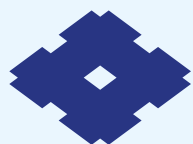


2018 ▶ 2019

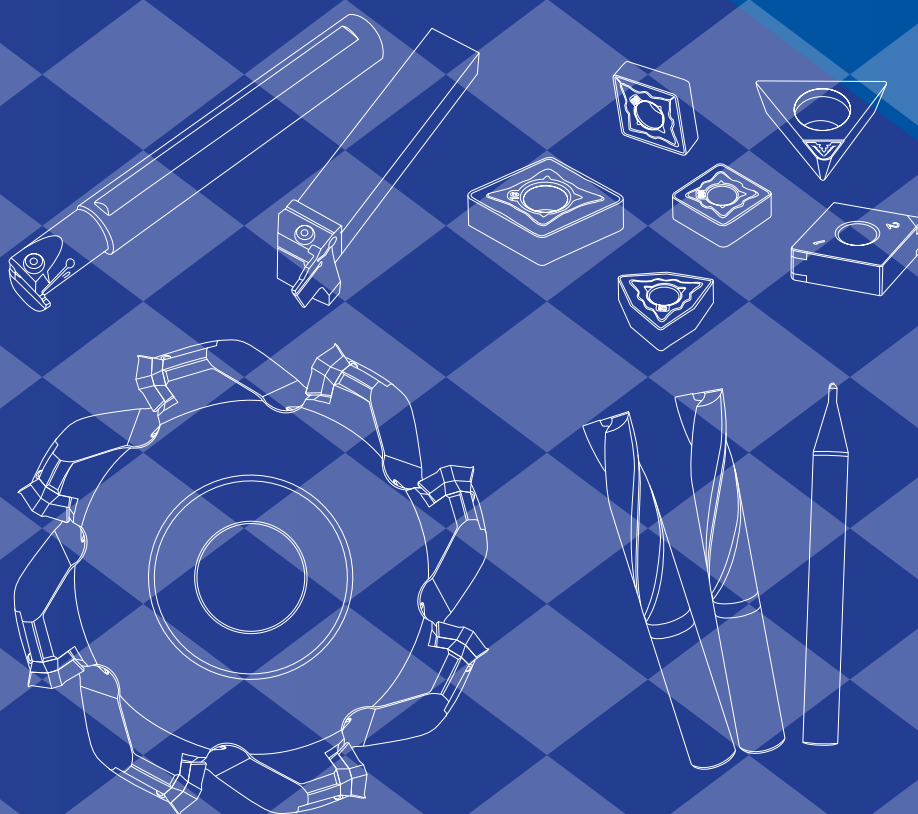
General Catalogue



SUMITOMO

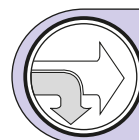
CARBIDE - CBN - DIAMOND

# PERFORMANCE CUTTING TOOLS



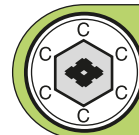
SUMITOMO ELECTRIC





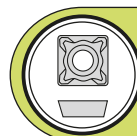
# A

Insert  
Selection



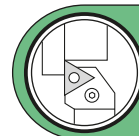
# B

Grades



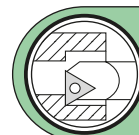
# C

Negative  
& Positive  
Inserts



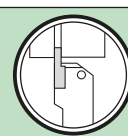
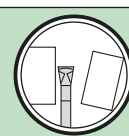
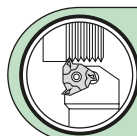
# D

External  
Holders



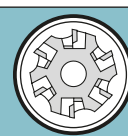
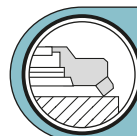
# E

Boring  
Bars



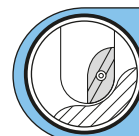
# F

Parting-Off  
Grooving  
Threading  
Holders



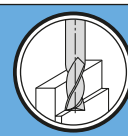
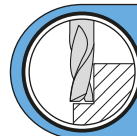
# G

Milling  
Cutters



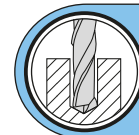
# H

Indexable  
Endmills



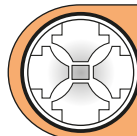
# J

Solid  
Carbide  
Endmills



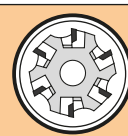
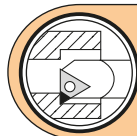
# K

Multi-Drills



# L

SumiBoron  
SumiDia



# M

CBN/PCD  
Inserts &  
Tools



# N P

Guidance  
Spare Parts  
Index

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 **Insert Selection A1 ~**

 **Grades B1 ~**

 **Inserts C1 ~**  
Negative Type

 **Inserts C57 ~**  
Positive Type

 **External Holders D1 ~**

 **Boring Bars E1 ~**

 **Grooving Holders Parting-Off Holders F1 ~**

 **Threading Holders F43 ~**

Negative / Positive

 **80° Diamond Type C18 C57**

 **55° Diamond Type C25 C63**

 **Round Type C66**

 **Square Type C33 C67**

 **60° Triangular Type C40 C70**

 **35° Diamond Type C49 C80**

 **80° Trigon Type C52 C84**

 **CBN Inserts M1~**

 **PCD Inserts M1~**

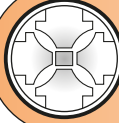
 **Guidance N1 ~**




 **Milling Cutters G1 ~**

 **Multi-Drills K1 ~**

 **Milling Cutters G43~**  
High Feed / Special Purpose Cutters

 **SumiBoron L1 ~**  
CBN Grades

 **Indexable Endmills H1 ~**

 **SumiDia L22 ~**  
PCD Grades

 **Endmills J1 ~**  
Coated Solid Types

 **CBN / PCD M1 ~**  
Inserts and Tools

 **Endmills J41 ~**  
Uncoated Solid Types

 **Spare Parts P1 ~**

 **Index P9 ~**

## Notice

Thank you for using the Sumitomo Electric Hardmetal General Catalogue  
(Sumitomo/SUMIBORON/SUMIDIA Cutting Tools Catalogue).

This catalogue presents the major items in the Sumitomo Cutting Tools product line.

The catalogue is organised as follows:

- (1) Cutting Tool Grades
- (2) Sumitomo Products
- (3) SUMIBORON, SUMIDIA Products

Ask for our brochures and pamphlets.

This catalogue is current as of January 2018.

As a result of our ongoing research, product may reflect enhancements in quality, performance and specifications not listed in this catalogue.

To order Sumitomo/SUMIBORON/SUMIDIA products, contact your nearest Sumitomo Electric Hardmetal dealer or distributor.

For inquiries or other requests, feel free to contact your nearest sales office.

## Stock Marking Chart

● : Euro stock item

○ : Japan stock item

□ : Delivery on request

▲ : To be replaced by new item

□ : Made to order item

— : We cannot produce

**Note:**

Stocking policy may change without prior notice, please consult our sales representative for actual stock situation.

## Meaning of Icons

### Common



Featured for the first time in this catalogue

### Grade

ISO classification of work material:



Steel



Stainless Steel



Cast Iron



Non Ferrous Alloy



Exotic Alloy



Hardened Steel

### Endmill

Shape



Sharp edge



Corner with honing



Helix angle (ex.)



Radius



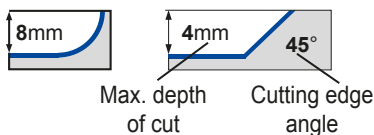
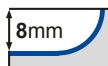
Ballnose

No. of teeth



Flutes

### Milling Cutter



Max. depth of cut

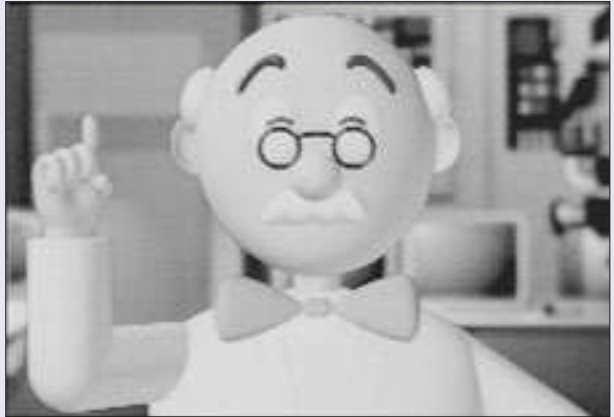
Cutting edge angle

# Insert Selection

# A



**A1 ~ A20**



Insert Selection

Insert Selection	<b>Sumitomo Grades (Turning) .....</b> A2 <b>Sumitomo Grades (Milling) .....</b> A3
Chipbreaker and Grade Selection	<b>Steel Turning Inserts .....</b> A 4 - 7 <b>Stainless Steel Turning Inserts .....</b> A 8 - 9 <b>Cast Iron Turning Inserts .....</b> A10-11 <b>Exotic Alloy Inserts .....</b> A12-13 <b>Hardened Steel Turning Inserts .....</b> A14-15 <b><span style="background-color: yellow; border: 1px solid black; padding: 2px;">New</span> Non-Ferrous Metal Turning Inserts.....</b> A16-17 <b>Small Product Machining .....</b> A18-19

# Selection of Sumitomo Grades (Turning)

According to Work Materials and Applications

Insert Selection

Cutting Process	<b>P General Steel (Carbon Steel, Alloy Steel), Soft Steel</b>						<b>M Stainless Steel</b>					<b>K Cast Iron</b>					
	High-Speed	Finishing to Light		Medium	Rough to Heavy		High-Speed	Finishing to Light	Medium	Rough to Heavy		High-Speed	Finishing	Medium			
	Wear Resistance ←			→ Fracture Resistance			Wear Resistance ←			→ Fracture Resistance			Wear Resistance ←		→ Fracture Resistance		
ISO Classification	-	P01	P10	P20	P30	P40	-	M01	M10	M20	M30	M40	-	K01	K10	K20	K30
<b>Coated Carbide</b>		AC805P	AC810P	New AC8025P	AC820P	AC830P		New AC6020M		AC6030M	AC6040M			AC405K			
<b>Small Product Machining</b>			New AC1030U						New AC1030U					New AC1030U			
<b>Coated Cermet</b>		T1500Z		T3000Z													
<b>Cermet</b>		T1000A		T1500A				T1000A	T1500A					T1000A			
<b>Carbide</b>			ST10P	ST20E	A30									G10E			
<b>Uncoated CBN</b>																	BNS800
<b>Coated CBN</b>																	BN7000
																	BNC500

Cutting Process	<b>S Exotic Alloy</b>					<b>H Hardened Steel</b>				<b>N Non-Ferrous Metal</b>				<b>Sintered Components</b>						
	High-Speed	Light		Medium		High-Speed	Light	Medium		High-Speed	Light	Medium		High-Speed	Light	Medium				
	Wear Resistance ←			→ Fracture Resistance		Wear Resistance ←			→ Fracture Resistance		Wear Resistance ←		→ Fracture Resist.		Wear Resistance ←		→ Fracture Resist.			
ISO Classification	-	S01	S10	S20	S30	-	H01	H10	H20	H30	-	N01	N10	N20	N30	-	01	10	20	30
<b>Coated Carbide</b>			AC510U	AC520U				New AC503U												AC510U
<b>Cermet</b>																				T1000A
<b>Carbide</b>			EH510	EH520											H1					
<b>Coated CBN</b>								BNC2010		BNC2020										
								BNC100		BNC160										
										BNC200										
<b>Uncoated CBN</b>			BN7000					BN1000		BN2000										BN7500
																				BN7000
<b>PCD</b>																				DA1000
																				DA150



# Selection of Sumitomo Grades (Milling)

According to Work Materials and Applications

Insert Selection

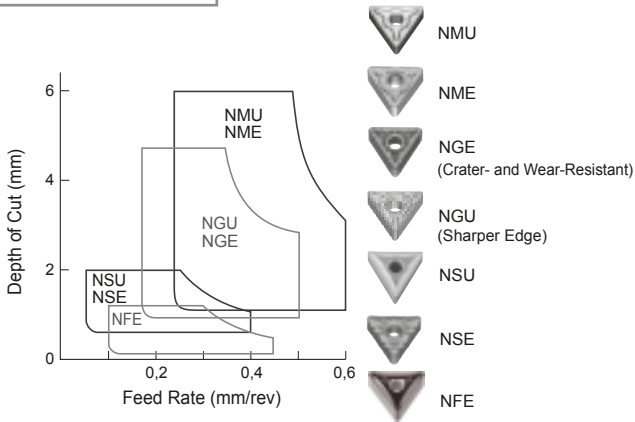
Cutting Process	<b>P</b> General Steel (Carbon Steel, Alloy Steel), Soft Steel					<b>M</b> Stainless Steel					<b>K</b> Cast Iron									
	High-Speed	Finishing to Light	Medium	Rough to Heavy		High-Speed	Finishing to Light	Medium	Rough to Heavy		High-Speed	Finishing	Medium							
	Wear Resistance ← Fracture Resistance →					Wear Resistance ← Fracture Resistance →					Wear Resistance ← Fracture Resistance →									
ISO Classification	—	P01	P10	P20	P30	P40	—	M01	M10	M20	M30	M40	—	K01	K10	K20	K30			
Coated Carbide			ACP100					ACM100		ACM200		ACM300		ACK100			ACK200			ACK300
Cermet		T250A						T250A		T4500A										
Carbide				A30N							A30N					G10E				
Uncoated CBN Coated CBN																	BNS800			BN7000

Cutting Process	<b>S</b> Exotic Alloy					<b>H</b> Hardened Steel				<b>N</b> Non-Ferrous Metal								
	High-Speed	Finishing to Light	Medium	Rough to Heavy		High-Speed	Light	Medium		High-Speed	Light	Medium						
	Wear Resistance ← Fracture Resistance →					Wear Resistance ← Fracture Resistance →				Wear Resistance ← Fracture Resistance →								
ISO Classification	—	S01	S10	S20	S30	S40	—	H01	H10	H20	H30	—	N01	N10	N20	N30		
Coated Carbide			ACM100												DL1000			
Carbide				EH520												H1		
Uncoated CBN										BN7000								
PCD									BN350								DA1000	

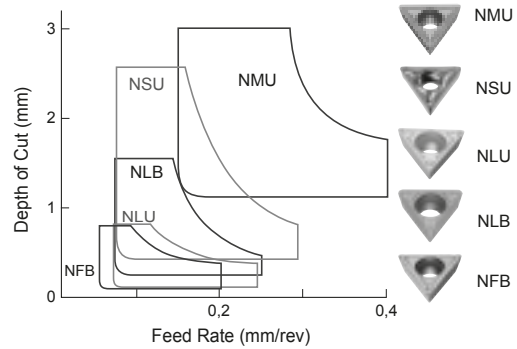
█ █ █ █ █ : 1st Recommendation  
   : 2nd Recommendation  
 ▽ : CVD Coating  
 ▲ : PVD Coating  
 Blank: Uncoated

### Main Chipbreakers

#### Negative Type



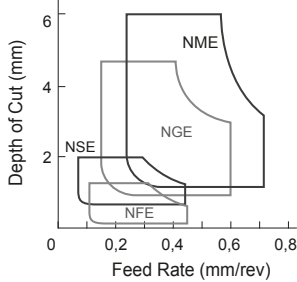
#### Positive Type



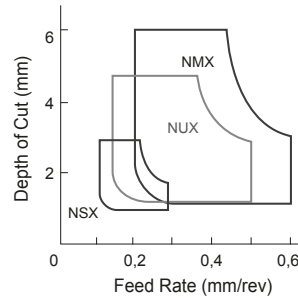
### Sub-Chipbreakers

#### Negative Type

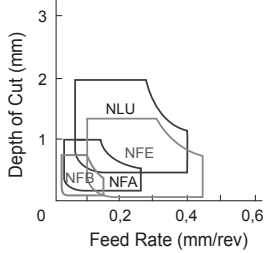
##### Chipbreakers for High-Efficiency Machining



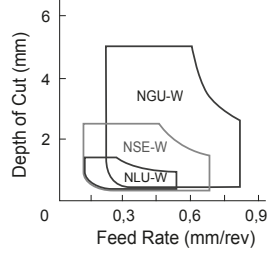
##### Strong Edge Chipbreakers



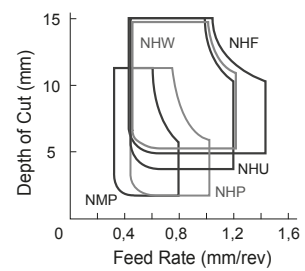
##### Chipbreakers for Small Depths



##### Wiper Inserts

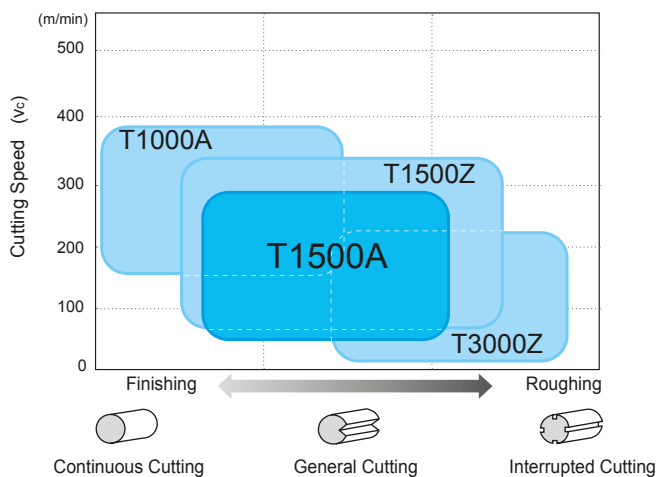


##### Chipbreakers for Heavy Cutting

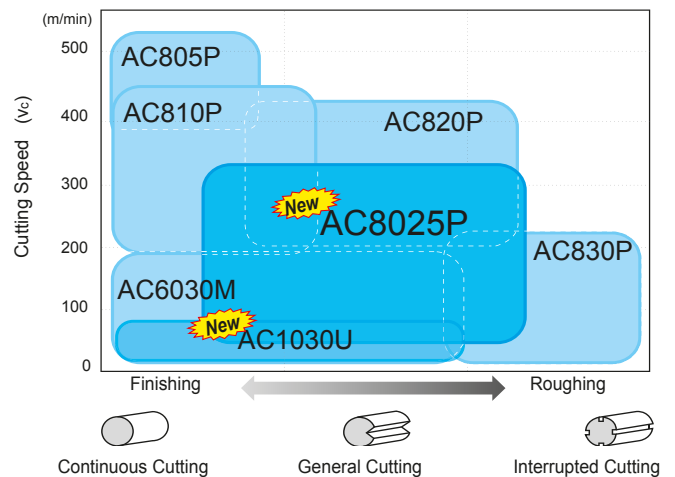


### Grades

#### ● Fine Finishing to Finishing



#### ● Finishing to Rough Cutting



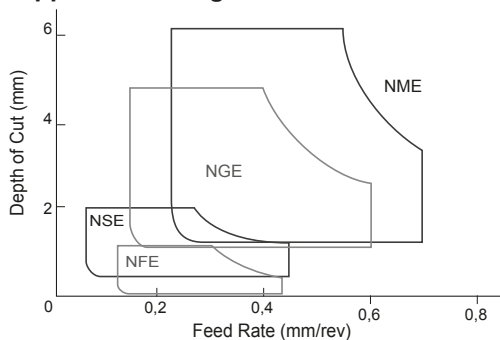
**P Recommended Cutting Conditions**

(Min. - Optimum - Max.)

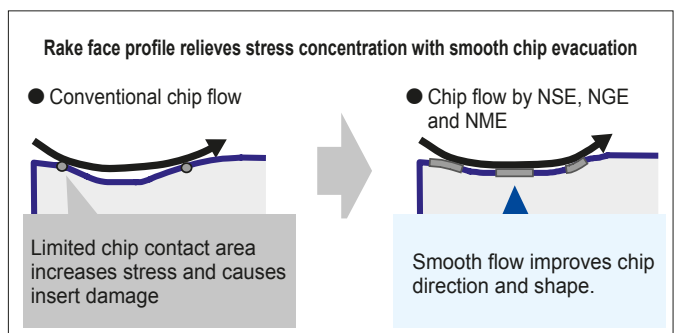
Work Material	Cutting Process	Chipbreaker	Grade	Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (mm/min)
Soft Steel	Fine Finishing	NFL	<b>T1500Z</b>	0,2- <b>0,6</b> -1,0	0,05- <b>0,15</b> -0,25	100- <b>250</b> -400
	Finishing	NSE	<b>AC805P</b>			
	Finishing	NLU	<b>AC810P</b>	0,5- <b>1,0</b> -1,5	0,1- <b>0,25</b> -0,4	260- <b>340</b> -420
	Medium Cutting	NGU	<b>AC820P</b>			
	Medium Cutting	<b>NGU</b>	<b>AC8025P</b>	1,0- <b>2,5</b> -4,0	0,2- <b>0,35</b> -0,5	200- <b>260</b> -320
	Roughing	NMU	<b>AC830P</b>	2,0- <b>4,0</b> -6,0	0,3- <b>0,45</b> -0,6	140- <b>180</b> -220
Medium Carbon Steel	Fine Finishing	NFL	<b>T1500Z</b>	0,2- <b>0,6</b> -1,0	0,05- <b>0,15</b> -0,25	100- <b>200</b> -300
	Finishing	NSE	<b>AC805P</b>			
	Finishing	NLU	<b>AC810P</b>	0,5- <b>1,0</b> -1,5	0,1- <b>0,25</b> -0,4	210- <b>275</b> -340
	Medium Cutting	NGU	<b>AC820P</b>			
	Medium Cutting	<b>NGU</b>	<b>AC8025P</b>	1,0- <b>2,5</b> -4,0	0,2- <b>0,35</b> -0,5	150- <b>190</b> -230
	Roughing	NMU	<b>AC830P</b>	2,0- <b>4,0</b> -6,0	0,3- <b>0,45</b> -0,6	110- <b>135</b> -160
High Carbon Steel	Fine Finishing	NFL	<b>T1500Z</b>	0,2- <b>0,6</b> -1,0	0,05- <b>0,15</b> -0,25	50- <b>150</b> -250
	Finishing	NSE	<b>AC805P</b>			
	Finishing	NLU	<b>AC810P</b>	0,5- <b>1,0</b> -1,5	0,1- <b>0,25</b> -0,4	170- <b>225</b> -280
	Medium Cutting	NGU	<b>AC820P</b>			
	Medium Cutting	<b>NGU</b>	<b>AC8025P</b>	1,0- <b>2,5</b> -4,0	0,2- <b>0,35</b> -0,5	130- <b>165</b> -200
	Roughing	NMU	<b>AC830P</b>	2,0- <b>4,0</b> -6,0	0,3- <b>0,45</b> -0,6	90- <b>120</b> -150

● Shared Features of the High Efficiency Chipbreaker Series

● Application Range



● Characteristics



### Grades

AC805P / AC810P / AC820P / **AC8025P** / AC830P / AC1030U

New

New

AC800P Series covers a wide range of machining applications from high speed to interrupted cutting.

- All grades feature Super FF Coat, which has excellent wear and chipping resistance.
- Versatile GE Type chipbreaker suited to high-feed applications. High efficiency, long tool life.

**AC805P:** The ultra-thick alumina coating achieves excellent wear resistance at high speed cutting above 300 m/min under dry cutting conditions.

**AC810P:** In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a tough, thick Alumina coating enhanced by newly developed grain growth control technology, excellent wear resistance and long tool life in high-speed, high-feed cutting.

**AC820P:** In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a high-density structured FF-Al<sub>2</sub>O<sub>3</sub> layer using new smooth surface treatment technology, and also employs coating thickness control technology to achieve excellent versatility, stability, and long tool life.

**AC8025P:** Employs Absotech Platinum, a new CVD coating. This grade has excellent adhesion and chipping resistance thanks to the smooth surface treatment and reduction in tensile stress of the coating to achieve a stable, long tool life.

**AC830P:** In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a strengthened FF-Al<sub>2</sub>O<sub>3</sub> layer using new stress control technology, and moreover provides excellent reliability and wear-resistance in heavy interrupted cutting to achieve long tool life.

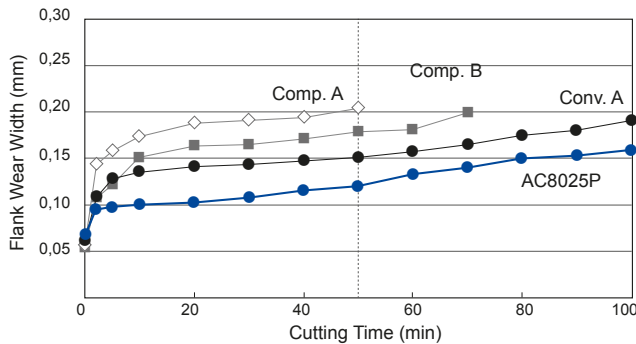
**AC1030U:** Employs Absotech Bronze, a new PVD coating and exclusive tough carbide substrate. This grade reduces adhesion and microchipping with a high-quality cutting edge to achieve excellent machined surface quality.

### Performance

#### AC8025P

##### ● Wear Resistance (Medium-Speed $v_c=200\text{m/min}$ )

Excellent wear resistance in medium-speed cutting.



Work Material: 34CrMo4, Toolholder: PCLNR2525M12, Insert: CNMG120408NSE  
Cutting Conditions:  $v_c=200\text{m/min}$ ,  $f=0,2\text{mm/rev}$ ,  $a_p=1,5\text{mm}$ , Wet



AC8025P



Conv. A



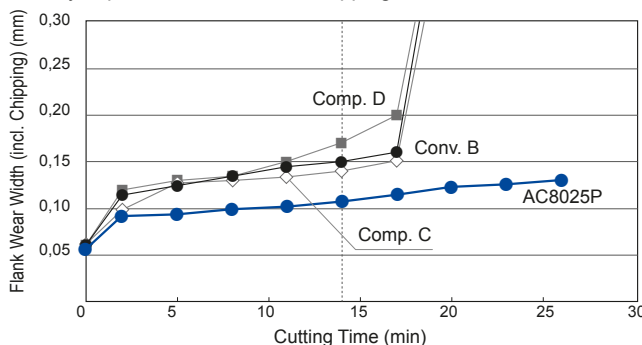
Comp. A



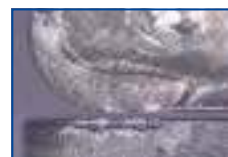
Comp. B

##### ● Adhesion and Chipping Resistance

Greatly improved adhesion and chipping resistance with an advanced coating and smooth surface treatment.



Work Material: 15CrMo5, Toolholder: PCLNR2525M12, Insert: CNMG120408NGU  
Cutting Conditions:  $v_c=300\text{m/min}$ ,  $f=0,3\text{mm/rev}$ ,  $a_p=1,5\text{mm}$ , Wet



AC8025P



Conv. B



Comp. C



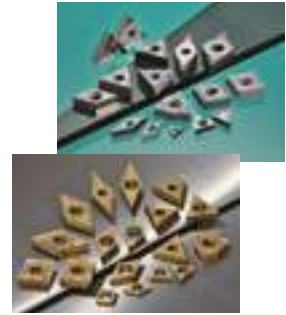
Comp. D

**Grades T1000A / T1500A / T1500Z**

**T1000A:** An uncoated cermet grade designed with wear resistance in mind that provides long tool life and excellent wear resistance in continuous finishing and profiling applications.

**T1500A:** A general purpose uncoated cermet grade that provides excellent value for money and delivers improved finished surface quality while providing good wear and fracture resistance.

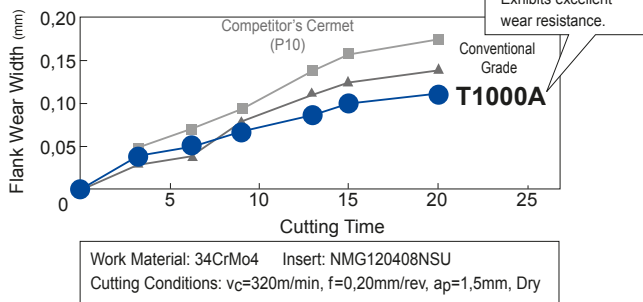
**T1500Z:** Superior turning quality thanks to „Brilliant Coat“. PVD coating with excellent adhesion resistance. A general purpose coated cermet grade capable of maintaining high-quality finished surfaces while providing excellent wear resistance.



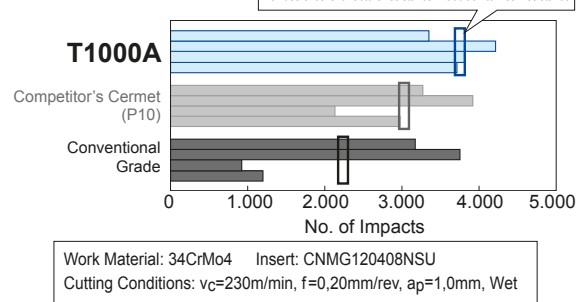
**Performance**

**T1000A**

● **Wear Resistance**

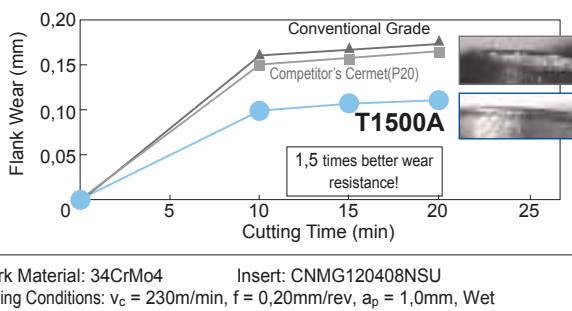


● **Fracture Resistance**



**T1500A**

● **Wear Resistance**

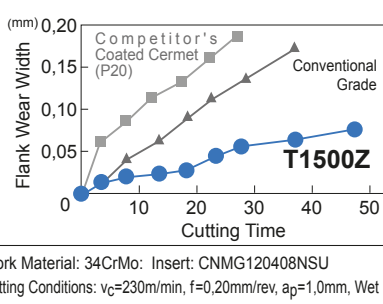


● **Machined Surface Finish**

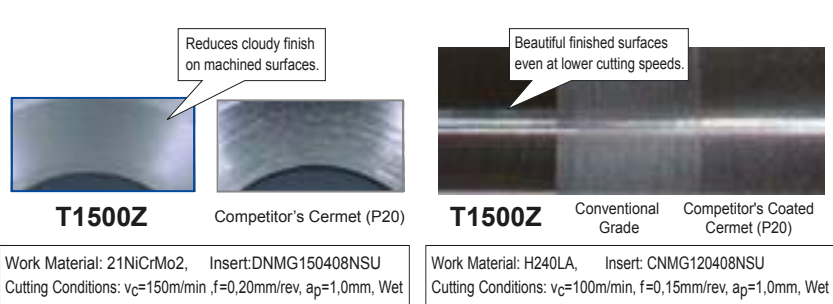


**T1500Z**

● **Wear Resistance**



● **Machined Surface Finish**



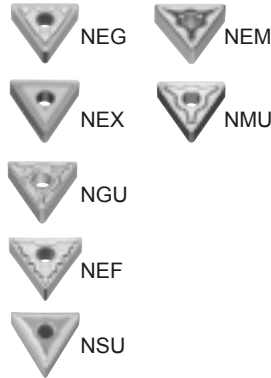
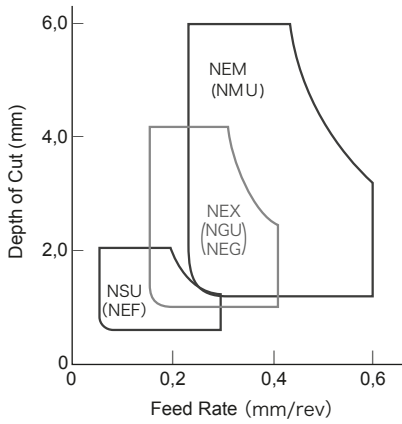
**P Recommended Cutting Conditions**

(Min. - Optimum - Max.)

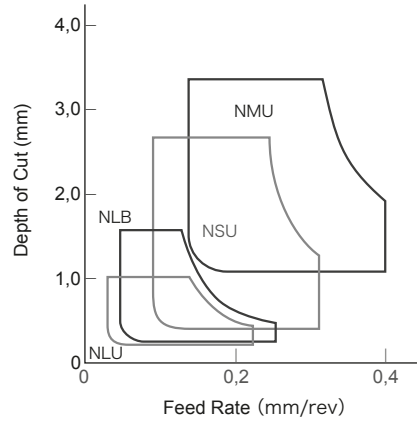
Work Material	Cutting Process	Chipbreaker	Grades	Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Soft Steel	Fine Finishing	NFA / NFL	T1500Z	0,2-0,5-1,0	0,05-0,15-0,25	150-280-400
	Finishing	NLU	T3000Z	0,3-1,0-1,8	0,08-0,20-0,35	150-280-400
Alloy Steel Carbon Steel	Fine Finishing	NFA / NFL	T1500A	0,2-0,5-1,0	0,05-0,15-0,25	100-200-300
	Finishing	NSU / NSE	T1500A	0,5-1,0-2,0	0,08-0,20-0,35	100-200-300
	Medium	NGU	T1500Z	0,8-2,2-4,0	0,15-0,25-0,50	100-200-300
High Carbon Steel Carbon Steel	Fine Finishing	NFA / NFL	T1000A	0,2-0,5-1,0	0,05-0,15-0,25	50-150-250
	Finishing	NSU / NSE	T1500Z	0,5-1,0-2,0	0,08-0,20-0,35	50-150-250
	Medium	NGU	T1500Z	0,8-2,2-4,0	0,15-0,25-0,50	50-150-250

### Chipbreakers

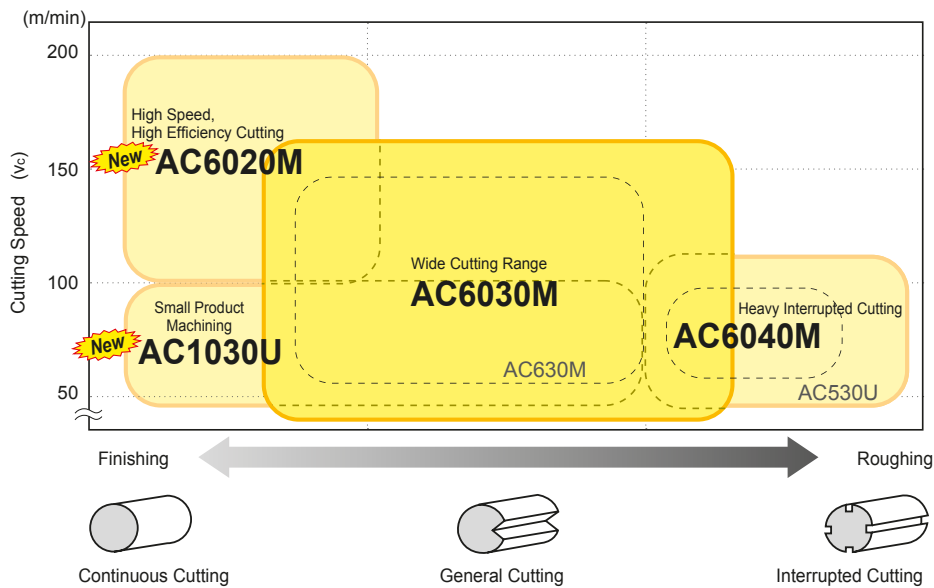
#### Negative Type



#### Positive Type



### Grades



### M Recommended Cutting Conditions

(Min. - Optimum - Max.)

Work Material			Cutting Range	Chipbreaker	Grade	Cutting Conditions		
						Depth of Cut $a_p$ (mm)	Feed Rate $f$ (mm/rev)	Cutting Speed $v_c$ (m/min)
Cr-Based	Ferritic Materials	X6CrAl 13, X8CrNiS 18 9, X29CrS 13, X6CrMoS 17, X12CrS 13	Finishing	NEF (NSU)	AC6020M	0,5-1,5-2,0	0,05-0,15-0,25	170-230-300
			Medium	NEG · NEX · NGU	AC6030M	1,0-2,5-4,0	0,10-0,25-0,40	140-170-250
			Roughing	NEM	AC6040M	1,5-3,5-6,0	0,20-0,35-0,60	140-170-200
	Martensitic Materials	X12Cr 13, X20Cr 13, X30Cr 13, X6Cr 17, X19CrNi 17 2, X6CrNi 18 9	Finishing	NEF (NSU)	AC6020M	0,5-1,5-2,0	0,05-0,15-0,25	120-180-240
			Medium	NEG · NEX · NGU	AC6030M	1,0-2,5-4,0	0,10-0,25-0,40	100-150-200
			Roughing	NEM	AC6040M	1,5-3,5-6,0	0,20-0,35-0,60	80-130-180
Cr/Ni-Based	Austenitic Materials	X5CrNi 18 10, X2CrNi 19 11, X2CrNiMo 18 10, X4CrNiMo 17 12 2, X2CrNiMo 17 12 2, X5CrNiMo 17 13, X6CrNiTi 18 10, X7CrMo 15	Finishing	NEF (NSU)	AC6020M	0,5-1,5-2,0	0,05-0,15-0,25	120-180-240
			Medium	NEG · NEX · NGU	AC6030M	1,0-2,5-4,0	0,10-0,25-0,40	100-150-200
			Roughing	NEM	AC6040M	1,5-3,5-6,0	0,20-0,35-0,60	80-130-180
	Two-Phase (Austenite / Ferrite) Materials	X5CrNi 17 7, X2CrNi 18 9, X6CrNi 25 20, X2CrNiMoN 17 12 2, X6CrNiNb 18 10	Finishing	NEF (NSU)	AC6030M	0,5-1,5-2,0	0,05-0,15-0,25	100-145-180
			Medium	NEG · NEX · NGU	AC6030M	1,0-2,5-4,0	0,10-0,25-0,40	80-120-160
			Roughing	NEM	AC6040M	1,5-3,5-6,0	0,20-0,35-0,60	70-100-140
	Precipitation Hardening	X5CrNiCuNb 16 4, X7CrNiAl 17 7, X4CrNiMo 27 5 2, X2CrNiMoN 22 5 3, X2CrNiMoCuN 25 6 3	Finishing	NEF (NSU)	AC6030M	0,5-1,5-2,0	0,05-0,15-0,25	90-115-140
			Medium	NEG · NEX · NGU	AC6030M	1,0-2,5-4,0	0,10-0,25-0,40	70-90-110
			Roughing	NEM	AC6040M	1,5-3,5-6,0	0,20-0,35-0,60	50-80-120

**Grades**

**New**

**AC6020M / AC6030M / AC6040M / AC1030U**

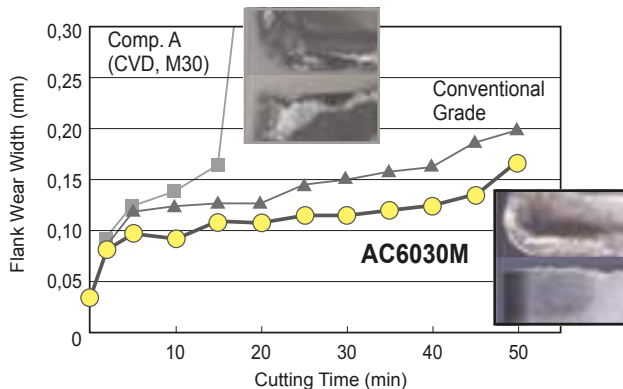
**New**

- AC6020M:** Employs "Absotech Platinum", a new CVD coating. The first recommended grade for continuous stainless steel machining that achieves a good balance between wear resistance and fracture resistance by combining a hardened substrate with excellent wear resistance.
- AC6030M:** Employs "Absotech Platinum", a new CVD coating. The first recommended grade for general machining of stainless steel that drastically reduces the occurrence of abnormal damage, which is a problem in stainless steel machining. Achieves long and stable machining thanks to the improved coating strength and excellent adhesion.
- AC6040M:** Employs "Absotech Bronze", a new PVD coating and exclusive tough carbide substrate. The first recommended grade for interrupted machining of stainless steel that drastically improves the reliability in unstable machining thanks to the excellent adhesion and peel-off resistance of the new PVD coating as well as the improved fracture resistance of the exclusive carbide substrate.
- AC1030U:** Employs "Absotech Bronze", a new PVD coating with a special tough carbide substrate. Achieving excellent machined surface quality with a high-quality cutting edge that reduces adhesion and micro-chipping.

**Performance**

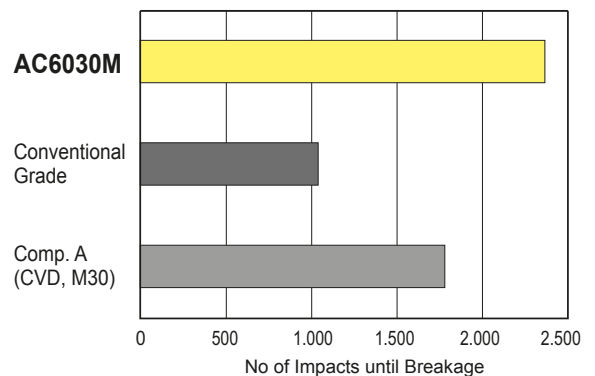
**AC6030M**

● **Continuous Cutting**



Work Material: X6CrMo17 12 2      Insert: CNMG 120408 NEX  
Cutting Conditions:  $v_c=200\text{m/min}$ ,  $f=0,2\text{mm/rev}$ ,  $d_{oc}=2,0\text{mm}$ , Wet

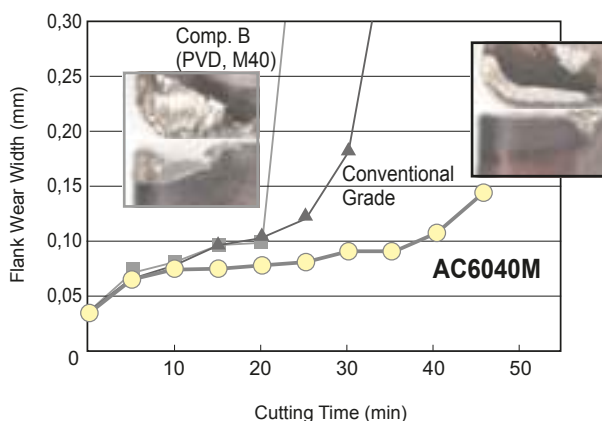
● **Interrupted Cutting**



Work Material: X6CrMo17 12 2      Insert: CNMG 120408 NGU  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,1\text{mm/rev}$ ,  $d_{oc}=1,0\text{mm}$ , Wet

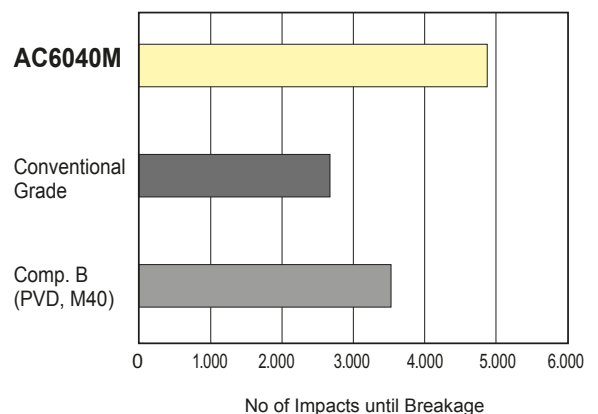
**AC6040M**

● **Continuous Cutting**



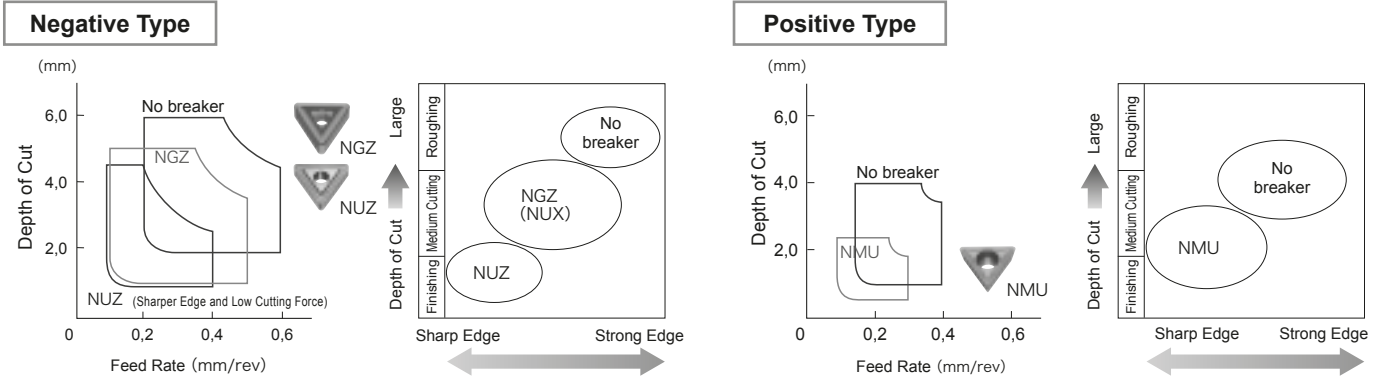
Work Material: X6CrMo17 12 2      Insert: CNMG 120408 NGU  
Cutting Conditions:  $v_c=150\text{m/min}$ ,  $f=0,2\text{mm/rev}$ ,  $d_{oc}=2,0\text{mm}$ , Wet

● **Interrupted Cutting**

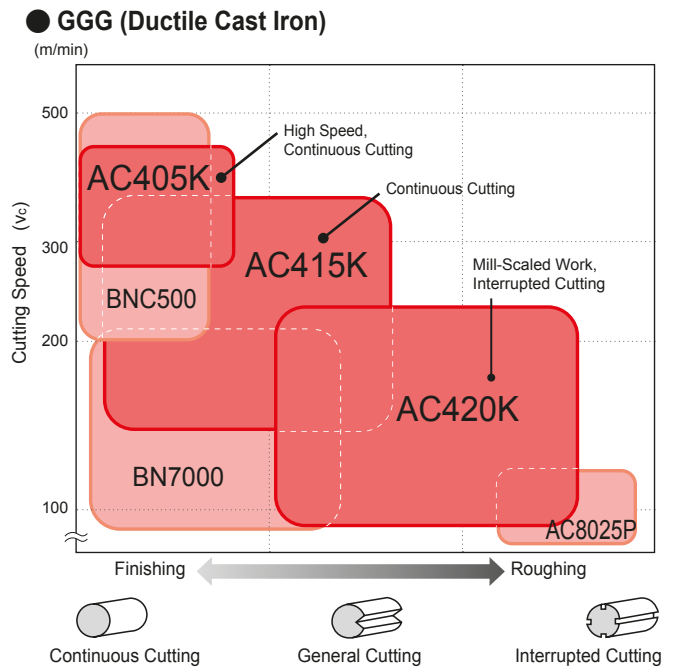
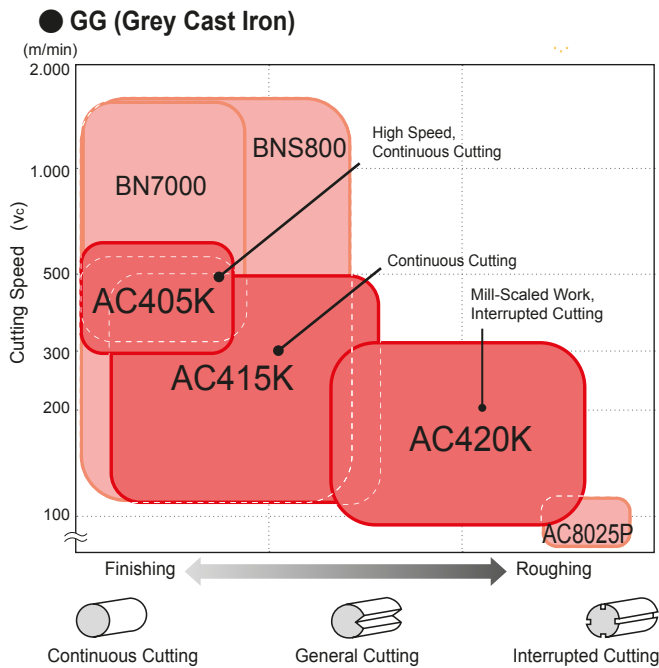


Work Material: CNMG 120408 NGU      Insert: CNMG 120408 NGU  
Cutting Conditions:  $v_c=230\text{m/min}$ ,  $f=0,23\text{mm/rev}$ ,  $d_{oc}=0,80\text{mm}$ , Dry

### Chipbreakers



### Grades



### K Recommended Cutting Conditions

(Min. - Optimum - Max.)

Applications	Cutting Process	Chipbreakers	Grades	GG (Grey Cast Iron)		GGG (Ductile Cast Iron)	
				Feed Rate (mm/rev)	Cutting Speed (m/min)	Feed Rate (mm/rev)	Cutting Speed (m/min)
High Speed Cutting	Continuous ~ General	—	<b>BN7000</b>	0,1-0,20-0,5	500-1.500-2.000	—	—
	Continuous	—	<b>BNC500</b>	—	—	0,1-0,20-0,4	250-350-500
Finishing	Continuous	NUZ	<b>AC405K</b>	0,1-0,25-0,4	230-400-570	0,1-0,25-0,4	170-350-500
	General	<b>NUZ</b>	<b>AC415K</b>	0,1-0,25-0,4	200-350-500	0,1-0,25-0,4	150-300-450
	Interrupted	NGZ	<b>AC415K</b>	0,1-0,30-0,5	150-275-400	0,1-0,30-0,5	150-250-350
Light Interrupted Medium	Continuous	NGZ	<b>AC405K</b>	0,1-0,30-0,5	170-315-460	0,1-0,30-0,5	170-285-400
	General	<b>NGZ</b>	<b>AC415K</b>	0,1-0,30-0,5	150-275-400	0,1-0,30-0,5	150-250-350
	Interrupted	NGZ	<b>AC420K</b>	0,1-0,30-0,5	100-200-300	0,1-0,30-0,5	80-150-220
Roughing	Continuous	NGZ	<b>AC415K</b>	0,1-0,30-0,5	150-275-400	0,1-0,30-0,5	150-250-350
	General	<b>NGZ</b>	<b>AC420K</b>	0,1-0,30-0,5	100-200-300	0,1-0,30-0,5	80-150-220
	Interrupted	—	<b>AC420K</b>	0,2-0,35-0,6	100-175-250	0,2-0,35-0,6	80-130-180



## Recommended Grades and Chipbreakers

### Grades AC405K / AC415K / AC420K

**AC405K:** Suitable for high-speed continuous cutting. Excellent resistance to wear and plastic deformation.

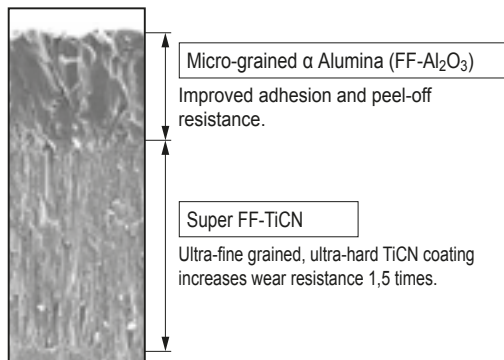
**AC415K:** First recommended grade for cast iron turning. Provides stability and long tool life in a wide range of processes.

**AC420K:** Superior fracture resistance provides excellent stability in interrupted unstable cutting and when cutting mill-scaled work.

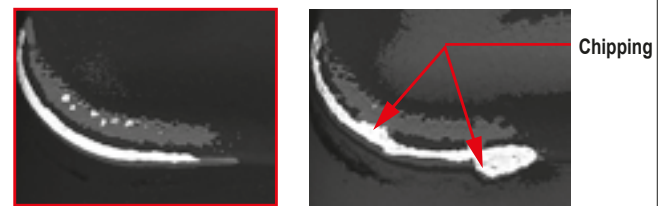


- Improvements to super FF-TiCN coating grain and hardness provide significantly improved wear resistance. Newly developed stress control technology enhances micro-grained  $\alpha$  Alumina (FF- $Al_2O_3$ ) coating for superior reliability.

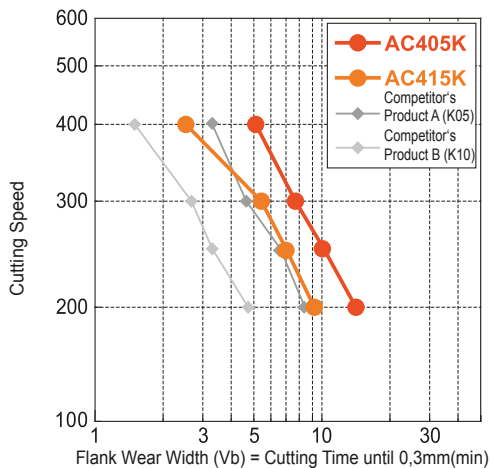
#### ● Coating Structure



Coating stress control technology reduces abnormal damage caused by chipping.

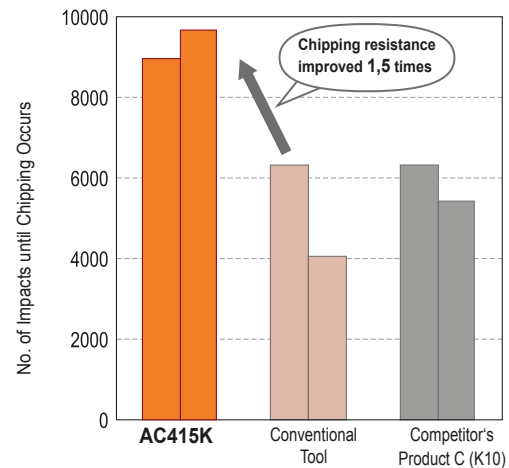


### AC405K / AC415K Wear Resistance



Work Material: GGG-40,3 (Round Bar)  
 Insert: CNMG120408  
 Cutting Conditions:  $v_c=200 \sim 400$ m/min,  $f=0,30$ mm/rev,  $d_{oc}=1,5$ mm, Wet

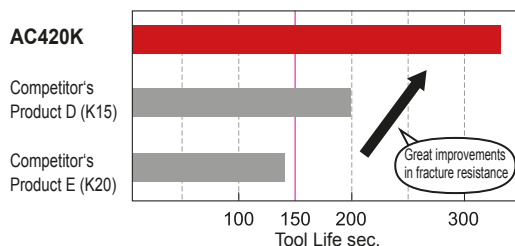
### AC415K Chipping Resistance



Work Material: GGG-40,3  
 Insert: CNMG120408  
 Cutting Conditions:  $v_c=300$ m/min,  $f=0,25$ mm/rev,  $d_{oc}=1,5$ mm, Wet

### AC420K Fracture Resistance

GGG-40,3 Grooved (Heavy Interrupted Acceleration Test)



Edge Wear Comparison (After 150s)

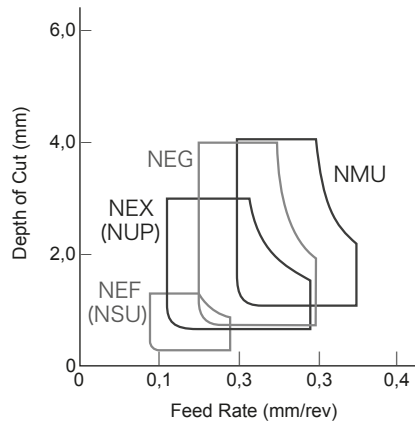


**AC420K** (Left): Shows minimal edge wear.  
**Competitor's Product D (K15)** (Middle): Shows significant edge wear.  
**Competitor's Product E (K20)** (Right): Shows significant edge wear.

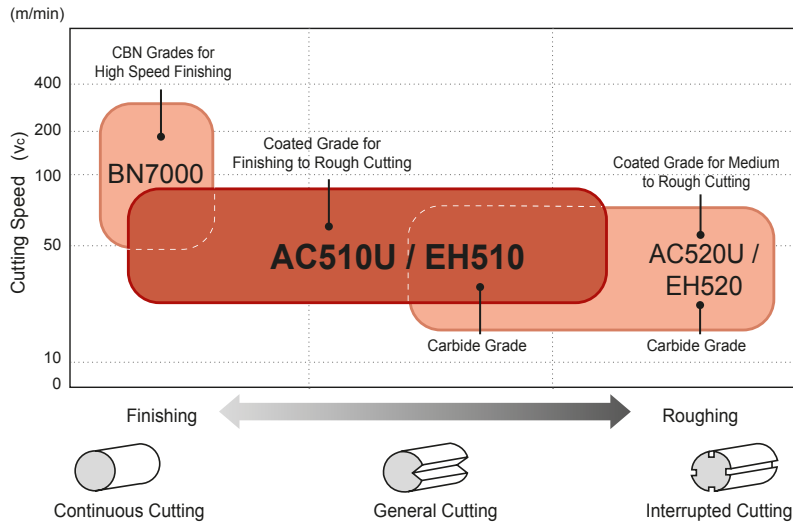
Work Material: GGG-40,3  
 Toolholder: PCLNR2525-43, Insert: CNMG120408  
 Cutting Conditions:  $v_c=350$ m/min,  $f=0,25$ mm/rev,  $d_{oc}=1,5$ mm, Wet

### Chipbreakers

Negative Type



### Grades



### S Recommended Cutting Conditions

(Min. - Optimum - Max.)

Work Material	Cutting Process	Chipbreakers	Grades	Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Heat-Resistant Alloy	Finishing	NEF(NSU)	AC510U	0,2-0,5-1,5	0,1-0,12-0,2	50-60-90
	Light	NEX	AC510U	0,5-1,0-3,0	0,1-0,20-0,3	40-50-80
	Medium	NEG	AC510U	0,5-2,0-4,0	0,15-0,25-0,3	40-50-80
	Rough	NMU	AC520U	1,0-2,0-4,0	0,2-0,25-0,35	30-45-60
Titanium Alloy	Finishing	NEF(NSU)	EH510 (AC510U)	0,2-0,5-1,5	0,1-0,15-0,2	50-65-80
	Light	NEX	AC510U	0,5-1,0-2,5	0,1-0,20-0,25	40-55-70
	Medium	NEG	EH510 (AC510U)	0,5-2,0-3,5	0,15-0,25-0,3	40-55-70
	Rough	NMU	AC520U	1,0-2,0-3,5	0,2-0,25-0,3	30-40-50

### Grades

### AC510U / AC520U / EH510 / EH520

- PVD (Super ZX Coat) grade with excellent wear and thermal resistance.

- Carbides with excellent thermal, wear, and fracture resistance for use with exotic alloys. Lineup also includes new chipbreaker design.

**AC510U:** Excellent sharpness and reliability. A general purpose grade suitable for a wide range of applications from roughing to finishing.

**EH510:** General purpose grade for titanium machining that features excellent wear and thermal resistance. For applications from roughing to finishing.

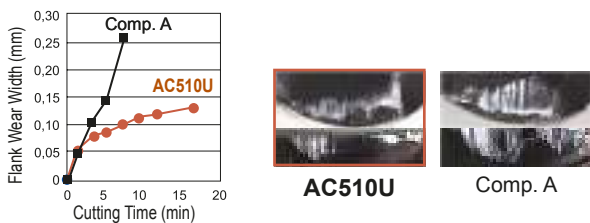
**AC520U:** Excellent fracture resistance. A tough grade that is perfect for heavy interrupted cutting and mill-scaled work.

**EH520:** Tough grade for titanium machining with excellent fracture and thermal resistance. Perfect for interrupted cutting and mill-scaled work.

### Performance

#### AC510U

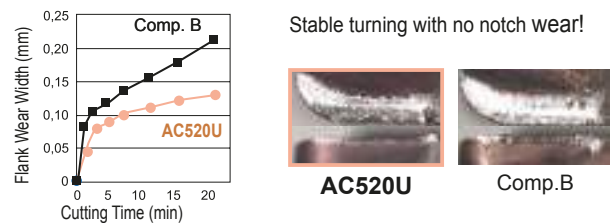
- Turning of Thermal Resistant (Ni-based) Alloys



Work Material: Inconel 718 (45HRC)  
 Insert: CNMG 120408 NEX (AC510U)  
 Cutting Conditions:  $v_c=80\text{m/min}$ ,  $f=0,12\text{mm/rev}$ ,  $d_{oc}=0,8\text{mm}$ , Wet

#### AC520U

- Turning of Thermal Resistant (Fe-based) Alloys

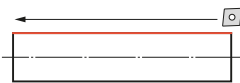


Work Material: Heat resistant ferrous alloy  
 Insert: CNMG 120408 NMU (AC520U)  
 Cutting Conditions:  $v_c=40\text{m/min}$ ,  $f=0,2\text{mm/rev}$ ,  $d_{oc}=2,0\text{mm}$ , Wet

### Application Examples

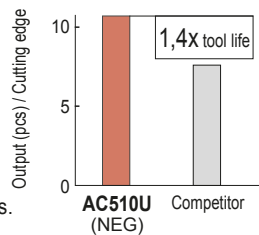
#### AC510U / EH510

##### Inconel 718, Shaft Component

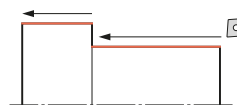


Stable, long tool life with no breakages. Small chips.

Insert: CNMG 120408 NEG (AC510U)  
 Cutting Conditions:  $v_c=45\text{m/min}$ ,  $f=0,23\text{mm/rev}$ ,  $d_{oc}=2\text{mm}$ , Wet

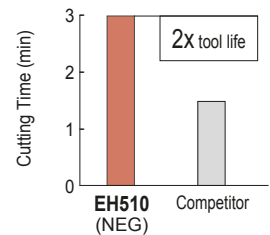


##### Titanium Ti-6Al-4V



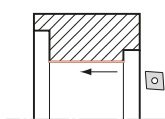
Tool life doubled with reduced crater wear. Now with drastically improved chip control.

Insert: CNMG 120412 NEG (EH510)  
 Cutting Conditions:  $v_c=65\text{m/min}$ ,  $f=0,2\text{mm/rev}$ ,  $d_{oc}=2,5\text{mm}$ , Wet



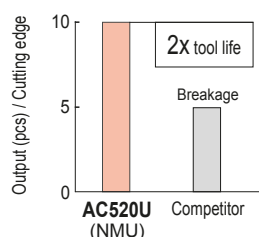
#### AC520U

##### Inconel 718, Machine Component

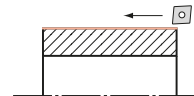


Stable, long tool life with no breakage.

Insert: CNMG 120412 NMU (AC520U)  
 Cutting Conditions:  $v_c=35\text{m/min}$ ,  $f=0,2\text{mm/rev}$ ,  $d_{oc}=2,5\text{mm}$ , Wet

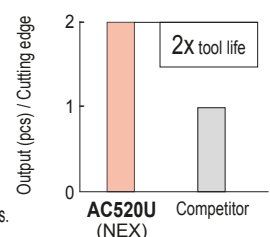


##### Stellite, Machine Component



Achieving 1,5x higher efficiency with cutting speeds of 30m/min as compared to 20m/min for conventional grades.

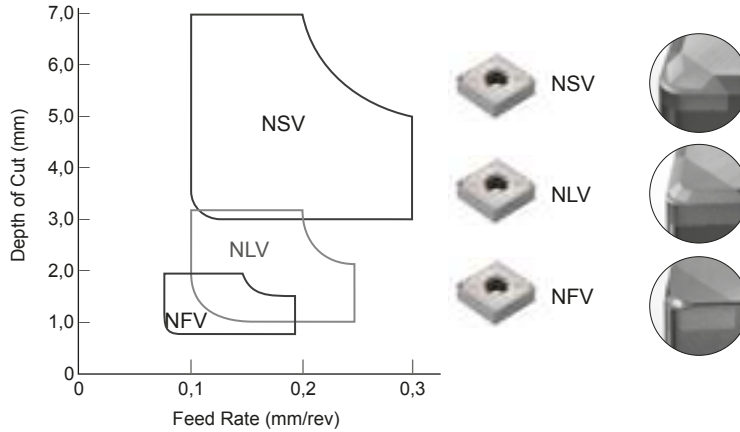
Insert: CNMG 120408 NEX (AC520U)  
 Cutting Conditions:  $v_c=30\text{m/min}$ ,  $f=0,1\text{mm/rev}$ ,  $d_{oc}=1,0\text{mm}$ , Wet



### Chipbreakers

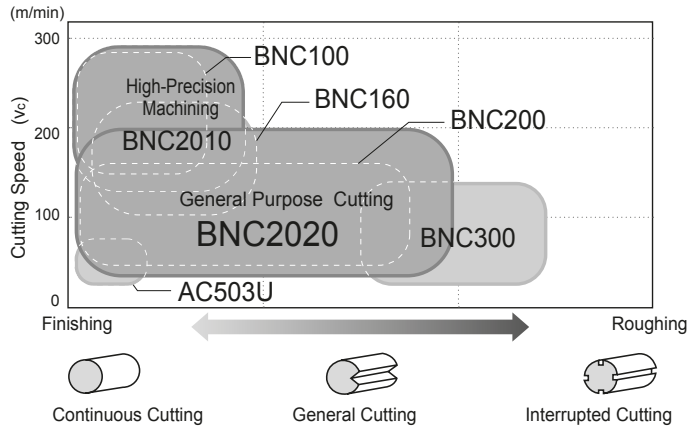
NSV Type Chipbreaker: For chip control during carburized layer removal

NLV Type / NFV Type Chipbreaker: For chip control during finishing of hardened steel

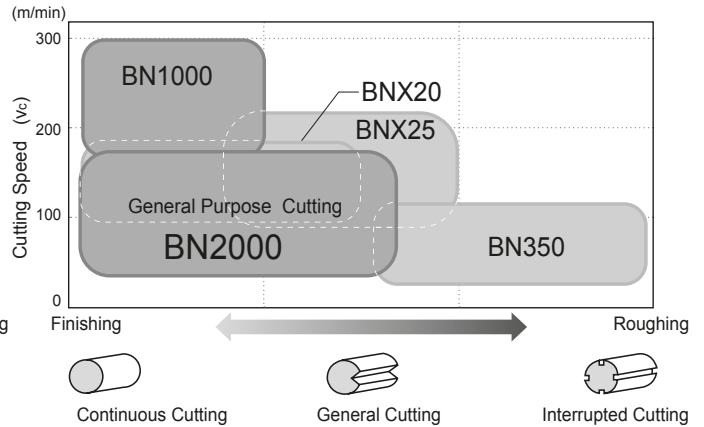


### Grades

#### ● Coated SUMIBORON



#### ● Uncoated SUMIBORON



### H Recommended Cutting Conditions

(Min. - Optimum - Max.)

Cutting Process	Grade	Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Continuous Cutting	BNC2010	0,03-0,20-0,35	0,03-0,10-0,20	120-200-300
	BNC100	0,03-0,20-0,30	0,03-0,10-0,20	120-200-300
	BN1000	0,03-0,15-0,20	0,03-0,10-0,15	100-150-300
	BNX10	0,03-0,10-0,20	0,03-0,10-0,15	120-180-300
	AC503U	0,03-0,50-1,00	0,02-0,05-0,10	40- 70-100
General Turning	BNC2020	0,03-0,30-0,50	0,03-0,20-0,40	50-130-220
	BNC160	0,03-0,20-0,35	0,03-0,10-0,25	120-180-220
	BNC200	0,03-0,30-0,50	0,03-0,10-0,30	50-130-220
	BN2000	0,03-0,20-0,30	0,03-0,10-0,20	50-100-200
	BNX20	0,03-0,20-0,35	0,03-0,15-0,30	70-130-170
Interrupted Cutting	BNC300	0,03-0,20-0,30	0,03-0,10-0,20	50-100-150
	BN350	0,03-0,20-0,30	0,03-0,10-0,20	50-100-150
	BNX25	0,03-0,20-0,50	0,03-0,15-0,30	120-160-220

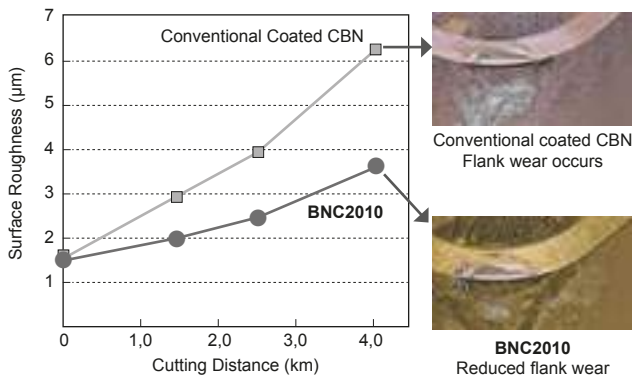
## Grades

### BNC2010 / BNC2020 / BN1000 / BN2000

- BNC2010:** A grade for high-precision machining applicable for finishing requiring good surface roughness and dimensional accuracy. Provides further improved wear resistance thanks to a newly developed CBN substrate coated with a TiCN layer. Reduces flank wear and achieves excellent surface finish thanks to newly developed special stable multi-layered coating.
- BNC2020:** A general-purpose grade applicable to general hardened steel machining. A newly developed tough CBN-substrate coated with a highly wear-resistant TiAlN layer. Achieves more stable machining and longer tool life by employing a highly adhesive layer for high chipping resistance.
- BN1000:** For high speed machining. BN1000 provides the highest wear resistance of all uncoated SUMIBORON grades. Features improved fracture resistance while still placing a priority on wear resistance.
- BN2000:** General purpose grade suitable for typical hardened steel machining applications. Provides a high degree of fracture and wear resistance.

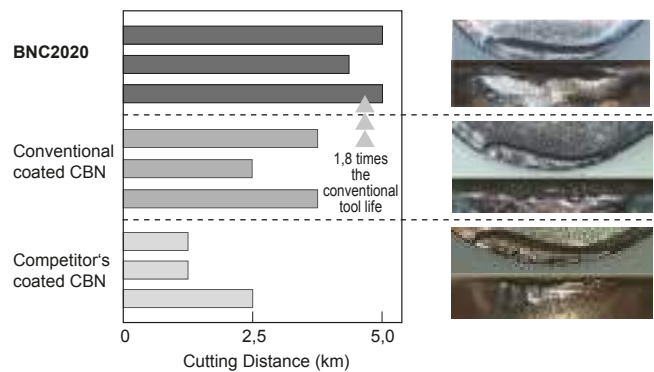
## Performance

### BNC2010



Work Material: 15CrMo5, 58-62HRC, Continuous  
 Insert: DNGA 150408 NC4 (BNC2010)  
 Cutting Edge Treatment: S01225  
 Cutting Conditions:  $v_c=160\text{m/min}$ ,  $f=0,08\text{mm/rev}$ ,  $a_p=0,1\text{mm}$ , Wet

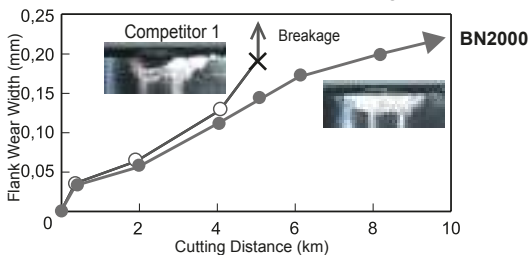
### BNC2020



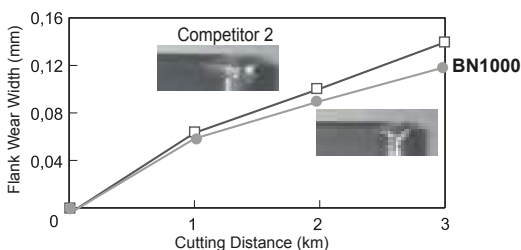
Work Material: SCM415-5V, 58-62HRC, Interrupted  
 Insert: CNGA 120412 NC4 (BNC2020)  
 Cutting Edge Treatment: S01225  
 Cutting Conditions:  $v_c=130\text{m/min}$ ,  $f=0,1\text{mm/rev}$ ,  $a_p=0,6\text{mm}$ , Dry

### BN1000 / BN2000

#### Wear Resistance (Continuous Cutting)



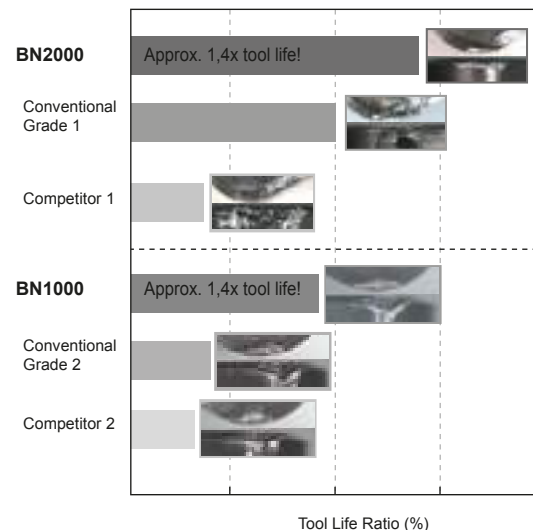
Work Material: 15CrMo5, Round Bar (58-62HRC)  
 Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,1\text{mm/rev}$ ,  $a_p=0,2\text{mm}$ , Dry



Work Material: 100Cr6, Round Bar (58-62HRC)  
 Cutting Conditions:  $v_c=150\text{m/min}$ ,  $f=0,1\text{mm/rev}$ ,  $a_p=0,2\text{mm}$ , Dry

#### Chipping Resistance (Interrupted Cutting)

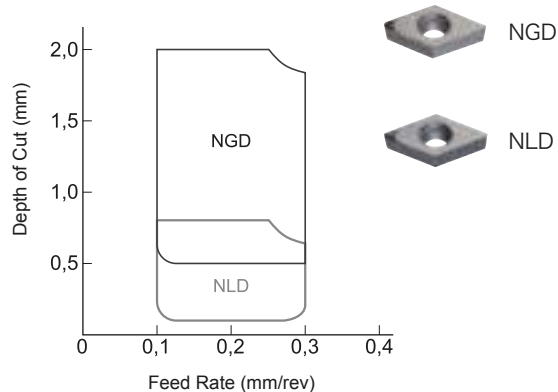
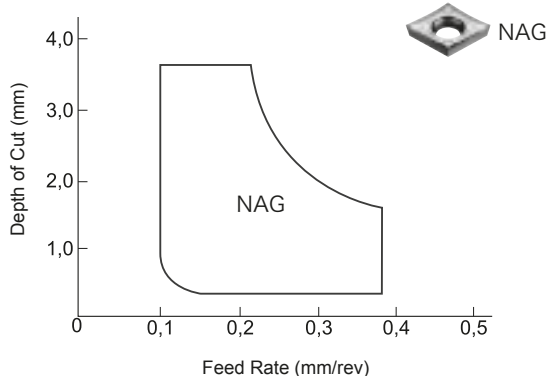
(Comparison based on conventional BN2000 as 100%.)



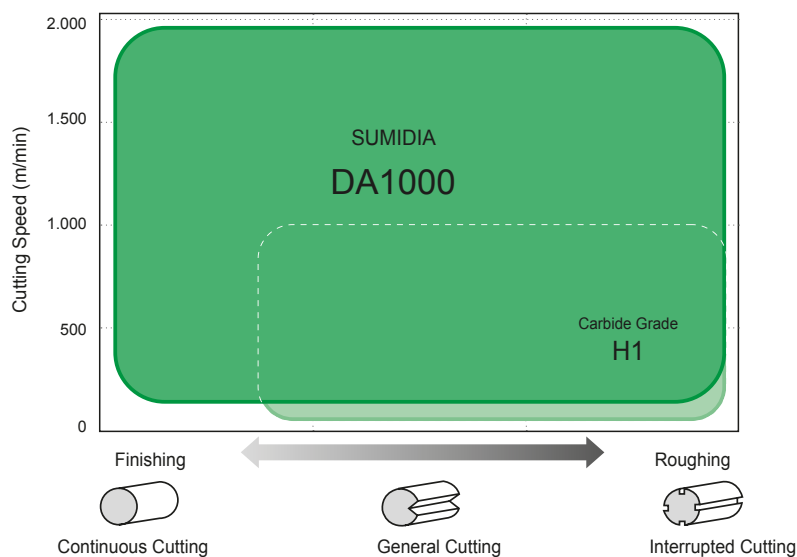
Work Material: 15CrMo5, 8V Grooved Material (58-62HRC)  
 Insert: CNGA120408 NU-2  
 Cutting Conditions:  $v_c=150\text{m/min}$ ,  $f=0,1\text{mm/rev}$ ,  $a_p=0,2\text{mm}$ , Dry

### Chipbreakers

#### Positive Type



### Grades



### N Recommended Cutting Conditions

(Min. - Optimum - Max.)

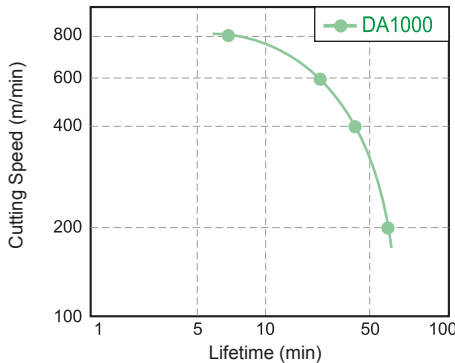
Cutting Process	Category	Grades	Cutting Conditions		
			Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Continuous Cutting General Turning Interrupted Cutting	SUMIDIA	<b>DA1000</b>	0,1- <b>0,5</b> -3,0	0,05- <b>0,10</b> -0,20	~ 2000
	Carbide	<b>H1</b>	0,3- <b>1,0</b> -5,0	0,1- <b>0,20</b> -0,5	~ 1000

**Grades**

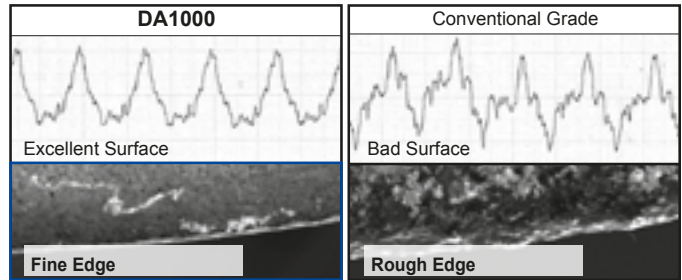
**DA1000**

- Ultra-high-density sintered, ultra-fine diamond particles
- Significantly improved surface roughness on machined surfaces
- World's best wear resistance and strength
- Suitable for use with all aluminium and non-ferrous alloys

● **DA1000 Wear Resistance**

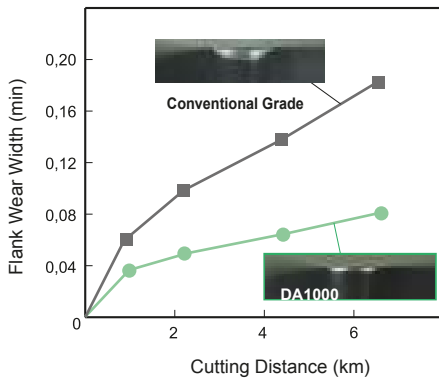


● **Comparison of Surface Roughness of Nose Radius Cutting Edge**



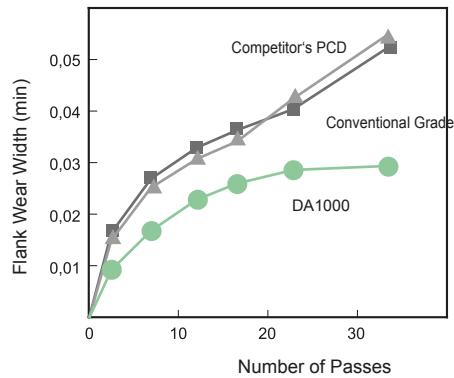
Insert: TPGW 160308  
Cutting Conditions:  $v_c=1000\text{m/min}$ ,  $f=0,15\text{mm/rev}$ ,  $d_{oc}=0,2\text{mm}$ , Wet

● **Wear Resistance in Turning Applications**



Insert: TPGN160304  
Cutting Conditions:  $v_c=800\text{m/min}$ ,  $f=0,12\text{mm/rev}$ ,  $d_{oc}=0,5\text{mm}$ , Wet

● **Wear Resistance in Milling Applications**



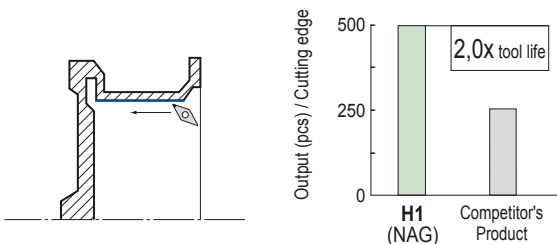
Insert: SNEW1204 ADRF-NF  
Cutting Conditions:  $v_c=2000\text{m/min}$ ,  $f=0,15\text{mm/rev}$ ,  $d_{oc}=3,0\text{mm}$ , Wet

**Application Examples**

**H1 + NAG Type Breakers**

**ADC12 Aluminium Wheel**

Excellent adhesion resistance.  
Longer tool life.

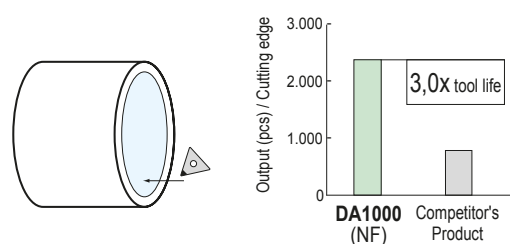


Insert: VCGT160408 NAG (H1)  
Cutting Conditions:  $v_c=2000\text{m/min}$ ,  $f=0,25\text{mm/rev}$ ,  $d_{oc}=2,0\text{mm}$ , Wet

**DA1000**

**Copper Alloy Bush**

Stable surface roughness with no edge breakage (3,2S).  
Tool life improved to 3x that of conventional models.



Insert: TPGN160308 NF (DA1000)  
Cutting Conditions:  $v_c=300\text{m/min}$ ,  $f=0,07\text{mm/rev}$ ,  $d_{oc}=0,08\text{mm}$ , Wet

### Grades

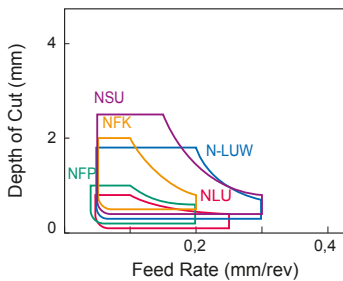
Category	Application Range			Work Material					
	High Precision	Finish-Light Cut	Medium Cut	General Steel	Stainless Steel	Cast Iron	Heat Resistant Steel	Hardened Steel	Non-Ferrous Metal
Coated Carbide (PVD)	ACZ150			◎	◎				○
	AC510U			○	◎	○	◎		
	AC520U			○	◎	○	◎		
	AC530U			○	◎	○	◎		○
	New AC1030U			◎	◎	○	○		○
Cermet/Coated Cermet	T1000A			◎	○	◎			○
	T1500A / T1500Z			◎	○	○			○
Carbide	H1			○	○				◎
	EH510			○	○	○	◎		○
CBN (SUMIBORON)	BN1000 / BN2000							◎	
SUMIDIA	DA1000								◎

◎ Preferred Choice

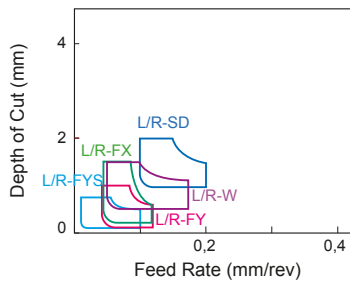
○ Suitable

### Chipbreakers

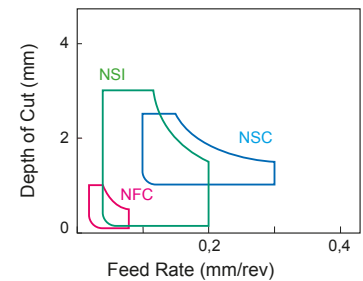
● M-Class Finishing to Light Cut



● G-Class Chipbreaker (Groove Design)



● G-Class Chipbreaker (3D Design)



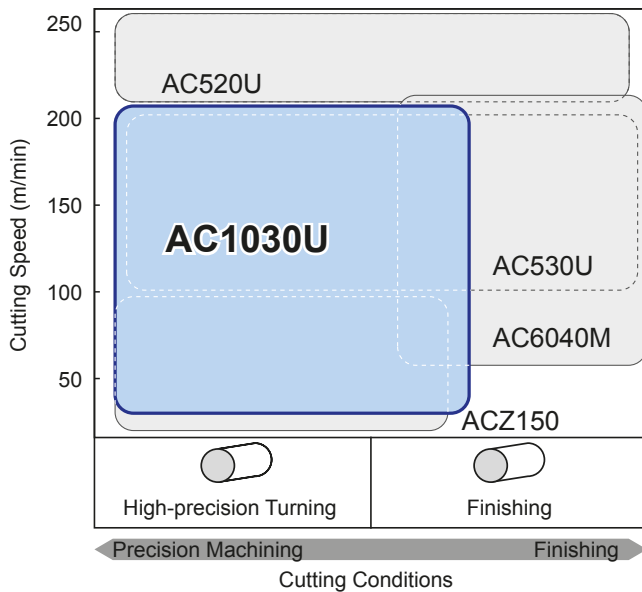
### Recommended Cutting Conditions

Grade	P Free Cutting Steel		P Carbon Steel		M Stainless Steel		H Hardened Steel		N Aluminium		N Brass	
	$v_c$ (m/min)	$f$ (mm/rev)	$v_c$ (m/min)	$f$ (mm/rev)	$v_c$ (m/min)	$f$ (mm/rev)	$v_c$ (m/min)	$f$ (mm/rev)	$v_c$ (m/min)	$f$ (mm/rev)	$v_c$ (m/min)	$f$ (mm/rev)
ACZ150	50 - 200	0,02 - 0,10	50 - 150	0,01 - 0,08	50 - 150	0,01 - 0,05			70 - 300	0,05 - 0,20	70 - 300	0,05 - 0,20
AC510U	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 200	*0,02 - 0,10					70 - 300	0,05 - 0,20
AC520U	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 200	*0,02 - 0,10					70 - 300	0,05 - 0,20
AC530U	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 200	*0,02 - 0,10					70 - 300	0,05 - 0,20
AC1030U	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 200	*0,02 - 0,10					70 - 300	0,05 - 0,20
T1000A	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 150	*0,02 - 0,10			70 - 300	0,05 - 0,20	70 - 300	0,05 - 0,20
T1500A	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 150	*0,02 - 0,10			70 - 300	0,05 - 0,20	70 - 300	0,05 - 0,20
T1500Z	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 150	*0,02 - 0,10			70 - 300	0,05 - 0,20	70 - 300	0,05 - 0,20
BN1000							50 - 200	0,02 - 0,10				
BN2000							50 - 120	0,02 - 0,10				
DA1000									70 - 300	0,02 - 0,10	70 - 300	0,02 - 0,10

\* Please use maximal possible C/speed



### Application Range

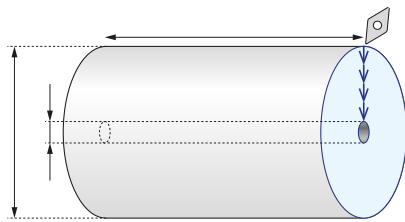


### AC1030U



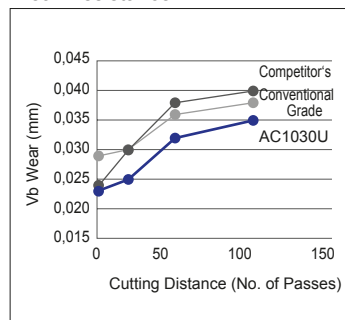
Employs "Absotech Bronze", a new PVD coating, with a special tough carbide substate. Achieving excellent machined surface quality with a high-quality cutting edge that reduces adhesion and micro-chipping.

### AC1030U Performance

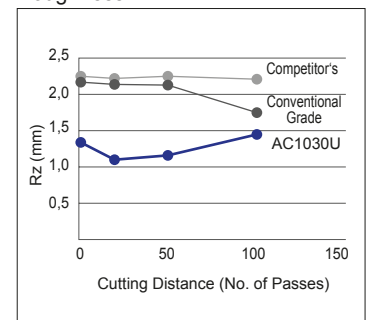


Material: X5CrNiS18-10, 1.4301  
 Insert: DCGT11T302RFY (AC1030U)  
 Cutting Data:  $v_c=100\text{m/min}$ ,  $f=0,05\text{mm/rev}$ ,  $a_p=0,1\text{mm}$ , wet (Oil)

#### Wear Resistance

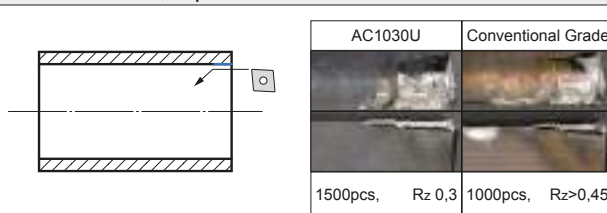


#### Roughness



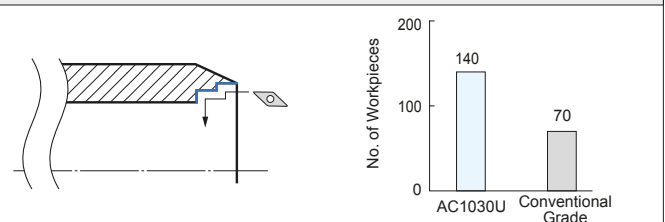
### Application Examples

#### STKM12C-EC, Pipe



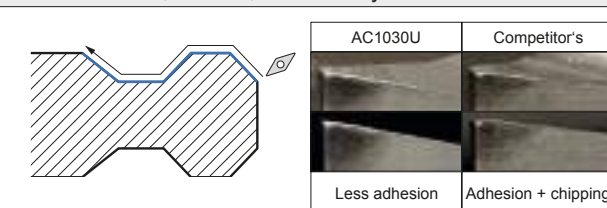
Insert: CCGT060201LFX (AC1030U)  
 Cutting Data:  $v_c=196\text{m/min}$ ,  $f=0,04\text{mm/rev}$ ,  $a_p=0,4\text{mm}$ , wet

#### C45, Stator Shaft



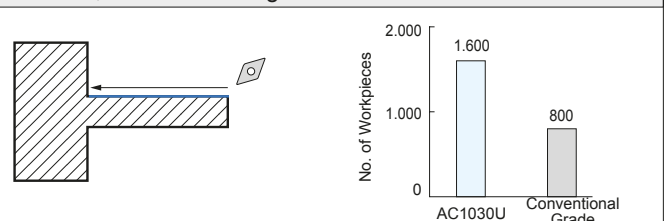
Insert: VCGT110302RFX (AC1030U)  
 Cutting Data:  $v_c=195\text{m/min}$ ,  $f=0,12\text{mm/rev}$ ,  $a_p=0,175-0,25\text{mm}$ , wet

#### X5CrNiS18-10, 1.4301, Valve Body



Insert: VCGT110301RFY (AC1030U)  
 Cutting Data:  $v_c=31,5\text{m/min}$ ,  $f=0,025\text{mm/rev}$ ,  $a_p=0,2\text{mm}$ , wet

#### X6Cr17, Sensor Housing

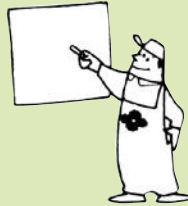


Insert: DCGT11T304M NFC (AC1030U)  
 Cutting Data:  $v_c=50\text{m/min}$ ,  $f=0,06\text{mm/rev}$ ,  $a_p=0,2\text{mm}$ , wet



# Grades

# B



**B1 ~ B14**



Grades

Coated Grades	Coating Series .....	B2
	CVD / PVD Series .....	B3 - 4
Coated and Uncoated	Cermet .....	B5
Uncoated Carbide	"Igetalloy" .....	B6
CBN Grades	"SUMIBORON" .....	B7 - 8
PCD Grades	"SUMIDIA" .....	B9
	<b>New</b> "SUMIDIA" Binderless .....	B10
Chart	Grades Comparison Chart .....	B11-13
	Properties of Base Materials .....	B14

# Coated Carbide

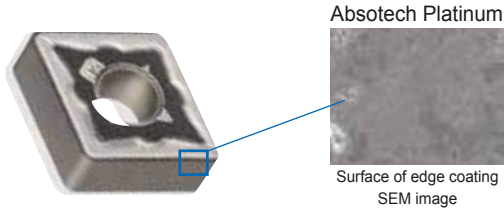
## Coating Series

Sumitomo Electric Hardmetal's Coating Series are high-quality, high-performance indexable grades that combines a proprietary, special ultra-hard carbide substrate with a multi-layered coating that provides excellent wear and heat resistance plus superior adhesion strength. Utilised in high-speed, high-efficiency applications on a wide range of work material including, steel, cast iron, and exotic alloys.

### Characteristics

#### Absotech Platinum

CVD



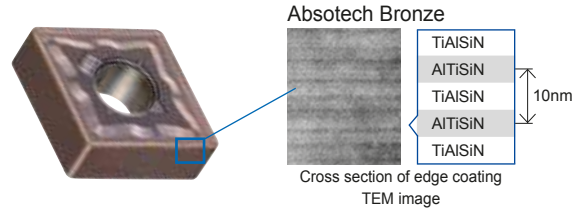
Achieves a good balance between drastically-improved coating strength and excellent surface smoothness thanks to a newly-developed, boride-based titanium compound coating.

- Achieves more than double the chipping resistance of conventional coatings thanks to the improved coating strength.
- Drastically improves the adhesion resistance and reduces the occurrence of abnormal damage thanks to excellent surface smoothness.
- Improves the corner visibility with a unique light color.

Adopted Grades For stainless steel turning: AC6030M

#### Absotech Bronze

PVD



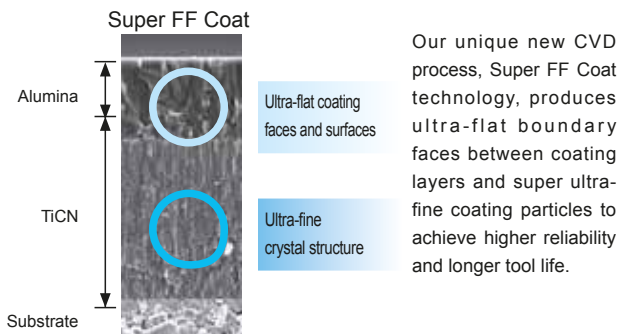
Improves the stability of cutting edge by succeeding our unique-multi-layered coating structure, which is applied to Super ZX coating and by employing highly-heat-resistant coating of new composition, as well as improving the adhesion strength between carbide substrate and coating.

- Achieves excellent wear and oxidation resistance thanks to the new composition's TiAlSiN-based ultra-multi-layered coating structure.
- Drastically improves the peeling-off resistance of coating by improving the boundary control technology between carbide substrate and coating.
- Compared to conventional grades, achieves more than double the fracture resistance in stainless steel machining.

Adopted Grades For stainless steel turning: AC6040M

#### Super FF Coat

CVD



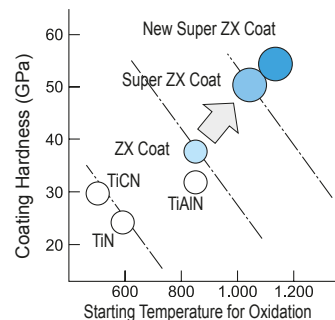
Our unique new CVD process, Super FF Coat technology, produces ultra-flat boundary faces between coating layers and super ultra-fine coating particles to achieve higher reliability and longer tool life.

- Smooth coating surface provides excellent adhesion and chipping resistance. Improved coating adhesion strength.
- Harder than conventional coatings with huge improvements in wear resistance.
- High speed, high efficiency machining of more than 1.5 times that of conventional grades is possible.
- Achieving more than double the tool life of conventional grades under conventional cutting conditions.

Adopted Grades For Steel Turning: AC805P, AC810P, AC820P, AC830P  
For Cast Iron Turning: AC405K, AC415K, AC420K  
For Stainless Steel Turning: AC610M, AC630M  
For Milling: ACP100, ACM200, ACK100, ACK200

#### New Super ZX Coat / Super ZX Coat

PVD



Utilising our proprietary thin layer coating technology and advanced nanotechnology, Sumitomo Electric Hardmetal has developed NEW Super ZX Coat and Super ZX Coat, coatings that consist of approximately 1,000 alternating, nanometre-level-thin (1 nanometre = 1 billionth of a metre) layers.

- Coating hardness increased by 40% and starting temperature for start of oxidation increased by 200°C compared to conventional grades.
- At least 1.5x improvement in high-speed and high-efficiency cutting compared to conventional grades
- Achieving more than double the tool life of conventional grades under conventional cutting conditions.

Adopted Grades For Turning: AC510U, AC520U, AC530U, AC503U  
For Milling: ACK300, ACM100, ACM300, ACP200, ACP300

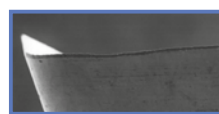
#### AURORA Coat (DLC : Diamond Like Carbon)

PVD

Using our proprietary PVD process technology, we have developed a hydrogen-free DLC coating that is extremely hard and smooth.



#### ADC12 Comparison of Cutting Edge Adhesion After Cutting



AURORA Coat



Uncoated

Work Material : ADC12  
Cutting Conditions:  $v_c$  : 300m/min  
 $f_t$  : 0,15mm/t  
 $d_{oc} = w_{oc}$  : 5mm, Dry

- Second only to diamond in terms of hardness, this smooth coating has a low coefficient of friction and provides excellent adhesion resistance to deliver better-quality machined surfaces.
- Can be used for high-speed, high-efficiency cutting of aluminium alloys, copper alloys, resins, and more.

Adopted Grades For Milling DL1000  
For Endmilling DL1000, DL1200  
For Drilling DL1300, DL1500

## Characteristic Values

### For Turning (CVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (µm)	Characteristics	Old Grades
<b>P</b>	AC805P	91,0	2,2	Super FF Coat	20	A new P05 grade with Super FF ultra-thick alumina coating for excellent crater wear resistance under high speed cutting.	—
	AC810P	91,0	2,2	Super FF Coat	18	A P10 grade with excellent wear resistance that features stability and longer tool life. Utilises a special carbide substrate with Super FF Coat for high to medium speed cutting.	AC700G
	AC820P	90,1	2,2	Super FF Coat	14	A P20 grade that features stability and longer tool life. Employs special carbide substrate and Super FF Coat to improve on P20 wear and fracture resistance.	AC2000
	<b>New</b> AC8025P	90,1	2,3	Absotech Platinum	12	A P20 grade that drastically reduces the occurrence of abnormal damage and achieves long and stable tool life by employing a special carbide substrate and the new Absotech Platinum coating.	AC820P
	AC830P	89,4	2,6	Super FF Coat	8	Stable long-life grade employs special tough, carbide substrate and Super FF Coat. Improves on P30 grade fracture resistance and approaches P20 grade in terms of wear resistance.	AC3000
	AC630M	89,5	2,7	Super FF Coat	5	Superior performance in continuous and light cutting, and other low-speed applications that require sharp edges.	AC230
<b>M</b>	AC610M	91,0	2,2	Super FF Coat	5	A high efficiency M10 grade featuring improved wear resistance during stainless steel cutting. Employs special, ultra-hard substrate and thin Super FF Coat.	—
	<b>New</b> AC6020M	90,1	2,3	Absotech Platinum	5	An M20 grade that maintains wear resistance in stainless steel machining while drastically reducing the occurrence of abnormal damage by employing a special carbide substrate and the new Absotech Platinum coating.	—
	AC6030M	89,5	2,7	Absotech Platinum	5	The first recommended grade for general machining of stainless steel that drastically reduces the occurrence of abnormal damage in stainless steel machining and achieves long and stable tool life by employing a new coating: Absotech Platinum.	—
	AC630M	89,5	2,7	Super FF Coat	5	A general purpose grade featuring improved wear and fracture resistance during stainless steel cutting. Utilises a special tough carbide substrate with a thin Super FF Coat.	AC304
<b>K</b>	AC405K	92,0	2,4	Super FF Coat	18	Employs an ultra-hard substrate and ultra-hard Super FF Coat to provide excellent resistance to wear and plastic deformation. Suitable for high-speed continuous cutting of cast iron.	AC410K
	AC415K	91,1	2,5	Super FF Coat	18	Employs a special dedicated ultra-hard substrate that is also suitable for interrupted cutting and ultra-hard Super FF Coat to provide stability and long tool life in a wide range of processes. First recommended grade for cast iron turning.	AC410K
	AC420K	91,1	2,5	Super FF Coat	12	A new, extremely versatile grade that can be used for rough, interrupted cutting of ductile and grey cast iron. Employs special, ultra-hard carbide substrate and Super FF Coat to provide stability and long tool life.	AC700G
	AC820P	90,1	2,2	Super FF Coat	14	A grade suited to heavy interrupted cutting of ductile cast iron.	AC2000

### For Milling (CVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (µm)	Characteristics	Old Grades
<b>P</b>	ACP100	89,3	3,1	Super FF Coat	6	A grade that employs a tough carbide substrate and thin-layer Super FF Coat to provide superior thermal crack and wear resistance in high-speed milling of steel.	AC230
<b>M</b>	ACM200	89,8	3,4	Super FF Coat	6	A grade ideal for hardened steel machining that provides excellent wear and heat resistance by employing a newly-developed ultra-hard carbide and Super FF Coat.	AC230
<b>K</b>	<b>New</b> ACK100	92,0	2,4	Super FF Coat	6	A grade that employs a high-strength carbide substrate and Super FF Coat to provide excellent wear resistance in high-speed milling.	—
	ACK200	91,7	2,5	Super FF Coat	6	A grade that employs a tough carbide substrate and thin-layer Super FF Coat to provide superior thermal crack and wear resistance for high-speed milling.	AC211

## Characteristic Values

### For Turning (PVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (µm)	Characteristics	Old Grades
<b>P</b>	<b>T1500Z</b> (Cermet)	92,0	2,2	Brilliant Coat*	3	Brilliant Coat* PVD coating gives excellent lubricity for higher quality machining. General-purpose coated cermet grade that can maintain high-quality machined surfaces and also gives excellent wear resistance.	T2000Z
	<b>T3000Z</b> (Cermet)	91,3	2,4	ZX Coat	3	An ultra-reliable coating grade with tough cermet substrate.	—
	<b>AC530U</b>	91,4	3,3	Super ZX Coat	3	For interrupted and general steel cutting. Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.	ACZ310
	<b>AC520U</b>	91,7	3,0	Super ZX Coat	3	Interrupted machining and stainless steel machining. Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a super tough substrate for excellent fracture resistance.	EH520Z EH20Z
<b>M</b>	<b>AC6040M</b>	91,6	3,8	Absotech Bronze	3	The first recommended grade for interrupted machining of stainless steel that drastically improves the reliability in unstable machining thanks to the excellent adhesion and peel-off resistance of the new Absotech Bronze PVD coating, as well as the improved fracture resistance of the exclusive ultra-hard carbide substrate.	AC530U
	<b>AC530U</b>	91,4	3,3	Super ZX Coat	3	Heavy interrupted machining and stainless steel machining. Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.	ACZ310
<b>K</b>	<b>AC510U</b>	92,6	2,6	Super ZX Coat	3	General to interrupted machining of cast iron and ductile cast iron. Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.	EH510Z EH10Z
<b>S</b>	<b>AC510U</b>	92,6	2,6	Super ZX Coat	3	Finishing to medium cutting of exotic alloys. Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. Superior wear and heat resistance, and stable, long tool life.	EH510Z EH10Z
	<b>AC520U</b>	91,7	3,0	Super ZX Coat	3	Medium to rough cutting of exotic alloys. Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. Superior wear and heat resistance, and stable, long tool life even in interrupted cutting.	EH520Z EH20Z
<b>H</b>	<b>New</b> <b>AC503U</b>	93,2	1,7	Super ZX Coat	3	For hardened steel. Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with an ultra-hard substrate for excellent wear resistance.	—
Small Product Machining	<b>ACZ150</b>	91,4	3,3	ZX Coat	1	For small tools, and high-precision finishing to general finishing applications. TiN ultra-thin coating and fine-grained, super tough substrate combine to give good edge sharpness and superior cut finish.	—
	<b>New</b> <b>AC1030U</b>	91,6	3,8	Absotech Bronze	2	For precision machining that supports a wide range of work materials. Employs the new "Absotech Bronze" coating with excellent adhesion and peel-off resistance to deliver excellent machined surface quality with improvements in cutting edge quality and superb stability.	—

### For Milling (PVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Main Coating Components	Coating Thickness (µm)	Characteristics	Old Grades
<b>P</b>	<b>ACP200</b>	89,5	3,2	(New) Super ZX Coat	3	For general machining of general and die steel. Employs PVD coating consisting of multiple nanometre-thin layers. A general grade that achieves a good balance between fracture resistance and wear resistance when combined with an exclusive tough substrate.	ACZ330
	<b>ACP300</b>	89,3	3,1	(New) Super ZX Coat	3	For interrupted machining and stainless steel machining. Employs PVD coating consisting of multiple nanometre-thin layers. Provides excellent fracture resistance when combined with an ultra-tough substrate.	ACZ350
<b>M</b>	<b>ACM100</b>	91,4	3,3	(New) Super ZX Coat	3	A grade that provides excellent wear resistance by employing an ultra-hard fine-grained carbide and New Super ZX Coating.	ACZ310
	<b>ACM300</b>	89,8	3,4	(New) Super ZX Coat	3	The first recommended grade for stainless steel machining that achieves a good balance between wear resistance and fracture resistance by employing a newly-developed ultra-hard carbide and New Super ZX Coating.	—
<b>K</b>	<b>ACK300</b>	91,4	3,3	(New) Super ZX Coat	3	For general and interrupted machining of cast iron and ductile cast iron. Employs PVD coating consisting of multiple nanometre-thin layers. Provides excellent fracture resistance when combined with a fine-grained tough substrate.	ACZ310
<b>N</b>	<b>DL1000</b>	92,9	2,1	AURORA Coat (DLC Coat)	0,5	For machining of non-ferrous metals including aluminum and copper alloy as well as resin. Coated with DLC, which provides a low friction coefficient and excellent adhesion resistance.	—

\*There may be minor differences in the colour tonellustre of Brilliant Coat grades due to the interference of light. Such differences have no effect on performance.



**Various grades and expanded lineup of catalogue items meet a wide range of finishing needs.**

Lineup includes wear-resistant T1000A, general purpose T1500A, general purpose coated cermet T1500Z and tough T3000Z.

Significantly expanded lineup of catalogue items for a wide variety of finishing applications.

## Characteristics

### Uncoated Cermet

#### T1000A High Speed Finishing Grade

High speed finishing grade with excellent wear resistance.

- Improved wear and fracture resistance.
- Solid solution hard phase reduces reaction with steel.
- Perfect for high-speed continuous finishing of steel, cast iron and powdered metal.



#### T1500A New General Purpose Grade

General purpose cermet grade that provides both wear and fracture resistance with better quality finished surfaces.

- Mixing hard phases of different functionality, grain size and compositions improves balance of wear and fracture resistance.
- Reduces adhesion of work material for beautiful finished surfaces.



### Coated Cermet

#### T1500Z New General Purpose Grade

General purpose coated cermet grade that employs new Brilliant Coat\* PVD coating with excellent lubricity.

- Excellent wear resistance provides long tool life.
- Reduces adhesion of work material for beautiful finished surfaces.



