	M6×10	

ALUMINUM CUTTER

ARBOR





Type	Dimensions (mm)								Center Bolt
	D	D_1	d	d1	W	H_1	S	E	
QCBA-D200	200	195	47.625	119.97	25.4	14	M20	25	TMBA-M20
QCBA-D250	250	245	60	159.97	25.4	14	M20	25	
QCBA-D315	315	310	60	214.97	25.4	14	M20	25	

PART. A
TURNING & MILLING
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

CYLINDER BLOCK

- FACE OIL PAN CUTTER

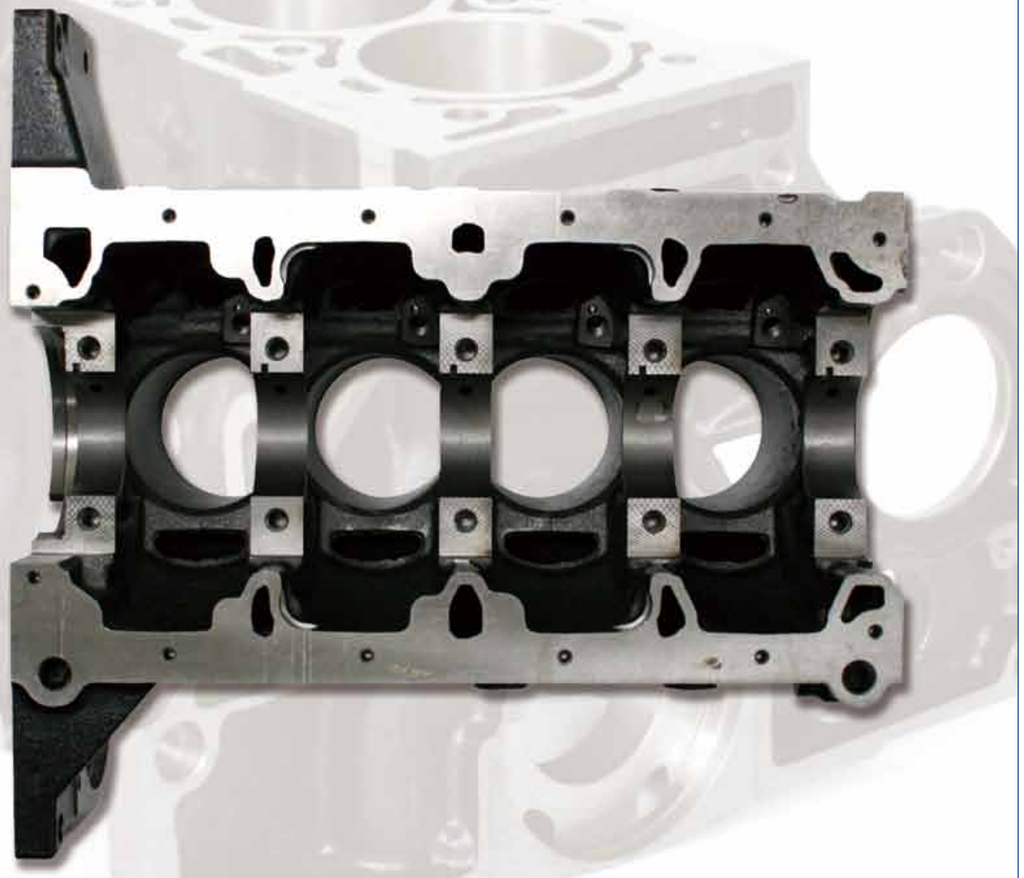
- BLOCK HEADS CUTTER

- MANUFACTURING INDEX HOLE PROCESSING TOOL

- BEARING CAP CUTTER

- LOCK NOTCH CUTTER

- FACE NOZZLE PISTON COOLING ENDMILL



SPECIAL TOOLS

CYLINDER BLOCK

- CYLINDER BORE SEMI & FINISH BORING TOOL

- CYLINDER BORE HONING HOLDER

- CYLINDER BORE ROUGH BORING TOOL

- TOP FACE MILLING CUTTER

- FRONT FACE MILLING CUTTER

CYLINDER BLOCK

• REAR FACE MILLING CUTTER

• OIL MAIN CHANNEL DRILL

• FACE HOLE TRANSMISSION DRILL

• SLOT SPEED SENSOR ENDMILL

• STOP FACE SEALING CRANK SHAFT BORING TOOL

• CRANK HONING HOLDER

• FACE MOUNTING BOSSES MILLING CUTTER

• CUT OUT STARTER BORING TOOL

CYLINDER HEAD

- EXHAUST FACE MILLING CUTTER

- TOP FACE MILLING CUTTER

- SPARK PLUG HOLE REAMER

- VALVE GUIDE SEAT LIFTER
  VALVE BORING TOOL

- SEAT LIFTER-VALVE IN & EX BORING TOOL

- SEAT LIFTER-VALVE IN & EX BORING TOOL

CYLINDER HEAD

• CAMSHAFT BEARING CHAMFER

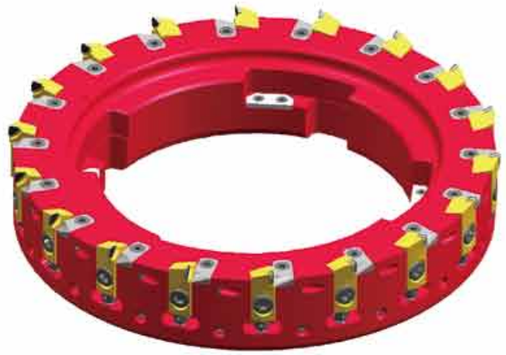
• VALVE SEAT GUIDE BORING TOOL

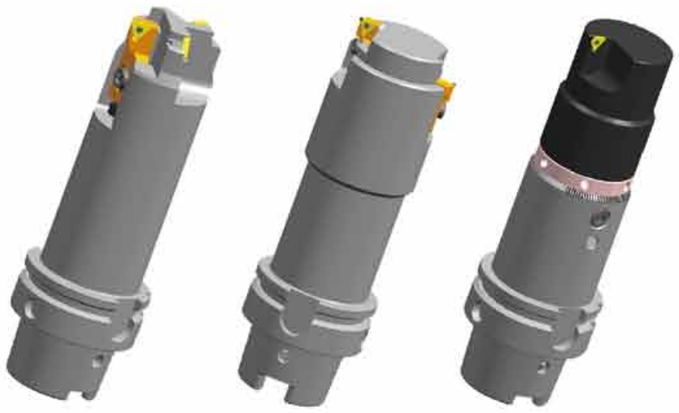
• CAMSHAFT BEARING FINISH BORING TOOL

• VALVE SEAT GUIDE FINISH BORING TOOL

T/MISSION CASE

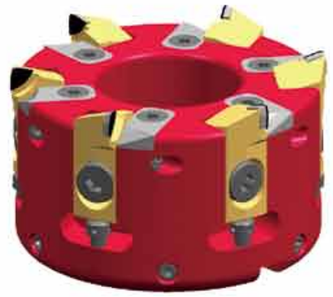
• GEAR SHIFT SHAFT LOCK HOLE BORING TOOL



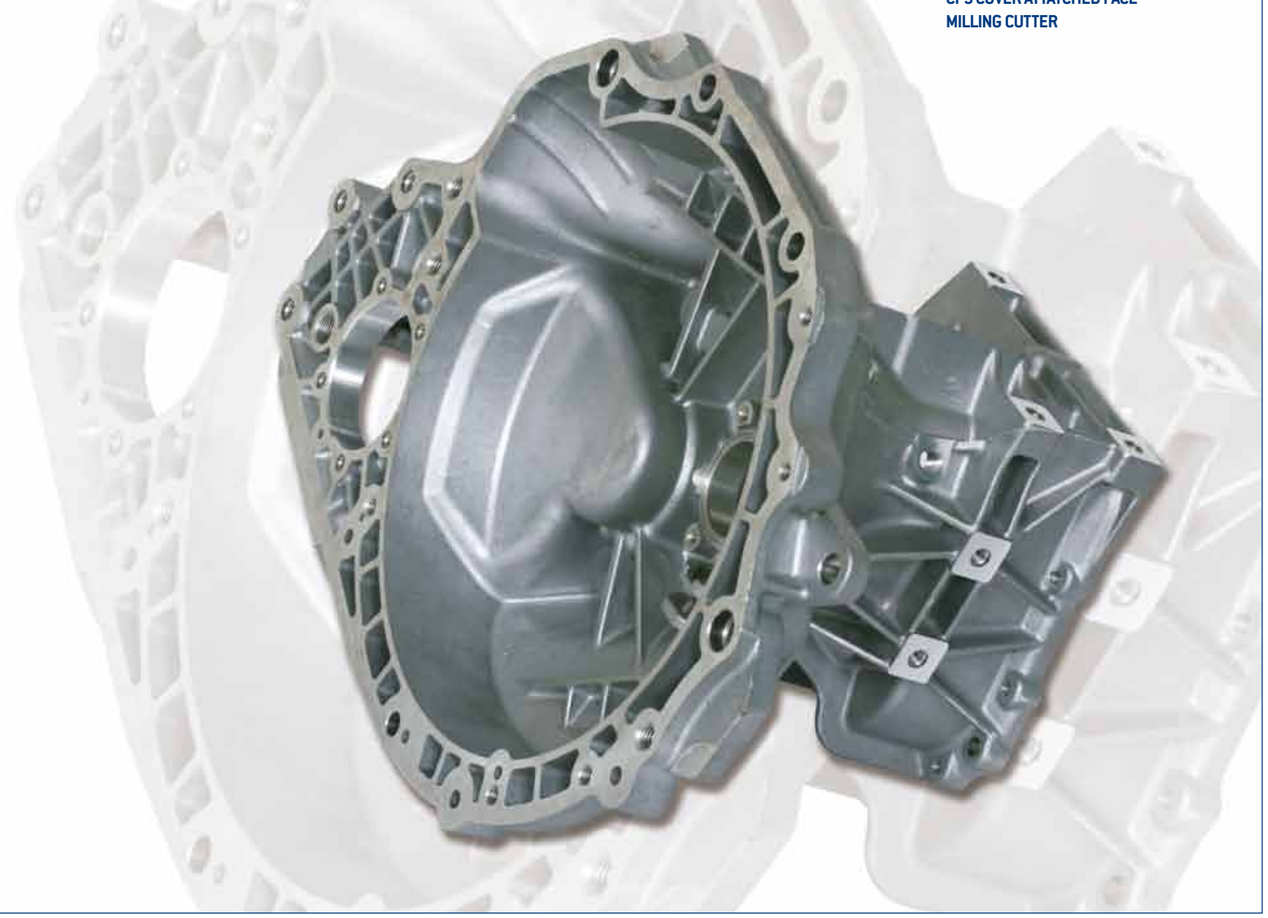


• DIFT HOUSING & OIL SEAL HOLE BORING TOOL

• CLUTCH RELEASE LEVER HOLE REAMER



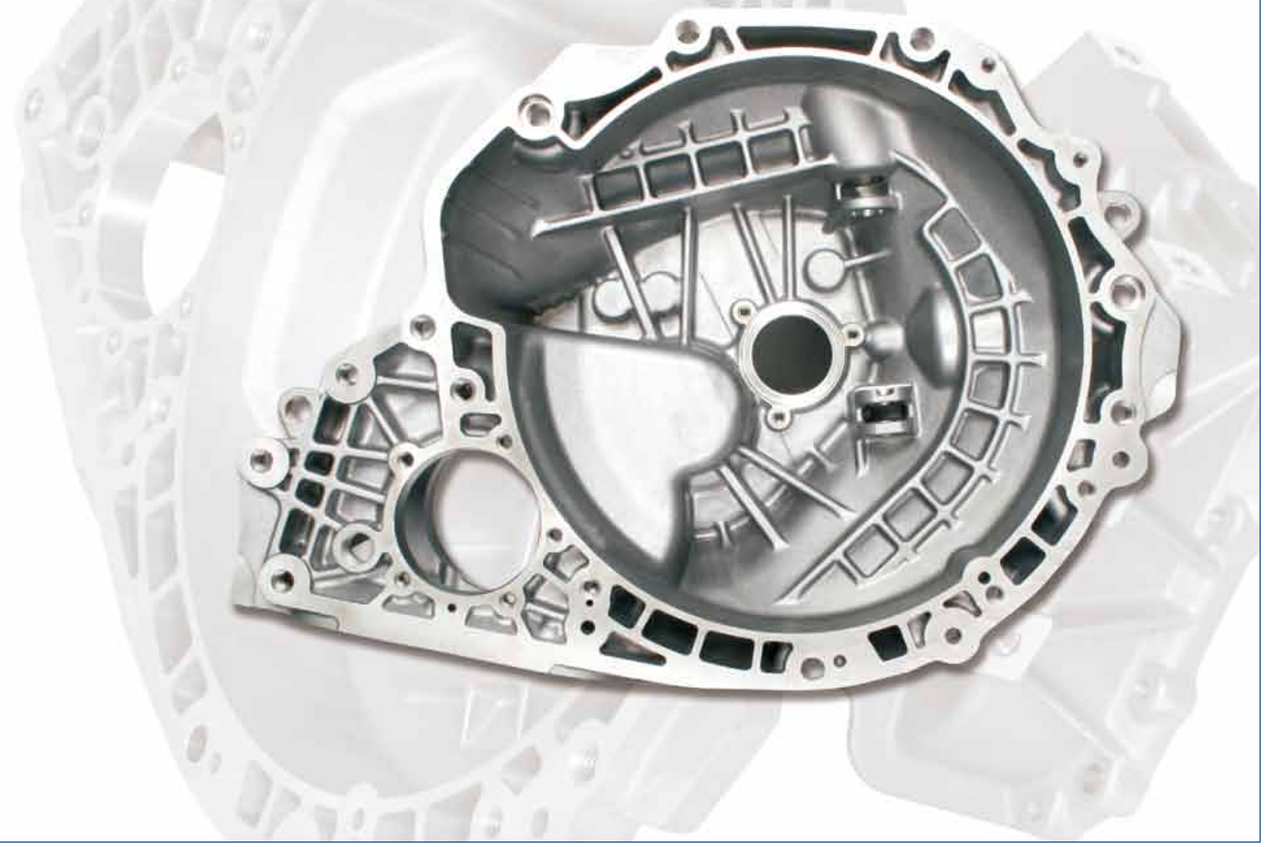
• CPS COVER ATTATCHED FACE MILLING CUTTER



T/MISSION CASE

- COUNTER SHAFT BRG. HOLE BORING TOOL

- ENGINE MOUNTING HOLE BORING TOOL



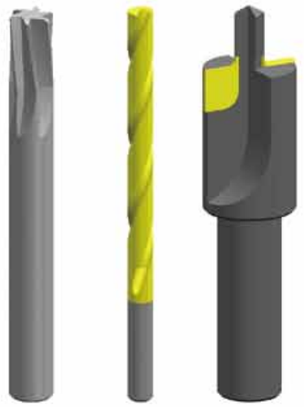
BRAKE HOUSING

• DISC PATH MILLING CUTTER

• MAIN BORE PROCESSING TOOL

• LUG CUTTER

BRAKE CARRIER



• HOLE PROCESSING TOOL

• CARRIER CUTTER

• BROACH HOLDER

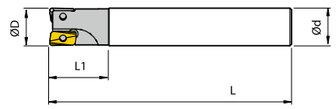
SPECIAL TOOLS

K N U C K L E

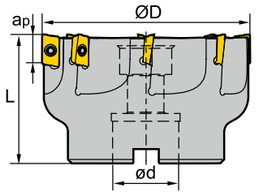
CONNECTING ROD

ENDMILL CUTTER

ARE01

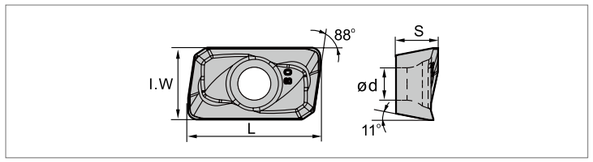


ARE02



Type		Dimensions (mm)				
		ØD	Ød	L_1	L	
ARE01	ARE01-016-120-AP11-2F	16	16	25	120	2
	ARE01-016-180-AP11-2F	16	16	30	180	2
	ARE01-020-120-AP11-2F	20	20	30	120	2
	ARE01-020-180-AP11-2F	20	20	30	180	2
	ARE01-025-150-AP11-3F	25	25	35	150	3
	ARE01-025-200-AP11-3F	25	25	35	200	3
	ARE01-025-150-AP16-2F	25	25	35	150	2
	ARE01-025-200-AP16-2F	25	25	35	200	2
	ARE01-032-160-AP16-3F	32	32	40	160	3
	ARE01-032-200-AP16-3F	32	32	40	200	3
ARE02	ARE02-050-A22-AP16-5F	50	22	-	40	5
	ARE02-063-A22-AP16-6F	63	22	-	50	6

Diameter ØD	Insert	Screw	Wrench	
				
016~025	AP11	DTKA 02555	T-7	-
025~063	AP16	DTKA 04100	-	T-15



SPG200

- PVD Coating
- P20, M20

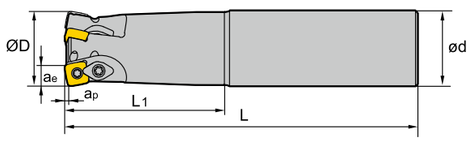
Insert shape	Type	Dimensions (mm)					Grade
		L	I.W	S	d	r	SPG200
	APMT1135PDR	11.25	6.2	3.5	2.8	0.8	●
	APMT160408PDER	17.25	9.25	4.76	4.4	0.8	●

● Stock

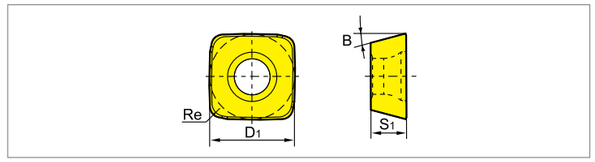
HIGH FEED CUTTER

HFC01

S type insert, straight shank



Type		Dimensions (mm)				⚙
		ØD	Ød	L_1	L	
HFC01	**HFC01-33-200-SD12-2F**	33	32	50	200	2
	HFC01-33-250-SD12-2F	33	32	50	250	2



SPG210

- PVD Coating
- P20, M20

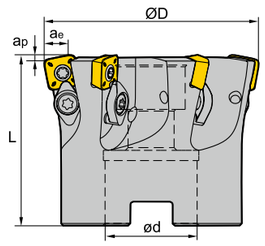
Insert shape	Type	Dimensions (mm)				Grade
		B	Re	S_1	D_1	SPG210
	**SDMT09T312-DM**	15°	1.2	3.97	9.525	●
	SDMT120412-DM	15°	2.0	4.76	12.7	●

● Stock

Tool Type	Insert Screw	Clamp Screw	Clamp	Wrench	
					
HFC01 □□-SD12□□	DTKA 04100	DS 5003-1	DYR 08	T-15	T-20

HFC01

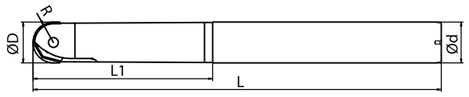
S type insert, Arbor mounting



Type		Dimensions (mm)				⚙
		ØD	Ød	L_1	L	
HFC01	**HFC01-50-A22-SD12-3F**	50	22	-	50	3
	HFC01-63-A22-SD12-4F	63	22	-	50	4

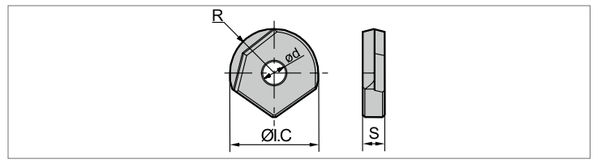
FINISH BALL CUTTER

FBC



Type		Dimensions (mm)				
		R	ØD	Ød	L_1	L
FBC	FBC 012-130	6	12	12	50	130
	FBC 012-150	6	12	12	60	150
	FBC 016-150	8	16	16	60	150
	FBC 016-180	8	16	16	80	180
	FBC 020-180	10	20	20	75	180
	FBC 020-220	10	20	20	90	220
	FBC 025-200	12.5	25	25	90	200
	FBC 025-250	12.5	25	25	110	250
	FBC 030-200	15	30	30	90	200
	FBC 030-250	15	30	30	110	250
	FBC 030-300	15	30	30	125	300

Diameter	Screw	Wrench
		
012	DBF 1210	T-15
016	DBF 1611	T-15
020	DBF 20165	T-20
025	DBF 2520	T-25
030	DBF 3025	L-5



SPG250

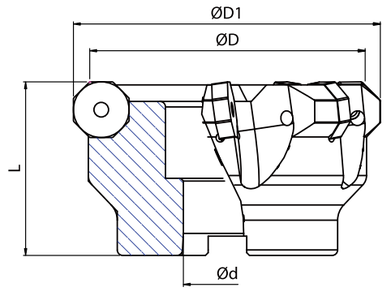
- PVD Coating
- P20, M20, K20

Insert shape	Type	Dimensions (mm)					Grade
		R	ØI.C	S	Ød	ØD	SPG250
	DFBI1203-M/F	6	12	3	4	012	●
	DFBI1604-M/F	8	16	4	5	016	●
	DFBI2005-M/F	10	20	5	5	020	●
	DFBI2506-M/F	12.5	25	6	6	025	●
	DFBI3007-M/F	15	30	7	8.25	030	●

● Stock

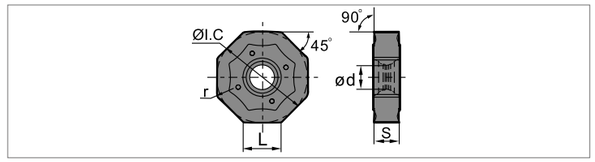
FACE MILL CUTTER

OMR07



Type		Dimensions (mm)				
		ØD	Ød	L_1	L	⚙
OMR07	OMR07-080-B27-0N08-06	80	92	27	50	6
	OMR07-100-B32-0N08-07	100	111	32	63	7
	OMR07-125-B40-0N08-08	125	138	40	63	8

Diameter ØD	Insert	Screw	Wrench
			
063~0315	ONHU 08▥PF/PM	DTKA512-60	T-20



SCK150

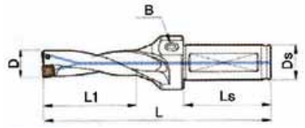
- CVD Coating
- K15

Insert shape	Type	Dimensions (mm)					Grade
		L	ØI.C	S	Ød	r	SCK150
	ONHU08T508-PF	8.37	20.2	5.77	5.3	0.83	
	ONHU08T508-PM	8.37	20.2	5.79	5.3	0.83	●

● Stock

INDEXIBLE DRILL

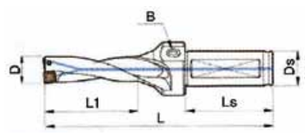
JTR 2×D



Type	D	L1	L	Ds	Ls	B	Insert	Screw	Wrench
JTR-12520D	12.5	28	105	20	50	PT-1/8	SPGT050204-PM	TSB-20045	TXL-6
JTR-13020D	13.0	29	106	20	50	PT-1/8			
JTR-13520D	13.5	30	107	20	50	PT-1/8			
JTR-14020D	14.0	31	108	20	50	PT-1/8			
JTR-14520D	14.5	32	109	20	50	PT-1/8			
JTR-15020D	15.0	33	110	20	50	PT-1/8			
JTR-15520D	15.5	34	120	25	56	PT-1/8	SPGT060204-PM	TSB-22052	
JTR-16020D	16.0	35	121	25	56	PT-1/8			
JTR-16520D	16.5	36	122	25	56	PT-1/8			
JTR-17020D	17.0	37	123	25	56	PT-1/8			
JTR-17520D	17.5	38	124	25	56	PT-1/8			
JTR-18020D	18.0	39	125	25	56	PT-1/8			
JTR-18520D	18.5	40	126	25	56	PT-1/8			
JTR-19020D	19.0	41	127	25	56	PT-1/8			
JTR-19520D	19.5	42	128	25	56	PT-1/8			
JTR-20020D	20.0	43	129	25	56	PT-1/8			
JTR-20520D	20.5	44	130	25	56	PT-1/8			
JTR-21020D	21.0	45	131	25	56	PT-1/8			
JTR-21520D	21.5	46	132	25	56	PT-1/8			
JTR-22020D	22.0	47	133	32	60	PT-1/4	SPGT07T308-PM	TSB-25065	TXL-8
JTR-22520D	22.5	48	143	32	60	PT-1/4			
JTR-23020D	23.0	49	144	32	60	PT-1/4			
JTR-23520D	23.5	50	145	32	60	PT-1/4			
JTR-24020D	24.0	51	146	32	60	PT-1/4			
JTR-24520D	24.5	52	147	32	60	PT-1/4			
JTR-25020D	25.0	53	148	32	60	PT-1/4			
JTR-25520D	25.5	54	149	32	60	PT-1/4			
JTR-26020D	26.0	55	150	32	60	PT-1/4			
JTR-26520D	26.5	56	151	32	60	PT-1/4			
JTR-27020D	27.0	57	152	32	60	PT-1/4			
JTR-27520D	27.5	58	153	32	60	PT-1/4			
JTR-28020D	28.0	59	154	32	60	PT-1/4	SPGT090408-PM	TSB-35090	TXL-15
JTR-28520D	28.5	60	155	32	60	PT-1/4			
JTR-29020D	29.0	61	156	32	60	PT-1/4			
JTR-29520D	29.5	64	159	32	60	PT-1/4			
JTR-30020D	30.0	65	160	32	60	PT-1/4			
JTR-31020D	31.0	67	162	32	60	PT-1/4			
JTR-32020D	32.0	69	164	32	60	PT-1/4			
JTR-33020D	33.0	71	166	32	60	PT-1/4			
JTR-34020D	34.0	73	168	32	70	PT-1/4	SPGT110408-PM	TSB-40100	
JTR-35020D	35.0	75	170	32	70	PT-1/4			
JTR-36020D	36.0	77	172	32	70	PT-1/4			
JTR-37020D	37.0	79	189	40	70	PT-1/4			
JTR-38020D	38.0	81	191	40	70	PT-1/4			
JTR-39020D	39.0	83	193	40	70	PT-1/4			
JTR-40020D	40.0	85	195	40	70	PT-1/4			
JTR-41020D	41.0	87	197	40	70	PT-1/4			
JTR-42020D	42.0	89	199	40	70	PT-1/4	SPGT140512-PM	TSB-50125	TXL-20
JTR-43020D	43.0	91	201	40	70	PT-1/4			
JTR-44020D	44.0	93	203	40	70	PT-1/4			
JTR-45020D	45.0	95	205	40	70	PT-1/4			
JTR-46020D	46.0	97	207	40	70	PT-1/4			
JTR-47020D	47.0	99	209	40	70	PT-1/4			
JTR-48020D	48.0	101	211	40	70	PT-1/4			
JTR-49020D	49.0	103	213	40	70	PT-1/4			
JTR-50020D	50.0	105	215	40	70	PT-1/4			

INDEXIBLE DRILL

JTR 3×D

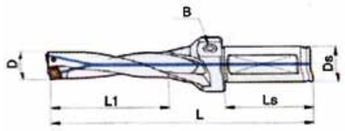


Type	D	L1	L	Ds	Ls	B	Insert	Screw	Wrench
JTR-12530D	12.5	41	118	20	50	PT-1/8	SPGT050204-PM	TSB-20045	TXL-6
JTR-13030D	13.0	42	119	20	50	PT-1/8			
JTR-13530D	13.5	44	121	20	50	PT-1/8			
JTR-14030D	14.0	45	122	20	50	PT-1/8			
JTR-14530D	14.5	47	124	20	50	PT-1/8			
JTR-15030D	15.0	48	125	20	50	PT-1/8			
JTR-15530D	15.5	50	136	25	56	PT-1/8	SPGT060204-PM	TSB-22052	
JTR-16030D	16.0	51	137	25	56	PT-1/8			
JTR-16530D	16.5	53	139	25	56	PT-1/8			
JTR-17030D	17.0	54	140	25	56	PT-1/8			
JTR-17530D	17.5	56	142	25	56	PT-1/8			
JTR-18030D	18.0	57	143	25	56	PT-1/8			
JTR-18530D	18.5	59	145	25	56	PT-1/8			
JTR-19030D	19.0	60	146	25	56	PT-1/8			
JTR-19530D	19.5	62	148	25	56	PT-1/8			
JTR-20030D	20.0	63	149	25	56	PT-1/8			
JTR-20530D	20.5	65	151	25	56	PT-1/8			
JTR-21030D	21.0	66	152	25	56	PT-1/8			
JTR-21530D	21.5	68	154	25	56	PT-1/8			
JTR-22030D	22.0	69	155	32	60	PT-1/4	SPGT07T308-PM	TSB-25065	TXL-8
JTR-22530D	22.5	71	166	32	60	PT-1/4			
JTR-23030D	23.0	72	167	32	60	PT-1/4			
JTR-23530D	23.5	74	169	32	60	PT-1/4			
JTR-24030D	24.0	75	170	32	60	PT-1/4			
JTR-24530D	24.5	77	172	32	60	PT-1/4			
JTR-25030D	25.0	78	173	32	60	PT-1/4			
JTR-25530D	25.5	80	175	32	60	PT-1/4			
JTR-26030D	26.0	81	176	32	60	PT-1/4			
JTR-26530D	26.5	83	178	32	60	PT-1/4			
JTR-27030D	27.0	84	179	32	60	PT-1/4			
JTR-27530D	27.5	86	181	32	60	PT-1/4			
JTR-28030D	28.0	87	182	32	60	PT-1/4	SPGT090408-PM	TSB-35090	TXL-15
JTR-28530D	28.5	89	184	32	60	PT-1/4			
JTR-29030D	29.0	90	185	32	60	PT-1/4			
JTR-29530D	29.5	94	189	32	60	PT-1/4			
JTR-30030D	30.0	95	190	32	60	PT-1/4			
JTR-31030D	31.0	98	193	32	60	PT-1/4			
JTR-32030D	32.0	101	196	32	60	PT-1/4			
JTR-33030D	33.0	104	199	32	60	PT-1/4			
JTR-34030D	34.0	107	202	32	70	PT-1/4	SPGT110408-PM	TSB-40100	
JTR-35030D	35.0	110	205	32	70	PT-1/4			
JTR-36030D	36.0	113	208	32	70	PT-1/4			
JTR-37030D	37.0	116	226	40	70	PT-1/4			
JTR-38030D	38.0	119	229	40	70	PT-1/4			
JTR-39030D	39.0	122	232	40	70	PT-1/4			
JTR-40030D	40.0	125	235	40	70	PT-1/4			
JTR-41030D	41.0	128	238	40	70	PT-1/4			
JTR-42030D	42.0	131	241	40	70	PT-1/4	SPGT140512-PM	TSB-50125	TXL-20
JTR-43030D	43.0	134	244	40	70	PT-1/4			
JTR-44030D	44.0	137	247	40	70	PT-1/4			
JTR-45030D	45.0	140	250	40	70	PT-1/4			
JTR-46030D	46.0	143	253	40	70	PT-1/4			
JTR-47030D	47.0	146	256	40	70	PT-1/4			
JTR-48030D	48.0	149	259	40	70	PT-1/4			
JTR-49030D	49.0	152	262	40	70	PT-1/4			
JTR-50030D	50.0	155	265	40	70	PT-1/4			

PART. A
TURNING & MILLING
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

INDEXIBLE DRILL

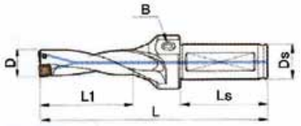
JTR 4×D



Type	D	L1	L	Ds	Ls	B	Insert	Screw	Wrench
JTR-12540D	12.5	53	130	20	50	PT-1/8	SPGT050204-PM	TSB-20045	TXL-6
JTR-13040D	13.0	55	132	20	50	PT-1/8			
JTR-13540D	13.5	57	134	20	50	PT-1/8			
JTR-14040D	14.0	59	136	20	50	PT-1/8			
JTR-14540D	14.5	61	138	20	50	PT-1/8			
JTR-15040D	15.0	63	140	20	50	PT-1/8			
JTR-15540D	15.5	65	151	25	56	PT-1/8	SPGT060204-PM	TSB-22052	
JTR-16040D	16.0	67	153	25	56	PT-1/8			
JTR-16540D	16.5	69	155	25	56	PT-1/8			
JTR-17040D	17.0	71	157	25	56	PT-1/8			
JTR-17540D	17.5	73	159	25	56	PT-1/8			
JTR-18040D	18.0	75	161	25	56	PT-1/8			
JTR-18540D	18.5	77	163	25	56	PT-1/8			
JTR-19040D	19.0	79	165	25	56	PT-1/8			
JTR-19540D	19.5	81	167	25	56	PT-1/8			
JTR-20040D	20.0	83	169	25	56	PT-1/8			
JTR-20540D	20.5	85	171	25	56	PT-1/8			
JTR-21040D	21.0	87	173	25	56	PT-1/8			
JTR-21540D	21.5	89	175	25	56	PT-1/8			
JTR-22040D	22.0	91	177	32	60	PT-1/4	SPGT07T308-PM	TSB-25065	TXL-8
JTR-22540D	22.5	93	188	32	60	PT-1/4			
JTR-23040D	23.0	95	190	32	60	PT-1/4			
JTR-23540D	23.5	97	192	32	60	PT-1/4			
JTR-24040D	24.0	99	194	32	60	PT-1/4			
JTR-24540D	24.5	101	196	32	60	PT-1/4			
JTR-25040D	25.0	103	198	32	60	PT-1/4			
JTR-25540D	25.5	105	200	32	60	PT-1/4			
JTR-26040D	26.0	107	202	32	60	PT-1/4			
JTR-26540D	26.5	109	204	32	60	PT-1/4			
JTR-27040D	27.0	111	206	32	60	PT-1/4			
JTR-27540D	27.5	113	208	32	60	PT-1/4			
JTR-28040D	28.0	115	210	32	60	PT-1/4	SPGT090408-PM	TSB-35090	TXL-15
JTR-28540D	28.5	117	212	32	60	PT-1/4			
JTR-29040D	29.0	119	214	32	60	PT-1/4			
JTR-29540D	29.5	123	218	32	60	PT-1/4			
JTR-30040D	30.0	125	220	32	60	PT-1/4			
JTR-31040D	31.0	129	224	32	60	PT-1/4			
JTR-32040D	32.0	133	228	32	60	PT-1/4			
JTR-33040D	33.0	137	232	32	60	PT-1/4			
JTR-34040D	34.0	141	236	32	70	PT-1/4	SPGT110408-PM	TSB-40100	
JTR-35040D	35.0	145	240	32	70	PT-1/4			
JTR-36040D	36.0	149	244	32	70	PT-1/4			
JTR-37040D	37.0	153	263	40	70	PT-1/4			
JTR-38040D	38.0	157	267	40	70	PT-1/4			
JTR-39040D	39.0	161	271	40	70	PT-1/4			
JTR-40040D	40.0	165	275	40	70	PT-1/4			
JTR-41040D	41.0	169	279	40	70	PT-1/4			
JTR-42040D	42.0	173	283	40	70	PT-1/4	SPGT140512-PM	TSB-50125	TXL-20
JTR-43040D	43.0	177	287	40	70	PT-1/4			
JTR-44040D	44.0	181	291	40	70	PT-1/4			
JTR-45040D	45.0	185	295	40	70	PT-1/4			
JTR-46040D	46.0	189	299	40	70	PT-1/4			
JTR-47040D	47.0	193	303	40	70	PT-1/4			
JTR-48040D	48.0	197	307	40	70	PT-1/4			
JTR-49040D	49.0	201	311	40	70	PT-1/4			
JTR-50040D	50.0	205	315	40	70	PT-1/4			

INDEXIBLE DRILL

JSFD 2×D



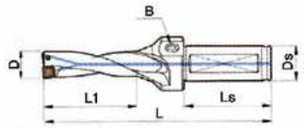
Type	D	L_1	L	Ds	Ls	B	Insert	Screw	Wrench
JSFD-16020D	16	37	114	20	50	PT-1/8	WCMX030208R-PG	TSB-22045 (ZSB-22045)	TXL-6
JSFD-17020D	17	39	116	20	50	PT-1/8			
JSFD-18020D	18	41	118	20	50	PT-1/8			
JSFD-19020D	19	43	120	20	50	PT-1/8			
JSFD-20020D	20	45	122	20	50	PT-1/8			
JSFD-21020D	21	47	134	25	60	PT-1/8	WCMX040208R-PG	TSB-25055 (ZSB-25055)	TXL-8
JSFD-22020D	22	49	136	25	60	PT-1/8			
JSFD-23020D	23	51	138	25	60	PT-1/8			
JSFD-24020D	24	53	140	25	60	PT-1/8			
JSFD-25020D	25	55	142	25	60	PT-1/8			
JSFD-26020D	26	57	157	32	70	PT-1/4	WCMX050308R-PG	TSB-30070 (ZSB-30070)	
JSFD-27020D	27	59	159	32	70	PT-1/4			
JSFD-28020D	28	61	161	32	70	PT-1/4			
JSFD-29020D	29	63	163	32	70	PT-1/4			
JSFD-30020D	30	65	165	32	70	PT-1/4			
JSFD-31020D	31	67	167	32	70	PT-1/4	WCMX06T308R-PG	TSB-35090 (ZSB-35090)	TXL-15
JSFD-32020D	32	69	169	32	70	PT-1/4			
JSFD-33020D	33	71	171	32	70	PT-1/4			
JSFD-34020D	34	73	173	32	70	PT-1/4			
JSFD-35020D	35	75	175	32	70	PT-1/4			
JSFD-36020D	36	77	177	32	70	PT-1/4			
JSFD-37020D	37	79	179	32	70	PT-1/4			
JSFD-38020D	38	81	181	32	70	PT-1/4			
JSFD-39020D	39	83	183	32	70	PT-1/4			
JSFD-40020D	40	85	185	32	70	PT-1/4			
JSFD-41020D	41	87	187	32	70	PT-1/4			
JSFD-42020D	42	89	199	40	80	PT-1/4	WCMX080412R-PG	TSB-40110 (ZSB-40110)	
JSFD-43020D	43	91	201	40	80	PT-1/4			
JSFD-44020D	44	93	203	40	80	PT-1/4			
JSFD-45020D	45	95	205	40	80	PT-1/4			
JSFD-46020D	46	97	207	40	80	PT-1/4			
JSFD-47020D	47	99	209	40	80	PT-1/4			
JSFD-48020D	48	101	211	40	80	PT-1/4			
JSFD-49020D	49	103	213	40	80	PT-1/4			
JSFD-50020D	50	105	215	40	80	PT-1/4			
JSFD-51020D	51	107	217	40	80	PT-1/4			
JSFD-52020D	52	109	219	40	80	PT-1/4			
JSFD-53020D	53	111	221	40	80	PT-1/4			
JSFD-54020D	54	113	223	40	80	PT-1/4			
JSFD-55020D	55	115	225	40	80	PT-1/4			
JSFD-56020D	56	117	227	40	80	PT-1/4			
JSFD-57020D	57	119	229	40	80	PT-1/4			
JSFD-58020D	58	121	231	40	80	PT-1/4			

* TSB : Big screw head / ZSB : Small screw head

PART. A
TURNING & MILLING
CERAMIC
CERMET
PCBN / PCD
TOOL HOLDER
MILLING CUTTER

INDEXIBLE DRILL

JSFD 3×D

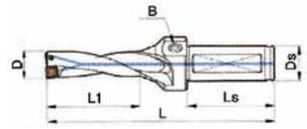


Type	D	L_1	L	Ds	Ls	B	Insert	Screw	Wrench
JSFD-16030D	16	53	130	20	50	PT-1/8	WCMX030208R-PG	TSB-22045 (ZSB-22045)	TXL-6
JSFD-17030D	17	56	133	20	50	PT-1/8			
JSFD-18030D	18	59	136	20	50	PT-1/8			
JSFD-19030D	19	62	139	20	50	PT-1/8			
JSFD-20030D	20	65	142	20	50	PT-1/8			
JSFD-21030D	21	68	155	25	60	PT-1/8	WCMX040208R-PG	TSB-25055 (ZSB-25055)	TXL-8
JSFD-22030D	22	71	158	25	60	PT-1/8			
JSFD-23030D	23	74	161	25	60	PT-1/8			
JSFD-24030D	24	77	164	25	60	PT-1/8			
JSFD-25030D	25	80	167	25	60	PT-1/8			
JSFD-26030D	26	83	183	32	70	PT-1/4	WCMX050308R-PG	TSB-30070 (ZSB-30070)	
JSFD-27030D	27	86	186	32	70	PT-1/4			
JSFD-28030D	28	89	189	32	70	PT-1/4			
JSFD-29030D	29	92	192	32	70	PT-1/4			
JSFD-30030D	30	95	195	32	70	PT-1/4			
JSFD-31030D	31	98	198	32	70	PT-1/4	WCMX06T308R-PG	TSB-35090 (ZSB-35090)	TXL-15
JSFD-32030D	32	101	201	32	70	PT-1/4			
JSFD-33030D	33	104	204	32	70	PT-1/4			
JSFD-34030D	34	107	207	32	70	PT-1/4			
JSFD-35030D	35	110	210	32	70	PT-1/4			
JSFD-36030D	36	113	213	32	70	PT-1/4			
JSFD-37030D	37	116	216	32	70	PT-1/4			
JSFD-38030D	37	119	219	32	70	PT-1/4			
JSFD-39030D	39	122	222	32	70	PT-1/4			
JSFD-40030D	40	125	225	32	70	PT-1/4			
JSFD-41030D	41	128	228	32	70	PT-1/4			
JSFD-42030D	42	131	241	40	80	PT-1/4	WCMX080412R-PG	TSB-40110 (ZSB-40110)	
JSFD-43030D	43	134	244	40	80	PT-1/4			
JSFD-44030D	44	137	247	40	80	PT-1/4			
JSFD-45030D	45	140	250	40	80	PT-1/4			
JSFD-46030D	46	143	253	40	80	PT-1/4			
JSFD-47030D	47	146	256	40	80	PT-1/4			
JSFD-48030D	48	149	259	40	80	PT-1/4			
JSFD-49030D	49	152	262	40	80	PT-1/4			
JSFD-50030D	50	155	265	40	80	PT-1/4			
JSFD-51030D	51	158	268	40	80	PT-1/4			
JSFD-52030D	52	161	271	40	80	PT-1/4			
JSFD-53030D	53	164	274	40	80	PT-1/4			
JSFD-54030D	54	167	277	40	80	PT-1/4			
JSFD-55030D	55	170	280	40	80	PT-1/4			
JSFD-56030D	56	173	283	40	80	PT-1/4			
JSFD-57030D	57	176	286	40	80	PT-1/4			
JSFD-58030D	58	179	289	40	80	PT-1/4			

* TSB : Big screw head / ZSB : Small screw head

INDEXIBLE DRILL

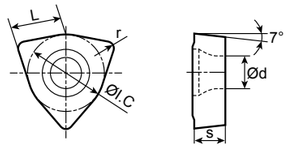
JSFD 4×D



Type	D	L_1	L	Ds	Ls	B	Insert	Screw	Wrench
JSFD-16040D	16	69	146	20	50	PT-1/8	WCMX030208R-PG	TSB-22045 (ZSB-22045)	TXL-6
JSFD-17040D	17	73	150	20	50	PT-1/8			
JSFD-18040D	18	77	154	20	50	PT-1/8			
JSFD-19040D	19	81	158	20	50	PT-1/8			
JSFD-20040D	20	85	162	20	50	PT-1/8			
JSFD-21040D	21	89	176	25	60	PT-1/8	WCMX040208R-PG	TSB-25055 (ZSB-25055)	TXL-8
JSFD-22040D	22	93	180	25	60	PT-1/8			
JSFD-23040D	23	97	184	25	60	PT-1/8			
JSFD-24040D	24	101	188	25	60	PT-1/8			
JSFD-25040D	25	105	192	25	60	PT-1/8			
JSFD-26040D	26	109	209	32	70	PT-1/4	WCMX050308R-PG	TSB-30070 (ZSB-30070)	
JSFD-27040D	27	113	213	32	70	PT-1/4			
JSFD-28040D	28	117	214	32	70	PT-1/4			
JSFD-29040D	29	121	221	32	70	PT-1/4			
JSFD-30040D	30	125	225	32	70	PT-1/4			
JSFD-31040D	31	129	229	32	70	PT-1/4	WCMX06T308R-PG	TSB-35090 (ZSB-35090)	TXL-15
JSFD-32040D	32	133	233	32	70	PT-1/4			
JSFD-33040D	33	137	237	32	70	PT-1/4			
JSFD-34040D	34	141	241	32	70	PT-1/4			
JSFD-35040D	35	145	245	32	70	PT-1/4			
JSFD-36040D	36	149	249	32	70	PT-1/4			
JSFD-37040D	37	153	253	32	70	PT-1/4			
JSFD-38040D	37	157	257	32	70	PT-1/4			
JSFD-39040D	39	161	261	32	70	PT-1/4			
JSFD-40040D	40	165	265	32	70	PT-1/4			
JSFD-41040D	41	169	269	32	70	PT-1/4			
JSFD-42040D	42	173	283	40	80	PT-1/4	WCMX080412R-PG	TSB-40110 (ZSB-40110)	
JSFD-43040D	43	177	287	40	80	PT-1/4			
JSFD-44040D	44	181	291	40	80	PT-1/4			
JSFD-45040D	45	185	295	40	80	PT-1/4			
JSFD-46040D	46	189	299	40	80	PT-1/4			
JSFD-47040D	47	193	303	40	80	PT-1/4			
JSFD-48040D	48	197	307	40	80	PT-1/4			
JSFD-49040D	49	201	311	40	80	PT-1/4			
JSFD-50040D	50	205	315	40	80	PT-1/4			
JSFD-51040D	51	209	319	40	80	PT-1/4			
JSFD-52040D	52	213	323	40	80	PT-1/4			
JSFD-53040D	53	217	327	40	80	PT-1/4			
JSFD-54040D	54	221	331	40	80	PT-1/4			
JSFD-55040D	55	225	335	40	80	PT-1/4			
JSFD-56040D	56	229	339	40	80	PT-1/4			
JSFD-57040D	57	233	343	40	80	PT-1/4			
JSFD-58040D	58	237	347	40	80	PT-1/4			

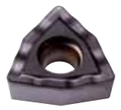
* TSB : Big screw head / ZSB : Small screw head

MILLING & DRILLING

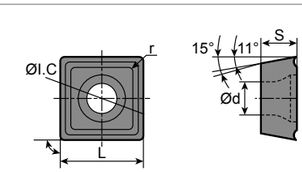


SPG200

- PVD Coating
- P20, M20

Insert shape	Type	Dimensions (mm)					Grade
		L	Ø I.C	s	d	r	SPG200
	**WCMX030208R-PG**	3.8	5.56	2.38	2.8	0.8	●
	WCMX040208R-PG	4.3	6.35	2.38	3.1	0.8	●
	WCMX050308R-PG	5.4	7.94	3.18	3.2	0.8	●
	WCMX06T308R-PG	6.5	9.525	3.97	3.7	0.8	●
	WCMX080412R-PG	8.7	12.7	4.76	4.3	1.2	●

● Stock



SPG207

- PVD Coating
- P20, M20

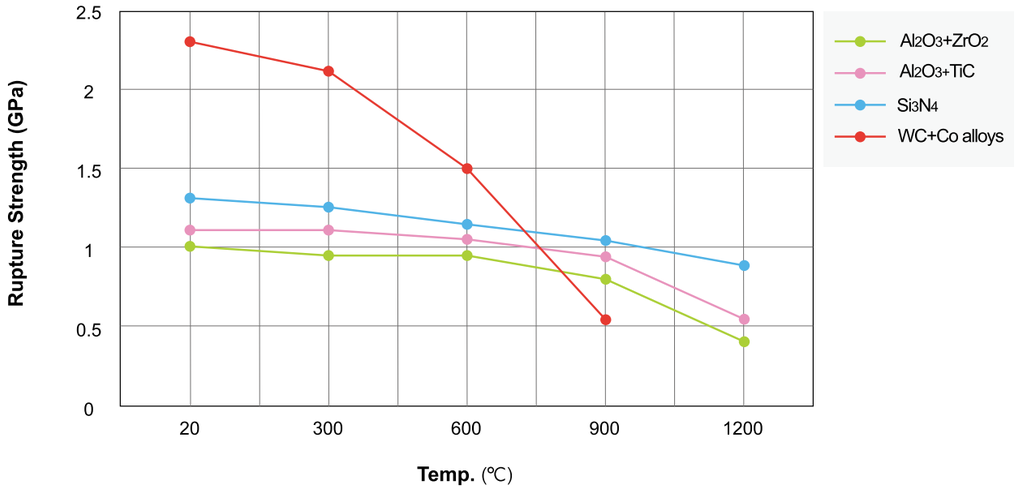
Insert shape	Type	Dimensions (mm)					Grade
		L	Ø I.C	s	d	r	SPG200
	**SPGT050204-PM**	5.0	5.0	2.38	2.2	0.4	●
	SPGT060204-PM	6.0	6.0	2.38	2.6	0.4	●
	SPGT07T308-PM	7.94	7.94	3.97	2.8	0.8	●
	SPGT090408-PM	9.8	9.8	4.3	4.2	0.8	●
	SPGT110408-PM	11.5	11.5	4.76	4.4	0.8	●
	SPGT140512-PM	14.3	14.3	5.2	5.75	1.2	●

● Stock

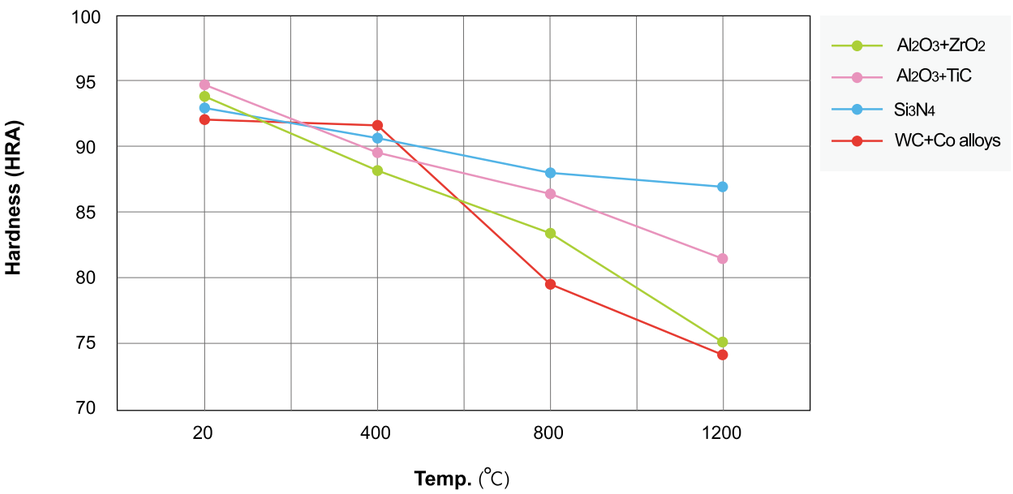
MEMO

TECHNICAL DATA

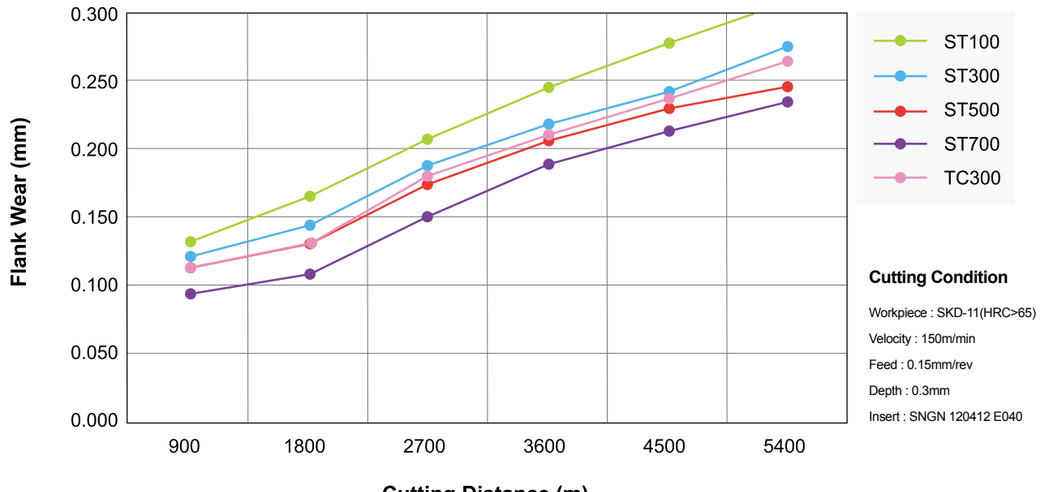
HIGH TEMPERATURE STRENGTH



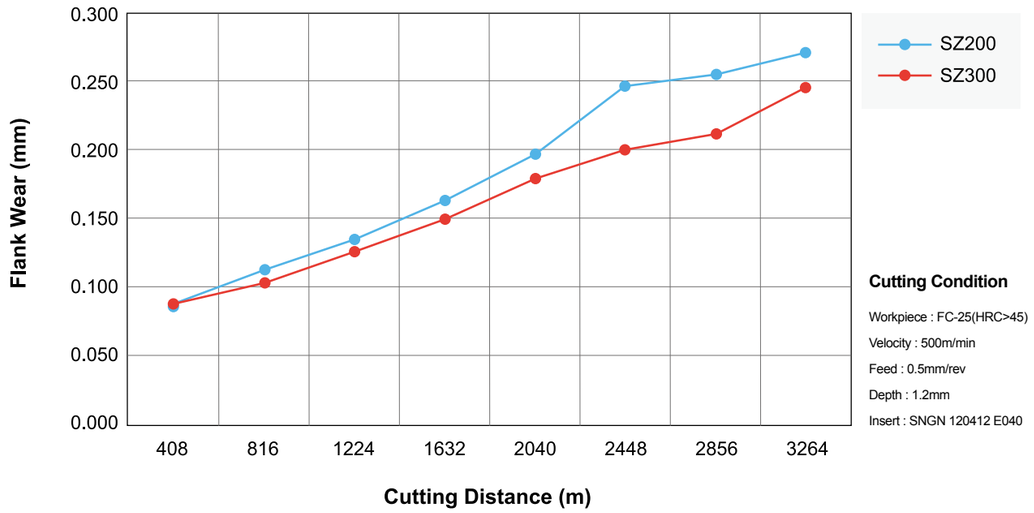
HARDNESS VS TEMPERATURE



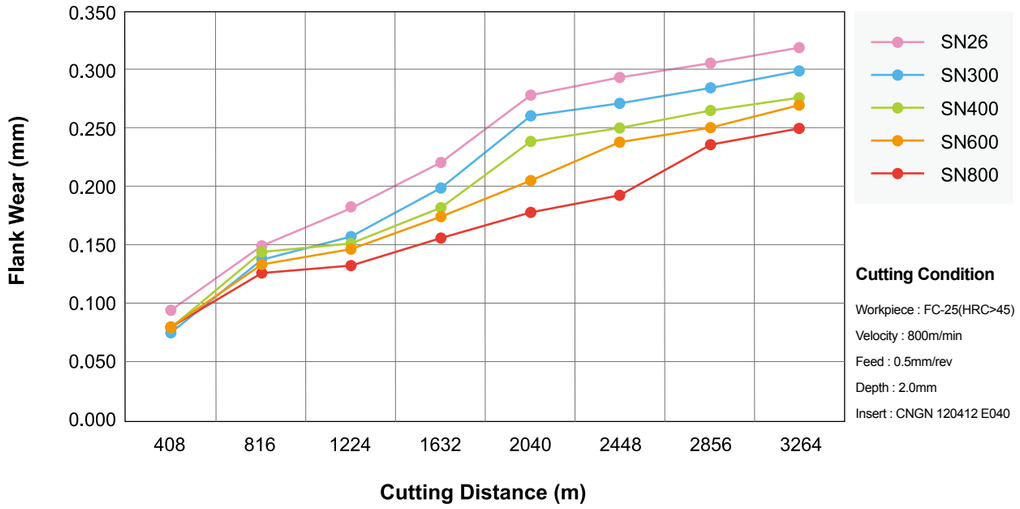
FLANK WEAR VS CUTTING DISTANCE



FLANK WEAR VS CUTTING DISTANCE



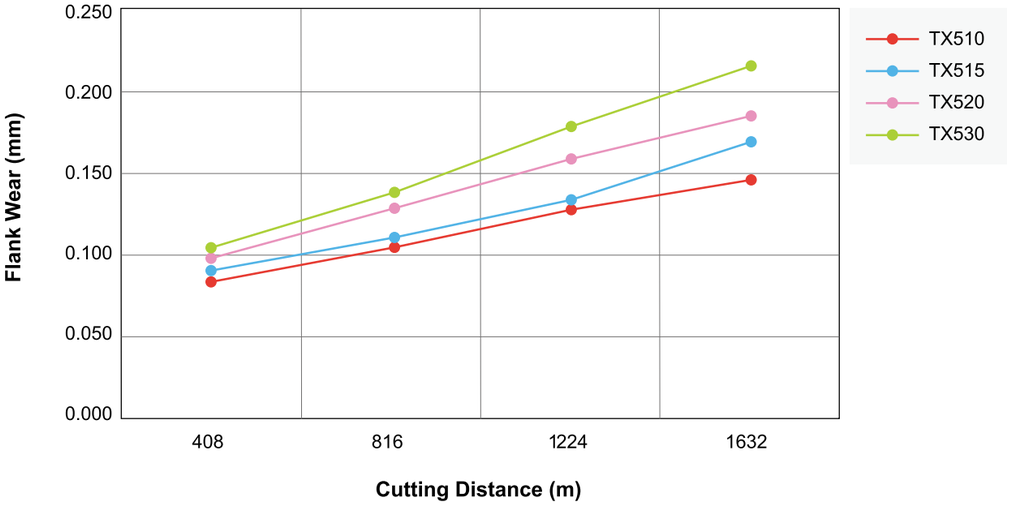
FLANK WEAR VS CUTTING DISTANCE



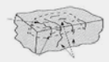
Cutting Condition

Workpiece : FC-25(HRC>45)
Velocity : 800m/min
Feed : 0.5mm/rev
Depth : 2.0mm
Insert : CNGN 120412 E040

FLANK WEAR VS CUTTING DISTANCE



TROUBLE SHOOTING

Types		Status	Cause	Countermeasures
Flank Wear		• Variation of dimension • Deteriorated finishing surface • Increasing machining load	• Wear by grinded surface • Excessive feed rate and cutting speed	• Reduce cutting Speed • Use larger corner radius • Use high wear-resistant grade
Crater Wear		• Deterioration of chip disposal • Deteriorated finishing surface	• Wear by chips (remarkable with ductile cast iron) • Excessive cutting speed	• Reduce cutting Speed • Use smaller lead angle • Check edge geometry • Use high wear-resistant grade
Thermal Cracking		• Deteriorated finishing surface • Occurrence of chipping	• Severe cycle of heating & cooling during cutting • Excessive feed rate and cutting speed	• Reduce cutting speed • Reduce feed rate • Change to dry machining • Use tougher grade
Notch Wear		• Deteriorated finishing surface • Increasing machining load	• Excessive feed rate and cutting depth	• Reduce cutting depth • Reduce feed rate • Use tougher grade • Increase coolant supply
Edge Splintering		• Occurrence of fire flower • Occurrence of noise • Increasing Machining load	• Excessive feed rate • Falling-off of BUE • Weak cutting edge	• Use tougher grade • Check edge geometry • Increase stability of the system • Use larger lead angle
Plastic Deformation		• Variation of dimension • Chipping of cutting edge	• High machining load • Use of improper grade	• Reduce cutting speed • Reduce feed rate • Reduce cutting depth • Use harder grade
Built-up-Edge		• Deteriorated finishing surface • Variation of dimension • Occurrence of chipping	• High affinity with work piece • Low cutting speed	• Increase cutting speed • Increase feed rate • Use tougher grade • Use larger rake angle
Breakage		• Occurrence of fire flower • Cutting impossible	• Using low toughness Insert • Using improper clamping holder	• Use tougher grade • Reduce feed rate • Reduce cutting depth • Increase stability of the system

TECHNICAL DATA

HARDNESS CONVERSION TABLE

VICKERS HARDNESS NUMBER (HV)	KNOOP HARDNESS NUMBER (HK)	BRINELL HARDNESS NUMBER (HB)		ROCKWELL HARDNESS NUMBER (HR)				ROCKWELL SUPERFICIAL HARDNESS NUMBER (HR)			SHORE HARDNESS NUMBER (HS)	TENSILE STRENGTH (APPROX.)
	500gf LOAD and OVER	HBS 3000kgf LOAD 10mm STEEL BALL	HBW 3000kgf LOAD 10mm CARBIDE BALL	SCALE A 60kgf LOAD DIAMOND INDENTER	SCALE B 100kgf LOAD 1/16″ STEEL BALL	SCALE C 150kgf LOAD DIAMOND INDENTER	SCALE D 100kgf LOAD DIAMOND INDENTER	SCALE 15N 15kgf LOAD DIAMOND INDENTER	SCALE 30N 30kgf LOAD DIAMOND INDENTER	SCALE 45N 45kgf LOAD DIAMOND INDENTER		
1865				92.1		80	86.5	96.5	92.0	87.0		
1787				91.6		79	85.7	96.3	91.5	86.2		
1710				91.1		78	84.9	96.1	90.9	85.4		
1633				90.6		77	84.2	95.8	90.3	84.5		
1556				90.1		76	83.4	95.5	89.7	83.6		
1478				89.6		75	82.6	95.2	89.1	82.5		
1400				89.0		74	81.8	94.9	88.5	81.6		
1323				88.5		73	81.0	94.6	87.9	80.7		
1245				88.0		72	80.1	94.3	87.2	79.7		
1160				87.1		71	79.4	94.0	86.5	78.7		
1076	972			86.8		70	78.6	93.7	85.8	77.6		
1004	946			86.2		69	77.8	93.4	85.1	76.4		
940	920			85.6		68	76.9	93.2	84.3	75.4		
900	895			85.0		67	76.1	92.9	83.6	74.2	95.2	
865	870			84.5		66	75.4	92.5	82.8	73.3	93.1	
832	846		739	83.9		65	74.5	92.2	81.9	72.0	91.0	
800	822		722	83.4		64	73.8	91.8	81.1	71.0	88.9	
772	799		705	82.8		63	73.0	91.4	80.1	69.9	87.0	
746	776		688	82.3		62	72.2	91.1	79.3	66.6	85.2	
720	754		670	81.8		61	71.5	90.7	78.4	67.7	83.3	
697	732		654	81.2		60	70.7	90.2	77.5	66.6	81.6	
674	710		634	80.7		59	69.9	89.8	76.6	65.5	79.9	
653	690		615	80.1		58	69.2	89.3	75.7	64.3	78.2	
633	670		595	79.6		57	68.5	88.9	74.8	63.2	75.6	
613	650		577	79.0		56	67.7	88.3	73.9	62.0	75.0	
595	630		560	78.5		55	66.9	87.9	73.0	60.9	73.5	212
577	612		543	78.0		54	66.1	87.4	72.0	59.8	71.9	205
560	594		525	77.4		53	65.4	86.9	71.2	58.6	70.4	199
544	576	500	512	76.8		52	64.6	86.4	70.2	57.4	69.0	192
528	558	487	496	76.3		51	63.8	85.9	69.4	56.1	67.6	186
513	542	475	481	75.9		50	63.1	85.5	68.5	55.0	66.2	179
498	526	464	469	75.2		49	62.1	85.0	67.6	53.8	64.7	172
484	510	451	455	74.7		48	61.4	84.5	66.7	52.5	63.4	167
471	495	442	443	74.1		47	60.8	83.9	65.8	51.4	62.1	161
458	480	432	432	73.6		46	60.0	83.5	64.8	50.3	60.8	156
446	466	421	421	73.1		45	59.2	83.0	64.0	49.0	59.6	151
434	452	409	409	72.5		44	58.5	82.5	63.1	47.8	58.4	146
423	438	400	400	70.0		43	57.7	82.0	62.2	46.7	57.2	141
412	426	390	390	71.5		42	56.9	81.5	61.3	45.5	56.1	136
402	414	381	381	70.9		41	56.2	80.9	60.4	44.3	55.0	132
392	402	371	371	70.4		40	55.4	80.4	59.5	43.1	53.9	127
382	391	362	362	69.9		39	54.6	79.9	58.6	41.9	52.9	124
372	380	353	353	69.4		38	53.8	79.4	57.7	40.8	51.8	120
363	370	344	344	68.9		37	53.1	78.8	56.8	39.6	50.7	118
354	360	336	336	68.4	109.0	36	52.3	78.3	55.9	38.4	49.7	114
345	351	327	327	67.9	108.5	35	51.5	77.7	55.0	37.2	48.7	110
336	342	319	319	67.4	108.0	34	50.8	77.2	54.2	36.1	47.7	108
327	334	311	311	66.8	107.5	33	50.0	76.6	53.3	34.9	46.6	105
318	326	301	301	66.3	107.0	32	49.2	76.1	52.1	33.7	45.6	102
310	318	294	294	65.8	106.0	31	48.4	75.6	51.3	32.5	44.6	100
302	311	286	286	65.3	105.5	30	47.7	75.0	50.4	31.3	43.6	97
294	304	279	279	64.7	104.5	29	47.0	74.5	49.5	30.1	42.7	95
286	297	271	271	64.3	104.0	28	46.1	73.9	48.6	28.9	41.7	93
279	290	264	264	63.8	103.0	27	45.2	73.3	47.7	27.8	40.8	90
272	284	258	258	63.3	102.5	26	44.6	72.8	46.8	26.7	39.9	88
266	278	253	253	62.8	101.5	25	43.8	72.2	45.9	25.5	39.2	86
260	272	247	247	62.4	101.0	24	43.1	71.6	45.0	24.3	38.4	84
254	266	243	243	62.0	100.0	23	42.1	71.0	44.0	23.1	37.7	82
248	261	237	237	61.5	99.0	22	41.6	70.5	43.2	22.0	36.9	80
243	256	231	231	61.0	98.5	21	40.9	69.9	42.3	20.7	36.3	79
238	251	226	226	60.5	97.8	20	40.1	69.4	41.5	19.6	35.6	77
230	243	219	219		96.7	18					34.6	75
222	236	212	212		95.5	16					33.5	72
213	229	203	203		93.9	14					32.3	69
204	220	194	194		92.3	12					31.1	66
196	212	187	187		90.7	10					30.0	63
188	204	179	179		89.5	8						61
180	196	171	171		87.1	6						59
173	189	165	165		85.5	4						56
166	181	158	158		83.5	2						54

PROPERTIES OF ELEMENTS

Element	Density (g/cm^3)	Hardness (kg/mm^2)	Young's Modulus ($X10^3 kg/mm^2$)	Thermal Expansion Coefficient ($10^{-6}/°C$)	Melting Point (°C)
WC	15.60	2,150	70	5.1	2,900
TiC	4.94	3,200	46	7.6	3,200
TaC	14.50	1,800	29	6.6	3,800
NbC	8.20	2,050	35	6.8	3,500
TiN	5.43	2,000	26	9.2	2,950
Al2O3	3.98	3,000	42	8.5	2,050
CBN	3.48	4,500	71	4.7	
Diamond	3.52 >	9,000	99	3.1	
Co	8.90		10~18	12.3	1,495
Ni	8.90		20	13.3	1,455

PART. A
TURNING & MILLING

GRADE COMPARISON

Grade \ Maker		Union	NTK	Ceram Tec	Kennametal	Sandvik	Tungaloy	Greenleaf	Kyocera	Mitsbishi	Sumitomo	Taegu Tec
CERAMIC	Black Ceramic	ST100	HC2	SH1	K090		LX21		A65	XD202	NB90M	
		ST300	HC4	SH2/SH3	KY1615	CC650		GEM6		XD805	NB90S	AB20
		ST500 ST900	HC5 HC7		MC2				KT66			AB20
		SD200	HC6									
	Coated Ceramic	TC100 TC300 TM300	ZC4 ZC7	SH2C	KY4400 HTM85D	CC6050	LX11		A66N PT600M		NB100C	
	White Ceramic	SZ200	HC1	SN60 SN80	AC5 K060	CC620	LXA	GEM9	AZ5000 SN60		W80	AW120
	Pink	SZ300	HW2									AW120
	Silicon Nitride	SN26	EC1	SL100	KY2000				KS5000		NS130	AS10
		SN300	SX8	SL200	KY3000	CC690			KS5000			
		SN400/ SN600	SX2 SX6	SL500/SL506 SL608	KY1320/KY3500	CC6090	FX90 FX105	GSN	KS6000	XD515 XD520	NS260	AS10
		SN500	SX1	SL508			CX710 CSC73		KS7000		NS30	AS10
			SX5			CC680						
		SN800 SN1000	SX9 SX7	SL800/SL806	KY1540/KY1310 KY2100	CC6080 CC6060/CC6065			KS6040			AS500
	Coated Silicon Nitride	NC400	SP2	SL550C	KY3400	GC1690	CXC73 TF110	HSN200	KX207		NS260C	
	Whisker	SW400 SW800	WA5 WA1		KY1525 KY4300 MC3	CC670		WG300 WG600 WG700			WX120 WX2000	TC430
CERMET	Non Coated	TX510	T3N/CTX XT3	SC35	KT125/HTX		NS520		TN30 TN6010		T110A	
		TX515	T15/C30	SC15	KT315/KT175/HT2	CT5015 CT525			TN40		T12A	
		TX520	C7X/N20/ C50	SC40	TT125/PS5	CT530	NS420 NS730		TN60 TN6020		T130A	
		TX530	N40/C45	SC60	KZ20S		NS540 NS740		TN90			
	Coated	TX910					GT520 GT720		PV30 PV7010			
		TX915	Q151Z15				AT530 GT730		PV7020	AP25N		
		TX920	Q50/ C7Z/Z50		KT513S	GC1525	GT530			UP35N	T1200A T130Z	
		TX930								UP45N		
PCBN		SBN1000	B22	WBN735 WBN750	KB1345 KD120		BX950		KBN65B	MB710 MB730	BN100 BN500 BN600 BN700	
		SBN2000	B20	WBN570	KB1610 KD050/KD081	CB7015	BX310		KBN10B	MB810	BN250 BNX10	
		SBN3000	B24	WBN560	KB1625	CB7020	BX330			MB825	BN250	
		SBN4000	B36	WBN555	KB1630	CB7050	BX360 BX380 BX450		KBN25B	MB8025 MB850 MB835	BN350 BN300 BNX20 BNS25 BN250 BN80	
		SBN5000	B16	WBN100 WBN101	KD230	CB50	BX90S		KBN900	MBS140	BNS800	
PCD		SPD1000					DX120		KPD001 KPD002	MD230	DA200	
		SPD2000	PA1		KD100	CD10	DX140		KPD010	MD220	DA150	
					KD1415							
		SPD3000	PD1		KD100		DX160		KPD025	MD205	DA90 DA1000	
							DX180					

COMPARISON OF WORK-PIECE

ISO	Korea KS	United Kingdom BS	America AIS/SAE	German DIN	Spain UNF	Italy UNI	Sweden SS	France AFNOR	Japan JIS
P Steel	Carbon steels								
	SM15C	080M15	1015	Ck15	C15K	C16	1370	XC12	S15C
	SM25C	-	1025	Ck25	-	-	-	-	S25C
	SM35C	060A35	1035(1037)	Ck35	-	C36	1572	XC38TS	S35C
	SM45C	080M46	1045(1046)	Ck45	C45K	C45	1672	XC42	S45C
	SM50C	060A52	1049	Ck50	-	C53	1674	XC48TS	S50C
	SM55C	070M55	1055	Ck55	C55K	C5	-	XC55	S55C
	SM58C	080A62	1060	Ck58	-	C60	1678	XC60	S58C
	-	212M36	1140	35S20	F210G	-	1957	35MF4	-
	SCMn1	150M28	1330	28Mn6	-	-	-	20M5	SCMn1
	-	230M07	1215	9SMn36	12SMn35	CF9SMn36	-	S300	-
	SMn438(H)	-	1355	36Mn5	36Mn5	-	2120	40M5	SMn438(H)
	sum22	230M07	1213	9SMn28	11SMn28	CF9SMn28	1912	S250	sum22
	Low alloy steels								
	SNC815	655M13	3310:3415	14NiCr14	-	-	-	12NC15	SNC815(H)
	SNC415	-	3415	14NiCr10	15NiCr11	16NiCr11	-	14NC11	SNC415(H)
	SNC236	640A35	3435	36NiCr6	-	-	-	35NC6	SNC236
	SCM420,SCM430	1717DS110	41300	25CrMo4	55Cr3	25CrMo(KB)	2225	25CD4	SM420;SCM430
	SCM432,SCCRM3	708A37	4137:4135	34CrMo4	34CrMo4	35CrMo4	2234	35CD4	SM432;SCCRM3
	SCM415	-	-	15CrMo5	12CrMo4	-	2216	12CD4	SCM415(H)
	SCM440	708M40	4140	42CrMo4	42CrMo4	42CrMo4	2244	42CD4	SCM440(H)
	SCM440	708M40	4140:4142	41CrMo4	42CrMo4	41CrMo4	2244	42CD4TS	SCM440
	-	820A16	-	17CrNiMo6	14NiCrMo13	-	-	18NCD6	-
	-	1503-245-420	4520	16Mo5	16Mo5	16Mo5	-	-	-
	SCMnH1	Z120M12	-	G-X120Mn12	X120Mn12	XG120Mn12	-	Z120M12	SCMnH/1
	SCr415	523M15	5015	15Cr3	-	-	-	12C3	SCr415(H)
	-	(527M20)	5115	16MnCr5	16MnCr5	16MnCr5	2511	16MC5	-
	SCr430	530A32	5130	34Cr4	35Cr4	34Cr4(KB)	-	32C4	SCr430(H)
	SCr440	530M40	5140	42Cr4	42Cr4	41Cr4	-	42C4	SCr440(H)
	SPS	735A50	6050	50CrV4	51CrV4	50CrV4	2230	50CA4	SUP10
	SPS9	527M60	5155	55Cr3	-	-	-	55Cr3	SUP9(A)
	-	905M39	-	41CrAlMo7	41CrAlMo7	41CrAlMo7	2940	40CAD6,12	-
	SNCM220	805M20	8620	21NiCrMo22	20NiCrMo2	20NiCrMo2	2506	30NCD2	SNCM22(H)
	SNCM240	311-Type7	8637, 8640	40NiCrMo22	40NiCrMo2	40NiCrMo2(KB)	-	-	SNCM240
	-	250A53	9255	55Si7	56Si7	55Si8	2085	55S7	-
	-	816M40	9840	36CrNiMo4	35NiCrMo4	38NiCrMo4(KB)	-	40NCD3	-
	SU2	534A99	52100	100Cr6	F.131	100Cr6	2258	100C6	SU2
	SUM22L	-	12L13	9SMnPb28	11SMnPb28	CF9SMnPb28	1914	S250Pb	SUM22L
	-	-	12L14	-SMnPb36	12SMnPb25	CF9SMnPb36	1926	S300Pb	-
	-	150-620Gr27	ASTM A182	13CrMo44	14CrMo45	14CrMo45	-	15CD3.5	-
	-	1501-622	ASTM A182	10CrMo910	TU.H	12CrMo9,10	2218	12CD9,10	-
	-	-	ASTM A350LF5	14Ni6	15Ni6	14Ni6	-	16N6	-
	-	1501-240	ASTM A204Gr.A	15Mo3	16Mo3	16Mo3KW	2912	15D3	-
	-	722M24	-32CrMo12	32CrMo12	F124.A	32CrMo12	2240	30CD12	-
	High alloy steels								
	STD1	BD3	D3	X210Cr12	X210Cr12	X210CrMoV13KU	-	Z200C12	SKD1
	STS12	-	A2	Z100CnMoV5IZ100CDV5	BA2	2260	Z100CnMoV51	Z100CnMoV51KU	SKD12
	-	-	-	X210CrW12	X210CrE12	X215CRW121KU	2312	-	SKD2
	STD61	BH21	H21	X30WCrV9	X30WCrV9	X28W09KU	-	Z30WCV9	SKD5
	-	BH13	H13	X40CrMoV51	X40CrMoV5	X35CrMoVKU	2242	Z40CDV5	SKS31
	STS31	-	-	105WCr6	05WCr5	3KU	2140	105WC13	SKS43
	STS43	BW2	W210	100Vi	-	-	-	Y105V	SKT4
	STF4	-	L6	55NiCrMoV6	F.520.S	-	-	55NCDV7	SUH1
	-	401S45	HW3	X45GrSi93	F322	10WCr6	-	Z45CS9	SKH55
	-	-	-	-	-	-	-	-	-
	SKH55	-	-	S6-5-2-5	HS6-5-2-5	-	2723	Z85WDKCV2723	SKH3
	SKH3	BT4	T4	S18-1-2-5	HS18-1-1-5	X78WCo1805KU	-	Z80WKCV	SKH9
	SKH51	BM2	M2	S6-5-2	HS6-5-2	X82WMo0650KU	-2722	Z85WDCV	-
	-	-	-	M7	HS2-9-2	Z100WCWVHS2-9-2	2782	S2-9-2	-
	SKH2	BT1	T1	S18-0-1	HS18-0-1	X75W18KU	-	Z08WCV	SKH2
	-	BS1	S1	45WCrV7	45WCrSi8	45WCrV8KU	2710	-	-

TECHNICAL DATA

COMPARISON OF WORK-PIECE

ISO	Korea KS	United Kingdom BS	America AIS/SAE	German DIN	Spain UNF	Italy UNI	Sweden SS	France AFNOR	Japan JIS
M Stainless Steel	Carbon steels								
	STS301	-	301	X12CrNi177	-	2331	F.3517	Z12CN1707X12CrNi1707	SUS301
	STS303	-	303	X12CrNiS188Z10CNF18.09	-	2346	F.3517	X10CrNiS18.09	SUS303
	-	-	304	X5CrNi189	304S31	X5CrNi18	2332/2333F.3551	Z6CN18.09	SUS304
	STS304	304S15	304	X5CrNi189	F.3551	X5CrNi1810	2332	Z6CN18.09	SUS304
	STS304L	-	304L	X2CrNi1911	304C12	2333	-	-	SUS304L
	SSC16	-	304LX2CrNi1819	Z2CrNi1810	304S12	2352	F.3503	X2CrNi1011	SCS16
	STS304L	304S62	304LN	Z2CrNiN,1810	-	-	2371	Z2CN1810	NSUS304LN
	STR31	-	HW3X45CrSi93	Z45CrSi93	401S45	-	SF322	X45CrSi8	SUH1
	STR309	-	309	X15CrNiSi201	-	-	-	Z15CNS2012	SUH309
	STR310	310S24	310S	X12CrNi2521	F.332	X60CrNi2520	2361	Z12CN2520	SUH310
	STS316	-	316	X5CrNiMo1810	346S16	X5CrNiMo17122347	F.3543	Z6CND1711	SUS316
	STS316LN	-	316LN	X2CrNiMoN	-	-	2375	X2CND1713	SUS316LN
	STS316L	-	316L	X2CrNiMo1812	-	-	-	-	SUS316L
	SSC16	-	316LXCrNiMo	Z2cndCND1712	316S13	2353	-	X2CrNiMo1712	SCS16
	-	320S17	316Ti	Z2CND1915	F.3535	X6CrNiMoTi1712	2350	Z6VDT17.12	-
	STS317L	-	317L	X24CrNiMo1816	317S12	2367	-	X2CrNiMo1816	317L
	-	-	X10CrNi	Z6CNDNb	-	-	-	X6CrNiMoMoNb	318
	-	-	S32304	"X2CrNiN,234"	-	-	2327	Z2CN23-04AZ	-
	-	-	S32900	X8CrNiMo.275	-	-	2324	-	-
	-	-	S31803	X2CrNiMoN	-	-	2377	Z2CND22-0503	-
	STS321	351S12	321	X10CrNiTi	F.3553	X6CrNiTi1811	2337	Z6CNT18.10	SUS321
	STS347	-	347	X6CrNiNb189	347S17	X6CrNiNb18.112338	F.3552	Z6CNNb18.10	SUS347
	STS12	BA2	A2	Z100CnMoV51	Z100CnMoV51	Z100CnMoV51KU	2260	Z100CDV5	SKD12
	High alloy steels								
	STS403	403S17	403	X7Cr13	F.3110	X6Cr13	2301	Z6C13	SUS403
	STS405	403S17	405	X10CrAl13	F.311	X10CrAl13	-	Z10C13	SUS405
	STS410	410S21	410	X10Cr13	F.3401	L13	2302	Z10C14	SUS410
	STS420J2	420S45	-	X46Cr13	F.3405	X40Cr145	2304	Z4CM	SUS420J2
	STS430	430S15	430	X8Cr17	F.3113	X8Cr17	2320	ZBC17	SUS430
	STS430F	-	430F	X12CrMoS17	F.3117	X10CrS17	2383	Z10CF17	SUS430F
	STS431	431S29	431	X22CrNi6	F.33427	X16CrNi16	2321	Z15CNi6.02	SUS431
	STS434	434S17	434	X6CrMo17	-	ZX8CrMo17	2325	ZBCD1701	SUS434
	STR446	-	446	X10CrA124	-	X16Cr26	2322	Z10CAC24	SUH446
	SSC5	425C11	-	X5CrNi134	-	-	-	Z4CND13.4M	SCS5
	STR35,STR36	348S54	EV8	X53CrMnNiN219	-	X53CrMnNiNN	-	Z52CMN21.09	SUH35,SUH36
	STR4	443S65	HNW6	X80CrNiSi20	F.320B	X80CrSiNi20	-	Z80CSN20.02	SUH4
	High alloy steels								
	HRHC15	330C11	-	GX40NiCrSi	-	XG50NiCr	-	-	SCH15
	STR330	-	X12NiCrSi	·	-	-	-	Z12NCS35.16	SUH330330
	-	3072-76	4676	NiCu30Al	-	-	-	-	
	-	-	5390A	-	-	-	-	NC22FeD	
	-	3146-3	5391	S-NiCr13A16MoNb	-	-	-	NC12D	
	-	HR8	5383	NiCr19Fe19NbMo	-	-	-	NC19rNB	
	-	-	5537C	CoCr20W15Ni	-	-	-	KC20WN	
	-	-	5660	NiFe35Cr14MoTi	-	-	-	ZSNCDT42	
	-	-	5666	NiCr22Mo9Nb	-	-	-	NC22FeDNB	
	-	-	AMS5397	NiCr15Cr10MoATi	-	-	-	-	
	-	-	AMS5399	NiCr19Co11MoTi	-	-	-	NC19KDT	
	-	-	AMS5544	NiCr19Fe19NbMo	-	-	-	NC20K14	
	-	-	AMS5772	CoCr22W14Ni	-	-	-	KC22WN	
	-	TA10-13/TA28	AMSR56400	TiAl6V4	-	-	-	T-A6V	
	-	TA14/17	AMSR54520	TiAl5Sn2.5	-	-	-	T-A5E	

COMPARISON OF WORK-PIECE

ISO	Korea KS	United Kingdom BS	America AIS/SAE	German DIN	Spain UNF	Italy UNI	Sweden SS	France AFNOR	Japan JIS
K Cast iron	Gray cast iron								
	GC100	-	No20B	GG10	-	G10	110	Ft10D	FC100
	GC150	Grade150	No25B	GG15	-	G14	115	Ft15D	FC150
	GC200	Grade220	No30B	GG20	-	G20	120	Ft20D	FC200
	GC250	Grade260	No35B	GG25	-	G25	125	Ft25D	FC250
	GC300	Grade300	GNo45B	GG30	-	G30	130	Ft30D	FC300
	GC350	Grade350	No50B	GG35	-	G35	135	Ft35D	FC350
	GCD400	SNG420/2	60-40-18	GGG40	-	GS400-12	0717-02	FCS400-12	FCD400
	GCD500	SNG500/7	65-45-12	GGG50	-	GS500/7	0727-02	HGS500-7	FCD500
	GCD600	SNG600/3	80-55-06	GGG60	-	GS600/3	0732-03	FGS600-3	FCD600
	GCD700	SNG700/2	100-70-03	GGG70	-	GS700/2	0737-01	FGS700-2	FCD700
	Ductile cast iron								
	-	B340/12	32510	GTS-35	-	-	0815	MN35-10	-
	-	P440/7	40010	GTS-45	-	-	0852	-	-
	-	P510/4	50005	GTS-55	-	-	0854	MP50-5	-
	-	P570/3	70003	GTS-65	-	-	0858	MP60-3	-
Aumi-nium	Aluminium alloy								
	HRHC15	330C11	-	GX40NiCrSi	-	XG50NiCr	-	-	SCH15
	STR330	-	X12NiCrSi	·	-	-	-	Z12NCS35.16	SUH330330
	-	3072-76	4676	NiCu30Al	-	-	-	-	
	-	-	5390A	-	-	-	-	NC22FeD	
	-	3146-3	5391	S-NiCr13A16MoNb	-	-	-	NC12D	

COMPARISON OF WORK-PIECE (NI-BASED HEAT RESISTANT ALLOYS)

Material Condition	Commercial designation	Hardness Brinell HB		Nominal composition Approximate content in %											USA		UK	France	Germany		Others
		Ann.	Aged	Ni	Cr	Co	Fe	Mo	C	Mn	Si	Al	Ti	Others	SAE	AMS	BS	AFNOR	Werkst.-Nr	DIN1706	
Ni-based Alloys	Haynes 80A	-	-	70.9	20.0	2.0	3.0	-	0.1	-	-	1.5	2.5	-	-	-		-	-	-	-
	Haynes 75	-	-	73.7	20.0	-	5.0	-	0.12	-	-	0.25	0.4	0.5	-	-		-	-	-	-
	Haynes 263	-	-	51.4	20.0	20.0	-	6.0	0.06	-	-	1.0	1.5	-	-	-	-	-	-	-	-
	Haynes 600	-	-	75.9	16.0	-	8.0	-	0.08	-	-	-	-	-	-	-	-	-	-	-	-
	Haynes 625	-	-	61.4	21.0	-	5.0	9.0	0.1	-	-	-	-	3.5	-	-	-	-	-	-	-
	Haynes X-750	-	-	74.9	16.0	-	7.0	-	0.08	-	-	0.8	0.25	1.0	-	5542	-	NC15TNbA	-	-	-
	Haynes 718	-	-	53.5	18.0	-	19.0	3.0	0.08	-	-	0.5	0.9	5.0	-	-	-	-	-	-	-
	Inconel 781	-	-	70.0	16.0	-	8.0	-	0.07	2.25	0.15	0.1	3.0	0.2	-	-	-	-	-	-	-
	Nimocast PE10	-	-	56.4	20.0	-	-	6.0	-	-	-	-	-	9.0	-	-	-	-	-	NiFe33Cr17Mo	-
	Nimocast PD16	-	-	43.8	16.5	-	34.0	3.3	0.06	-	-	1.2	1.2	-	-	5397	-	NK15CAT	LW2.4674	-	-
	Nimocast PK24	-	-	61.1	9.5	15.0	-	3.0	0.17	-	-	5.5	4.7	1.0	-	-	-	-	-	-	-
	Nimocast 842	-	-	57.7	22.0	10.0	-	10.0	0.3	-	-	-	-	-	5391A	-	HC204	NC13AD	2.4670	S-NiCr13Al6MoNb	-
	Nimocast 713	-	-	72.6	13.4	-	-	4.5	0.12	-	-	6.2	1.0	2.3	-	-	3146	-	-	-	-
	Nimonic 95	-	-	49.9	19.5	-	5.0	-	0.11	-	1.0	2.0	3.5	-	-	-	HC6,204	-	-	-	-
	Nimonic 242	-	-	58.0	21.5	10.0	-	10.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	Nimonic PE13	-	-	49.0	21.8	1.5	18.5	9.0	0.1	0.5	0.5	-	-	0.6	5536E	5754E	-	NC22FeD	2.4665	NiCr22Fe18Mo	-
	Nimonic PK25	-	-	49.9	19.0	19.5	-	4.0	0.08	0.8	0.8	2.9	2.9	-	5751A	5753	-	NK0D20ATU	2.4666	NiCr18CoMo	-
	Nimonic PK31	-	-	53.8	20.0	14.0	-	4.5	-	-	-	0.4	2.3	5.0	-	-	-	-	-	-	-
	Refractaloy 26	-	-	38.0	19.0	20.0	16.0	3.2	0.03	0.8	1.0	0.2	2.75	-	-	-	-	Z6NKCDT38	-	-	-
	Rene 63	-	-	54.4	14.0	15.0	0.5	6.0	0.05	0.1	0.2	3.8	2.5	3.5	-	-	-	-	-	-	-
	Rene 77	-	-	57.6	15.0	15.0	0.4	4.2	0.17	0.1	0.1	4.3	3.3	-	-	-	-	-	-	-	-
	Rene 80	-	-	61.0	14.0	9.5	-	4.0	0.15	-	-	-	.0	8.0	-	-	-	-	-	-	-
	Rene 95	-	-	64.5	14.0	8.0	-	3.5	0.15	-	-	-	2.5	3.5	-	-	-	NC14K8	-	-	-
	Rene 100	-	-	60.6	10.0	15.0	-	3.0	0.18	-	-	5.5	4.7	-	-	-	-	-	-	NiCo15Cr10MoAlTi	-
	Rene 125	-	-	60.0	8.9	10.0	-	2.0	0.1	-	-	4.7	2.5	7.0	-	-	-	-	-	-	-
	TRW 1800	-	-	70.0	13.0	-	-	-	0.1	-	-	6.0	0.06	10.5	-	-	-	-	-	-	-
	TRW V1 A	-	-	70.5	6.0	7.5	-	2.0	0.13	-	-	5.4	1.0	6.3	-	-	-	-	-	NiTa9Co8W6CrAl	-
	Udimet 630	-	-	41.0	17.0	-	17.5	3.0	0.04	-	-	0.6	1.1	4.1	-	-	-	-	2.4668	NiCr19NbMo	-
	Udimet 700	-	-	54.6	15.0	17.5	-	-	0.1	-	-	4.4	3.4	-	-	-	-	NCKD20AT	2.4636	NiCo15CrMoAlTi	-
	Udimet 710	-	-	55.0	18.0	15.0	0.5	1.5	0.07	-	-	2.5	5.0	1.5	-	-	-	NC18TDA	-	-	-
Annealed or Solution Treated	Hastalloy B	140	-	64.3	0.6	1.25	5.5	28.0	0.1	0.8	0.7	-	-	-	5396A	5596	-	ND37FeV	2.4800	S-NiMo30	N10001
	Hastalloy C	200	-	54.1	16.0	1.25	5.75	17.0	0.07	0.8	0.7	-	-	4.0	5388C	5388	-	-	2.4602	NiCr17Mo17FeW	N10002
	Hastalloy N	-	-	72.2	7.0	0.25	3.0	16.5	0.06	0.4	0.25	0.5	-	0.21	5771	5607	-	-	-	-	N10003
	Hastalloy W	-	-	62.7	5.0	1.25	5.5	24.5	0.06	0.5	0.5	-	-	-	-	5786	-	-	-	-	N10004
	Hastalloy X	160	-	47.1	22.0	1.5	18.5	9.0	0.1	0.6	0.6	-	-	0.6	5390A	5390	3072-76	NC22FeD	2.4603	-	N06002
	Incoloy 804	-	-	41.0	29.5	-	26.0	-	0.1	1.0	0.75	0.25	0.6	0.5	-	-	3072-76	-	-	-	-
	Incoloy 825	180	-	42.0	21.0	-	30.0	3.0	0.04	-	-	-	1.0	2.0	-	-	-	NC21FeDU	2.4858	NiCr21Mo	N08825
	Inconel 600	170	-	75.0	15.5	-	8.0	-	0.05	-	-	-	-	-	5540	5580	-	NC15Fe	2.4816	NiCr15Fe	N06600
	Inconel 601	150	-	60.0	23.0	-	14.0	-	0.05	-	-	1.4	-	-	-	5715	-	-	2.4851	NiCr23Fe	N06601
	Inconel 604	180	-	74.4	15.8	-	7.2	-	0.04	0.2	0.2	-	-	0.1	-	-	3072-76	-	-	-	-
	Inconel 625	180	-	61.0	21.5	-	2.5	9.0	0.04	0.5	0.5	0.4	0.4	3.6	-	5666	-	NC22FeDNB	2.4856	NiCr22Mo9Nb	N06625
	Monel 400	110	-	64.0	-	-	1.5	-	0.12	1.0	-	-	-	32.0	4544	4574	HR5,203-4	NU30	2.4360	NiCu30Fe	N04400
	Monel R-405	110	-	66.0	-	-	1.2	-	0.15	1.0	-	-	-	31.06	4674	7234		-	-	-	N04405
	Nimonic 75	170	-	75.0	19.5	-	4.0	-	0.12	-	-	-	0.4	-	-	-		NC20T	2.4630	NiCr20Ti	-

TECHNICAL DATA

COMPARISON OF WORK-PIECE (NI-BASED HEAT RESISTANT ALLOYS)

Material Condition	Commercial designation	Hardness Brinell HB		Nominal composition Approximate content in %											USA		UK	France	Germany		Others
		Ann.	Aged	Ni	Cr	Co	Fe	Mo	C	Mn	Si	Al	Ti	Others	SAE	AMS	BS	AFNOR	Werkst.-Nr	DIN1706	
Aged or Solution Treated and Aged	Astroloy	-	-	56.9	15.0	15.0	-	5.25	0.06	-	-	4.0	3.5	0.05	-	-	-	-	-	-	-
	Hastelloy R235	-	-	61.0	15.0	2.5	10.0	5.5	0.15	0.25	0.6	3.0	2.0	-	-	-	-	-	-	-	-
	Incoloy 901	180	300	44.3	12.5	-	34.0	6.0	0.05	0.24	0.12	0.15	2.7	0.15	-	5660	-	ZSNCDT42	LW2.4662	NiFe35Cr14MoTi	N09901
	Incoloy 903	-	380	39.0	-	15.0	41.0	-	0.02	-	-	0.7	1.4	3.0	-	-	-	-	-	-	-
	Inconel 700	-	350	46.0	15.0	23.5	0.7	3.75	0.12	0.10.0	0.3	3.0	2.2	-	-	-	-	NK27CADT	-	NiCo29Cr15MoAlTi	-
	Inconel 702	-	-	79.6	15.6	-	0.35	-	0.04	0.05	0.2	3.0	0.7	-	-	5550	-	-	-	-	N07702
	Inconel 706	-	-	42.0	16.0	-	40.0	-	0.03	0.2	0.3	0.4	1.75	-	-	5702	-	-	-	-	N09707
	Inconel 713	-	-	75.0	12.5	-	-	4.2	0.12	-	-	6.1	0.8	-	-	5391	3146-3	NC12AD	LW2.4670	S-NiCr13Al6MoNb	-
	Inconel 718	180	380	52.5	19.0	-	19.0	3.0	0.04	0.35	0.35	0.9	0.9	0.1	5383	5589	HR8	NC19FeNB	LW24668	NiCr19Fe19NbMo	N07713
	Inconel 722	-	380	74.8	15.0	-	6.5	-	0.04	0.55	0.2	0.6	2.4	-	-	5541	-	NC16FeTi	-	NiCr16FeTi	N07722
	Inconel X-750	-	390	73.0	15.5	-	7.0	-	0.04	0.35	0.35	0.7	2.5	-	5542G	5582	-	NC16FeTNb	2.4669	NiCr16FeTi	N07750
	Inconel 751	-	-	70.0	15.5	-	7.0	-	0.1	1.0	0.5	1.5	2.6	0.5	-	-	-	-	-	-	N07751
	Jethete M-252	-	320	55.3	20.0	10.0	-	10.0	0.15	0.5	0.5	1.0	2.6	-	-	5551	-	-	2.4916	S-NiCr19Co	N07252
	MAR-M 246	-	270	59.5	9.0	10.0	0.2	2.5	0.15	-	-	5.5	1.5	11.5	-	-	-	-	2.4675	NiCo10W10Cr9AlTi	-
	MAR-M 421	-	-	62.3	15.5	10.0	-	1.7	0.15	-	-	4.3	1.75	5.3	-	-	-	-	-	NiCR16Co10WAlTi	-
	MAR-M 432	-	-	52.3	15.5	20.0	-	-	0.15	-	-	2.8	4.3	5.0	-	-	-	-	-	NiCo20Cr16WAlTi	-
	Monel K-500	120	290	64.0	-	-	1.0	-	0.13	0.8	-	2.8	0.6	30.0	4676	-	3072-76	-	2.4375	NiCu30Al	N05500
	Nimocast 80	-	-	69.9	20.0	2.0	5.0	-	0.1	-	-	1.0	2.0	-	-	-	3146	-	-	-	-
	Nimocast 90	-	-	52.9	20.0	18.0	5.0	-	0.1	-	-	1.5	2.5	-	-	-	-	-	-	-	-
	Nimonic 80A	-	350	75.0	19.5	-	-	-	0.08	-	-	1.4	2.4	-	-	-	Hr401,601	NC20TA	2.4631	NiCr20TiAk	N07080
	Nimonic 90	-	346	59.0	19.5	16.5	-	-	0.08	-	-	1.5	2.5	-	-	-	Hr2,202	NC20ATV	2.4632	NiCr20Co18Ti	N07090
	Nimonic 105	-	320	53.0	15.0	20.0	-	5.0	0.12	-	-	4.7	1.2	-	-	-	HR3	NCKD20ATV	2.4634	NiCo20C15MoAlTi	-
	Nimonic 115	-	350	59.0	14.2	13.2	-	4.0	0.16	-	-	5.0	4.0	-	-	-	HR4	NCK15ATD	2.4636	NiCo15C15MoAlTi	-
	Nimonic 901	-	350	44.0	12.5	-	35.0	5.7	0.04	-	-	0.3	2.9	-	5660C	5661A	-	ZSNCDT42	2.4662	NiCr15MoTi	-
	Nimonic 263/C263	-	275	51.5	20.2	20.0	-	6.0	0.06	-	-	0.5	2.0	-	-	-	HR10	NCK20D	2.4650	NiCr15Co19MoTi	-
	Nimonic PE16	-	250	43.5	16.5	-	34.0	3.3	0.06	-	-	1.2	1.2	-	-	-	HR207	NW11AC	-	NiFe33Cr17Mo	-
	Nimonic PK33	-	350	55.9	18.0	14.0	0.5	7.0	0.05	0.25	0.25	2.1	2.2	-	-	-	-	NC19KDUV	-	NiCr20Co16MoTi	-
	R-235	-	-	63.3	15.0	1.2	10.0	5.5	0.12	0.1	0.3	2.0	2.5	-	-	-	-	-	-	-	-
	Rene 41	-	-	53.1	19.0	11.0	1.8	10.5	0.09	0.3	0.3	1.5	3.1	-	-	5399	-	NC19KDT	2.4973	NiCr19Co11MoTi	N07041
	Udimet 500	-	-	51.7	19.0	19.0	-	4.0	0.4	0.1	0.1	3.0	3.0	-	-	5751	-	NCK19DAT	2.4983	NiCr18Co18MoTi	N07500
	Udimet 718	180	380	52.5	18.0	-	18.0	3.0	0.05	-	-	0.6	0.1	5.2	5383	5589	HR8	NC19FeN	LW2.4668	NiCr19Co19NbMo	N07718
	Waspaloy	-	-	56.9	19.8	13.5	0.8	4.45	0.07	0.1	0.1	1.4	3.0	-	-	5544	-	NC20K14	LW2.4668	NiCr19Co19NbMo	N07001
Cast or Cast and Aged	GMR 235	-	-	63.3	15.5	-	10.0	5.2	0.15	0.25	0.6	3.0	2.0	0.06	-	-	-	-	-	-	AISI:686
	GMR 235D	-	-	63.0	15.5	-	4.5	5.0	0.15	0.1	0.3	3.5	2.5	0.05	-	-	-	-	-	NiCr16MoAl	-
	IN-100	-	-	61.6	10.0	15.0	-	3.0	0.18	1.2	0.5	5.5	4.75	-	-	5397	-	-	LW2.4674	NiCo15Cr10MoAlTi	N13100
	Jessop G39	130	-	67.5	19.5	-	5.0	3.0	0.5	-	-	-	-	4.5	-	-	-	-	-	NiCr20MoW	-
	Jessop G64	220	-	60.7	11.0	-	2.0	3.0	0.15	-	-	6.0	-	4.0	-	-	-	-	-	NiCr11AlWNb	-
	Jessop G81	-	300	79.3	20.0	13.0	-	-	0.05	-	-	1.3	2.3	-	-	-	-	-	-	NiCr20Co18Ti	-
	MAR-M 200	-	-	69.4	9.0	10.0	-	-	0.15	-	-	5.0	2.0	13.5	-	-	-	-	-	NiW13Co10Cr9AlTi	-

TECHNICAL DATA

COMPARISON OF WORK-PIECE (NI-BASED HEAT RESISTANT ALLOYS)

Material Condition	Commercial designation	Hardness Brinell HB		Nominal composition Approximate content in %											USA		UK	France	Germany		Others
		Ann.	Aged	Ni	Cr	Co	Fe	Mo	C	Mn	Si	Al	Ti	Others	SAE	AMS	BS	AFNOR	Werkst.-Nr	DIN1706	
Co-based Alloys	Air Resist 13	-	-	1.0	-	79.6	2.5	-	11.0	-	-	3.5	-	4.12	-	-	-	-	-	-	-
	Air Resist 213	-	-	-	19.0	65.8	-	-	4.7	-	-	3.5	-	6.68	-	-	-	-	-	-	-
	Altemp S 816	-	-	20.0	20.0	47.6	-	4.0	4.0	-	-	-	-	0.4	-	(5534)	-	-	LW2.4989	CoCr20Ni20W	-
	FSX 414	-	-	10.0	29.0	52.8	1.0	-	7.0	-	-	-	-	0.25	-	-	-	-	-	-	-
	Haynes 36	-	-	10.0	18.5	52.8	2.0	-	14.5	1.2	0.6	-	-	0.4	-	-	-	-	-	CoCr19W14NiB	-
	Haynes 151	-	-	-	20.0	65.6	-	-	12.8	0.5	0.5	-	0.15	0.47	-	-	-	-	-	CoCr20W13	-
	HS 25	-	-	10.0	20.0	48.4	3.0	-	15.0	1.5	2.0	-	-	0.1	-	5759	-	KC20WN	LW2.4964	CoCr20W15Ni	-
	HS 30	-	-	16.0	24.0	51.4	1.0	6.0	-	0.6	0.6	-	-	0.4	5380	-	-	-	-	CoCr25NiW	R30030
	HS 31	-	-	10.0	25.0	53.8	1.5	-	8.0	0.6	0.8	-	-	0.4	5382	-	3146	-	LW2.4670	CoCr25NiW	R30031
	HS 36	-	-	10.0	18.0	53.1	2.0	-	15.0	1.5	-	-	-	0.4	-	-	-	-	-	CoCr19W14NiB	-
	Jessop 832	-	-	12.0	19.0	44.0	17.0	2.0	-	0.8	0.3	-	-	3.5	-	-	-	-	-	CoCr19Fe16NiMoVNb	-
	Jessop 834	-	-	12.0	19.0	42.0	20.0	2.0	-	-	-	-	-	6.5	-	-	-	-	-	CoCr19Fe20NiMoVNb	-
	Jessop 865	-	-	10.5	25.5	53.0	2.0	-	7.5	0.6	0.6	-	-	0.45	-	-	-	-	-	CoCr25NiW	-
	Jessop 875	-	-	-	21.0	66.0	-	-	11.0	-	-	-	-	2.45	-	-	-	-	-	CoCr21W11Nb	-
	Jessop 887	-	-	10.0	20.0	50.0	3.0	-	15.0	0.5	1.5	-	-	0.1	-	-	-	-	-	CoCr20W15Ni	-
	Jetalloy 209	-	-	10.0	20.0	52.0	1.0	-	15.0	-	-	-	2.0	0.02	-	-	-	-	-	-	-
	L-251	-	-	10.0	19.0	56.0	1.0	-	14.0	-	-	-	-	0.4	-	-	-	-	-	-	-
	L-605	-	-	10.0	20.0	51.0	1.6	-	15.0	1.5	0.6	-	-	0.1	-	5759	-	-	2.4964	CoCr20W15Ni	R30605
	M 203	-	-	25.0	20.0	38.0	1.6	-	12.0	0.8	1.0	0.7	2.0	1.67	-	-	-	-	-	-	-
	M 204	-	-	25.0	18.0	42.0	1.6	-	12.0	-	-	-	-	1.27	-	-	-	-	-	-	-
	M 205	-	-	25.0	18.0	40.0	1.6	-	12.0	-	-	2.7	-	1.67	-	-	-	-	-	-	-
	MAR-M 302	-	-	-	21.5	57.0	0.75	-	10.0	0.1	0.2	-	-	10.0	-	-	-	-	-	CoCrW10TaZrB	-
	MAR-M 322	-	-	-	21.5	60.0	0.75	-	9.0	0.1	0.1	-	0.75	7.7	-	-	-	-	-	CoCr22W9TaZrNb	-
	MAR-M 509	-	-	10.0	23.0	55.0	-	-	7.0	0.05	0.05	-	0.2	4.6	-	-	3146-3	-	-	CoCr24Ni10WTaZrB	-
	MAR-M 905	-	-	20.0	20.0	55.0	-	-	-	-	-	-	0.5	7.65	-	-	-	-	-	-	-
	MAR-M 918	-	-	20.0	20.0	52.0	0.4	-	-	0.1	0.1	-	0.5	7.65	-	-	-	-	-	CoCr20Ni20Ta	-
	Refractaloy 70	-	-	20.0	21.0	46.0	0.5	8.0	4.0	-	-	-	-	0.08	-	-	-	-	-	-	-
	V-36	-	-	20.0	25.0	43.2	2.4	4.0	2.0	0.6	0.5	-	-	2.29	-	-	-	-	-	CoCr25NiMoWNb	-
	WI-52	-	-	0.5	21.0	62.6	2.0	-	11.0	0.25	0.25	-	-	2.45	-	-	-	-	-	CoCr12MoW	-
	Jessop X-40	-	-	10.5	25.5	53.0	1.5	-	7.5	0.75	0.75	-	-	0.5	-	5382	3156-2	-	LW2.4670	CoCr25NiW	-
	Jessop X-45	-	-	10.5	25.5	54.7	2.0	-	7.0	-	-	-	-	0.25	-	-	-	-	-	-	-
	Jessop X-50	-	-	20.5	25.5	40.3	4.0	-	12.0	-	-	-	-	0.75	-	-	-	-	-	-	-
	Jessop X-63	-	-	10.0	25.0	57.6	1.0	6.0	-	-	-	-	-	0.45	-	-	-	-	-	-	-
Annealed or SolutionTtreated	J 1650	-	-	27.0	19.0	38.0	-	-	12.0	-	-	-	-	0.2	-	-	-	-	-	-	-
In Aged Condition	Haynes 25	-	-	10.0	20.0	49.0	3.0	-	15.0	0.5	0.5	-	-	0.1	5537C	5759	-	KC20WN	LW2.4964	CoCr20W15Ni	-
	Haynes 188	-	-	22.0	22.0	38.0	2.5	-	14.0	0.4	0.4	-	-	0.1	-	5772	-	KC22WN	-	CoCr22W14Ni	-
	HS 6	-	-	2.5	28.0	60.5	3.0	-	5.0	-	-	-	-	1.0	-	5373	-	-	-	-	R30006
	HS 21	-	-	3.0	27.0	62.6	2.0	5.0	-	0.6	0.6	-	-	0.25	-	5385	3531	-	-	CoCr29Mo	R30021
	J1570	-	-	28.0	19.0	39.0	2.0	-	7.0	-	-	-	-	-	-	-	-	-	-	-	-

UNION MATERIALS

CUTTING TOOLS

B

ENDMILL & DRILL

APPLICATION INDEX

Zamus Star

Inch Size

Metric Size

Zamus Plus

Inch Size

Metric Size

Zamus Classic

Inch Size

Metric Size

Zamus Thunder

Inch Size

Metric Size

Zamus Sus-Mate

Metric Size

PART. B
ENDMILL & DRILL

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Zamus Copper-Mate

Metric Size

BC502	RC502
	
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Zamus Gra-Mate

Metric Size

G	GE
	
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Alu-Wave Series

Metric Size

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AF313

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Standard Endmill

Metric Size

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EB302	EB304	EB322	EB324	BB302
				
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Power Max Drill

PF503	PF505	SF503	SF505	P503A(F)	PI503A(F)	PI505A(F)
						
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Power Drill

PDS	PDM	PDSI	PDMI
			
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Solid Spiral Drill

SSD	SSDL
	
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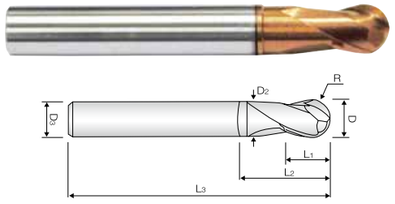
ZAMUS STAR SERIES

INCH / METRIC

DA702



2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

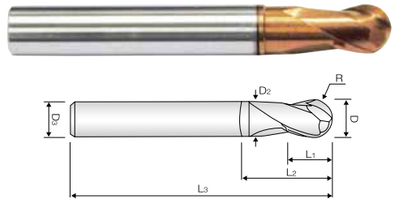
- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Excellent workpiece finishes.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
DA702001	1/32	R1/64	1/32	1/16	2	.029	1/4	●
DA702002	1/16	R1/32	1/16	1/8	2	.059	1/4	●
DA702003	3/32	R3/64	3/32	3/16	2	.090	1/4	●
DA702004	1/8	R1/16	1/8	1/4	2-1/2	.121	1/4	●
DA702006	3/16	R3/32	3/16	3/8	3	.184	1/4	●
DA702008	1/4	R1/8	1/4	1/2	3-1/2	.246	1/4	●
DA702010	5/16	R5/32	5/16	5/8	4	.309	5/16	●
DA702012	3/8	R3/16	3/8	3/4	4	.371	3/8	●
DA702016	1/2	R1/4	1/2	1	4-1/2	.496	1/2	●

Diameter	Tolerance of Radius(Inch)	Tolerance of Shank Dia.
up to 1/4	±.0002	h6
over 1/4	±.0004	

* For the items produced from 1st. 2010, apply to these tolerance.

DB702



2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

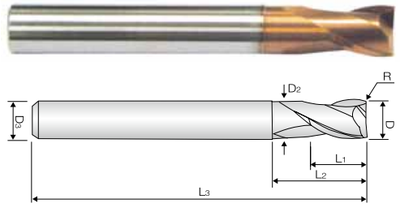
- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Excellent workpiece finishes.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
DB702005	0.5	0.25	0.7	-	40	-	4	●
DB702006	0.6	0.3	0.9	-	40	-	4	●
DB702007	0.7	0.35	1.1	-	40	-	4	●
DB702008	0.8	0.4	1.2	-	40	-	4	●
DB702009	0.9	0.45	1.4	-	40	-	4	●
DB702010	1	0.5	1.5	3	50	0.95	6	●
DB702015	1.5	0.75	2	4	50	1.45	6	●
DB702020	2	1	2.5	5	50	1.9	6	●
DB702025	2.5	1.25	3	7	50	2.45	6	●
DB702030S	3	1.5	4	10	50	2.9	6	●
DB702030	3	1.5	4	10	60	2.9	6	●
DB702031	3	1.5	4	10	70	2.9	6	●
DB702040S	4	2	5	10	50	3.7	6	●
DB702040	4	2	5	10	60	3.7	6	●
DB702041	4	2	5	10	70	3.7	6	●
DB702050	5	2.5	6	12	60	4.7	6	●
DB702060	6	3	7	12	60	5.6	6	●
DB702061	6	3	7	12	90	5.9	6	●
DB702080	8	4	9	15	70	7.4	8	●
DB702081	8	4	9	15	100	7.9	8	●
DB702100	10	5	11	25	75	9.4	10	●
DB702101	10	5	11	25	100	9.9	10	●
DB702120	12	6	12	25	80	11.4	12	●
DB702121	12	6	12	25	110	11.9	12	●

Diameter	Tolerance of Radius(Inch)	Tolerance of Shank Dia.
up to 6	±0.005	h6
over 6	±0.01	

* For the items produced from 1st. 2010, apply to these tolerance.

ZE702



2 FLUTE, STUB CUT LENGTH with EXTENDED NECK

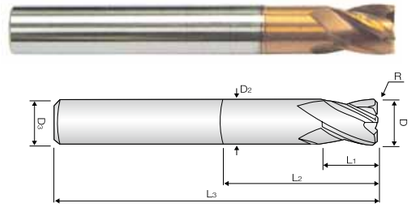
- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Corner radius against chipping in high speed machining.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZE702003	0.3	-	0.5	-	40	-	4	●
ZE702004	0.4	-	0.7	-	40	-	4	●
ZE702005	0.5	0.05	1	-	40	-	4	●
ZE702006	0.6	0.05	1.2	-	40	-	4	●
ZE702007	0.7	0.05	1.4	-	40	-	4	●
ZE702008	0.8	0.05	1.6	-	40	-	4	●
ZE702009	0.9	0.05	2	-	40	-	4	●
ZE702010S4	1	0.1	1.5	-	40	-	4	●
ZE702010	1	0.1	1.5	-	40	-	6	●
ZE7020 15	1.5	0.1	2.2	-	40	-	6	●
ZE702020S4	2	0.1	3	6	40	1.9	4	●
ZE702020	2	0.1	3	6	40	1.9	6	●
ZE702025	2.5	0.1	4	6	40	2.4	6	●
ZE702030	3	0.1	4	7	45	2.9	6	●
ZE702035	3.5	0.1	6	9	45	3.3	6	●
ZE702040	4	0.1	6	9	45	3.8	6	●
ZE702045	4.5	0.1	6	10	45	4.3	6	●
ZE702050	5	0.2	6	11	50	4.8	6	●
ZE702060	6	0.2	7	14	50	5.8	6	●
ZE702080	8	0.2	9	18	60	7.8	8	●
ZE702100	10	0.2	12	25	75	9.7	10	●
ZE702120	12	0.3	15	30	75	11.7	12	●
ZE702160	16	0.3	18	38	90	15.7	16	●
ZE702200	20	0.3	24	45	100	19.7	20	●

Tolerance of Mill Dia. (mm)		Tolerance of Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

* For the items produced from 1st. 2010, apply to these tolerance.

ZE704



4 FLUTE, STUB CUT LENGTH with EXTENDED NECK

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Corner radius against chipping in high speed machining.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZE704010S4	1	0.1	1.5	-	40	-	4	●
ZE704010	1	0.1	1.5	-	40	-	6	●
ZE704015	1.5	0.1	2.2	-	40	-	6	●
ZE704020S4	2	0.1	3	6	40	1.9	4	●
ZE704020	2	0.1	3	6	40	1.9	6	●
ZE704025	2.5	0.1	4	6	40	2.4	6	●
ZE704030	3	0.1	4	7	45	2.9	6	●
ZE704035	3.5	0.1	5	9	45	3.3	6	●
ZE704040	4	0.1	5	9	45	3.8	6	●
ZE704045	4.5	0.1	6	10	45	4.3	6	●
ZE704050	5	0.2	6	11	50	4.8	6	●
ZE704060	6	0.2	7	14	50	5.8	6	●
ZE704080	8	0.2	9	18	60	7.8	8	●
ZE704100	10	0.2	12	25	75	9.7	10	●
ZE704120	12	0.3	15	30	75	11.7	12	●
ZE704160	16	0.3	18	38	90	15.7	16	●
ZE704200	20	0.3	24	45	100	19.7	20	●

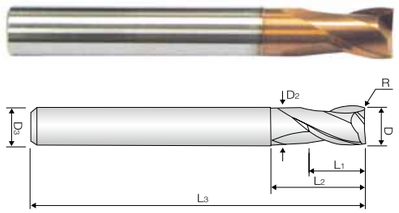
Tolerance of Mill Dia. (mm)		Tolerance of Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS STAR SERIES

INCH

ZE752



2 FLUTE, STUB CUT LENGTH with EXTENDED NECK

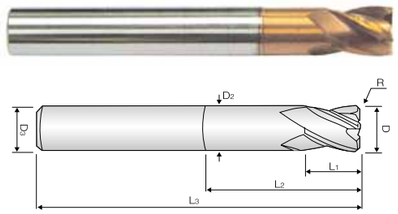
- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Corner radius(**below 0.05**) against chipping in high speed machining.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZE752010S4	1	0.05	1.5	-	40	-	4	●
ZE752010	1	0.05	1.5	-	40	-	6	●
ZE7520 15	1.5	0.05	2.2	-	40	-	6	●
ZE752020S4	2	0.05	3	6	40	1.9	4	●
ZE752020	2	0.05	3	6	40	1.9	6	●
ZE752025	2.5	0.05	4	6	40	2.4	6	●
ZE752030	3	0.05	4	7	45	2.9	6	●
ZE752035	3.5	0.05	6	9	45	3.3	6	●
ZE752040	4	0.05	6	9	45	3.8	6	●
ZE752045	4.5	0.05	6	10	45	4.3	6	●
ZE752050	5	0.05	6	11	50	4.8	6	●
ZE752060	6	0.05	7	14	50	5.8	6	●
ZE752080	8	0.05	9	18	60	7.8	8	●
ZE752100	10	0.05	12	25	75	9.7	10	●
ZE752120	12	0.05	15	30	75	11.7	12	●

Tolerance of Mill Dia. (mm)		Tolerance of Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

* For the items produced from 1st. 2010, apply to these tolerance.

ZE754



4 FLUTE, STUB CUT LENGTH with EXTENDED NECK

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Corner radius(**below 0.05**) against chipping in high speed machining.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZE754020S4	2	0.05	3	6	40	1.9	4	●
ZE754020	2	0.05	3	6	40	1.9	6	●
ZE754025	2.5	0.05	4	6	40	2.4	6	●
ZE754030	3	0.05	4	7	45	2.9	6	●
ZE754035	3.5	0.05	5	9	45	3.3	6	●
ZE754040	4	0.05	5	9	45	3.8	6	●
ZE754045	4.5	0.05	6	10	45	4.3	6	●
ZE754050	5	0.05	6	11	50	4.8	6	●
ZE754060	6	0.05	7	14	50	5.8	6	●
ZE754080	8	0.05	9	18	60	7.8	8	●
ZE754100	10	0.05	12	25	75	9.7	10	●
ZE754120	12	0.05	15	30	75	11.7	12	●

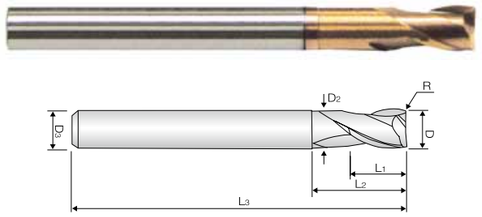
Tolerance of Mill Dia. (mm)		Tolerance of Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS STAR SERIES

METRIC

ZR702



2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner “R” and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR7020100104	1	0.1	1.5	4	50	0.95	6	●
ZR7020100106				6				●
ZR7020100204		0.2		4				●
ZR7020100206				6				●
ZR7020100210				10				●
ZR7020100212				12				●
ZR7020120208	1.2	0.2	2	8	50	1.15	6	●
ZR7020120212				12				●
ZR7020150204	1.5	0.2	2.5	4	50	1.45	6	●
ZR7020150206				6				●
ZR7020150208				8				●
ZR7020150210				10				●
ZR7020150215				15				●
ZR7020200108	2	0.1	3	8	50	1.9	6	●
ZR7020200112				12				●
ZR7020200206		0.2		6				●
ZR7020200209				9				●
ZR7020200216				16				●
ZR7020200306		0.3		6				●
ZR7020200506		0.5		6				●
ZR7020200509				9				●
ZR7020200512				12				●
ZR7020200516				16				●
ZR7020300108	3	0.1	4	8	55	2.9	6	●
ZR7020300112				12				●
ZR7020300209		0.2		9				●
ZR7020300309		0.3		9				●
ZR7020300312				12				●
ZR7020300314				14				●
ZR7020300509		0.5		9				●
ZR7020300516				16				●
ZR7020300520				20				●

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR7020400212	4	0.2	5	12	55	3.8	6	●
ZR7020400216				16				●
ZR7020400220				20				●
ZR7020400312		0.3		12				●
ZR7020400316				16				●
ZR7020400512		0.5		12				●
ZR7020400516				16				●
ZR7020400520				20				●
ZR7020500318	5	0.3	6	18	60	4.8	6	●
ZR7020600320	6	0.3	7	20	60	5.8	6	●
ZR7020600520		0.5		20				●
ZR7020601020		1		20				●
ZR7020800325	8	0.3	9	25	60	7.8	8	●
ZR7020800525		0.5		25				●
ZR7020801025		1		25				●
ZR7021000332	10	0.3	11	32	70	9.7	10	●
ZR7021000532		0.5		32				●
ZR7021001032		1		32				●
ZR7021200538	12	0.5	12	38	80	11.7	12	●
ZR7021201038		1		38				●

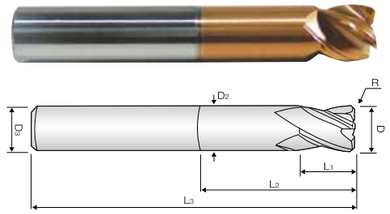
Diameter	Tolerance of Radius(Inch)	Tolerance of Shank Dia.
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS STAR SERIES

METRIC

ZS1(2)04



4 FLUTE, CORNER RADIUS BROKEN INDEX

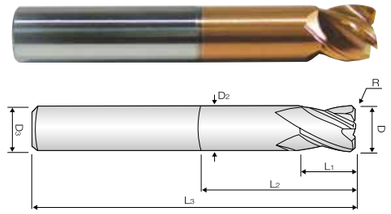
- The impacting debut of new type endmill for high hardened steels up to HRc70 and high speed machining up to 200m/min.
- High precision and excellent surface due to each 4F unequal index geometry.
- Longer tool life over 50% as reducing chatter and resonance.

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZS104030	3	-	4	7	45	2.9	6	●
ZS204030	3	0.1	4	7	45	2.9	6	●
ZS104040	4	-	5	9	45	3.8	6	●
ZS204040	4	0.1	5	9	45	3.8	6	●
ZS104060	6	-	7	14	50	5.8	6	●
ZS204060	6	0.2	7	14	50	5.8	6	●
ZS104080	8	-	9	18	60	7.8	8	●
ZS204080	8	0.2	9	18	60	7.8	8	●
ZS104100	10	-	12	25	75	9.7	10	●
ZS204100	10	0.2	12	25	75	9.7	10	●
ZS104120	12	-	15	30	75	11.7	12	●
ZS204120	12	0.3	15	30	75	11.7	12	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZS204



4 FLUTE, CORNER RADIUS BROKEN INDEX

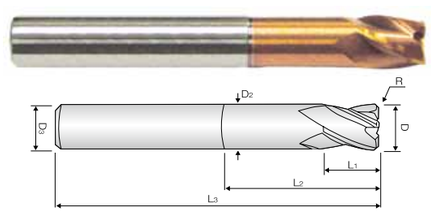
- The impacting debut of new type endmill for high hardened steels up to HRc70 and high speed machining up to 200m/min.
- High precision and excellent surface due to each 4F unequal index geometry.
- Longer tool life over 50% as reducing chatter and resonance.

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZS2040300309	3	0.3	4	9	55	2.9	6	●
ZS2040300312		0.3		12				●
ZS2040300316		0.3		16				●
ZS2040400312	4	0.3	5	12	55	3.8	6	●
ZS2040400316		0.3		16				●
ZS2040400320		0.3		20				●
ZS2040400512		0.5		12				●
ZS2040400516		0.5		16				●
ZS2040400520		0.5		20				●
ZS2040401012		1.0		12				●
ZS2040600520	6	0.5	7	20	60	5.8	6	●
ZS2040601020		1.0						●
ZS2040601520		1.5						●
ZS2040800525	8	0.5	9	25	60	7.8	8	●
ZS2040801025		1.0						●
ZS2040801525		1.5						●
ZS2040802025		2.0						●
ZS2041000532	10	0.5	11	32	75	9.7	10	●
ZS2041001032		1.0						●
ZS2041001532		1.5						●
ZS2041002032		2.0						●
ZS2041200538	12	0.5	12	38	75	11.7	12	●
ZS2041201038		1.0						●
ZS2041201538		1.5						●
ZS2041202038		2.0						●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR704



4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

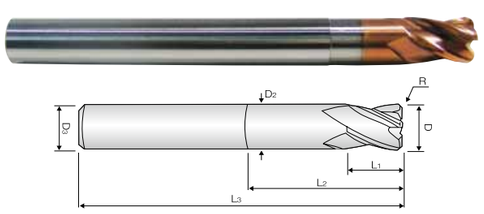
- Applied various corner “R” and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZR7040200208	2	0.2	3	8	50	1.9	6	●
ZR7040300309	3	0.3	4	9	55	2.9	6	●
ZR7040300312		0.3		12				●
ZR7040300316		0.3		16				●
ZR7040300509		0.5		9				●
ZR7040300516		0.5		16				●
ZR7040300520		0.5		20				●
ZR7040400212	4	0.2	5	12	55	3.8	6	●
ZR7040400312		0.3		12				●
ZR7040400512		0.5		12				●
ZR7040400516		0.5		16				●
ZR7040400520		0.5		20				●
ZR7040600520	6	0.5	7	20	60	5.8	6	●
ZR7040601020		1.0		20				●
ZR7040800525	8	0.5	9	25	60	7.8	8	●
ZR7040801025		1.0		25				●
ZR7041000532	10	0.5	11	32	70	9.7	10	●
ZR7041001032		1.0		32				●
ZR7041200538	12	0.5	12	38	80	11.7	12	●
ZR7041201038		1.0		38				●

Tolerance of Mill Dia. (mm)		Tolerance of Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

* For the items produced from 1st. 2010, apply to these tolerance.

ZR724



4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with LONG SHANK

- Applied various corner “R” and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZR7240600520	6	0.5	9	20	90	5.8	6	●
ZR7240601020		1.0						●
ZR7240800525	8	0.5	12	25	100	7.7	8	●
ZR7240801025		1.0						●
ZR7241000532	10	0.5	15	32	100	9.7	10	●
ZR7241001032		1.0						●
ZR7241002032		2.0						●
ZR7241200538	12	0.5	18	38	110	11.7	12	●
ZR7241201038		1.0						●
ZR7241202038		2.0						●

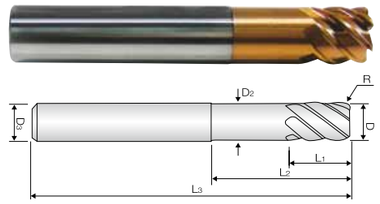
Tolerance of Mill Dia. (mm)		Tolerance of Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS STAR SERIES

METRIC

ZR706



6 FLUTE, 45° HELIX STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner “R” and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR7060600314	6	0.3	6	14	50	5.8	6	●
ZR7060600514	6	0.5	6	14	50	5.8	6	●
ZR7060800524	8	0.5	8	24	60	7.8	8	●
ZR7060801024	8	1	8	24	60	7.8	8	●
ZR7061000530	10	0.5	10	30	70	9.8	10	●
ZR7061001030	10	1	10	30	70	9.8	10	●
ZR7061200530	12	0.5	12	30	75	11.8	12	●
ZR7061201030	12	1	12	30	75	11.8	12	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE712

2 FLUTE, 35° HELIX REGULAR LENGTH

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE712010	1	3	40	6	●
ZE712015	1.5	4	40	6	●
ZE712020	2	5	40	6	●
ZE712025	2.5	6	40	6	●
ZE712030	3	8	45	6	●
ZE712035	3.5	10	45	6	●
ZE712040	4	10	45	6	●
ZE712045	4.5	11	45	6	●
ZE712050	5	13	50	6	●
ZE712055	5.5	13	50	6	●
ZE712060	6	13	50	6	●
ZE712065	6.5	16	60	8	●
ZE712070	7	18	60	8	●
ZE712080	8	19	60	8	●
ZE712100	10	22	70	10	●
ZE712120	12	26	75	12	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS STAR SERIES

METRIC

ZE714

4 FLUTE, 45° HELIX REGULAR LENGTH

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE714020	2	5	40	6	●
ZE714025	2.5	6	40	6	●
ZE714030	3	8	45	6	●
ZE714040	4	10	45	6	●
ZE714050	5	13	50	6	●
ZE714060	6	13	50	6	●
ZE714080	8	19	60	8	●
ZE714100	10	22	70	10	●
ZE714120	12	26	75	12	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE716

6 FLUTE, 50° HELIX REGULAR LENGTH

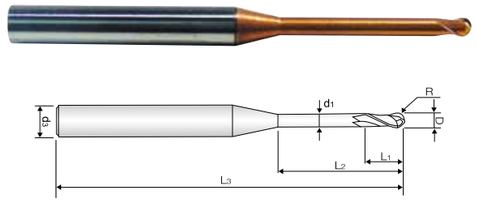
- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE716060	6	13	50	6	●
ZE716080	8	18	60	8	●
ZE716100	10	22	70	10	●
ZE716120	12	26	75	12	●
ZE716160	16	35	90	16	●
ZE716200	20	44	100	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZSLNB



For RIB PROCESSING

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Long neck design for deep machining near walls.

EDP. No.	Dimension(mm)							STOCK
	R	D	L1	L2	L3	D2	D3	
ZSLNB2001-0.2	0.05	0.1	0.2	0.08	0.08	45	4	●
ZSLNB2001-0.3			0.3					●
ZSLNB2001-0.5			0.5					●
ZSLNB2002-0.5	0.1	0.2	0.5	0.15	0.17	50	4	●
ZSLNB2002-1			1					●
ZSLNB2002-1.5			1.5					●
ZSLNB2002-2			2.					●
ZSLNB2002-2.5			2.5					●
ZSLNB2002-3.0			3					●
ZSLNB2003-1	0.15	0.3	1	0.25	0.27	50	4	●
ZSLNB2003-1.5			1.5					●
ZSLNB2003-2			2					●
ZSLNB2003-2.5			2.5					●
ZSLNB2003-3			3					●
ZSLNB2004-1	0.2	0.4	1	0.3	0.37	50	4	●
ZSLNB2004-1.5			1.5					●
ZSLNB2004-2			2					●
ZSLNB2004-2.5			2.5					●
ZSLNB2004-3			3					●
ZSLNB2004-3.5			3.5					●
ZSLNB2004-4			4					●
ZSLNB2004-4.5			4.5					●
ZSLNB2005-1	0.25	0.5	1	0.35	0.47	50	4	●
ZSLNB2005-2			2					●
ZSLNB2005-3			3					●
ZSLNB2005-4			4					●
ZSLNB2005-5			5					●
ZSLNB2005-6			6					●
ZSLNB2005-7			8					●
ZSLNB2006-1	0.3	0.6	1	0.4	0.57	50	4	●
ZSLNB2006-2			2					●
ZSLNB2006-3			3					●
ZSLNB2006-4			4					●
ZSLNB2006-5			5					●
ZSLNB2006-6			6					●
ZSLNB2006-7			7					●
ZSLNB2006-8			8					●
ZSLNB2006-9			9					●
ZSLNB2006-10			10					●
ZSLNB2006-12			12					●
ZSLNB2008-2	0.4	0.8	2	0.5	0.77	50	4	●
ZSLNB2008-4			4					●
ZSLNB2008-5			5					●
ZSLNB2008-6			6					●
ZSLNB2008-8			8					●
ZSLNB2008-10			10					●

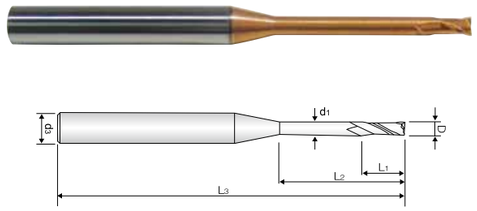
EDP. No.	Dimension(mm)							STOCK
	R	D	L1	L2	L3	D2	D3	
ZSLNB2010-2	0.5	1	2	0.8	0.96	50	4	●
ZSLNB2010-3			3					●
ZSLNB2010-4			4					●
ZSLNB2010-5			5					●
ZSLNB2010-6			6					●
ZSLNB2010-7			7					●
ZSLNB2010-8			8					●
ZSLNB2010-9			9					●
ZSLNB2010-10			10					●
ZSLNB2010-12			12			55		●
ZSLNB2010-14			14					●
ZSLNB2010-16			16			60		●
ZSLNB2010-18			18					●
ZSLNB2010-20			20					●
ZSLNB2012-8	0.6	1.2	8	1.1	1.15	50	4	●
ZSLNB2012-12			12			55		●
ZSLNB2014-8	0.7	1.4	8	1.3	1.34	50	4	●
ZSLNB2014-12			12			55		●
ZSLNB2014-16			16					●
ZSLNB2015-4	0.75	1.5	4	1.35	1.44	50	4	●
ZSLNB2015-6			6					●
ZSLNB2015-8			8					●
ZSLNB2015-10			10					●
ZSLNB2015-12			12			55		●
ZSLNB2015-16			16					●
ZSLNB2015-20			20			60		●
ZSLNB2016-8	0.8	1.6	8	1.4	1.54	50	4	●
ZSLNB2016-12			12			55		●
ZSLNB2016-16			16					●
ZSLNB2016-20			20			60		●
ZSLNB2018-8	0.9	1.8	8	1.6	1.73	50	4	●
ZSLNB2018-12			12			55		●
ZSLNB2018-16			16					●
ZSLNB2018-20			20			60		●

EDP. No.	Dimension(mm)							STOCK
	R	D	L1	L2	L3	D2	D3	
ZSLNB2020-3	1	2	3	1.7	1.92	50	4	●
ZSLNB2020-4			4					●
ZSLNB2020-6			6					●
ZSLNB2020-8			8					●
ZSLNB2020-10			10					●
ZSLNB2020-12			12			55		●
ZSLNB2020-14			14					●
ZSLNB2020-16			16					●
ZSLNB2020-18			18			60		●
ZSLNB2020-20			20					●
ZSLNB2020-22			22			60		●
ZSLNB2020-25			25			65		●
ZSLNB2020-30			30			70		●
ZSLNB2020-35			35			75		●
ZSLNB2020-40			40			80		●
ZSLNB2030-8	1.5	3	8	2.5	2.88	55	6	●
ZSLNB2030-10			10					●
ZSLNB2030-13			13			60		●
ZSLNB2030-16			16					●
ZSLNB2030-20			20			65		●
ZSLNB2030-25			25			70		●
ZSLNB2030-30			30			75		●
ZSLNB2030-35			35			80		●
ZSLNB2040-10	2	4	10	3	3.9	55	6	●
ZSLNB2040-13			13			60		●
ZSLNB2040-16			16					●
ZSLNB2040-20			20			65		●
ZSLNB2040-25			25			70		●
ZSLNB2040-30			30			75		●
ZSLNB2040-35			35			80		●
ZSLNB2040-40			40					●
ZSLNB2040-45			45			90		●
ZSLNB2040-50			50			100		●
ZSLNB2050-20	2.5	5	20	3.5	4.9	65	6	●
ZSLNB2050-25			25			70		●
ZSLNB2050-30			30			75		●
ZSLNB2050-35			35			80		●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
±0.005	h5

* For the items produced from 1st. 2010, apply to these tolerance.

ZSLNS



For RIB PROCESSING

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Long neck design for deep machining near walls.