#### Surface Finish Comparison



**T1500Z**



Conventional  
Coated Cermet

Work Material: St 34-2  
Insert: CNMG 120408 NLU  
Cutting Conditions:  $v_c=100\text{m/min}$   
 $f=0,15\text{mm/rev}$   
 $d_{oc}=1,0\text{mm}$ , Wet

Excellent Wear Resistance  
Glossy Finished Surfaces  
Reduced Blemishes

## Characteristic Values

### For Turning

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness ( $\mu\text{m}$ )	Characteristics	Old Grades
P	T1000A	93,3	1,8	—	—	Uncoated cermet grade with excellent wear resistance that provides good cost efficiency. Demonstrates excellent wear resistance in continuous finishing applications, and stable finishing of cast iron and sintered alloy as well as steel.	T110A
	T1500A	92,0	2,2	—	—	A general purpose grade that employs a substrate with improved balance of fracture and wear resistance to deliver superior finished surfaces in a wide variety of cutting conditions.	T1200A
	T1500Z	92,0	2,2	PVD Brilliant Coat*	3	Brilliant Coat's* new PVD coating gives excellent lubricity for higher quality machining. General-purpose coated cermet grade that can maintain high-quality machined surfaces and also gives excellent wear resistance.	T2000Z
	T3000Z	91,3	2,4	PVD ZX Coat	3	An ultra-reliable coated grade with tough cermet substrate.	—
K	T1000A	93,3	1,8	—	—	Exclusive uncoated cermet grade with excellent cost efficiency suitable for cast iron finishing, which requires high hardness.	T110A

### For Milling

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness ( $\mu\text{m}$ )	Characteristics	Old Grades
P	T1500A	92,0	2,2	—	—	A general-purpose grade that employs a substrate with an improved balance between fracture and wear resistance to deliver superior finished surfaces in a wide variety of cutting conditions.	T1200A
M	T250A	91,4	2,1	—	—	Tough cermet grade with enhanced crack advancement resistance.	—

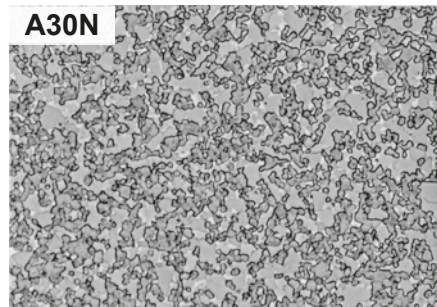
\*There may be minor differences in the colour tone/lustre of Brilliant Coat grades due to the interference of light. Such differences have no effect on performance.

# WC (Tungsten Carbide) „Igetalloy“

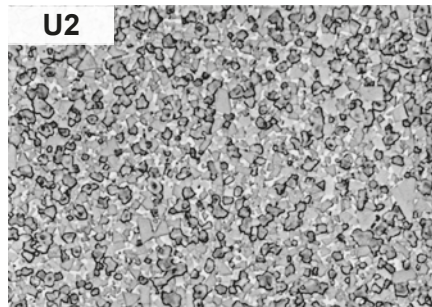
Igetalloy carbides have a solid history and a big variety of grades to suit many different applications. They are widely used and appreciated for their superior performance.

The Igetalloy line-up consists of carbide cutting tools that are available in a variety of different structures and compositions, each differing in terms of WC grain size and containing varying amounts of CO binder and TiC, TaC, and other double carbide components. The wide selection enables excellent wear resistance and toughness with a variety of work materials and cutting conditions.

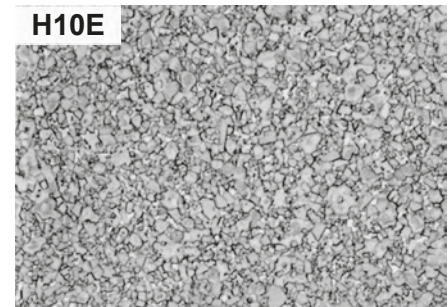
● For Steel



● For Stainless Steel



● For Cast Iron



## Characteristic Values

Application	Grade	Hardness (HRA)	TRS (GPa)	Young's Modulus (GPa)	Thermal Conductivity (W/m·°C)	Compressive Strength (GPa)	Linear-Thermal Expansion Coefficient (X 10 <sup>-6</sup> /°C)
<b>P</b>	ST10P	92,1	1,9	470	25	4,9	6,2
	ST20E	91,8	1,9	550	42	4,8	5,2
	A30	91,3	2,1	520	—	—	5,2
	A30N	91,2	2,2	520	—	—	—
	ST40E	90,4	2,6	—	75	—	—
<b>M</b>	U10E	92,4	1,8	460	—	5,9	—
	EH510	92,6	2,6	—	—	—	—
	U2	91,5	2,2	—	88	—	—
	EH520	91,7	3,0	—	—	—	—
	A30	91,3	2,1	520	—	—	5,2
	A30N	91,0	2,4	—	—	—	—
<b>K</b>	BL130	94,3	2,9	—	—	—	—
	H2	93,2	1,8	600	105	6,1	4,4
	H1	92,9	2,1	650	109	6,1	4,7
	EH10	92,4	3,4	640	105	—	4,5
	EH510	92,6	2,6	—	—	—	—
	H10E	92,3	2,0	—	67	—	—
	EH20	91,3	3,5	620	105	—	4,5
	EH520	91,7	3,0	—	—	—	—
	G10E	91,1	2,2	620	105	5,7	—
<b>N</b>	H1	92,9	2,1	650	109	6,1	4,7
<b>S</b>	EH510	92,6	2,6	—	—	—	—
	EH520	91,7	3,0	—	—	—	—



# CBN (Cubic Boron Nitride) SUMIBORON



**High hardness and heat resistance for cutting high hardness steel and hard cast iron. Long tool life with high-speed finishing of grey cast iron.**

In 1977, Sumitomo Electric Hardmetal successfully developed a revolutionary CBN sintered tool - SUMIBORON. The main component in SUMIBORON is Cubic Boron Nitride with a special ceramic binder sintered under super high pressure and temperature. As compared to other conventional tool materials, CBN has higher hardness and excellent heat resistance. With these distinct characteristics, SUMIBORON can perform machining of hardened steel, high hardness cast iron and exotic metals where previously only grinding was done. Furthermore, excellent efficiency and longer tool life can also be achieved from high speed machining of cast irons.

## Characteristics

Classifications	Structure	CBN Content	Hardness (GPa)	Grades	Application	Characteristics
Mainly CBN grains fused together		High	44	BN700 BN7000 BN7500 BNS800	{ Carbide Chilled cast iron Ni-Hard cast iron Heat-resistant alloy, Cast iron Sintered ferrous alloy	High carbon content. Structure consists of strongly fused CBN grains. Suited to cutting cast iron, heat-resistant alloy, ultra-hard alloy, and other hard materials.
Mainly CBN grains held together with a binder		Low	21	BNC500,* BN1000, BN2000, BN350,* BNX10, BNX20, BNX25, BNC2010, BNC2020 BNC100, BNC160, BNC200, BNC300	{ Alloy steel Case hardened steel Carbon tool steels Bearing steel, Die steel Ductile cast iron	CBN grains are fused together strongly with a special ceramic binder. Strong CBN binding force gives superior wear resistance and toughness when cutting hardened steel and cast iron.

\*BNC500 can also be used with cast iron, while BN350 can also be used with sintered ferrous alloys.

## Grade Range Map

Class	Series	Finishing ~ Light Cutting		Medium Cutting	Rough ~ Heavy Cutting
		H01	H10	H20	H30
<b>H</b>	Classification				
	Coated SUMIBORON	BNC2010		BNC2020	
		BNC100	BNC160	BNC200	
				BNC300	
Uncoted SUMIBORON	BNX10, BN1000		BN2000	BNX20	BNX25, BN350
	Classification	01	10	20	30
Sintered Components	Uncoted SUMIBORON			BN700, BN7000	
			BN7500		
<b>K</b>	Classification	K01	K10	K20	K30
	Coated SUMIBORON	BNC500			
	Uncoted SUMIBORON			BN7000, BN700	
				BN7500	
				BNS800	

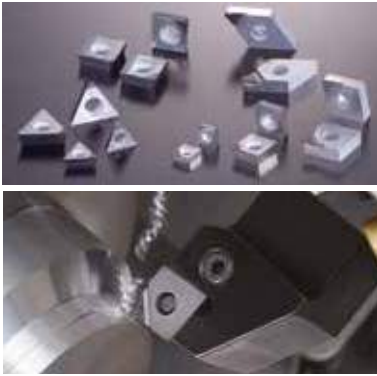
# CBN (Cubic Boron Nitride)

## SUMIBORON

### Characteristic Values

Class	Grade	Binder	Carbon Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Characteristics
<b>H</b>	<b>BNC2010</b>	TiCN	50 ~ 55	2	30 ~ 32	1,10 ~ 1,20	TiCN multi-layered	1,5	Improves the wear resistance of coating and substrate and stably achieves excellent surface roughness.
	<b>BNC2020</b>	TiN	70 ~ 75	5	34 ~ 36	1,20 ~ 1,30	TiAlN multi-layered	1,5	Provides long tool life in general and high-efficiency cutting thanks to tough substrate coated with a highly wear-resistant and highly adhesive layer.
	<b>BNC100</b>	TiN	40 ~ 45	1	29 ~ 32	1,05 ~ 1,15	TiAlN	1	Highly wear resistant coating makes this grade suited for high speed finishing.
	<b>BNC160</b>	TiN	60 ~ 65	3	31 ~ 33	1,10 ~ 1,20	TiAlN/TiCN	2	Stable, high precision finishing of hardened steel.
	<b>BNC200</b>	TiN	65 ~ 70	4	34 ~ 36	1,15 ~ 1,25	TiAlN/TiCN	2	Tough substrate with high wear resistant coating provide longer tool life.
	<b>BNC300</b>	TiN	60 ~ 65	1	33 ~ 35	1,15 ~ 1,25	TiAlN	2	Suited for finishing when there is a combination of continuous and interrupted cutting.
	<b>BNX10</b>	TiCN	40 ~ 45	3	27 ~ 31	0,80 ~ 0,90	–	–	Optimum wear resistance. Suited to continuous, high-speed cutting.
	<b>BN1000</b>	TiCN	40 ~ 45	1	27 ~ 31	0,90 ~ 1,00	–	–	Ultimate wear and fracture resistance. Suited to high-speed cutting.
	<b>BNX20</b>	TiN	55 ~ 60	3	31 ~ 33	0,95 ~ 1,10	–	–	Crater resistant grade, suitable for high efficiency cutting under high temperature conditions.
	<b>BNX25</b>	TiN	65 ~ 70	4	29 ~ 31	1,00 ~ 1,10	–	–	Excellent fracture resistance during high speed cutting. Suited to high speed interrupted cutting of hardened steel.
	<b>BN2000</b>	TiN	50 ~ 55	2	31 ~ 34	1,05 ~ 1,15	–	–	A general purpose grade for hardened steel that provides a high degree of fracture and wear resistance.
	<b>BN350</b>	TiN	60 ~ 65	1	33 ~ 35	1,20 ~ 1,30	–	–	High cutting edge strength. suited to heavy interrupted cutting.
Sintered Components	<b>BN7500</b>	Co Compound	90 ~ 95	1	41 ~ 44	1,40 ~ 1,50	–	–	Maintains optimum cutting edge sharpness. Suited for finishing of sintered alloy.
	<b>BN700</b>	Co Compound	90 ~ 95	2	40 ~ 43	1,20 ~ 1,30	–	–	Maintains good wear and fracture resistance in rough cutting of sintered components.
	<b>BN7000</b>	Co Compound	90 ~ 95	2	41 ~ 44	1,30 ~ 1,40	–	–	Improved wear and fracture resistance in rough cutting of sintered components.
<b>K</b>	<b>BN700</b>	Co Compound	90 ~ 95	2	40 ~ 43	1,20 ~ 1,30	–	–	Maintains good wear and fracture resistance in rough cutting of cast iron and exotic alloy.
	<b>BN7000</b>	Co Compound	90 ~ 95	2	41 ~ 44	1,30 ~ 1,40	–	–	Improved wear and fracture resistance in rough cutting of cast iron and exotic alloy.
	<b>BNS800</b>	Al Alloy	85 ~ 90	8	39 ~ 42	0,95 ~ 1,10	–	–	100% solid CBN structure with good thermal impact resistance.
	<b>BNC500</b>	TiC	60 ~ 65	4	32 ~ 34	1,00 ~ 1,10	TiAlN	2	Substrate with excellent wear resistance and coating makes this grade suited for hard-to-cut cast iron.

# PCD (Polycrystalline Diamond) SUMIDIA



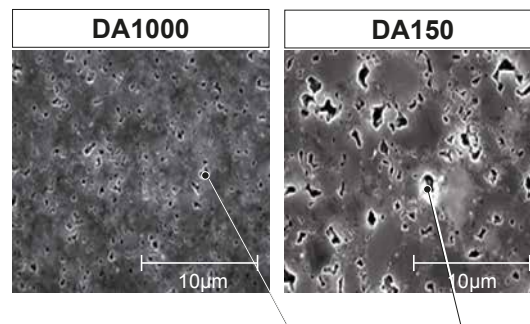
Excellent wear resistance, longer tool life, and high-speed, high-efficiency, high-precision cutting of non-ferrous metals and non-metals.

SUMIDIA is a polycrystalline diamond material made from sintered diamond powder that was first created using our proprietary technology in 1978. SUMIDIA's superior wear resistance achieves longer tool life, high speed, high efficiency and high precision in non-metal cutting and non-ferrous metal applications including aluminium, copper, magnesium and zinc alloys.

## Characteristics DA1000

The DA1000 utilises Sumitomo Electric Hardmetal's proprietary sintering technology to achieve a high-density sintered material made of ultra-fine diamond particles that has superior wear and fracture resistance and longer tool life.

Polycrystalline Diamond Subjected to Acid Treatment



Holes formed when binder is dissolved during acid treatment

## Grade Range Map

Class	Series	Finishing ~ Light Cutting		Medium Cutting	Rough ~ Heavy Cutting
		01	10		
N	Classification	01	10	20	30
	SUMIDIA Binderless	NPD10 <span style="color: yellow; font-weight: bold;">New</span>			
	Classification	N01	N02	N20	N30
	PCD (sintered)	DA150			
		DA1000			

## Characteristic Values

Class	Grade	Binder	Carbon Content (%)	Grain Size (µm)	Hardness HV (GPa)	TRS (GPa)	Characteristics
N	DA1000	Co	90 ~ 95	~ 0,5	110 ~ 120	≈ 2,60	High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear and fracture resistance, and edge sharpness.
	DA150	Co	85 ~ 90	5	100 ~ 120	≈ 1,95	Sintered material made of fine diamond particles that provides a good balance of workability and wear resistance.

# PCD (Polycrystalline Diamond) SUMIDIA Binderless

**New**

Grades



SUMIDIA Binderless Series uses nano-polycrystalline diamond for the cutting edge and demonstrates excellent wear and fracture resistance compared to conventional sintered diamond tools.

In particular, SUMIDIA Binderless Series allows for improvements in tool life and machining precision that go far beyond conventional diamond tools in the machining of hard brittle materials, such as carbide.

### Excellent for High Precision Machining of Carbide

Nano-polycrystalline diamond with excellent wear resistance achieves high precision machining of carbide.

### Maintains Superior Dimensional Tolerances Over Many Hours

Greatly reduces the number of tool replacements compared to conventional diamond tools and increases work efficiency while reducing total costs.

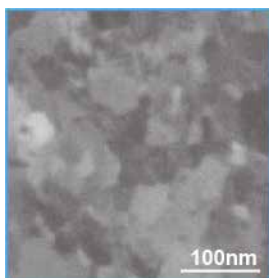
### Suitable for Hard Brittle Material Machining

Hard brittle materials (such as ceramics) that could only be ground before can now be cut.

## Characteristics

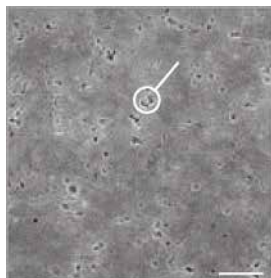
### Comparison of Structure

Nano-Polycrystalline Diamond  
SEM Structure



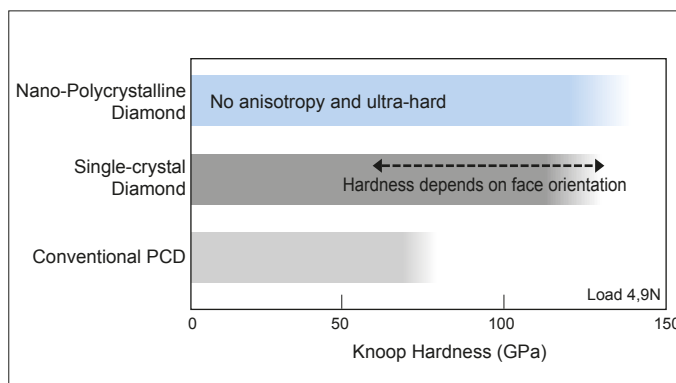
Diamond Particles  
(30 ~ 50nm)

Conventional PCD  
SEM Structure



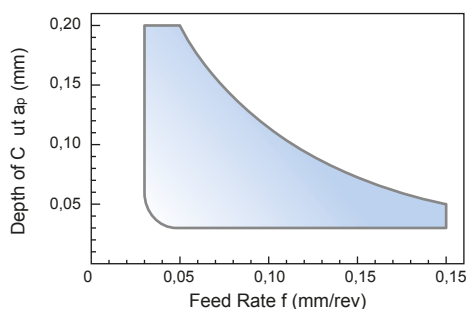
Diamond Particles  
(1 ~ 10µm)

### Hardness

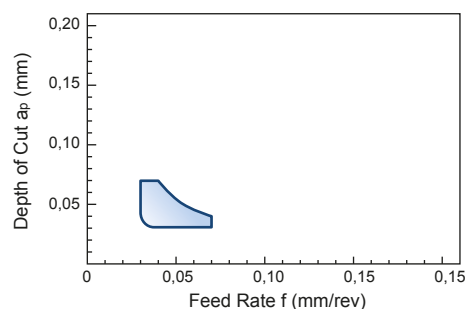


### Application (Carbide Machining)

Hardness < 88HRA



Hardness ≥ 88HRA



### Recommended Cutting Conditions (Carbide Machining)

Coolant: Dry

Min. - Optimum - Max.

Work Material			Cutting Conditions		
Classification	Hardness (HRA)	SEH Grade	Cutting Speed $v_c$ (m/min)	Feed Rate $f$ (mm/rev)	Depth of Cut $a_p$ (mm/rev)
VM VC	70 60 50	83 ~ 87	G7 G6	5 - 20 - 30	0,03 - 0,10 - 0,20
VM VC	40	≥ 88	G5 G2	5 - 15 - 30	0,03 - 0,05 - 0,07

# Grade Comparison Chart

## Coated Carbide

Appli- cation	Class	Grade	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Mitsubishi- Hitachi	Sandvik	Kennametal	Dijet	Valenite	SECO Tools Japan	WALTER	ISCAR	
Turning	P	P05	<b>AC805P</b> <b>AC810P</b>	UE6105	T9105	CA510 CA5505	HG8010	GC4205	KCP05 KC9105	JC110V	VP5515 VP1510	TP0500	WPP05	IC8005 IC428	
		P10	<b>AC810P</b>	UE6110	T9115	CA515 CA5515	HG8010	GC4215 GC4315	KCP10 KC9110	JC110V JC215V	SV310 SV315 SV515	TP1500	WPP10S WPP10	IC8150 IC9015	
		P20	<b>AC8025P</b> <b>AC820P</b>	MC6025 UE6020	T9125	CA525 CA5525	IP2000 HG8025 GM25	GC4225 GC4325	KCP25 KC9125	JC215V	SV315 SV325 VP5525	TP2500	WPP20S WPP20	IC8250 IC9015	
		P30	<b>AC830P</b> <b>AC630M</b>	UE6035 VP15TF	T9135	CA530 CA5535	IP3000 GM8035	GC4235	KCP30 KC9140	JC215V JC325V	VP5535 SV325 SV230	TP3500	WPP30S WPP30	IC8350 IC8025	
		P40	<b>AC830P</b> <b>AC630M</b>	UE6035 UH6400	T9135	PR660	IP3000 GM8035	GC4235	KC9140	JC325V JC450V	SV235 V1N VP5535	TP3500	WTN53	IC8350 IC8025	
	M	M10 S10	<b>AC610M</b> <b>AC620M</b> <b>AC510U</b>	MC7015 US905 VP05RT VP10RT US7020	T9115 AH110 AH905	CA6515 PR915 PR1025 PR1215 PR1225	IP050S IP100S	GC2015 GC1105 GC1115	KCM15 KC5510 KCU10	JC605X JC5003 JC110V	SV310 SV315 VC929	TP1500 TS2000	WSM10	IC807 IC8025 IC907	
		M20 S20	<b>AC6020M</b> <b>AC6030M</b> <b>AC610M</b> <b>AC520U</b>	MC7025 US7020 VP20MF UP20M MP9015	T6120 T6020 T9125 AH630 AH120 AH725	CA6525 PR930 PR915 PR1025 PR1125 PR1215	IP100S HG8025	GC2025 GC1125	KCM25 KC5525 KCU25 KC5020	JC110V JC5015 JC8015 JC525X	VPS525 VC901 SV230	TP2500 TM2000 TS2500	WSM20	IC808 IC8080 IC908	
		M30	<b>AC6030M</b> <b>AC6040M</b> <b>AC630M</b> <b>AC830P</b> <b>AC530U</b> <b>AC1030U</b>	MC7025 MC7035 US735 VP15TF VP20MF	AH725 T6130 T6030 AH630 AH645	CA6525 PR1125	GM8035 GX30	GC2035	KCM35 KC9240	JC5015 JC8015 JC525X	VC901 V1N	TP3500 TM4000	WSM30	IC8080 IC830	
		M40	<b>AC6040M</b> <b>AC530U</b>	MC7035 US735 VP15TF	AH645	PR1125	GX30	GC235			V1N	TM4000		IC830 IC928	
	K	K05	<b>AC405K</b>	MC5005 UC5105 UC5115	T5105 T5115	CA4505 CA4010	HG3305 HX3305	GC3205	KCK05	JC105V JC050W	SV405 SV510	TK1000 TK1001	WAK10 WKK10S	IC5005	
		K10	<b>AC415K</b>	MC5005 MC5015 UC5105 UC5115	T5115 T5125	CA4505 CA4515 CA4115	HX3305 HG3305 HG3315 HX3315	GC3210	KCK15	JC105V	SV410 SV515	TK1000 TK1001	WAK10 WAK20 WKK10S WKK20S	IC5010 IC5100	
		K20	<b>AC420K</b>	MC5015 UC5115 VP15TF UE6110	T5125 T9125	CA4515 CA4120 CA4115	HX3315 HG3315 HG8010	GC3215	KCK20	JC215V	SV415 SV515	TK2000 TK2001	WAK20 WAK30 WKK20S	IC8150	
	Milling	P	P10	<b>ACP100</b>	FH7020 F7030	T3130 T3030		JP4005 JP4020	GC4220 GC4230	KC715M KC930M KC935M	JC8003 JC730	V1N	T250M T350M MP1500 MP2500	WKP25 WKP25S WPP20 WKP35S	IC4100 IC4050 IC520M DT7150
			P20	<b>ACP200</b>	VP15TF VP20RT	AH9030 AH725	PR1525 PR1225 PR830	JS4045 GX2140	GC1010 GC1025 GC2040 GC4240	KTPK20 KCPM20	JC6235 JC5040 JC8015 JC5015 JC5118	VC935	MP3000 F25M F30M	WSM20	IC808 IC810 IC380
			P30	<b>ACP300</b>	VP30RT	AH3035 AH130 AH140 SH730	PR1525 PR1230	JS4060 JX1045 JX1060 CY150 CY250	GC1030 GC2030	KCPK30 KCMP30 KC725 KC730 KC735	JC5040 JC8050		MM4500 F40M	WSM30 WSM35 WSP45S WSP45	IC830 IC928 IC330
M		M10	<b>ACM100</b> <b>ACK300</b>			PR1025 PR1225	JX1020 CY9020 JP4020	GC1025 GC1030	KC522M						
		M20	<b>ACM200</b>	F7030 VP15TF VP20RT	GH330 AH330 AH120 AH130	PR1525 PR1025 PR1225	JX1015 CY150 CY15	GC2030	KC730M KC525M	JC5015 JC5030 JC5040		F25M F30M	WSM35 WSM35	IC908 IC928	
		M30	<b>ACM300</b>	F7030 VP30RT MP7030	AH130 AH140	CA6535 PR1535	JX1045 JX1060 GX2160	GC2040	KC994M KC725M	JC5015 JC5030 JC5040	VC935	F30M F40M	WSM35 WXM35	IC328 IC330 IC830	
K		K20	<b>ACK200</b>	F5010 F5020 MC5020	T1115	PR905	JP4020	GC3220 GC3020 GC3040 K15W K20D K20W	KCK15 KCK20 KC915M KC930M KC935M	JV608X JC600 JC605W JC610 JC8003	VN5	T150M MK1500 MK3000	WAK15 WKK25 WKP35S	IC5100 DT7150	
		K30	<b>ACK300</b>	VP15TF VP20RT	AH725 AH120 AH110 AH330 GH110 GH130	PR1510 PR1210	GX2140 JS4045 JX1045 CY150 CY250	GC1010 GC1020 GC1025 GC1030	KTPK20 KCPK30 KC510M KC520M KC525M	JC6235 JC5003 JC5015 JC5080 JC8015	VC928	MK2050 MK2000 MH1000	WKP35S WPP20	IC830 IC810 IC908 IC910 IC928 IC950	

# Grade Comparison Chart

## ■ Cermet

Applica-tion	Class	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Mitsubishi-Hitachi	Sandvik	Kennametal	Dijet	Valenite	SECO Tools Japan	WALTER	ISCAR
Turning	<b>P</b>	P10	<b>T1000A</b>	NX2525 AP25N*	GT720* NS520	TN30 PV30* TN6010 PV7010*	CZ25*	CT5015	KT125 HTX KT1120	LN10 CX50	VC605		IC20N IC520N
		P20	<b>T1500A</b> <b>T1500Z*</b>	AP25N* NX2525 NX3035	NS530 GT530* NS730 NS9530 GT9530* GT730*	TN60 TN6020 PV60* PV7020* PV7025*	CH550	GC1525*	KT6215 KT315* KT175 KT5020*	CX50 CX75	VC610	CM CMP C15M TP1020	IC30N IC530N
		P30	<b>T3000Z*</b>	NX3035 MP3025*		PV7025* PV90*				CX90 CX99			
Milling	<b>K</b>	K10	<b>T1000A</b>	AP25N* NX2525	GT720* NS520	TN30 PV30* TN6010 PV7005* PV7010*		CT5015	KT125 HTX	LN10 CX50	VC605		
		<b>P</b>	<b>T250A</b>	NX4545 VP45N*	NS540 NS740	TC60M TN100M	MZ1000* MZ2000* MZ3000*	CT530	KT530M*	CX90	VC630	C15M	

\* denotes coated cermet

## ■ Uncoated Carbide

Class	Grade	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Hitachi	Sandvik	Kennametal	Dijet	SECO Tools Japan	ISCAR
<b>P</b>	P10	<b>ST10P</b>				WS10	S1P		SRT		
	P20	<b>ST20E</b>	UTi20T	UX30		EX35	SMA	K125M	SRT		IC70 IC50M
	P30	<b>A30</b> <b>A30N</b>	UTi20T	UX30	PW30	EX40	SM30		DX30		IC54 IC28
	P40	<b>ST40E</b>				EX45	S6		SR30		IC54 IC28
<b>M</b>	M10	<b>U10E</b> <b>EH510</b>				WA10B	H10A	KU10 K313 K68 KYSM10	UMN	890	IC07 IC08 IC20
	M20	<b>U2</b> <b>EH520</b>	UTi20T	UX30			H13A	K313 K68	DX25 UMS	HX 883	IC07 IC08 IC20
	M30	<b>A30</b> <b>A30N</b>	UTi20T	UX30			H10F SM30		UMS UM40		IC28
<b>K</b>	K01	<b>H2</b> <b>H1</b>	HTi05T			WH01 WH05		KU10,K68 K313 K115M	KG03		IB50 IB85 IS8
	K10	<b>H1</b> <b>EH10</b> <b>EH510</b>	HTi10	TH10	KW10 GW15	WH10	H13A	KU10, K313 K68,K115M K110M KY3500	KG10 KT9 CR1	890	IB50, IB85 IB55, IB90 IC20, IS8
	K20	<b>G10E</b> <b>EH20</b> <b>EH520</b>	UTi20T	UX30	GW25	WH20	H13A	KMF KY3500 KYHS10	KT9 KG20 CR1	890 883 HX	IC20 IS8
	K30	<b>G10E</b>	UTi20T			WH30		KY3500	KG30	883	
Fine-grained Carbide	<b>S</b>	<b>EH510</b> <b>EH520</b>	RT9005 RT9010 MT9015 TF15	TH10 KS20	SW05, SW10 SW25, KW10 GW15	WH10	H10A H10F H13A	KU10, K313 K68, KMF K110M, K1025 KYHS10	KG10 KG20	HX H25	ID5, IB85 IC20, IC07 IC08, IC28
		<b>F0</b>	SF10,MF07 MF10	F,MD1508 MD08F		NM08			FB05,FB10 FZ05		IC07
		<b>F1,AFU</b> <b>XF1</b>	HTi10 MF20	M,MD10 MD05F,MD07F	FW30	NM15	6UF,8UF PN90,H6FF		FZ10,FB15 FZ15	890	IC07
		<b>AF0,AF1</b> <b>SF2</b>	TF15 MF30	EM10,MD20 MD15		BRM20 EF20N	12UF		FB20,FZ15 FB15	890 883	IC08
	<b>A1</b> <b>CC</b>		UM		NM25	N6F H10F		FZ20 FB20	883	IC08	

# Grade Comparison Chart

## ■ CBN

Class	Grade	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	NGK	Sandvik	Kennametal	Dijet	SECO Tools Japan
<b>K</b>	K01	<b>BNC500</b> <b>BN7000</b>	MB710 MB5015	BX930 BX870 BX910	KBN475 KBN60M	B30 B16	CB7525 CB7925	KB1340	JBN795	
	K10	<b>BN700</b> <b>BN7000</b> <b>BN7500</b>	MB710 MB730 MB5015	BX470 BX480 BX950	KBN65B KBN60M KBN900	B23 B16	CB7925 CB7525		JBN330	CBN200, CBN300 CBN300P, CBN400C
	K20	<b>BN700</b> <b>BN7000</b> <b>BNS800</b>	MB730 MBS140 BC5030	BX470 BX480 BXC90 BX90S	KBN900					
	K30	<b>BNS800</b>	MBS140	BX90S BXC90				KB5630		CBN500
<b>S</b>	S01	<b>BN700</b> <b>BN7000</b>	MB730 MB4020	BX950 BX470 BX480	KBN65B KBN70M			KB5630 KB1340		
<b>H</b>	H01	<b>BNC2010</b> <b>BNC100</b> <b>BN1000</b> <b>BN2000</b> <b>BNX10</b>	BC8105 BC8110 MBC010 MB810	BXM10 BX310	KBN05M KBN25M KBN510	B5K B52		KB5610		CH0550 CBN10 CBN100 CBN60K
	H10	<b>BNC2010</b> <b>BNC2020</b> <b>BNC160</b> <b>BNC200</b> <b>BN2000</b>	BC8110 BC8120 MBC020 MB8025 MB825	BXM10 BX330	KBN05M KBN25M KBN525	B5K B6K B52 B36	CB7015 CB20	KBH20 KB5610 KB5625	JBN300	CBN10, CBN150 CBN100, CBN60K CBN160C
	H20	<b>BNC2020</b> <b>BNC200</b> <b>BNX20</b>	BC8120 BC8020 MBC020 MB825	BXA20 BXM20 BX360	KBN30M KBN35M KBN900	B36 B40 B6K	CB7025 CB20	KBH20 KB5625 KB5630	JBN245	CH2540 CBN150 CBN160C
	H30	<b>BNC300</b> <b>BN350</b> <b>BNX25</b>	MB835 BC8130	BXM20 BXC50 BX380		B40	CB7525	KB5630		CH3515

## ■ PCD

Class	Grade	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Sandvik	Kennametal	Dijet	SECO Tools Japan
<b>N</b>	N01	<b>DA150</b> <b>DA1000</b>	MD205	DX180 DX160	KPD001	CD05 CD10	KD1400	JDA30 JDA735	
	N10	<b>DA150</b> <b>DA1000</b>	MD205 MD220	DX140 DX110	KPD001 KPD010 KPD230	CD1810	KD1400 KD1425		PCD05 PCD10
	N20	<b>DA1000</b>	MD220 MD230	DX120 DX110	KPD230		KD1400 KD1425	JDA10 JDA715	PCD05 PCD20
	N30	<b>DA1000</b>	MD2030 MD230	DX110			KD1400		PCD05 PCD30 PCD30M

# Grade Properties Chart

## ■ Properties of Basic Materials

Material		Specific Gravity	Micro Vickers Hardness (GPa)	Young's Modulus (GPa)	Thermal Conductivity Coefficient (W/m·°C)	Linear-Thermal Expansion Coefficient (x 10 <sup>-6</sup> /°C)	Melting Point (°C)
Tungsten Carbide	<b>WC</b>	15,6	21	690	126	5,1	2.900
Titanium Carbide	<b>TiC</b>	4,94	31	450	17	7,6	3.200
Tantalum Carbide	<b>TaC</b>	14,5	18	280	21	6,6	3.800
Niobium Carbide	<b>NbC</b>	8,2	20	340	17	6,8	3.500
Titanium Nitrate	<b>TiN</b>	5,43	20	260	29	9,2	2.900
Aluminium Oxide	<b>Al<sub>2</sub>O<sub>3</sub></b>	3,98	29	410	29	8,5	2.050
Silicon Nitride	<b>Si<sub>3</sub>N<sub>4</sub></b>	3,17	25	310	29	3,0	>1.900 (Disintegrate)
Cubic Boron Nitride	<b>CBN</b>	3,48	44	700	1.300	4,7	–
Carbon	<b>C</b>	3,52	>90	970	2.100	3,1	–
Cobalt	<b>Co</b>	8,9	–	100 ~ 180	69	12,3	1.495
Nickel	<b>Ni</b>	8,9	–	200	92	13,3	1.495
<b>Carbide</b>	<b>WC- 5% Co</b>	15,0	18	630	79	5,0	–
	<b>WC-10% Co</b>	14,6	14	580	75	5,0	–
	<b>WC-20% Co</b>	13,5	10	530	67	6,0	–
<b>High Speed Steel</b>		8,7	8	210	17	11,0	–



# Indexable Inserts for Turning

## Negative / Positive Inserts



**C1 ~ C86**



Inserts

C

D

K

R

S

T

V

W

ISO	Inserts Identification Table	C2 - 3
Chipbreaker for Low Carbon and General Steel Turning	<b>NFE / NFB</b> <small>New</small>	C4
Chipbreaker for Hardened Steel Turning	<b>NGH</b> <small>New</small>	C5
Chipbreaker for Exotic Alloys and Stainless Steel Turning	<b>NEG / NEF</b>	C6 - 7
Chipbreaker for Stainless Steel Turning	<b>NEM</b>	C8
Positive M Class Chipbreaker	<b>NFB / NLB</b>	C9
Chipbreaker for Steel Turning	<b>(M) NSI</b>	C10
Comparison Chart	<b>Chipbreaker</b>	C11
Selection	<b>Chipbreaker Application Table</b>	C12 -17
Negative Inserts	<b>C / 80° Diamond Type (With Hole)</b>	C18-24
	<b>D / 55° Diamond Type (With Hole)</b>	C25-32
	<b>S / Square Type (With Hole)</b>	C33-39
	<b>S / Square Type (Without Hole)</b>	C39
	<b>T / Triangle Type (With Hole)</b>	C40-48
	<b>T-REX Insert</b>	C46
	<b>V / 35° Diamond Type (With Hole)</b>	C49-51
	<b>W / Polygon Type (With Hole)</b>	C52-56
Positive Inserts	<b>C / 80° Diamond Type (With Hole)</b>	C57-62
	<b>D / 55° Diamond Type (With Hole)</b>	C63-65
	<b>R / Round Type (With Hole)</b>	C66
	<b>S / Square Type (With Hole)</b>	C67-68
	<b>S / Square Type (Without Hole)</b>	C69
	<b>T / Triangle Type (With Hole)</b>	C70-77
	<b>T / Triangle Type (Without Hole)</b>	C78-79
	<b>V / 35° Diamond Type (With Hole)</b>	C80-83
	<b>W / Polygon Type (With Hole)</b>	C84-85

### Stock marking chart

- : Eurostock item
- : Japanstock item
- ▲ : To be replaced by new item

☐ : We cannot produce

#### Note:

Stocking policy may change without prior notice, please consult our sales representative for actual stock situation.

# Inserts Identification Table

Inserts

C

D

K

R

S

T

V

W

**C**      **N**      **M**      **G**

①

②

③

④

**Insert Shape**  
Chart 1

**Tolerance**  
Chart 3

**Relief Angle**  
Chart 2

**Insert Type**  
Chart 4

**Chart 1: Insert Shape**

Symbol	Insert Shape	Angle
C		80°
D		55°
E		75°
F		50°
V		35°
R		Round
S		Square
T		Triangle
W		Trigon
A		85°
B		82°
K		55°
H		Hexagonal
O		Octagonal
P		Pentagonal
L		Rectangular
M		Rhombic

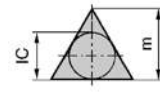


**Chart 2: Relief Angle**

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

\* Inserts with a 10° relief angle are sometimes considered as "P"

**Chart 3: Tolerance (mm)**

Symbol	Nose Height	Inscribed Circle	Thickness
A	± 0,005	± 0,025	± 0,025
F	± 0,005	± 0,013	± 0,025
C	± 0,013	± 0,025	± 0,025
H	± 0,013	± 0,013	± 0,025
E	± 0,025	± 0,025	± 0,025
G	± 0,025	± 0,025	± 0,13
J*	± 0,005	± 0,05~± 0,15	± 0,025
K*	± 0,013	± 0,05~± 0,15	± 0,025
L*	± 0,025	± 0,05~± 0,15	± 0,025
M*	± 0,08~± 0,2	± 0,05~± 0,15	± 0,13
N*	± 0,08~± 0,2	± 0,05~± 0,15	± 0,025
U*	± 0,13~± 0,38	± 0,08~± 0,25	± 0,13

The height "m" on sharp corner.

**Chart 4: Insert Hole or Breaker**

Symbol	Hole	Hole Style	Chip Breaker	Shape	Symbol	Hole	Hole Style	Chip Breaker	Shape
N	No Hole	—	Nil		A	With Hole	Straight Hole	Nil	
R			One Face		M			One Face	
F			Both Faces		G			Both Faces	
W	With Hole	Straight hole with top end counter-sink (40°~60°)	Nil		B	With Hole	Straight hole with top end counter-sink (70°~90°)	Nil	
T			One Face		H			One Face	
Q	With Hole	Straight hole with top end counter-sink (40°~60°)	Nil		C	With Hole	Straight hole with top end counter-sink (70°~90°)	Nil	
U			Both Faces		J			Both Faces	
					X	—	—	—	Special

● **Tolerance of Nose Height (M-Class)**

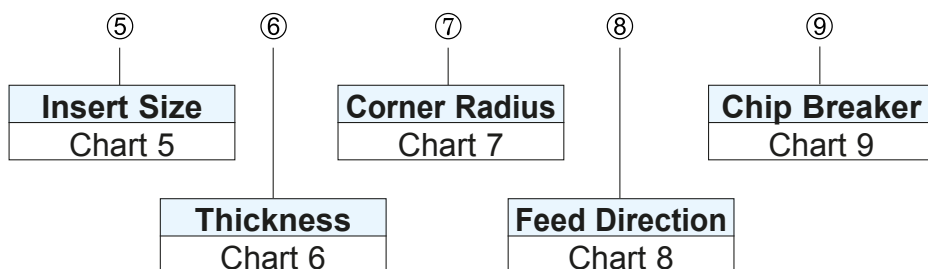
Inscribed Circle	Triangle	Square	80° Diamond	55° Diamond	35° Diamond	Round
6,35	± 0,08	± 0,08	± 0,08	± 0,11	—	—
9,525	± 0,08	± 0,08	± 0,08	± 0,11	± 0,16	—
12,70	± 0,13	± 0,13	± 0,13	± 0,15	—	—
15,875	± 0,15	± 0,15	± 0,15	± 0,18	—	—
19,05	± 0,15	± 0,15	± 0,15	± 0,18	—	—
25,40	± 0,18	± 0,18	± 0,18	—	—	—
31,75	—	± 0,20	—	—	—	—

● **Tolerance of Inscribed Circle (M-Class)**

Inscribed Circle	Triangle	Square	80° Diamond	55° Diamond	35° Diamond	Round
6,35	± 0,05	± 0,05	± 0,05	± 0,05	—	—
9,525	± 0,05	± 0,05	± 0,05	± 0,05	± 0,05	± 0,05
12,70	± 0,08	± 0,08	± 0,08	± 0,08	—	± 0,08
15,875	± 0,10	± 0,10	± 0,10	± 0,10	—	± 0,10
19,05	± 0,10	± 0,10	± 0,10	± 0,10	—	± 0,10
25,40	± 0,13	± 0,13	± 0,13	—	—	± 0,10
31,75	—	± 0,15	—	—	—	± 0,12

# Inserts Identification Table

## 12 04 08 N - GE



Picture of insert shown as example  
(ISO Cat, No.)



Inserts

**Chart 5: Cutting Edge Length (mm)**

Shape	Symbol	Cutting Edge	Inscribed Circle	Shape	Symbol	Cutting Edge	Inscribed Circle	Shape	Symbol	Cutting Edge	Inscribed Circle		
C	03	3,55	3,50	D	07	7,7	6,35	W	03	3,8	5,56		
	04	4,97	4,30		09	9,7	7,94		04	4,3	6,35		
	06	6,4	6,35		11	11,6	9,525		05	5,4	7,94		
	08	8,0	7,94		15	15,5	12,70		06	6,5	9,525		
	09	9,7	9,525		19	19,4	15,875		08	8,7	12,70		
	12	12,9	12,70						10	10,9	15,875		
	16	16,1	15,875		V	08	8,3		4,76	R	08	8,0	8,0
	19	19,3	19,05			09	9,7		5,56		10	10,0	10,0
	25	25,8	25,4			11	11,1		6,35		12	12,0	12,0
						16	16,6		9,525		15	15,875	15,875
			22	22,1		12,7	16	16,0	16,0				
							19	19,05	19,05				
S	06	6,35	6,35	T	06	6,9	3,97	20	20,0		20,0		
	S7	7,14	7,14		08	8,2	4,76	24	24,0		24,0		
	07	7,94	7,94		09	9,6	5,56	25	25,0		25,0		
	09	9,525	9,525		11	11,0	6,35	25	25,40		25,40		
	12	12,70	12,70		16	16,5	9,525	32	32,0	32,0			
	15	15,875	15,875		22	22,0	12,70						
	19	19,05	19,05		27	27,5	15,875						
	25	25,40	25,40		33	33,0	19,05						
	31	31,75	31,75										

**Chart 6: Thickness**

Symbol	Thickness (mm)
X1	*
01	1,59
02	2,38
T2	2,78
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94
09	9,52

(\*):  
CCET03X1 Insert thickness: 1,40  
CCET04X1 Insert thickness: 1,80

**Chart 7: Nose Radius**

Symbol	Nose Radius (mm)
00	Sharp Point
003	0,03
008	0,08
01	0,1
015	0,15
018	0,18
02	0,2
0,35	0,35
04	0,4
08	0,8
10	1,0
12	1,2
16	1,6
20	2,0
24	2,4
32	3,2
M0	Round Insert (Metric)
00	Round Insert (Imperial)

An "M" after the nose radius indicates a negative tolerance  
Example:  
CCG T09T302 M NSI AC520U

**Chart 8: Feed Direction**

Symbol	Direction
R	Right-hand
L	Left-hand
N	Neutral

**Chart 9: Chip Breaker**

Symbol	Process	Bumpy Type	Standard	Handed
F	Fine Finishing to Finishing	FA, FL, FE, FB, FC FK, FP		FT, FX, FZ FY, FW
S	Light Cut	SE, SEW, SI, SC, SF, SP, SU, SX		SD SDW ST
L		LU, LUW, LB		
G	General	GE, GU, GUW	GZ	UM
U		UG, UP US, UX	UZ	
M	Rough	MP, MU, MX, ME	MC	MM HM
H	Heavy	HG, HP, HF	HU HW	

Other specials	
Wide Chipbreaker	W
For Countersink	C
For Round insert	RD, RP, RX, RH
For Exotic Alloy	EF, EG, EX
For Aluminium	AG, LD, GD
For Hardened Steel	FV, LV
For Carburized Layer Removal	SV
For Stainless Steel	EF, EG, EM

C

D

K

R

S

T

V

W

# Chipbreaker NFE Type / NFB Type

**New**

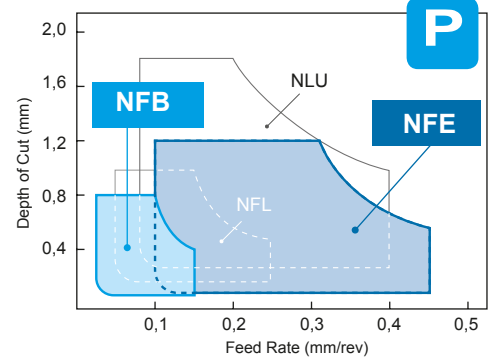
## Negative M Class Chipbreakers for Low Carbon and General Steel Turning



### General Features

The high performance NFE type, which ensures stable chip control in a wide range of feed rate, has been added to the chipbreaker series for low carbon steel and general steel turning. Extensive product lines are available to meet various machining requirements. A positive insert execution of chipbreaker NFB is also available.

### Application Range



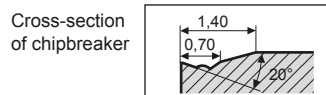
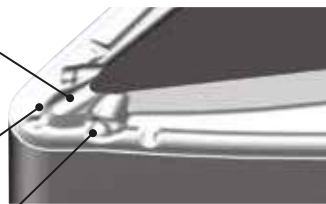
### NFE Chipbreaker for Finishing

Supports general purpose machining to high speed machining.

The arc-shaped main breaker ensures stable chip control in a wide feed rate range.

The two step chipbreakers enable stable chip control at a low feed rate of  $f = 0,1 \text{ mm/rev}$ .

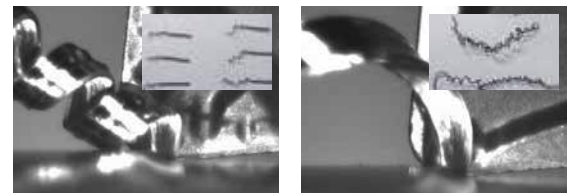
The sub-breaker controls cutting chips in profiling.



### Performance

Work Material: Pipe steel (H240LA, 1.0480)  
Insert: CNMG 120408 NFE (AC8025P)  
Cutting Conditions:  $v_c=200 \text{ m/min}$ ,  $f=0,4 \text{ mm/rev}$ ,  $a_p=0,2 \text{ mm}$ , Dry

Excellent chip control under low depth of cut and high feed rate condition



NFE Type (AC8025P)

Conventional

### Application Examples

Work Material: Deep-draw steel (SPHC440)  
Facing Insert: CNMG 120408 NFE (AC8025P)  
Cutting Conditions:  $v_c=200 \text{ m/min}$ ,  $f=0,15 \text{ mm/rev}$ ,  $a_p=0,2-0,5 \text{ mm}$ , Wet

Stable chip curling and breaking in facing of gummy steel.



NFE Type (AC8025P)

Competitor

Work Material: C53E, 1.1210,  $\varnothing 20-100$   
Exter. Turning+Facing Ins.: DNMG 150412 NFE (AC8025P)  
Cutting Conditions:  $v_c=180 \text{ m/min}$ ,  $f=0,25 \text{ mm/rev}$  (radius),  $0,45 \text{ mm/rev}$  (straight section),  $a_p=0,3 \text{ mm}$ , Wet

Stable chip control even at a variable feed rate in shallow cutting.



NFE Type (AC8025P)

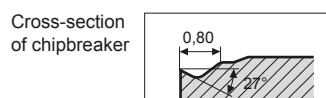
Conventional

### NFB Chipbreaker for Low Feed Finishing

Supports low feed machining.

Smooth chipbreaker geometry with a high rake reduces cutting resistance.

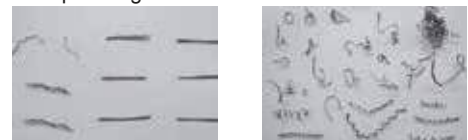
The variable rake angle in nose radius makes effective strain on chips and improves the breaking performance.



### Application Example

Work Material: Pipe steel (STKM13C)  
Internal Turning Insert: DNMG 150404 NFB (T3000Z)  
Cutting Conditions:  $v_c=352 \text{ m/min}$ ,  $f=0,03-0,2 \text{ mm/rev}$ ,  $a_p=0,7 \text{ mm}$ , Wet

Small chip curling and control



NFB Type (T3000Z)

Competitor

Inserts

C

D

K

R

S

T

V

W



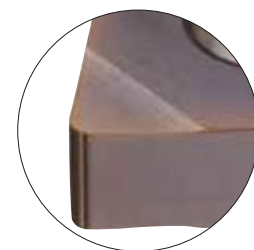
# Chipbreaker NGH Type

## For Hardened Steel Turning



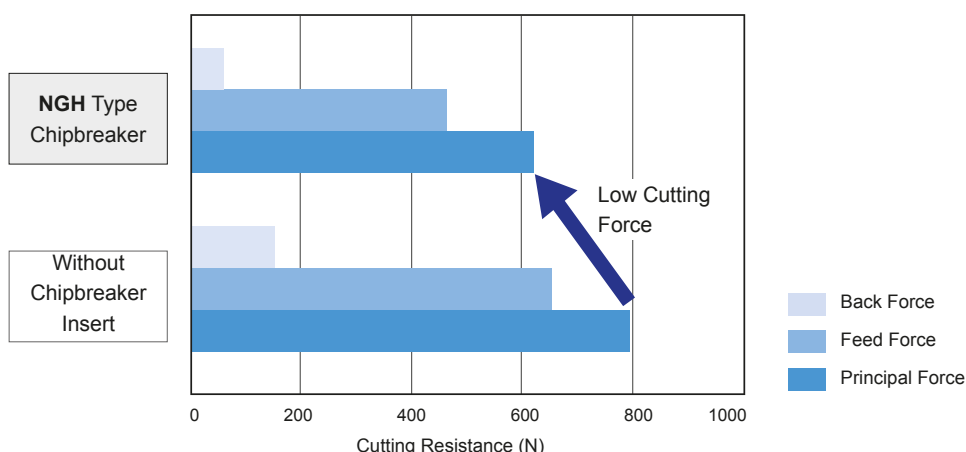
### General Features

Enables medium roughing of hardened steel in combination with coating and grade AC503U.  
 Reduces heat generation and enables deep cutting ( $a_p = 1 \sim 3\text{mm}$ ) of hardened steel by using a wide neutral ground chipbreaker (rake angle:  $4^\circ$ ) and sharp edge.  
 Discharges chips smoothly.



### Negative Insert for Rough Cutting NGH Type Chipbreaker

#### Performance



#### Application Examples



Work Material: X155CrVMo12-1 (61HRC)  
 Insert: TNGG 160404 NGH (AC503U)  
 Cutting Conditions:  $v_c=50\text{m/min}$ ,  $f=0,05\text{mm/rev}$ ,  $a_p=3,0\text{mm}$ , Dry

#### Recommended Cutting Conditions

Application Range	Cutting Speed $v_c$ (m/min)	Feed Rate $f$ (mm/rev)	Depth of Cut $a_p$ (mm)	Recommended Chipbreaker
Finishing	40 ~ 100	0,02 ~ 0,10	<1	Without chipbreaker insert
Medium Roughing	20 ~ 60	0,02 ~ 0,05	1 ~ 3	NGH Type

Work Material: Hardened steel (50 ~ 62HRC), X155CrVMo12-1, X40CrVMo5-1, S6-5-2, High-speed powder and high speed steel

Inserts

C

D

K

R

S

T

V

W

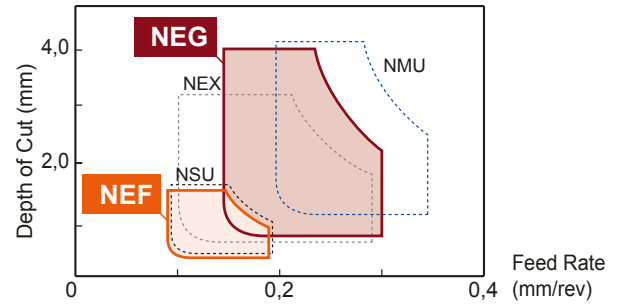
# Chipbreaker NEG Type / NEF Type

For Exotic Alloys and Stainless Steel Turning

## General Features

NEG/NEF type chipbreaker for exotic alloy machining can be used for Titanium alloys, heat-resistant alloys and a variety of other exotic alloys. They deliver excellent wear resistance and superior chip management. These chipbreakers can solve quality problems caused by the unstable tool life and poor chip control provided by conventional chipbreakers for exotic alloys.

## Application Range

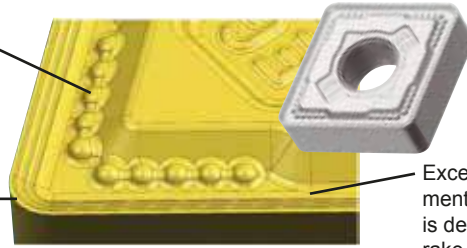


## NEG Chipbreaker for Roughing

Provides excellent wear resistance and chip control from general-purpose machining to roughing applications. Reduces damage to insert and eliminates trouble from chips specific to exotic alloys. Also demonstrates very high versatility.

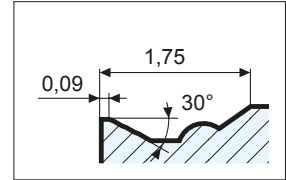
Crater wear advancement is prevented by the round bumps, whilst maintaining excellent control.

The cutting edge maintains the strength slowing the progress of crater wear.



Excellent chip management and wear prevention is delivered by the special rake face design.

Cross Section of Chipbreaker



## Cutting Performance – NEG Type

### Heat Resistant Alloy

Chipbreaker type: NEG (AC510U)



Suppresses the chipping of peripheral cutting edge and notch wear. Excellent chip management.

Work Material: Inconel 718

Insert: CNMG120412

Cutting Data:  
 $v_c = 40\text{m/min}$   
 $d_{oc} = 2,5\text{mm}$   
 $f = 0,2\text{mm/rev}$   
Wet  
 $T_c = 7\text{min}$

Conventional tool (S10)



Notch wear / poor chip control

### Titanium Alloy

Chipbreaker type: NEG (AC510U)



Suppresses crater wear and flank wear. Excellent chip management.

Work Material: Ti-6Al-4V

Insert: CNMG120412

Cutting Data:  
 $v_c = 65\text{m/min}$   
 $d_{oc} = 2,5\text{mm}$   
 $f = 0,2\text{mm/rev}$   
Wet  
 $T_c = 8\text{min}$

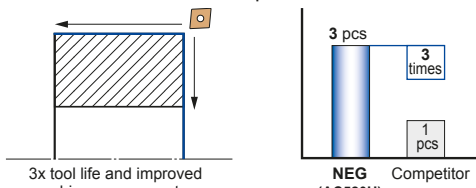
Conventional tool (S10)



Crater wear / flank wear / poor chip control

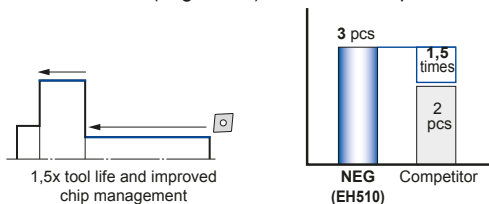
## Application Example – NEG Type

Inconel 718, machine component



Insert: CNMG120408 NEG (AC520U)  
Cutting Data:  $v_c=50\text{m/min}$ ,  $d_{oc}=1,5\text{mm}$ ,  $f=0,3\text{mm/rev}$ , Wet

Pure Titanium (Ti grade 3), machine component

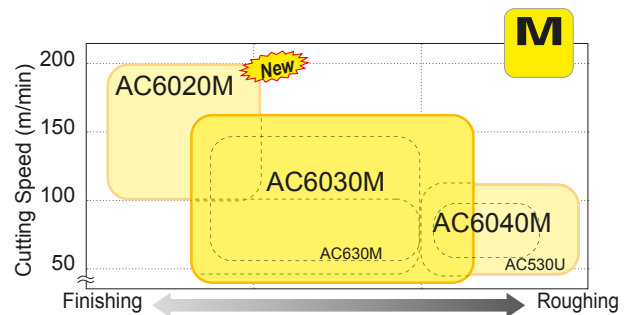
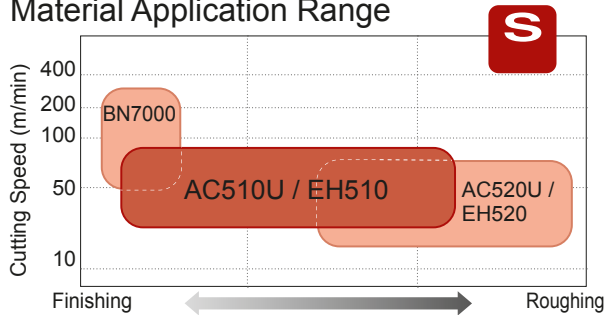


Insert: CNMG120408 NEG (EH510)  
Cutting Data:  $v_c=80\sim 100\text{m/min}$ ,  $d_{oc}=1,0\text{mm}$ ,  $f=0,25\text{mm/rev}$ , Wet

# Chipbreaker NEG Type / NEF Type

## For Exotic Alloys and Stainless Steel Turning

### Material Application Range

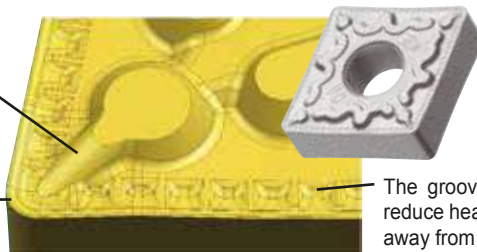


### NEF Chipbreaker for Finishing

The NEF chipbreaker reduces chip curl diameter in finishing applications. Provides extremely good chip management not fluctuated by the material in use.

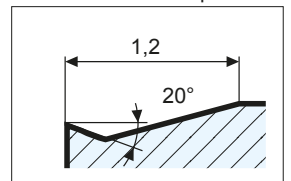
Main chipbreaker that enables good chip control even at low depths of cut.

Sharp edge with 20° rake angle reduces wear.



The grooves on the rake face reduce heat and assist chip flow away from the workpiece.

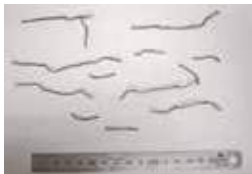
Cross Section of Chipbreaker



### Cutting Performance – NEF Type

#### Heat Resistant Alloy

Chipbreaker type: NEF (AC510U)



Improvements in chip control and chip removal management based on small curled chips.

Work Material: Inconel 718

Insert: CNMG120408

Cutting Data:  
 $v_c = 55\text{m/min}$   
 $d_{oc} = 0,3\text{mm}$   
 $f = 0,15\text{mm/rev}$   
 Wet  
 $T_c = 8\text{min}$

Conventional tool (S10)



Competitor's product (S10)



There is a problem in the length and the diameter of chips.

#### Titanium Alloy

Chipbreaker type: NEF (AC510U)



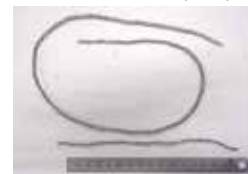
Improvements in chip control and chip removal management based on small curled chips.

Work Material: Ti-6Al-4V

Insert: CNMG120408

Cutting Data:  
 $v_c = 80\text{m/min}$   
 $d_{oc} = 0,5\text{mm}$   
 $f = 0,2\text{mm/rev}$   
 Wet  
 $T_c = 25\text{min}$

Conventional tool (S10)



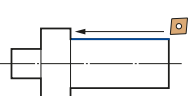
Competitor's product (S10)



There is a problem in the length and the diameter of chips.

### Application Example – NEF Type

Inconel 718, shaft component



Great improvement in chip management. Keeps workpieces free of damage. It is possible to omit final polishing process.



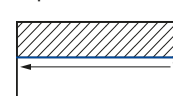
NEF (AC510U)



Conventional tool

Insert: CNMG120408 NEF (AC510U)  
 Cutting Data:  $v_c=45\text{m/min}$ ,  $d_{oc}=0,25\text{mm}$ ,  $f=0,1\text{mm/rev}$ , Wet

Duplex stainless steel cover



Improvements in chip management. Suppress damage to finished surface with no entanglement of chips.



NEF (AC510U)



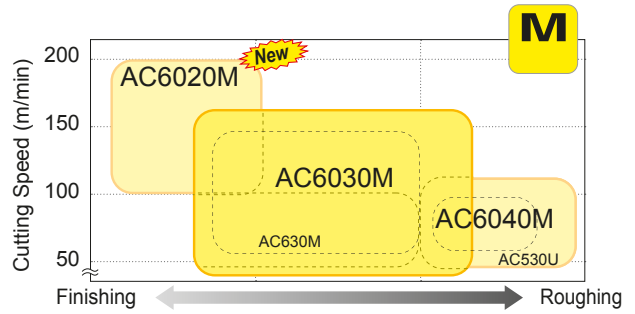
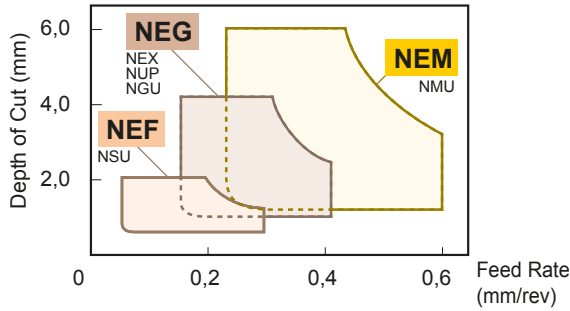
Conventional tool

Insert: CNMG120408 NEF (AC510U)  
 Cutting Data:  $v_c=55\text{m/min}$ ,  $d_{oc}=0,3\text{mm}$ ,  $f=0,125\text{mm/rev}$ , Wet

# Chipbreaker NEM Type

## Chipbreaker for Stainless Steel Turning

### Application Range



### NEM Chipbreaker for Rough Cutting

The NEM chipbreaker achieves excellent fracture and crater resistance and ensures extremely stable machining.

Large radius rake face design that reduces crater wear while maintaining the cutting edge strength.



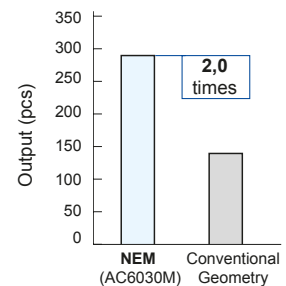
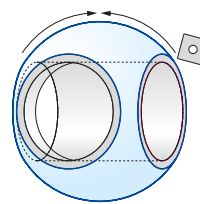
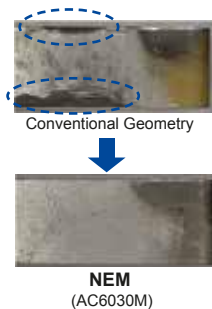
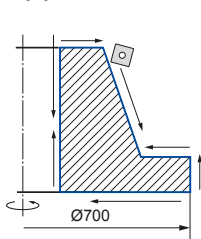
Bright colors for easy identification of used cutting edge.

Reduces boundary damage by eliminating changing points from the cutting edge.

### Reduction of Damage

	Reduction of Boundary Damage		Reduction of Crater Wear	
	Cutting Edge	Boundary Wear Comparison	Cross Section	Crater Wear Comparison
Conventional Geometry				
NEM Type				
	The NEM chipbreaker has no changing points on the cutting edge, so boundary damage is reduced.		The NEM chipbreaker smoothly evacuates chips thanks to its large radius rake face design, so crater wear is reduced.	

### Application Example



Reduces breakage out of the cutting edge and ensures stable machining.

Reduces crater wear and provides long tool life.

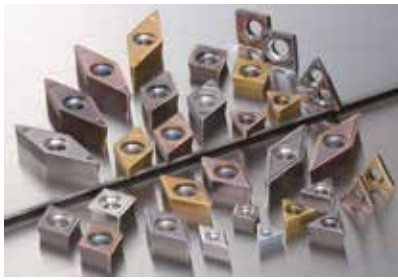
Work Material: X5CrMo17 12 2  
 Insert: SNMG190616NEM (AC6030M)  
 Cutting Conditions:  $v_c=70\text{m/min}$ ,  $f=0,5\text{mm/rev}$ ,  $a_p=3,0\sim 8,0\text{mm}$ , Wet

Work Material: X5CrNiS18 10  
 Insert: SNMG120408NEM (AC6030M)  
 Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,32\text{mm/rev}$ ,  $a_p=2,0\sim 2,5\text{mm}$ , Wet

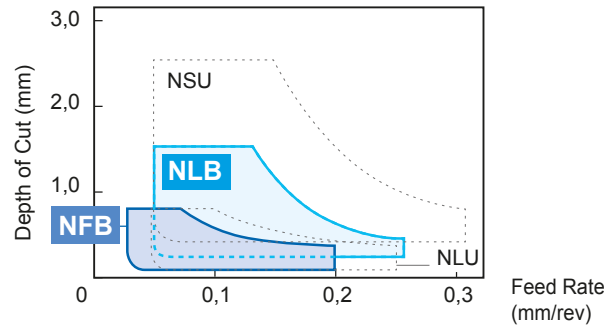


# Positive M Class Chipbreakers for Low Carbon and General Steel Turning

# Chipbreaker NFB Type / NLB Type

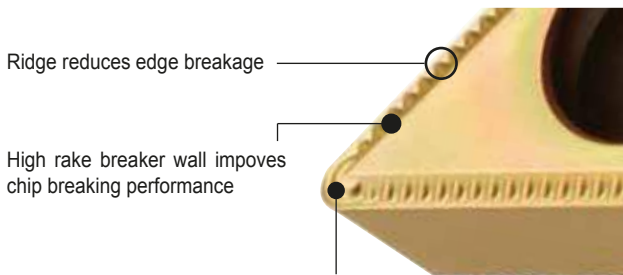


## Application Range

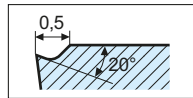


## NFB Chipbreaker for Finishing

The NFB type for finishing and the NLB type for light cutting have been added to the chipbreaker series for low carbon and general steel machining in addition to the already present NLU type for finishing and NSU type for light cutting. The NFB and NLB type chipbreakers improve chip control in finishing of low carbon and general steel.

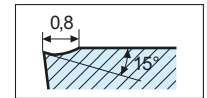
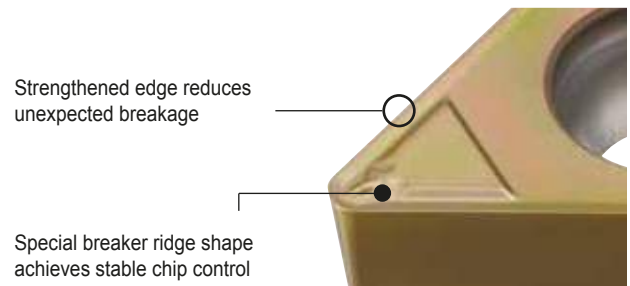


Variable rake angle in nose radius increases chip strain and improves chip breaking performance



Cross Section of Chipbreaker

## NLB Chipbreaker for Light Cutting

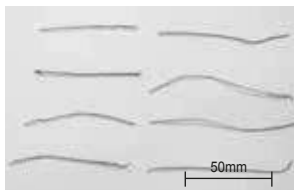


Cross Section of Chipbreaker

## Performance

### Chip Control

Achieves stable chip control at small cutting depth and low feed.



NFB Type Chipbreaker (T1500A)



Competitor's Product

Work Material: Pipe (H240LA), Ø30 Boring  
Insert: TPMT 110304 NFB (T1500A)  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,12\text{mm/rev}$ ,  $a_p=0,1\text{mm}$ , Wet

## Performance

### Chip Control ①

Achieves stable chip control in light cutting.



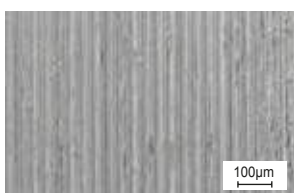
NLB Type Chipbreaker (T1500A)



Competitor's Product

Work Material: Pipe (H240LA), Ø30 Boring  
Insert: TPMT 110304 NLB (T1500A)  
Cutting Conditions:  $v_c=200\text{m/min}$ ,  $f=0,15\text{mm/rev}$ ,  $a_p=0,5\text{mm}$ , Wet

### Comparison of Surface Roughness of Finished Surfaces



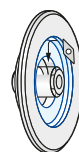
NFB Type Chipbreaker (T1500A)



Competitor's Product

Work Material: Pipe (H240LA), Ø100 Boring  
Insert: TPMT 110304 NFB (T1500A)  
Cutting Conditions:  $v_c=200\text{m/min}$ ,  $f=0,07\text{mm/rev}$ ,  $a_p=0,1\text{mm}$ , Wet

### Chip Control ②



NLB Type Chipbreaker (T1500A)



Competitor's Product



Doubles the tool life by improving chip control and reducing blemishes on machined surfaces.

Work Material: Hub (C45)  
Insert: VBMT 160408 NLB (T1500A)  
Cutting Conditions:  $v_c=240\text{m/min}$ ,  $f=0,25\sim0,28\text{mm/rev}$ ,  $a_p=0,6\text{mm}$ , Wet

Inserts

C

D

K

R

S

T

V

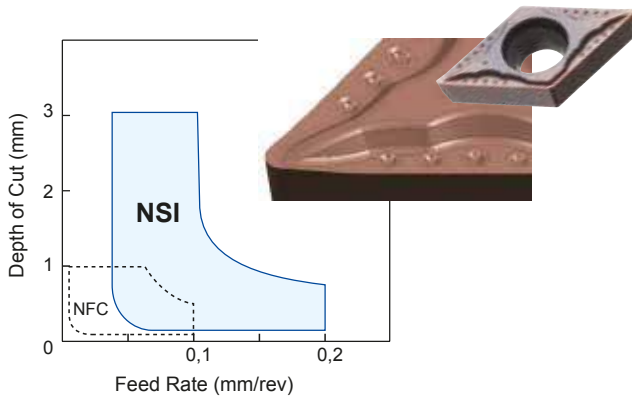
W

# Chipbreaker for Steel Turning (M)NSI Type

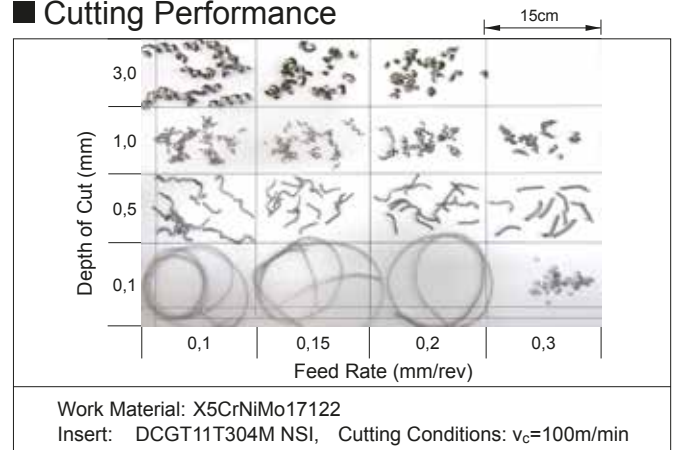
Nose radius with minus tolerance (M)

Example: DCGT 11T304M NSI

## Application Range



## Cutting Performance



## Application Examples

Inconel 718, machine component external turning

1,5 x higher tool life. Improved chip management.

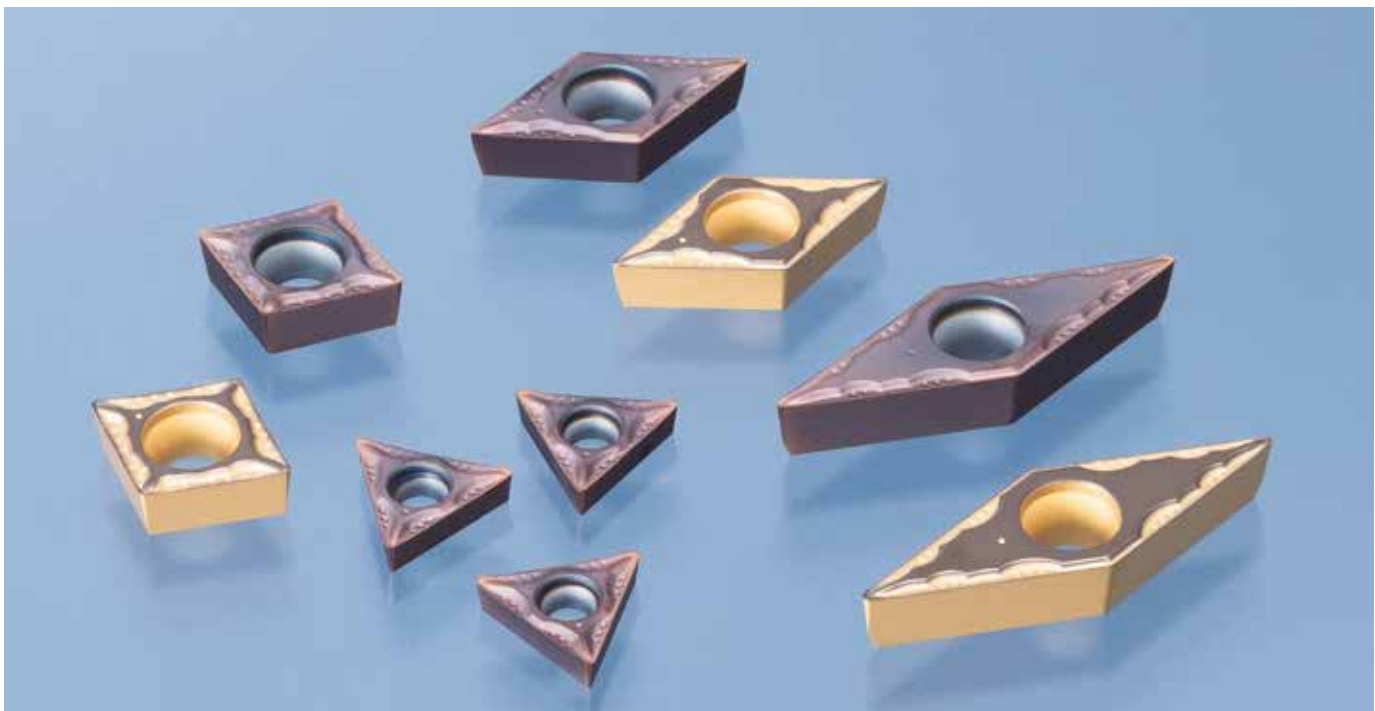
Insert: DCGT11T302M NSI (AC510U)  
Cutting Conditions:  $v_c=35\text{m/min}$ ,  $f=0,08\text{mm/rev}$ ,  $d_{oc}=0,8\text{mm}$ , Wet

X5CrNi1810, Shaft component external turning & facing

Improved chip management. Suppressing cutting edge adhesion to ensure a stable, long tool life.

Insert: DCGT11T304M NSI (AC520U)  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,08\text{mm/rev}$ ,  $d_{oc}=0,5\text{mm}$ , Wet

- Sharp designed cutting edge with low-cutting force
- Better chip control in wide range DOC for bar feeder machine
- Combination of high rake edge design and G-class precision offers superior cutting performance
- Suitable for medical parts and high precision machining



Inserts  
C  
D  
K  
R  
S  
T  
V  
W

# Chipbreaker Comparison

## ■ Negative Type

Class	Application	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Mitsub.-Hitachi	Sandvik	Kennametal	SECO Tools	WALTER	ISCAR
<b>P</b>	Fine Finishing	<b>FA</b>	FH	TF	GP		QF	FF	FF1		SF
		<b>FL, FB</b>	FS,FY	NS,ZF	XP,XF,VF	FE			FF2	FP5	
	Finishing	<b>LU, FE</b>	SA,SY	NM, SS	XQ,CQ,PP	BE	LC	FN		NF3	
		<b>SU</b>	SH	TS,TSF,11	HQ	CE,B,BH	XF,MF	CT	MF2		NF,TF
	Wiper Edge	<b>LUW</b>		AFW, FW	WP		WL,WP		W-FF2		
		<b>SEW</b>	SW	ASW, SW	WQ		WF,WMX	FW	W-MF2	NF	WF
	Finishing to Light Cut	<b>SE, SX</b>	LP	AS,ZM,27	CJ,XS	AB,CT	PF,KF	LF, 33		MP3,NS6	F3P, TF
	Medium Cut	<b>GU (UG)</b>	MA,MV	TM	HS,PS	AH	XM,QM	P,MG	M3		GN, HT
		<b>GE, UX</b>	MH,MP	DM,AM	CS,GS,PQ,PT	AE,AY	PM,SM,KM	MN, MP1		MP5,NM4,NM6	RF, LF
	Wiper Edge	<b>GUW</b>	MW				WM	MW, RW	W-M3	NM	WG
	Roughing	<b>MU, ME</b>	GH, RP	TH, S	HT,GT,PH	RE,AR	PR,XMR,KR	RP	M5,MR7	NM7,NM9,RP5	M3P,NR
		<b>MX</b>	HAS,MT	CH				RN	MR6		
	Heavy Cut	<b>HG</b>	HA,HZ,HX,HBS	THS,TRS	PX,HX	TE,UE	QR	RM,MR	R4,R5,R6	NR6,NRF	NM
		<b>HP</b>	HH,HXD	65			HR,SR	RH	R7	NR8	TNM
		<b>HU, HW</b>	HV			H					
		<b>HF</b>	HCS	TUS		HX,HE	MR		RR9	NRR	R3P
<b>M</b>	Finishing	<b>SU, EF</b>	LM,SH	SS	MQ,GU	SE,MP	MF	FP,FS,LF	MF2	NF4	
	Light to Medium Cut	<b>EX, EG</b>	GM,MS	SF,SA	MS, MU	PV	23	MS	MF1,M1		TF,VL
		<b>GU</b>	MM	SM	HU	DE	MM, SMR	MP	MF3,M3	NM4	M3M,PP
	Roughing	<b>HM</b>	ES,1M,2M	S					MF4, MF5	NR4, RM5	
<b>EM, MU</b>		GH,RM	SH	TK		MR, MRR		M5,MR3		MR	
<b>S</b>	Finishing	<b>EF</b>	LS,FJ	HRF			SF, SGF			NFT	
	Medium Cut	<b>EG, EX</b>	MJ,MS	HMM,SA			SM, SMC			NMT	
	Roughing	<b>MU</b>	GJ,RS				SMR			NRT	
<b>K</b>	Light Cut	<b>UZ</b>	LK,MA,MK,SW	CM,CF	Standard	V,VA	KF	UN	M5	NM5	GN
	Medium Cut	<b>GZ (UX)</b>	GH,Standard	Standard,CH,33	ZS,GC	Y,RE	KM,KR		MR7	RK5, RK7	
<b>H</b>	Finishing	FV, GH									
	Light Cut	LV									
	Carburized Layer Removal	SV									

## ■ Positive Type

Class	Application	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Mitsub.-Hitachi	Sandvik	Kennametal	SECO Tools	WALTER	ISCAR
<b>P</b>	Finishing	<b>FC</b>	FJ,AM	01, JRP,JTS	CF,GF,VF		UM		GT-F1	FM4	
		<b>FB, LU (FP, FK)</b>	FP,FM,FV,SQ	PSF,PF,23	GP,XP,MP,PP	JQ,MP	PF,UF,MF,KF	11,UF,FP	FF1	PF4	PF
<b>M</b>	Wiper Edge	<b>LUW</b>	SW				WF	FW	W-F1	PF	WF
		<b>SDW</b>					WK,WM	MW	W-F2		WG
	Finishing to Light Cut	<b>SI</b>	SMG	JS	CK						
<b>K</b>	Light Cut	<b>LB, SU (SK, SF)</b>	LP,LM,SV,MQ	PSS,PS,24	HQ,XQ,GK	JE	PM,UM,MM,PM	LF	F1	MP4,MM4,FK6	SM,14
		<b>SC</b>			GQ,SK			MP	MF2		
	Medium Cut	<b>MU</b>	MV,MM,MK	PM			PR,UR,MR,KR	MF	F2,M3,M5	PM5,RP4,RM4	19
<b>N</b>	Finishing	<b>AG</b>	AZ	AL,PP	AH		AL	HP	AL	PM2	AS,AF
	Finishing to Light Cut	<b>LD, GD</b>									
<b>H</b>	Finishing	<b>FV</b>									
	Light Cut	<b>LV</b>									

Inserts

C

D

K

R

S

T

V

W

# Chipbreaker Application

Bumpy Breaker	Standard Breaker	Handed Breaker
Break Master (CBN/PCD)	For Chamfering	

## Negative Type

## Finishing to Medium Cutting

**New**

**N-FB** **P M K N S H**  
Better chipcontrol under low feed conditions with sharp edge shape.  
0,80  
27°  
α = 0°  
CNMG1204-0-NFB

**N-FA** **P M K N S H**  
Profile breaker perfect for fine finishing  
1,0  
20°  
α = 0°  
CNMG1204-0-NFA

**N-FL** **P M K N S H**  
Optimal breaker for chip management on iron sheeting  
1,0  
10°  
α = 0°  
CNMG1204-0-NFL

**N-FE** **P M K N S H** **New**  
Good chipcontrol from low to high feed rate  
1,40  
0,70  
20°  
α = 0°  
CNMG1204-0-NFE

Breaker Code: **N-GU** **P M K N S H** Work Material Characteristics  
 Appearance: Cross Section  
 Relief angle: α = 0° Cross Section Cat. No.  
 Stock Items: **C D R S T V W**

Diagram showing dimensions: 0,25, 2,05, 7°, 25°  
 CNMG1204-0-NGU

**N-LU** **P M K N S H**  
Effective chip management for fluctuating cut depths and copying  
1,5  
1,0  
10°  
α = 0°  
CNMG1204-0-NLU

**N-SP** **P M K N S H**  
Shows excellent cutting performance in finishing to light cutting  
1,3  
13°  
α = 0°  
CNMG1204-0-NSP

**N-SU** **P M K N S H**  
Effective in high-speed fine finishing  
1,3  
13°  
α = 0°  
CNMG1204-0-NSU

**N-SE** **P M K N S H**  
Finishing breaker reduces tool wear on rake face. Effective even for high efficiency machining.  
0,1  
1,5  
17°  
5°  
α = 0°  
CNMG1204-0-NSE

**N-EF** **P M K N S H**  
Chipbreaker for exotic alloy finishing with excellent chip management  
1,2  
20°  
α = 0°  
CNMG1204-0-NEF

**NLU-W** **P M K N S H** **Wiper**  
High performance finishing breaker with wiper edge  
1,5  
1,0  
10°  
α = 0°  
CNMG1204-0-NLUW

**NSE-W** **P M K N S H** **Wiper**  
New high feed finishing breaker with wiper edge  
0,13  
1,9  
17°  
5°  
α = 0°  
CNMG1204-0-NSEW

**L/R-FX** **P M K N S H**  
Parallel breaker with superior sharp edge  
1,5  
14°  
α = 0°  
TNGG1604-0-LRFX

**L/R-FY** **P M K N S H**  
Wide type breaker with sharp edge  
2,5  
15°  
α = 0°  
TNGG1604-0-LRFY

**L/R-FT** **P M K N S H**  
Arc-shaped ground type finishing breaker  
0,15  
1,35  
α = 0°  
TNGG1103-0-LRFT

**N-SJ** **P M K N S H**  
Standard breaker with excellent cutting edge strength  
0,18  
1,2  
α = 0°  
SNMG1204-0-NSJ

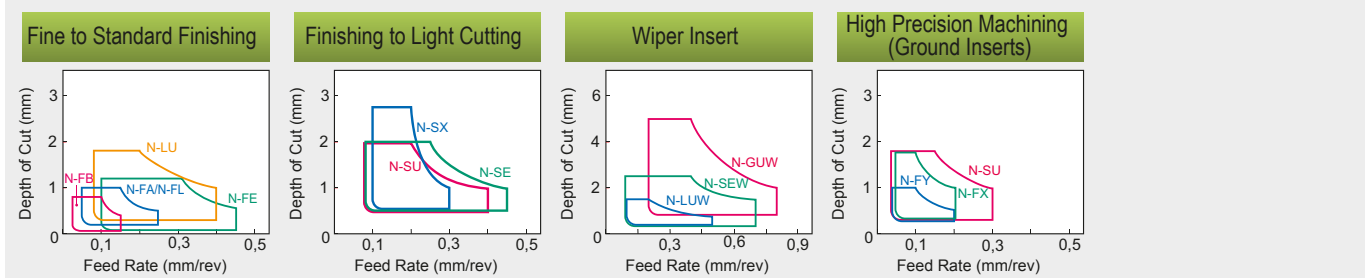
**L/R-ST** **P M K N S H**  
Arc-shaped ground type breaker for light cutting  
0,15  
1,65  
α = 0°  
TNGG1603-0-LRST

**N-EX** **P M K N S H**  
Standard breaker designed especially for use with exotic alloys  
2,0  
16°  
α = 0°  
CNMG1204-0-NEX

**N-UP** **P M K N S H**  
Double positive edge for optimal stainless steel cutting  
2,1  
10°  
α = 0°  
CNMG1204-0-NUP

**N-SX** **P M K N S H**  
Perform copying and raise steps  
0,2  
1,35  
3°  
15°  
α = 0°  
CNMG1204-0-NSX

## Chipbreaker Application Range (Insert IC up to Ø 12,7mm)



Indicated chipbreaker application ranges and shapes are representative values only. Actual values may change according to the actual catalogue number. For details, refer to stock pages (from Chapter B onward).

Bumpy Breaker	Standard Breaker	Handed Breaker
Break Master (CBN/PCD)	For Chamfering	

# Chipbreaker Application

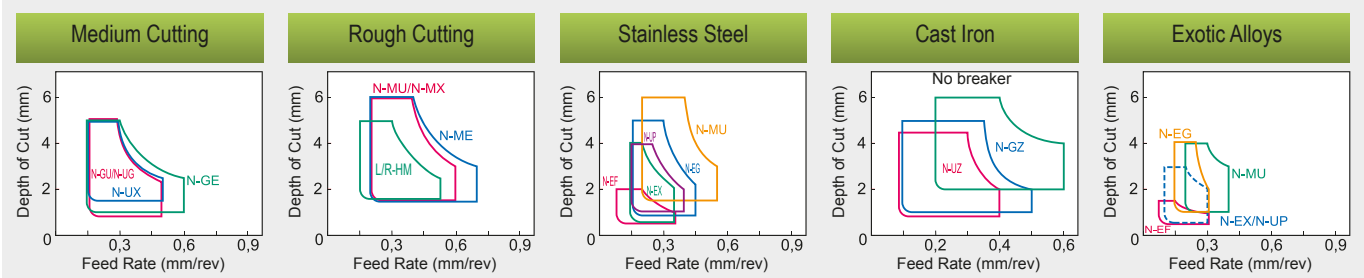
Negative Type

Medium to Rough Cutting

Medium	<b>N-GU</b> Features low cutting resistance and excellent wear resistance.  $\alpha = 0^\circ$ 	<b>N-GE</b> A versatile breaker with excellent rake surface wear in high efficiency cutting.  $\alpha = 0^\circ$ 	<b>N-UX</b> Extremely reliable and versatile breaker with strong cutting edge.  $\alpha = 0^\circ$ 	<b>N-UG</b> Popular and versatile breaker.  $\alpha = 0^\circ$ 
	<b>N-EG</b> General-purpose chipbreaker for exotic alloys with good chip control and wear resistance.  $\alpha = 0^\circ$ 	<b>NGU-W</b> Finishing breaker with wiper edge for high efficiency medium finishing.  $\alpha = 0^\circ$ 	<b>L/R-UM</b> General-purpose ground type medium cutting breaker.  $\alpha = 0^\circ$ 	

Medium to Rough	<b>N-EM</b> Achieves excellent fracture and crater resistance.  $\alpha = 0^\circ$ 	<b>N-MU</b> Economical, double-sided breaker with low cutting resistance for high feed cutting.  $\alpha = 0^\circ$ 	<b>N-ME</b> Chipbreaker for rough cutting that supports high-feed cutting with reduced rake face wear.  $\alpha = 0^\circ$ 	<b>N-MX</b> Strong cutting edge for interrupted cutting.  $\alpha = 0^\circ$ 
	<b>N-UZ</b> Standard breaker with stable cutting performance.  $\alpha = 0^\circ$ 	<b>N-GZ</b> Extremely reliable standard breaker with strong cutting edge.  $\alpha = 0^\circ$ 	<b>L/R-HM</b> Wide, M class, handed breaker with low cutting resistance for medium to rough cutting.  $\alpha = 0^\circ$ 	

## Chipbreaker Application Range (Insert IC up to $\varnothing 12,7\text{mm}$ )



Indicated chipbreaker application ranges and shapes are representative values only. Actual values may change according to the actual catalogue number. For details, refer to stock pages (from Chapter B onward).

Inserts

C

D

K

R

S

T

V

W

# Chipbreaker Application

Bumpy Breaker	Standard Breaker	Handed Breaker
SUMIBORON Break Master	For Chamfering	

## Negative Type

## Rough Cutting

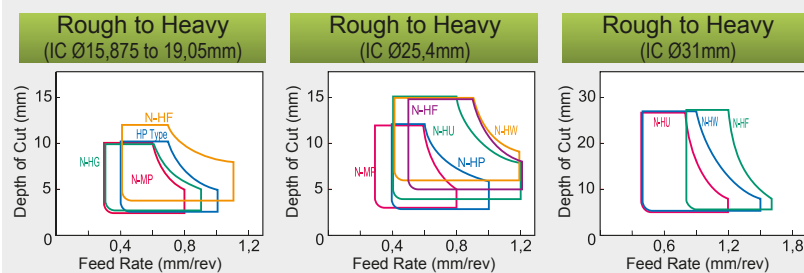
Rough to Heavy	<b>N-HG</b> Excellent chip management for heavy cutting $0.4$ $22^\circ$ $\alpha = 0^\circ$ CNMM1606--NHG	<b>N-MP</b> Single-sided breaker with low cutting resistance for rough cutting $0.3$ $22^\circ$ $\alpha = 0^\circ$ CNMM1606--NMP	<b>N-HP</b> Strongest cutting edge for heavy cutting $0.3 \sim 0.6$ $22^\circ$ $\alpha = 0^\circ$ CNMM1606--NHP
	<b>N-HU</b> Strong edges and excellent chip management for heavy cutting $3.2$ $0.6$ $0.25$ $-15^\circ$ $16^\circ$ $\alpha = 0^\circ$ SNMM2507--NHU	<b>N-HW</b> Two step breaker with excellent chip evacuation for heavy cutting $6.3$ $0.3$ $-0.75$ $-15^\circ$ $17^\circ$ $\alpha = 0^\circ$ SNMM3109--NHW	<b>N-HF</b> Strong edge chipbreaker for heavy cutting with excellent chip evacuation even in high-feed cutting $4.5$ $0.2$ $0.4$ $15^\circ$ $20^\circ$ $\alpha = 0^\circ$ SNMM1906--NHF

## Negative Type





## For Hardened Steel

**N-GH** New  
 For cutting hardened steel with low cutting force and excellent chip control  
 $3.5$   $3^\circ$   
 $\alpha = 0^\circ$  CNGG1204--NGH

## Chipbreaker Application Range


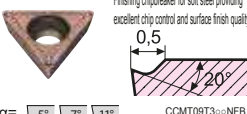

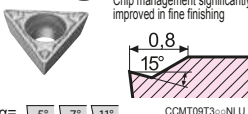

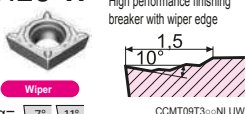

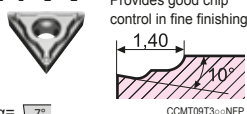

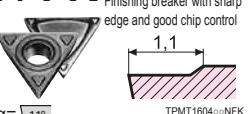

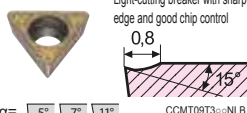

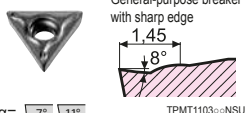

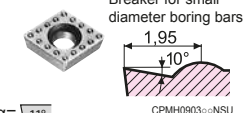

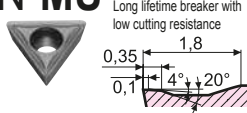

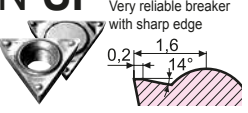


Indicated chipbreaker application ranges and shapes are representative values only. Actual values may change according to the actual catalogue number. For details, refer to stock pages (from Chapter B onward).


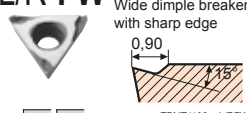

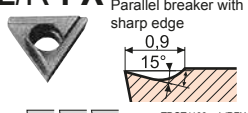

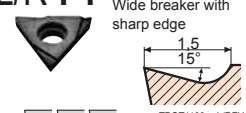

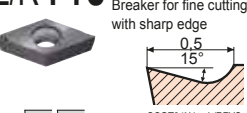

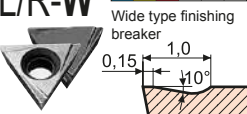

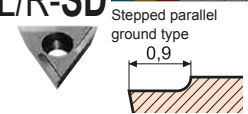

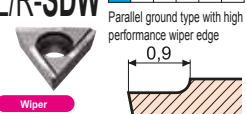
 Bumpy Breaker	 Standard Breaker	 Handed Breaker
 Break Master (CBN/PCD)		

# Chipbreaker Application

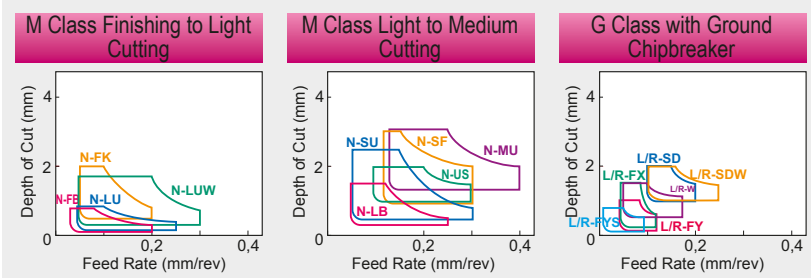
## Positive Type Medium to Rough Cutting

Finish to Light	<b>N-FB</b>  Finishing chipbreaker for soft steel providing excellent chip control and surface finish quality.  $\alpha = 5^\circ, 7^\circ, 11^\circ$ CCMT09T3--NFB	<b>N-LU</b>  Chip management significantly improved in fine finishing.  $\alpha = 5^\circ, 7^\circ, 11^\circ$ CCMT09T3--NLU	<b>NLU-W</b>  High performance finishing breaker with wiper edge.  Wiper $\alpha = 7^\circ, 11^\circ$ CCMT09T3--NLUW	<b>N-FP</b>  Provides good chip control in fine finishing.  $\alpha = 7^\circ$ CCMT09T3--NFP	<b>N-FK</b>  Finishing breaker with sharp edge and good chip control.  $\alpha = 11^\circ$ TPMT1604--NFK		
	Light to Medium	<b>N-LB</b>  Light-cutting breaker with sharp edge and good chip control.  $\alpha = 5^\circ, 7^\circ, 11^\circ$ CCMT09T3--NLB	<b>N-SU</b>  General-purpose breaker with sharp edge.  $\alpha = 7^\circ, 11^\circ$ TPMT1103--NSU	<b>N-US</b>  Breaker for small diameter boring bars.  $\alpha = 11^\circ$ CPMH0903--NSU			
		<b>N-MU</b>  Long lifetime breaker with low cutting resistance.  $\alpha = 7^\circ, 11^\circ$ TPMT1604--NMU	<b>N-SF</b>  Very reliable breaker with sharp edge.  $\alpha = 11^\circ$ TPMT1604--NSF				

## Positive Type G Class with Ground Chipbreaker

Finish to Light	<b>L/R-FW</b>  Wide dimple breaker with sharp edge.  $\alpha = 5^\circ, 11^\circ$ TPMT1102--LRFW	<b>L/R-FX</b>  Parallel breaker with sharp edge.  $\alpha = 5^\circ, 7^\circ, 11^\circ$ TPGT1103--LRFX	<b>L/R-FY</b>  Wide breaker with sharp edge.  $\alpha = 5^\circ, 7^\circ, 11^\circ$ TPGT1103--LRFY	<b>L/R-FYS</b>  Breaker for fine cutting with sharp edge.  $\alpha = 5^\circ, 7^\circ$ CCGT04X1--LRFYS
	<b>L/R-W</b>  Wide type finishing breaker.  $\alpha = 5^\circ, 11^\circ$ TPGR1103--LRW	<b>L/R-SD</b>  Stepped parallel ground type.  $\alpha = 7^\circ, 11^\circ$ TPGT1103--LRSND	<b>L/R-SDW</b>  Parallel ground type with high performance wiper edge.  Wiper $\alpha = 11^\circ$ TPGX1103--LRSWD	

## Chipbreaker Application Range



Indicated chipbreaker application ranges and shapes are representative values only. Actual values may change according to the actual catalogue number. For details, refer to stock pages (from Chapter B onward).

- Inserts
- C
- D
- K
- R
- S
- T
- V
- W

# Chipbreaker Application


## Positive Type G Class

Finish to Light	<b>N-FC*</b> <p>Peripheral grinding 3D breaker with good chip control and sharp edge</p> <p>CCGT09T3---NFC</p>	<b>N-SI*</b> <p>Shaper-edge breaker for a wide range of cutting applications from finishing to light cutting</p> <p>CCGT09T3---NSI</p>	<b>N-SC*</b> <p>Two step breaker for light cutting</p> <p>TGCT1103---NSC</p>
	$\alpha = 7^\circ, 11^\circ$	$\alpha = 7^\circ$	$\alpha = 7^\circ$

\* Remarks:  
 N-FC, N-SI and N-SC have minus tolerance indicated by "M" after the nose radius.  
 Example:  
 DCGT 11T302 M NSI AC520U

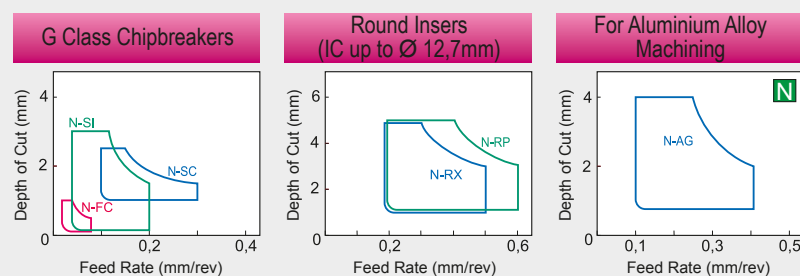
## Positive Type Round Inserts

Round	<b>N-RX</b> <p>Round, bumpy type insert with excellent chip management</p> <p>RCMX1606MON-RX</p>	<b>N-RP</b> <p>Standard breaker for copying</p> <p>RCMX1606MON-RP</p>
	$\alpha = 7^\circ$	$\alpha = 7^\circ$

## Positive Type For Al - Alloy Machining

Finishing	<b>N-AG</b> <p>Al breaker for mirror finish and anti-adhesion</p> <p>CCGT09T3---NAG</p>
	$\alpha = 7^\circ$

## Chipbreaker Application Range



Indicated chipbreaker application ranges and shapes are representative values only. Actual values may change according to the actual catalogue number. For details, refer to stock pages (from Chapter B onward).