EDP. No.	Dimension(mm)						STOCK
	D	L_2	L_1	d_1	L_3	d_3	
ZSLNS2001-1.5	0.1	0.3	0.15	0.08	45	4	●
ZSLNS2001-0.5		0.5					●
ZSLNS2001-1		1					●
ZSLNS2002-0.5	0.2	0.5	0.3	0.17	50	4	●
ZSLNS2002-1		1					●
ZSLNS2002-1.5		1.5					●
ZSLNS2003-1	0.3	1	0.45	0.27	50	4	●
ZSLNS2003-1.5		1.5					●
ZSLNS2003-2		2					●
ZSLNS2003-2.5		2.5					●
ZSLNS2003-3		3					●
ZSLNS2004-1	0.4	1	0.6	0.37	50	4	●
ZSLNS2004-1.5		1.5					●
ZSLNS2004-2		2					●
ZSLNS2004-2.5		2.5					●
ZSLNS2004-3		3					●
ZSLNS2004-3.5		3.5					●
ZSLNS2004-4		4					●
ZSLNS2004-5		5					●
ZSLNS2004-6		6					●
ZSLNS2005-1	0.5	1	0.75	0.47	50	4	●
ZSLNS2005-1.5		1.5					●
ZSLNS2005-2		2					●
ZSLNS2005-2.5		2.5					●
ZSLNS2005-3		3					●
ZSLNS2005-4		4					●
ZSLNS2005-5		5					●
ZSLNS2005-6		6					●
ZSLNS2005-8		8					●
ZSLNS2006-2	0.6	2	0.9	0.57	50	4	●
ZSLNS2006-4		4					●
ZSLNS2006-6		6					●
ZSLNS2006-8		8					●
ZSLNS2006-10		10					●
ZSLNS2007-2	0.7	2	1.05	0.67	50	4	●
ZSLNS2007-4		4					●
ZSLNS2007-6		6					●
ZSLNS2007-8		8					●
ZSLNS2007-10		10					●
ZSLNS2008-4	0.8	4	1.2	0.77	50	4	●
ZSLNS2008-6		6					●
ZSLNS2008-8		8					●
ZSLNS2008-10		10					●
ZSLNS2008-12		12			55		●
ZSLNS2009-6	0.9	6	1.35	0.86	50	4	●
ZSLNS2009-8		8					●
ZSLNS2009-10		10					●
ZSLNS2009-12		12			55		●
ZSLNS2010-2	1	2	1.5	0.96	50	4	●
ZSLNS2010-4		4					●
ZSLNS2010-6		6					●
ZSLNS2010-8		8					●
ZSLNS2010-10		10					●
ZSLNS2010-12		12			55		●
ZSLNS2010-14		14					●
ZSLNS2010-16		16			60		●
ZSLNS2012-6	1.2	6	1.8	1.15	50	4	●
ZSLNS2012-8		8					●
ZSLNS2012-10		10					●
ZSLNS2012-12		12			55		●
ZSLNS2012-16		16					●
ZSLNS2014-6	1.4	6	2.1	1.34	50	4	●
ZSLNS2014-8		8					●
ZSLNS2014-10		10					●
ZSLNS2014-12		12			55		●
ZSLNS2014-14		14					●
ZSLNS2014-16		16					●
ZSLNS2015-4	1.5	4	2.25	1.44	50	4	●
ZSLNS2015-6		6					●
ZSLNS2015-8		8					●
ZSLNS2015-10		10					●
ZSLNS2015-12		12			55		●
ZSLNS2015-14		14					●
ZSLNS2015-16		16					●
ZSLNS2015-18		18			60		●
ZSLNS2015-20		20					●
ZSLNS2015-25		25			65		●
ZSLNS2016-6	1.6	6	2.4	1.54	50	4	●
ZSLNS2016-8		8					●
ZSLNS2016-10		10					●
ZSLNS2016-12		12			55		●
ZSLNS2016-14		14					●
ZSLNS2016-16		16					●
ZSLNS2016-18		18			60		●
ZSLNS2016-20		20					●

EDP. No.	Dimension(mm)						STOCK
	D	L_2	L_1	d_1	L_3	d_3	
ZSLNS2018-6	1.8	6	2.7	1.73	50	4	●
ZSLNS2018-8		8					●
ZSLNS2018-10		10					●
ZSLNS2018-12		12			55		●
ZSLNS2018-14		14					●
ZSLNS2018-16		16					●
ZSLNS2018-18		18			60		●
ZSLNS2018-20		20					●
ZSLNS2020-4	2	4	3	1.92	50	4	●
ZSLNS2020-6		6					●
ZSLNS2020-8		8					●
ZSLNS2020-10		10					●
ZSLNS2020-12		12			55		●
ZSLNS2020-14		14					●
ZSLNS2020-16		16					●
ZSLNS2020-18		18			60		●
ZSLNS2020-20		20					●
ZSLNS2020-25		25			65		●
ZSLNS2020-30		30			70		●
ZSLNS2025-8	2.5	8	3.75	2.4	50	4	●
ZSLNS2025-12		12			55		●
ZSLNS2025-16		16					●
ZSLNS2025-20		20			60		●
ZSLNS2030-8	3	8	4.5	2.88	55	6	●
ZSLNS2030-12		12			60		●
ZSLNS2030-16		16					●
ZSLNS2030-20		20			65		●
ZSLNS2030-25		25			70		●
ZSLNS2030-30		30			75		●
ZSLNS2030-40		40			90		●
ZSLNS2040-12	4	12	6	3.85	60	6	●
ZSLNS2040-16		16					●
ZSLNS2040-20		20			70		●
ZSLNS2040-25		25					●
ZSLNS2040-30		30			80		●
ZSLNS2040-35		35					●
ZSLNS2040-40		40			90		●

Data → P100

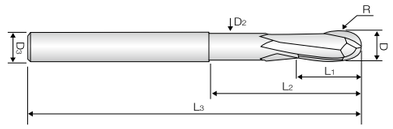
Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.012	h5
0 ~ -0.015	h5

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS PLUS SERIES

INCH / METRIC

DA412



2 FLUTE, 15° HELIX STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

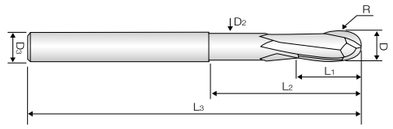
- Designed for high hardened materials up to HRc 62.
- Suitable for high speed machining.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
DA412001	1/32	R 1/64	1/32	1/16	2	.029	1/4	●
DA412002	1/16	R 1/32	1/16	1/8	2	.059	1/4	●
DA412003	3/32	R 3/64	3/32	3/16	2	.090	1/4	●
DA412004	1/8	R 1/16	1/8	1/4	2-1/2	.121	1/4	●
DA412006	3/16	R 3/32	3/16	3/8	3	.184	1/4	●
DA412008	1/4	R 1/8	1/4	1/2	3-1/2	.246	1/4	●
DA412010	5/16	R 5/32	5/16	5/8	4	.309	5/16	●
DA412012	3/8	R 3/16	3/8	3/4	4	.371	3/8	●
DA412016	1/2	R 1/4	1/2	1	4-1/2	.496	1/2	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DB412



2 FLUTE, 15° HELIX STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

- Designed for high hardened materials up to HRc 62.
- Suitable for high speed machining.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
DB412010	1	0.5	1	3	50	4	0.95	●
DB412015	1.5	0.75	2	5	50	4	1.4	●
DB412020	2	1	3	6	50	6	1.9	●
DB412030S	3	1.5	4	8	50	4	2.9	●
DB412030	3	1.5	4	8	50	6	2.9	●
DB412030L	3	1.5	4	8	75	6	2.9	●
DB412040S	4	2	5	10	50	4	3.9	●
DB412040	4	2	5	10	50	6	3.9	●
DB412040L	4	2	5	10	75	6	3.9	●
DB412050	5	2.5	5	10	50	6	4.9	●
DB412060S	6	3	6	12	50	6	5.9	●
DB412060	6	3	6	12	75	6	5.9	●
DB412060L	6	3	6	16	100	6	5.9	●
DB412080	8	4	8	16	60	8	7.9	●
DB412080L	8	4	8	25	100	8	7.9	●
DB412100	10	5	10	20	70	10	9.9	●
DB412100L	10	5	10	30	100	10	9.9	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE512

2 FLUTE, 35° HELIX REGULAR LENGTH

- Designed for high hardened materials up to HRc 62.
- Suitable for high speed machining.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE512010	1	3	40	6	●
ZE512015	1.5	4	40	6	●
ZE512020	2	5	40	6	●
ZE512025	2.5	6	40	6	●
ZE512030	3	8	45	6	●
ZE512035	3.5	10	45	6	●
ZE512040	4	10	45	6	●
ZE512045	4.5	11	45	6	●
ZE512050	5	13	50	6	●
ZE512055	5.5	13	50	6	●
ZE512060	6	13	50	6	●
ZE512065	6.5	16	60	8	●
ZE512070	7	18	60	8	●
ZE512080	8	19	60	8	●
ZE512100	10	22	70	10	●
ZE512120	12	26	75	12	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE514

4 FLUTE, 45° HELIX REGULAR LENGTH

- Designed for high hardened materials up to HRc 62.
- Suitable for high speed machining.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE514020	2	5	40	6	●
ZE514025	2.5	6	40	6	●
ZE514030	3	8	45	6	●
ZE514040	4	10	45	6	●
ZE514050	5	13	50	6	●
ZE514060	6	13	50	6	●
ZE514080	8	19	60	8	●
ZE514100	10	22	70	10	●
ZE514120	12	26	75	12	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS PLUS SERIES

METRIC

ZE516

6 FLUTE, 50° HELIX REGULAR LENGTH

- Designed for high hardened materials up to HRc 62.
- Suitable for high speed machining.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE516060	6	13	50	6	●
ZE516080	8	18	60	8	●
ZE516100	10	22	70	10	●

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE516120	12	26	75	12	●
ZE516160	16	35	90	16	●
ZE516200	20	44	100	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

INCH

DA512

2 FLUTE, LONG LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- For copy-milling machines.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
DA512001	1/32	R1/64	1/32	2-1/2	1/4	●
DA512002	1/16	R1/32	1/16	2-1/2	1/4	●
DA512003	3/32	R3/64	3/32	2-1/2	1/4	●
DA512004	1/8	R1/16	5/16	2-3/8	1/8	●
DA512006	3/16	R3/32	3/8	3-1/8	3/16	●
DA512008	1/4	R1/8	1/2	3-1/2	1/4	●
DA512010	5/16	R5/32	9/16	4	5/16	●
DA512012	3/8	R3/16	3/4	4	3/8	●
DA512016	1/2	R1/4	7/8	4-1/4	1/2	●
DA512020	5/8	R5/16	1-1/4	5-1/2	5/8	●
DA512024	3/4	R3/8	1-1/2	6-1/4	3/4	●
DA512032	1	R1/2	2	7-1/8	1	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DA514

4 FLUTE, LONG LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- For copy-milling machines.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
DA514004	1/8	R1/16	5/16	2-3/8	1/8	●
DA514006	3/16	R3/32	3/8	3-1/8	3/16	●
DA514008	1/4	R1/8	1/2	3-1/2	1/4	●
DA514010	5/16	R5/32	9/16	4	5/16	●
DA514012	3/8	R3/16	3/4	4	3/8	●
DA514016	1/2	R1/4	7/8	4-1/4	1/2	●
DA514020	5/8	R5/16	1-1/4	5-1/2	5/8	●
DA514024	3/4	R 3/8	1-1/2	6-1/4	3/4	●
DA514032	1	R 1/2	2	7-1/8	1	●

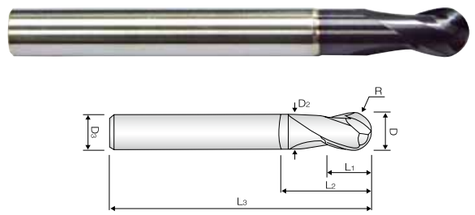
Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

INCH

DA522



2 FLUTE, LONG LENGTH, BALL NOSE with EXTENDED NECK

- Deep slotting milling is possible by reduced neck.
- High efficiency milling is possible in deep slotting with projection of the end mill being long.

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
DA522004	1/8	R1/16	5/16	-	2-3/4	-	1/4	●
DA522006	3/16	R3/32	1/2	-	3-1/8	-	1/4	●
DA522008	1/4	R1/8	1/2	7/8	3-1/8	.242	1/4	●
DA522010	5/16	R5/32	9/16	1-1/16	3-1/2	.305	5/16	●
DA522012	3/8	R3/16	3/4	1-1/4	4	.367	3/8	●
DA522016	1/2	R1/4	7/8	1-3/8	4-1/4	.492	1/2	●
DA522020	5/8	R5/16	1-1/4	2	5-1/2	.617	5/8	●
DA522024	3/4	R3/8	1-1/2	2-1/4	6-1/4	.742	3/4	●
DA522032	1	R1/2	2-1/8	3	7	.992	1	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

MD502

2 FLUTE, MINIATURE, BALL NOSE

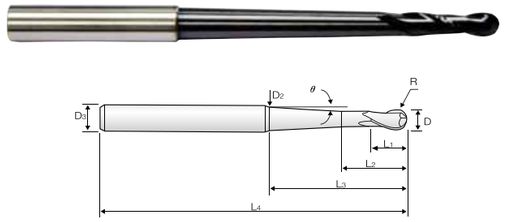
- High precision milling in medical, optical, electronics and aero-space industrials.
- Excellent performance at dry cutting conditon.
- Excellent performance on high hardened steel.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
MD502024	.024	R.012	.043	1-1/2	1/8	●
MD502028	.028	R.014	.060	1-1/2	1/8	●
MD502031	.031	R.0155	.080	1-1/2	1/8	●
MD502035	.035	R.0175	.087	1-1/2	1/8	●
MD502040	.040	R.020	.100	1-1/2	1/8	●
MD502043	.043	R.0215	.118	1-1/2	1/8	●
MD502047	.047	R.0235	.118	1-1/2	1/8	●
MD502052	.052	R.026	.138	1-1/2	1/8	●
MD502055	.055	R.0275	.138	1-1/2	1/8	●
MD502062	.062	R.031	.157	1-1/2	1/8	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.001	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DA542



2 FLUTE, BALL NOSE with TAPER NECK

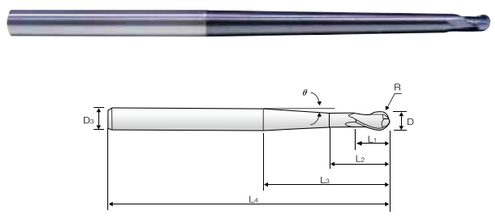
- High efficiency milling is possible in deep slotting with projection of the end mill being long.

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	L_4	θ	STOCK
DA542001	1/16	R1/32	5/32	15/64	7/8	.096	1/4	2-3/8	1°30′	●
DA542002	1/16	R1/32	5/32	15/64	1-5/8	.208	1/4	3-1/8	3°	●
DA542004	1/8	R1/16	1/4	21/64	2-1/16	.216	1/4	3-5/8	1°30′	●
DA542006	3/16	R3/32	3/8	29/64	2-3/8	.288	3/8	4-3/8	1°30′	●
DA542008	1/4	R1/8	1/2	5/8	2-1/16	.325	3/8	4-3/8	1°30′	●
DA542010	5/16	R5/32	9/16	11/16	2-1/16	.385	1/2	4-3/4	1°30′	●
DA542012	3/8	R3/16	11/16	13/16	2-3/8	.458	1/2	5-1/16	1°30′	●
DA542016	1/2	R1/4	7/8	1	3-1/4	.618	3/4	6-3/8	1°30′	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

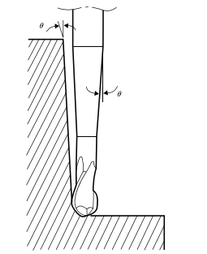
DA552



2 FLUTE, BALL NOSE with PENCIL NECK

- High efficiency milling is possible in deep slotting with projection of the end mill being long.

EDP. No.	D	R	L_1	L_2	L_3	D_3	L_4	θ	STOCK
DA552006	3/16	R3/32	9/16	.659	3-11/32	3/8	7-3/4	2°	●
DA552007	3/16	R3/32	9/16	.666	2-13/16	3/8	6	2° 30′	●
DA552008	1/4	R1/8	3/4	.859	4-7/16	1/2	7-3/4	2°	●
DA552009	1/4	R1/8	3/4	.856	3-23/32	1/2	6	2° 30′	●
DA552010	5/16	R5/32	3/4	.868	4-29/32	1/2	7-3/4	1° 20′	●
DA552011	5/16	R5/32	3/4	.870	3-15/16	1/2	6	1° 45′	●
DA552012	3/8	R3/16	1-3/16	1.326	4-29/32	5/8	7-3/4	2°	●
DA552013	3/8	R3/16	1-3/16	1.325	4-3/16	5/8	6	2° 30′	●
DA552016	1/2	R1/4	1-3/16	1.309	4	5/8	7-3/4	1° 20′	●
DA552017	1/2	R1/4	1-3/16	1.329	3-3/8	5/8	6	1° 45′	●



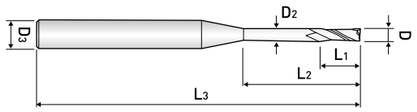
MILLING ON TAPERED WALL

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

WB712

ULTRA FINE | 4 | 130° HELIX | R 3/32" Ø3~Ø6 | R 5/32" Ø9~Ø12 | AlTiN



2 FLUTE, For RIB PROCESSING

- High efficiency milling is possible in deep slotting with projection of the end mill being long.
- Excellent preformance on tool steel, mold steel, alloy steel.

EDP. No.	R	L1	L2	L3	D2	D3	STOCK
WB7120502	0.25	0.5	2	45	0.45	4	●
WB7120503			3				●
WB7120504			4				●
WB7120505			5				●
WB7120506			6				●
WB7120508			8				●
WB7120510			10				●
WB7120602	0.3	0.6	2	45	0.55	4	●
WB7120603			3				●
WB7120604			4				●
WB7120605			5				●
WB7120606			6				●
WB7120608			8				●
WB7120610			10				●
WB7120612			12				●
WB7120702	0.35	0.7	2	45	0.65	4	●
WB7120704			4				●
WB7120708			8				●
WB7120802	0.4	0.8	2	45	0.75	4	●
WB7120804			4				●
WB7120805			5				●
WB7120806			6				●
WB7120807			7				●
WB7120808			8				●
WB7120810			10				●
WB7120812			12				●
WB7120816			16	50			●

EDP. No.	R	L1	L2	L3	D2	D3	STOCK
WB7121003	0.5	0.5	3	45	0.95	4	●
WB7121004			4				●
WB7121005			5				●
WB7121006			6				●
WB7121007			7				●
WB7121008			8				●
WB7121009			9				●
WB7121010			10				●
WB7121012			12				●
WB7121014			14	50			●
WB7121016			16				●
WB7121018			18				●
WB7121020			20	55			●
WB7121022			22	60			●
WB7121025			25				●
WB7121204	0.6	1.2	4	45	1.15	4	●
WB7121206			6				●
WB7121208			8				●
WB7121210			10				●
WB7121212			12				●
WB7121216			16	50			●
WB7121220			20	55			●
WB7121224			24	60			●
WB7121406	0.7	1.4	6	45	1.35	4	●
WB7121408			8				●
WB7121412			12				●
WB7121416			16	50			●
WB7121503	0.75	1.5	3	45	1.45	4	●
WB7121504			4				●
WB7121506			6				●
WB7121508			8				●
WB7121510			10				●
WB7121512			12				●
WB7121514			14	50			●
WB7121516			16				●
WB7121518			18				●
WB7121520			20	55			●
WB7121522			22	60			●
WB7121525			25				●
WB7121530			30	70			●
WB7121535			35				●
WB7121606	0.8	1.6	6	45	1.55	4	●
WB7121608			8				●
WB7121610			10				●
WB7121612			12				●
WB7121616			16	50			●
WB7121620			20	55			●

EDP. No.	R	L1	L2	L3	D2	D3	STOCK
WB7122004	0.9	1.8	6	45	1.75	4	●
WB7122006			8				●
WB7122008			12				●
WB7122010			16	50			●
WB7122012			20	55			●
WB7122014	1	2	4	45	1.95	4	●
WB7122016			6				●
WB7122018			8				●
WB7122020			10				●
WB7122022			12				●
WB7122025			14	50			●
WB7122030			16				●
WB7122035			18	55			●
WB7122040			20				●
WB7122045			22	60			●
WB7122508			25	65			●
WB7122510			30	70			●
WB7122516			35				●
WB7122520			40	80			●
WB7122525			45				●
WB7122530	1.25	2.5	8	50	2.4	4	●
WB7122535			10				●
WB7123006			16				●
WB7123008			20	60			●
WB7123010			25				●
WB7123012			30	70			●
WB7123014			35				●
WB7123016	1.5	3	6	50	2.85	6	●
WB7123018			8				●
DB6123010			10				●
DB6123012			12				●
DB6123014			14	55			●
DB6123016			16				●
DB6123018			18	60			●

ZA502 - REGULAR LENGTH
ZA522 - LONG LENGTH

ULTRA FINE | 4 | 130° HELIX | AlTiN

2 FLUTE, REGULAR & LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZA502004	1/16	3/16	1-1/2	1/8	●
ZA502008	1/8	1/2	1-1/2	1/8	●
ZA502012	3/16	5/8	2	3/16	●
ZA502016	1/4	3/4	2-1/2	1/4	●
ZA502020	5/16	13/16	2-1/2	5/16	●
ZA502024	3/8	1	2-1/2	3/8	●
ZA502032	1/2	1	3	1/2	●
ZA502040	5/8	1-1/4	3-1/2	5/8	●
ZA502048	3/4	1-1/2	4	3/4	●
ZA502064	1	1-1/2	4	1	●

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZA522008	1/8	3/4	2-1/4	1/8	●
ZA522012	3/16	3/4	2-1/2	3/16	●
ZA522016	1/4	1-1/8	3	1/4	●
ZA522020	5/16	1-1/8	3	5/16	●
ZA522024	3/8	1-1/8	3	3/8	●
ZA522032	1/2	2	4	1/2	●
ZA522040	5/8	2-1/4	5	5/8	●
ZA522048	3/4	2-1/4	5	3/4	●
ZA522064	1	2-1/4	5	1	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

INCH

MZ502

2 FLUTE, MINIATURE

- High precision milling in medical, optical, electronics and aero space industries.
- Excellent preformance on high hardened steel.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
MZ502016	.016	.031	1-1/2	1/8	●
MZ502020	.020	.040	1-1/2	1/8	●
MZ502024	.024	.047	1-1/2	1/8	●
MZ502028	.028	.055	1-1/2	1/8	●
MZ502031	.031	.063	1-1/2	1/8	●
MZ502035	.035	.080	1-1/2	1/8	●
MZ502040	.040	.100	1-1/2	1/8	●
MZ502043	.043	.100	1-1/2	1/8	●
MZ502047	.047	.157	1-1/2	1/8	●
MZ502052	.052	.157	1-1/2	1/8	●
MZ502055	.055	.157	1-1/2	1/8	●
MZ502062	.062	.157	1-1/2	1/8	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.001	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZA504 - REGULAR LENGTH
ZA524 - LONG LENGTH

4 FLUTE, REGULAR & LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZA504004	1/16	3/16	1-1/2	1/8	●
ZA504008	1/8	1/2	1-1/2	1/8	●
ZA504012	3/16	5/8	2	3/16	●
ZA504016	1/4	3/4	2-1/2	1/4	●
ZA504020	5/16	13/16	2-1/2	5/16	●
ZA504024	3/8	1	2-1/2	3/8	●
ZA504028	7/16	1	2-3/4	7/16	●
ZA504032	1/2	1	3	1/2	●
ZA504040	5/8	1-1/4	3-1/2	5/8	●
ZA504048	3/4	1-1/2	4	3/4	●
ZA504064	1	1-1/2	4	1	●

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZA524008	1/8	3/4	2-1/4	1/8	●
ZA524012	3/16	3/4	2-1/2	3/16	●
ZA524016	1/4	1-1/8	3	1/4	●
ZA524020	5/16	1-1/8	3	5/16	●
ZA524024	3/8	1-1/8	3	3/8	●
ZA524032	1/2	2	4	1/2	●
ZA524040	5/8	2-1/4	5	5/8	●
ZA524048	3/4	2-1/4	5	3/4	●
ZA524064	1	2-1/4	5	1	●
ZA504048	3/4	1-1/2	4	3/4	●
ZA504064	1	1-1/2	4	1	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

INCH

ZA506(8) - LONG LENGTH
ZA526(8) - EXTRA LONG LENGTH

6&8 FLUTE, 45 HELIX LONG EXTRA LONG LENGTH

- Designed to machine tool steel, hardened materials.
- High speed cutting and finish milling with high feed rate.
- Superior workpiece finishes.
- Superior wear resistant.

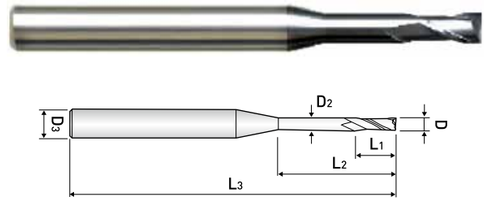
EDP. No.	Dia.	C.L	OAL	SH.Dia.	NO. OF FLUTE	STOCK
ZA506016	1/4	1/2	2-1/4	1/4	6	●
ZA506020	5/16	3/4	2-1/2	5/16	6	●
ZA506024	3/8	7/8	2-7/8	3/8	6	●
ZA506032	1/2	1	3-1/4	1/2	6	●
ZA506040	5/8	1-1/4	3-5/8	5/8	6	●
ZA508048	3/4	1-1/2	4-1/8	3/4	8	●
ZA508064	1	1-3/4	4-1/4	1	8	●

EDP. No.	Dia.	C.L	OAL	SH.Dia.	NO. OF FLUTE	STOCK
ZA506016	1/4	1/2	2-1/4	1/4	6	●
ZA506020	5/16	3/4	2-1/2	5/16	6	●
ZA506024	3/8	7/8	2-7/8	3/8	6	●
ZA506020	5/16	3/4	2-1/2	5/16	6	●
ZA506020	5/16	3/4	2-1/2	5/16	6	●
ZA506024	3/8	7/8	2-7/8	3/8	6	●
ZA506032	1/2	1	3-1/4	1/2	6	●
ZA506040	5/8	1-1/4	3-5/8	5/8	6	●
ZA508048	3/4	1-1/2	4-1/8	3/4	8	●
ZA508064	1	1-3/4	4-1/4	1	8	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

WE712



2 FLUTE, For RIB PROCESSING

- High efficiency milling is possible in deep slotting with projection of the end mill being long.
- Excellent preformance on tool steel, mold steel, alloy steel.

EDP. No.	D	L_1	L_2	L_3	D_2	D_3	STOCK
WE7120402	0.4	0.6	2	45	0.37	4	●
WE7120403			3				●
WE7120404			4				●
WE7120405			5				●
WE7120406			6				●
WE7120408			8				●
WE7120502	0.5	0.7	2	45	0.45	4	●
WE7120503			3				●
WE7120504			4				●
WE7120505			5				●
WE7120506			6				●
WE7120508			8				●
WE7120510			10				●
WE7120602	0.6	0.9	2	45	0.55	4	●
WE7120603			3				●
WE7120604			4				●
WE7120605			5				●
WE7120606			6				●
WE7120608			8				●
WE7120610			10				●
WE7120612			12				●
WE7120702	0.7	1	2	45	0.65	4	●
WE7120704			4				●
WE7120706			6				●
WE7120708			8				●
WE7120710			10				●
WE7120802	0.8	1.2	2	45	0.75	4	●
WE7120804			4				●
WE7120806			6				●
WE7120808			8				●
WE7120810			10				●
WE7120812			12				●

ZAMUS CLASSIC SERIES

INCH

EDP. No.	D	L1	L2	L3	D2	D3	STOCK
WE7120906	0.9	1.4	6	45	0.85	4	●
WE7120908			8				●
WE7120910			10				●
WE7121003	1	1.5	3	45	0.95	4	●
WE7121004			4				●
WE7121005			5				●
WE7121006			6				●
WE7121008			8				●
WE7121010			10				●
WE7121012			12				●
WE7121014			14				●
WE7121016			16	50			●
WE7121018			18				●
WE7121020			20				●
WE7121025			25	60			●
WE7121206	1.2	1.8	6	45	1.15	4	●
WE7121208			8				●
WE7121210			10				●
WE7121212			12				●
WE7121216			16	50			●
WE7121220			20				●
WE7121225			25	60			●
WE7121406	1.4	2.1	6	45	1.35	4	●
WE7121408			8				●
WE7121410			10				●
WE7121412			12				●
WE7121414			14	50			●
WE7121416			16				●
WE7121420			20				●
WE7121506	1.5	2.3	6	45	1.45	4	●
WE7121508			8				●
WE7121510			10				●
WE7121512			12				●
WE7121514			14				●
WE7121516			16	50			●
WE7121518			18	55			●
WE7121520			20				●
WE7121525			25	60			●
WE7121606	1.6	2.5	6	45	1.55	4	●
WE7121608			8				●
WE7121610			10				●
WE7121612			12				●
WE7121614			14	50			●
WE7121616			16				●
WE7121618			18	55			●
WE7121620			20				●

EDP. No.	D	L1	L2	L3	D2	D3	STOCK
WE7121806	1.8	2.8	6	45	1.75	4	●
WE7121808			8				●
WE7121810			10				●
WE7121812			12				●
WE7121814			14	50			●
WE7121816			16				●
WE7121818			18	55			●
WE7121820			20				●
WE7122006	2	3	6	45	1.95	4	●
WE7122008			8				●
WE7122010			10				●
WE7122012			12				●
WE7122014			14	50			●
WE7122016			16				●
WE7122018			18	55			●
WE7122020			20				●
WE7122022			22	60			●
WE7122025			25				●
WE7122030			30	70			●
WE7122035			35				●
WE7122040			40	80			●
WE7122508	2.5	3.7	8	45	2.45	4	●
WE7122510			10				●
WE7122512			12				●
WE7122514			14	50			●
WE7122516			16				●
WE7122518			18	55			●
WE7122520			20				●
WE7122525			25	60			●
WE7122530			30	70			●
WE7122535			35				●
WE7122540			40	80			●
WE7123008	3	4.5	8	45	2.85	6	●
WE7123010			10				●
WE7123012			12				●
WE7123014			14	50			●
WE7123016			16				●
WE7123018			18	55			●
WE7123020			20				●
WE7123025			25	60			●
WE7123030			30	70			●
WE7123035			35	80			●
WE7123040			40	90			●
WE7123045			45				●
WE7123050			50	100			●

ZAMUS CLASSIC SERIES

INCH

EDP. No.	D	L1	L2	L3	D2	D3	STOCK
WE7124010	4	6	10	50	3.85	6	●
WE7124012			12				●
WE7124016			16	60			●
WE7124020			20				●
WE7124025			25	70			●
WE7124030			30				●
WE7124035			35	80			●
WE7124040			40	90			●
WE7124045			45				●
WE7124050			50	100			●
WE7125016	5	7.5	16	60	4.85	6	●
WE7125020			20				●
WE7125025			25	70			●
WE7125030			30				●
WE7125035			35	80			●
WE7125040			40	90			●
WE7125050			45	100			●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR502A

2 FLUTE, STUB LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR502A00408	1/16	R.008	1/8	2-1/4	1/4	●
ZR502A00810	1/8	R.010	1/4	2-1/4	1/4	●
ZR502A00820		R.020				●
ZR502A00830		R.030				●
ZR502A01210	3/16	R.010	3/8	2-1/2	1/4	●
ZR502A01220		R.020				●
ZR502A01230		R.030				●
ZR502A01610	1/4	R.010	1/2	3	1/4	●
ZR502A01620		R.020				●
ZR502A01630		R.030				●
ZR502A02020	5/16	R.020	1/2	3	5/16	●
ZR502A02030		R.030				●
ZR502A02060		R.060				●
ZR502A02090		R.090				●
ZR502A02420	3/8	R.020	5/8	3	3/8	●
ZR502A02430		R.030				●
ZR502A02460		R.060				●
ZR502A02490		R.090				●
ZR502A03220	1/2	R.020	5/8	4	1/2	●
ZR502A03230		R.030				●
ZR502A03260		R.060				●
ZR502A03290		R.090				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

INCH

ZR522A

2 FLUTE, REGULAR LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR522A00408	1/16	R.008	3/16	2-1/4	1/4	●
ZR522A00810	1/8	R.010	1/2	2-1/4	1/4	●
ZR522A00820		R.020				●
ZR522A00830		R.030				●
ZR522A01210	3/16	R.010	5/8	2-1/2	1/4	●
ZR522A01220		R.020				●
ZR522A01230		R.030				●
ZR522A01610	1/4	R.010	3/4	3	1/4	●
ZR522A01620		R.020				●
ZR522A01630		R.030				●
ZR522A02020	5/16	R.020	13/16	3	5/16	●
ZR522A02030		R.030				●
ZR522A02060		R.060				●
ZR522A02090		R.090				●
ZR522A02420	3/8	R.020	1	3	3/8	●
ZR522A02430		R.030				●
ZR522A02460		R.060				●
ZR522A02490		R.090				●
ZR522A02820	7/16	R.020	1	4	7/16	●
ZR522A02830		R.030				●
ZR522A02860		R.060				●
ZR522A02890		R.090				●
ZR522A03220	1/2	R.020	1	4	1/2	●
ZR522A03230		R.030				●
ZR522A03260		R.060				●
ZR522A03290		R.090				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR532A

2 FLUTE, LONG LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR532A01620	1/4	R.020	1-1/8	3	1/4	●
ZR532A01630		R.030				●
ZR532A02020	5/16	R.020	1-1/8	3	5/16	●
ZR532A02030		R.030				●
ZR532A02060		R.060				●
ZR532A02090		R.090				●
ZR532A02420	3/8	R.020	1-1/8	3	3/8	●
ZR532A02430		R.030				●
ZR532A02460		R.060				●
ZR532A02490		R.090				●
ZR532A03220	1/2	R.020	2	4	1/2	●
ZR532A03230		R.030				●
ZR532A03260		R.060				●
ZR532A03290		R.090				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

INCH

ZR504A

4 FLUTE, STUB LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR504A00408	1/16	R.008	1/8	2-1/4	1/4	●
ZR504A00810	1/8	R.010	1/4	2-1/4	1/4	●
ZR504A00820		R.020				●
ZR504A00830		R.030				●
ZR504A01210	3/16	R.010	3/8	2-1/2	1/4	●
ZR504A01220		R.020				●
ZR504A01230		R.030				●
ZR504A01610	1/4	R.010	1/2	3	1/4	●
ZR504A01620		R.020				●
ZR504A01630		R.030				●
ZR504A02020	5/16	R.020	1/2	3	5/16	●
ZR504A02030		R.030				●
ZR504A02060		R.060				●
ZR504A02090		R.090				●
ZR504A02420	3/8	R.020	5/8	3	3/8	●
ZR504A02430		R.030				●
ZR504A02460		R.060				●
ZR504A02490		R.090				●
ZR504A03220	7/16	R.020	5/8	4	1/2	●
ZR504A03230		R.030				●
ZR504A03260		R.060				●
ZR504A03290		R.090				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR524A

4 FLUTE, REGULAR LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR524A00408	1/16	R.008	3/16	2-1/4	1/4	●
ZR524A00810	1/8	R.010	1/2	2-1/4	1/4	●
ZR524A00820		R.020				●
ZR524A00830		R.030				●
ZR524A01210	3/16	R.010	5/8	2-1/2	1/4	●
ZR524A01220		R.020				●
ZR524A01230		R.030				●
ZR524A01610	1/4	R.010	3/4	3	1/4	●
ZR524A01620		R.020				●
ZR524A01630		R.030				●
ZR524A02020	5/16	R.020	13/16	3	5/16	●
ZR524A02030		R.030				●
ZR524A02060		R.060				●
ZR524A02090		R.090				●
ZR524A02420	3/8	R.020	1	3	3/8	●
ZR524A02430		R.030				●
ZR524A02460		R.060				●
ZR524A02490		R.090				●
ZR524A02820	7/16	R.020	1	4	7/16	●
ZR524A02830		R.030				●
ZR524A02860		R.060				●
ZR524A02890		R.090				●
ZR524A03220	1/2	R.020	1	4	1/2	●
ZR524A03230		R.030				●
ZR524A03260		R.060				●
ZR524A03290		R.090				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

INCH

ZR534A

4 FLUTE, LONG LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR534A01620	1/4	R.020	1-1/8	3	1/4	●
ZR534A01630		R.030				●
ZR534A02020	5/16	R.020	1-1/8	3	5/16	●
ZR534A02030		R.030				●
ZR534A02060		R.060				●
ZR534A02090		R.090				●
ZR534A02420	3/8	R.020	1-1/8	3	3/8	●
ZR534A02430		R.030				●
ZR534A02460		R.060				●
ZR534A02490		R.090				●
ZR534A03220	1/2	R.020	2	4	1/2	●
ZR534A03230		R.030				●
ZR534A03260		R.060				●
ZR534A03290		R.090				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR506(8)A

6&8 FLUTE, 45° HELIX, LONG LENGTH, CORNER RADIUS

- Designed to machine tool steel, hardened materials.
- High speed cutting and finish milling with high feed rates.
- Superior workpiece finishes.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	NO. OF FLUTE	STOCK
ZR506A01620	1/4	R.020	1/2	2-1/4	1/4	6	●
ZR506A02020	5/16	R.020	3/4	2-1/2	5/16	6	●
ZR506A02420	3/8	R.020	7/8	2-7/8	3/8	6	●
ZR506A02430	3/8	R.030	7/8	2-7/8	3/8	6	●
ZR506A03220	1/2	R.020	1	3-1/4	1/2	6	●
ZR506A03230	1/2	R.030	1	3-1/4	1/2	6	●
ZR506A04030	5/8	R.030	1-1/4	3-5/8	5/8	6	●
ZR506A04060	5/8	R.060	1-1/4	3-5/8	5/8	6	●
ZR508A04830	3/4	R.030	1-1/2	4-1/8	3/4	8	●
ZR508A04860	3/4	R.060	1-1/2	4-1/8	3/4	8	●
ZR508A04890	3/4	R.090	1-1/2	4-1/8	3/4	8	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

METRIC

DB512

2 FLUTE, LONG LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
DB512010	1.0	0.5	3	50	6	●
DB512015	1.5	0.75	4	50	6	●
DB512020	2.0	1	5	60	6	●
DB512025	2.5	1.25	6	60	6	●
DB512030	3.0	1.5	8	70	6	●
DB512035	3.5	1.75	8	70	6	●
DB512040	4.0	2	8	70	6	●
DB512045	4.5	2.25	10	70	6	●
DB512050	5.0	2.5	12	80	6	●
DB512055	5.5	2.75	12	80	6	●
DB512060	6.0	3	12	90	6	●
DB512065	6.5	3.25	12	90	8	●
DB512070	7.0	3.5	15	90	8	●
DB512080	8.0	4	15	100	8	●
DB512090	9.0	4.5	20	100	10	●
DB512100	10	5	20	100	10	●
DB512101			25	150		●
DB512110	11	5.5	25	110	12	●
DB512120	12	6	25	110	12	●
DB512121			30	150		●
DB512122			35	200		●
DB512130	13	6.5	30	120	14	●
DB512140	14	7	30	120	14	●
DB512150	15	7.5	35	140	16	●
DB512160	16	8	35	140	16	●
DB512161			40	200		●
DB512162			45	250		●
DB512180	18	9	40	150	18	●
DB512200	20	10	40	160	20	●
DB512201			45	200		●
DB512202			50	250		●
DB512250	25	12.5	50	180	25	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DB514

4 FLUTE, LONG LENGTH, BALL NOSE

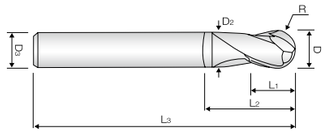
- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
DB514030	3	1.5	8	70	6	●
DB514040	4	2	8	70	6	●
DB514050	5	2.5	10	80	6	●
DB514060	6	3	12	90	6	●
DB514070	7	3.5	15	90	8	●
DB514080	8	4	15	100	8	●
DB514090	9	4.5	20	100	10	●
DB514100	10	5	20	100	10	●
DB514110	11	5.5	25	110	12	●
DB514120	12	6	25	110	12	●
DB514130	13	6.5	30	120	14	●
DB514140	14	7	30	120	14	●
DB514150	15	7.5	35	140	16	●
DB514160	16	8	35	140	16	●
DB514180	18	9	40	150	18	●
DB514200	20	10	40	160	20	●
DB514250	25	12.5	50	180	25	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DB502



2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

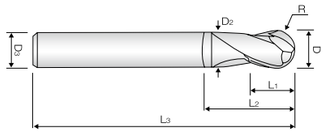
- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.
- Designed to high strength.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
DB502010	1.0	0.5	1	3	50	0.95	6	●
DB502015	1.5	0.75	1.5	4	50	1.45	6	●
DB502020	2.0	1	2	6	60	1.9	6	●
DB502030	3.0	1.5	4	9	70	2.85	6	●
DB502040	4.0	2	5	12	70	3.85	6	●
DB502050	5.0	2.5	6	15	80	4.7	6	●
DB502060	6.0	3	7	18	90	5.7	6	●
DB502080	8.0	4	10	24	90	7.7	8	●
DB502100	10.0	5	12	30	100	9.5	10	●
DB502120	12.0	6	14	36	110	11.5	12	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DB522



2 FLUTE, EXTENDED NECK-LONG SHANK

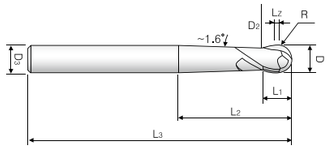
- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.
- Suitable for deep copy milling with long neck type.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
DB522030	3	1.5	4	35	100	2.9	6	●
DB522040	4	2	6	35	100	3.9	6	●
DB522050	5	2.5	7	40	115	4.9	6	●
DB522060	6	3	8	45	115	5.9	6	●
DB522061	6	3	8	45	115	5.9	8	●
DB522070	7	3.5	10	45	125	6.9	8	●
DB522080	8	4	12	55	125	7.9	8	●
DB522081	8	4	12	55	125	7.9	10	●
DB522090	9	4.5	15	65	140	8.9	10	●
DB522100	10	5	15	65	140	9.9	10	●
DB522120	12	6	18	75	150	11.9	12	●
DB522140	14	7	23	75	155	13.9	14	●
DB522160	16	8	30	75	155	15.9	16	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DB532



2 FLUTE, MMC-SPHERE TYPE

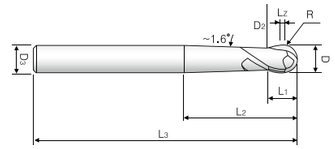
- For copy milling & steep sloped machining in Mold & Die.
- ALTiN coated for high wear resistance.

EDP. No.	D	R	L1	L2	L3	D3	L4	Lz	STOCK
DB532030	3	1.5	4	30	80	2.5	6	1.5	●
DB532031	3	1.5	2.3	30	80	2.5	6	-	●
DB532040	4	2	5	30	80	3.3	6	1.5	●
DB532041	4	2	3.1	30	80	3.3	6	-	●
DB532050	5	2.5	6	43	80	4.1	6	2	●
DB532051	5	2.5	3.9	38	80	4.1	6	-	●
DB532060	6	3	7	30	100	4.7	6	2	●
DB532061	6	3	4.9	28	100	4.7	6	-	●
DB532080	8	4	9	36	100	6.5	8	3	●
DB532081	8	4	6.3	33	100	6.5	8	-	●
DB532100	10	5	11	43	100	8.2	10	3	●
DB532101	10	5	7.9	40	100	8.2	10	-	●
DB532120	12	6	13	52	100	9.8	12	3	●
DB532121	12	6	9.5	49	100	9.8	12	-	●
DB532160	16	8	15	61	150	13.4	16	3	●
DB532161	16	8	12.4	59	150	13.4	16	-	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DB534



4 FLUTE, MMC-SPHERE TYPE

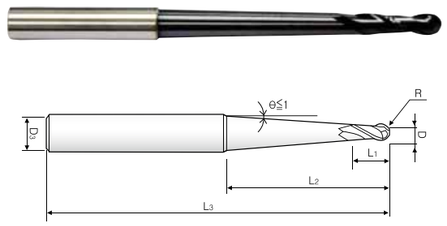
- For copy milling & steep sloped machining in Mold & Die.
- ALTiN coated for high wear resistance.

EDP. No.	D	R	L1	L2	L3	D3	L4	Lz	STOCK
DB534050	5	2.5	6	43	80	4.1	6	2	●
DB534051	5	2.5	3.9	38	80	4.1	6	-	●
DB534060	6	3	7	30	100	4.7	6	2	●
DB534061	6	3	4.9	28	100	4.7	6	-	●
DB534080	8	4	9	36	100	6.5	8	3	●
DB534081	8	4	6.3	33	100	6.5	8	-	●
DB534100	10	5	11	43	100	8.2	10	3	●
DB534101	10	5	7.9	40	100	8.2	10	-	●
DB534120	12	6	13	52	100	9.8	12	3	●
DB534121	12	6	9.5	49	100	9.8	12	-	●
DB534160	16	8	15	61	150	13.4	16	3	●
DB534161	16	8	12.4	59	150	13.4	16	-	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DB54(5)2



2 FLUTE, BALL NOSE with TAPER NECK

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.
- Suitable for deep copy milling with taper long neck type.

EDP. No.	D	R	L_1	L_2	L_3	D_3	STOCK
DB542020	2	1.0	3	63	110	6	●
DB552020	2	1.0	5	85	155	6	●
DB542030	3	1.5	5	65	110	6	●
DB552030	3	1.5	7	87	155	6	●
DB542040	4	2.0	7	67	110	6	●
DB552040	4	2.0	10	90	155	8	●
DB542050	5	2.5	10	70	110	6	●
DB552050	5	2.5	15	95	155	8	●
DB542060	6	3.0	18	78	155	10	●
DB552060	6	3.0	20	110	200	10	●
DB542080	8	4.0	30	100	155	12	●
DB552080	8	4.0	30	120	200	12	●
DB542100	10	5.0	40	100	155	12	●
DB552100	10	5.0	40	120	200	12	●
DB542120	12	6.0	50	110	155	16	●
DB552120	12	6.0	50	130	200	16	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE502

2 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE502010	1	3	42	6	●
ZE502015	1.5	4	42	6	●
ZE502020	2	6	42	6	●
ZE502025	2.5	8	42	6	●
ZE502030	3	10	50	6	●
ZE502035	3.5	10	50	6	●
ZE502040	4	12	50	6	●
ZE502045	4.5	14	50	6	●
ZE502050	5	15	50	6	●
ZE502055	5.5	15	50	6	●
ZE502060	6	15	50	6	●
ZE502065	6.5	18	60	8	●
ZE502070	7	20	60	8	●
ZE502075	7.5	20	60	8	●
ZE502080	8	20	60	8	●
ZE502085	8.5	23	70	10	●
ZE502090	9	25	70	10	●
ZE502095	9.5	25	70	10	●
ZE502100	10	25	70	10	●
ZE502105	10.5	28	75	12	●
ZE502110	11	30	75	12	●
ZE502115	11.5	30	75	12	●
ZE502120	12	30	75	12	●
ZE502130S12	13	30	80	12	●
ZE502130	13	35	85	14	●
ZE502130S16	13	35	90	16	●
ZE502140	14	35	85	14	●
ZE502140S16	14	35	90	16	●
ZE502150	15	40	90	16	●
ZE502160	16	40	90	16	●
ZE502170	17	40	100	16	●
ZE502180	18	45	100	18	●
ZE502190	19	45	100	20	●
ZE502200	20	45	100	20	●
ZE502220	22	45	100	20	●
ZE502240	24	50	120	25	●
ZE502250	25	50	120	25	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE504

4 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE504020	2	6	42	6	●
ZE504025	2.5	8	42	6	●
ZE504030	3	10	50	6	●
ZE504035	3.5	10	50	6	●
ZE504040	4	12	50	6	●
ZE504045	4.5	14	50	6	●
ZE504050	5	15	50	6	●
ZE504055	5.5	15	50	6	●
ZE504060	6	15	50	6	●
ZE504065	6.5	18	60	8	●
ZE504070	7	20	60	8	●
ZE504075	7.5	20	60	8	●
ZE504080	8	20	60	8	●
ZE504085	8.5	23	70	10	●
ZE504090	9	25	70	10	●
ZE504095	9.5	25	70	10	●
ZE504100	10	25	70	10	●
ZE504105	10.5	28	75	12	●
ZE504110	11	30	75	12	●
ZE504115	11.5	30	75	12	●
ZE504120	12	30	75	12	●
ZE504130S12	13	35	80	12	●
ZE504130	13	35	85	14	●
ZE504130S16	13	35	90	16	●
ZE504140	14	35	85	14	●
ZE504140S16	14	35	90	16	●
ZE504150	15	40	90	16	●
ZE504160	16	40	90	16	●
ZE504170	17	40	100	16	●
ZE504180	18	45	100	18	●
ZE504190	19	45	100	20	●
ZE504200	20	45	100	20	●
ZE504220	22	45	100	20	●
ZE504240	24	50	120	25	●
ZE504250	25	50	120	25	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

METRIC

ZE503

3 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE503060	6	15	50	6	●
ZE503070	7	18	60	8	●
ZE503080	8	18	60	8	●
ZE503090	9	22	70	10	●
ZE503100	10	22	70	10	●
ZE503110	11	26	75	12	●
ZE503120	12	26	75	12	●
ZE503130	13	32	85	14	●
ZE503140	14	32	85	14	●
ZE503150	15	35	90	16	●
ZE503160	16	35	90	16	●
ZE503180	18	40	100	18	●
ZE503200	20	40	100	20	●
ZE503250	25	50	120	25	●
ZE503320	32	70	150	32	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE506

6 FLUTE, REGULAR & LONG LENGTH

- Designed for highly hardened materials up to HRc 55.
- Suitable for high speed & finishing machining.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE506060	6	15	50	6	●
ZE506061	6	26	70	6	●
ZE506070	7	18	60	8	●
ZE506080	8	18	60	8	●
ZE506081	8	36	90	8	●
ZE506090	9	22	70	10	●
ZE506100	10	22	70	10	●
ZE506101	10	46	100	10	●
ZE506110	11	26	75	12	●
ZE506120	12	26	75	12	●
ZE506121	12	56	110	12	●
ZE506130	13	32	85	14	●
ZE506140	14	32	85	14	●
ZE506150	15	35	90	16	●
ZE506160	16	35	90	16	●
ZE506161	16	66	130	16	●
ZE506180	18	44	100	18	●
ZE506200	20	44	100	20	●
ZE506201	20	76	150	20	●
ZE506250	25	50	120	25	●
ZE506251	25	92	180	25	●
ZE506320	32	70	150	32	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZM502

2 FLUTE, MEDIUM LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZM502020	2	8	40	4	●
ZM502030	3	12	50	6	●
ZM502040	4	15	50	6	●
ZM502050	5	20	60	6	●
ZM502060	6	20	60	6	●
ZM502080	8	25	70	8	●
ZM502100	10	30	90	10	●
ZM502120	12	30	90	12	●
ZM502140	14	40	110	16	●
ZM502160	16	50	110	16	●
ZM502180	18	50	110	20	●
ZM502200	20	55	110	20	●
ZM502250	25	75	140	25	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZM504

4 FLUTE, MEDIUM LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZM504020	2	8	40	4	●
ZM504030	3	12	50	6	●
ZM504040	4	15	50	6	●
ZM504050	5	20	60	6	●
ZM504060	6	20	60	6	●
ZM504080	8	25	70	8	●
ZM504100	10	30	90	10	●
ZM504120	12	30	90	12	●
ZM504140	14	40	110	16	●
ZM504160	16	50	110	16	●
ZM504180	18	50	110	20	●
ZM504200	20	55	110	20	●
ZM504250	25	75	140	25	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

METRIC

ZM522

2 FLUTE, MEDIUM CUT LONG SHANK TYPE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZM522030	3	10	70	6	●
ZM522040	4	12	70	6	●
ZM522050	5	15	80	6	●
ZM522060	6	15	80	6	●
ZM522080	8	20	100	8	●
ZM522100	10	25	100	10	●
ZM522120	12	30	110	12	●
ZM522160	16	40	125	16	●
ZM522200	20	45	150	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZM524

4 FLUTE, MEDIUM CUT LONG SHANK TYPE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZM524030	3	10	70	6	●
ZM524040	4	12	70	6	●
ZM524050	5	15	80	6	●
ZM524060	6	15	80	6	●
ZM524080	8	20	100	8	●
ZM524100	10	25	100	10	●
ZM524120	12	30	110	12	●
ZM524160	16	40	125	16	●
ZM524200	20	45	150	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE522

2 FLUTE, LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE522030	3	25	75	6	●
ZE522040	4	25	75	6	●
ZE522050	5	30	85	6	●
ZE522060	6	30	85	6	●
ZE522070	7	35	85	8	●
ZE522080	8	35	85	8	●
ZE522090	9	45	100	10	●
ZE522100	10	45	100	10	●
ZE522101	10	60	155	10	●
ZE522120	12	55	120	12	●
ZE522121	12	65	155	12	●
ZE522140	14	60	120	14	●
ZE522160	16	60	120	16	●
ZE522161	16	75	165	16	●
ZE522180	18	60	120	18	●
ZE522200	20	60	120	20	●
ZE522201	20	75	165	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE524

4 FLUTE, LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE524030	3	25	75	6	●
ZE524040	4	25	75	6	●
ZE524050	5	30	85	6	●
ZE524060	6	30	85	6	●
ZE524070	7	35	85	8	●
ZE524080	8	35	85	8	●
ZE524090	9	45	100	10	●
ZE524100	10	45	100	10	●
ZE524120	12	55	120	12	●
ZE524140	14	60	120	14	●
ZE524160	16	60	120	16	●
ZE524180	18	60	120	18	●
ZE524200	20	60	120	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

METRIC

ZE534

4 FLUTE, EXTRA LONG LENGTH

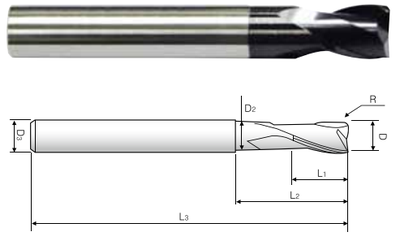
- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE534040	4	30	130	6	●
ZE534050	5	35	130	6	●
ZE534060	6	40	130	6	●
ZE534061	6	50	155	6	●
ZE534081	8	60	155	8	●
ZE534082	8	80	200	8	●
ZE534101	10	60	155	10	●
ZE534102	10	80	200	10	●
ZE534121	12	60	155	12	●
ZE534122	12	80	200	12	●
ZE534161	16	80	155	16	●
ZE534162	16	100	200	16	●
ZE534163	16	120	250	16	●
ZE534201	20	80	165	20	●
ZE534202	20	100	200	20	●
ZE534203	20	130	250	20	●
ZE534252	25	100	200	25	●
ZE534253	25	150	250	25	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR502



2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR5020405	4	0.5	6	10	55	3.7	6	●
ZR5020410		1						●
ZR5020605	6	0.5	8	15	55	5.7	6	●
ZR5020610		1						●
ZR5020805	8	0.5	10	20	65	7.7	8	●
ZR5020810		1						●
ZR5020815		1.5						●
ZR5020820		2						●
ZR5021005	10	0.5	12	28	80	9.5	10	●
ZR5021010		1						●
ZR5021015		1.5						●
ZR5021020		2						●
ZR5021205	12	0.5	15	30	82	11.5	12	●
ZR5021210		1						●
ZR5021215		1.5						●
ZR5021220		2						●

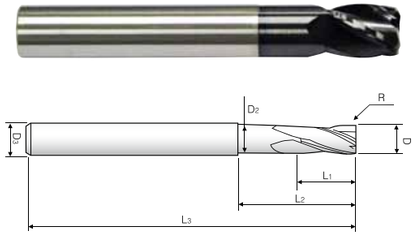
Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

METRIC

ZR504



4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR5040405	4	0.5	6	10	55	3.7	6	●
ZR5040410		1						●
ZR5040605	6	0.5	8	15	55	5.7	6	●
ZR5040610		1						●
ZR5040805	8	0.5	10	20	65	7.7	8	●
ZR5040810		1						●
ZR5040815		1.5						●
ZR5040820		2						●
ZR5041005	10	0.5	12	28	80	9.5	10	●
ZR5041010		1						●
ZR5041015		1.5						●
ZR5041020		2						●
ZR5041205	12	0.5	15	30	82	11.5	12	●
ZR5041210		1						●
ZR5041215		1.5						●
ZR5041220		2						●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR512

2 FLUTE, REGULAR LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR5120605	6	0.5	15	55	6	●
ZR5120610		1				●
ZR5120805	8	0.5	20	65	8	●
ZR5120810		1				●
ZR5120815		1.5				●
ZR5120820		2				●
ZR5121005	10	0.5	25	80	10	●
ZR5121010		1				●
ZR5121015		1.5				●
ZR5121020		2				●
ZR5121025		2.5				●
ZR5121030		3				●
ZR5121205	12	0.5	30	82	12	●
ZR5121210		1				●
ZR5121215		1.5				●
ZR5121220		2				●
ZR5121225		2.5				●
ZR5121230		3				●
ZR5121605	16	0.5	40	100	16	●
ZR5121610		1				●
ZR5121615		1.5				●
ZR5121620		2				●
ZR5121630		3				●
ZR5122005	20	0.5	45	110	20	●
ZR5122010		1				●
ZR5122015		1.5				●
ZR5122020		2				●
ZR5122030		3				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

PART. B
ENDMILL & DRILL
ENDMILL
DRILL

ZAMUS CLASSIC SERIES

METRIC

ZR514

4 FLUTE, REGULAR LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR5140605	6	0.5	15	55	6	●
ZR5140610		1				●
ZR5140805	8	0.5	20	65	8	●
ZR5140810		1				●
ZR5140815		1.5				●
ZR5140820		2				●
ZR5141005	10	0.5	25	80	10	●
ZR5141010		1				●
ZR5141015		1.5				●
ZR5141020		2				●
ZR5141025		2.5				●
ZR5141030		3				●
ZR5141205	12	0.5	30	82	12	●
ZR5141210		1				●
ZR5141215		1.5				●
ZR5141220		2				●
ZR5141225		2.5				●
ZR5141230		3				●
ZR5141605	16	0.5	40	100	16	●
ZR5141610		1				●
ZR5141615		1.5				●
ZR5141620		2				●
ZR5141630		3				●
ZR5142005	20	0.5	45	110	20	●
ZR5142010		1				●
ZR5142015		1.5				●
ZR5142020		2				●
ZR5142030		3				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR522

2 FLUTE, LONG LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR5220302	3	0.2	8	60	6	●
ZR5220305		0.5				●
ZR5220402	4	0.2	11	70	6	●
ZR5220405		0.5				●
ZR5220410		1				●
ZR5220502	5	0.2	13	80	6	●
ZR5220505		0.5				●
ZR5220510		1				●
ZR5220602	6	0.2	13	90	6	●
ZR5220605		0.5				●
ZR5220610		1				●
ZR5220805	8	0.5	19	100	8	●
ZR5220810		1				●
ZR5220815		1.5				●
ZR5220820		2				●
ZR5221005	10	0.5	22	100	10	●
ZR5221010		1				●
ZR5221015		1.5				●
ZR5221020		2				●
ZR5221025		2.5				●
ZR5221205	12	0.5	26	110	12	●
ZR5221210		1				●
ZR5221215		1.5				●
ZR5221220		2				●
ZR5221225		2.5				●
ZR5221230		3				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS CLASSIC SERIES

METRIC

ZR524

4 FLUTE, LONG LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR5240302	3	0.2	8	60	6	●
ZR5240305		0.5				●
ZR5240402	4	0.2	11	70	6	●
ZR5240405		0.5				●
ZR5240410		1				●
ZR5240502	5	0.2	13	80	6	●
ZR5240505		0.5				●
ZR5240510		1				●
ZR5240602	6	0.2	13	90	6	●
ZR5240605		0.5				●
ZR5240610		1				●
ZR5240805	8	0.5	19	100	8	●
ZR5240810		1				●
ZR5240815		1.5				●
ZR5240820		2				●
ZR5241005	10	0.5	22	100	10	●
ZR5241010		1				●
ZR5241015		1.5				●
ZR5241020		2				●
ZR5241025		2.5				●
ZR5241205	12	0.5	26	110	12	●
ZR5241210		1				●
ZR5241215		1.5				●
ZR5241220		2				●
ZR5241225		2.5				●
ZR5241230		3				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

TE503

3 FLUTE, TAPER END MILL

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ALTiN coated for high wear resistance.

EDP. No.	Dia.	θ°	C.L	N.D	OAL	SH.Dia.	STOCK
TE5033106	3	1	10	3.4	50	6	●
TE5033206		2		3.7			●
TE5033306		3		4			●
TE5033506		5		4.8			●
TE5034106	4	1	15	4.5	50	6	●
TE5034206		2		5			●
TE5034306		3		5.6			●
TE5034508		5		6.6		8	●
TE5035106	5	1	20	5.7	60	6	●
TE5035208		2		6.4		8	●
TE5035308		3		7.1			●
TE5035508		5		8.5			●
TE5036108	6	1	20	6.7	60	8	●
TE5036208		2		7.4			●
TE5036308		3		8.1			●
TE5036510		5		9.5	70	10	●
TE5038110	8	1	25	8.9	70	10	●
TE5038210		2		9.8			●
TE5038312		3		10.6	75	12	●
TE5038512		5		12.4			●
TE5030112	10	1	35	11.2	90	12	●
TE5030212		2	28	12.4		12	●
TE5030314		3	35	13.7		14	●
TE5030516		5		16.1		16	●

ENDMILL
DRILL

ZAMUS CLASSIC SERIES

METRIC

TB503

3 FLUTE, TAPER BALL END MILL

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ALTiN coated for high wear resistance.

EDP. No.	Dia.	R	θ°	C.L	OAL	SH.Dia.	STOCK
TB50315306	3	1.5		12	60	6	
TB50320306	4	2		15	60	6	
TB50325308	5	2.5		18	60	8	
TB50330310	6	3	3°	22	70	10	
TB50340312	8	4		26	75	12	
TB50350312	10	5		19	75	12	
TB50360316	12	6		36	90	16	
TB50315506	3	1.5		12	60	6	
TB50320508	4	2		15	60	8	
TB50325510	5	2.5		18	70	10	
TB50330510	6	3	5°	22	70	10	
TB50340512	8	4		26	75	12	
TB50350516	10	5		30	90	16	
TB50360520	12	6		36	100	20	
TB50315706	3	1.5		12	60	6	
TB50320708	4	2		15	60	8	
TB50325710	5	2.5		18	70	10	
TB50330712	6	3	7°	22	75	12	
TB50340716	8	4		26	90	16	
TB50350716	10	5		30	90	16	
TB50360720	12	6		36	100	20	

TB504

4 FLUTE, TAPER BALL END MILL

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ALTiN coated for high wear resistance.

EDP. No.	Dia.	R	θ°	C.L	OAL	SH.Dia.	STOCK
TB50425308	5	2.5		18	60	8	
TB50430310	6	3		22	70	10	
TB50440312	8	4	3°	26	75	12	
TB50450312	10	5		19	75	12	
TB50460316	12	6		36	90	16	
TB50425510	5	2.5		18	70	10	
TB50430510	6	3		22	70	10	
TB50440512	8	4	5°	26	75	12	
TB50450516	10	5		30	90	16	
TB50460520	12	6		36	100	20	
TB50425710	5	2.5		18	70	10	
TB50430712	6	3		22	75	12	
TB50440716	8	4	7°	26	90	16	
TB50450716	10	5		30	90	16	
TB50460720	12	6		36	100	20	

ZF60

ROUGHING END MILL

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- ALTiN coated for high wear resistance.
- Rough & finish type.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	Z	STOCK
ZF603060	6	15	50	6	3	●
ZF603070	7	18	60	8	3	●
ZF603080	8	18	60	8	3	●
ZF604090	9	22	70	10	4	●
ZF604100	10	22	70	10	4	●
ZF604110	11	26	75	12	4	●
ZF604120	12	26	75	12	4	●
ZF604130	13	32	85	14	4	●
ZF604140	14	32	85	14	4	●
ZF604150	15	35	90	16	4	●
ZF604160	16	35	90	16	4	●
ZF604180	18	44	100	18	4	●
ZF604200	20	44	100	20	4	●
ZF605250	25	50	120	25	5	●
ZF606320	32	70	150	32	6	●

μm=1/1000mm

Tolerance \ Dia	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

ZF61

ROUGHING END MILL - FINE Pitch DIN6527L / DIN6535-HA, DIN6535-HB

- Designed for machine tool steel, alloy steel, mold steel and other highly hardened materials.
- High velocity milling of hardened steels.
- For dry and wet milling.
- Fast chip ejection.

EDP. No.		Dia.	C.L	OAL	SH. Dia.	Z	STOCK
PLAIN SHANK	FLAT SHANK						
ZF613060	**ZF613060F**	6	16	57	6	3	●
ZF613070	**ZF613070F**	7	16	63	8	3	●
ZF613080	**ZF613080F**	8	16	63	8	3	●
ZF614090	**ZF614090F**	9	19	72	10	4	●
ZF614100	**ZF614100F**	10	22	72	10	4	●
ZF614120	**ZF614120F**	12	26	83	12	4	●
ZF614140	**ZF614140F**	14	32	83	14	4	●
ZF614160	**ZF614160F**	16	35	92	16	4	●
ZF614180	**ZF614180F**	18	40	100	18	4	●
ZF614200	**ZF614200F**	20	44	104	20	4	●
ZF615250	**ZF615250F**	25	50	120	25	5	●

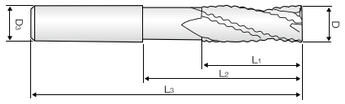
μm=1/1000mm

Tolerance \ Dia	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

ZAMUS CLASSIC SERIES

METRIC

PK503



Z - AXIS ROUGHING END MILL

- Reducing cycle time by 1pass operating from Z-axis to slotting.
- Preventing the working interruption as Neck type.

EDP. No.	D	L_1	L_2	L_3	d	Z	STOCK
PK503060	6	9	15	57	6	3	●
PK503080	8	12	20	63	8		●
PK503100	10	15	25	72	10		●
PK503120	12	18	30	83	12		●

EDP. No.	D	L_1	L_2	L_3	d	Z	STOCK
PK503140	14	21	35	83	14	3	●
PK503160	16	24	40	92	16		●
PK503200	20	30	50	104	20		●

μm=1/1000mm

Dia / Tolerance	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h11)	-20 -85	-30 -105	-40 -150	-50 -180	-65 -225
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

ZAMUS THUNDER SERIES

INCH

DA302

2 FLUTE, REGULAR LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
DA302001	1/32	R1/64	1/32	1-1/2	1/8	●
DA302002	1/16	R1/32	1/16	1-1/2	1/8	●
DA302003	3/32	R3/64	3/32	1-1/2	1/8	●
DA302004	1/8	R1/16	5/16	1-1/2	1/8	●
DA302006	3/16	R3/32	3/8	2	3/16	●
DA302008	1/4	R1/8	1/2	2-1/2	1/4	●
DA302010	5/16	R5/32	9/16	2-1/2	5/16	●
DA302012	3/8	R3/16	3/4	2-1/2	3/8	●
DA302016	1/2	R1/4	7/8	3	1/2	●
DA302020	5/8	R5/16	1-1/4	3-1/2	5/8	●
DA302024	3/4	R3/8	1-1/2	4	3/4	●
DA302032	1	R1/2	1-1/2	4	1	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZA302

2 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZA302002	1/32	1/8	1-1/2	1/8	●
ZA302004	1/16	3/16	1-1/2	1/8	●
ZA302008	1/8	1/2	1-1/2	1/8	●
ZA302012	3/16	5/8	2	3/16	●
ZA302016	1/4	3/4	2-1/2	1/4	●
ZA302020	5/16	13/16	2-1/2	5/16	●
ZA302024	3/8	1	2-1/2	3/8	●
ZA302032	1/2	1	3	1/2	●
ZA302040	5/8	1-1/4	3-1/2	5/8	●
ZA302048	3/4	1-1/2	4	3/4	●
ZA302064	1	1-1/2	4	1	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS THUNDER SERIES

INCH / METRIC

ZA304

4 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZA304004	1/16	3/16	1-1/2	1/8	●
ZA304008	1/8	1/2	1-1/2	1/8	●
ZA304012	3/16	5/8	2	3/16	●
ZA304016	1/4	3/4	2-1/2	1/4	●
ZA304020	5/16	13/16	2-1/2	5/16	●
ZA304024	3/8	1	2-1/2	3/8	●
ZA304032	1/2	1	3	1/2	●
ZA304040	5/8	1-1/4	3-1/2	5/8	●
ZA304048	3/4	1-1/2	4	3/4	●
ZA304064	1	1-1/2	4	1	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -.0012	h6

* For the items produced from 1st. 2010, apply to these tolerance.

DB312

2 FLUTE, LONG LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
DB312010S4	1	0.5	2.5	50	4	●
DB312010	1	0.5	2.5	50	6	●
DB312012	1.2	0.6	3	50	6	●
DB312015	1.5	0.75	4	50	6	●
DB312020S4	2	1	5	50	4	●
DB312020	2	1	5	50	6	●
DB312025	2.5	1.25	6	60	6	●
DB312030S3	3	1.5	8	60	3	●
DB312030S4	3	1.5	8	60	4	●
DB312030	3	1.5	8	60	6	●
DB312035	3.5	1.75	8	70	6	●
DB312040S4	4	2	8	70	4	●
DB312040	4	2	8	70	6	●
DB312045	4.5	2.25	8	70	6	●
DB312050	5	2.5	10	80	6	●
DB312055	5.5	2.75	10	80	6	●
DB312060S	6	3	12	60	6	●
DB312060	6	3	12	90	6	●
DB312065	6.5	3.25	12	90	8	●
DB312070	7	3.5	14	90	8	●
DB312080S	8	4	14	60	8	●
DB312080	8	4	14	100	8	●
DB312090	9	4.5	18	100	10	●
DB312100S	10	5	18	60	10	●
DB312100	10	5	18	100	10	●
DB312120	12	6	22	110	12	●
DB312140	14	7	26	110	14	●
DB312160	16	8	30	140	16	●
DB312180	18	9	34	140	18	●
DB312200	20	10	38	160	20	●

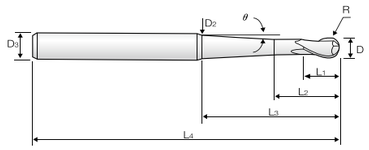
Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS THUNDER SERIES

METRIC

DB342



2 FLUTE, BALL NOSE with TAPER NECK

- High efficiency milling is possible in deep slotting with projection of the end mill being long.

EDP. No.	D	R	L_1	L_2	L_3	L_4	D_2	D_3	θ	STOCK
DB34201015	1	0.5	2	4	23	60	6	2	1° 30′	●
DB34201050	1	0.5	2	4	23	60	6	4.3	5°	●
DB34201030	1	0.5	2	4	42	80	6	5	3°	●
DB34202015	2	1	4	6	23	60	6	2.9	1° 30′	●
DB34202050	2	1	4	6	23	60	6	5	5°	●
DB34202030	2	1	4	6	41	80	6	5.7	3°	●
DB34203030	3	1.5	6	8	32	70	6	5.6	3°	●
DB34203015	3	1.5	6	8	52	90	6	5.3	1° 30′	●
DB34204030	4	2	8	10	28	70	6	6	3°	●
DB34204015	4	2	8	10	49	90	6	6	1° 30′	●
DB34205030	5	2.5	10	12	41	90	8	8	3°	●
DB34205015	5	2.5	10	12	61	110	8	7.6	1° 30′	●
DB34206030	6	3	12	15	34	90	8	8	3°	●
DB34206015	6	3	12	15	53	110	8	8	1° 30′	●
DB34208030	8	4	14	17	36	100	10	10	3°	●
DB34208015	8	4	14	17	55	120	10	10	1° 30′	●
DB34210030	10	5	18	21	40	110	12	12	3°	●
DB34210015	10	5	18	21	59	130	12	12	1° 30′	●
DB34212030	12	6	22	25	63	140	16	16	3°	●
DB34212015	12	6	22	25	83	160	16	15	1° 30′	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE304

4 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE304020	2	6	40	6	●
ZE304025	2.5	8	40	6	●
ZE304030	3	8	45	6	●
ZE304035	3.5	10	45	6	●
ZE304040	4	11	45	6	●
ZE304045	4.5	11	45	6	●
ZE304050	5	13	50	6	●
ZE304055	5.5	13	50	6	●
ZE304060	6	13	50	6	●
ZE304065	6.5	16	60	8	●
ZE304070	7	16	60	8	●
ZE304075	7.5	16	60	8	●
ZE304080	8	19	60	8	●
ZE304085	8.5	19	70	10	●
ZE304090	9	19	70	10	●
ZE304095	9.5	19	70	10	●
ZE304100	10	22	70	10	●
ZE304105	10.5	22	75	12	●
ZE304110	11	22	75	12	●
ZE304115	11.5	22	75	12	●
ZE304120	12	26	75	12	●
ZE304130	13	26	80	12	●
ZE304140	14	26	80	14	●
ZE304150	15	32	90	16	●
ZE304160	16	32	90	16	●
ZE304180	18	32	100	18	●
ZE304200	20	38	100	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS THUNDER SERIES

METRIC

ZE322

2 FLUTE, LONG & EXTRA LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE322030	3	15	60	6	●
ZE322031		20	70		●
ZE322030S		20	100	3	●
ZE322040	4	15	60	6	●
ZE322041		20	70		●
ZE322040S		20	100	4	●
ZE322050	5	20	60	6	●
ZE322051		20	80		●
ZE322052		25	100		●
ZE322060	6	20	80	6	●
ZE322061		30	100		●
ZE322062		40	150		●
ZE322080	8	30	90	8	●
ZE322081		35	100		●
ZE322082		40	150		●
ZE322100	10	30	90	10	●
ZE322101		35	100		●
ZE322102		45	150		●
ZE322103		55	180		●
ZE322120	12	30	90	12	●
ZE322121		40	110		●
ZE322122		50	150		●
ZE322123		60	200		●
ZE322140	14	40	120	14	●
ZE322141		60	150		●
ZE322160	16	50	140	16	●
ZE322161		70	160		●
ZE322162		80	200		●
ZE322180	18	50	140	18	●
ZE322200	20	60	150	20	●
ZE322201		100	200		●
ZE322202		130	250		●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZE324

4 FLUTE, LONG & EXTRA LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
ZE324030	3	15	60	6	●
ZE324031		20	70		●
ZE324030S		20	100	3	●
ZE324040	4	15	60	6	●
ZE324041		20	70		●
ZE324040S		20	100	4	●
ZE324050	5	20	60	6	●
ZE324051		20	80		●
ZE324052		25	100		●
ZE324060	6	20	80	6	●
ZE324061		30	100		●
ZE324062		40	150		●
ZE324080	8	30	90	8	●
ZE324081		35	100		●
ZE324082		40	150		●
ZE324100	10	30	90	10	●
ZE324101		35	100		●
ZE324102		45	150		●
ZE324103		55	180		●
ZE324120	12	30	90	12	●
ZE324121		40	110		●
ZE324122		50	150		●
ZE324123		60	200		●
ZE324140	14	40	120	14	●
ZE324141		60	150		●
ZE324160	16	50	140	16	●
ZE324161		70	160		●
ZE324162		80	200		●
ZE324180	18	50	140	18	●
ZE324200	20	60	150	20	●
ZE324201		100	200		●
ZE324202		130	250		●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR322

2F CORNER RADIUS LONG LENGTH

- Designed to machine tool steel, alloy steel mold steel and other high hardened materials.
- TiALN coated for high wear resistance.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR3220302	3	0.2	8	60	6	●
ZR3220303		0.3				●
ZR3220305		0.5				●
ZR3220402	4	0.2	11	70	6	●
ZR3220403		0.3				●
ZR3220405		0.5				●
ZR3220410		1.0				●
ZR3220502	5	0.2	13	80	6	●
ZR3220503		0.3				●
ZR3220505		0.5				●
ZR3220510		1.0				●
ZR3220602	6	0.2	13	90	6	●
ZR3220603		0.3				●
ZR3220605		0.5				●
ZR3220610		1.0				●
ZR3220803	8	0.3	19	100	8	●
ZR3220805		0.5				●
ZR3220810		1.0				●
ZR3220815		1.5				●
ZR3220820		2.0				●
ZR3221003	10	0.3	22	100	10	●
ZR3221005		0.5				●
ZR3221010		1.0				●
ZR3221015		1.5				●
ZR3221020		2.0				●
ZR3221025		2.5				●
ZR3221205	12	0.5	26	110	12	●
ZR3221210		1.0				●
ZR3221215		1.5				●
ZR3221220		2.0				●
ZR3221225		2.5				●
ZR3221230		3.0				●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR324

4F CORNER RADIUS LONG LENGTH

- Designed to machine tool steel, alloy steel mold steel and other high hardened materials.
- TiALN coated for high wear resistance.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
ZR3240302	3	0.2	8	60	6	●
ZR3240303		0.3				●
ZR3240305		0.5				●
ZR3240402	4	0.2	11	70	6	●
ZR3240403		0.3				●
ZR3240405		0.5				●
ZR3240410		1.0				●
ZR3240502	5	0.2	13	80	6	●
ZR3240503		0.3				●
ZR3240505		0.5				●
ZR3240510		1.0				●
ZR3240602	6	0.2	13	90	6	●
ZR3240603		0.3				●
ZR3240605		0.5				●
ZR3240610		1.0				●
ZR3240803	8	0.3	19	100	8	●
ZR3240805		0.5				●
ZR3240810		1.0				●
ZR3240815		1.5				●
ZR3240820		2.0				●
ZR3241003	10	0.3	22	100	10	●
ZR3241005		0.5				●
ZR3241010		1.0				●
ZR3241015		1.5				●
ZR3241020		2.0				●
ZR3241025		2.5				●
ZR3241205	12	0.5	26	110	12	●
ZR3241210		1.0				●
ZR3241215		1.5				●
ZR3241220		2.0				●
ZR3241225		2.5				●
ZR3241230		3.0				●

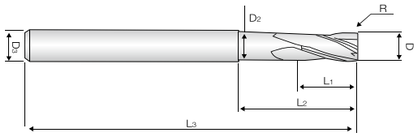
Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS THUNDER SERIES

METRIC

ZR304H



4 FLUTE, 45° HELIX STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

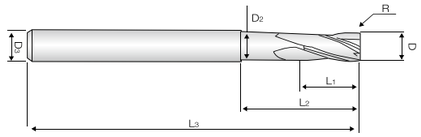
- Designed for high hardened materials up to HRc 45.
- Suitable for high speed machining.