# Chipbreaker Application

Bumpy Breaker
  Standard Breaker
  Handed Breaker

## SUMIBORON Insert CBN

Finish to Light	<b>N-LV</b> <span style="border: 1px solid black; padding: 2px;">P M K N S H</span> Significantly improved chip control during hardened steel finishing 	<b>N-FV</b> <span style="border: 1px solid black; padding: 2px;">P M K N S H</span> Significantly improved chip control during hardened steel finishing 
	<b>N-SV</b> <span style="border: 1px solid black; padding: 2px;">P M K N S H</span> Significantly improved chip management with carburized layer removal 	

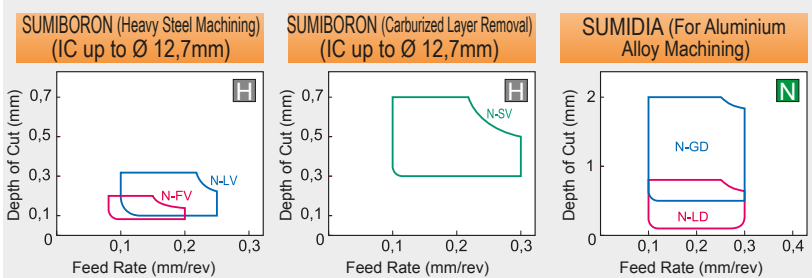
## SUMIDIA Insert PCD

Finish to Light	<b>N-LD</b> <span style="border: 1px solid black; padding: 2px;">P M K N S H</span> Ideal for finishing of Al by utilizing a special cutting edge shape 	<b>N-GD</b> <span style="border: 1px solid black; padding: 2px;">P M K N S H</span> Ideal for finishing to general machining of Al by utilizing a special cutting edge shape 	<b>L/R-DM</b> <span style="border: 1px solid black; padding: 2px;">P M K N S H</span> Perfect for highspeed finishing of aluminium alloy 
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Inserts

- C
- D
- K
- R
- S
- T
- V
- W

## Chipbreaker Application Range



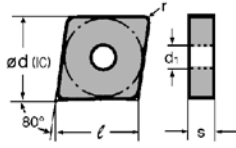
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# C DIAMOND TYPE

## INSERTS FOR TURNING

### Negative Inserts

80° Diamond Type 0° Relief  
With Insert Hole



Dimensions (mm)				
CN	l	∅d (IC)	s	d <sub>1</sub>
0903..	9,7	9,525	3,18	3,81
0904..	9,7	9,525	4,76	3,81
1204..	12,9	12,7	4,76	5,16



⇨ D12, D18  
D41

⇨ E8

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## CNMG

### ● M-Class, Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide													
				Coated						ZX-Coated						Uncoated		Uncoated													
				P	M	PM	K	H	KS	MS	PM	P	K	S	N	P	K	S	N												
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Fine Finishing	<p><b>NFB</b></p>	<b>CNMG 090304 NFB</b> <b>CNMG 090308 NFB</b> <b>CNMG 090404 NFB</b> <b>CNMG 090408 NFB</b>	0,4 0,8 0,4 0,8																												
		<b>CNMG 120402 NFB</b> <b>CNMG 120404 NFB</b> <b>CNMG 120408 NFB</b>	0,2 0,4 0,8																												
Fine Finishing	<p><b>NFA</b></p>	<b>CNMG 120402 NFA</b> <b>CNMG 120404 NFA</b> <b>CNMG 120408 NFA</b>	0,2 0,4 0,8																												
Fine Finishing	<p><b>NFL</b></p>	<b>CNMG 090308 NFL</b> <b>CNMG 120404 NFL</b> <b>CNMG 120408 NFL</b>	0,8 0,4 0,8																												
Fine Finishing	<p><b>NFE</b></p>	<b>CNMG 090304 NFE</b> <b>CNMG 090308 NFE</b> <b>CNMG 090404 NFE</b> <b>CNMG 090408 NFE</b>	0,4 0,8 0,4 0,8																												
		<b>CNMG 120402 NFE</b> <b>CNMG 120404 NFE</b> <b>CNMG 120408 NFE</b> <b>CNMG 120412 NFE</b>	0,2 0,4 0,8 1,2																												
Finishing	<p><b>NLU</b></p>	<b>CNMG 090304 NLU</b> <b>CNMG 090308 NLU</b>	0,4 0,8																												
		<b>CNMG 120402 NLU</b> <b>CNMG 120404 NLU</b> <b>CNMG 120408 NLU</b> <b>CNMG 120412 NLU</b>	0,2 0,4 0,8 1,2																												
Finishing	<p><b>NLU-W</b></p>	<b>CNMG 120404 NLU-W</b> <b>CNMG 120408 NLU-W</b> <b>CNMG 120412 NLU-W</b>	0,4 0,8 1,2																												
Finishing	<p><b>NEF</b></p>	<b>CNMG 090404 NEF</b> <b>CNMG 090408 NEF</b>	0,4 0,8																												
		<b>CNMG 120404 NEF</b> <b>CNMG 120408 NEF</b> <b>CNMG 120412 NEF</b>	0,4 0,8 1,2																												

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

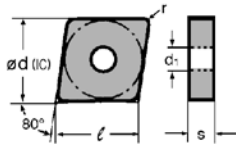


# C DIAMOND TYPE

## INSERTS FOR TURNING

### Negative Inserts

80° Diamond Type 0° Relief  
With Insert Hole



Dimensions (mm)				
CN	l	∅d (IC)	s	d <sub>1</sub>
0903..	9,7	9,525	3,18	3,81
0904..	9,7	9,525	4,76	3,81
09T3..	9,7	9,525	3,97	3,81
1204..	12,9	12,7	4,46	5,16
1606..	16,1	15,875	6,35	6,35
1906..	19,3	19,05	6,35	7,94



⇒ D12, D18  
D41

⇒ E8

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

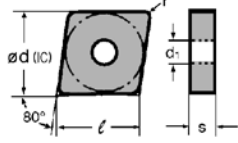
## CNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide											Cermets				Carbide			
				Coated					ZX-Coated						Uncoated				Uncoated			
				P	M	PM	K	H	KS	MS	PM	P	K	S	N	P	K	S	N			
Medium Cut Depth of cut (mm) Feed rate (mm/rev)		CNMG 120404 NGE	0,4	●	●	●	●															
		CNMG 120408 NGE	0,8	●	●	●	●															
		CNMG 120412 NGE	1,2	●	●	●	●															
		CNMG 120416 NGE	1,6	●	●	●	●															
		CNMG 160608 NGE	0,8																			
		CNMG 160612 NGE	1,2	●	●	●	●															
CNMG 160616 NGE	1,6	●	●	●	●																	
Medium Cut Depth of cut (mm) Feed rate (mm/rev)		CNMG 090304 NUG	0,4																			
		CNMG 090308 NUG	0,8																			
		CNMG 090404 NUG	0,4																			
		CNMG 090408 NUG	0,8																			
		CNMG 09T304 NUG	0,4																			
		CNMG 09T308 NUG	0,8																			
CNMG 120404 NUG	0,4			●																		
CNMG 120408 NUG	0,8			●																		
CNMG 120412 NUG	1,2			●																		
CNMG 120416 NUG	1,6			○																		
CNMG 160616 NUG	1,6			○																		
CNMG 190612 NUG	1,2			○																		
CNMG 190616 NUG	1,6			○																		
Medium Cut Depth of cut (mm) Feed rate (mm/rev)		CNMG 090408 NEG	0,8																			
		CNMG 090412 NEG	1,2																			
		CNMG 120404 NEG	0,4			●																
		CNMG 120408 NEG	0,8			●										●	●					
		CNMG 120412 NEG	1,2			●										●	●					
		CNMG 120416 NEG	1,6			●										●	●					
CNMG 160608 NEG	0,8			●		○																
CNMG 160612 NEG	1,2			●		○								●	●							
CNMG 160616 NEG	1,6			●		○								●	●							
CNMG 190612 NEG	1,2			○		●																
CNMG 190616 NEG	1,6			○		●																
Medium Cut Depth of cut (mm) Feed rate (mm/rev)		CNMG 120404 NEX	0,4			●	●	●							●	●						
		CNMG 120408 NEX	0,8			●	●	●								●	●					
		CNMG 120412 NEX	1,2			●	●	●								●	●					
		CNMG 160612 NEX	1,2													●	●					
		CNMG 190612 NEX	1,2													●	●					

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

**80° Diamond Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
CN	ℓ	ød (IC)	s	d <sub>1</sub>
1204..	12,9	12,7	4,46	5,16
1606..	16,1	15,875	6,35	6,35
1906..	19,3	19,05	6,35	7,94
2509..	25,8	25,4	9,52	9,2



⇨ D12, D18  
D41

⇨ E8

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

# CNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide										Cermets			Carbide													
				Coated						ZX-Coated				Uncoated			Uncoated													
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N											
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Medium Cut		CNMG 120404 NUP	0,4			●	●	●	●	●	●	●																		
		CNMG 120408 NUP	0,8			●	●	●	●	●	●	●	●																	
		CNMG 120412 NUP	1,2			●	●	●	●	●	●	●	●																	
		CNMG 160612 NUP	1,2					●	●					●																
CNMG 190612 NUP	1,2					●	●					●																		
Medium Cut		CNMG 120408 NEM	0,8				●		●	●	●																			
		CNMG 120412 NEM	1,2				●		●	●	●																			
		CNMG 120416 NEM	1,6				●		●	●	●																			
		CNMG 160608 NEM	0,8				●		●	○	○	○																		
		CNMG 160612 NEM	1,2				●		●	●	●	●																		
		CNMG 160616 NEM	1,6				●		●	●	●	●																		
Roughing		CNMG 120408 NMU	0,8			●	●	●	●	●		▲	●																	
		CNMG 120412 NMU	1,2			●	●	●	●	●		▲	●																	
		CNMG 120416 NMU	1,6			●	●	●	●	●		▲	●																	
		CNMG 160608 NMU	0,8			●	●	●	●	○		▲	●																	
		CNMG 160612 NMU	1,2			●	●	●	●	●		▲	●																	
		CNMG 160616 NMU	1,6			●	●	●	●	●		▲	●																	
Roughing		CNMG 120408 NME	0,8		●	●	●	●	●																					
		CNMG 120412 NME	1,2		●	●	●	●	●																					
		CNMG 120416 NME	1,6		●			●																						
		CNMG 160608 NME	0,8					●																						
		CNMG 160612 NME	1,2					●																						
		CNMG 160616 NME	1,6					●																						
Roughing		CNMG 190612 NME	1,2					○																						
		CNMG 190616 NME	1,6					●																						
		CNMG 190624 NME	2,4					○																						
		CNMG 250924 NME	2,4					○																						

- = Euro stock
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- ▲ = To be replaced by new item

Neg. Inserts

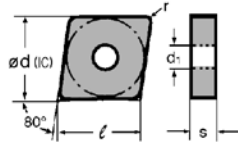
- C
- D
- K
- R
- S
- T
- V
- W

# C DIAMOND TYPE

## INSERTS FOR TURNING

### Negative Inserts

80° Diamond Type 0° Relief  
With Insert Hole



Dimensions (mm)				
CN	l	∅d (IC)	s	d <sub>1</sub>
0904..	9,7	9,525	4,76	3,81
1204..	12,9	12,7	4,76	5,16
1606..	16,1	15,875	6,35	6,35
1906..	19,3	19,05	6,35	7,94



⇨ D12, D18  
D41

⇨ E8

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

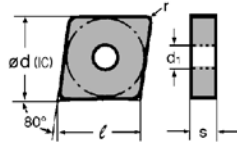
## CNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide										Cermets		Carbide															
				Coated					ZX-Coated					Uncoated		Uncoated															
				P	M	P/M	K	H	K/S	M/S	P/M	P	K	S	N																
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
<b>Roughing</b>  	<b>NUX</b> CNMG 120404 NUX CNMG 120408 NUX CNMG 120412 NUX CNMG 120416 NUX CNMG 160608 NUX CNMG 160612 NUX CNMG 160616 NUX CNMG 190608 NUX CNMG 190612 NUX CNMG 190616 NUX	0,4			●	●	●																								
		0,8	●	●	●	●	●																								
		1,2	●	●	●	●	●																								
		1,6	●	●	●	●	●																								
		0,8	●	●	○	●											●														
		1,6	●	●	○	●										●															
	<b>NMX</b> CNMG 120408 NMX CNMG 120412 NMX CNMG 120416 NMX CNMG 160608 NMX CNMG 160612 NMX CNMG 160616 NMX CNMG 190612 NMX CNMG 190616 NMX	0,8		●	●	●																									
		1,2		●	●	●																									
		1,6		●	●	●																									
		0,8		●	●	●																									
		1,2		●	●	●																									
		1,6		●	●	●																									
<b>NGZ</b> CNMG 090408 NGZ CNMG 090412 NGZ CNMG 120404 NGZ CNMG 120408 NGZ CNMG 120412 NGZ CNMG 120416 NGZ CNMG 160612 NGZ CNMG 160616 NGZ CNMG 190612 NGZ CNMG 190616 NGZ	0,8													○	○	○															
	1,2													○	○	○															
	0,4													●	●																
	0,8													●	●	●															
	1,2													●	●	●															
	1,6													●	●	●															
<b>NUZ</b> CNMG 120404 NUZ CNMG 120408 NUZ CNMG 120412 NUZ CNMG 120416 NUZ CNMG 160608 NUZ CNMG 160612 NUZ CNMG 160616 NUZ CNMG 190608 NUZ CNMG 190612 NUZ CNMG 190616 NUZ	0,4													○																	
	0,8													○																	
	1,2													○																	
	1,6													○																	
	0,8													○																	
	1,6													○																	

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

**80° Diamond Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
CN	l	∅d (IC)	s	d <sub>1</sub>
1204..	12,9	12,7	4,76	5,16
1606..	16,1	15,875	6,35	6,35
1906..	19,3	19,05	6,35	7,94
2507..	25,8	25,4	7,94	9,2
2509..	25,8	25,4	9,52	9,2



⇨ D12, D18

⇨ E8

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## CNMM

● M-Class One Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide											Cermets		Carbide												
				Coated								ZX-Coated			Uncoated			P	K	S	N								
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N														
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1				
Heavy Roughing Depth of cut (mm) Feed rate (mm/rev)		NMP	CNMM 120408 NMP	0,8	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○		
			CNMM 120412 NMP	1,2	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	
			CNMM 120416 NMP	1,6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 160608 NMP	0,8	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 160612 NMP	1,2	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 160616 NMP	1,6	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 160624 NMP	2,4	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 190608 NMP	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 190612 NMP	1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 190616 NMP	1,6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 190624 NMP	2,4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 250724 NMP	2,4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			CNMM 250924 NMP	2,4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

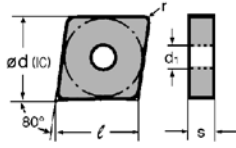
- Neg. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# C DIAMOND TYPE

## INSERTS FOR TURNING

### Negative Inserts

80° Diamond Type 0° Relief  
With Insert Hole



Dimensions (mm)				
CN	ℓ	∅d (IC)	s	d <sub>1</sub>
1204..	12,9	12,7	4,76	5,16
1606..	16,1	15,875	6,35	6,35
1906..	19,3	19,05	6,35	7,94



⇨ D12, D18

⇨ E8

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## CNMA / CNGA / CNMX

### ● Flat and One Side Handed Inserts

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide												
				Coated						ZX-Coated						Uncoated		Uncoated												
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N															
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Roughing		CNMA 120404	0,4											●	●	●														
		CNMA 120408	0,8												●	●	●										●			
		CNMA 120412	1,2												●	●	●													
		CNMA 120416	1,6												●	●	●													
		CNMA 160612	1,2												●	●	●													
		CNMA 160616	1,6												●	●	●													
		CNMA 190612	1,2												●	●	●													
CNMA 190616	1,6												●	●	●															
Medium Cut		CNGA 120402	0,2																											
		CNGA 120404	0,4																											
		CNGA 120408	0,8																											
Heavy Roughing		CNMX 120408 L	0,8			●	▲																							
		CNMX 120408 R	0,8			●	▲																							

## CNGG

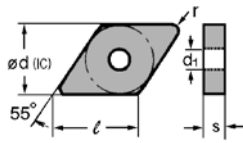
### ● G-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide												
				Coated						ZX-Coated						Uncoated		Uncoated												
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N															
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Finishing		CNGG 120402 NSU	0,2																											
		CNGG 120404 NSU	0,4																											
		CNGG 120408 NSU	0,8																											
Finishing		CNGG 120402 NGH	0,2																											
		CNGG 120404 NGH	0,4																											
		CNGG 120408 NGH	0,8																											

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item



**55° Diamond Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
DN	$\ell$	$\phi d (IC)$	s	$d_1$
1104..	11,6	9,525	4,76	3,81
1504..	15,5	12,7	4,76	5,16
1506..	15,5	12,7	6,35	5,16



⇒ D13, D19  
D41

⇒ E9

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

# DNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets			Carbide											
				Coated						ZX-Coated						Uncoated			Uncoated											
				P	M	P <sub>M</sub>	K	H	F	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N										
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Fine Finishing	 NFB Depth of cut (mm) vs Feed rate (mm/rev) graph	DNMG 110404 NFB DNMG 110408 NFB DNMG 150404 NFB DNMG 150408 NFB DNMG 150604 NFB DNMG 150608 NFB	0,4 0,8 0,4 0,8 0,4 0,8																											
Fine Finishing	 NFA Depth of cut (mm) vs Feed rate (mm/rev) graph	DNMG 150404 NFA DNMG 150408 NFA DNMG 150604 NFA DNMG 150608 NFA	0,4 0,8 0,4 0,8																											
Fine Finishing	 NFL Depth of cut (mm) vs Feed rate (mm/rev) graph	DNMG 150404 NFL DNMG 150408 NFL DNMG 150412 NFL DNMG 150604 NFL DNMG 150608 NFL	0,4 0,8 1,2 0,4 0,8																											
Fine Finishing	 NFE Depth of cut (mm) vs Feed rate (mm/rev) graph	DNMG 110404 NFE DNMG 110408 NFE DNMG 110412 NFE DNMG 150402 NFE DNMG 150404 NFE DNMG 150408 NFE DNMG 150412 NFE DNMG 150602 NFE DNMG 150604 NFE DNMG 150608 NFE DNMG 150612 NFE	0,4 0,8 1,2 0,2 0,4 0,8 1,2 0,2 0,4 0,8 1,2																											
Finishing	 NLU Depth of cut (mm) vs Feed rate (mm/rev) graph	DNMG 110404 NLU DNMG 110408 NLU DNMG 150402 NLU DNMG 150404 NLU DNMG 150408 NLU DNMG 150412 NLU DNMG 150604 NLU DNMG 150608 NLU DNMG 150612 NLU	0,4 0,8 0,2 0,4 0,8 1,2 0,4 0,8 1,2																											

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

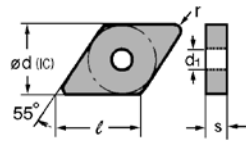
- Neg. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# DIAMOND TYPE

## INSERTS FOR TURNING

### Negative Inserts

55° Diamond Type 0° Relief  
With Insert Hole



Dimensions (mm)				
DN	l	ød (IC)	s	d <sub>1</sub>
1104..	11,6	9,525	4,76	3,81
1504..	15,5	12,7	4,76	5,16
1506..	15,5	12,7	6,35	5,16



⇨ D13, D19  
D41

⇨ E9

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

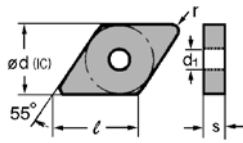
## DNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide												
				Coated						ZX-Coated						Uncoated		Uncoated												
				P	M	PM	K	H	KS	MS	PM	P	K	S	N	P	K	S	N											
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Finishing	NEF	DNMG 110404 NEF	0,4				●	●	●	●	●	●																		
		DNMG 110408 NEF	0,8				●	●	●	●	●	●																		
		DNMG 110412 NEF	1,2				○	○	○	○	○	○																		
Finishing	NSU	DNMG 150404 NEF	0,4				○	○	○	○	○	○	●																	
		DNMG 150408 NEF	0,8				○	○	○	○	○	○	●																	
		DNMG 150412 NEF	1,2				○	○	○	○	○	○	●																	
Finishing	NSE	DNMG 150604 NEF	0,4				●	●	●	●	●	●	●																	
		DNMG 150608 NEF	0,8				●	●	●	●	●	●	●																	
		DNMG 150612 NEF	1,2				●	●	●	●	●	●	●																	
Finishing	NSX	DNMG 110404 NSU	0,4	●	●	●	●	●	○	○	○	○	○																	
		DNMG 110408 NSU	0,8	●	●	●	●	●	○	○	○	○	○																	
		DNMG 110412 NSU	1,2	●	●	●	●	○	○	○	○	○	○																	
Finishing	NGU	DNMG 150604 NSU	0,4	●	●	●	●	○	○	○	○	○	○																	
		DNMG 150608 NSU	0,8	●	●	●	●	○	○	○	○	○	○																	
		DNMG 150612 NSU	1,2	●	●	●	●	○	○	○	○	○	○																	
Medium Cut	NGU	DNMG 150604 NSU	0,4	●	●	●	●	○	○	○	○	○	○																	
		DNMG 150608 NSU	0,8	●	●	●	●	○	○	○	○	○	○																	
		DNMG 150612 NSU	1,2	●	●	●	●	○	○	○	○	○	○																	
Medium Cut	NGU	DNMG 150616 NSU	1,6	●	●	●	●	○	○	○	○	○	○																	
		DNMG 150616 NSU	1,6	●	●	●	●	○	○	○	○	○	○																	
		DNMG 150616 NSU	1,6	●	●	●	●	○	○	○	○	○	○																	

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

**55° Diamond Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
DN	l	ød (IC)	s	d <sub>1</sub>
1104..	11,6	9,525	4,76	3,81
1504..	15,5	12,7	4,76	5,16
1506..	15,5	12,7	6,35	5,16



⇒ D13, D19  
D41

⇒ E9

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## DNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide													
				Coated						ZX-Coated						Uncoated		Uncoated													
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N												
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Medium Cut	 <b>NGE</b>	DNMG 110408 NGE	0,8																												
		DNMG 110412 NGE	1,2			○																									
		DNMG 150404 NGE	0,4			○																									
		DNMG 150408 NGE	0,8			○	○																								
		DNMG 150412 NGE	1,2			○	○	○																							
		DNMG 150416 NGE	1,6			○																									
Medium Cut	 <b>NUG</b>	DNMG 110404 NUG	0,4																												
		DNMG 110408 NUG	0,8				○																								
		DNMG 150408 NUG	0,8				○																								
		DNMG 150412 NUG	1,2				○																								
		DNMG 150604 NUG	0,4				○																								
		DNMG 150608 NUG	0,8				●																								
Medium Cut	 <b>NEG</b>	DNMG 110408 NEG	0,8					●																							
		DNMG 110412 NEG	1,2					●																							
		DNMG 150404 NEG	0,4				○			○																					
		DNMG 150408 NEG	0,8				○			○																					
		DNMG 150412 NEG	1,2				○			○																					
		DNMG 150604 NEG	0,4				●			●																					
Medium Cut	 <b>NEX</b>	DNMG 110404 NEX	0,4							●																					
		DNMG 110408 NEX	0,8							●																					
		DNMG 150404 NEX	0,4								○																				
		DNMG 150408 NEX	0,8								○																				
		DNMG 150412 NEX	1,2								○																				
		DNMG 150604 NEX	0,4								●																				
DNMG 150608 NEX	0,8								●																						
DNMG 150612 NEX	1,2								●																						

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 ▲ = To be replaced by new item

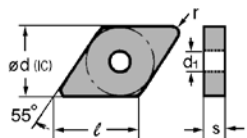
- Neg. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# DIAMOND TYPE

## INSERTS FOR TURNING

### Negative Inserts

55° Diamond Type 0° Relief  
With Insert Hole



Dimensions (mm)				
DN	l	ød (IC)	s	d <sub>1</sub>
1504..	15,5	12,7	4,76	5,16
1506..	15,5	12,7	6,35	5,16



⇨ D13, D19  
D41

⇨ E9

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

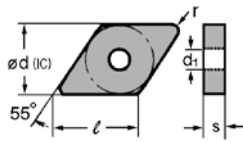
## DNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide														Cermets		Carbide							
				Coated										ZX-Coated				Uncoated		Uncoated		Uncoated					
				P	P	M	M	P	K	H	K	M	P	K	M	P	M	P	K	K	S	N	N				
AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Medium Cut	 <b>NUP</b>	DNMG 150404 NUP	0,4																								
		DNMG 150408 NUP	0,8																								
		DNMG 150412 NUP	1,2																								
Medium Cut	 <b>L/RUM</b>	DNMG 150604 NUP	0,4																								
		DNMG 150608 NUP	0,8																								
		DNMG 150612 NUP	1,2																								
Medium Cut	 <b>L/RUM</b>	DNMG 150404 LUM	0,4																								
		DNMG 150408 LUM	0,8																								
		DNMG 150404 RUM	0,4																								
Medium Cut	 <b>L/RUM</b>	DNMG 150408 RUM	0,8																								
		DNMG 150608 NMU	0,8																								
		DNMG 150612 NMU	1,2																								
Roughing	 <b>NMU</b>	DNMG 150616 NMU	1,6																								
		DNMG 150404 NMU	0,4																								
		DNMG 150408 NMU	0,8																								
Roughing	 <b>NEM</b>	DNMG 150412 NEM	1,2																								
		DNMG 150416 NEM	1,6																								
		DNMG 150608 NEM	0,8																								
Roughing	 <b>NME</b>	DNMG 150612 NEM	1,2																								
		DNMG 150616 NEM	1,6																								
		DNMG 150408 NME	0,8																								
Roughing	 <b>NME</b>	DNMG 150412 NME	1,2																								
		DNMG 150416 NME	1,6																								
		DNMG 150608 NME	0,8																								
Roughing	 <b>NME</b>	DNMG 150612 NME	1,2																								
		DNMG 150616 NME	1,6																								
		DNMG 150616 NME	1,6																								

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- ▲ = To be replaced by new item

**55° Diamond Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
DN	l	ød (IC)	s	d <sub>1</sub>
1104..	11,6	9,525	4,76	3,81
1504..	15,5	12,7	4,76	5,16
1506..	15,5	12,7	6,35	5,16



⇨ D13, D19  
D41

⇨ E9

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## DNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide														
				Coated						ZX-Coated						Uncoated		Uncoated														
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N													
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1			
Roughing	 L/RHM	DNMG 150404 LHM DNMG 150408 LHM	0,4 0,8				○			○																						
		DNMG 150404 RHM DNMG 150408 RHM	0,4 0,8				○			○																						
Roughing	 NUX	DNMG 110408 NUX	0,8				○	○																								
		DNMG 150404 NUX DNMG 150408 NUX DNMG 150412 NUX	0,4 0,8 1,2	○	○	○	○	○																								
		DNMG 150604 NUX DNMG 150608 NUX DNMG 150612 NUX DNMG 150616 NUX	0,4 0,8 1,2 1,6	○	●	●	●	●																								
		DNMG 150408 NMX DNMG 150412 NMX	0,8 1,2		○	○	○																									
		DNMG 150608 NMX DNMG 150612 NMX	0,8 1,2		●	●																										
Roughing	 NGZ	DNMG 110408 NGZ DNMG 110412 NGZ	0,8 1,2											●	●	●																
		DNMG 150604 NGZ DNMG 150608 NGZ DNMG 150612 NGZ	0,4 0,8 1,2												●	●	●															
		DNMG 150404 NUZ DNMG 150408 NUZ DNMG 150412 NUZ	0,4 0,8 1,2				○																									
Roughing	 NUZ	DNMG 150608 NUZ DNMG 150612 NUZ	0,8 1,2				○							●	●	●																

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 ▲ = To be replaced by new item

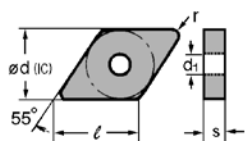
- Neg. Inserts
- - 
  - 
  - 
  - 
  - 
  - 
  -

# DIAMOND TYPE

## INSERTS FOR TURNING

### Negative Inserts

55° Diamond Type 0° Relief  
With Insert Hole



Dimensions (mm)				
DN	l	ød (IC)	s	d <sub>1</sub>
1504..	15,5	12,7	4,76	5,16
1506..	15,5	12,7	6,35	5,16



⇒ D13, D19

⇒ E9

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## DNMM

Application	Shape	ISO Cat. No.	r	Carbide														Cermets		Carbide										
				Coated							ZX-Coated							Uncoated		Uncoated										
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N											
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Heavy Roughing		DNMM 150404 NMP DNMM 150408 NMP DNMM 150412 NMP DNMM 150416 NMP  DNMM 150604 NMP DNMM 150608 NMP DNMM 150612 NMP DNMM 150616 NMP	0,4 0,8 1,2 1,6  0,4 0,8 1,2 1,6	○	○	○	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Heavy Roughing		DNMM 150604 NHG DNMM 150608 NHG DNMM 150612 NHG DNMM 150616 NHG	0,4 0,8 1,2 1,6	●	●	●	●	●	▲	▲	▲	▲	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Heavy Roughing		DNMM 150404 NHP DNMM 150408 NHP DNMM 150412 NHP DNMM 150416 NHP  DNMM 150604 NHP DNMM 150608 NHP DNMM 150612 NHP DNMM 150616 NHP	0,4 0,8 1,2 1,6  0,4 0,8 1,2 1,6	○	○	○	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

Neg. Inserts

C

D

K

R

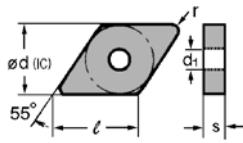
S

T

V

W

**55° Diamond Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
DN	l	ød (IC)	s	d <sub>1</sub>
1104..	11,6	9,525	4,76	3,81
1504..	15,5	12,7	4,76	5,16
1506..	15,5	12,7	6,35	5,16



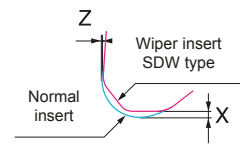
- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## DNMA / DNMX

Flat Inserts and One Side Handed Inserts  
 ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Roughing		<b>DNMA 150608</b> <b>DNMA 150612</b>	0,8 1,2
		<b>DNMX 150608 L</b>	0,8
		<b>DNMX 150608 R</b>	0,8
Finishing	 NSE-W 	<b>DNMX 110404 NSE-W</b>	0,4
		<b>DNMX 110408 NSE-W</b>	0,8
		<b>DNMX 110412 NSE-W</b>	1,2
		<b>DNMX 150404 NSE-W</b>	0,4
		<b>DNMX 150408 NSE-W</b>	0,8
		<b>DNMX 150412 NSE-W</b>	1,2
		<b>DNMX 150604 NSE-W</b>	0,4
		<b>DNMX 150608 NSE-W</b>	0,8
		<b>DNMX 150612 NSE-W</b>	1,2

	Carbide										Cermets			Carbide											
	Coated					ZX-Coated					Uncoated			Uncoated											
	P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N													
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1



(Note) The cutting point position of the SDW type does not follow the ISO standard.  
 Wenn using on a boring holder with a 93° approach angle, there is a need to revise the cutting point position (refer to right table) relative to using standard inserts.

r	Compensation (mm)	
	X (Diam. change)	Z
0,4	-0,14 (Ø: -0,28)	-0,02
0,8	-0,14 (Ø: -0,28)	-0,02
1,2	-0,1 (Ø: -0,2)	-0,03

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

- Inserts
- C
- D
- K
- R
- S
- T
- V
- W

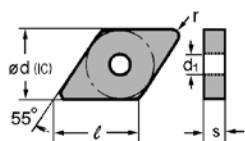
# D DIAMOND TYPE

## INSERTS FOR TURNING

### Negative Inserts

55° Diamond Type

0° Relief  
With Insert Hole



Dimensions (mm)				
DN	l	ød (IC)	s	d <sub>1</sub>
1104..	11,6	9,525	4,76	3,81
1504..	15,5	12,7	4,76	5,16



⇨ D13, D19

⇨ E9

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## DNGA

### ● G-Class One Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermet		Carbide											
				Coated						ZX-Coated						Uncoated		Uncoated											
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N										
Medium Cut		<b>DNGA 150402</b> <b>DNGA 150404</b> <b>DNGA 150408</b>	0,2 0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1

## DNGG

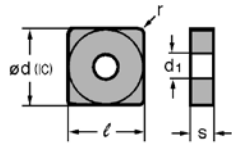
### ● G-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermet		Carbide											
				Coated						ZX-Coated						Uncoated		Uncoated											
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N										
Finishing	 Depth of cut (mm) vs Feed rate (mm/rev) graph	<b>DNGG 150402 NSU</b> <b>DNGG 150404 NSU</b> <b>DNGG 150408 NSU</b>	0,2 0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Medium Cut	 Depth of cut (mm) vs Feed rate (mm/rev) graph	<b>DNGG 110404 LUM</b> <b>DNGG 110408 LUM</b>	0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
		<b>DNGG 150404 LUM</b> <b>DNGG 150408 LUM</b>	0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Finishing	 Depth of cut (mm) vs Feed rate (mm/rev) graph	<b>DNGG 110404 RUM</b> <b>DNGG 110408 RUM</b>	0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
		<b>DNGG 150404 RUM</b> <b>DNGG 150408 RUM</b>	0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Finishing	 Depth of cut (mm) vs Feed rate (mm/rev) graph	<b>DNGG 150402 NGH</b> <b>DNGG 150404 NGH</b> <b>DNGG 150408 NGH</b>	0,2 0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1

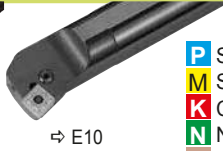
- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item



90° Square Type 0° Relief  
With Insert Hole



Dimensions (mm)				
SN	ℓ	∅d (IC)	s	d <sub>1</sub>
1204..	12,7	12,7	4,76	5,16



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## SNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide													
				Coated						ZX-Coated				Uncoated		Uncoated		Uncoated													
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N												
Fine Finishing	 <b>NFB</b> Depth of cut (mm) vs Feed rate (mm/rev) graph.	<b>SNMG 120404 NFB</b> <b>SNMG 120408 NFB</b>	0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Fine Finishing	 <b>NFL</b> Depth of cut (mm) vs Feed rate (mm/rev) graph.	<b>SNMG 120408 NFL</b>	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
Fine Finishing	 <b>NFE</b> Depth of cut (mm) vs Feed rate (mm/rev) graph.	<b>SNMG 120404 NFE</b> <b>SNMG 120408 NFE</b> <b>SNMG 120412 NFE</b>	0,4 0,8 1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Finishing	 <b>NLU</b> Depth of cut (mm) vs Feed rate (mm/rev) graph.	<b>SNMG 120408 NLU</b> <b>SNMG 120412 NLU</b>	0,8 1,2	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Finishing	 <b>NSU</b> Depth of cut (mm) vs Feed rate (mm/rev) graph.	<b>SNMG 120408 NSU</b> <b>SNMG 120412 NSU</b>	0,8 1,2	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Finishing	 <b>NSE</b> Depth of cut (mm) vs Feed rate (mm/rev) graph.	<b>SNMG 120408 NSE</b> <b>SNMG 120412 NSE</b>	0,8 1,2	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

Neg. Inserts

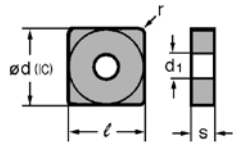


# S SQUARE TYPE

## INSERTS FOR TURNING

### Negative Inserts

90° Square Type 0° Relief  
With Insert Hole



Dimensions (mm)				
SN	l	ød (IC)	s	d <sub>1</sub>
0903..	9,525	9,525	3,18	3,81
1204..	12,7	12,7	4,76	5,16
1506..	15,875	15,875	6,35	6,35



⇒ D14, D20~21  
D41

⇒ E10

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## SNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide											
				Coated						ZX-Coated						Uncoated		Uncoated											
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N										
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Finishing Depth of cut (mm) 0 1 2 Feed rate (mm/rev) 0,2 0,4		SNMG 120404 NEF SNMG 120408 NEF	0,4					●																					
			0,8			○		●																					
Finishing Depth of cut (mm) 0 2 4 6 Feed rate (mm/rev) 0,2 0,4 0,6 0,8		SNMG 090304 NSJ SNMG 120404 NSJ	0,4																										
			0,4																										
Finishing Depth of cut (mm) 0 2 4 6 Feed rate (mm/rev) 0,2 0,4 0,6 0,8		SNMG 120404 NSX SNMG 120408 NSX SNMG 120412 NSX	0,4																										
			0,8																										
Medium Cut Depth of cut (mm) 0 2 4 6 Feed rate (mm/rev) 0,2 0,4 0,6 0,8		SNMG 090304 NGU SNMG 090308 NGU SNMG 120404 NGU SNMG 120408 NGU SNMG 120412 NGU SNMG 120416 NGU SNMG 150608 NGU SNMG 150612 NGU SNMG 150616 NGU	0,4			○	●																						
			0,8			○	●	○																					
Medium Cut Depth of cut (mm) 0 2 4 6 Feed rate (mm/rev) 0,2 0,4 0,6 0,8		SNMG 120408 NGE SNMG 120412 NGE SNMG 120416 NGE SNMG 150608 NGE SNMG 150612 NGE SNMG 150616 NGE	0,8			●	●	●																					
			1,2			●	●	●																					
Medium Cut Depth of cut (mm) 0 2 4 6 Feed rate (mm/rev) 0,2 0,4 0,6 0,8		SNMG 120408 NGE SNMG 120412 NGE SNMG 120416 NGE SNMG 150608 NGE SNMG 150612 NGE SNMG 150616 NGE	1,6			●	●	●																					
			0,8			○	○	○																					
Medium Cut Depth of cut (mm) 0 2 4 6 Feed rate (mm/rev) 0,2 0,4 0,6 0,8		SNMG 120408 NGE SNMG 120412 NGE SNMG 120416 NGE SNMG 150608 NGE SNMG 150612 NGE SNMG 150616 NGE	1,2			○	○	○																					
			1,6			○	○	○																					

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

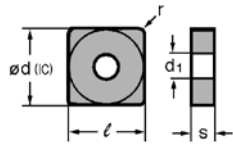


# S SQUARE TYPE

## INSERTS FOR TURNING

### Negative Inserts

90° Square Type 0° Relief  
With Insert Hole



Dimensions (mm)				
SN	l	∅d (IC)	s	d <sub>1</sub>
1204..	12,7	12,7	4,46	5,16
1506..	15,875	15,875	6,35	6,35
1906..	19,05	19,05	6,35	7,94
2509..	25,4	25,4	9,52	9,2



⇒ D14, D20~21  
D41



⇒ E10

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

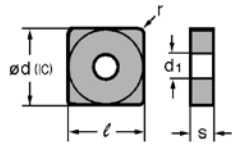
## SNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide											
				Coated						ZX-Coated						Uncoated		Uncoated											
				P	M	P	K	H	K	M	P	P	K	S	N														
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Roughing Depth of cut (mm) Feed rate (mm/rev)		SNMG 120408 NUX SNMG 120412 NUX SNMG 120416 NUX  SNMG 190612 NUX SNMG 190616 NUX	0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing Depth of cut (mm) Feed rate (mm/rev)		SNMG 120408 NMU SNMG 120412 NMU SNMG 120416 NMU  SNMG 150608 NMU SNMG 150612 NMU SNMG 150616 NMU  SNMG 190612 NMU SNMG 190616 NMU SNMG 190624 NMU  SNMG 250924 NMU	0,8	●	●	●	●	●	●	●	●	▲	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			1,2	●	●	●	●	●	●	●	●	●	▲	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing Depth of cut (mm) Feed rate (mm/rev)		SNMG 120408 NEM SNMG 120412 NEM SNMG 120416 NEM  SNMG 150608 NEM SNMG 150612 NEM SNMG 150616 NEM  SNMG 190612 NEM SNMG 190616 NEM SNMG 190624 NEM  SNMG 250924 NEM	0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing Depth of cut (mm) Feed rate (mm/rev)		SNMG 120408 NME SNMG 120412 NME SNMG 120416 NME  SNMG 150608 NME SNMG 150612 NME SNMG 150616 NME  SNMG 190612 NME SNMG 190616 NME SNMG 190624 NME  SNMG 250924 NME	0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

90° Square Type 0° Relief  
With Insert Hole



Dimensions (mm)				
SN	l	ød (IC)	s	d <sub>1</sub>
1204..	12,7	12,7	4,46	5,16
1506..	15,875	15,875	6,35	6,35
1906..	19,05	19,05	6,35	7,94



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## SNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide													
				Coated						ZX-Coated						Uncoated		Uncoated													
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N												
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Roughing	 L/RHM	SNMG 120408 LHM	0,8				○		●																						
		SNMG 120408 RHM	0,8				○		●																						
Roughing	 NMX	SNMG 120408 NMX	0,8		●	○	●																								
		SNMG 120412 NMX	1,2		●	○	●																								
		SNMG 120416 NMX	1,6		●	○	●																								
		SNMG 150612 NMX	1,2		●	○	●																								
Roughing	 NGZ	SNMG 150616 NMX	1,6		●	○	●																								
		SNMG 190612 NMX	1,2		●	○	●																								
		SNMG 190616 NMX	1,6		●	○	●																								
		SNMG 120408 NGZ	0,8												●	●	●														
Roughing	 NUZ	SNMG 120412 NGZ	1,2											●	●	●															
		SNMG 120416 NGZ	1,6												●	●	●														
		SNMG 150612 NGZ	1,2												●	●	●														
		SNMG 150616 NGZ	1,6												●	●	●														
Roughing	 NUZ	SNMG 190612 NGZ	1,2											●	●	●															
		SNMG 190616 NGZ	1,6												●	●	●														
		SNMG 120408 NUZ	0,8				○								●	●	●														
		SNMG 120412 NUZ	1,2				○								●	●	●														
Roughing	 NUZ	SNMG 120416 NUZ	1,6				○							●	●	●															
		SNMG 150612 NUZ	1,2				○								●	●	●														
		SNMG 150616 NUZ	1,6				○								●	●	●														
		SNMG 190612 NUZ	1,2				○								●	●	●														
SNMG 190616 NUZ	1,6				○								●	●	●																

● = Euro stock  
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 ▲ = To be replaced by new item

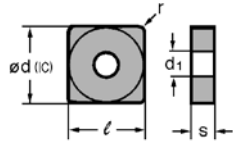
- Neg. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# S SQUARE TYPE

## INSERTS FOR TURNING

### Negative Inserts

90° Square Type 0° Relief  
With Insert Hole



Dimensions (mm)				
SN	l	∅d (IC)	s	d <sub>1</sub>
1204..	12,7	12,7	4,46	5,16
1506..	15,875	15,875	6,35	6,35
1906..	19,05	19,05	6,35	7,94
2507..	25,4	25,4	7,94	9,2
2509..	25,4	25,4	9,52	9,2
3109..	31,75	31,75	9,52	8,8



⇒ D14, D20~21

⇒ E10

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

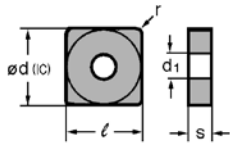
## SNMM

### ● M-Class One Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide										Cermets		Carbide															
				Coated					ZX-Coated					Uncoated		Uncoated															
				P	M	PM	K	H	KS	MS	PM	P	K	S	N																
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Heavy Roughing Depth of cut (mm) Feed rate (mm/rev)	 <b>NMP</b>	SNMM 120408 NMP	0,8	●	●	●	●	●	●	●	●	●	●					○	○												
		SNMM 120412 NMP	1,2	○	●	○	●	●	●	●	●	●	●	●					○	○											
		SNMM 120416 NMP	1,6	○	●	○	●	●	●	●	●	●	●	●					○	○											
		SNMM 120420 NMP	2,0		●	○	●	●	●	●	●	●	●	●					○	○											
		SNMM 150612 NMP	1,2	●	●	●	●	●	●	○	●	●	●	●																	
		SNMM 150616 NMP	1,6	●	●	●	●	●	●	○	●	●	●	●																	
		SNMM 190612 NMP	1,2	●	●	●	●	●	●	●	●	●	●	●						○	○										
		SNMM 190616 NMP	1,6	●	●	●	●	●	●	●	●	●	●	●						○	○										
		SNMM 190624 NMP	2,4		●	○	●	●	●	●	●	●	●	●																	
		SNMM 250724 NMP	2,4	○	○	○	●	●	●	●	○	○	○	○																	
SNMM 250924 NMP	2,4	○	○	○	○	○	○	○	○	○	○	○																			
SNMM 310924 NMP	2,4	○	○	○	○	○	○	○	○	○	○	○																			
Heavy Roughing Depth of cut (mm) Feed rate (mm/rev)	 <b>NHG</b>	SNMM 120408 NHG	0,8	●	●	○	●	●		▲	●	●	●																		
		SNMM 120412 NHG	1,2	●	●	○	●	●		▲	●	●	●																		
		SNMM 120416 NHG	1,6	●	●	○	●	●		▲	●	●	●																		
		SNMM 150612 NHG	1,2	●	○	●	●	●			▲	●	●	●																	
		SNMM 150616 NHG	1,6	●	○	●	●	●			▲	●	●	●																	
		SNMM 190612 NHG	1,2	○	●	○	●	●			▲	●	●	●																	
		SNMM 190616 NHG	1,6	○	●	○	●	●			▲	●	●	●																	
		SNMM 190624 NHG	2,4		●	○	●	●				▲	●	●	○																
		Heavy Roughing Depth of cut (mm) Feed rate (mm/rev)	 <b>NHP</b>	SNMM 120408 NHP	0,8		●	○	●	●																					
				SNMM 120412 NHP	1,2		●	○	●	●																					
SNMM 120416 NHP	1,6				●	○	●	●																							
SNMM 150612 NHP	1,2				●	○	●	●						○																	
SNMM 190612 NHP	1,2				●	○	●	●						○																	
SNMM 190616 NHP	1,6				●	○	●	●						○																	
SNMM 190624 NHP	2,4				●	○	●	●						○																	
SNMM 250724 NHP	2,4			○	○	○	●	●						○																	
SNMM 250924 NHP	2,4			○	○	○	○	○						○																	
SNMM 310924 NHP	2,4			○	○	○	○	○						○																	
Heavy Roughing Depth of cut (mm) Feed rate (mm/rev)	 <b>NHW</b>	SNMM 190616 NHU	1,6		●	○	●	●					●																		
		SNMM 250724 NHU	2,4		●	○	●	●					●																		
		SNMM 250924 NHU	2,4		●	○	●	●					●																		
		SNMM 310924 NHU	2,4		●	○	●	●					○																		
		SNMM 190616 NHW	1,6		●	○	●	●					●																		
		SNMM 250724 NHW	2,4		●	○	●	●					●																		
		SNMM 250924 NHW	2,4		●	○	●	●					●																		
		SNMM 310924 NHW	2,4		●	○	●	●					○																		
Heavy Roughing Depth of cut (mm) Feed rate (mm/rev)	 <b>NHF</b>	SNMM 190616 NHF	1,6					○																							
		SNMM 190624 NHF	2,4					○																							
		SNMM 250724 NHF	2,4					○																							
		SNMM 250732 NHF	3,2					○																							
		SNMM 250924 NHF	2,4					○																							
		SNMM 250932 NHF	3,2					○																							
		SNMM 310924 NHF	2,4					○																							

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

90° Square Type 0° Relief  
With Insert Hole



Dimensions (mm)				
SN	l	∅d (IC)	s	d <sub>1</sub>
0903..	9,525	9,525	3,18	3,81
1204..	12,7	12,7	4,76	5,16
1906..	19,05	19,05	6,35	7,94



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## SN\_A

● G/M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r
Roughing		SNMA 120408	0,8
		SNMA 120412	1,2
		SNMA 120416	1,6
		SNMA 190612	1,2
Medium Cut		SNGA 120404	0,4
		SNGA 120408	0,8
		SNGA 120412	1,2

Carbide												Cermet		Carbide												
Coated						ZX-Coated				Uncoated																
P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N															
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
										●	●	●											●			
													○													

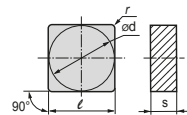
## SNGG

● G-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Light Cutting		SNMG 090304 LST	0,4
		SNMG 090308 LST	0,8
		SNMG 090304 RST	0,4
		SNMG 090308 RST	0,8
Medium Cut		SNGG 120404 LUM	0,4
		SNGG 120408 LUM	0,8
		SNGG 120404 RUM	0,4
		SNGG 120408 RUM	0,8
		SNGG 120412 RUM	1,2

Carbide												Cermet		Carbide												
Coated						ZX-Coated				Uncoated																
P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N															
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	

90° Square Type 0° Relief  
Without Insert Hole



## SN\_N

● G/M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r
Medium Cut		SNGN 120408	0,8
Medium Cut		SNMN 120408	0,8

Carbide												Cermet		Carbide												
Coated						ZX-Coated				Uncoated																
P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N															
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	

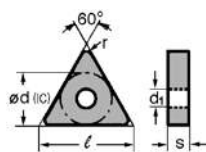
● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

# T TRIANGLE TYPE

## INSERTS FOR TURNING

### Negative Inserts

60° Triangle Type 0° Relief  
With Insert Hole



Dimensions (mm)				
TN	l	ød (IC)	s	d1
1604..	16,5	9,525	4,76	3,81



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## TNMG

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide											
				Coated						ZX-Coated						Uncoated		P	K	S	N								
				P	M	PM	K	H	KS	MS	PM	P	K	S	N														
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Fine Finishing	<b>NFB</b>	TNMG 160402 NFB TNMG 160404 NFB TNMG 160408 NFB	0,2 0,4 0,8																										
Fine Finishing	<b>NFA</b>	TNMG 160402 NFA TNMG 160404 NFA TNMG 160408 NFA	0,2 0,4 0,8																										
Fine Finishing	<b>NFL</b>	TNMG 160404 NFL TNMG 160408 NFL	0,4 0,8																										
Fine Finishing	<b>NFE</b>	TNMG 160402 NFE TNMG 160404 NFE TNMG 160408 NFE TNMG 160412 NFE	0,2 0,4 0,8 1,2																										
Finishing	<b>NLU</b>	TNMG 160402 NLU TNMG 160404 NLU TNMG 160408 NLU TNMG 160412 NLU	0,2 0,4 0,8 1,2																										
Finishing	<b>NEF</b>	TNMG 160404 NEF TNMG 160408 NEF	0,4 0,8																										
Finishing	<b>NSU</b>	TNMG 160402 NSU TNMG 160404 NSU TNMG 160408 NSU TNMG 160412 NSU	0,2 0,4 0,8 1,2																										

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

Neg. Inserts

C

D

K

R

S

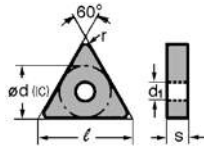
T

V

W



60° Triangle Type 0° Relief  
With Insert Hole



Dimensions (mm)				
TN	l	∅d (IC)	s	d <sub>1</sub>
1604..	16,5	9,525	4,76	3,81
2204..	22,0	12,7	4,76	5,16



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## TNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets			Carbide														
				Coated						ZX-Coated						Uncoated			Uncoated														
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N														
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1				
Finishing	 <b>NSE</b>  Depth of cut (mm) Feed rate (mm/rev)	TNMG 160404 NSE TNMG 160408 NSE TNMG 160412 NSE  TNMG 220404 NSE TNMG 220408 NSE TNMG 220412 NSE	0,4	●	●	●	○																										
			0,8	●	●	●	○																		○	○	○						
			1,2	●	●	●	○																		○	○	○						
Finishing	 <b>NSX</b>  Depth of cut (mm) Feed rate (mm/rev)	TNMG 160404 NSX TNMG 160408 NSX  TNMG 220404 NSX TNMG 220408 NSX TNMG 220412 NSX	0,4				○																										
			0,8				●																		○	○	○						
			1,2				○																		○	○	○						
Medium Cut	 <b>NGU</b>  Depth of cut (mm) Feed rate (mm/rev)	TNMG 160404 NGU TNMG 160408 NGU TNMG 160412 NGU TNMG 160416 NGU  TNMG 220404 NGU TNMG 220408 NGU TNMG 220412 NGU	0,4	●	●	●	●	●	●	●	▲	●											○	○	○								
			0,8	●	●	●	●	●	●	●	▲	●												○	○	○							
			1,2	●	●	●	●	●	●	●	▲	●												○	○	○							
Medium Cut	 <b>NGE</b>  Depth of cut (mm) Feed rate (mm/rev)	TNMG 160404 NGE TNMG 160408 NGE TNMG 160412 NGE  TNMG 220408 NGE TNMG 220412 NGE	0,4	●	●	●	●																										
			0,8	●	●	●	●																										
			1,2	●	●	●	●																										

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

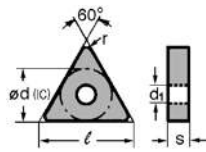
- Neg. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# T TRIANGLE TYPE

## INSERTS FOR TURNING

### Negative Inserts

60° Triangle Type 0° Relief  
With Insert Hole



Dimensions (mm)				
TN	l	ød (IC)	s	d1
1604..	16,5	9,525	4,76	3,81
2204..	22,0	12,7	4,76	5,16



⇒ D15, D22~23  
D42

⇒ E12

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

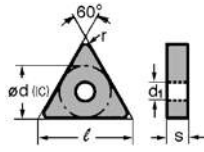
## TNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide														
				Coated						ZX-Coated						Uncoated		Uncoated														
				P	M	PM	K	H	KS	MS	PM	P	K	S	N	P	K	S	N													
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1			
Medium Cut		<p><b>TNMG 160404 NUG</b></p> <p><b>TNMG 160408 NUG</b></p> <p><b>TNMG 160412 NUG</b></p> <p><b>TNMG 160416 NUG</b></p> <p><b>TNMG 220408 NUG</b></p> <p><b>TNMG 220412 NUG</b></p>	0,4 0,8 1,2 1,6 0,8 1,2				○	○	○	○	○	○																				
Medium Cut		<p><b>TNMG 160404 LUM</b></p> <p><b>TNMG 160408 LUM</b></p> <p><b>TNMG 220404 LUM</b></p> <p><b>TNMG 220408 LUM</b></p> <p><b>TNMG 160404 RUM</b></p> <p><b>TNMG 160408 RUM</b></p> <p><b>TNMG 220404 RUM</b></p> <p><b>TNMG 220408 RUM</b></p>	0,4 0,8 0,4 0,8 0,4 0,8 0,4 0,8																			○	○	○	○							
Medium Cut		<p><b>TNMG 160404 NEG</b></p> <p><b>TNMG 160408 NEG</b></p> <p><b>TNMG 160412 NEG</b></p>	0,4 0,8 1,2				●	●	●	●	●	●						●	●							●	●					
Medium Cut		<p><b>TNMG 160404 NEX</b></p> <p><b>TNMG 160408 NEX</b></p> <p><b>TNMG 160412 NEX</b></p>	0,4 0,8 1,2					●	●	●	●	●	●					●	●													
Medium Cut		<p><b>TNMG 160404 NUP</b></p> <p><b>TNMG 160408 NUP</b></p> <p><b>TNMG 160412 NUP</b></p> <p><b>TNMG 220408 NUP</b></p> <p><b>TNMG 220412 NUP</b></p>	0,4 0,8 1,2 0,8 1,2				●	●	●	●	●	●					●	●														

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

**60° Triangle Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
TN	ℓ	∅d (IC)	s	d <sub>1</sub>
1604..	16,5	9,525	4,76	3,81
2204..	22,0	12,7	4,76	5,16
2706..	27,5	15,875	6,35	6,35
3309..	33,0	19,05	9,52	7,93



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## TNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide											
				Coated						ZX-Coated				Uncoated				P	K	S	N								
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N														
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Roughing	<p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p> <p><b>NUX</b></p>	TNMG 160404 NUX	0,4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		TNMG 160408 NUX	0,8	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		TNMG 160412 NUX	1,2	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing	<p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p> <p><b>NMU</b></p>	TNMG 220408 NUX	0,8	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		TNMG 220412 NUX	1,2	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Roughing	<p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p> <p><b>NEM</b></p>	TNMG 160408 NMU	0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		TNMG 160412 NMU	1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing	<p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p> <p><b>NME</b></p>	TNMG 220408 NMU	0,8	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		TNMG 220412 NMU	1,2	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Roughing	<p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p> <p><b>NMX</b></p>	TNMG 220416 NMU	1,6	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		TNMG 330924 NEM	2,4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Roughing	<p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p> <p><b>NME</b></p>	TNMG 160408 NEM	0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		TNMG 160412 NEM	1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing	<p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p> <p><b>NME</b></p>	TNMG 220408 NEM	0,8	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		TNMG 220412 NEM	1,2	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Roughing	<p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p> <p><b>NMX</b></p>	TNMG 220416 NEM	1,6	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		TNMG 220412 NMX	1,2	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

- C
- D
- K
- R
- S
- T
- V
- W

# T TRIANGLE TYPE

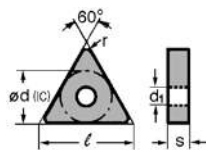
## INSERTS FOR TURNING

### Negative Inserts

60° Triangle Type

0° Relief

With Insert Hole



Dimensions (mm)				
TN	l	ød (IC)	s	d1
1604..	16,5	9,525	4,76	3,81
2204..	22,0	12,7	4,76	5,16
2706..	27,5	15,875	6,35	6,35



⇒ D15, D22~23  
D42

⇒ E12

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

# TNMG

## ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide										Cermets		Carbide														
				Coated					ZX-Coated					Uncoated		Uncoated														
				P	M	P/M	K	H	K/S	M/S	P/M	P	K	S	N															
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>NGZ</b>	TNMG 160404 NGZ	0,4																											
		TNMG 160408 NGZ	0,8																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>L/RHM</b>	TNMG 220408 NGZ	0,8																											
		TNMG 220412 NGZ	1,2																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>L/RHM</b>	TNMG 220416 NGZ	1,6																											
		TNMG 220404 LHM	0,4																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>L/RHM</b>	TNMG 220408 LHM	0,8																											
		TNMG 220404 RHM	0,4																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>L/RHM</b>	TNMG 220408 RHM	0,8																											
		TNMG 220404 RHM	0,4																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>NUZ</b>	TNMG 160404 NUZ	0,4																											
		TNMG 160408 NUZ	0,8																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>NUZ</b>	TNMG 160412 NUZ	1,2																											
		TNMG 160416 NUZ	1,6																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>NUZ</b>	TNMG 160420 NUZ	2,0																											
		TNMG 220408 NUZ	0,8																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>NUZ</b>	TNMG 220412 NUZ	1,2																											
		TNMG 220416 NUZ	1,6																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>NUZ</b>	TNMG 270608 NUZ	0,8																											
		TNMG 270612 NUZ	1,2																											
Roughing Depth of cut (mm) 6 4 2 0 0.2 0.4 0.6 0.8 Feed rate (mm/rev)	 <b>NUZ</b>	TNMG 270616 NUZ	1,6																											

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

Neg. Inserts

C

D

K

R

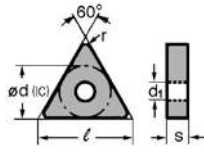
S

T

V

W

**60° Triangle Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
TN	l	ød (IC)	s	d <sub>1</sub>
1604..	16,5	9,525	4,76	3,81
2204..	22,0	12,7	4,76	5,16
2706..	27,5	15,875	6,35	6,35



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

### TNMM

● M-Class One Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide			
				Coated						ZX-Coated						Uncoated		Uncoated			
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N						
Heavy Roughing	 <b>NMP</b> Depth of cut (mm) vs Feed rate (mm/rev) graph showing IC: ø15.875 - 19.05 and IC: ~ø12.7.	TNMM 160404 NMP	0,4																		
		TNMM 160408 NMP	0,8	●	●	●			●												
		TNMM 160412 NMP	1,2	○	●	●	●			●											
		TNMM 160416 NMP	1,6		●																
		TNMM 220408 NMP	0,8		○	●	●	●													
		TNMM 220412 NMP	1,2		○	●	●	●													
		TNMM 220416 NMP	1,6		○	●	●	●													
		TNMM 270612 NMP	1,2				○														
		TNMM 270616 NMP	1,6				○														
		Heavy Roughing	 <b>NHG</b> Depth of cut (mm) vs Feed rate (mm/rev) graph showing IC: ø15.875 - 19.05 and IC: ~ø12.7.	TNMM 160408 NHG	0,8		●														
				TNMM 160412 NHG	1,2		●														
				TNMM 160416 NHG	1,6		●														
TNMM 220408 NHG	0,8				○	●	○	●													
TNMM 220412 NHG	1,2				○	●	●	●													
TNMM 220416 NHG	1,6				○	●	●	●													
Heavy Roughing	 <b>NHP</b> Depth of cut (mm) vs Feed rate (mm/rev) graph showing IC: ø15.875 - 19.05 and IC: ~ø12.7.			TNMM 160408 NHP	0,8																
				TNMM 160412 NHP	1,2				○	○											
				TNMM 220408 NHP	0,8					○											
				TNMM 220412 NHP	1,2					○	○										
				TNMM 220416 NHP	1,6					○	○										
				TNMM 270612 NHP	1,2					○											
		TNMM 270616 NHP	1,6					○													

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

- Neg. Inserts
- - 
  - 
  - 
  - 
  - 
  - 
  -

# T TRIANGLE TYPE

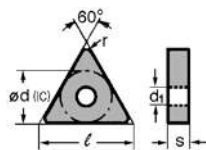
## INSERTS FOR TURNING

### Negative Inserts

60° Triangle Type

0° Relief

With Insert Hole



Dimensions (mm)				
TN	l	ød (IC)	s	d <sub>1</sub>
1604..	16,5	9,525	4,76	3,81
2204..	22,0	12,7	4,76	5,16



⇒ D15, D22~23

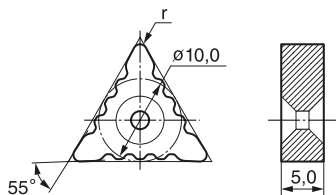
⇒ E12

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## TNMA

● G/M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide										Cermets		Carbide															
				Coated					ZX-Coated					Uncoated		Uncoated															
				P	M	P/M	K	H	K <sub>s</sub>	M <sub>s</sub>	P <sub>M</sub>	P	K	S	N																
Roughing		TNMA 160404	0,4	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
		TNMA 160408	0,8											●	●												●				
		TNMA 160412	1,2											●	●	●															
		TNMA 160416	1,6											●	●	●	●														
		TNMA 220408	0,8											●	●																
		TNMA 220412	1,2											●	●																
		TNMA 220416	1,6											●	●																



⇒ D11

⇒ E11

## TRM

● M-Class Bumpy Chipbreaker

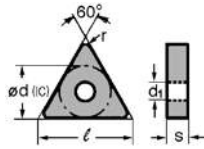
Application	Shape	ISO Cat. No.	r	Carbide										Cermets		Carbide															
				Coated					ZX-Coated					Uncoated		Uncoated															
				P	M	P/M	K	H	K <sub>s</sub>	M <sub>s</sub>	P <sub>M</sub>	P	K	S	N																
Fine Finishing		TRM 551704 -FL	0,4	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
		TRM 551708 -FL	0,8																								○				
Finishing	 	TRM 551704 -LU	0,4		●	●	○																								
		TRM 551708 -LU	0,8		●	●	○																								
		TRM 551712 -LU	1,2		●	●	○																								
Light Cut	 	TRM 551704 -SU	0,4			○	○						▲	●																	
		TRM 551708 -SU	0,8			○	○						▲	●																	
		TRM 551712 -SU	1,2			○	○						▲	●																	
Light Cut		TRM 551704 -GU	0,4		●	●	○	●					●																		
		TRM 551708 -GU	0,8		●	●	○	●					●																		
		TRM 551712 -GU	1,2		●	●	○	●					○																		

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

# T TRIANGLE TYPE

## INSERTS FOR TURNING

60° Triangle Type 0° Relief  
With Insert Hole



Dimensions (mm)				
TN	l	∅d (IC)	s	d <sub>1</sub>
1103..	11,0	6,35	3,18	2,26
1603..	16,5	9,525	3,18	3,81
1604..	16,5	9,525	4,76	3,81



⇒ D15, D22~23

⇒ E12

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

# TNGG

● G-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermet		Carbide											
				Coated						ZX-Coated				Uncoated				P	K	S	N								
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N														
Finishing	 L/RFT	TNGG 110302 LFT TNGG 110304 LFT  TNGG 110302 RFT TNGG 110304 RFT	0,2 0,4	AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Light Cutting	 L/RST	TNGG 160302 LST TNGG 160304 LST TNGG 160308 LST	0,2 0,4 0,8																										
		TNGG 160402 LST TNGG 160404 LST TNGG 160408 LST TNGG 160412 LST	0,2 0,4 0,8 1,2																										
Finishing	 NSU	TNGG 160302 RST TNGG 160304 RST TNGG 160308 RST	0,2 0,4 0,8																										
		TNGG 160402 RST TNGG 160404 RST TNGG 160408 RST TNGG 160412 RST	0,2 0,4 0,8 1,2																										
Finishing	 NSU	TNGG 160402 NSU TNGG 160404 NSU TNGG 160408 NSU	0,2 0,4 0,8																										
Finishing	 L/RFY	TNGG 160401 LFY TNGG 160402 LFY TNGG 160404 LFY TNGG 160408 LFY TNGG 160412 LFY	0,1 0,2 0,4 0,8 1,2																										
		TNGG 160401 RFY TNGG 160402 RFY TNGG 160404 RFY TNGG 160408 RFY TNGG 160412 RFY	0,1 0,2 0,4 0,8 1,2																										
Finishing	 L/RFX	TNGG 160401 NSU TNGG 160402 NSU TNGG 160408 NSU	0,2 0,4 0,8																										
		TNGG 160402 LFX TNGG 160404 LFX TNGG 160408 LFX	0,2 0,4 0,8																										
Finishing	 L/RFX	TNGG 160402 RFX TNGG 160404 RFX TNGG 160408 RFX	0,2 0,4 0,8																										

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

- Neg. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# T TRIANGLE TYPE

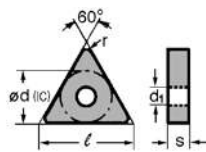
## INSERTS FOR TURNING

### Negative Inserts

60° Triangle Type

0° Relief

With Insert Hole



Dimensions (mm)				
TN	l	ød (IC)	s	d1
1103..	11,0	6,35	3,18	2,26
1604..	16,5	9,525	4,76	3,81
2204..	22,0	12,7	4,76	5,16







⇒ D15, D22~23

⇒ E12

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel


## TNGG

### ● G-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide												
				Coated						ZX-Coated						Uncoated		Uncoated												
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N											
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Medium Cut		TNGG 160402 LUM	0,2																											
		TNGG 160404 LUM	0,4																											
		TNGG 160408 LUM	0,8																											
		TNGG 160412 LUM	1,2																											
Medium Cut		TNGG 220404 LUM	0,4																											
		TNGG 220408 LUM	0,8																											
		TNGG 160402 RUM	0,2																											
		TNGG 160404 RUM	0,4																											
Medium Cut		TNGG 160408 RUM	0,8																											
		TNGG 160412 RUM	1,2																											
		TNGG 220404 RUM	0,4																											
		TNGG 220408 RUM	0,8																											
Finishing		TNGG 160402 NGH	0,2																											
		TNGG 160404 NGH	0,4																											
		TNGG 160408 NGH	0,8																											

## TNGA

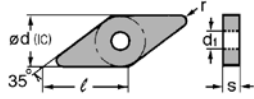
### ● G-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide												
				Coated						ZX-Coated						Uncoated		Uncoated												
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N											
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Medium Cut		TNGA 110308	0,8																											
		TNGA 160402	0,2																											
		TNGA 160404	0,4																											
		TNGA 160408	0,8																											

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item



**35° Diamond Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
VN	ℓ	ød (IC)	s	d <sub>1</sub>
1604..	16,6	9,525	4,76	3,81



⇒ D16

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

**VNMA** ○○○○○○

● M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r
Roughing		VNMA 160404	0,4
		VNMA 160408	0,8
		VNMA 160412	1,2

Carbide										Cermets			Carbide													
Coated					ZX-Coated					Uncoated																
P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N															
AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
										●	●															

**VNMG** ○○○○○○ □ □

● G/M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Fine Finishing	 NFB	VNMG 160404 NFB VNMG 160408 NFB	0,4 0,8
Fine Finishing	 NFA	VNMG 160404 NFA VNMG 160408 NFA	0,4 0,8
Fine Finishing	 NFL	VNMG 160404 NFL VNMG 160408 NFL	0,4 0,8
Fine Finishing	 NFE	VNMG 160402 NFE VNMG 160404 NFE VNMG 160408 NFE VNMG 160412 NFE	0,2 0,4 0,8 1,2
Finishing	 NLU	VNMG 160402 NLU VNMG 160404 NLU VNMG 160408 NLU	0,2 0,4 0,8
Medium Cut	 NEF	VNMG 160402 NEF VNMG 160404 NEF VNMG 160408 NEF	0,2 0,4 0,8

Carbide										Cermets			Carbide													
Coated					ZX-Coated					Uncoated																
P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N															
AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

Neg. Inserts

C

D

K

R

S

T

V

W

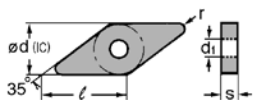
# DIAMOND TYPE INSERTS FOR TURNING

## Negative Inserts

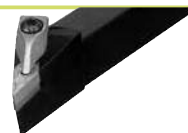
35° Diamond Type

0° Relief

With Insert Hole



Dimensions (mm)				
VN	l	ød (IC)	s	d1
1604..	16,6	9,525	4,76	3,81



⇨ D16

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## VNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide													Cermets		Carbide										
				Coated						ZX-Coated					Uncoated		P	K	S	N									
				P	M	M	K	H	K	M	P	M	P	K	S	N													
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Finishing	 NSU	VNMG 160402 NSU VNMG 160404 NSU VNMG 160408 NSU	0,2 0,4 0,8		●	●	●	○	●	●	●	▲	●					○	○			○	○	○	○				
Medium Cut	 NSE	VNMG 160404 NSE VNMG 160408 NSE	0,4 0,8		●	●	○	○														○		○	○				
Medium Cut	 NSX	VNMG 160404 NSX VNMG 160408 NSX	0,4 0,8				○	○														○		○					
Medium Cut	 NGU	VNMG 160404 NGU VNMG 160408 NGU VNMG 160412 NGU	0,4 0,8 1,2		●	●	●	○	●	●	●	▲	●					○	○			○		○					
Medium Cut	 NGE	VNMG 160404 NGE VNMG 160408 NGE VNMG 160412 NGE	0,4 0,8 1,2		●	●	○	●																					
Medium Cut	 NUG	VNMG 160404 NUG VNMG 160408 NUG	0,4 0,8				○	○																					
Medium Cut	 NEG	VNMG 160404 NEG VNMG 160408 NEG VNMG 160412 NEG	0,4 0,8 1,2			●			●	●	●																		

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

Neg. Inserts

C

D

K

R

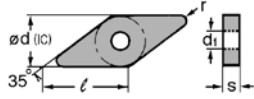
S

T

V

W

**35° Diamond Type** 0° Relief  
With Insert Hole



Dimensions (mm)				
VN	$\ell$	$\phi d$ (IC)	s	$d_1$
1604..	16,6	9,525	4,76	3,81



⇒ D16

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

**VNMG** ○○○○○○ ■■■■

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide											
				Coated						ZX-Coated						Uncoated		Uncoated											
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N										
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Medium Cut	 NEX	VNMG 160404 NEX VNMG 160408 NEX	0,4 0,8						●	●	●	○						●	●										
Medium Cut	 NUP	VNMG 160404 NUP VNMG 160408 NUP	0,4 0,8			●	●	●	●	●			●					●	●										
Medium Cut	 NUX	VNMG 160404 NUX VNMG 160408 NUX VNMG 160412 NUX	0,4 0,8 1,2	○	●	○	●	●																					
Medium Cut	 NGZ	VNMG 160404 NGZ VNMG 160408 NGZ VNMG 160412 NGZ	0,4 0,8 1,2											●	●	●													
Medium Cut	 NUZ	VNMG 160404 NUZ VNMG 160408 NUZ VNMG 160412 NUZ	0,4 0,8 1,2			○								●	●	●													

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

- Neg. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# W TRIGON TYPE

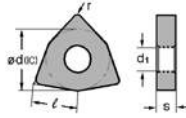
## INSERTS FOR TURNING

### Negative Inserts

80° Trigon Type

0° Relief

With Insert Hole



Dimensions (mm)				
WN	ℓ	ød (IC)	s	d <sub>1</sub>
0604..	6,5	9,525	4,76	3,81
0804..	8,7	12,7	4,76	5,16



⇒ D17, D24  
D42

⇒ E13

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

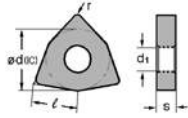
## WNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide													Cermets		Carbide												
				Coated						ZX-Coated							Uncoated		Uncoated												
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N												
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Fine Finishing	<b>NFB</b>	WNMG 060404 NFB WNMG 060408 NFB  WNMG 080402 NFB WNMG 080404 NFB WNMG 080408 NFB	0,4 0,8																												
Fine Finishing	<b>NFA</b>	WNMG 080402 NFA WNMG 080404 NFA WNMG 080408 NFA	0,2 0,4 0,8																												
Fine Finishing	<b>NFL</b>	WNMG 080404 NFL WNMG 080408 NFL	0,4 0,8																												
Fine Finishing	<b>NFE</b>	WNMG 060404 NFE WNMG 060408 NFE  WNMG 080402 NFE WNMG 080404 NFE WNMG 080408 NFE WNMG 080412 NFE	0,4 0,8  0,2 0,4 0,8 1,2																												
Finishing	<b>NLU</b>	WNMG 060404 NLU WNMG 060408 NLU WNMG 060412 NLU  WNMG 080404 NLU WNMG 080408 NLU WNMG 080412 NLU	0,4 0,8 1,2  0,4 0,8 1,2																												
Finishing	<b>NLU-W</b>	WNMG 060404 NLU-W WNMG 060408 NLU-W  WNMG 080404 NLU-W WNMG 080408 NLU-W WNMG 080412 NLU-W	0,4 0,8  0,4 0,8 1,2																												

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

80° Trigon Type 0° Relief  
With Insert Hole



Dimensions (mm)				
WN	ℓ	ød (IC)	s	d <sub>1</sub>
0604..	6,5	9,525	4,76	3,81
06T3..	6,5	9,525	3,97	3,81
0804..	8,7	12,7	4,76	5,16



⇒ D17, D24  
D42

⇒ E13

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## WNMG

Application	Shape	ISO Cat. No.	r	Carbide												Cermets			Carbide											
				Coated						ZX-Coated						Uncoated			Uncoated											
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N											
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC620M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Finishing	 NEF	WNMG 060404 NEF WNMG 060408 NEF	0,4 0,8				●	●	●	●	●																			
		WNMG 080404 NEF WNMG 080408 NEF	0,4 0,8				●	●	●	●	●	●	●															●	●	
Finishing	 NSU	WNMG 060404 NSU WNMG 060408 NSU WNMG 060412 NSU	0,4 0,8 1,2		●	●	○	○	●	○		▲	●						●	●										
		WNMG 06T304 NSU WNMG 06T308 NSU	0,4 0,8				○	○																						
Finishing	 NSE	WNMG 080404 NSE WNMG 080408 NSE WNMG 080412 NSE	0,4 0,8 1,2		●	●	○	○	●	○														○	○	○				
		WNMG 060404 NSE-W WNMG 060408 NSE-W	0,4 0,8				○	○	●																					
Finishing	 NSE-W	WNMG 080404 NSE-W WNMG 080408 NSE-W WNMG 080412 NSE-W	0,4 0,8 1,2		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○					
		WNMG 080404 NSX WNMG 080408 NSX WNMG 080412 NSX	0,4 0,8 1,2					○	○	○														○	○	○				
Medium Cut	 NGU	WNMG 060404 NGU WNMG 060408 NGU WNMG 060412 NGU	0,4 0,8 1,2		●	●	●	●	●	○	○	▲	●																	
		WNMG 080404 NGU WNMG 080408 NGU WNMG 080412 NGU	0,4 0,8 1,2		●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○				○	○	○				
Medium Cut	 NGU-W	WNMG 080404 NGU-W WNMG 080408 NGU-W WNMG 080412 NGU-W	0,8 0,8 1,2		●	●	●	●	●	●	●	●	●	●	●	●	●	○	○											
		WNMG 080408 NGU-W WNMG 080412 NGU-W	0,8 1,2		●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○										

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

Neg. Inserts



# W TRIGON TYPE

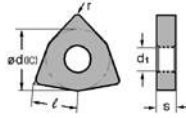
## INSERTS FOR TURNING

### Negative Inserts

80° Trigon Type

0° Relief

With Insert Hole



Dimensions (mm)				
WN	l	ød (ic)	s	d <sub>1</sub>
0604..	6,5	9,525	4,76	3,81
06T3..	6,5	9,525	3,97	3,81
0804..	8,7	12,7	4,76	5,16



⇒ D17, D24  
D42

⇒ E13

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

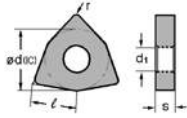
# WNMG

### ● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets				Carbide									
				Coated						ZX-Coated						Uncoated				Uncoated									
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N										
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Medium Cut		WNMG 060408 NGE WNMG 060412 NGE  WNMG 080404 NGE WNMG 080408 NGE WNMG 080412 NGE WNMG 080416 NGE	0,8 1,2	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Medium Cut		WNMG 060404 NUG WNMG 060408 NUG  WNMG 06T304 NUG WNMG 06T308 NUG  WNMG 080404 NUG WNMG 080408 NUG WNMG 080412 NUG	0,4 0,8	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Medium Cut		WNMG 060408 NEG WNMG 060412 NEG  WNMG 080404 NEG WNMG 080408 NEG WNMG 080412 NEG	0,8 1,2	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Medium Cut		WNMG 060404 NEX WNMG 060408 NEX  WNMG 080404 NEX WNMG 080408 NEX WNMG 080412 NEX	0,4 0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Medium Cut		WNMG 080408 NUP WNMG 080412 NUP	0,8 1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Medium Cut		WNMG 080408 NEM WNMG 080412 NEM	0,8 1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

**80° Trigon Type**      **0° Relief**  
 With Insert Hole



WN	l	φd (IC)	s	d <sub>1</sub>
0604..	6,5	9,525	4,76	3,81
0804..	8,7	12,7	4,76	5,16



⇒ D17, D24  
D42

⇒ E13

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## WNMG

### M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide																												
				Coated								ZX-Coated			Cermets			Carbide														
				P	M	PM	K	H	KS	MS	PM	P	K	S	N																	
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1			
Roughing	 <b>NUX</b>	<b>WNMG 080404 NUX</b> <b>WNMG 080408 NUX</b> <b>WNMG 080412 NUX</b>	0,4	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
			1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing	 <b>NMU</b>	<b>WNMG 060408 NMU</b> <b>WNMG 060412 NMU</b>  <b>WNMG 080408 NMU</b> <b>WNMG 080412 NMU</b> <b>WNMG 080416 NMU</b>	0,8	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
			1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
			1,6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing	 <b>NME</b>	<b>WNMG 060408 NME</b> <b>WNMG 060412 NME</b>  <b>WNMG 080408 NME</b> <b>WNMG 080412 NME</b> <b>WNMG 080416 NME</b>	0,8	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
			1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
			1,6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing	 <b>NMX</b>	<b>WNMG 080408 NMX</b> <b>WNMG 080412 NMX</b>	0,8	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
			1,2	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
			1,6	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing	 <b>NGZ</b>	<b>WNMG 060408 NGZ</b> <b>WNMG 060412 NGZ</b>  <b>WNMG 080404 NGZ</b> <b>WNMG 080408 NGZ</b> <b>WNMG 080412 NGZ</b>	0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
			1,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			1,6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roughing	 <b>NUZ</b>	<b>WNMG 080404 NUZ</b> <b>WNMG 080408 NUZ</b> <b>WNMG 080412 NUZ</b>	0,4	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
			0,8	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
			1,2	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

Neg. Inserts



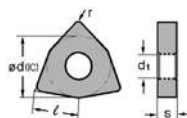
# W TRIGON TYPE

## INSERTS FOR TURNING

### Negative Inserts

80° Trigon Type

0° Relief  
With Insert Hole



Dimensions (mm)				
WN	l	∅d (IC)	s	d <sub>1</sub>
0804..	8,7	12,7	4,76	5,16



⇒ D17, D24

⇒ E13

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## WNMM

### ● M-Class One Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide																									
				Coated						ZX-Coated				Uncoated															
				P	M	P/M	K	H	S	M/S	P/M	P	K	S	N														
Heavy Roughing	<p><b>NMP</b></p>	<b>WNMM 080408 NMP</b> <b>WNMM 080412 NMP</b>	0,8 1,2	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Heavy Roughing				<p><b>NHG</b></p>	<b>WNMM 080408 NHG</b> <b>WNMM 080412 NHG</b>	0,8 1,2	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E

## WNMA

### ● M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide																									
				Coated						ZX-Coated				Uncoated															
				P	M	P/M	K	H	S	M/S	P/M	P	K	S	N														
Roughing		<b>WNMA 080408</b> <b>WNMA 080412</b> <b>WNMA 080416</b>	0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
			1,2	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
			1,6	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1

## WNGG

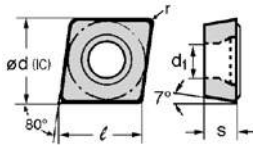
### ● G-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide																									
				Coated						ZX-Coated				Uncoated															
				P	M	P/M	K	H	S	M/S	P/M	P	K	S	N														
Finishing	<p><b>NSU</b></p>	<b>WNGG 080404 NSU</b>	0,4	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
			0,4	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
			0,4	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
			0,4	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item



80° Diamond Type 7° Relief  
With Insert Hole



Dimensions (mm)				
CC	l	ød (IC)	s	d <sub>1</sub>
03X1..	3,55	3,5	1,4	1,9
04X1..	4,37	4,3	1,8	2,3
0602..	6,4	6,35	2,38	2,8
09T3..	9,7	9,525	3,97	4,4



⇒ D31

⇒ E14

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

# CCET

● E-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets			Carbide													
				Coated						ZX-Coated						Uncoated			Uncoated													
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N													
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1			
Finishing Depth of cut (mm)  Feed rate (mm/rev) L/RFY 	LFY	CCET 03X1003 LFY	0,03																													
		CCET 03X101 LFY	0,1																						○	○						
		CCET 03X102 LFY	0,2																						○	○	○	○				
		CCET 03X104 LFY	0,4																						○	○	○	○				
		CCET 04X1003 LFY	0,03																							○	○					
		CCET 04X101 LFY	0,1																							○	○	○	○			
		CCET 04X102 LFY	0,2																							○	○	○	○			
		CCET 04X104 LFY	0,4																							○	○	○	○			
		CCET 060201 LFY	0,1																							○	○					
		CCET 060202 LFY	0,2																							○	○					
		CCET 09T301 LFY	0,1																							○	○					
		CCET 09T302 LFY	0,2																							○	○					
	RFY	CCET 03X1003 RFY	0,03																							○	○					
		CCET 03X101 RFY	0,1																							○	○	○	○			
		CCET 03X102 RFY	0,2																							○	○	○	○			
		CCET 03X104 RFY	0,4																							○	○	○	○			
		CCET 04X1003 RFY	0,03																								○	○				
		CCET 04X101 RFY	0,1																								○	○	○	○		
		CCET 04X102 RFY	0,2																								○	○	○	○		
		CCET 04X104 RFY	0,4																								○	○	○	○		
		CCET 060201 RFY	0,1																								○	○				
		CCET 060202 RFY	0,2																								○	○				
		CCET 09T301 RFY	0,1																								○	○				
		CCET 09T302 RFY	0,2																								○	○				

● = Euro stock  
 ○ = Japan stock  
 ▲ = To be replaced by new item

Pos. Inserts

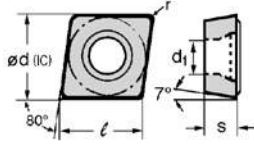


# C DIAMOND TYPE INSERTS FOR TURNING

## 7° Positive Inserts

80° Diamond Type

7° Relief  
With Insert Hole



Dimensions (mm)				
CC	$l$	$\phi d (IC)$	$s$	$d_1$
03X1..	3,55	3,5	1,4	1,9
04X1..	4,37	4,3	1,8	2,3
0602..	6,4	6,35	2,38	2,8
09T3..	9,7	9,525	3,97	4,4



- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

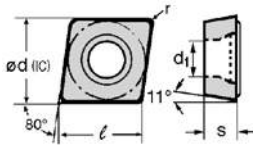
## CCGT

### ● G-Class

Application	Shape	ISO Cat. No.	r	Carbide										Cermet		Carbide					
				Coated					ZX-Coated					Uncoated		Uncoated					
				P	M	M	K	H	S	M	P	M	P	K	S	N					
Finishing Depth of cut (mm) Feed rate (mm/rev)	NFC	CCGT 060201M NFC	<0,1																		
		CCGT 060202M NFC	<0,2																		
		CCGT 060204M NFC	<0,4																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFX	CCGT 09T301M NFC	<0,1																		
		CCGT 09T302M NFC	<0,2																		
		CCGT 09T304M NFC	<0,4																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFX	CCGT 0602003 LFX	0,03																		
		CCGT 060201 LFX	0,1																		
		CCGT 060202 LFX	0,2																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFX	CCGT 060204 LFX	0,4																		
		CCGT 09T3003 LFX	0,03																		
		CCGT 09T301 LFX	0,1																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFX	CCGT 09T302 LFX	0,2																		
		CCGT 09T304 LFX	0,4																		
		CCGT 09T308 LFX	0,8																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFX	CCGT 0602003 RFX	0,03																		
		CCGT 060201 RFX	0,1																		
		CCGT 060202 RFX	0,2																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFX	CCGT 060204 RFX	0,4																		
		CCGT 09T3003 RFX	0,03																		
		CCGT 09T301 RFX	0,1																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFX	CCGT 09T302 RFX	0,2																		
		CCGT 09T304 RFX	0,4																		
		CCGT 09T308 RFX	0,8																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFYS	CCGT 03X1003 LFYS	0,03																		
		CCGT 03X101 LFYS	0,1																		
		CCGT 03X102 LFYS	0,2																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFYS	CCGT 03X104 LFYS	0,4																		
		CCGT 04X1003 LFYS	0,03																		
		CCGT 04X101 LFYS	0,1																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFYS	CCGT 04X102 LFYS	0,2																		
		CCGT 04X104 LFYS	0,4																		
		CCGT 03X1003 RFYS	0,03																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFYS	CCGT 03X101 RFYS	0,1																		
		CCGT 03X102 RFYS	0,2																		
		CCGT 03X104 RFYS	0,4																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFYS	CCGT 04X1003 RFYS	0,03																		
		CCGT 04X101 RFYS	0,1																		
		CCGT 04X102 RFYS	0,2																		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFYS	CCGT 04X104 RFYS	0,4																		

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

80° Diamond Type 7° Relief  
With Insert Hole



Dimensions (mm)				
CC	$\ell$	$\phi d (IC)$	s	$d_1$
03X1..	3,55	3,5	1,4	1,9
04X1..	4,37	4,3	1,8	2,3
0602..	6,4	6,35	2,38	2,8
0903..	9,7	9,525	3,18	4,4
09T3..	9,7	9,525	3,97	4,4
1204..	12,9	12,7	4,76	5,5



⇒ E14

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

# CCGT

● G-Class

Application	Shape	ISO Cat. No.	r	Carbide										Cermets		Carbide															
				Coated					ZX-Coated					Uncoated		Uncoated															
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N																
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFY	CCGT 03X101 LFY CCGT 03X102 LFY CCGT 03X104 LFY	0,1 0,2 0,4																												
		CCGT 04X101 LFY CCGT 04X102 LFY CCGT 04X104 LFY	0,1 0,2 0,4																												
		CCGT 03X101 RFY CCGT 03X102 RFY CCGT 03X104 RFY	0,1 0,2 0,4																												
Light Cut Depth of cut (mm) Feed rate (mm/rev)	NAG	CCGT 060202 NAG CCGT 060204 NAG	0,2 0,4																												
		CCGT 09T302 NAG CCGT 09T304 NAG CCGT 09T308 NAG	0,2 0,4 0,8																												
		CCGT 120404 NAG CCGT 120408 NAG	0,4 0,8																												
Light cut Depth of cut (mm) Feed rate (mm/rev)	NSI	CCGT 09T301M NSI CCGT 09T302M NSI CCGT 09T304M NSI	<0,1 <0,2 <0,4																												
Light cut Depth of cut (mm) Feed rate (mm/rev)	NSC	CCGT 0602003 NSC	0,03																												
		CCGT 09T3003 NSC	0,03																												
		CCGT 060201M NSC CCGT 060202M NSC CCGT 060204M NSC	<0,1 <0,2 <0,4																												

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

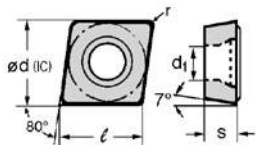
- Pos. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# C DIAMOND TYPE INSERTS FOR TURNING

## 7° Positive Inserts

80° Diamond Type

7° Relief  
With Insert Hole



Dimensions (mm)				
CC	l	ød (IC)	s	d1
0602..	6,4	6,35	2,38	2,8
09T3..	9,7	9,525	3,97	4,4
1204..	12,9	12,7	4,76	5,5



⇒ D31

⇒ E14

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

### CCMT

Pos. Inserts

C

D

K

R

S

T

V

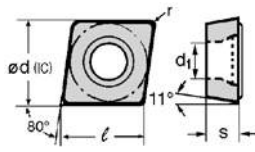
W

#### M-Class

Application	Shape	ISO Cat. No.	r	Carbide														Cermets		Carbide										
				Coated							ZX-Coated							Uncoated		Uncoated										
				P	M	P	K	H	S	M	P	M	P	K	S	N	P	K	S	N										
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Finishing Depth of cut (mm) Feed rate (mm/rev)	 <b>NFB</b>	CCMT 060202 NFB	0,2																											
		CCMT 060204 NFB	0,4																											
Finishing ~ Light Cut Depth of cut (mm) Feed rate (mm/rev)	 <b>NFP</b>	CCMT 060202 NFP	0,2																											
		CCMT 060204 NFP	0,4																											
Finishing Depth of cut (mm) Feed rate (mm/rev)	 <b>NLU</b>	CCMT 060202 NLU	0,2	●	○	●			●	●	●	▲	●									●	○	●	○	○				
		CCMT 060204 NLU	0,4	●	○	●			●	●	●	▲	●										●	○	●	○	○			
Finishing Depth of cut (mm) Feed rate (mm/rev)	 <b>NLU-W</b>	CCMT 09T302 NLU	0,2						●													●								
		CCMT 09T304 NLU	0,4						●														●							
Finishing Depth of cut (mm) Feed rate (mm/rev)	 <b>NLU-W</b>	CCMT 09T308 NLU	0,8	●	○	●			●													●	○	●	○	○				
		CCMT 09T308 NLU-W	0,8	●	○	●			●														●	○	●	○	○			
Light Cut Depth of cut (mm) Feed rate (mm/rev)	 <b>NLB</b>	CCMT 060202 NLB	0,2				○		○														●	●		●				
		CCMT 060204 NLB	0,4				○		○															●	●		●			
Light Cut Depth of cut (mm) Feed rate (mm/rev)	 <b>NSU</b>	CCMT 060202 NSU	0,2	●	●	●	○		●	●	●	▲	●	●	●			●	●			●	●	●	●	●	●	●	●	●
		CCMT 060204 NSU	0,4	●	●	●	○		●	●	●	▲	●	●	●				●	●			●	●	●	●	●	●	●	●
Light Cut Depth of cut (mm) Feed rate (mm/rev)	 <b>NSU</b>	CCMT 060208 NSU	0,8	●	●	●	○		●	●	●	▲	●	●	●				●	●			●	●	●	●	●	●	●	
		CCMT 09T302 NSU	0,2				○		●	●	●	▲	●	●	●								●	●	●	●	●	●	●	●
Light Cut Depth of cut (mm) Feed rate (mm/rev)	 <b>NSU</b>	CCMT 09T304 NSU	0,4				○		●	●	●	▲	●	●	●							●	●	●	●	●	●	●	●	
		CCMT 09T308 NSU	0,8	●	●	●	○		●	●	●	▲	●	●	●								●	●	●	●	●	●	●	●
Light Cut Depth of cut (mm) Feed rate (mm/rev)	 <b>NSU</b>	CCMT 120404 NSU	0,4				○		●													●								
		CCMT 120408 NSU	0,8				○		●														●							

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

80° Diamond Type 7° / 11° Relief  
With Insert Hole



Dimensions (mm)				
C	$\ell$	$\phi d (IC)$	s	$d_1$
0602..	6,4	6,35	2,38	2,8
0802..	8,0	7,94	2,38	3,4
0803..	8,0	7,94	3,18	3,4
0903..	9,7	9,525	3,18	4,4
09T3..	9,7	9,525	3,97	4,4
1204..	12,9	12,7	4,76	5,5



⇨ E15

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## CCMT

### ● M-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermet		Carbide		
				Coated						ZX-Coated						Uncoated		Uncoated		
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N					
Light Cut		CCMT 060204 NSC	0,4																	
		CCMT 080304 NSC	0,4	○	○															
		CCMT 090304 NSC	0,4		○															
		CCMT 090308 NSC	0,8		○															
		CCMT 120408 NSC	0,8		○															
Light Cut		CCMT 060204 NSK	0,4	●	●	●														
		CCMT 060208 NSK	0,8	●	●	●														
		CCMT 09T304 NSK	0,4	●	●	●														
		CCMT 09T308 NSK	0,8	●	●	●														
Light Cut		CCMT 120404 NSK	0,4	●	●	●														
		CCMT 120408 NSK	0,8	●	●	●														
Roughing		CCMT 09T304 NMU	0,4	●	●	●	▲	●	●	●										
		CCMT 09T308 NMU	0,8	●	●	●	▲	●	●	●										
Roughing		CCMW 09T304	0,4					●	●											
		CCMW 09T308	0,8					●	●											

## CPGT

### ● G-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermet		Carbide		
				Coated						ZX-Coated						Uncoated		Uncoated		
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N					
Finishing ~ Light Cut		CPGT 080202 NSD	0,2																	
		CPGT 080204 NSD	0,4										○	○	○	○				
		CPGT 080208 NSD	0,8										○	○	○	○				
Finishing ~ Light Cut		CPGT 090302 NSD	0,2																	
		CPGT 090304 NSD	0,4										○	○	○	○				
		CPGT 090308 NSD	0,8										○	○	○	○				
Finishing ~ Light Cut		CPGT 120402 NSD	0,2																	
		CPGT 120404 NSD	0,4										○	○	○	○				
		CPGT 120408 NSD	0,8										○	○	○	○				

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

Pos. Inserts



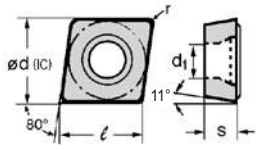
# C DIAMOND TYPE

## INSERTS FOR TURNING

### 11° Positive Inserts

80° Diamond Type

11° Relief  
With Insert Hole



Dimensions (mm)				
CP	l	ød (IC)	s	d1
0802..	8,0	7,94	2,38	3,4
0903..	9,7	9,525	3,18	4,4



⇒ E15

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

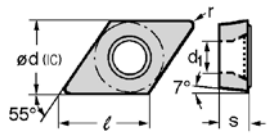
# CPMT

### ● M-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide													
				Coated						ZX-Coated						Uncoated		Uncoated													
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N																
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Finishing Depth of cut (mm) Feed rate (mm/rev)		CPMT 080204 NFB CPMT 090304 NFB CPMT 090308 NFB	0,4																												
			0,4																												
			0,8																												
Finishing Depth of cut (mm) Feed rate (mm/rev)		CPMT 080204 NLU CPMT 090304 NLU CPMT 090308 NLU	0,4																												
			0,4																												
			0,8																												
Finishing Depth of cut (mm) Feed rate (mm/rev)		CPMT 090304 NLU-W CPMT 090308 NLU-W	0,4																												
			0,8																												
			0,8																												
Light Cut Depth of cut (mm) Feed rate (mm/rev)		CPMT 080204 NLB CPMT 090304 NLB CPMT 090308 NLB	0,4																												
			0,4																												
			0,8																												
Light Cut Depth of cut (mm) Feed rate (mm/rev)		CPMT 080204 NSU CPMT 080208 NSU CPMT 090304 NSU CPMT 090308 NSU	0,4																												
			0,8																												
			0,4																												
Light - Medium Cut Depth of cut (mm) Feed rate (mm/rev)		CPMT 080204 NMU CPMT 080208 NMU CPMT 090304 NMU CPMT 090308 NMU	0,4																												
			0,8																												
			0,4																												

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

**55° Diamond Type** 7° Relief  
With Insert Hole



Dimensions (mm)				
DC	ℓ	∅d (IC)	s	d <sub>1</sub>
0702..	7,7	6,35	2,38	2,8
11T3..	11,6	9,525	3,97	4,4

⇒ D32~33      ⇒ E16~17

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## DCGT

### ● G-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide												
				Coated						ZX-Coated						Uncoated		P	K	S	N									
				P	M	PM	K	H	KS	MS	PM	P	K	S	N															
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Finishing Depth of cut (mm)  Feed rate (mm/rev)		DCGT 070201M NFC	<0,1																			●	○	○	○					
		DCGT 070202M NFC	<0,2																				●	○	○	○				
		DCGT 070204M NFC	<0,4																				●	○	○	○				
		DCGT 11T301M NFC	<0,1																				●	○	○	○				
Finishing Depth of cut (mm)  Feed rate (mm/rev)		DCGT 0702003 LFX	0,03																			○	○	○	○					
		DCGT 070201 LFX	0,1																				○	○	○	○				
		DCGT 070202 LFX	0,2																				○	○	○	○				
		DCGT 070204 LFX	0,4																				○	○	○	○				
Finishing Depth of cut (mm)  Feed rate (mm/rev)		DCGT 0702003 RFX	0,03																			○	○	○	○					
		DCGT 070201 RFX	0,1																				○	○	○	○				
		DCGT 070202 RFX	0,2																				○	○	○	○				
		DCGT 070204 RFX	0,4																				○	○	○	○				
Finishing Depth of cut (mm)  Feed rate (mm/rev)		DCGT 0702003 LFYS	0,03																			○	○	○	○					
		DCGT 070201 LFYS	0,1																				○	○	○	○				
		DCGT 070202 LFYS	0,2																				○	○	○	○				
		DCGT 070204 LFYS	0,4																				○	○	○	○				
Finishing Depth of cut (mm)  Feed rate (mm/rev)		DCGT 0702003 LFY	0,03																			○	○	○	○					
		DCGT 070201 LFY	0,1																				○	○	○	○				
		DCGT 070202 LFY	0,2																				○	○	○	○				
		DCGT 070204 LFY	0,4																				○	○	○	○				

● = Euro stock  
○ = Japan stock  
▲ = To be replaced by new item

Pos. Inserts

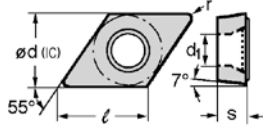
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# DIAMOND TYPE INSERTS FOR TURNING

## 7° Positive Inserts

### 55° Diamond Type

7° Relief  
With Insert Hole



Dimensions (mm)				
DC	l	ød (IC)	s	d <sub>1</sub>
0702..	7,7	6,35	2,38	2,8
0902..	9,7	7,94	2,38	3,4
1103..	11,6	9,525	3,18	4,4
11T3..	11,6	9,525	3,97	4,4



⇨ D32~33

⇨ E16~17

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## DCG\_

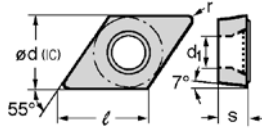
### ● G-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide													
				Coated						ZX-Coated						Uncoated		Uncoated													
				P	M	PM	K	H	KS	MS	PM	MS	PM	P	K	S	N	P	K	S	N										
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Finishing Depth of cut (mm) Feed rate (mm/rev)	RFY	DCGT 0702003 RFY	0,03																												
		DCGT 070201 RFY	0,1																												
		DCGT 070202 RFY	0,2																												
		DCGT 070204 RFY	0,4																												
		DCGT 11T3003 RFY	0,03																												
Finishing ~ Light Cut Depth of cut (mm) Feed rate (mm/rev)	L/RSD	DCGT 070202 LSD	0,2																												
		DCGT 070204 LSD	0,4																												
		DCGT 11T304 LSD	0,4																												
		DCGT 11T308 LSD	0,8																												
		DCGT 070202 RSD	0,2																												
Light Cut Depth of cut (mm) Feed rate (mm/rev)	NAG	DCGT 070202 NAG	0,2																												
		DCGT 070204 NAG	0,4																												
		DCGT 11T302 NAG	0,2																												
		DCGT 11T304 NAG	0,4																												
		DCGT 11T308 NAG	0,8																												
Light Cut Depth of cut (mm) Feed rate (mm/rev)	NSI	DCGT 070201M NSI	<0,1						▲	●							●	●	●	●	○										
		DCGT 070202M NSI	<0,2						▲	●								●	●	●	●	○									
		DCGT 070204M NSI	<0,4							▲	●								●	●	●	●	○								
		DCGT 11T301M NSI	<0,1							▲	●								●	●	●	●	○								
		DCGT 11T308M NSI	<0,8								▲	●								●	●	●	●	○							
Light cut Depth of cut (mm) Feed rate (mm/rev)	NSC	DCGT 0702003 NSC	0,03																												
		DCGT 11T3003 NSC	0,03																												
		DCGT 070201M NSC	<0,1																												
		DCGT 070202M NSC	<0,2																												
		DCGT 070204M NSC	<0,4																												
		DCGT 090201M NSC	<0,1																												
		DCGT 090202M NSC	<0,2																												
		DCGT 110301M NSC	<0,1																												
		DCGT 110302M NSC	<0,2																												
Light Cut	DCGW	DCGW 070202	0,2																												
		DCGW 070204	0,4																												
		DCGW 070208	0,8																												
		DCGW 11T302	0,2																												
		DCGW 11T308	0,8																												

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item



**55° Diamond Type** 7° Relief  
With Insert Hole



Dimensions (mm)				
DC	ℓ	∅d (IC)	s	d <sub>1</sub>
0702..	7,7	6,35	2,38	2,8
11T3..	11,6	9,525	3,97	4,4



⇒ D32-33

⇒ E16-17

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel



● M-Class

Application	Shape	ISO Cat. No.	r	Carbide														Cermets		Carbide												
				Coated							ZX-Coated							Uncoated		Uncoated												
				P	M	PM	K	H	KS	MS	PM	P	K	S	N	P	K	S	N													
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1			
Finishing	Depth of cut (mm) Feed rate (mm/rev)	NFB	0,2																				●	●	●	●						
			0,4																					●	●	●	●					
			0,8																					●	●	●	●					
Finishing	Depth of cut (mm) Feed rate (mm/rev)	NFP	0,2																				●	●	●	●						
			0,4																					●	●	●	●					
			0,8																					●	●	●	●					
Finishing	Depth of cut (mm) Feed rate (mm/rev)	NLU	0,2	●	●	○			●	●	▲	●										●	○	●	○	○						
			0,4	●	●	○			●	●	▲	●											●	○	●	○	○					
			0,8	●	●	○			●	●	▲	●											●	○	●	○	○					
Light Cut	Depth of cut (mm) Feed rate (mm/rev)	NLB	0,2					○	○														●	●	●	●						
			0,4					○	○															●	●	●	●					
			0,8					○	○															●	●	●	●					
Light Cut	Depth of cut (mm) Feed rate (mm/rev)	NSU	0,2	●	●	○			●	●	▲	●	●	●				●	●			●	●	●	●	●						
			0,4	●	●	○			●	●	▲	●	●	●	●				●	●			●	●	●	●	●					
			0,8	●	●	○			●	●	▲	●	●	●	●				●	●			●	●	●	●	●					
Light Cut	Depth of cut (mm) Feed rate (mm/rev)	NSK	0,4		●	●																										
			0,8		●	●																										
			1,2		●	●																										
Roughing	Depth of cut (mm) Feed rate (mm/rev)	NMU	0,4	●	●	●	●		●	●	▲	●	●	●	●																	
			0,8	●	●	●	●		●	●	▲	●	●	●	●																	
Roughing	Depth of cut (mm)	DCMW 11T304 DCMW 11T308	0,4												●	●																
			0,8													●	●															
Finishing		DCMX 11T308 NLUW	0,8	●	●								●		●	●																

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

Pos. Inserts

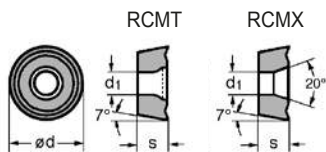


# R ROUND TYPE

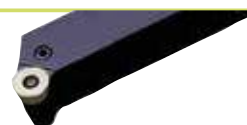
## INSERTS FOR TURNING

### 7° Positive Inserts

#### Round Type Inserts 7° Relief With Insert Hole



RC...	ℓ	∅d (IC)	s	d1
1003	-	10,0	3,18	3,6
10T3	-	10,0	3,97	3,6
12	-	12,0	4,76	4,2
16	-	16,0	6,35	5,2
20	-	20,0	6,35	6,5
25	-	25,0	7,94	7,2
32	-	32,0	9,52	9,5



Lever lock holders for RCMX  
⇒ D34~35

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

(M0: IC is metric)

## RCMT M0

#### ● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide										Cermets		Carbide																
				Coated					ZX-Coated					Uncoated		Uncoated																
				P	M	P/M	K	H	K/S	M/S	P/M	P	K	S	N																	
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1			
Roughing 		RCMT 1003M0 NRX	-	●	●	●	●					●																				
		RCMT 10T3M0 NRX	-	●	●	●	●						●																			
		RCMT 1204M0 NRX	-	●	●	●	●							●																		
		RCMT 1606M0 NRX	-	●	●	●	●							●																		
		RCMT 2006M0 NRX	-	●	●	●	●							●																		
		RCMT 2507M0 NRX	-	●	●	○	●							●																		
Roughing 		RCMT 1204M0 NRH	-				○																									
		RCMT 1606M0 NRH	-				○																									
		RCMT 2006M0 NRH	-				○																									

## RCMX M0

#### ● M-Class Grooved Chipbreaker

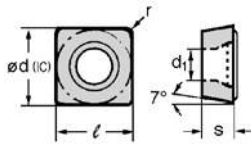
Application	Shape	ISO Cat. No.	r	Carbide										Cermets		Carbide																
				Coated					ZX-Coated					Uncoated		Uncoated																
				P	M	P/M	K	H	K/S	M/S	P/M	P	K	S	N																	
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1			
Roughing 		RCMX 1003M0 NRP	-	○	●	●	●																									
		RCMX 1204M0 NRP	-	○	●	●	●												○													
		RCMX 1606M0 NRP	-	○	●	●	●																									
		RCMX 2006M0 NRP	-	○	●	●	●													○												
		RCMX 2507M0 NRP	-	○	●	○	○																									
		RCMX 3209M0 NRP	-	○	○	○																										

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

# S SQUARE TYPE

INSERTS FOR TURNING

90° Square Type 7° Relief  
With Insert Hole



Dimensions (mm)				
SC	ℓ	∅d <sub>1(C)</sub>	s	d <sub>1</sub>
0702..	7,94	7,94	2,38	3,4
0903..	9,525	9,525	3,18	4,4
09T3..	9,525	9,525	3,97	4,4
1204..	12,7	12,7	4,76	5,5



⇨ D36

"S ... SSKC" - Type  
 (⇨ Stock in Japan)

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## SC\_T ○○○○○○-□

● G/M-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide							
				Coated						ZX-Coated						Uncoated		Uncoated							
				P	M	PM	K	H	KS	MS	PM	P	K	S	N	P	K	S	N						
Finishing Depth of cut (mm) Feed rate (mm/rev)		SCMT 09T304 NFB SCMT 09T308 NFB	0,4 0,8																						
		SCMT 120404 NFP SCMT 120408 NFP	0,4 0,8																						
Finishing Depth of cut (mm) Feed rate (mm/rev)		SCMT 09T304 NLU SCMT 09T308 NLU	0,4 0,8	●	○																				
		SCMT 120412 NLU	1,2		●																				
Light Cut Depth of cut (mm) Feed rate (mm/rev)		SCMT 09T304 NLB SCMT 09T308 NLB	0,4 0,8		○	○	○	○	○																
		SCMT 09T304 NSU SCMT 09T308 NSU	0,4 0,8	●	●	○	●	●	○	▲	●	●	●	●		●	●	●							
Light Cut Depth of cut (mm) Feed rate (mm/rev)		SCMT 120404 NSU SCMT 120408 NSU	0,4 0,8	●	●	○	●	●	○	▲	●	●	●		●	●	●								
		SCMT 09T304 NSK SCMT 09T308 NSK	0,4 0,8		●	●	●	●																	
Light Cut Depth of cut (mm) Feed rate (mm/rev)		SCMT 120404 NSK SCMT 120408 NSK SCMT 120412 NSK	0,4 0,8 1,2	●	●	●	●																		
		SCMT 09T308 NMU SCMT 120408 NMU SCMT 120412 NMU	0,8 0,8 1,2	●	●	○	●																		
		SCGT 09T302 LFX SCGT 09T304 LFX SCGT 120404 LFX	0,2 0,4 0,4																				○	○	○
Finishing Depth of cut (mm) Feed rate (mm/rev)		SCGT 09T302 RFX SCGT 09T304 RFX SCGT 120404 RFX	0,2 0,4 0,4																			○	○	○	
		SCGT 070201M NSC SCGT 070202M NSC	<0,1 <0,2																				○	○	○
		SCGT 090301M NSC SCGT 090302M NSC	<0,1 <0,2																					○	○
Light Cut Depth of cut (mm) Feed rate (mm/rev)		SCGT 09T301M NSC SCGT 09T302M NSC	<0,1 <0,2																				○	○	○

● = Euro stock  
 ○ = Japan stock  
 ▲ = To be replaced by new item

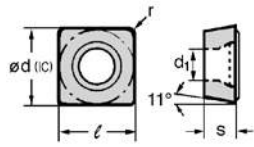


# S SQUARE TYPE

## INSERTS FOR TURNING

### 11° Positive Inserts

90° Square Type 11° Relief  
With Insert Hole



Dimensions (mm)				
SP	l	∅d (IC)	s	d <sub>1</sub>
0903..	9,525	9,525	3,18	3,4



⇒ E18

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## SPGW

● G-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r
Light Cut		<b>SPGW 090304 T</b>	0,4

Carbide										Cermets		Carbide													
Coated					ZX-Coated					Uncoated		Uncoated													
P	M	PM	K	H	KS	MS	PM	P	K	S	N	P	K	S	N										
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1

SPGW / SPMT ..... NFK / NSF



## SP\_T

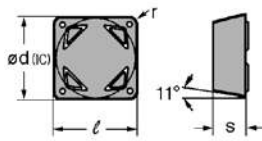
● G/M-Class

Application	Shape	ISO Cat. No.	r
Finishing	 NFB	SPMT 090304 NFB	0,4
		SPMT 090308 NFB	0,8
Finishing	 NLU	SPMT 090304 NLU	0,4
		SPMT 090308 NLU	0,8
Finishing	 NFK	SPMT 090304 NFK	0,4
Light - Medium Cut	 NLB	SPMT 090304 NLB	0,4
		SPMT 090308 NLB	0,8
Light - Medium Cut	 NSF	SPMT 090304 NSF	0,4
		SPMT 090308 NSF	0,8
Finishing - Light Cut	 L/RSD	SPGT 090302 LSD	0,2
		SPGT 090304 LSD	0,4
		SPGT 090308 LSD	0,8
Finishing - Light Cut	 L/RSD	SPGT 090302 RSD	0,2
		SPGT 090304 RSD	0,4
		SPGT 090308 RSD	0,8

Carbide										Cermets		Carbide													
Coated					ZX-Coated					Uncoated		Uncoated													
P	M	PM	K	H	KS	MS	PM	P	K	S	N	P	K	S	N										
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

90° Square Type 11° Relief  
Without Insert Hole



Dimensions (mm)				
SP	ℓ	ød (IC)	s	d <sub>1</sub>
0903..	9,525	9,525	3,18	-
1203..	12,7	12,7	3,18	-



"S... CSKP...09/12" - Type  
 (⇒ Stock in Japan)

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## SPMR

● M-Class

Application	Shape	ISO Cat. No.	r	Carbide													Cermets		Carbide		
				Coated						ZX-Coated							Uncoated		Uncoated		
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N		
Finishing		SPMR 090304 NFK SPMR 090308 NFK	0,4																		
			0,8																		
Medium Cut		SPMR 090304 NSF SPMR 090308 NSF	0,4																		
			0,8	●	●	●															
Light-Medium Cut		SPMR 090304 NUJ SPMR 090308 NUJ	0,4																		
			0,8																		

## SP<sub>N</sub>

● G/M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide													Cermets		Carbide		
				Coated						ZX-Coated							Uncoated		Uncoated		
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N		
Medium Cut		SPGN 090304 SPGN 090308	0,4																		
			0,8																		
Medium Cut		SPMN 090304 SPMN 090308	0,4																		
			0,8																		
Medium Cut		SPMN 120308 SPMN 120312	0,8																		
			1,2																		

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

- Pos. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# T TRIANGLE TYPE

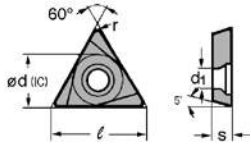
## INSERTS FOR TURNING

### 5° Positive Inserts

60° Triangle Type

5° Relief

With Insert Hole



Dimensions (mm)				
TB	l	ød (IC)	s	d1
0601..	6,9	3,97	1,59	2,2



⇒ E20

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## TBGT

### ● G-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide												
				Coated						ZX-Coated						Uncoated		Uncoated												
				P	M	P/M	K	H	S	M/S	P/M	P	K	S	N	P	K	S	N											
Finishing Depth of cut (mm) Feed rate (mm/rev)		TBGT 060102 LFW TBGT 060104 LFW	0,2	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
			0,4																											
Finishing Depth of cut (mm) Feed rate (mm/rev)		TBGT 060102 LFX TBGT 060104 LFX	0,2																											
			0,4																											
Finishing Depth of cut (mm) Feed rate (mm/rev)		TBGT 060101 LFY TBGT 060102 LFY TBGT 060104 LFY	0,1																											
			0,2																											
Finishing Depth of cut (mm) Feed rate (mm/rev)		TBGT 060102 LW TBGT 060104 LW	0,2																											
			0,4																											
Finishing-Light Cut Depth of cut (mm) Feed rate (mm/rev)		TBGT 060102 RW TBGT 060104 RW	0,2																											
			0,4																											

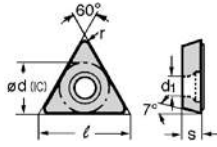
## TBGW

### ● G-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide											
				Coated						ZX-Coated						Uncoated		Uncoated											
				P	M	P/M	K	H	S	M/S	P/M	P	K	S	N	P	K	S	N										
Light Cut		TBGW 060102 TBGW 060104	0,2	AC805P	AC810P	AC820P	AC830P	AC2000	AC3000	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC900G	AC510U	AC520U	AC530U	T1500Z	T2000Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
			0,4																										

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

60° Triangle Type 7° Relief  
With Insert Hole



Dimensions (mm)				
TC	l	ød (IC)	s	d <sub>1</sub>
0802..	8,2	4,76	2,38	2,3
0902..	9,62	5,56	2,38	2,5
1102..	11,0	6,35	2,38	2,8
16T3..	16,5	9,525	3,97	4,3



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## TCGT ○○○○○○-□□

● G-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide											
				Coated						ZX-Coated						Uncoated													
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N														
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFX	TCGT 090201 LFX TCGT 090202 LFX	0,1 0,2																										
		TCGT 110201 LFX TCGT 110202 LFX	0,1 0,2																										
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFX	TCGT 090201 RFX TCGT 090202 RFX	0,1 0,2																										
		TCGT 110201 RFX TCGT 110202 RFX	0,1 0,2																										
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFY	TCGT 090201 LFY TCGT 090202 LFY	0,1 0,2																										
		TCGT 110201 LFY TCGT 110202 LFY	0,1 0,2																										
Finishing Depth of cut (mm) Feed rate (mm/rev)	L/RFY	TCGT 090201 RFY TCGT 090202 RFY	0,1 0,2																										
		TCGT 110201 RFY TCGT 110202 RFY	0,1 0,2																										
Light cut Depth of cut (mm) Feed rate (mm/rev)	NSI	TCGT 110204M NSI	<0,4																										
Light Cut Depth of cut (mm) Feed rate (mm/rev)	NAG	TCGT 110202 NAG TCGT 110204 NAG	0,2 0,4																										
		TCGT 16T304 NAG TCGT 16T308 NAG	0,4 0,8																										
Light Cut Depth of cut (mm) Feed rate (mm/rev)	NSC	TCGT 080201M NSC TCGT 080202M NSC	<0,1 <0,2																										
		TCGT 090201M NSC TCGT 090202M NSC	<0,1 <0,2																										
		TCGT 110201M NSC TCGT 110202M NSC TCGT 110204M NSC	<0,1 <0,2 <0,4																										
		TCGT 110301M NSC TCGT 110302M NSC	<0,1 <0,2																										

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

Pos. Inserts

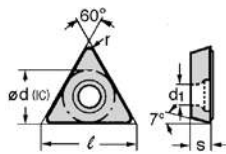


# T TRIANGLE TYPE

## INSERTS FOR TURNING

7° Positive Inserts

60° Triangle Type 7° Relief  
With Insert Hole



Dimensions (mm)				
TC	l	ød (IC)	s	d1
0902..	9,6	5,56	2,38	2,5
1102..	11,0	6,35	2,38	2,8
16T3..	16,5	9,525	3,97	4,3



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

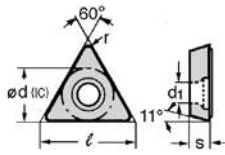
## TCMT/-W

		Carbide												Cermets		Carbide													
		Coated						ZX-Coated						Uncoated		Uncoated													
		P	P	M	M	K	K	H	K	M	P	P	M	P	K	S	S	N											
Application	Shape	ISO Cat. No.	r	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
Finishing	 NFB	TCMT 110204 NFB TCMT 110208 NFB	0,4 0,8																										
Finishing	 NFP	TCMT 090202 NFP TCMT 090204 NFP TCMT 090208 NFP  TCMT 110202 NFP TCMT 110204 NFP TCMT 110208 NFP  TCMT 16T304 NFP TCMT 16T308 NFP	0,2 0,4 0,8  0,2 0,4 0,8  0,4 0,8																										
Finishing	 NLU	TCMT 110204 NLU TCMT 110208 NLU	0,4 0,8	○	●	●			○												●		○	○	○	○			
Light Cut	 NLB	TCMT 110204 NLB TCMT 110208 NLB	0,4 0,8				○		○	○	○											○	○						
Light Cut	 NSU	TCMT 110204 NSU TCMT 110208 NSU  TCMT 16T304 NSU TCMT 16T308 NSU	0,4 0,8  0,4 0,8	●	●	●	○	●	●	●	▲	●	●	●	●						●	●	●	●					
Light Cut	 NSK	TCMT 110204 NSK TCMT 110208 NSK  TCMT 16T304 NSK TCMT 16T308 NSK TCMT 16T312 NSK	0,4 0,8  0,4 0,8 1,2		●	●	●																						
Light Cut	 TCMW	TCMW 110204 TCMW 110208  TCMW 16T304 TCMW 16T308	0,4 0,8  0,4 0,8										●	●															

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item



60° Triangle Type 11° Relief  
With Insert Hole



Dimensions (mm)				
TB	l	ød (IC)	s	d <sub>1</sub>
0802..	8,2	4,76	2,38	2,4
0902..	9,6	5,56	2,38	2,8
1103..	11,0	6,35	3,18	3,4
1603..	16,5	9,525	3,18	4,4



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## TPGT

● G-Class

Application	Shape	ISO Cat. No.	r	Carbide													Cermet			Carbide											
				Coated						ZX-Coated							Uncoated			Uncoated											
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N												
Finishing Depth of cut (mm) Feed rate (mm/rev)		TPGT 110302M NFC TPGT 110304M NFC	<0,2 <0,4	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
				○																		○				○	○	○			
Finishing Depth of cut (mm) Feed rate (mm/rev)		TPGT 080202 LFW TPGT 080204 LFW	0,2 0,4																			○	○	○	○						
		TPGT 110202 LFW TPGT 110204 LFW	0,2 0,4																				○	○	○	○					
		TPGT 080202 RFW TPGT 080204 RFW	0,2 0,4																				○	○	○	○					
		TPGT 110202 RFW TPGT 110204 RFW	0,2 0,4																				○	○	○	○					
Finishing Depth of cut (mm) Feed rate (mm/rev)		TPGT 080202 LFX TPGT 080204 LFX	0,2 0,4																			○	○								
		TPGT 090204 LFX	0,4																					○	○						
		TPGT 110302 LFX TPGT 110304 LFX TPGT 110308 LFX	0,2 0,4 0,8																				○	●	●	●					
		TPGT 160304 LFX TPGT 160308 LFX	0,4 0,8																				○	○							
		TPGT 080202 RFX TPGT 080204 RFX	0,2 0,4																					○	○						
		TPGT 110302 RFX TPGT 110304 RFX TPGT 110308 RFX	0,2 0,4 0,8																					○	●	●	●				
TPGT 160304 RFX TPGT 160308 RFX	0,4 0,8																					○	○								

● = Euro stock  
 ○ = Japan stock  
 ▲ = To be replaced by new item

Pos. Inserts



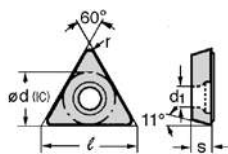
# T TRIANGLE TYPE

## INSERTS FOR TURNING

### 11° Positive Inserts

60° Triangle Type

11° Relief  
With Insert Hole



Dimensions (mm)				
TP	l	∅d (IC)	s	d1
0802..	8,2	4,76	2,38	2,4
0902..	9,6	5,56	2,38	2,8
1102..	11,0	6,35	2,38	2,8
1103..	11,0	6,35	3,18	3,4
1603..	16,5	9,525	3,18	4,4



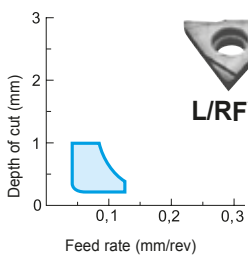
⇒ E20

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## TPGT/W

### ● G-Class

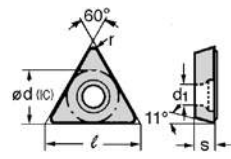
Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide													
				Coated						ZX-Coated						Uncoated		Uncoated													
				P	M	P/M	K	H	K/S	M/S	P/M	P	K	S	N	P	K	S	N												
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Finishing	L/RFY	TPGT 0802003 LFY	0,03																												
		TPGT 080201 LFY	0,1																												
		TPGT 080202 LFY	0,2																												
		TPGT 080204 LFY	0,4																												
		TPGT 090201 LFY	0,1																												
		TPGT 090202 LFY	0,2																												
		TPGT 090204 LFY	0,4																												
		TPGT 110202 LFY	0,2																												
		TPGT 110204 LFY	0,4																												
		TPGT 110208 LFY	0,8																												
		TPGT 1103003 LFY	0,03																												
		TPGT 110301 LFY	0,1																												
	TPGT 110302 LFY	0,2																													
	TPGT 110304 LFY	0,4																													
	TGPT 110308 LFY	0,8																													
	TPGT 160302 LFY	0,2																													
	TPGT 160304 LFY	0,4																													
	TPGT 160308 LFY	0,8																													
	Light Cut	V	TPGT 0802003 RFY	0,03																											
			TPGT 080201 RFY	0,1																											
			TPGT 080202 RFY	0,2																											
			TPGT 080204 RFY	0,4																											
			TPGT 090201 RFY	0,1																											
			TPGT 090202 RFY	0,2																											
TPGT 090204 RFY			0,4																												
TPGT 110202 RFY			0,2																												
TPGT 110204 RFY			0,4																												
TPGT 110208 RFY			0,8																												
TPGT 1103003 RFY			0,03																												
TPGT 110301 RFY			0,1																												
TPGT 110302 RFY	0,2																														
TPGT 110304 RFY	0,4																														
TPGT 110308 RFY	0,8																														
TPGT 160302 RFY	0,2																														
TPGT 160304 RFY	0,4																														
TPGT 160308 RFY	0,8																														



- Pos. Inserts
- C
- D
- K
- R
- S
- T
- V
- W

● = Euro stock  
○ = Japan stock  
▲ = To be replaced by new item

60° Triangle Type 11° Relief  
With Insert Hole



Dimensions (mm)				
TP	l	ød (IC)	s	d1
0802..	8,2	4,76	2,38	2,4
1103..	11,0	6,35	3,18	3,4
1604..	16,5	9,525	4,76	4,4



⇒ E20

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

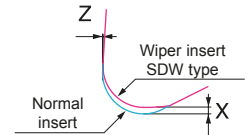
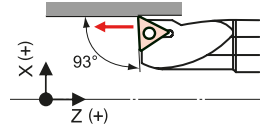
### TPG

● G-Class Handed Chipbreaker

Application	Shape	ISO Cat. No.	r	
Finishing-Light Cutting	 L/RW	TPGT 080202 LW TPGT 080204 LW	0,2 0,4	
		TPGT 110302 LW TPGT 110304 LW	0,2 0,4	
		TPGT 160402 LW TPGT 160404 LW	0,2 0,4	
		TPGT 080202 RW TPGT 080204 RW	0,2 0,4	
		TPGT 110302 RW TPGT 110304 RW	0,2 0,4	
		TPGT 160404 RW	0,4	
	 L/RSD	TPGT 110302 LSD TPGT 110304 LSD TPGT 110308 LSD	0,2 0,4 0,8	
		TPGT 160402 LSD TPGT 160404 LSD TPGT 160408 LSD	0,2 0,4 0,8	
		TPGT 110302 RSD TPGT 110304 RSD TPGT 110308 RSD	0,2 0,4 0,8	
		TPGT 160402 RSD TPGT 160404 RSD TPGT 160408 RSD	0,2 0,4 0,8	
		 L/RSDW	TPGX 110304 L-SDW TPGX 110308 L-SDW	0,4 0,8
			TPGX 160404 L-SDW TPGX 160408 L-SDW	0,4 0,8
TPGX 110304 R-SDW TPGX 110308 R-SDW	0,4 0,8			
 TPGX 160404 R-SDW TPGX 160408 R-SDW	TPGX 160404 R-SDW TPGX 160408 R-SDW	0,4 0,8		

	Carbide										Cermets		Carbide													
	Coated					ZX-Coated					P	K	S	N												
	P	M	PM	K	H	KS	MS	PM																		
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○

- Pos. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W



(Note) The cutting point position of the SDW type does not follow the ISO standard.  
 Wenn using on a boring holder with a 93° approach angle, there is a need to revise the cutting point position (refer to right table) relative to using standard inserts.

r	Compensation (mm)	
	X (Diam. change)	Z
0,4	+0,12 (Ø: +0,24)	-0,02
0,8	+0,12 (Ø: +0,24)	-0,02

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

# T TRIANGLE TYPE

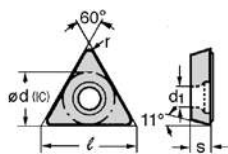
## INSERTS FOR TURNING

### 11° Positive Inserts

60° Triangle Type

11° Relief

With Insert Hole



Dimensions (mm)				
TP	l	ød (IC)	s	d1
0802..	8,2	4,76	2,38	2,4
0902..	9,6	5,56	2,38	2,8
1103..	11,0	6,35	3,18	3,4
1603..	16,5	9,525	3,18	4,4
1604..	16,5	9,525	4,76	4,4



⇒ E20

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

# TPMT

### ● M-Class

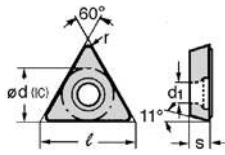
Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide												
				Coated						ZX-Coated						Uncoated														
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N															
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Finishing Depth of cut (mm) Feed rate (mm/rev)	NFB	TPMT 080202 NFB	0,2																											
		TPMT 080204 NFB	0,4																											
		TPMT 090202 NFB	0,2																											
		TPMT 090204 NFB	0,4																											
		TPMT 110302 NFB	0,2																											
		TPMT 110304 NFB	0,4																											
Light Cut Depth of cut (mm) Feed rate (mm/rev)	NLB	TPMT 110308 NFB	0,8																											
		TPMT 160304 NFB	0,4																											
		TPMT 160404 NFB	0,4																											
		TPMT 160408 NFB	0,8																											
		TPMT 080202 NLB	0,2			○		○	○	○	○	○												○	○	○	○			
		TPMT 080204 NLB	0,4			○		○	○	○	○	○												○	○	○	○			
Finishing Depth of cut (mm) Feed rate (mm/rev)	NFK	TPMT 090202 NLB	0,2			○		○	○	○	○												○	○	○	○				
		TPMT 090204 NLB	0,4			○		○	○	○	○													○	○	○	○			
		TPMT 110302 NLB	0,2			○		○	○	○	○	○												○	○	○	○			
		TPMT 110304 NLB	0,4			○		○	○	○	○	○												○	○	○	○			
		TPMT 110308 NLB	0,8			○		○	○	○	○	○												○	○	○	○			
		TPMT 160304 NLB	0,4			○		○	○	○	○	○												○	○	○	○			
Finishing Depth of cut (mm) Feed rate (mm/rev)	NLU	TPMT 160308 NLB	0,8			○		○	○	○	○												○	○	○	○				
		TPMT 160404 NFK	0,4																					●	●					
		TPMT 160408 NFK	0,8																					●	●					
		TPMT 080202 NLU	0,2							●	●													○	○					
		TPMT 080204 NLU	0,4			●				●	●	▲												○	○					
		TPMT 090202 NLU	0,2							○														○	○	○	○			
Finishing Depth of cut (mm) Feed rate (mm/rev)	NLU	TPMT 090204 NLU	0,4						○														○	○	○	○				
		TPMT 110302 NLU	0,2																				○	○	○	○				
		TPMT 110304 NLU	0,4																				○	○	○	○				
		TPMT 110308 NLU	0,8																				○	○	○	○				

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

# T TRIANGLE TYPE

## INSERTS FOR TURNING

**60° Triangle Type** 11° Relief  
With Insert Hole



Dimensions (mm)				
TP	l	∅d (IC)	s	d <sub>1</sub>
0802..	8,2	4,76	2,38	2,4
1103..	11,0	6,35	3,18	3,4
1604..	16,5	9,525	4,76	4,4



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## TPMT

● M-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide															
				Coated						ZX-Coated						Uncoated		Uncoated															
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N																		
<b>Light Cut</b>  TPMT 080202 NSU TPMT 080204 NSU  TPMT 110302 NSU TPMT 110304 NSU TPMT 110308 NSU  TPMT 160404 NSU TPMT 160408 NSU	 <b>NSU</b>		0,2 0,4	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1				
				●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
<b>Light -Medium Cut</b>  TPMT 110304 NMU TPMT 110308 NMU  TPMT 160404 NMU TPMT 160408 NMU	 <b>NMU</b>		0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1				
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

## TPMT/-H NSF

● M-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide															
				Coated						ZX-Coated						Uncoated		Uncoated															
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N																		
<b>Light -Medium Cut</b>  TPMH 110304 NSF TPMH 110308 NSF  TPMT 160404 NSF TPMT 160408 NSF	 <b>NSF</b>		0,4 0,8	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1				
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

Pos.  
Inserts



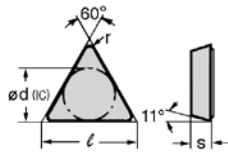
# T TRIANGLE TYPE

## INSERTS FOR TURNING

11° Positive Inserts

60° Triangle Type

5°/11° Relief  
Without Insert Hole



TP/TB	l	ød (ic)	s	d <sub>1</sub>
0601..	6,9	3,97	1,59	-
0902..	9,6	5,56	2,38	-
1103..	11,0	6,35	3,18	-
1603..	16,5	9,525	3,18	-



- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## TPGR

### ● G-Class Handed Chipbreaker

Application	Shape	ISO Cat. No.	r
Finishing-Light Cut 		TPGR 090202 LW	0,2
		TPGR 090204 LW	0,4
		TPGR 090208 LW	0,8
		TPGR 110302 LW	0,2
		TPGR 110304 LW	0,4
		TPGR 110308 LW	0,8
		TPGR 160302 LW	0,2
		TPGR 160304 LW	0,4
Finishing-Light Cut 		TPGR 090202 RW	0,2
		TPGR 090204 RW	0,4
		TPGR 090208 RW	0,8
		TPGR 110302 RW	0,2
		TPGR 110304 RW	0,4
		TPGR 160302 RW	0,2
		TPGR 160304 RW	0,4
		TPGR 160308 RW	0,8

Carbide												Cermets		Carbide											
Coated						ZX-Coated						Uncoated		Uncoated											
P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N										
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1

## TBG

### ● G-Class No Chipbreaker/ Handed Chipbreaker

Application	Shape	ISO Cat. No.	r
Fin.-L-Light-C.		TBGN 060104	0,4
		TBGR 060104 LW	0,4

Carbide												Cermets		Carbide											
Coated						ZX-Coated						Uncoated		Uncoated											
P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N										
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1

## TPGN

### ● G-Class No Chipbreaker

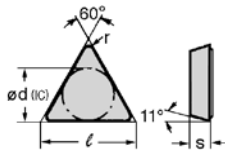
Application	Shape	ISO Cat. No.	r
Light Cut		TPGN 090202	0,2
		TPGN 090204	0,4
		TPGN 090208	0,8
		TPGN 110302	0,2
		TPGN 110304	0,4
		TPGN 110308	0,8
		TPGN 160302	0,2
		TPGN 160304	0,4
		TPGN 160308	0,8

Carbide												Cermets		Carbide											
Coated						ZX-Coated						Uncoated		Uncoated											
P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N										
AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

### 60° Triangle Type

11°/20° Relief  
Without Insert Hole



Dimensions (mm)				
TP	ℓ	ød (IC)	s	d <sub>1</sub>
0902..	9,6	5,56	2,38	-
1103..	11,0	6,35	3,18	-
1603..	16,5	9,525	3,18	-
2204..	22,0	12,7	4,76	-



- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

## TPMR

### ● M-Class

Application	Shape	ISO Cat. No.	r	Carbide													Cermets		Carbide			
				Coated						ZX-Coated							Uncoated		Uncoated			
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N			
Finishing Depth of cut (mm) Feed rate (mm/rev)		<b>TPMR 090204 NFK</b> <b>TPMR 110302 NFK</b> <b>TPMR 110304 NFK</b> <b>TPMR 110308 NFK</b>  <b>TPMR 160304 NFK</b> <b>TPMR 160308 NFK</b> <b>TPMR 160312 NFK</b>	0,4																			
			0,2																			
			0,4																			
Light-Medium Cut Depth of cut (mm) Feed rate (mm/rev)		<b>TPMR 110304 NSF</b> <b>TPMR 110308 NSF</b>  <b>TPMR 160304 NSF</b> <b>TPMR 160308 NSF</b> <b>TPMR 160312 NSF</b>	0,4																			
			0,8																			
			0,4																			
Light-Medium Cut Depth of cut (mm) Feed rate (mm/rev)		<b>TPMR 110304 NUJ</b> <b>TPMR 110308 NUJ</b>  <b>TPMR 160304 NUJ</b> <b>TPMR 160308 NUJ</b>	0,4																			
			0,8																			
			0,4																			

## TPMN

### ● M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide													Cermets		Carbide		
				Coated						ZX-Coated							Uncoated		Uncoated		
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N		
Medium Cut		<b>TPMN 160308</b> <b>TPMN 220408</b>	0,8																		
			0,8																		

## TEGN

### ● E-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide													Cermets		Carbide		
				Coated						ZX-Coated							Uncoated		Uncoated		
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N		
Light-Medium Cut		<b>TEGN 160308</b>	0,8																		
			0,8																		

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

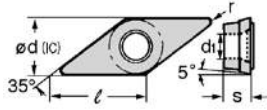
- Pos. Inserts
- C
  - D
  - K
  - R
  - S
  - T
  - V
  - W

# DIAMOND TYPE

## INSERTS FOR TURNING

### 5° Positive Inserts

35° Diamond Type 5° Relief  
With Insert Hole



Dimensions (mm)				
VB	l	ød (IC)	s	d <sub>1</sub>
1102..	11,0	6,35	2,38	2,38
1103..	11,1	6,35	3,18	2,8
1604..	16,6	9,525	4,76	4,4



⇒ D38

⇒ E21~22

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## VBMT/-W

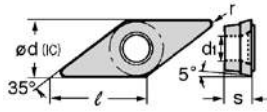
### ● M-Class

Application	Shape	ISO Cat. No.	r	Carbide														Cermets				Carbide									
				Coated							ZX-Coated							Uncoated				Uncoated									
				P	M	P	M	K	H	K	S	M	P	M	P	M	P	M	P	K	S	N	P	K	S	N					
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1		
Finishing	 <b>NFB</b>	VBMT 110302 NFB VBMT 110304 NFB VBMT 110308 NFB  VBMT 160404 NFB VBMT 160408 NFB	0,2 0,4 0,8  0,4 0,8																												
Finishing	 <b>NFP</b>	VBMT 110202 NFP VBMT 110204 NFP  VBMT 160404 NFP VBMT 160408 NFP	0,2 0,4  0,4 0,8																												
Finishing	 <b>NLU</b>	VBMT 110302 NLU VBMT 110304 NLU VBMT 110308 NLU  VBMT 160404 NLU VBMT 160408 NLU	0,2 0,4 0,8  0,4 0,8																												
Light Cut	 <b>NLB</b>	VBMT 110302 NLB VBMT 110304 NLB VBMT 110308 NLB  VBMT 160404 NLB VBMT 160408 NLB VBMT 160412 NLB	0,2 0,4 0,8  0,4 0,8 1,2																												
Light Cut	 <b>NSU</b>	VBMT 110204 NSU VBMT 110208 NSU VBMT 110304 NSU  VBMT 110308 NSU VBMT 160404 NSU  VBMT 160408 NSU VBMT 160412 NSU	0,4 0,8 0,4  0,8 0,4  0,8 1,2																												
Light Cut	 <b>NSK</b>	VBMT 110204 NSK VBMT 110208 NSK  VBMT 160404 NSK VBMT 160406 NSK VBMT 160408 NSK VBMT 160412 NSK	0,4 0,8  0,4 0,6 0,8 1,2																												
Light - Medium Cut	 <b>NMU</b>	VBMT 160408 NMU	0,8																												
Light Cut	 <b>VBMW</b>	VBMT 160404 VBMT 160408	0,4 0,8																												

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item



35° Diamond Type 5° Relief  
With Insert Hole



Dimensions (mm)				
VB	ℓ	∅d (IC)	s	d <sub>1</sub>
1103..	11,1	6,35	3,18	2,8
1604..	16,6	9,525	4,76	4,4



⇨ D38

⇨ E21-22

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## VBGT

● G-Class

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide														
				Coated						ZX-Coated						Uncoated		Uncoated														
				P	M	PM	K	H	KS	MS	PM	P	K	S	N	P	K	S	N													
				AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1			
Finishing Depth of cut (mm) Feed rate (mm/rev)	 L/RFX	VBGT 110301 LFX VBGT 110302 LFX VBGT 110304 LFX	0,1 0,2 0,4																													
		VBGT 160402 LFX VBGT 160404 LFX	0,2 0,4																													
		VBGT 110301 RFX VBGT 110302 RFX VBGT 110304 RFX	0,1 0,2 0,4																													
		VBGT 160402 RFX VBGT 160404 RFX	0,2 0,4																													
Finishing Depth of cut (mm) Feed rate (mm/rev)	 L/RFYS	VBGT 1103003 LFYS VBGT 110301 LFYS VBGT 110302 LFYS VBGT 110304 LFYS VBGT 110308 LFYS	0,03 0,1 0,2 0,4 0,8																													
		VBGT 1103003 RFYS VBGT 110301 RFYS VBGT 110302 RFYS VBGT 110304 RFYS VBGT 110308 RFYS	0,03 0,1 0,2 0,4 0,8																													
		VBGT 110301 LFY VBGT 110302 LFY VBGT 110304 LFY	0,1 0,2 0,4																													
		VBGT 110301 RFY VBGT 110302 RFY VBGT 110304 RFY	0,1 0,2 0,4																													
Light Cut Depth of cut (mm) Feed rate (mm/rev)	 NSI	VBGT 110301M NSI VBGT 110302M NSI VBGT 110304M NSI VBGT 110308M NSI	<0,1 <0,2 <0,4 <0,8																													
		VBGT 160401M NSI VBGT 160402M NSI VBGT 160404M NSI VBGT 160408M NSI	<0,1 <0,2 <0,4 <0,8																													

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

Pos. Inserts



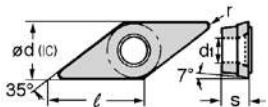
# DIAMOND TYPE

## INSERTS FOR TURNING

### 7° Positive Inserts

35° Diamond Type

7° Relief  
With Insert Hole



Dimensions (mm)				
VC	l	∅d (IC)	s	d1
0802..	8,3	4,76	2,38	2,3
1103..	11,1	6,35	3,18	2,8
1604..	16,6	9,525	4,76	4,4



⇒ D39

"S...- SV...C" - Type  
(⇒ Stock in Japan)

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

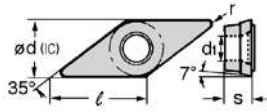
## VCGT

### ● G-Class

Application	Shape	ISO Cat. No.	r	Carbide													Cermets		Carbide											
				Coated						ZX-Coated							Uncoated		Uncoated											
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N											
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Finishing	NFC	VCVT 080204M NFC	<0,4																											
		VCVT 110301M NFC VCVT 110302M NFC VCVT 110304M NFC	<0,1 <0,2 <0,4																											
Finishing	L/RFX	VCVT 110301 LFX VCVT 110302 LFX VCVT 110304 LFX	0,1 0,2 0,4																											
		VCVT 110301 RFX VCVT 110302 RFX VCVT 110304 RFX	0,1 0,2 0,4																											
Finishing	L/RFY	VCVT 110301 LFY VCVT 110302 LFY VCVT 110304 LFY	0,1 0,2 0,4																											
		VCVT 110301 RFY VCVT 110302 RFY VCVT 110304 RFY	0,1 0,2 0,4																											
Light Cut	NAG	VCVT 110302 NAG VCVT 110304 NAG	0,2 0,4																											
		VCVT 160408 NAG VCVT 160412 NAG	0,8 1,2																											
Light Cut	NSI	VCVT 110301M NSI VCVT 110302M NSI VCVT 110304M NSI VCVT 110308M NSI	<0,1 <0,2 <0,4 <0,8																											
		VCVT 160401M NSI VCVT 160402M NSI VCVT 160404M NSI VCVT 160408M NSI	<0,1 <0,2 <0,4 <0,8																											

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

35° Diamond Type 7° Relief  
With Insert Hole



Dimensions (mm)				
VC	ℓ	ød (IC)	s	d <sub>1</sub>
0802..	8,3	4,76	2,38	2,3
1103..	11,1	6,35	3,18	2,8
1604..	16,6	9,525	4,76	4,4



⇒ D39

"S...- SV...C" - Type  
 (⇒ Stock in Japan)

- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## VCMT

● M-Class

Application	Shape	ISO Cat. No.	r	Carbide										Cermets		Carbide						
				Coated					ZX-Coated					Uncoated		Uncoated						
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N							
Finishing Depth of cut (mm) Feed rate (mm/rev)	 <b>NFB</b>	VCMT 080202 NFB VCMT 080204 NFB	0,2 0,4																			
		VCMT 160404 NFB VCMT 160408 NFB	0,4 0,8																			
		Finishing Depth of cut (mm) Feed rate (mm/rev)	 <b>NLU</b>	VCMT 160404 NLU VCMT 160408 NLU	0,4 0,8																	
				Light Cut Depth of cut (mm) Feed rate (mm/rev)	 <b>NLB</b>	VCMT 080202 NLB VCMT 080204 NLB	0,2 0,4															
						VCMT 160404 NLB VCMT 160408 NLB	0,4 0,8															
Light Cut Depth of cut (mm) Feed rate (mm/rev)	 <b>NSU</b>	VCMT 080204 NSU	0,4																			
		VCMT 110302 NSU VCMT 110304 NSU VCMT 110308 NSU	0,2 0,4 0,8																			
Light Cut Depth of cut (mm) Feed rate (mm/rev)	 <b>NSK</b>	VCMT 160404 NSU VCMT 160408 NSU	0,4 0,8																			
		VCMT 160404 NSK VCMT 160408 NSK	0,4 0,8																			

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

Pos. Inserts



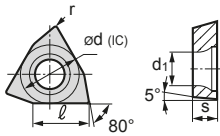
# W TRIGON TYPE

## INSERTS FOR TURNING

### 5° Positive Inserts

80° Trigon Type

5° Relief  
With Insert Hole



Dimensions (mm)				
WB	ℓ	ød (IC)	s	d1
0601..	3,2	3,97	1,59	2,2
0802..	4,6	4,76	2,38	2,4



⇒ E23

- P** Steel
- M** Stainless Steel
- K** Cast Iron
- N** Non-Ferrous Metals
- S** Super Alloy
- H** Hardened Steel

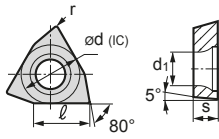
# WBGT

## ● G-Class Handed Chipbreaker

Application	Shape	ISO Cat. No.	r	Carbide												Cermets		Carbide												
				Coated						ZX-Coated						Uncoated		Uncoated												
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	P	K	S	N											
				AC805P	AC810P	AC820P	AC825P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1	
Finishing Depth of cut (mm) Feed rate (mm/rev)	 L/RFW	WBGT 060102 LFW WBGT 060104 LFW	0,2 0,4																											
		WBGT 080202 LFW WBGT 080204 LFW	0,2 0,4																											
		WBGT 060102 RFW WBGT 060104 RFW	0,2 0,4																											
		WBGT 080202 RFW WBGT 080204 RFW	0,2 0,4																											
Finishing Depth of cut (mm) Feed rate (mm/rev)	 L/RFX	WBGT 060102 LFX WBGT 060104 LFX	0,2 0,4																	●	●									
		WBGT 080202 LFX WBGT 080204 LFX	0,2 0,4																		○	○								
		WBGT 060102 RFX WBGT 060104 RFX	0,2 0,4																		●	●								
		WBGT 080202 RFX WBGT 080204 RFX	0,2 0,4																			○	○							
Finishing Depth of cut (mm) Feed rate (mm/rev)	 L/RFY	WBGT 0601003 LFY WBGT 060101 LFY WBGT 060102 LFY WBGT 060104 LFY	0,03 0,1 0,2 0,4																											
		WBGT 080201 LFY WBGT 080202 LFY WBGT 080204 LFY	0,1 0,2 0,4																											
		WBGT 060101 RFY WBGT 060102 RFY WBGT 060104 RFY	0,1 0,2 0,4																											
		WBGT 080201 RFY WBGT 080202 RFY WBGT 080204 RFY	0,1 0,2 0,4																											
		Finishing ~ Light Cut Depth of cut (mm) Feed rate (mm/rev)	 L/RW	WBGT 060102 LW WBGT 060104 LW	0,2 0,4																	●	●							
				WBGT 060102 RW WBGT 060104 RW	0,2 0,4																		●	●						

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

80° Trigon Type 11° Relief  
With Insert Hole



Dimensions (mm)				
WP	ℓ	ød (IC)	s	d <sub>1</sub>
1102..	4,3	6,35	2,38	2,8
1603..	6,5	9,525	3,18	4,4



- P Steel
- M Stainless Steel
- K Cast Iron
- N Non-Ferrous Metals
- S Super Alloy
- H Hardened Steel

## WPMT ○○○○ NLB

● M-Class

Application	Shape	ISO Cat. No.	r	Carbide														Cermets		Carbide									
				Coated							ZX-Coated							Uncoated		Uncoated									
				P	M	P <sub>M</sub>	K	H	K <sub>S</sub>	M <sub>S</sub>	P <sub>M</sub>	P	K	S	N	K	S	N											
Light Cut Depth of cut (mm)  Feed rate (mm/rev)	 <b>NLB</b>	<b>WPMT 110204 NLB</b>	0,4	AC805P	AC810P	AC820P	AC8025P	AC830P	AC6020M	AC6030M	AC6040M	AC610M	AC630M	AC405K	AC415K	AC420K	AC503U	AC510U	AC520U	AC1030U	AC530U	T1500Z	T3000Z	T1000A	T1500A	G10E	EH510	EH520	H1
		<b>WPMT 160308 NLB</b>	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item

Pos. Inserts





# External Holders

# D



D1 ~ D46



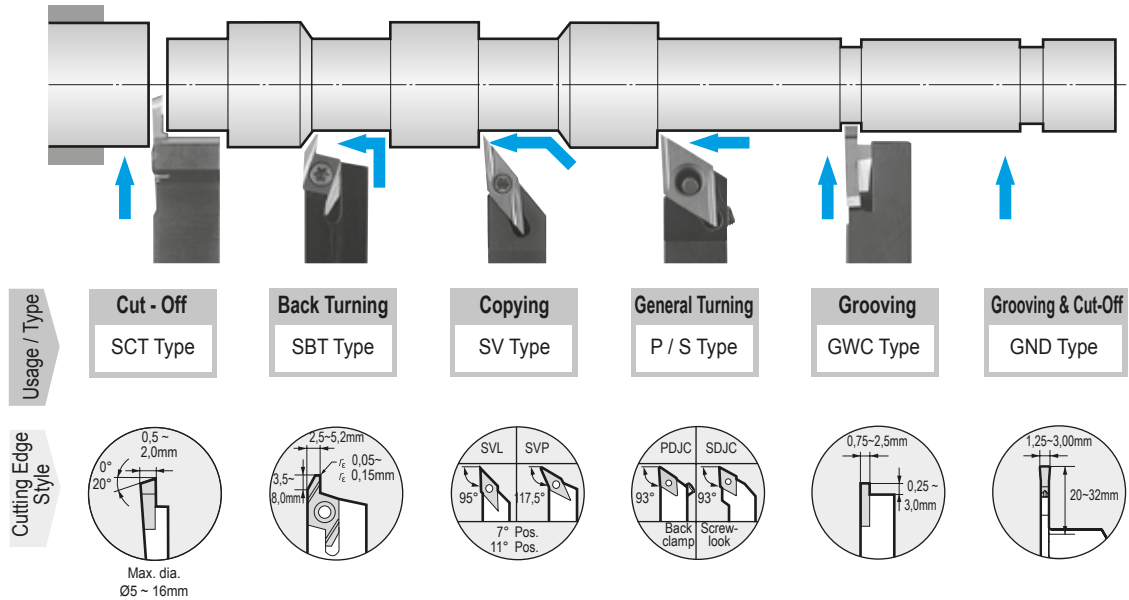
External Holders

Selection	<b>Turning Holder Series</b> .....	D2 - 7
ISO	Turning Holder Identification Table .....	D8
	Calculation of The Cutting Edge Position .....	D9
T-REX Tool Holders	<b>SumiTurn T-REX Tool Holders</b> .....	D10 - 11
For High Performance Turning	<b>D Type Double Clamp Holders</b>	
	DC Type Holders .....	D12
	DD Type Holders .....	D13
	DS Type Holders .....	D14
	DT Type Holders .....	D15
	DV Type Holders .....	D16
	DW Type Holders .....	D17
For General Turning	<b>P Type Lever Lock and M Type Top &amp; Hole Clamp Holders</b>	
	PC Type Holders .....	D18
	PD Type Holders .....	D19
	PS Type Holders .....	D20-21
	PT / MT Type Holders .....	D22-23
	PW / MW Type Holders .....	D24
For Solid CBN Inserts	<b>C Type Clamp On Holders</b> .....	D25-26
	<b>X Type Dimple Lock Holders</b> .....	D27
Selection	<b>Mini Holders Series</b> .....	D28-29
Special for Back Facing	SBT Type Mini Holders .....	D30
Small Product Turning	PC / SC Type Mini Holders .....	D31
	PD / SD Type Mini Holders .....	D32-33
	PR Type Holders .....	D34
	SR Type Holders .....	D35
	SS Type Mini Holders .....	D36
	ST Type Mini Holders .....	D37
	SV Type Copying Holders .....	D38-39
For High Performance Turning	<b>Polygon-Shank Holders</b> .....	D40
	<b>D Type Double Clamp Holders</b>	
	PSC**DC Type Holders .....	D41
	PSC**DD Type Holders .....	D41
	PSC**DS Type Holders .....	D41
	PSC**DT Type Holders .....	D42
	PSC**DW Type Holders .....	D42
For General Turning	<b>S Type Srew Clamp</b>	
	PSC**SC Type Holders .....	D43
	PSC**SD Type Holders .....	D43
	PSC**SS Type Holders .....	D43
	PSC**ST Type Holders .....	D44
	PSC**SV Type Holders .....	D44-45

Application	For Neg. Inserts	For Pos. Inserts	Special Type for Hardened Steel
General Turning	<b>P Type Lever Lock Type</b>  ⇨ D18~D22	<b>P Type Lever Lock Type</b>  ⇨ D31, D32	<b>D Type Double Lock Type</b>  ⇨ D12~D17 ⇨ D41~D42
	<b>M Type Double Lock Type</b>  ⇨ D23~D24	<b>S Type Screw On Type</b>  D31~D33 ⇨ D35~D37 ⇨ D43~D45	<b>C Type Top Clamp Type</b>  ⇨ D25~D26
Copying	<b>T-REX</b>  ⇨ D10~D11	<b>S Type Screw On Type</b>  ⇨ D38~D39 ⇨ D43~D45	<b>D Type Double Lock Type</b>  ⇨ D13, D16 ⇨ D41
	<b>GNDS, GNDM, GNDMS Type General Grooving</b>  ⇨ F16, F18, F20 ⇨ F32, F33	<b>GNDL, GNDLS Type Deep Grooving</b>  ⇨ F16, F22 ⇨ F32, F33	<b>GNDF, GNDFS Type Axial Grooving</b>  ⇨ F28, F30 ⇨ F32, F33
Parting-Off Grooving	<b>SCT and GWC Type</b>  ⇨ F34~F36 ⇨ F34	<b>Sumi Grip and Sumi Grip Jr.</b>  ⇨ F37~F42	<b>GWB Type Hard Grooving</b>  ⇨ M42 ⇨ M43
	<b>LTE and STE Type</b> Pitch { 1~4 mm } 24~8 Threads/inch  ⇨ F46	<b>THE Type</b> Pitch { 0,8~3 mm } 24~10 Threads/inch  ⇨ Stock in Jp.	<b>BNGG-TT Type Hard Threading</b> Pitch 1~3 mm  ⇨ M44



## External Turning



## Holder Selection for Autolathe

	Offset - 0 mm Type Holders	Offset - 0,5 mm Type Holders
Tooling		
Features	Program correction is not necessary.	The position of cutting edge can be put in near guide bush through a program correction.
Holder Types	SDJC-X, SDAC-X, SDLC-X, SCAC-X, SVJC-X (⇒ Stock in Japan)	PDJC, SDJC, SDAC, PCLC, SCAC, STAC, SVLC

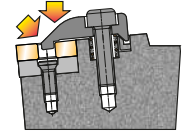


# External Tool Holder Series

Lever Lock System

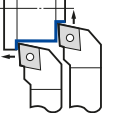
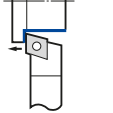
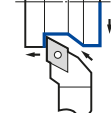
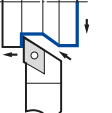
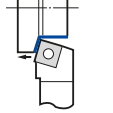
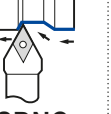
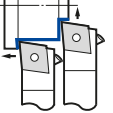
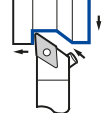
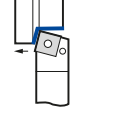
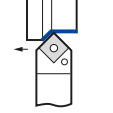
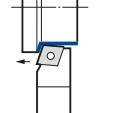
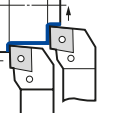
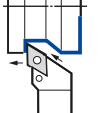
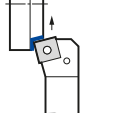
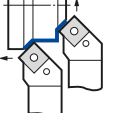
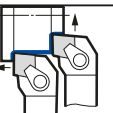
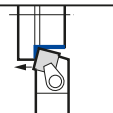
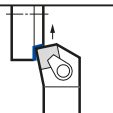
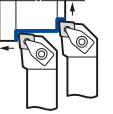
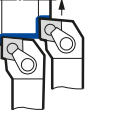
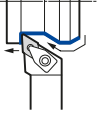
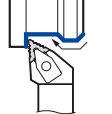
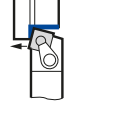
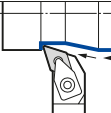
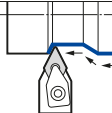
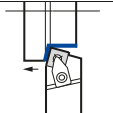
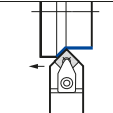


Double Lock (D)

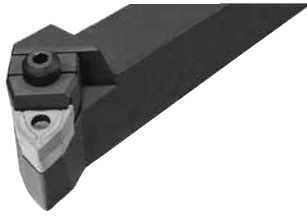


D Type "Double Clamp" Holders for high performance machining

## TOOLING SELECTION

Application		General Turning & Facing	General Turning & Copying		General Turning			
			80° Diamond Type	55° Diamond Type	T-REX 55°	90° Square Type		
System		Insert Type		System		System		
Screw Lock System	S Type Mini Holder	 <b>SCLC</b> ⇨ D31	 <b>SCAC</b> ⇨ D31	 <b>SDJC</b> ⇨ D32	 <b>SDAC</b> ⇨ D33	—	 <b>SSBC</b> ⇨ D36	
		—	—	 <b>SDNC</b> ⇨ D33	—	—	—	
Lever Lock System	P Type (* Side Lever Lock Type)	 <b>PCLC</b> (*) ⇨ D31	—	 <b>PDJC</b> (*) ⇨ D32	—	—	 <b>PSBN</b> ⇨ D20	 <b>PSDN</b> ⇨ D20
		 <b>PCBN</b> ⇨ D18	 <b>PCLN</b> ⇨ D18	 <b>PDJN</b> ⇨ D19	—	—	 <b>PSKN</b> ⇨ D21	 <b>PSSN</b> ⇨ D21
Top-On Clamp System	C & M Type	 <b>CCLN</b> ⇨ D25	—	—	—	—	 <b>CSBN</b> ⇨ D25	 <b>CSKN</b> ⇨ D25
Double Lock (D) Dimple Lock (X)	D & X Type	 <b>DCLN</b> ⇨ D12	 <b>XCLN</b> ⇨ D27	 <b>DDJN</b> ⇨ D13	—	 <b>DTR</b> ⇨ D11	 <b>XSBN</b> ⇨ D27	—
		—	—	 <b>DDHN</b> ⇨ D13	 <b>DDNN</b> ⇨ D13	—	 <b>DSBN</b> ⇨ D14	 <b>DSDN</b> ⇨ D14

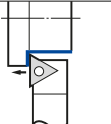
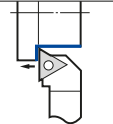
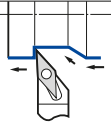
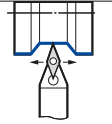
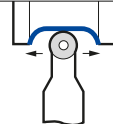
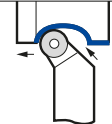

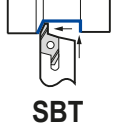
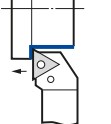
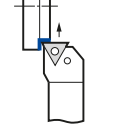
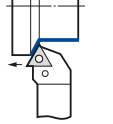
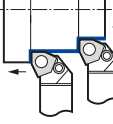
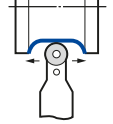
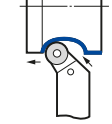
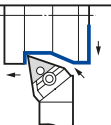
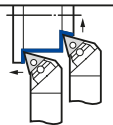
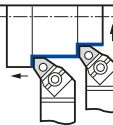
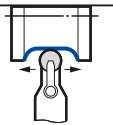
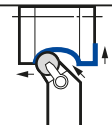
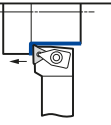
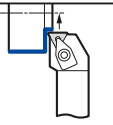
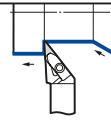
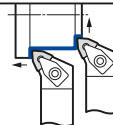
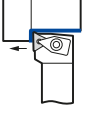
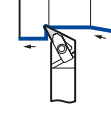
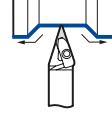
Top-On Clamp System



Screw Lock System



## TOOLING SELECTION

Application		General Turning			Copying		General Turning	Special Turning	
Insert Type		60° Triangle Type			35° Diamond Type		80° Trigon Type	Round and Special Purpose Inserts	
System									
Screw Lock System	S Type Mini Holder	 <b>STAC</b> ⇨ D37	 <b>STGC</b> ⇨ D37	-	 <b>SVJB</b> ⇨ D38 <b>SVLC</b> ⇨ D39	 <b>SVVB</b> ⇨ D38	-	 <b>SRDC</b> ⇨ D35	 <b>SRSC</b> ⇨ D35
		-	-	-	 <b>SVPB</b> ⇨ D38 <b>SVPC</b> ⇨ D39	-	-	 <b>SBT</b> ⇨ D30	-
Lever Lock System	P Type	 <b>PTGN</b> ⇨ D22	 <b>PTFN</b> ⇨ D22	 <b>PTTN</b> ⇨ D22	-	-	 <b>PWLN</b> ⇨ D24	 <b>PRDC</b> ⇨ D34	 <b>PRGC</b> ⇨ D34
		-	-	-	-	-	-	-	-
Top-On Clamp System	C & M Type	 <b>MTJN</b> ⇨ D23	 <b>MTXN</b> ⇨ D23	-	-	-	 <b>MWLN</b> ⇨ D24	 <b>CRDN</b> ⇨ D26	 <b>CRSN</b> ⇨ D26
Double Lock (D) Dimple Lock (X)	D & X Type	 <b>DTJN</b> ⇨ D15	 <b>DTFN</b> ⇨ D15	-	 <b>DVJN</b> ⇨ D16	-	 <b>DWLN</b> ⇨ D17	-	-
		 <b>DTGN</b> ⇨ D15	-	-	 <b>DVQN</b> ⇨ D16	 <b>DVVN</b> ⇨ D16	-	-	-

# External Tool Holder Series



Polygon - Shank Holder - Produced According to ISO 26623-1

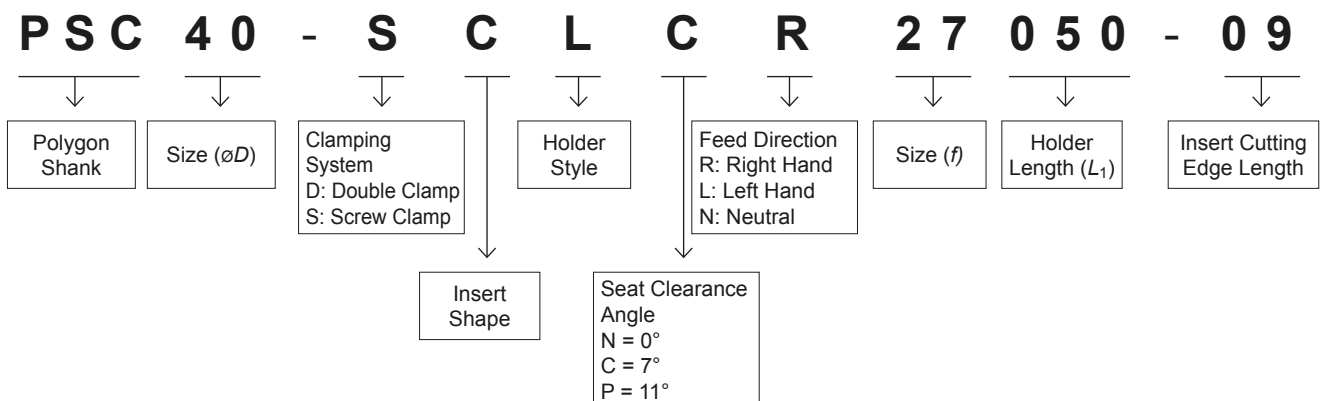


Negative Insert Type

## TOOLING SELECTION

Application			General Turning & Facing		General Turning & Copying			General Turning	
Insert Type System			80° Diamond Type		55° Diamond Type		T-REX 55°	90° Square Type	
Screw Lock System	S Type Mini Holder		<b>SCLC</b> ⇒ D43	—	<b>SDJC</b> ⇒ D43	—	—	—	<b>SSBC</b> ⇒ D43
			—	—	<b>SDHC</b> ⇒ D43	—	—	<b>SRSCR</b>	—
Double Lock (D)	D Type		<b>DCLN</b> ⇒ D41	—	<b>DDJN</b> ⇒ D41	—	—	—	—
			—	—	<b>DDHN</b> ⇒ D41	—	—	<b>DSBN</b> ⇒ D41	—


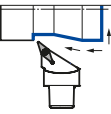
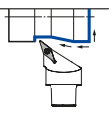
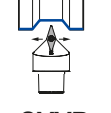
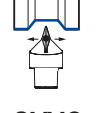
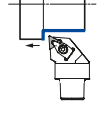
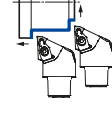
## Classification System for Polygon - Shank Holder





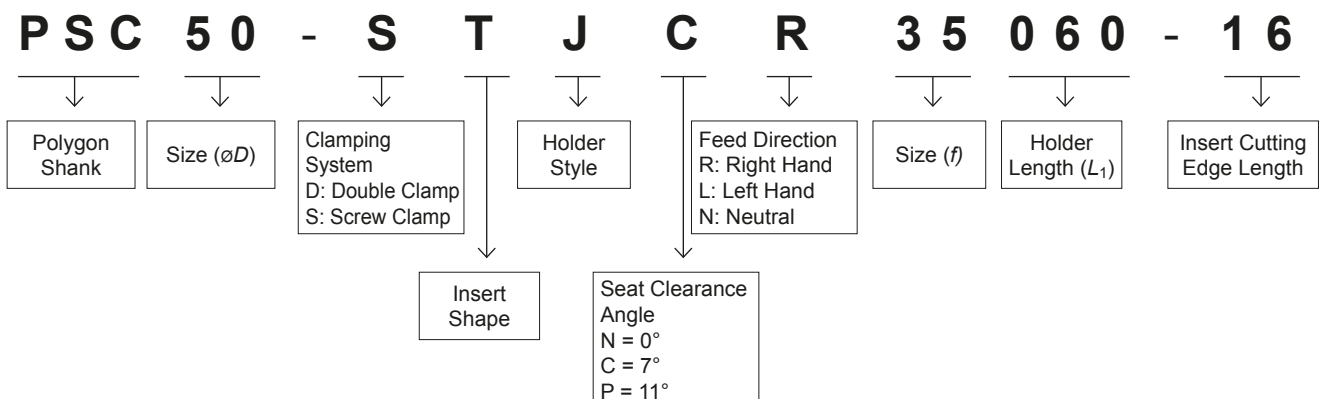
Positive Insert Type

## TOOLING SELECTION

Application		General Turning			Copying		General Turning	Special Turning	
Insert Type		60° Triangle Type			35° Diamond Type		80° Trigon Type	Round and Special Purpose Inserts	
System									
Screw Lock System	S Type Mini Holder	 <b>STJC</b> ⇨ D44	-	-	 <b>SVJB</b> ⇨ D44 <b>SVHB</b> ⇨ D44	 <b>SVJC</b> ⇨ D45 <b>SVHC</b> ⇨ D45	-	-	-
	S Type	-	-	-	 <b>SVVB</b> ⇨ D44	 <b>SVVC</b> ⇨ D45	-	-	-
Double Lock (D)	D Type	 <b>DTJN</b> ⇨ D42	-	-	-	-	 <b>DWLN</b> ⇨ D42	-	-
		-	-	-	-	-	-	-	-

External Holders

## Classification System for Polygon - Shank Holder



# ISO Holders Identification

## ■ Catalogue Classification System For SEC-Tool Holders

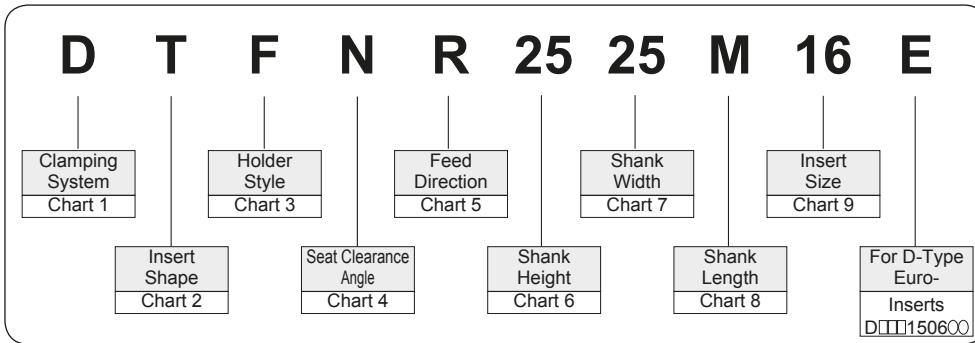


Chart 1

Clamping System					
Symbol	Clamp Types	Example of Structure	Symbol	Clamp Types	Example of Structure
C	Top Clamp		M	Top & Hole Clamp Type	
D	Double Clamp		P	Lever Lock Type (Insert is Supported by 1 face)	
E	Pin Lock Type (Insert is supported by 1 face)		S	Screw Clamp Type	

Chart 5

Feed Direction					
Symbol	Right Hand Feed	Symbol	Neutral Feed	Symbol	Left Hand Feed
R		N		L	

Chart 3

Holder Style					
Symbol	Shape	Offset	Symbol	Shape	Offset
A		Nil	L		With Offset
B		Nil	N		Nil
D		Nil	R		With Offset
E		Nil	S		With Offset
F		With Offset	T		With Offset
G		With Offset	U		With Offset
J		With Offset	W		With Offset
K		With Offset	Y		With Offset

Chart 2

Insert Shape					
Symbol	Insert Shape	Symbol	Insert Shape	Symbol	Insert Shape
A	Parallelogram 85°	M	Rhombic 86°		
B	Parallelogram 82°	O	Octagonal		
C	Diamond 80°	P	Pentagonal		
D	Diamond 55°	R	Round		
E	Diamond 75°	S	Square		
F	Diamond 50°	T	Triangular		
H	Hexagonal	V	Diamond 35°		
K	Parallelogram 55°	W	Trigon		
L	Rectangular				

Chart 4

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

Chart 6

Shank Height		Shank Width	
Symbol	Height (mm)	Symbol	Width (mm)
	12		12
	16		16
	20		20
	25		25
	32		32
	40		40
	50		50
00	Round shank,		Shank Diameter is Shown for Round Shank,

2 digits are used for each dimension in mm.

Chart 7

Shank Length	
Symbol	Length (mm)
F	80
H	100
K	125
M	150
N	160
P	170
Q	180
S	250
T	300
U	350

For some Products, a Hyphen is used Instead of an alphabet.

Chart 8

Cutting Edge	
Symbol	Length (mm)
06	6,9
08	8,2
09	9,6
11	11,0
16	16,5
22	22,0
27	27,5
33	33,0

Chart 9

Cutting Edge		For Round Inserts:	
Symbol	Length (mm)		
Eg. for Triangle Inserts:			
10	10		
12	12		
16	16		
20	20		
25	25		
32	32		

## ■ Cutting Edge Dimensions by Corner Radius

(This table shows X and Y dimensions based on 0° approach angle cutting edge inclination)

Holders			Dimensions(mm)			Holders			Dimensions(mm)		
Symbol	Shapes	Corner Shapes	R	X	Y	Symbol	Shapes	Corner Shapes	R	X	Y
A			0,4	0,291	–	K			0,4	0,024	0,089
			0,8	0,581	–				0,8	0,048	0,178
			1,2	0,872	–				1,2	0,072	0,268
			1,6	1,162	–				1,6	0,096	0,357
			2,4	1,743	–				2,4	0,143	0,535
B			0,4	0,089	0,024	L			0,4	0,040	0,040
			0,8	0,178	0,048				0,8	0,079	0,079
			1,2	0,268	0,072				1,2	0,119	0,119
			1,6	0,357	0,096				1,6	0,159	0,159
			2,4	0,535	0,143				2,4	0,238	0,238
D			0,4	0,164	0,164	N			0,4	0,463	0,263
			0,8	0,329	0,329				0,8	0,925	0,471
			1,2	0,493	0,493				1,2	1,388	0,707
			1,6	0,658	0,658				1,6	1,850	0,943
			2,4	0,986	0,986				2,4	2,776	1,414
E			0,4	0,396	0,229	S			0,4	0,164	0,164
			0,8	0,793	0,458				0,8	0,329	0,329
			1,2	1,190	0,687				1,2	0,493	0,493
			1,6	1,587	0,916				1,6	0,658	0,658
			2,4	2,381	1,374				2,4	0,986	0,986
F			0,4	–	0,291	T			0,4	0,396	0,229
			0,8	–	0,581				0,8	0,793	0,458
			1,2	–	0,872				1,2	1,190	0,687
			1,6	–	1,162				1,6	1,587	0,916
			2,4	–	1,743				2,4	2,381	1,374
G			0,4	0,291	–	U			0,4	0,253	0,058
			0,8	0,581	–				0,8	0,506	0,116
			1,2	0,872	–				1,2	0,759	0,175
			1,6	1,162	–				1,6	1,013	0,233
			2,4	1,743	–				2,4	1,519	0,350
J			0,4	0,344	0,033	Y			0,4	0,002	0,033
			0,8	0,687	0,079				0,8	0,005	0,066
			1,2	1,031	0,118				1,2	0,008	0,099
			1,6	1,375	0,157				1,6	0,011	0,132
			2,4	2,062	0,236				2,4	0,017	0,198

External Holders

### ● Calculation of the Nose Radius Dimensions

(Unit in mm)

Insert Shape	Calculation
	$B = \frac{3}{2}A - R$
	$B = (\sqrt{2}-1) \times (\frac{A}{2} - R)$
	$B = \{ \frac{1}{\sin(\theta/2)} - 1 \} \times (\frac{A}{2} - R)$

### Figures of „A“ and „R“ to calculate Figure „B“

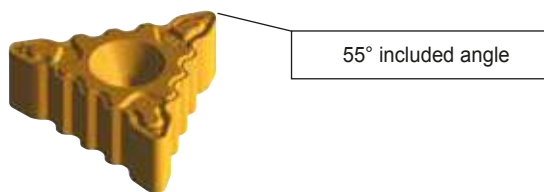
I.C. size (inch)	„A“ dimensions (mm)	Nose symbol	Size (inch)	„R“ dimension (mm)
– 5/32	3,9688	02	(0)	0,203
– 6/32	4,7625	04	1/64	0,397
– 7/32	5,5562	08	2/64	0,794
2/8	8/32	12	3/64	1,191
– (0)	7,9375	16	4/64	1,588
3/8	–	24	6/64	2,389
4/8	–			
5/8	–			
6/8	–			
8/8	–			

# SumiTurn T-REX Tool Holders

RIGIDITY - ECONOMY - PRECISION



- T-REX clamping for maximum rigidity 50% more cutting edges than a DNMG Insert



## Advantages

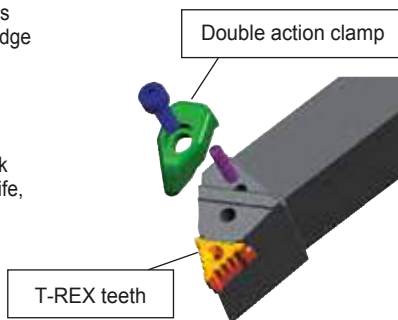
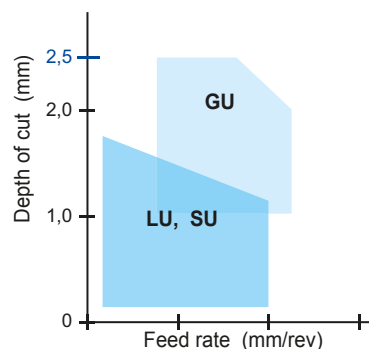
### ● T-REX Inserts for Maximum Economy

With 6 cutting edges and a 55 degree included angle - T-Rex is the intelligent alternative to profile turning with a traditional 4 edge DNMG insert.

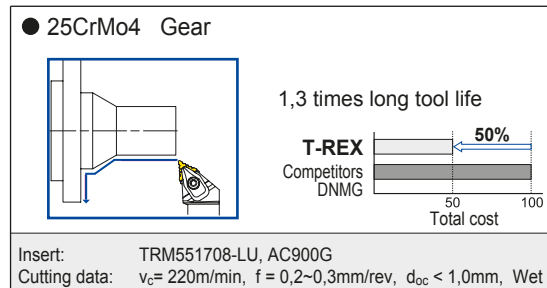
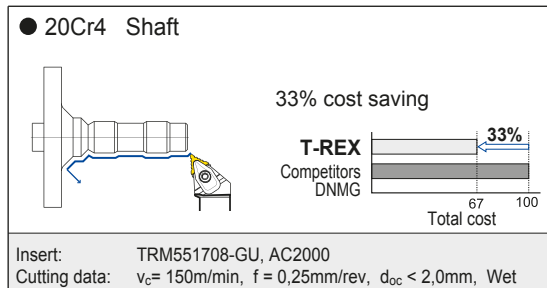
### ● Biting Performance from T-REX Teeth

The double clamp tool holder and powerful teeth of T-REX lock the insert to eliminate movement, dramatically improving tool life, machining accuracy, and cutting edge security.

## Application Range



## Application Examples



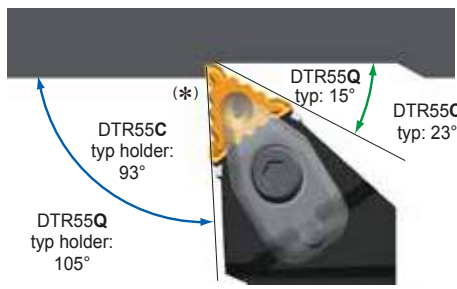
## Recommendations

### ● Depth of Cut



Max.  $a_p = 2,5\text{ mm}$

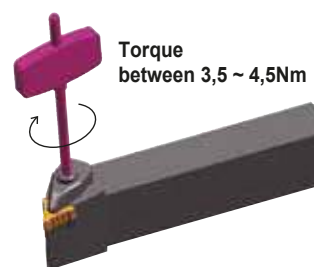
### ● Approach Angle



(\*) Angle of major cutting edge

C-Type: 95,5°  
Q-Type: 107,5°

### ● Insert Clamping

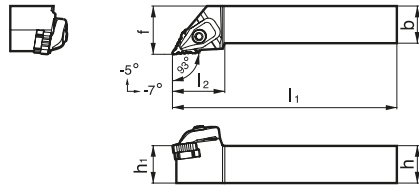
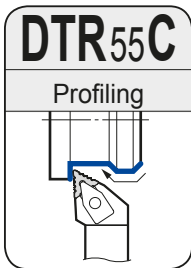


Recommended Tightening Torque (N·m)

- = Eurostock
- = Japanstock



### External Turning & Copying



#### ■ Holders

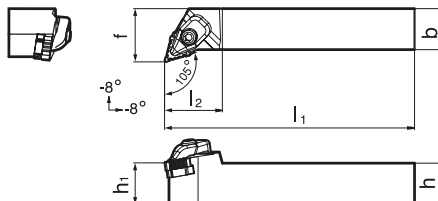
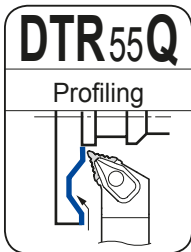
Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DTR 55C-R/L 2020-K17	●	●	20	20	20	125	35	25
DTR 55C-R/L 2525-M17	●	●	25	25	25	150	35	32

#### ■ Spare Parts

Clamp	Spring	Screw	Shim	Screw	Wrench	Wrench
TRCP3	S-SP4-20	BX0520	TRW5505	BFTX0307N	TSW040	TRX10 <sup>(*)</sup>

(\*) Note: Wrench (TRX) for shim clamp screw is not included.



#### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DTR 55Q-R/L 2020-K17	●	●	20	20	20	125	35	28,5
DTR 55Q-R/L 2525-M17	●	●	25	25	25	150	35	32

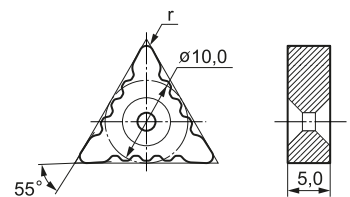
#### ■ Spare Parts

Clamp	Spring	Screw	Shim	Screw	Wrench	Wrench
TRCP3	S-SP4-20	BX0520	TRW5505	BFTX0307N	TSW040	TRX10 <sup>(*)</sup>

(\*) Note: Wrench (TRX) for shim clamp screw is not included.

#### ■ Inserts

Applic.	Shape	Ordering No.	r	Coated Carbide					Coated Cermet
				AC810P	AC8025P <b>New</b>	AC820P	AC830P	AC630M	T3000Z
Fine Finishing	FL	TRM 551704-FL	0,4		○				○
		551708-FL	0,8		○				○
Finishing	LU	TRM 551704-LU	0,4	●	○	●			○
		551708-LU	0,8	●	○	●		○	
	551712-LU	1,2	●	○	●		○		
SU	SU	TRM 551704-SU	0,4		○	○		●	○
		551708-SU	0,8		○	○		●	○
		551712-SU	1,2		○	○		●	○
Light Cut	GU	TRM 551704-GU	0,4	●	○	●	●	●	
		551708-GU	0,8	●	○	●	●	●	
		551712-GU	1,2	●	○	●	●	○	



Application **P** Steel  
**M** Stainless steel

#### ● Recommended Cutting Conditions

— Cutting speed (m/min)

Grade		Coated Carbide					Coated Cermet
		AC810P	AC8025P	AC820P	AC830P	AC630M	T3000Z
Work materials	Low carbon steel	220 400	150 350	150 350	120 300	120 300	100 400
	Alloy steel	150 300	100 250	100 250	80 200	80 230	100 250
	Stainless steel				50 150	100 160	
Application range	Finishing	○	○	○	○	○	○
	Medium cutting	○	○	○	○	○	○
	Interrupted cutting		○	○	○	○	○

○ Preferred choice ○ Suitable

# External Tool Holders D Type (Double Clamp)

## Tool Holders for neg. Inserts CN

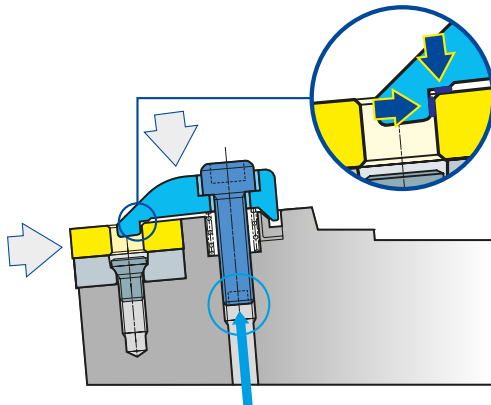


### ■ Characteristics

Insert is clamping firmly for improved fracture resistance.  
High indexing accuracy improves machining accuracy.  
Insert can be changed from below the holder.  
Suitable for high efficiency machining and interrupted cutting in hardened steel.

### ■ Clamp Mechanism

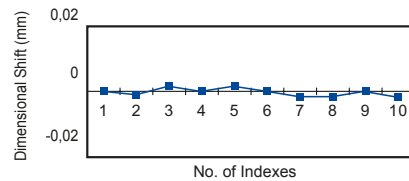
Secured in two directions and supported by two faces.



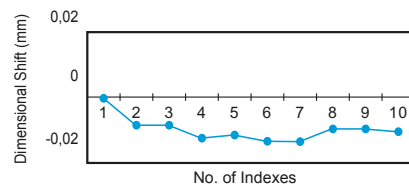
Insert can be changed from below the holder.

### ■ Index Accuracy Comparison (Length Wise)

#### D Type Tool Holders



#### Lever Lock



## General Turning and Facing



### ■ Inserts

Eg.

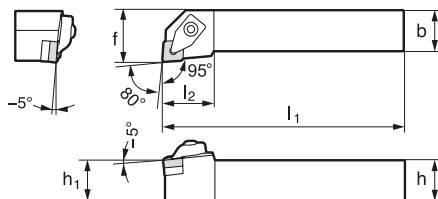
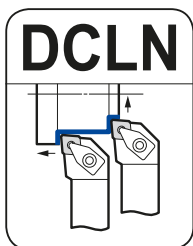
N-GU

- ① CNMG 120408 N-GU
- ② CNMG 160608 N-GU
- ③ CNMM 190612 N-HG
- ④ CNMM 250924 N-HU

### ■ Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-2	5,0 (N·m)	CNS1204	BFTX0409N	3,4 (N·m)	TRX15 <sup>(*)</sup>	LH040 LH025	①
SCP-3	5,0 (N·m)	CNS1606	BFTX0509N	5,0 (N·m)	TRX20 <sup>(*)</sup>	LH040 LH025	②
SCP-5	5,0 (N·m)	CNS1906	BFTX0511N	5,0 (N·m)	TRX20 <sup>(*)</sup>	LH040 LH025	③
SCP-6	6,0 (N·m)	CNS2509	BFTX0615N	7,5 (N·m)	TRD25 <sup>(*)</sup>	LH060	④

(\*) Note: Wrench (TRX / TRD) for shim clamp screw is not included.



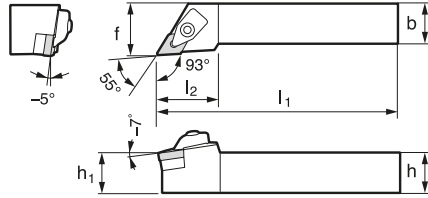
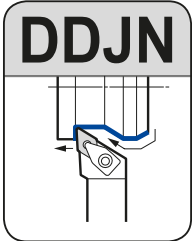
### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DCLN R/L 2020 K12	●	●	20	20	20	125	32	25
DCLN R/L 2525 M12	●	●	25	25	25	150	32	32
DCLN R/L 2525 M16	●	●	25	25	25	150	32	32
DCLN R/L 3232 P16	●	●	32	32	32	170	32	40
DCLN R/L 3232 P19	●	●	32	32	32	170	42	40
DCLN R/L 4040 S19	●	●	40	40	40	250	42	50
DCLN R/L 4040 S25	●	●	40	40	40	250	53	50



## General Turning and Copying



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f								
<b>DDJN R/L 2020 K15</b>			20	20	20	125	38	25	SCP-2	5,0 (Nm)	DNS1504	BFTX0409N	TRX15 <sup>(*)</sup>	LH040		①
<b>DDJN R/L 2020 K15E</b>	●	●	20	20	20	125	38	25								②
<b>DDJN R/L 2525 M15</b>	□		25	25	25	150	38	32								①
<b>DDJN R/L 2525 M15E</b>	●	●	25	25	25	150	38	32								②

(\*) Note: Wrench (TRX) for shim clamp screw is not included.

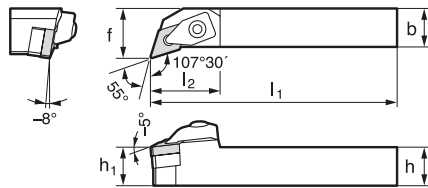
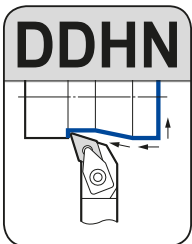
### ■ Inserts

Eg.

N-GU

- ① DNMG 150408 N-GU
- ② DNMG 150608 N-GU

### ■ Spare Parts



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f								
<b>DDHN R/L 2020 K15E</b>	●	●	20	20	20	125	35	25	SCP-2	5,0 (Nm)	DNS1506	BFTX0409N	TRX15 <sup>(*)</sup>	LH040		②
<b>DDHN R/L 2525 M15E</b>	●	●	25	25	25	150	35	32								②

(\*) Note: Wrench (TRX) for shim clamp screw is not included.

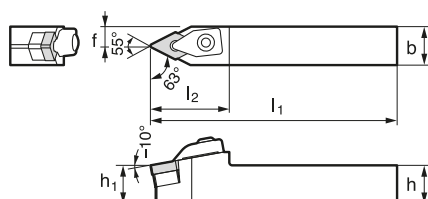
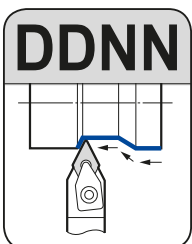
### ■ Inserts

Eg.

N-GU

- ② DNMG 150608 N-GU

### ■ Spare Parts



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock	Dimensions (mm)						Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
		h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f								
<b>DDNN N 2020 K15E</b>	●	20	20	20	125	40	10,5	SCP-2	5,0 (Nm)	DNS1506	BFTX0409N	TRX15 <sup>(*)</sup>	LH040		②
<b>DDNN N 2525 M15E</b>	●	25	25	25	150	40	13,0								②

(\*) Note: Wrench (TRX) for shim clamp screw is not included.

### ■ Inserts

Eg.

N-GU

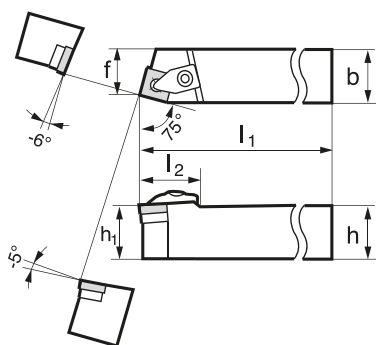
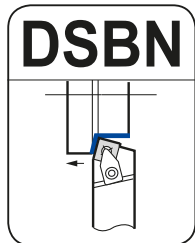
- ② DNMG 150608 N-GU

### ■ Spare Parts

# External Tool Holders D Type (Double Clamp)

## Tool Holders for neg. Inserts SN

### General Turning and Facing



#### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
<b>DSBN R/L 3232 P19</b>	●	●	32	32	32	170	45	27
<b>DSBN R/L 4040 S2507</b>	●	●	40	40	40	250	58	35
<b>DSBN R/L 4040 S2509</b>	●	●	40	40	40	250	58	35

#### ■ Inserts

Eg.

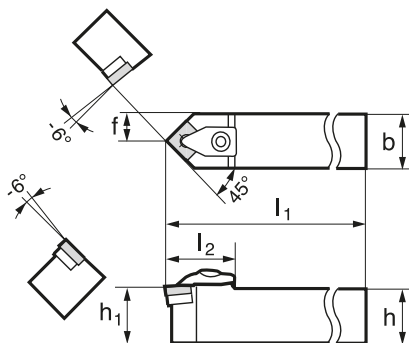
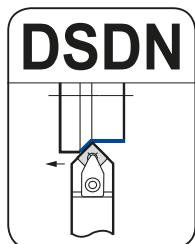
N-UZ, N-HU

- ① SNMG 190612 N-UZ
- ② SNMM 250724 N-HU
- ③ SNMM 250924 N-HU

#### ■ Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-5		5,0 <sup>(Nm)</sup>	SNS1906	BFTX0511N 5,0 <sup>(Nm)</sup>	TRX20 <sup>(*)</sup>	LH040, LH025	①
SCP-6		6,0 <sup>(Nm)</sup>	SNS2507 SNS2509	BFTX0615N 7,5 <sup>(Nm)</sup>	TRD25 <sup>(*)</sup>	LH060	② ③

(\*) Note: Wrench (TRX / TRD) for shim clamp screw is not included.



#### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f		
<b>DSDN N 3232 P19</b>	●	●	32	32	32	170	50	16
<b>DSDN N 4040 S2507</b>	●	●	40	40	40	250	63	20
<b>DSDN N 4040 S2509</b>	●	●	40	40	40	250	63	20

#### ■ Inserts

Eg.

N-UZ, N-HU

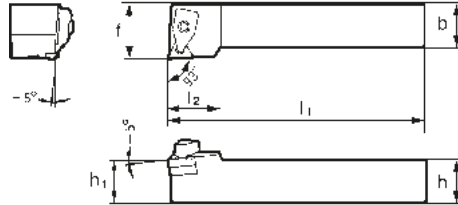
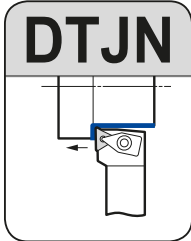
- ① SNMG 190612 N-UZ
- ② SNMM 250724 N-HU
- ③ SNMM 250924 N-HU

#### ■ Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-5		5,0 <sup>(Nm)</sup>	SNS1906	BFTX0511N 5,0 <sup>(Nm)</sup>	TRX20 <sup>(*)</sup>	LH040, LH025	①
SCP-6		6,0 <sup>(Nm)</sup>	SNS2507 SNS2509	BFTX0615N 7,5 <sup>(Nm)</sup>	TRD25 <sup>(*)</sup>	LH060	② ③

(\*) Note: Wrench (TRX / TRD) for shim clamp screw is not included.

## General Turning and Facing



### ■ Inserts



### ■ Spare Parts

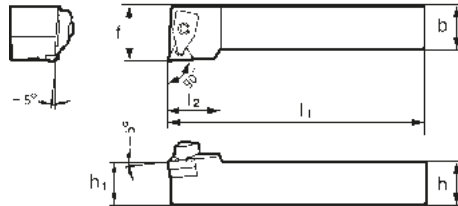
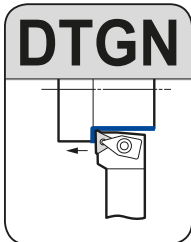
							Insert
Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	
SCP-1		5,0 <sup>(Nm)</sup>	TNS1604	BFTX0307N 2,0 <sup>(Nm)</sup>	TRX10 <sup>(*)</sup>	LH040	①

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DTJN R/L 2020 K16	●	●	20	20	20	125	31	25
DTJN R/L 2525 M16	●	●	25	25	25	150	31	32

<sup>(\*)</sup>Note: Wrench (TRX) for shim clamp screw is not included.



### ■ Inserts



### ■ Spare Parts

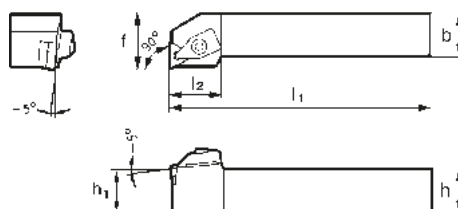
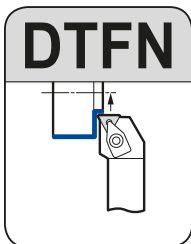
							Insert
Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	
SCP-1		5,0 <sup>(Nm)</sup>	TNS1604	BFTX0307N 2,0 <sup>(Nm)</sup>	TRX10 <sup>(*)</sup>	LH040	①

<sup>(\*)</sup>Note: Wrench (TRX) for shim clamp screw is not included.

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DTGN R/L 2020 K16	□		20	20	20	125	31	25
DTGN R/L 2525 M16	●	●	25	25	25	150	31	32



### ■ Inserts



### ■ Spare Parts

							Insert
Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	
SCP-1		5,0 <sup>(Nm)</sup>	TNS1604	BFTX0307N 2,0 <sup>(Nm)</sup>	TRX10 <sup>(*)</sup>	LH040	①

<sup>(\*)</sup>Note: Wrench (TRX) for shim clamp screw is not included.

### ■ Holders

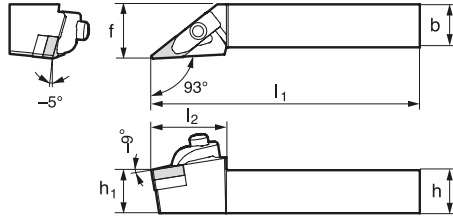
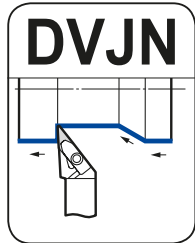
Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DTFN R/L 2020 K16	□		20	20	20	125	30	25
DTFN R/L 2525 M16	●	●	25	25	25	150	30	32

# External Tool Holders D Type (Double Clamp)

## Tool Holders for neg. Inserts VN

### General Turning and Copying



#### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DVJN R/L 2020 K16	●	●	20	20	20	125	35	25
DVJN R/L 2525 M16	●	●	25	25	25	150	35	32

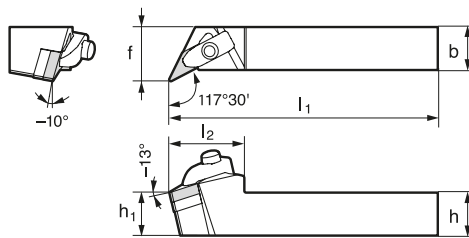
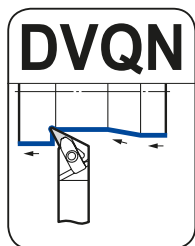
#### ■ Inserts



#### ■ Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-4		5,0 <sup>(Nm)</sup>	VNS1604	BFTX0307N 2,0 <sup>(Nm)</sup>	TRX10 <sup>(*)</sup>	LH040 LH025	

<sup>(\*)</sup> Note: Wrench (TRX) for shim clamp screw is not included.



#### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DVQN R/L 2020 K16	●	●	20	20	20	125	35	25
DVQN R/L 2525 M16	●	●	25	25	25	150	35	32

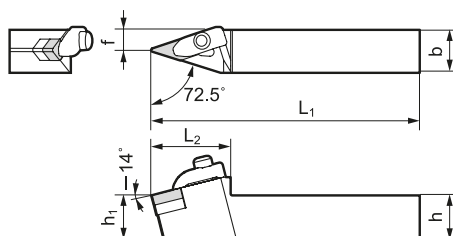
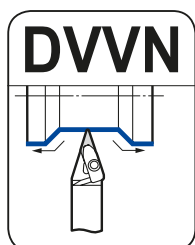
#### ■ Inserts



#### ■ Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-4		5,0 <sup>(Nm)</sup>	VNS1604	BFTX0307N 2,0 <sup>(Nm)</sup>	TRX10 <sup>(*)</sup>	LH040 LH025	

<sup>(\*)</sup> Note: Wrench (TRX) for shim clamp screw is not included.



#### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock	Dimensions (mm)					
		h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DVVN N 2020 K16	●	20	20	20	125	37	10,0
DVVN N 2525 M16	●	25	25	25	150	37	12,5

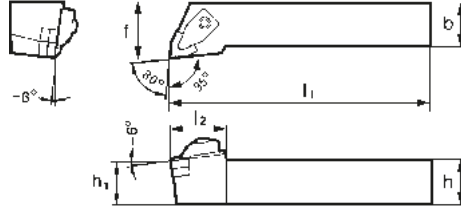
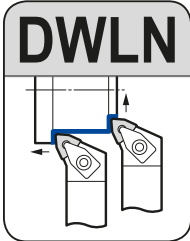
#### ■ Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-4		5,0 <sup>(Nm)</sup>	VNS1604	BFTX0307N 2,0 <sup>(Nm)</sup>	TRX10 <sup>(*)</sup>	LH040 LH025	

<sup>(\*)</sup> Note: Wrench (TRX) for shim clamp screw is not included.



## General Turning and Facing



### ■ Inserts



### ■ Spare Parts

							Insert
Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	
	SCP-2	5,0 <sup>(Net)</sup>	WNS0804	BFTX0409N 3,4 <sup>(Net)</sup>	TRX15 <sup>(*)</sup>	LH040 LH025	1

### ■ Holders

Above figures show right hand tools.

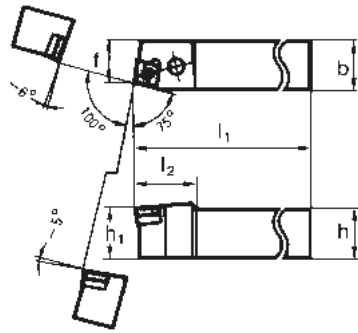
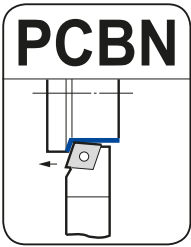
Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f
DWLN R/L 2020 K08	●	●	20	20	20	125	32	25
DWLN R/L 2525 M08	●	●	25	25	25	150	32	32

(\*) Note: Wrench (TRX) for shim clamp screw is not included.

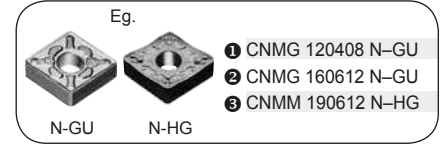
# External Tool Holders P Type (Lever Lock)

Tool Holders for neg. Inserts CN

## General Turning and Facing



### ■ Inserts

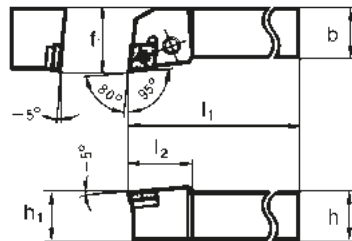
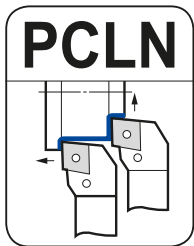


### ■ Spare Parts

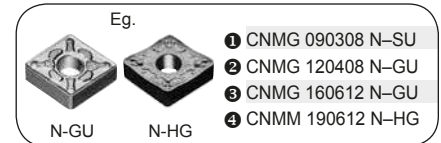
Ordering No.	Stock	Dimensions (mm)							Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f							
PCBN R/L 2020 K12	● □	20	20	20	125	27	17							
PCBN R/L 2525 M12	● ●	25	25	25	150	27,7	22	LCL4SD	LCS42BS-SD	LSC42SD	LSP4SD	LH030	①	
PCBN R/L 3225 P12	□ ●	32	32	25	170	27,7	22							
PCBN R/L 2525 M16	□ ●	25	25	25	150	31,7	22	LCL5SD	LCS5B-SD	LSC53SD	LSP5SD	LH030	②	
PCBN R/L 3225 P16	□ ●	32	32	25	170	31,7	22							
PCBN R/L 3232 P19	● ●	32	32	32	170	37,9	27	LCL6SD	LCS6B-SD	LSC63SD	LSP6SD	LH040	③	

### ■ Holders

Above figures show right hand tools.



### ■ Inserts



### ■ Spare Parts

Ordering No.	Stock	Dimensions (mm)							Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f							
PCLN R/L 1616 H09	● ●	16	16	16	100	25,7	20							
PCLN R/L 2020 K09	● □	20	20	20	125	27	25	LCL3SD	LCS3TB-SD	LSC32SD	LSP3SD	LH025	①	
PCLN R/L 2525 M09	□ □	25	25	25	150	27	32							
PCLN R/L 1616 H12	● ●	16	16	16	100	26,1	20		LCS4CA					
PCLN R/L 2020 K12	□ □	20	20	20	125	27,4	25	LCL4SD	LCS42BS-SD	LSC42SD	LSP4SD	LH030	②	
PCLN R/L 2525 M12	□ □	25	25	25	150	28	32							
PCLN R/L 3225 P12	● ●	32	32	25	170	28	32							
PCLN R/L 2525 M16	● □	25	25	25	150	32,6	32	LCL5SD	LCS5B-SD	LSC53SD	LSP5SD	LH030	③	
PCLN R/L 3225 P16	● □	32	32	25	170	32,6	32							
PCLN R/L 3232 P16	● ●	32	32	32	170	32,6	40							
PCLN R/L 2525 M19	□ ●	25	25	25	150	37	32							
PCLN R/L 3225 P19	□ □	32	32	32	170	38	32	LCL6SD	LCS6B-SD	LSC63SD	LSP6SD	LH040	④	
PCLN R/L 3232 P19	□ □	32	32	32	170	38	40							
PCLN R/L 4040 S19	□ □	40	40	40	250	37,8	50							

### ■ Holders

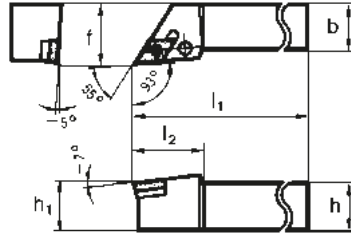
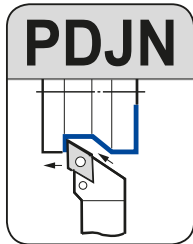
Above figures show right hand tools.

External Holders for neg. Inserts

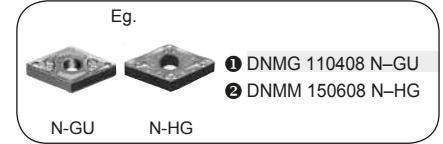




## General Turning and Facing



### ■ Inserts



### ■ Spare Parts

					Insert
Lever pin	Clamp bolt	Shim	Shim pin	Wrench	
LCL3D-SD	LCS3TB-SD	LSD32SD	LSP3SD	LH025	1
LCL4D-SD	LCS5DB-SD	LSD42SD	LSP4SD	LH030	2

### ■ Holders

Above figures show right hand tools.

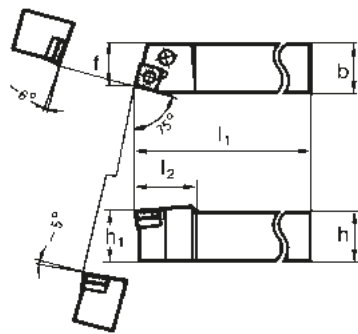
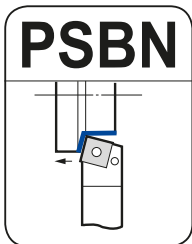
Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	
PDJN R/L 1616 H11	●	●	16	16	16	100	30	20	
PDJN R/L 2020 K11	●	●	20	20	20	125	30	25	
PDJN R/L 2525 M11	●	●	25	25	25	150	30	32	
PDJN R/L 2020 K15	●	●	20	20	20	125	34,7	25	
PDJN R/L 2525 M15	●	●	25	25	25	150	34,7	32	
PDJN R/L 3225 P15	●	●	32	32	25	170	34,7	32	
PDJN R/L 4025 P15	□	□	40	40	25	170	35	28,7	

External Holders for neg. Inserts

# External Tool Holders P Type (Lever Lock)

Tool Holders for neg. Inserts SN

## General Turning and Chamfering



### ■ Inserts



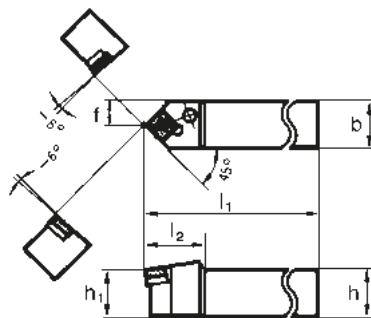
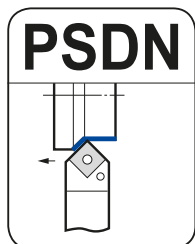
### ■ Spare Parts

						Insert
	Lever pin	Clamp bolt	Shim	Shim pin	Wrench	
	LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	1
	LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	2
	LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	3

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f						
PSBN R/L 2020 K12	●	●	20	20	20	125	27,5	17	LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	1
PSBN R/L 2525 M12	●	●	25	25	25	150	27,5	22	LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	2
PSBN R/L 2525 M15	●	●	25	25	25	150	32	22	LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	2
PSBN R/L 3225 P15	●	●	32	32	25	170	32	22	LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	2
PSBN R/L 3232 P19	●	●	32	32	32	170	39,2	27	LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	3



### ■ Inserts



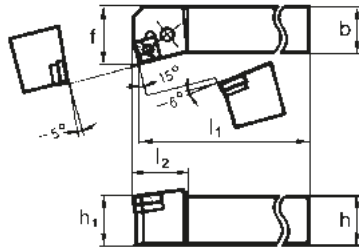
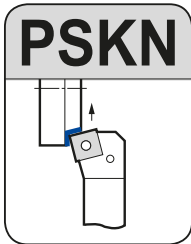
### ■ Spare Parts

						Insert
	Lever pin	Clamp bolt	Shim	Shim pin	Wrench	
	LCL3SD	LCS 3TB-SD	LSS32SD	LSP3SD	LH025	1
	LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	2
	LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	3

### ■ Holders

Ordering No.	Stock	Dimensions (mm)						Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
		h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f						
PSDN N 1616 H09	●	16	16	16	100	21	8,3	LCL3SD	LCS 3TB-SD	LSS32SD	LSP3SD	LH025	1
PSDN N 2020 K12	●	20	20	20	125	27,6	10,3	LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	2
PSDN N 2525 M12	●	25	25	25	150	27,6	12,8	LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	2
PSDN N 3225 P12	●	32	32	25	170	27,6	12,8	LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	2
PSDN N 3225 P19	□	32	32	25	170	40,6	13	LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	3
PSDN N 3232 P19	●	32	32	32	170	40,6	16,5	LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	3

## General Turning and Facing



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert	
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f							
PSKN R/L 2020 K12	●	□	20	20	20	125	22,7	17							
PSKN R/L 2525 M12	●	●	25	25	25	150	22,7	32	LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	①	
PSKN R/L 3225 P12	□	□	32	32	25	170	22,7	32							
PSKN R/L 2525 M15	□	□	25	25	25	150	32	32							
PSKN R/L 3225 P15	□	●	32	32	25	170	32	32	LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	②	
PSKN R/L 3232 P15	□	□	32	32	32	170	32	40							
PSKN R/L 3232 P19	□	□	32	32	32	170	33,7	40	LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	③	

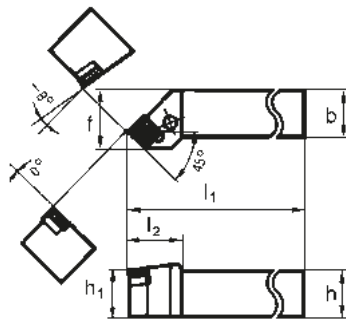
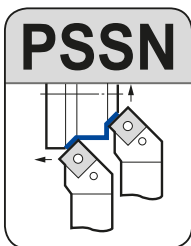


### ■ Inserts



### ■ Spare Parts

Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f						
PSSN R/L 2020 K12	●	●	20	20	20	125	29,3	25						
PSSN R/L 2525 M12	●	●	25	25	25	150	29,3	32	LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	①
PSSN R/L 3225 P12	●	□	32	32	25	170	29,3	32						
PSSN R/L 2525 M15	●	●	25	25	25	150	32	32						
PSSN R/L 3225 P15	□	□	32	32	25	170	32	32	LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	②
PSSN R/L 3232 P15	●	□	32	32	32	170	32	40						
PSSN R/L 3232 P19	●	●	32	32	32	170	40,2	40	LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	③

### ■ Inserts



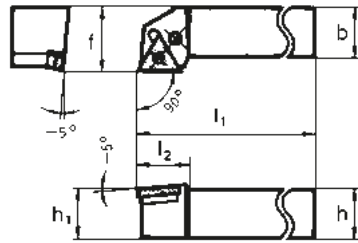
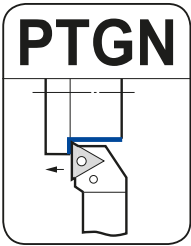
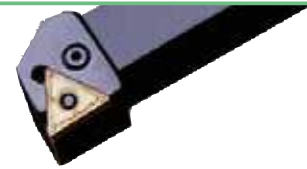
### ■ Spare Parts

Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert

# External Tool Holders P Type (Lever Lock)

## Tool Holders for neg. Inserts TN

### General Turning and Facing



#### ■ Inserts



#### ■ Spare Parts

Ordering No.	Stock		Dimensions (mm)						Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f						
PTGN R/L 1616 H16	●	●	16	16	16	100	20	20	LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025	①
PTGN R/L 2020 K16	●	●	20	20	20	125	20	25	LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025	①
PTGN R/L 2525 M16	●	●	25	25	25	150	22,2	32	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030	②
PTGN R/L 2525 M22	●	●	25	25	25	150	28,7	32	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030	②
PTGN R/L 3225 P22	●	□	32	32	25	170	28,7	32	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030	②
PTGN R/L 3232 P22	●	●	32	32	32	170	28,7	32	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030	②

#### ■ Holders

Above figures show right hand tools.

#### ■ Inserts



#### ■ Spare Parts

Ordering No.	Stock		Dimensions (mm)						Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f						
PTFN R/L 1616 H16	●	●	16	16	16	100	19,7	20	LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025	①
PTFN R/L 2020 K16	●	●	20	20	20	125	20,2	25	LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025	①
PTFN R/L 2525 M16	●	●	25	25	25	150	20,2	32	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030	②
PTFN R/L 2525 M22	●	□	25	25	25	150	25,2	32	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030	②
PTFN R/L 3225 P22	●	●	32	32	25	170	25,2	32	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030	②

#### ■ Holders

Above figures show right hand tools.

#### ■ Inserts

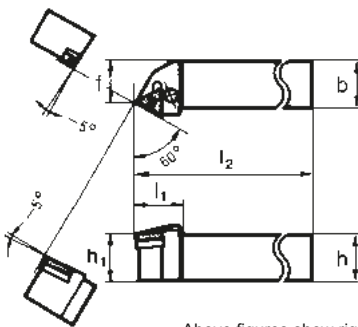
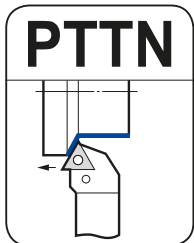


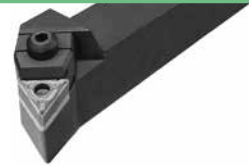
#### ■ Spare Parts

Ordering No.	Stock		Dimensions (mm)						Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f						
PTTN R/L 2020 K16	□	□	20	20	20	125	25,9	17	LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025	①
PTTN R/L 2525 M16	●	□	25	25	25	150	25,9	22	LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025	①
PTTN R/L 2525 M22	□	□	25	25	25	150	31,9	22	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030	②
PTTN R/L 3225 P22	□	●	32	32	25	170	31,9	22	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030	②

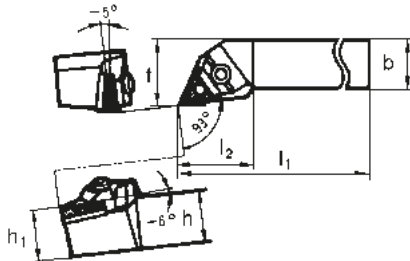
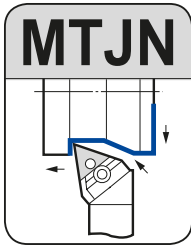
#### ■ Holders

Above figures show right hand tools.





## General Turning and Copying

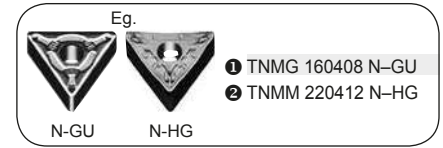


### ■ Holders

Above figures show right hand tools.

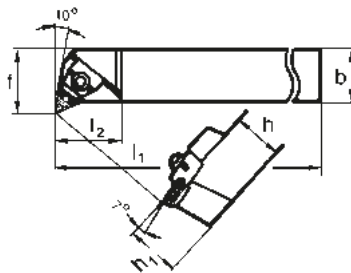
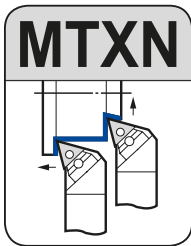
Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	
MTJN R/L 2020-33 (K16)	●	●	20	20	20	125	37	25	
MTJN R/L 2525-33 (M16)	●	□	25	25	25	150	37	32	
MTJN R/L 2525-43 (M22)	●	●	25	25	25	150	37	32	
MTJN R/L 3225-43 (P22)	□	□	32	32	25	170	37	32	
MTJN R/L V-43 (D22)			20	20	25	60	37	30	

### ■ Inserts



### ■ Spare Parts

Wedge	Shim pin	Shim	Clamp bolt	Nut	Ring	Wrench	Insert
MMW30	MP317	STW323	BHA0525 4,0 <sub>(mm)</sub>	CPM32N	ER04	LH030	①
	MP320						
MMW40	MP420	STW434	BHA0625 4,5 <sub>(mm)</sub>	CPM43N	ER05	LH030 LH040	②
	MP416						



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	
MTXN R/L 2020-33 (K16)	□	□	20	20	20	125	32	25	
MTXN R/L 2525-33 (M16)	□	□	25	25	25	150	32	32	
MTXN R/L 2525-43 (M22)			25	25	25	150	38	32	

### ■ Inserts



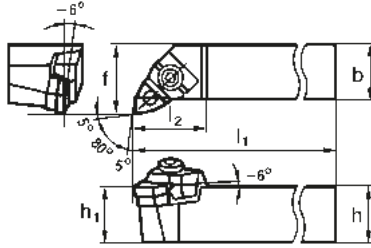
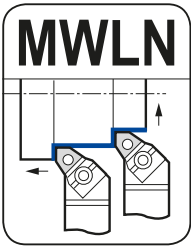
### ■ Spare Parts

Wedge	Shim pin	Shim	Clamp bolt	Nut	Ring	Wrench	Insert
MMW30	MP317	STW323	BHA0525 4,0 <sub>(mm)</sub>	CPM32N	ER04	LH030	①
	MP320						
MMW40	MP420	STW434	BHA0625 4,5 <sub>(mm)</sub>	CPM43N	ER05	LH030, 040	②

# External Tool Holders M Type (Wedge Clamp)

## Tool Holders for neg. Inserts WN

### General Turning and Facing



#### ■ Inserts



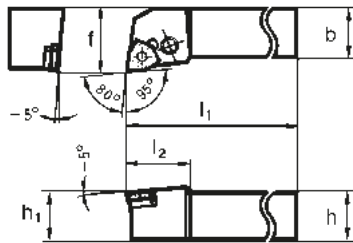
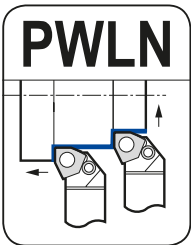
#### ■ Spare Parts

Ordering No.	Stock		Dimensions (mm)						Wedge	Shim pin	Shim	Clamp bolt	Nut	Ring	Wrench	Insert	
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f									
MWLN R/L 2020-43 (K08)			20	20	20	125	32	25									
MWLN R/L 2525-43 (M08)	☐	☐	25	25	25	150	32	32	MWW40	MP416		BHA0625	CPM43S				
MWLN R/L 3225-43 (P08)	☐	☐	32	32	25	170	32	32		MP420	SWW433	4,5 <sup>(Nm)</sup>	CPM43N	ER05	LH030 LH040	1, 2	
MWLN R/L 2525-54 (M10)			25	25	25	150	37	32									
MWLN R/L 3225-54 (P10)			32	32	25	170	37	32	MWW50	MP531 MP534	SWW544	BHA0834	CPM54N	ER07	LH040 LH050		

#### ■ Holders

Above figures show right hand tools.

### P Type Lever Lock Holders



#### ■ Inserts



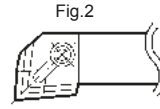
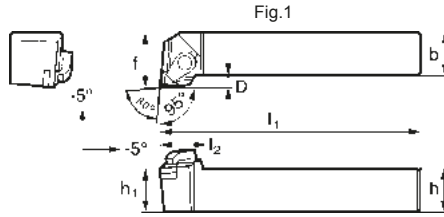
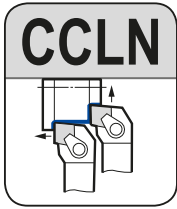
#### ■ Spare Parts

Ordering No.	Stock		Dimensions (mm)						Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert	
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f							
PWLN R/L 2020 K06 (PWLN R/L 2020 -33)	☐	☐	20	20	20	125	27	25							
PWLN R/L 2525 M06 (PWLN R/L 2525 -33)	☐	☐	25	25	25	150	27	32	LCL3SD	LCS3TB-SD	LSW317	LSP3SD	LH025	1	

#### ■ Holders

Above figures show right hand tools.

## C Type Top Clamp Holders



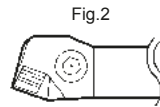
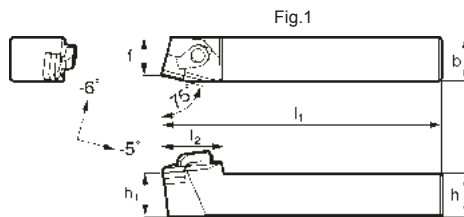
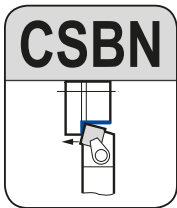
### Inserts



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Fig.	Clamp	Insert protector	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h=h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	D									
<b>CCLN R/L 2525 M09</b>	☐		25	25	150	25	32	7	1	CCM8UL	CBC0903	WB8-22T	SCN0903	SPP3	LT27		①
<b>CCLN R/L 2525 M12-03</b>	☐		25	25	150	30	32	7	1		CBC4		SCND433				②
<b>CCLN R/L 2525 M12-04</b>	☐		25	25	150	30	32	7	2	CCM8-LONG	CBC4	WB8-30	SCND433	SPP3	LH040		③



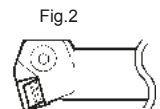
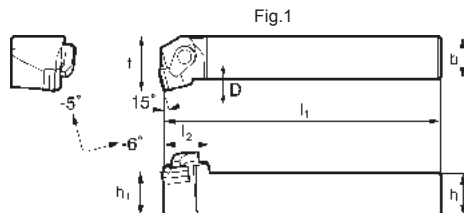
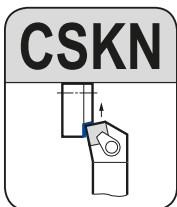
### ■ Inserts



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Fig.	Clamp	Insert protector	Clamp bolt	Shim	Shim pin	Spring	Wrench	Insert
	R	L																
<b>CSBN R/L 2525 N09</b>	☐		25	25	160	30	21,5	-	1	CCM8UL	CBS13	WB8-22T	SSN0903	-	-		LH040	①
<b>CSBN R/L 2525 N12-03</b>	☐		25	25	160	35	21,5	-	1		CBS14		SSND423				LH040	②
<b>CSBN R/L 2525 N12-04</b>	☐		25	25	160	33	21,5	-	2	DC-RL1	CBD 4 RL	BH 0830 RL	SSND423	SPP3	DSP5		LH040	③



### ■ Inserts



### ■ Holders

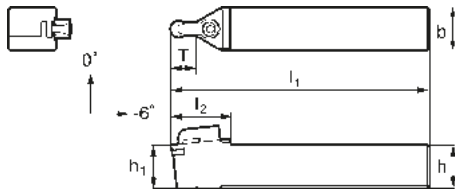
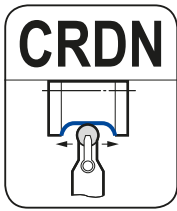
Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Fig.	Clamp	Insert protector	Clamp bolt	Shim	Shim pin	Spring	Wrench	Insert
	R	L																
<b>CSKN R/L 2525 N09</b>	☐		25	25	160	25	32	7	1	CCM8UL	CBS13	WB8-22T	SSN0903	-	-		LH040	①
<b>CSKN R/L 2525 N12-03</b>	☐		25	25	160	25	32	7	1		CBS14		SSND423				LH040	②
<b>CSKN R/L 2525 N12-04</b>	☐		25	25	160	21	32	7	2	DC-L/R1	CBD 4 L/R	BH 0830 L/R	SSND423	SPP3	DSP5		LH040	③

External Holders for neg. Inserts

# External Tool Holders for Solid SUMIBORON

## C Type Top Clamp Holders



### ■ Inserts

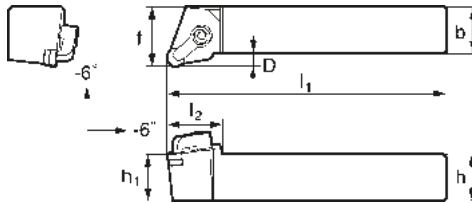
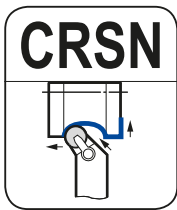


### ■ Holders

Ordering No.	Stock	Dimensions (mm)							Clamp	Double screw	Shim	Shim pin	Wrench	Insert
		h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	T						
<b>CRDNN 2525 M09</b>	●	25	25	25	150	35	-	15	CCM8-LONG	WB8-22T	SRND32	SPP3	LT27	1
<b>CRDNN 2525 M12-03</b>	●	25	25	25	150	35	-	20			SRND42			2
<b>CRDNN 2525 M12-04</b>	●	25	25	25	150	35	-	20			SRND42			3

### ■ Spare Parts

Clamp	Double screw	Shim	Shim pin	Wrench	Insert



### ■ Inserts



### ■ Holders

Above figures show right hand tools.