EDP. No.	D	C.L	L1	L2	OAL	SH.Dia.	STOCK
ZR304H0303	3	0.3	4	12	55	6	●
ZR304H0305		0.5					●
ZR304H0403	4	0.3	5	16	55	6	●
ZR304H0405		0.5					●
ZR304H0605	6	0.5	7	20	60	6	●
ZR304H0610		1.0					●
ZR304H0805	8	0.5	10	25	65	8	●
ZR304H0810		1.0					●
ZR304H1005	10	0.5	12	30	70	10	●
ZR304H1010		1.0					●
ZR304H1015		1.5					●
ZR304H1020		2.0					●
ZR304H1205	12	0.5	15	30	80	12	●
ZR304H1210		1.0					●
ZR304H1215		1.5					●
ZR304H1220		2.0					●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZR324H



4 FLUTE, 45° HELIX STUB CUT LENGTH, CORNER RADIUS with LONG SHANK

- Designed for high hardened materials up to HRc 45.
- Suitable for high speed machining.

EDP. No.	D	C.L	L1	L2	OAL	SH.Dia.	STOCK
ZR324H0605	6	0.5	9	20	90	6	●
ZR324H0610		1.0					●
ZR324H0805	8	0.5	12	25	100	8	●
ZR324H0810		1.0					●
ZR324H1005	10	0.5	15	32	100	10	●
ZR324H1010		1.0					●
ZR324H1015		1.5					●
ZR324H1020		2.0					●
ZR324H1205	12	0.5	18	38	110	12	●
ZR324H1210		1.0					●
ZR324H1215		1.5					●
ZR324H1220		2.0					●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS SUS-MATE SERIES

METRIC

DS502

2 FLUTE, BALL NOSE REGULAR & LONG LENGTH

- Suitable for Stainless steel, Titanium, Inconel.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
DS502010	1	0.5	3	50	6	●
DS502020	2	1	6	50	6	●
DS502030	3	1.5	8	50	6	●
DS502031				70		●
DS502040	4	2	10	50	6	●
DS502041				70		●
DS502050	5	2.5	13	50	6	●
DS502051				80		●
DS502060	6	3	13	50	6	●
DS502061				90		●
DS502080	8	4	19	60	8	●
DS502081				100		●
DS502100	1	5	22	70	10	●
DS502101				100		●
DS502120	12	6	26	75	12	●
DS502121				110		●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
±0.01	h6

* For the items produced from 1st. 2010, apply to these tolerance.

SM503

3 FLUTE, REGULAR LENGTH

- Suitable for Stainless steel, Titanium, Inconel.

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
SM503020	2	6	45	6	●
SM503030	3	8	45	6	●
SM503040	4	10	50	6	●
SM503050	5	13	50	6	●
SM503060	6	13	50	6	●
SM503080	8	19	60	8	●
SM503100	10	22	70	10	●
SM503120	12	26	75	12	●
SM503140	14	30	82	14	●
SM503160	16	40	100	16	●
SM503180	18	40	100	18	●
SM503200	20	40	100	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS SUS-MATE SERIES

METRIC

SM504

4 FLUTE, REGULAR LENGTH

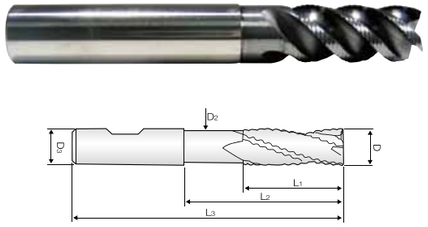
- Suitable for Stainless steel, Titanium, Inconel.
- Broken Index Type.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
SM504030	3	0.1	10	45	6	●
SM504040	4	0.2	12	50	6	●
SM504050	5	0.2	13	50	6	●
SM504060	6	0.2	13	50	6	●
SM504070	7	0.2	16	60	8	●
SM504080	8	0.2	16	60	8	●
SM504090	9	0.2	19	70	10	●
SM504100	10	0.3	22	70	10	●
SM504120	12	0.3	26	75	12	●
SM504140	14	0.3	26	82	14	●
SM504160	16	0.3	32	90	16	●
SM504180	18	0.3	32	100	18	●
SM504200	20	0.3	38	100	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ZF62



ROUGHING END MILL
DIN6527 / DIN6535-HA, DIN6535-HB

- Designed to machine tool steel, alloy steel, stainless steel and other high hardness materials.
- Fast chip ejection.

EDP. No.		D	L1	L2	D2	L3	D3	Z	STOCK
PLAIN SHANK	FLAT SHANK								
ZF624060	ZF624060F	6	7	-	-	54	6	4	●
ZF624061	ZF624061F		16	-	-	57			●
ZF624062	ZF624062F		16	20	5.5	57			●
ZF624080	ZF624080F	8	9	-	-	58	8	4	●
ZF624081	ZF624081F		16	-	-	63			●
ZF624082	ZF624082F		16	26	7.5	63			●
ZF624100	ZF624100F	10	14	-	-	66	10	4	●
ZF624101	ZF624101F		22	-	-	72			●
ZF624102	ZF624102F		22	31	9.5	72			●
ZF624120	ZF624120F	12	16	-	-	73	12	4	●
ZF624121	ZF624121F		26	-	-	83			●
ZF624122	ZF624122F		26	37	11.5	83			●
ZF625160	ZF625160F	16	22	-	-	82	16	5	●
ZF625161	ZF625161F		32	-	-	92			●
ZF625162	ZF625162F		32	51	15.5	100			●
ZF626200	ZF626200F	20	26	-	-	92	20	6	●
ZF626201	ZF626201F		38	-	-	104			●
ZF626202	ZF626202F		38	59	19.2	110			●

μm=1/1000mm

Tolerance \ Dia	Ø1 ~Ø3	Ø3 ~Ø6	Ø6 ~Ø10	Ø10 ~Ø18	Ø18 ~Ø30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

ZAMUS COPPER-MATE SERIES

METRIC

BC502

2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

- Suitable for copper & non-ferrous material.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
BC502010	1	0.5	1.5	3	50	0.95	6	●
BC502015	1.5	0.75	2	4	50	1.45	6	●
BC502020	2	1	2.5	5	50	1.95	6	●
BC502025	2.5	1.25	3	7	50	2.45	6	●
BC502030	3	1.5	4	10	60	2.9	6	●
BC502040	4	2	5	10	60	3.9	6	●
BC502050	5	2.5	6	12	60	4.9	6	●
BC502060	6	3	7	12	60	5.9	6	●
BC502061	6	3	7	12	90	5.9	6	●
BC502080	8	4	9	15	70	7.9	8	●
BC502081	8	4	9	16	100	7.9	8	●
BC502100	10	5	11	25	75	9.9	10	●
BC502101	10	5	11	25	100	9.9	10	●
BC502120	12	6	12	25	80	11.9	12	●
BC502121	12	6	12	25	110	11.9	12	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
±0.01	h6

* For the items produced from 1st. 2010, apply to these tolerance.

RC502

2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Suitable for copper & non-ferrous material.

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
RC5020200509	2	0.5	3	9	55	1.8	6	●
RC5020300509	3	0.5	4	9	55	2.8	6	●
RC5020300516	3	0.5	4	16	55	2.8	6	●
RC5020300520	3	0.5	4	20	55	2.8	6	●
RC5020400512	4	0.5	5	12	55	3.7	6	●
RC5020400516	4	0.5	5	16	55	3.7	6	●
RC5020400520	4	0.5	5	20	55	3.7	6	●
RC5020600520	6	0.5	7	20	60	5.5	6	●
RC5020601020	6	1	7	20	60	5.5	6	●
RC5020800525	8	0.5	9	25	60	7.4	8	●
RC5020801025	8	1	9	25	60	7.4	8	●
RC5021000532	10	0.5	11	32	70	9.2	10	●
RC5021001032	10	1	11	32	70	9.2	10	●
RC5021200538	12	0.5	12	38	80	11	12	●
RC5021201038	12	1	12	38	80	11	12	●

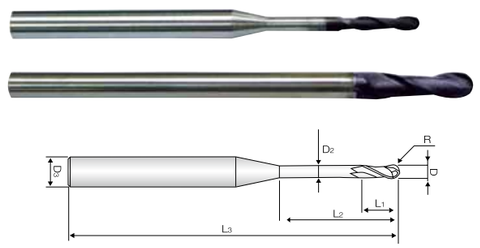
Tolerance of Mill Dia. (mm)		Tolerance of Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

* For the items produced from 1st. 2010, apply to these tolerance.

ZAMUS GRA-MATE SERIES

METRIC

G



2 FLUTE, DIAMOND COATING BALL NOSE

- High performance on graphite, wrought aluminum, bakelite, plastics, wood, brass etc.

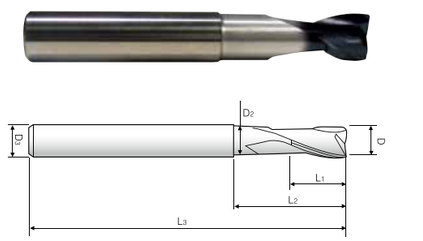
EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
G00501003	0.5	0.25	1	3	50	0.45	4	●
G00501006				6				●
G00501010				10				●
G00601203	0.6	0.3	1.2	3	50	0.55	4	●
G00601206				6				●
G00601208				8				●
G00601210				10				●
G00601212				12				●
G0080164	0.8	0.4	1.6	4	50	0.75	4	●
G0100306	1	0.5	3	6	60	0.95	4	●
G0100308				8				●
G0100310				10				●
G0100312				12				●
G0100314				14				●
G0100316				16				●
G0100318				18				●
G0100320				20				●
G0120410	1.2	0.6	4	10	70	1.15	4	●
G0150510	1.5	0.75	5	10	60	1.45	4	●
G0150512				12				●
G0150516				16				●
G0150520				20				●
G0150525				25	70			●
G0150530				30				●
G0200812	2	1	8	12	60	1.95	4	●
G0200816				16				●
G0200820				20				●
G0200825				25	70			●
G0200830				30				●
G0200835				35	80			●
G0200840				40				●
G0201020			10	20	80			●
G0201020L				20	100			●

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
G0251020	2.5	1.25	10	20	80	2.43	4	●
G0301216	3	1.5	12	16	60	2.9	6	●
G0301220				20	70			●
G0301225				25				●
G0301230				30	80			●
G0301235				35				●
G0301240				40	90			●
G0301245				45				●
G0301525			15	25	80		4	●
G04015S	4	2	15	-	50	-	4	●
G04015M				-	80	-		●
G04015L				-	120	-		●
G0401520				20	60	3.9	6	●
G0401525				25	70			●
G0401530				30	80			●
G0401535				35				●
G0401540				40	90			●
G0401545				45				●
G0401550				50	100			●
G0402030			20	30	80		4	●
G0503050	5	2.5	30	50	100	4.8	6	●
G0503050L					150			●
G06020S	6	3	20	-	70	-	6	●
G06020M				-	100	-		●
G06020L				-	150	-		●
G0603050			30	50	100	5.8		●
G0603050L					150			●
G08025S	8	4	25	-	70	-	8	●
G08025M				-	110	-		●
G08025L				-	160	-		●
G0804060			40	60	110	7.8		●
G0804060L					200			●
G10030S	10	5	30	-	80	-	10	●
G10030M				-	120	-		●
G10030L				-	170	-		●
G1005070			50	70	120	9.7		●
G1005070L					200			●
G12035S	12	6	35	-	80	-	12	●
G12035M				-	130	-		●
G12035L				-	180	-		●
G1205575			55	75	130	11.7		●
G1205575L					200			●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

GE



2 FLUTE, DIAMOND COATING END MILL

- High performance on graphite, wrought aluminum, bakelite, plastics, wood, brass etc.

EDP. No.	D	L1	L2	L3	D2	D3	STOCK
GE00501006	0.5	1	6	50	0.45	4	●
GE00601206	0.6	1.2	6	50	0.55	4	●
GE00601210			10				●
GE00701506	0.7	1.5	6	50	0.65	4	●
GE00802006	0.8	2	6	50	0.75	4	●
GE0100308	1	3	8	60	0.95	4	●
GE0100310			10				●
GE0100312			12				●
GE0150412	1.5	4	12	60	1.45	4	●
GE0200612	2	6	12	60	1.95	4	●
GE0200612S6			12			6	●
GE0250812	2.5	8	12	60	2.43	4	●
GE0301012	3	10	12	60	2.9	4	●
GE0301016			16				●
GE0301012S6			12			6	●
GE0301016S6			16				●
GE0401212	4	12	12	60	3.9	6	●
GE0401216			16				●
GE0401220			20				●
GE0501520	5	15	20	60	4.8	6	●
GE06020S	6	20	-	60	5.8	6	●
GE0602030			30	80			●
GE0603050		30	50	150			●
GE08025S	8	25	-	70	7.8	8	●
GE0802540			40	100			●
GE0804070		40	70	150			●
GE10030S	10	30	-	80	9.7	10	●
GE1003050			50	100			●
GE1004580		45	80	160			●
GE12030S	12	30	-	80	11.7	12	●
GE1203050			50	110			●
GE1205080		50	80	160			●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

ALU-WAVE SERIES

METRIC

AE302

2 FLUTE, LONG LENGTH - for Aluminum

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
AE302010	1	3	40	4	●
AE302020S4	2	6	40	4	●
AE302020	2	6	57	6	●
AE302030	3	12	57	6	●
AE302040	4	14	57	6	●
AE302050	5	16	57	6	●
AE302060	6	16	57	6	●
AE302070	7	20	63	8	●
AE302080	8	22	63	8	●
AE302090	9	25	72	10	●
AE302100	10	28	72	10	●
AE302110	11	30	80	12	●
AE302120	12	32	80	12	●
AE302130	13	35	85	14	●
AE302140	14	35	85	14	●
AE302150	15	40	90	16	●
AE302160	16	45	90	16	●
AE302180	18	45	100	18	●
AE302200	20	50	100	20	●
AE302250	25	50	120	25	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.03	h6

* For the items produced from 1st. 2010, apply to these tolerance.

AE30(2)3

3 FLUTE, LONG & EXTRA LONG LENGTH - for Aluminum

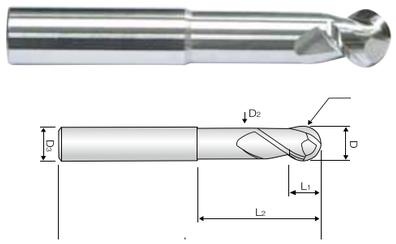
EDP. No.	D	C.L	OAL	SH.Dia.	STOCK
AE303030	3	12	57	6	●
AE303031		15	57		●
AE323030		20	62		●
AE323031		25	62		●
AE303040	4	14	57	6	●
AE303041		20	57		●
AE323040		25	62		●
AE323041		30	70		●
AE303050	5	16	57	6	●
AE303051		20	57		●
AE303052		25	62		●
AE323050		30	70		●
AE323051		35	70		●
AE303060	6	16	57	6	●
AE303061		20	57		●
AE303062		25	62		●
AE303063		30	70		●
AE323060		35	80		●
AE323061		42	90		●
AE303070	7	20	63	8	●
AE303080	8	22	63	8	●
AE303081		30	70		●
AE303082		35	80		●
AE323080		40	100		●
AE323081		45	100		●
AE303090	9	25	72	10	●
AE303100	10	28	72	10	●
AE303101		35	80		●
AE303102		45	100		●
AE323100		55	110		●
AE323101		65	120		●
AE303110	11	30	80	12	●

EDP. No.	D	C.L	OAL	SH.Dia.	STOCK
AE303120	12	32	80	12	●
AE303121		40	90		●
AE303122		45	100		●
AE303123		55	110		●
AE323120		65	120		●
AE323121		75	125		●
AE303130	13	35	85	14	●
AE303140	14	35	85	14	●
AE303150	15	40	90	16	●
AE303160	16	45	90	16	●
AE303161		55	110		●
AE303162		65	125		●
AE303163		75	130		●
AE323160		85	150		●
AE303180	18	45	100	18	●
AE303200	20	50	100	20	●
AE303201		60	110		●
AE303202		70	130		●
AE323200		80	150		●
AE323201		90	160		●
AE323202		100	160		●
AE303250	25	50	120	25	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

AB302



2 FLUTE, STUB CUT BALL NOSE - for Aluminum

- Excellent cutting qualities on aluminum & copper.

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
AB302060	6	3	5.5	25	55	5.4	6	●
AB302061	6	3	5.5	40	90	5.4	6	●
AB302080	8	4	7	30	65	7.2	8	●
AB302081	8	4	7	50	100	7.2	8	●
AB302100	10	5	8.5	35	75	9	10	●
AB302101	10	5	10	50	100	9	10	●
AB302102	10	5	10	60	150	9	10	●
AB302120	12	6	10.5	40	75	11	12	●
AB302121	12	6	12	50	110	11	12	●
AB302122	12	6	12	60	150	11	12	●
AB302160	16	8	14	50	90	14.5	16	●
AB302161	16	8	16	70	150	14.5	16	●
AB302162	16	8	16	90	200	14.5	16	●
AB302200	20	10	17	50	100	18	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
±0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

AR502

2 FLUTE, CORNER RADIUS, LONG LENGTH

- Suitable for aluminium, aluminium alloy, copper & non-ferrous material.
- Corner radius against chipping in high speed machining.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
AR502010	1	0.05	3	40	6	●
AR502015	1.5	0.05	5	40	6	●
AR502020	2	0.1	6	40	6	●
AR502021	2	0.1	12	50	6	●
AR502030	3	0.1	10	50	6	●
AR502031	3	0.1	20	60	6	●
AR502040	4	0.1	12	50	6	●
AR502041	4	0.1	20	60	6	●
AR502050	5	0.1	15	57	6	●
AR502060	6	0.1	15	57	6	●
AR502061	6	0.1	22	65	6	●
AR502070	7	0.1	20	63	8	●
AR502080	8	0.1	20	63	8	●
AR502081	8	0.1	28	70	8	●
AR502090	9	0.1	25	72	10	●
AR502100	10	0.2	28	72	10	●
AR502101	10	0.2	32	80	10	●
AR502110	11	0.2	30	80	12	●
AR502120	12	0.2	32	80	12	●
AR502121	12	0.2	40	100	12	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

AR503

3 FLUTE, CORNER RADIUS, LONG LENGTH

- Suitable for aluminium, aluminium alloy, copper & non-ferrous material.
- Corner radius against chipping in high speed machining.

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
AR503040	4	0.5	14	57	6	●
AR503041	4	1	25	62	6	●
AR503060	6	0.5	16	57	6	●
AR503061	6	1	25	62	6	●
AR503080	8	0.5	22	63	8	●
AR503081	8	1	35	80	8	●
AR503100	10	0.5	28	72	10	●
AR503101	10	1	45	100	10	●
AR503120	12	0.5	32	80	12	●
AR503121	12	1	45	100	12	●
AR503160	16	0.5	45	90	16	●
AR503161	16	1	65	125	16	●
AR503200	20	0.5	50	100	20	●
AR503201	20	1	70	130	20	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.02	h6

* For the items produced from 1st. 2010, apply to these tolerance.

AF303

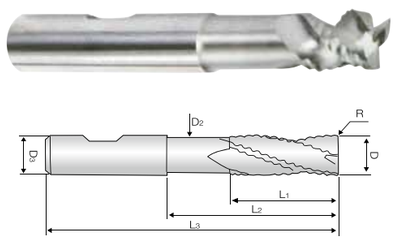
ROUGHING END MILL - for Aluminum DIN6527L / DIN6535-HA, DIN6535-HB

EDP. No.		D	C.L	OAL	SH. Dia.	STOCK
PLAIN SHANK	FLAT SHANK					
AF303060	**AF303060F**	6	16	57	6	●
AF303070	**AF303070F**	7	16	63	8	●
AF303080	**AF303080F**	8	16	63	8	●
AF303090	**AF303090F**	9	19	72	10	●
AF303100	**AF303100F**	10	22	72	10	●
AF303120	**AF303120F**	12	26	83	12	●
AF303140	**AF303140F**	14	26	83	14	●
AF303160	**AF303160F**	16	32	92	16	●
AF303180	**AF303180F**	18	32	92	18	●
AF303200	**AF303200F**	20	38	104	20	●

µm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

AF313



ROUGHING END MILL - for Aluminum DIN6527L / DIN6535-HA, DIN6535-HB

EDP. No.		Dia.	C.L	OAL	SH. Dia.	Z	Z	Z	STOCK
PLAIN SHANK	FLAT SHANK								
AF313060	**AF313060F**	6	0.2	9	21	57	5.5	6	
AF313080	**AF313080F**	8	0.2	12	27	63	7.5	8	
AF313100	**AF313100F**	10	0.2	12	31	72	9.5	10	
AF313120	**AF313120F**	12	0.2	12	37	83	11.5	12	
AF313160	**AF313160F**	16	0.2	14	43	92	15.5	16	
AF313200	**AF313200F**	20	0.2	17	53	104	19.2	20	

µm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

STANDARD ENDMILL SERIES

METRIC

E302

2 FLUTE, REGULAR LENGTH

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
E302010S4	1	3	42	4	●
E302010	1	3	42	6	●
E302015S4	1.5	4	42	4	●
E302015	1.5	4	42	6	●
E302020S4	2	6	42	4	●
E302020	2	6	42	6	●
E302025S4	2.5	8	42	4	●
E302025	2.5	8	42	6	●
E302030	3	10	50	6	●
E302035	3.5	10	50	6	●
E302040	4	12	50	6	●
E302045	4.5	14	50	6	●
E302050	5	15	50	6	●
E302055	5.5	15	50	6	●
E302060	6	15	50	6	●
E302065	6.5	18	60	8	●
E302070	7	20	60	8	●
E302075	7.5	20	60	8	●
E302080	8	20	60	8	●
E302085	8.5	23	70	10	●
E302090	9	25	70	10	●
E302095	9.5	25	70	10	●
E302100	10	25	70	10	●
E302105	10.5	28	75	12	●
E302110	11	30	75	12	●
E302115	11.5	30	75	12	●
E302120	12	30	75	12	●
E302130	13	35	85	14	●
E302130S16	13	35	90	16	●
E302140	14	35	85	14	●
E302140S16	14	35	90	16	●
E302150	15	40	90	16	●
E302160	16	40	90	16	●
E302180	18	45	100	18	●
E302200	20	45	100	20	●
E302250	25	50	120	25	●

μm=1/1000mm

Dia. / Tolerance	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

E304

4 FLUTE, REGULAR LENGTH

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
E304020S4	2	6	42	4	●
E304020	2	6	42	6	●
E304025	2.5	8	42	6	●
E304030	3	10	50	6	●
E304035	3.5	10	50	6	●
E304040	4	12	50	6	●
E304045	4.5	14	50	6	●
E304050	5	15	50	6	●
E304055	5.5	15	50	6	●
E304060	6	15	50	6	●
E304065	6.5	18	60	8	●
E304070	7	20	60	8	●
E304075	7.5	20	60	8	●
E304080	8	20	60	8	●
E304085	8.5	23	70	10	●
E304090	9	25	70	10	●
E304095	9.5	25	70	10	●
E304100	10	25	70	10	●
E304105	10.5	28	75	12	●
E304110	11	30	75	12	●
E304115	11.5	30	75	12	●
E304120	12	30	75	12	●
E304130	13	35	85	14	●
E304130S16	13	35	90	16	●
E304140	14	35	85	14	●
E404140S16	14	35	90	16	●
E304150	15	40	90	16	●
E304160	16	40	90	16	●
E304180	18	45	100	18	●
E304200	20	45	100	20	●
E304250	25	50	120	25	●

μm=1/1000mm

Dia. / Tolerance	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

PART. B
ENDMILL & DRILL

STANDARD ENDMILL SERIES

METRIC

B302

2 FLUTE, BALL NOSE LONG LENGTH

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
B302010	1	0.5	3	50	6	●
B302015	1.5	0.75	4	50	6	●
B302020	2	1	6	60	6	●
B302025	2.5	1.25	6	60	6	●
B302030	3	1.5	8	70	6	●
B302035	3.5	1.75	8	70	6	●
B302040	4	2	8	70	6	●
B302045	4.5	2.25	10	70	6	●
B302050	5	2.5	12	80	6	●
B302055	5.5	2.75	12	80	6	●
B302060	6	3	12	90	6	●
B302065	6.5	3.25	12	90	8	●
B302070	7	3.5	20	90	8	●
B302080	8	4	20	100	8	●
B302090	9	4.5	25	100	10	●
B302100	10	5	25	100	10	●
B302110	11	5.5	30	110	12	●
B302120	12	6	30	110	12	●
B302130	13	6.5	35	120	14	●
B302140	14	7	35	120	14	●
B302150	15	7.5	40	140	16	●
B302160	16	8	40	140	16	●
B302180	18	9	45	150	18	●
B302200	20	10	45	160	20	●
B302250	25	12.5	50	180	25	●

μm=1/1000mm

Dia. / Tolerance	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

B304

4 FLUTE, BALL NOSE LONG LENGTH

EDP. No.	Dia.	R	C.L	OAL	SH.Dia.	STOCK
B304030	3	1.5	8	70	6	●
B304040	4	2	8	70	6	●
B304050	5	2.5	12	80	6	●
B304060	6	3	12	90	6	●
B304070	7	3.5	20	90	8	●
B304080	8	4	20	100	8	●
B304090	9	4.5	25	100	10	●
B304100	10	5	25	100	10	●
B304110	11	5.5	30	110	12	●
B304120	12	6	30	110	12	●
B304130	13	6.5	35	120	14	●
B304140	14	7	35	120	14	●
B304150	15	7.5	40	140	16	●
B304160	16	8	40	140	16	●
B304180	18	9	45	150	18	●
B304200	20	10	45	160	20	●
B304250	25	12.5	50	180	25	●

μm=1/1000mm

Dia. / Tolerance	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

ENDMILL
DRILL

STANDARD ENDMILL SERIES

METRIC

E322

2 FLUTE, LONG LENGTH

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
E322030	3	25	75	6	●
E322040	4	25	75	6	●
E322050	5	30	85	6	●
E322060	6	30	85	6	●
E322070	7	35	85	8	●
E322080	8	35	85	8	●
E322090	9	45	100	10	●
E322100	10	45	100	10	●
E322101	10	60	155	10	●
E322120	12	55	120	12	●
E322121	12	65	155	12	●
E322140	14	60	120	14	●
E322160	16	60	120	16	●
E322161	16	75	165	16	●
E322180	18	60	120	18	●
E322200	20	60	120	20	●
E322201	20	75	165	20	●

E324

4 FLUTE, LONG LENGTH

EDP. No.	Dia.	C.L	OAL	SH.Dia.	STOCK
E324030	3	25	75	6	●
E324040	4	25	75	6	●
E324050	5	30	85	6	●
E324060	6	30	85	6	●
E324070	7	35	85	8	●
E324080	8	35	85	8	●
E324090	9	45	100	10	●
E324100	10	45	100	10	●
E324101	10	60	155	10	●
E324120	12	55	120	12	●
E324121	12	65	155	12	●
E324140	14	60	120	14	●
E324160	16	60	120	16	●
E324161	16	75	165	16	●
E324180	18	60	120	18	●
E324200	20	60	120	20	●
E324201	20	75	165	20	●

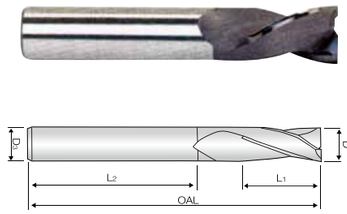
μm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

μm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

EB302



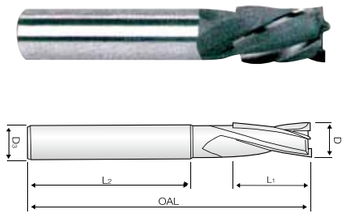
2 FLUTE, REGULAR LENGTH - BRAZED TYPE

EDP. No.	D	L2	L1	OAL	D3	STOCK
EB302140	14	60	28	98	16	●
EB302150	15	60	28	98	16	●
EB302160	16	60	28	98	16	●
EB302170	17	70	32	115	20	●
EB302180	18	70	32	115	20	●
EB302190	19	70	32	115	20	●
EB302200	20	70	32	115	20	●
EB302220	22	70	32	115	20	●
EB302230	23	85	40	140	25	●
EB302240	24	85	40	140	25	●
EB302250	25	85	40	140	25	●
EB302260	26	85	40	140	25	●
EB302280	28	85	40	140	25	●
EB302300	30	85	50	150	32	●
EB302320	32	85	50	150	32	●
EB302350	35	85	50	150	32	●
EB302360	36	85	50	150	32	●
EB302380	38	85	55	155	32	●
EB302400	40	85	55	155	32	●
EB302450	45	85	63	160	32	●
EB302500	50	85	63	160	32	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.05	h7

* For the items produced from 1st. 2010, apply to these tolerance.

EB304



4 FLUTE, REGULAR LENGTH - BRAZED TYPE

EDP. No.	D	L1	L2	OAL	D3	STOCK
EB304140	14	28	60	98	16	●
EB304150	15	28	60	98	16	●
EB304160	16	28	60	98	16	●
EB304170	17	32	70	115	20	●
EB304180	18	32	70	115	20	●
EB304190	19	32	70	115	20	●
EB304200	20	32	70	115	20	●
EB304220	22	32	70	115	20	●
EB304230	23	40	85	140	25	●
EB304240	24	40	85	140	25	●
EB304250	25	40	85	140	25	●
EB304260	26	40	85	140	25	●
EB304280	28	40	85	140	25	●
EB304300	30	50	85	150	32	●
EB304320	32	50	85	150	32	●
EB304350	35	50	85	150	32	●
EB304360	36	50	85	150	32	●
EB304380	38	55	85	155	32	●
EB304400	40	55	85	155	32	●
EB304450	45	63	85	160	32	●
EB304500	50	63	85	160	32	●

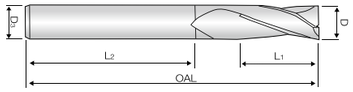
Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.05	h7

* For the items produced from 1st. 2010, apply to these tolerance.

STANDARD ENDMILL SERIES

METRIC

EB322



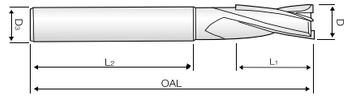
2 FLUTE, LONG LENGTH - BRAZED TYPE

EDP. No.	D	L_1	L_2	OAL	D_3	STOCK
EB322140	14	50	60	130	16	●
EB322150	15	50	60	130	16	●
EB322160	16	60	60	140	16	●
EB322180	18	65	60	145	20	●
EB322200	20	65	60	145	20	●
EB322220	22	65	60	145	25	●
EB322240	24	70	60	150	25	●
EB322250	25	70	60	150	25	●
EB322260	26	70	60	150	32	●
EB322280	28	70	60	150	32	●
EB322300	30	80	70	180	32	●
EB322320	32	90	70	190	32	●
EB322350	35	100	70	200	32	●
EB322380	38	120	70	220	32	●
EB322400	40	120	70	220	32	●
EB322450	45	120	80	230	32	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.05	h7

* For the items produced from 1st. 2010, apply to these tolerance.

EB324



4 FLUTE, LONG LENGTH - BRAZED TYPE

EDP. No.	D	L_1	L_2	OAL	D_3	STOCK
EB324140	14	50	60	130	16	●
EB324150	15	50	60	130	16	●
EB324160	16	60	60	140	16	●
EB324180	18	65	60	145	20	●
EB324200	20	65	60	145	20	●
EB324220	22	65	60	145	25	●
EB324240	24	70	60	150	25	●
EB324250	25	70	60	150	25	●
EB324260	26	70	60	150	32	●
EB324280	28	70	60	150	32	●
EB324300	30	80	70	180	32	●
EB324320	32	90	70	190	32	●
EB324350	35	100	70	200	32	●
EB324380	38	120	70	220	32	●
EB324400	40	120	70	220	32	●
EB324450	45	120	80	230	32	●

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.05	h7

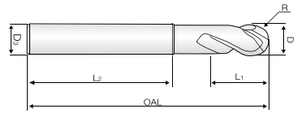
* For the items produced from 1st. 2010, apply to these tolerance.

STANDARD ENDMILL SERIES

METRIC

PART. B
ENDMILL & DRILL

BB302



2 FLUTE, BALL NOSE REGULAR LENGTH - BRAZED TYPE

EDP. No.	D	R	L_2	L_1	L_3	OAL	STOCK
BB302150	15	7.5	55	28	16	100	
BB302160	16	8	55	28	16	100	
BB302180	18	9	55	29	20	110	
BB302200	20	10	55	29	20	110	
BB302220	22	11	60	36	25	110	

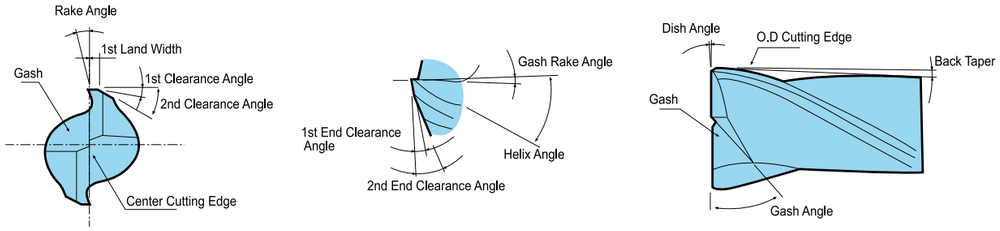
EDP. No.	D	R	L_2	L_1	L_3	OAL	STOCK
BB302240	24	12	60	37	25	110	
BB302250	25	12.5	60	38	25	120	
BB302280	28	14	65	40	32	120	
BB302300	30	15	65	46	32	130	
BB302320	32	16	65	47	32	140	

Tolerance of Mill Dia. (mm)	Tolerance of Shank Dia.
0 ~ -0.05	h7

* For the items produced from 1st. 2010, apply to these tolerance.

ENDMILL
DRILL

NOMENCLATURE OF ENDMILL



APPLICATION RANGE OF GRADE

WORKPIECE	GRADE
Carbon Steel, Alloy Steel, Tool Steel, Metal Mold Steel	• Micro Grain Carbide • P30
Cast Iron, Ductile	• Micro Grain Carbide • K10
Heat Treatment Steel(HRC 40-60)	• Ultrafinest Carbide
Aluminium, Nonferrous Meterial	• Micro Grain Carbide • K10

FORMULA OF ENDMILLING

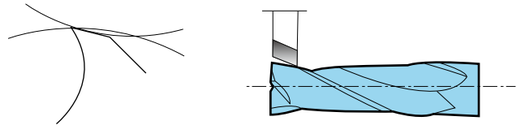
1) Cutting Speed $V = \frac{\pi \times D \times N}{1000}$ (m/min)	V : Cutting Speed (m/min) D : Diameter of End Mill (mm) N : End Mill revolution (RPM)
2) Feed per tooth $fz = \frac{F}{Z \times N}$ (mm/tooth)	fz : Feed per tooth (mm/tooth) Z : No. of teeth N : End Mill revolution (RPM)
3) Table Feed rate $F = fz \times Z \times N$	F : Feed rate (mm/min) fz : Feed per tooth (mm/tooth) Z : No. of teeth N : End Mill revolution (RPM)
4) Cutting Time $Tc = \frac{L}{F}$	Tc: Cutting Time (min) F : Table feed rate (m/min) L : Length of cut (workpiece Length + Diameter of Endmill +)

FOR REGRINDING

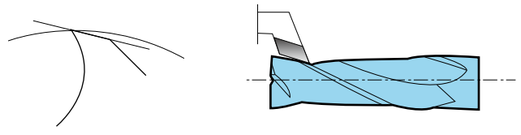
1. Regrinding range

APPLICATION RANGE	CUTTER Dia.	AMOUNT OF FLANK WEAR
Finish Machining	~ 010 011 ~ 030 031 ~ 050	0.05 ~ 0.1 0.1 ~ 0.25 0.2 ~ 0.35
Rough Machining	~ 010 011 ~ 030 031 ~ 050	0.08 ~ 0.15 0.15 ~ 0.35 0.3 ~ 0.45

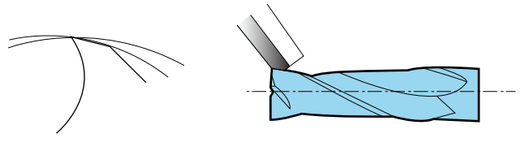
2. Regrinding Method of Relief



(1) Concave method
- In case when precise outer Diameter dimension is required.
- In case of aluminium machining.

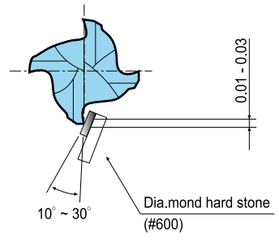


(2) Flat method
- Excellent machinability
  - Applicable to ball end mill and taper end mill.
- Secondary clearance angle work is required.
  - When Diameter is large.



(3) Eccentric method
- Excellent toughness and surface roughness.
- Secondary clearance angle work is not required.

3. Honing



1) Recommend honing for machining mold metal and high hardness workpiece.
   - The amount of honing shall be less than that of feed per blade.

2) Whan using end mill without honing, machine for 10 to 30 seconds at feed rate of less than 0.01 mm/blade and then machine at normal feed rate.

3) Honing is not required for machining aluminium and non-ferrous metal.

TROUBLE SHOOTING FOR ENDMILLING

Problems	Cause	Cutting Speed	Feed Rate	Depth of Cut	Coolant	Up & Down Cut	Relief Angle	Lead Angle	Cutting Length	Numbers of Teeth	Honing	Chip Pocket	Toughness	Hardness	Machanical Rigidity	Machanical Chattering	Workpiece Setting	Overhang
		Cutting Conditions					Tool shape						Grade		The Others			
Cutting edge breakage	Excessive wear on periphery	• Improper cutting conditions	▼	▲		⊙								▲				
Cutting edge breakage	Chipping	• Improper cutting conditions • Generation of built-up edge • Improper tool grade		▼			▼	▼				⊙		▲		▼	▲	▼
Cutting edge breakage	Breakage while cutting	• Improper cutting conditions • Excessive cutting load • Excessive overhang		▼	▼					▼			▲			▲		▲	▼
Poor surface finish		• Generation of built-up edge	▲	▲		⊙			▲			⊙						
Poor surface finish		• Generation of chattering	▼			○	▼			▼					▲	⊙	▲	▼
Poor surface finish		• Surface Squarence		▼	▼		▲		▲	▼								▼
Oversize or undersize		• Improper cutting conditions • Improper choice of endmill type	▲	▼			▼			▼	▲				▲	▼		▼
Poor chip control		• Excessive cutting rate • Improper chip Pocket • Improper cutting conditions		▼	▼						▼			▲				

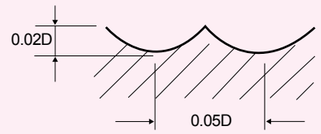
▲ : Increase ▼ : Decrease ○ : Application ⊙ : Proper application

DA702

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R1/64×1/32	50000	188.98	50000	165.35	45000	149.61	40000	118.11	35000	102.36	35000	90.55
R1/32×1/16	49700	224.41	47800	188.98	40000	157.48	35000	124.02	32000	110.24	28500	90.55
R3/64×3/32	49700	224.41	47800	188.98	40000	157.48	35000	124.02	32000	110.24	28500	90.55
R1/16×1/8	33100	236.22	31800	208.66	26500	157.48	23500	124.02	21000	110.24	19000	90.55
R3/32×3/16	18600	228.35	17800	192.91	15000	147.64	13500	120.08	11500	100.39	10500	82.68
R1/8×1/4	13900	190.94	13400	161.42	11000	122.05	10000	98.43	8800	84.65	8000	68.90
R5/32×5/16	11100	165.35	10700	137.80	9000	106.30	8000	84.65	7000	72.83	6500	61.02
R3/16×3/8	9300	145.67	8900	122.05	7500	94.49	6600	74.80	5800	64.96	5300	54.33
R1/4×1/2	6950	116.14	6680	98.43	5600	74.80	5000	61.02	4400	49.21	4000	41.34

RPM : Revolution Per Min
FEED : inch / min

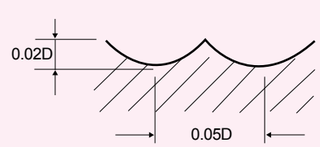
※The feed, in long & extra long types, should be reduced by around 50%



DB702

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	50000	4800	50000	4200	45000	3800	40000	3000	35000	2600	35000	2300
2	49700	5700	47800	4800	40000	4000	35000	3150	32000	2800	28500	2300
3	33100	6000	31800	5300	26500	4000	23500	3150	21000	2800	19000	2300
4	24900	6000	23900	5300	20000	4000	17500	3150	16000	2800	14500	2300
5	18600	5800	17800	4900	15000	3750	13500	3050	11500	2550	10500	2100
6	13900	4850	13400	4100	11000	3100	10000	2500	8800	2150	8000	1750
8	11100	4200	10700	3500	9000	2700	8000	2150	7000	1850	6500	1550
10	9300	3700	8900	3100	7500	2400	6600	1900	5800	1650	5300	1380
12	6950	2950	6680	2500	5600	1900	5000	1550	4400	1250	4000	1050
16	5570	2650	5350	2200	4500	1700	4000	1350	3500	1000	3200	850
20	4450	2350	4300	1950	3600	1500	3200	1200	2800	800	2550	660

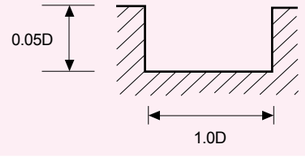
RPM = rev. / min.
FEED = mm / min.

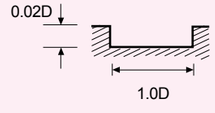


ZE702, ZE752 , ZE712 - SLOTTING

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	48000	750	38000	570	25500	360	20500	215	16000	135	12500	85
2	33300	850	26000	680	17500	420	14500	260	11000	160	9500	115
3	21800	850	17300	680	11500	420	9500	260	7500	160	6400	115
4	16700	880	13200	700	8800	440	7200	270	5600	170	4750	118
5	15700	1000	12500	805	8300	500	6400	285	5100	180	4450	132
6	13100	950	10350	770	6900	480	5300	280	4200	180	3700	130
8	9880	930	7800	720	5200	445	4000	255	3200	165	2800	120
10	7800	850	6150	680	4100	415	3200	240	2550	155	2200	112
12	6650	850	5250	680	3500	415	2650	240	2100	155	1860	112
16	4900	730	3900	580	2600	365	2000	210	1600	135	1400	95
20	3900	660	3100	525	2050	335	1600	195	1300	125	1100	85

RPM = rev. / min.
FEED = mm / min.

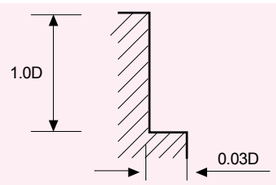




ZE702, ZE752 , ZE712 - SIDE CUTTING

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	48000	1050	38000	820	25500	510	20500	310	16000	190	12500	125
2	33300	1200	26000	970	17500	600	14500	370	11000	230	9500	165
3	21800	1200	17300	970	11500	600	9500	370	7500	230	6400	165
4	16700	1250	13200	1000	8800	625	7200	385	5600	240	4750	170
5	15700	1450	12500	1150	8300	710	6400	410	5100	260	4450	190
6	13100	1350	10350	1100	6900	690	5300	400	4200	255	3700	185
8	9880	1320	7800	1030	5200	635	4000	365	3200	235	2800	170
10	7800	1200	6150	970	4100	590	3200	340	2550	220	2200	160
12	6650	1200	5250	970	3500	590	2650	340	2100	220	1860	160
16	4900	1050	3900	840	2600	520	2000	300	1600	190	1400	140
20	3900	950	3100	750	2050	475	1600	275	1300	175	1100	125

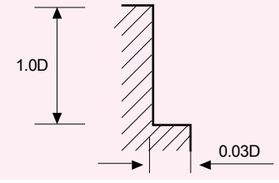
RPM = rev. / min.
FEED = mm / min.



ZE704, ZE754 , ZE714 - SIDE CUTTING

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	48000	1480	38000	1050	25500	710	20500	430	16000	270	12500	175
2	33300	1750	26000	1250	17500	840	14500	520	11000	320	9500	230
3	21800	1750	17300	1250	11500	840	9500	520	7500	320	6400	230
4	16700	1800	13200	1300	8800	880	7200	540	5600	335	4750	240
5	15700	2000	12500	1500	8300	1000	6400	580	5100	370	4450	270
6	13100	1950	10350	1400	6900	950	5300	560	4200	350	3700	260
8	9880	1880	7800	1350	5200	900	4000	520	3200	330	2800	240
10	7800	1750	6150	1260	4100	840	3200	480	2550	310	2200	220
12	6650	1750	5250	1260	3500	840	2650	480	2100	300	1860	220
16	4900	1500	3900	1100	2600	730	2000	420	1600	270	1400	200
20	3900	1300	3100	970	2050	650	1600	380	1300	250	1100	180

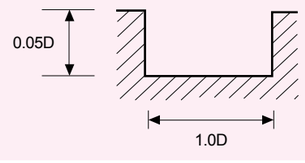
RPM = rev. / min.
FEED = mm / min.

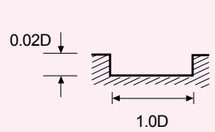


ZR702 - SLOTTING

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	33300	680	26000	544	17500	336	14500	208	11000	128	9500	92
3	21800	680	17300	544	11500	336	9500	208	7500	128	6400	92
4	16700	704	13200	560	8800	352	7200	216	5600	136	4750	94
5	15700	800	12500	644	8300	400	6400	228	5100	144	4450	106
6	13100	760	10350	616	6900	384	5300	224	4200	144	3700	104
8	9880	744	7800	576	5200	356	4000	204	3200	132	2800	96
10	7800	680	6150	544	4100	332	3200	192	2550	124	2200	90
12	6650	680	5250	544	3500	332	2650	192	2100	124	1860	90
16	4900	584	3900	464	2600	292	2000	168	1600	108	1400	78
20	3900	528	3100	420	2050	268	1600	168	1300	100	1100	70

RPM = rev. / min.
FEED = mm / min.

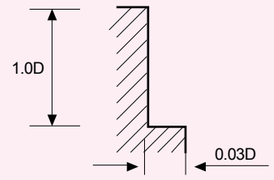




ZS104, ZS204 - SIDE CUTTING

MATERIAL	HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
4	17200	1690	11440	1140	9360	700	7280	430	6170	310
6	13450	1820	8970	1230	6890	720	5460	450	4810	330
8	9100	1750	6760	1170	5200	670	4160	420	3640	310
10	8000	1630	5330	1090	4160	620	3320	400	2860	280
12	6830	1630	4550	1010	3450	580	2730	370	2420	260

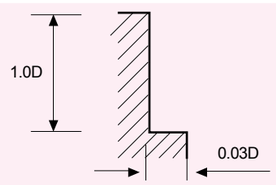
RPM = rev. / min.
FEED = mm / min.



ZE702, ZE752 , ZE712 - SIDE CUTTING

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	33300	960	26000	776	17500	480	14500	296	11000	184	9500	132
3	21800	960	17300	776	11500	480	9500	296	7500	184	6400	132
4	16700	1000	13200	800	8800	500	7200	308	5600	192	4750	136
5	15700	1160	12500	920	8300	568	6400	328	5100	208	4450	152
6	13100	1080	10350	880	6900	552	5300	320	4200	204	3700	148
8	9880	1056	7800	824	5200	508	4000	292	3200	188	2800	136
10	7800	960	6150	776	4100	472	3200	272	2550	176	2200	128
12	6650	960	5250	776	3500	472	2650	272	2100	176	1860	128
16	4900	840	3900	672	2600	416	2000	240	1600	152	1400	112
20	3900	760	3100	600	2050	380	1600	220	1300	140	1100	100

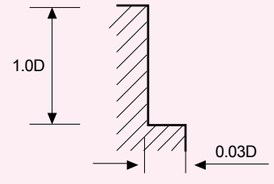
RPM = rev. / min.
FEED = mm / min.



ZR704, ZR724

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	21800	1400	17300	1000	11500	672	9500	416	7500	256	6400	184
4	16700	1440	13200	1040	8800	704	7200	432	5600	268	4750	192
5	15700	1600	12500	1200	8300	800	6400	464	5100	296	4450	216
6	13100	1560	10350	1120	6900	760	5300	448	4200	280	3700	208
8	9880	1504	7800	1080	5200	720	4000	416	3200	264	2800	192
10	7800	1400	6150	1008	4100	672	3200	384	2550	248	2200	176
12	6650	1400	5250	1008	3500	672	2650	384	2100	240	1860	176
16	4900	1200	3900	880	2600	584	2000	336	1600	216	1400	160
20	3900	1040	3100	776	2050	520	1600	304	1300	200	1100	144

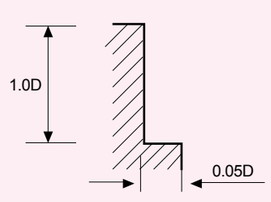
RPM = rev. / min.
FEED = mm / min.

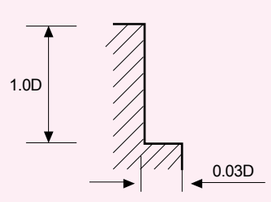


ZR706, ZE716

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65		HRc 65 ~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	24800	5350	23500	4900	16000	4900	13500	3300	10500	2100	8000	1450
8	20000	5500	19000	5000	12000	4600	10000	3100	8000	2000	6000	1400
10	16000	4900	15500	4500	9500	4100	8000	2900	6400	1800	4800	1300
12	13000	4500	12500	4100	8000	3800	6600	2500	5300	1600	4000	1150
16	10000	4000	9700	3700	6000	3400	5000	2300	4000	1250	3000	870
20	8000	3350	7800	3400	4800	3200	4000	2100	3200	1020	2400	690

RPM = rev. / min.
FEED = mm / min.

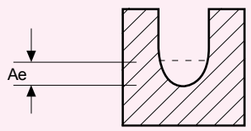




ZSLNB

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS			HARDENED STEELS			COPPER		
HARDNESS	HRc 30 ~ HRc 45			HRc 45 ~ HRc 55			HRc 55 ~ HRc 65					
DIAMETER(mm)	RPM	RPM	FEED	RPM	RPM	FEED	RPM	RPM	FEED	RPM	RPM	FEED
0.5	34100~49500	600~870	0.007~0.028	31900~35200	490~540	0.005~0.023	31900~35200	440~480	0.005~0.021	49000~50000	1100~1400	0.010~0.042
0.6	28600~40700	590~850	0.007~0.034	26400~29700	480~540	0.006~0.028	26400~29700	400~480	0.006~0.025	42000~50000	1100~1700	0.011~0.050
0.8	22000~30800	640~890	0.016~0.064	19800~22000	490~550	0.013~0.052	19800~22000	440~500	0.012~0.048	31000~50000	1100~2250	0.024~0.096
1.0	17600~24200	600~850	0.008~0.080	15400~17600	470~540	0.007~0.065	15400~17600	440~500	0.006~0.060	24000~49500	1100~2200	0.012~0.120
1.2	14300~18700	590~780	0.024~0.032	12000~14000	480~540	0.020~0.026	12000~14000	420~480	0.018~0.024	28500~38500	1480~1950	0.036~0.048
1.5	11000~14300	580~760	0.031~0.048	10000~11500	480~540	0.025~0.039	10000~11500	420~480	0.023~0.036	17000~28500	1100~1950	0.046~0.072
2.0	8500~11000	590~800	0.024~0.160	7900~8800	470~530	0.020~0.130	7900~8800	440~480	0.018~0.120	12600~24000	1100~2150	0.036~0.240
3.0	5700~8200	730~1000	0.064~0.24	5300~5800	590~650	0.052~0.195	5300~5800	550~620	0.048~0.120	11900~17000	1850~2700	0.096~0.360
4.0	4300~6200	680~990	0.080~0.320	3950~4400	550~620	0.065~0.260	3850~4400	530~570	0.060~0.240	6600~12500	1260~2500	0.120~0.480

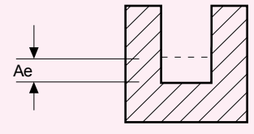
RPM = rev. / min.
FEED = mm / min.



ZSLNS

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS			HARDENED STEELS			COPPER		
HARDNESS	HRc 30 ~ HRc 45			HRc 45 ~ HRc 55			HRc 55 ~ HRc 65					
DIAMETER(mm)	RPM	RPM	FEED	RPM	RPM	FEED	RPM	RPM	FEED	RPM	RPM	FEED
0.4	34100~50000	350~590	0.005~0.028	30500~35200	295~340	0.003~0.020	18300~24600	120~200	0.002~0.012	48000~50000	790~920	0.008~0.048
0.5	25650~33000	370~470	0.006~0.035	23750~26000	285~315	0.004~0.025	14200~18000	115~130	0.003~0.015	44000~50000	800~1150	0.010~0.060
0.6	20900~35200	330~560	0.007~0.030	19900~22000	260~290	0.005~0.021	11900~15500	100~120	0.003~0.013	37500~50000	770~1250	0.011~0.051
0.8	16150~26400	360~590	0.009~0.040	15200~16700	280~310	0.006~0.028	9000~11700	110~125	0.004~0.017	28500~47000	770~1300	0.015~0.068
1.0	12300~18700	350~540	0.011~0.028	10500~11500	250~280	0.008~0.020	6300~8050	100~115	0.005~0.012	22500~34000	810~1300	0.018~0.048
1.2	10450~17600	350~590	0.025~0.070	9100~10000	250~280	0.015~0.042	5400~7000	100~115	0.009~0.026	22500~31500	950~1350	0.036~0.101
1.5	9100~17600	430~830	0.017~0.077	7000~8000	250~280	0.012~0.055	4300~5500	100~115	0.007~0.033	14500~25000	770~1320	0.028~0.132
2.0	6350~10550	340~570	0.021~0.140	6100~6700	270~300	0.015~0.100	3600~4700	100~120	0.009~0.060	11500~18500	770~1250	0.036~0.240
3.0	4300~7050	550~900	0.056~0.210	3990~4600	445~515	0.040~0.150	2400~3200	105~310	0.024~0.090	9000~13000	1400~2110	0.096~0.360
4.0	3200~5300	400~675	0.074~0.280	3000~3400	335~380	0.053~0.200	1800~2400	75~230	0.032~0.120	6750~9750	1050~1575	0.128~0.480

RPM = rev. / min.
FEED = mm / min.



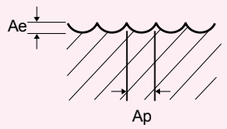
DA412 - GENERAL SPEED CUTTING

MATERIAL	HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 45~HRc 50		HRc 50~HRc 55		HRc 55~HRc 60		HRc 60~HRc 65	
STRENGTH	1500~1750N/mm2		1750~2000N/mm2		2000~2080N/mm2		2080N/mm2	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
R1/16×1/8	12700	43.30	12300	41.30	11800	39.40	8400	26.00
R3/32×3/16	9400	43.30	9050	41.30	8600	37.40	5600	26.80
R1/8×1/4	8600	45.30	8250	43.30	7850	37.40	4850	27.60
R5/32×5/16	7000	41.30	6700	39.40	6350	37.40	3800	25.60
R3/16×3/8	6050	39.40	5800	37.80	5450	35.40	3200	24.40
R1/4×1/2	5450	39.40	5200	37.80	4900	35.40	2750	24.40
R5/16×5/8	4350	34.30	4150	32.70	3900	32.30	2150	10.40
R3/8×3/4	3500	27.20	3300	25.60	3150	24.80	1700	8.70
R1/2×1	2800	27.20	2650	25.60	2520	24.80	1360	8.70

RPM = rev. / min.
FEED = inch / min.

Ae : D1/8=.006
D3/16 ~ D5/16=.010
D3/8 ~ D1=.012

Ap : 0.1×D



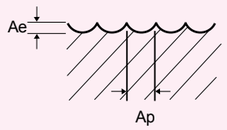
DA412 - HIGH SPEED CUTTING

MATERIAL	HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 45~HRc 50		HRc 50~HRc 55		HRc 55~HRc 65	
STRENGTH	1500~1750N/mm2		1750~2000N/mm2		2000~2080N/mm2	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
R1/16×1/8	12700	68.90	12300	65.70	11800	39.90
R3/32×3/16	9400	65.00	9050	61.80	8600	29.50
R1/8×1/4	8600	68.90	8250	65.70	7850	27.60
R5/32×5/16	7000	61.00	6700	57.50	6350	25.60
R3/16×3/8	6050	57.10	5800	53.50	5450	24.40
R1/4×1/2	5450	55.90	5200	52.40	4900	24.00
R5/16×5/8	4350	48.40	4150	44.50	3900	10.40
R3/8×3/4	3500	39.40	3300	35.40	3150	8.70
R1/2×1	2800	39.40	2640	35.40	2520	8.70

RPM = rev. / min.
FEED = inch / min.

Ae : D1/8=.006
D3/16 ~ D5/16=.010
D3/8 ~ D1=.012

Ap : 0.1×D



RPM = rev. / min.
FEED = mm / min.

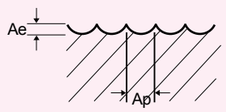
DB412

MATERIAL	HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 45~HRc 50		HRc 50~HRc 55		HRc 55~HRc 60		HRc 60~HRc 65	
STRENGTH	1500~1750N/mm2		1750~2000N/mm2		2000~2080N/mm2		2080N/mm2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	20000	460	20000	400	20000	350	20000	240
1.5	16300	640	16100	580	16000	570	14200	360
2	14500	800	14200	740	13850	760	11300	465
2.5	13400	950	13000	890	12600	920	9600	560
3	12700	1100	12300	1050	11800	1000	8400	660
4	10600	1100	10300	1050	9800	1000	6650	650
5	9400	1100	9050	1050	8600	950	5600	680
6	8600	1150	8250	1100	7850	950	4850	700
8	7000	1050	6700	1000	6350	950	3800	650
10	6050	1000	5800	960	5450	900	3200	620
12	5450	1000	5200	960	4900	900	2750	610

RPM = rev. / min.
FEED = mm / min.

Ae : D1 ~ D4=0.05×D
D5 ~ D8=0.025mm
D10 ~ D20=0.30mm

Ap : D1 ~ D20=0.1×D

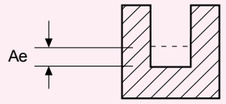


RPM = rev. / min.
FEED = mm / min.

DB602, DB302

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~HRc 30			HRc 30~HRc 45			HRc 45~HRc 55		
STRENGTH	~1000N/mm2			1000~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.5	33000~42000	200~540	0.023~0.045	24000~30000	100~300	0.023~0.045	15000~19000	100~2000	0.005~0.009
0.6	33000~42000	250~700	0.027~0.054	24000~30000	120~385	0.027~0.054	15000~19000	120~250	0.005~0.011
0.8	33000~42000	250~700	0.036~0.072	24000~30000	120~385	0.036~0.072	15000~19000	120~250	0.007~0.014
1.0	30000~38000	275~770	0.045~0.090	22000~27000	140~430	0.045~0.090	13500~17500	140~280	0.009~0.018
1.2	25000~32000	275~860	0.055~0.100	18000~23000	140~430	0.055~0.100	11500~14500	140~280	0.010~0.022
1.4	22000~27000	275~860	0.062~0.125	16000~19000	140~430	0.062~0.125	10000~12500	140~280	0.012~0.025
1.5	20000~25000	275~860	0.070~0.135	14500~18500	140~430	0.070~0.135	9500~11500	140~280	0.014~0.028
1.6	19000~25000	275~860	0.075~0.145	14000~17500	140~430	0.075~0.145	9000~11000	140~280	0.015~0.030
1.8	18000~23000	275~860	0.080~0.160	12500~16000	140~430	0.080~0.160	8000~10000	140~280	0.016~0.032
2	16000~20000	275~860	0.090~0.180	11500~14500	140~430	0.090~0.180	7500~9000	140~280	0.018~0.035
3	11000~14000	275~860	0.135~0.270	7500~9500	140~430	0.135~0.270	5000~6000	140~280	0.028~0.055
4	9000~12000	275~860	0.180~0.360	6100~8200	140~430	0.180~0.360	4000~5000	140~280	0.035~0.070

RPM = rev. / min.
FEED = mm / min.

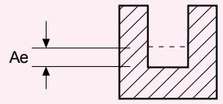


RPM = rev. / min.
FEED = mm / min.

ZE602, ZE302 - RIB PROCESSING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~HRc 30			HRc 30~HRc 45			HRc 45~HRc 55		
STRENGTH	~1000N/mm2			1000~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.4	33000~42000	220~490	0.007~0.018	24000~30000	100~375	0.007~0.018	15000~18000	35~100	0.004~0.008
0.5	33000~42000	220~190	0.009~0.022	24000~30000	100~375	0.009~0.022	15000~18000	35~100	0.004~0.009
0.6	33000~42000	275~630	0.011~0.026	24000~30000	120~485	0.011~0.026	15000~18000	45~120	0.005~0.011
0.7	33000~42000	275~630	0.012~0.031	24000~30000	120~485	0.012~0.031	15000~18000	45~120	0.006~0.013
0.8	28500~37000	310~700	0.014~0.035	20500~26000	130~530	0.014~0.035	13000~15500	50~140	0.007~0.015
0.9	26000~33000	310~800	0.030~0.060	19000~24000	180~600	0.030~0.060	11500~13500	60~145	0.008~0.016
1.0	24000~30000	310~900	0.045~0.090	16500~21000	210~660	0.045~0.090	10500~13500	75~145	0.009~0.018
1.2	19500~24000	310~990	0.055~0.100	14000~17000	210~660	0.055~0.100	9000~11000	75~145	0.010~0.022
1.4	17000~21000	310~990	0.062~0.125	12000~15000	210~660	0.062~0.125	7500~9500	75~145	0.012~0.025
1.5	15500~20000	310~990	0.070~0.135	11000~14500	210~660	0.070~0.135	7000~8500	75~145	0.014~0.028
1.6	15000~19000	310~990	0.075~0.145	11000~13500	210~660	0.075~0.145	6500~8500	75~145	0.015~0.030
1.8	14000~18000	310~990	0.080~0.160	10000~12000	210~660	0.080~0.160	6000~7500	75~145	0.016~0.032
2.0	12500~15500	310~990	0.090~0.180	9000~11000	210~660	0.090~0.180	5500~7000	75~145	0.018~0.035
2.5	10000~13000	310~990	0.112~0.235	7000~9000	210~660	0.112~0.235	4500~5500	75~145	0.022~0.045
3.0	8500~10500	310~990	0.135~0.270	6000~7500	210~660	0.135~0.270	3500~4500	75~145	0.028~0.055
4.0	6500~8000	310~990	0.180~0.360	4500~5500	210~660	0.180~0.360	2700~3500	75~145	0.036~0.072

RPM = rev. / min.
FEED = mm / min.



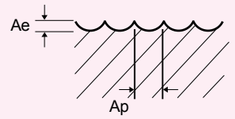
DA512, DA302 - GENERAL SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 40		HRc 45~HRc 65	
STRENGTH	~1000N/mm2		1000~1250N/mm2		1500N/mm2	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
R1/64×1/32	15760	9.80	12720	7.80	5800	3.80
R1/32×1/16	15760	13.80	12140	1.60	5320	4.70
R3/64×3/32	14400	29.50	10700	19.30	4680	5.90
R1/16×1/8	13100	26.70	10000	18.10	4520	5.90
R3/32×3/16	9140	32.30	7300	22.80	3680	7.10
R1/8×1/4	7780	33.00	6300	24.80	3160	7.50
R5/32×5/16	5260	37.50	4420	26.00	2100	7.50
R3/16×3/8	4620	40.10	3780	28.00	1780	7.50
R1/4×1/2	3780	35.40	2940	26.00	1360	7.50
R5/16×5/8	2740	36.20	2320	26.00	1160	7.50
R3/8×3/4	2100	33.00	1900	25.00	840	7.50

RPM = rev. / min.
FEED = inch / min.

Ae : D1/32 ~ D1/4=.008inch
D5/16 ~ D3/4=.012inch

Ap : 0.2×D



Ae : D1/32 ~ D1/4=.008inch
D5/16 ~ D3/4=.012inch

Ap : 0.1×D

RPM = rev. / min.
FEED = mm / min.

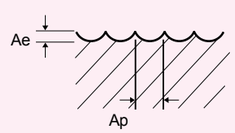
DA512, DA302 - HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		HARDENED STEELS	
HARDNESS	~ HRc 45		HRc 45~HRc 65	
STRENGTH	~ 1500N/mm²		1500N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED
R1/64×1/32	25000	25.60	25000	15.70
R1/32×1/16	23000	27.50	23000	16.90
R3/64×3/32	21000	34.60	19000	19.30
R1/16×1/8	21000	39.40	17000	20.50
R3/32×3/16	21000	70.90	12000	23.60
R1/8×1/4	21000	90.90	10500	24.80
R5/32×5/16	15760	111.80	7880	29.10
R3/16×3/8	13660	120.00	6300	33.00
R1/4×1/2	10500	103.50	5260	33.00
R5/16×5/8	8200	103.50	3780	28.00
R3/8×3/4	6300	99.00	2940	20.80

RPM = rev. / min.
FEED = inch / min.

Ae : D1/32 ~ D1/4=.008inch
D5/16 ~ D3/4=.012inch

Ap : 0.05×D



RPM = rev. / min.
FEED = mm / min.

TECHNICAL DATA

INCH

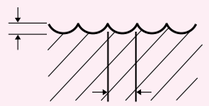
DA514 - GENERAL SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 40		HRc 45~HRc 65	
STRENGTH	~1000N/mm²		1000~1250N/mm²		~1500N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
R1/16×1/8	13100	40.10	10000	27.00	4520	8.85
R3/32×3/16	9140	48.50	7300	34.00	3680	10.50
R1/8×1/4	7780	49.50	6300	37.00	3160	11.25
R5/32×5/16	5260	56.00	4420	39.00	2100	11.25
R3/16×3/8	4620	60.00	3780	42.00	1780	11.25
R1/4×1/2	3780	53.00	2940	39.00	1360	11.25
R5/16×5/8	2740	54.50	2320	38.50	1160	11.25

RPM = rev. / min.
FEED = inch / min.

Ae : D1/8 ~ D1/4=.008inch
D5/16 ~ D5/8=.012inch

Ap : 0.02×D



Ae : D1/8 ~ D1/4=.008inch
D5/16 ~ D5/8=.012inch

Ap : 0.1×D

RPM = rev. / min.
FEED = mm / min.

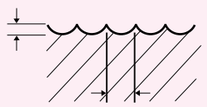
DA514 - HIGH SPEED CUTTING

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS	
HARDNESS	~ HRc 45		HRc 45~HRc 65	
STRENGTH	~ 1500N/mm²		~ 1500N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED
R1/16×1/8	21000	59.00	17000	30.50
R3/32×3/16	21000	106.25	12000	35.50
R1/8×1/4	21000	136.50	10500	37.00
R5/32×5/16	15760	167.50	7800	43.50
R3/16×3/8	13660	180.00	6300	49.50
R1/4×1/2	10500	155.50	5260	49.50
R5/16×5/8	8200	155.50	3780	42.00

RPM = rev. / min.
FEED = inch / min.

Ae : D1/8 ~ D1/4=.008inch
D5/16 ~ D5/8=.012inch

Ap : 0.05×D



RPM = rev. / min.
FEED = mm / min.

TECHNICAL DATA

INCH

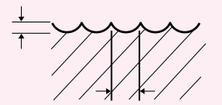
DA522 - GENERAL SPEED CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~HRc 40		HRc 45~HRc 50		HRc 45~HRc 65	
STRENGTH	1000~1250N/mm²		1500~1750N/mm²		1750~2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
R1/16×1/8	10000	18.10	12700	43.30	12300	41.30
R3/32×3/16	7300	22.80	9400	43.30	9050	41.30
R1/8×1/4	6300	24.80	8600	45.30	8250	43.30
R5/32×5/16	4420	26.00	7000	41.30	6700	39.40
R3/16×3/8	3780	28.00	6050	39.40	5800	37.80
R1/4×1/2	2940	26.00	5450	39.40	5200	37.80
R5/16×5/8	2320	26.00	4350	34.30	4150	32.70
R3/8×3/4	1900	25.00	3500	27.20	3300	25.60
R1/2×1	1520	25.00	2800	27.20	2650	25.60

RPM = rev. / min.
FEED = inch / min.