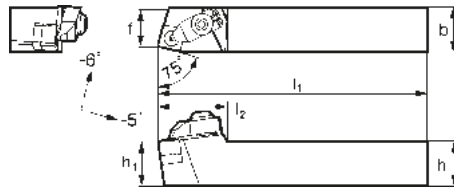
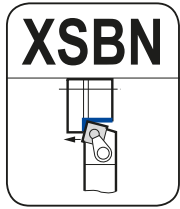
Ordering No.	Stock		Dimensions (mm)							Clamp	Double screw	Shim	Shim pin	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	D						
<b>CRSN R/L 2525 M09</b>	●	●	25	25	25	150	30	32	7	CCM8-LONG	WB8-22T	SRND32	SPP3	LT27	1
<b>CRSN R/L 2525 M12-03</b>	●	●	25	25	25	150	30	32	7			SRND42			2
<b>CRSN R/L 2525 M12-04</b>	●	●	25	25	25	150	30	32	7			SRND42			3

### ■ Spare Parts

Clamp	Double screw	Shim	Shim pin	Wrench	Insert



## X Type Dimple Lock Holders



### ■ Inserts



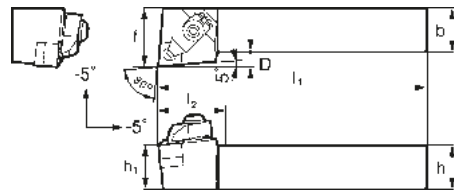
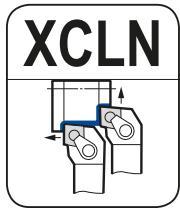
### ■ Spare Parts

Clamp	Clamp bolt	Shim	Shim pin	Spring	Wrench	Insert
DSLX8	BH0825	SSND423	SPP3	GSP10	LH050	①

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Clamp	Clamp bolt	Shim	Shim pin	Spring	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	D							
<b>XSBN R/L 2525 N12</b>	●		25	25	25	160	38	21,5	7	DSLX8	BH0825	SSND423	SPP3	GSP10	LH050	①



### ■ Inserts



### ■ Spare Parts

Clamp	Clamp bolt	Shim	Shim pin	Spring	Wrench	Insert
DSLX8	BH0825	SCND433	SPP3	GSP10	LH050	①

### ■ Holders

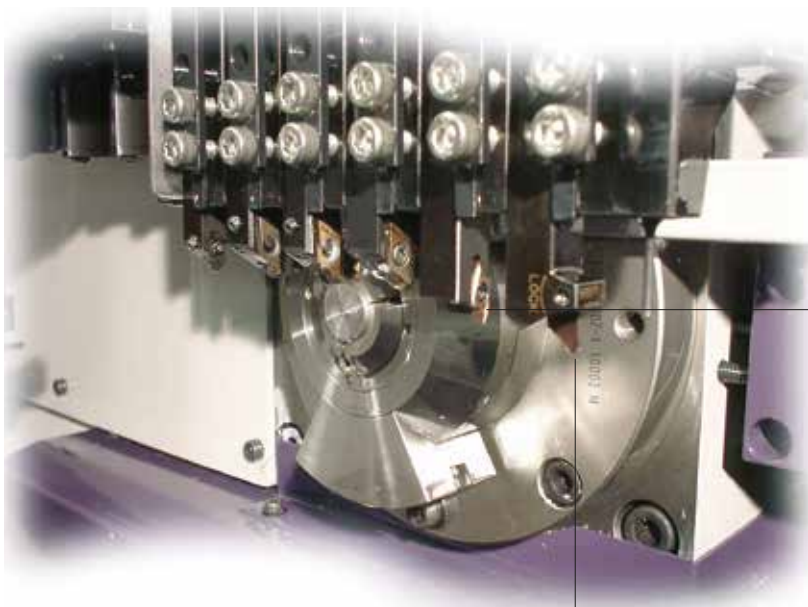
Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Clamp	Clamp bolt	Shim	Shim pin	Spring	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	D							
<b>XCLN R/L 2525 M12</b>	●		25	25	25	150	33	32	7	DSLX8	BH0825	SCND433	SPP3	GSP10	LH050	①

External Holders for neg. Inserts

# External Mini Holders

External Holders  
for pos. Inserts



## Back-Turning Tool Holder SBT Type

Sharp cutting edges with good surface finish.  
Max. reach of insert 8,0mm, edge width 2,5mm



## Cut-off Tool Holder SCT Type

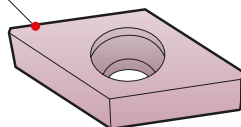
Easy insert change by just loosening the screw  
from the back.

Max. cut-off dia. Ø5mm, Ø12mm, Ø16mm

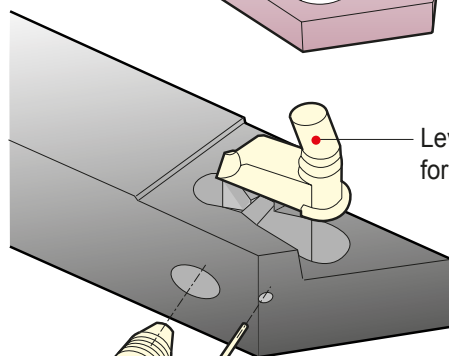


PDJCR type  
lever lock holder

Wear-resistant tool materials;  
**T1500A** (Cermet) and  
**AC530U** (2000 layers  
coated carbide grade)



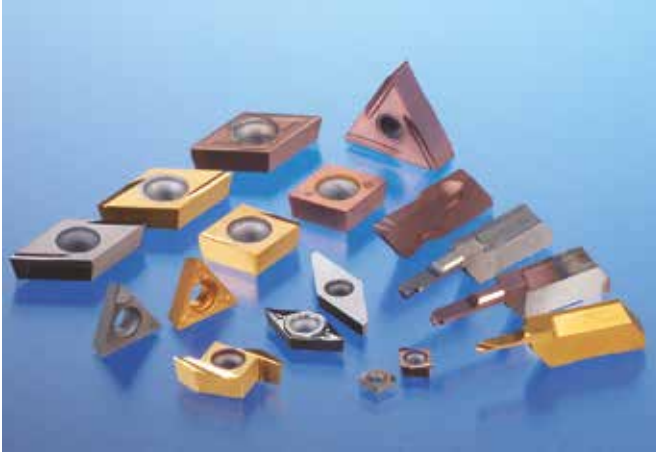
Sharp cutting edge  
( $r = 0,03$   
0,1 and 0,2 mm )



Lever lock clamping  
for 7° positive inserts

Easy access  
side locking screw

# External Mini Holders



In 1984, Sumitomo Electric Hardmetal first released the Mini Tool Holder series for the machining of small components in small NC autolathes.

A full range of insert grades comprising of the Cermet T1500A, SUMIBORON BN2000, SUMIDIA DA1000 and especially AC530U, was also introduced to meet a variety of machining requirements.

External Holders  
for pos. Inserts

## Grade Selection

Category	Application Range			Work Material					
	High Precision	Finish-Light Cut	Medium Cut	General Steel	Stainless Steel	Cast Iron	Heat Resistant Steel	Hardened Steel	Non-Ferrous Metal
Coated Carbide (PVD)	ACZ150			◎	◎				○
	AC510U			○	◎	○	◎		
	AC520U			○	◎	○	◎		
	AC530U			◎	◎	○	○		○
	New AC1030U			◎	◎	○	○		○
Cermet/Coated Cermet	T1000A			◎	○	◎			○
	T1500A / T1500Z			◎	○	○			○
Carbide	H1			○	○	○			◎
	EH510			○	○	○	◎		○
CBN (SUMIBORON)	BN1000 / BN2000							◎	
SUMIDIA	DA1000								◎

◎ Preferred Choice

○ Suitable

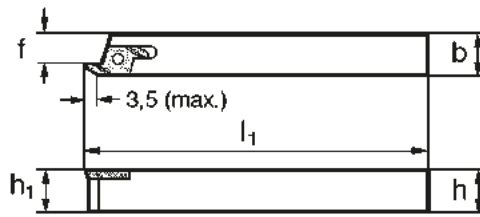
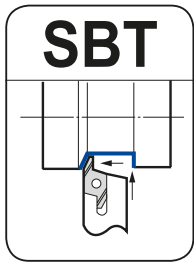
## Recommended Cutting Conditions

Work Material	P Free Cutting Steel		P Carbon Steel		M Stainless Steel		H Hardened Steel		N Aluminium		N Brass	
	$v_c$ (m/min)	f (mm/rev)	$v_c$ (m/min)	f (mm/rev)	$v_c$ (m/min)	f (mm/rev)	$v_c$ (m/min)	f (mm/rev)	$v_c$ (m/min)	f (mm/rev)	$v_c$ (m/min)	f (mm/rev)
ACZ150	50 - 200	0,02 - 0,10	50 - 150	0,01 - 0,08	50 - 150	0,01 - 0,05			70 - 300	0,05 - 0,20	70 - 300	0,05 - 0,20
AC510U	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 200	*0,02 - 0,10					70 - 300	0,05 - 0,20
AC520U	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 200	*0,02 - 0,10					70 - 300	0,05 - 0,20
AC530U	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 200	*0,02 - 0,10					70 - 300	0,05 - 0,20
AC1030U	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 200	*0,02 - 0,10					70 - 300	0,05 - 0,20
T1000A	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 150	*0,02 - 0,10			70 - 300	0,05 - 0,20	70 - 300	0,05 - 0,20
T1500A	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 150	*0,02 - 0,10			70 - 300	0,05 - 0,20	70 - 300	0,05 - 0,20
T1500Z	50 - 200	0,02 - 0,15	50 - 200	0,02 - 0,10	*50 - 150	*0,02 - 0,10			70 - 300	0,05 - 0,20	70 - 300	0,05 - 0,20
BN1000							50 - 200	0,02 - 0,10				
BN2000							50 - 120	0,02 - 0,10				
DA1000									70 - 300	0,02 - 0,10	70 - 300	0,02 - 0,10

\* Please use maximal possible C/speed

# External Mini Tool Holders SBT Type

## Special Mini Holders for Back Facing



### ■ Spare Parts

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock	Dimensions (mm)						Screw	⌚ (N·m)	Wrench	Insert
		h	h <sub>1</sub>	b	l <sub>1</sub>	f					
<b>SBT 35-R 1010</b>	●	10	10	10	120	7,5					
<b>SBT 35-R 1212</b>	●	12	12	12	120	9,5		BFTX0307N	<b>2,0</b>	TRX10	BTR 35_—
<b>SBT 35-R 1616</b>	●	16	16	16	120	13,5					

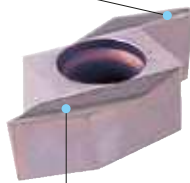
### ■ INSERTS

■ Coated carbide

□ Uncoated Cermet

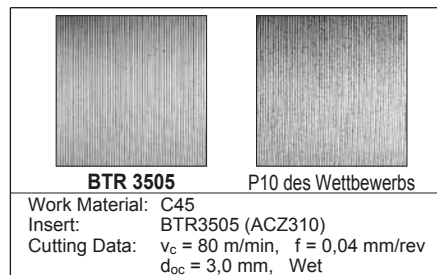
BTR	Ordering No.	Stock				Dimensions (mm)			
		AC130U	AC530U	ACZ310	T 1500A	d	s	r	
	<b>BTR 3505</b>	○	▲	●	○			0,05	
	<b>BTR 3515</b>	○	▲	●	○	6,8	3,8	0,15	

Sharp cutting edge with 15° rake angle



Wide groove breaker for smooth chip evacuation

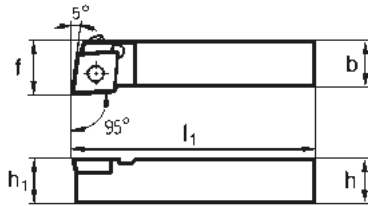
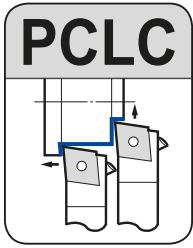
### ● Surface roughness comparison



### ■ Recommended cutting data (SBT type)

Work Material	Tooling	v <sub>c</sub> (m/min)	f (mm/rev)
General steel	Grooving	50 ~ 150	0,02 ~ 0,05
	Back facing		0,02 ~ 0,10
Free-cutting steel	Grooving	50 ~ 150	0,02 ~ 0,10
	Back facing		0,02 ~ 0,15
Stainless steel	Grooving	50 ~ 150	0,02 ~ 0,04
	Back facing		0,02 ~ 0,06

## P Type Lever Lock Holders



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	f		
<b>PCLC R/L 0810 K06</b>	☐	☐	8	8	10	125	10,5		
<b>PCLC R/L 1010 K06</b>	●	☐	10	10	10	125	10,5		
<b>PCLC R/L 1212 M09</b>	●	●	12	12	12	150	12,5		
<b>PCLC R/L 1616 M09</b>	●		16	16	16	150	16,5		



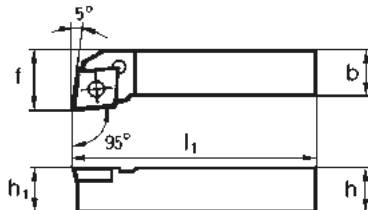
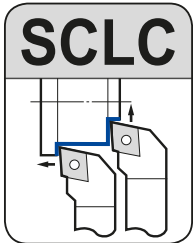
### ■ Inserts



### ■ Spare Parts

Lever pin	Clamp screw	Side pin	Wrench	Insert
LCL 06	BTT 0407	LP 07	TH 020	1
LCL 09	BTT 0411	LP 06		2

## S Type Screw Lock Holders



### ■ Holders

Above figures show right hand tools.

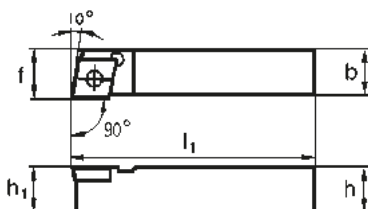
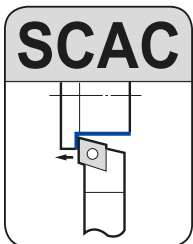
Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	f		
<b>SCLC R/L 0808 D06</b>	●	●	8	8	8	60	10		
<b>SCLC R/L 1010 E06</b>	●	●	10	10	10	70	12		
<b>SCLC R/L 1212 F09</b>	●	●	12	12	12	80	16		
<b>SCLC R/L 1616 H09</b>	●	●	16	16	16	100	20		
<b>SCLC R/L 2020 H09</b>	●	☐	20	20	20	100	25		
<b>SCLC R/L 2020 K09</b>	●	●	20	20	20	125	25		
<b>SCLC R/L 2020 K12</b>	●	●	20	20	20	125	25		
<b>SCLC R/L 2525 M12</b>	●	●	20	25	25	150	32		

### ■ Inserts



### ■ Spare Parts

Screw	(N·m)	Wrench	Insert
BFTX02506N	1,5	TRX08	1
BFTX0409N	3,4	TRX15	2
BFTX0511N	5,0	TRX20	3

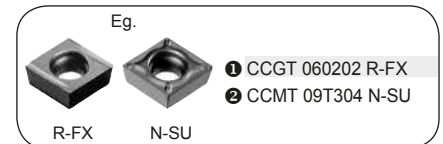


### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	f		
<b>SCAC R/L 0808 D06</b>	●	☐	8	8	8	60	8,5		
<b>SCAC R/L 1010 E06</b>	●	☐	10	10	10	70	10,5		
<b>SCAC R/L 1212 F09</b>	●	☐	12	12	12	80	12,5		

### ■ Inserts



### ■ Spare Parts

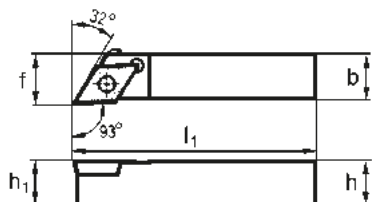
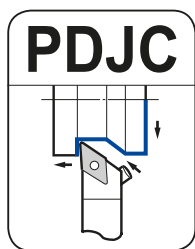
Screw	(N·m)	Wrench	Insert
BFTX02506N	1,5	TRX08	1
BFTX0409N	3,4	TRX15	2

External Holders  
for pos. Inserts

# External Mini Tool Holders PD/SD Type

Mini Holders for 7° DC \_\_\_ pos. Inserts

## P Type Lever Lock Holders



### ■ Inserts



### ■ Spare Parts

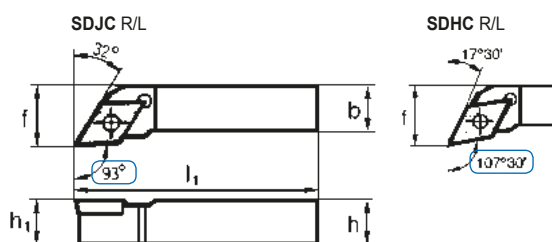
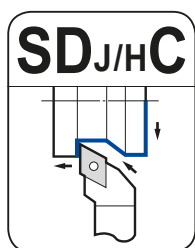
Ordering No.	Stock	Dimensions (mm)				Lever pin	Clamp screw	Side pin	Wrench	Insert
	R L	h	h <sub>1</sub>	b	l <sub>1</sub>	f				
PDJC R/L 0810 K07	● □	8	8	10	125	10,5				1
PDJC R/L 1010 K07	● ●	10	10	10	125	10,5				
PDJC R/L 1212 M11	● ●	12	12	12	150	12,5				2
PDJC R/L 1616 M11	● □	16	16	16	150	16,5				

### ■ Holders

Above figures show right hand tools.

External Holders for pos. Inserts

## S Type Screw Lock Holders



### ■ Inserts



### ■ Spare Parts

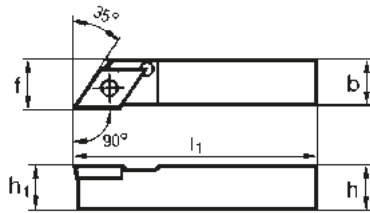
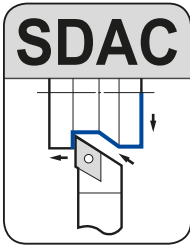
Ordering No.	Stock	Dimensions (mm)				Screw	Wrench	Insert			
	R L	h	h <sub>1</sub>	b	l <sub>1</sub>	f					
SDJC R/L 0808 D07	● ●	8	8	8	60	10		BFTX02506N	1,5	TRX08	1
SDJC R/L 1010 E07	● ●	10	10	10	70	12					
SDJC R/L 1212 F07	● ●	12	12	12	80	16					
SDJC R/L 1616 H07	● ●	16	16	16	100	20					
SDJC R/L 2020 K07	● ●	20	20	20	125	25					
SDJC R/L 1212 F11	● ●	12	12	12	80	16		BFTX0409N	3,4	TRX15	2
SDJC R/L 1616 H11	● ●	16	16	16	100	20					
SDJC R/L 2020 K11	● ●	20	20	20	125	25					
SDJC R/L 2525 M11	● ●	25	25	25	150	32					
SDHC R/L 1616 H11	● ●	16	16	16	100	20					
SDHC R/L 2020 K11	● ●	20	20	20	125	25		BFTX0409N	3,4	TRX15	2
SDHC R/L 2525 M11	● ●	25	25	25	150	32					

### ■ Holders

Above figures show right hand tools.



## S Type Screw Lock Holders



### ■ Holders

Above figures show right hand tools.

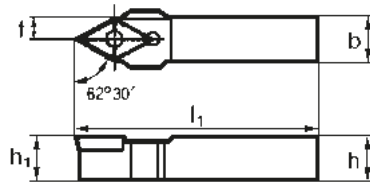
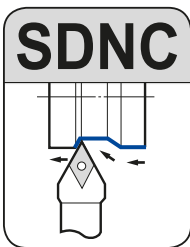
Ordering No.	Stock		Dimensions (mm)						Screw	N·m	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	f					
<b>SDAC R/L 0808 D07</b>	□	●	8	8	8	60	8,5	BFTX02506N	1,5	TRX08	①	
<b>SDAC R/L 1010 E07</b>	●	●	10	10	10	70	10,5					
<b>SDAC R/L 1212 F11</b>	●	●	12	12	12	80	12,5					BFTX0409N

### ■ Inserts



### ■ Spare Parts

Screw	N·m	Wrench	Insert
BFTX02506N	1,5	TRX08	①
BFTX0409N	3,4	TRX15	②



### ■ Holders

Ordering No.	Stock	Dimensions (mm)						Screw	N·m	Wrench	Insert
		h	h <sub>1</sub>	b	l <sub>1</sub>	f					
<b>SDNCN 0808 D07</b>	●	8	8	8	60	4,2	BFTX02506N	1,5	TRX08	①	
<b>SDNCN 1010 E07</b>	●	10	10	10	70	5,2					
<b>SDNCN 1212 F07</b>	●	12	12	12	80	6,2					
<b>SDNCN 1616 H07</b>	●	16	16	16	100	8,2					
<b>SDNCN 2020 K07</b>	●	20	20	20	125	10,2					
<b>SDNCN 1212 F11</b>	●	12	12	12	80	6,5	BFTX0409N	3,4	TRX15	②	
<b>SDNCN 1616 H11</b>	●	16	16	16	100	8,5					
<b>SDNCN 2020 K11</b>	●	20	20	20	125	10,5					
<b>SDNCN 2525 M11</b>	●	25	25	25	150	13					

### ■ Inserts

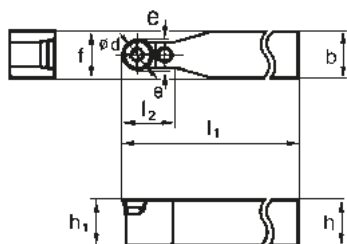
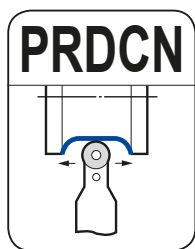


### ■ Spare Parts


Screw	N·m	Wrench	Insert
BFTX02506N	1,5	TRX08	①
BFTX0409N	3,4	TRX15	②

External Holders  
for pos. Inserts

### P Type Lever Lock Holders



#### ■ Inserts

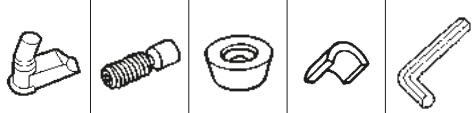
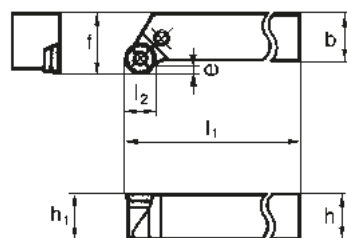
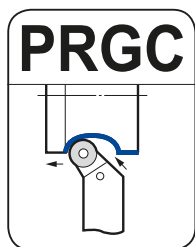
Eg.  N-RP

- ❶ RCOO 0906M0
- ❷ RCOO 1003M0 N-RO
- ❸ RCOO 1204M0 N-RO
- ❹ RCOO 1606M0 N-RO
- ❺ RCOO 2006M0 N-RO


#### ■ Spare Parts

Ordering No.	Stock	Dimensions (mm)							Lever pin	Clamp screw	Shim	Shim pin	Wrench	Insert
		h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	e						
<b>PRDC N 3225 P9</b>	☐	32	32	25	170	25	12,5	0,5	LCL3S	LCS 3	LSR817	LSP3	LH025	❶
<b>PRDC N 2020 M10</b>	●	20	20	20	150	22	15,0	1,0	LCL10	LCS10	LSR10	LSP10	LH020	❷
<b>PRDC N 2525 M10</b>	●	25	25	25	150	22	17,5	1,0	LCL12	LCS12	LSR12	LSP10	LH025	❸
<b>PRDC N 2525 M12</b>	●	25	25	25	150	24	18,5	1,2	LCL16	LCS16	LSR16	LSP16	LH025	❹
<b>PRDC N 3225 Q12</b>	●	32	32	25	180	24	18,5	1,2	LCL20	LCS20	LSR20	LSP20	LH030	❺
<b>PRDC N 3225 Q16</b>	●	32	32	25	180	28	20,5	1,5						
<b>PRDC N 3232 Q20</b>	●	32	32	32	180	32	26,0	1,7						

#### ■ Holders

#### ■ Inserts

Eg.  N-RP


- ❶ RCOO 0906M0
- ❷ RCOO 1003M0 N-RO
- ❸ RCOO 1204M0 N-RO
- ❹ RCOO 1606M0 N-RO
- ❺ RCOO 2006M0 N-RO

#### ■ Spare Parts

Above figures show right hand tools.

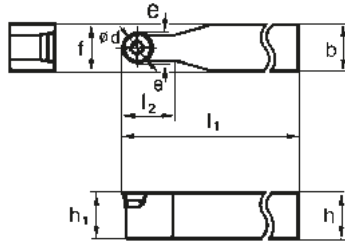
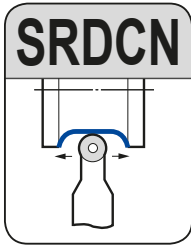
Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp screw	Shim	Shim pin	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	ød						
<b>PRGC R/L 3225 P9</b>	☐	☐	32	32	25	170	10	32	-	LCL3S	LCS 3	LSR817	LSP3	LH025	❶
<b>PRGC R/L 2020 K10</b>	●	☐	20	20	20	125	-	25	1,5	LCL10	LCS10	LSR10	LSP10	LH020	❷
<b>PRGC R/L 2525 M10</b>	●	●	25	25	25	150	-	32	1,5	LCL12	LCS12	LSR12	LSP10	LH025	❸
<b>PRGC R/L 2020 K12</b>	●	☐	20	20	20	125	-	25	2,5	LCL16	LCS16	LSR16	LSP16	LH025	❹
<b>PRGC R/L 2525 M12</b>	☐	●	25	25	25	150	-	32	2,5	LCL20	LCS20	LSR20	LSP20	LH030	❺
<b>PRGC R/L 3225 P12</b>	☐	☐	32	32	25	170	-	32	2,5						
<b>PRGC R/L 2525 M16</b>	●	☐	25	25	25	150	-	32	3						
<b>PRGC R/L 3225 P16</b>	●	☐	32	32	25	170	-	32	3						
<b>PRGC R/L 3232 P20</b>	●	☐	32	32	32	170	-	40	4						

#### ■ Holders





## S Type Screw Lock Holders



### ■ Holders

Ordering No.	Stock	Dimensions (mm)								Screw	Shim	Screw	Wrench	Wrench	Insert
		h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	e							
SRDC N 2020 K10T3	●	20	20	20	125	25	15,0	1,0	BFTX 03510-SD	SRNS 103-SD	BW 0508F-SD TRX...	TRX 15 IP-35	LH 035	①	
SRDC N 2525 M10T3	●	25	25	25	150	25	17,5	1,0	2,0 <sup>(NEM)</sup>						
SRDC N 2525 M12	●	25	25	25	150	28	18,5	1,2	BFTX 03512-SD	SRNS 123-SD	BW 0508F-SD TRX...	TRX 15 IP-35	LH 035	②	
SRDC N 3225 P12	●	32	32	25	170	28	18,5	1,2	2,0 <sup>(NEM)</sup>						
SRDC N 2525 M16	□	25	25	25	150	35	20,5	1,5	BFTX 0517-SD	SRNS 164-SD	BW 0810F-SD	LT 20 IP	LH 050	③	
SRDC N 3225 P16	●	32	32	25	170	35	20,5	1,5	5,0 <sup>(NEM)</sup>						
SRDC N 3232 P16	□	32	32	32	170	35	20,5	1,5	BFTX 0618-SD	SRNS 204-SD	BW 0912F-SD	LT 25 IP	LH 060	④	
SRDC N 3232 P20	●	32	32	32	170	40	26,0	1,7	7,5 <sup>(NEM)</sup>						








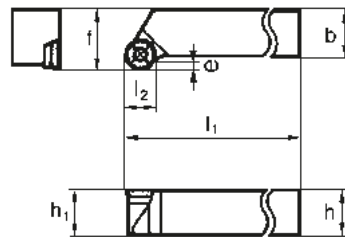
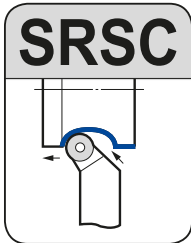
### ■ Inserts

Eg.  N-RX

- RCOO 1003M0
- ① RCOO 10T3M0 N-RO
- ② RCOO 1204M0 N-RO
- ③ RCOO 1606M0 N-RO
- ④ RCOO 2006M0 N-RO

### ■ Spare Parts


					Insert
BFTX 03510-SD	SRNS 103-SD	BW 0508F-SD	TRX 15 IP-35	LH 035	①
BFTX 03512-SD	SRNS 123-SD	BW 0508F-SD	TRX 15 IP-35	LH 035	②
BFTX 0517-SD	SRNS 164-SD	BW 0810F-SD	LT 20 IP	LH 050	③
BFTX 0618-SD	SRNS 204-SD	BW 0912F-SD	LT 25 IP	LH 060	④



### ■ Holders






Ordering No.	Stock		Dimensions (mm)								Screw	Shim	Screw	Wrench	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	e							
SRSC R/L 2020 K10T3	●	●	20	20	20	125	-	25	1,5	BFTX 03510-SD	SRNS 103-SD	BW 0508F-SD	TRX 15 IP-35	LH 035	①	
SRSC R/L 2525 M10T3	●	●	25	25	25	150	-	32	1,5	2,0 <sup>(NEM)</sup>						
SRSC R/L 2525 M12	●	●	25	25	25	150	-	32	2,5	BFTX 03512-SD	SRNS 123-SD	BW 0508F-SD	TRX 15 IP-35	LH 035	②	
SRSC R/L 3225 P12	●	●	32	32	25	170	-	32	2,5	2,0 <sup>(NEM)</sup>						
SRSC R/L 3225 M16	□	□	25	25	25	150	-	32	3,0	BFTX 0517-SD	SRNS 164-SD	BW 0810F-SD	LT 20 IP	LH 050	③	
SRSC R/L 3225 P16	●	●	32	32	25	170	-	32	3,0	5,0 <sup>(NEM)</sup>						
SRSC R/L 3232 P16	□	□	32	32	32	170	-	40	3,0	BFTX 0618-SD	SRNS 204-SD	BW 0912F-SD	LT 25 IP	LH 060	④	
SRSC R/L 3232 P20	●	●	32	32	32	170	-	40	4,0	7,5 <sup>(NEM)</sup>						

### ■ Inserts

Eg.  N-RX

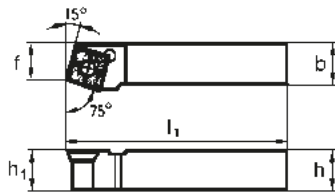
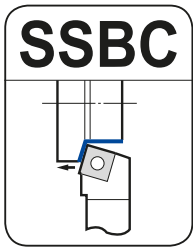
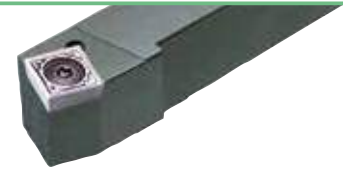
- RCOO 1003M0
- ① RCOO 10T3M0 N-RO
- ② RCOO 1204M0 N-RO
- ③ RCOO 1606M0 N-RO
- ④ RCOO 2006M0 N-RO

### ■ Spare Parts

					Insert
BFTX 03510-SD	SRNS 103-SD	BW 0508F-SD	TRX 15 IP-35	LH 035	①
BFTX 03512-SD	SRNS 123-SD	BW 0508F-SD	TRX 15 IP-35	LH 035	②
BFTX 0517-SD	SRNS 164-SD	BW 0810F-SD	LT 20 IP	LH 050	③
BFTX 0618-SD	SRNS 204-SD	BW 0912F-SD	LT 25 IP	LH 060	④

External Holders  
for pos. Inserts

#### S Type Screw Lock Holders



#### ■ Inserts



#### ■ Spare Parts

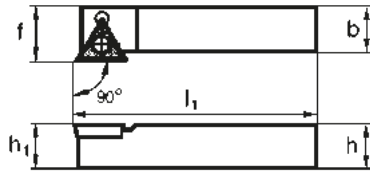
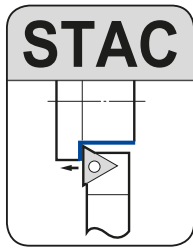
#### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Screw	Ⓜ (N·m)	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	f						
<b>SSBC R/L 1010 E07</b>	☐	☐	10	10	10	70	9			BFTX0307N	<b>2,0</b>	TRX10	①
<b>SSBC R/L 1212 F09</b>	☐	●	12	12	12	80	11			BFTX0409N	<b>3,4</b>	TRX15	②
<b>SSBC R/L 1616 H09</b>	●	●	16	16	16	100	13						
<b>SSBC R/L 2020 K12</b>	☐	☐	20	20	20	125	17			BFTX0511N	<b>5,0</b>	TRX20	③
<b>SSBC R/L 2525 M12</b>	☐	☐	25	25	25	150	22						

External Holders for pos. Inserts

## S Type Screw Lock Holders



### ■ Holders

Above figures show right hand tools.

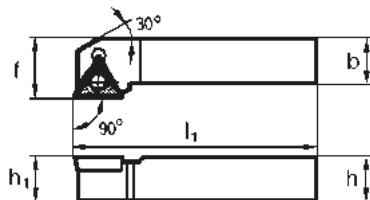
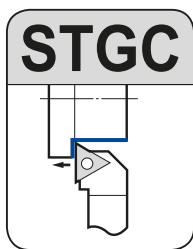
Ordering No.	Stock		Dimensions (mm)						Screw	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	f				
<b>STAC R/L 0808 D09</b>	●		8	8	8	60	8,5	BFTX02205N	1,1	TRX06	①
<b>STAC R/L 1010 E09</b>	□		10	10	10	70	10,5	BFTX02506N	1,5	TRX08	②
<b>STAC R/L 1212 F11</b>	●	□	12	12	12	80	12,5				

### ■ Inserts



### ■ Spare Parts

Screw	Wrench	Insert
BFTX02205N	TRX06	①
BFTX02506N	TRX08	②

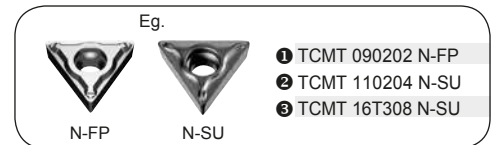


### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						Screw	Wrench	Insert
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	f				
<b>STGC R/L 0808 D09</b>	□		8	8	8	60	10	BFTX02205N	1,1	TRX06	①
<b>STGC R/L 1010 E09</b>	●	●	10	10	10	70	12	BFTX02506N	1,5	TRX08	②
<b>STGC R/L 1212 F11</b>	●	●	12	12	12	80	16	BFTX0409N	3,4	TRX15	③
<b>STGC R/L 1616 H11</b>	●	●	16	16	16	100	20				
<b>STGC R/L 1616 H16</b>	●	●	16	16	16	100	20				
<b>STGC R/L 2020 K16</b>	●	●	20	20	20	125	25				
<b>STGC R/L 2525 M16</b>	□	□	25	25	25	150	32				

### ■ Inserts

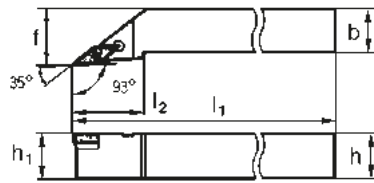
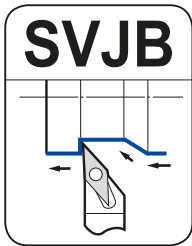
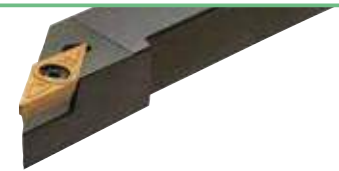


### ■ Spare Parts

Screw	Wrench	Insert
BFTX02205N	TRX06	①
BFTX02506N	TRX08	②
BFTX0409N	TRX15	③

External Holders  
for pos. Inserts

### S Type Screw Lock Holders



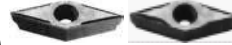
#### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	
SVJB R/L 1212 F11	●	●	12	12	12	80	25	16	
SVJB R/L 1616 H11	●	●	16	16	16	100	25	20	
SVJB R/L 2020 K16	●	●	20	20	20	125	41	25	
SVJB R/L 2525 M16	●	●	25	25	25	150	41	32	
SVJB R/L 3225 P16	●	●	32	32	25	170	41	32	

#### ■ Inserts

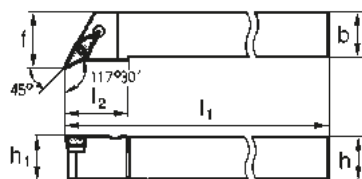
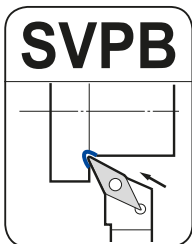
Eg.



- 1 VBMT 110202 N-FP
- 2 VBMT 160404 N-SU

#### ■ Spare Parts

Stopper	Nut	Shim	Wrench	ScREW	WRENCH	Insert
-	-	-	-	BFTX 02508NV 1,5 (N·m)	TRX08	1
VP20	CPV33N	SVP32	LH025	BFTX 03508 2,0 (N·m)	TRX10	2
VP25						
VP32						



#### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	
SVPB R/L 1212 F11	●	□	12	12	12	80	25	16	
SVPB R/L 1616 H11	●	●	16	16	16	100	25	20	
SVPB R/L 2020 K16	●	●	20	20	20	125	36	25	
SVPB R/L 2525 M16	●	●	25	25	25	150	36	32	
SVPB R/L 3225 P16	●	●	32	32	25	170	36	32	

#### ■ Inserts

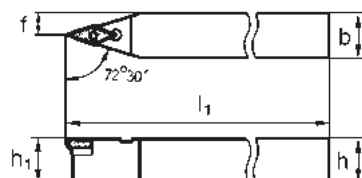
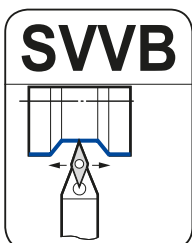
Eg.



- 1 VBMT 110202 N-FP
- 2 VBMT 160404 N-SU

#### ■ Spare Parts

Stopper	Nut	Shim	Wrench	ScREW	WRENCH	Insert
-	-	-	-	BFTX 02508NV 1,5 (N·m)	TRX08	1
VP20	CPV33N	SVP32	LH025	BFTX 03508 2,0 (N·m)	TRX10	2
VP25						
VP32						



#### ■ Holders

Ordering No.	Stock	Dimensions (mm)						
		h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	
SVVB N 1212 F11	●	12	12	12	80	-	6	
SVVB N 1616 H11	●	16	16	16	100	-	8	
SVVB N 2020 K16	●	20	20	20	125	-	10	
SVVB N 2525 M16	●	25	25	25	150	-	12,5	
SVVB N 3225 P16	●	32	32	25	170	-	12,5	

#### ■ Inserts

Eg.

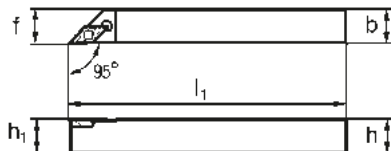
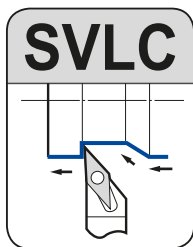


- 1 VBMT 110202 N-FP
- 2 VBMT 160404 N-SU

#### ■ Spare Parts

Stopper	Nut	Shim	Wrench	ScREW	WRENCH	Insert
-	-	-	-	BFTX 02508NV 1,5 (N·m)	TRX08	1
VP20	CPV33N	SVP32	LH025	BFTX 03508 2,0 (N·m)	TRX10	2
VP25						
VP32						

## S Type Screw Lock Holders



### ■ Holders

Above figures show right hand tools.

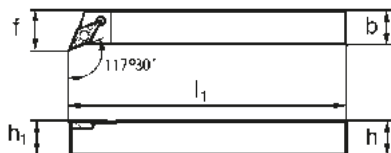
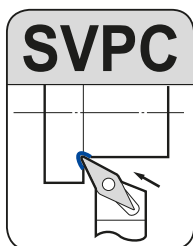
Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	f	
SVLC R/L 1010 H11	●	●	10	10	10	100	10,5	
SVLC R/L 1212 H11	●	●	12	12	12	100	12,5	
SVLC R/L 1616 H11	●	●	16	16	16	100	16,5	
SVLC R/L 2525 M11	●		25	25	25	150	25,5	

### ■ Inserts



### ■ Spare Parts

Screw	Wrench	Insert
BFTX 02508NV	1,5 TRX08	①



### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h <sub>1</sub>	b	l <sub>1</sub>	f	
SVPC R/L 1010 H11	□	□	10	10	10	100	14,5	
SVPC R/L 1212 H11	●	●	12	12	12	100	16,5	
SVPC R/L 1616 H11	●	●	16	16	16	100	20,5	

### ■ Inserts



### ■ Spare Parts

Screw	Wrench	Insert
BFTX 02508NV	1,5 TRX08	①

External Holders  
for pos. Inserts

# External Tool Holders

## Polygon - Shank Holder



### ■ Features

The Sumitomo polygon shank holders enable an extremely high stiffness connection between machine and tool. The conical polygon can take high bending and torque moments based on the combination of the face contact to the spindle.

This self-guiding coupling system offers high precision and a repeatability of  $\pm 2\mu\text{m}$  in X, Y and Z axis.

While using this easy and quick coupling system it is possible to gain higher machine utilization time as the set-up and tool change times are reduced.

The compact design and the high stiffness connection to the spindle offer a versatile use e.g. on multi-task machines, machining centers and turning-milling centers.



### ■ Characteristics

- original SUMITOMO D-type double clamping system
- compact design
- monoblock system - no additional interfaces
- precise positioning; self-guiding with high repeatability
- high stiffness supported by face contact of holder
- carbide shims to prevent holders from damage
- simple tool holder change and low-maintenance operation
- internal coolant supply directly to the cutting edge
- Polygon shank and insert seat hardened for long holder life

Polygon - shank holder - produced according to ISO 26623-1

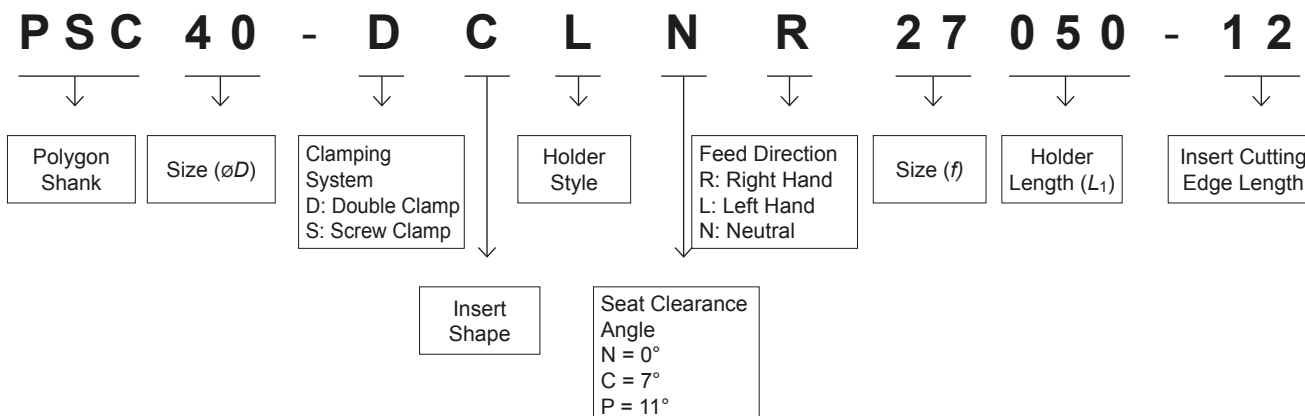
Negative Insert Type



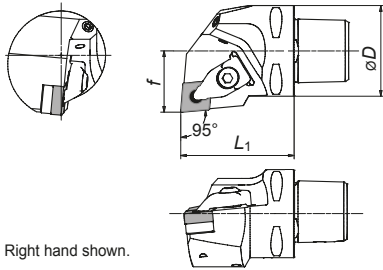
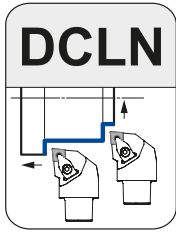
Positive Insert Type



### ■ Classification System for Polygon - Shank Holder



General Turning, Copying and Facing

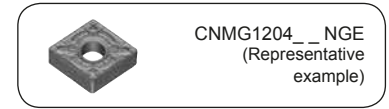


Right hand shown.

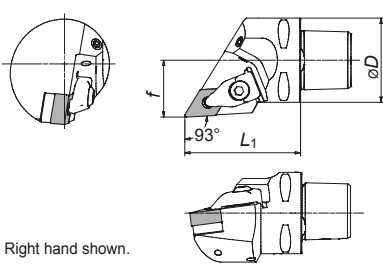
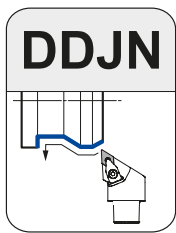
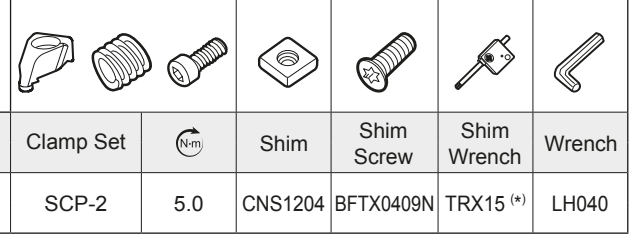
■ Holders

Cat. No.	Stock		Dimensions (mm)			Applicable Insert	Clamp Set	N·m	Shim	Shim Screw	Shim Wrench	Wrench
	R	L	L <sub>1</sub>	f	∅D							
PSC40 DCLN R/L 27050-12	●	●	50	27	40	CN□□ 1204	SCP-2	5.0	CNS1204	BFTX0409N	TRX15 (*)	LH040
PSC50 DCLN R/L 35060-12	●	●	60	35	50							

■ Inserts



■ Spare Parts



Right hand shown.

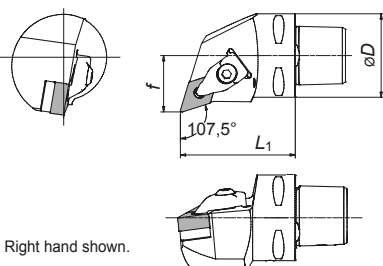
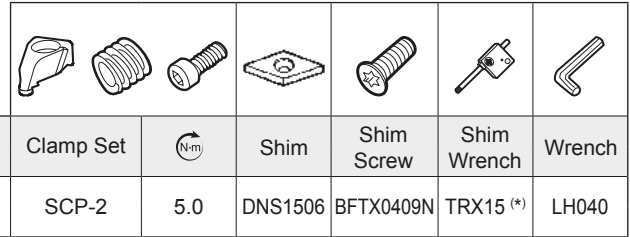
■ Holders

Cat. No.	Stock		Dimensions (mm)			Applicable Insert	Clamp Set	N·m	Shim	Shim Screw	Shim Wrench	Wrench
	R	L	L <sub>1</sub>	f	∅D							
PSC40 DDJN R/L 27055-15	●	●	55	27	40	DN□□ 1506	SCP-2	5.0	DNS1506	BFTX0409N	TRX15 (*)	LH040
PSC50 DDJN R/L 35060-15	●	●	60	35	50							

■ Inserts



■ Spare Parts



Right hand shown.

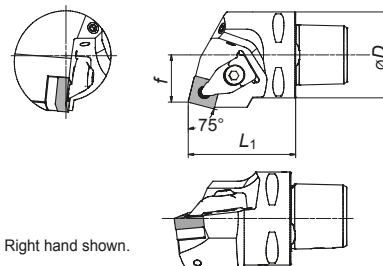
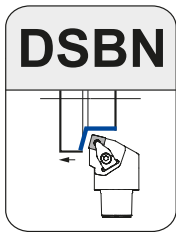
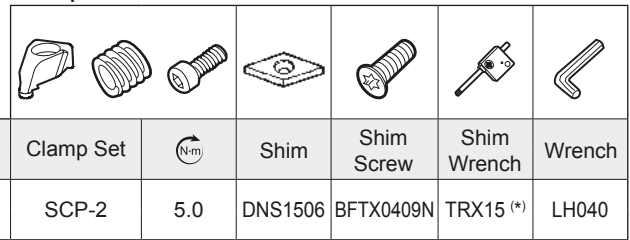
■ Holders

Cat. No.	Stock		Dimensions (mm)			Applicable Insert	Clamp Set	N·m	Shim	Shim Screw	Shim Wrench	Wrench
	R	L	L <sub>1</sub>	f	∅D							
PSC40 DDHN R/L 27055-15	●	●	55	27	40	DN□□ 1506	SCP-2	5.0	DNS1506	BFTX0409N	TRX15 (*)	LH040
PSC50 DDHN R/L 35060-15	●	●	60	35	50							

■ Inserts



■ Spare Parts

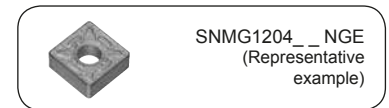


Right hand shown.

■ Holders

Cat. No.	Stock		Dimensions (mm)			Applicable Insert	Clamp Set	N·m	Shim	Shim Screw	Shim Wrench	Wrench
	R	L	L <sub>1</sub>	f	∅D							
PSC40 DSBN R/L 22050-12	●	●	50	22	40	SN□□ 1204	SCP-2	5.0	SNS1204	BFTX0409N	TRX15 (*)	LH040
PSC50 DSBN R/L 27060-12	●	●	60	27	50							

■ Inserts



■ Spare Parts

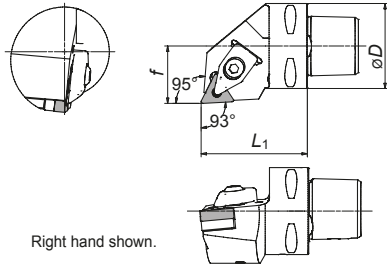
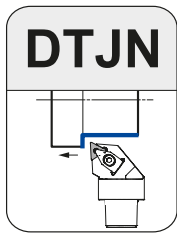


(\*) Item is sold separately.

# External Tool Holders Polygon - Shank Holder

## Negative Insert Type

### General Turning and Facing

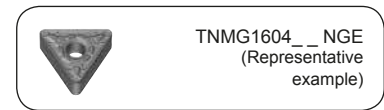


Right hand shown.

#### ■ Holders

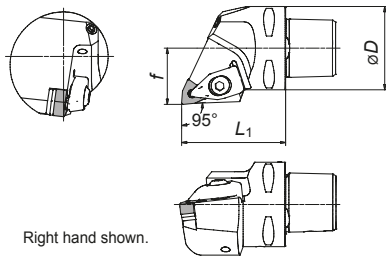
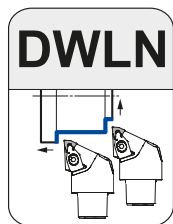
Cat. No.	Stock		Dimensions (mm)			Applicable Insert
	R	L	L <sub>1</sub>	f	øD	
PSC40 DTJN R/L 27050-16	●	●	50	27	40	TN□□ 1604
PSC50 DTJN R/L 35060-16	●	●	60	35	50	

#### ■ Inserts



#### ■ Spare Parts

Clamp Set		Shim	Shim Screw	Shim Wrench	Wrench
SCP-1	5.0	TNS1604	BFTX0307N	TRX15 (*)	LH040

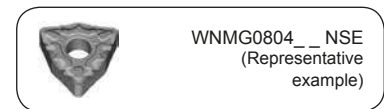


Right hand shown.

#### ■ Holders

Cat. No.	Stock		Dimensions (mm)			Applicable Insert
	R	L	L <sub>1</sub>	f	øD	
PSC40 DWLN R/L 27050-06	●	●	50	27	40	WN□□ 06
PSC50 DWLN R/L 35060-06	●	●	60	35	50	
PSC40 DWLN R/L 27050-08	●	●	50	27	40	WN□□ 08
PSC50 DWLN R/L 35060-08	●	●	60	35	50	

#### ■ Inserts



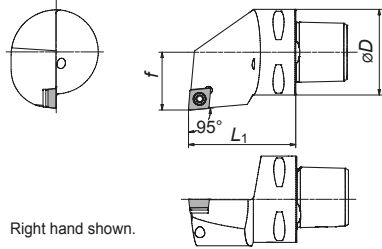
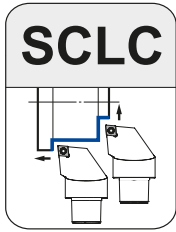
#### ■ Spare Parts

Clamp Set		Shim	Shim Screw	Shim Wrench	Wrench
SCP-1	5.0	WNS0604	BFTX0307N	TRX15 (*)	LH040
SCP-2	5.0	WNS0804	BFTX0409N	TRX15 (*)	LH040

(\*) Item is sold separately.



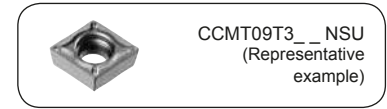
General Turning, Copying and Facing



■ Holders

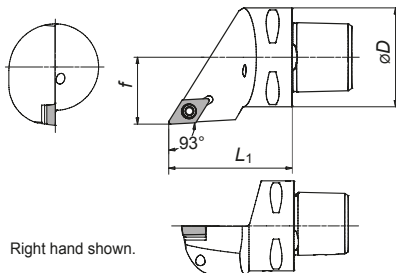
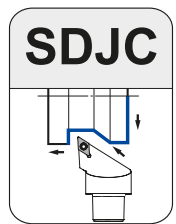
Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	ØD	
PSC40 SCLC R/L 27050-09	●	●		50	27	40	CC□□ 09T3
PSC50 SCLC R/L 35060-09	●	●		60	35	50	

■ Inserts



■ Spare Parts

Shim	Shim Screw	Insert Screw	Wrench	Shim Wrench
CCS09T3	KGBS1111	KSS1111	3,5	LH035K*



■ Holders

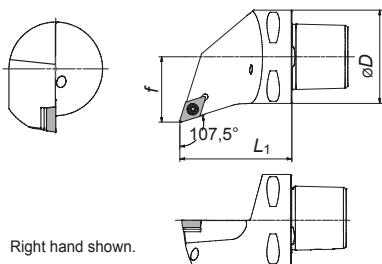
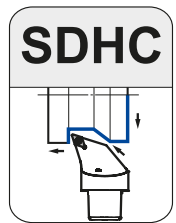
Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	ØD	
PSC40 SDJC R/L 27050-11	●	●		50	27	40	DC□□ 11T3
PSC50 SDJC R/L 35060-11	●	●		60	35	50	

■ Inserts



■ Spare Parts

Shim	Shim Screw	Insert Screw	Wrench	Shim Wrench
DCS11T3	KGBS1111	KSS1111	3,5	LH035K*



■ Holders

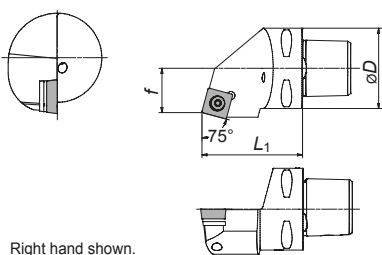
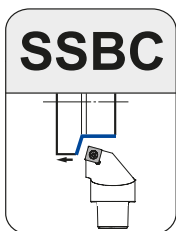
Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	ØD	
PSC40 SDHC R/L 27050-11	●	●		50	27	40	DC□□ 11T3
PSC50 SDHC R/L 35060-11	●	●		60	35	50	

■ Inserts



■ Spare Parts

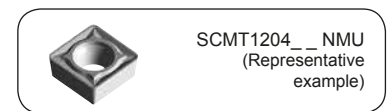
Shim	Shim Screw	Insert Screw	Wrench	Shim Wrench
DCS11T3	KGBS1111	KSS1111	3,5	LH035K*



■ Holders

Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	ØD	
PSC40 SSBC R/L 22050-12	●	●		50	22	40	SC□□ 1204
PSC50 SSBC R/L 27060-12	●	●		60	27	50	

■ Inserts



■ Spare Parts

Shim	Shim Screw	Insert Screw	Wrench	Shim Wrench
SCS1204	KGBS1221	KSS1221	4,5	LH045K*

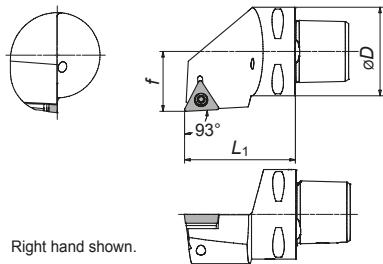
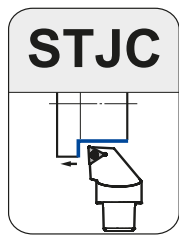
(\*) Item is sold separately.

# External Tool Holders

## Polygon - Shank Holder

### Positive Insert Type

#### General Turning, Copying and Facing



Right hand shown.

#### ■ Holders

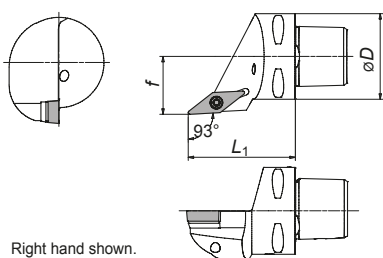
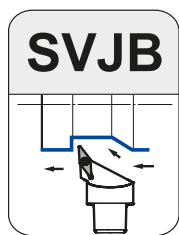
Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	∅D	
PSC40 STJC R/L 27050-16	●	●		50	27	40	TC□□ 16T3
PSC50 STJC R/L 35060-16	●	●		60	35	50	

#### ■ Inserts



#### ■ Spare Parts

Shim	Shim Screw	Insert Screw	$\curvearrowright$ (N·m)	Wrench	Shim Wrench
TCS16T3	KGBS1111	KSS1111	3,5	LT15K	LH035K*

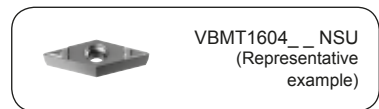


Right hand shown.

#### ■ Holders

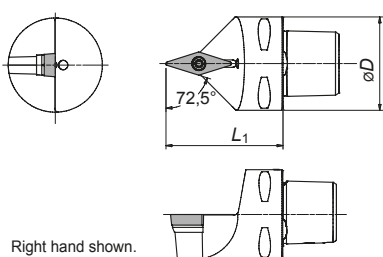
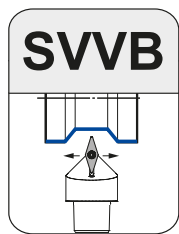
Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	∅D	
PSC40 SVJB R/L 27050-16	●	●		50	27	40	VB□□ 1604
PSC50 SVJB R/L 35060-16	●	●		60	35	50	

#### ■ Inserts



#### ■ Spare Parts

Shim	Shim Screw	Insert Screw	$\curvearrowright$ (N·m)	Wrench	Shim Wrench
VCS1604	KGBS1111	KSS1111	3,5	LT15K	LH035K*

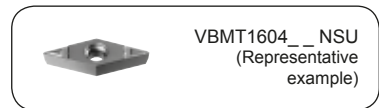


Right hand shown.

#### ■ Holders

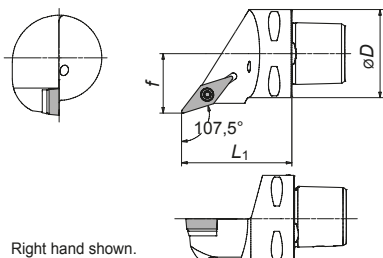
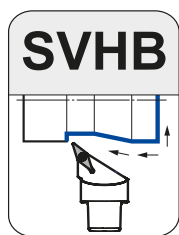
Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	∅D	
PSC40 SVVB N 00050-16			●	50		40	VB□□ 1604
PSC50 SVVB N 00060-16			●	60		50	

#### ■ Inserts



#### ■ Spare Parts

Shim	Shim Screw	Insert Screw	$\curvearrowright$ (N·m)	Wrench	Shim Wrench
VCS1604	KGBS1111	KSS1111	3,5	LT15K	LH035K*

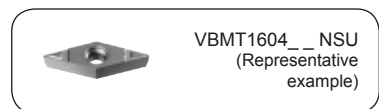


Right hand shown.

#### ■ Holders

Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	∅D	
PSC40 SVHB R/L 27050-16	●	●		50	27	40	VB□□ 1604
PSC50 SVHB R/L 35060-16	●	●		60	35	50	

#### ■ Inserts



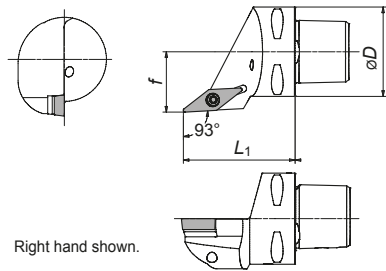
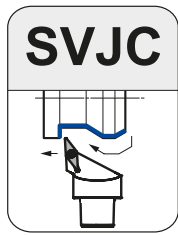
#### ■ Spare Parts

Shim	Shim Screw	Insert Screw	$\curvearrowright$ (N·m)	Wrench	Shim Wrench
VCS1604	KGBS1111	KSS1111	3,5	LT15K	LH035K*

(\*) Item is sold separately.

External Holders for pos. Inserts

## General Turning, Copying and Facing

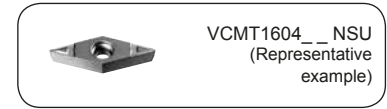


Right hand shown.

### ■ Holders

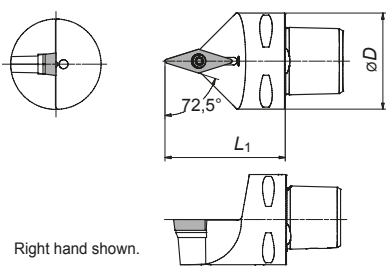
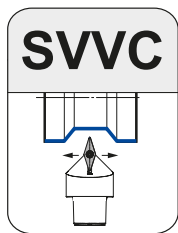
Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	øD	
PSC40 SVJC R/L 27050-16	●	●		50	27	40	VC□□ 1604
PSC50 SVJC R/L 35060-16	●	●		60	35	50	

### ■ Inserts



### ■ Spare Parts

Shim	Shim Screw	Insert Screw		Wrench
VCS1604	KGBS1111	KSS1111	3,5	LT15K
				LH035K*

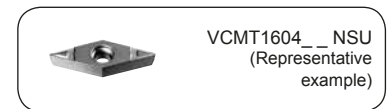


Right hand shown.

### ■ Holders

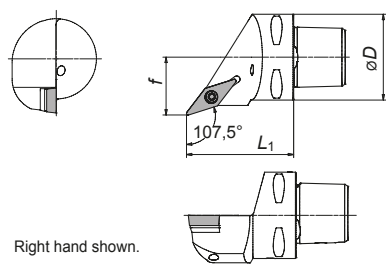
Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	øD	
PSC40 SVVC N 00050-16			●	50		40	VC□□ 1604
PSC50 SVVC N 00060-16			●	60		50	

### ■ Inserts



### ■ Spare Parts

Shim	Shim Screw	Insert Screw		Wrench
VCS1604	KGBS1111	KSS1111	3,5	LT15K
				LH035K*

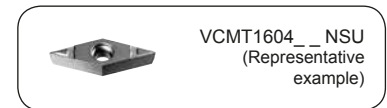


Right hand shown.

### ■ Holders

Cat. No.	Stock			Dimensions (mm)			Applicable Insert
	R	L	N	L <sub>1</sub>	f	øD	
PSC40 SVHC R/L 27050-16	●	●		50	27	40	VC□□ 1604
PSC50 SVHC R/L 35060-16	●	●		60	35	50	

### ■ Inserts



### ■ Spare Parts

Shim	Shim Screw	Insert Screw		Wrench
VCS1604	KGBS1111	KSS1111	3,5	LT15K
				LH035K*

(\*) Item is sold separately.



# Boring Bars

E1 ~ E24



Boring Bars

Selection	Boring Tool Selection Table .....	E2 - 4
ISO	Boring Tool Identification Table .....	E5
Features	Boring Tool Series .....	E6 - 7

## Boring Bars for Negative Insert Type :

CN_ _ :	<b>D...DCLN / S...PCLN</b> .....	E8
DN_ _ :	<b>D...DDUN / S...PDUN</b> .....	E9
SN_ _ :	<b>S...PSKN</b> .....	E10
<b>SumiTurn T-Rex</b>	<b>S...DTR</b> .....	E11
TN_ _ :	<b>D...DTFN / S...PTFN</b> .....	E12
WN_ _ :	<b>D...DWLN / S...WMLN</b> .....	E13

## Boring Bars for Positive Insert Type :

<b>X-Bar for CC_ _ :</b>	<b>B/D...SCLC</b> .....	E14
CC_ _ :	<b>S ... SCLC</b> .....	E14
CP_ _ :	<b>S/C...SCLP</b> .....	E15
<b>X-Bar for DC_ _ :</b>	<b>B/D...SDUC / SDQC</b> .....	E16-17
DC_ _ :	<b>S ... SDQC / SDUC</b> .....	E16-17
SP_ _ :	<b>S/C...SSKP</b> .....	E18
TC_ _ :	<b>S ... STFC</b> .....	E19
<b>X-Bar for TP_ _ :</b>	<b>B/D...STUP</b> .....	E20
TP_ _ :	<b>S/C...STUP</b> .....	E20
<b>X-Bar for VB_ _ :</b>	<b>D ... SVUB / SVZB</b> .....	E21
VB_ _ :	<b>S ... SVQB / SVUB / SVZB</b> .....	E22
WB_ _ :	<b>S/C...SWUB</b> .....	E23

Very Small Dia. Boring	<b>BXBR...R(-NB)</b> .....	E24
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# Boring Tools Selection

According to Applications / Boring -  $\phi D$

## BORING TOOLS

Coloured boxes indicate available size.


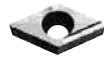






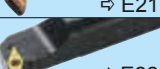
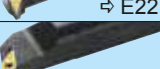



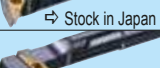
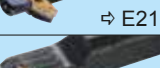
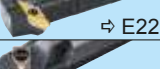


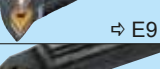








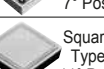
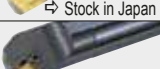


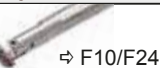
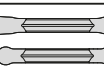


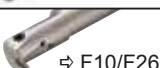
Application	Type	Boring Depth (L/D)			Applicable Insert	Tooling	Min. Boring $\phi D$ (mm)																						
		Shank					(Min. cutting diameter is shown when not matched in this table.)																						
		Steel	Carbide	X-Bar (Steel)			2	2.5	3	3.5	4	4.5	5	6	7	8	10	12	13	14	16	18	20	22	25	28	35	44	54
Very Small Dia. Boring	BXBR ⇒ E24			~ 5	Special boring bar		○	○	○	○	○	○																	
	DABB ⇒ M45			~ 2	Sumidia brazed			●	●	●	●	●																	
Stop Boring	BSME ⇒ M36-M38			~ 4	Sumiboron brazed		●	●	●	●	●																		
	SEXC ⇒ M36,37,39			~ 3	Sumiboron insert					●	●	●																	
	BNBB ⇒ M40			~ 5	Sumiboron brazed				●	●	●	●	●																
	BNB ⇒ M41			~ 4	Sumiboron insert									●	●	●	●	●	●										
	S/C-SWUB ⇒ E23			~ 3 ~ 8	Trigon Type 5° Pos.							●																	
	S-STFC ⇒ E19			~ 3													●	●	●	●	●	●	●	●	●	●	●	●	
	B/D-STUP ⇒ E20			~ 6											●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	S-STUP(B) ⇒ E20			~ 3	Triangle Type 5° & 11° Pos.										●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	C-STUP ⇒ E20			~ 8											●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	CTFP ⇒ Stock in Japan			~ 3	Triangle 11° Pos.														○	○	○	○	○	○	○	○	○	○	
	D-DTFN ⇒ E12			~ 3 ~ 6																						●	●	●	●
	S-PTFN ⇒ E12				Triangle Neg. Type																					●	●	●	●
	Bottom Facing	BNZ ⇒ M33			~ 5	Sumiboron insert									●	●	●	●	●	●	●	●	●	●	●	●	●	●	
		S-SCLP ⇒ E15			~ 3													●	●	●	●	●	●	●	●	●	●	●	
B-SCLP ⇒ Stock in Japan				~ 6	80° Diamond 11° Pos. Type													○	○	○	○	○	○	○	○	○	○		
C-SCLP ⇒ E15				~ 8																									
B/D-SCLC ⇒ E14				~ 6																						●	●	●	
S-SCLC ⇒ E14				~ 3	80° Diamond 7° Pos. Type																					●	●	●	
C-SCLC ⇒ Stock in Japan				~ 8																									
D-DCLN ⇒ E8				~ 6																							●	●	●
S-PCLN ⇒ E8				~ 3	80° Diamond Neg. Type																						●	●	●
D-DWLN ⇒ E13				~ 6																							●	●	●
S-MWLN ⇒ E13			~ 3	Trigon Neg. Type																						●	●	●	

● = Eurostock  
○ = Japanstock

# Boring Tools Selection

## ■ BORING TOOLS

Coloured boxes indicate available size.

Application	Type	Boring Depth (L/D)			Applicable Insert	Tooling	Min. Boring $\phi$ D (mm)																						
		Shank					6	8	10	12	13	14	16	18	20	22	25	28	32	34	35	40	44	50	54	70			
		Steel	Carbide	X-Bar (Steel)																									
Copying	B/D-SDUC  ⇒ E16			~ 6	55° Diamond 7° Pos. Type 																								
	S-SDUC  ⇒ E16			~ 3																									
	C-SDUC  ⇒ Stock in Japan			~ 8																									
	B/D-SDQC  ⇒ E17			~ 6																									
	S-SDQC  ⇒ E17			~ 3																									
	D-SVUB  ⇒ E21			~ 6																									
	S-SVUB  ⇒ E22			~ 3																									
	S-SVQB  ⇒ E22			~ 3																									
	B/C-SVQB  ⇒ Stock in Japan			~ 8			~ 6	35° Diamond Type 5° & 7° Pos. 																					
	D-SVZB  ⇒ E21			~ 6																									
	S-SVZB  ⇒ E22																												
	D-DDUN  ⇒ E9			~ 6				55° Diamond Neg. Type 																					
	S-PDUN  ⇒ E9			~ 3																									
	Through Boring	S-SSKP  ⇒ E18					~ 3	55° Diamond Neg. Type 																					
C-SSKP  ⇒ E18				~ 8																									
SSKC  ⇒ Stock in Japan				~ 3	Square Type 7° Pos. 																								
CSKP  ⇒ Stock in Japan				~ 3	Square Type 11° Pos. 																								
S-PSKN  ⇒ E10				~ 3	Square Neg. Type 																								
Grooving	GNDI  ⇒ F10/F24			~																									
	GNDIS   ⇒ F10/F26			~																									

# Boring Tool Series

## TOOLING SELECTION

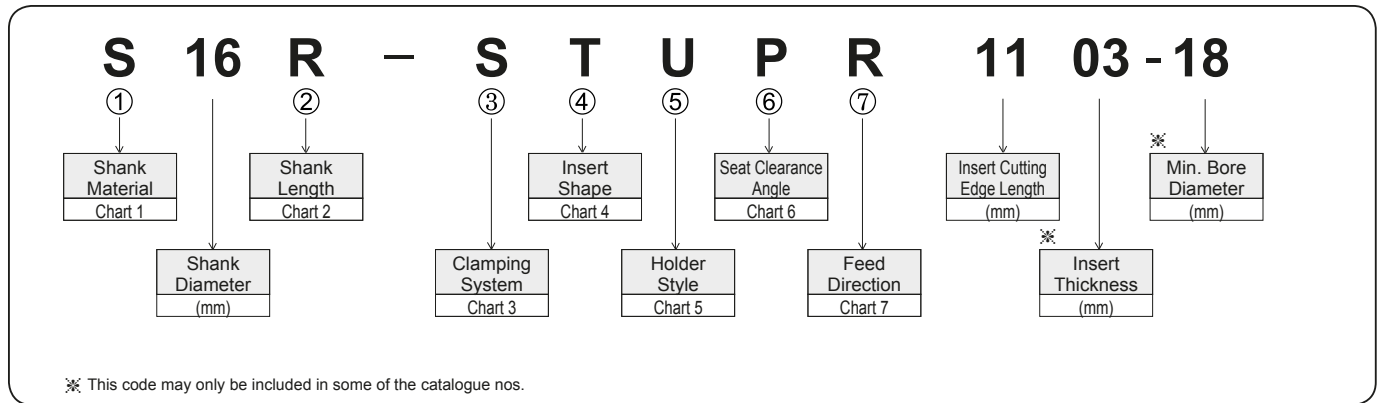
Application		Stop Boring		Bottom Facing		Trough Boring	Copying		
Insert Type System	Triangle	Poligon / Others	80° Diamond		Square	55° T-REX	55° Diamond	35° Diamond	
	Screw Lock	Steel	 <b>S-STFC</b> ⇨ E19 <b>S-STUP</b> (B) ⇨ E20	 <b>S-SWUB</b> ⇨ E23	 <b>S-SCLC</b> ⇨ E14	 <b>S-SCLP</b> ⇨ E15	 <b>S-SSKP</b> ⇨ E18	—	 <b>S-SDUC</b> ⇨ E16 <b>S-SDQC</b> ⇨ E17
Anti-vibration		 <b>B-STUP</b> ⇨ E20	—	 <b>B-SCLC</b> ⇨ E14	—	—	—	 <b>B-SDUC</b> ⇨ E16 <b>B-SDQC</b> ⇨ E17	—
Anti-vibration with Oil Hole		 <b>D-STUP</b> ⇨ E20	—	 <b>D-SCLC</b> ⇨ E14	—	—	—	 <b>D-SDUC</b> ⇨ E16 <b>D-SDQC</b> ⇨ E17	 <b>D-SVUB</b> ⇨ E21 <b>D-SVZB</b> ⇨ E21
Carbide		 <b>C-STUP</b> (C-STUB) ⇨ E20	 <b>C-SWUB</b> ⇨ E23	—	 <b>C-SCLP</b> ⇨ E15	 <b>C-SSKP</b> ⇨ E18	—	—	—
Lever Lock	Steel	 <b>S-PTFN</b> ⇨ E12	—	 <b>S-PCLN</b> ⇨ E8	—	 <b>S-PSKN</b> ⇨ E10	—	 <b>S-PDUN</b> ⇨ E9	—
	Anti-vibration with Oil Hole	 <b>D-DTFN</b> ⇨ E12	 <b>D-DWLN</b> ⇨ E13	 <b>D-DCLN</b> ⇨ E8	—	—	—	 <b>D-DDUN</b> ⇨ E9	—
Top Clamp	Steel	—	 <b>S-MWLN</b> ⇨ E13	—	—	—	 <b>S-DTR</b> ⇨ E11	—	
	Carbide	 <b>BNB</b> ⇨ M41	 <b>BNBB</b> ⇨ M40	 <b>BNZ</b> ⇨ M41	—	 <b>BXBR</b> ⇨ E24			
CBN	Carbide	 <b>BSME</b> ⇨ M38	 <b>SEXC</b> ⇨ M39	—	—	—	—	—	

Boring Bars



# Boring Tools Identification

## ■ Catalogue Classification System For Boring Holders



① Chart 1

Shank Material	
S	Steel
B	Steel with Anti-vibration Mechanism without Oil Hole
C	Carbide
D	Steel with Anti-vibration Mechanism with Oil Hole
E	Carbide with Oil Hole

② Chart 2

Shank Length			
Symbol	Length (mm)	Symbol	Length (mm)
F	80	P	170
G	90	Q	180
H	100	R	200
J	110	S	250
K	125	T	300
L	140	U	350
M	150	V	400
N	160	W	450

③ Chart 3

Clamping System					
Symbol	System	Structure	Symbol	System	Structure
C	Top Clamp		M	Top & Hole Clamp Type	
D	Double Clamp		P	Lever Lock Type (Insert is Supported by 1 face)	
E	Pin Lock Type (Insert is supported by 1 face)		S	Screw Clamp Type	

⑦ Chart 7

Feed Direction	
Symbol	Feed Direction
R	Right Hand Feed
L	Left Hand Feed
N	Neutral Feed

④ Chart 4

Insert Shape			
Symbol	Insert Shape	Symbol	Insert Shape
A	Parallelogram 85°	M	Rhombic 86°
B	Parallelogram 82°	O	Octagonal
C	Diamond 80°	P	Pentagonal
D	Diamond 55°	R	Round
E	Diamond 75°	S	Square
F	Diamond 50°	T	Triangular
H	Hexagonal	V	Diamond 35°
K	Parallelogram 55°	W	Trigon
L	Rectangular		

⑤ Chart 5

Holder Style					
Symbol	Shape	Offset	Symbol	Shape	Offset
A		Nil	N		Nil
B		Nil	Q		With Offset
D		Nil	R		With Offset
E		Nil	S		With Offset
F		With Offset	T		With Offset
G		With Offset	U		With Offset
J		With Offset	W		With Offset
K		With Offset	Y		With Offset
L		With Offset	Z		With Offset

⑥ Chart 6

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

# Boring Bars

## Boring Tool Series



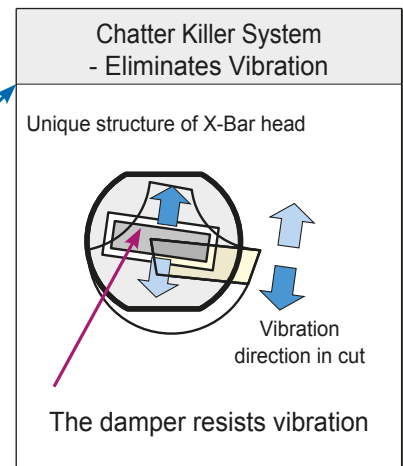
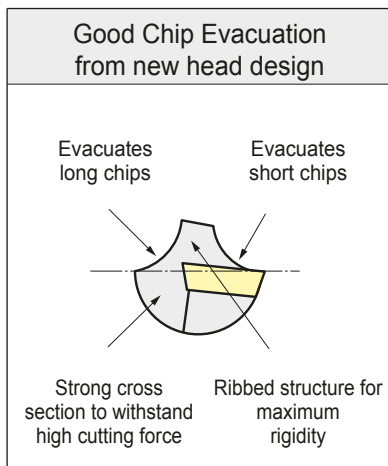
### General Features

Since being the first in 1976 to introduce indexable boring bars, Sumitomo Electric has been continuously developing a comprehensive range which includes the SEC-Small Hole boring bar series, high rigidity boring head series, with either steel / carbide shanks, and the latest anti-vibration mechanism - SumiTurn X-Bar series coupled with a wide variety of insert grades and chipbreakers, cover a whole range of process requirements.

### Features

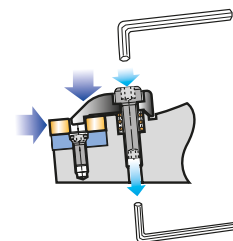
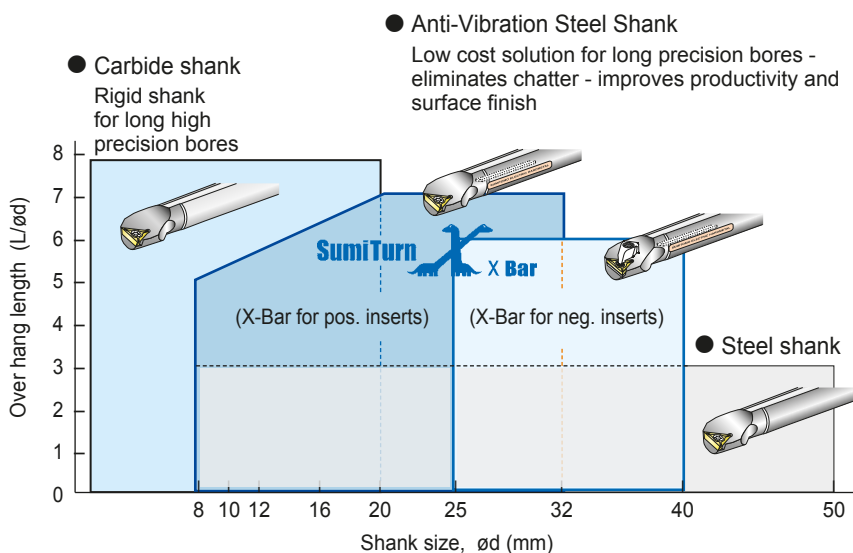
- Wide selection for various boring operations
  - Minimum bore diameter from  $\varnothing 5,5\text{mm}$  onwards
  - New anti-vibration boring bars, SumiTurn X-Bar.
  - High rigidity head-design for small boring bars
  - Wide selection of grades and chipbreakers available for various processes and work materials
- XXX

### Series SumiTurn X Bar



- New negative type "X Bar" with high performance double clamping system

### Application Guide



**SumiTurn X Bar**

**ATTENTION:**

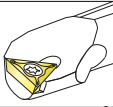
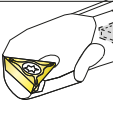
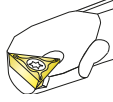
Please keep this area free to get the effect of "X Bar" chattering killer system

Min. over hang length =  $3,5 \times \varnothing d$

# Boring Bars

## Boring Tool Series

### Recommended Over Hang Length / Shank Diameter (L/D)

Type of boring bar		Over hang length (L/D)									
		1	2	3	4	5	6	7	8	9	10
<ul style="list-style-type: none"> <li>● Steel Shank</li> </ul> Rigid head design for low cost hole boring.											
<ul style="list-style-type: none"> <li>● Anti-Vibration Type Shank</li> </ul> Chatter killer system eliminates vibration - improves productivity - improves quality		(X-Bar for pos. inserts)					(X-Bar for neg. inserts)				
<ul style="list-style-type: none"> <li>● Carbide Shank</li> </ul> High rigidity shank for high accuracy hole boring.											

### Grades

Tool Material		Process			Work Material						
		High Precision	Finish~Light Cut	Medium Cut	P General Steel	M Stainless Steel	K Cast Iron	S Heat Resistant Alloy	H Hardened Steel	N Non-Ferrous Metal	PM Powder Metal
Coated Carbide	CVD	AC805P			○	○	○	○	○	○	○
		New AC8025P			○	○	○	○	○	○	○
		AC810P			○	○	○	○	○	○	○
		AC820P			○	○	○	○	○	○	○
		AC830P			○	○	○	○	○	○	○
		New AC6020M			○	○	○	○	○	○	○
		AC6030M			○	○	○	○	○	○	○
		AC405K			○	○	○	○	○	○	○
	PVD	ACZ150			○	○	○	○	○	○	○
		AC510U			○	○	○	○	○	○	○
		AC520U			○	○	○	○	○	○	○
		AC530U			○	○	○	○	○	○	○
		New AC1030U			○	○	○	○	○	○	○
		AC6040M			○	○	○	○	○	○	○
Cermet Coated Cermet	T1000A			○	○	○	○	○	○	○	
	T1500A/T1500Z			○	○	○	○	○	○	○	
	T3000Z			○	○	○	○	○	○	○	
Carbide	G10E			○	○	○	○	○	○	○	
				○	○	○	○	○	○	○	
SumiBoron	BN1000			○	○	○	○	○	○	○	
	BN2000			○	○	○	○	○	○	○	
	BNC2010			○	○	○	○	○	○	○	
	BNC2020			○	○	○	○	○	○	○	
	BN7000 (BN700)			○	○	○	○	○	○	○	
	BN7500			○	○	○	○	○	○	○	
SumiDia	DA1000			○	○	○	○	○	○	○	
	DA150			○	○	○	○	○	○	○	

○ Preferred choice

○ Suitable

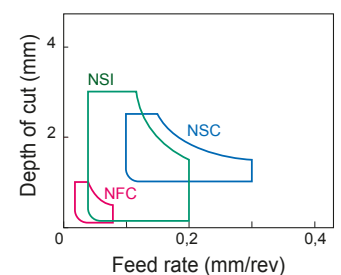
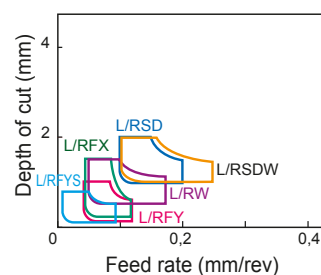
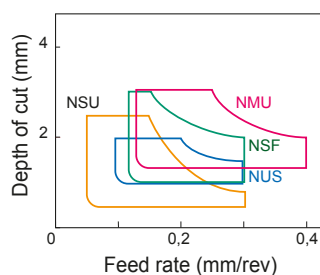
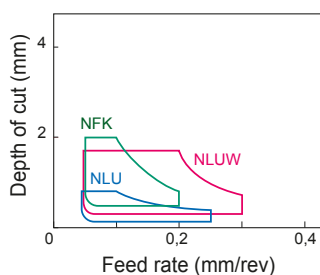
### Recommended Chip Breakers

● M-Class Finish-Light-Cut

● M-Class Light-Medium-Cut

● G-Class Ground Typ

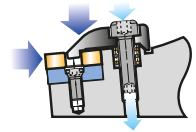
● G-Class Breaker



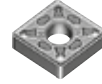
# D...DCLN / S...PCLN Type



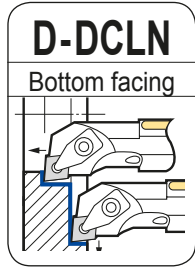
Sumitomo X Bar



Insert (eg.)



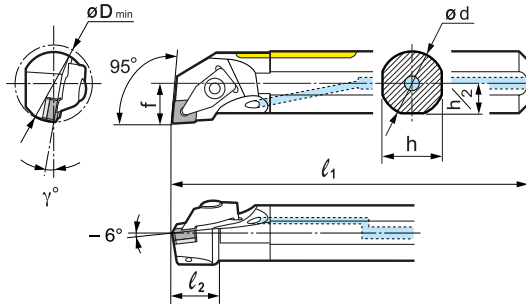
N-GU



**D-DCLN**

Bottom facing

Anti-vibration D type with oil hole



### Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim screw	Wrench	Wrench
SCP-2			CNS1203B	BFTX0307N	TRX10 <sup>(*)</sup>	LH040
			CNS1204B	BFTX0409N 3.4	TRX15 <sup>(*)</sup>	LH025

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Insert (eg.)
	R	L	$\phi D_{min}$	$\phi d$	h	$l_1$	$l_2$	f	$\gamma$	
D25T - DCLN R/L 1204-32	●	●	32	25	23	300	26	17	-12°	CN□□1204□□
D32T - DCLN R/L 1204-40	●	●	40	32	30	300	26	22	-10°	
D40U - DCLN R/L 1204-50	●	●	50	40	37	350	26	27	-10°	

(\*) Note: Wrench (TRX type) for shim screw is not included.

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.  
Left handed tool holders are applicable with right handed or neutral inserts.

### ■ Holders

Tool holders (P type) with lever-lock system	Ordering No.	Stock		Dimensions (mm)							Image
		R	L	$\phi D_{min}$	d	h	$l_1$	$l_2$	f	$\gamma$	
<p>S - PCLN R/L</p>	S20S - PCLN R/L09	●	●	25	20	18	250	29	13	-11°	CN__0903__
	S25T - PCLN R/L09	●	●	30	25	23	300	33	17	-10°	
	S25T - PCLN R/L12	●	●	32	25	23	300	42	17	-10°	CN__1204__
	S32U - PCLN R/L12	●	●	40	32	30	350	49	22	-11°	
	S40V - PCLN R/L12	●	●	50	40	37	400	56	27	-10°	
	S32U - PCLN R/L16	●	●	40	32	30	350	56	22	-11°	CN__1606__
	S40V - PCLN R/L16	●	●	50	40	37	400	56	27	-10°	
	S50W - PCLN R/L16	□	□	63	50	47	450	56	35	-11°	
	S50W - PCLN R/L19	□	□	63	50	47	450	63	35	-11°	CN__1906__

All figures show right hand tools.

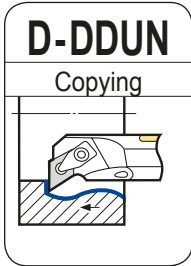
### ■ Applicable Inserts

### ■ Spare Parts

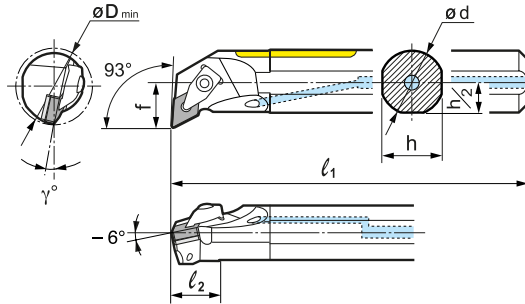
Holder	Carbides, Cermets		CBN, PCD	Lever pin	Clamp bolt	Shim	Shim pin	Wrench
	Double sided	One sided						
S - PCLN R/L								
S.....09	CNMG 0903__ NGU	-	-	LCL3C-SD	LCS3B-SD	-	-	LH020
S25T.....12	CNMG 1204__ NGU	CNMM 1204__ NMP	CNGA 1204__	LCL4C-SD	LCS4B-SD	-	-	LH025
S32U.....12	CNMG 1204__ NGU	CNMM 1204__ NMP	CNGA 1204__	LCL4T-SD	LCS41BS-SD	LSC42SD	LSP4SD	LH030
S40V.....12	CNMG 1204__ NGU	CNMM 1204__ NMP	CNGA 1204__	LCL4SD	LCS42BS-SD	LSC42SD	LSP4SD	LH030
S.....16	CNMG 1606__ NGU	CNMM 1606__ NMP	-	LCL5SD	LCS5B-SD	LSC53SD	LSP5SD	LH030
S.....19	CNMG 1906__ NGU	CNMM 1906__ NMP	-	LCL5C-SD	LCS6B-SD	LSC63SD	LSP6SD	LH040

● = Eurostock  
□ = Delivery on request

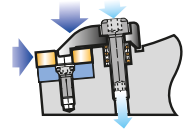
Recommended Tightening Torque (N·m)



Anti-vibration D type with oil hole



SumiTurn X Bar



Insert (eg.)



N-GU

### Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench
	SCP-1		DNS1104B	BFTX0307N	TRX10 <sup>(*)</sup>	
	SCP-2		DNS1506B	BFTX0409N ③ 3.4	TRX15 <sup>(*)</sup>	LH040 LH025

(\*) Note: Wrench (TRX type) for shim screw is not included.

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		$\phi D_{min}$	Dimensions (mm)							Insert (eg.)	Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench
	R	L		$\phi d$	h	$l_1$	$l_2$	f	$\gamma$									
D32T - DDUN R/L 1104-40	●	●	40	32	30	300	26	22	-10°	DN□□1104□□								
D32T - DDUN R/L 1506-40	●	●	40	32	30	300	26	22	-12°									
D40U - DDUN R/L 1506-50	●	●	50	40	37	350	26	27	-12°	DN□□1506□□								

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.  
Left handed tool holders are applicable with right handed or neutral inserts.

### ■ Holders

Tool holders (P type) with lever-lock system	Ordering No.	Stock		Dimensions (mm)							Image	
		R	L	$\phi D_{min}$	d	h	$l_1$	$l_2$	f	$\gamma$		
<p>S - PDUN R/L</p>	S25T - PDUN R/L 11	●	●	32	25	23	300	35	17	-11°	DN__ 1104__	
	S32U - PDUN R/L 15 04	●	●	40	32	30	350	40	22	-11°	DN__ 1504__	
	S40V - PDUN R/L 15	●	●	50	40	37	400	56	27	-11°	DN__ 1506__	
	S50W - PDUN R/L 15	□	□	63	50	47	450	63	35	-10°	DN__ 1506__	

All figures show right hand tools.

### ■ Applicable Inserts

### ■ Spare Parts

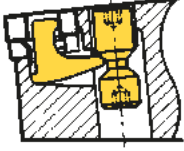
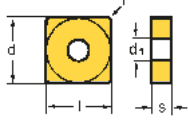
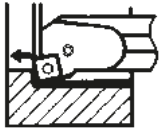
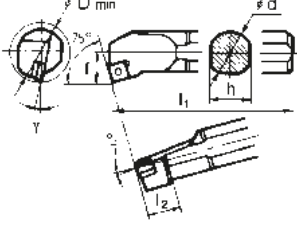
Holder	Carbides, Cermets		CBN, PCD	Lever pin	Clamp bolt	Shim	Shim pin	Wrench	
	Double sided	One sided							
S - PDUN R/L									
S25T ....11	DNMG 1104__ NGU	-	DNGA 1104__	LCL3DB-SD	LCS3DB-SD	-	-	LH020	
S32U ....15 04	DNMG 1504__ NGU	DNMM 1504__ NMP	DNGA 1504__	LCL4D-SD	LCS5DB-SD	LSD42SD	LSP4SD	LH030	
S40V ....15	DNMG 1506__ NGU	DNMM 1506__ NMP	DNGA 1506__	LCL4D-SD	LCS5DB-SD	LSD42SD	LSP4SD	LH030	
S50W....15	DNMG 1506__ NGU	DNMM 1506__ NMP	DNGA 1506__	LCL4D-SD	LCS5DB-SD	LSD42SD	LSP4SD	LH030	

# Boring Bars S...PSKN Type

For Negative SN \_\_ - Inserts ( $\alpha = 0^\circ$ )



## ■ Holders


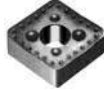






 Tool holders (P type) with lever-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	$\phi D_{min}$	d	h	$l_1$	$l_2$	f	$\gamma$	
<b>S - PSKN R/L</b>  	S25T - PSKN R/L 12	●	●	32	25	23	300	42	17	-11°	SN __ 1204 __
	S32U - PSKN R/L 12	●	●	40	32	30	350	45	22	-10°	
	S40V - PSKN R/L 12	●	●	50	40	37	400	50	27	-10°	
	S40V - PSKN R/L 15	●	□	63	40	47	400	60	35	-10°	SN __ 1506 __
	S50W - PSKN R/L 15	□	□	63	50	47	450	60	35	-10°	
	S50W - PSKN R/L 19	□	□	63	50	47	450	60	35	-9°	SN __ 1906 __

All figures show right hand tools.

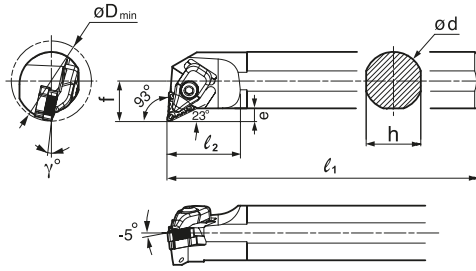
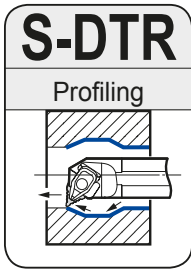
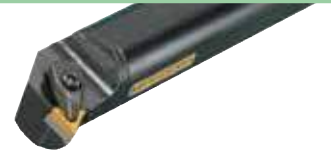
Boring Bars  
for neg. insert

## ■ Applicable Inserts

## ■ Spare Parts

Holder	Carbides, Cermets		CBN	Lever pin	Clamp bolt	Shim	Shim pin	Wrench	
	Double sided	One sided							
S - PSKN R/L									
S25T....12	SNMG 0903 __ NGU	-	-	LCL4C-SD	LCS4B-SD	-	-	LH025	
S32U....12	SNMG 1204 __ NGU	SNMM 1204 __ NMP	SNGA 1204 __	LCL4T-SD	LCS41BS-SD	LSS42SD	LSP4SD	LH030	
S40V....12	SNMG 1204 __ NGU	SNMM 1204 __ NMP	SNGA 1204 __	LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	
S....15	SNMG 1506 __ NGU	SNMM 1506 __ NMP	-	LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	
S....19	SNMG 1906 __ NGU	SNMM 1906 __ NMP	-	LCL5C-SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	

## Internal Turning & Copying



### Spare Parts

Clamp	Spring	Screw	Shim	Screw	Wrench	Wrench
TRCP3	S-SP4-20	BX0520	TRW5505	BFTX0307N 2.0	TSW040	TRX10 <sup>(*)</sup>

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							
	R	L	$\phi D_{min}$	$\phi d$	h	$l_1$	$l_2$	f	$\gamma$	e
<b>S32S-DTR55C R/L-17</b>	●	□	44	32	30	250	40	22	-12°	7
<b>S40T-DTR55C R/L-17</b>	●	□	50	40	37	300	40	25	-10°	6,2

(\*) Note: Wrench (TRX10) for shim is not included.

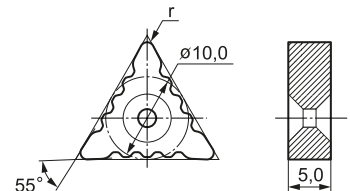
### ■ Advantages

- T-REX Inserts for Maximum Economy

With 6 cutting edges and a 55 degree included angle - T-Rex is the intelligent alternative to profile turning with a traditional 4 edge DNMG insert.

### ■ Inserts

Applic.	Shape	Ordering No.	r	Coated Carbide					Coated Cermet
				AC810P	AC8025P <sup>New</sup>	AC820P	AC830P	AC630M	T3000Z
Fine Finishing		TRM 551704-FL	0,4		○				○
		551708-FL	0,8		○				
Finishing		TRM 551704-LU	0,4	●	○	●			○
		551708-LU	0,8	●	○	●			○
		551712-LU	1,2	●	○	●			○
Light Cut		TRM 551704-SU	0,4		○	○		●	○
		551708-SU	0,8		○	○		●	○
		551712-SU	1,2		○	○		●	○
Light Cut		TRM 551704-GU	0,4	●	○	●	●	●	
		551708-GU	0,8	●	○	●	●	●	
		551712-GU	1,2	●	○	●	●	○	



Application   P Steel  
  M Stainless steel

### ● Recommended Cutting Conditions

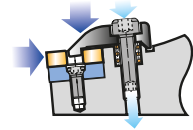
— Cutting speed (m/min)

Grade		Coated Carbide					Coated Cermet
		AC810P	AC8025P	AC820P	AC830P	AC630M	T3000Z
Work materials	Low carbon steel	220 400	150 350	150 350	120 300	120 300	100 400
	Alloy steel	150 300	100 250	100 250	80 200	80 230	100 250
	Stainless steel				50 150	100 160	
Application range	Finishing	◎	○	○	○	○	◎
	Medium cutting	○	◎	◎	○	◎	○
	Interrupted cutting		○	○	◎	○	○

◎ Preferred choice      ○ Suitable



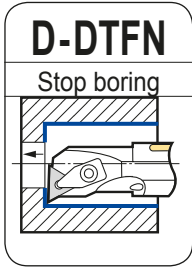
SumiTurn X Bar



Insert (eg.)



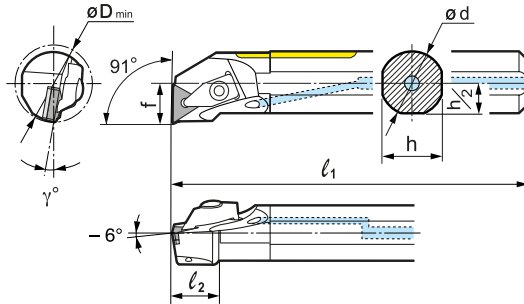
N-GU



**D-DTFN**

Stop boring

Anti-vibration D type with oil hole



### Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim screw	Wrench	Wrench
SCP-1			TNS1603B TNS1604B	BFTX0307N 2.0	TRX10 <sup>(*)</sup>	LH040 LH025

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Insert (eg.)
	R	L	$\phi D_{min}$	$\phi d$	h	$l_1$	$l_2$	f	$\gamma$	
D25T - DTFN R/L 1604-32	●	●	32	25	23	300	21	17	-12°	TN□□1604□□
D32T - DTFN R/L 1604-40	●	●	40	32	30	300	26	22	-10°	
D40U - DTFN R/L 1604-50	●	●	50	40	37	350	26	27	-10°	

(\*) Note: Wrench (TRX type) for shim screw is not included.

### ■ Holders

Tool holders (P type) with lever-lock system	Ordering No.	Stock		Dimensions (mm)							Image
		R	L	$\phi D_{min}$	d	h	$l_1$	$l_2$	f	$\gamma$	
 <b>S - PTFN R/L</b>	S20S - PTFN R/L 11	●	●	25	20	18	250	30	13	-12°	TN__1103__
	S25T - PTFN R/L 16	●	●	32	25	23	300	43,3	17	-13°	TN__1604__
	S32U - PTFN R/L 16	●	●	40	32	30	350	49,6	27	-12°	
	S40V - PTFN R/L 16	●	□	50	40	37	400	49,5	27	-11°	
	S50W - PTFN R/L 16	□	□	63	50	47	450	56	35	-10°	TN__2204__
	S40V - PTFN R/L 22	●	●	50	40	37	400	59	27	-11°	
	S50W - PTFN R/L 22	□	□	63	50	47	450	66	35	-10°	

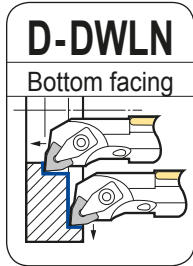
All figures show right hand tools.

### ■ Applicable Inserts

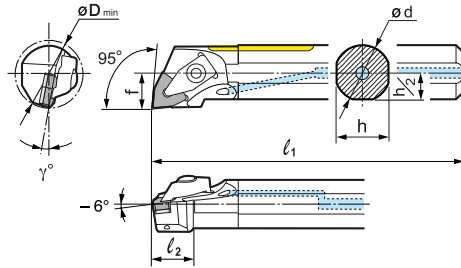
### ■ Spare Parts

Holder	Carbides, Cermets		CBN	Lever pin	Clamp bolt	Shim	Shim pin	Wrench
	Double sided	One sided						
S - PTFN R/L								
S...11	-	-	-	LCL3T-SD	LCS3B-SD	-	-	LH020
S...16	TNMG 1604__ NGU	TNMM 1604__ NMP	TNGA 1604__	LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025
S...22	TNMG 2204__ NGU	TNMM 2204__ NMP	TNGA 2204__	LCL4SD	LCS42BS-SD	LST42SD	LSP4SD	LH030

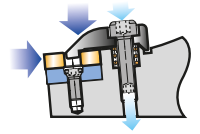




Anti-vibration D type with oil hole



Sumitomo X Bar



Insert (eg.)



N-GU

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						Insert (eg.)	Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	
	R	L	øD <sub>min</sub>	ød	h	l <sub>1</sub>	l <sub>2</sub>	f									γ
D25T - DWLN R/L 0804-32	●	●	32	25	23	300	26	17	-12°	WN□□0804□□	SCP-2		WNS0803B	BFTX0307N	TRX10 <sup>(*)</sup>		
D32T - DWLN R/L 0804-40	●	●	40	32	30	300	26	22	-10°				WNS0804B	BFTX0409N	TRX15 <sup>(*)</sup>	LH040	LH025
D40U - DWLN R/L 0804-50	●	●	50	40	37	350	26	27	-10°								

(\*) Note: Wrench (TRX type) for shim screw is not included.

### ■ Holders

Tool holders (M type) with wedge clamp system	Ordering No.	Stock		Dimensions (mm)						Insert	
		R	L	øD <sub>min</sub>	d	h	l <sub>1</sub>	l <sub>2</sub>	f		γ
	S25R - MWLN R/L 08	●	●	32	25	23	200	28	17	-15°	WNMG 0804 __
	S32S - MWLN R/L 08	●	●	40	32	30	250	28	22	-14°	
	S40T - MWLN R/L 08	●	●	50	40	37	300	28	27	-12°	

All figures show right hand tools.

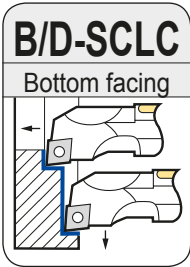
### ■ Applicable Inserts

### ■ Spare Parts

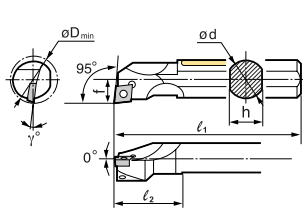
Holder	Carbides, Cermets		Clamp	Double screw	Pin	Shim	Wrench
	Double sided	One sided					
S - MWLN R/L							
S...08	WNMG 0804 __ NGU	WNMM 0804 __ NMP	HE060011W	WB 6-16	HE060011P	HE060011E	LH025, LH030

# Boring Bars B/D/S...SCLC Type

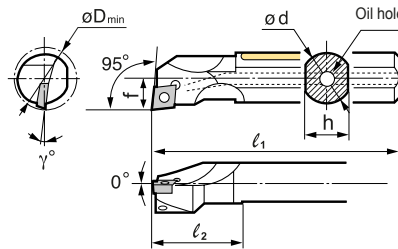
For Positive CC\_\_ - Inserts ( $\alpha = 7^\circ$ )



**B Type** (Fig.1)  
Min. Bore Dia.



**D Type** (Fig.2)



Insert (ex.)



## ■ Holders

Steel shank	Ordering No.	Stock		$\phi D_{min}$	Dimensions (mm)						Fig.	Insert (ex.)	Screw	Wrench
		R	L		$\phi d$	h	$\ell_1$	f	$\ell_2$	$\gamma$				
Anti-vibration B type	<b>B08H - SCLC R/L 0602-10</b>	●	●	10	8	7	100	5,5	19	-13°	1.	CC□T 0602□□	BFTX02505N	TRX08
	<b>B10K - SCLC R/L 0602-12</b>	●	●	12	10	9	125	6	21	-12°			BFTX02506N	
Anti-vibration D type with oil hole	<b>D12M - SCLC R/L 0602-14</b>	●	●	14	12	11	150	7	25	-10°	2.	CC□T 09T3□□	BFTX0407N	TRX15
	<b>D16R - SCLC R/L 09T3-18</b>	●	●	18	16	15	200	11	30	-8°			BFTX0409N	
	<b>D20S - SCLC R/L 09T3-22</b>	●	●	22	20	18	250	13	30	-7°			BFTX0511N	
	<b>D25T - SCLC R/L 1204-32</b>	●	●	32	25	23	300	17	38	-6°				
	<b>D32U - SCLC R/L 1204-40</b>	●	●	40	32	30	350	22	53	-10°				
	<b>D32V - SCLC R/L 1204-40</b>	●	●	40	32	30	300	20	53	-6°				

## ■ Spare Parts



All figures show right hand tools.

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.  
Left handed tool holders are applicable with right handed or neutral inserts.

## ■ Holders

Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	$\phi D_{min}$	d	h	$\ell_1$	$\ell_2$	f	$\gamma$	
<b>S - SCLC R/L</b> 	S10K - SCLC R/L 06	●	●	13	10	9	125	9	7	-12°	CC__ 0602__
	S12M - SCLC R/L 06	●	●	16	12	11	150	11	9	-10°	
	S16R - SCLC R/L 06	●	●	20	16	15	200	15	11	-8°	
	S16R - SCLC R/L 09	●	●	20	16	15	200	15	11	-8°	CC__ 09T3__
	S20S - SCLC R/L 09	●	●	25	20	18	250	20	13	-7°	
	S25T - SCLC R/L 12	●	●	32	25	23	300	20	17	-6°	CC__ 1204__
	S32U - SCLC R/L 12	●	●	40	32	30	350	25	22	-10°	
	S40V - SCLC R/L 12	□	●	50	40	37	400	25	27	-8°	

All figures show right hand tools.

## ■ Applicable Inserts

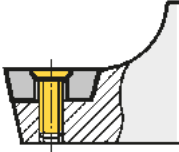
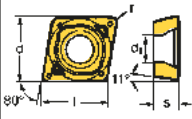
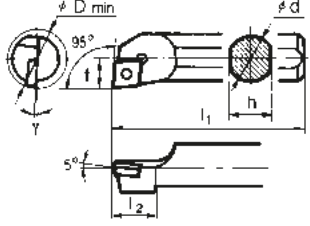
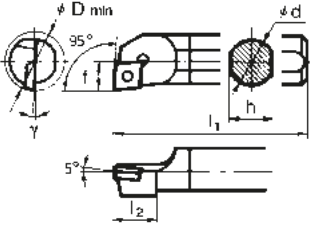
## ■ Spare Parts

Holder	Carbides, Cermets		Screw	$\overset{\text{N}\cdot\text{m}}{\curvearrowright}$	Wrench	
S - SCLC R/L						
S.....06	CCMT 0602__ NFP	CCGW 0602__	-	BFTX02505N	1,1	TRX08
S16R.....09	CCMT 09T3__ NFP	CCGW 09T3__	-	BFTX0407N	3,0	TRX15
S20S.....09	CCMT 09T3__ NFP	CCGW 09T3__	-	BFTX0409N	3,4	TRX15
S.....12	CCMT 1204__ NFP	CCGW 1204__	-	BFTX0511N	5,0	TRX20

Boring Bars for pos. insert




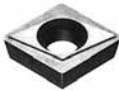



## ■ Holders

 Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	$\phi D_{min}$	d	h	$l_1$	$l_2$	f	$\gamma$	
<b>S - SCLP R/L</b> Steel shank 	S10K - SCLP R/L 08	●	●	12	10	9	125	12	6	-5°	CP_T 0802__
	S12M - SCLP R/L 08	●	●	16	12	11	150	15	8	-3°	
	S16R - SCLP R/L 09	●	●	20	16	15	200	18	10	-3°	CP_T 0903__
	S20S - SCLP R/L 09	●	●	25	20	18	250	18	12,5	0	
	S25T - SCLP R/L 12	●	●	28	25	22	300	17,4	14	-3°	CP_T 1204__
<b>C - SCLP R/L</b> Carbide shank 	C10Q - SCLP R/L 08	●	□	12	10	9	180	15	6	-5°	CP_T 0802__
	C12R - SCLP R/L 08	□	□	16	12	11	200	15	8	-2°	
	C16S - SCLP R/L 09	●	□	20	16	15	250	15	10	-2°	CP_T 0903__

All figures show right hand tools.

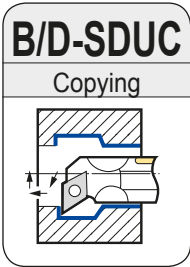
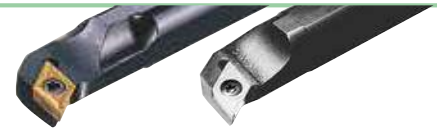
## ■ Applicable Inserts

## ■ Spare Parts

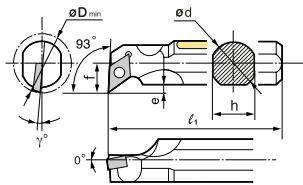
Holder	Carbides, Cermets	CBN	Screw	 (N·m)	Wrench				
S/C-SCLP R/L									
S/C 10.....08	CPGT 0802__ NSD	CPMW 0802__	BFTX 0305 A	-	TRX 10				
S/C 12.....08	CPGT 0802__ NSD	CPMW 0802__	BFTX 0305 A	-	TRX 10				
S/C 16.....09	CPGT 0903__ NSD	CPMW 0903__	BFTX 0407 A	3,4	TRX 15				
S 20.....09	CPGT 0903__ NSD	CPMW 0903__	BFTX 0407 A	3,4	TRX 15				
S 25.....12	CPGT 1204__ NSD	-	BFTX 0509 A	5,0	TRX 20				

# Boring Bars B/D/S...SDUC Type

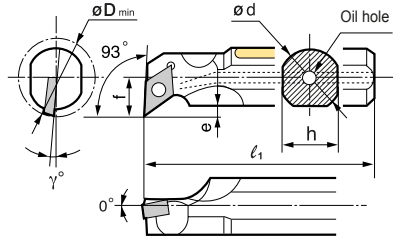
For Positive DC \_\_ - Inserts ( $\alpha = 7^\circ$ )



**B Type** (Fig.1)  
Min. Bore Dia.



**D Type** (Fig.2)



Insert (ex.)



### ■ Spare Parts

Fig.	Insert (ex.)	Screw	Wrench
1.	DC□T 0702□□	BFTX02506N 1,5 (N·m)	TRX08
2.	DC□T 11T3□□	BFTX0409N 3,4 (N·m)	TRX15

### ■ Holders

Steel shank	Ordering No.	Stock		$\phi D_{min}$	Dimensions (mm)						Fig.	Insert (ex.)	Screw	Wrench
		R	L		$\phi d$	h	$\ell_1$	f	e	$\gamma$				
Anti-vibration B type	<b>B10M - SDUC R/L 0702-13</b>	●	●	13	10	9	150	7	2,5	-8°	1.	DC□T 0702□□	BFTX02506N 1,5 (N·m)	TRX08
	<b>D12M - SDUC R/L 0702-16</b>	●	●	16	12	11	150	9	3,5	-8°				
Anti-vibration D type with oil hole	<b>D16R - SDUC R/L 0702-20</b>	●	●	20	16	15	200	11	4,0	-6°	2.	DC□T 11T3□□	BFTX0409N 3,4 (N·m)	TRX15
	<b>D20S - SDUC R/L 11T3-25</b>	●	●	25	20	18	250	13	4,5	-6°				
	<b>D25S - SDUC R/L 11T3-32</b>	●	●	32	25	22	250	17	7,0	-6°				
	<b>D32T - SDUC R/L 11T3-40</b>	●	●	40	32	30	300	22	8,0	-6°				

All figures show right hand tools.

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.  
Left handed tool holders are applicable with right handed or neutral inserts.

### ■ Holders

Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)						Fig.	
		R	L	$\phi D_{min}$	d	h	$\ell_1$	f	e		$\gamma$
	S10K - SDUC R/L 07	●	●	13	10	9	125	7	2,5	-8°	DC__ 0702__
	S12M - SDUC R/L 07	●	●	16	12	11	150	9	3,5	-8°	
	S16R - SDUC R/L 07	●	●	20	16	15	200	11	4	-6°	
	S20S - SDUC R/L 11	●	●	25	20	18	250	13	4,5	-6°	DC__ 11T3__
	S25T - SDUC R/L 11	●	●	32	25	22	300	17	7,5	-6°	
	S32U - SDUC R/L 11	●	●	40	32	30	350	22	11	-6°	

All figures show right hand tools.

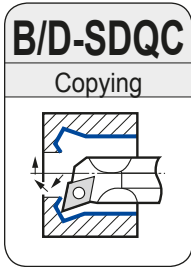
### ■ Applicable Inserts

### ■ Spare Parts

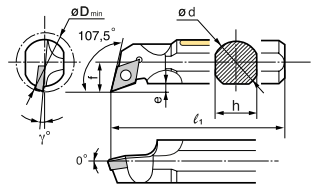
Holder	Carbides, Cermets		CBN, PCD	Screw	(N·m)	Wrench			
S - SDUC R/L S - SDQC R/L									
S10K.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	1,5	TRX08			
S12M.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	1,5	TRX08			
S16R.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	1,5	TRX08			
S.....11	DCMT 11T3__ NFP	DCMT 11T3__ NSK	DCGW 11T3__	BFTX0409N	3,4	TRX15			

Boring Bars for pos. insert

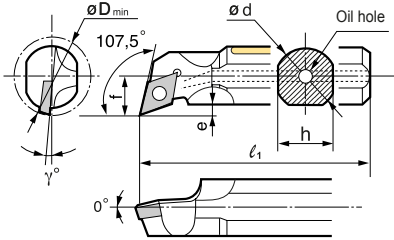
# Boring Bars B/D/S...SDQC Type



**B Type** (Fig.1)  
Min. Bore Dia.



**D Type** (Fig.2)



Insert (ex.)



### Spare Parts

DC□□ 0702□□	BFTX02506N 1,5 $\text{C}_{(Nm)}$	TRX08
DC□□ 11T3□□	BFTX0409N 3,4 $\text{C}_{(Nm)}$	TRX15

### ■ Holders

Steel shank	Ordering No.	Stock		Dimensions (mm)							Fig.	Insert (ex.)	Screw	Wrench
		R	L	$\phi D_{min}$	$\phi d$	h	$\ell_1$	f	e	$\gamma$				
Anti-vibration B type	<b>B10M - SDQC R/L 0702-13</b>	●	●	13	10	9	150	7	2,5	-8°	1.	DC□□ 0702□□	BFTX02506N 1,5 $\text{C}_{(Nm)}$	TRX08
Anti-vibration D type with oil hole	<b>D12M - SDQC R/L 0702-16</b> <b>D16R - SDQC R/L 0702-20</b> <b>D20S - SDQC R/L 11T3-25</b> <b>D25S - SDQC R/L 11T3-32</b> <b>D32T - SDQC R/L 11T3-40</b>	●	●	16	12	11	150	9	3,5	-8°	2.			
		●	●	20	16	15	200	11	4,0	-6°				
		●	●	25	20	18	250	13	4,5	-6°				
		●	●	32	25	22	250	17	7,0	-6°				
		●	●	40	32	30	300	22	7,0	-10°				

All figures show right hand tools.

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.  
Left handed tool holders are applicable with right handed or neutral inserts.

### ■ Holders

	Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
			R	L	$\phi D_{min}$	d	h	$\ell_1$	f	e	$\gamma$	
<b>S - SDQC R/L</b>		S10K - SDQC R/L-07	●	●	13	10	9	125	7	2,5	-8°	DC__ 0702__
		S12M - SDQC R/L-07	●	●	16	12	11	150	9	3,5	-8°	
		S16R - SDQC R/L-07	●	●	20	16	15	200	11	4	-6°	
		S20S - SDQC R/L-11	●	●	25	20	18	250	13	4,5	-6°	DC__ 11T3__
		S25T - SDQC R/L-11	●	●	32	25	22	300	17	7	-6°	

All figures show right hand tools.

### ■ Applicable Inserts

### ■ Spare Parts

Holder	Carbides, Cermets		CBN, PCD	Screw	$\text{C}_{(Nm)}$	Wrench			
S - SDUC R/L S - SDQC R/L					$\text{C}_{(Nm)}$				
S10K.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	1,5	TRX08			
S12M.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	1,5	TRX08			
S16R.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	1,5	TRX08			
S.....11	DCMT 11T3__ NFP	DCMT 11T3__ NSK	DCGW 11T3__	BFTX0409N	3,4	TRX15			

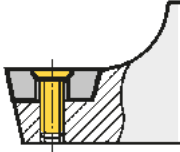
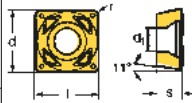
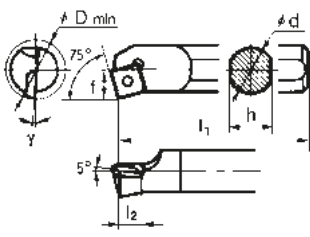
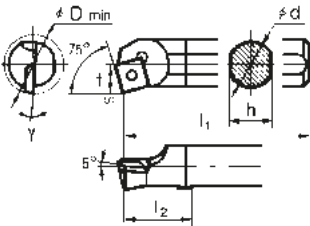
Boring Bars  
for pos. Insert

# Boring Bars S/C...SSKP Type

For Positive SP\_\_ - Inserts ( $\alpha = 11^\circ$ )



## ■ Holders





 Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	$\varnothing D_{min}$	d	h	$l_1$	$l_2$	f	$\gamma$	
<b>S - SSKP R/L</b> Steel shank 	S12M - SSKP R/L 09	●	●	16	12	11	150	9	8	-6°	SP_T 0903__
	S16R - SSKP R/L 09	●	●	20	16	15	200	6,8	10	-4°	
	S20S - SSKP R/L 09	●	□	25	20	18	250	8,5	12,5	-2°	
	S25T - SSKP R/L 09	●	□	28	25	22	300	5	14	0	
<b>C - SSKP R/L</b> Carbide shank 	C12R - SSKP R/L 09	●	□	16	12	11	200	25	8	-6°	SP_T 0903__
	C16S - SSKP R/L 09	●	□	20	16	15	250	30	10	-4°	

All figures show right hand tools.

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.  
Left handed tool holders are applicable with right handed or neutral inserts.  
SPGT figure shows left hand tool.

## ■ Applicable Inserts

## ■ Spare Parts

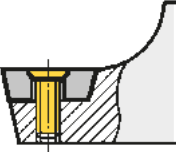
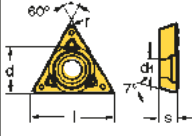
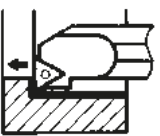
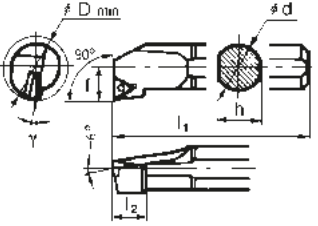
Holder	Carbides, Cermets	CBN		Screw	$\text{N}\cdot\text{m}$	Wrench			
S/C-SSKP R/L									
S/C 12.....09	SPGT 0903__L/R-SD	SPGW 0903__		BFTX 0307 A	2,0	TRX 10			
S/C 16.....09									
S 20.....09									
S 25.....09									

● = Eurostock  
□ = Delivery on request

$\text{N}\cdot\text{m}$  Recommended Tightening Torque (N·m)



## ■ Holders

	Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
			R	L	$\phi D_{min}$	d	h	$l_1$	$l_2$	f	$\gamma$	
<b>S - STFC R/L</b>  	S10K - STFC R/L 09	● ●	13	10	9	125	-	7	-15°	TC__0902__		
	S12M - STFC R/L 11	● ●	16	12	11	150	10	9	-10°	TC__1102__		
	S16R - STFC R/L 11	● ●	20	16	15	200	12	11	-6°			
	S20S - STFC R/L 11	● ●	25	20	18	250	14	13	-3°			
	S25T - STFC R/L 16	● □	32	25	23	300	18	17	-6°	TC__16T3__		
	S32U - STFC R/L 16	● □	40	32	30	350	20	22	-10°			
	S40V - STFC R/L 16	□ □	50	40	37	400	25	27	-8°			

All figures show right hand tools.

Boring Bars  
for pos. Insert

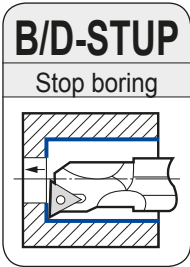
## ■ Applicable Inserts

## ■ Spare Parts

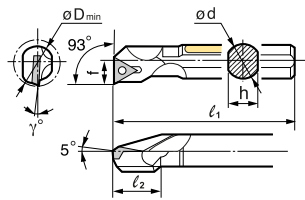
Holder	Carbides, Cermets		CBN, PCD	Screw	$\overset{\curvearrowright}{(N\cdot m)}$	Wrench			
S - STFC R/L									
S.....09	TCMT 0902__ NFP	-	TCGW 0902__	BFTX02205N	0,5	TRX06			
S.....11	TCMT 1102__ NFP	TCMT 1102__ NSK	TCGW 1102__	BFTX02506N	1,5	TRX08			
S.....16	TCMT 16T3__ NFP	TCMT 16T3__ NSK	TCGW 16T3__	BFTX0409N	3,4	TRX15			

# Boring Bars B/D/S/C...STUP(B) Type

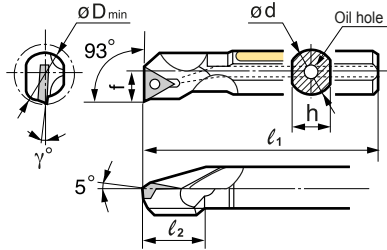
For Positive TB / TP \_\_\_ - Inserts ( $\alpha = 5, 11^\circ$ )



**B Type** (Fig.1)  
Min. Bore Dia.



**D Type** (Fig.2)



Insert (ex.)



## Spare Parts



## ■ Holders

Steel shank	Ordering No.	Stock		$\phi D_{min}$	Dimensions (mm)						Fig.	Insert (ex.)	Screw	Wrench
		R	L		$\phi d$	h	$l_1$	f	$l_2$	$\gamma$				
Anti-vibration B type	<b>B08H - STUP R/L 0802-10</b>	●	●	10	8	7	100	5	13	-10°	1.	TP□T 0802□□	BFTX0204A $\leq 0.5$	TRX06
	<b>B10K - STUP R/L 1103-12</b>	●	●	12	10	9	125	6	15	-8°				
Anti-vibration D type with oil hole	<b>D12M - STUP R/L 1103-14</b>	●	●	14	12	11	150	7	17	-7°	2.	TP□T 1103□□	BFTX0306A $\leq 2.0$	TRX10
	<b>D16R - STUP R/L 1103-18</b>	●	●	18	16	15	200	9	18	-4°				
	<b>D20S - STUP R/L 1103-22</b>	●	●	22	20	18	250	11	18	-3°				
	<b>D25T - STUP R/L 1604-28</b>	●	●	28	25	22	300	14	18	-2°				
	<b>D32T - STUP R/L 1604-40</b>	●	●	40	32	30	300	20	13	-2°				

All figures show right hand tools.

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.  
Left handed tool holders are applicable with right handed or neutral inserts.

## ■ Holders

Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							TECH $\alpha = 5^\circ$ TPGH $\alpha = 11^\circ$
		R	L	$\phi D_{min}$	d	h	$l_1$	$l_2$	f	$\gamma$	
S - STUP/B R/L Steel shank	S08H - STUB R/L 06-01	●	●	8	8	7	100	30	4	-12°	TB_T 0601__
	S08H - STUP R/L 08-02	●	●	10	8	7	100	13	5	-10°	TP_T 0802__
	S10K - STUP R/L 11-03	●	●	12	10	9	125	15	6	-8°	TP_T 1103__
	S12M - STUP R/L 11-03	●	●	16	12	11	150	17	8	-6°	
	S16R - STUP R/L 11-03	●	●	20	16	15	200	18	10	-2°	TP_T 1604__
	S20S - STUP R/L 16	●	●	25	20	18	250	18	12,5	-3°	
S25T - STUP R/L 16	●	●	28	25	22	300	18	14	-2°		
C - STUP/B R/L Carbide shank	C08M - STUB R/L 06	●	●	8	8	7	150	50	4	-12°	TB_T 0601__
	C08M - STUP R/L 08	●	●	10	8	7	150	18	5	-10°	TP_T 0802__
	C10Q - STUP R/L 11	●	●	12	10	9	180	19	6	-8°	TP_T 1103__
	C12R - STUP R/L 11	●	●	16	12	11	200	25	8	-6°	
	C16S - STUP R/L 11	●	□	20	16	15	250	30	10	-4°	

## ■ Applicable Inserts

## ■ Spare Parts

Holder	Carbides, Cermets	CBN, PCD	Screw	$\leq$ (N·m)	Wrench
S/C-STU_ R/L					
S/C 08.....06-01	TBGT 0601__L/R-W	-	BFTX 0204 A	0,5	TRX 06
S/C 08.....08-02	TPGT 0802__L/R-W	TPMW 0802__	BFTX 0204 A	0,5	TRX 06
S/C 10.....11-03	TPGT 1103__L/R-W	TPGW 1103__	BFTX 0306 A	2,0	TRX 10
S/C 12/16.....11-03	TPGT 1103__L/R-W	TPGW 1103__	BFTX 0307 A	2,0	TRX 10
S 20/25.....16	TPGT 1604__L/R-W	TPGW 1604__	BFTX 0410 A	3,4	TRX 15

Boring Bars for pos. insert





Anti-vibration D type  
with oil hole

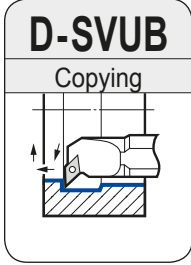


Fig.1

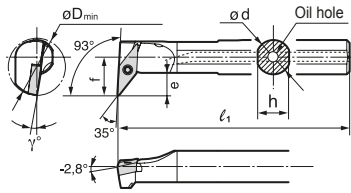
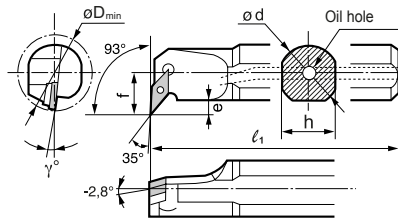


Fig.2



Insert (ex.)



### ■ Spare Parts

Pin	Clamp screw	Shim	Screw	Wrench	Wrench
-	-	-	BFTX02506	TRX08	-
-	-	-	BFTX03508	TRX10	LH020
VP32B	BH03504	SVP32	2.0		

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		$\phi D_{min}$	Dimensions (mm)					Fig.	Insert (ex.)	Pin	Clamp screw	Shim	Screw	Wrench	Wrench	
	R	L		$\phi d$	h	$\ell_1$	f	e									$\gamma$
D16R - SVUB R/L 1103-22	●	●	22	16	15	200	13	5	-7°	1.	VB□□ 1103○○	-	-	-	BFTX02506	TRX08	-
D20S - SVUB R/L 1103-27	●	●	27	20	18	250	15	5	-5°								
D25T - SVUB R/L 1604-35	●	●	35	25	23	300	20,5	9	-7,5°	2.	VB□□ 1604○○	VP32B	BH03504	SVP32	2.0	TRX10	LH020
D32T - SVUB R/L 1604-40	●	●	40	32	30	300	22	9	-7,5°								

Remarks: Right handed tool holders are applicable with left handed or neutral inserts.  
Left handed tool holders are applicable with right handed or neutral inserts.



Anti-vibration D type  
with oil hole

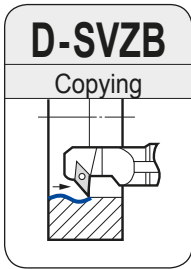


Fig.1

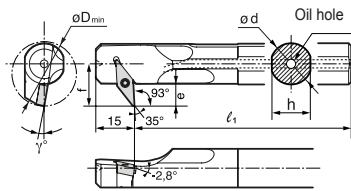
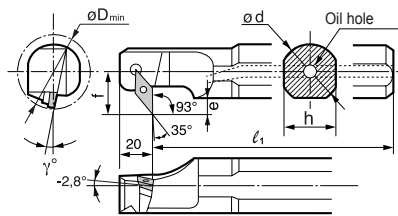


Fig.2



Insert (ex.)



### ■ Spare Parts

Pin	Clamp screw	Shim	Screw	Wrench	Wrench
-	-	-	BFTX02506	TRX08	-
-	-	-	BFTX03508	TRX10	LH020
VP32B	BH03504	SVP32	2.0		

### ■ Holders

Above figures show right hand tools.

Ordering No.	Stock		$\phi D_{min}$	Dimensions (mm)					Fig.	Insert (ex.)	Pin	Clamp screw	Shim	Screw	Wrench	Wrench	
	R	L		$\phi d$	h	$\ell_1$	f	e									$\gamma$
D16R - SVZB R/L 1103-22	●	●	22	16	15	200	13	5	-7°	1.	VB□□ 1103○○	-	-	-	BFTX02506	TRX08	-
D20S - SVZB R/L 1103-27	●	●	27	20	18	250	15	5	-5°								
D25T - SVZB R/L 1604-35	●	●	35	25	23	300	20,5	9	-7,5°	2.	VB□□ 1604○○	VP32B	BH03504	SVP32	2.0	TRX10	LH020
D32T - SVZB R/L 1604-40	●	●	40	32	30	300	22	9	-7,5°								

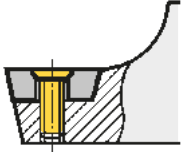

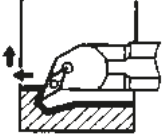
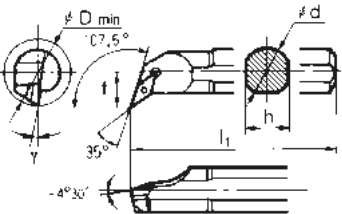
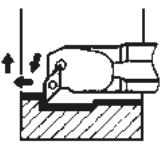
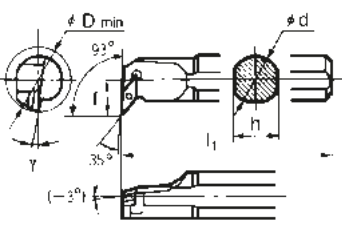
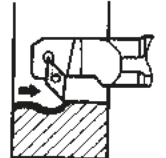
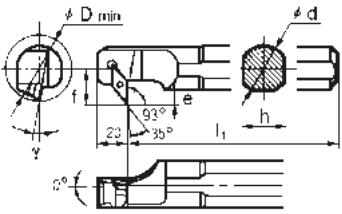
Boring Bars  
for pos. Insert

# Boring Bars S...SVQB / SVUB, SVZB Type

For Positive VB\_\_ - Inserts ( $\alpha = 5^\circ$ )












## ■ Holders

	Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
			R	L	$\phi D_{min}$	d	h	$l_1$	f	$\gamma$	e	
		S16R - SVQB R/L 11	●	●	22	16	15	200	13	-6,5°	VB__ 1102__	
		S20S - SVQB R/L 11	●	●	27	20	18	250	15	-6,5°		
		S25T - SVQB R/L 16	●	●	35	25	23	300	20,5	-6,5°	VB__ 1604__	
		S32U - SVQB R/L 16	●	●	40	32	30	350	22	-6,5°		
		S40V - SVQB R/L 16	□	□	50	40	37	400	27	-6,5°		
		S16R - SVUB R/L 11	●	●	22	16	15	200	13	-7,5°	VB__ 1102__	
		S20S - SVUB R/L 11	●	●	27	20	18	250	15	-7,5°		
		S25T - SVUB R/L 16	●	●	35	25	23	300	20,5	-7,5°	VB__ 1604__	
		S32U - SVUB R/L 16	●	●	40	32	30	350	22	-7,5°		
		S40V - SVUB R/L 16	□	□	50	40	37	400	27	-7,5°		
		S16R - SVZB R/L 11	●	●	22	16	15	200	13	-7,5°	VB__ 1102__	
		S20S - SVZB R/L 11	●	●	27	20	18	250	15	-7,5°		
		S25T - SVZB R/L 16	●	●	35	25	23	300	20,5	-7,5°	VB__ 1604__	
		S32U - SVZB R/L 16	●	●	40	32	30	350	22	-7,5°		
		S40V - SVZB R/L 16	□	□	50	40	37	400	27	-7,5°		

All figures show right hand tools.

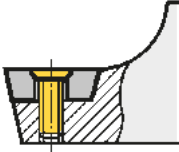
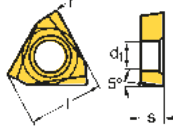

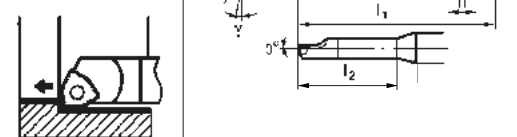
## ■ Applicable Inserts

## ■ Spare Parts

Holder	Carbides, Cermets		CBN	Pin	Clamp bolt	Shim	Screw	Wrench	Wrench
									
S16R	VBMT 1102__ NFP	VBMT 1102__ NSK	-	-	-	-	BFTX02506N	TRX08	-
S20S	VBMT 1102__ NFP	VBMT 1102__ NSK	-	-	-	-	$\ominus$ 1,5	TRX08	-
S25T	VBMT 1604__ NFP	VBMT 1604__ NSK	VBGW 1604__	-	-	-	BFTX03508 $\ominus$ 2,0	TRX10	-
S32U	VBMT 1604__ NFP	VBMT 1604__ NSK	VBGW 1604__	VP32B	BH03504	SVP32		TRX10	LH020
S40V	VBMT 1604__ NFP	VBMT 1604__ NSK	VBGW 1604__	VP40B	BH03504	SVP32		TRX10	LH020



## ■ Holders





 Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	$\emptyset D_{min}$	d	h	$l_1$	$l_2$	f	$\gamma$	
<b>S - SWUB R/L</b> Steel shank 	S08H - SWUB R/L 06-01	●	●	5,5	8	7	100	18	3	-12°	WBGT 0601__
<b>C - SWUB R/L</b> Carbide shank 	C08K - SWUB R/L 06	●	●	5,5	8	7	125	30	3	-12°	WBGT 0601__

All figures show right hand tools.

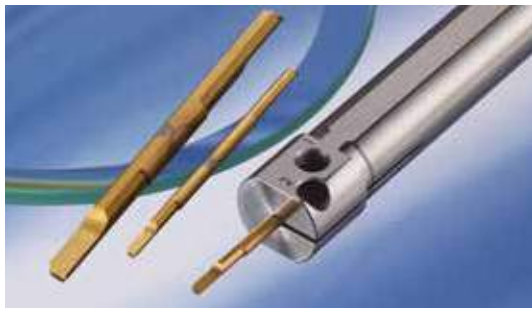
Remarks: Right handed tool holders are applicable with left handed or neutral inserts.  
Left handed tool holders are applicable with right handed or neutral inserts.

## ■ Applicable Inserts

## ■ Spare Parts

Holder	Carbides, Cermets	CBN	Screw		Wrench
S/C-SWUBR/L					
S/C 08.....R 06	WBGT 0601__ LW	-	BFTX 0203 N	0,5	TRX 06
S/C 08.....L 06	WBGT 0601__ RW	-	BFTX 0203 N	0,5	TRX 06

# Solid Carbide Boring Bars BXBR Type



**Sumi Small**

## Characteristics

- Economical, two-cornered insert.
- Maximum boring depth 5D (5 times the shank diameter)
- Usable at any desired overhang.
- Shank size = min. bore diameter for easy selection.  
(Available from  $\phi 2$  mm to  $\phi 5$  mm in 0,5 mm increments.)
- KBMX Type cutting edge used, no breaker versions also available in stock.

## Small Hole Finishing

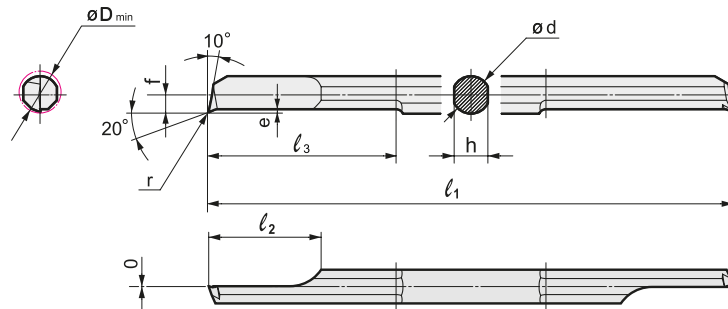
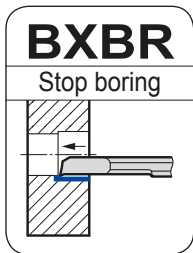


Figure shows tool with breaker.

\*  $l_3$ : Max. depth of boring

## Solid Carbide Bar

	Cat. No.	Stock		$\phi D_{min}$	Dimensions (mm)								Applicable Sleeve	
		ACZ150	AC530U		$\phi d$	h	$l_1$	f	$l_2$	$l_3$	e	r		
With Breaker	<b>BXBR 02005 R</b>	○		<b>2,0</b>	2,0	1,8	50	0,80	6,0	10,0	0,20	0,05	HBX 2016	
	<b>02020 R</b>	○		<b>2,0</b>	2,0	1,8	50	0,80	6,0	10,0	0,20	0,20	HBX 2016	
	<b>BXBR 02505 R</b>	○		<b>2,5</b>	2,5	2,2	50	1,05	7,5	12,5	0,20	0,05	HBX 2516	
	<b>02520 R</b>	○		<b>2,5</b>	2,5	2,2	50	1,05	7,5	12,5	0,20	0,20	HBX 2516	
	<b>BXBR 03005 R</b>	○		<b>3,0</b>	3,0	2,7	50	1,30	9,0	15,0	0,25	0,05	HBX 3016	
	<b>03020 R</b>	○		<b>3,0</b>	3,0	2,7	50	1,30	9,0	15,0	0,25	0,20	HBX 3016	
	<b>BXBR 03505 R</b>	○		<b>3,5</b>	3,5	3,1	60	1,55	10,5	17,5	0,25	0,05	HBX 3516	
	<b>03520 R</b>	○		<b>3,5</b>	3,5	3,1	60	1,55	10,5	17,5	0,25	0,20	HBX 3516	
	<b>BXBR 04005 R</b>	○		<b>4,0</b>	4,0	3,6	60	1,80	12,0	20,0	0,35	0,05	HBX 4016	
	<b>04020 R</b>	○		<b>4,0</b>	4,0	3,6	60	1,80	12,0	20,0	0,35	0,20	HBX 4016	
	<b>BXBR 04505 R</b>	○		<b>4,5</b>	4,5	4,1	70	2,05	13,5	22,5	0,35	0,05	HBX 4516	
	<b>04520 R</b>	○		<b>4,5</b>	4,5	4,1	70	2,05	13,5	22,5	0,35	0,20	HBX 4516	
	<b>BXBR 05005 R</b>	○		<b>5,0</b>	5,0	4,5	70	2,30	15,0	25,0	0,40	0,05	HBX 5016	
	<b>05020 R</b>	○		<b>5,0</b>	5,0	4,5	70	2,30	15,0	25,0	0,40	0,20	HBX 5016	
	No Breaker	<b>BXBR 02005 R-NB</b>	○		<b>2,0</b>	2,0	1,8	50	0,80	6,0	10,0	0,20	0,05	HBX 2016
		<b>02020 R-NB</b>	○		<b>2,0</b>	2,0	1,8	50	0,80	6,0	10,0	0,20	0,20	HBX 2016
		<b>BXBR 02505 R-NB</b>	○		<b>2,5</b>	2,5	2,2	50	1,05	7,5	12,5	0,20	0,05	HBX 2516
		<b>02520 R-NB</b>	○		<b>2,5</b>	2,5	2,2	50	1,05	7,5	12,5	0,20	0,20	HBX 2516
<b>BXBR 03005 R-NB</b>		○		<b>3,0</b>	3,0	2,7	50	1,30	9,0	15,0	0,25	0,05	HBX 3016	
<b>03020 R-NB</b>		○		<b>3,0</b>	3,0	2,7	50	1,30	9,0	15,0	0,25	0,20	HBX 3016	
<b>BXBR 03505 R-NB</b>		○		<b>3,5</b>	3,5	3,1	60	1,55	10,5	17,5	0,25	0,05	HBX 3516	
<b>03520 R-NB</b>		○		<b>3,5</b>	3,5	3,1	60	1,55	10,5	17,5	0,25	0,20	HBX 3516	
<b>BXBR 04005 R-NB</b>		○		<b>4,0</b>	4,0	3,6	60	1,80	12,0	20,0	0,35	0,05	HBX 4016	
<b>04020 R-NB</b>		○		<b>4,0</b>	4,0	3,6	60	1,80	12,0	20,0	0,35	0,20	HBX 4016	
<b>BXBR 04505 R-NB</b>		○		<b>4,5</b>	4,5	4,1	70	2,05	13,5	22,5	0,35	0,05	HBX 4516	
<b>04520 R-NB</b>		○		<b>4,5</b>	4,5	4,1	70	2,05	13,5	22,5	0,35	0,20	HBX 4516	
<b>BXBR 05005 R-NB</b>		○		<b>5,0</b>	5,0	4,5	70	2,30	15,0	25,0	0,40	0,05	HBX 5016	
<b>05020 R-NB</b>		○		<b>5,0</b>	5,0	4,5	70	2,30	15,0	25,0	0,40	0,20	HBX 5016	

## Adaptor Sleeve (Optional)

	Cat. No.	Stock	$\phi D_s$ (mm)	Applicable Bar
	<b>HBX 2016</b>	○		2,0
<b>HBX 2516</b>	○		2,5	BXBR 02500 R(-NB)
<b>HBX 3016</b>	○		3,0	BXBR 03000 R(-NB)
<b>HBX 3516</b>	○		3,5	BXBR 03500 R(-NB)
<b>HBX 4016</b>	○		4,0	BXBR 04000 R(-NB)
<b>HBX 4516</b>	○		4,5	BXBR 04500 R(-NB)
<b>HBX 5016</b>	○		5,0	BXBR 05000 R(-NB)

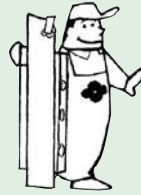
\* BXBR bars can be used with HBB type sleeves. Commercially available sleeves may also be used.

## Spare Parts (For sleeve)

Screw	$\text{N}\cdot\text{m}$	Setting Screw	Wrench
BFTX 0409 N	<b>3,4</b>	BT 06035 T	TRD 15

# Grooving & Parting-Off Threading Holders

F1 ~ F48



GND Type Grooving Tools Selection Guide	<b>GND</b> .....	F 2-15
External Grooving, (Small Tools)	<b>GNDM / GNDL</b> .....	F16-17
(Shallow Grooves)	<b>GNDS</b> .....	F18-19
	<b>GNDM / GNDMS</b> .....	F20-21
	<b>GNDL / GNDLS</b> .....	F22-23
Internal Grooving	<b>GNDI / GNDIS</b> <b>New</b> .....	F24-26
Necking	<b>GNDN</b> <b>New</b> .....	F27
Face Grooving	<b>GNDF / GNDFS</b> <b>New</b> .....	F28-31
ISO-PSC Polygon Modular Grooving System Holders	<b>PSC</b> <b>New</b> .....	F32
ISO-PSC Polygon Modular Grooving System Inserts	<b>GCM</b> .....	F33
"SumiTurn B-Groove" Holders	<b>GWC / GWCS / GWCI / PSC</b> .....	F34-35
"SumiTurn B-Groove" Inserts	<b>TGA-BF</b> .....	F35
Parting-Off Mini Holders	<b>SCT</b> .....	F36
Sumi-Grip Inserts	<b>WCF (-N/R/L)</b> .....	F37
"Sumi-Grip Jr." Steel Type	<b>STFH / STFS R/L</b> .....	F38-39
"Sumi-Grip" Carbide Blade Type	<b>WCFH / WCFS R/L</b> .....	F40-42
Threading Tools Selection Guide	.....	F43-44
Cutting Conditions	.....	F45
External Threading Holders	<b>LTER / STER</b> .....	F46
Internal Threading Holders	<b>STIR</b> .....	F47

# Grooving Tool Holders GND Type



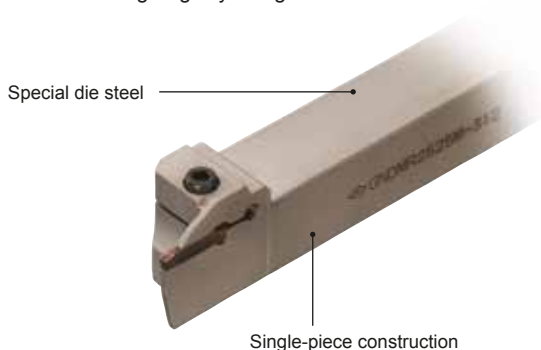
## Characteristics

- Wide range of application processes  
Applicable for grooving, turning, copying, facing, boring and cut-off.
- Achieving stable tool life  
An array of chipbreakers improves the efficiency in chip control in various applications and prevents unexpected damages caused by chip blockade.
- Achieving smooth cutting and high efficiency machining  
Holders utilizing one-piece body construction made of special steel, reduce vibration by 30% during machining as compared to conventional types.
- Achieving high precision grooving widths with moulded inserts  
Grooving insert width tolerance of  $\pm 0,03\text{mm}$  over the entire range

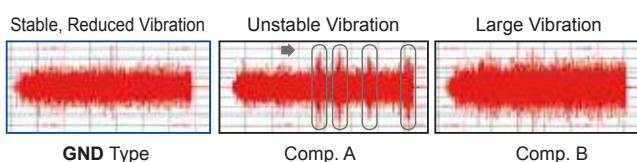
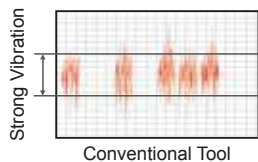
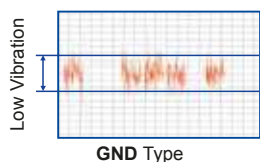
## Cutting Performance

### Eliminates Vibration

Reduces vibration up to 30% compared to conventional grades thanks to its high-rigidity design.



### Ensures both high rigidity and good chip evacuation



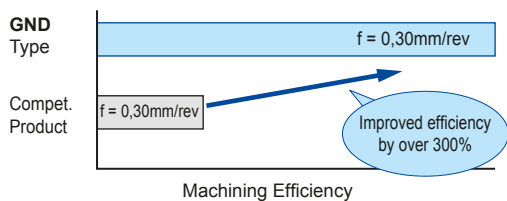
Work Material:	15CrMo5
Holder:	GNDL R2525M 220
Insert:	GCM N2002 GG
Cutting Conditions:	$v_c=100\text{m/min}$ , $f=0,10\text{mm/rev}$ , $a_p=20\text{mm}$ , wet

Work Material:	15CrMo5
Holder:	GNDI R2532 T306
Insert:	GCM N3002 GG
Cutting Conditions:	$v_c=100\text{m/min}$ , $f=0,05\text{mm/rev}$ , $a_p=3,0\text{mm}$ , wet

## Application Examples

### Substantially improved machining efficiency!

High rigidity holder enables high load machining at high feed rate.



Work Material:	42CrMo4
Holder:	GNDL R2525M 320
Insert:	GCM N3002 GG (AC530U)
Cutting Conditions:	$v_c=130\text{m/min}$ , $f=0,30\text{mm/rev}$ , wet

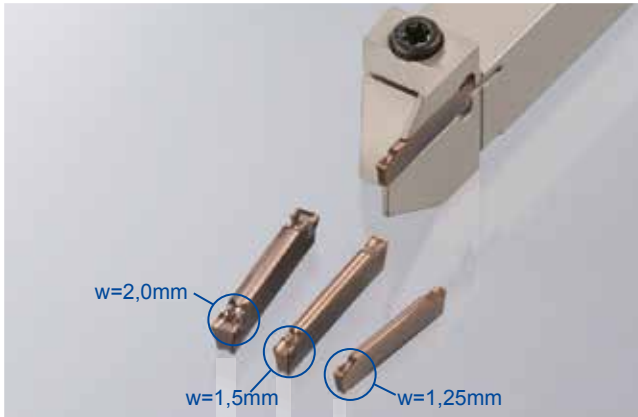
### Stable and long tool life ensures reliable functionality even on automatic production lines!

Reduction of chattering prevents unexpected breakage.



Work Material:	C53
Holder:	GNDM L2525M 618
Insert:	GCM N6030 RG (AC530U)
Cutting Conditions:	$v_c=130\text{m/min}$ , $f=0,30\text{mm/rev}$ , wet

# Grooving Tool Holders GND Type



## ■ GND Series Expansion for Small Lathes

- Supplementing the holder program with the cross-section 1010, 1212, 1616, 2020 and 2525.
- The line up includes grooving widths of 1,25mm, 1,5mm, 2,0mm and 3,0mm.
- Reduces chattering and achieves high-efficiency machining

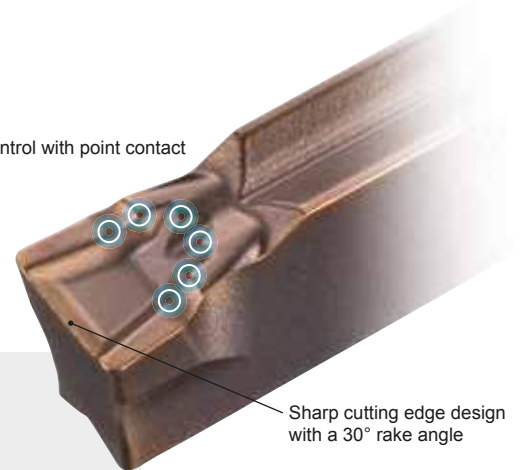
Reducing vibration during grooving by employing the same high-rigidity holder design of the GND series.

## ■ Low Cutting Resistance Chipbreaker GF Type

- Reduces chip control problems  
The GF type chipbreaker is added to the current wide selection of chipbreakers to improve chip control under various conditions.
- Reduces chattering during cutting
- Ideal for machining using low-powered equipment such as small lathes
- Reduces adhesion to tools and achieves long tool life in machining of stainless steel, etc.

Achieves excellent chip control and reduced cutting resistance due to the sharp cutting edge design with a 30° rake angle as well as the reduction of frictional resistance through chip control with point contact.

Chip control with point contact



Sharp cutting edge design with a 30° rake angle

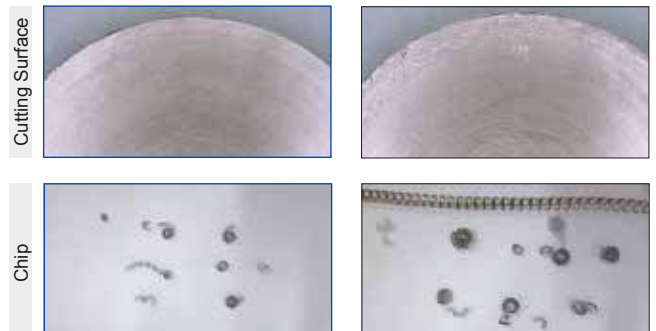
## ■ Minimum Groove Width: 1,25mm

Effective for reduction of material costs and for reduction of vibration during cutting off.



Work Material: 15CrMo5, Ø22mm  
Holder: GNDL R1212JX 1,2512  
Insert: GCM N125005GF (AC530U)  
Cutting Conditions:  $n=2000\text{min}^{-1}$ ,  $f=0,03\text{mm/rev}$ , wet

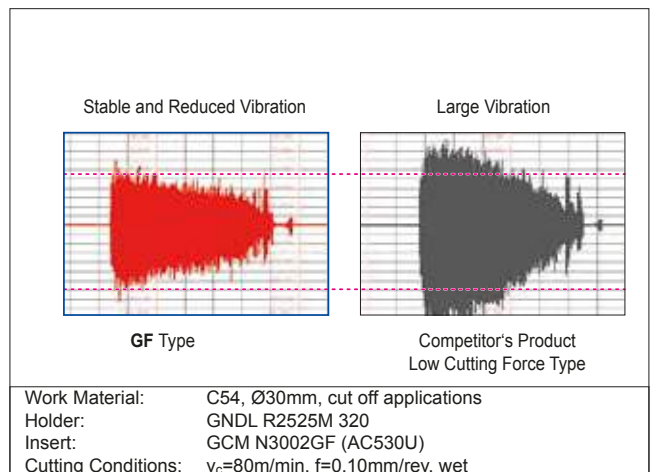
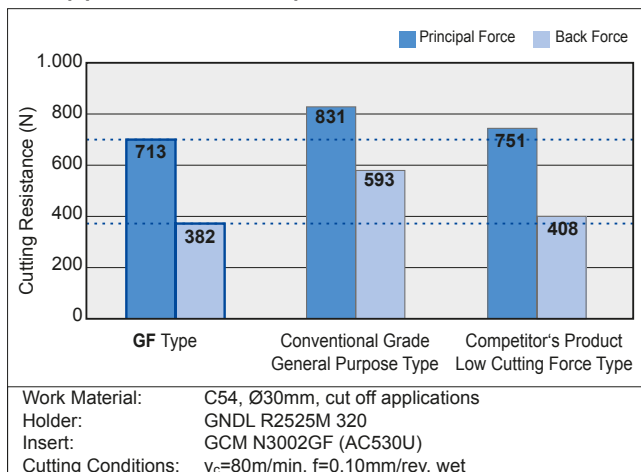
## Provides Excellent Surface Finish and Chip Control



GND (GF) Type

Competitor's Product

## ■ Application Examples



# Grooving Tool Holders GND Type

**New**



## ■ Cermet Grade T2500A

- Presenting a new cermet grade for steel grooving and turning
- Greatly improves toughness through a dense and uniform structure for stability and longer tool life.
- Uses a new cutting edge treatment method to maintain a good glossy surface finish from the beginning and over a long period of time.

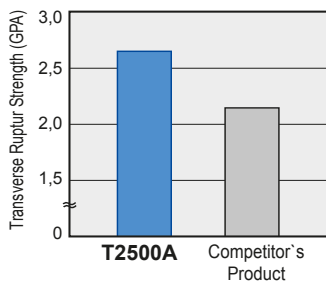


T2500A

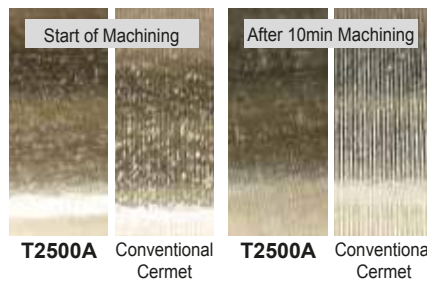


Conventional Grade

### ● Transverse Rupture Strength

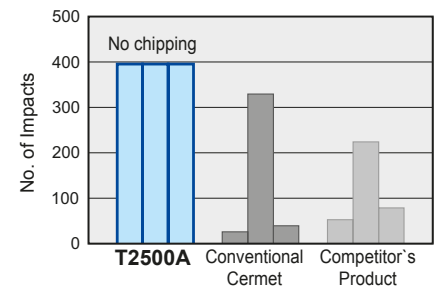


### ● Excellent Machined Surface Quality



Work Material: 15CrMo5  
Cutting Conditions:  $v_c=150\text{m/min}$ ,  $f=0,2\text{mm/rev}$ ,  $a_p=0,8\text{mm}$ , wet

### ● Interrupted Cutting



Work Material: 34CrMo4, grooved  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,2\text{mm/rev}$ ,  $a_p=1,0\text{mm}$ , dry

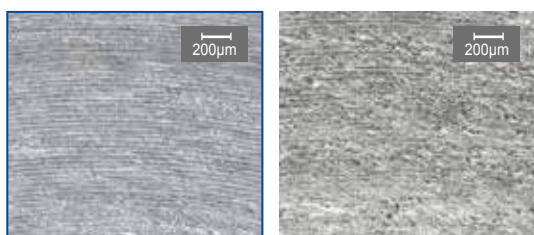
**New**



## ■ GA Type Ground Breakers

- For aluminium alloy and non-ferrous metals
- High quality ground breaker GA type reduces work material adhesion and provides excellent machined surface
- Achieves good chip control
- Stable machining in combination with special carbide grade H10 for grooving

### ● Machined Surface Quality

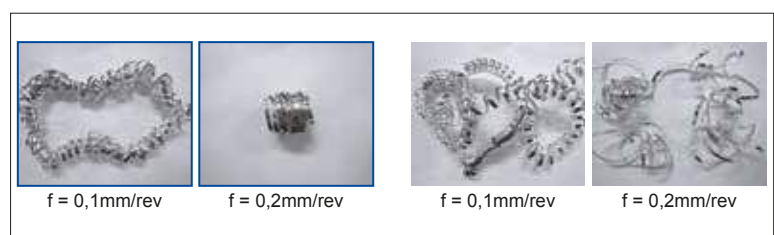


H10 + GA

Conventional Grade

Work Material: A5056 (Aluminium Alloy)  
Application: Inner Diameter Radial Groove (ID  $\varnothing 60\text{mm}$ )  
Cutting Conditions:  $a_p=2,8\text{mm}$ , Width= 3mm,  $n_{max}=3.500\text{min}^{-1}$ ,  $v_c=200\text{m/min}$ ,  $f=0,05\text{mm/rev}$ , wet

### ● Excellent Chip Management



H10 + GA

Conventional Grade

Work Material: A5056 (Aluminium Alloy)  
Application: Inner Diameter Radial Groove (ID  $\varnothing 60\text{mm}$ )  
Cutting Conditions:  $a_p=5,0\text{mm}$ , Width=3mm,  $v_c=200\text{m/min}$ ,  $f=0,1-0,2\text{mm/rev}$ , wet



# Grooving Tool Holders GND Type

**New**

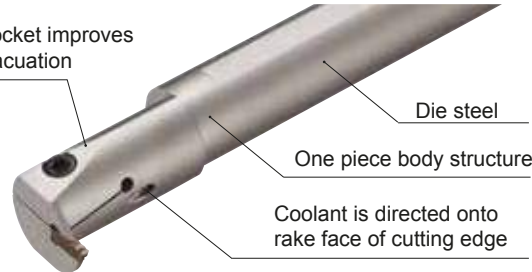


Notice: Different insert sizes  
GNDIS type: use smaller GXM type inserts  
GNDI type: use standard GCM inserts

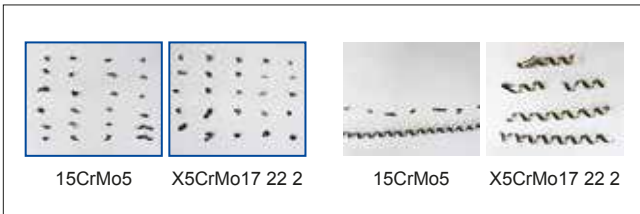
## ■ GNDIS Type for Internal Grooving

- For small bores with minimum bore diameters from  $\varnothing 14\text{mm}$
- Reduces vibration during grooving by employing the same high-rigidity holder design of the GND series
- Increased tool life through one-piece body structure  
Uses special 2-cornered inserts (GXM type)

Wide pocket improves chip evacuation



## ● Improved Chip Management

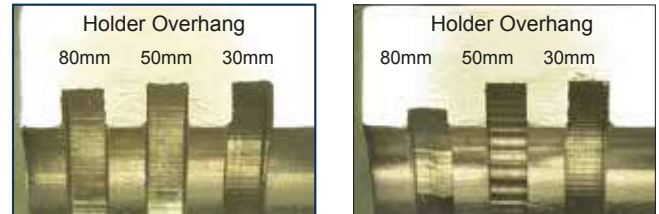


GNDIS Type + GF

Competitor's Product

Work Material: 15CrMo5/X5CrMo17 22 2  
Cutting Conditions: Grooving Widths: 3,0mm  
 $v_c=100\text{m/min}$ ,  $f=0,05\text{mm/rev}$ ,  $a_p=2,0\text{mm}$ , wet

## ● Chattering Resistance Performance



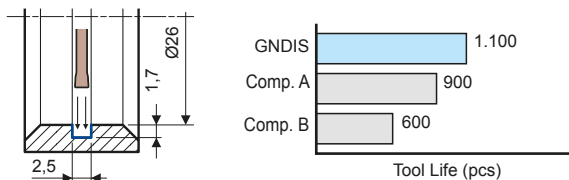
GNDIS Type + GF

Competitor's Product

Work Material: X5CrMo17222  
Cutting Conditions: Grooving Widths: 2,0mm  
 $v_c=100\text{m/min}$ ,  $f=0,05\text{mm/rev}$ ,  $a_p=2,0\text{mm}$ , wet

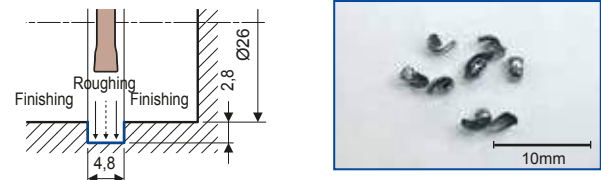
## ■ Application Examples

Long tool life through stable chip control using a high-rigidity tool and 3D breaker.



Work Material: C45  
Toolholder: GNDISR1620-T2046  
Insert: GXM N2002S GF (AC1030U)  
Cutting Conditions:  $v_c=150\text{m/min}$ ,  $f=0,03\text{mm/rev}$ ,  $a_p=1,7\text{mm}$ , wet

With good chip control, the step machining of roughing process performed by competitor's product is not necessary.



Work Material: 20CrMo5  
Toolholder: GNDISR1620-T2046  
Insert: GXM N2002S GF (AC1030U)  
Cutting Conditions: Roughing:  $v_c=50\text{m/min}$ ,  $f=0,07\text{mm/rev}$ ,  $a_p=2,8\text{mm}$ , wet  
Finishing:  $v_c=80\text{m/min}$ ,  $f=0,05\text{mm/rev}$ ,  $a_p=2,8\text{mm}$ , wet

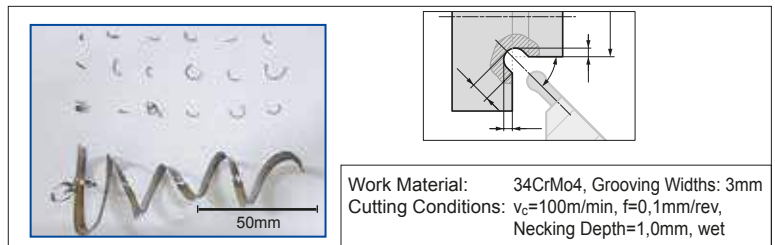
**New**



## ■ GNDN Type Holder for Necking

- The lineup includes grooving widths from 2mm to 6mm
- Demonstrates excellent chip control in corner necking when combined with RN chipbreakers

## ● Chip Management










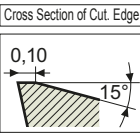
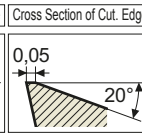
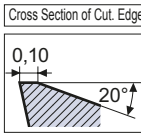
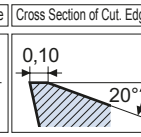
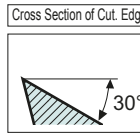
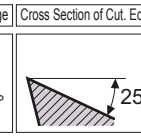
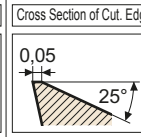
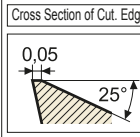
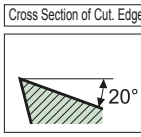


Work Material: 34CrMo4, Grooving Widths: 3mm  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,1\text{mm/rev}$ ,  
Necking Depth=1,0mm, wet

# Grooving Tool Holders GND Type

## ■ Inserts - Chipbreaker Series

Achieving stability and longer tool life. A variety of chipbreakers ensures outstanding chip control performance in many different types of applications.

Grooving / Turning		Grooving / Cut-Off				Profiling	Necking	Non Ferrous Metals
General Type	Low Feed Type	General Type	Low Feed Type	Low Cutting Force Type	Cut-Off Type	General Type	General Type	General Type
<b>MG</b> 	<b>ML</b> 	<b>GG</b> 	<b>GL</b> 	<b>GF</b> 	<b>CG</b> 	<b>RG</b> 	<b>RN</b> <b>New</b> 	<b>GA</b> <b>New</b> 
								
Grooving Width (mm) 0,10 15°	Grooving Width (mm) 0,05 20°	Grooving Width (mm) 0,10 20°	Grooving Width (mm) 0,10 20°	Grooving Width (mm) 30°	Grooving Width (mm) 25°	Grooving Width (mm) 0,05 25°	Grooving Width (mm) 0,05 25°	Grooving Width (mm) 20°
Grooving Width (mm) 1,25 1,5 2,0 3,0 4,0 5,0 6,0 7,0 8,0	Grooving Width (mm) 1,25 1,5 2,0 3,0 4,0 5,0 6,0 7,0 8,0	Grooving Width (mm) 1,25 1,5 2,0 3,0 4,0 5,0 6,0 7,0 8,0	Grooving Width (mm) 1,25 1,5 2,0 3,0 4,0 5,0 6,0 7,0 8,0	Grooving Width (mm) 1,25 1,5 2,0 3,0 4,0 5,0 6,0 7,0 8,0	Grooving Width (mm) 1,25 1,5 2,0 3,0 4,0 5,0 6,0 7,0 8,0	Grooving Width (mm) 1,25 1,5 2,0 3,0 4,0 5,0 6,0 7,0 8,0	Grooving Width (mm) 1,25 1,5 2,0 3,0 4,0 5,0 6,0 7,0 8,0	Grooving Width (mm) 1,25 1,5 2,0 3,0 4,0 5,0 6,0 7,0 8,0
Grade AC830P AC425K AC830P AC425K AC520U AC530U AC520U AC530U AC1030U T2500A *AC1030U T2500A H10	Grade AC830P AC425K AC830P AC425K AC520U AC530U AC520U AC530U AC1030U T2500A *AC1030U T2500A H10	Grade AC830P AC425K AC830P AC425K AC520U AC530U AC520U AC530U AC1030U T2500A *AC1030U T2500A H10	Grade AC830P AC425K AC830P AC425K AC520U AC530U AC520U AC530U AC1030U T2500A *AC1030U T2500A H10	Grade AC830P AC425K AC830P AC425K AC520U AC530U AC520U AC530U AC1030U T2500A *AC1030U T2500A H10	Grade AC830P AC425K AC830P AC425K AC520U AC530U AC520U AC530U AC1030U T2500A *AC1030U T2500A H10	Grade AC830P AC425K AC830P AC425K AC520U AC530U AC520U AC530U AC1030U T2500A *AC1030U T2500A H10	Grade AC830P AC425K AC830P AC425K AC520U AC530U AC520U AC530U AC1030U T2500A *AC1030U T2500A H10	Grade AC830P AC425K AC830P AC425K AC520U AC530U AC520U AC530U AC1030U T2500A *AC1030U T2500A H10

Stock

\* Only use with GNDIS

## ■ Recommended Cutting Conditions

Work Material	<b>P</b> Carbon Steel / Alloy Steel	<b>M</b> Stainless Steel	<b>K</b> Cast Iron	<b>S</b> Exotic Alloy	<b>N</b>
Grade	AC830P AC520U AC530U T2500A	AC830P AC520U AC530U	AC425K AC520U AC530U AC1030U	AC520U AC530U AC1030U	H10
Cutting Speed (m/min)	80~200 80~200 50~200 50~200	70~150 70~150 50~150	80~200 60~200 50~200 50~200	20~80 20~60 20~60	150~300

## ■ Excellent Chip Control

### Grooving



**GND Type**  
(GG Type Chipbreaker)



Conventional Tool

Work Material: 15CrMo5  
Holder: GNDL R2525M 320  
Insert: GCM N3002 GG  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,15\text{mm/rev}$ ,  $a_p=12,0\text{mm}$ , wet

### Turning



**GND Type**  
(ML Type Chipbreaker)



Conventional Tool

Work Material: 15CrMo5  
Holder: GNDM R2525M 312  
Insert: GCM N3002 ML  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,10\text{mm/rev}$ ,  $a_p=0,5\text{mm}$ , wet

### Cut-Off



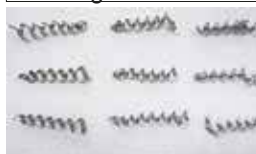
**GND Type**  
(CG Type Chipbreaker)



Conventional Tool

Work Material: X5CrMo17122 (Ø30mm)  
Holder: GNDL R2525M 220  
Insert: GCM R2002 CG 05  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,15\text{mm/rev}$ , wet

### Profiling



**GND Type**  
(RG Type Chipbreaker)



Conventional Tool

Work Material: 15CrMo5  
Holder: GNDM R2525M 312  
Insert: GCM N3015 RG  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,15\text{mm/rev}$ ,  $a_p=0,1\text{mm}$ , wet

# Grooving Tool Holders GND Type

## Chipbreaker Selection

	Grooving / Turning	Grooving	Cut-Off	
1st Recommendation	<b>MG</b> General Feed 	<b>GG</b> General Feed 	<b>GG</b> General Feed 	
	Improved Chip Control Chipping Prevention	Improved Chip Control Chipping Prevention	Prevent Nip Formation Good Chip Control	Improved Chip Control Chipping Prevention
2nd Recommendation	<b>ML</b> Low Feed Good Chip Control 	<b>GL</b> General Feed Good Chip Control 	<b>CG</b> Handed Type 	<b>GL</b> General Feed Good Chip Control 
		Good Chip Control Reduce Chattering Chipping Prevention		Good Chip Control Reduce Chattering Chipping Prevention
		<b>GF</b> Low Cutting Force 		<b>GF</b> Low Cutting Force 
	Profiling / Radius Grooving Outside Diameter	Necking / Radius Grooving Internal Profiling		For Non Ferrous Metals
Recommendation	<b>RG</b> General Feed 1st Recommendation 	<b>RN</b> General Feed 2nd Recommendation w = 2mm 	<b>RN</b> General Feed 	<b>GA</b> General Feed 
		New	New	New

Grooving & Parting-Off

## Grade Selection

	<b>P</b> Steel	<b>M</b> Stainless Steel	<b>K</b> Cast Iron	<b>S</b> Exotic Alloy	<b>N</b> Non Ferrous Metals
1st Recommendation	<b>AC530U</b> AC1030U* PVD	<b>AC530U</b> AC1030U* PVD	<b>AC425K</b> CVD	<b>AC520U</b> PVD	<b>H10</b> Uncoated Carbide
	Insufficient Wear Resistance Chipping Countermeasures	Insufficient Wear Resistance Chipping Countermeasures	Chipping Countermeasures Insufficient Wear Resistance	Chipping Countermeasures Insufficient Wear Resistance	
2nd Recommendation	<b>AC520U</b> PVD	<b>AC520U</b> PVD	<b>AC520U</b> PVD		
	Insufficient Wear Resistance Chipping Countermeasures	Insufficient Wear Resistance Chipping Countermeasures	Chipping Countermeasures Insufficient Wear Resistance	Insufficient Wear Resistance	
	<b>AC830P</b> CVD	<b>AC830P</b> CVD	<b>AC530U</b> AC1030U* PVD	<b>AC530U</b> AC1030U* PVD	
	<b>T2500A</b> Uncoated Cermet				

\* Will replace grade AC530U

# Grooving Tool Holders

## GND Type

For External Machining

Turning / Profiling

Grooving / Cut-Off

Model	Type	Shank Size (H x W)	Grooving Width (mm)	Chipbreaker
GNDM	Small Tools, Straight Type	16mm x 16mm	1.25, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0	MG ML GG GL GF RG RN CG GA
GNDLS	Shallow Grooves, Straight Type	20mm x 20mm, 25mm x 25mm	1.25, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0	MG ML GG GL GF RG RN CG GA
GNDM	Straight Type	20mm x 20mm, 25mm x 25mm, 32mm x 25mm, 32mm x 32mm	1.25, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0	MG ML GG GL GF RG RN CG GA
GNDMS	L Type	20mm x 20mm, 25mm x 25mm	1.25, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0	MG ML GG GL GF RG RN CG GA
GNDL	Small Tools, Straight Type	10mm x 10mm, 12mm x 12mm, 16mm x 16mm	1.25, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0	MG ML GG GL GF RG RN CG GA
GNDL	Straight Type	20mm x 20mm, 25mm x 25mm, 32mm x 25mm, 32mm x 32mm	1.25, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0	MG ML GG GL GF RG RN CG GA
GNDLS	L Type	20mm x 20mm, 25mm x 25mm	1.25, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0	MG ML GG GL GF RG RN CG GA

### Series for External Machining

Type	Shank Size (H x W)	Cutting Width (mm)	Series	Max. Grooving Depth (mm)						Ref. Page	Applicable Chipbreaker												
				5	10	15	20	25	30		MG	ML	GG	GL	GF	RG	RN	CG	GA				
Small Tools	10	10	GNDL	10																			
			GNDL	10																			
		GNDL	10																				
		GNDL	12																				
		GNDL	12.5																				
		GNDL	12.5																				
	16	16	1.25	GNDM	8																		
				GNDL	12.5																		
		16	1.5	GNDM	10																		
				GNDL	12																		
			2	GNDL	16																		
				GNDM	12																		
Straight Type	20	20	GNDM	10																			
			GNDL	16																			
		20	2	GNDM	6																		
				GNDL	10																		
			3	GNDM	10																		
				GNDL	20																		
	25	25	4	GNDM	18																		
				GNDL	25																		
		25	5	GNDM	18																		
				GNDL	25																		
			7	GNDM	18																		
				GNDL	25																		
L Type	20	20	GNDLS	16																			
			GNDMS	10																			
		20	3	GNDLS	16																		
				GNDMS	12																		
			4	GNDMS	12																		
				GNDLS	18																		
	25	25	2	GNDMS	12																		
				GNDLS	18																		
		25	3	GNDMS	12																		
				GNDLS	18																		
			4	GNDMS	14																		
				GNDLS	23																		

Stock

\* Make to order item (32x25mm)

○ 1st Recommendation

○ 2nd Recommendation


# Grooving Tool Holders GND Type

## For Necking

### Necking

**GNDN**  
Straight Type  
**New**

Shank Size  
Height x Width  
20mm x 20mm  
25mm x 25mm



Grooving Width (mm)		
1,25	1,5	2,0
3,0	4,0	5,0
6,0	7,0	8,0

Chipbreaker


MG ML GG GL GF RG RN CG GA

## For Face Machining

### Grooving / Turning / Profiling

**GDNF**  
Straight Type

Shank Size  
Height x Width  
20mm x 20mm  
25mm x 25mm




Grooving Width (mm)		
1,25	1,5	2,0
3,0	4,0	5,0
6,0	7,0	8,0

Chipbreaker

MG ML GG GL GF RG RN CG GA

**GNDFS**  
L Type  
**New**

Shank Size  
Height x Width  
25mm x 25mm  
32mm x 32mm

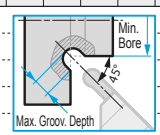


Grooving Width (mm)		
1,25	1,5	2,0
3,0	4,0	5,0
6,0	7,0	8,0

Chipbreaker

MG ML GG GL GF RG RN CG GA

### Series for Necking

Type	Shank Size	Cutting Width (mm)					Series	Max. Grooving Depth (mm)	Min. Bore (mm)	Ref. Page	Applicable Chipbreaker										
		2	3	4	5	6					MG	ML	GG	GL	GF	RG	RN	CG	GA		
Straight Type	20	20	2	3			GNDN	2,0	 Min. Bore Max. Groov. Depth	→ F27											
	25	25			4	5		6			2,5	3,0	3,5	4,0	ø20 ø20 ø30 ø30 ø30						

Stock

### Series for Face Machining

Type	Shank Size	Cutting Width (mm)								Series	Max. Grooving Depth (mm)	Bore (mm)	Ref. Page	Applicable Chipbreaker													
		3	4	5	6	7	8	MG	ML					GG	GL	GF	RG	RN	CG	GA							
Straight Type	20	20	3						GDNF	12	ø35	ø45	→ F28														
			3							12	ø40	ø55															
			3								18	ø50		ø70													
			3								18	ø65		ø100													
			3								18	ø90		ø150													
			3								18	ø140		ø200													
	25	25	4						GDNF	18	ø40	ø55	→ F28														
			4							23	ø50	ø70															
			4							23	ø65	ø90															
			4							23	ø85	ø130															
			4							23	ø125	ø200															
			4							23	ø180	ø300															
20	20	5						GDNF	23	ø50	ø70	→ F28															
		5							23	ø65	ø90																
		5							23	ø85	ø130																
		5							23	ø125	ø200																
		5							23	ø180	ø300																
		5							23	ø280	ø1.000																
25	25	6						GDNF	23	ø50	ø75	→ F28															
		6							23	ø70	ø110																
		6							23	ø100	ø200																
		6							23	ø180	ø300																
		6							23	ø280	ø1.000																
		6							23	ø450	-																
L Type	20	20	6					GNDFS	20	ø70	ø100	→ F30															
			6						20	ø100	ø200																
			6						20	ø180	ø300																
	25	25	6					GNDFS	20	ø70	ø100	→ F30															
			6						20	ø100	ø200																
			6						20	ø180	ø300																

Stock

Make to order item

⊙ 1st Recommendation

○ 2nd Recommendation

# Grooving Tool Holders

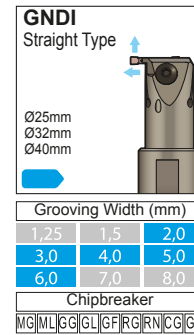
## GND Type

For Internal Machining ( $\geq \varnothing 14\text{mm} \sim$ )

For Internal Machining ( $\geq \varnothing 32\text{mm} \sim$ )

Grooving / Turning / Copying

Grooving / Turning / Copying



### Series for Internal Machining ( $\geq \varnothing 14\text{mm} \sim$ )

Type	Shank Size ØD <sub>s</sub> (mm)	Cutting Width (mm)			Series	Max. Grooving Depth (mm)	Min. Bore (mm)	Ref. Page	Applicable Chipbreaker		
		1,5	2	3					ML	GF	
Straight Type	Ø12	1,5			GNDIS	2,6	Ø14	→ F26		○	
		1,5				3,6	Ø14			○	
			2	3		2,6	Ø14		○	○	
			2	3		3,6	Ø14		○	○	
		1,5				4,6	Ø16		○	○	
		1,5				3,6	Ø16		○	○	
	Ø16		2	3	GNDIS	4,6	Ø20		○	○	
			2	3		3,6	Ø16		○	○	
			2	3		4,6	Ø20		○	○	
			2	3		3,6	Ø20		○	○	
		1,5				GNDIS	6,6		Ø25	○	○
		1,5					6,6		Ø25	○	○

Stock

GNDIS type: use smaller GXM type inserts

1st Recommendation

### Series for Internal Machining ( $\geq \varnothing 32\text{mm} \sim$ )

Type	Shank Size ØD <sub>s</sub> (mm)	Cutting Width (mm)					Series	Max. Grooving Depth (mm)	Min. Bore (mm)	Ref. Page	Applicable Chipbreaker									
		2	3	4	5	6					MG	ML	GG	GL	GF	RG	RN	CG	GA	
Straight Type	Ø25	2					GNDI	6	Ø32	→ F24	○	○	○	○	○	○	○	○	○	
			3	4	5			6	Ø32		○	○	○	○	○	○	○	○	○	
			2						6		Ø32	○	○	○	○	○	○	○	○	○
	Ø32		3	4	5			GNDI	10		Ø40	○	○	○	○	○	○	○	○	○
			3	4	5	6			11		Ø50	○	○	○	○	○	○	○	○	○
			3	4	5	6							○	○	○	○	○	○	○	○

Stock

1st Recommendation

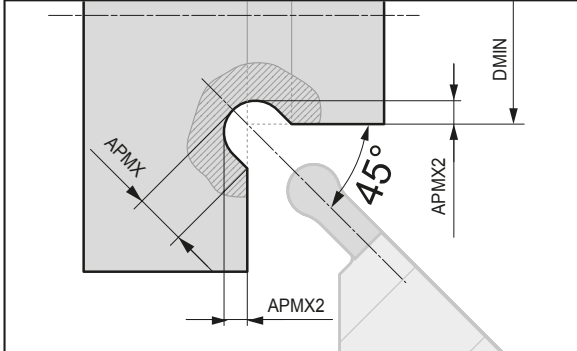
2nd Recommendation

## Tips for Necking

Notes for Undercutting

Recommended Chipbreaker: **RN**

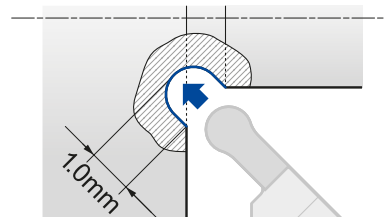
### Distance between Workpiece and Necking



Edge Width CW (mm)	Depth of Necking APMX (mm)	Distance between Workpiece and Necking APMX2 (mm)
2,0	1,50	0,646
3,0	2,00	0,793
4,0	2,50	0,939
5,0	3,00	1,086
6,0	3,50	1,232

The recommended cutting conditions for necking are the same as grooving with RN type chipbreaker and edge width. To prevent interference with the work material, do not use the holder for less than the minimum cutting diameter (DMIN) as specified for GNGN type holders.

### Chip Shape

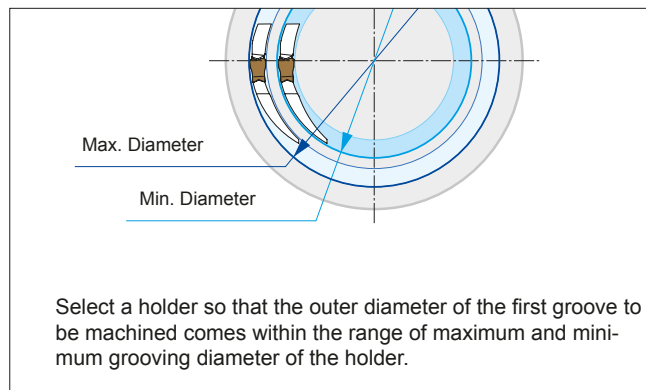


Work Material: 34CrMo4  
 Holder: GNDN R2020K 325-020  
 Insert: GCM N3015 RN  
 Cutting Conditions:  $v_c = 100\text{m/min}$ ,  $f = 0,1\text{mm/rev}$   
 Depth of Necking = 1,0mm, wet

# Grooving Tool Holders GND Type

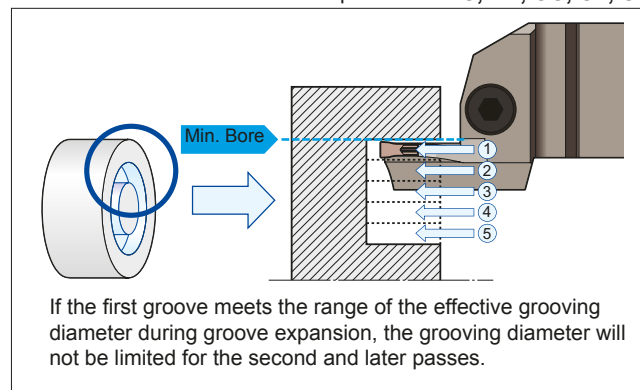
## Key Points for Face Machining

### Holder Selection



### Precautions for Groove Expansion

Recommended Chipbreaker: **MG, ML, GG, GL, GF**

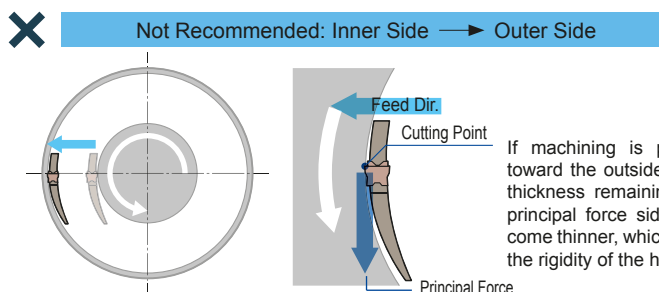
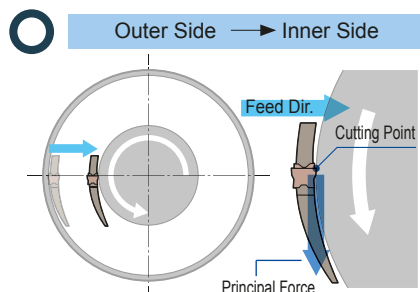


### Precautions for Turning

Recommended Chipbreaker:

**MG, ML**

Considering the rigidity of the holder, we recommend machining from the outside to the inside.



- If the first groove meets the range of the effective grooving diameter in face turning, the grooving diameter will not be limited for the second and later passes.
- Select the chipbreaker of the lower limit side of the recommended cutting conditions and straight chips before evacuation. (In face grooving, broken chips easily get stuck in grooves, which causes problems.)
- When breaking chips, step feed is required.

## Key Points for Internal Machining

### Precautions for Internal Machining

Recommended Chipbreaker:

**ML, GL**

If the prepared hole diameter is small, use an ML or GL low-feed chipbreaker, each of which reduces chip curl diameter, to ensure adequate chip evacuation.



Work Material: 15CrMo5 (Ø25mm)  
Holder: GNDI R2532 T306  
Insert: GCM N300□-□□  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,10\text{mm/rev}$ ,  $a_p=3,0\text{mm}$ , wet



Chip shapes differ between internal and external machining even under the same cutting conditions.

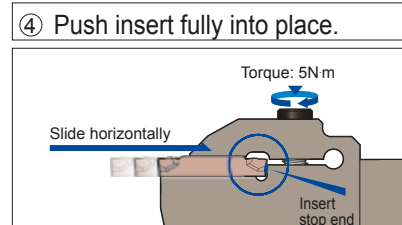
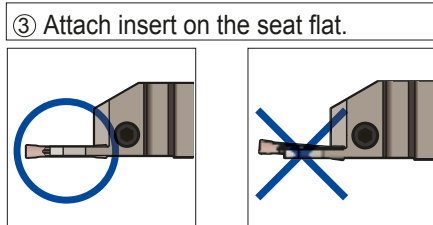
Work Material: 15CrMo5  
Holder: GNDL R2525M 320  
Insert: GCM N3002 GG  
Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,10\text{mm/rev}$ ,  $a_p=5\text{mm}$ , wet



# Grooving Tool Holders GND Type

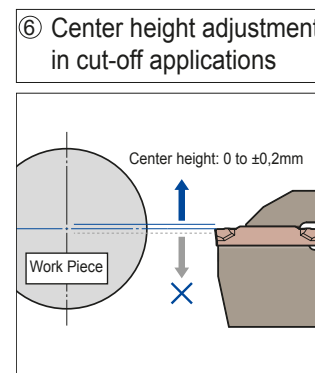
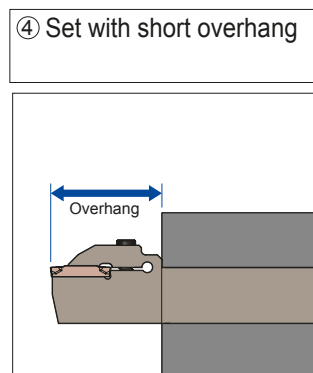
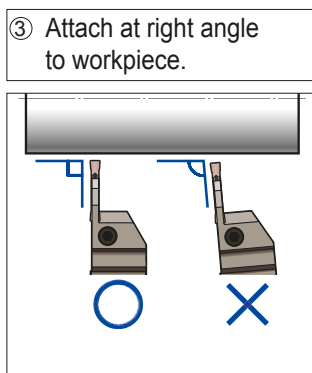
## Notes on how to Attach Inserts

- ① Remove any foreign particles or oil from the insert seat before attaching the insert.
- ② Ensure the seat location is clean and free of damage.
- ③ Slide the insert level over its seat.
- ④ Push the insert with its opposite end (the holder side) firmly against the insert stop end.
- ⑤ The recommended tightening torque is 5N·m. Tightening above the recommended torque may damage the insert or the holder which could cause injury and other accidents.



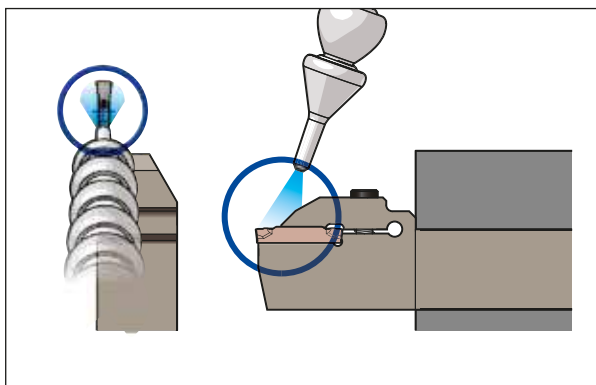
## Notes on how to Apply Holders

- ① Remove any foreign particles or oil from the tool post before attaching the holder.
- ② Ensure the seat location is clean and free of damage.
- ③ Attach the holder so that the insert is perpendicular to the workpiece.
- ④ Set holder with shortest possible overhang.
- ⑤ When grooving or turning, adjust the center height of the cutting edge to as close  $\pm 0\text{mm}$  as possible. (Within  $\pm 0,1\text{mm}$  is recommended)
- ⑥ Incorrect center height adjustment may cause chattering. (In cut-off applications, adjust the center height of the cutting edge to a value from 0,0 to  $+0,2\text{mm}$ ).  
A lower center height will result in larger nip at the center.



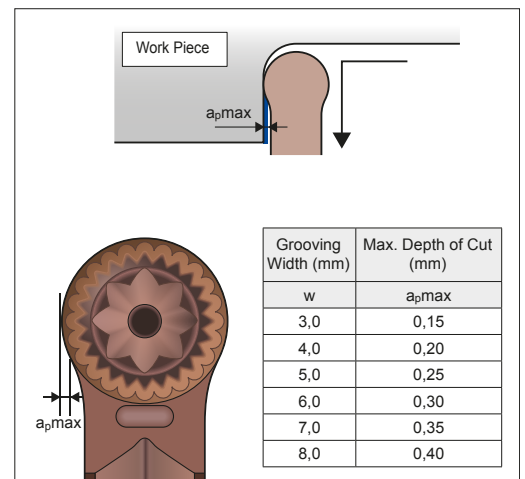
## Notes on Setting Coolant Supply Nozzle

Set the coolant supply nozzle so that coolant can be supplied from the top of the upper clamp unit.



## Maximum Depth of Cut

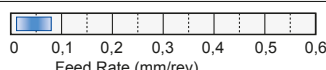
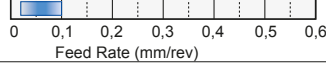
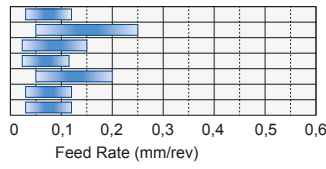
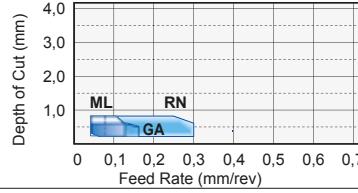
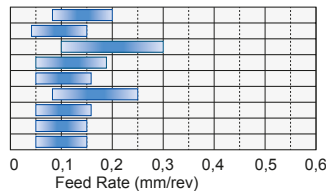
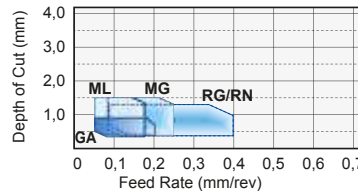
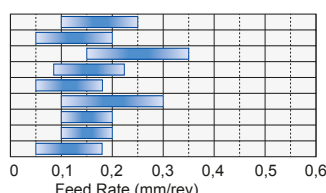
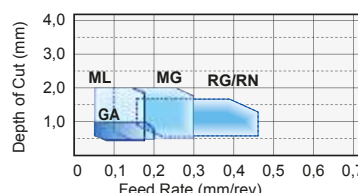
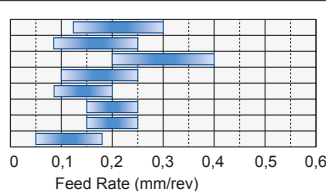
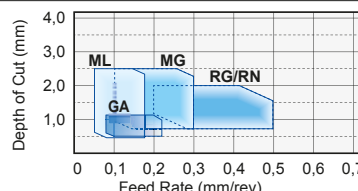
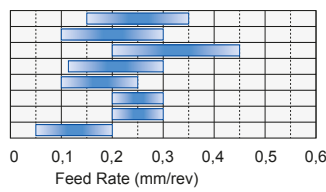
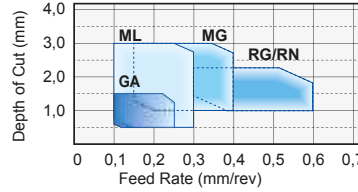
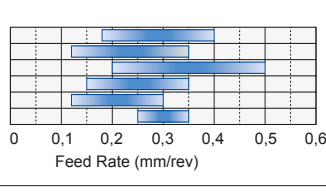
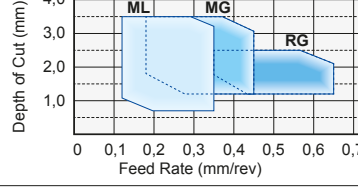
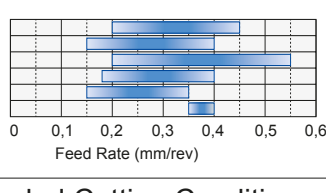
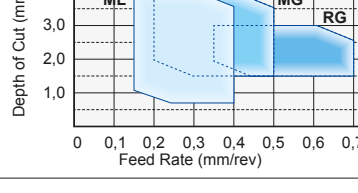
Maximum depth of cut when pulling up with RG chipbreaker



# Grooving Tool Holders

## GND Type

### Chipbreaker Selection Guide

Groov. Width (mm)	Recommended Cutting Conditions		Nose Radius (mm)	Inserts
	Grooving	Turning		
1,25	Chip-breaker GF 		0,05	GCM N12505 GF
1,5	Chip-breaker GF 		0,05	GCM N150005 GF
2,0	Chipbreaker ML GG GL GF CG RN GA 		0,2	GCM N2002 ML GCM N2002 GG GCM N2002 GL GCM N2002 GF GCM R/L2002 CG05 GCM N2002 GA
			1,0	GCM N2010 RN
3,0	Chipbreaker MG ML GG GL GF CG RG RN GA 		0,2	GCM N3002 ML GCM N3002 GG GCM N3002 GL GCM N3002 GF GCM R/L3002 CG05 GCM N3004 GA GCM N3004 MG GCM N3004 GG
			0,4	GCM N3015 RG GCM N3015 RN
			1,5	
4,0	Chipbreaker MG ML GG GL GF CG RG RN GA 		0,2	GCM N4002 GG GCM N4002 GL GCM N4002 GF GCM R/L4002 CG05 GCM N4004 ML GCM N4004 GG GCM N4004 GA
			0,4	GGCM N 4008 MG
			0,8	GCM N4020 RG GCM N4020 RN
			2,0	
5,0	Chipbreaker MG ML GG GL GF CG RG RN GA 		0,2	GCM N5002 GG GCM N5002 GL GCM N5002 GF GCM N5004 ML GCM N5004 GG GCM N5004 GA
			0,4	GCM N5008 MG
			0,8	GCM N5025 RG GCM N2025 RN
			2,5	
6,0	Chipbreaker MG ML GG GL GF CG RG RN GA 		0,2	GCM N6002 GG GCM N6002 GL GCM N6002 GF GCM N6004 ML GCM N6004 GG GCM N6004 GA
			0,4	GCM N6008 MG
			0,8	GCM N6030 RG GCM N6030 RN
			3,0	
7,0	Chipbreaker MG ML GG GL GF CG RG RN GA 		0,2	GCM N7002 GF
			0,4	GCM N7004 ML GCM N7004 GG GCM N7004 GL GCM N7004 GF
			0,8	GCM N7008 MG
			3,5	GCM N7035 RG
8,0	Chipbreaker MG ML GG GL GF CG RG RN GA 		0,2	GCM N8002 GF
			0,4	GCM N8004 ML GCM N8004 GG GCM N8004 GL GCM N8004 GF
			0,8	GCM N8008 MG
			4,0	GCM N8040 RG

### Recommended Cutting Conditions

Work Material	<b>P</b> Carbon Steel / Alloy Steel	<b>M</b> Stainless Steel	<b>K</b> Cast Iron	<b>S</b> Exotic Alloy
Grade	AC830P AC520U AC530U	AC830P AC520U AC530U	AC425K AC520U AC530U	AC520U AC530U
Cutting Speed (m/min)	80 ~ 200 80 ~ 200 50 ~ 200	70 ~ 150 70 ~ 150 50 ~ 150	80 ~ 200 60 ~ 200 50 ~ 200	20 ~ 80 20 ~ 60

# Grooving Tool Holders GND Type

## Identification Details – Holders

**G N D M R 25 25 (M) - (T) 3 12 (- 0 3 5)**

① Series Symbol: GND  
② Application: Chart 2  
③ Holder Design: Chart 3  
④ Shank Height / Dia.: Chart 4  
⑤ Shank Width / Work Dia.: Chart 5  
⑥ Shank Length: Chart 6  
⑦ Type: Internal Grooving  
⑧ Insert Width: Chart 7  
⑨ Max. Grooving Depth: Chart 8

Symbol	Application	Grooving / Cut Off / Turning / Profiling
S	External Multi-Purpose	Grooving / Cut Off / Turning / Profiling
M	External Multi-Purpose	Grooving / Cut Off / Turning / Profiling
L	External Grooving	Grooving / Cut Off
MS	External L-Styled (Side Cut) Multi-Purpose	Grooving / Turning / Profiling
LS	External L-Styled (Side Cut) Deep Grooving	Grooving
I	Internal Grooving	Grooving / Turning / Profiling
F	Face Grooving	Grooving / Turning / Profiling

Symbol	Direction
R	Right
L	Left

Application	Symbol	Height (mm)
External/ Face Grooving (Shank Height)	10	10
	12	12
	16	16
	20	20
	<b>25</b>	<b>25</b>
Internal Grooving (Shank Diameter)	25	25
	32	32
	40	40

Application	Symbol	Width (mm)
External/ Face Grooving (Shank Width)	10	10
	12	12
	16	16
	20	20
	<b>25</b>	<b>25</b>
Internal Grooving (Shank Diameter)	32	32
	40	40
	50	50

Symbol	Length (mm)
JX	120
K	125
<b>M</b>	<b>150</b>
P	170

Symbol	Groov. Width (mm)
1,25	1,25
1,5	1,5
2	2,0
<b>3</b>	<b>3,0</b>
4	4,0
5	5,0
6	6,0
7	7,0
8	8,0

Symbol	Groov. Depth (mm)
06	6
<b>10</b>	<b>10</b>
11	11
<b>12</b>	<b>12</b>
12,5	12,5
18	18
20	20
21	21
25	25

To ensure maximum rigidity, use the multi-purpose type holder to machine the maximum grooving depth.

## Identification Details – Inserts

**G C M N 30 02 G G - (05)**

① Series Symbol: Grooving  
② Tolerance: M Class  
③ Front Relief Angle: C: 7°  
④ Insert Design: Symbol, Direction (N: Neutral, R: Right Hand, L: Left Hand)  
⑤ Insert Width: Symbol, Groov. Width (mm)  
⑥ Nose Radius: Symbol, R (mm)  
⑦ Chipbreaker: Symbol, Application  
⑧ Front Angle: 05 : 5°

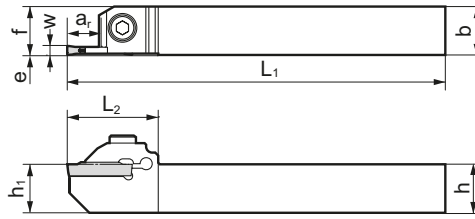
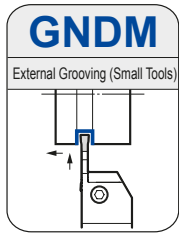
Symbol	Groov. Width (mm)
125	1,25
150	1,5
20	2,0
<b>30</b>	<b>3,0</b>
40	4,0
50	5,0
60	6,0
70	7,0
80	8,0

Symbol	R (mm)
005	0,05
<b>02</b>	<b>0,2</b>
04	0,4
08	0,8
15	1,5
20	2,0
25	2,5
30	3,0

Symbol	Application
MG	Multi-Purpose: General Feed
ML	Multi-Purpose: Low Feed
<b>GG</b>	<b>Grooving: General Feed</b>
GL	Grooving: Low Feed
GF	Grooving: Low Cutting Forces
CG	Cut-Off
RG	Copying: General Feed
RN	Multi-Purpose: General Feed
GA	Multi-Purpose: General Feed

# Grooving Tool Holders GNDM /GNDL Type

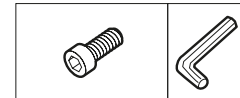
## External Multi-Purpose Small Tools Type (Grooving, Turning, Profiling)



Use the multi-purpose profiling insert for turning (wide grooves).

Above figures show right hand tools.

### Spare Parts



### ■ Holders

Cat. No.	Stock		Dimensions (mm)							Grooving Width (mm)	Max. Groov. Depth (mm)	Max. Cut-Off Dia (mm)	Applicable Insert	Cap Screw	N·m	Spanner
	R	L	h	b	L <sub>1</sub>	f	h <sub>1</sub>	L <sub>2</sub>	e							
<b>New</b> GNDM R/L 1616 JX 1.2508	●	●	16	16	120	(16)	16	26	0	<b>1,25</b>	<b>8,0</b>	<b>16</b>	GCM N125005 GF	BX0515	4,0	LH040
GNDM R/L 1616 JX 1.510	●	●	16	16	120	(16)	16	26	0	<b>1,50</b>	<b>10,0</b>	<b>20</b>	GCM N150005 GF			
GNDM R/L 1616 JX 212	●	●	16	16	120	(16)	16	30	0	<b>2,00</b>	<b>12,0</b>	<b>24</b>	GCM □2000-□□			
GNDM R/L 1616 JX 312	●	●	16	16	120	(16)	16	30	0	<b>3,00</b>	<b>12,0</b>	<b>24</b>	GCM □3000-□□			

Select holders and inserts with the same grooving width (w).

## External Grooving / Cut-Off Small Tools

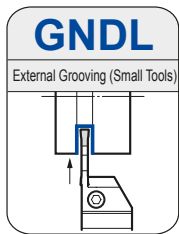


Fig. 1

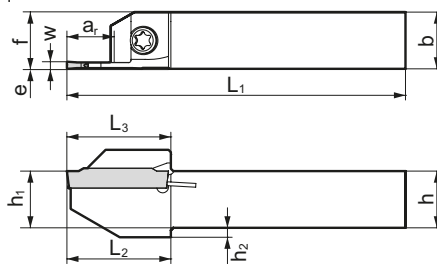
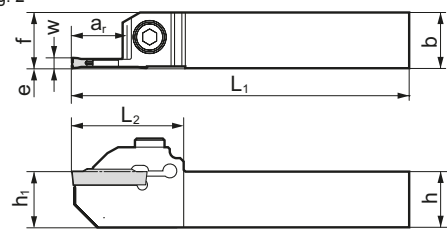
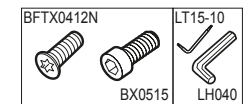


Fig. 2



Above figures show right hand tools.

### ■ Spare Parts



### ■ Holders

Cat. No.	Stock		Dimensions (mm)										Grooving Width (mm)	Max. Groov. Depth (mm)	Max. Cut-Off Dia (mm)	Fig.	Applicable Insert	Cap Screw	N·m	Spanner
	R	L	h	b	L <sub>1</sub>	f	h <sub>1</sub>	h <sub>2</sub>	L <sub>2</sub>	L <sub>3</sub>	e	w								
GNDL R/L 1010 JX 1.2510	●	●	10	10	120	(10)	10	2,0	18	18,3	0	<b>1,25</b>	<b>10,0</b>	<b>20</b>	1	GCM N125005 GF	BFTX0412N	3,0	LT15-10	
GNDL R/L 1010 JX 1.510	●	●	10	10	120	(10)	10	2,0	18	18,3	0	<b>1,50</b>	<b>10,0</b>	<b>20</b>		GCM N150005 GF				
GNDL R/L 1010 JX 210	●	●	10	10	120	(10)	10	2,0	22	22,3	0	<b>2,00</b>	<b>10,0</b>	<b>20</b>		GCM □2000-□□				
GNDL R/L 1010 JX 310	●	●	10	10	120	(10)	10	2,0	22	22,3	0	<b>3,00</b>	<b>10,0</b>	<b>20</b>		GCM □3000-□□				
GNDL R/L 1212 JX 1.2512	●	●	12	12	120	(12)	12	2,0	19	19,3	0	<b>1,25</b>	<b>12,0</b>	<b>24</b>	1	GCM N125005 GF	BFTX0412N	3,0	LT15-10	
GNDL R/L 1212 JX 1.512	●	●	12	12	120	(12)	12	2,0	19	19,3	0	<b>1,50</b>	<b>12,0</b>	<b>24</b>		GCM N150005 GF				
GNDL R/L 1212 JX 212.5	●	●	12	12	120	(12)	12	2,0	22	22,3	0	<b>2,00</b>	<b>12,5</b>	<b>25</b>		GCM □2000-□□				
GNDL R/L 1212 JX 312.5	●	●	12	12	120	(12)	12	2,0	22	22,3	0	<b>3,00</b>	<b>12,5</b>	<b>25</b>		GCM □3000-□□				
<b>New</b> GNDL R/L 1616 JX 1.2512.5	●	●	16	16	120	(16)	16		28		0	<b>1,25</b>	<b>12,5</b>	<b>20</b>	2	GCM N125005 GF	BFTX0515	4,0	LH040	
GNDL R/L 1616 JX 1.512.5	●	●	16	16	120	(16)	16		28		0	<b>1,50</b>	<b>12,5</b>	<b>25</b>		GCM N150005 GF				
GNDL R/L 1616 JX 216	●	●	16	16	120	(16)	16		32		0	<b>2,00</b>	<b>16,0</b>	<b>32</b>		GCM □2000-□□				
GNDL R/L 1616 JX 316	●	●	16	16	120	(16)	16		32		0	<b>3,00</b>	<b>16,0</b>	<b>32</b>		GCM □3000-□□				

Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDM / GNDL Type

## ■ Inserts for GNDM (Small Tools) / GNGL (Small Tools)

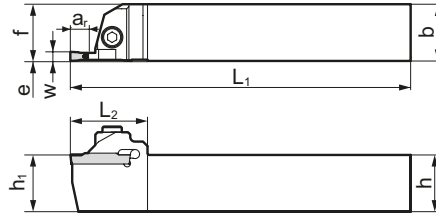
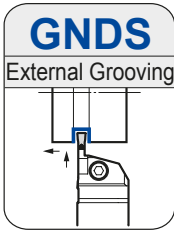
Application	Shape	Type	Cat. No.	Coated Carbide				Cermet	Carbide	Dimensions (mm)				
				AC830P	AC425K	AC520U	AC530U	T2500A	H10	W		$r_\epsilon$	$\ell$	s
										Cutting Width	Tolerance			
Grooving / Turning		General Purpose	GCM N3004 MG	●	●	○	●			3,0	±0,03	0,4	21,1	3,8
		Low Feed	GCM N2002 ML <b>New</b>			○	●			2,0	±0,03	0,2	21,1	3,6
			N3002 ML	●	●	○	●	○		3,0	±0,03	0,2	21,1	3,8
Copying / Cut-Off		General Purpose	GCM N2002 GG	●		○	●			2,0	±0,03	0,2	21,1	3,6
			N3002 GG	●		○	●			3,0	±0,03	0,2	21,1	3,8
			N3004 GG	●		○	●			3,0	±0,03	0,2	21,1	3,8
		Low Feed	GCM N2002 GL	●		○	●			2,0	±0,03	0,2	21,1	3,6
			M3002 GL	●		○	●			3,0	±0,03	0,2	21,1	3,8
		Low Cutting Force	GCM N125005 GF				●			1,25	±0,03	0,05	17,4	3,2
N150005 GF					●			1,5	±0,03	0,05	17,4	3,7		
Copying		General Purpose	GCM N3015 RG	●	●	○	●	○		3,0	±0,03	1,5	21,1	3,8
Face / Necking		General Purpose	GCM N2010 RN <b>New</b>			○	○			2,0	±0,03	1,0	21,7	3,6
			N3015 RN <b>New</b>	○	○	○	○			3,0	±0,03	1,5	22,4	3,8
Non Ferrous Metals		General Purpose	GCG N2002 GA <b>New</b>						○	2,0	±0,025	0,2	21,1	3,6
			N3002 GA <b>New</b>						○	3,0	±0,025	0,2	21,1	3,8

Application	Shape	Type	Cat. No.	Coated Carbide				Cermet	Carbide	Dimensions (mm)										
				AC830P		AC425K		AC520U		AC530U		T2500A		H10		W		$r_\epsilon$	$\ell$	s
				R	L	R	L	R	L	R	L	R	L	R	L					
Cut-Off		General Purpose	GCM R/L2002 CG 05	●	●		○	○	●	●					2,0	±0,03	0,2	21,1	3,6	
			R/L3002 CG 05	●	●		○	○	●	●					3,0	±0,03	0,2	21,3	3,8	

Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDS Type

## External Multi-Purpose Shallow Grooves Type (Grooving, Turning, Profiling)



Use the multi-purpose profiling insert for turning (wide grooves).

Above figures show right hand tools.

### ■ Spare Parts

Cap Screw	Spanner
BX0520	LH040

### ■ Holders

Cat. No.	Stock		Dimensions (mm)						Grooving Width (mm)	Max. Groov. Depth (mm)	Applicable Insert	Cap Screw		Spanner
	R	L	h	b	L <sub>1</sub>	f	h <sub>1</sub>	L <sub>2</sub>						
GNDS R/L 2020 K 206	●	●	20	20	125	20	20	30	2,0	6	GCM □20○○-□□	BX0520	5,0	LH040
GNDS R/L 2020 K 306	●	●	20	20	125	20	20	30	3,0	6	GCM □30○○-□□			
GNDS R/L 2020 K 410	●	●	20	20	125	20	20	34	4,0	10	GCM □40○○-□□			
GNDS R/L 2020 K 510	●	●	20	20	125	20	20	34	5,0	10	GCM N50○○-□□			
GNDS R/L 2020 K 610	●	●	20	20	125	20	20	34	6,0	10	GCM N60○○-□□			
GNDS R/L 2525 M 206	●	●	25	25	150	25	25	30	2,0	6	GCM □20○○-□□			
GNDS R/L 2525 M 306	●	●	25	25	150	25	25	30	3,0	6	GCM □30○○-□□			
GNDS R/L 2525 M 410	●	●	25	25	150	25	25	34	4,0	10	GCM □40○○-□□			
GNDS R/L 2525 M 510	●	●	25	25	150	25	25	34	5,0	10	GCM N50○○-□□			
GNDS R/L 2525 M 610	●	●	25	25	150	25	25	34	6,0	10	GCM N60○○-□□			

Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDS Type

## Inserts for GNDS

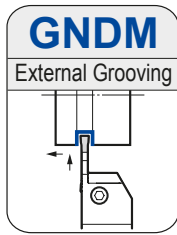
Application	Shape	Type	Cat. No.	Coated Carbide				Cermet		Carbide		Dimensions (mm)						
				AC830P	AC425K	AC520U	AC530U	T2500A	H10	W		$r_\epsilon$	$\ell$	s				
										Cutting Width	Tolerance							
Grooving / Turning		<b>MG</b>  General Purpose	GCM N3004 MG	●	●	○	●					3,0	±0,03	0,4	21,1	3,8		
			N4008 MG	●	●	○	●						4,0	±0,03	0,8	26,4	4,0	
			N5008 MG	●	●	○	●							5,0	±0,03	0,8	26,4	4,1
			N6008 MG	●	●	○	●							6,0	±0,03	0,8	26,4	4,5
		<b>ML</b>  w<4mm w>=5mm Low Feed	GCM N2002 ML <b>New</b>	●	●	○	●						2,0	±0,03	0,2	21,1	3,6	
			N3002 ML	●	●	○	●	○						3,0	±0,03	0,2	21,1	3,8
			N4004 ML	●	●	○	●	○						4,0	±0,03	0,4	26,4	4,0
			N5004 ML	●	●	○	●	○						5,0	±0,03	0,4	26,4	4,1
			N6004 ML	●	●	○	●	○						6,0	±0,03	0,4	26,4	4,5
			Copying / Cut-Off		<b>GG</b>  General Purpose	GCM N2002 GG	●		○	●					2,0	±0,03	0,2	21,1
N3002 GG	●					○	●						3,0	±0,03	0,2	21,1	3,8	
N4002 GG	●					○	●						4,0	±0,03	0,2	26,4	4,0	
N5002 GG	●					○	●						5,0	±0,03	0,2	26,4	4,1	
N6002 GG	●					○	●						6,0	±0,03	0,2	26,4	4,5	
GCM N3004 GG	●					○	●						3,0	±0,03	0,4	21,1	3,8	
<b>GL</b>  Low Feed	GCM N2002 GL	●				○	●						2,0	±0,03	0,2	21,1	3,6	
	M3002 GL	●				○	●						3,0	±0,03	0,2	21,1	3,8	
	N4002 GL	●				○	●						4,0	±0,03	0,2	26,4	4,0	
	N5002 GL	●				○	●						5,0	±0,03	0,2	26,4	4,1	
<b>GF</b>  Low Cutting Force	GCM N2002 GF					○	●	○					2,0	±0,03	0,2	21,1	3,6	
	N3002 GF	●				○	●	○					3,0	±0,03	0,2	21,1	3,8	
	N4002 GF	●				○	●	○					4,0	±0,03	0,2	26,4	4,0	
	N5002 GF	●				○	●	○					5,0	±0,03	0,2	26,4	4,1	
<b>RG</b>  General Purpose	GCM N3015 RG <b>New</b>	●	●	○	●	○					3,0	±0,03	1,5	21,1	3,8			
	N4020 RG <b>New</b>	●	●	○	●	○					4,0	±0,03	2,0	26,4	4,0			
	N5025 RG <b>New</b>	●	●	○	●	○					5,0	±0,03	2,5	27,2	4,1			
	N6030 RG <b>New</b>	●	●	○	●	○					6,0	±0,03	3,0	27,5	4,5			
Face / Necking		<b>RN</b>  General Purpose	GCM N2010 RN <b>New</b>	○		○	○					2,0	±0,03	1,0	21,7	3,6		
			N3015 RN <b>New</b>	○		○	○						3,0	±0,03	1,5	22,4	3,8	
			N4020 RN <b>New</b>	○		○	○						4,0	±0,03	2,0	28,0	4,0	
			N5025 RN <b>New</b>	○		○	○						5,0	±0,03	2,5	28,1	4,1	
			N6030 RN <b>New</b>	○		○	○						6,0	±0,03	3,0	28,1	4,5	
Non Ferrous Metals		<b>GA</b>  General Purpose	GCG N2002 GA							○		2,0	±0,025	0,2	21,1	3,6		
			N3002 GA							○		3,0	±0,025	0,2	21,1	3,8		
			N4004 GA							○		4,0	±0,025	0,4	26,4	4,0		
			N5004 GA							○		5,0	±0,025	0,4	26,4	4,1		
			N6004 GA							○		6,0	±0,025	0,4	26,4	4,5		

Application	Shape	Type	Cat. No.	Coated Carbide				Cermet		Carbide		Dimensions (mm)								
				AC830P		AC425K		AC520U	AC530U	T2500A	H10	W		$r_\epsilon$	$\ell$	s				
				R	L	R	L	R	L	R	L	R	L				Cutting Width	Tolerance		
Cut-Off	Figures show right hand tools. 	<b>CG</b>  General Purpose	GCM R/L2002 CG 05	●	●		○	○	●	●					2,0	±0,03	0,2	21,1	3,6	
			R/L3002 CG 05	●	●		○	○	●	●						3,0	±0,03	0,2	21,3	3,8
			R/L4002 CG 05	●	●		○	○	●	●						4,0	±0,03	0,2	26,7	4,0

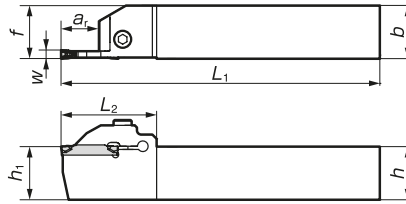
Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDM / GNDMS Type

## External Multi-Purpose Type (Grooving, Turning, Profiling)



Use for multi-purpose or profiling insert for turning (wide grooves).