Ae : D1/8 ~ D1/4=.008
D5/16 ~ D1=.012

Ap : 0.2×D



Ae : D1/8=.006
D3/16 ~ D5/16=.010
D3/8 ~ D1=.012

Ap : 0.1×D

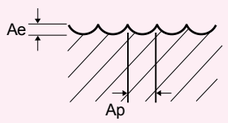
DA522 - HIGH SPEED CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~HRc 40		HRc 45~HRc 50		HRc 45~HRc 55	
STRENGTH	1000~1250N/mm²		1500~1750N/mm²		1750~2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
R1/16×1/8	21000	39.40	12700	68.90	12300	65.70
R3/32×3/16	21000	70.90	9400	65.00	9050	61.80
R1/8×1/4	21000	90.90	8600	69.00	8250	65.70
R5/32×5/16	15760	111.80	7000	61.00	6700	57.50
R3/16×3/8	13660	120.10	6050	57.10	5800	53.50
R1/4×1/2	10500	103.50	5450	55.90	5200	52.40
R5/16×5/8	8200	103.50	4350	48.40	4150	44.50
R3/8×3/4	6300	99.20	3500	39.40	3300	35.40
R1/2×1	5040	99.20	2800	39.40	2650	35.40

RPM = rev. / min.
FEED = inch / min.

Ae : D1/8 ~ D1/4=.008
D5/16 ~ D1=.012

Ap : 0.05×D



Ae : D1/8=.006
D3/16 ~ D5/16=.010
D3/8 ~ D1=.012

Ap : 0.05×D

TECHNICAL DATA

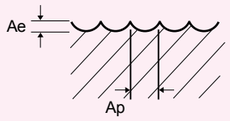
INCH

DA514 - HIGH SPEED CUTTING

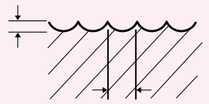
MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		HARDENED STEELS	
HARDNESS	HRc 30 ~ HRc45		HRc 45 ~ HRc 55	
STRENGTH	1000 ~ 1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED
R.012×.024	30000	23.60	30000	11.80
R.0155×.031	27000	25.60	27000	15.00
R.020×.040	25000	25.60	25000	15.70
R.0235×.047	24000	26.40	24000	16.50
R.031×.062	23000	27.60	23000	16.90

RPM = rev. / min.
FEED = inch / min.

D < .040
Ae : 0.05×D
Ap : 0.15×D
D ≧ .040
Ae : 0.075×D
Ap : 0.15×D



D < .040
Ae : 0.05×D
Ap : 0.1×D
D ≧ .040
Ae : 0.05×D
Ap : 0.15×D



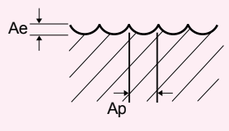
DA542 - GENERAL SPEED CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~HRc 40		HRc 45~HRc 50		HRc 50~HRc 55	
STRENGTH	1000~1250N/mm²		1250~1750N/mm²		1750~2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
R1/32×1/16	97000	8.30	13800	19.90	13600	17.90
R1/16×1/8	8000	14.60	10200	34.60	9800	33.50
R3/32×3/16	5840	18.10	7500	34.60	7200	33.50
R1/8×1/4	5040	19.70	6900	36.20	6500	34.60
R5/32×5/16	3540	20.90	5600	33.10	5300	31.50
R3/16×3/8	3020	22.40	4850	31.50	4650	30.30
R1/4×1/2	2350	20.90	4350	31.50	4150	30.30

RPM = rev. / min.
FEED = inch / min.

Ae : D1/16 ~ D1/4=.008
D5/16 ~ D1/2=.012

Ap : 0.2×D



Ae : D1/16 ~ D1/8=0.05×D
D3/16 ~ D5/16=.010
D3/8 ~ D1/2=.012

Ap : 0.1×D

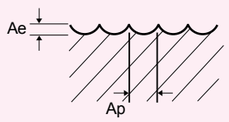
DA542 - HIGH SPEED CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc 45		HRc 45~HRc 50		HRc 50~HRc 55	
STRENGTH	1500N/mm²		1250~1750N/mm²		1750~2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
R1/32×1/16	18400	21.90	13800	28.90	13600	30.10
R1/16×1/8	16800	31.50	10200	55.10	9800	51.20
R3/32×3/16	16800	56.70	7500	52.00	7200	49.20
R1/8×1/4	16800	72.80	6900	55.10	6500	53.10
R5/32×5/16	12600	89.40	5600	49.20	5300	45.30
R3/16×3/8	10930	96.10	4850	45.30	4650	43.30
R1/4×1/2	8400	82.70	4350	44.50	4150	41.30

RPM = rev. / min.
FEED = inch / min.

Ae : D1/16 ~ D1/4=.008
D5/16 ~ D1/2=.012

Ap : 0.052×D



Ae : D1/16 ~ D1/8=0.052×D
D3/16 ~ D5/16=.010
D3/8 ~ D1/2=.012

Ap : 0.052×D

TECHNICAL DATA

INCH

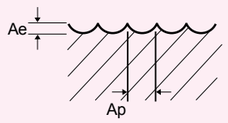
DA552 - GENERAL SPEED CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~HRc 40		HRc 40~HRc 50		HRc 50~HRc 55	
STRENGTH	1000~1250N/mm²		1250~1750N/mm²		1750~2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
R3/32×3/16	4670	14.50	6000	27.70	5760	26.80
R1/8×1/4	4030	15.80	5520	29.00	5200	27.70
R5/32×5/16	2830	16.70	4480	26.50	4240	25.20
R3/16×3/8	2420	17.90	3880	25.20	3720	24.20
R1/4×1/2	1880	16.70	3480	25.20	3320	24.20

RPM = rev. / min.
FEED = inch / min.

Ae : D3/16 ~ D1/4=.008
D5/16 ~ D1/2=.012

Ap : 0.22×D



Ae : D3/16 ~ D5/16=.010
D3/8 ~ D1/2=.012

Ap : 0.12×D

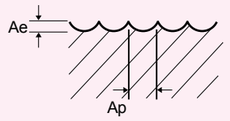
DA552 - HIGH SPEED CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 45		HRc 45~HRc 50		HRc 50~HRc 55	
STRENGTH	~1500N/mm²		1250~1750N/mm²		1750~2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
R3/32×3/16	13440	45.40	6000	41.60	5760	39.40
R1/8×1/4	13440	58.20	5520	44.10	5200	42.50
R5/32×5/16	10080	71.50	4480	39.40	4240	36.20
R3/16×3/8	8740	76.90	3880	36.30	3720	34.60
R1/4×1/2	6720	66.20	3480	35.60	3320	33.00

RPM = rev. / min.
FEED = inch / min.

Ae : D3/16 ~ D1/4=.008
D5/16 ~ D1/2=.012

Ap : 0.52×D



Ae : D3/16 ~ D5/16=.010
D3/8 ~ D1/2=.012

Ap : 0.052×D

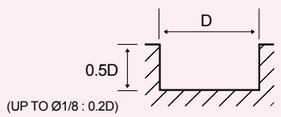
TECHNICAL DATA

INCH

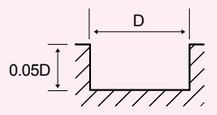
ZA502, ZA302

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	ff HRc 30		HRc 30 ~ HRc 45				HRc 45 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²				1500 ~ 2000N/mm²		2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1/16	11560	7.50	7560	4.70	6300	3.55	5040	1.40		
1/8	8920	8.25	5560	5.50	4620	4.70	3360	1.55	1900	1.55
3/16	6300	12.60	3780	7.50	3160	6.30	2320	1.95	1260	1.55
1/4	5560	13.80	3360	8.65	2840	7.10	2000	2.15	1100	1.55
5/16	4200	14.95	2520	7.85	2100	7.10	1680	2.95	840	1.55
3/8	3260	13.00	2000	6.30	1680	6.30	1360	2.35	680	1.40
1/2	2740	11.00	1680	5.10	1360	5.10	1160	2.15	560	1.40
5/8	2200	8.65	1360	4.30	1060	4.30	900	1.55	440	0.80
3/4	1680	6.70	1060	3.15	840	3.15	680	1.20	320	0.80
1	1360	5.10	840	2.75	680	2.35	540	0.80	260	0.60

RPM = rev. / min.
FEED = inch / min.



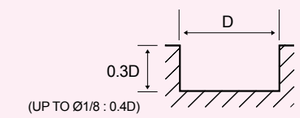
(UP TO Ø1/8 : 0.2D)



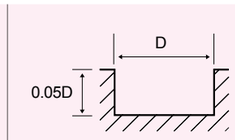
ZA522

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 40		HRc 45 ~ HRc 55	
STRENGTH	~1000N/mm²		1000~1500N/mm²		1500~2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
1/8	4410	7.8	3570	2.4	2200	1.2
3/16	3050	4.1	2420	3.3	1580	1.6
1/4	2630	4.9	2100	4.1	1370	2.0
5/16	2000	5.3	1580	4.1	1050	2.0
3/8	1680	5.3	1370	4.1	840	2.0
1/2	1370	4.1	1160	3.7	700	1.6
5/8	1160	3.7	890	3.0	560	1.4
3/4	840	2.8	680	2.0	420	1.0
1	610	2.0	540	1.6	330	0.7

RPM = rev. / min.
FEED = inch / min.



(UP TO Ø1/8 : 0.4D)



TECHNICAL DATA

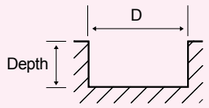
INCH

MZ502

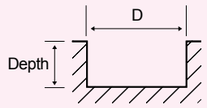
MATERIAL	ALLOY STEELS TOOL STEELS		ALLOY STEELS TOOL STEELS	
HARDNESS	HRc 30 ~ HRc45		HRc 45 ~ HRc 55	
STRENGTH	1000 ~ 1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED
.016	30000	7.10	23000	3.90
.031	24000	11.80	18000	5.10
.040	20000	12.60	15000	5.90
.047	16000	12.60	12000	5.90
.062	12000	11.80	9000	5.50

RPM = rev. / min.
FEED = inch / min.

D < .040
Depth=0.15×D
D ≧ .040
Depth=0.25×D



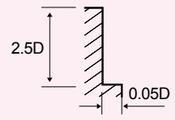
D < .040
Depth=0.02×D
D ≧ .040
Depth=0.05×D

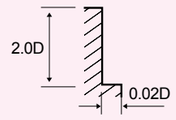


ZA524

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45		HRc 45 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~1000N/mm²		1000~1500N/mm²		1500~2000N/mm²		2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1/8	4410	4.5	3570	3.9	2200	2.2	1890	1.2
3/16	3050	7.1	2420	5.5	1580	2.8	1260	1.6
1/4	2630	8.5	2100	7.1	1370	3.5	1160	2.0
5/16	2000	9.1	1580	7.1	1050	3.5	840	2.0
3/8	1680	9.1	1370	7.1	840	3.5	670	2.0
1/2	1370	7.1	1160	6.3	700	2.8	560	1.6
5/8	1160	6.3	890	4.9	560	2.4	440	1.4
3/4	840	4.5	680	3.5	420	1.8	340	1.0
1	670	4.5	540	3.5	340	1.8	270	1.0

RPM = rev. / min.
FEED = inch / min.

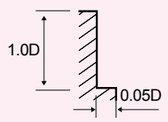


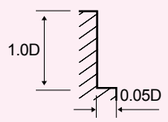


ZA504, ZA304

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45				HRc 45 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²				1500 ~ 2000N/mm²		2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1/16	11560	11.00	7560	6.70	6300	5.50	5040	1.95		
1/8	8920	12.60	5560	7.85	4620	6.70	3360	2.35	1900	2.35
3/16	6300	23.60	3780	14.15	3160	11.80	2320	2.75	1260	2.35
1/4	5560	26.00	3360	16.15	2840	13.00	2000	3.15	1100	2.35
5/16	4200	27.95	2520	14.95	2100	13.80	1680	4.30	840	2.35
3/8	3260	24.00	2000	11.80	1680	11.80	1360	3.55	680	1.95
1/2	2740	20.50	1680	9.85	1360	9.45	1160	3.15	560	1.95
5/8	2200	16.15	1360	7.85	1060	7.85	900	2.35	440	1.20
3/4	1680	12.60	1060	6.30	840	5.90	680	1.55	320	1.20
1	1360	9.85	840	5.10	680	4.70	540	1.20	260	0.80

RPM = rev. / min.
FEED = inch / min.

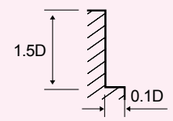


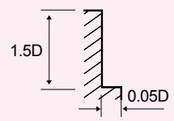


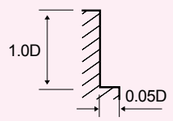
ZA506(8) - GENERAL SPEED CUTTING

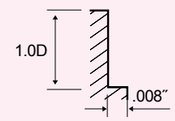
MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45		HRc 45 ~ HRc 55		HRc 60 ~ HRc 65	
STRENGTH	~1000N/mm²		1000~1750N/mm²		1750~2080N/mm²		2080N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1/4	5560	79.00	3880	54.00	1580	8.25	1100	5.10
5/16	4200	79.00	2940	54.00	1160	8.25	840	5.10
3/8	3360	79.00	2320	54.00	1000	8.25	680	5.10
1/2	2840	66.00	2000	46.00	840	7.10	560	4.35
5/8	2100	50.00	1480	35.00	640	5.10	420	2.75
3/4	1680	40.00	1160	27.00	500	4.35	320	2.35
1	1260	25.00	870	17.50	375	3.00	240	1.54

RPM = rev. / min.
FEED = inch / min.









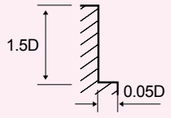
TECHNICAL DATA

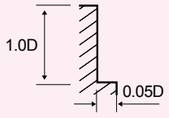
INCH

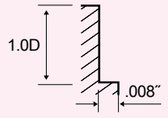
ZA506(8) - HIGH SPEED CUTTING

MATERIAL	CARBON STEELS TOOL STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc 50		HRc 50~HRc 60		HRc 60	
STRENGTH	1750N/mm²		1750~2080N/mm²		2080N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
1/4	16800	240.00	8400	120.00	4200	58.00
5/16	12600	240.00	6300	120.00	3160	58.00
3/8	9980	235.00	5040	120.00	2520	58.00
1/2	8400	199.00	4200	100.00	2100	50.00
5/8	6300	149.00	3160	75.00	1580	37.00
3/4	5040	120.00	2520	58.00	1260	30.00
1	3790	75.00	1890	38.00	950	19.00

RPM = rev. / min.
FEED = inch / min.



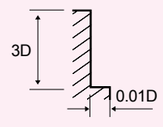


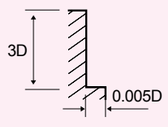


ZA526(8)

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 60		HRc 60 ~ HRc 65	
STRENGTH	~1250N/mm²		1250~1750N/mm²		1750~2080N/mm²		2080N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1/4	2230	19.00	1670	14.00	1390	10.00	1110	8.00
5/16	1670	18.00	1250	13.00	1050	9.50	840	7.00
3/8	1330	17.00	1000	12.00	840	9.00	680	6.30
1/2	1110	16.00	840	11.00	690	8.50	560	6.00
5/8	840	13.00	630	9.00	530	6.50	420	5.00
3/4	670	11.00	500	8.00	420	6.00	320	4.70
1	540	9.50	400	6.50	340	5.00	270	3.70

RPM = rev. / min.
FEED = inch / min.





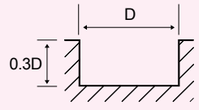
TECHNICAL DATA

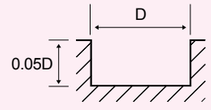
INCH

ZR502A, ZR522A, ZR532A

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 38		HRc 45 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~1000N/mm²		1000~1200N/mm²		1400~2000N/mm²		2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1/4	2630	4.90	2100	4.20	1370	2.00	1160	1.40
5/16	2000	5.30	1580	4.20	1050	2.00	840	1.40
3/8	1680	5.30	1370	4.20	840	2.00	670	1.40
1/2	1370	4.20	1160	3.80	700	1.50	550	1.00

RPM = rev. / min.
FEED = inch / min.

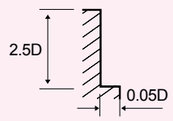


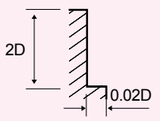


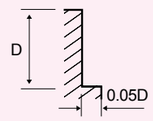
ZR504A, ZR524A, ZR534A

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~1000N/mm²		1000~1750N/mm²		1750~2000N/mm²		2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1/4	2630	8.50	2100	7.10	1370	3.30	1160	2.00
5/16	2000	9.00	1580	7.10	1050	3.30	840	2.00
3/8	1680	9.00	1370	7.10	840	3.30	670	2.00
1/2	1370	7.10	1160	6.30	700	2.80	550	1.50

RPM = rev. / min.
FEED = inch / min.



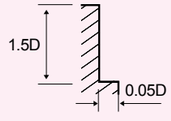


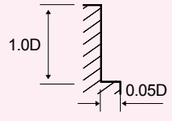


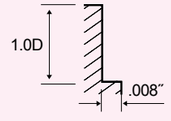
ZR506(8)A - HIGH SPEED CUTTING

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS TOOL STEELS		HARDENED STEELS	
HARDNESS	~HRc 50		HRc 50~HRc 60		HRc 60~HRc 65	
STRENGTH	1750N/mm²		1750N/mm²		2080N/mm²~	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
1/4	16800	240.00	8400	120.00	4200	58.00
5/16	12600	240.00	6300	120.00	3200	58.00
3/8	10000	235.00	5000	120.00	2500	58.00
1/2	8400	200.00	4200	100.00	2100	50.00
5/8	6300	150.00	3150	75.00	1600	37.00
3/4	5000	120.00	2500	58.00	1260	30.00

RPM = rev. / min.
FEED = inch / min.







ZR506(8)A

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 38		HRc 38 ~ HRc 45		HRc 45 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~1000N/mm²		1000~1200N/mm²		1200~1400N/mm²		1400~2000N/mm²		2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1/4	15600	91.35	12400	33.10	8400	22.45	3400	10.25	2400	7.50
5/16	11600	91.35	9200	33.10	6300	22.45	2400	9.50	1800	7.10
3/8	9200	91.35	7600	33.10	5100	22.45	2000	11.40	1300	7.50
1/2	8000	94.50	6000	31.50	4200	22.45	1680	10.25	1200	7.50
5/8	6000	94.50	4800	29.90	3300	20.05	1200	6.30	800	4.35
3/4	5200	91.35	4400	28.35	2700	16.55	1100	5.90	700	3.95
1	4800	85.05	3600	22.05	2400	14.15	1000	5.90	660	3.95

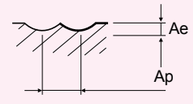
DB512, DB502, DB522, DB312 - GENERAL CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 40		HRc 45~HRc 65	
STRENGTH	~1000N/mm²		1000 ~1250N/mm²		1500N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
1	16500	290	13300	230	6100	105
1.5	16500	405	12700	310	5590	140
2	15100	865	11200	565	4900	175
2.5	15100	865	11200	565	4900	175
3	13800	780	10500	530	4750	175
4	11000	850	8800	610	4410	205
5	9600	945	7600	665	3860	205
6	8900	1150	7200	955	3340	220
8	7500	1500	6050	1060	2590	255
10	6700	1750	5300	1170	2140	260
12	6150	2000	4900	1280	1840	280
16	5000	1950	3900	1220	1420	280
20	4350	1900	3400	1200	1170	290

RPM = rev. / min.
FEED = mm / min.

Ae : D1 ~ D6=0.2mm
D8 ~ D20=0.3mm

Ap : 0.2×D



Ae : D1 ~ D6=0.2mm
D8 ~ D20=0.3mm

Ap: 0.1×D

• Please reduce cutting speed around 20~30% above the table in case of DB522 series.

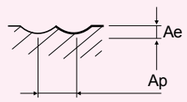
DB512, DB502, DB522, DB312 - HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS	
HARDNESS	~ HRc45		HRc 30 ~ HRc 40	
STRENGTH	~ 1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED
1	26000	1500	26000	920
1.5	24000	1600	24000	990
2	22000	1700	22000	1080
2.5	22000	2000	20000	1130
3	22000	2300	17800	1200
4	22000	3350	14300	1300
5	22000	4150	12600	1380
6	22000	4600	11000	1440
8	17500	4600	8800	1440
10	14700	4450	7350	1380
12	12800	4450	6400	1330
16	10000	4000	5000	1150
20	8350	3650	4150	1060

RPM = rev. / min.
FEED = mm / min.

Ae : D1 ~ D6=0.2mm
D8 ~ D20=0.3mm

Ap : 0.2×D



• Please reduce cutting speed around 20~30% above the table in case of DB522 series.

TECHNICAL DATA

INCH

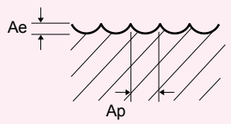
DB514 - GENERAL SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 40		HRc 45~HRc 65	
STRENGTH	~1000N/mm²		1000 ~1250N/mm²		~ 1500N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
3	13100	1020	10000	690	4520	220
4	10500	1110	8400	800	4200	270
5	9140	1230	7300	870	3680	270
6	7780	1260	6300	950	3160	280
8	5260	1430	4420	990	2100	280
10	4620	1530	3780	1070	1780	280
12	3780	1350	2940	990	1360	280
16	2740	1380	2320	980	1160	280
20	2100	1260	1900	950	840	280

RPM = rev. / min.
FEED = mm / min.

Ae : D1 ~ D6=0.2mm
D8 ~ D20=0.3mm

Ap : 0.2×D



Ae : D1 ~ D6=0.2mm
D8 ~ D20=0.3mm

Ap: 0.1×D

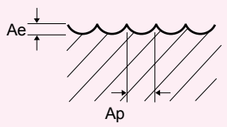
DB514 - HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		HARDENED STEELS	
HARDNESS	~ HRc 45		HRc 45 ~ HRc 65	
STRENGTH	~ 1500N/mm²		~ 1500N/mm² ~	
DIAMETER(inch)	RPM	FEED	RPM	FEED
3	21000	1500	17000	780
4	21000	2210	13660	870
5	21000	2700	12000	900
6	21000	3470	10500	940
8	15760	4260	7880	1110
10	13660	4580	6300	1260
12	10500	3950	5260	1260
16	8200	3950	3780	1060
20	6300	3780	2940	790

RPM = rev. / min.
FEED = mm / min.

Ae : D1 ~ D6=0.2mm
D8 ~ D20=0.3mm

Ap : 0.05×D



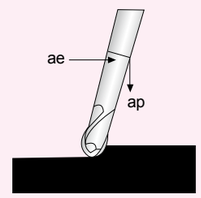
TECHNICAL DATA

INCH

DB532 - GENERAL CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 40		HRc 45~HRc 65	
STRENGTH	~1000N/mm²		1000 ~1250N/mm²		1500N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
3	35000	2800	33000	2600	12000	900
4	26000	2300	25000	2200	9000	800
5	21000	2100	20000	2000	7000	700
6	17000	1900	16000	1800	6000	650
8	13000	1700	12000	1600	4500	550
10	10500	1450	10000	1400	3500	500
12	9000	1400	8000	1300	3000	450
16	6000	1200	5500	1100	2000	400

RPM = rev. / min.
FEED = mm / min.



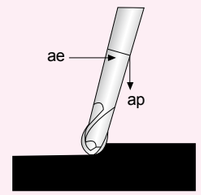
ae: 0.05×d1

ap: 0.02×d1

DB532 - HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 40		HRc 45~HRc 65	
STRENGTH	~1000N/mm²		1000 ~1250N/mm²		1500N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
3	47000	3700	44000	3500	17000	1400
4	35000	3200	33000	3000	13000	1200
5	28000	2800	27000	2600	10000	1100
6	23000	2600	22000	2400	8000	950
8	18000	2300	17000	2100	6000	850
10	14000	2000	13000	1900	5000	750
12	12000	1800	11000	1800	4000	700
16	9000	1600	8000	1500	3300	600

RPM = rev. / min.
FEED = mm / min.



ae: 0.05×d1

ap: 0.02×d1

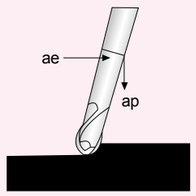
TECHNICAL DATA

INCH

DB534 - GENERAL CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 40		HRc 45~HRc 65	
STRENGTH	~1000N/mm²		1000 ~1250N/mm²		1500N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
5	21000	4000	20000	4000	7000	1400
6	17000	4000	16000	3500	6000	1300
8	13000	3500	12000	3000	4500	1100
10	10500	3000	10000	2500	3500	1000
12	9000	2800	8000	2500	3000	950
16	6000	2800	5500	2200	2000	800

RPM = rev. / min.
FEED = mm / min.



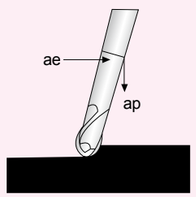
ae: 0.05×d1

ap: 0.02×d1

DB534 - HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 40		HRc 45~HRc 65	
STRENGTH	~1000N/mm²		1000 ~1250N/mm²		1500N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
5	28000	5600	27000	5300	11000	2100
6	23000	5100	22000	4900	9000	1900
8	18000	4600	17000	4300	7000	1700
10	14000	3900	13000	3700	5000	1400
12	12000	3700	11000	3500	4500	1300
16	9000	3100	8000	3000	3300	1100

RPM = rev. / min.
FEED = mm / min.



ae: 0.05×d1

ap: 0.02×d1

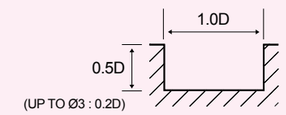
TECHNICAL DATA

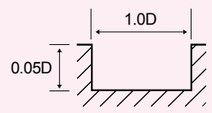
INCH

ZE502, ZE522, ZE302, ZE322 - GENERAL CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS				STAINLESS STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 40 ~ HRc 55			
STRENGTH	1000 ~1250N/mm²		1250 ~1750N/mm²		1750 ~2000N/mm²			
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	9700	220	6350	135	2500	46	5300	105
3	7500	240	4670	160	2000	46	3880	135
4	6350	345	3880	205	1550	46	3250	175
5	5300	370	3170	220	1320	46	2650	185
6	4670	405	2830	255	1150	46	2380	205
8	3530	435	2120	230	880	46	1760	205
10	2730	380	1680	185	715	40	1420	185
12	2310	320	1420	150	590	40	1140	150
16	1850	255	1140	125	460	23	890	125
20	1420	195	890	90	335	23	705	90
25	1150	150	705	80	275	17	580	70

RPM = rev. / min.
FEED = mm / min.



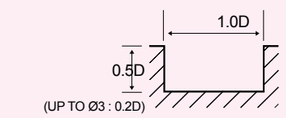


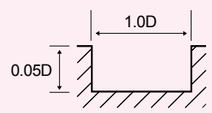
• Please reduce cutting speed around 20~30% from the above table in case of ZE522, ZE322 series.

ZE502, ZE522, ZE302, ZE322 - HIGH SPEED CUTTING

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS				STAINLESS STEELS	
HARDNESS	HRc 30 ~ HRc 40		HRc 40 ~ HRc 50		HRc 40 ~ HRc 55			
STRENGTH	1000 ~1250N/mm²		1250 ~1750N/mm²		1750 ~2000N/mm²			
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	18000	665	11800	415	8700	175	9800	345
3	11000	655	6800	435	5600	185	6200	370
4	10300	725	6300	430	4300	185	5300	370
5	9350	715	5570	420	3700	185	4620	355
6	8200	750	4930	470	3250	185	4100	390
8	6300	770	3780	410	2470	185	3120	355
10	4830	750	2940	360	2000	160	2470	310
12	4100	750	2520	345	1680	160	2100	300
16	3260	715	2000	355	1890	150	1940	290
20	2520	665	1580	310	1680	150	1630	275
25	2000	635	1260	340	1570	150	1420	290

RPM = rev. / min.
FEED = mm / min.





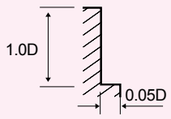
TECHNICAL DATA

INCH

ZE503 - SIDE CUTTING

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45				HRc 45 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²				1500 ~ 2000N/mm²		2000N/mm² ~	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	5560	500	3360	310	2840	250	2000	60	1100	45
8	4200	530	2520	290	2100	265	1680	80	840	45
10	3260	460	2000	230	1680	230	1360	70	680	35
12	2740	390	1680	190	1360	180	1160	60	560	35
16	2200	310	1360	150	1060	150	900	45	440	20
18	1940	280	1210	135	950	130	790	35	380	20
20	1680	240	1060	120	840	115	680	30	320	20

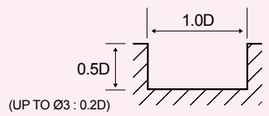
RPM = rev. / min.
FEED = mm / min.

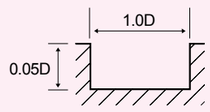


ZE503 - SLOTTING

MATERIAL	CARBON STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45				HRc 45 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²				1500 ~ 2000N/mm²		2000N/mm² ~	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	5560	310	3360	200	2840	160	2000	50	1100	35
8	4200	340	2520	180	2100	160	1680	65	840	35
10	3260	300	2000	140	1680	145	1360	55	680	30
12	2740	250	1680	120	1360	120	1160	50	560	30
16	2200	200	1360	100	1060	100	900	35	440	20
18	1940	175	1210	85	950	85	790	30	380	20
20	1680	150	1060	70	840	70	680	25	320	20

RPM = rev. / min.
FEED = mm / min.





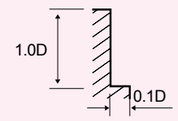
TECHNICAL DATA

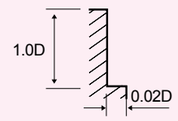
INCH

ZE504, ZE524, ZE304, ZE324 - GENERAL CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		HARDENED STEELS				STAINLESS STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45		HRc 45 ~ HRc 55			
STRENGTH	~1000N/mm²		1000 ~1500N/mm²		1500 ~2000N/mm²			
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	12100	320	7900	195	2700	47	6600	160
3	9400	370	5840	230	2000	58	4850	195
4	7900	655	4850	405	1500	58	4070	320
5	6600	690	3970	415	1300	58	3320	345
6	5830	760	3530	470	1150	58	2980	380
8	4410	815	2650	435	880	58	2200	405
10	3420	700	2100	345	720	46	1760	345
12	2880	600	1760	290	590	46	1430	275
16	2310	470	1430	230	460	29	1150	230
20	1760	370	1110	185	340	29	880	175
25	1430	290	880	150	270	23	715	140

RPM = rev. / min.
FEED = mm / min.



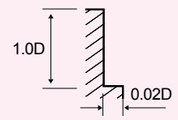


• Please reduce cutting speed around 20~30% from the above table in case of ZE524, ZE324 series.

ZE504, ZE524, ZE304, ZE324 - HIGH SPEED CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		HARDENED STEELS				STAINLESS STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45		HRc 45 ~ HRc 55			
STRENGTH	~1000N/mm²		1000 ~1500N/mm²		1500 ~2000N/mm²			
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	31400	1230	23500	520	12600	275	21600	465
3	19300	1210	13600	735	8900	390	13500	660
4	18100	1330	12600	865	7090	465	11800	775
5	16400	1310	11100	1010	6040	530	10300	910
6	14400	1380	9900	1100	5300	580	9100	990
8	11000	1430	7600	1090	3990	575	6900	980
10	8500	1380	5880	1110	3150	580	5420	1000
12	7200	1380	5040	1090	2620	575	4600	985
16	5700	1320	3990	1010	2000	535	3590	910
20	4400	1270	3150	930	1580	490	2840	840
25	3500	1170	2520	755	1260	390	2270	680

RPM = rev. / min.
FEED = mm / min.



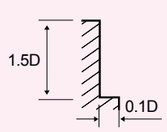
TECHNICAL DATA

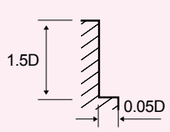
INCH

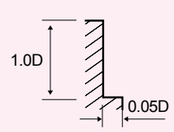
ZE506 - GENERAL SPEED CUTTING

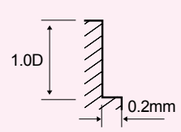
MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 50		HRc 50 ~ HRc 60		HRc 60 ~ HRc 65	
STRENGTH	~1000N/mm²		1000~1750N/mm²		1750~2080N/mm²		2080N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	5560	2000	3880	1370	1580	210	1100	130
8	4200	2000	2940	1370	1160	210	840	130
10	3360	2000	2320	1370	1000	210	680	130
12	2840	1680	2000	1160	840	180	560	110
16	2100	1260	1480	880	640	130	420	70
20	1680	1010	1160	690	500	110	320	60
25	1500	900	1100	600	430	90	260	50

RPM = rev. / min.
FEED = mm / min.





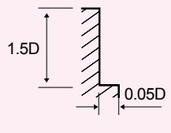


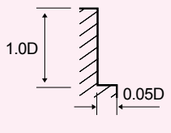


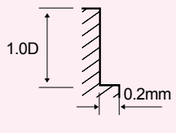
ZE506 - HIGH SPEED CUTTING

MATERIAL	HEAT RESISTANT STEELS HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc 50		HRc 50~HRc 60		HRc 60 ~ HRc 65	
STRENGTH	~1750N/mm²		1750 ~2080N/mm²		2080N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
6	16800	6090	8400	3050	4200	1470
8	12600	6090	6300	3050	3160	1470
10	9980	5990	5040	3050	2520	1470
12	8400	5040	4200	2520	2100	1260
16	6300	3780	3160	1890	1580	950
20	5040	3050	2520	1470	1260	760
25	4500	2750	2200	1300	1120	670

RPM = rev. / min.
FEED = mm / min.





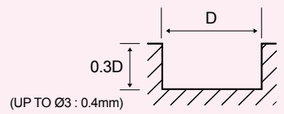


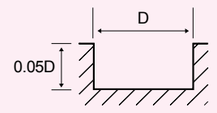
• Please reduce cutting speed around 20~30% from the above table in case of Extra long series.

ZM502, ZM522

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 45		HRc 45 ~ HRc 55	
STRENGTH	~1000N/mm²		1000 ~1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
2	6300	60	5040	50	3150	25
3	4410	70	3570	60	2200	30
4	3570	85	2840	70	1790	35
5	3050	105	2420	85	1580	40
6	2630	125	2100	105	1370	50
8	2000	135	1580	105	1050	50
10	1680	135	1370	105	840	50
12	1370	105	1160	95	700	40
16	1160	95	890	75	560	35
20	840	70	680	50	420	25

RPM = rev. / min.
FEED = mm / min.

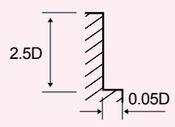


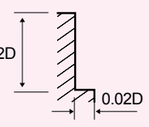


ZM504, ZM524

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45		HRc 45 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~1000N/mm²		1000~1500N/mm²		1500 ~ 2000N/mm²		2000N/mm² ~	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	6300	100	5040	80	3150	45		
3	4410	115	3570	100	2200	55	1890	30
4	3570	140	2840	115	1790	60	1470	35
5	3050	180	2420	140	1580	70	1260	40
6	2630	215	2100	180	1370	90	1160	50
8	2000	230	1580	180	1050	90	840	50
10	1680	230	1370	180	840	90	670	50
12	1370	180	1160	160	700	70	560	40
16	1160	160	890	125	560	60	440	35
20	840	115	680	90	420	45	340	25

RPM = rev. / min.
FEED = mm / min.





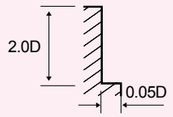
TECHNICAL DATA

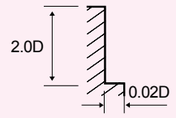
INCH

ZR502, ZR512, ZR522, ZR322 - SIDE CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 45		HRc 45 ~ HRc 55	
STRENGTH	~1000N/mm²		1000 ~1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
3	6950	195	4500	150	3300	100
4	5600	240	3600	170	2700	105
5	4800	250	3050	210	2350	125
6	4150	250	2650	210	2050	125
8	3150	265	2000	210	1600	125
10	2150	265	1700	210	1250	125
12	1800	210	1500	185	1050	105
16	1800	185	1100	140	840	90
20	1300	130	860	105	625	65

RPM = rev. / min.
FEED = mm / min.

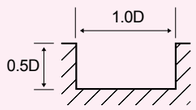




ZR502, ZR512, ZR522, ZR322 - SLOTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 45		HRc 45 ~ HRc 55	
STRENGTH	~1000N/mm²		1000 ~1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
3	6950	160	4500	80	3300	55
4	5600	195	3600	100	2700	60
5	4800	240	3050	115	2350	75
6	4150	290	2650	145	2050	90
8	3150	210	2000	145	1600	90
10	2150	250	1700	140	1250	90
12	1800	200	1500	135	1050	75
16	1800	215	1100	100	840	60
20	1300	160	860	70	625	45

RPM = rev. / min.
FEED = mm / min.



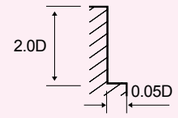
TECHNICAL DATA

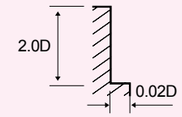
INCH

ZR504, ZR514, ZR524, ZR324

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 45		HRc 45 ~ HRc 55	
STRENGTH	~1000N/mm²		1000 ~1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
3	6950	195	4500	150	3300	100
4	5600	240	3600	170	2700	105
5	4800	250	3050	210	2350	125
6	4150	250	2650	210	2050	125
8	3150	265	2000	210	1600	125
10	2150	265	1700	210	1250	125
12	1800	210	1500	185	1050	105
16	1880	185	1100	140	840	90
20	1300	130	860	105	625	65

RPM = rev. / min.
FEED = mm / min.

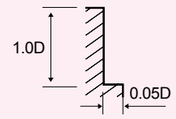




ZR304H, ZR324H

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~HRc 30		HRc 30~HRc 45		HRc 45 ~ HRc 55	
STRENGTH	~1000N/mm²		1000 ~1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(inch)	RPM	FEED	RPM	FEED	RPM	FEED
6	7000	910	4200	560	3000	140
8	5300	980	3200	530	2500	190
10	4100	840	2500	410	2050	165
12	3500	730	2100	340	1700	140

RPM = rev. / min.
FEED = mm / min.



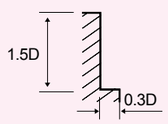
TECHNICAL DATA

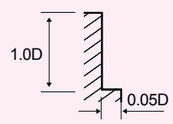
INCH

ZF60, ZF61

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 38		HRc 38 ~ HRc 45		HRc 45 ~ HRc 55		HRc 55 ~ HRc 65	
STRENGTH	~ 1000N/mm²		1000 ~ 1200N/mm²		1200 ~ 1400N/mm²		1400 ~ 2000N/mm²		2000N/mm² ~	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	15600	2320	12400	840	8400	570	3400	260	2400	190
8	11600	2320	9200	840	6300	570	2400	240	1800	180
10	9200	2320	7600	840	5100	570	2000	290	1300	190
12	8000	2400	6000	800	4200	570	1680	260	1200	190
14	6800	2400	5200	840	3600	570	1400	200	900	130
16	6000	2400	4800	760	3300	510	1200	160	800	110
18	5200	2320	4400	720	2700	420	1100	150	700	100
20	4800	2160	3600	560	2400	360	1000	150	660	100
25	4300	2150	3200	620	2160	410	900	160	600	100

RPM = rev. / min.
FEED = mm / min.

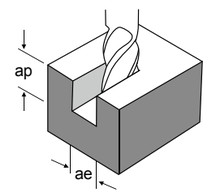


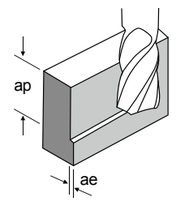


PK503

MATERIAL		Alloy Steels · High Carbon Steels				Prehardened Steels · Tool Steels			
HARDNESS						HRc 30 ~ 40			
(V)m/min		130 ~ 150				100 ~ 120			
DIAMETER(mm)		(r.p.m.)	fz			(r.p.m.)	fz		
			Slot	Side Cutting	Slot		Slot	Side Cutting	Slot
6		7,400	0.030	0.045	0.018	5,800	0.025	0.030	0.012
8		5,600	0.035	0.062	0.025	4,400	0.030	0.045	0.018
10		4,600	0.045	0.075	0.030	3,500	0.040	0.048	0.019
12		3,700	0.050	0.087	0.035	3,000	0.045	0.052	0.020
14		3,200	0.055	0.090	0.036	2,500	0.053	0.056	0.022
16		2,800	0.055	0.090	0.036	2,200	0.060	0.060	0.024
20		2,200	0.080	0.095	0.038	1,800	0.066	0.066	0.026
	ap		1.0D	1.0D	0.5D		1.0D	1.0D	0.5D
	ae		1.0D	0.5D	1.0D		1.0D	0.3D	1.0D

MATERIAL		Alloy Steels · High Carbon Steels				Prehardened Steels · Tool Steels			
HARDNESS		HRc 40 ~ 45							
(V)m/min		130 ~ 150				100 ~ 120			
DIAMETER(mm)		(r.p.m.)	fz			(r.p.m.)	fz		
			Slot	Side Cutting	Slot		Slot	Side Cutting	Slot
6		3,200	0.020	0.030	0.012	2,100	0.017	0.020	0.008
8		2,400	0.030	0.040	0.016	1,600	0.025	0.025	0.010
10		1,900	0.040	0.055	0.022	1,300	0.035	0.040	0.016
12		1,600	0.045	0.065	0.026	1,100	0.040	0.050	0.020
14		1,360	0.048	0.070	0.028	900	0.043	0.053	0.021
16		1,200	0.050	0.075	0.030	800	0.045	0.055	0.022
20		1,000	0.052	0.083	0.033	600	0.050	0.057	0.023
	ap		0.5D	1.0D	0.5D		0.5D	1.0D	0.5D
	ae		1.0D	0.5D	1.0D		1.0D	0.3D	1.0D





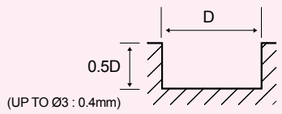
TECHNICAL DATA

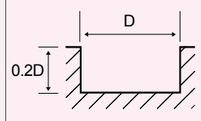
INCH

SM503 - SLOTTING

MATERIAL	CARBON STEELS ALLOY STEELS · TOOL STEELS						CAST IRON		STAINLESS STEELS		COOOER ALLOYS		TITANIUM ALLOYS		INCONEL	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc45											
STRENGTH	1000N/mm²		800~1000N/mm²		800~1000N/mm²											
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	10080	950	7750	740	5550	395	6700	520	5550	320	8300	360	5550	395	2200	100
4	7550	1400	5850	1100	4200	595	5050	550	4200	320	6200	400	4200	595	1650	105
6	5050	1650	3850	1250	2800	700	3350	660	2800	370	4100	440	2800	700	1150	130
8	3750	1700	2950	1330	2100	710	2500	665	2100	375	3100	500	2100	710	850	120
10	3050	1650	2300	1250	1650	655	2000	630	1650	355	2500	530	1650	665	650	120
12	2500	1500	2000	1200	1350	605	1650	570	1350	320	2000	550	1350	605	555	110

RPM = rev. / min.
FEED = mm / min.

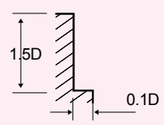


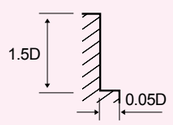


SM503 - SIDE CUTTING

MATERIAL	CARBON STEELS ALLOY STEELS · TOOL STEELS						CAST IRON		STAINLESS STEELS		COOOER ALLOYS		TITANIUM ALLOYS		INCONEL	
HARDNESS	~ HRc20		HRc20 ~ HRc30		HRc30 ~ HRc45											
STRENGTH	1000N/mm²		800~1000N/mm²		800~1000N/mm²											
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	10080	950	7750	740	5550	395	6700	520	5550	320	8300	360	5550	395	2200	100
4	7550	1400	5850	1100	4200	595	5050	550	4200	320	6200	400	4200	595	1650	105
6	5050	1650	3850	1250	2800	700	3350	660	2800	370	4100	440	2800	700	1150	130
8	3750	1700	2950	1330	2100	710	2500	665	2100	375	3100	500	2100	710	850	120
10	3050	1650	2300	1250	1650	655	2000	630	1650	355	2500	530	1650	665	650	120
12	2500	1500	2000	1200	1350	605	1650	570	1350	320	2000	550	1350	605	555	110

RPM = rev. / min.
FEED = mm / min.





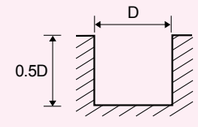
TECHNICAL DATA

INCH

SM504

MATERIAL	ALLOY STEELS · CAST IRON		STAINLESS STEEL 300 SERIES TITANIUM		STAINLESS STEELS 400 SERIES	
HARDNESS	~ HB230					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	6950	195	4500	150	3300	100
4	5600	240	3600	170	2700	105
5	4800	250	3050	210	2350	125
6	4150	250	2650	210	2050	125
8	3150	265	2000	210	1600	125
10	2150	265	1700	210	1250	125
12	1800	210	1500	185	1050	105
16	1880	185	1100	140	840	90
20	1300	130	860	105	625	65

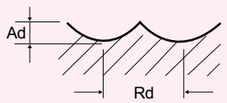
RPM = rev. / min.
FEED = mm / min.



BC502

MATERIAL		UNALLOYED COPPER			
R	DIAMETER(inch)	RPM	FEED	RPM	FEED
0.5	1	41000	1660	0.040	0.063
0.75	1.5	27000	1830	0.068	0.087
1	2	20000	1780	0.089	0.112
1.25	2.5	16000	1840	0.115	0.090
1.5	3	13000	2220	0.171	0.168
2	4	10000	2080	0.208	0.200
2.5	5	8300	1990	0.240	0.200
3	6	6900	1940	0.281	0.250
4	8	5720	1000	0.175	0.400
5	10	4550	700	0.154	0.500
6	12	3770	600	0.159	0.600

RPM = rev. / min.
FEED = mm / min.



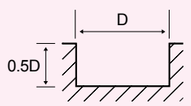
TECHNICAL DATA

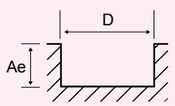
INCH

ZF62 - SLOTTING

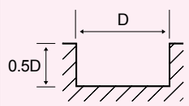
MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		INCONEL	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 50					
STRENGTH	~1000N/mm²		1000~1500N/mm²					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	16380	2680	13020	970	8820	670	3000	285
8	12180	2680	9660	970	6615	670	2250	270
10	9660	2680	7980	970	5355	660	1625	285
12	8400	2770	6300	925	4410	660	1500	285
16	6300	2770	5040	880	3465	590	1000	165
20	5040	2495	3780	650	2520	415	825	150

RPM = rev. / min.
FEED = mm / min.





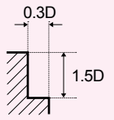
Ae : Ø4 ~ Ø10=0.25×D
Ø12 ~ Ø16=0.15×D
Ø18 ~ Ø20=0.10×D

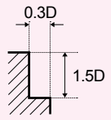


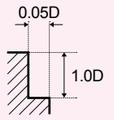
ZF62 - SIDE CUTTING

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		INCONEL	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45					
STRENGTH	~1000N/mm²		1000~1500N/mm²					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	16380	2680	13020	970	8820	670	3000	285
8	12180	2680	9660	970	6615	670	2250	270
10	9660	2680	7980	970	5355	660	1625	285
12	8400	2770	6300	925	4410	660	1500	285
16	6300	2770	5040	880	3465	590	1000	165
20	5040	2495	3780	650	2520	415	825	150

RPM = rev. / min.
FEED = mm / min.



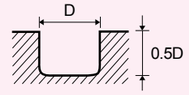


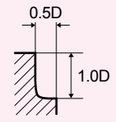


RC502

MATERIAL	UNALLOYED COPPER			
DIAMETER(inch)	RPM	FEED	RPM	FEED
3	44500	2350	50000	3700
4	33400	2100	50000	4700
6	22300	2100	33400	4900
8	16700	2100	25000	4700
10	13370	2100	20000	4800
12	11100	2100	16700	4700

RPM = rev. / min.
FEED = mm / min.

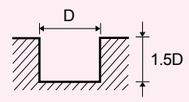




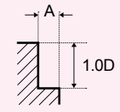
AE302

MATERIAL	ALLOY STEELS · CAST IRON		ALUMINUM	
HARDNESS	~ HB230			
DIAMETER(mm)	RPM	FEED	RPM	FEED
1.0	16870	505	16870	845
1.5	13150	525	13150	790
2.0	11300	565	11300	790
2.5	10565	635	10565	845
3.0	10000	700	10000	900
4.0	10000	900	10000	1100
5.0	10000	1000	10000	1300
6.0	10000	1200	10000	1500
7.0	8850	1240	8850	1505
8.0	8000	1400	8000	1800
9.0	8000	1550	8000	1680
10.0	8000	1700	8000	2100
12.0	8000	2100	8000	2600
14.0	6000	1800	6000	2200
16.0	6000	1900	6000	2400
18.0	4000	1400	4000	1800
20.0	4000	1600	4000	1900

RPM = rev. / min.
FEED = mm / min.



Ae : Ø3 ~ Ø10=0.25×D
Ø12 ~ Ø20=0.5×D



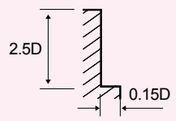
TECHNICAL DATA

INCH

AE303, AE323 - SIDE CUTTING

MATERIAL	ALUMINUM · NONFERROUS METALS	
DIAMETER(mm)	RPM	FEED
3	7000	455
4	7000	546
5	7000	651
6	7000	756
8	5600	861
10	5600	1050
12	5600	882
14	4200	1106
16	4200	1211
18	2800	910
20	2800	956

RPM = rev. / min.
FEED = mm / min.

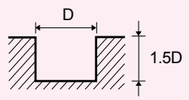


• Please reduce cutting speed around 20~30% from the above table in case of AE303 series.

AE303, AE323 - SLOTTING

MATERIAL	ALUMINUM · NONFERROUS METALS	
DIAMETER(mm)	RPM	FEED
3	7000	350
4	7000	441
5	7000	504
6	7000	606
8	5600	700
10	5600	854
12	5600	1050
14	4200	903
16	4200	945
18	2800	700
20	2800	805

RPM = rev. / min.
FEED = mm / min.



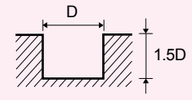
TECHNICAL DATA

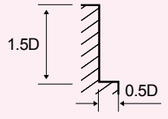
INCH

AF303, AF313 - SLOTTING

MATERIAL	ALUMINUM · NONFERROUS METALS			
DIAMETER(mm)	RPM	FEED	RPM	FEED
6	10500	800	13500	1050
8	8000	700	10500	900
10	6500	750	8500	950
12	5250	800	6800	1050
16	4000	800	5200	1050
20	3200	800	4200	1050

RPM = rev. / min.
FEED = mm / min.

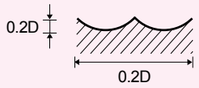




G

MATERIAL	GRAPHITE	
DIAMETER(mm)	RPM	FEED
R0.5	16000	480
R0.75	16000	640
R1	16000	800
R1.5	16000	1450
R2	16000	2100
R3	15000	2950
R4	13000	3000
R5	11500	3050
R6	10500	3150
R8	8555	2960

RPM = rev. / min.
FEED = mm / min.



POWER MAX DRILL SERIES

PF503

POWER MAX DRILL - STUB / HIGH SPEED MACHINING

- Suitable for high speed cutting due to newly developed raw-material and new coating.

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PF503020	2.0	14	50	3	●
PF503021	2.1				●
PF503022	2.2				●
PF503023	2.3				●
PF503024	2.4				●
PF503025	2.5				●
PF503026	2.6				●
PF503027	2.7				●
PF503028	2.8				●
PF503029	2.9				●
PF503030	3.0	18	60		●
PF503031	3.1	20	60	4	●
PF503032	3.2				●
PF503033	3.3				●
PF503034	3.4	22			●
PF503035	3.5				●
PF503036	3.6				●
PF503037	3.7	24			●
PF503038	3.8				●
PF50039	3.9				●
PF503040	4.0				●
PF503041	4.1				●
PF503042	4.2	26	62	5	●
PF503043	4.3				●
PF503044	4.4				●
PF503045	4.5				●
PF503046	4.6				●
PF503047	4.7				●
PF503048	4.8				●
PF503049	4.9				●
PF503050	5.0				●
PF503051	5.1				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PF503052	5.2	28	66	6	●
PF503053	5.3				●
PF503054	5.4				●
PF503055	5.5				●
PF503056	5.6	30			●
PF503057	5.7				●
PF503058	5.8				●
PF503059	5.9				●
PF503060	6.0				●
PF503061	6.1				●
PF503062	6.2	34	74	7	●
PF503063	6.3				●
PF503064	6.4				●
PF503065	6.5				●
PF503066	6.6				●
PF503067	6.7	37			●
PF503068	6.8				●
PF503069	6.9				●
PF503070	7.0				●
PF503071	7.1				●
PF503072	7.2	40	79	8	●
PF503073	7.3				●
PF503074	7.4				●
PF503075	7.5				●
PF503076	7.6				●
PF503077	7.7				●
PF503078	7.8				●
PF503079	7.9				●
PF503080	8.0				●
PF503081	8.1				●
PF503082	8.2	43	84	9	●
PF503083	8.3				●
PF503084	8.4				●
PF503085	8.5				●
PF503086	8.6				●
PF503087	8.7				●
PF503088	8.8				●
PF503089	8.9				●
PF503090	9.0				●
PF503091	9.1				●
PF503092	9.2	47	89	10	●
PF503093	9.3				●
PF503094	9.4				●
PF503095	9.5				●
PF503096	9.6				●
PF503097	9.7				●
PF503098	9.8				●
PF503099	9.9				●
PF503100	10.0				●
PF503101	10.1				●

POWER MAX DRILL SERIES

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PF503102	10.2	51	95	11	●
PF503103	10.3				●
PF503104	10.4				●
PF503105	10.5				●
PF503106	10.6				●
PF503107	10.7				●
PF503108	10.8				●
PF503109	10.9				●
PF503110	11.0				●
PF503111	11.1				●
PF503112	11.2	54	102	12	●
PF503113	11.3				●
PF503114	11.4				●
PF503115	11.5				●
PF503116	11.6				●
PF503117	11.7				●
PF503118	11.8				●
PF503119	11.9				●
PF503120	12.0				●
PF503121	12.1				●
PF503122	12.2	57	102	13	●
PF503123	12.3				●
PF503124	12.4				●
PF503125	12.5				●
PF503126	12.6				●
PF503127	12.7				●
PF503128	12.8				●
PF503129	12.9				●
PF503130	13.0				●
PF503131	13.1				●
PF503132	13.2	60	107	14	●
PF503133	13.3				●
PF503134	13.4				●
PF503135	13.5				●
PF503136	13.6				●
PF503137	13.7				●
PF503138	13.8				●
PF503139	13.9				●
PF503140	14.0				●
PF503141	14.1				●
PF503142	14.2	62	111	15	●
PF503143	14.3				●
PF503144	14.4				●
PF503145	14.5				●
PF503146	14.6				●
PF503147	14.7				●
PF503148	14.8				●
PF503149	14.9				●
PF503150	15.0				●
PF503151	15.1				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PF503152	15.2	64	115	16	●
PF503154	15.4				●
PF503155	15.5				●
PF503156	15.6				●
PF503157	15.7				●
PF503158	15.8				●
PF503160	16.0				●
PF503161	16.1				●
PF503163	16.3	66	119	17	●
PF503165	16.5				●
PF503170	17.0				●
PF503171	17.1				●
PF503172	17.2	66	123	18	●
PF503175	17.5				●
PF503177	17.7				●
PF503178	17.8				●
PF503180	18.0				●
PF503181	18.1				●
PF503182	18.2	70	127	19	●
PF503185	18.5				●
PF503190	19.0				●
PF503191	19.1				●
PF503195	19.5	70	131	20	●
PF503197	19.7				●
PF503200	20.0				●

μm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27	0 -33
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

POWER MAX DRILL SERIES

PF505

POWER MAX DRILL - MEDIUM / HIGH SPEED MACHINING

- Suitable for high speed cutting due to newly developed raw-material and new coating.

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PF505030	3.0	25	60	3	●
PF505031	3.1	27		4	●
PF505032	3.2				●
PF505033	3.3				●
PF505034	3.4	30	65		●
PF505035	3.5				●
PF505036	3.6				●
PF505037	3.7				●
PF505038	3.8	33	71		●
PF505039	3.9				●
PF505040	4.0				●
PF505041	4.1	33	71	5	●
PF505042	4.2				●
PF505043	4.3	36			●
PF505044	4.4				●
PF505045	4.5				●
PF505046	4.6				●
PF505047	4.7				●
PF505048	4.8	39			●
PF505049	4.9				●
PF505050	5.0				●
PF505051	5.1	39	83	6	●
PF505052	5.2				●
PF505053	5.3				●
PF505054	5.4	43			●
PF505055	5.5				●
PF505056	5.6				●
PF505057	5.7				●
PF505058	5.8				●
PF505059	5.9				●
PF505060	6.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PF505061	6.1	47	87	7	●
PF505062	6.2				●
PF505063	6.3				●
PF505064	6.4				●
PF505065	6.5				●
PF505066	6.6				●
PF505067	6.7				●
PF505068	6.8				●
PF505069	6.9				●
PF505070	7.0				●
PF505071	7.1	52	92	8	●
PF505072	7.2				●
PF505073	7.3				●
PF505074	7.4				●
PF505075	7.5				●
PF505076	7.6				●
PF505077	7.7				●
PF505078	7.8				●
PF505079	7.9				●
PF505080	8.0				●
PF505081	8.1	56	96	9	●
PF505082	8.2				●
PF505083	8.3				●
PF505084	8.4				●
PF505085	8.5				●
PF505086	8.6				●
PF505087	8.7				●
PF505088	8.8				●
PF505089	8.9				●
PF505090	9.0				●
PF505091	9.1	62	105	10	●
PF505092	9.2				●
PF505093	9.3				●
PF505094	9.4				●
PF505095	9.5				●
PF505096	9.6				●
PF505097	9.7				●
PF505098	9.8				●
PF505099	9.9				●
PF505100	10.0				●
PF505101	10.1	68	115	11	●
PF505102	10.2				●
PF505103	10.3				●
PF505104	10.4				●
PF505105	10.5				●
PF505106	10.6				●
PF505107	10.7				●
PF505108	10.8				●
PF505109	10.9				●
PF505110	11.0				●

POWER MAX DRILL SERIES

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PF505111	11.1	71	121	12	●
PF505112	11.2				●
PF505113	11.3				●
PF505114	11.4				●
PF505115	11.5				●
PF505116	11.6				●
PF505117	11.7				●
PF505118	11.8				●
PF505119	11.9				●
PF505120	12.0				●
PF505121	12.1	75	125	13	●
PF505122	12.2				●
PF505123	12.3				●
PF505124	12.4				●
PF505125	12.5				●
PF505126	12.6				●
PF505127	12.7				●
PF505128	12.8				●
PF505129	12.9				●
PF505130	13.0				●
PF505131	13.1	80	134	14	●
PF505132	13.2				●
PF505133	13.3				●
PF505134	13.4				●
PF505135	13.5				●
PF505136	13.6				●
PF505137	13.7				●
PF505138	13.8				●
PF505139	13.9				●
PF505140	14.0				●
PF505141	14.1	83	143	15	●
PF505142	14.2				●
PF505143	14.3				●
PF505144	14.4				●
PF505145	14.5				●
PF505146	14.6				●
PF505147	14.7				●
PF505148	14.8				●
PF505149	14.9				●
PF505150	15.0				●
PF505151	15.1	90	152	16	●
PF505152	15.2				●
PF505154	15.4				●
PF505155	15.5				●
PF505156	15.6				●
PF505157	15.7				●
PF505158	15.8				●
PF505160	16.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PF505161	16.1	95	155	17	●
PF505163	16.3				●
PF505165	16.5				●
PF505170	17.0				●
PF505171	17.1	100	157	18	●
PF505172	17.2				●
PF505175	17.5				●
PF505177	17.7				●
PF505178	17.8				●
PF505180	18.0				●
PF505181	18.1	105	160	19	●
PF505182	18.2				●
PF505185	18.5				●
PF505190	19.0				●
PF505191	19.1	110	163	20	●
PF505195	19.5				●
PF505197	19.7				●
PF505200	20.0				●

μm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27	0 -33
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

POWER MAX DRILL SERIES

SF503

POWER MAX DRILL - STUB / INTERNAL COOLANT

- Suitable for high speed cutting due to newly developed raw-material and new coating.

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
SF503030	3.0	18	60	4	●
SF503031	3.1	20			●
SF503032	3.2				●
SF503033	3.3				●
SF503034	3.4	22			●
SF503035	3.5				●
SF503036	3.6				●
SF503037	3.7				●
SF503038	3.8	24			●
SF503039	3.9				●
SF503040	4.0				●
SF503041	4.1	24	62	5	●
SF503042	4.2	26			●
SF503043	4.3				●
SF503044	4.4				●
SF503045	4.5				●
SF503046	4.6				●
SF503047	4.7				●
SF503048	4.8				●
SF503049	4.9				●
SF503050	5.0				●
SF503051	5.1	28	66	6	●
SF503052	5.2				●
SF503053	5.3				●
SF503054	5.4				●
SF503055	5.5				●
SF503056	5.6	30			●
SF503057	5.7				●
SF503058	5.8				●
SF503059	5.9				●
SF503060	6.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
SF503061	6.1	34	74	7	●
SF503062	6.2				●
SF503063	6.3				●
SF503064	6.4				●
SF503065	6.5				●
SF503066	6.6				●
SF503067	6.7	37			●
SF503068	6.8				●
SF503069	6.9				●
SF503070	7.0				●
SF503071	7.1	40	79	8	●
SF503072	7.2				●
SF503073	7.3				●
SF503074	7.4				●
SF503075	7.5				●
SF503076	7.6				●
SF503077	7.7				●
SF503078	7.8				●
SF503079	7.9				●
SF503080	8.0				●
SF503081	8.1	43	84	9	●
SF503082	8.2				●
SF503083	8.3				●
SF503084	8.4				●
SF503085	8.5				●
SF503086	8.6				●
SF503087	8.7				●
SF503088	8.8				●
SF503089	8.9				●
SF503090	9.0				●
SF503091	9.1	47	89	10	●
SF503092	9.2				●
SF503093	9.3				●
SF503094	9.4				●
SF503095	9.5				●
SF503096	9.6				●
SF503097	9.7				●
SF503098	9.8				●
SF503099	9.9				●
SF503100	10.0				●
SF503101	10.1	51	95	11	●
SF503102	10.2				●
SF503103	10.3				●
SF503104	10.4				●
SF503105	10.5				●
SF503106	10.6				●
SF503107	10.7				●
SF503108	10.8				●
SF503109	10.9				●
SF503110	11.0				●

POWER MAX DRILL SERIES

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
SF503111	11.1	54	102	12	●
SF503112	11.2				●
SF503113	11.3				●
SF503114	11.4				●
SF503115	11.5				●
SF503116	11.6				●
SF503117	11.7				●
SF503118	11.8				●
SF503119	11.9				●
SF503120	12.0				●
SF503121	12.1	57	102	13	●
SF503122	12.2				●
SF503123	12.3				●
SF503124	12.4				●
SF503125	12.5				●
SF503126	12.6				●
SF503127	12.7				●
SF503128	12.8				●
SF503129	12.9				●
SF503130	13.0				●
SF503131	13.1	60	107	14	●
SF503132	13.2				●
SF503133	13.3				●
SF503134	13.4				●
SF503135	13.5				●
SF503136	13.6				●
SF503137	13.7				●
SF503138	13.8				●
SF503139	13.9				●
SF503140	14.0				●
SF503141	14.1	62	111	15	●
SF503142	14.2				●
SF503143	14.3				●
SF503144	14.4				●
SF503145	14.5				●
SF503146	14.6				●
SF503147	14.7				●
SF503148	14.8				●
SF503149	14.9				●
SF503150	15.0				●
SF503151	15.1	64	115	16	●
SF503152	15.2				●
SF503154	15.4				●
SF503155	15.5				●
SF503156	15.6				●
SF503157	15.7				●
SF503158	15.8				●
SF503160	16.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
SF503161	16.1	66	119	17	●
SF503163	16.3				●
SF503165	16.5				●
SF503170	17.0				●
SF503171	17.1	66	123	18	●
SF503172	17.2				●
SF503175	17.5				●
SF503177	17.7				●
SF503178	17.8				●
SF503180	18.0				●
SF503181	18.1	70	127	19	●
SF503182	18.2				●
SF503185	18.5				●
SF503190	19.0				●
SF503191	19.1	70	131	20	●
SF503195	19.5				●
SF503197	19.7				●
SF503200	20.0				●

μm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27	0 -33
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

POWER MAX DRILL SERIES

SF505

POWER MAX DRILL - MEDIUM / INTERNAL COOLANT

- Suitable for high speed cutting due to newly developed raw-material and new coating.