Above figures show right hand tools.

### Spare Parts

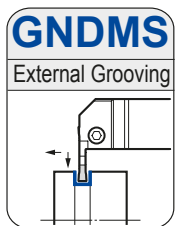


### ■ Holders

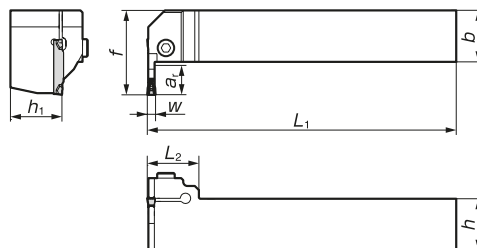
Cat. No.	Stock		Dimensions (mm)						Grooving Width (mm)	Max. Groov. Depth (mm)	Max. Cut-Off Dia (mm)	Applicable Insert	Cap Screw	N·m	Spanner
	R	L	h	b	L <sub>1</sub>	f	h <sub>1</sub>	L <sub>2</sub>							
GNDM R/L 2020 K 1.2510 <sup>New</sup>	●	●	20	20	125	20	20	34,0	1,25	10	20	GCM N125005 GF	BX0520	5,0	LH040
GNDM R/L 2020 K 1.510 <sup>New</sup>	●	●	20	20	125	20	20	34,0	1,50	10	20	GCM N150005 GF			
GNDM R/L 2020 K 210	●	●	20	20	125	20	20	33,6	2,00	10	20	GCM □200○-□□			
GNDM R/L 2020 K 312	●	●	20	20	125	20	20	36,6	3,00	12	24	GCM □300○-□□			
GNDM R/L 2020 K 418	●	●	20	20	125	20	20	45,0	4,00	18	36	GCM □400○-□□			
GNDM R/L 2020 K 518	●	●	20	20	125	20	20	45,0	5,00	18	36	GCM N500○-□□			
GNDM R/L 2020 K 618	●	●	20	20	125	20	20	45,0	6,00	18	36	GCM N600○-□□			
GNDM R/L 2525 M 1.2510 <sup>New</sup>	●	●	25	25	150	25	25	36,0	1,25	10	20	GCM N125005 GF			
GNDM R/L 2525 M 1.510 <sup>New</sup>	●	●	25	25	150	25	25	36,0	1,25	10	20	GCM N150005 GF			
GNDM R/L 2525 M 210	●	●	25	25	150	25	25	33,6	2,00	10	20	GCM N200○-□□			
GNDM R/L 2525 M 312	●	●	25	25	150	25	25	36,6	3,00	12	24	GCM □300○-□□			
GNDM R/L 2525 M 418	●	●	25	25	150	25	25	45,0	4,00	18	36	GCM □400○-□□			
GNDM R/L 2525 M 518	●	●	25	25	150	25	25	45,0	5,00	18	36	GCM N500○-□□			
GNDM R/L 2525 M 618	●	●	25	25	150	25	25	45,0	6,00	18	36	GCM N600○-□□			
GNDM R/L 3225 P 312			32	25	170	25	32	36,6	3,00	12	24	GCM □300○-□□	BX0620	6,0	LH050
GNDM R/L 3225 P 418			32	25	170	25	32	45,0	4,00	18	36	GCM □400○-□□			
GNDM R/L 3225 P 518			32	25	170	25	32	45,0	5,00	18	36	GCM N500○-□□			
GNDM R/L 3225 P 618			32	25	170	25	32	45,0	6,00	18	36	GCM N600○-□□			
GNDM R/L 3225 P 718			32	25	170	25	32	50,0	7,00	18	36	GCM N700○-□□			
GNDM R/L 3225 P 818			32	25	170	25	32	50,0	8,00	18	36	GCM N800○-□□			
GNDM R/L 3232 P 312	●	●	32	32	170	32	32	36,6	3,00	12	24	GCM □300○-□□	BX0620	6,0	LH050
GNDM R/L 3232 P 418	●	●	32	32	170	32	32	45,0	4,00	18	36	GCM □400○-□□			
GNDM R/L 3232 P 518	●	●	32	32	170	32	32	45,0	5,00	18	36	GCM N500○-□□			
GNDM R/L 3232 P 618	●	●	32	32	170	32	32	45,0	6,00	18	36	GCM N600○-□□			
GNDM R/L 3232 P 718	●	●	32	32	170	32	32	50,0	7,00	18	36	GCM N700○-□□			
GNDM R/L 3232 P 818	●	●	32	32	170	32	32	50,0	8,00	18	36	GCM N800○-□□			

Select holders and inserts with the same grooving width (w).

## External L-Styled (Side Cut) Multi-Purpose Type (Grooving, Turning, Profiling)



Use for multi-purpose or profiling insert for turning (wide grooves).



Above figures show right hand tools.

### Spare Parts



### ■ Holders

Cat. No.	Stock		Dimensions (mm)						Grooving Width (mm)	Max. Groov. Depth (mm)	Applicable Insert	Cap Screw	N·m	Spanner
	R	L	h	b	L <sub>1</sub>	f	h <sub>1</sub>	L <sub>2</sub>						
GNDMS R/L 2020 K 310	●	●	20	20	125	32	20	25	3,0	10	GCM □300○-□□	BX0520	5,0	LH040
GNDMS R/L 2020 K 412	●	●	20	20	125	34	20	25	4,0	12	GCM □400○-□□			
GNDMS R/L 2020 K 512	●	●	20	20	125	34	20	25	5,0	12	GCM N500○-□□			
GNDMS R/L 2525 M 312	●	●	25	25	150	39	25	25	3,0	12	GCM □300○-□□			
GNDMS R/L 2525 M 414	●	●	25	25	150	41	25	25	4,0	14	GCM □400○-□□			
GNDMS R/L 2525 M 514	●	●	25	25	150	41	25	25	5,0	14	GCM N500○-□□			
GNDMS R/L 2525 M 614	●	●	25	25	150	41	25	25	6,0	14	GCM N600○-□□			

Select holders and inserts with the same grooving width (w).



# Grooving Tool Holders GNDM / GNDMS Type

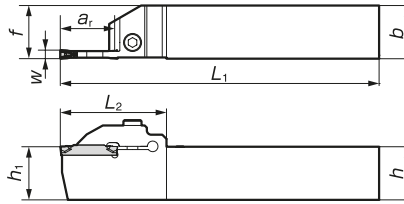
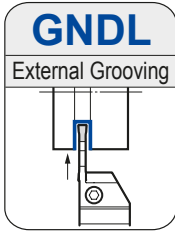
## Inserts for GNDM / GNDMS

Application	Shape	Type	Cat. No.	Coated Carbide				Cermet Carbide		Dimensions (mm)										
				AC830P		AC425K		AC520U		AC530U		T2500A		H10		Cutting Width	Tolerance	$r_E$	$\ell$	$s$
				R	L	R	L	R	L	R	L	R	L	R	L					
Grooving / Turning		<b>MG</b> General Purpose	GCM N3004 MG	●	●	○	●			3,0	±0,03	0,4	21,1	3,8						
			N4008 MG	●	●	○	●			4,0	±0,03	0,8	26,4	4,0						
			N5008 MG	●	●	○	●			5,0	±0,03	0,8	26,4	4,1						
			N6008 MG	●	●	○	●			6,0	±0,03	0,8	26,4	4,5						
			N7008 MG	●	●	○	●			7,0	±0,04	0,8	28,75	5,5						
			N8008 MG	●	●	○	●			8,0	±0,04	0,8	28,75	6,0						
		<b>ML</b> w=<4mm w=>5mm Low Feed	GCM N2002 ML <b>New</b>			○	●			2,0	±0,03	0,2	21,1	3,6						
			N3002 ML	●	●	○	●	○		3,0	±0,03	0,2	21,1	3,8						
			N4004 ML	●	●	○	●	○		4,0	±0,03	0,4	26,4	4,0						
			N5004 ML	●	●	○	●			5,0	±0,03	0,4	26,4	4,1						
			N6004 ML	●	●	○	●			6,0	±0,03	0,4	26,4	4,5						
			N7004 ML	●	●	○	●			7,0	±0,04	0,4	28,75	5,5						
			N8004 ML	●	●	○	●			8,0	±0,04	0,4	28,75	6,0						
			Copying / Cut-Off		<b>GG</b> General Purpose	GCM N2002 GG	●		○	●			2,0	±0,03	0,2	21,1	3,6			
N3002 GG	●					○	●			3,0	±0,03	0,2	21,1	3,8						
N4002 GG	●					○	●			4,0	±0,03	0,2	26,4	4,0						
N5002 GG	●					○	●			5,0	±0,03	0,2	26,4	4,1						
N6002 GG	●					○	●			6,0	±0,03	0,2	26,4	4,5						
GCM N3004 GG	●					○	●			3,0	±0,03	0,4	21,1	3,8						
N4004 GG	●					○	●			4,0	±0,03	0,4	26,4	4,0						
N5004 GG	●					○	●			5,0	±0,03	0,4	26,4	4,1						
<b>GL</b> Low Feed	GCM N2002 GL	●				○	●			2,0	±0,03	0,2	21,1	3,6						
	M3002 GL	●				○	●			3,0	±0,03	0,2	21,1	3,8						
	N4002 GL	●				○	●			4,0	±0,03	0,2	26,4	4,0						
	N5002 GL	●				○	●			5,0	±0,03	0,2	26,4	4,1						
	N6002 GL	●				○	●			6,0	±0,03	0,2	26,4	4,5						
	N7004 GL	●				○	●			7,0	±0,04	0,4	28,75	5,5						
	N8004 GL	●				○	●			8,0	±0,04	0,4	28,75	6,0						
	<b>GF</b> Low Cutting Force	GCM N125005 GF						●			1,25	±0,03	0,05	17,4	3,2					
N150005 GF							●			1,5	±0,03	0,05	17,4	3,7						
N2002 GF						○	●	○		2,0	±0,03	0,2	21,1	3,6						
N3002 GF		●				○	●	○		3,0	±0,03	0,2	21,1	3,8						
N4002 GF		●				○	●	○		4,0	±0,03	0,2	26,4	4,0						
N5002 GF		●				○	●			5,0	±0,03	0,2	26,4	4,1						
N6002 GF		●				○	●			6,0	±0,03	0,2	26,4	4,5						
N7002 GF <b>New</b>		●		○	●			7,0	±0,04	0,2	28,75	5,5								
N8002 GF <b>New</b>		●		○	●			8,0	±0,04	0,2	28,75	6,0								
GCM N7004 GF <b>New</b>		●		○	●			7,0	±0,04	0,4	28,75	5,5								
N8004 GF <b>New</b>	●		○	●			8,0	±0,04	0,4	28,75	6,0									
Copying		<b>RG</b> General Purpose	GCM N3015 RG	●	●	○	●	○		3,0	±0,03	1,5	21,1	3,8						
			N4020 RG	●	●	○	●	○		4,0	±0,03	2,0	26,4	4,0						
			N5025 RG	●	●	○	●			5,0	±0,03	2,5	27,2	4,1						
			N6030 RG	●	●	○	●			6,0	±0,03	3,0	27,5	4,5						
			N7035 RG	●	●	○	●			7,0	±0,04	3,5	29,05	5,5						
			N8040 RG	●	●	○	●			8,0	±0,04	4,0	29,25	6,0						
Face / Necking		<b>RN</b> General Purpose	GCM N2010 RN <b>New</b>	○	○	○	○			2,0	±0,03	1,0	21,7	3,6						
			N3015 RN <b>New</b>	○	○	○	○			3,0	±0,03	1,5	22,4	3,8						
			N4020 RN <b>New</b>	○	○	○	○			4,0	±0,03	2,0	28,0	4,0						
			N5025 RN <b>New</b>	○	○	○	○			5,0	±0,03	2,5	28,1	4,1						
			N6030 RN <b>New</b>	○	○	○	○			6,0	±0,03	3,0	28,1	4,5						
Non Ferrous Metals		<b>GA</b> General Purpose	GCM N2002 GA <b>New</b>					○		2,0	±0,025	0,2	21,1	3,6						
			N3002 GA <b>New</b>					○		3,0	±0,025	0,2	21,1	3,8						
			N4004 GA <b>New</b>					○		4,0	±0,025	0,4	26,4	4,0						
			N5004 GA <b>New</b>					○		5,0	±0,025	0,4	26,4	4,1						
			N6004 GA <b>New</b>					○		6,0	±0,025	0,4	26,4	4,5						
Cut-Off		<b>CG</b> General Purpose	GCM R/L2002 CG 05	●	●		○	○	●	2,0	±0,03	0,2	21,1	3,6						
			R/L3002 CG 05	●	●		○	○	●	3,0	±0,03	0,2	21,3	3,8						
			R/L4002 CG 05	●	●		○	○	●	4,0	±0,03	0,2	26,7	4,0						

Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDL / GNDLS Type

## External Deep Grooving and Cut-Off



Above figures show right hand tools.

### Spare Parts

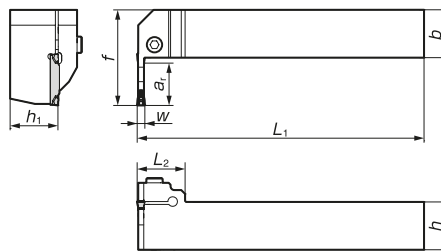
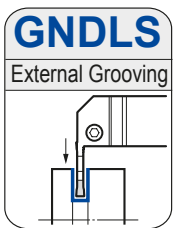


### ■ Holders

Cat. No.	Stock		Dimensions (mm)						Grooving Width (mm)	Max. Groov. Depth (mm)	Max. Cut-Off Dia (mm)	Applicable Insert	Cap Screw	N·m	Spanner
	R	L	h	b	L <sub>1</sub>	f	h <sub>1</sub>	L <sub>2</sub>							
GNDL R/L 2020 K 1.2516 <sup>New</sup>	●	●	20	20	125	20	20	38,0	1,25	16	32	GCM N125005 GF	BX0520	5,0	LH040
GNDL R/L 2020 K 1.516 <sup>New</sup>	●	●	20	20	125	20	20	38,0	1,50	16	32	GCM N150005 GF			
GNDL R/L 2020 K 220	●	●	20	20	125	20	20	44,5	2,00	20	40	GCM □20○-□□			
GNDL R/L 2020 K 320	●	●	20	20	125	20	20	44,5	3,00	20(18)	40	GCM □30○-□□			
GNDL R/L 2020 K 425	●	●	20	20	125	20	20	50,0	4,00	25(23)	50	GCM □40○-□□			
GNDL R/L 2020 K 525	●	●	20	20	125	20	20	50,0	5,00	25(23)	50	GCM N50○-□□			
GNDL R/L 2020 K 625	●	●	20	20	125	20	20	50,0	6,00	25(23)	50	GCM N60○-□□			
GNDL R/L 2525 M 1.2516 <sup>New</sup>	●	●	25	25	150	25	25	40,0	1,25	16	32	GCM N125005 GF			
GNDL R/L 2525 M 1.516 <sup>New</sup>	●	●	25	25	150	25	25	40,0	1,50	16	32	GCM N150005 GF			
GNDL R/L 2525 M 220	●	●	25	25	150	25	25	44,5	2,00	20	40	GCM □20○-□□			
GNDL R/L 2525 M 320	●	●	25	25	150	25	25	44,5	3,00	20(18)	40	GCM □30○-□□			
GNDL R/L 2525 M 425	●	●	25	25	150	25	25	50,0	4,00	25(23)	50	GCM □40○-□□			
GNDL R/L 2525 M 525	●	●	25	25	150	25	25	50,0	5,00	25(23)	50	GCM N50○-□□			
GNDL R/L 2525 M 625	●	●	25	25	150	25	25	50,0	6,00	25(23)	50	GCM N60○-□□			
GNDL R/L 3225 P 320			32	25	170	25	32	44,5	3,00	20(18)	40	GCM □30○-□□	BX0520	6,0	LH050
GNDL R/L 3225 P 425			32	25	170	25	32	50,0	4,00	25(23)	50	GCM □40○-□□			
GNDL R/L 3225 P 525			32	25	170	25	32	50,0	5,00	25(23)	50	GCM N50○-□□			
GNDL R/L 3225 P 625			32	25	170	25	32	50,0	6,00	25(23)	50	GCM N60○-□□			
GNDL R/L 3225 P 725			32	25	170	25	32	50,0	7,00	25(23)	50	GCM N70○-□□			
GNDL R/L 3225 P 825			32	25	170	25	32	50,0	8,00	25(23)	50	GCM N80○-□□			
GNDL R/L 3232 P 320	●	●	32	32	170	32	32	44,5	3,00	20(18)	40	GCM □30○-□□	BX0620	6,0	LH050
GNDL R/L 3232 P 425	●	●	32	32	170	32	32	50,0	4,00	25(23)	50	GCM □40○-□□			
GNDL R/L 3232 P 525	●	●	32	32	170	32	32	50,0	5,00	25(23)	50	GCM N50○-□□			
GNDL R/L 3232 P 625	●	●	32	32	170	32	32	50,0	6,00	25(23)	50	GCM N60○-□□			
GNDL R/L 3232 P 725	●	●	32	32	170	32	32	50,0	7,00	25(23)	50	GCM N70○-□□			
GNDL R/L 3232 P 825	●	●	32	32	170	32	32	50,0	8,00	25(23)	50	GCM N80○-□□			

Select holders and inserts with the same grooving width (w). Dimensions in parentheses are for applications that use copying inserts (RG type breakers).

## External L-Styled (Side Cut) Grooving



Above figures show right hand tools.

### ■ Spare Parts



### ■ Holders

Cat. No.	Stock		Dimensions (mm)						Grooving Width (mm)	Max. Groov. Depth (mm)	Applicable Insert	Cap Screw	N·m	Spanner
	R	L	h	b	L <sub>1</sub>	f	h <sub>1</sub>	L <sub>2</sub>						
GNDLS R/L 2020 K 216	●	●	20	20	125	38	20	25	2,0	16	GCM □20○-□□	BX0520	5,0	LH040
GNDLS R/L 2020 K 316	●	●	20	20	125	38	20	25	3,0	16	GCM □30○-□□			
GNDLS R/L 2525 M 218	●	●	25	25	150	45	25	25	2,0	18	GCM □20○-□□			
GNDLS R/L 2525 M 318	●	●	25	25	150	45	25	25	3,0	18	GCM □30○-□□			
GNDLS R/L 2525 M 423	●	●	25	25	150	50	25	25	4,0	23	GCM □40○-□□			
GNDLS R/L 2525 M 523	●	●	25	25	150	50	25	25	5,0	23	GCM N50○-□□			
GNDLS R/L 2525 M 623	●	●	25	25	150	50	25	25	6,0	23	GCM N60○-□□			

Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDL / GNDLS Type

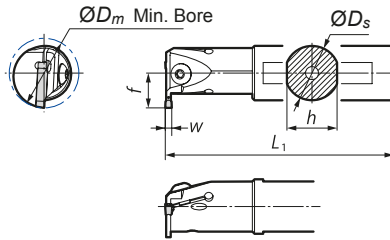
## Inserts for GNDL / GNDLS

Application	Shape	Type	Cat. No.	Coated Carbide				Cermet Carbide		Dimensions (mm)					
				AC830P	AC425K	AC520U	AC530U	T2500A	H10	W		$r_E$	$\ell$	s	
										Cutting Width	Tolerance				
Grooving / Turning		<b>MG</b> General Purpose	GCM N3004 MG	●	●	○	●			3,0	±0,03	0,4	21,1	3,8	
			N4008 MG	●	●	○	●			4,0	±0,03	0,8	26,4	4,0	
			N5008 MG	●	●	○	●			5,0	±0,03	0,8	26,4	4,1	
			N6008 MG	●	●	○	●			6,0	±0,03	0,8	26,4	4,5	
			N7008 MG	●	●	○	●			7,0	±0,04	0,8	28,75	5,5	
			N8008 MG	●	●	○	●			8,0	±0,04	0,8	28,75	6,0	
		<b>ML</b> w=<4mm w=>5mm Low Feed	GCM N2002 ML <b>New</b>			○	●				2,0	±0,03	0,2	21,1	3,6
			N3002 ML	●	●	○	●	○			3,0	±0,03	0,2	21,1	3,8
			N4004 ML	●	●	○	●	○			4,0	±0,03	0,4	26,4	4,0
			N5004 ML	●	●	○	●	○			5,0	±0,03	0,4	26,4	4,1
			N6004 ML	●	●	○	●	○			6,0	±0,03	0,4	26,4	4,5
			N7004 ML	●	●	○	●	○			7,0	±0,04	0,4	28,75	5,5
			N8004 ML	●	●	○	●	○			8,0	±0,04	0,4	28,75	6,0
			Copying / Cut-Off		<b>GG</b> General Purpose	GCM N2002 GG	●		○	●			2,0	±0,03	0,2
N3002 GG	●					○	●			3,0	±0,03	0,2	21,1	3,8	
N4002 GG	●					○	●			4,0	±0,03	0,2	26,4	4,0	
N5002 GG	●					○	●			5,0	±0,03	0,2	26,4	4,1	
N6002 GG	●					○	●			6,0	±0,03	0,2	26,4	4,5	
GCM N3004 GG	●					○	●			3,0	±0,03	0,4	21,1	3,8	
N4004 GG	●					○	●			4,0	±0,03	0,4	26,4	4,0	
N5004 GG	●					○	●			5,0	±0,03	0,4	26,4	4,1	
<b>GL</b> Low Feed	GCM N2002 GL	●				○	●				2,0	±0,03	0,2	21,1	3,6
	M3002 GL	●				○	●				3,0	±0,03	0,2	21,1	3,8
	N4002 GL	●				○	●				4,0	±0,03	0,2	26,4	4,0
	N5002 GL	●				○	●				5,0	±0,03	0,2	26,4	4,1
	N6002 GL	●				○	●				6,0	±0,03	0,2	26,4	4,5
	N7004 GL	●				○	●				7,0	±0,04	0,4	28,75	5,5
	N8004 GL	●				○	●				8,0	±0,04	0,4	28,75	6,0
	<b>GF</b> Low Cutting Force	GCM N125005 GF						●				1,25	±0,03	0,05	17,4
N150005 GF							●				1,5	±0,03	0,05	17,4	3,7
N2002 GF						○	●	○			2,0	±0,03	0,2	21,1	3,6
N3002 GF		●				○	●	○			3,0	±0,03	0,2	21,1	3,8
N4002 GF		●				○	●	○			4,0	±0,03	0,2	26,4	4,0
N5002 GF		●				○	●	○			5,0	±0,03	0,2	26,4	4,1
N6002 GF		●				○	●	○			6,0	±0,03	0,2	26,4	4,5
N7002 GF <b>New</b>		●				○	●	○			7,0	±0,04	0,2	28,75	5,5
N8002 GF <b>New</b>	●				○	●	○			8,0	±0,04	0,2	28,75	6,0	
<b>RG</b> General Purpose	GCM N3015 RG	●	●	○	●	○			3,0	±0,03	1,5	21,1	3,8		
	N4020 RG	●	●	○	●	○			4,0	±0,03	2,0	26,4	4,0		
	N5025 RG	●	●	○	●	○			5,0	±0,03	2,5	27,2	4,1		
	N6030 RG	●	●	○	●	○			6,0	±0,03	3,0	27,5	4,5		
	N7035 RG	●	●	○	●	○			7,0	±0,04	3,5	29,05	5,5		
	N8040 RG	●	●	○	●	○			8,0	±0,04	4,0	29,25	6,0		
	<b>RN</b> General Purpose	GCM N2010 RN <b>New</b>	○	○	○	○	○			2,0	±0,03	1,0	21,7	3,6	
		N3015 RN <b>New</b>	○	○	○	○	○			3,0	±0,03	1,5	22,4	3,8	
N4020 RN <b>New</b>		○	○	○	○	○			4,0	±0,03	2,0	28,0	4,0		
N5025 RN <b>New</b>		○	○	○	○	○			5,0	±0,03	2,5	28,1	4,1		
N6030 RN <b>New</b>		○	○	○	○	○			6,0	±0,03	3,0	28,1	4,5		
Non Ferrous Metals	<b>GA</b> General Purpose	GCG N2002 GA <b>New</b>						○	2,0	±0,025	0,2	21,1	3,6		
		N3002 GA <b>New</b>						○	3,0	±0,025	0,2	21,1	3,8		
		N4004 GA <b>New</b>						○	4,0	±0,025	0,4	26,4	4,0		
		N5004 GA <b>New</b>						○	5,0	±0,025	0,4	26,4	4,1		
		N6004 GA <b>New</b>						○	6,0	±0,025	0,4	26,4	4,5		

Application	Shape	Type	Cat. No.	Coated Carbide				Cermet Carbide		Dimensions (mm)										
				AC830P	AC425K	AC520U	AC530U	T2500A	H10	W		$r_E$	$\ell$	s						
				R	L	R	L	R	L	R	L				Cutting Width	Tolerance				
Cut-Off		<b>CG</b> General Purpose	GCM R/L2002 CG 05	●	●		○	○	●	●					2,0	±0,03	0,2	21,1	3,6	
			R/L3002 CG 05	●	●		○	○	●	●						3,0	±0,03	0,2	21,3	3,8
			R/L4002 CG 05	●	●		○	○	●	●						4,0	±0,03	0,2	26,7	4,0

# Grooving Tool Holders GNDI Type

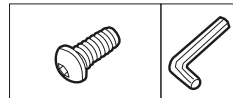
## Internal Grooving



Use for multi-purpose or profiling insert for turning (wide grooves).

Above figures show right hand tools.

### ■ Spare Parts



### ■ Holders

Cat. No.	Stock		Dimensions (mm)				Min. Bore (mm)	Groov. Width (mm)	Max. Groov. Depth (mm)	Applicable Insert	Cap Screw	N·m	Spanner
	R	L	ØDs	h	L <sub>1</sub>	f							
GNDI R/L 2532 T 206	●	●	25	23	200	16	32	2,0	6	GCM N20○○-□□	BH0516	5,0	LH030
GNDI R/L 3240 T 210	●	●	32	30	250	26	40	2,0	10	GCM N20○○-□□	BH0616	6,0	LH040
GNDI R/L 2532 T 306	●	●	25	23	200	16	32	3,0	6	GCM N30○○-□□	BH0516	5,0	LH030
GNDI R/L 3240 T 310	●	●	32	30	250	26	40	3,0	10	GCM N30○○-□□	BH0616	6,0	LH040
GNDI R/L 4050 T 311	●	●	40	38	300	31	50	3,0	11	GCM N30○○-□□	BH0616	6,0	LH040
GNDI R/L 2532 T 406	●	●	25	23	200	19	32	4,0	6	GCM N40○○-□□	BH0516	5,0	LH030
GNDI R/L 3240 T 410	●	●	32	30	250	26	40	4,0	10	GCM N40○○-□□	BH0616	6,0	LH040
GNDI R/L 4050 T 411	●	●	40	38	300	31	50	4,0	11	GCM N40○○-□□	BH0616	6,0	LH040
GNDI R/L 2532 T 506	●	●	25	23	200	19	32	5,0	6	GCM N50○○-□□	BH0516	5,0	LH030
GNDI R/L 3240 T 510	●	●	32	30	250	26	40	5,0	10	GCM N50○○-□□	BH0616	6,0	LH040
GNDI R/L 4050 T 511	●	●	40	38	300	31	50	5,0	11	GCM N50○○-□□	BH0616	6,0	LH040
GNDI R/L 4050 T 611	●	●	40	38	300	31	50	6,0	11	GCM N60○○-□□	BH0616	6,0	LH040

Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDI Type

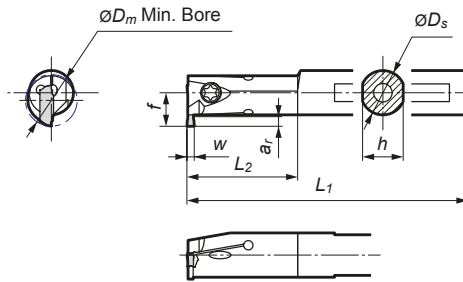
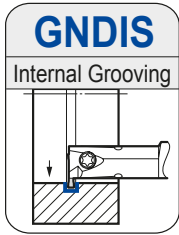
## ■ GNDI Inserts

Application	Shape	Type	Cat. No.	Coated Carbide				Cermet	Carbide	Dimensions (mm)						
				AC830P	AC425K	AC520U	AC530U	T2500A	H10	W		$r_\epsilon$	$\ell$	s		
										Cutting Width	Tolerance					
Grooving / Turning		<b>MG</b>  General Purpose	GCM N3004 MG	●	●	○	●			3,0	±0,03	0,4	21,1	3,8		
			N4008 MG	●	●	○	●			4,0	±0,03	0,8	26,4	4,0		
			N5008 MG	●	●	○	●			5,0	±0,03	0,8	26,4	4,1		
			N6008 MG	●	●	○	●			6,0	±0,03	0,8	26,4	4,5		
		<b>ML</b>  w<4mm w>=5mm Low Feed	GCM N2002 ML <b>New</b>	●	●	○	●			2,0	±0,03	0,2	21,1	3,6		
			N3002 ML	●	●	○	●	○		3,0	±0,03	0,2	21,1	3,8		
			N4004 ML	●	●	○	●	○		4,0	±0,03	0,4	26,4	4,0		
			N5004 ML	●	●	○	●			5,0	±0,03	0,4	26,4	4,1		
			N6004 ML	●	●	○	●			6,0	±0,03	0,4	26,4	4,5		
			Copying / Cut-Off		<b>GG</b>  General Purpose	GCM N2002 GG	●		○	●			2,0	±0,03	0,2	21,1
N3002 GG	●					○	●			3,0	±0,03	0,2	21,1	3,8		
N4002 GG	●					○	●			4,0	±0,03	0,2	26,4	4,0		
N5002 GG	●					○	●			5,0	±0,03	0,2	26,4	4,1		
N6002 GG	●					○	●			6,0	±0,03	0,2	26,4	4,5		
GCM N3004 GG	●					○	●			3,0	±0,03	0,4	21,1	3,8		
<b>GL</b>  Low Feed	GCM N2002 GL	●				○	●			2,0	±0,03	0,2	21,1	3,6		
	M3002 GL	●				○	●			3,0	±0,03	0,2	21,1	3,8		
	N4002 GL	●				○	●			4,0	±0,03	0,2	26,4	4,0		
	N5002 GL	●				○	●			5,0	±0,03	0,2	26,4	4,1		
	N6002 GL	●				○	●			6,0	±0,03	0,2	26,4	4,5		
	<b>GF</b>  Low Cutting Force	GCM N2002 GF					○	●	○		2,0	±0,03	0,2	21,1	3,6	
N3002 GF		●				○	●	○		3,0	±0,03	0,2	21,1	3,8		
N4002 GF		●				○	●	○		4,0	±0,03	0,2	26,4	4,0		
N5002 GF		●				○	●			5,0	±0,03	0,2	26,4	4,1		
N6002 GF		●				○	●			6,0	±0,03	0,2	26,4	4,5		
Copying					<b>RG</b>  General Purpose	GCM N3015 RG <b>New</b>	●	●	○	●	○		3,0	±0,03	1,5	21,1
	N4020 RG <b>New</b>					●	●	○	●	○		4,0	±0,03	2,0	26,4	4,0
	N5025 RG <b>New</b>		●	●		○	●			5,0	±0,03	2,5	27,2	4,1		
	N6030 RG <b>New</b>		●	●		○	●			6,0	±0,03	3,0	27,5	4,5		
	Face / Necking			<b>RN</b>  General Purpose		GCM N2010 RN <b>New</b>	○		○	○			2,0	±0,03	1,0	21,7
N3015 RN <b>New</b>		○				○	○			3,0	±0,03	1,5	22,4	3,8		
N4020 RN <b>New</b>		○				○	○			4,0	±0,03	2,0	28,0	4,0		
N5025 RN <b>New</b>		○				○	○			5,0	±0,03	2,5	28,1	4,1		
N6030 RN <b>New</b>		○				○	○			6,0	±0,03	3,0	28,1	4,5		
Non Ferrous Metals		<b>GA</b>  General Purpose	GCG N2002 GA						○	2,0	±0,025	0,2	21,1	3,6		
			N3002 GA						○	3,0	±0,025	0,2	21,1	3,8		
			N4004 GA						○	4,0	±0,025	0,4	26,4	4,0		
			N5004 GA						○	5,0	±0,025	0,4	26,4	4,1		
			N6004 GA						○	6,0	±0,025	0,4	26,4	4,5		

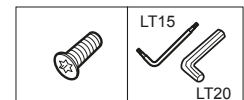
Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDIS Type

## Internal Grooving



### ■ Spare Parts



### ■ Holders

Cat. No.	Stock		Dimensions (mm)					Min. Bore (mm)	Groov. Width (mm)	Max. Groov. Depth (mm)	Applicable Insert	Cap Screw	Spanner
	R	L	$\varnothing D_s$	$h$	$L_1$	$L_2$	$f$						
GNDIS R/L 1214 T 1526	●	○	12	11	150	30	9,0	14	1,5	2,6	GXM N150005S GF		
GNDIS R/L 1214 T 1536	●	○	12	11	150	30	10,0	14	1,5	3,6	GXM N150005F GF	BFTX0409N	3,4 LT15
GNDIS R/L 1616 T 1536	●	○	16	15	160	35	11,5	16	1,5	3,6	GXM N150005S GF		
GNDIS R/L 1620 T 1546	●	○	16	15	160	40	14,5	20	1,5	4,6	GXM N150005S GF		
GNDIS R/L 2025 T 1566	●	○	20	19	180	40	19,0	25	1,5	6,6	GXM N150005S GF	BFTX0511N	5,0 LT20
GNDIS R/L 1214 T 2026	●	○	12	11	150	30	9,0	14	2,0	2,6	GXM N2002S-□□		
GNDIS R/L 1214 T 2036	●	○	12	11	150	30	10,0	14	2,0	3,6	GXM N2002S-□□	BFTX0409N	3,4 LT15
GNDIS R/L 1616 T 2036	●	○	16	15	160	35	11,5	16	2,0	3,6	GXM N2002S-□□		
GNDIS R/L 1620 T 2046	●	○	16	15	160	40	14,5	20	2,0	4,6	GXM N2002S-□□		
GNDIS R/L 2025 T 2066	●	○	20	19	180	40	19,0	25	2,0	6,6	GXM N2002S-□□	BFTX0511N	5,0 LT20
GNDIS R/L 1214 T 3026	●	○	12	11	150	30	9,0	14	3,0	2,6	GXM N3002S-□□		
GNDIS R/L 1214 T 3036	●	○	12	11	150	30	10,0	14	3,0	3,6	GXM N3002S-□□	BFTX0409N	3,4 LT15
GNDIS R/L 1616 T 3036	●	○	16	15	160	35	11,5	16	3,0	3,6	GXM N3002S-□□		
GNDIS R/L 1620 T 3046	●	○	16	15	160	40	14,5	20	3,0	4,6	GXM N3002S-□□		
GNDIS R/L 2025 T 3066	●	○	20	19	180	40	19,0	25	3,0	6,6	GXM N3002S-□□	BFTX0511N	5,0 LT20

Select holders and inserts with the same grooving width ( $w$ ).

Only GXM inserts can be used.

### ■ GNDIS Inserts

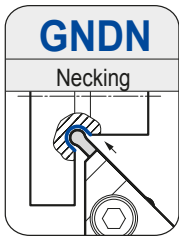
Application	Shape	Type	Cat. No.	Coated Carbide		Dimensions (mm)				
				AC520U	AC1030U	$w$		$r_\epsilon$	$\ell$	$s$
						Cutting Width	Tolerance			
Grooving/ Turning		ML Low Feed	GXM N2002S ML <b>New</b>	○	○	2,0	±0,03	0,2	11,1	3,1
			GXM N3002S ML <b>New</b>	○	○	3,0	±0,03	0,2	11,1	3,1
Grooving		GF Low Cutting Force	GXM N150005S GF <b>New</b>	○	○	1,5	±0,03	0,05	11,1	3,1
			GXM N2002S GF <b>New</b>	○	○	2,0	±0,03	0,2	11,1	3,1
			GXM N3002S GF <b>New</b>	○	○	3,0	±0,03	0,2	11,1	3,1

Select holders and inserts with the same grooving width ( $w$ ).

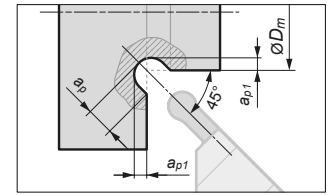
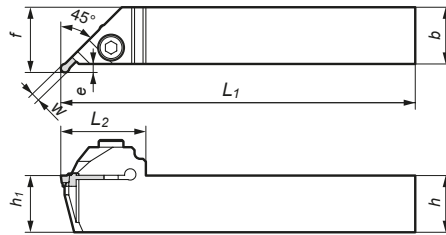
GCM and GCG inserts are not compatible.

# Grooving Tool Holders GNDN Type

## Necking



**New**



Above figures show right hand tools.

## ■ Spare Parts



## ■ Holders

Cat. No.	Stock		Dimensions (mm)							Min. Bore (mm)	Groov. Width (mm)	$a_p$	$a_{p1}$	Applicable Insert	Cap Screw	Spanner	
	R	L	h	b	$L_1$	f	$h_1$	$L_2$	e								$\varnothing D_m$
GNDN R/L2020 K 220-020	○	○	20	20	125	23	20	30	3,0	20	2,0	2,0	1,00	GCM N2010 RN	BX0520	5,0	LH040
GNDN R/L2020 K 325-020	○	○	20	20	125	23	20	30	3,0	20	3,0	2,5	1,15	GCM N3015 RN			
GNDN R/L2020 K 430-030	○	○	20	20	125	24	20	32	4,0	30	4,0	3,0	1,29	GCM N4020 RN			
GNDN R/L2020 K 535-030	○	○	20	20	125	25	20	35	5,0	30	5,0	3,5	1,44	GCM N5025 RN			
GNDN R/L2020 K 640-030	○	○	20	20	125	25	20	35	5,0	30	6,0	4,0	1,59	GCM N6030 RN			
GNDN R/L2525 M 220-020	○	○	25	25	150	23	25	30	3,0	20	2,0	2,0	1,00	GCM N2010 RN	BX0520	5,0	LH040
GNDN R/L2525 M 325-020	○	○	25	25	150	28	25	30	3,0	20	3,0	2,5	1,15	GCM N3015 RN			
GNDN R/L2525 M 430-030	○	○	25	25	150	29	25	32	4,0	30	4,0	3,0	1,29	GCM N4020 RN			
GNDN R/L2525 M 535-030	○	○	25	25	150	30	25	35	5,0	30	5,0	3,5	1,44	GCM N5025 RN			
GNDN R/L2525 M 640-030	○	○	25	25	150	30	25	35	5,0	30	6,0	4,0	1,59	GCM N6030 RN			

Select holders and inserts with the same grooving width (w).

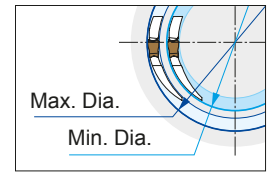
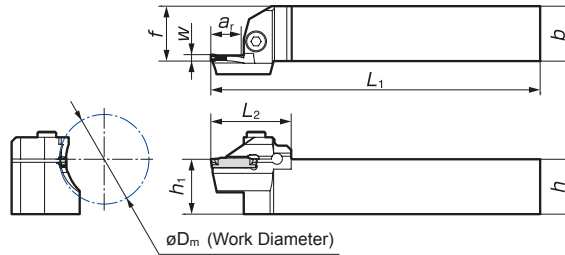
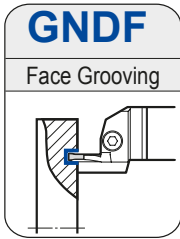
## ■ GNDN Inserts

Application	Shape	Type	Cat. No.	Coated Carbide				Dimensions (mm)				
				AC830P	AC425K	AC520U	AC530U	w		$r_\epsilon$	$\ell$	s
								Cutting Width	Tolerance			
Face / Necking		RN General Purpose	GCM N2010 RN <b>New</b>	-	-	○	○	2,0	±0,03	0,4	21,7	3,6
			N3015 RN <b>New</b>	○	○	○	○	3,0	±0,03	0,8	22,4	3,8
			N4020 RN <b>New</b>	○	○	○	○	4,0	±0,03	0,8	28,0	4,0
			N5025 RN <b>New</b>	○	○	○	○	5,0	±0,03	0,8	28,1	4,1
			N6030 RN <b>New</b>	○	○	○	○	6,0	±0,03	0,2	28,1	4,5

Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDF Type

## Face Grooving



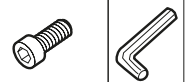
Work diameters in the stock indicate external diameters of face grooving.

Use for multi-purpose or profiling insert for turning (wide grooves).

Above figures show right hand tools.

### ■ Holders

### ■ Spare Parts



Cat. No.	Stock		Dimensions (mm)						Work Dia. (mm)	Groov. Width (mm)	Max. Cut-off Dia. (mm)	Applicable Insert	Cap Screw	N·m	Spanner
	R	L	h	b	L <sub>1</sub>	f	h <sub>1</sub>	L <sub>2</sub>	ØD <sub>m</sub>	w	a <sub>r</sub>				
GNDF R/L 2020 K 312-035	●	●	20	20	125	20	20	35,6	35 ~ 45	3,0	12	GCM N30○-□□	BX0520	5,0	LH040
GNDF R/L 2020 K 312-040	●	●	20	20	125	20	20	35,6	40 ~ 55	3,0	12				
GNDF R/L 2020 K 318-050	●	●	20	20	125	20	20	41,6	50 ~ 70	3,0	18				
GNDF R/L 2020 K 318-065	●	●	20	20	125	20	20	41,6	65 ~ 100	3,0	18				
GNDF R/L 2020 K 318-090	●	●	20	20	125	20	20	41,6	90 ~ 150	3,0	18				
GNDF R/L 2020 K 318-140	●	●	20	20	125	20	20	41,6	140 ~ 200	3,0	18				
GNDF R/L 2020 K 318-180	●	●	20	20	125	20	20	41,6	180 ~ 300	3,0	18				
GNDF R/L 2020 K 418-040	●	●	20	20	125	20	20	41,6	40 ~ 55	4,0	18	GCM N40○-□□	BX0520	5,0	LH040
GNDF R/L 2020 K 423-050	●	●	20	20	125	20	20	46,6	50 ~ 70	4,0	23				
GNDF R/L 2020 K 423-065	●	●	20	20	125	20	20	46,6	65 ~ 90	4,0	23				
GNDF R/L 2020 K 423-085	●	●	20	20	125	20	20	46,6	85 ~ 130	4,0	23				
GNDF R/L 2020 K 423-125	●	●	20	20	125	20	20	46,6	125 ~ 200	4,0	23				
GNDF R/L 2020 K 423-180	●	●	20	20	125	20	20	46,6	180 ~ 300	4,0	23				
GNDF R/L 2020 K 423-280	●	●	20	20	125	20	20	46,6	280 ~ 1000	4,0	23				
GNDF R/L 2020 K 523-050	●	●	20	20	125	20	20	46,6	50 ~ 70	5,0	23	GCM N50○-□□	BX0520	5,0	LH040
GNDF R/L 2020 K 523-065	●	●	20	20	125	20	20	46,6	65 ~ 90	5,0	23				
GNDF R/L 2020 K 523-085	●	●	20	20	125	20	20	46,6	85 ~ 130	5,0	23				
GNDF R/L 2020 K 523-125	●	●	20	20	125	20	20	46,6	125 ~ 200	5,0	23				
GNDF R/L 2020 K 523-180	●	●	20	20	125	20	20	46,6	180 ~ 300	5,0	23				
GNDF R/L 2020 K 523-280	●	●	20	20	125	20	20	46,6	280 ~ 1000	5,0	23				
GNDF R/L 2020 K 623-050	●	●	20	20	125	20	20	46,6	50 ~ 75	6,0	23	GCM N60○-□□	BX0520	5,0	LH040
GNDF R/L 2020 K 623-070	●	●	20	20	125	20	20	46,6	70 ~ 110	6,0	23				
GNDF R/L 2020 K 623-100	●	●	20	20	125	20	20	46,6	100 ~ 200	6,0	23				
GNDF R/L 2020 K 623-180	●	●	20	20	125	20	20	46,6	180 ~ 300	6,0	23				
GNDF R/L 2020 K 623-280	●	●	20	20	125	20	20	46,6	280 ~ 1000	6,0	23				
GNDF R/L 2525 M 312-035	●	●	25	25	150	25	25	35,6	35 ~ 45	3,0	12				
GNDF R/L 2525 M 312-040	●	●	25	25	150	25	25	35,6	40 ~ 55	3,0	12				
GNDF R/L 2525 M 318-050	●	●	25	25	150	25	25	41,6	50 ~ 70	3,0	18				
GNDF R/L 2525 M 318-065	●	●	25	25	150	25	25	41,6	65 ~ 100	3,0	18				
GNDF R/L 2525 M 318-090	●	●	25	25	150	25	25	41,6	90 ~ 150	3,0	18				
GNDF R/L 2525 M 318-140	●	●	25	25	150	25	25	41,6	140 ~ 200	3,0	18				
GNDF R/L 2525 M 318-180	●	●	25	25	150	25	25	41,6	180 ~ 300	3,0	18				
GNDF R/L 2525 M 418-040	●	●	25	25	150	25	25	41,6	40 ~ 55	4,0	18	GCM N40○-□□	BX0520	5,0	LH040
GNDF R/L 2525 M 423-050	●	●	25	25	150	25	25	46,6	50 ~ 70	4,0	23				
GNDF R/L 2525 M 423-065	●	●	25	25	150	25	25	46,6	65 ~ 90	4,0	23				
GNDF R/L 2525 M 423-085	●	●	25	25	150	25	25	46,6	85 ~ 130	4,0	23				
GNDF R/L 2525 M 423-125	●	●	25	25	150	25	25	46,6	125 ~ 200	4,0	23				
GNDF R/L 2525 M 423-180	●	●	25	25	150	25	25	46,6	180 ~ 300	4,0	23				
GNDF R/L 2525 M 423-280	●	●	25	25	150	25	25	46,6	280 ~ 1000	4,0	23				
GNDF R/L 2525 M 523-050	●	●	25	25	150	25	25	46,6	50 ~ 70	5,0	23	GCM N50○-□□	BX0520	5,0	LH040
GNDF R/L 2525 M 523-065	●	●	25	25	150	25	25	46,6	65 ~ 90	5,0	23				
GNDF R/L 2525 M 523-085	●	●	25	25	150	25	25	46,6	85 ~ 130	5,0	23				
GNDF R/L 2525 M 523-125	●	●	25	25	150	25	25	46,6	125 ~ 200	5,0	23				
GNDF R/L 2525 M 523-180	●	●	25	25	150	25	25	46,6	180 ~ 300	5,0	23				
GNDF R/L 2525 M 523-280	●	●	25	25	150	25	25	46,6	280 ~ 1000	5,0	23				
GNDF R/L 2525 M 623-050	●	●	25	25	150	25	25	46,6	50 ~ 75	6,0	23	GCM N60○-□□	BX0520	5,0	LH040
GNDF R/L 2525 M 623-070	●	●	25	25	150	25	25	46,6	70 ~ 110	6,0	23				
GNDF R/L 2525 M 623-100	●	●	25	25	150	25	25	46,6	100 ~ 200	6,0	23				
GNDF R/L 2525 M 623-180	●	●	25	25	150	25	25	46,6	180 ~ 300	6,0	23				
GNDF R/L 2525 M 623-280	●	●	25	25	150	25	25	46,6	280 ~ 1000	6,0	23				

Select holders and inserts with the same grooving width (w).

● = Euro stock  
○ = Japan stock

Ⓜ Recommended Tightening Torque (N·m)



# Grooving Tool Holders GNDF Type

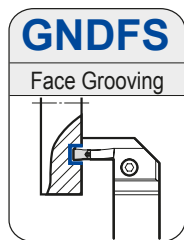
## Inserts for GNDF

Application	Shape	Type	Cat. No.	Coated Carbide					Cermet	Carbide	Dimensions (mm)				
				AC830P	AC425K	AC520U	AC530U	T2500A	H10	W		$r_\epsilon$	$\ell$	s	
				Cutting Width	Tolerance										
Grooving / Turning		<b>MG</b> General Purpose	GCM N3004 MG	●	●	○	●			3,0	±0,03	0,4	21,1	3,8	
			N4008 MG	●	●	○	●			4,0	±0,03	0,8	26,4	4,0	
			N5008 MG	●	●	○	●			5,0	±0,03	0,8	26,4	4,1	
			N6008 MG	●	●	○	●			6,0	±0,03	0,8	26,4	4,5	
		<b>ML</b> $w < 4\text{mm}$ $w > 5\text{mm}$ Low Feed	GCM N3002 ML	●	●	○	●	○			3,0	±0,03	0,2	21,1	3,8
			N4004 ML	●	●	○	●	○			4,0	±0,03	0,4	26,4	4,0
			N5004 ML	●	●	○	●	○			5,0	±0,03	0,4	26,4	4,1
			N6004 ML	●	●	○	●	○			6,0	±0,03	0,4	26,4	4,5
Copying / Cut-Off		<b>GG</b> General Purpose	GCM N3002 GG	●		○	●			3,0	±0,03	0,2	21,1	3,8	
			N4002 GG	●		○	●			4,0	±0,03	0,2	26,4	4,0	
			N5002 GG	●		○	●			5,0	±0,03	0,2	26,4	4,1	
			N6002 GG	●		○	●			6,0	±0,03	0,2	26,4	4,5	
		<b>GL</b> Low Feed	GCM N3004 GG	●		○	●				3,0	±0,03	0,4	21,1	3,8
			N4004 GG	●		○	●				4,0	±0,03	0,4	26,4	4,0
			N5004 GG	●		○	●				5,0	±0,03	0,4	26,4	4,1
			N6004 GG	●		○	●				6,0	±0,03	0,4	26,4	4,5
		<b>GF</b> Low Cutting Force	GCM M3002 GL	●		○	●				3,0	±0,03	0,2	21,1	3,8
			N4002 GL	●		○	●				4,0	±0,03	0,2	26,4	4,0
			N5002 GL	●		○	●				5,0	±0,03	0,2	26,4	4,1
			N6002 GL	●		○	●				6,0	±0,03	0,2	26,4	4,5
		<b>GF</b> Low Cutting Force	GCM N3002 GF	●		●	●	○			3,0	±0,03	0,2	21,1	3,8
			N4002 GF	●		●	●	○			4,0	±0,03	0,2	26,4	4,0
N5002 GF	●			●	●	○			5,0	±0,03	0,2	26,4	4,1		
N6002 GF	●			●	●	○			6,0	±0,03	0,2	26,4	4,5		
Face / Necking		<b>RN</b> General Purpose	GCM N3015 RN <b>New</b>	○	○	○	○			3,0	±0,03	1,5	22,4	3,8	
			N4020 RN <b>New</b>	○	○	○	○			4,0	±0,03	2,0	28,0	4,0	
			N5025 RN <b>New</b>	○	○	○	○			5,0	±0,03	2,5	28,1	4,1	
			N6030 RN <b>New</b>	○	○	○	○			6,0	±0,03	3,0	28,1	4,5	
Non Ferrous Metals		<b>GA</b> General Purpose	GCM N3002 GA <b>New</b>						○	3,0	±0,025	0,2	21,1	3,8	
			N4004 GA <b>New</b>						○	4,0	±0,025	0,4	26,4	4,0	
			N5004 GA <b>New</b>						○	5,0	±0,025	0,4	26,4	4,1	
			N6004 GA <b>New</b>						○	6,0	±0,025	0,4	26,4	4,5	

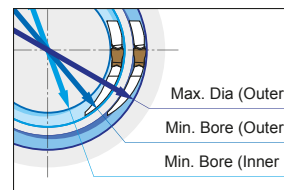
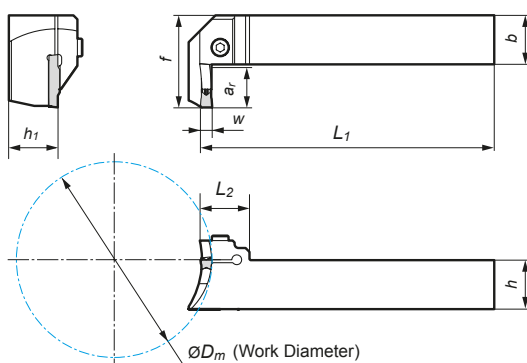
Select holders and inserts with the same grooving width (w).

# Grooving Tool Holders GNDFS Type

## Face Grooving L-Styled (Non-Adjustable Type)



Use the multi-purpose copying inserts for turning (wide grooves).



Above figures show right hand tools.

### ■ Holders

Cat. No.	Stock		Dimensions (mm)						Work Dia. (mm)	Min. Bore Ø Inner (mm)	Groov. Width (mm) w	Max. Groov. Depth (mm) ar	Applicable Insert	Cap Screw	Spanner	
	R	L	h	b	L <sub>1</sub>	f	h <sub>1</sub>	L <sub>2</sub>								ØD <sub>m</sub>
GNDFS R/L2525M 620 070			25	25	150	47	25	25	70~100	64	6,0	20	GC□ N60○○-□□	BX0520	5,0	LH040
GNDFS R/L2525M 620 100			25	25	150	47	25	25	100~200	94	6,0	20				
GNDFS R/L2525M 620 180			25	25	150	47	25	25	180~300	174	6,0	20				
GNDFS R/L2525M 620 280			25	25	150	47	25	25	280~1000	274	6,0	20				
GNDFS R/L2525M 620 450			25	25	150	47	25	25	>450	444	6,0	20				
GNDFS R/L3232P 620 070			32	32	170	54	32	25	70~100	64	6,0	20	GC□ N60○○-□□	BX0620	6,0	LH050
GNDFS R/L3232P 620 100			32	32	170	54	32	25	100~200	94	6,0	20				
GNDFS R/L3232P 620 180			32	32	170	54	32	25	180~300	174	6,0	20				
GNDFS R/L3232P 620 280			32	32	170	54	32	25	280~1000	274	6,0	20				
GNDFS R/L3232P 620 450			32	32	170	54	32	25	>450	444	6,0	20				
GNDFS R/L2525M 820 070			25	25	150	47	25	30	70~100	62	8,0	20	GCM N80○○-□□	BX0620	6,0	LH050
GNDFS R/L2525M 820 100			25	25	150	47	25	30	100~200	92	8,0	20				
GNDFS R/L2525M 820 180			25	25	150	47	25	30	180~300	172	8,0	20				
GNDFS R/L2525M 820 280			25	25	150	47	25	30	280~1000	272	8,0	20				
GNDFS R/L2525M 820 450			25	25	150	47	25	30	>450	442	8,0	20				
GNDFS R/L3232P 820 070			32	32	170	54	32	30	70~100	62	8,0	20	GCM N80○○-□□	BX0620	6,0	LH050
GNDFS R/L3232P 820 070			32	32	170	54	32	30	100~200	92	8,0	20				
GNDFS R/L3232P 820 070			32	32	170	54	32	30	180~300	172	8,0	20				
GNDFS R/L3232P 820 070			32	32	170	54	32	30	280~1000	272	8,0	20				
GNDFS R/L3232P 820 070			32	32	170	54	32	03	>450	442	8,0	20				
GNDFS R/L3232P 820 070			32	32	170	54	32	03	>450	442	8,0	20				

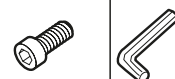
Select holders and inserts with the same grooving width (w).

### ■ Inserts for GNDFS

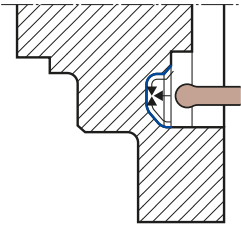
Application	Shape	Type	Cat. No.	Coated Carbide				Cermet Carbide		Dimensions (mm)						
				AC830P	AC425K	AC520U	AC530U	T2500A	H10	W		r <sub>ε</sub>	ℓ	s		
				●	●	○	●	○	○	Cutting Width	Tolerance					
Grooving / Turning		<b>MG</b> General Purpose	GCM N6008 MG	●	●	○	●				6,0	±0,03	0,8	26,4	4,5	
			N8008 MG	●	●	○	●				8,0	±0,04	0,8	28,75	6,0	
		<b>ML</b> Low Feed	GCM N6004 ML	●	●	○	●					6,0	±0,03	0,4	26,4	4,5
			N8004 ML	●	●	○	●					8,0	±0,04	0,4	28,75	6,0
Copying / Cut-Off		<b>GG</b> General Purpose	GCM N6002 GG	●	●	○	●				6,0	±0,03	0,2	26,4	4,5	
			N6004 GG	●	●	○	●				6,0	±0,03	0,4	26,4	4,5	
		<b>GL</b> Low Feed	GCM M6002 GL	●	●	○	●					6,0	±0,03	0,2	26,4	4,5
			N8004 GL	●	●	○	●					8,0	±0,04	0,4	28,75	6,0
		<b>GF</b> Low Cutting Force	GCM N6002 GF	●	●	○	●					6,0	±0,03	0,2	26,4	4,5
			N8002 GF <b>New</b>	●	●	○	●					8,0	±0,04	0,2	28,75	6,0
Face / Necking		<b>RN</b> General Purpose	GCM N6030 RN <b>New</b>	○	○	○	○				6,0	±0,03	3,0	28,1	4,5	
Non Ferrous Metals		<b>GA</b> General Purpose	GCM N6004 GA <b>New</b>							○	6,0	±0,025	0,4	26,4	4,5	

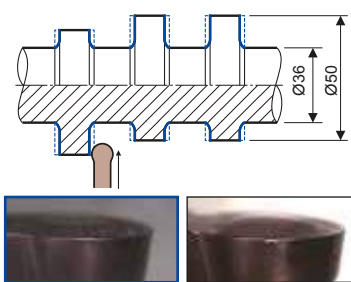
Select holders and inserts with the same grooving width (w).

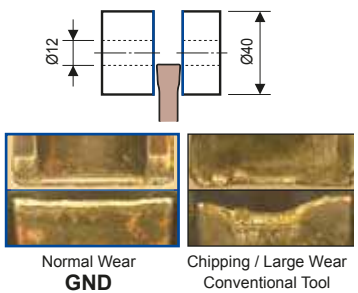
### ■ Spare Parts

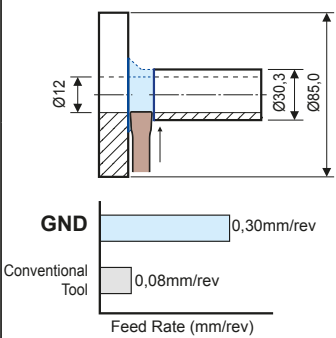


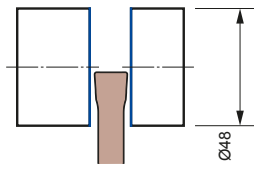
## Application Examples

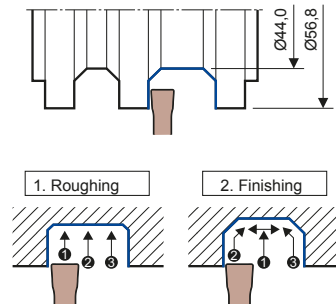
20CrMo5, Automotive Part, Face Profiling	
	<b>Target:</b> - Higher rigidity - Vibration reduction - Chip control - Wear resistance performance
	Holder: GDNF R2525M 423-125 Insert: GCM N4020 RG Grooving width: 4mm Cutting conditions: $v_c = 200\text{m/min}$ $f = 0,14\text{mm/rev}$ wet
Stable machining free of vibration! Excellent chip control using the GND type.	

C53, Cam Shaft Grooving / Finishing (Contin. to Heavy Interrupted)	
	<b>Target:</b> - Higher rigidity - Vibration reduction - Chip control - Fracture resistance
	Holder: GNDM L2525M 618 Insert: GCM N6030 RG Grooving width: 6mm Cutting conditions: $v_c = 130\text{m/min}$ $f = 0,36\text{mm/rev}$ wet
Stable machining free of vibration! Excellent fracture resistance Stable chip control	

C48, Machine Part, Cut-Off	
	<b>Target:</b> - Higher rigidity - Vibration reduction - Fracture resistance
	Holder: GNDL R2525M 320 Insert: GCM N3002 GG Grooving width: 3mm Cutting conditions: $n = 1600\text{min}^{-1}$ $v_c = 200\text{m/min}$ $f = 0,05\text{mm/rev}$ wet
Stable machining free of vibration! Excellent fracture resistance Stable fracture resistance	

34CrMo4, Crank, Cut-Off	
	<b>Target:</b> - Higher rigidity - Vibration reduction - Chip control
	Holder: GNDL R2525M 320 Insert: GCM N3002 GG Grooving width: 3mm Cutting conditions: $v_c = 115\text{m/min}$ $f = 0,30\text{mm/rev}$ wet
Improved efficiency Stable machining free of vibration Stable chip control	

X40CrVMo5-1, (45-48HRC), Machine Part, Cut-Off	
	<b>Target:</b> - Higher rigidity - Vibration reduction - Chip control
	Holder: GNDL R2525M 425 Insert: GCM N4002 GG Grooving width: 4mm Cutting conditions: $v_c = 50\text{m/min}$ $f = 0,03\text{mm/rev}$ wet
Stable machining free of vibration! Excellent chip control using the GND type. No more unexpected breakage!	

20Cr4, Gear Shaft, Grooving / Pocketing	
	<b>Target:</b> - Higher rigidity - Vibration reduction - Chip control
	Holder: GNDM R2020K 518 Insert: GCM N5008 MG Grooving width: 5mm Cutting conditions: $v_c = 150\text{m/min}$ $f = 0,1\text{mm/rev}$ wet
Stable machining free of vibration! Excellent chip control using the GND type.	

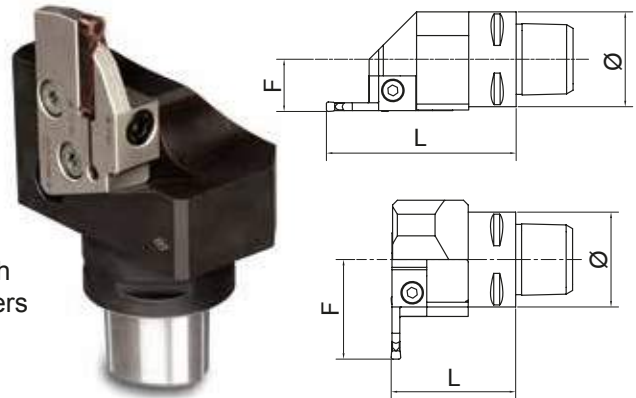
# ISO-PSC Polygon Modular GND Grooving System

**New**



## General Features

New grades and chipbreakers have been added to the already established GND grooving system with polygon shank and a flexible and economical cassette system for inserts. An array of chipbreakers improves the efficiency in chip control in various applications such as grooving, turning, profiling and cut-off.



## Advantages

- GND inserts for soft grooving from 2,0 - 6,0 mm width
- Expanded grade selection with 9 different chipbreakers for a wide application range
- Provides excellent chip control
- Achieves stable long tool life

## Holder

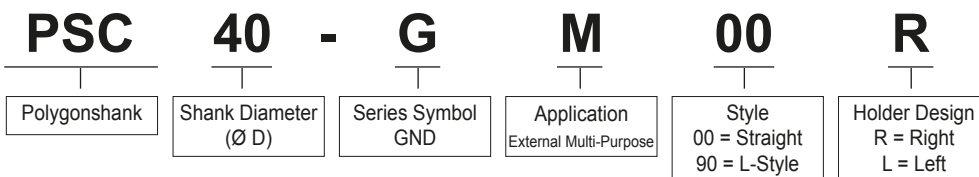
Cat. No.	R	L	Ø (mm)	F (mm)	L (mm)	Cap Screw	Tightening Torque (N·m)	Spanner
PSC40GM00 R/L	●	●	40	22	80	BFTX0619N	7,5 <sup>Nm</sup>	LT25
PSC50GM00 R/L	●	●	50	27				
PSC40GM90 R/L	●	●	40	42	52,5			
PSC50GM90 R/L	●	●	50	47	55,0			



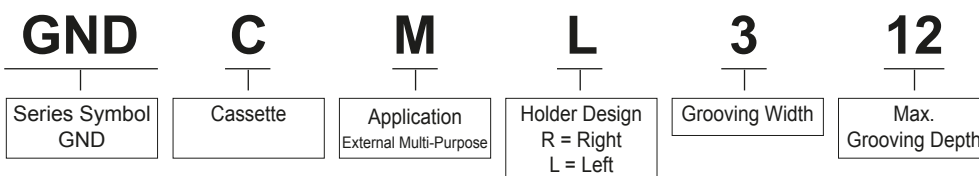
## Cassette

Cat. No.	R	L	Grooving Width w (mm)	Grooving Depth (mm)	Inserts	Cap Screw	Tightening Torque (N·m)	Spanner
GNDCM R/L 212	●	●	2	12	GCM □20□□-□□	BX0512	5,0 <sup>Nm</sup>	LH040
GNDCM R/L 312	●	●	3		GCM □30□□-□□			
GNDCM R/L 418	●	●	4	GCM □40□□-□□	6,0 <sup>Nm</sup>			
GNDCM R/L 518	●	●	5	GCM □50□□-□□				
GNDCM R/L 618	●	●	6	GCM □60□□-□□				

## Identification Details - Polygon-Toolholder



## Identification Details - Cassette



● = Euro stock  
○ = Japan stock

<sup>Nm</sup> Recommended Tightening Torque (N·m)



# ISO-PSC Polygon Modular GND Grooving System

## ■ Inserts

Application	Shape	Type	Cross section of cutting edge	Cat. No.	Coated Carbide				Cermet Carbide		Dimensions (mm)					
					AC830P	AC425K	AC520U	AC530U	T2500A	H10	w		r <sub>E</sub>	ℓ	s	
											Cutting Width	Tolerance				
Grooving / Turning		<b>MG</b>  General Purpose		GCM N3004 MG	●	●	○	●			<b>3,0</b>	±0,03	0,4	21,1	3,8	
				N4008 MG	●	●	○	●			<b>4,0</b>	±0,03	0,8	26,4	4,0	
				N5008 MG	●	●	○	●			<b>5,0</b>	±0,03	0,8	26,4	4,1	
				N6008 MG	●	●	○	●			<b>6,0</b>	±0,03	0,8	26,4	4,5	
		<b>ML</b>  Low Feed		GCM N2002 ML			○	●				<b>2,0</b>	±0,03	0,2	21,1	3,6
				N3002 ML	●	●		●	○			<b>3,0</b>	±0,03	0,2	21,1	3,8
				N4004 ML	●	●		●	○			<b>4,0</b>	±0,03	0,4	26,4	4,0
				N5004 ML	●	●		●	○			<b>5,0</b>	±0,03	0,4	26,4	4,1
				N6004 ML	●	●	○	●				<b>6,0</b>	±0,03	0,4	26,4	4,5
Copying / Cut-Off		<b>GG</b>  General Purpose		GCM N2002 GG	●			●			<b>2,0</b>	±0,03	0,2	21,1	3,6	
				N3002 GG	●		○	●			<b>3,0</b>	±0,03	0,2	21,1	3,8	
				N4002 GG	●			●			<b>4,0</b>	±0,03	0,2	26,4	4,0	
				N5002 GG	●		○	●			<b>5,0</b>	±0,03	0,2	26,4	4,1	
				N6002 GG	●		○	●			<b>6,0</b>	±0,03	0,2	26,4	4,5	
		<b>GL</b>  Low Feed		GCM N2002 GL	●			●				<b>2,0</b>	±0,03	0,2	21,1	3,6
				N3002 GL	●		○	●			<b>3,0</b>	±0,03	0,2	21,1	3,8	
				N4002 GL	●		○	●			<b>4,0</b>	±0,03	0,2	26,4	4,0	
				N5002 GL	●		○	●			<b>5,0</b>	±0,03	0,2	26,4	4,1	
				N6002 GL	●		○	●			<b>6,0</b>	±0,03	0,2	26,4	4,5	
		<b>GF</b>  Low Cutting Force		N2002 GF			○	●	○			<b>2,0</b>	±0,03	0,2	21,1	3,6
				N3002 GF				●	○	○		<b>3,0</b>	±0,03	0,2	21,1	3,8
				N4002 GF				●	○	○		<b>4,0</b>	±0,03	0,2	26,4	4,0
				N5002 GF				●	○	○		<b>5,0</b>	±0,03	0,2	26,4	4,1
				N6002 GF				●	○	○		<b>6,0</b>	±0,03	0,2	26,4	4,5
Copying		<b>RG</b>  General Purpose		GCM N3015 RG	●	●	○	●	○		<b>3,0</b>	±0,03	1,5	21,1	3,8	
				N4020 RG	●	●		●	○		<b>4,0</b>	±0,03	2,0	26,4	4,0	
				N5025 RG	●	●		●	○		<b>5,0</b>	±0,03	2,5	27,2	4,1	
				N6030 RG	●	●	○	●			<b>6,0</b>	±0,03	3,0	27,5	4,5	
Face / Necking		<b>RN</b>  General Purpose		GCM N2010 RN			○	○			<b>2,0</b>	±0,03	1,0	21,7	3,6	
				N3015 RN	○	○	○	○			<b>3,0</b>	±0,03	1,5	22,4	3,8	
				N4020 RN	○	○	○	○			<b>4,0</b>	±0,03	2,0	28,0	4,0	
				N5025 RN	○	○	○	○			<b>5,0</b>	±0,03	2,5	28,1	4,1	
				N6030 RN	○	○	○	○			<b>6,0</b>	±0,03	3,0	28,1	4,5	
Non Ferrous Metals		<b>GA</b>  General Purpose		GCG N2002 GA						○	<b>2,0</b>	±0,025	0,2	21,1	3,6	
				N3002 GA						○	<b>3,0</b>	±0,025	0,2	21,1	3,8	
				N4004 GA						○	<b>4,0</b>	±0,025	0,4	26,4	4,0	
				N5004 GA						○	<b>5,0</b>	±0,025	0,4	26,4	4,1	
				N6004 GA						○	<b>6,0</b>	±0,025	0,4	26,4	4,5	

Select holders and inserts with the same grooving width (w).

Application	Shape	Type	Cross section of cutting edge	Cat. No. R / L	Coated Carbide				Cermet Carbide		Dimensions (mm)								
					AC830P		AC425K		AC520U		AC530U		T2500A	H10	w		r <sub>E</sub>	ℓ	s
					R	L	R	L	R	L	R	L			Cutting Width	Tolerance			
Cut-Off	Figures show right hand tools. 	<b>CG</b>  General Purpose		GCM □2002 CG 05	●	●		○	○	●	●			<b>2,0</b>	±0,03	0,2	21,1	3,6	
				□3002 CG 05	●	●		○	○	●	●			<b>3,0</b>	±0,03	0,2	21,3	3,8	
				□4002 CG 05	●	●		○	○	●	●			<b>4,0</b>	±0,03	0,2	26,7	4,0	

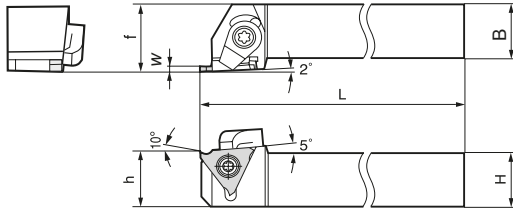
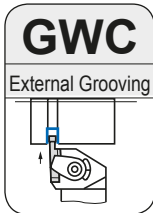
# SumiTurn B-Groove Insert TGA-BF Type



## Characteristics

- Outstanding chip control when grooving
- Excellent chip control when finishing wide grooves using axial feed  
Grooving inserts from 1,5mm - 4,5mm wide
- Grade **AC530U** with Super ZX ultra hard coating for steels,
- stainless steels and cast iron increases productivity and extends tool life

## External Grooving



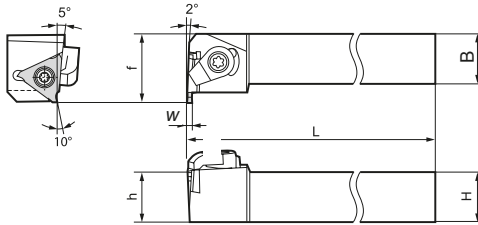
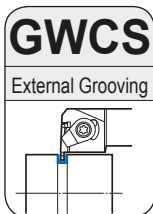
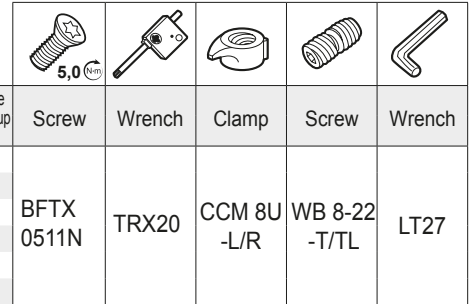
Figures show right hand tools.

### ■ Holders

Right handed tool holders are used with **right** handed inserts (TGA-R), **left** handed clamp (CCM 8U-L) and **right** handed screw (WB8-22-T).

Cat. No.	Stock		Dimensions (mm)					Grooving width w (mm)	Maximum Grooving Depth (mm)	Applicable Insert Group No.	Screw	Wrench	Clamp	Screw	Wrench
	R	L	H	B	L	f	h								
<b>GWC R/L 2020-15</b>	●	●	20	20	125	25	20	1,25~1,45	2,0	①	BFTX 0511N	TRX20	CCM 8U -L/R	WB 8-22 -T/TL	LT27
<b>GWC R/L 2020-25</b>	●	●	20	20	125	25	20	1,50~2,30	3,5	②					
<b>GWC R/L 2020-35</b>	●	●	20	20	125	25	20	2,50~4,80	5,0	③					
<b>GWC R/L 2525-15</b>	●	●	25	25	150	30	25	1,25~1,45	2,0	①					
<b>GWC R/L 2525-25</b>	●	●	25	25	150	30	25	1,50~2,30	3,5	②					
<b>GWC R/L 2525-35</b>	●	●	25	25	150	30	25	2,50~4,80	5,0	③					

### ■ Spare Parts



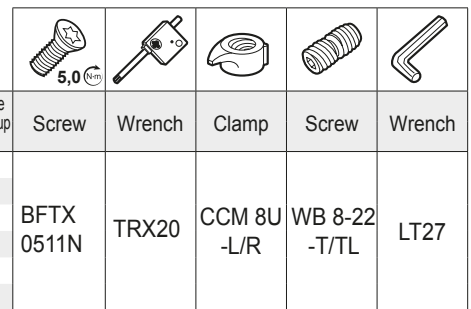
Figures show right hand tools.

### ■ Holders

Right handed tool holders are used with **left** handed inserts (TGA-L), **right** handed clamp (CCM 8U-R) and **left** handed screw (WB8-22-TL).

Cat. No.	Stock		Dimensions (mm)					Grooving width w (mm)	Maximum Grooving Depth (mm)	Applicable Insert Group No.	Screw	Wrench	Clamp	Screw	Wrench
	R	L	H	B	L	f	h								
<b>GWCS R/L 2020-15</b>	□	□	20	20	125	27	20	1,25~1,45	2,0	①	BFTX 0511N	TRX20	CCM 8U -L/R	WB 8-22 -T/TL	LT27
<b>GWCS R/L 2020-25</b>	□	□	20	20	125	27	20	1,50~2,30	3,5	②					
<b>GWCS R/L 2020-35</b>	□	□	20	20	125	27	20	2,50~4,80	5,0	③					
<b>GWCS R/L 2525-15</b>	□	□	25	25	150	32	25	1,25~1,45	2,0	①					
<b>GWCS R/L 2525-25</b>	□	□	25	25	150	32	25	1,50~2,30	3,5	②					
<b>GWCS R/L 2525-35</b>	□	□	25	25	150	32	25	2,50~4,80	5,0	③					

### ■ Spare Parts



## ISO-PSC Polygon Modular



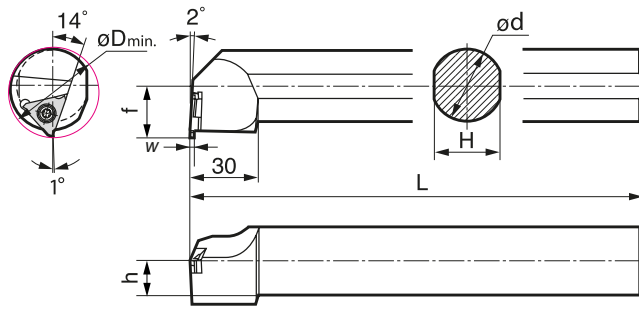
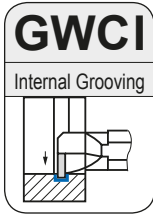
### ■ Holder

Cat. No.	R	L	Ø (mm)	F (mm)	L (mm)	Cap Screw	Spanner
<b>PSC 40 GM00 R/L</b>	●	●	40	22	80,0	BFTX0619N 7,5 Nm	LT25
<b>PSC 50 GM00 R/L</b>	●	●	50	27	80,0		
<b>PSC 40 GM90 R/L</b>	●	●	40	42	52,5		
<b>PSC 50 GM90 R/L</b>	●	●	50	47	55,0		

### ■ Cassette

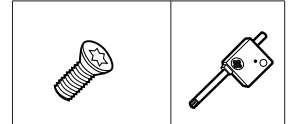
Cat. No.	R	L	Grooving Width w (mm)	Grooving Depth ℓ (mm)	Insert	Insert Screw	Spanner	Clamp Finger	Cap Screw	Spanner
<b>GWCCM R/L 25</b>	●	●	1,5 - 2,3	3,9	TGA□4□□□BF	BFTX0511N	TRX20	CLWN01	BX0414 3,0 Nm	LH030
<b>GWCCM R/L 35</b>	●	●	2,5 - 4,5	5,4	TGA□4□□□BF	5,0 Nm				

### Internal Grooving



Figures show right hand tools.

### ■ Spare Parts

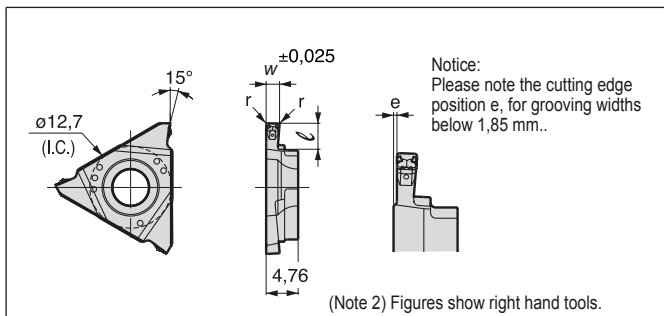


### ■ Holders

Right handed tool holders are applicable with left handed inserts (TGA-L).

Cat. No.	Stock		Dimensions (mm)						Grooving width w (mm)	Maximum Grooving Depth (mm)	Applicable Insert Group No.	Screw	N <sub>m</sub>	Wrench
	R	L	$\phi D_{min}$	$\phi d$	L	H	h	f						
<b>GWCI R/L 325</b>			35	25	200	23	11,5	17,5	0,33~2,80	0,8~2,0		BFTX 0409N	3,4	TRX 15
<b>GWCI R/L 432</b>	□	□	40	32	250	30	15,0	17,5	1,25~4,80	2,0~2,5	① ② ③	BFTX 0511N	5,0	TRX 20

### ■ Inserts



(Note 2) Figures show right hand tools.

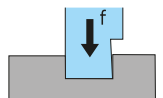
Cat. No.	Coated		Dimensions (mm)					Applicable holder & insert group
	AC530U		( ) in $\ell$ presents max. depth					
	R	L	w	$\ell$	r	e		
<b>TGA R/L 4145BF</b>			1,45	2,5 (2,0)	0,2	0,275	①	
<b>TGA R/L 4150BF</b>	●	●	1,50	3,9		0,250		
<b>TGA R/L 4165BF</b>	○	○	1,65			0,175		
<b>TGA R/L 4175BF</b>	○	○	1,75			0,125		
<b>TGA R/L 4185BF</b>	○		1,85	External (3,5) Internal (2,5)	0,075	②		
<b>TGA R/L 4200BF</b>	●	●	2,00					
<b>TGA R/L 4220BF</b>	○	○	2,20					
<b>TGA R/L 4230BF</b>	○	○	2,30					
<b>TGA R/L 4250BF</b>	●	●	2,50	5,4	0,3	0	③	
<b>TGA R/L 4265BF</b>	○	○	2,65					
<b>TGA R/L 4270BF</b>	○	○	2,70					
<b>TGA R/L 4280BF</b>	○	○	2,80					
<b>TGA R/L 4300BF</b>	●	●	3,00					
<b>TGA R/L 4320BF</b>	○	○	3,20					
<b>TGA R/L 4330BF</b>	○	○	3,30					
<b>TGA R/L 4350BF</b>	●	●	3,50					
<b>TGA R/L 4370BF</b>	○	○	3,70					
<b>TGA R/L 4390BF</b>	○	○	3,90					
<b>TGA R/L 4400BF</b>	●	●	4,00	0,4				
<b>TGA R/L 4410BF</b>	○	○	4,10					
<b>TGA R/L 4420BF</b>		○	4,20					
<b>TGA R/L 4430BF</b>	○	○	4,30					
<b>TGA R/L 4440BF</b>	○	○	4,40					
<b>TGA R/L 4450BF</b>	●	●	4,50					

### ■ Recommended Cutting Conditions

#### ● Grooving

Wet condition is recommended.

Feed direction

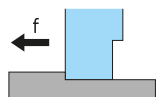


Work Material	General Steel	Stainless Steel	
Cutting speed (m/min)	50 ~ 180	50 ~ 160	
Groove width (mm)	1,5 ~ 2,3	2,5 ~ 3,3	3,5 ~ 4,5
Feed rate (mm/rev)	0,03 ~ 0,12	0,04 ~ 0,12	0,05 ~ 0,12
Depth of cut (mm)	Ext.	~ 3,5	~ 5,0
	Int.	~ 2,5	

#### ● Axial Feed

Feed direction for axial feed

Wet condition is recommended.



Work Material	General Steel	Stainless Steel	
Cutting speed (m/min)	50 ~ 180	50 ~ 160	
Feed rate (mm/rev)	0,03 ~ 0,10	0,05 ~ 0,10	0,07 ~ 0,12
Depth of cut (mm)	~ 0,3	~ 0,5	~ 0,7

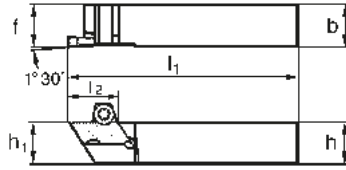
\*) Please select applicable inserts for the holders by using matching group numbers.

# Parting-Off Mini Holders SCT Type



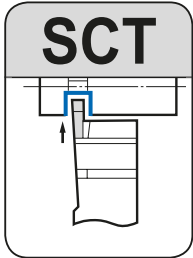
Parting-Off  
Tools

## ■ Holders



## ■ Spare Parts

CTR ___	BFTX 0410 T8 L 1,1
CTL ___	BFTX 0410 T8 R 1,1
	TRX 08



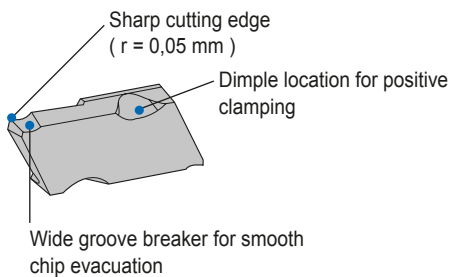
Ordering No.	Stock	Dimensions (mm)					Applicable inserts
		h=h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	
SCT R 1010	●	10	10	120	15	10	CTR ___
SCT R 1212	●	12	12	120	15	12	
SCT R 1616	●	16	16	120	15	16	
SCT L 1010	●	10	10	120	15	10	CTL ___
SCT L 1212	●	12	12	120	15	12	
SCT L 1616	●	16	16	120	15	16	

Above figures show right hand tools.

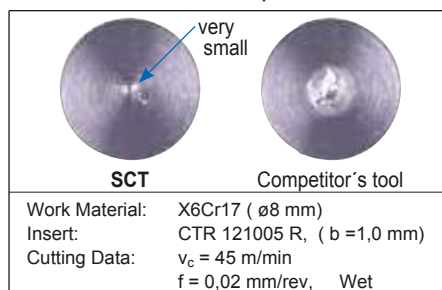
## ■ Inserts

( Coated carbide)

CTR CTL	Ordering No.	Stock ACZ310	Dimensions (mm)		Insert Type	
			b	Max. ø D	(R) right handed type	(N) neutral type
	CTR 050505 R	●	0,5	5		
	CTR 121005 R	●	1,0	12		
	CTR 121505 R	●	1,5			
	CTR 122005 R	●	2,0			
	CTR 121005 N	●	1,0			
	CTR 121505 N	●	1,5			
CTR 122005 N	●	2,0				
	CTL 050505 L	●	0,5	5		
	CTL 121005 L	●	1,0	12		
	CTL 121505 L	●	1,5			
	CTL 122005 L	●	2,0			
	CTL 121005 N	●	1,0			
	CTL 121505 N	●	1,5			
CTL 122005 N	●	2,0				



## ● Surface Finish Comparision



## ■ Recommended Cutting Data (SCT Type)

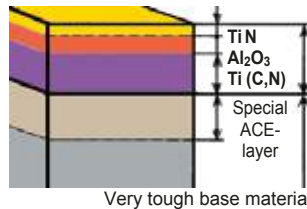
Work Material	Approach angle	v <sub>c</sub> (m/min)	f (mm/rev)
General steel	20° (R/L-Platte)	50 ~ 150	0,02 ~ 0,05
	0° (N-Platte)		0,02 ~ 0,10
Free-cutting steel	20° (R/L-Platte)	50 ~ 150	0,02 ~ 0,05
	0° (N-Platte)		0,02 ~ 0,10
Stainless steel	20° (R/L-Platte)	50 ~ 150	0,02 ~ 0,04
	0° (N-Platte)		0,02 ~ 0,05

Cutting data for coated grade ACZ310

- = Euro stock
- = Japan stock
- ▲ = To be replaced by new item



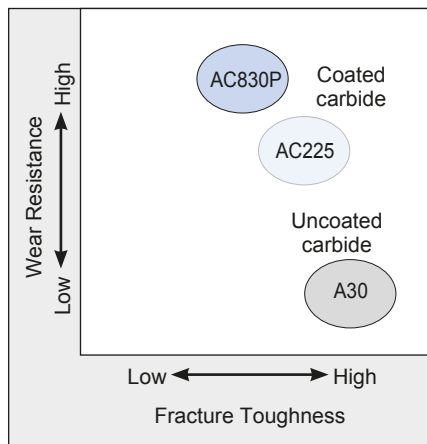
 Neutral (N)	WCF - N/R/L __ (General steel)			WCF - N/R/L __ A Type A for hard to cut materials (Slow feed)			WCF - N/R/L __ B					
	Ordering No.	Coated carbide	[ a ] (mm)	Ordering No.	Coated carbide	Uncoated carbide	[ a ] (mm)	Ordering No.	Uncoated carbide	[ a ] (mm)		
		AC830P			AC225	A30			G10E			
 Right hand (R)	WCFN 2 T	○	2	WCFN 2 A	●		2					
	WCFN 3	○	3	WCFN 3 A	●		3	WCFN 3 B	●	3		
	WCFR 3	○		WCFR 3 A	●	WCFR 3 B		●				
WCFL 3	○	WCFL 3 A		●	WCFL 3 B	●						
 Left hand (L)	WCFN 4	○	4	WCFN 4 A	●	○	4	WCFN 4 B	●	4		
	WCFR 4	○		WCFR 4 A	●	WCFR 4 B		●				
	WCFL 4	○		WCFL 4 A	●	WCFL 4 B		●				
	WCFN 5	○		5	WCFN 5 A	●		5	WCFN 5 B		●	5
	WCFR 5	○			WCFR 5 A	●			WCFR 5 B		●	
WCFL 5	○	WCFL 5 A	●		WCFL 5 B	●						



Structure of AC225 coated layer

There is a multi layer coating which includes a 2 μm thick Al<sub>2</sub>O<sub>3</sub> layer. It is very tough and resistant to adhesion wear.

### Insert Grade Map



### Applications and Features of Inserts

Grade	Ordering No. (Ex. a=3mm)	Applications	Features
AC830P (AC3000)	WCFN 3	General steel and high feed cutting (0,08~0,3/rev)	Coated insert having excellent wear resistance with low cutting resistance
AC225	WCFN 3A	General steel and slow feed cutting (0,04~0,25/rev) soft steel, stainless steel	Coated insert having excellent fracture toughness with good chip removal
A30	WCFN 3A	Hard to cut materials	Equivalent to P30
G10E	WCFN 3B	Cast iron, aluminum alloy	Equivalent to K10 with a small edge treatment

### Recommended Cutting Conditions

Grade	v <sub>c</sub> (m/min) f (mm/rev)	General Steel	Soft Steel	Stainless Steel	Die Steel	Gray Cast Iron
AC830P (AC3000)	v <sub>c</sub>	100 - 220	120 - 250	80 - 200	60 - 150	-
	f	0,08 - 0,3	0,08 - 0,15	0,08 - 0,15	0,08 - 0,15	-
AC225	v <sub>c</sub>	80 - 200	100 - 230	60 - 180	60 - 150	-
	f	0,04 - 0,25	0,04 - 0,2	0,04 - 0,2	0,04 - 0,2	-
A30	v <sub>c</sub>	50 - 120	70 - 150	70 - 150	50 - 120	-
	f	0,05 - 0,2	0,04 - 0,15	0,04 - 0,15	0,04 - 0,15	-
G10E	v <sub>c</sub>	-	-	-	-	50 - 100
	f	-	-	-	-	0,06 - 0,2

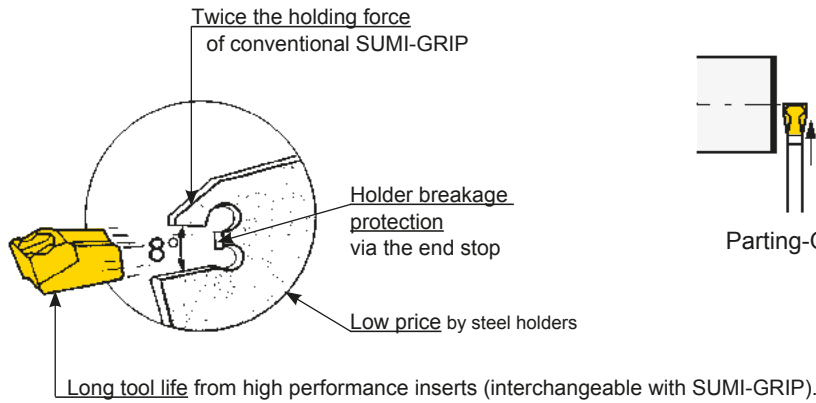
The recommended cutting conditions are valid when using the part-off tool with tool block type and shank type in the clamping system.

# Parting-Off Holders

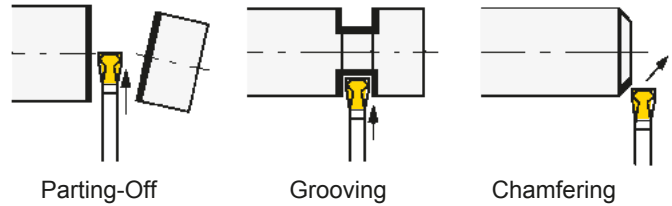
## Sumi-Grip "Jr."

Steel Blade and Shank Type

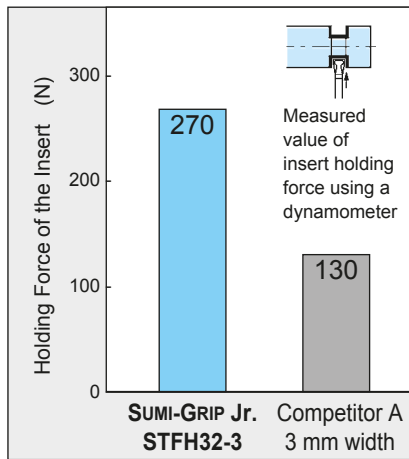
### Features of Design



### Effective Tooling with Sumi-Grip Jr.

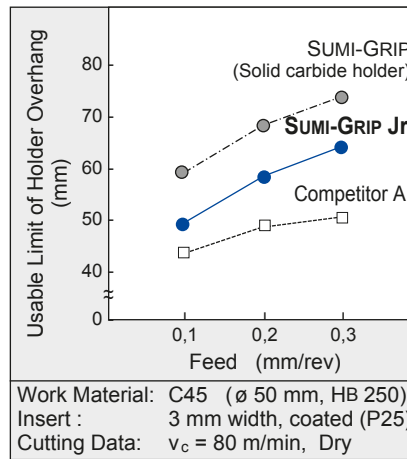


### Twice the Insert Holding Force



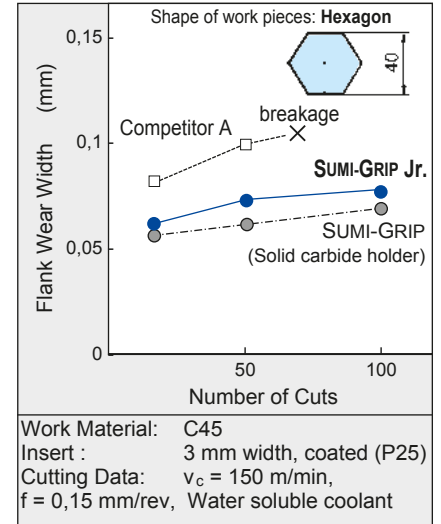
### Low Vibration

#### Comparison of usable limit vibration



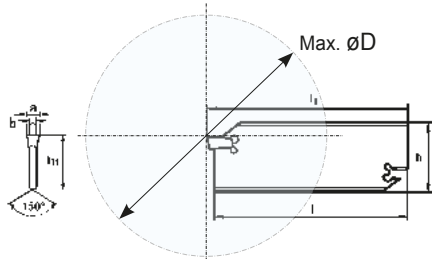
### WEAR RESISTANCE

#### (Interrupted cut part off)



### Part-Off Holders

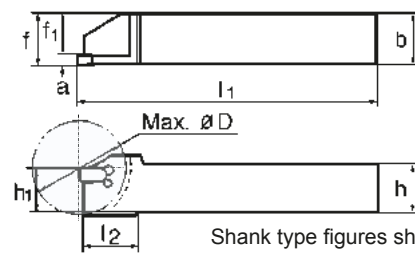
#### Steel Blades (Tool Block Type Holders)



Ordering No.	Stock	Dimensions (mm)							Applicable inserts
		a	$\varnothing D_{Max}$	h	$h_1$	b	l	$l_1$	
STFH 26-2	●	2	40	26	21,4	1,7	108	109	WCF_2_
STFH 26-3	●	3	70	26	21,4	2,4	108	109	WCF_3_
STFH 26-4	●	4	70	26	21,4	3,4	108	109	WCF_4_
STFH 26-5	●	5	70	26	21,4	4,3	108	109	WCF_5_
STFH 32-2	●	2	40	32	25	1,7	148	149	WCF_2_
STFH 32-3	●	3	100	32	25	2,4	148	149	WCF_3_
STFH 32-4	●	4	100	32	25	3,4	148	149	WCF_4_
STFH 32-5	●	5	100	32	25	4,3	148	149	WCF_5_

Remarks: All tool holders include a wrench type **SL-4**.  
 Tool blocks for steel blades are ordered separately.

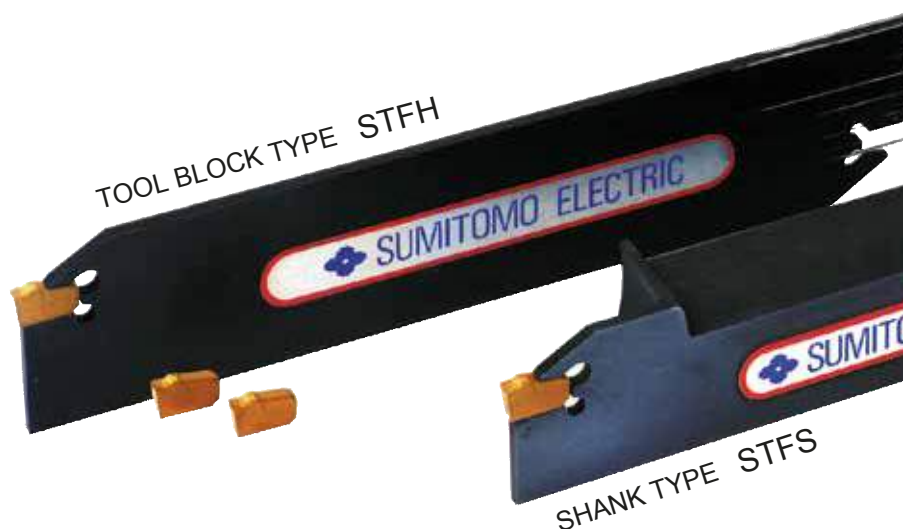
#### Shank Type Holders



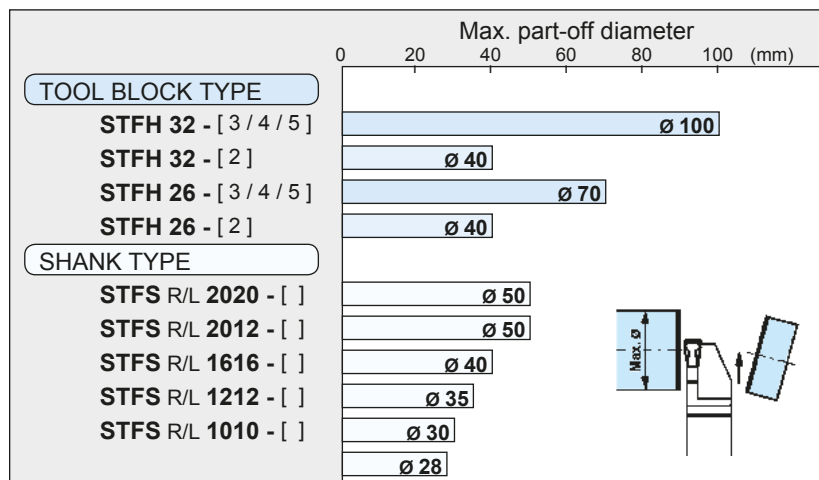
Shank type figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)										Applicable inserts
	R	L	a	$\varnothing D_{Max}$	h	$h_1$	b	$l_1$	$l_2$	f	$f_1$		
STFS R/L 1010-2	●	□	28	10	10	10	86	18	10	8	WCF_2_		
STFS R/L 1212-2	●	●	30	12	12	12	110	20	12	10			
STFS R/L 1616-2	●	●	35	16	16	16	110	20	16	14			
STFS R/L 2020-2	●	●	50	20	20	20	125	-	20	18			
STFS R/L 1616-3	●	●	35	16	16	16	110	20	16	13	WCF_3_		
STFS R/L 2012-3	●	□	40	20	20	12	110	-	12	9			
STFS R/L 2020-3	●	●	50	20	20	20	125	-	20	17			
STFS R/L 2525-3	●	●	50	25	25	25	150	-	25	22			
STFS R/L 2020-4	●	●	50	20	20	20	125	-	20	16	WCF_4_		
STFS R/L 2525-4	●	●	50	25	25	25	150	-	25	21			
STFS R/L 2020-5	●	□	50	20	20	20	125	-	20	15			
STFS R/L 2525-5	●	□	50	25	25	25	150	-	25	20			

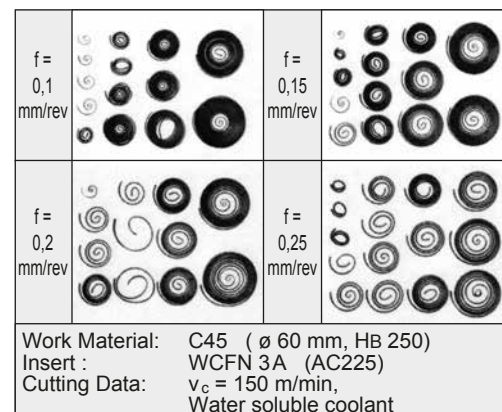
# Parting-Off Holders Sumi-Grip "Jr."



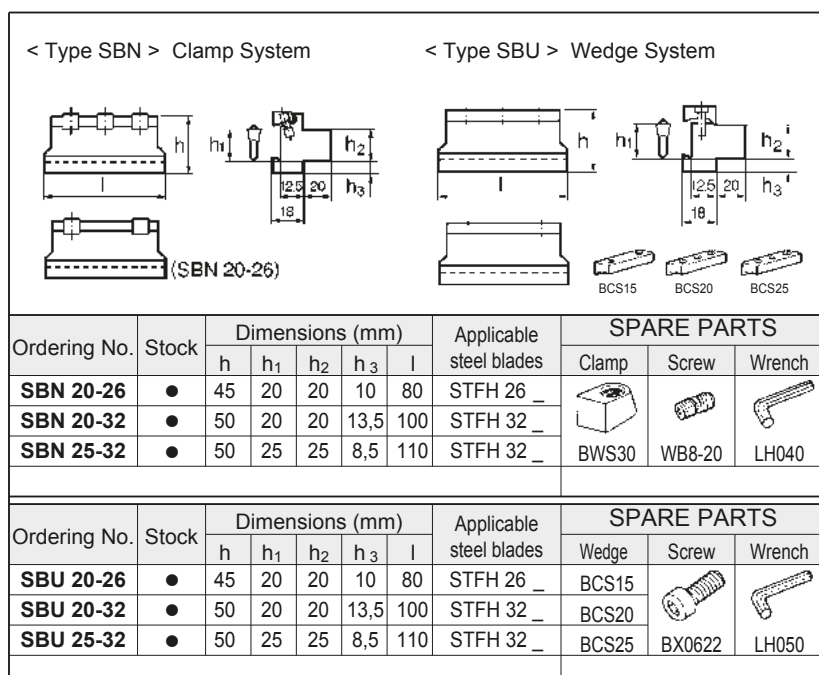
## Recommended Application Range



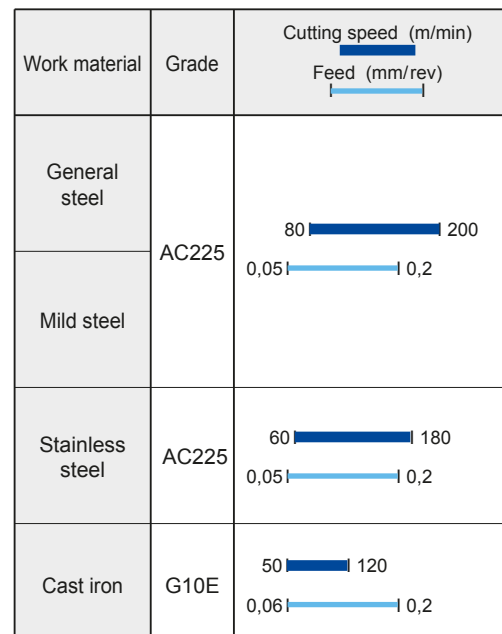
## Good Chip Removal



## Tool Blocks



## Recommended Grades and Cutting Conditions



# Parting-Off Holders Sumi-Grip Series

Carbide Blade Type

## Sumi-Grip- Series



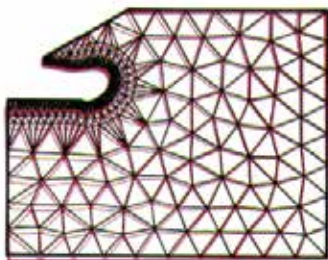
## Features of Sumi-Grip

### High Rigidity

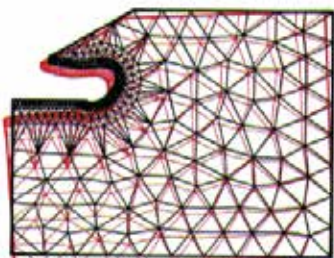
This figure shows a computer generated comparison of the distortion of steel and carbide holders caused by cutting forces.

The reduced distortion of the carbide holder makes cutting under harsher conditions and higher feeds possible.