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
SF505031	3.1	27	74	4	●
SF505032	3.2				●
SF505033	3.3				●
SF505034	3.4	30			●
SF505035	3.5				●
SF505036	3.6				●
SF505037	3.7				●
SF505038	3.8	33			●
SF505039	3.9				●
SF505040	4.0				●
SF505041	4.1	33	80	5	●
SF505042	4.2				●
SF505043	4.3	36			●
SF505044	4.4				●
SF505045	4.5				●
SF505046	4.6				●
SF505047	4.7				●
SF505048	4.8	39			●
SF505049	4.9				●
SF505050	5.0				●
SF505051	5.1	39	87	6	●
SF505052	5.2				●
SF505053	5.3				●
SF505054	5.4	43			●
SF505055	5.5				●
SF505056	5.6				●
SF505057	5.7				●
SF505058	5.8				●
SF505059	5.9				●
SF505060	6.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
SF505061	6.1	47	95	7	●
SF505062	6.2				●
SF505063	6.3				●
SF505064	6.4				●
SF505065	6.5				●
SF505066	6.6				●
SF505067	6.7				●
SF505068	6.8				●
SF505069	6.9				●
SF505070	7.0				●
SF505071	7.1	52	103	8	●
SF505072	7.2				●
SF505073	7.3				●
SF505074	7.4				●
SF505075	7.5				●
SF505076	7.6				●
SF505077	7.7				●
SF505078	7.8				●
SF505079	7.9				●
SF505080	8.0				●
SF505081	8.1	56	105	9	●
SF505082	8.2				●
SF505083	8.3				●
SF505084	8.4				●
SF505085	8.5				●
SF505086	8.6				●
SF505087	8.7				●
SF505088	8.8				●
SF505089	8.9				●
SF505090	9.0				●
SF505091	9.1	62	108	10	●
SF505092	9.2				●
SF505093	9.3				●
SF505094	9.4				●
SF505095	9.5				●
SF505096	9.6				●
SF505097	9.7				●
SF505098	9.8				●
SF505099	9.9				●
SF505100	10.0				●
SF505101	10.1	68	125	11	●
SF505102	10.2				●
SF505103	10.3				●
SF505104	10.4				●
SF505105	10.5				●
SF505106	10.6				●
SF505107	10.7				●
SF505108	10.8				●
SF505109	10.9				●
SF505110	11.0				●

POWER MAX DRILL SERIES

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
SF505111	11.1	71	133	12	●
SF505112	11.2				●
SF505113	11.3				●
SF505114	11.4				●
SF505115	11.5				●
SF505116	11.6				●
SF505117	11.7				●
SF505118	11.8				●
SF505119	11.9				●
SF505120	12.0				●
SF505121	12.1	75	137	13	●
SF505122	12.2				●
SF505123	12.3				●
SF505124	12.4				●
SF505125	12.5				●
SF505126	12.6				●
SF505127	12.7				●
SF505128	12.8				●
SF505129	12.9				●
SF505130	13.0				●
SF505131	13.1	80	142	14	●
SF505132	13.2				●
SF505133	13.3				●
SF505134	13.4				●
SF505135	13.5				●
SF505136	13.6				●
SF505137	13.7				●
SF505138	13.8				●
SF505139	13.9				●
SF505140	14.0				●
SF505141	14.1	83	148	15	●
SF505142	14.2				●
SF505143	14.3				●
SF505144	14.4				●
SF505145	14.5				●
SF505146	14.6				●
SF505147	14.7				●
SF505148	14.8				●
SF505149	14.9				●
SF505150	15.0				●
SF505151	15.1	90	152	16	●
SF505152	15.2				●
SF505154	15.4				●
SF505155	15.5				●
SF505156	15.6				●
SF505157	15.7				●
SF505158	15.8				●
SF505160	16.0				●

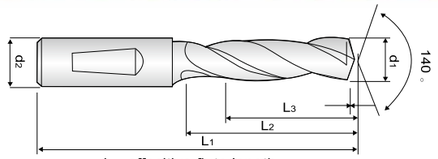
EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
SF505161	16.1	95	155	17	●
SF505163	16.3				●
SF505165	16.5				●
SF505170	17.0				●
SF505171	17.1	100	157	18	●
SF505172	17.2				●
SF505175	17.5				●
SF505177	17.7				●
SF505178	17.8				●
SF505180	18.0				●
SF505181	18.1	105	160	19	●
SF505182	18.2				●
SF505185	18.5				●
SF505190	19.0				●
SF505191	19.1	110	163	20	●
SF505195	19.5				●
SF505197	19.7				●
SF505200	20.0				●

μm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27	0 -33
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

POWER MAX DRILL SERIES

P503A
P503F



L3=effecitive flute length

POWER MAX DRILL - STUB / DIN 6537K

■ **Shank Form**

- **P503A** : DIN 6535 HA - straight A type
- **P503F** : DIN 6535 HE - 2° Whistle Flat F type

EDP. No.	EDP. No.	d1(m7)	d2(h6)	L1	L2	L3	STOCK
P503A030	P503F030	3.0	6	62	20	14	
P503A031	P503F031	3.1					
P503A032	P503F032	3.2					
P503A033	P503F033	3.3					
P503A034	P503F034	3.4					
P503A035	P503F035	3.5					
P503A036	P503F036	3.6					
P503A037	P503F037	3.7					
P503A038	P503F038	3.8	6	66	24	17	
P503A039	P503F039	3.9					
P503A040	P503F040	4.0					
P503A041	P503F041	4.1					
P503A042	P503F042	4.2					
P503A043	P503F043	4.3					
P503A044	P503F044	4.4					
P503A045	P503F045	4.5					
P503A046	P503F046	4.6					
P503A047	P503F047	4.7					
P503A048	P503F048	4.8	6	66	28	20	
P503A049	P503F049	4.9					
P503A050	P503F050	5.0					
P503A051	P503F051	5.1					
P503A052	P503F052	5.2					
P503A053	P503F053	5.3					
P503A054	P503F054	5.4					
P503A055	P503F055	5.5					
P503A056	P503F056	5.6					
P503A057	P503F057	5.7					
P503A058	P503F058	5.8					
P503A059	P503F059	5.9					
P503A060	P503F060	6.0					

EDP. No.	EDP. No.	d1(m7)	d2(h6)	L1	L2	L3	STOCK
P503A061	P503F061	6.1	8	79	34	24	
P503A062	P503F062	6.2					
P503A063	P503F063	6.3					
P503A064	P503F064	6.4					
P503A065	P503F065	6.5					
P503A066	P503F066	6.6					
P503A067	P503F067	6.7					
P503A068	P503F068	6.8					
P503A069	P503F069	6.9					
P503A070	P503F070	7.0					
P503A071	P503F071	7.1	8	79	41	29	
P503A072	P503F072	7.2					
P503A073	P503F073	7.3					
P503A074	P503F074	7.4					
P503A075	P503F075	7.5					
P503A076	P503F076	7.6					
P503A077	P503F077	7.7					
P503A078	P503F078	7.8					
P503A079	P503F079	7.9					
P503A080	P503F080	8.0					
P503A081	P503F081	8.1	10	89	47	35	
P503A082	P503F082	8.2					
P503A083	P503F083	8.3					
P503A084	P503F084	8.4					
P503A085	P503F085	8.5					
P503A086	P503F086	8.6					
P503A087	P503F087	8.7					
P503A088	P503F088	8.8					
P503A089	P503F089	8.9					
P503A090	P503F090	9.0					
P503A091	P503F091	9.1	10	89	47	35	
P503A092	P503F092	9.2					
P503A093	P503F093	9.3					
P503A094	P503F094	9.4					
P503A095	P503F095	9.5					
P503A096	P503F096	9.6					
P503A097	P503F097	9.7					
P503A098	P503F098	9.8					
P503A099	P503F099	9.9					
P503A100	P503F100	10.0					
P503A101	P503F101	10.1	12	102	55	40	
P503A102	P503F102	10.2					
P503A103	P503F103	10.3					
P503A104	P503F104	10.4					
P503A105	P503F105	10.5					
P503A106	P503F106	10.6					
P503A107	P503F107	10.7					
P503A108	P503F108	10.8					
P503A109	P503F109	10.9					
P503A110	P503F110	11.0					

POWER MAX DRILL SERIES

EDP. No.	EDP. No.	d1(m7)	d2(h6)	L1	L2	L3	STOCK
P503A111	P503F111	11.1	12	102	55	40	
P503A112	P503F112	11.2					
P503A113	P503F113	11.3					
P503A114	P503F114	11.4					
P503A115	P503F115	11.5					
P503A116	P503F116	11.6					
P503A117	P503F117	11.7					
P503A118	P503F118	11.8					
P503A119	P503F119	11.9					
P503A120	P503F120	12.0					
P503A121	P503F121	12.1	14	107	60	43	
P503A122	P503F122	12.2					
P503A123	P503F123	12.3					
P503A124	P503F124	12.4					
P503A125	P503F125	12.5					
P503A126	P503F126	12.6					
P503A127	P503F127	12.7					
P503A128	P503F128	12.8					
P503A129	P503F129	12.9					
P503A130	P503F130	13.0					
P503A131	P503F131	13.1	14	107	60	43	
P503A132	P503F132	13.2					
P503A133	P503F133	13.3					
P503A134	P503F134	13.4					
P503A135	P503F135	13.5					
P503A136	P503F136	13.6					
P503A137	P503F137	13.7					
P503A138	P503F138	13.8					
P503A139	P503F139	13.9					
P503A140	P503F140	14.0					
P503A141	P503F141	14.1	16	115	65	45	
P503A142	P503F142	14.2					
P503A143	P503F143	14.3					
P503A144	P503F144	14.4					
P503A145	P503F145	14.5					
P503A146	P503F146	14.6					
P503A147	P503F147	14.7					
P503A148	P503F148	14.8					
P503A149	P503F149	14.9					
P503A150	P503F150	15.0					
P503A151	P503F151	15.1	16	115	65	45	
P503A152	P503F152	15.2					
P503A153	P503F153	15.3					
P503A154	P503F154	15.4					
P503A155	P503F155	15.5					
P503A156	P503F156	15.6					
P503A157	P503F157	15.7					
P503A158	P503F158	15.8					
P503A159	P503F159	15.9					
P503A160	P503F160	16.0					

EDP. No.	EDP. No.	d1(m7)	d2(h6)	L1	L2	L3	STOCK
P503A161	P503F161	16.1	18	123	73	51	
P503A163	P503F163	16.3					
P503A165	P503F165	16.5					
P503A170	P503F170	17.0					
P503A171	P503F171	17.1	18	123	73	51	
P503A172	P503F172	17.2					
P503A175	P503F175	17.5					
P503A177	P503F177	17.7					
P503A178	P503F178	17.8					
P503A180	P503F180	18.0					
P503A181	P503F181	18.1	20	131	79	55	
P503A182	P503F182	18.2					
P503A185	P503F185	18.5					
P503A190	P503F190	19.0					
P503A191	P503F191	19.1	20	131	79	55	
P503A195	P503F195	19.5					
P503A197	P503F197	19.7					
P503A200	P503F200	20.0					

μm=1/1000mm

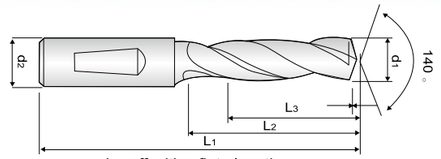
Dia. / Tolerance	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h7)	+12 +2	+16 +4	+21 +6	+25 +7	+29 +8
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

PART. B
ENDMILL & DRILL
ENDMILL
DRILL

POWER MAX DRILL SERIES

PI503A
PI503F

ULTRA FINE · HELIX · m7



L3=effective flute length

POWER MAX DRILL
- STUB INTERNAL COOLANT/ DIN 6537K

■ **Shank Form**
- **PI503A** : DIN 6535 HA - straight A type
- **PI503F** : DIN 6535 HE - 2° Whistle Flat F type

EDP. No.	EDP. No.	d_1(m7)	d_2(h6)	L_1	L_2	L_3	STOCK
PI503A030	PI503F030	3.0	6	62	20	14	
PI503A031	PI503F031	3.1					
PI503A032	PI503F032	3.2					
PI503A033	PI503F033	3.3					
PI503A034	PI503F034	3.4					
PI503A035	PI503F035	3.5					
PI503A036	PI503F036	3.6					
PI503A037	PI503F037	3.7					
PI503A038	PI503F038	3.8	6	66	24	17	
PI503A039	PI503F039	3.9					
PI503A040	PI503F040	4.0					
PI503A041	PI503F041	4.1					
PI503A042	PI503F042	4.2					
PI503A043	PI503F043	4.3					
PI503A044	PI503F044	4.4					
PI503A045	PI503F045	4.5					
PI503A046	PI503F046	4.6					
PI503A047	PI503F047	4.7					
PI503A048	PI503F048	4.8	6	66	28	20	
PI503A049	PI503F049	4.9					
PI503A050	PI503F050	5.0					
PI503A051	PI503F051	5.1					
PI503A052	PI503F052	5.2					
PI503A053	PI503F053	5.3					
PI503A054	PI503F054	5.4					
PI503A055	PI503F055	5.5					
PI503A056	PI503F056	5.6					
PI503A057	PI503F057	5.7					
PI503A058	PI503F058	5.8					
PI503A059	PI503F059	5.9					
PI503A060	PI503F060	60					

EDP. No.	EDP. No.	d_1(m7)	d_2(h6)	L_1	L_2	L_3	STOCK
PI503A061	PI503F061	6.1	8	79	34	24	
PI503A062	PI503F062	6.2					
PI503A063	PI503F063	6.3					
PI503A064	PI503F064	6.4					
PI503A065	PI503F065	6.5					
PI503A066	PI503F066	6.6					
PI503A067	PI503F067	6.7					
PI503A068	PI503F068	6.8					
PI503A069	PI503F069	6.9					
PI503A070	PI503F070	7.0					
PI503A071	PI503F071	7.1	8	79	41	29	
PI503A072	PI503F072	7.2					
PI503A073	PI503F073	7.3					
PI503A074	PI503F074	7.4					
PI503A075	PI503F075	7.5					
PI503A076	PI503F076	7.6					
PI503A077	PI503F077	7.7					
PI503A078	PI503F078	7.8					
PI503A079	PI503F079	7.9					
PI503A080	PI503F080	8.0					
PI503A081	PI503F081	8.1	10	89	47	35	
PI503A082	PI503F082	8.2					
PI503A083	PI503F083	8.3					
PI503A084	PI503F084	8.4					
PI503A085	PI503F085	8.5					
PI503A086	PI503F086	8.6					
PI503A087	PI503F087	8.7					
PI503A088	PI503F088	8.8					
PI503A089	PI503F089	8.9					
PI503A090	PI503F090	9.0					
PI503A091	PI503F091	9.1	10	89	47	35	
PI503A092	PI503F092	9.2					
PI503A093	PI503F093	9.3					
PI503A094	PI503F094	9.4					
PI503A095	PI503F095	9.5					
PI503A096	PI503F096	9.6					
PI503A097	PI503F097	9.7					
PI503A098	PI503F098	9.8					
PI503A099	PI503F099	9.9					
PI503A100	PI503F100	10.0					
PI503A101	PI503F101	10.1	12	102	55	40	
PI503A102	PI503F102	10.2					
PI503A103	PI503F103	10.3					
PI503A104	PI503F104	10.4					
PI503A105	PI503F105	10.5					
PI503A106	PI503F106	10.6					
PI503A107	PI503F107	10.7					
PI503A108	PI503F108	10.8					
PI503A109	PI503F109	10.9					
PI503A110	PI503F110	11.0					

POWER MAX DRILL SERIES

EDP. No.	EDP. No.	d_1(m7)	d_2(h6)	L_1	L_2	L_3	STOCK
PI503A111	PI503F111	11.1	12	102	55	40	
PI503A112	PI503F112	11.2					
PI503A113	PI503F113	11.3					
PI503A114	PI503F114	11.4					
PI503A115	PI503F115	11.5					
PI503A116	PI503F116	11.6					
PI503A117	PI503F117	11.7					
PI503A118	PI503F118	11.8					
PI503A119	PI503F119	11.9					
PI503A120	PI503F120	12.0					
PI503A121	PI503F121	12.1	14	107	60	43	
PI503A122	PI503F122	12.2					
PI503A123	PI503F123	12.3					
PI503A124	PI503F124	12.4					
PI503A125	PI503F125	12.5					
PI503A126	PI503F126	12.6					
PI503A127	PI503F127	12.7					
PI503A128	PI503F128	12.8					
PI503A129	PI503F129	12.9					
PI503A130	PI503F130	13.0					
PI503A131	PI503F131	13.1	14	107	60	43	
PI503A132	PI503F132	13.2					
PI503A133	PI503F133	13.3					
PI503A134	PI503F134	13.4					
PI503A135	PI503F135	13.5					
PI503A136	PI503F136	13.6					
PI503A137	PI503F137	13.7					
PI503A138	PI503F138	13.8					
PI503A139	PI503F139	13.9					
PI503A140	PI503F140	14.0					
PI503A141	PI503F141	14.1	16	115	65	45	
PI503A142	PI503F142	14.2					
PI503A143	PI503F143	14.3					
PI503A144	PI503F144	14.4					
PI503A145	PI503F145	14.5					
PI503A146	PI503F146	14.6					
PI503A147	PI503F147	14.7					
PI503A148	PI503F148	14.8					
PI503A149	PI503F149	14.9					
PI503A150	PI503F150	15.0					
PI503A151	PI503F151	15.1	16	115	65	45	
PI503A152	PI503F152	15.2					
PI503A153	PI503F153	15.3					
PI503A154	PI503F154	15.4					
PI503A155	PI503F155	15.5					
PI503A156	PI503F156	15.6					
PI503A157	PI503F157	15.7					
PI503A158	PI503F158	15.8					
PI503A159	PI503F159	15.9					
PI503A160	PI503F160	16.0					

EDP. No.	EDP. No.	d_1(m7)	d_2(h6)	L_1	L_2	L_3	STOCK
PI503A161	PI503F161	16.1	18	123	73	51	
PI503A163	PI503F163	16.3					
PI503A165	PI503F165	16.5					
PI503A170	PI503F170	17.0					
PI503A171	PI503F171	17.1	18	123	73	51	
PI503A172	PI503F172	17.2					
PI503A175	PI503F175	17.5					
PI503A177	PI503F177	17.7					
PI503A178	PI503F178	17.8					
PI503A180	PI503F180	18.0					
PI503A181	PI503F181	18.1	20	131	79	55	
PI503A182	PI503F182	18.2					
PI503A185	PI503F185	18.5					
PI503A190	PI503F190	19.0					
PI503A191	PI503F191	19.1	20	131	79	55	
PI503A195	PI503F195	19.5					
PI503A197	PI503F197	19.7					
PI503A200	PI503F200	20.0					

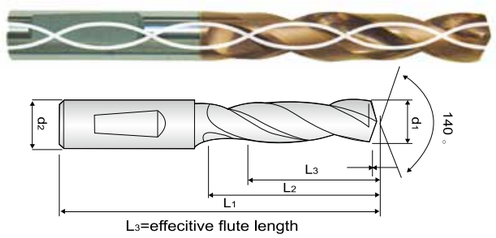
µm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h7)	+12 +2	+16 +4	+21 +6	+25 +7	+29 +8
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

ENDMILL
DRILL

POWER MAX DRILL SERIES

PI505A
PI505F



L3=effective flute length

POWER MAX DRILL
- MEDIUM INTERNAL COOLANT/ DIN 6537L

■ **Shank Form**

- **PI505A** : DIN 6535 HA - straight A type
- **PI505F** : DIN 6535 HE - 2° Whistle Flat F type

EDP. No.	EDP. No.	d1(m7)	d2(h6)	L1	L2	L3	STOCK
PI505A040	PI505F040	4.0	6	74	36	29	
PI505A041	PI505F041	4.1					
PI505A042	PI505F042	4.2					
PI505A043	PI505F043	4.3					
PI505A044	PI505F044	4.4					
PI505A045	PI505F045	4.5					
PI505A046	PI505F046	4.6					
PI505A047	PI505F047	4.7					
PI505A048	PI505F048	4.8	6	82	44	35	
PI505A049	PI505F049	4.9					
PI505A050	PI505F050	5.0					
PI505A051	PI505F051	5.1					
PI505A052	PI505F052	5.2					
PI505A053	PI505F053	5.3					
PI505A054	PI505F054	5.4					
PI505A055	PI505F055	5.5					
PI505A056	PI505F056	5.6					
PI505A057	PI505F057	5.7					
PI505A058	PI505F058	5.8					
PI505A059	PI505F059	5.9					
PI505A060	PI505F060	6.0					
PI505A061	PI505F061	6.1	8	91	53	43	
PI505A062	PI505F062	6.2					
PI505A063	PI505F063	6.3					
PI505A064	PI505F064	6.4					
PI505A065	PI505F065	6.5					
PI505A066	PI505F066	6.6					
PI505A067	PI505F067	6.7					
PI505A068	PI505F068	6.8					
PI505A069	PI505F069	6.9					
PI505A070	PI505F070	7.0					
PI505A071	PI505F071	7.1	8	91	53	43	
PI505A072	PI505F072	7.2					
PI505A073	PI505F073	7.3					
PI505A074	PI505F074	7.4					
PI505A075	PI505F075	7.5					
PI505A076	PI505F076	7.6					
PI505A077	PI505F077	7.7					
PI505A078	PI505F078	7.8					
PI505A079	PI505F079	7.9					
PI505A080	PI505F080	8.0					
PI505A081	PI505F081	8.1	10	103	61	49	
PI505A082	PI505F082	8.2					
PI505A083	PI505F083	8.3					
PI505A084	PI505F084	8.4					
PI505A085	PI505F085	8.5					
PI505A086	PI505F086	8.6					
PI505A087	PI505F087	8.7					
PI505A088	PI505F088	8.8					
PI505A089	PI505F089	8.9					
PI505A090	PI505F090	9.0					
PI505A091	PI505F091	9.1	10	103	61	49	
PI505A092	PI505F092	9.2					
PI505A093	PI505F093	9.3					
PI505A094	PI505F094	9.4					
PI505A095	PI505F095	9.5					
PI505A096	PI505F096	9.6					
PI505A097	PI505F097	9.7					
PI505A098	PI505F098	9.8					
PI505A099	PI505F099	9.9					
PI505A100	PI505F100	10.0					
PI505A101	PI505F101	10.1	12	118	71	56	
PI505A102	PI505F102	10.2					
PI505A103	PI505F103	10.3					
PI505A104	PI505F104	10.4					
PI505A105	PI505F105	10.5					
PI505A106	PI505F106	10.6					
PI505A107	PI505F107	10.7					
PI505A108	PI505F108	10.8					
PI505A109	PI505F109	10.9					
PI505A110	PI505F110	11.0					
PI505A111	PI505F111	11.1	12	118	71	56	
PI505A112	PI505F112	11.2					
PI505A113	PI505F113	11.3					
PI505A114	PI505F114	11.4					
PI505A115	PI505F115	11.5					
PI505A116	PI505F116	11.6					
PI505A117	PI505F117	11.7					
PI505A118	PI505F118	11.8					
PI505A119	PI505F119	11.9					
PI505A120	PI505F120	12.0					

POWER MAX DRILL SERIES

EDP. No.	EDP. No.	d1(m7)	d2(h6)	L1	L2	L3	STOCK
PI505A121	PI505F121	12.1	14	124	77	60	
PI505A122	PI505F122	12.2					
PI505A123	PI505F123	12.3					
PI505A124	PI505F124	12.4					
PI505A125	PI505F125	12.5					
PI505A126	PI505F126	12.6					
PI505A127	PI505F127	12.7					
PI505A128	PI505F128	12.8					
PI505A129	PI505F129	12.9					
PI505A130	PI505F130	13.0					
PI505A131	PI505F131	13.1	14	124	77	60	
PI505A132	PI505F132	13.2					
PI505A133	PI505F133	13.3					
PI505A134	PI505F134	13.4					
PI505A135	PI505F135	13.5					
PI505A136	PI505F136	13.6					
PI505A137	PI505F137	13.7					
PI505A138	PI505F138	13.8					
PI505A139	PI505F139	13.9					
PI505A140	PI505F140	14.0					
PI505A141	PI505F141	14.1	16	133	83	63	
PI505A142	PI505F142	14.2					
PI505A143	PI505F143	14.3					
PI505A144	PI505F144	14.4					
PI505A145	PI505F145	14.5					
PI505A146	PI505F146	14.6					
PI505A147	PI505F147	14.7					
PI505A148	PI505F148	14.8					
PI505A149	PI505F149	14.9					
PI505A150	PI505F150	15.0					
PI505A151	PI505F151	15.1	16	133	83	63	
PI505A152	PI505F152	15.2					
PI505A153	PI505F153	15.3					
PI505A154	PI505F154	15.4					
PI505A155	PI505F155	15.5					
PI505A156	PI505F156	15.6					
PI505A157	PI505F157	15.7					
PI505A158	PI505F158	15.8					
PI505A159	PI505F159	15.9					
PI505A160	PI505F160	16.0					
PI505A161	PI505F161	16.1	18	143	93	71	
PI505A163	PI505F163	16.3					
PI505A165	PI505F165	16.5					
PI505A170	PI505F170	17.0					
PI505A171	PI505F171	17.1	18	143	93	71	
PI505A172	PI505F172	17.2					
PI505A175	PI505F175	17.5					
PI505A177	PI505F177	17.7					
PI505A178	PI505F178	17.8					
PI505A180	PI505F180	18.0					
PI505A181	PI505F181	18.1	20	153	101	77	
PI505A182	PI505F182	18.2					
PI505A185	PI505F185	18.5					
PI505A190	PI505F190	19.0					
PI505A191	PI505F191	19.1	20	153	101	77	
PI505A195	PI505F195	19.5					
PI505A197	PI505F197	19.7					
PI505A200	PI505F200	20.0					

µm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h7)	+12 +2	+16 +4	+21 +6	+25 +7	+29 +8
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

POWER DRILL SERIES

PDS

POWER DRILL - STUB

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDS 020	2.0	14	50	3	●
PDS 021	2.1				●
PDS 022	2.2				●
PDS 023	2.3				●
PDS 024	2.4				●
PDS 025	2.5				●
PDS 026	2.6				●
PDS 027	2.7				●
PDS 028	2.8				●
PDS 029	2.9				●
PDS 030	3.0	18	60		●
PDS 031	3.1	20	60	4	●
PDS 032	3.2				●
PDS 033	3.3				●
PDS 034	3.4	22			●
PDS 035	3.5				●
PDS 036	3.6				●
PDS 037	3.7				●
PDS 038	3.8	24			●
PDS 039	3.9				●
PDS 040	4.0				●
PDS 041	4.1	24	62	5	●
PDS 042	4.2	26			●
PDS 043	4.3				●
PDS 044	4.4				●
PDS 045	4.5				●
PDS 046	4.6				●
PDS 047	4.7				●
PDS 048	4.8				●
PDS 049	4.9				●
PDS 050	5.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDS 051	5.1	28	66	6	●
PDS 052	5.2				●
PDS 053	5.3				●
PDS 054	5.4				●
PDS 055	5.5				●
PDS 056	5.6	30			●
PDS 057	5.7				●
PDS 058	5.8				●
PDS 059	5.9				●
PDS 060	6.0				●
PDS 061	6.1	34	74	7	●
PDS 062	6.2				●
PDS 063	6.3				●
PDS 064	6.4				●
PDS 065	6.5				●
PDS 066	6.6				●
PDS 067	6.7	37			●
PDS 068	6.8				●
PDS 069	6.9				●
PDS 070	7.0				●
PDS 071	7.1	40	79	8	●
PDS 072	7.2				●
PDS 073	7.3				●
PDS 074	7.4				●
PDS 075	7.5				●
PDS 076	7.6				●
PDS 077	7.7				●
PDS 078	7.8				●
PDS 079	7.9				●
PDS 080	8.0				●
PDS 081	8.1	43	84	9	●
PDS 082	8.2				●
PDS 083	8.3				●
PDS 084	8.4				●
PDS 085	8.5				●
PDS 086	8.6				●
PDS 087	8.7				●
PDS 088	8.8				●
PDS 089	8.9				●
PDS 090	9.0				●
PDS 091	9.1	47	89	10	●
PDS 092	9.2				●
PDS 093	9.3				●
PDS 094	9.4				●
PDS 095	9.5				●
PDS 096	9.6				●
PDS 097	9.7				●
PDS 098	9.8				●
PDS 099	9.9				●
PDS 100	10.0				●

POWER DRILL SERIES

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDS 101	10.1	51	95	11	●
PDS 102	10.2				●
PDS 103	10.3				●
PDS 104	10.4				●
PDS 105	10.5				●
PDS 106	10.6				●
PDS 107	10.7				●
PDS 108	10.8				●
PDS 109	10.9				●
PDS 110	11.0				●
PDS 111	11.1	54	102	12	●
PDS 112	11.2				●
PDS 113	11.3				●
PDS 114	11.4				●
PDS 115	11.5				●
PDS 116	11.6				●
PDS 117	11.7				●
PDS 118	11.8				●
PDS 119	11.9				●
PDS 120	12.0				●
PDS 121	12.1	57	102	13	●
PDS 122	12.2				●
PDS 123	12.3				●
PDS 124	12.4				●
PDS 125	12.5				●
PDS 126	12.6				●
PDS 127	12.7				●
PDS 128	12.8				●
PDS 129	12.9				●
PDS 130	13.0				●
PDS 131	13.1	60	107	14	●
PDS 132	13.2				●
PDS 133	13.3				●
PDS 132	13.4				●
PDS 135	13.5				●
PDS 136	13.6				●
PDS 137	13.7				●
PDS 138	13.8				●
PDS 139	13.9				●
PDS 140	14.0				●
PDS 141	14.1	62	111	15	●
PDS 142	14.2				●
PDS 143	14.3				●
PDS 144	14.4				●
PDS 145	14.5				●
PDS 146	14.6				●
PDS 147	14.7				●
PDS 148	14.8				●
PDS 149	14.9				●
PDS 150	15.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDS 151	15.1	64	115	16	●
PDS 152	15.2				●
PDS 154	15.4				●
PDS 155	15.5				●
PDS 156	15.6				●
PDS 157	15.7				●
PDS 158	15.8				●
PDS 160	16.0				●
PDS 161	16.1	66	119	17	●
PDS 163	16.3				●
PDS 165	16.5				●
PDS 170	17.0				●
PDS 171	17.1	66	123	18	●
PDS 172	17.2				●
PDS 175	17.5				●
PDS 177	17.7				●
PDS 178	17.8				●
PDS 180	18.0				●
PDS 181	18.1	70	127	19	●
PDS 182	18.2				●
PDS 185	18.5				●
PDS 190	19.0				●
PDS 191	19.1	70	131	20	●
PDS 195	19.5				●
PDS 197	19.7				●
PDS 200	20.0				●

μm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27	0 -33
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

POWER DRILL SERIES

PDM

POWER DRILL - MEDIUM

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDM 030	3.0	25	60	3	●
PDM 031	3.1	27		4	●
PDM 032	3.2				●
PDM 033	3.3				●
PDM 034	3.4	30	65		●
PDM 035	3.5				●
PDM 036	3.6				●
PDM 037	3.7				●
PDM 038	3.8	33	71		●
PDM 039	3.9				●
PDM 040	4.0				●
PDM 041	4.1	33	71	5	●
PDM 042	4.2				●
PDM 043	4.3	36			●
PDM 044	4.4				●
PDM 045	4.5				●
PDM 046	4.6				●
PDM 047	4.7				●
PDM 048	4.8	39			●
PDM 049	4.9				●
PDM 050	5.0				●
PDM 051	5.1	39	83	6	●
PDM 052	5.2				●
PDM 053	5.3				●
PDM 054	5.4	43			●
PDM 055	5.5				●
PDM 056	5.6				●
PDM 057	5.7				●
PDM 058	5.8				●
PDM 059	5.9				●
PDM 060	6.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDM 061	6.1	47	87	7	●
PDM 062	6.2				●
PDM 063	6.3				●
PDM 064	6.4				●
PDM 065	6.5				●
PDM 066	6.6				●
PDM 067	6.7				●
PDM 068	6.8				●
PDM 069	6.9				●
PDM 070	7.0				●
PDM 071	7.1	52	92	8	●
PDM 072	7.2				●
PDM 073	7.3				●
PDM 074	7.4				●
PDM 075	7.5				●
PDM 076	7.6				●
PDM 077	7.7				●
PDM 078	7.8				●
PDM 079	7.9				●
PDM 080	8.0				●
PDM 081	8.1	56	96	9	●
PDM 082	8.2				●
PDM 083	8.3				●
PDM 084	8.4				●
PDM 085	8.5				●
PDM 086	8.6				●
PDM 087	8.7				●
PDM 088	8.8				●
PDM 089	8.9				●
PDM 090	9.0				●
PDM 091	9.1	62	105	10	●
PDM 092	9.2				●
PDM 093	9.3				●
PDM 094	9.4				●
PDM 095	9.5				●
PDM 096	9.6				●
PDM 097	9.7				●
PDM 098	9.8				●
PDM 099	9.9				●
PDM 100	10.0				●
PDM 101	10.1	68	115	11	●
PDM 102	10.2				●
PDM 103	10.3				●
PDM 104	10.4				●
PDM 105	10.5				●
PDM 106	10.6				●
PDM 107	10.7				●
PDM 108	10.8				●
PDM 109	10.9				●
PDM 110	11.0				●

POWER DRILL SERIES

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDM 111	11.1	71	121	12	●
PDM 112	11.2				●
PDM 113	11.3				●
PDM 114	11.4				●
PDM 115	11.5				●
PDM 116	11.6				●
PDM 117	11.7				●
PDM 118	11.8				●
PDM 119	11.9				●
PDM 120	12.0				●
PDM 121	12.1	75	125	13	●
PDM 122	12.2				●
PDM 123	12.3				●
PDM 124	12.4				●
PDM 125	12.5				●
PDM 126	12.6				●
PDM 127	12.7				●
PDM 128	12.8				●
PDM 129	12.9				●
PDM 130	13.0				●
PDM 131	13.1	80	134	14	●
PDM 132	13.2				●
PDM 133	13.3				●
PDM 134	13.4				●
PDM 135	13.5				●
PDM 136	13.6				●
PDM 137	13.7				●
PDM 138	13.8				●
PDM 139	13.9				●
PDM 140	14.0				●
PDM 141	14.1	83	143	15	●
PDM 142	14.2				●
PDM 143	14.3				●
PDM 144	14.4				●
PDM 145	14.5				●
PDM 146	14.6				●
PDM 147	14.7				●
PDM 148	14.8				●
PDM 149	14.9				●
PDM 150	15.0				●
PDM 151	15.1	90	152	16	●
PDM 152	15.2				●
PDM 154	15.4				●
PDM 155	15.5				●
PDM 156	15.6				●
PDM 157	15.7				●
PDM 158	15.8				●
PDM 160	16.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDM 161	16.1	95	155	17	●
PDM 163	16.3				●
PDM 165	16.5				●
PDM 170	17.0				●
PDM 171	17.1	100	157	18	●
PDM 172	17.2				●
PDM 175	17.5				●
PDM 177	17.7				●
PDM 178	17.8				●
PDM 180	18.0				●
PDM 181	18.1	105	160	19	●
PDM 182	18.2				●
PDM 185	18.5				●
PDM 190	19.0				●
PDM 191	19.1	110	163	20	●
PDM 195	19.5				●
PDM 197	19.7				●
PDM 200	20.0				●

μm=1/1000mm

Dia. / Tolerance	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27	0 -33
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

POWER DRILL SERIES

PDSI

POWER DRILL - STUB / INTERNAL COOLANT

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDSI 030	3.0	18	60	4	●
PDSI 031	3.1	20			●
PDSI 032	3.2				●
PDSI 033	3.3				●
PDSI 034	3.4	22			●
PDSI 035	3.5				●
PDSI 036	3.6				●
PDSI 037	3.7				●
PDSI 038	3.8	24			●
PDSI 039	3.9				●
PDSI 040	4.0				●
PDSI 041	4.1	24	62	5	●
PDSI 042	4.2	26			●
PDSI 043	4.3				●
PDSI 044	4.4				●
PDSI 045	4.5				●
PDSI 046	4.6				●
PDSI 047	4.7				●
PDSI 048	4.8				●
PDSI 049	4.9				●
PDSI 050	5.0				●
PDSI 051	5.1	28	66	6	●
PDSI 052	5.2				●
PDSI 053	5.3				●
PDSI 054	5.4				●
PDSI 055	5.5				●
PDSI 056	5.6	30			●
PDSI 057	5.7				●
PDSI 058	5.8				●
PDSI 059	5.9				●
PDSI 060	6.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDSI 061	6.1	34	74	7	●
PDSI 062	6.2				●
PDSI 063	6.3				●
PDSI 064	6.4				●
PDSI 065	6.5				●
PDSI 066	6.6				●
PDSI 067	6.7				●
PDSI 068	6.8	37			●
PDSI 069	6.9				●
PDSI 070	7.0				●
PDSI 071	7.1	40	79	8	●
PDSI 072	7.2				●
PDSI 073	7.3				●
PDSI 074	7.4				●
PDSI 075	7.5				●
PDSI 076	7.6				●
PDSI 077	7.7				●
PDSI 078	7.8				●
PDSI 079	7.9				●
PDSI 080	8.0				●
PDSI 081	8.1	43	84	9	●
PDSI 082	8.2				●
PDSI 083	8.3				●
PDSI 084	8.4				●
PDSI 085	8.5				●
PDSI 086	8.6				●
PDSI 087	8.7				●
PDSI 088	8.8				●
PDSI 089	8.9				●
PDSI 090	9.0				●
PDSI 091	9.1	47	89	10	●
PDSI 092	9.2				●
PDSI 093	9.3				●
PDSI 094	9.4				●
PDSI 095	9.5				●
PDSI 096	9.6				●
PDSI 097	9.7				●
PDSI 098	9.8				●
PDSI 099	9.9				●
PDSI 100	10.0				●
PDSI 101	10.1	51	95	11	●
PDSI 102	10.2				●
PDSI 103	10.3				●
PDSI 104	10.4				●
PDSI 105	10.5				●
PDSI 106	10.6				●
PDSI 107	10.7				●
PDSI 108	10.8				●
PDSI 109	10.9				●
PDSI 110	11.0				●

POWER DRILL SERIES

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDSI 111	11.1	54	102	12	●
PDSI 112	11.2				●
PDSI 113	11.3				●
PDSI 114	11.4				●
PDSI 115	11.5				●
PDSI 116	11.6				●
PDSI 117	11.7				●
PDSI 118	11.8				●
PDSI 119	11.9				●
PDSI 120	12.0				●
PDSI 121	12.1	57	102	13	●
PDSI 122	12.2				●
PDSI 123	12.3				●
PDSI 124	12.4				●
PDSI 125	12.5				●
PDSI 126	12.6				●
PDSI 127	12.7				●
PDSI 128	12.8				●
PDSI 129	12.9				●
PDSI 130	13.0				●
PDSI 131	13.1	60	107	14	●
PDSI 132	13.2				●
PDSI 133	13.3				●
PDSI 134	13.4				●
PDSI 135	13.5				●
PDSI 136	13.6				●
PDSI 137	13.7				●
PDSI 138	13.8				●
PDSI 139	13.9				●
PDSI 140	14.0				●
PDSI 141	14.1	62	111	15	●
PDSI 142	14.2				●
PDSI 143	14.3				●
PDSI 144	14.4				●
PDSI 145	14.5				●
PDSI 146	14.6				●
PDSI 147	14.7				●
PDSI 148	14.8				●
PDSI 149	14.9				●
PDSI 150	15.0				●
PDSI 151	15.1	64	115	16	●
PDSI 152	15.2				●
PDSI 154	15.4				●
PDSI 155	15.5				●
PDSI 156	15.6				●
PDSI 157	15.7				●
PDSI 158	15.8				●
PDSI 160	16.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDSI 161	16.1	66	119	17	●
PDSI 163	16.3				●
PDSI 165	16.5				●
PDSI 170	17.0				●
PDSI 171	17.1	66	123	18	●
PDSI 172	17.2				●
PDSI 175	17.5				●
PDSI 177	17.7				●
PDSI 178	17.8				●
PDSI 180	18.0				●
PDSI 181	18.1	70	127	19	●
PDSI 182	18.2				●
PDSI 185	18.5				●
PDSI 190	19.0				●
PDSI 191	19.1	70	131	20	●
PDSI 195	19.5				●
PDSI 197	19.7				●
PDSI 200	20.0				●

μm=1/1000mm

Dia. / Tolerance	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27	0 -33
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

PART. B
ENDMILL & DRILL
ENDMILL
DRILL

POWER DRILL SERIES

PDMI

POWER DRILL - MEDIUM / INTERNAL COOLANT

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDMI 031	3.1	27	74	4	●
PDMI 032	3.2				●
PDMI 033	3.3				●
PDMI 034	3.4	30			●
PDMI 035	3.5				●
PDMI 036	3.6				●
PDMI 037	3.7				●
PDMI 038	3.8	33			●
PDMI 039	3.9				●
PDMI 040	4.0				●
PDMI 041	4.1	33	80	5	●
PDMI 042	4.2				●
PDMI 043	4.3	36			●
PDMI 044	4.4				●
PDMI 045	4.5				●
PDMI 046	4.6				●
PDMI 047	4.7				●
PDMI 048	4.8	39			●
PDMI 049	4.9				●
PDMI 050	5.0				●
PDMI 051	5.1	39	87	6	●
PDMI 052	5.2				●
PDMI 053	5.3				●
PDMI 054	5.4	43			●
PDMI 055	5.5				●
PDMI 056	5.6				●
PDMI 057	5.7				●
PDMI 058	5.8				●
PDMI 059	5.9				●
PDMI 060	6.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDMI 061	6.1	47	95	7	●
PDMI 062	6.2				●
PDMI 063	6.3				●
PDMI 064	6.4				●
PDMI 065	6.5				●
PDMI 066	6.6				●
PDMI 067	6.7				●
PDMI 068	6.8				●
PDMI 069	6.9				●
PDMI 070	7.0				●
PDMI 071	7.1	52	103	8	●
PDMI 072	7.2				●
PDMI 073	7.3				●
PDMI 074	7.4				●
PDMI 075	7.5				●
PDMI 076	7.6				●
PDMI 077	7.7				●
PDMI 078	7.8				●
PDMI 079	7.9				●
PDMI 080	8.0				●
PDMI 081	8.1	56	105	9	●
PDMI 082	8.2				●
PDMI 083	8.3				●
PDMI 084	8.4				●
PDMI 085	8.5				●
PDMI 086	8.6				●
PDMI 087	8.7				●
PDMI 088	8.8				●
PDMI 089	8.9				●
PDMI 090	9.0				●
PDMI 091	9.1	62	108	10	●
PDMI 092	9.2				●
PDMI 093	9.3				●
PDMI 094	9.4				●
PDMI 095	9.5				●
PDMI 096	9.6				●
PDMI 097	9.7				●
PDMI 098	9.8				●
PDMI 099	9.9				●
PDMI 100	10.0				●
PDMI 101	10.1	68	125	11	●
PDMI 102	10.2				●
PDMI 103	10.3				●
PDMI 104	10.4				●
PDMI 105	10.5				●
PDMI 106	10.6				●
PDMI 107	10.7				●
PDMI 108	10.8				●
PDMI 109	10.9				●
PDMI 110	11.0				●

POWER DRILL SERIES

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDMI 111	11.1	71	133	12	●
PDMI 112	11.2				●
PDMI 113	11.3				●
PDMI 114	11.4				●
PDMI 115	11.5				●
PDMI 116	11.6				●
PDMI 117	11.7				●
PDMI 118	11.8				●
PDMI 119	11.9				●
PDMI 120	12.0				●
PDMI 121	12.1	75	137	13	●
PDMI 122	12.2				●
PDMI 123	12.3				●
PDMI 124	12.4				●
PDMI 125	12.5				●
PDMI 126	12.6				●
PDMI 127	12.7				●
PDMI 128	12.8				●
PDMI 129	12.9				●
PDMI 130	13.0				●
PDMI 131	13.1	80	142	14	●
PDMI 132	13.2				●
PDMI 133	13.3				●
PDMI 134	13.4				●
PDMI 135	13.5				●
PDMI 136	13.6				●
PDMI 137	13.7				●
PDMI 138	13.8				●
PDMI 139	13.9				●
PDMI 140	14.0				●
PDMI 141	14.1	83	148	15	●
PDMI 142	14.2				●
PDMI 143	14.3				●
PDMI 144	14.4				●
PDMI 145	14.5				●
PDMI 146	14.6				●
PDMI 147	14.7				●
PDMI 148	14.8				●
PDMI 149	14.9				●
PDMI 150	15.0				●
PDMI 151	15.1	90	152	16	●
PDMI 152	15.2				●
PDMI 154	15.4				●
PDMI 155	15.5				●
PDMI 156	15.6				●
PDMI 157	15.7				●
PDMI 158	15.8				●
PDMI 160	16.0				●

EDP. No.	Dia.	F.L	OAL	SH.Dia.	STOCK
PDMI 161	16.1	95	155	17	●
PDMI 163	16.3				●
PDMI 165	16.5				●
PDMI 170	17.0				●
PDMI 171	17.1	100	157	18	●
PDMI 172	17.2				●
PDMI 175	17.5				●
PDMI 177	17.7				●
PDMI 178	17.8				●
PDMI 180	18.0				●
PDMI 181	18.1	105	160	19	●
PDMI 182	18.2				●
PDMI 185	18.5				●
PDMI 190	19.0				●
PDMI 191	19.1	110	163	20	●
PDMI 195	19.5				●
PDMI 197	19.7				●
PDMI 200	20.0				●

μm=1/1000mm

Dia. / Tolerance	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27	0 -33
Shank (h6)	0 -6	0 -8	0 -9	0 -11	0 -13

SOLID SPIRAL DRILL SERIES

SSD

SOLID SPIRAL DRILL

EDP. No.	Dia.	F.L	OAL	STOCK
SSD010	1.0	10	38	●
SSD011	1.1			●
SSD012	1.2			●
SSD013	1.3			●
SSD014	1.4			●
SSD015	1.5	13		●
SSD016	1.6			●
SSD017	1.7			●
SSD018	1.8			●
SSD019	1.9			●
SSD020	2.0	16	45	●
SSD021	2.1	16	45	●
SSD022	2.2			●
SSD023	2.3			●
SSD024	2.4	18	50	●
SSD025	2.5	20		●
SSD026	2.6			●
SSD027	2.7	22		●
SSD028	2.8			●
SSD029	2.9			●
SSD030	3.0			●
SSD031	3.1	25	50	●
SSD032	3.2			●
SSD033	3.3			●
SSD034	3.4			●
SSD035	3.5	28	55	●
SSD036	3.6			●
SSD037	3.7			●
SSD038	3.8			●
SSD039	3.9			●
SSD040	4.0			●
SSD041	4.1	30	60	●
SSD042	4.2			●
SSD043	4.3			●
SSD044	4.4			●
SSD045	4.5			●
SSD046	4.6	33	65	●
SSD047	4.7			●
SSD048	4.8	35		●
SSD049	4.9			●
SSD050	5.0			●

SOLID SPIRAL DRILL SERIES

EDP. No.	Dia.	F.L	OAL	STOCK
SSD051	5.1	35	65	●
SSD052	5.2			●
SSD053	5.3			●
SSD054	5.4			●
SSD055	5.5			●
SSD056	5.6	38	70	●
SSD057	5.7			●
SSD058	5.8			●
SSD059	5.9			●
SSD060	6.0			●
SSD061	6.1	38	75	●
SSD062	6.2			●
SSD063	6.3			●
SSD064	6.4			●
SSD065	6.5			●
SSD066	6.6	45	80	●
SSD067	6.7			●
SSD068	6.8			●
SSD069	6.9			●
SSD070	7.0			●
SSD071	7.1	45	80	●
SSD072	7.2			●
SSD073	7.3			●
SSD074	7.4			●
SSD075	7.5	18		●
SSD076	7.6	50	85	●
SSD077	7.7			●
SSD078	7.8			●
SSD079	7.9			●
SSD080	8.0			●
SSD081	8.1	50	85	●
SSD082	8.2			●
SSD083	8.3			●
SSD084	8.4			●
SSD085	8.5			●
SSD086	8.6		95	●
SSD087	8.7			●
SSD088	8.8			●
SSD089	8.9			●
SSD090	9.0			●

EDP. No.	Dia.	F.L	OAL	STOCK
SSD091	9.1	50	95	●
SSD092	9.2			●
SSD093	9.3			●
SSD094	9.4			●
SSD095	9.5			●
SSD096	9.6			●
SSD097	9.7			●
SSD098	9.8			●
SSD099	9.9	55	100	●
SSD100	10.0			●
SSD101	10.1	55	115	●
SSD102	10.2			●
SSD103	10.3			●
SSD104	10.4			●
SSD105	10.5			●
SSD106	10.6	60		●
SSD107	10.7			●
SSD108	10.8			●
SSD109	10.9			●
SSD110	11.0			●
SSD115	11.5	65	120	●
SSD120	12.0			●
SSD125	12.5	70	125	●
SSD130	13.0	75	130	●

µm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27
Shank (h7)	0 -10	0 -12	0 -18	0 -10

SOLID SPIRAL DRILL SERIES

SSDL

SOLID SPIRAL DRILL - LONG

EDP. No.	Dia.	F.L	OAL	STOCK
SSDL030	3.0	42	73	●
SSDL031	3.1			●
SSDL032	3.2			●
SSDL033	3.3			●
SSDL034	3.4			●
SSDL035	3.5			●
SSDL036	3.6	45	80	●
SSDL037	3.7			●
SSDL038	3.8	48		●
SSDL039	3.9	50		●
SSDL040	4.0	54	85	●
SSDL041	4.1	54	85	●
SSDL042	4.2			●
SSDL043	4.3			●
SSDL044	4.4			●
SSDL045	4.5			●
SSDL046	4.6	59	90	●
SSDL047	4.7			●
SSDL048	4.8			●
SSDL049	4.9			●
SSDL050	5.0			●
SSDL051	5.1	63	95	●
SSDL052	5.2			●
SSDL053	5.3			●
SSDL054	5.4			●
SSDL055	5.5			●
SSDL056	5.6	66	100	●
SSDL057	5.7			●
SSDL058	5.8			●
SSDL059	5.9			●
SSDL060	6.0			●

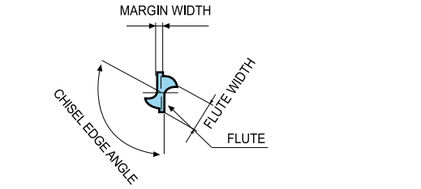
EDP. No.	Dia.	F.L	OAL	STOCK
SSDL061	6.1	70	105	●
SSDL062	6.2			●
SSDL063	6.3			●
SSDL064	6.4			●
SSDL065	6.5			●
SSDL066	6.6	73		●
SSDL067	6.7			●
SSDL068	6.8			●
SSDL069	6.9			●
SSDL070	7.0			●
SSDL071	7.1	76	110	●
SSDL072	7.2			●
SSDL073	7.3			●
SSDL074	7.4			●
SSDL075	7.5			●
SSDL076	7.6	80	115	●
SSDL077	7.7			●
SSDL078	7.8			●
SSDL079	7.9			●
SSDL080	8.0			●
SSDL081	8.1	85	125	●
SSDL082	8.2			●
SSDL083	8.3			●
SSDL084	8.4			●
SSDL085	8.5			●
SSDL086	8.6			●
SSDL087	8.7			●
SSDL088	8.8			●
SSDL089	8.9			●
SSDL090	9.0			●
SSDL091	9.1	88	130	●
SSDL092	9.2			●
SSDL093	9.3			●
SSDL094	9.4			●
SSDL095	9.5			●
SSDL096	9.6	90		●
SSDL097	9.7			●
SSDL098	9.8			●
SSDL099	9.9			●
SSDL100	10.0			●

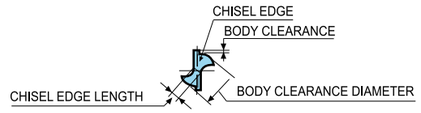
μm=1/1000mm

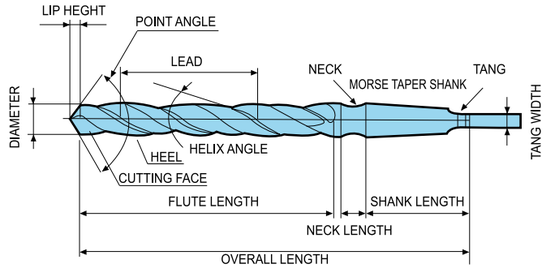
Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18
Cutting Edge (h8)	0 -14	0 -18	0 -22	0 -27
Shank (h7)	0 -10	0 -12	0 -18	0 -18

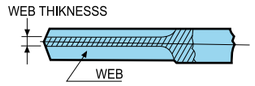
TECHNICAL DATA

NOMENCLATURE OF DRILL



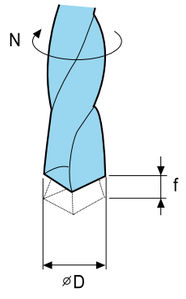






WORKING OF MAIN ANGLE

POINT ANGLE	HELIX ANGLE	LIP RELIEF ANGLE
70° 118° 140°	10° 38° 40°	7° 10° 12° 15°
Large → Torque → Small Small → Thrust → Large	Bad → Cutting Capacity → Good Good → Chip Ejection → Bad Large → Rigidity of tool → Small	Small → Tool Wear → Large Small → Vibration → Large



■ Cutting Speed

$$V = \frac{\pi \times D \times N}{1000} \text{ (m/min)}$$

- V : Cutting Speed (m/min)
- D : Diameter of drill (mm)
- N : revolution (rpm)
- π : (3.14)

■ Feed

$$f = \frac{S}{N} \text{ (m/rev)}$$

- f : feed (m/min)
- S : depth of cut per min (mm)
- N : revolution (rpm)

■ Cutting Speed

$$\delta = \text{Tan}^{-1}\left(\frac{\pi D}{L}\right)$$

- δ : helix angle (m/min)
- D : Diameter of drill (mm)
- L : lea (rpm)
- π : (3.14)

TROUBLE SHOOTING FOR DRILLING

Problems	Cause	Cutting Speed	Feed Rate	Step Feed	Initial Feed	Cutting Fluid	Relief Angle	Point Angle	Thinning Angle	Honing	Change the rate of flute and land width	Thinning	Toughness	Hardness	Machanical rigidity of machine	Drill Rigidity	Guide - Bush	Improvement of setting type
Chipping	• Improper cutting edge						▼		▼	▲		▲						
	• Improper cutting speed	▼				○												
	• Generation of built-up edge					○	▼		▼	▲		▲						
	• Generation of chattering and vibration	▼													▲	▲		○
Excessive wear on cutting dege	• Cutting speed too high in relation to insert grade	▼				○	▲	▲						▲				
Breakage — In the beginning of operating	• Poor surface conditions of workpiece			○	▼													▼
	• Insufficient rigidity of tool and workpiece														▲			○
	• Deflection of hole	▼	▼															
Breakage — Under the operating	• Default of chip ejection		▼	○								○						

▲ : Increase ▼ : Decrease ○ : Application ⦿ : Proper application

PDS - POWER DRILL

V : m/min, f : mm/rev

DRILL			MILD STEEL · ALLOY STEEL · CARBON STEEL		ALLOY STEEL FORGED STEEL		HIGH HARDENED STEEL		STAINLESS STEEL		DUCTILE CAST IRON		CAST IRON	
			≤ HRc 25		HRc 25 ~ HRc 35		HRc 35 ~ HRc 45							
	Dia.	COD	V	F	V	F	V	F	V	F	V	F	V	F
SOLD TYPE	Ø3~5	PDS030ff050	40~70	0.15~0.25	35~55	0.10~0.20	15~25	0.05~0.15	15~25	0.05~0.15	35~70	0.15~0.25	45~75	0.15~0.30
	Ø5~8	PDS051~080	50~75	0.20~0.30	45~60	0.15~0.25	15~30	0.10~0.20	15~30	0.10~0.20	45~75	0.20~0.35	55~85	0.20~0.40
	Ø8~10	PDS081~100	50~75	0.25~0.35	45~60	0.15~0.30	20~35	0.10~0.20	15~30	0.10~0.20	45~75	0.25~0.40	55~85	0.20~0.40
	Ø10~12	PDS101~120	50~75	0.25~0.35	45~60	0.15~0.30	20~35	0.10~0.25	15~30	0.10~0.25	45~75	0.25~0.40	55~85	0.20~0.45
	Ø12~14	PDS121~140	55~80	0.25~0.40	50~70	0.20~0.35	20~35	0.10~0.25	15~30	0.10~0.25	50~80	0.25~0.45	60~90	0.25~0.50
	Ø14~20	PDS141~200	55~80	0.30~0.45	50~70	0.20~0.35	20~35	0.10~0.30	15~30	0.10~0.25	50~80	0.25~0.50	60~100	0.25~0.55

PDSI - OIL HOLE POWER DRILL

V : m/min, f : mm/rev

	MILD STEEL · ALLOY STEEL · CARBON STEEL		ALLOY STEEL FORGED STEEL		HIGH HARDENED STEEL		STAINLESS STEEL		DUCTILE CAST IRON		CAST IRON	
	≤ HRc 25		HRc 25 ~ HRc 35		HRc 35 ~ HRc 45							
Dia.	V	F	V	F	V	F	V	F	V	F	V	F
7~8	80~110	0.15~0.25	70~100	0.15~0.25	50~80	0.10~0.20	30~60	0.10~0.20	50~80	0.15~0.25	80~120	0.15~0.30
8~10	90~120	0.20~0.30	80~110	0.15~0.30	60~90	0.15~0.25	30~70	0.10~0.20	60~90	0.20~0.30	100~130	0.25~0.35
10~12	100~130	0.25~0.35	90~120	0.20~0.30	70~100	0.20~0.30	30~70	0.10~0.20	70~100	0.25~0.35	110~140	0.25~0.35
12~16	110~140	0.25~0.35	100~130	0.25~0.35	80~100	0.20~0.30	40~70	0.15~0.25	80~110	0.30~0.40	120~150	0.30~0.40
16~20	120~150	0.25~0.40	110~140	0.25~0.35	90~110	0.20~0.30	40~70	0.15~0.30	90~120	0.30~0.40	130~160	0.30~0.40

PF50, P50

MATERIAL	CARBON STEEL (C < 0.3%) ALLOY STEEL / SS400 SCM~710N/mm²		CARBON STEEL (C ≧ 0.3%) ALLOY STEEL / S50C SCM~1,060N/mm²		SUJ2 · SUS440		SKD61 34~43 HRC		43~48 HRC		SKD11 48~53 HRC		CAST IRON FC 250~350		DUCTILE FC 400~500	
V	80~125m/min		80~125m/min		63~80m/min		40~63m/min		32~45m/min		25~36m/min		80~125m/min		63ff90m/min	
DIAMETER (mm)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)
2	12,000	0.06~0.08	12,000	0.06~0.08	11,000	0.06~0.08	8,000	0.06~0.08	6,000	0.05~0.07	4,500	0.03~0.06	15,000	0.06~0.08	11,000	0.06~0.08
3	9,600	0.09~0.12	9,600	0.09~0.12	7,500	0.09~0.12	5,300	0.09~0.12	4,000	0.07~0.11	3,200	0.05~0.09	10,000	0.09~0.12	7,600	0.09~0.12
4	8,000	0.10~0.15	8,000	0.10~0.15	5,650	0.10~0.15	4,000	0.10~0.15	3,000	0.08~0.13	2,600	0.06~0.10	8,000	0.10~0.15	6,000	0.10~0.15
5	6,400	0.12~0.18	6,400	0.12~0.18	4,550	0.12~0.18	3,300	0.12~0.18	2,400	0.10~0.15	2,000	0.8~0.12	6,400	0.12~0.18	4,800	0.12~0.18
6	5,300	0.14~0.20	5,300	0.14~0.20	3,800	0.14~0.20	2,750	0.14~0.20	2,000	0.12~0.18	1,700	0.09~0.15	5,300	0.14~0.20	4,000	0.14~0.20
8	4,000	0.16~0.24	4,000	0.16~0.24	2,850	0.16~0.24	2,100	0.16~0.24	1,500	0.14~0.22	1,300	0.12~0.20	4,000	0.16~0.24	3,000	0.16~0.24
10	3,200	0.18~0.27	3,200	0.18~0.27	2,250	0.18~0.27	1,700	0.18~0.27	1,200	0.15~0.25	1,000	0.13~0.23	3,200	0.18~0.27	2,400	0.18~0.27
12	2,650	0.20~0.30	2,650	0.20~0.30	1,900	0.20~0.30	1,400	0.20~0.30	1,000	0.17~0.26	850	0.14~0.24	2,700	0.20~0.30	2,000	0.20~0.30
14	2,300	0.22~0.35	2,300	0.22~0.35	1,600	0.22~0.35	1,200	0.22~0.35	860	0.18~0.30	730	0.15~0.26	2,300	0.22~0.35	1,700	0.22~0.35
16	2,000	0.25~0.36	2,000	0.25~0.36	1,400	0.25~0.36	1,050	0.25~0.36	760	0.20~0.32	640	0.16~0.26	2,000	0.25~0.36	1,500	0.25~0.36
18	1,800	0.28~0.38	1,800	0.28~0.38	1,250	0.28~0.38	920	0.28~0.38	670	0.23~0.33	570	0.18~0.28	1,800	0.28~0.38	1,350	0.28~0.38
20	1,600	0.30~0.40	1,600	0.30~0.40	1,150	0.30~0.40	850	0.30~0.40	600	0.25~0.35	500	0.20~0.30	1,600	0.30~0.40	1,200	0.30~0.40

SF50, PI50

MATERIAL	CARBON STEEL (C < 0.3%) ALLOY STEEL / SS400 SCM~710N/mm²		CARBON STEEL (C ≧ 0.3%) ALLOY STEEL / S50C SCM~1,060N/mm²		SUJ2 · SUS440		SKD61 34~43 HRC		43~48 HRC		SKD11 48~53 HRC		CAST IRON FC 250~350		DUCTILE FC 400~500	
V	80~150m/min		80~150m/min		63~100m/min		40~70m/min		32~50m/min		25~40m/min		80~150m/min		63~100m/min	
DIAMETER (mm)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)
3	12,000	0.09~0.12	13,000	0.09~0.12	7,600	0.09~0.12	6,400	0.09~0.12	5,300	0.07~0.11	3,800	0.05~0.09	12,000	0.09~0.12	8,500	0.09~0.12
4	9,500	0.10~0.15	10,000	0.10~0.15	5,700	0.10~0.15	4,800	0.10~0.15	4,000	0.08~0.13	2,950	0.06~0.10	9,000	0.10~0.15	6,350	0.10~0.15
5	7,600	0.12~0.18	8,000	0.12~0.18	4,600	0.12~0.18	3,800	0.12~0.18	3,200	0.10~0.15	2,300	0.8~0.12	7,600	0.12~0.18	5,100	0.12~0.18
6	6,400	0.14~0.20	6,600	0.14~0.20	3,800	0.14~0.20	3,200	0.14~0.20	2,650	0.12~0.18	1,900	0.09~0.15	6,400	0.14~0.20	4,250	0.14~0.20
8	4,800	0.16~0.24	5,000	0.16~0.24	2,900	0.16~0.24	2,400	0.16~0.24	2,000	0.14~0.22	1,450	0.12~0.20	4,800	0.16~0.24	3,200	0.16~0.24
10	3,800	0.18~0.27	4,000	0.18~0.27	2,300	0.18~0.27	1,900	0.18~0.27	1,600	0.15~0.25	1,150	0.13~0.23	3,800	0.18~0.27	2,550	0.18~0.27
12	3,200	0.20~0.30	3,300	0.20~0.30	1,900	0.20~0.30	1,600	0.20~0.30	1,300	0.17~0.26	950	0.14~0.24	3,200	0.20~0.30	2,100	0.20~0.30
14	2,700	0.22~0.35	2,800	0.22~0.35	1,600	0.22~0.35	1,350	0.22~0.35	1,150	0.18~0.30	800	0.15~0.26	2,700	0.22~0.35	1,800	0.22~0.35
16	2,400	0.25~0.36	2,500	0.25~0.36	1,400	0.25~0.36	1,200	0.25~0.36	1,000	0.20~0.32	700	0.16~0.26	2,400	0.25~0.36	1,600	0.25~0.36
18	2,100	0.28~0.38	2,200	0.28~0.38	1,300	0.28~0.38	1,100	0.28~0.38	900	0.23~0.33	650	0.18~0.28	2,100	0.28~0.38	1,400	0.28~0.38
20	1,900	0.30~0.40	2,000	0.30~0.40	1,150	0.30~0.40	1,000	0.30~0.40	800	0.25~0.35	600	0.20~0.30	1,900	0.30~0.40	1,250	0.30~0.40

MEMO

UNION MATERIALS

CUTTING TOOLS

C

CHUCK

APPLICATION INDEX

PART. C
CHUCK

HYDRAULIC CHUCK

MILLING CHUCK

SHRINK FIT CHUCK

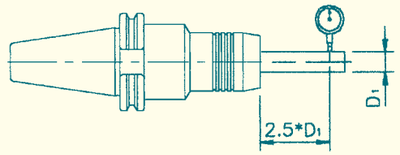
PRODUCTS INFORMATION

1. Apply Tools

Endmill, Drill, Reamer,
High accuracy tools, etc.

2. High roundness within 3μm.

Fine roundness assures longer tool life.



3. Over limit bore size, various size of collet can be applied.

4. Easy to clamp and unclamp with a T-wrench.

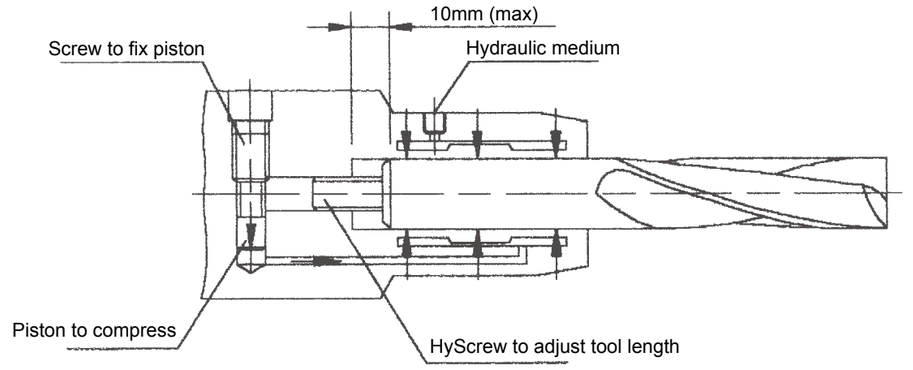
5. Good for high speed.

Even under high speed, it works very fast without vibration and makes sure of fine process and safety.

6. Coolant System.

Coolant can be supplied to the center through internal and external shank.
DIN69871 AD+B type.

BASIC PLAN OF HYDRAULIC EXPANSION CHUCK



Advantages of Hydraulic Expansion Chuck

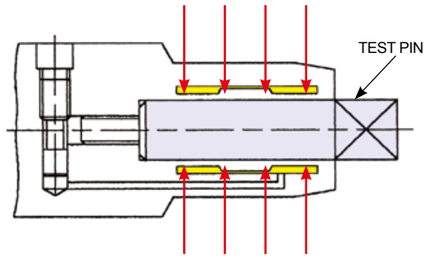
- High T.I.R. accuracy and repeatability of ≤3μm guarantee to have a precise interference between tool cutting edge and workpeice, rendering less tool wear.
- Balance (option)
  Good balance of Hydraulic Chuck enables fine working under high speed and safety.
- The advanced system of Hydraulic Chuck completely prevents penetration of oil, grease, coolant or chips.
- Excellent output is expected when clamping with straight cylindrical shanks.

Advantages of Collet

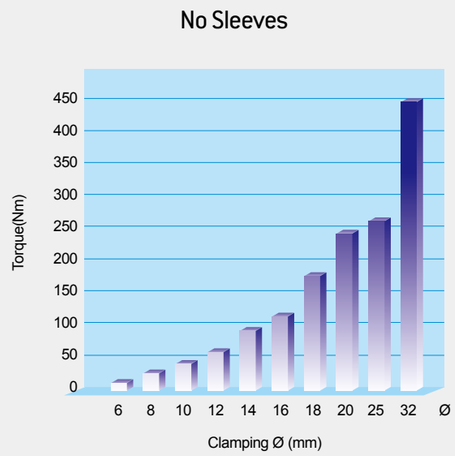
- Collets can save costs by clamping with variety of shank diameter.
- Shanks with recesses may also be clamped by using a collet.

PRODUCTS INFORMATION

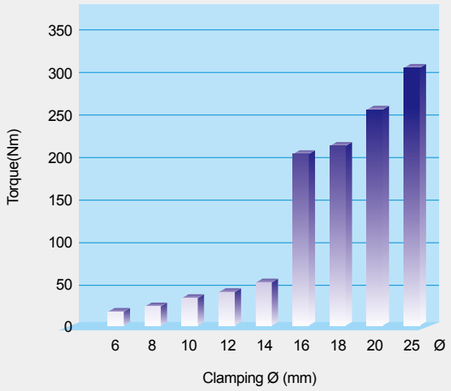
TORQUE (HYDRAULIC CHUCK)



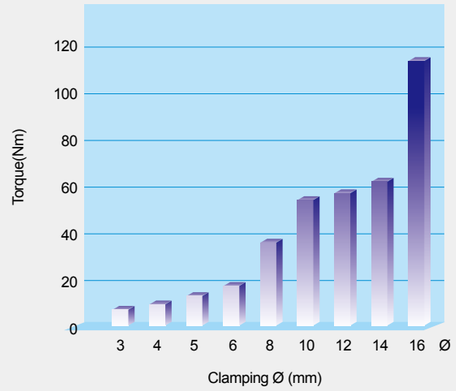
※Torque(Nm) when clamping with straight cylindrical shanks



※Torque(Nm) of Hydraulic Chuck with direct clamping of Ø 6-32mm.



※Torque(Nm) of Hydraulic Chuck clamping Ø 32mm with HK collet.

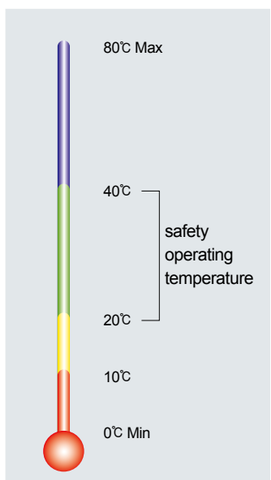


※Torque(Nm) of Hydraulic Chuck clamping Ø 20mm with HK collet.

R·P·M / BALANCE

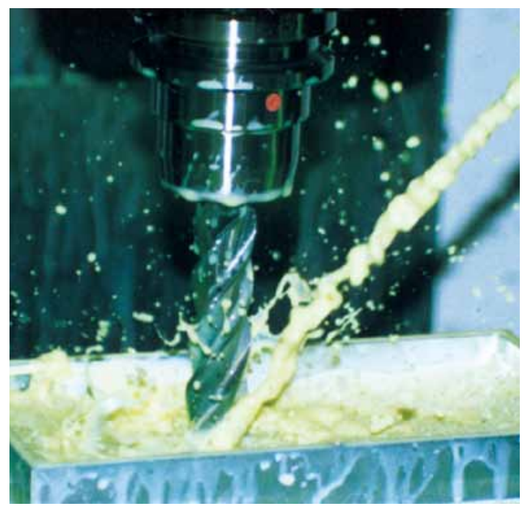
Special Balanced	25,000 rpm
Fine Balanced	10,000 rpm

TEMPERATURE



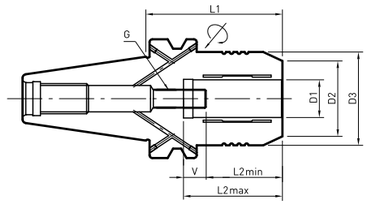
Operating Temperature

Generally, the normal operating temperature of Hydraulic Chuck is between 20℃ ~ 40℃. When operating temperature isn't the normal range, pls ask technical information.



HYDRAULIC EXPANSION CHUCK

MAS 403 - BT SHORT & HEAVY DESIGN



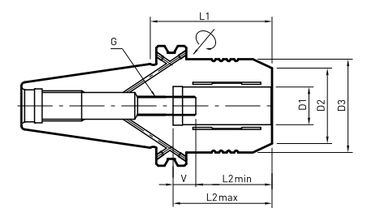
Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD/B	48~50

mm

CODE NO			D_1	D_2	D_3	L_1	$L_{2\,max}$	$L_{2\,min}$	V	G
23.30.111	BT30	SHC 20P-85	20	40	44	85	52.5	42.5	10	M8×1.0
24.40.211	BT40	SHC 20P-72.5			49.5	72.5				
27.50.311	BT50	SHC 32P-90	32	60	72	90	65	55		M16×1.0

Note BT50 : Balancing grade G2.5 / 15000rpm

DIN 69871 - SK SHORT & HEAVY DESIGN



Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD/B	48~50

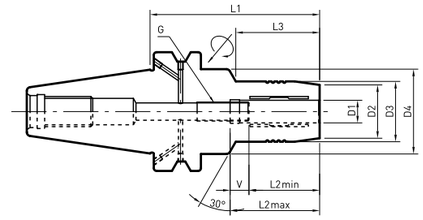
mm

CODE NO			D_1	D_2	D_3	L_1	$L_{2\,max}$	$L_{2\,min}$	V	G
26.40.411	SK40	SHC 20P-64.5	20	40	49.5	64.5	52.5	42.5	10	M8×1.0
27.50.511	SK50	SHC 32P-81	32	60	72	81	65	55		M16×1.0

Note SK50 : Balancing grade G2.5 / 15000rpm

HYDRAULIC EXPANSION CHUCK

MAS 403 - BT30



Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD/B	48~50

mm

CODE NO			D_1	D_2	D_3	D_4	L_1	$L_{2\,max}$	$L_{2\,min}$	V	L_3	G
23.30.211	BT30	SHC 6-70	6	25	28	45	70	37.5	27.5	10	28	M5×0.8 M6×1.0
23.30.212		SHC 8-70	8	27	30							
23.30.213		SHC 10-75	10	29	32		75	42.5	32.5		38	
23.30.214		SHC 12-75	12	31	34		85	47.5	37.5		34	
23.30.215		SHC 14-85	14	33	36						44	M8×1.0
23.30.216		SHC 16-90	16	35	38						46	
23.30.217		SHC 18-90	18	38	41		90	52.5	42.5			
23.30.218		SHC 20-90	20	40	43	-					-	

Note Reducing tool shank OD(chuck ID) through Reduction Sleeve

HYDRAULIC EXPANSION CHUCK

MAS 403 - BT40

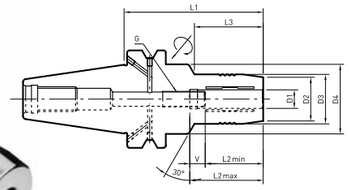


Fig1

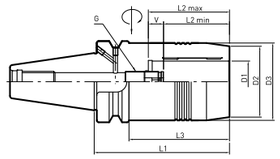


Fig2

Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD/B	48~50

mm

CODE NO			D_1	D_2	D_3	D_4	L_1	$L_{2\,max}$	$L_{2\,min}$	V	L_3	G	Type
24.40.225	BT40	SHC 6-65	6	25	28	50	65	37.5	27.5	10	23	M5×0.8	Fig1
24.40.212		SHC 6-90					90				44		
24.40.226		SHC 8-65	8	27	30		65				23	M6×1.0	
24.40.213		SHC 8-90					90				44		
24.40.227		SHC 10-65	10	29	32		65	42.5	32.5		23		
24.40.214		SHC 10-90					90				44		
24.40.228		SHC 12-65	12	31	34		65	47.5	37.5		23		
24.40.215		SHC 12-90					90				44		
24.40.233		SHC 14-65	14	33	36		65				23		
24.40.234		SHC 14-90					90				44		
24.40.229		SHC 16-65	16	35	38		65	52.5	42.5		23	M8×1.0	
24.40.216		SHC 16-90					90				48		
24.40.235		SHC 18-75	18	38	41		75				30		
24.40.236		SHC 18-90					90				48		
24.40.230		SHC 20-75	20	40	43		75				30		
24.40.217		SHC 20-90					90				48		
24.40.231		SHC 25-100	25	53	57	-	100	61	51		73	M16×1.0	Fig2
24.40.232		SHC 32-105	32	58	63		105	65	55		78		

Note Reducing tool shank OD(chuck ID) through Reduction Sleeve

HYDRAULIC EXPANSION CHUCK

MAS 403 - BT50

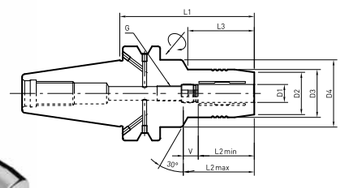


Fig1

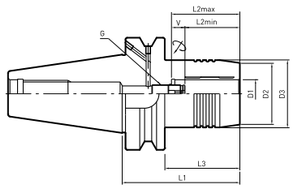


Fig2

Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD/B	48~50

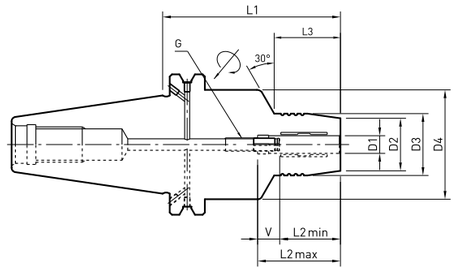
mm

CODE NO			D_1	D_2	D_3	D_4	L_1	$L_{2\,max}$	$L_{2\,min}$	V	L_3	G	Type
25.50.316	BT50	SHC 6-90	6	25	28	50	90	37.5	27.5	10	32	M5×0.8	Fig1
25.50.411		SHC 6-120					120				38		
20.50.317		SHC 8-90	8	27	30		90				32	M6×1.0	
25.50.412		SHC 8-120					120				40		
25.50.318		SHC 10-90	10	29	32		90	42.5	32.5		32		
25.50.413		SHC 10-120					120				42		
25.50.319		SHC 12-90	12	31	34		90	47.5	37.5		32		
25.50.414		SHC 12-120					120				44		
25.50.324		SHC 14-90	14	33	36		90				32		
25.50.415		SHC 14-120					120				44		
25.50.320		SHC 16-90	16	35	38		90	52.5	42.5		32	M8×1.0	
25.50.416		SHC 16-120					120				46		
25.50.325		SHC 18-90	18	38	41		90				32		
25.50.417		SHC 18-120					120				46		
25.50.321		SHC 20-90	20	40	43		90				32		
25.50.418		SHC 20-120					120				48		
25.50.322		SHC 25-105	25	53	57	-	105	61	51		67	M16×1.0	Fig2
25.50.323		SHC 32-115	32	-	63		115	65	55		77		

Note Reducing tool shank OD(chuck ID) through Reduction Sleeve

HYDRAULIC EXPANSION CHUCK

DIN 69871 - SK40



Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD/B	48~50

mm

CODE NO			D_1	D_2	D_3	D_4	L_1	$L_{2\,max}$	$L_{2\,min}$	V	L_3	G
26.40.426		SHC 6-65					65				23	
26.40.412		SHC 6-80.5	6	25	28		80.5				44	M5×0.8
26.40.420		SHC 6-110					110	37.5	27.5			
26.40.427		SHC 8-65					65				23	
26.40.413		SHC 8-80.5	8	27	30		80.5				44	
26.40.421		SHC 8-110					110					
26.40.248		SHC 10-65					65				23	M6×1.0
26.40.414		SHC 10-80.5	10	29	32		80.5	42.5	32.5		44	
26.40.422		SHC 10-110					110					
26.40.429		SHC 12-65					65				23	
26.40.415		SHC 12-80.5	12	31	34		80.5				44	
26.40.423		SHC 12-110					110					
26.40.431		SHC 14-65					65				23	
26.40.434	SK40	SHC 14-80.5	14	33	36	50	80.5	47.5	37.5	10	44	M8×1.0
26.40.436		SHC 14-110					110					
26.40.430		SHC 16-75					75				30	
26.40.416		SHC 16-80.5	16	35	38		80.5				48	
26.40.424		SHC 16-110					110					
26.40.432		SHC 18-75					75				30	
26.40.435		SHC 18-80.5	18	38	41		80.5	52.5	42.5		48	
26.40.437		SHC 18-110					135					
26.40.433		SHC 20-75					75				30	M10×1.0
26.40.417		SHC 20-80.5	20	40	43		80.5				48	
26.40.425		SHC 20-110					110					
26.40.418		SHC 25-80.5	25	53	57	66	80.5	61.0	51.0		26	M16×1.0
26.40.419		SHC 32-80.5	32	60	63	80		65.0	55.0			

Note Reducing tool shank OD(chuck ID) through Reduction Sleeve

HYDRAULIC EXPANSION CHUCK

DIN 69871 - SK50

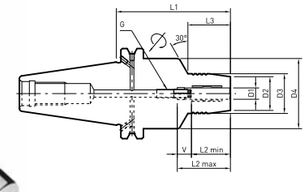


Fig1

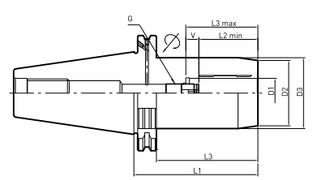


Fig2

Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD/B	48~50

mm

CODE NO			D_1	D_2	D_3	D_4	L_1	$L_{2\,max}$	$L_{2\,min}$	V	L_3	G	Type
27.50.514		SHC 6-90	6	25	28			37.5	27.5		44	M5×0.8	
27.50.515		SHC 8-90	8	27	30						44	M6×1.0	
27.50.516		SHC 10-90	10	29	32			42.5	32.5		44		
27.50.517		SHC 12-90	12	31	34						44		
27.50.520	SK50	SHC 14-90	14	33	36	50	90	47.5	37.5	10	44	M8×1.0	Fig1
27.50.518		SHC 16-90	16	35	38						48		
27.50.521		SHC 18-90	18	38	41			52.5	42.5		48		
27.50.519		SHC 20-90	20	40	43						48		
27.50.522		SHC 25-105	25	53	57	-	105	61.0	51.0		85.9	M16×1.0	Fig2
27.50.523		SHC 32-115	32	58	63		115	65.0	55.0		95.8		

Note Reducing tool shank OD(chuck ID) through Reduction Sleeve

HYDRAULIC EXPANSION CHUCK

DIN 69893 - HSK TYPE A

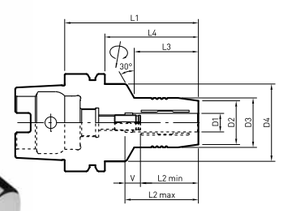


Fig1

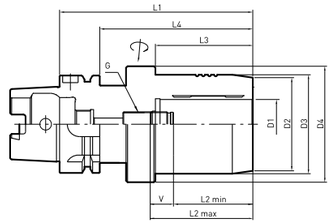


Fig2

Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD	48~50

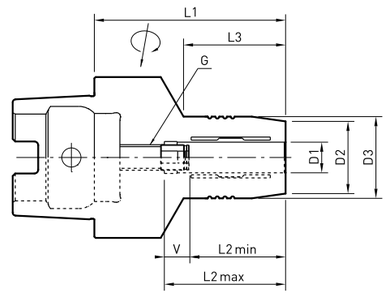
mm

CODE NO			D_1	D_2	D_3	D_4	L_1	$L_{2\,max}$	$L_{2\,min}$	V	L_3	L_4	G	Type
28.40.611	HSK40A	SHC 6-70	6	25	28	34	70	37.5	27.5	10	28	50	M5×0.8	Fig1
28.40.612		SHC 8-70	8	27	30									
28.40.613		SHC 10-75	10	29	32		75	42.5	32.5		34	55	M6×1.0	
28.40.614		SHC 12-85	12	31	34		85	47.5	37.5		40	60		
29.50.711	HSK50A	SHC 6-70	6	25	28	40	70	37.5	27.5		28	44	M5×0.8	
29.50.712		SHC 8-70	8	27	30									
29.50.713		SHC 10-80	10	29	32		80	42.5	32.5		34	49		
29.50.714		SHC 12-85	12	31	34		85	47.5	37.5		44	59	M8×1.0	
29.50.715		SHC 14-85	14	33	36									
29.50.716		SHC 16-90	16	35	38	60	90	52.5	42.5		30	64		Fig2
29.50.717		SHC 18-90	18	38	41	62								
29.50.718		SHC 20-90	20	40	43									
30.63.811	HSK63A	SHC 6-70	6	25	28	50	70	37.5	27.5		24	44	M5×0.8	Fig1
30.63.812		SHC 8-70	8	27	30								M6×1.0	
30.63.813		SHC 10-80	10	29	32		80	42.5	32.5		35	54	M8×1.0	
30.63.814		SHC 12-85	12	31	34		85	47.5	37.5		40	59		
30.63.815		SHC 14-85	14	33	36									
30.63.816		SHC 16-90	16	35	38		90	52.5	42.5		46	64		
30.63.817		SHC 18-90	18	38	41						47			
30.63.818		SHC 20-90	20	40	43						48			
30.63.819		SHC 25-120	25	53	57	63	120	61	51		59	94	M16×1.0	Fig2
30.63.820		SHC 32-125	32	58	63	75	125	65	55		63	99		
31.10.911	HSK100A	SHC 6-75	6	25	28	50	75	37.5	27.5		26	46	M5×0.8	Fig1
31.10.912		SHC 8-75	8	27	30								M6×1.0	
31.10.913		SHC 10-90	10	29	32		90	42.5	32.5		42	61	M8×1.0	
31.10.914		SHC 12-95	12	31	34		95	47.5	37.5		47	66		
31.10.915		SHC 14-95	14	33	36									
31.10.916		SHC 16-100	16	35	38		100	52.5	42.5		53	71		
31.10.917		SHC 18-100	18	38	41									
31.10.918		SHC 20-105	20	40	43		105				59	76		
31.10.919		SHC 25-110	25	53	57	63	110	61	51		62	81		
31.10.920		SHC 32-110	32	58	63	75		65	56					

Note Reducing tool shank OD(chuck ID) through Reduction Sleeve

HYDRAULIC EXPANSION CHUCK

DIN 69893 - HSK TYPE C



Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD	48~50

mm

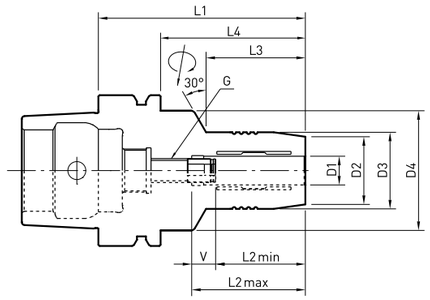
CODE NO			D_1	D_2	D_3	L_1	$L_{2\,max}$	$L_{2\,min}$	V	L_3	G
28.40.615	HSK40C	SHC 6-60	6	25	28	60	37.5	27.5	10	35	M5×0.8
28.40.616		SHC 8-60	8	27	30					36	M6×1.0
28.40.617		SHC 10-65	10	29	32	65	42.5	32.5		41	
28.40.618		SHC 12-70	12	31	34	70	47.5	37.5		47	M8×1.0
29.50.719	HSK50C	SHC 6-60	6	25	28	60	37.5	27.5		30	M5×0.8
29.50.720		SHC 8-60	8	27	30					30	M6×1.0
29.50.721		SHC 10-65	10	29	32	65	42.5	32.5		35	
29.50.722		SHC 12-75	12	31	34	75	47.5	37.5		44	
29.50.723		SHC 14-75	14	33	36					46	
29.50.724		SHC 16-80	16	35	38	80	52.5	42.5		51	M8×1.0
29.50.725		SHC 18-80	18	38	41					51	
29.50.726		SHC 20-80	20	40	43					52	

Note Reducing tool shank OD(chuck ID) through Reduction Sleeve

HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

HYDRAULIC EXPANSION CHUCK

DIN 69893 - HSK TYPE E



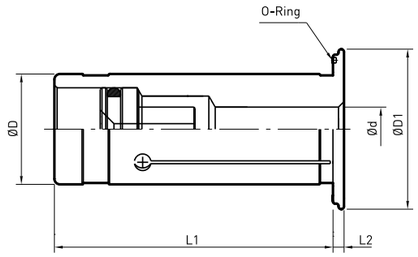
Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G2.5 20000	AD	48~50

mm

CODE NO			D_1	D_2	D_3	L_1	$L_{2\,max}$	$L_{2\,min}$	V	L_3	G
28.40.619	HSK40E	SHC 6-75	6	25	28	75	37.5	27.5	10	28	M5×0.8
28.40.620		SHC 8-70	8	27	30	70				28	M6×1.0
28.40.621		SHC 10-75	10	29	32	75	42.5	32.5		34	
28.40.622		SHC 12-85	12	31	34	85	47.5	37.5		-	
29.50.727	HSK50E	SHC 6-70	6	25	28	70	37.5	27.5		28	M5×0.8
29.50.728		SHC 8-70	8	27	30					34	M6×1.0
29.50.729		SHC 10-80	10	29	32	80	42.5	32.5		44	M8×1.0
29.50.730		SHC 12-85	12	31	34	85	47.5	37.5		44	
29.50.733		SHC 14-90	14	33	36	90				44	
29.50.731		SHC 16-90	16	35	38		52.5	42.5		30	
29.50.734		SHC 18-90	18	38	41					30	
29.50.732		SHC 20-90	20	40	43					30	

Note Reducing tool shank OD(chuck ID) through Reduction Sleeve

OD



100% Coolant Waterproof

- Using for center through coolant system
- Reducing Tool Shank OD(=Chuck ID)

T.I.R
≥5μm 2.5×D

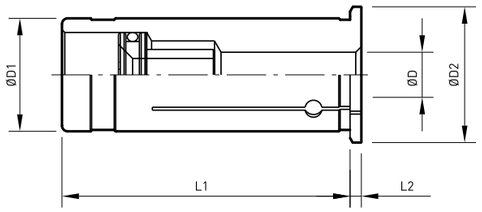
mm

CODE NO		d	D	D_1	L_1	L_2
OHK12	3	3	12	12	45	2
	4	4				
	5	5				
	6	6				
	8	8				
OHK20	3	3	20	29	50.5	2
	4	4				
	5	5				
	6	6				
	8	8				
	10	10				
	12	12				
	14	14				
	16	16				
OHK32	6	6	32	39	60.5	3
	8	8				
	10	10				
	12	12				
	14	14				
	16	16				
	18	18				
	20	20				
	25	25				

HYDRAULIC EXPANSION CHUCK

REDUCTION SLEEVE - STANDARD

D



Reducing Tool Shank OD(=Chuck ID)

T.I.R ≥5μm 2.5×D

mm

CODE NO			D	D_1	D_2	L_1	L_2
21.12.003	HK12	3	3	12	16	44.5	2
21.12.004		4	4				
21.12.005		5	5				
21.12.006		6	6				
21.12.008		8	8				
22.20.003	HK20	3	3	20	24	50.5	2
22.20.004		4	4				
22.20.005		5	5				
22.20.006		6	6				
22.20.008		8	8				
22.20.010		10	10				
22.20.012		12	12				
22.20.014		14	14				
22.20.016		16	16				
23.32.006	HK32	6	6	32	36	60.5	3
23.32.008		8	8				
23.32.010		10	10				
23.32.012		12	12				
23.32.014		14	14				
23.32.016		16	16				
23.32.018		18	18				
23.32.020		20	20				
23.32.025		25	25				

HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

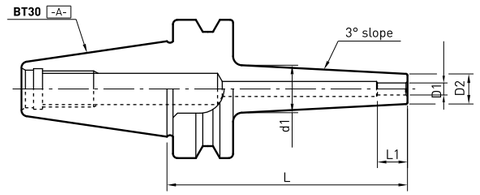
SHRINK FIT CHUCK

HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

SHRINK FIT CHUCK

SLIM DESIGN

MAS 403 - BT30



Taper	T.I.R	Bal./rpm	Coolant	HRc	For
AT3	≥3μm 2.5×D	G2.5 25000	AD/B	52~55	Solid Carbide

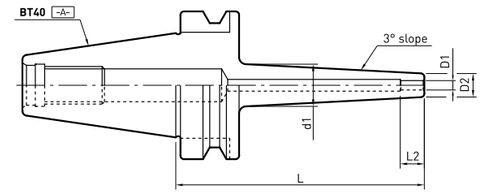
mm

CODE NO		Ød1	D1	D2	L1	L
BT30	SHR 3-80	14.8	3	9	9	80
	SHR 4-80	15.8	4	10	12	80
	SHR 5-80	16.8	5	11	15	80
	SHR 6-80	17.8	6	12	25	80
	SHR 8-80	19.8	8	14	25	80
	SHR 10-80	21.8	10	16	32	80
	SHR 12-80	23.8	12	18	38	80
	SHR 14-80	25.8	14	20	40	80
	SHR 16-90	27.8	16	22	40	90
	SHR 18-90	29.8	18	24	42	90
	SHR 20-90	31.8	20	26	44	90

h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

MAS 403 - BT40



Taper	T.I.R	Bal./rpm	Coolant	HRc	For
AT3	≥3μm 2.5×D	G2.5 25000	AD/B	52~55	Solid Carbide

mm

CODE NO		Ød1	D1	D2	L1	L
BT40	SHR 3-90	17	3	9	9	90
	SHR 4-90	18	4	10	12	90
	SHR 5-90	19	5	11	15	90
	SHR 6-90	20	6	12	25	90
	SHR 8-90	22	8	14	25	90
	SHR 10-90	24	10	16	32	90
	SHR 12-90	26	12	18	38	90
	SHR 14-90	28	14	20	4	90
	SHR 16-90	30	16	22	40	90
	SHR 18-95	32	18	24	42	95
	SHR 20-95	34	20	26	44	95
	SHR 25-100	39	25	31	50	100

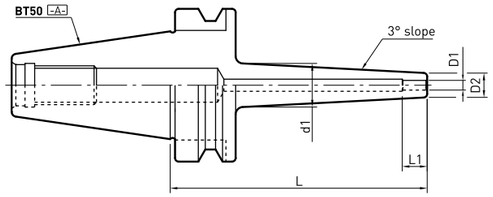
h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

SHRINK FIT CHUCK

SLIM DESIGN

MAS 403 - BT50



Taper	T.I.R	Bal./rpm	Coolant	HRc	For
AT3	≥3μm 2.5×D	G2.5 25000	AD/B	52~55	Solid Carbide

mm

CODE NO		Ød1	D1	D2	L1	L
BT50	SHR 6-100	20.4	6	12	25	100
	SHR 8-100	22.4	8	14		
	SHR 10-100	24.4	10	16	32	
	SHR 12-100	26.4	12	18	38	
	SHR 14-100	28.4	14	20	40	
	SHR 16-100	30.4	16	22		
	SHR 18-100	32.4	18	24	42	
	SHR 20-100	34.4	20	26	44	
	SHR 25-100	39.4	25	31	50	
	SHR 32-100	46.4	32	38		

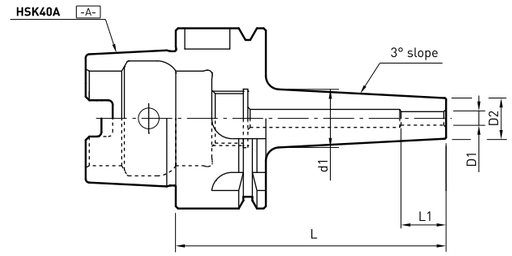
h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

SHRINK FIT CHUCK

SLIM DESIGN

DIN 69893 HSK40 - FORM A



Taper	T.I.R	Bal./rpm	Coolant	HRc	For
AT3	≥3μm 2.5×D	G2.5 25000	AD	52~55	Solid Carbide

mm

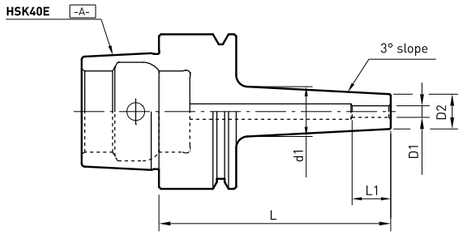
CODE NO		Ød1	D1	D2	L1	L
HSK40A	SHR 3-60	19	3	9	9	60
	SHR 3-120					120
	SHR 4-60	20	4	10	12	60
	SHR 4-120					120
	SHR 5-60	21	5	11	15	60
	SHR 5-120					120
	SHR 6-80	22	6	12	25	80
	SHR 6-120					120
	SHR 8-80	24	8	14		80
	SHR 8-120					120
	SHR 10-80	26	10	16	32	80
	SHR 10-120					120
	SHR 12-90	28	12	18	38	90
	SHR 12-120					120

h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

PART. C
CHUCK
HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

DIN 69893 HSK40 - FORM E



Taper	T.I.R	Bal./rpm	Coolant	HRc	For
AT3	≥3μm 2.5×D	G2.5 25000	AD	52~55	Solid Carbide

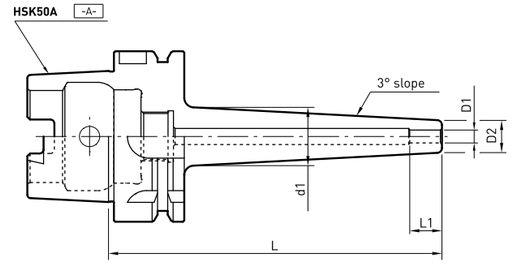
mm

CODE NO		Ød1	D1	D2	L1	L
HSK40E	SHR 3-60	19	3	9	9	120
	SHR 3-120					60
	SHR 4-60	20	4	10	12	120
	SHR 4-120					60
	SHR 5-60	21	5	11	15	120
	SHR 5-120					80
	SHR 6-80	22	6	12	25	120
	SHR 6-120					80
	SHR 8-80	24	8	14		120
	SHR 8-120					80
	SHR 10-80	26	10	16	32	120
	SHR 10-120					90
	SHR 12-90	28	12	18	38	120
	SHR 12-120					

h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

DIN 69893 HSK50 - FORM A



Taper	T.I.R	Bal./rpm	Coolant	HRc	For
AT3	≥3μm 2.5×D	G2.5 25000	AD	52~55	Solid Carbide

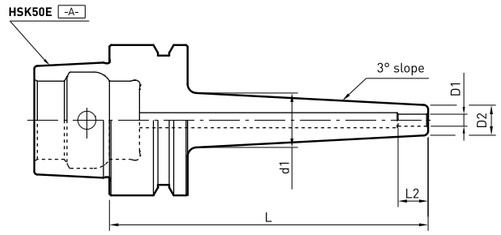
mm

CODE NO		Ød1	D1	D2	L1	L
HSK50A	SHR 4-60	18.6	4	9	12	60
	SHR 5-60	19.6	5	10	15	
	SHR 6-60		6	11	25	
	SHR 8-80	21.6	8	12		80
	SHR 8-120					120
	SHR 10-80	23.6	10	14	32	80
	SHR 10-120					120
	SHR 12-85	25.6	12	16	38	85
	SHR 12-120					120
	SHR 14-90	27.6	14	18		90
	SHR 14-120					120
	SHR 16-90	29.6	16	20	40	90
	SHR 16-120					120
	SHR 18-95	31.6	18	22	42	95
	SHR 18-120					120
	SHR 20-100		20		44	100
	SHR 20-120					120

h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

DIN 69893 HSK50 - FORM E



Taper	T.I.R	Bal./rpm	Coolant	HRc	For
AT3	≥3μm 2.5×D	G2.5 25000	AD	52~55	Solid Carbide

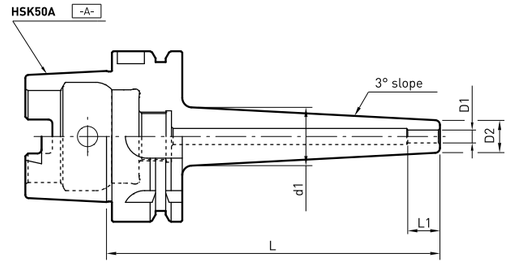
mm

CODE NO		Ød1	D1	D2	L1	L
HSK50E	SHR 4-60	18.6	4	9	12	60
	SHR 5-60	19.6	5	10	15	
	SHR 6-60		6	11	25	
	SHR 8-80	21.6	8	12		80
	SHR 8-120					120
	SHR 10-80	23.6	10	14		80
	SHR 10-120					120
	SHR 12-85	25.6	12	16	38	85
	SHR 12-120					120
	SHR 14-90	27.6	14	18		90
	SHR 14-120					120
	SHR 16-90	29.6	16	20	40	90
	SHR 16-120					120
	SHR 18-95	31.6	18	22	42	95
	SHR 18-120					120
	SHR 20-100		20		44	100
	SHR 20-120					120

h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

DIN 69893 HSK63 - FORM A



Taper	T.I.R	Bal./rpm	Coolant	HRc	For
AT3	≥3μm 2.5×D	G2.5 25000	AD	52~55	Solid Carbide

mm

CODE NO		Ød1	D1	D2	L1	L
HSK63A	SHR 3-80	17.1	3	9	9	80
	SHR 4-80	18.1	4	10	12	80
	SHR 5-80	19.1	5	11	15	80
	SHR 6-80	20.1	6	12	25	80
	SHR 6-120					120
	SHR 8-80	22.1	8	14		80
	SHR 8-120					120
	SHR 10-85	24.1	10	16	32	85
	SHR 10-120					120
	SHR 12-90	26.1	12	18	38	90
	SHR 12-120					120
	SHR 14-90	28.1	14	20		90
	SHR 14-120					120
	SHR 16-95	30.1	16	22	40	95
	SHR 16-120					120
	SHR 18-95	32.1	18	24	42	95
	SHR 18-120					120
	SHR 20-100	34.1	20	26	44	100
	SHR 20-120					120
	SHR 25-115	39.1	25	31	50	115
	SHR 25-130					130
	SHR 32-120	46.1	32	38		120
	SHR 32-130					130

h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

DIN 69893 HSK100 - FORM A

HSK100A Form.

- Heat resistant hot-working steel
- Hardened 54-2 HRC
- For HSS and solid carbide tools
- Shank tolerance h6

Certificate of Quality

- Chuck body fine balanced
- G2.5 25,000 RPM
- All functional surfaces machined
- More accurate than DIN

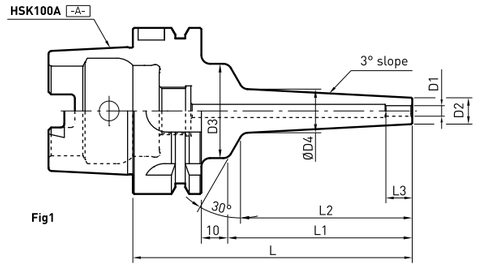


Fig1

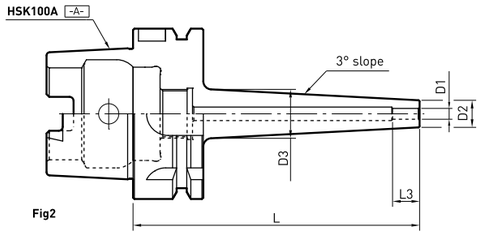


Fig2

Taper	T.I.R	Bal./rpm	Coolant	HRc	For
AT3	≥3μm 2.5×D	G2.5 25000	AD	52~55	Solid Carbide

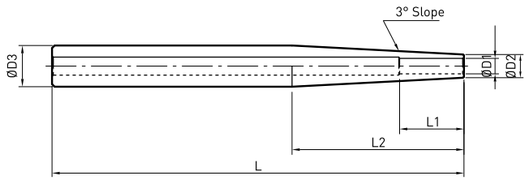
mm

CODE NO		D_1	D_2	D_3	L_1	$L_{2\,max}$	$L_{2\,min}$	V	L_3	G
HSK100A	SHR 6-85	6	12	50	24.8	91	83.84	25	80	Fig 1
	SHR 8-85	8	14						85	
	SHR 10-90	10	16					32	90	
	SHR 12-95	12	18					38	95	
	SHR 14-95	14	20							
	SHR 16-100	16	22					40	100	
	SHR 18-100	18	24	-	39.2	-	-	42	100	Fig 2
	SHR 20-105	20	26	-		-	-	44	105	
	SHR 25-115	25	31	-		-	-	50	115	
	SHR 32-120	32	38	-		-	-		120	

h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

EXTENSION SLEEVE



Taper	T.I.R	Coolant	HRc	For
AT3	≥3μm 2.5×D	AD	52~55	Solid Carbide

mm

CODE NO		D_1	D_2	D_3	L_1	L_2	L	Shank Tolerance
SR12	SHR 3-160	3	6	12	9	28.6	160	h4
	SHR 4-160	4	7		12			
	SHR 5-160	5	8		15			
	SHR 6-160	6	9		25			
SR16	SHR 3-160	3	6	16	9	66.8		h6
	SHR 4-160	4	7		12			
	SHR 5-160	5	8		15			
	SHR 6-160	6	9		25			
	SHR 8-160	8	11					
	SHR 10-160	10	13		32			
SR20	SHR 6-160	6	9	20	25	105		
	SHR 8-160	8	11					
	SHR 10-160	10	13		32			
	SHR 12-160	12	15		38			

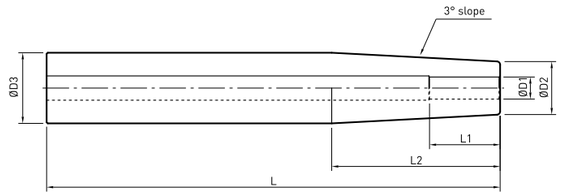
h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

SHRINK FIT EXTENSION CHUCK

SLIM DESIGN

EXTENSION SLEEVE



Taper	T.I.R	Coolant	HRc	For
AT3	≥3μm 2.5×D	AD	52~55	Solid Carbide

mm

CODE NO		D_1	D_2	D_3	L_1	L_2	L	Shank Tolerance
SR20	SHR 6-300	6	12	20	25	76.3	300	h6
	SHR 8-300	8	14					
SR16	SHR 8-300	8	14	25	25	124		
	SHR 10-300	10	16		32			
	SHR 12-300	12	18		38			
	SHR 14-300	14	20					
	SHR 16-300	16	22		40			
SR20	SHR 10-300	10	16	32	32	190.8		
	SHR 12-300	12	18		38			
	SHR 14-300	14	20					
	SHR 16-300	16	22		40			
	SHR 20-300	20	26		42			

h6 Tolerance Data of Tool Shank OD

TOOL SHANK OD (Ø)	3.0~6.0	6.1~10.0	10.1~14.0	14.1~18.0	18.1~24.0	24.1~30.0	30.1~40.0
h6 Tolerance	0~8μm	0~9μm	0~11μm	0~11μm	0~13μm	0~13μm	0~16μm

SINGLE MILLING CHUCK

Durability

- Milling chuck will guarantee long life through retainer that contains 300pcs of needle bearing with minimized friction on its rolling side.
- The retainer made of special steel is semi-permanent.

Slot

- 6 slot eliminate oil and dregs, and improve chucking ability by preventing slips.

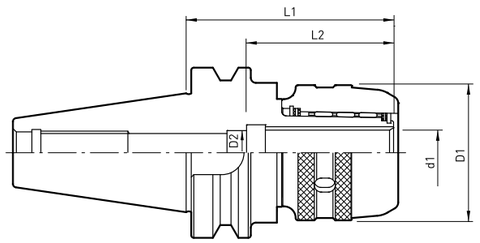
Needle Roller Bearing

- The Needle roller bearing high precision & high strength works softly without friction, noise, and hard load.

T.I.R Accuracy

- Below 0.01mm at 2.5D

MAS 403 - BT



COOLANT

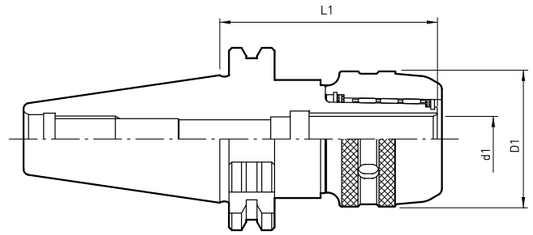
• It is possible to use center through coolant.
Apply the ONK collet.

Taper	T.I.R	Coolant	HRc
AT3	≥10μm 2.5×D	AD	58~60

mm

CODE NO		d_1	D_2	D_1	L_1	L_2	COLLET
BT30	C20-75	20	19	59	75	65	K20
	C20-90				90		
BT40	C20-80				80		
	C20-90				90		
	C20-135				135		
	C25-90	25	25	62	90	70	K25
	C25-135				135		
	C32-90	32	25	75	90	75	K32
	C32-105				105		
	C32-135				135		
BT50	C20-105	20	19	59	105	65	K20
	C20-150				150		
	C25-105	25	25	62	105	70	K25
	C25-135				135		
	C32-110	32	25	75	110	75	K32
	C32-135				135		
	C32-165				165		
	C42-110	42	25	94	110	85	K42
	C42-135				135		
	C42-165				165		

DIN 69871 - SK



Taper	T.I.R	Coolant	HRc
AT3	≥10μm 2.5×D	AD	58~60

mm

CODE NO		d_1	D_1	L_1	COLLET
SK40	C20-105	20	59	105	K20
	C25-105	25	62		K25
	C32-105	32	75		K32
	C32-135			135	
SK50	C20-105	20	59	105	K20
	C25-105	25	62		K25
	C32-105	32	75		K32
	C32-135			135	
	C32-165			165	
	C42-115	42	94	115	K42
	C42-135			135	
	C42-165			165	

SINGLE MILLING CHUCK

DIN 69893 - HSK

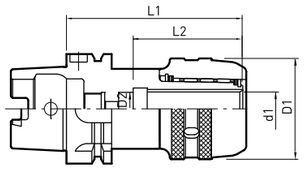


Fig.1

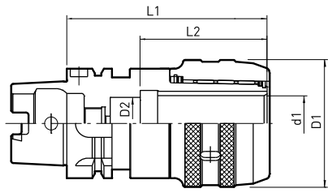


Fig.2

COOLANT
• It is possible to use center through coolant. Apply the ONK collet.

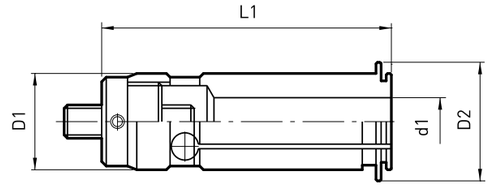
Taper	T.I.R	Coolant	HRc
AT3	≥10μm 2.5×D	AD	58~60

mm

CODE NO		FIG	d_1	D_2	D_1	L_1	L_2
HSK50A	C20-100	1	20	19	59	100	65
HSK63A	C20-105					105	
	C32-130	2	32	25	75	130	75
HSK100A	C20-110	1	20	19	59	110	65
	C32-135		32	25	75	135	75
	C42-135		42		94	135	85

MILLING CHUCK COLLET

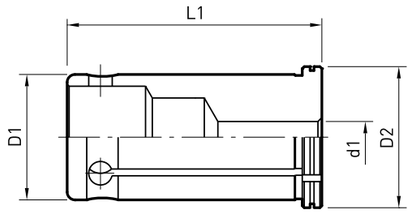
NK (LENGTH ADJUSTABLE)



mm

CODE NO (d_1)		D_1	D_2	L_1
NK20	6, 8, 10, 12, 16	20	24	66
NK32	6, 8, 10, 12, 16, 20, 25	32	37	80
NK42	6, 8, 10, 12, 16, 20, 25, 32	42	48	87

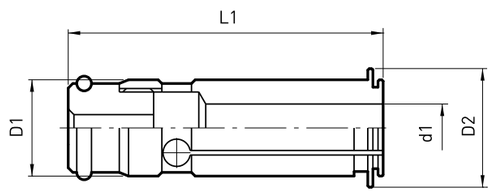
K (STRAIGHT COLLET)



mm

CODE NO (d_1)		D_1	D_2	L_1
K20	6, 8, 10, 12, 16	20	24	50
K32	6, 8, 10, 12, 16, 20, 25	32	36	65
K42	6, 8, 10, 12, 16, 20, 25, 32	42	48	75

ONK (FOR CENTER THROUGH COOLANT)



mm

CODE NO (d_1)		D_1	D_2	L_1
ONK20	6, 8, 10, 12, 16	20	24	77
ONK32	6, 8, 10, 12, 16, 20, 25	32	37	90
ONK42	6, 8, 10, 12, 16, 20, 25, 32	42	48	97

ER COLLET CHUCK

MAS 403 - BT30

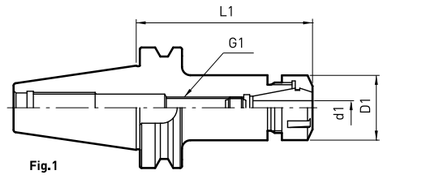


Fig.1

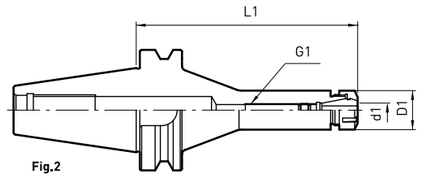


Fig.2

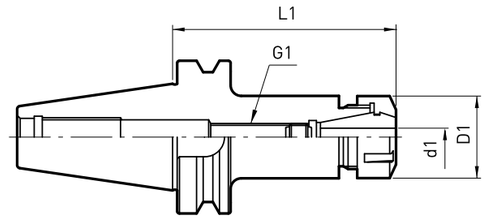
Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

mm

CODE NO		FIG	d_1	D_1	L_1	G_1	WEIGHT(kg)	NUT	SPANNER
BT30	ER11-60	1	0.5~7	19	60	M8×1.0	0.5	ERN11	ERS11
	ER11-90				90		0.6		
	ER16-60		1.0~1.0	28	60	M11×1.0	0.5	ERN16	ERS16
	ER16-90				90		0.6		
	ER20-60		1.0~13	34	60	M14×1.0	0.6	ERN20	ERS20
	ER20-90				90		0.7		
	ER25-75		1.0~16	42	75	M18×1.5	1.0	ERN25	ERS25
	ER25-105				105		1.1		
	ER32-75		2.0~20	50	75	M8×1.25	1.1	ERN32	ERS32
	ER32-105				105	M24×1.5	1.2		

ER COLLET CHUCK

MAS 403 - BT40



Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

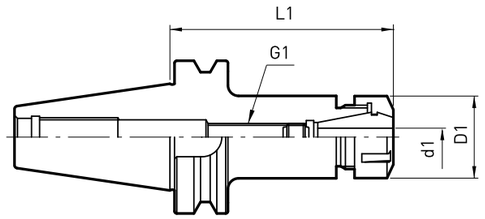
mm

CODE NO		d_1	D_1	L_1	G_1	WEIGHT(kg)	NUT	SPANNER
BT40	ER11-60	0.5~7	19	60	M8×1.0	1.0	ERN11	ERS11
	ER16-60	1.0~10	28	60	M11×1.0	1.1	ERN16	ERS16
	ER16-90			90		1.3		
	ER20-80	1.0~13	34	80	M14×1.0	1.2	ERN20	ERS20
	ER20-105			105		1.4		
	ER25-80	1.0~16	42	80	M18×1.5	1.3	ERN25	ERS25
	ER25-105			105		1.5		
	ER32-80	2.0~20	50	80	M24×1.5	1.4	ERN32	ERS32
	ER32-105			105		1.7		
	ER40-80	3.0~26	63	80	M12×1.75	1.6	ERN40	ERS40
	ER40-105			105	M28×1.5	2.2		
	ER50-105	5.0~34	78	105	M36×2.0	2.7	ERN50	ERS50

PART. C
CHUCK
HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

ER COLLET CHUCK

MAS 403 - BT50



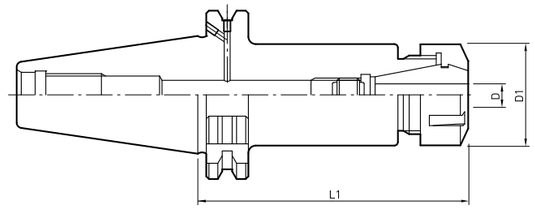
Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

mm

CODE NO		d_1	D_1	L_1	G_1	WEIGHT(kg)	NUT	SPANNER
BT50	**ER16-90**	1.0~10	28	90	M11×1.0	3.9	ERN16	ERS16
	ER16-120			120		4.1		
	ER20-90	1.0~13	34	90	M14×1.0	4.0	ERN20	ERS20
	ER20-120			120		4.2		
	ER25-105	1.0~16	42	105	M18×1.5	4.0	ERN25	ERS25
	ER25-135			135		4.3		
	ER32-105	2.0~20	50	105	M24×1.5	4.1	ERN32	ERS32
	ER32-135			135		4.4		
	ER40-105	3.0~26	63	105	M28×1.5	4.3	ERN40	ERS40
	ER40-135			135		4.7		
	ER50-105	5.0~34	78	105	M36×2.0	4.8	ERN50	ERS50
	ER50-135			135		5.5		

SINGLE MILLING CHUCK

DIN 69871 - SK



Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

mm

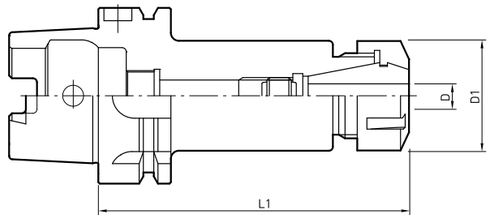
CODE NO		FIG	d_1	D_1	L_1	NUT	SPANNER
SK40	**ER16-70**	1.0~10	28	70	ER16	ERN16	ERS16
	ER16-100			100			
	ER20-70	1.0~13	34	70	ER20	ERN20	ERS20
	ER20-100			100			
	ER25-70	1.0~16	42	70	ER25	ERN25	ERS25
	ER25-100			100			
	ER32-70	1.5~20	50	70	ER32	ERN32	ERS32
	ER32-100			100			
SK50	**ER16-70**	1.0~10	28	70	ER16	ERN16	ERS16
	ER16-100			100			
	ER20-70	1.0~13	34	70	ER20	ERN20	ERS20
	ER20-100			100			
	ER25-70	1.0~16	42	70	ER25	ERN25	ERS25
	ER25-100			100			
	ER32-70	1.5~20	50	70	ER32	ERN32	ERS32
	ER32-100			100			
	ER40-70	2.5~26	63	70	ER40	ERN40	ERS40
	ER40-100			100			

Note SK30 shank ER collet chuck are avaialble depend on buyer request

PART. C CHUCK
HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

ER COLLET CHUCK

DIN 69893 - HSK



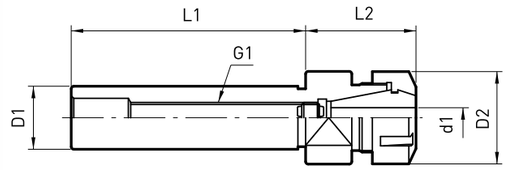
Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

mm

CODE NO		CHUCKING(D)	D_1	L_1	COLLET	NUT	SPANNER
HSK50A	ER11-60	0.5~7	19	60	ER11	ERN11	ERS11
	ER16-60	0.5~10	28	60	ER16	ERN16	ERS16
	ER16-100	0.5~10	28	100	ER16	ERN16	ERS16
	ER20-70	1.0~13	34	70	ER20	ERN20	ERS20
	ER20-100	1.0~13	34	100	ER20	ERN20	ERS20
	ER25-70	1.0~16	42	70	ER25	ERN25	ERS25
	ER25-100	1.0~16	42	100	ER25	ERN25	ERS25
	ER32-80	1.5~20	50	80	ER32	ERN32	ERS32
	ER32-100	1.5~20	50	100	ER32	ERN32	ERS32
HSK63A	ER11-75	0.5~7	19	75	ER11	ERN11	ERS11
	ER11-100	0.5~7	19	100	ER11	ERN11	ERS11
	ER16-75	0.5~10	28	75	ER16	ERN16	ERS16
	ER16-100	0.5~10	28	100	ER16	ERN16	ERS16
	ER20-75	1.0~13	34	75	ER20	ERN20	ERS20
	ER20-100	1.0~13	34	100	ER20	ERN20	ERS20
	ER25-75	1.0~16	42	75	ER25	ERN25	ERS25
	ER25-100	1.0~16	42	100	ER25	ERN25	ERS25
	ER32-75	1.5~20	50	75	ER32	ERN32	ERS32
	ER32-100	1.5~20	50	100	ER32	ERN32	ERS32
	ER40-75	1.5~20	63	75	ER40	ERN40	ERS40
	ER40-120	1.5~20	63	120	ER40	ERN40	ERS40
HSK100A	ER16-100	0.5~10	28	100	ER16	ERN16	ERS16
	ER20-100	1.0~13	34	100	ER20	ERN20	ERS20
	ER25-100	1.0~16	42	100	ER25	ERN25	ERS25
	ER32-100	1.5~20	50	100	ER32	ERN32	ERS32
	ER40-120	1.5~20	63	120	ER40	ERN40	ERS40

STRAIGHT SHANK ER COLLET CHUCK

STRAIGHT SHANK ER COLLET CHUCK (STANDARD DESIGN)



Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

mm

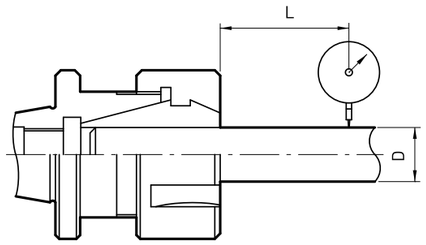
CODE NO		d_1	D_1	D_2	L_1	L_2	G_2	SPANNER
K16	ER11-75	0.5~7	16	19	40	35	M8×1.0	ERS11
	ER11-110				70	40		
	ER11-100				60			
	ER11-130				90			
K20	ER16-105	1.0~10	20	28	60	40	M11×1.0	ERS16
	ER16-135				90	45		
	ER20-120	1.0~13		34	70		M14×1.0	ERS20
	ER20-150				100	50		
K25	ER16-130	1.0~10	25	28	80		M11×1.0	ERS16
	ER16-160				110			
	ER20-130	1.0~13		34	80		M14×1.0	ERS20
	ER20-160				110			
	ER25-135	1.0~16		42	80	55	M18×1.5	ERS25
K32	ER20-130	1.0~13	32	34	80	50	M14×1.0	ERS20
	ER20-160				110			
	ER25-135	1.0~16		42	80	55	M18×1.5	ERS25
	ER25-165				110			
K42	ER32-170	2.0~20	42	50	110	60	M24×1.5	ERS32
	ER32-210				150			
	ER50-185	5.0~34		78	100	85	M16×2.0	ERS50
	ER50-225				140			

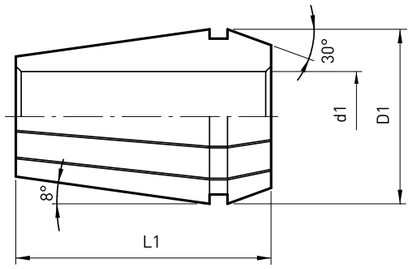
K - ER / M

CODE NO		d_1	D_1	D_2	L_1	L_2	G_2	SPANNER
K16	ER11M-140	0.5~7	16	16	140	30	M8×1.0	ERS11M
K20	ER16M-140	1.0~10	20	22	140	40	M11×1.0	ERS16M

ER COLLET CHUCK

ER COLLET





L	D	RUNOUT(T.I.R)
6	1.0~1.4	0.015
10	1.5~2.9	0.015
16	3.0~5.9	0.015
25	6.0~9.9	0.015
40	10.0~17.9	0.02
50	18.0~26.9	0.02
60	27.0~34.0	0.02

mm

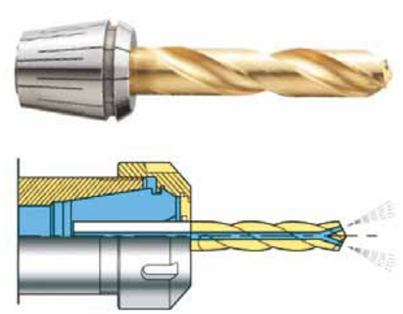
CODE NO (d_1)	d_1	D_1	L_1	CHUCK	NUT
ER11	0.5~7	11.5	18.0	ER11	ERN11
ER16	1.0~10	17.0	27.5	ER16	ERN16
ER20	1.0~13	21.0	31.5	ER20	ERN20
ER25	1.0~16	26.0	34.0	ER25	ERN25
ER32	2.0~20	33.0	40.0	ER32	ERN32
ER40	3.0~26	41.0	46.0	ER40	ERN40
ER50	5.0~34	52.0	60.0	ER50	ERN50

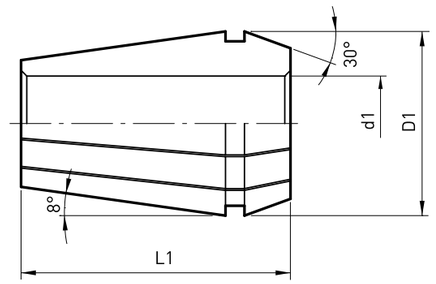
ER COLLET CODE NO (d_1)		NUT
ER11	1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0	13PCS
ER16	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	10PCS
ER20	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	12PCS
ER25	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	15PCS
ER32	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20	18PCS
ER40	4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26	23PCS
ER50	6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34	17PCS

HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

SINGLE MILLING CHUCK

ERC (FOR CENTER THROUGH COOLANT)





mm

CODE NO (d_1)	d_1	D_1	L_1	CHUCK	NUT
ERC16	1.0~10	17.0	27.5	ER16	ERN16
ERC20	1.0~13	21.0	31.5	ER20	ERN20
ERC25	1.0~16	26.0	34.0	ER25	ERN25
ERC32	2.0~20	33.0	40.0	ER32	ERN32
ERC40	3.0~26	41.0	46.0	ER40	ERN40

ER COLLET CODE NO (d_1)		NUT
ERC16	4, 5, 6, 7, 8, 9, 10	7PCS
ERC20	6, 7, 8, 9, 10, 11, 12, 13	8PCS
ERC25	6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	11PCS
ERC32	8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20	13PCS
ERC40	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26	17PCS

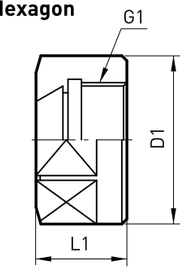
Note Collet set to be supplied with wooden tray

HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

ER NUT / ER SPANNER

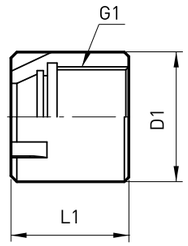
ERN

Hexagon



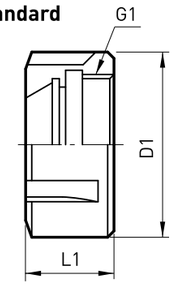
A Type

Mini



M Type

Standard

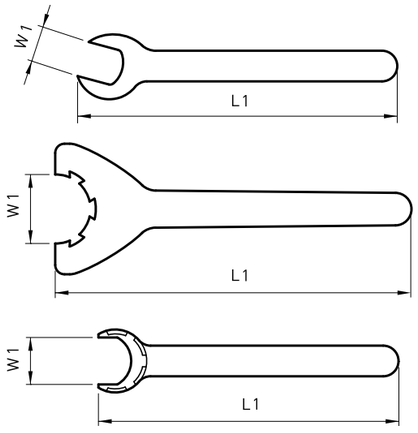


UM/RD Type

mm

CODE NO (d1)	D1	L1	G1	COLLET	CHUCK
ERN11-A	19	11.3	M28 1.5	ER11	ER11
ERN16-A	28	17.5	M22 1.5	ER16	ER16
ERN20-A	34	19.0	M25 1.5	ER20	ER20
ERN11-M	16	12.0	M13 0.75	ER11	ER11
ERN16-M	22	18.0	M19 1.0	ER16	ER16
ERN20-M	28	19.0	M24 1.0	ER20	ER20
ERN25-M	35	20.0	M30 1.0	ER25	ER25
ERN25-UM/RD	42	20.0	M32 1.5	ER25	ER25
ERN32-UM/RD	50	22.5	M40 1.5	ER32	ER32
ERN40-UM/RD	63	22.5	M50 1.5	ER40	ER40
ERN50-UM/RD	78	35.5	M64 2.0	ER50	ER50

ERN

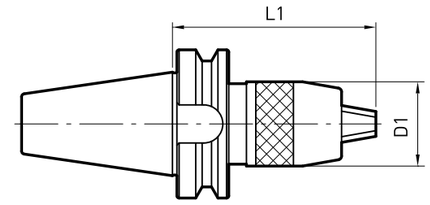


mm

CODE NO (d1)	W1	L1
ERS11-A	17.0	155
ERS16-A	25.0	210
ERS20-A	30.0	250
ERS25-UM.KM/RD	37.0	206
ERS32-UM.KM/RD	46.5	253
ERS40-UM.KM/RD	58.0	289
ERS50-UM.KM/RD	74.0	351
ERS11-M	11.5	95
ERS16-M	15.0	117
ERS20-M	19.5	129
ERS25-M	25.0	142

NC DRILL CHUCK

MAS 403 - BT

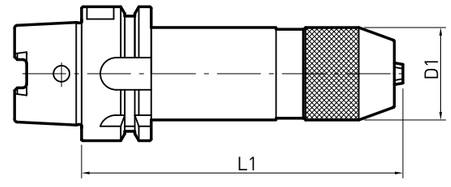


Taper AT3 | T.I.R ≥30μm 2.5×D | HRc 58~60

mm

CODE NO		CHUCKING	D1	L1 MIN	L1 MAX
BT30	**NPU8-70**	1.0~8	38	72	78
	NPU13-105	1.0~13	50.5	97	108
BT40	**NPU8-70**	1.0~8	38	72	78
	NPU8-110			111	117
	NPU13-100	1.0~13	50.5	100	111
	NPU13-130			132	143
BT50	**NPU8-85**	1.0~8	38	83	89
	NPU8-110			111	117
	NPU13-100	1.0~13	50.5	100	111
	NPU13-130			132	143

DIN 69893 - HSK



Taper AT3 | T.I.R ≥30μm 2.5×D | HRc 58~60

mm

CODE NO		CHUCKING	D1	L1 MIN	L1 MAX
HSK50A	**NPU8-140**	1.0~8	34.5	141	147
HSK63A	**NPU8-140**	1.0~8	34.5		
	NPU13-140	1.0~13	46.0	142	153
HSK100A	**NPU8-150**	1.0~8	34.5	151	157
	NPU13-170	1.0~13	46.0	172	183

END MILL HOLDER

MAS 403 - BT

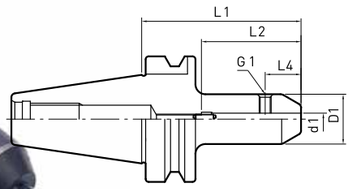


Fig1

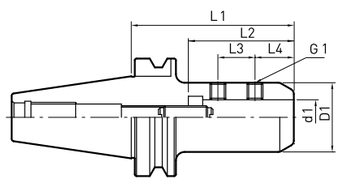


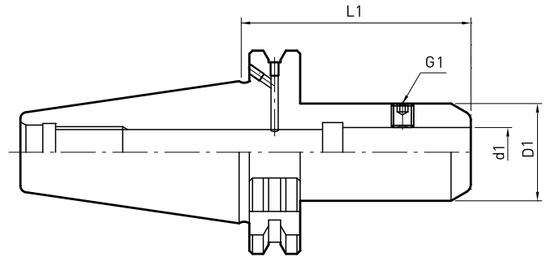
Fig2

Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

mm

CODE NO		d_1	D_1	L_1	L_2	L_3	L_4	G_1	FIG
BT30	**EMH6-60**	6	25	60	50	-	18	M6×0.75	1
	EMH8-60	8	28					M8×1.0	
	EMH10-60	10	35	60	54		20	M10×1.25	
	EMH12-60	12	37	60	59		22.5		
	EMH16-75	16	40	75	62	20	24		2
	EMH20-75	20	43	75	64				
	EMH25-75	25	48	75	69	20	20		
BT40	**EMH6-80**	6	25	80	50	-	18	M6×0.75	1
	EMH8-80	8	28					M8×1.0	
	EMH10-80	10	35		54		20	M10×1.25	
	EMH12-80	12	42		59		22.5	M12×1.5	
	EMH16-80	16	48		62	20	24		2
	EMH20-90	20	52	90	69			M16×1.5	
	EMH25-90	25	55		74	25			
	EMH32-105	32	60	105	78	28			
BT50	**EMH6-90**	6	25	90	50	-	18	M6×0.75	1
	EMH8-90	8	28					M8×1.0	
	EMH10-90	10	35	90	54		20	M10×1.25	
	EMH12-90	12	42		59		22.5	M12×1.5	
	EMH16-105	16	48	105	62	20	24		2
	EMH20-105	20	52		69			M16×1.5	
	EMH25-105	25	62		74	25			
	EMH32-105	32	75		78	28			
	EMH40-120	40	80	120	88	32	30	M20×1.5	
	EMH42-120	42							
	EMH50-120	50	100		98	35	35		

DIN 69871 - SK40



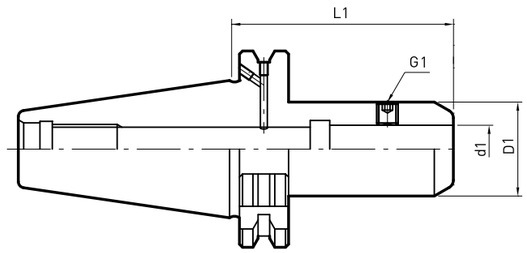
Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

mm

CODE NO		d_1	D_1	L_1	G_1
SK40	**EMH6-50**	6	25	50	M6
	EMH6-100			100	
	EMH8-50	8	28	50	M8
	EMH8-100			100	
	EMH10-50	10	35	50	M10
	EMH10-100			100	
	EMH12-50	12	42	50	M12
	EMH12-100			100	
	EMH14-50	14	44	50	M12
	EMH14-100			100	
	EMH16-63	16	48	63	M14
	EMH16-100			100	
	EMH18-63	18		63	
	EMH18-100			100	
	EMH20-63	20	52	63	M16
	EMH20-100			100	
	EMH25-100	25	55	100	M18
	EMH32-100	32	60	100	M20

END MILL HOLDER

DIN 69871 - SK50

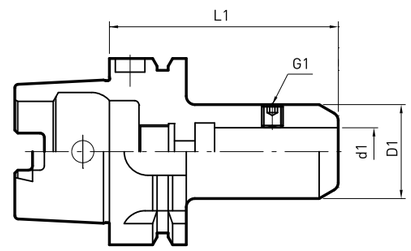


Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

mm

CODE NO		d_1	D_1	L_1	G_1
SK50	EMH6-63	6	25	63	M6
	EMH6-100			100	
	EMH8-63	8	28	63	M8
	EMH8-100			100	
	EMH10-63	10	35	63	M10
	EMH10-100			100	
	EMH12-63	12	42	63	M12
	EMH12-100			100	
	EMH14-63	14	44	63	
	EMH14-100			100	
	EMH16-63	16	48	63	M14
	EMH16-100			100	
	EMH18-63	18		63	
	EMH18-100			100	
	EMH20-63	20	52	63	M16
	EMH20-100			100	
	EMH25-80	25	62	80	
	EMH25-100			100	
	EMH32-100	32	75	100	M20
	EMH40-100	40	80		

DIN 69893 - HSK



Taper	T.I.R	Bal./rpm	Coolant	HRc
AT3	≥5μm 2.5×D	G6.3 12000	AD	58~60

mm

CODE NO		d_1	D_1	L_1	G_1
HSK50A	EMH6-65	6	25	65	M6
	EMH8-65	8	28	65	M8
	EMH10-65	10	35	65	M10
	EMH12-80	12	42	80	M12
	EMH16-80	16	48	80	M14
	EMH20-80	20	52	80	M16
HSK63A	EMH6-65	6	25	65	M6
	EMH8-65	8	28	65	M8
	EMH10-65	10	35	65	M10
	EMH12-80	12	42	80	M12
	EMH14-80	14	44	80	M12
	EMH16-80	16	48	80	M14
	EMH18-80	18	50	80	M14
	EMH20-80	20	52	80	M16
	EMH25-110	25	62	110	M16
	EMH32-110	32	75	110	M20
HSK100A	EMH6-80	6	25	80	M6
	EMH8-80	8	28	80	M8
	EMH10-80	10	35	80	M10
	EMH12-80	12	42	80	M12
	EMH14-80	14	44	80	M12
	EMH16-100	16	48	100	M14
	EMH18-100	18	50	100	M14
	EMH20-100	20	52	100	M16
	EMH25-100	25	62	100	M18
	EMH32-100	32	75	100	M20

FACE MILL ARBOR - FMA

FMA

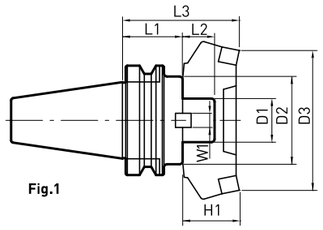


Fig.1

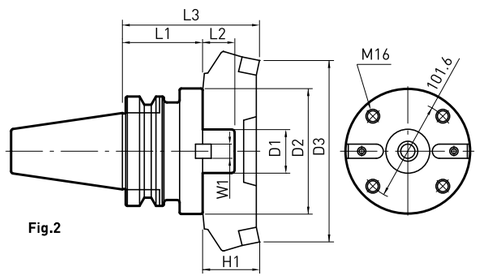


Fig.2

Taper: AT3 | HRc: 58~60

mm

CODE NO			FIG	L_2	D_2	W_1	D_4	L_4	WEIGHT (kg)	After assembling cutter		
TAPER	D_1	L_1								L_3	D_3	H_1
BT30	**FMA25.4**	**45**	1	22	50	9.5	33	10	1.3	95	80	50
BT40									1.5			
	FMA31.75	**45**		30	60	12.7	40		1.7	105	100	60
	FMA38.1	**60**		34	80	15.9	50	14	2.9	120	125	
BT50	**FMA25.4**	**45**		22	50	9.5	33	10	3.7	95	80	50
		90							4.6	140		
	FMA31.75	**45**		30	60	12.7	40		4.5	105	100	60
		75							5.3	135		
	FMA38.1	**45**		34	80	15.9	50	14	4.3	105	125	
		75							5.6	135		
	FMA50.8	**45**		36	98	19	65		4.9	105	160	
		75							6.8	135		
	FMA47.625		2	38	128.57	25.4	-	-	7.7		200	

FACE MILL ARBOR - FMA

DIN 69893 - HSK

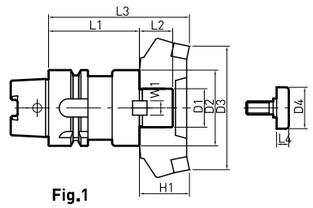


Fig.1

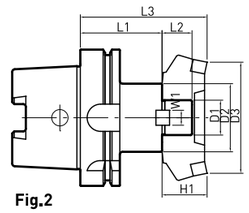


Fig.2

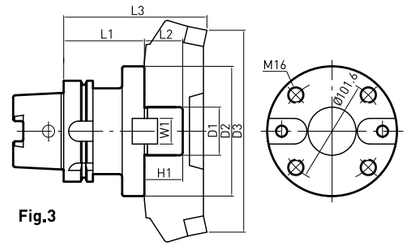


Fig.3

Taper: AT3 | HRc: 58~60

mm

CODE NO			FIG	L_2	D_2	W_1	D_4	L_4	After assembling cutter		
TAPER	D_1	L_1							L_3	D_3	H_1
HSK50A	**FMA25.4**	**60**	1	22	50	9.5	33	10	110	80	50
HSK63A	**FMA31.75**	**65**		30	60	12.7	40		125	100	60
	FMA38.1			34	80	15.9	50	14		125	
HSK100A	**FMA25.4**	**60**	2	22	50	9.5	33	10	110	80	50
	FMA31.75	**65**		30	60	12.7	40		125	100	60
	FMA38.1			34	80	15.9	50	14	125	125	
	FMA50.8	**75**		36	98	19	65		135	160	
	FMA47.625	**80**	3	38	128.57	25.4	-	-	140	200	

PART. C
CHUCK
HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

FACE MILL ARBOR - FMB

FMB

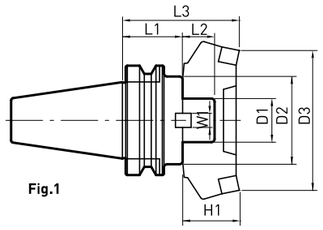


Fig.1

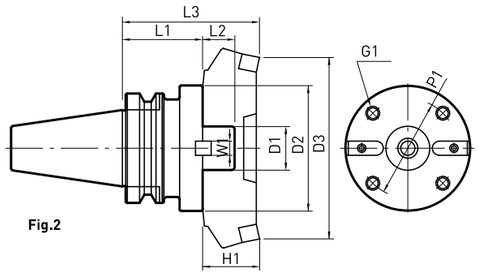


Fig.2

Taper: AT3 | HRc: 58~60 | mm

INCH TYPE																METRIC TYPE		
CODE NO			FIG	L_2	D_2	W_1		G_1	P_1	D_4	L_4	WEIGHT (kg)	L_3	D_3	H_1	CODE NO		
TAPER	D_1	L_1				INCH	METRIC									TAPER	D_1	L_1
BT30		45										1.7	95			BT30		45
BT40	FMB25.4	60			80	9.5	12	-	-	33	10	2.5	110	80	50	BT40	FMB27	60
		90										4.7	140					90
	FMB38.1	60			85	15.9	16	-	-	50	14	7.4	123	125	63		FMB40	60
BT50	FMB25.4	45	1	26	80	9.5	12	-	-	33	10	40	95	80	50	BT50	FMB27	45
		90										5.8	140					90
																		150
	FMB38.1	45			85	15.9	16	-	-	50	14	4.7	108	125	63		FMB40	45
		75										6.1	138					75
		105										8.7	168					105
	-	-	2	25	140		25.4	M16	101.6	-	-	7.9	138	200			FMB60	75

SINGLE MILLING CHUCK

FMC

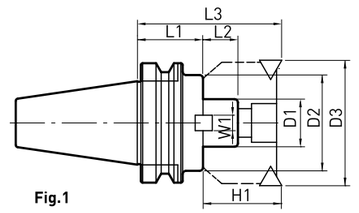


Fig.1

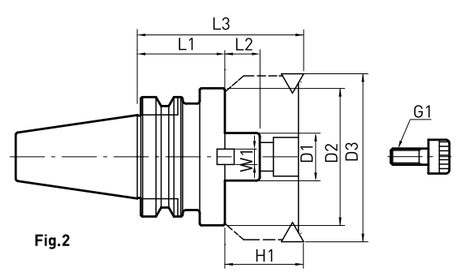


Fig.2

Taper: AT3 | HRc: 58~60 | mm

INCH TYPE											METRIC TYPE		
CODE NO			Fig	L_2	D_2	W_1		G_1	WEIGHT (kg)	L_3	D_3	H_1	CODE NO		
TAPER	D_1	L_1				INCH	METRIC						TAPER	D_1	L_1
BT30									1.4	80			BT30		40
	-	-	1	18	45	-	10	M10×30	1.3	85	50	40		FMC22	45
									2.0	130					90
BT40	FMC25.4	60	2	20	70	9.5	12	M12×35	1.5	110	80	50	BT40	FMC27	60
		90							2.2	140					90
	FMC38.1	60		22	85	15.9	14	M16×35	2.3	110	100			FMC32	60
		75							2.6	125					75
BT50	-	-	1	18	45	-	10	M10×30	4.2	100	50	40	BT50	FMC22	60
									4.7	145					105
									5.3	190					150
	FMC25.4	45		20	70	9.5	12	M12×35	4.1	95	80	50		FMC27	45
		90							5.5	140					90
															150
	FMC38.1	45		22	85	15.9	14	M16×35	4.2	95	100			FMC32	45
		75							5.5	125					75
		105							7.0	155					105

FACE MILL ARBOR - FMC

DIN 69893 - HSK

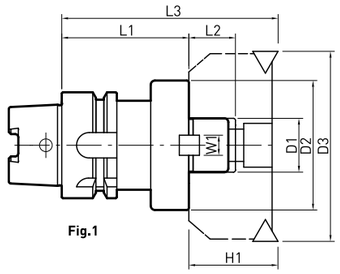


Fig.1

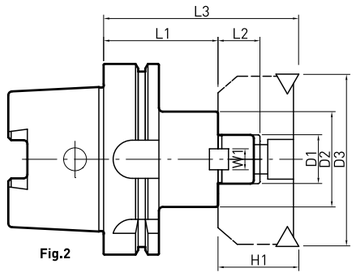


Fig.2

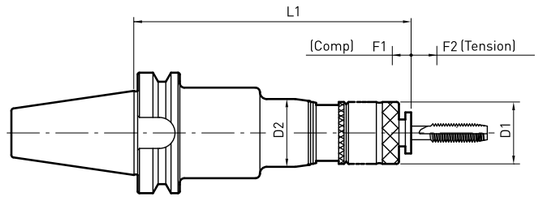
Taper AT3 | HRc 58~60

mm

METRIC TYPE										
CODE NO			FIG	L_2	D_2	W_1	G_1	After assembling cutter		
TAPER	D_1	L_1				METRIC		L_3	D_3	H_1
HSK40A	**FMC16**	**45**	1	17	38	8	M8×3.0	85	40	40
	FMC22	**45**		18	45	10	M10×3.0		50	
HSK50A	**FMC16**	**45**	2	17	38	8	M8×3.0		40	
	FMC22	**50**	1	18	45	10	M10×3.0	90	50	
	FMC27	**50**		20	70	12	M12×3.5	100	80	50
	FMC32	**50**		22	85	14	M16×3.5		100	
HSK63A	**FMC16**	**60**	2	17	38	8	M8×3.0		40	40
	FMC22	**60**		18	45	10	M10×3.0		50	
	FMC27	**60**	1	20	70	12	M12×3.5	110	80	50
	FMC32	**60**		22	85	14	M16×3.5		100	
HSK100A	**FMC16**	**75**	2	17	38	8	M8×3.0	115	40	40
	FMC22	**75**		18	45	10	M10×3.0		50	
	FMC27	**75**		20	70	12	M12×3.5	125	80	50
	FMC32	**75**		22	85	14	M16×3.5		100	

TAPPING CHUCK

MAS 403 - BT



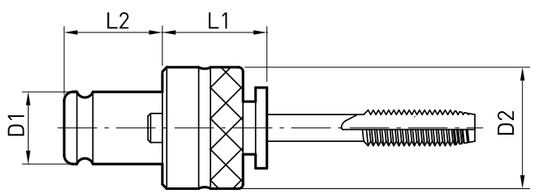
Taper AT3 | HRc 58~60

mm

CODE NO		Tapping Range			D_1	D_2	L_1	F_1	F_2	WEIGHT (kg)	Collet
		M	U	P							
BT30	**TC0312-130**	3~12	1/4~1/2	1/8	32	45	130	635	12	1.5	SES1
BT40	**TC0312-135**						135			1.8	
	TC0822-160	8~25	5/16~7/8	1/8~1/2	50	62	160	14.5	13	2.6	SES2
BT50	**TC0312-150**	3~12	1/4~1/2	1/8	32	45	150	6.5	12	4.2	SES1
	TC0822-175	8~25	5/16~7/8	1/8~1/2	50	62	175	14.5	13	5.4	SES2
	TC1638-240	16~38	5/8~1 3/8	1/4~1 3/8	72	88	240	20	20	7.8	SES3

TAPPING CHUCK

SES



58~60 mm

CODE NO	Tapping Range			D_1	D_2	L_1	L_2	CHUCK CODE
	M	U	P					
SES-1	3~12	1/4~1/2	1/8	19	32	25	21.5	TC0312
SES-2	8~25	5/16~7/8	1/8~1/2	31	50	33	35.5	TC0822
SES-3	16~38	5/8~1 3/8	1/4~1 1/8	48	72	45	55.5	TC1638

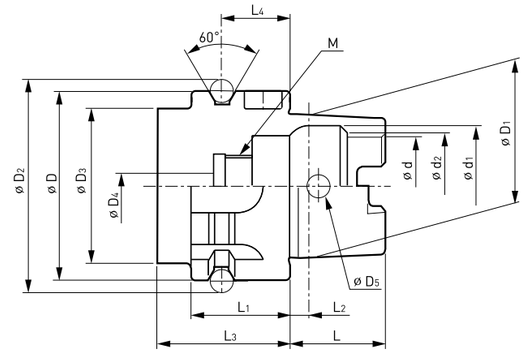
Tap collet size		Tap size					
		METRIC			UNC	SHANK	
						Ø	⊠
SES-1		M3			N0 5, 6	4.0	3.2
		M4	M4.5			5.0	4.0
		M5	M5.5			5.5	4.5
		M6			U1/4	6.0	
					U5/16	6.1	5.0
		M8	M7			6.2	
		M10	M9		U3/8	7.0	5.5
			M11		U7/16	8.0	6.0
		M12				8.5	6.5
					U1/2	9.0	7.0
SES-2			M14	M15	U9/16	10.5	8.0
					U5/8	12.0	9.0
		M16				12.5	10.0
			M17			13.0	
			M18		U3/4	14.0	11.0
		M20				15.0	12.0
			M22		U7/8	17.0	13.0
SES-3		M24	M25			19.0	15.0
			M27	M26	U1	20.0	
			M28			21.0	17.0
					U1 1/8	22.0	
		M30				23.0	17.0
			M32		U1 1/4	24.0	19.0
			M33			25.0	
			M35	M34	U1 3/8	26.0	21.0
		M36	M38			28.0	

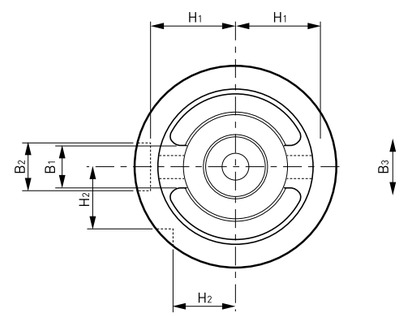
Tap collet size		Tap size			
		PT	PF	SHANK	
				Ø	⊠
SES-1		1/8	1/8	8	6
SES-2		1/4	1/4	11	9
		3/8	3/8	14	11
		1/2	1/2	18	14
SES-3			5/8	19	15
		3/4	3/4	23	17
			7/8	24	19
		1	1	26	21
			1 1/8	28	

Note
M : Metric threads
UNC : Unified coarse threads
PT : Pipe taper threds
PF : Pipe straight threads

HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

HSK SHANK DIN 69893-1, ISO 12164-1 : 2001



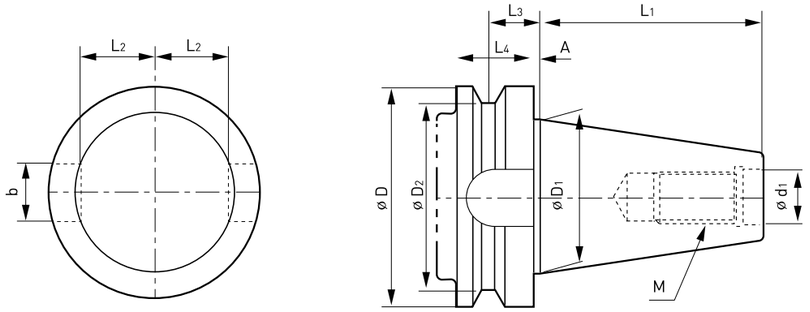


TAPER	D	D_1	D_2	D_3	D_4	D_5	L	L_1	L_1	L_3	L_4
HSK40A	40	30	45.00	34	5.0	4.6	20	20	4.0	35	16
HSK50A	50	38	59.30	42	6.8	6.0	25	26	5.0	42	18
HSK63A	63	48	72.30	53	8.4	7.5	32	26	6.3	42	18
HSK100A	100	75	109.75	82	12.0	12.0	50	29	10.0	45	20

TAPER	D	D_1	D_2	B_1	B_2	B_3	H_1	H_2	M
HSK40A	21	25.5	23	8.05	11	9	17.0	12.0	M12×1.0
HSK50A	26	32.0	29	10.54	14	12	21.0	15.5	M16×1.0
HSK63A	34	40.0	37	12.54	18	16	26.5	20.0	M18×1.0
HSK100A	53	63.0	58	20.02	22	20	44.0	31.5	M24×15

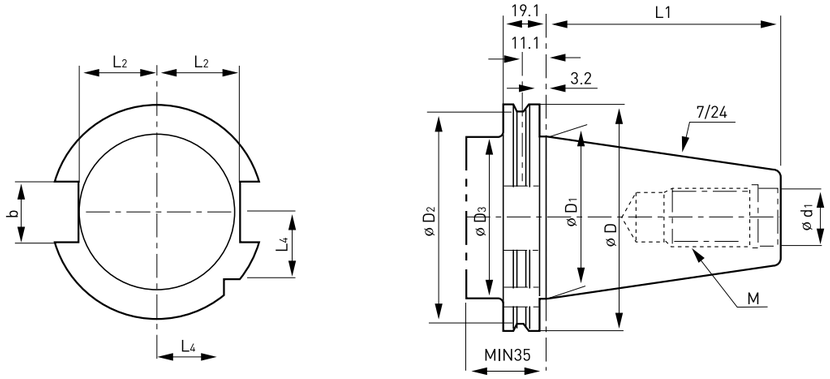
HYDRAULIC CHUCK
SHRINK FIT CHUCK
MILLING CHUCK
ER COLLET CHUCK
NC DRILL CHUCK
TAPPING CHUCK

BOTTLE GRIP TAPER MAS 403 - BT



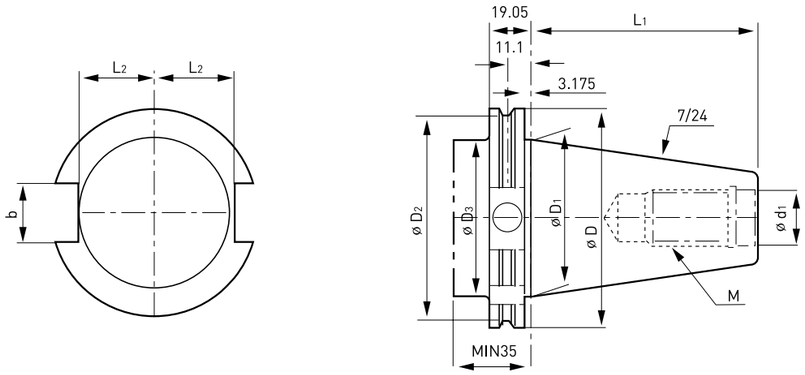
TAPER	D	D_1	D_2	d_1	L_1	L_2	L_3	L_4	A	B	M
BT30	46	31.75	38	12.5	48.4	16.3	13.6	20	2	16.1	M12×1.75
BT40	63	44.45	53	17.0	65.4	22.6	16.6	25	2	16.1	M16×2.0
BT50	100	69.85	85	25.0	101.8	35.4	23.2	35	3	25.7	M24×3.0
BT60	155	107.95	135	31.0	161.8	60.1	28.2	45	3	25.7	M30×3.5

DIN 69871-1 A/B, 7388/1 : 1983(E)



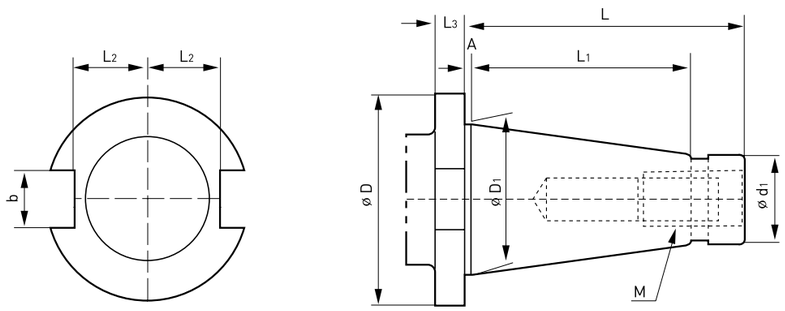
TAPER	D	D_1	D_2	d_1	L_1	L_2	L_3	L_4	A	B	M
SK30	50.00	31.75	44.30	45	13	47.8	16.4	19.0	15.0	16.1	M12×1.75
SK40	63.55	44.45	56.25	50	17	68.4	22.8	25.0	18.5	16.1	M16×2.0
SK50	97.50	69.85	91.25	80	25	101.75	35.5	37.7	30.0	25.7	M24×3.0

CAT SHANK (ANSI/ASME B5.50 - 1985)



TAPER	D	D_1	D_2	D_3	d_1	L_1	L_2	L_3	B	M
CAT30	50.00	31.75	44.30	31.75	13.0	47.625	16.25	18.67	16.1	UNC 1/2~13
CAT40	63.55	44.45	56.25	44.45	17.0	68.250	22.60	25.00	16.1	UNC 5/8~11
CAT50	97.50	69.85	91.25	70.10	25.0	101.600	35.30	37.70	25.7	UNC 1~18
CAT60	15.50	107.95	135.26	32.00	161.8	161.930	54.00	59.30	25.7	UNC C1, 1/4~7

DIN 2080, JIS B 6101, ISO 297 : 1988(E)



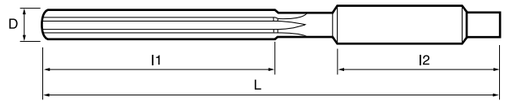
TAPER	D	D_1	d_1	L	L_1	L_2	L_3	A	B	M
NT30	46	31.75	17.4	68.4	48.4	16.2	10	1.6	16.1	UNC 1/2~13
NT40	63	44.45	25.3	93.4	65.4	22.5	10	1.6	16.1	UNC 5/8~11
NT50	100	69.85	39.6	126.8	101.8	35.3	12	3.2	25.7	UNC 1~18
NT60	155	107.95	60.2	206.8	161.8	60.0	15	3.2	25.7	UNC C1, 1/4~7

D

REAMER

REAMER

HAND REAMER



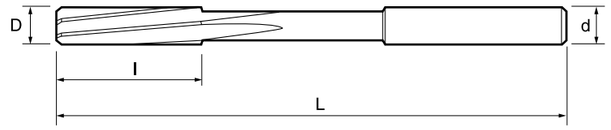
- SKH51(M2), JIS
- Straight Flutes & ST Shank
- Suitable for through Holes
- Easy Resharpening

HSS M2 JIS SF ST

CODE NO	D	L	l1	l2	Flutes
GEM 100010~14	1.0M~1.4M	65	15	23	4
GEM 100015~19	1.5M~1.9M	65	23	23	4
GEM 100020~29	2.0M~2.9M	65	30	23	4
GEM 100030~39	3.0M~3.9M	72	40	23	4
GEM 100040~49	4.0M~4.9M	80	40	30	6
GEM 100050~59	5.0M~5.9M	90	45	35	6
GEM 100060~69	6.0M~6.9M	100	50	38	6
GEM 100070~79	7.0M~7.9M	105	55	38	6
GEM 100080~89	8.0M~8.9M	115	60	42	6
GEM 100090~99	9.0M~9.9M	125	65	45	6
GEM 100100~109	10.0M~10.9M	130	70	45	6
GEM 100110~119	11.0M~11.9M	140	75	50	6
GEM 100120~129	12.0M~12.9M	150	75	58	6
GEM 100130~139	13.0M~13.9M	160	80	62	6
GEM 100140	14.0M	165	85	62	8
GEM 100150	15.0M	175	90	66	8
GEM 100160	16.0M	185	95	70	8
GEM 100170	17.0M	190	100	70	8
GEM 100180	18.0M	200	105	75	8
GEM 100190	19.0M	210	105	85	8
GEM 100200	20.0M	220	110	88	8
GEM 100210	21.0M	230	120	88	8
GEM 100220	22.0M	235	120	90	8
GEM 100230	23.0M	250	130	95	8
GEM 100240	24.0M	255	130	100	8
GEM 100250	25.0M	260	130	102	8
GEM 100260	26.0M	270	130	102	8
GEM 100270	27.0M	270	140	102	10
GEM 100280	28.0M	290	140	120	10
GEM 100290	29.0M	290	140	120	10
GEM 100300	30.0M	305	140	120	10

CODE NO	D	L	l1	l2	Flutes
GEM 100300	30.0M	305	140	120	10
GEM 100310	31.0M	305	150	120	10
GEM 100320	32.0M	315	150	120	10
GEM 100330	33.0M	315	160	120	10
GEM 100340	34.0M	315	160	120	10
GEM 100350	35.0M	315	160	120	10
GEM 100360	36.0M	320	160	120	10
GEM 100370	37.0M	320	165	120	10
GEM 100380	38.0M	325	165	125	10
GEM 100390	39.0M	325	165	125	10
GEM 100400	40.0M	330	165	125	12
GEM 100410	41.0M	330	170	125	12
GEM 100420	42.0M	335	170	125	12
GEM 100430	43.0M	335	170	125	12
GEM 100440	44.0M	340	170	125	12
GEM 100450	45.0M	340	170	125	12
GEM 100460	46.0M	345	170	125	12
GEM 100470	47.0M	345	175	125	12
GEM 100480	48.0M	350	180	125	12
GEM 100490	49.0M	350	180	125	12
GEM 100500	50.0M	355	180	125	12
GEM 100510	51.0M	355	180	125	12
GEM 100520	52.0M	355	180	125	12
GEM 100530	53.0M	360	195	125	14
GEM 100540	54.0M	360	195	125	14
GEM 100550	55.0M	360	195	125	14
GEM 100560	56.0M	360	195	125	14
GEM 100570	57.0M	370	200	130	14
GEM 100580	58.0M	370	200	130	14
GEM 100590	59.0M	370	200	130	14
GEM 100600	60.0M	370	200	130	14

SPIRAL CHUCKING REAMER-7° ST



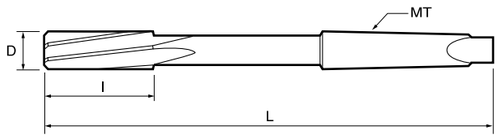
- SKH55(M35), DIN, H7 Tolerance
- LH Helical 7° & ST Shank
- Suitable for through Holes
- For Mold Hole

SKH 55° | M35 | DIN | H7 | LH 7° | ST

CODE NO	D	L	l1	l2	Flutes
GEM E407020	2.0M	55	16	D	4
GEM E407021~4	2.1M~2.4M	55	16	D	4
GEM E407025	2.5M	55	16	D	4
GEM E407026~9	2.6M~2.9M	55	16	D	4
GEM E407030	3.0M	61	15	D	6
GEM E407031~4	3.1M~3.4M	61	15	D	6
GEM E407035	3.5M	61	15	D	6
GEM E407036~9	3.6M~3.9M	61	15	D	6
GEM E407040	4.0M	75	19	4	6
GEM E407041~4	4.1M~4.4M	75	19	4	6
GEM E407045	4.5M	75	19	4.5	6
GEM E407046~9	4.6M~4.9M	75	19	4.5	6
GEM E407050	5.0M	86	23	5	6
GEM E407051~4	5.1M~5.4M	86	23	5	6
GEM E407055	5.5M	86	23	5.5	6
GEM E407056~9	5.6M~5.9M	86	23	5.5	6
GEM E407060	6.0M	93	26	6	6
GEM E407061~4	6.1M~6.4M	93	26	6	6
GEM E407065	6.5M	93	26	6	6
GEM E407066~9	6.6M~6.9M	93	26	6	6
GEM E407070	7.0M	109	31	7	6
GEM E407071~4	7.1M~7.4M	109	31	7	6
GEM E407075	7.5M	109	31	7	6
GEM E407076~9	7.6M~7.9M	109	31	7	6
GEM E407080	8.0M	117	33	8	6
GEM E407081~4	8.1M~8.4M	117	33	8	6
GEM E407085	8.5M	117	33	8	6
GEM E407086~9	8.6M~8.9M	117	33	8	6
GEM E407090	9.0M	125	36	9	6
GEM E407091~4	9.1M~9.4M	125	36	9	6
GEM E407095	9.5M	125	36	9	6

CODE NO	D	L	l1	l2	Flutes
GEM E407096~9	9.6M~9.9M	125	36	9	6
GEM E407100	10.0M	133	38	10	6
GEM E407101~4	10.1M~10.4M	133	38	10	6
GEM E407105	10.5M	133	38	10	6
GEM E407106~9	10.5M~10.8M	133	38	10	6
GEM E407110	11.0M	142	41	10	6
GEM E407111~4	11.1M~11.4M	142	41	10	6
GEM E407115	11.5M	142	41	10	6
GEM E407116~9	11.6M~11.9M	142	41	10	6
GEM E407120	12.0M	151	44	10	6
GEM E407121~4	12.1M~12.4M	151	44	10	6
GEM E407125	12.5M	151	44	10	6
GEM E407126~9	12.6M~12.9M	151	44	10	6
GEM E407130	13.0M	151	44	10	6
GEM E407135	13.5M	151	44	12	6
GEM E407140	14.0M	160	47	12	8
GEM E407145	14.5M	160	47	12	8
GEM E407150	15.0M	162	50	12	8
GEM E407155	15.5M	162	50	12	8
GEM E407160	16.0M	170	52	16	8
GEM E407165	16.5M	170	52	16	8
GEM E407170	17.0M	175	54	16	8
GEM E407175	17.5M	175	54	16	8
GEM E407180	18.0M	182	56	16	8
GEM E407185	18.5M	182	56	16	8
GEM E407190	19.0M	189	58	16	8
GEM E407195	19.5M	189	58	16	8
GEM E407200	20.0M	195	60	20	8
GEM E407210	21.0M	205	60	20	8
GEM E407220	22.0M	205	60	20	8

SPIRAL CHUCKING REAMER-7° MT

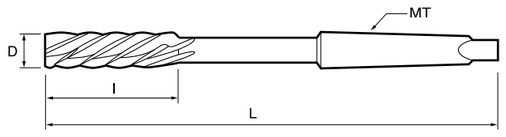


- SKH55(M35), DIN, H7 Tolerance
- LH Helical 7° & ST Shank
- Suitable for through Holes
- For Mold Hole

SKH 55° | M35 | DIN | H7 | LH 7° | MT

CODE NO	D	L	l1	MT	Flutes
GEM E407060M	6	130	35	MT1	6
GEM E407080M	8	150	40		6
GEM E407100M	10	160	40		6
GEM E407120M	12	170	45		6
GEM E407130M	13	180	45		6
GEM E407140M	14	190	50		8
GEM E407150M	15	205	50	MT2	8
GEM E407160M	16	205	50		8
GEM E407170M	17	210	55		8
GEM E407180M	18	220	55		8
GEM E407190M	19	220	55		8
GEM E407200M	20	230	60		8
GEM E407210M	21	240	60		8
GEM E407220M	22	240	60		8
GEM E407230M	23	250	65		8
GEM E407240M	24	265	65	MT3	8
GEM E407250M	25	270	65		8
GEM E407260M	26	270	70		8
GEM E407270M	27	270	70		10
GEM E407280M	28	270	70		10
GEM E407290M	29	280	75		10
GEM E407300M	30	280	75		10
GEM E407320M	32	300	80		10
GEM E407340M	34	325	80	MT4	10
GEM E407350M	35	325	80		10
GEM E407360M	36	330	85		10
GEM E407380M	38	330	85		12
GEM E407400M	40	330	85		12

HI HELICAL REAMER-45° MT

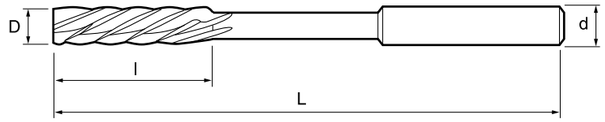


- SKH55(M35), DIN, H7 Tolerance
- LH Helical 45° & MT Shank
- Suitable for through Holes
- Much Higher Feed Rate
- Excellent Finish Surface

SKH 55° | M35 | DIN | H7 | LH 45° | MT

CODE NO	D	L	l1	MT	Flutes
GEM E445060M	6	130	35	MT1	3
GEM E445080M	8	150	40		3
GEM E445090M	9	150	40		3
GEM E445100M	10	160	40		3
GEM E445110M	11	160	40		3
GEM E445120M	12	170	45		3
GEM E445130M	13	180	45		3
GEM E445140M	14	190	50	MT2	4
GEM E445150M	15	205	50		4
GEM E445160M	16	205	50		4
GEM E445170M	17	210	55		4
GEM E445180M	18	220	55		4
GEM E445190M	19	220	55		4
GEM E445200M	20	230	60		4
GEM E445210M	21	240	60		4
GEM E445220M	22	240	60		4
GEM E445230M	23	250	65		4
GEM E445240M	24	265	65	MT3	4
GEM E445250M	25	270	65		4
GEM E445260M	26	270	70		6
GEM E445270M	27	270	70		6
GEM E445280M	28	270	70		6
GEM E445290M	29	280	75		6
GEM E445300M	30	280	75		6
GEM E445310M	32	300	80		6
GEM E445340M	34	325	80	MT4	8
GEM E445350M	35	325	80		8
GEM E445360M	36	330	85		8
GEM E445380M	38	330	85		8
GEM E445400M	40	330	85		8

HI HELICAL REAMER-45° ST



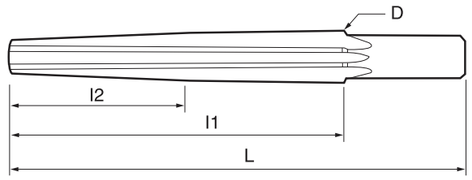
- SKH55(M35), DIN, H7 Tolerance
- LH Helical 45° & ST Shank
- Suitable for through Holes
- Much Higher Feed Rate
- Excellent Finish Surface

SKH 55° | M35 | DIN | H7 | LH 45° | ST

CODE NO	D	L	l1	l2	Flutes
GEM E445020	2.0M	55	16	D	3
GEM E445021~4	2.1M~2.4M	55	16	D	3
GEM E445025	2.5M	55	16	D	3
GEM E445026~9	2.6M~2.9M	55	16	D	3
GEM E445030	3.0M	61	15	D	3
GEM E445031~4	3.1M~3.4M	61	15	D	3
GEM E445035	3.5M	61	15	D	3
GEM E445036~9	3.6M~3.9M	61	15	D	3
GEM E445040	4.0M	75	19	4	3
GEM E445041~4	4.1M~4.4M	75	19	4	3
GEM E445045	4.5M	75	19	4.5	3
GEM E445046~9	4.6M~4.9M	75	19	4.5	3
GEM E445050	5.0M	86	23	5	3
GEM E445051~4	5.1M~5.4M	86	23	5	3
GEM E445055	5.5M	86	23	5.5	3
GEM E445056~9	5.6M~5.9M	86	23	5.5	3
GEM E445060	6.0M	93	26	6	3
GEM E445061~4	6.1M~6.4M	93	26	6	3
GEM E445065	6.5M	93	26	6	3
GEM E445066~9	6.6M~6.9M	93	26	6	3
GEM E445070	7.0M	109	31	7	3
GEM E445071~4	7.1M~7.4M	109	31	7	3
GEM E445075	7.5M	109	31	7	3
GEM E445076~9	7.6M~7.9M	109	31	7	3
GEM E445080	8.0M	117	33	8	3
GEM E445071~4	8.1M~8.4M	117	33	8	3
GEM E445085	8.5M	117	33	8	3
GEM E445086~9	8.6M~8.9M	117	33	8	3
GEM E445090	9.0M	125	36	9	3

CODE NO	D	L	l1	l2	Flutes
GEM E445091~4	9.1M~9.4M	125	36	9	3
GEM E445095	9.5M	125	36	9	3
GEM E445096~9	9.6M~9.9M	125	36	9	3
GEM E445100	10.0M	133	38	10	3
GEM E445101~4	10.1M~10.4M	133	38	10	3
GEM E445105	10.5M	133	38	10	3
GEM E445106~9	10.6M~10.9M	133	38	10	3
GEM E445110	11.0M	142	41	10	3
GEM E445111~4	11.1M~11.4M	142	41	10	3
GEM E445115	11.5M	142	41	10	3
GEM E445116~9	11.6M~11.9M	142	41	10	3
GEM E445120	12.0M	151	44	10	3
GEM E445121~4	12.1M~12.4M	151	44	10	3
GEM E445125	12.5M	151	44	10	3
GEM E445126~9	12.6M~12.9M	151	44	10	3
GEM E445130	13.0M	151	44	10	3
GEM E445135	13.5M	151	44	12	3
GEM E445140	14.0M	160	47	12	4
GEM E445145	14.5M	160	47	12	4
GEM E445150	15.0M	162	50	12	4
GEM E445155	15.5M	162	50	12	4
GEM E445160	16.0M	170	52	16	4
GEM E445165	16.5M	170	52	16	4
GEM E445170	17.0M	175	54	16	4
GEM E445175	17.5M	175	54	16	4
GEM E445180	18.0M	182	56	16	4
GEM E445185	18.5M	182	56	16	4
GEM E445190	19.0M	189	58	16	4
GEM E445195	19.5M	189	58	16	4
GEM E445200	20.0M	195	60	20	4
GEM E445210	21.0M	205	60	20	4
GEM E445220	22.0M	205	60	20	4

BRIDGE REAMER (ST SHANK)

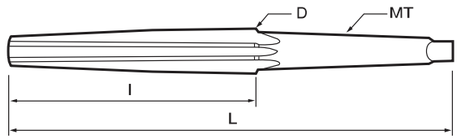


- SKH51(M2), JIS
- Straight Flutes & ST Shank
- Correct holes displacement of sandwitched sheet
- 1/20 taper

HSS M2 JIS SF ST

CODE NO	D	L	l	Flutes
GEM 501200	20.0 M	190	140	6
GEM 501205	20.5	190	140	6
GEM 501210	21.0	190	140	6
GEM 501215	21.5	190	140	8
GEM 501220	22.0	190	140	8
GEM 501225	22.5	190	140	8
GEM 501230	23.0	190	140	8
GEM 501235	23.5	190	140	8
GEM 501240	24.0	190	140	8
GEM 501245	24.5	190	140	8
GEM 501250	25.0	190	140	8
GEM 501255	25.5	190	140	8
GEM 501260	26.0	190	140	8

MACHINE BRIDGE REAMER (MT SHANK)

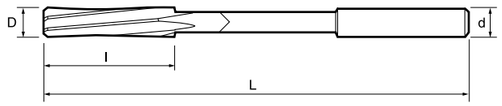


- SKH51(M2), JIS
- Straight Flutes & MT Shank
- Correct holes displacement of sandwitched sheet
- 1/20 taper

HSS M2 JIS SF ST

CODE NO	D	L	L	l	Flutes
GEM 500160	16.0	210	115	MT2	6
GEM 500180	18.0	210	115		6
GEM 500200	20.0	215	120		6
GEM 500210	21.0	215	120		6
GEM 500220	22.0	215	120		8
GEM 500230	23.0	215	120		8
GEM 500240	24.0	250	135	MT3	8
GEM 500250	25.0	250	135		8
GEM 500260	26.0	250	135		8
GEM 500270	27.0	260	145		8
GEM 500280	28.0	260	145		8
GEM 500290	29.0	280	165		8
GEM 500300	30.0	280	165		8
GEM 500310	31.0	280	165		8
GEM 500320	32.0	280	165		8
GEM 500330	33.0	280	165		8
GEM 500340	34.0	280	165		8

CARBIDE SPIRAL CHUCKING REAMER-7° ST

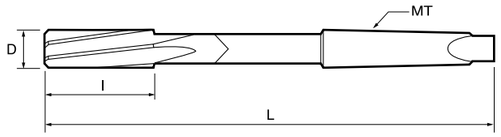


- Carbide, DIN, H7 Tolerance
- Unequal Flutes, ~HRc 50
- LH Helical 7° & ST Shank
- All and Top Solid
- Suitable for through Holes
- For Mold Hole

WC DIN H7 LH 7° ~HRc 50 ST

CODE NO	D	d	L	l
GEM C407020	2.0M	3	62	15
GEM C407030	3.0M	3	62	15
GEM C407040	4.0M	4	62	19
GEM C407050	5.0M	5	79	23
GEM C407060	6.0M	6	79	25
GEM C407070	7.0M (B)	7	109	27
GEM C407080	8.0M (B)	8	117	28
GEM C407090	9.0M (B)	9	125	29
GEM C407100	10.0M (B)	10	133	32
GEM C407110	11.0M (B)	10	142	32
GEM C407120	12.0M (B)	10	151	35
GEM C407130	13.0M (B)	10	151	35
GEM C407140	14.0M (B)	16	200	36
GEM C407150	15.0M (B)	16	200	36
GEM C407160	16.0M (B)	16	200	38
GEM C407170	17.0M (B)	16	200	38
GEM C407180	18.0M (B)	20	200	38
GEM C407190	19.0M (B)	20	200	38
GEM C407200	20.0M (B)	20	200	38
GEM C407220	22.0M (B)	20	235	42
GEM C407250	25.0M (B)	25	260	45

CARBIDE SPIRAL CHUCKING REAMER-7° MT

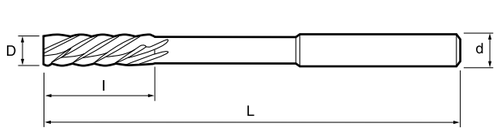


- Carbide, DIN, H7 Tolerance
- Unequal Flutes, ~HRc 50
- LH Helical 7° & MT Shank
- All and Top Solid
- Suitable for through Holes
- For Mold Hole

WC DIN H7 LH 7° ~HRc 50 MT

CODE NO	D	d	L	MT
GEM C407060M	6M (B)	130	26	MT1
GEM C407080M	8M (B)	150	28	
GEM C407100M	10M (B)	160	32	
GEM C407120M	12M (B)	180	35	
GEM C407130M	13M (B)	190	35	
GEM C407140M	14M (B)	190	36	
GEM C407150M	15M (B)	205	36	MT2
GEM C407160M	16M (B)	205	38	
GEM C407170M	17M (B)	210	38	
GEM C407180M	18M (B)	220	38	
GEM C407190M	19M (B)	220	38	
GEM C407200M	20M (B)	230	38	
GEM C407220M	22M (B)	240	42	
GEM C407250M	25M (B)	270	45	MT3
GEM C407300M	30M (B)	280	48	
GEM C407320M	32M (B)	300	48	

CARBIDE HI HELICAL REAMER-45° ST

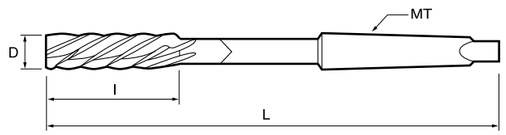


- Carbide, DIN, H7 Tolerance
- All and Top Solid, ~HRc 50
- LH Helical 45° & ST Shank
- Suitable for through Holes
- Much Higher Feed Rate
- Excellent Finish Surface

WC | DIN | H7 | LH 45° | ~HRc 50 | ST

CODE NO	D	d	L	l
GEM C445020	2M	3	62	12
GEM C445030	3M	4	62	12
GEM C445040	4M	4	62	12
GEM C445050	5M	6	79	16
GEM C445060	6M	6	79	16
GEM C445070	7M (B)	8	109	20
GEM C445080	8M (B)	8	117	20
GEM C445090	9M (B)	10	125	26
GEM C445100	10M (B)	10	133	26
GEM C445110	11M (B)	12	142	28
GEM C445120	12M (B)	12	151	28
GEM C445130	13M (B)	12	151	30
GEM C445140	14M (B)	16	200	35
GEM C445150	15M (B)	16	200	35
GEM C445160	16M (B)	16	200	36
GEM C445170	17M (B)	16	200	38
GEM C445180	18M (B)	20	200	38
GEM C445190	19M (B)	20	200	38
GEM C445200	20M (B)	20	200	38
GEM C445220	22M (B)	20	235	42
GEM C445250	25M (B)	20	260	45

CARBIDE HI HELICAL REAMER-45° MT



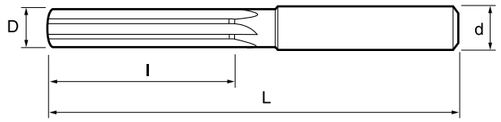
- Carbide, DIN, H7 Tolerance
- All and Top Solid, ~HRc 50
- LH Helical 45° & MT Shank
- Suitable for through Holes
- Much Higher Feed Rate
- Excellent Finish Surface

WC | DIN | H7 | LH 45° | ~HRc 50 | MT

CODE NO	D	d	L	MT
GEM C445060M	6 (B)	130	26	MT1
GEM C445080M	8 (B)	150	28	
GEM C445100M	10 (B)	160	32	
GEM C445120M	12 (B)	180	35	
GEM C445130M	13 (B)	190	35	
GEM C445140M	14 (B)	190	36	
GEM C445150M	15 (B)	205	36	MT2
GEM C445160M	16 (B)	205	38	
GEM C445170M	17 (B)	210	38	
GEM C457180M	18 (B)	220	38	
GEM C445190M	19 (B)	220	38	
GEM C445200M	20 (B)	230	38	
GEM C445220M	22 (B)	240	42	
GEM C445250M	25 (B)	270	45	MT3
GEM C445300M	30 (B)	280	48	
GEM C445320M	32 (B)	300	48	

PART. D
REAMER
HSS REAMER
CARBIDE REAMER
COUNTER
ENDMILL
DRILL

CARBIDE HAND REAMER

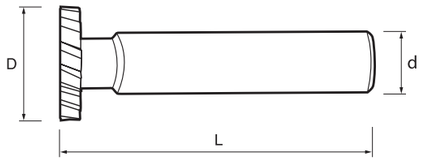


- Carbide, H7 Tolerance
- Straight Flutes & ST Shank
- Suitable for through & Blind Holes
- All Solid, ~HRc 50

WC | H7 | SF | ST | ~HRc 50

CODE NO	D	d	L	l
GEM C100020	2	3	62	15
GEM C100030	3	4	62	25
GEM C100040	4	4	62	28
GEM C100050	5	6	79	31
GEM C100060	6	6	79	31
GEM C100070	7	8	79	35
GEM C100080	8	8	79	35
GEM C100090	9	10	106	50
GEM C100100	10	10	106	50
GEM C100110	11	12	106	50
GEM C100120	12	12	106	50
GEM C100130	13	12	106	50
GEM C100140	14	12	106	50
GEM C100150	15	16	106	50
GEM C100160	16	16	106	50
GEM C100200	20	20	106	50

CARBIDE HELICAL T-CUTTER (HSS SHANK)

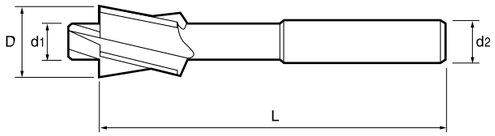


- Carbide, HSS shank, ~Hrc 50
- Helix 25°, Unequal flutes
- Reducing Vibration due to HSS body
- Much Higher Feed Rate
- Excellent Finish Surface

WC | RH 25° | ST | ~HRc 50

CODE NO	D	L	d	F
GEM CTHCT100050	10	64	10	8
GEM CTHCT150050	15	80	12	8
GEM CTHCT200050	20	80	12	8
GEM CTHCT250050	25	80	12	10
GEM CTHCT300050	30	100	16	12
GEM CTHCT350050	35	100	20	12
GEM CTHCT400050	40	120	20	12
GEM CTHCT450050	45	120	20	14
GEM CTHCT500050	50	120	20	14

COUNTER BORE-KOR

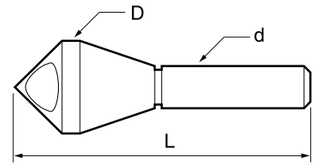


- SKH51(M2), DIN, 4 Flutes
- RH Helix 25°, ST Shank
- Suitable for Hole of Mold Bolt

HSS M2 RH 25° ST

CODE NO	Pr No	d1	D	l	d2
GEM 625030	3M	3.2	6.5	60	6
GEM 625040	4M	4.3	8.0	70	8
GEM 625050	5M	5.3	9.4	80	8
GEM 625060	6M	6.4	11.0	90	10
GEM 625070	7M	7.4	12.5	95	10
GEM 625080	8M	8.4	14.0	100	12
GEM 625090	9M	9.4	16.0	105	12
GEM 625100	10M	10.5	17.5	110	12
GEM 625110	11M	11.5	18.5	115	12
GEM 625120	12M	13.0	20.0	125	12
GEM 625130	13M	14.0	22.0	130	12
GEM 625140	14M	15.0	24.0	130	12
GEM 625150	15M	16.0	25.5	140	12
GEM 625160	16M	17.0	27.0	145	12
GEM 625170	17M	18.0	28.0	150	12
GEM 625180	18M	19.0	29.0	150	12
GEM 625190	19M	20.0	30.0	155	16
GEM 625200	20M	21.0	31.0	155	16
GEM 625210	21M	22.0	32.0	160	16
GEM 625220	22M	23.0	33.0	160	16
GEM 625230	23M	24.0	34.5	160	16
GEM 625240	24M	25.0	36.0	175	16
GEM 625250	25M	26.0	40.0	175	16
GEM 625260	26M	27.0	41.0	180	20
GEM 625270	27M	28.0	42.0	180	20
GEM 625280	28M	29.0	43.5	180	20
GEM 625290	29M	30.0	45.0	180	20
GEM 625300	30M	31.0	46.0	180	20

COUNTER SINK-90° HOLE



- Bur away
- TiN, TiCN, TiALN
- Excellent Finish Surface
- ST & MT Shank available
- For Plastics and Soft Steel

SKH 55 SKH 59 M35 M42 ST TiN TiCN TiAlN

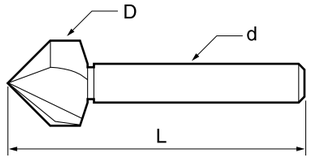
SKH55(CO 5%), M35

CODE NO	D	L	d
GEM 850100	10.0M	50	6
GEM 850150	15.0M	55	8
GEM 850200	20.0M	65	10
GEM 850250	25.0M	75	12
GEM 850300	30.0M	82	12
GEM 850350	35.0M	90	12
GEM 850400	40.0M	95	12
GEM 850450	45.0M	115	12
GEM 850500	50.0M	120	12

SKH59(CO 8%), M42

CODE NO	D	L	d
GEM 890100	10.0M	50	6
GEM 890150	15.0M	55	8
GEM 890200	20.0M	65	10
GEM 890250	25.0M	75	12
GEM 890300	30.0M	82	12
GEM 890350	35.0M	90	12
GEM 890400	40.0M	95	12
GEM 890450	45.0M	115	12
GEM 890500	50.0M	120	12

COUNTER SINK-90°, 1F



- Bur away
- TiN, TiCN, TiALN
- Good Finish Surface
- ST & MT Shank available

SKH 55 | SKH 59 | M35 | M42 | ST | TiN | TiCN | TiAlN

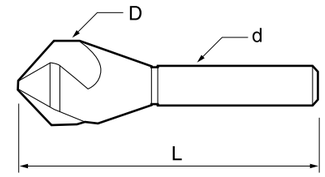
SKH55(CO 5%), M35

CODE NO	D	L	d
GEM 851100	10.0M	50	6
GEM 851150	15.0M	55	8
GEM 851200	20.0M	60	10
GEM 851250	25.0M	65	12
GEM 851300	30.0M	70	12
GEM 851350	35.0M	75	12
GEM 851400	40.0M	80	12
GEM 851450	45.0M	85	12
GEM 851500	50.0M	90	12

SKH59(CO 8%), M42

CODE NO	D	L	d
GEM 891100	10.0M	50	6
GEM 891150	15.0M	55	8
GEM 891200	20.0M	60	10
GEM 891250	25.0M	65	12
GEM 891300	30.0M	70	12
GEM 891350	35.0M	75	12
GEM 891400	40.0M	80	12
GEM 891450	45.0M	85	12
GEM 891500	50.0M	90	12

COUNTER SINK-90°, 3F



- Bur away
- TiN, TiCN, TiALN
- Good Finish Surface
- ST & MT Shank available

SKH 55 | SKH 59 | M35 | M42 | ST | TiN | TiCN | TiAlN

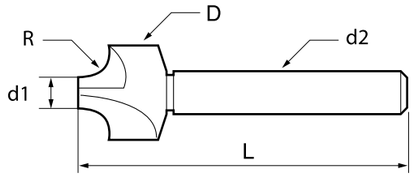
SKH55(CO 5%), M35

CODE NO	D	L	d
GEM 853100	10.0M	50	6
GEM 853150	15.0M	55	8
GEM 853200	20.0M	60	10
GEM 853250	25.0M	65	12
GEM 853300	30.0M	70	12
GEM 853350	35.0M	75	12
GEM 853400	40.0M	80	12
GEM 853450	45.0M	85	12
GEM 853500	50.0M	90	12

SKH59(CO 8%), M42

CODE NO	D	L	d
GEM 893100	10.0M	50	6
GEM 893150	15.0M	55	8
GEM 893200	20.0M	60	10
GEM 893250	25.0M	65	12
GEM 893300	30.0M	70	12
GEM 893350	35.0M	75	12
GEM 893400	40.0M	80	12
GEM 893450	45.0M	85	12
GEM 893500	50.0M	90	12

CORNER ROUNDING END MILL

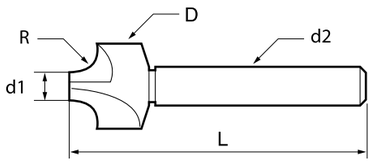


- SKH59(Co 8%), DIN
- For R Forming, ST Shank
- 4 Flutes

SKH 59 | M42 | ST

CODE NO	D	L	l1	l2	Flutes
GEM R810010	1.0R	6	8	60	10
GEM R810015	1.5R	6	9	60	10
GEM R810020	2.0R	6	10	60	10
GEM R810025	2.5R	6	11	60	10
GEM R810030	3.0R	6	12	60	12
GEM R810035	3.5R	6	13	60	12
GEM R810040	4.0R	6	14	60	12
GEM R810045	4.5R	6	15	60	12
GEM R810050	5.0R	6	16	60	12
GEM R810060	6.0R	8	20	67	16
GEM R810070	7.0R	8	22	71	16
GEM R810080	8.0R	8	24	71	16
GEM R810090	9.0R	8	26	85	25
GEM R810100	10.0R	8	28	85	25
GEM R810110	11.0R	10	32	90	25
GEM R810120	12.0R	10	34	90	25
GEM R810130	13.0R	16	42	100	25
GEM R810140	14.0R	16	44	100	25
GEM R810150	15.0R	16	46	100	25
GEM R810160	16.0R	16	48	100	25
GEM R810180	18.0R	16	52	112	32
GEM R810200	20.0R	16	56	112	32

CARBIDE CORNER ROUNDING END MILL

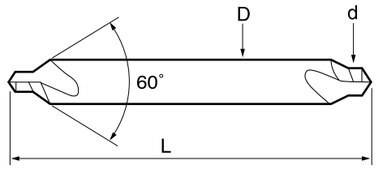


- Carbide, DIN
- For R Forming, ST Shank
- All Solid, Tip Blazed
- 2~4 Flutes, ~HRc 50

WC | ST | ~HRc 50

CODE NO	D	L	l1	l2	Flutes
GEM CR810005	0.5R	1.0	2.1	45	4
GEM CR810010	1.0R	3.9	6.0	52	6
GEM CR810015	1.5R	2.9	6.0	52	6
GEM CR810020	2.0R	1.9	6.0	52	6
GEM CR810025	2.5R	3.0	8.0	52	8
GEM CR810030	3.0R	1.9	8.0	52	8
GEM CR810035	3.5R	2.9	10.0	52	10
GEM CR810040	4.0R	1.9	10.0	52	10
GEM CR810045	4.5R	2.9	12.0	63	12
GEM CR810050	5.0R	1.9	12.0	63	12
GEM CR810060	6.0R (B)	7.9	20.0	110	16
GEM CR810080	8.0R (B)	8.9	25.0	110	20
GEM CR810100	10.0R (B)	8.9	29.0	110	20
GEM CR810120	12.0R (B)	8.9	33.0	120	25

CARBIDE CENTER DRILL A TYPE(60°)

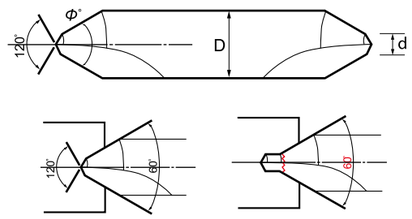


- Carbide
- For Centering & Chamfering
- Form A, ~HRc 50

HSS M2 JIS ST

CODE NO	d	L	D
GEM C700010	1.0M	44	4
GEM C700015	1.5M	44	4
GEM C700020	2.0M	52	6
GEM C700025	2.5M	52	6
GEM C700030	3.0M	52	6
GEM C700040	4.0M	63	8
GEM C700050	5.0M	63	10
GEM C700060	6.0M	79	12
GEM C700080	8.0M	79	16

HSS NC DOUBLE POINT DRILL-JIS



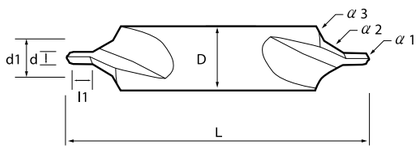
- HSS, TiALN, JIS
- For Centering
- Preventing Broken Pilot

HSS TiAlN JIS

CODE NO	d	D	L	ANGLE
GEM SPC700010J	1.0M	4	56	120´×60´
GEM SPC700015J	1.5M	4	56	120´×60´
GEM SPC700020J	2.0M	6	56	120´×60´
GEM SPC700025J	2.5M	8	65	120´×60´
GEM SPC700030J	3.0M	10	70	120´×60´
GEM SPC700040J	4.0M	12	80	120´×60´
GEM SPC700050J	5.0M	16	100	120´×60´
GEM SPC700060J	6.0M	20	120	120´×60´

CODE NO	d	D	L	ANGLE
GEM SPC750010J	1.0M	4	56	120´×90´
GEM SPC750015J	1.5M	4	56	120´×90´
GEM SPC750020J	2.0M	6	56	120´×90´
GEM SPC750025J	2.5M	8	65	120´×90´
GEM SPC750030J	3.0M	10	70	120´×90´
GEM SPC750040J	4.0M	12	80	120´×90´
GEM SPC750050J	5.0M	16	100	120´×90´
GEM SPC750060J	6.0M	20	120	120´×90´

HSS CENTER DRILL B TYPE

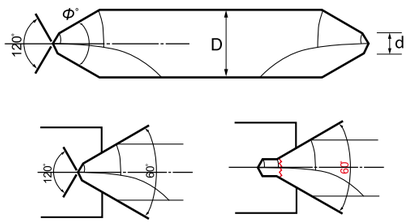


- HSS, JIS
- For Certering & Chamfering
- Form B

HSS M2 JIS ST

CODE NO	d	d1	d1	D	L
GEM B700020E	2	4.25	8	2.60	50
GEM B7000200	2	4.5	8	2.60	53
GEM B7000250	2.5	5.3	9	3.20	57
GEM B700025E	2.5	5.3	10	3.20	57
GEM B7000300	3	6	10	3.90	63
GEM B7000400	4	8	13	5.20	73
GEM B700040E	4	8.5	14	5.20	67
GEM B7000500	5	10	16	6.60	84
GEM B700050E	5	10.6	18	6.40	75
GEM B7000600	6	12	18	7.80	95

HSS NC DOUBLE POINT DRILL-KOR



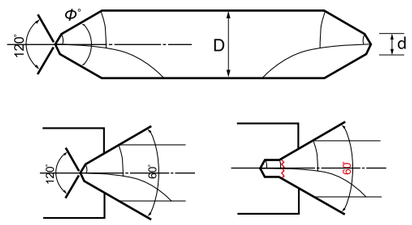
- HSS, TiALN, KOR
- For Centering
- Preventing Broken Pilot

HSS TiAlN KOR ~HRc 50

CODE NO	d	D	L	ANGLE
GEM SPC700010K	1.0M	4	50	120˚×60˚
GEM SPC700015K	1.5M	4	50	120˚×60˚
GEM SPC700020K	2.0M	6	50	120˚×60˚
GEM SPC700025K	2.5M	8	50	120˚×60˚
GEM SPC700030K	3.0M	8	55	120˚×60˚
GEM SPC700040K	4.0M	8	55	120˚×60˚
GEM SPC700050K	5.0M	10	65	120˚×60˚
GEM SPC700060K	6.0M	12	70	120˚×60˚
GEM SPC700080K	8.0M	16	80	120˚×60˚

CODE NO	d	D	L	ANGLE
GEM SPC750010K	1.0M	4	50	120˚×90˚
GEM SPC750015K	1.5M	4	50	120˚×90˚
GEM SPC750020K	2.0M	6	50	120˚×90˚
GEM SPC750025K	2.5M	8	50	120˚×90˚
GEM SPC750030K	3.0M	8	55	120˚×90˚
GEM SPC750040K	4.0M	8	55	120˚×90˚
GEM SPC750050K	5.0M	10	65	120˚×90˚
GEM SPC750060K	6.0M	12	70	120˚×90˚
GEM SPC750080K	8.0M	16	80	120˚×90˚

CARBIDE NC DOUBLE POINT DRILL-KOR



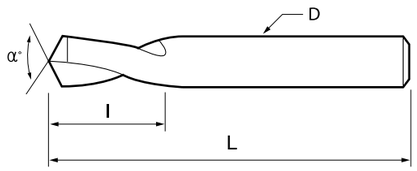
- HSS, TiALN, KOR
- For Centering
- Preventing Broken Pilot

WC | TiAlN | KOR | ~HRc 50

CODE NO	d	D	L	ANGLE
GEM SPC700010K	1.0M	4	44	120˚×60˚
GEM SPC700015K	1.5M	4	44	120˚×60˚
GEM SPC700020K	2.0M	6	52	120˚×60˚
GEM SPC700025K	2.5M	8	52	120˚×60˚
GEM SPC700030K	3.0M	8	52	120˚×60˚
GEM SPC700040K	4.0M	8	63	120˚×60˚
GEM SPC700050K	5.0M	10	63	120˚×60˚
GEM SPC700060K	6.0M	12	79	120˚×60˚
GEM SPC700080K	8.0M	16	79	120˚×60˚

CODE NO	d	D	L	ANGLE
GEM SPC750010K	1.0M	4	44	120˚×90˚
GEM SPC750015K	1.5M	4	44	120˚×90˚
GEM SPC750020K	2.0M	6	52	120˚×90˚
GEM SPC750025K	2.5M	8	52	120˚×90˚
GEM SPC750030K	3.0M	8	52	120˚×90˚
GEM SPC750040K	4.0M	8	63	120˚×90˚
GEM SPC750050K	5.0M	10	63	120˚×90˚
GEM SPC750060K	6.0M	12	79	120˚×90˚
GEM SPC750080K	8.0M	16	79	120˚×90˚

HSS CO NC SPOTTING DRILL

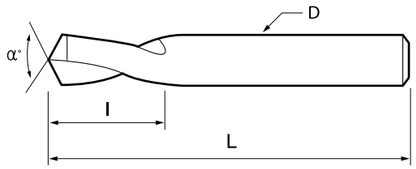


- SKH55(Co 5%), M35
- Helix 16°, ST Shank
- For Centering & Chamfering of tapping holes on one operation
- Only suitable for shallow drilling depth

SKH 55 | M35 | RH 16° | ST

CODE NO	D	L	l	d
GEM 900030	3	48	12	3
GEM 900040	4	53	13	4
GEM 900050	5	56	16	5
GEM 900060	6	62	20	6
GEM 900080	8	75	25	8
GEM 900100	10	85	25	10
GEM 900120	12	95	30	12
GEM 900140	14	105	34	14
GEM 900160	16	110	34	16
GEM 900200	20	125	38	20

LONG HSS NC SPOTTING DRILL



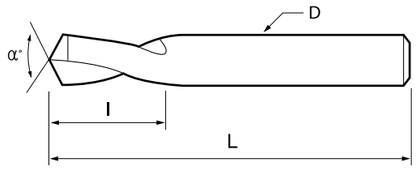
- SKH55(Co 5%), M35
- Helix 16°, ST Shank
- For Centering & Chamfering of tapping holes on one operation
- Only suitable for shallow drilling depth

SKH 55 | M35 | RH 16° | ST

SKH55-M35

CODE NO	D	L	l	d
GEM 910030	3	80	12	3
GEM 910040	4	100	15	4
GEM 910050	5	120	16	5
GEM 910060	6	140	20	6
GEM 910080	8	140	22	8
GEM 910100	10	170	36	10
GEM 910120	12	170	32	12
GEM 910160	16	200	36	16
GEM 910200	20	200	42	20

CARBIDE NC LEADING DRILL-TIALN



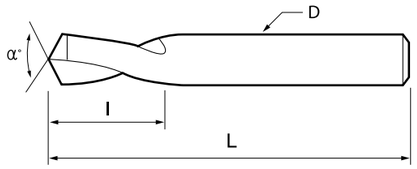
- Carbide, TiALN
- For Centering & Chamfering
- All Solid
- Form 90°

WC | ST | RH 10° | TiAlN

SKH55-M35

CODE NO	D	L	l	d
TLDS900030	3	44	12	3
TLDS900040	4	44	14	4
TLDS900050	5	52	16	5
TLDS900060	6	52	18	6
TLDS900080	8	63	24	8
TLDS900010	10	79	26	10
TLDS900012	12	79	26	12

CARBIDE V-MILL DRILL-FLAT TYPE



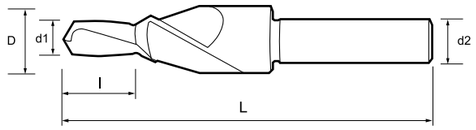
- Carbide
- For Centering & Chamfering
- For AL & V-Cutting
- Form 90°, ~HRc 50

WC ST ~HRc 50

SKH55-M35

CODE NO	D	L	l	d
C900020	2	40	10	2
C900030	3	45	12	3
C900040	4	45	14	4
C900050	5	54	16	5
C900060	6	54	18	6
C900080	8	65	24	8
C900100	10	80	26	10
C900120	12	80	26	12
C900140	16	100	28	16
C900160	16	100	28	16
C900200	20	120	35	20
C900250	25	150	40	25

HSS CO STEP DRILL-90° & 180°



- Drilling with Counter Sinking or Counter Boring

SKH 55 M35 ST

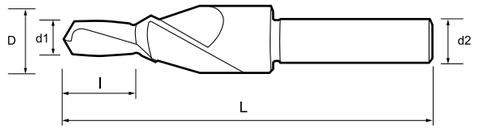
180°

CODE NO	PR NO	d1	D	d2	l	L
GEM STD1025050	M2.5	2.9	5.0	5.0	7	45
GEM STD1030060	M3.0	3.4	6.0	6.0	9	45
GEM STD1040080	M4.0	4.5	8.0	8.0	11	50
GEM STD1050100	M5.0	5.5	10.0	10.0	13	55
GEM STD1060110	M6.0	6.6	11.0	11.0	15	63
GEM STD1080150	M8.0	9.0	15.0	12.0	19	100
GEM STD1100180	M10.0	11.0	18.0	12.0	23	110
GEM STD1120200	M12.0	14.0	20.0	12.0	28	110
GEM STD1140240	M14.0	16.0	24.0	12.0	34	120

90°

CODE NO	PR NO	d1	D	d2	l	L
GEM STD030065	M3.0	3.2	6.5	6.0	9	45
GEM STD035076	M3.5	3.7	7.6	7.0	10	50
GEM STD040086	M4.0	4.3	8.6	8.0	11	50
GEM STD050104	M5.0	5.3	10.4	10.0	13	55
GEM STD060124	M6.0	6.4	12.4	12.0	15	63
GEM STD080164	M8.0	8.4	16.4	12.0	19	100
GEM STD100204	M10.0	10.5	20.4	12.0	23	110
GEM STD120250	M12.0	13.0	25.0	12.0	28	120

HSS CO STEP DRILL FOR TAP



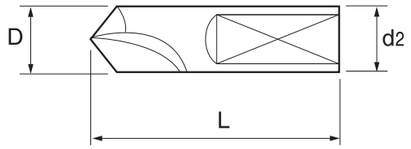
- For Tap Predrilling with Counter Sinking

SKH 55 | M35 | ST

90°

CODE NO	PR NO	d1	D	d2	l	L
GEM STD030040T	M3	2.5	4.0	4.0	8	52
GEM STD040050T	M4	3.3	5.0	5.0	11	58
GEM STD050060T	M5	4.2	6.0	6.0	13	66
GEM STD060066T	M6	5.0	6.6	6.0	16	70
GEM STD080090T	M8	6.8	9.0	9.0	20	84
GEM STD100110T	M10	8.5	11.0	10.0	24	95
GEM STD120140T	M12	10.2	14.0	12.0	29	107
GEM STD140160T	M14	12.0	16.0	12.0	32	115
GEM STD160180T	M16	14.0	18.0	12.0	34	135

PILOT DRILL



- SKH59(CO 8%) M42
- For Centering
- Oil Coolant

SKH 59 | M42 | TiN | TiAlN

CODE NO	Pr No.	L	D
GEM TPD0060	6 M	30	6
GEM TPD0080	8 M	35	8
GEM TPD0100	10 M	35	10
GEM TPD0120	12 M	38	12
GEM TPD0160	16 M	45	16
GEM TPD0200	20 M	45	20
GEM TPD0250	25 M	56	25
GEM TPD0300	30 M	68	30

E

INDUSTRIAL CERAMICS

NEW TECHNOLOGY PRODUCTS WHICH WILL CONTRIBUTE TO THE PRODUCTIVITY OF ALL KINDS OF INDUSTRIES.

Union Materials Corporation has utilized its technologies with expertise accumulated since 1962 manufacturing experiences of various materials like advanced inorganic materials and cement.

Fine ceramics of Union have enjoyed a world-wide fame infields of industries from electro-electric industry to automobile and chemical industries.

CERAMICS FOR FAUCET

With state-of-the-art facilities and technologies, Union has been supplying various types of ceramics all over the world. Enjoy the world best technologies for surface grinding, geometrical accuracy and chemicophysical stability.

PART.
E
TECH-
NICAL
DATA

CERAMICS FOR FIBER OPTIC FERRULE

Fiber optic ferrule with ultra high precision satisfies customers' requirement of concentricity, straightness and roundness that are essential to the quality.
The unique technologies of powder-compounding and nearnet shape of mould guarantee customers' easy processing and short production lead time.

CERAMICS FOR METALIZED PARTS

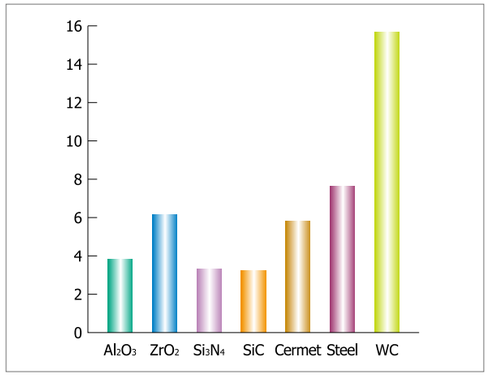
As the world biggest supplier of metalizing ceramics, Union has the strong point in metalizing and plating technologies for insulating parts such as ceramics for microwave oven and various interruptors.

BIO-CERMAICS AND OTHERS

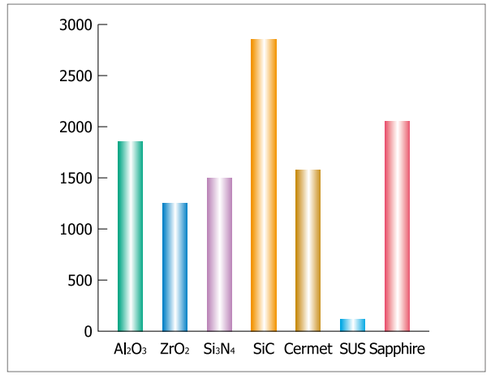
Following the various needs from the industries overall, Union has been developing the best of the best technology maximizing unique characteristics of ceramics; wear-resistance, anti-corrosiveness, thermal shock-resistance and electric insulation.
Now our products are; dental implant, extruding dies, fixtures, guides, oxygen sensors, shafts, seals, balls, nozzles, cutters, various jigs for electro-electric areas, automobile industry and etc.

PROPERTIES OF FINE CERAMICS

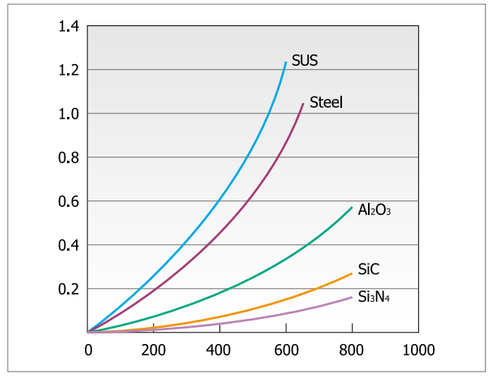
DENSITY(g/cm³)



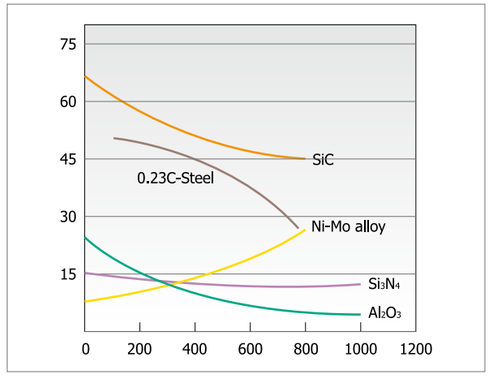
HARDNESS(Kg/mm²)



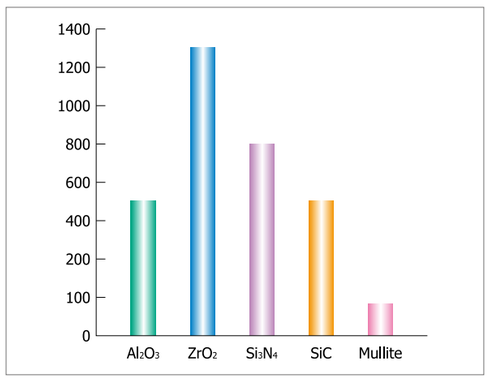
THERMAL EXPANSION(%)



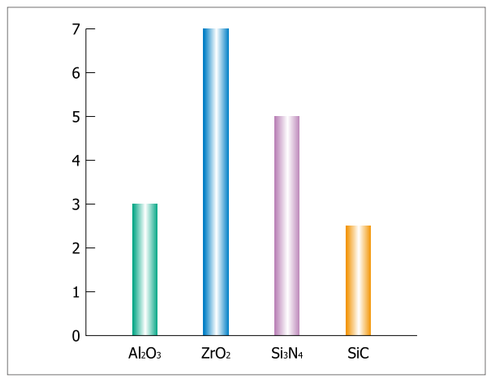
THERMAL CONDUCTIVITY(ω/mK)



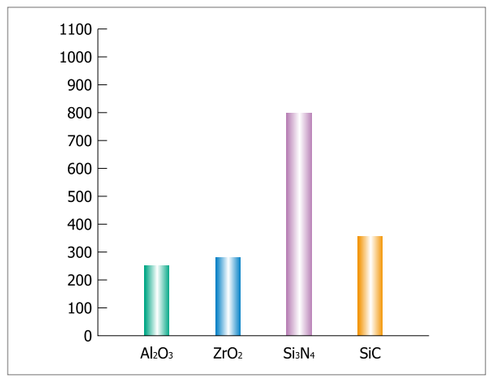
BENDING STRENGTH(MPa)



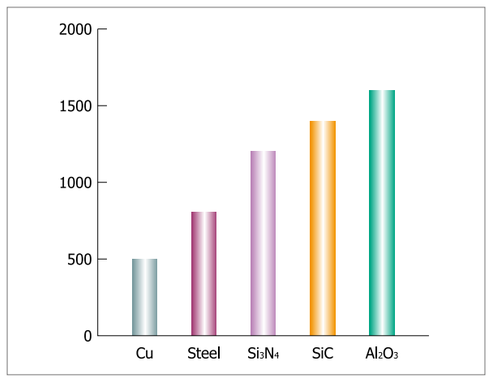
TOUGHNESS(MPa · √m)



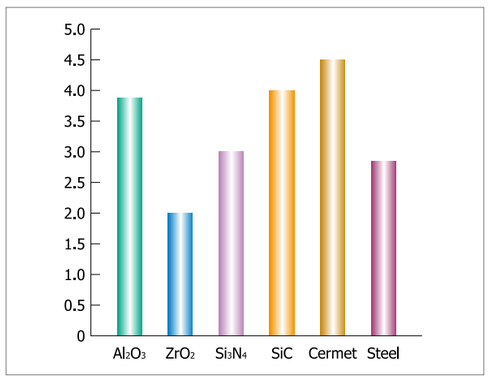
THERMAL SHOCK(ΔT, ℃)



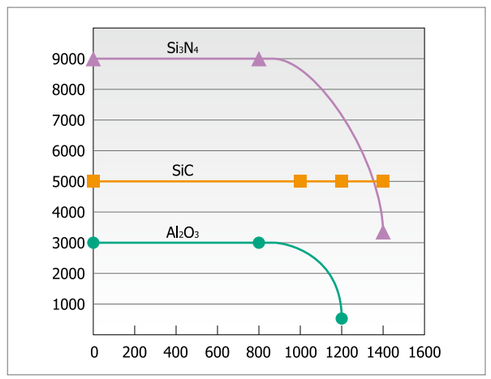
WORKING TEMP.(℃, in air)



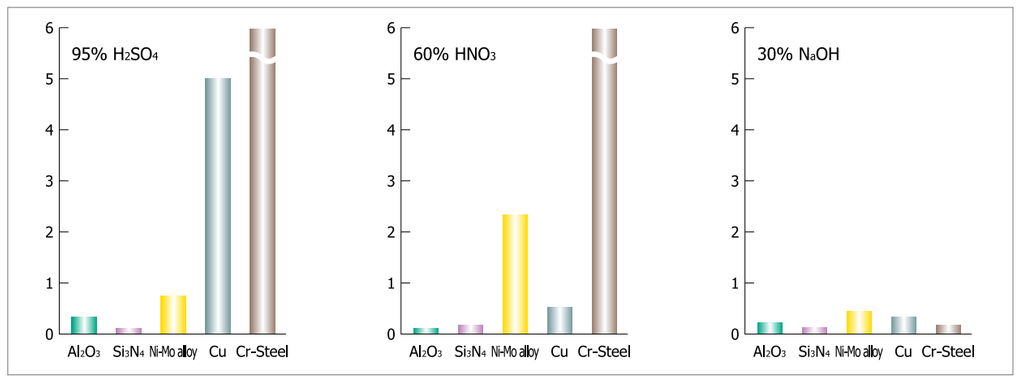
YOUNG'S MODULS(10⁶kg/cm²)



HIGH TEMPERATURE STRENGTH(kg/cm²)



CORROSION RESISTANCE(mg/cm³, boiling, 30min.)



PART. E TECH-NICAL DATA

PROPERTIES OF FINE CERAMICS

Materials		Al203		ZrO2	
Properties	Grade	SYAL 995	SYAL 950	SYZR-1	SYZR-2
Density(g/cm3)		3.94	3.77	6.10	5.45
Hardness(kg/mm2)		1,800	1,400	1,250	1,500
Toughness(MPa · √m)		3.0	2.0	7.0	5.5
Bending Strength(MPa)		500	380	1,300	2,000
Young's Modulus(106kg/cm2)		3.8	3.3	2.0	2.5
Specific Heat(cal/g · ℃)		0.19	0.19	-	-
Thermal Expansion Coeff.(×10-6/℃)		7.5	8.0	9.5	8.7
Thermal Shock(ΔT, ℃)		250	200	280	400
Thermal Conductivity(ω/mK)		23	23	3.0	7.0
Working Temperature(℃)		1,600	1,500	800	1,000
Corrosion Resistance	**Acid**	Excellent	Good	Good	Good
	Alkali	Excellent	Good	Good	Good
Merit		Wear resistance Anti-corrosion High temp. application High purity	Wear resistance Anti-corrosion High temp. application	High strength Wear resistance High toughness Insulation for heat	High strength Wear resistance High toughness Insulation for heat

Materials		Si3N4			SiC
Properties	Grade	SYSN-1	SYSN-2	SYSN-3	SYSC-1
Density(g/cm3)		3.24	3.26	3.32	3.20
Hardness(kg/mm2)		1,500	1,600	1,500	2,800
Toughness(MPa · √m)		5.0	6.0	4.9	2.5
Bending Strength(MPa)		800	1,000	900	500
Young's Modulus(106kg/cm2)		3.0	3.2	3.0	4.0
Specific Heat(cal/g · ℃)		0.19	0.19	0.19	0.16
Thermal Expansion Coeff.(×10-6/℃)		2.8	3.0	2.8	4.2
Thermal Shock(ΔT, ℃)		800	800	800	350
Thermal Conductivity(ω/mK)		29	29	40	120
Working Temperature(℃)		1,200	1,200	1,200	1,400
Corrosion Resistance	**Acid**	Good	Good	Good	Excellent
	Alkali	Good	Good	Good	Excellent
Merit		High temp. strength High thermal shock resistance Wear resistance Anti-corrosion	High temp. strength Wear resistance Anti-corrosion	High temp. strength High thermal shock resistance Wear resistance Anti-corrosion	High temp. strength Wear resistance Anti-corrosion Excellent hardness

MEMO

TURNING & MILLING

TURNING & MILLING

ENDMILL & DRILL

CHUCK

REAMER

C

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L

S

MEMO

MEMO

union materials

Best Choice for High Productivity

by Union

CERABIT