Distortion of **Sumi-Grip** (Carbide holder)



Distortion of steel holder



Structure of distortions

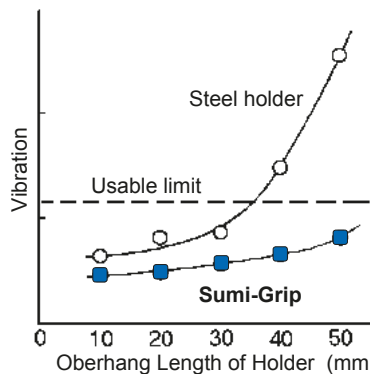
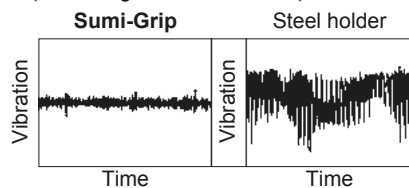
— Changed sharp  
— Unchanged sharp

### Low Vibration

The figure shows the measurement of cutting vibration.

At high speeds the carbide holder experiences for less vibrations than does the steel holder. Thus, the overhang length can be extended and cutting speed can be increased with the **Sumi Grip**'s carbide holder.

Measurement of vibrations  
(Overhang of holder: 50 mm)

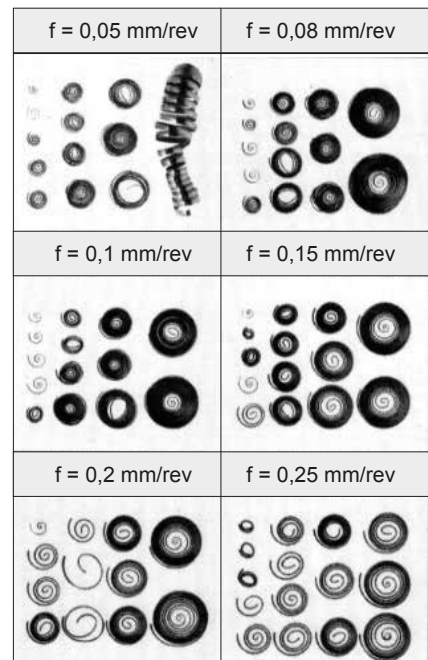


Work: Carbon steel (ø 60mm, HB250)  
Width of Insert: 3 mm  
Cutting Data:  $v_c = 150$  m/min,  $f = 0,1$  mm/rev

### Good Chip Removal

This picture show the shape of chips according to feed rate.

**SUMI GRIP** produces rolled chip which are easily removed.



Work material: Ck 45 (ø 60mm, HB250)  
Insert width and type : 3 mm,  
WCFN 3A (AC225)  
Cutting conditions:  $v_c = 150$  m/min, Wet



Beautiful surface finish



- Width of cut off: 2 ~ 5 mm
- Max. cut-off diameter is 140 mm (In case of 2,0 mm width insert up to  $\phi$  40 mm).
- double sided carbide blade
- Tool block and carbide holder are interchangeable between right and left hand use.

■ Carbide Blades

Ordering No.	Stock	Dimensions (mm)							Applicable inserts
		a	$\phi D_{Max}$	h	$h_1$	b	l	$l_1$	
WCFH 26-2	●	2	40	26	21,4	1,7	109	110	WCF_2_ _
WCFH 26-3	●	3	80	26	21,4	2,4	108,5	110	WCF_3_ _
WCFH 26-4	●	4	80	26	21,4	3,4	108,5	110	WCF_4_ _
WCFH 26-5	●	5	80	26	21,4	4,3	108,5	110	WCF_5_ _
WCFH 32-2	●	2	40	32	25	1,7	149	150	WCF_2_ _
WCFH 32-3	●	3	140	32	25	2,4	148,5	150	WCF_3_ _
WCFH 32-4	●	4	140	32	25	3,4	148,5	150	WCF_4_ _
WCFH 32-5	●	5	140	32	25	4,3	148,5	150	WCF_5_ _

■ Wrench

Wrench
SL - 2
SL - 1
SL - 1
SL - 1
SL - 2
SL - 1
SL - 1
SL - 1

Remark: A carbide blade includes a wrench. Applicable Tool block and insert are ordered separately.

■ Tool Blocks

<Type SBN> One piece type

Ordering No.	Stock	Dimensions (mm)					Applicable carbide blades
		h	$h_1$	$h_2$	$h_3$	l	
SBN 20-26	●	45	20	20	10	80	WCFH 26_ _
SBN 20-32	●	50	20	20	13,5	100	WCFH 32_ _
SBN 25-26	□	48	25	25	10	80	WCFH 26_ _
SBN 25-32	●	50	25	25	8,5	110	WCFH 32_ _

<Type SBU> Separate type

Ordering No.	Stock	Dimensions (mm)					Applicable carbide blades
		h	$h_1$	$h_2$	$h_3$	l	
SBU 20-26	●	45	20	20	10	80	WCFH 26_ _
SBU 20-32	●	50	20	20	13,5	100	WCFH 32_ _
SBU 25-26	□	48	25	25	10	80	WCFH 26_ _
SBU 25-32	●	50	25	25	8,5	110	WCFH 32_ _

■ Spare Parts

Clamp	Screw	Wrench
BWS 30	WB 8-20	LH 040

Wedge		
SBU 20-26	SBU 20-32	SBU 25-32
BCS 15	BCS 20	BCS 25
Screw	Wrench	
BX 0622	LH 050	

■ Nomenclature

<p>Holder</p> <p><b>WCF H 26-3</b></p> <p>Sumi-Grip</p> <p>Holder type</p> <p>Insert width a = 2, 3, 4, 5 mm</p> <p>Holder height h = 26, 32 mm (Type H) h = 20, 25 mm (Type S)</p>	<p>Insert</p> <p><b>WCF N 3 A</b></p> <p>Sumi-Grip</p> <p>Feed direction Neutral (N) Right hand (R) Left hand (L)</p> <p>Breaker type - Standard (Nil) - Type A - Type B</p> <p>Insert width a = 2, 3, 4, 5 mm</p>
---	--

# Parting-Off Holders Sumi-Grip Series

## Shank Type with Carbide Blade



- Carbide blade on shank fixed type
- Width of cut off: 3,0 ~ 5,0 mm
- Max. cut off diameter is 50 mm
- Suitable for machining with small N/C machines and automated lathe machines



- Carbide blade on shank brazed type
- Width of cut off: 2,0 mm
- Economical brazed type
- Suitable for machining with small CNC machines

### ■ Holders (Fixed Type)

Ordering No.	Stock		Dimensions (mm)								Included carbide blade	Applicable inserts
	R	L	a	b	h	h <sub>1</sub>	l <sub>1</sub>	f	f <sub>1</sub>			
WCFS R/L 20-3	●	●	3	20	20	20	125	23	20	WCFH 17-3	WCF_3_	
WCFS R/L 20-4	●	●	4	20	20	20	125	24	20	WCFH 17-4	WCF_4_	
WCFS R/L 20-5	□	□	5	20	20	20	125	25	20	WCFH 17-5	WCF_5_	
WCFS R/L 25-3	●	●	3	25	25	25	150	28	25	WCFH 17-3	WCF_3_	
WCFS R/L 25-4	●	□	4	25	25	25	150	29	25	WCFH 17-4	WCF_4_	
WCFS R/L 25-5	●	□	5	25	25	25	150	30	25	WCFH 17-5	WCF_5_	

Remarks: A holder includes an applicable carbide blade and a wrench.  
All figures show right hand tools.

### ■ Spare Parts

### ■ Wrench

Carbide blade	Stock	Dimensions (mm)		Applicable inserts	Ordering No.
		a	b		
WCFH 17-3	●	3	2,4	WCF_3_	SL - 1
WCFH 17-4	●	4	3,4	WCF_4_	SL - 1
WCFH 17-5	●	5	4,3	WCF_5_	SL - 1

### ■ Holders (Brazed Type)

### Wrench

Ordering No.	Stock		Dimensions (mm)										Applicable inserts	Wrench
	R	L	a	∅D <sub>max</sub>	h	h <sub>1</sub>	b	l <sub>1</sub>	l <sub>2</sub>	f	f <sub>1</sub>			
WCFS R/L 1010-2	●	□	2	28	10	10	10	86	18	10	8	WCFN 2A	SL - 2	
WCFS R/L 1212-2	●	●	2	30	12	12	12	110	20	12	10	WCFN 2A	SL - 2	
WCFS R/L 1616-2	□	●	2	35	16	16	16	100	-	16	14	WCFN 2A	SL - 2	

Remarks: A holder includes an applicable wrench.  
All figures show right hand tools.

# Threading Tools



## ■ General Features

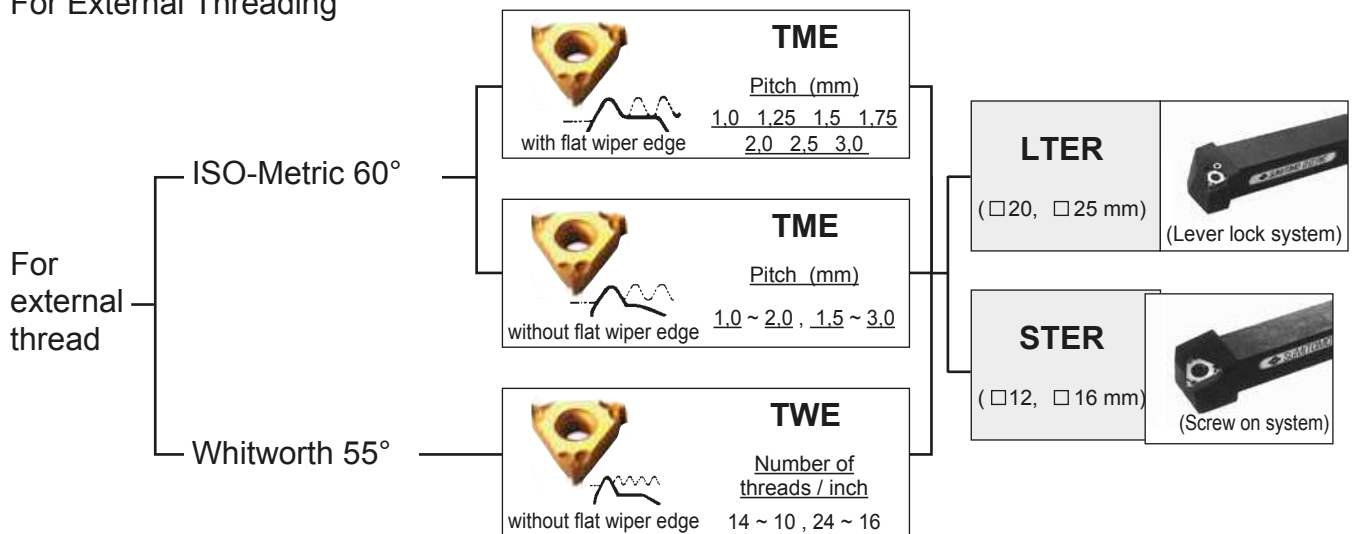
Sumitomo Electric has developed „TME“ external threading inserts with pitch ranges of 1,0 ~ 3,0 mm or 10 ~ 24 threads/inch and „TMI“ internal threading inserts with a pitch range of 1,0 ~ 3,0 mm.

The superior features of the new sintered threading inserts include an M-class tolerance and dimple shaped chip breaker. The M-class tolerance reduces insert cost by eliminating the need for expensive grinding.

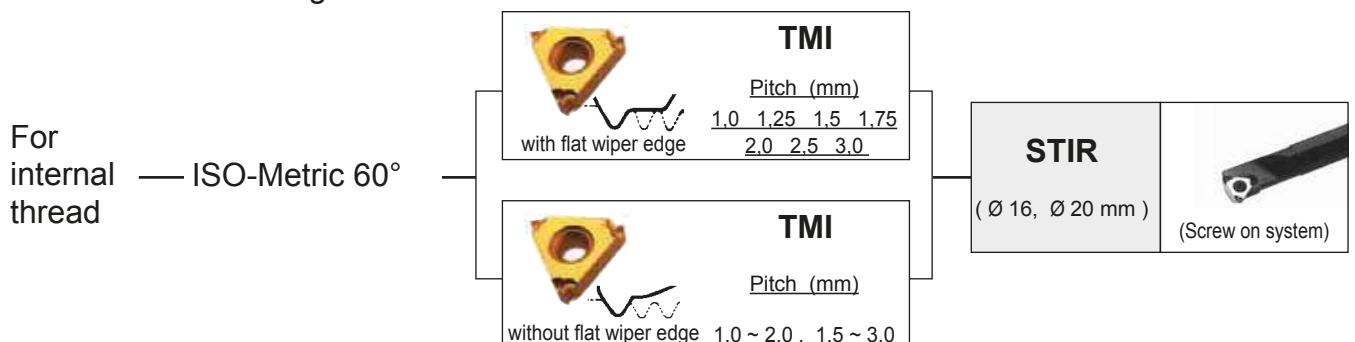
Furthermore, chip control is greatly improved as a result of the specially designed dimple chip breakers.

## ■ New Series of Indexable Inserts and Holders for Threading

### ● For External Threading

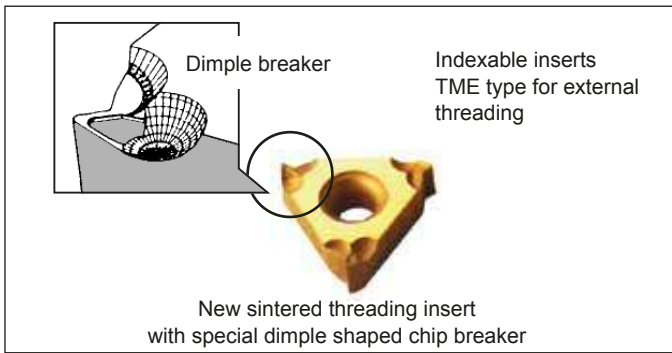


### ● For Internal Threading



# Threading Tools

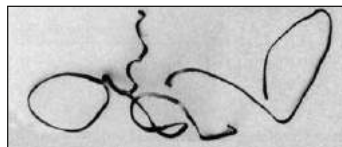
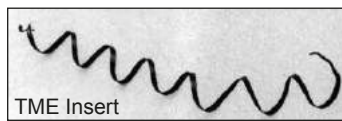
## Threading Insert



### ■ General Features

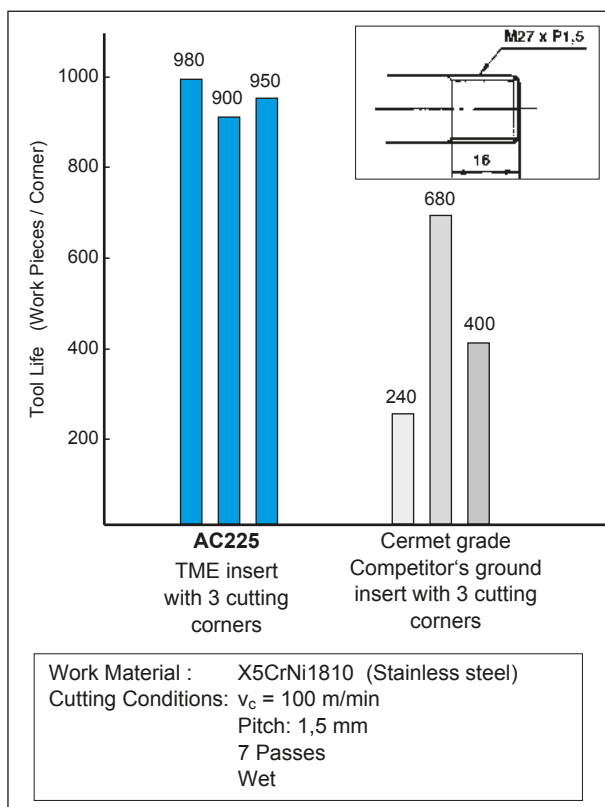
- A positive rake angle encourages good chip control and reduces cutting resistance.
- Two tier dimple-style chip breakers evacuate chip smoothly and easily.
- M-class tolerance reduces insert cost.
- Four available grades cover a wider range of applications.
- The LTER type holder is designed for easy clamping and replacement.

### ● Comparison of Chip Control



Work material: 25 CrMo 4  
Cutting speed: 100 m/min  
Pitch: 1,5 mm

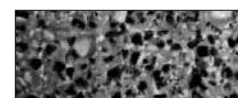
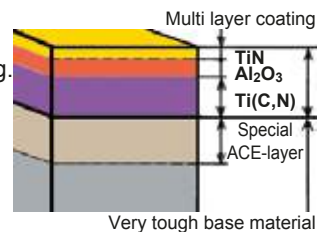
### ● Comparison of Tool Life



### ■ Cutting Grades for Threading

#### AC225

The AC225 is a carbide insert with a 2  $\mu$ m multiple-layer coating. This design results in improved toughness and adhesion resistance making this grade **suitable for stainless steel and general steel.**



Neue Cermet-Grade T130A

#### T130A

The T130A is a cermet grade containing high TiN with a uniform fine-grain microstructure which results in improved wear resistance and toughness. Thus, the T130A **produces a goods surface finish.**



# Threading Tools Cutting Conditions

## Recommended Cutting Conditions

### ● Cutting Speed (m/min.)

Work material	Grade	
	AC225	T130A
Soft steel	150 ~170	100 ~150
Carbon steel	100 ~170	80 ~130
Alloy steel	90 ~150	80 ~120
Stainless steel	70 ~140	-

### ● Depth of Cut (Wiper Insert)

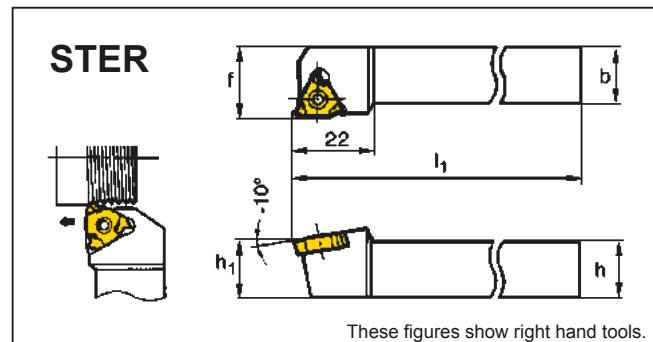
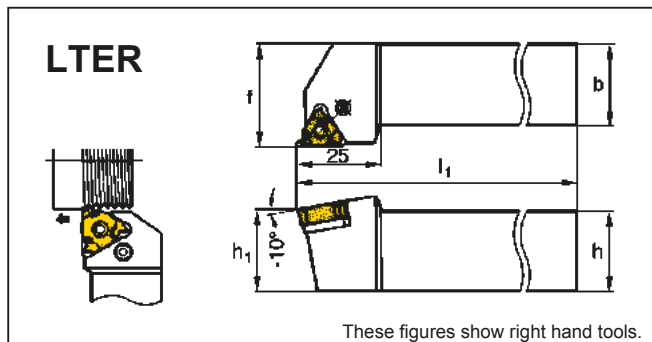
	Cat. No.	Pitch	Depth of cut	Pass	1	2	3	4	5	6	7	8	9	10	11	12	
ISO-Metric 60°	External	TME 100 R	1,00	0,68	5	0,20	0,16	0,14	0,11	0,07							
		TME 125 R	1,25	0,82	6	0,20	0,18	0,15	0,12	0,10	0,07						
		TME 150 R	1,50	0,96	7	0,22	0,18	0,14	0,13	0,12	0,10	0,07					
		TME 175 R	1,75	1,12	8	0,22	0,19	0,16	0,14	0,13	0,12	0,09	0,07				
		TME 200 R	2,00	1,25	8	0,25	0,21	0,18	0,16	0,15	0,13	0,10	0,07				
		TME 250 R	2,50	1,55	10	0,27	0,24	0,20	0,18	0,16	0,13	0,11	0,10	0,09	0,07		
		TME 300 R	3,00	1,86	12	0,28	0,25	0,20	0,19	0,17	0,15	0,13	0,12	0,10	0,10	0,09	0,07
	Internal	TMI 100 R	1,00	0,63	5	0,18	0,16	0,12	0,10	0,07							
		TMI 125 R	1,25	0,77	6	1,08	0,16	0,14	0,12	0,10	0,07						
		TMI 150 R	1,50	0,90	7	0,20	0,16	0,14	0,13	0,11	0,09	0,07					
		TMI 175 R	1,75	1,03	8	0,20	0,18	0,15	0,14	0,11	0,10	0,08	0,07				
		TMI 200 R	2,00	1,18	8	0,22	0,19	0,17	0,15	0,14	0,13	0,11	0,07				
		TMI 250 R	2,50	1,44	10	0,25	0,22	0,19	0,16	0,14	0,12	0,10	0,10	0,09	0,07		
		TMI 300 R	3,00	1,7	12	0,27	0,24	0,20	0,17	0,14	0,12	0,10	0,10	0,10	0,09	0,06	0,07

### ● Depth of Cut (Non wiper insert)

	Cat. No.	Radius	Pitch	Depth of cut	Pass	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
ISO-Metric 60°	External	TME 1020 R	0,13	1,00	0,68	5	0,20	0,16	0,12	0,10	0,07									
				1,25	0,84	6	0,20	0,18	0,16	0,13	0,10	0,07								
				1,50	1,03	7	0,22	0,20	0,17	0,15	0,12	0,10	0,07							
				1,75	1,22	8	0,22	0,21	0,18	0,16	0,15	0,13	0,10	0,07						
				2,00	1,41	10	0,22	0,20	0,18	0,16	0,14	0,13	0,12	0,10	0,09	0,07				
	External	TME 1530 R	0,20	1,50	0,95	7	0,22	0,17	0,14	0,13	0,12	0,10	0,07							
				1,75	1,14	8	0,22	0,18	0,15	0,14	0,13	0,12	0,09	0,07						
				2,00	1,33	9	0,25	0,20	0,18	0,16	0,15	0,13	0,10	0,09	0,07					
				2,50	1,71	12	0,25	0,22	0,19	0,17	0,15	0,14	0,13	0,12	0,10	0,09	0,08	0,07		
				3,00	2,09	14	0,25	0,22	0,20	0,20	0,18	0,17	0,15	0,14	0,14	0,10	0,10	0,09	0,08	0,07
	Internal	TMI 1020 R	0,06	1,00	0,59	6	0,16	0,12	0,10	0,08	0,08	0,05								
				1,25	0,75	7	0,16	0,14	0,12	0,10	0,10	0,08	0,05							
				1,50	0,92	8	0,18	0,15	0,14	0,12	0,10	0,10	0,08	0,05						
				1,75	1,08	9	0,18	0,16	0,14	0,13	0,12	0,12	0,10	0,08	0,05					
2,00				1,24	10	0,20	0,18	0,15	0,14	0,12	0,12	0,10	0,10	0,08	0,05					
Internal		TMI 1530 R	0,09	1,50	0,91	8	0,18	0,14	0,14	0,12	0,10	0,10	0,08	0,05						
				1,75	1,07	9	0,18	0,16	0,13	0,13	0,12	0,12	0,10	0,08	0,05					
				2,00	1,23	10	0,20	0,18	0,14	0,14	0,12	0,12	0,10	0,10	0,08	0,05				
				2,50	1,56	12	0,20	0,18	0,16	0,16	0,15	0,13	0,13	0,11	0,11	0,10	0,08	0,05		
				3,00	1,88	14	0,22	0,20	0,18	0,18	0,16	0,16	0,14	0,14	0,10	0,10	0,10	0,08	0,07	0,05

The shorter pitch, the slower speed. In case of non wiper insert or internal threading, passing time should be requested to increase.

# External Threading Holders LTER / STER Type



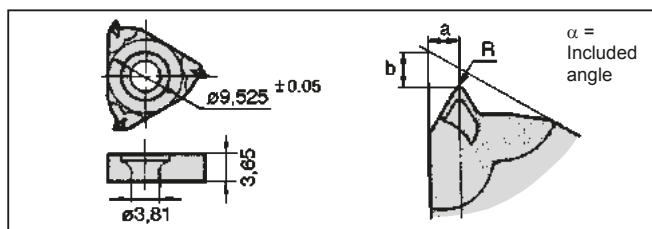
## ■ Holders with Lever Lock System

Ordering No.	Stock	Dimensions (mm)				
		h	h <sub>1</sub>	b	l <sub>1</sub>	f
LTER 2020	●	20	20	20	125	25
LTER 2525	●	25	25	25	150	32

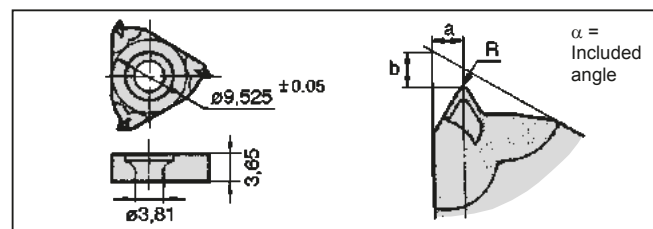
## ■ Holders with Screw on System

Ordering No.	Stock	Dimensions (mm)				
		h	h <sub>1</sub>	b	l <sub>1</sub>	f
STER 1212	●	12	12	12	100	16
STER 1616	●	16	16	16	100	20

## ■ Inserts



## ■ Inserts

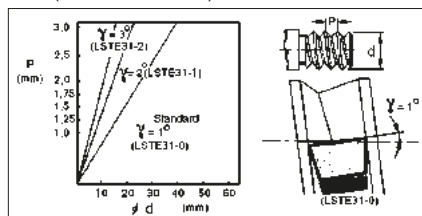


Ordering No.	Pitch		Coated carbide	Cermet	Dimensions (mm)			
	(mm)	Threads No./inch			R	$\alpha$	a	b
TME 100 R	1,00	-	●	○	0,13	60	0,8	1,2
TME 125 R	1,25	-	●	○	0,17	60	0,8	1,2
TME 150 R	1,50	-	●	○	0,20	60	1,0	1,2
TME 175 R	1,75	-	●	○	0,24	60	1,2	1,2
TME 200 R	2,00	-	●	○	0,27	60	1,4	1,2
TME 250 R	2,50	-	●	○	0,35	60	1,4	1,2
TME 300 R	3,00	-	●	○	0,42	60	1,8	1,2
TME 1020 R	1,00~2,00	24~12	●	○	0,13	60	1,4	1,2
TME 1530 R	1,50~3,00	16~8	●	○	0,20	60	1,4	1,0
TWE 1410 R	-	14~10	●	○	0,13	55	1,4	1,2
TWE 2416 R	-	24~16	●	○	0,23	55	1,4	1,2

Ordering No.	Pitch		Coated carbide	Cermet	Dimensions (mm)			
	(mm)	Threads No./inch			R	$\alpha$	a	b
TME 100 R	1,00	-	●	○	0,13	60	0,8	1,2
TME 125 R	1,25	-	●	○	0,17	60	0,8	1,2
TME 150 R	1,50	-	●	○	0,20	60	1,0	1,2
TME 175 R	1,75	-	●	○	0,24	60	1,2	1,2
TME 200 R	2,00	-	●	○	0,27	60	1,4	1,2
TME 250 R	2,50	-	●	○	0,35	60	1,4	1,2
TME 300 R	3,00	-	●	○	0,42	60	1,8	1,2
TME 1020 R	1,00~2,00	24~12	●	○	0,13	60	1,4	1,2
TME 1530 R	1,50~3,00	16~8	●	○	0,20	60	1,4	1,0
TWE 1410 R	-	14~10	●	○	0,13	55	1,4	1,2
TWE 2416 R	-	24~16	●	○	0,23	55	1,4	1,2

Remarks: (1) TME100R - 300R (ISO Thread)  
 (2) TME1020R, 1530R (ISO Thread) without chamfer  
 (3) TWE1410R, 2416R (Whitworth Thread) without chamfer

Remarks: (1) TME100R- 300R (ISO Thread)  
 (2) TME1020R, 1530R (ISO Thread) without chamfer  
 (3) TWE1410R, 2416R (Whitworth Thread) without chamfer



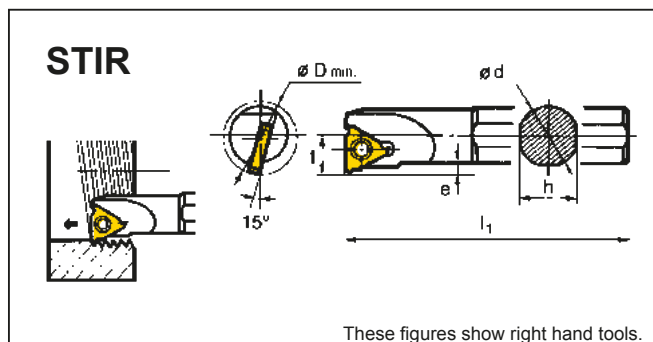
## ■ Spare Parts

Holder	Lever Pin	Screw	Shim	Shim pin	Wrench
LTER	LCL3SD	LCS3TE	LSTE31-0 *)	LSP3SD	LH025

## ■ Spare Parts

Holder	Screw	Wrench
STER	BFTX03508 2,0 Nm	TRX 10

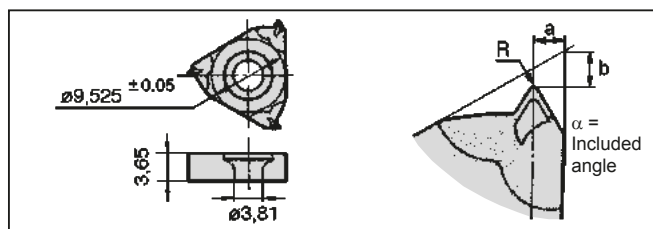
\*) Remarks: LTER type has supplement of  $\gamma = 1^\circ$  shim LSTE 31-0.  
 Shims LSTE 31-1 for  $\gamma = 2^\circ$  and LSTE 31-2 for  $\gamma = 3^\circ$  are option.



## ■ Holders with Screw on System

Ordering No.	Stock	Dimensions (mm)					
		$\varnothing d$	h	$l_1$	e	f	$\varnothing D_{min}$
STIR 316	●	16	15	150	3,5	11	20
STIR 320	●	20	18	180	5,0	14	25

## ■ Inserts



Ordering No.	Pitch		Coated carbide AC225	Cermet T130A	Dimensions (mm)			
	(mm)	Threads No./inch			R	$\alpha$	a	b
TMI 100 R	1,00	-	●		0,06	60	0,8	1,2
TMI 125 R	1,25	-	●		0,07	60	0,8	1,2
TMI 150 R	1,50	-	●		0,09	60	1,0	1,2
TMI 175 R	1,75	-	●		0,11	60	1,2	1,2 (1)
TMI 200 R	2,00	-	●		0,12	60	1,4	1,2
TMI 250 R	2,50	-	●		0,16	60	1,4	1,2
TMI 300 R	3,00	-	●		0,20	60	1,8	1,2
TMI 1020 R	1,00~2,00	24~12	●		0,06	60	1,0	1,2 (2)
TMI 1530 R	1,50~3,00	16~8	●		0,09	60	1,5	1,2

Remarks: (1) TME100R- 300R (ISO Thread)

(2) TME1020R,1530R (ISO Thread) without chamfer

## ■ Spare Parts

Holder	Screw	Wrench
STIR	BFTX03508	TRX 10



# Milling Cutters

**G1 ~ G54**

# G



Selection Guide  
ISO

**Milling Cutter Selection Guide** ..... G 2 - 3  
**Milling Insert Identification Table**..... G 4 - 5

## Face Milling

General Purpose Face Mills

**DGC (M/F) 13000** ..... G 6 - 9  
**WGX (M/F) 13000** ..... G10-11  
  
**WGC (M/F) 3000/4000** ..... G12-13  
**UFO (F) 4000/5000** ..... G14-15  
**DNX (F) 12000** ..... G16-17

## Multi Purpose Milling

"Wave Radius Mills" with Polygon Inserts  
with Round Inserts

**WRCX (F) 12000/16000/20000** ..... G18-19  
**RSX** ..... G20-21  
**RSX (F) 10000/12000/16000/20000** ..... G22-23

## Shoulder Milling

"Sumi Dual Mill"  
"Wave Mills" for Shoulder Milling  
  
"Sumi Dual Mill", tangential  
  
Tangential Milling System  
"Wave Mills" for Shoulder Milling  
Repeater Mill

**DFC 09000** ..... G24-27  
**WFX** ..... G28-29  
**WFX (M/F) 08000** ..... G30  
**WFX (F) 12000** ..... G31  
**TSX** **New** ..... G32-33  
**TSX (F) 08000** ..... G34  
**TSX (M) 13000** ..... G35  
**PWS (F) 4000** ..... G36-37  
**WEX (F) 1000/2000/3000** **New** ..... G38  
**WRX (F)** ..... G39  
**PWC (F) 4000** ..... G40-41  
**CNP (F) 13000** ..... G42  
**MSX 08000/12000/14000** ..... G43  
**WFXH** **New** ..... G44-45  
**WFXH 08000/12000** ..... G46-47  
**WAX 3000** ..... G48  
**WAX 4000** ..... G49

## Others

High Feed Milling  
High Feed Milling

"Wave Mill" Series for Aluminium

Aluminium Milling  
SUMIDIA "RF"  
SUMIDIA "SRF"  
Grey Cast Iron Milling

SUMIDIA "RF" ..... G50  
SUMIDIA "SRF" ..... G51  
SUMIBORON "BN Finish Mill" **FMU** ..... G52-53

Milling Cutters

# Face Mill and Shoulder Mill Selection Guide

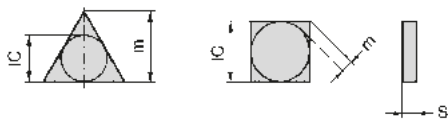
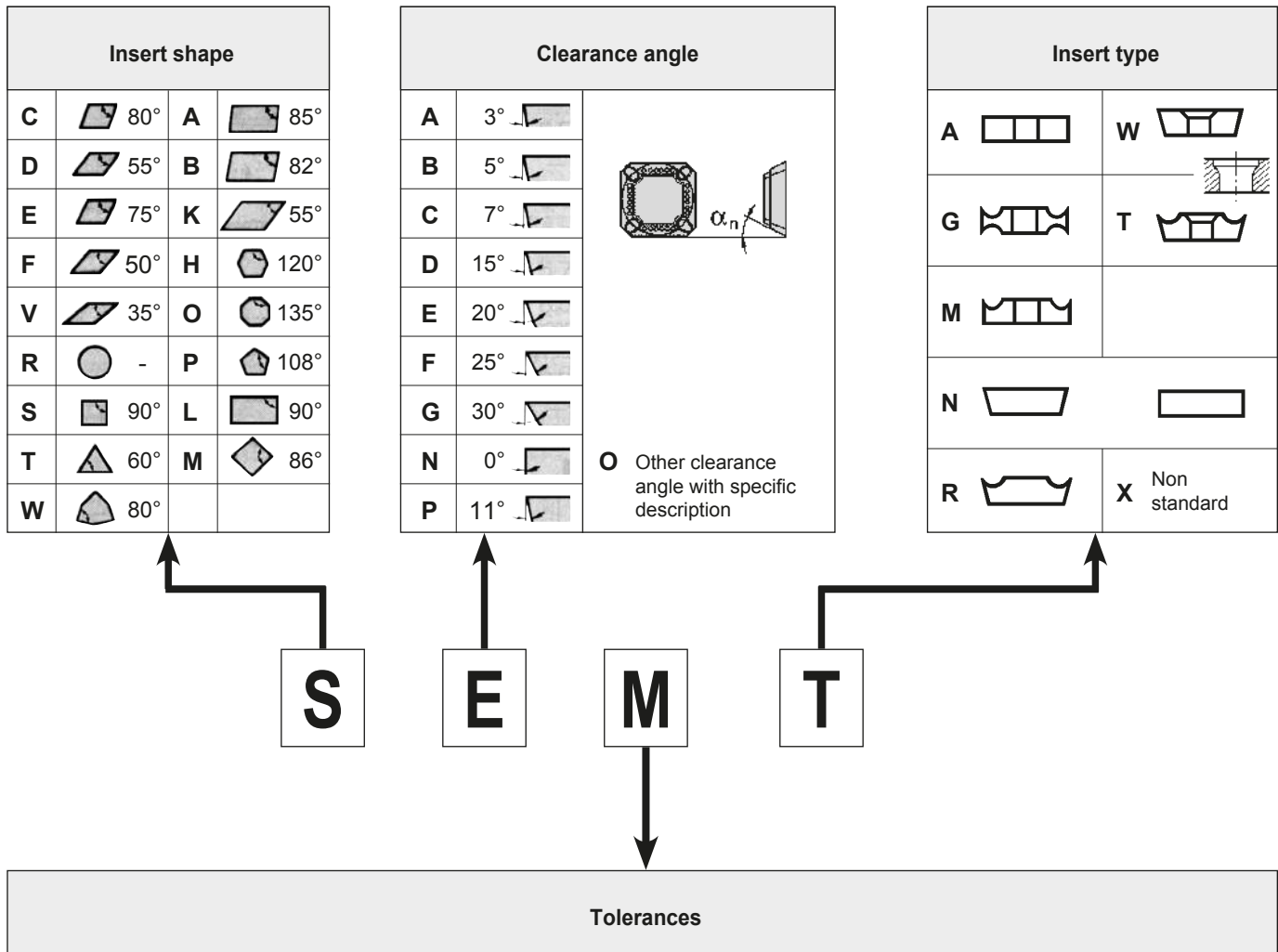
Application	Cutter Type	Series	Insert Type	Approach Angle Max. Depth of Cut (mm)	Cutter Diameter (mm)	Application											Ref. Page							
						General Purpose	Finishing	High Feed	Shoulder Milling	Slot Milling	Ramping	Copying	Chamfering	Boring	Finishing	Carbon Steel / Alloy Steel		Tempered Steel / Die Steel	Stainless Steel	Cast Iron / Ductile Cast Iron	Non-Ferrous Metal	Aluminium Alloy	Ti Alloy / Heat Resistant Alloy	Hardened Steel HRC 45 ~ 55
						P	M	K	N	S	H													
Face Milling	DGC	DGC (-M/F) 13000RS	SNM/EU 13T6..	SNMU 6 mm / 45°	ø40 ~ ø250	◎											◎	◎	◎	◎	◎	◎	G8	
			ONM/EU 13T6..	ONMU 3 mm / 45°	ø42.9 ~ ø252.9														◎	◎	◎	◎		◎
	WGX	WGX (-M/F) 13000RS	SEE/MT 13T3..	6 mm / 45°	ø40 ~ ø250	◎												◎	◎	◎	◎	◎	◎	G10
			SEE/MT0903.. (IC/l = 9,525) SEE/MT13T3.. (IC/l = 13,4)	4 mm / 45°	ø32 ~ ø100	◎													◎	◎	◎	◎	◎	
	WGC	WGC 3000 RS 4000 RS	WGC (-M/F) 4000 RS	6 mm / 45°	ø40 ~ ø200													◎	◎	◎	◎	◎	◎	G12
				6 mm / 45°	ø40 ~ ø200															◎	◎	◎	◎	
UFO	UFO (-F) 4000 RS	UFO 5000 RS	SFK-NR12T3.. (IC/l = 12,7) SFK-N1504.. (IC/l = 15,875)	5 mm / 45°	ø50 ~ ø315												◎	◎	◎	◎	◎	◎	G14 G15	
			7 mm / 45°	ø80 ~ ø315															◎	◎	◎	◎		◎
DNX	DNX (-F) 12000RS	SNMT1205..	8 mm / 65°	ø80 ~ ø250	◎												◎	◎	◎	◎	◎	◎	G16	
Radius Milling	RSX	RSX (-F) 10000RS RSX (-F) 12000RS RSX (-F) 16000RS RSX (-F) 20000RS	RDET10T3.. RDET1204..	5 mm / 45°	ø40 ~ ø52	◎																		G22
				6 mm / 45°	ø40 ~ ø100																			
				8 mm / 45°	ø63 ~ ø160																			
			RDET1606.. RDET2006..	10 mm / 45°	ø80 ~ ø160																			
Multi-Purpose	WRCX	WRCX (-F/X) 12000RS 16000RS 20000RS	QPMT1204../1606../2006 QPET1204../1606..	6 ~ 10 mm / 45°	ø40 ~ ø160	◎											◎	◎	◎	◎	◎	◎	G19	
High Feed Milling	MSX	MSX 08000RS 12000RS 14000RS	WDMT0603../0804../1205.. 1406..	1,5 ~ 2,5 mm / 20°	ø40 ~ ø100												◎	◎	◎	◎	◎	◎	G43	
			SOMT0803.. SOMT1204..	1,5 mm / 15°	ø40 ~ ø63														◎	◎	◎	◎		◎
	WFXH	WFXH 08000RS 12000RS	12,7 mm / 15°	2,5 mm / 15°	ø50 ~ ø63												◎	◎	◎	◎	◎	◎	G46 G47	
Shoulder Milling	DFC	DFC (-M/F) 09000RS	XNMTU0606..	6 mm / 90°	ø50 ~ ø200	◎											◎	◎	◎	◎	◎	◎	G26	

◎ : Best  
○ : Suitable

# Face Mill and Shoulder Mill Selection Guide

Application	Cutter Type	Series	Insert Type	Approach Angle Max. Depth of Cut (mm)	Cutter Diameter (mm)	Application											Work Material					Ref. Page				
						Face Milling		Shoulder Milling	Slot Milling	Ramping	Copying	Chamfering	Boring	Finishing	Carbon Steel / Alloy Steel	Tempered Steel / Die Steel	Stainless Steel	Cast Iron / Ductile Cast Iron	Non-Ferrous Metal	Aluminium Alloy	Ti Alloy / Heat Resistant Alloy		Hardened Steel HRC 45 ~ 55			
						General Purpose	Finishing																	High Feed	P	M
Shoulder Milling	WFX	WFX (-F/-M) 08000RS WFX (-F) 12000 RS	SOMT080.. SOMT1204.. 	 6 mm 90° 10 mm 90°	ø50 ~ ø160	○			○	○															G30 G31	
	TSX	TSX (-F) 08000RS TSX (-M) 13000 RS	LNEX0804.. LNEX1306.. 	8 mm 90° 12 mm 90°	ø40 ~ ø63 ø40 ~ ø160	○			○	○															G34 G35	
	PWS	PWS (-F) 4000 RS	LNMX1708.. 	16 mm 90°	ø80 ~ ø250	○		○	○	○																G37
	WEX	WEX 1000F WEX 2000F WEX 3000F	AXMT0602.. AXMT1235.. AXMT1705.. 	5 mm 90° 10 mm 90° 14 mm 90°	ø10 ~ ø100	○			○	○	○															G38
	WRX	WRX 2000F WRX 3000F	AXMT12350../1705.. 	18 ~ 36 mm 90° 27 ~ 53 mm 90°	ø40 ~ ø50 ø50 ø100	○			○	○	○															G39
	PWC	PWC (-F) 4000 RS	LNMX1606.. 	12 mm 88°	ø80 ~ ø200	○		○	○	○																G40
	CNP	CNP (-F) 13000 RS	CNMU1306.. CNMQ1306.. 	12 mm 90°	ø40 ~ ø200					○																G42
Aluminium Alloy and Non-Ferrous Metals	WAX	WAX 3000 RS WAX 4000 RS	AECT1604.. AECT2206.. 	16 ~ 18 mm 90° 22 ~ 24 mm 90°	ø50 ~ ø125	○			○	○	○														G48 G49	
	RF	RF 4000 RS	SNEW1204.. SDET1204.. 	3 mm 90°	ø80 ~ ø315	○	○																		G50	
	SRF	SRF 50/63 RS	SNEW09T3.. 	5 mm 90°	ø30 ~ ø63	○	○																		G51	
High Speed Finishing of Cast Iron	FMU	FMU 4000 RS	SNEW1204.. 	0.5 mm 45°	ø80 ~ ø315																			G53		

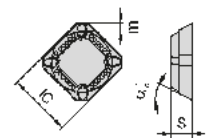
# Milling Insert ISO Identification Table



IC: theoretical diameter of inscribed circle  
m: nose height  
s: thickness

Class	Tolerances (mm)		
	m	IC	s
A	±0,005	±0,025	±0,025
F	±0,005	±0,013	±0,025
C	±0,013	±0,025	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,13

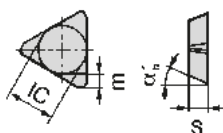
Class	Tolerances (mm)		
	m	IC	s
J	±0,005	±0,05~±0,13*	±0,025
K	±0,013	±0,05~±0,13*	±0,025
L	±0,025	±0,05~±0,13*	±0,025
M	±0,08~±0,18*	±0,05~±0,13*	±0,13
N	±0,08~±0,18*	±0,05~±0,13*	±0,025
U	±0,13~±0,38*	±0,08~±0,25*	±0,13



\* The tolerance is dependent upon the insert size of IC. See tables below.

Tolerance class for dimension m

m	S	T	C	W	V	D
6,35					-	±0,11
9,525		±0,08			±0,13	±0,11
12,7		±0,13				±0,15
15,875		±0,15				±0,18
19,05		±0,15				±0,18
25,4		±0,18				



Tolerance class for dimension IC

IC	S	T	C	D	V	W	R
6,35							
9,525				±0,05			±0,05
12,7				±0,08			±0,08
15,875				±0,10			±0,10
19,05				±0,10			±0,10
25,4				±0,13			±0,10



# Milling Insert ISO Identification Table

**Thickness**

**02** s = 2,38 mm  
**03** s = 3,18  
**T3** s = **3,97**  
**04** s = 4,76  
**05** s = 5,56  
**06** s = 6,35  
**07** s = 7,94  
**09** s = 9,52

**Corner geometry with wiper flat**

**Entering angle**

Feed direction →

**A** 45°  
**D** 60°  
**E** 75°  
**F** 85°  
**P** 90°  
**Z** - Others

1. Major cutting edge  
 2. Chamfered corner  
 3. Wiper flat  
 4. Side cutting edge

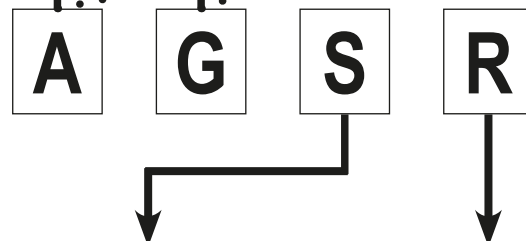
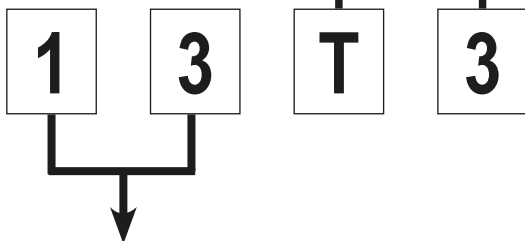
**Clearance angle on wiper flat**

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

**Radius**

**02** r = 0,2 mm  
**04** r = 0,4  
**08** r = 0,8  
**12** r = 1,2  
**16** r = 1,6  
**20** r = 2,0  
**24** r = 2,4

**M0** - Round insert (metric)  
**00** - Round insert (inch)



Insert size Symbol and cutting edge length (mm)							
IC d (mm)	Insert type						
	C 	D 	R 	S 	T 	V 	W 
3,97					06 (6,9)		
4,76					08 (8,2)		
5,0			05 (5,0)		09 (9,6)	09 (9,7)	03 (3,8)
5,56			06 (6,0)				
6,35	06 (6,4)	07 (7,7)		06 (6,35)	11 (11,0)	11 (11,1)	04 (4,3)
7,94	08 (8,0)			07 (7,94)			05 (5,4)
8,0			08 (8,0)				
9,525	09 (9,7)	11 (11,6)	09 (9,525)	09 (9,525)	16 (16,5)	16 (16,6)	06 (6,5)
10			10 (10,0)				
12			12 (12,0)				
12,7	12 (12,9)	15 (15,5)	12 (12,7)	12 (12,7)	22 (22,0)		08 (8,7)
15,875	16 (16,1)	19 (19,4)	15 (15,875)	15 (15,875)	27 (27,5)		10 (10,9)
16			16 (16,0)				
19,05	19 (19,3)		19 (19,05)	19 (19,05)	33 (33,0)		
20			20 (20,0)				
25			25 (25,0)				
25,4			25 (25,4)	25 (25,4)			
31,75			31 (31,75)	31 (31,75)			
32			32 (32,0)				

**Cutting edge condition**

**F** Sharp

**E** Rounded

**T** Chamfered

**S** Rounded and chamfered

**Feed direction**

Right hand

Neutral

Left hand

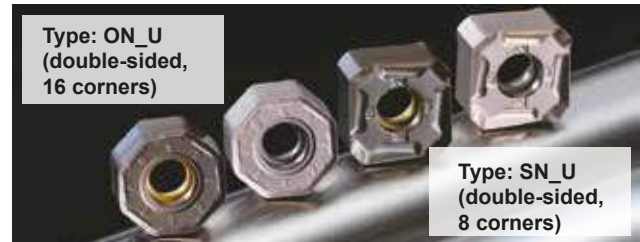
# "Sumi Dual Mill" DGC (M/F) Type



## General Features

Sumi Dual Mill DGC type utilizes double-sided inserts for excellent economy. This is a general-purpose cutter featuring high cutting edge strength for high efficiency milling and low-burr chipbreaker design that provides high quality machined surface.

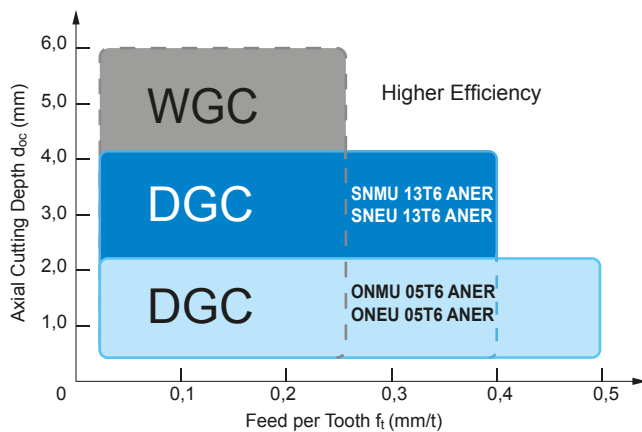
The DGC type insert lineup includes double-sided SNMU / SNEU and ONMU / ONEU types. Up to 16 corners can be used for improved economy.



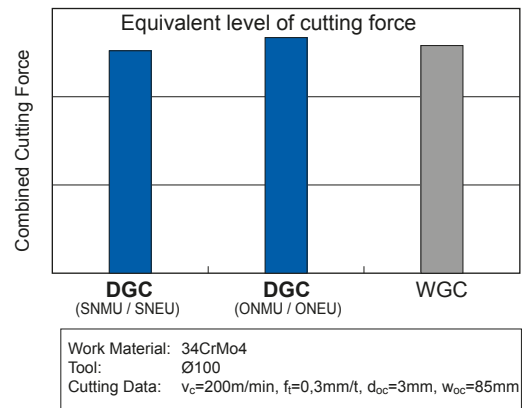
## Characteristics

- Same cutting performance as single-sided inserts plus superior economy.
- Achieves level of cutting edge sharpness and machined surface quality equivalent to single-sided cutter at a maximum cutting depth of  $d_{oc} \leq 3\text{mm}$ .

## Recommended Cutting Conditions for General Steel Milling



## Cutting Force Comparison



## Dual-Purpose Body

Two types of inserts can be used with a single body depending on milling application to help reduce costs. Stronger than single-sided cutters.



- first recommendation
- economical double-sided design offers 8 cutting edges with SN\_U inserts
- maximum depth of cut:  $d_{oc} = 6\text{mm}$

shim to protect cutter body

+



+



- double-sided design with 16 corners for improved economy
- maximum depth of cut:  $d_{oc} = 3\text{mm}$



Use two types of inserts for different applications.



# "Sumi Dual Mill" DGC (M/F) Type

## Line-up

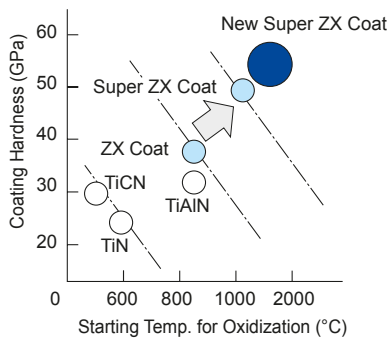
Choose a tool that fits your application from a comprehensive line-up

Cat. No	DGC 13000 RS	DGCM 13000 RS	DGCF 13000 RS	DGC 13000 EW
Type	Standard pitch	Medium pitch	Fine pitch	Endmill type
Cutter Diameter	Ø40mm ~ Ø250mm	Ø50mm ~ Ø250mm	Ø50mm ~ Ø250mm	Ø40mm ~ Ø63mm
Cutting Edges	3 ~ 10	4 ~ 14	5 ~ 18	3 ~ 4
Shape				

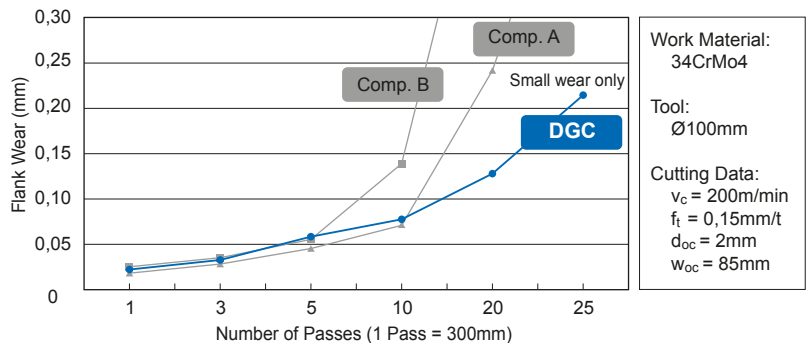
## High Reliability

Employs New Super ZX Coating, a multi-layer PVD coating grade and CVD coating grade with enhanced coating strength provided by newly developed stress control technology. Improved run-out precision reduces tool life deviation to achieve highly reliable tool life.

## Multi-layer PVD Coating



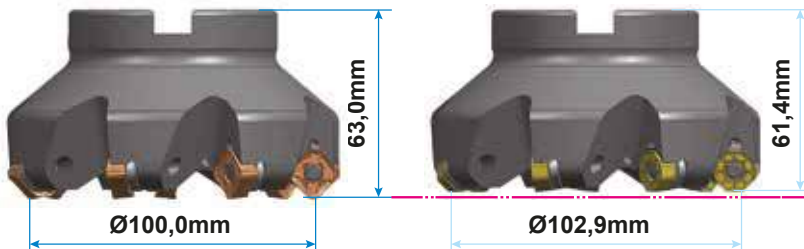
## Wear Resistance





## Cutter Diameter and Cutter Body Height

Insert: SN\_U 13T6 ANER (square)

Insert: ON\_U 05T6 ANER (octagonal)



Example: D <sub>c</sub> = 100mm	Number of Cutting Edges	Tool Diameter (mm)	Cutter Height (mm)	Max. Depth of Cut (mm)
SNMU / SNEU 	8	100,0	63,0	6,0
ONMU / ONEU 	16	102,9	61,4	3,0

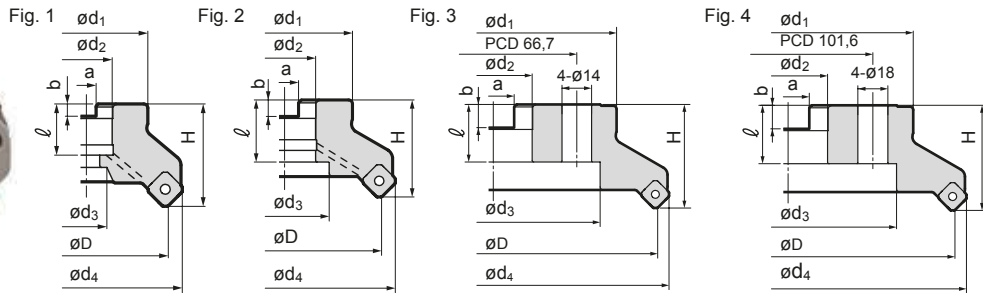
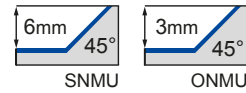
Square inserts (SNMU/SNEU) and octagonal inserts (ONMU/ONEU) can be used interchangeably on the same body. Using these inserts the cutter will have different cutter diameter and cutter body height.

# "Sumi Dual Mill" DGC (M/F) Type

## General Milling of Steel and Cast Iron

### ■ Body – Shell type

Rake Angle	Radial	-10°
	Axial	-5°



Cutter body ØD ≥ 160mm: no inner coolant

### ■ Body

#### ● Type: DGC, Standard Pitch

Cat. No.	Stock	Dimension (mm)				Mounting					No. of Teeth	Weight (kg)	Fig.
		øD	ød <sub>4</sub>	ød <sub>1</sub>	H	ød <sub>2</sub>	ød <sub>3</sub>	a	b	ℓ			
DGC 13040 RS	●	40 (42,90)	54	36	40 (38,44)	16	13,5	8,4	5,6	18	3	0,3	1
DGC 13050 RS	●	50 (52,90)	64	40	40 (38,44)	22	18,0	10,4	6,3	20	3	0,4	1
DGC 13063 RS	●	63 (65,90)	77	50	40 (38,44)	22	18,0	10,4	6,3	20	4	0,5	1
DGC 13080 RS	●	80 (82,90)	94	60	50 (48,44)	27	20,0	12,4	7,0	25	4	1,2	1
DGC 13100 RS	●	100 (102,90)	114	70	50 (48,44)	32	46,0	14,4	8,5	32	5	1,6	2
DGC 13125 RS	●	125 (127,90)	139	80	63 (61,44)	40	52,0	16,4	9,5	29	6	2,8	1
DGC 13160 RS	●	160 (162,90)	174	130	63 (61,44)	40	88,0	16,4	9,5	29	7	4,5	3
DGC 13200 RS	□	200 (202,90)	214	150	63 (61,44)	60	130,0	25,7	14,0	35	8	7,1	4
DGC 13250 RS	□	250 (252,90)	264	190	63 (61,44)	60	160,0	25,7	14,0	35	10	11,2	4

#### ● Type: DGCM, Medium Pitch

Cat. No.	Stock	Dimension (mm)				Mounting					No. of Teeth	Weight (kg)	Fig.
		øD	ød <sub>4</sub>	ød <sub>1</sub>	H	ød <sub>2</sub>	ød <sub>3</sub>	a	b	ℓ			
DGCM 13050 RS	●	50 (52,90)	64	40	40 (38,44)	22	18	10,4	6,3	20	4	0,3	1
DGCM 13063 RS	●	63 (65,90)	77	50	40 (38,44)	22	18	10,4	6,3	20	5	0,5	1
DGCM 13080 RS	●	80 (82,90)	94	60	50 (48,44)	27	20	12,4	7,0	25	6	1,1	1
DGCM 13100 RS	●	100 (102,90)	114	70	50 (48,44)	32	46	14,4	8,5	32	7	1,5	2
DGCM 13125 RS	●	125 (127,90)	139	80	63 (61,44)	40	52	16,4	9,5	29	8	2,8	1
DGCM 13160 RS	●	160 (162,90)	174	130	63 (61,44)	40	88	16,4	9,5	29	10	4,6	3
DGCM 13200 RS	□	200 (202,90)	214	150	63 (61,44)	60	130	25,7	14,0	35	12	7,0	4
DGCM 13250 RS	□	250 (252,90)	264	190	63 (61,44)	60	160	25,7	14,0	35	14	11,1	4

#### ● Type: DGCF, Fine Pitch

Cat. No.	Stock	Dimension (mm)				Mounting					No. of Teeth	Weight (kg)	Fig.
		øD	ød <sub>4</sub>	ød <sub>1</sub>	H	ød <sub>2</sub>	ød <sub>3</sub>	a	b	ℓ			
DGCF 13050 RS	●	50 (52,90)	64	40	40 (38,44)	22	18	10,4	6,3	20	5	0,3	1
DGCF 13063 RS	●	63 (65,90)	77	50	40 (38,44)	22	18	10,4	6,3	20	6	0,5	1
DGCF 13080 RS	●	80 (82,90)	94	60	50 (48,44)	27	20	12,4	7,0	25	8	1,1	1
DGCF 13100 RS	●	100 (102,90)	114	70	50 (48,44)	32	46	14,4	8,5	32	10	1,4	2
DGCF 13125 RS	●	125 (127,90)	139	80	63 (61,44)	40	52	16,4	9,5	29	12	2,7	1
DGCF 13160 RS	●	160 (162,90)	174	130	63 (61,44)	40	88	16,4	9,5	29	14	4,4	3
DGCF 13200 RS	□	200 (202,90)	214	150	63 (61,44)	60	130	25,7	14,0	35	16	6,9	4
DGCF 13250 RS	□	250 (252,90)	264	190	63 (61,44)	60	160	25,7	14,0	35	18	11,0	4

( ) Figures in brackets indicate values for ONMU inserts.  
Inserts are not included.

### ■ Identification Details

<b>DGC</b>	<b>M</b>	<b>13</b>	<b>050</b>	<b>R</b>	<b>S</b>
Cutter Series	M: Medium F: Fine	Insert Size	Cutter Diameter	Direction	Metric

● = Euro stock  
□ = Delivery on request

Recommended Tightening Torque (N·m)

# "Sumi Dual Mill" DGC Type

## ■ Inserts

Application	Coated Carbide						Fig.	
	P	M	M	K	K	M/S		
High Speed/Light cut	P			K		M/S		
General Purpose		P/M	M	K		M/S		
Roughing		P/M	P/M	K		M/S		
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	Fig.
SNMU 13T6ANER L	●	●	●	●	●			1
SNMU 13T6ANER G	●	●	●	●	●			1
SNMU 13T6ANER H	●	●	●	●	●			1
SNMU 13T6ANER FL	●	●	●	●	●			2
SNMU 13T6ANER FG	●	●	●	●	●			2
SNEU 13T6ANER L						●	●	1
SNEU 13T6ANER G						●	●	1
SNEU 13T6ANER FL						●	●	2
SNEU 13T6ANER FG						●	●	2
XNEU 13T6ANEN W		●						3
ONMU 05T6ANER L	●	●	●	●	●			4
ONMU 05T6ANER G	●	●	●	●	●			4
ONEU 05T6ANER L						●	●	4
ONEU 05T6ANER G						●	●	4

Fig. 1

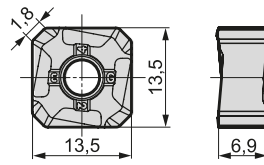


Fig. 2

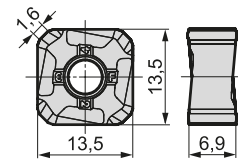


Fig. 3

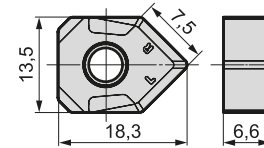
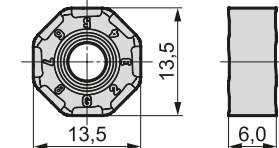
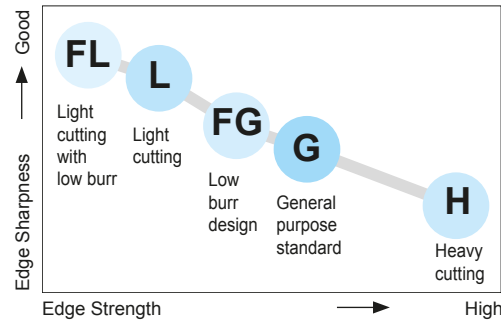


Fig. 4

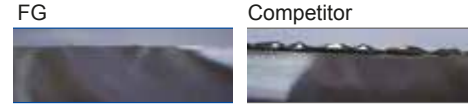
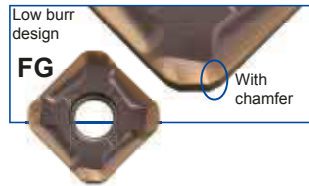


## ■ Chipbreaker



### ● Improved Milling Quality

FG type chipbreakers feature chamfer to minimize burrs and provide excellent milling quality.



FG type inserts with low-burr design enable high-quality milling with few burrs and little edge chipping.

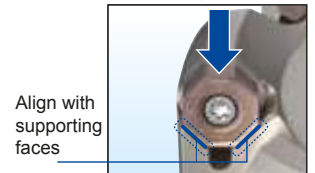
## ● Attaching Inserts



### Octagonal Inserts

Firmly align insert with supporting face, press down in the direction of the arrow and tighten the screw to fix the insert.

Press down firmly from above



## ■ Spare Parts

Shim	Shim Screw	L Seat Wrench	Insert Screw	Insert Wrench
DGCS13R	BW0609F	LH040	BFTX0412IP 3.0 <sup>mm</sup>	TRDR15IP

### Optional

Insert Screw (*)
BFTX0418IP

\*Corners can be changed simply by loosening the screw. (Only suitable for DGC / DGCM types with body size ≥ Ø80).

## ■ Recommended Cutting Conditions (SN\_U)

ISO	Work Material	Fit-ness	Cutting Speed v <sub>c</sub> (m/min)	Feed Rate f <sub>t</sub> (min/t)	Depth of Cut (mm)	Grade
P	General Steel	◎	150-200-250	0,10-0,25-0,40	<4	ACP200 ACP300
	Alloyed Steel	◎	180-250-350	0,10-0,30-0,45	<4	ACP200 ACP300
	Die Steel	◎	100-150-200	0,15-0,25-0,35	<4	ACP200 ACP300
M	Stainless Steel	○	160-200-250	0,15-0,23-0,30	<3	ACM200 ACM300 ACP300
K	GG+GGG	◎	100-200-250	0,10-0,25-0,40	<5	ACK200 ACK300

Min. - Optimum - Max.

## ■ Recommended Cutting Conditions (ON\_U)

ISO	Work Material	Fit-ness	Cutting Speed v <sub>c</sub> (m/min)	Feed Rate f <sub>t</sub> (min/t)	Depth of Cut (mm)	Grade
P	General Steel	◎	150-200-250	0,10-0,30-0,50	<2	ACP200 ACP300
	Alloyed Steel	◎	180-250-350	0,10-0,50-0,50	<2	ACP200 ACP300
	Die Steel	◎	100-150-200	0,15-0,25-0,30	<2	ACP200 ACP300
M	Stainless Steel	○	160-200-250	0,15-0,23-0,30	<2	ACM200 ACM300 ACP300
K	GG+GGG	◎	100-200-250	0,10-0,30-0,50	<2	ACK200 ACK300

◎ Preferred choice

○ Suitable

# "Wave Face Mill" WGX (M/F) Type

## General Milling of Steel and Cast Iron

### ■ Body – Shell type

Rake Angle	Radial	-20° ~ -24°	
	Axial	20° ~ 22°	



Fig. 1

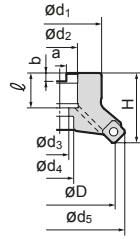


Fig. 2

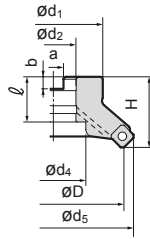


Fig. 3

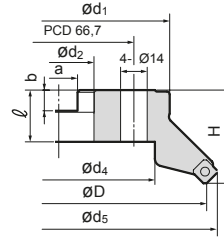
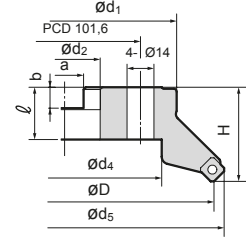


Fig. 4



Cutter body  $\phi D \geq 160\text{mm}$ : no inner coolant

### ■ Body

#### ● Type: WGX, Standard Pitch

Inner coolant available for  $D_c \leq \phi 125\text{mm}$

Cat. No.	Stock	Dimension (mm)				Mounting						No. of Teeth	Weight (kg)	Fig.
		$\phi D$	$\phi d_5$	$\phi d_1$	H	$\phi d_2$	$\phi d_4$	$\phi d_3$	a	b	$\ell$			
WGX 13040 RS	●	40	52	32	40	16	14,0	9,0	8,4	5,6	18	3	0,3	1
WGX 13050 RS	●	50	62	40	40	22	18,0	11,0	10,4	6,3	20	3	0,4	1
WGX 13063 RS	●	63	76	50	40	22	18,0	11,0	10,4	6,3	20	4	0,6	1
WGX 13080 RS	●	80	93	55	50	27	20,0	13,5	12,4	7,0	25	4	1,2	1
WGX 13100 RS	●	100	113	70	50	32	46,0	-	14,4	8,5	32	5	1,6	2
WGX 13125 RS	●	125	138	80	63	40	52,0	29,0	16,4	9,5	29	6	2,8	1
WGX 13160 RS	●	160	173	130	63	40	88,0	-	16,4	9,5	29	7	4,5	3
WGX 13200 RS	●	200	213	150	63	60	130,0	-	25,7	14,0	35	8	7,1	4
WGX 13250 RS	□	250	263	190	63	60	160,0	-	25,7	14,0	35	10	11,2	4

#### ● Type: WGXM, Medium Pitch

Cat. No.	Stock	Dimension (mm)				Mounting						No. of Teeth	Weight (kg)	Fig.
		$\phi D$	$\phi d_5$	$\phi d_1$	H	$\phi d_2$	$\phi d_4$	$\phi d_3$	a	b	$\ell$			
WGXM 13050 RS	●	50	62	40	40	22	18,0	11,0	10,4	6,3	20	4	0,4	1
WGXM 13063 RS	●	63	77	50	40	22	18,0	11,0	10,4	6,3	20	5	0,6	1
WGXM 13080 RS	●	80	94	55	50	27	20,0	13,5	12,4	7,0	25	6	1,1	1
WGXM 13100 RS	●	100	114	70	50	32	46,0	-	14,4	8,5	32	7	1,6	2
WGXM 13125 RS	●	125	139	80	63	40	52,0	29,0	16,4	9,5	29	8	2,8	1
WGXM 13160 RS	●	160	174	130	63	40	88,0	-	16,4	9,5	29	10	4,5	3
WGXM 13200 RS	●	200	214	150	63	60	130,0	-	25,7	14,0	35	12	7,0	4
WGXM 13250 RS	□	250	264	190	63	60	160,0	-	25,7	14,0	35	14	11,1	4

#### ● Type: WGXF, Fine Pitch

Cat. No.	Stock	Dimension (mm)				Mounting						No. of Teeth	Weight (kg)	Fig.
		$\phi D$	$\phi d_5$	$\phi d_1$	H	$\phi d_2$	$\phi d_4$	$\phi d_3$	a	b	$\ell$			
WGXF 13050 RS	●	50	62	40	40	22	18,0	11,0	10,4	6,3	20	5	0,4	1
WGXF 13063 RS	●	63	77	50	40	22	18,0	11,0	10,4	6,3	20	6	0,6	1
WGXF 13080 RS	●	80	94	55	50	27	20,0	13,5	12,4	7,0	25	8	1,1	1
WGXF 13100 RS	●	100	114	70	50	32	46,0	-	14,4	8,5	32	10	1,5	2
WGXF 13125 RS	●	125	139	80	63	40	52,0	29,0	16,4	9,5	29	12	2,7	1
WGXF 13160 RS	●	160	174	130	63	40	88,0	-	16,4	9,5	29	16	4,5	3
WGXF 13200 RS	●	200	214	150	63	60	130,0	-	25,7	14,0	35	20	6,9	4
WGXF 13250 RS	□	250	264	190	63	60	160,0	-	25,7	14,0	35	24	11,0	4

( ) Figures in brackets indicate values for ONMU inserts.  
Inserts are not included.

### ■ Identification Details

<b>WGX</b>	<b>M</b>	<b>13</b>	<b>050</b>	<b>R</b>	<b>S</b>
Cutter Series	M: Medium F: Fine	Insert Size	Cutter Diameter	Direction	Metric

● = Euro stock  
□ = Delivery on request

Recommended Tightening Torque (N·m)

# "Wave Face Mill" WGX (M/F) Type



## General Features

The Wavemill WGX Type employs unique chipbreaker design to provide lower cutting resistance and higher quality surface finishes than conventional tools.

## Series

Type	Cat. No.	Cutter	No. of Teeth
Standard Pitch	WGX 13000RS	Ø40 ~ Ø250	3 ~ 10
Medium Pitch	WGXM 13000RS	Ø50 ~ Ø250	4 ~ 14
Fine Pitch	WGXF 13000RS	Ø50 ~ Ø250	5 ~ 24
Endmill Type	WGX 13000EW	Ø32 ~ Ø63	3 ~ 5

Inner coolant available for  $D_c \leq \text{Ø}125\text{mm}$

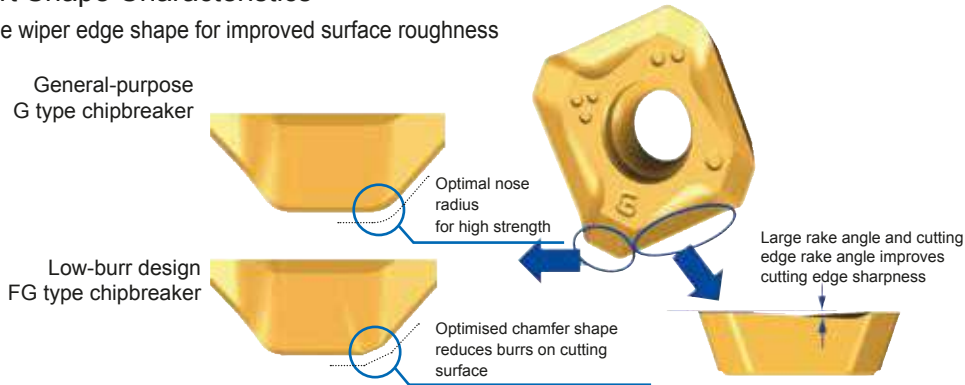


## Characteristics

- **Stable Cutting**  
Special chipbreaker designed for WGX enables lower cutting forces.
- **High Quality**  
Improved run-out precision and unique wiper edge shape ensure excellent surface finish quality. Optimised chamfer edge reduces burr and edge chipping.
- **Long Tool Life**  
Features high precision technology that reduces insert run-out variation and a new coating to provide stable and long tool life.

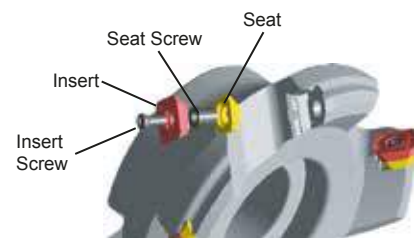
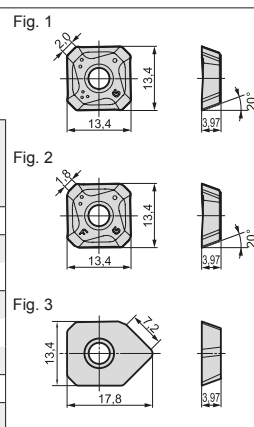
## Insert Shape Characteristics

Unique wiper edge shape for improved surface roughness



## Inserts

Application	Coated Carbide						Carb.	DLC
High Speed/Light Cut	P			K			K	N
General Purpose	P <sub>M</sub>	M	K		M <sub>S</sub>	M <sub>S</sub>		N
Roughing		P <sub>M</sub>		K		M <sub>S</sub>		
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	DL1000
SEET 13T3AGFR-L								○
SEET 13T3AGSR-L	●	●	●	●	●	●	●	○
SEET 13T3AGSR-G	●	●	●	●	●	●	●	
SEMT 13T3AGSR-L	●	●	●	●	●	●	●	
SEMT 13T3AGSR-G	●	●	●	●	●	●	●	
SEMT 13T3AGSR-H	●	●	●	●	●	●	●	
SEMT 13T3AGSR-FG	●	●	●	●	●	●	●	
XEEW 13T3AGER-WR		●			●			



## Spare Parts

Applicable Cutters	Seat	Seat Screw	Insert Screw	Insert Wrench	Seat Wrench
WGX (-M/F)	WGCS 13 R	BW 0507 F	BFTX 03512 IP	TRDR 15 IP	LH 035

## Recommended Cutting Conditions

ISO	Work Material	Hardness	Cutting Speed $v_c$ (m/min)	Feed Rate $f_t$ (mm/tooth)	Grade
P	General Steel	180~280HB	150-200-250	0,15-0,20-0,25	ACP200
	Soft Steel	≤180HB	180-265-350	0,10-0,25-0,40	ACP200
	Die Steel	200~220HB	100-150-200	0,15-0,20-0,25	ACP200
M	Stainless Steel	-	160-205-250	0,15-0,23-0,30	ACM300
K	Cast Iron	250HB	100-175-250	0,15-0,23-0,30	ACK200
N	Non Ferrous Alloy	-	500-750-1000	0,15-0,23-0,30	DL1000
S	Exotic Alloy	-	30 - 50- 80	0,10-0,20-0,30	ACM300

Minimum-Optimum-Maximum

# Face Mill WGC (M/F) Type

General Milling for Steel, Cast Iron & Exotic Material



Fig. 1

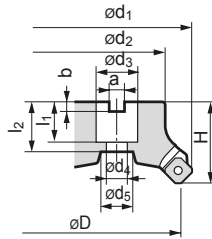


Fig. 2

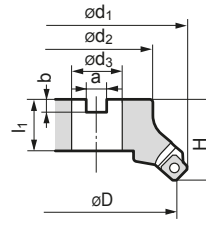
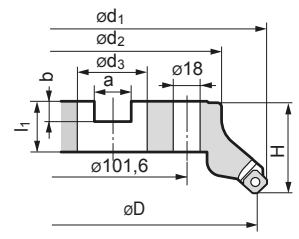


Fig. 3



- Body
- Standard WGC - Type

Type	Cat. No.	Stock	Dimensions (mm)				Mounting								No. of teeth	Weight (Kg)	Fig.
			$\phi D$	$\phi d_1$	$\phi d_2$	H	a	b	$\phi d_3$	$\phi d_4$	$\phi d_5$	$l_1$	$l_2$				
WGC 3000	WGC 3032 RS	□	32	41	32	40	8,4	5,6	16	9	14	18	28	4	0,2	1.	
	WGC 3040 RS	●	40	49	32	40	8,4	5,6	16	9	14	18	28	4	0,3		
	WGC 3050 RS	●	50	59	40	40	10,4	6,3	22	11	18	20	26	5	0,4		
	WGC 3063 RS	□	63	72	50	40	10,4	6,3	22	11	18	20	26	6	0,6		
	WGC 3080 RS	●	80	89	60	50	12,4	7,0	27	13,5	20	25	31	6	1,1		
	WGC 3100 RS	□	100	109	70	50	14,4	8,5	32	-	-	32	-	7	1,5	2.	
WGC 4000	WGC 4040 RS	□	40	52	32	40	8,4	5,6	16	9	14	18	28	3	0,4	1.	
	WGC 4050 RS	●	50	63	40	40	10,4	6,3	22	11	18	20	26	3	0,5		
	WGC 4063 RS	●	63	76	50	40	10,4	6,3	22	11	18	20	26	4	0,6		
	WGC 4080 RS	●	80	93	60	50	12,4	7,0	27	13,5	20	25	31	4	1,0		
		WGC 4100 RS	●	100	113	70	50	14,4	8,5	32	-	-	32	-	5	1,5	2.
		WGC 4125 RS	●	125	138	80	63	16,4	9,5	40	-	-	38	-	6	2,6	
		WGC 4160 RS	●	160	173	100	63	16,4	9,5	40	-	-	38	-	7	4,0	
	WGC 4200 RS	●	200	213	130	63	25,7	14,0	60	-	-	35	-	8	6,6	3.	

- Medium Pitch WGCM - Type

Type	Cat. No.	Stock	Dimensions (mm)				Mounting								No. of teeth	Weight (Kg)	Fig.
			$\phi D$	$\phi d_1$	$\phi d_2$	H	a	b	$\phi d_3$	$\phi d_4$	$\phi d_5$	$l_1$	$l_2$				
WGCM 4000	WGCM 4050 RS	●	50	63	40	40	10,4	6,3	22	11	18	20	26	4	0,5	1.	
	WGCM 4063 RS	●	63	76	50	40	10,4	6,3	22	11	18	20	26	5	0,6		
	WGCM 4080 RS	●	80	93	60	50	12,4	7,0	27	13,5	20	25	31	6	1,0		
		WGCM 4100 RS	●	100	113	70	50	14,4	8,5	32	-	-	32	-	7	1,5	2.
		WGCM 4125 RS	●	125	138	80	63	16,4	9,5	40	-	-	38	-	8	2,6	
		WGCM 4160 RS	●	160	173	100	63	16,4	9,5	40	-	-	38	-	10	4,0	
		WGCM 4200 RS	□	200	213	130	63	25,7	14,0	60	-	-	35	-	12	6,6	

- Fine Pitch WGCF - Type

Type	Cat. No.	Stock	Dimensions (mm)				Mounting								No. of teeth	Weight (Kg)	Fig.
			$\phi D$	$\phi d_1$	$\phi d_2$	H	a	b	$\phi d_3$	$\phi d_4$	$\phi d_5$	$l_1$	$l_2$				
WGCF 4000	WGCF 4050 RS	●	50	63	40	40	10,4	6,3	22	11	18	20	26	5	0,5	1.	
	WGCF 4063 RS	●	63	76	50	40	10,4	6,3	22	11	18	20	26	6	0,6		
	WGCF 4080 RS	●	80	93	60	50	12,4	7,0	27	13,5	20	25	31	8	1,0		
		WGCF 4100 RS	●	100	113	70	50	14,4	8,5	32	-	-	32	-	10	1,5	2.
		WGCF 4125 RS	●	125	138	80	63	16,4	9,5	40	-	-	38	-	12	2,6	
		WGCF 4160 RS	●	160	173	100	63	16,4	9,5	40	-	-	38	-	16	4,0	
		WGCF 4200 RS	□	200	213	130	63	25,7	14,0	60	-	-	35	-	20	6,6	

## ■ Spare Parts

Cutter	Shim	Shim screw	Insert screw	Wrench	Wrench
WGC 3000 RS	-	-	BFTX 0307 IP	2,0 TRDR 10 IP	-
WGC/F 4000 RS	WGCS 13 R	BW 0507 F	BFTX 03512 IP	3,0 TRDR 15 IP	LH035

## ■ Structure





## Features

- Suitable for high speed machining  $v_c < 400\text{m/min}$ .
- Tough lightweight cutter body with wide chip pockets for fast metal removal.
- Low cost precision moulded inserts give G class performance at greatly reduced cost.
- Wide range of grades for most workpiece materials - including steels, irons, high temperature alloys, aluminium's etc.
- Improves metal removal rates, flatness, dimensional accuracy, and surface finish.



## Insert

For WGC 3000 series	Cat. No.	Coated Carbide					DLC	Cermet	Uncoated Carbide		PCD	Dimensions (mm)			Fig.
		ACP100	ACP200	ACP300	ACK200	ACK300	DL1000	T250A	EH520	H1	DA2200	I	IC	s <sup>±1</sup>	
	SEET 0903 AGFN-L	●	●	●	●	●						9,525 ±0.025	3,18 ±0.025	1.	
	SEET 0903 AGSN-G	●	●	●	●	●						9,525 ±0.025	3,18 ±0.025		
	SEET 0903 AGSN-N	●	●	●	●	●						9,525 ±0.025	3,18 ±0.025		
	SEMT 0903 AGSN-L	○	●	●	●	○						9,525 ±0.05	3,18 ±0.13	1.	
	SEMT 0903 AGSN-G	●	●	●	●	●						9,525 ±0.05	3,18 ±0.13		
	SEMT 0903 AGSN-N	●	●	●	●	●						9,525 ±0.05	3,18 ±0.13		
	SEET 13T3 AGFN-L	●	●	●	●	●	●	●	●		13,4 ±0.025	3,97 ±0.025	1.		
	SEET 13T3 AGSN-G	●	●	●	●	●		●	●		13,4 ±0.025	3,97 ±0.025			
	SEET 13T3 AGSN-N	●	●	●	●	●		●	●		13,4 ±0.025	3,97 ±0.025			
	SEMT 13T3 AGSN-L	●	●	●	●	●						13,4 ±0.08	3,97 ±0.13	1.	
	SEMT 13T3 AGSN-G	●	●	●	●	●						13,4 ±0.08	3,97 ±0.13		
	SEMT 13T3 AGSN-H	●	●	●	●	●						13,4 ±0.08	3,97 ±0.13		
	SECW 13T3 AGTN-N-NF											13,4 ±0.025	3,97 ±0.025	2.	
	XEEW 13T3 AGFR-W-NF											18	13,4	3,97 ±0.025	3.
XEEW 13T3 AGER-W					○						18	13,4	3,97 ±0.025		

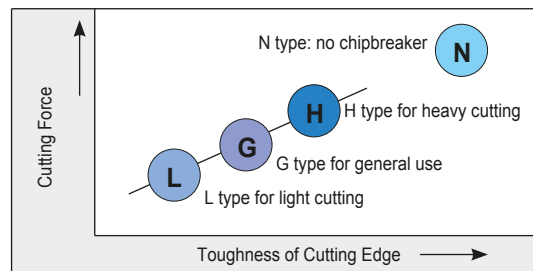
## Specifications

Approach angle: 45°  
 Axial rake angle: +20° ~ +22° (+20°)  
 Radial rake angle: -20° ~ -24° (-10° ~ -19°)

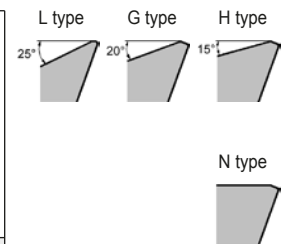
**0,03mm**  
 Max. depth of cut: 6 mm (4 mm)

**0,02mm**  
 Run-out with M class insert SEMT13T3

## Chip Breaker System



## Cutting Edge Geometry



## Recommended Cutting Conditions

( $v_c = \text{m/min}$ ,  $f_t = \text{mm/tooth}$ ) (min. – optimum – max.)

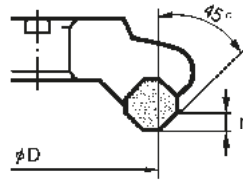
Type	Work Material	SEMT 13T3 AGSN-G											
		ACP100			ACP200			ACP300		ACK200		ACK300	
		Low carbon steel	Alloy steel	Die steel	Low carbon steel	Alloy steel	Die steel	Stainless steel		Cast iron	Ductile cast iron	Cast iron	Ductile cast iron
WGC (-M/-F) 4040 ~ 4200	$v_c$	100-250-400	80-220-280	80-150-250	80-200-370	70-150-250	60-130-220	120-180-240	100-140-200				
	$f_t$	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,2-0,3	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,25-0,4
	$d_{oc}$	1,0-3,0-5,0			1,0-3,0-5,0			1,0-2,0-3,0		1,0-3,0-5,0		1,0-3,0-5,0	

# Face Mill UFO / UFOF Type

General Milling for Steel, Cast Iron & Exotic Material



## Specifications



Approach angle: 45°  
 Axial rake angle: +27°  
 Radial rake angle: -7°  
 (-10° for  $\phi 50$  and  $\phi 63$ )  
 max depth of cut: 5,0 mm (UFO 4000 type)  
 7,0 mm (UFO 5000 type)

## Body

Type	Cat. No.	Stock		Dimensions (mm)				Mounting				No. of teeth	max. depth of cut	Weight (Kg)	Fig.	
		R	L	$\phi D$	$\phi d_1$	$\phi d_2$	H	$\phi d_3$	a	b	$l_1$					
UFO 4000	UFO 4050 R/L-S	●		50	74	45	50	22	10,4	6,3	20	4	5,0	1,3	1.	
	UFO 4063 R/L-S	●		63	86	50	50	22	10,4	6,3	20					1,6
	UFO 4080 R/L-S	●		80	103	60	50	27	12,4	7,0	25					2,1
	UFO 4100 R/L-S	●		100	122	75	50	32	14,4	8,5	29					2,9
	UFO 4125 R/L-S	●		125	146	75	63	40	16,4	9,5	29					4,2
	UFO 4160 R/L-S	●		160	180	100	63	40	16,4	9,5	29					6,6
	UFO 4200 R/L-S	●		200	220	130	63	60	25,7	14,0	32					9,5
	UFO 4250 R/L-S	□		250	270	300	63	60	25,7	14,0	40					14,8
UFO 4315 R/L-S	□		315	335	240	80	60	25,7	14,0	40	26,6	5.				
UFO 5000	UFO 5080 R/L-S	●		80	102	60	50	27	12,4	7,0	25	5	7,0	2,1	1.	
	UFO 5100 R/L-S	●		100	119	75	50	32	14,4	8,5	29					2,9
	UFO 5125 R/L-S	●		125	143	75	63	40	16,4	9,5	29					4,2
	UFO 5160 R/L-S	●		160	177	100	63	40	16,4	9,5	29					6,6
	UFO 5200 R/L-S	●		200	217	130	63	60	25,7	14,0	32					9,5
	UFO 5250 R/L-S	□		250	267	200	63	60	25,7	14,0	40					14,8
	UFO 5315 R/L-S	□		315	332	240	80	60	25,7	14,0	40					26,6

Fig. 1

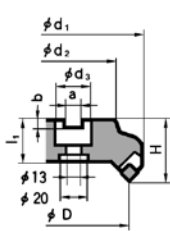


Fig. 2

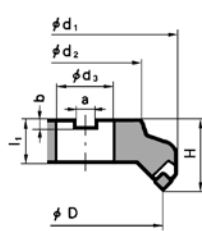


Fig. 3

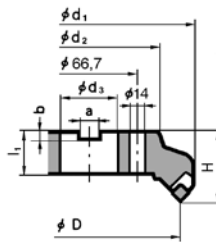


Fig. 4

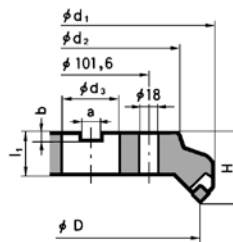
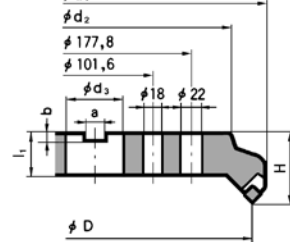


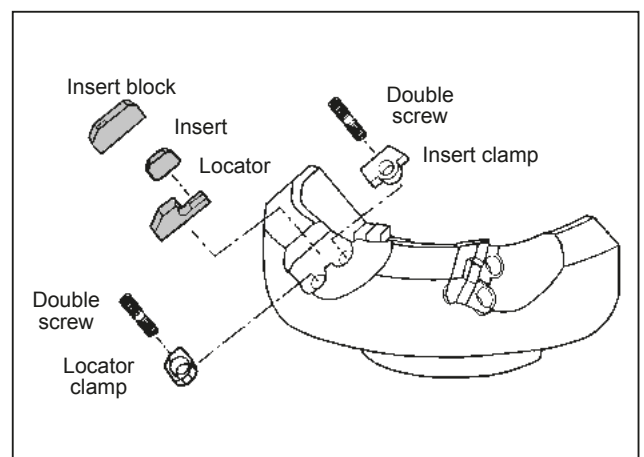
Fig. 5



## Spare Parts

Cutter	Locator	Insert block	Insert clamp
4050 - 4063	UF 4 K R/L	S-UF 4 S R/L	UFTW R/L
4080 - 4315	UF 4 K R/L	UF 4 S R/L	
5080 - 5315	UF 5 K R/L	UF 5 S R/L	
Cutter	Locator clamp	Double screw	Wrench
4050 - 4063	UFWK R/L	WB 7-15 T	TT 25
4080 - 4315			
5080 - 5315			

## Structure



### ■ Features

- 45° approach face mills
- 27° super high rake multi purpose cutter for outstanding productivity milling steels, irons and alloys
- Substantially improves metal removal rates on low powered machines
- Differential pitched inserts guarantee smooth cutting action
- Rigid body incorporates carbide locators and HSS shims resulting in extremely low run out



### ■ Body (Fine Pitch Type)

Type	Cat. No.	Stock		Dimensions (mm)				Mounting				No. of teeth	Max. depth of cut	Weight (Kg)	Fig.
		R	L	∅ D	∅ d <sub>1</sub>	∅ d <sub>2</sub>	H	∅ d <sub>3</sub>	a	b	l <sub>1</sub>				
UFOF 4000	UFOF 4080 R/L-S	●		80	103	60	50	27	12,4	7,0	25	6	5,0	2,1	1.
	UFOF 4100 R/L-S	●		100	122	75	50	32	14,4	8,5	29	8		2,9	
	UFOF 4125 R/L-S	●		125	146	75	63	40	16,4	9,5	29	10		4,2	2.
	UFOF 4160 R/L-S	●		160	180	100	63	40	16,4	9,5	29	12		6,6	
	UFOF 4200 R/L-S	□		200	220	130	63	60	25,7	14,0	32	16		9,5	4.
	UFOF 4250 R/L-S	□		250	270	300	63	60	25,7	14,0	40	20		14,8	
	UFOF 4315 R/L-S	□		315	335	240	80	60	25,7	14,0	40	24		26,6	

### ■ Insert

			Fig. 1	Fig. 2	Fig. 3							Fig.			
UFO 4000 UFOF 4000		Cat. No.	Coated Carbide					Cermet	Uncoated Carbide			Dimensions (mm)			Fig.
			ACP100	ACP200	ACP300	ACK200	ACK300	T250A	A30N	G10E	H1	H10E	I	IC	
	12 T3	SFKN 12T3 AZFN				●	●		○	○		12,7 <sup>±0,075</sup>	3,97 <sup>±0,025</sup>	1.	
		SFKN 12T3 AZTN	●	●	●			○	○			12,7 <sup>±0,05</sup>		2.	
		SFKR 12T3 AZTN	○	○											3.
		UW 12500 R									○	16	12,2		
UFO 5000	15 04	SFKN 1504 AZFN				●	○		○			15,875 <sup>±0,075</sup>	4,76 <sup>±0,025</sup>	1.	
		SFKN 1504 AZTN	●	●	●			○						2.	
		UW 15500 R									○	16		12,2	3.

### ■ Recommended Cutting Conditions

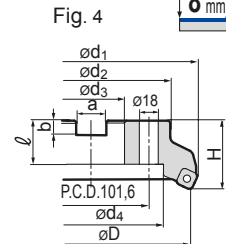
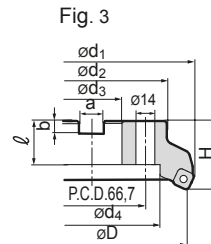
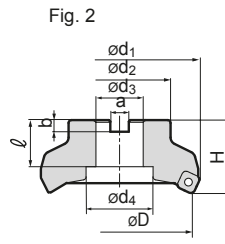
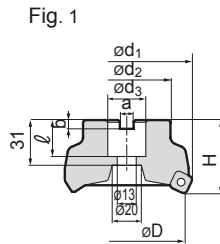
(v<sub>c</sub> = m/min, f<sub>t</sub> = mm/tooth) (min. – optimum – max.)

Grade	Work Material	ACP100			ACP200			ACP300		ACK200		ACK300	
		Low carbon steel	Alloy steel	Die steel	Low carbon steel	Alloy steel	Die steel	Stainless steel		Cast iron	Ductile cast iron	Cast iron	Ductile cast iron
								austenitic	martensitic				
UFO (-F) 4000	v <sub>c</sub>	100-250-400	80-220-280	80-150-250	80-200-370	70-150-250	60-130-220	120-180-240	100-140-200	220-270-450	150-180-250	180-220-270	130-160-220
	f <sub>t</sub>	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,2-0,3	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,25-0,4
	d <sub>oc</sub>	1,0-3,0-5,0			1,0-3,0-5,0			1,0-2,0-3,0		1,0-3,0-5,0		1,0-3,0-5,0	
UFO (-F) 5000	v <sub>c</sub>	100-250-400	80-220-280	80-150-250	80-200-370	70-150-250	60-130-220	120-180-240	100-140-200	220-270-450	150-180-250	180-220-270	130-160-220
	f <sub>t</sub>	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,2-0,3	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,25-0,4
	d <sub>oc</sub>	1,0-4,0-7,0			1,0-4,0-7,0			1,0-3,0-5,0		1,0-4,0-7,0		1,0-4,0-7,0	

# Face Mill DNX / DNXF Type

General Milling for Cast Iron and Steel

Approach angle : 65°  
Axial rake angle : +5°  
Radial rake angle : -6°



8 mm / 65°

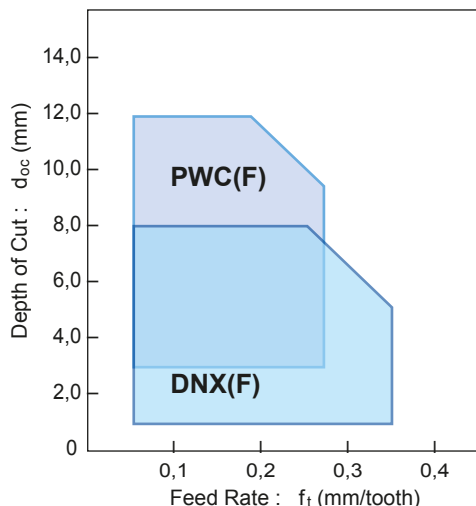
## Body Standard DNX - Type

Type	Cat. No.	Stock	Dimensions (mm)			Mounting						Number of teeth	Max. depth of cut	Weight (Kg)	Fig.
			$\phi D$	$\phi d_1$	H	$\phi d_2$	$\phi d_3$	$\phi d_4$	a	b	$\ell$				
DNX 12000	DNX 12080 RS	●	80	88	50	60	27	-	12,4	7,0	25	6	8,0	1,2	1.
	DNX 12100 RS	●	100	108	50	80	32	46	14,4	8,5	29	7		1,6	2.
	DNX 12125 RS	●	125	133	63	80	40	56	16,4	9,5	29	8		2,8	
	DNX 12160 RS	●	160	168	63	100	40	88	16,4	9,5	29	10		4,4	3.
	DNX 12200 RS	□	200	210	63	150	60	130	25,7	14,0	35	16		8,0	4.
	DNX 12250 RS	□	250	260	63	180	60	160	25,7	14,0	35	20		12,2	

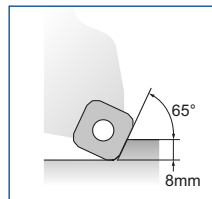
## Fine Pitch DNXF - Type

Type	Cat. No.	Stock	Dimensions (mm)			Mounting						Number of teeth	Max. depth of cut	Weight (Kg)	Fig.
			$\phi D$	$\phi d_1$	H	$\phi d_2$	$\phi d_3$	$\phi d_4$	a	b	$\ell$				
DNXF 12000	DNXF 12080 RS	●	80	88	50	60	27	-	12,4	7,0	25	8	8,0	1,2	1.
	DNXF 12100 RS	●	100	108	50	80	32	46	14,4	8,5	29	10		1,6	2.
	DNXF 12125 RS	●	125	133	63	80	40	56	16,4	9,5	29	11		2,7	
	DNXF 12160 RS	●	160	168	63	100	40	88	16,4	9,5	29	12		4,4	3.

## First Recommendation: DNX



## DNX / DNXF



Wiper width = 1,2mm



Max. depth of cut : 8mm, Approach angle : 65°		
Cutter Type	Diameter Range	Characteristics
DNX 12000 RS	Ø80~Ø250mm	- General purpose - Medium pitch type
DNXF 12000 RS	Ø80~Ø160mm	- General purpose - Fine pitch type

## Spare Parts

Cutter	Insert Screw	Insert Wrench	Locator	Clamp Screw	Wrench
Ø 80 ~ Ø160 Ø200 , Ø250	BFTX0412 IP 3,0 (Nm)	TRDR 15 IP	- DNXK 12 R	- BX 0515	- LH 040

## Identification of Cutter Body

**DNX F 12 080 R S**

Cutter type: DNX  
Fine pitch: F  
Insert size: 12  
Diam.: 080  
Cutting direction: R  
Shell type: S

● = Euro stock  
□ = Delivery on request

Recommended Tightening Torque (N·m)

# Face Mill DNX / DNXF Type

## ■ Features

- Small inserts with 8 cutting edges
- Economic by double-side usage
- Excellent grade for cast iron machining
- Optimised geometry for best results in cast iron
- Special inserts for steel machining



## ■ Insert

Cat. No.	Coated Carbide					Fig.
	ACP200	ACP300	ACK100	ACK200	ACK300	
SNMT 1205 ZNEN-G	●		●	●	●	1
SNMT 1205 ZNEN-H	●		●	●	●	2
SNMT 1205 ZNEN-SH	●	□	●	●	●	3

Fig. 1  
**G Type**

Cutting edge

Fig. 2  
**H Type**

Flat land

Fig. 3  
**SH Type**

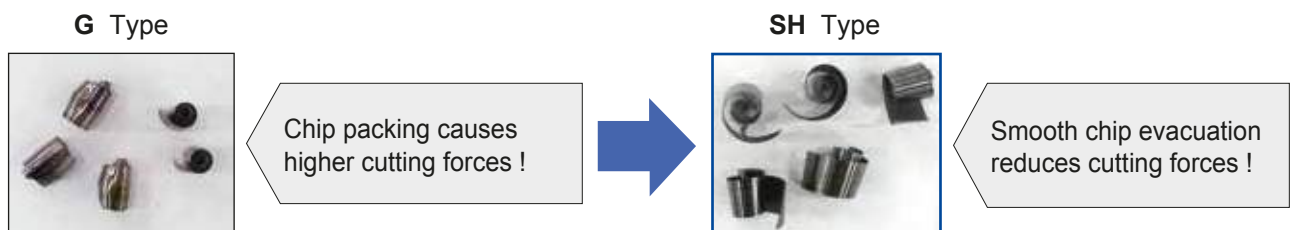
Flat land

- G Type** : For general purpose  
**H Type** : For heavy machining  
**SH Type** : For steel machining

- Negative inserts
- Inserts with 8 cutting edges
- Applicable for steel machining



## ■ Advantage of SH-Type when Steel machining



## ■ Recommended Cutting Conditions

( $v_c$  = m/min,  $f_t$  = mm/tooth) (min. – optimum – max.)

ISO	Work Material	Hardness (HB)	Cutting Speed $v_c$ (m/min)	Feed Rate $f_t$ (mm/tooth)	Insert Grade
<b>P</b>	Carbon steel	180 - 280	150 - <b>175</b> - 200	0,10 - <b>0,15</b> - 0,20	ACP200
	Alloy steel	180 - 280	150 - <b>175</b> - 200	0,10 - <b>0,15</b> - 0,20	ACP200
<b>K</b>	Grey cast iron (GG)	250	150 - <b>225</b> - 300	0,10 - <b>0,20</b> - 0,30	ACK200 / ACK300
	Ductile cast iron (GGG)	250	150 - <b>225</b> - 250	0,10 - <b>0,18</b> - 0,25	ACK200 / ACK300

# Wave Radius Mill WRCX Type

High Durable Mill with Polygon Inserts

Grades for Steels, Cast Iron and Aluminium



## Features

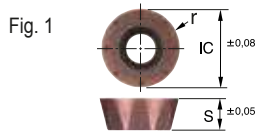
The "Wave Mill" WRCX type is a new multi purpose milling cutter for face milling, slotting, helical boring, plunging and profiling. Its unique design features 16 corner polygon inserts and a durable cutter body manufactured from high tensile alloyed steel protected by a hard surface treatment. Insert rigidity is maximised via close tolerance seat pockets and centre clamped using a torxscrew. Choose from a variety of insert grades such as our award winning Diamond like Carbon DL 1000 capable of high feed machining aluminium, our uncoated H1 grade suitable for non-ferrous metals or our new ACP/ACK grades for steels and irons.

## Advantages

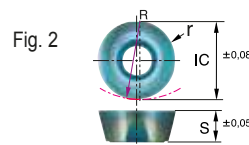
- Durable cutter body – Special alloyed steel with hard surface.
- High feed cutting – Optimised pitch and high number of cutting edges
- Excellent chip removal – Wide pocket and integral coolant hole
- Maximum rigidity – Rigid clamping of inserts with TORXPLUS screw
- Wide application range – Carbon steels, alloy steels, stainless steels, high temperature alloys, die mould steels, aluminiums, non-ferrous metals etc

## Insert

- QPMT... : Standard 16 cornered polygon type
- QPMT...-H : Stronger cutting edge type



- QPET...-S : Polished round insert for non-ferrous material



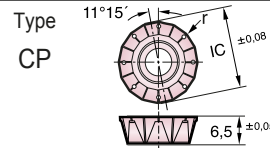
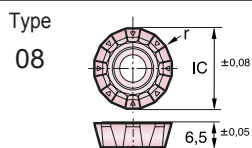
Rake angle: 25°

4 corners use

R : wiper radius

Cat. No.	Coated Carbide					Diamond Coated DL1000	Uncoated Carbide H1	IC (mm)	r (mm)	s (mm)	Max. d <sub>oc</sub>		Fig.	Applicable Cutter
	ACP100	ACP200	ACP300	ACK200	ACK300						4 corners application	8 corners application		
QPMT 120440 PPEN	●	●	●	●	●			12	4,0	4,76	5,6	1,5	①	WRCX/F 12000 RS
QPMT 120440 PPEN-H	●	●	●	●	●									
QPET 120460 PPR-S						●	●							
QPMT 160660 PPEN	●	●	●	●	●			16	6,0	6,5	7,6	2,1	①	WRCX/F-X 16000 RS
QPMT 160660 PPEN-H	●	●	●	●	●									
QPET 160680 PPR-S						●	●							
QPMT 200670 PPEN	●	●	●	●	●			20	7,0	6,5	9,4	2,5	①	WRCXF 20000 RS
QPMT 200670 PPEN-H	●	●	●	●	●									

## Anti-Vibration Type (Paired Sets for Vibration Free Machining)



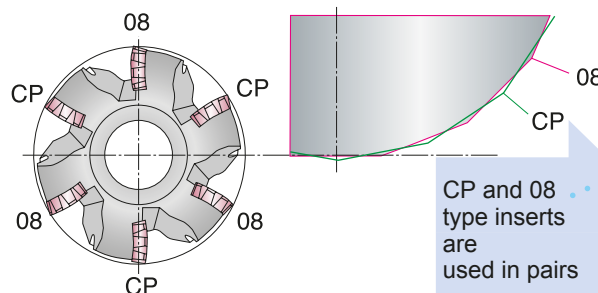
Cat. No.	Coated carbide					Diamond coated DL1000	Uncoated carbide H1	IC (mm)	r (mm)	s (mm)	Max. d <sub>oc</sub>		Insert type	Applicable cutter
	ACP100	ACP200	ACP300	ACK200	ACK300						4 corners application	8 corners application		
QPMT 160608 PPEN	●	●	●	●	●			16	0,8	6,5	7,6	1,2	08	WRCX/F-X 16000 RS
QPMT 160608 PPEN-CP	●	●	●	●	●							2,3	CP	
QPMT 200608 PPEN	●	●	●	●	●			20	0,8	6,5	9,4	1,6	08	WRCXF 20000 RS
QPMT 200608 PPEN-CP	●	●	●	●	●							2,9	CP	

The combination of different inserts in a staggered formation varies the cut depth and eliminates vibration when feed rate is

$$f_t < 0,15 \quad (IC=16 \text{ mm})$$

or

$$f_t < 0,2 \quad (IC=20 \text{ mm}).$$



CP and 08 type inserts are used in pairs

## Chip Formation

Anti-vibration Type	Standard Type
Work Material: 50C	
Cutting Data: f <sub>t</sub> = 0,1mm/tooth, d <sub>oc</sub> = 7 mm	
Insert Size: IC = 20 mm	

# Wave Radius Mill

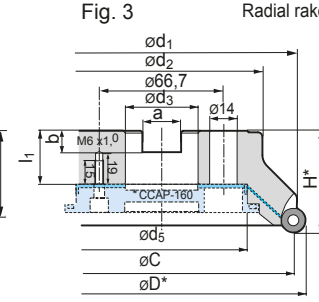
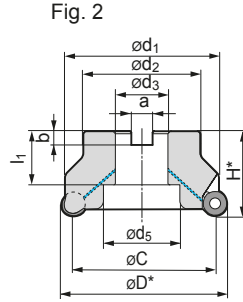
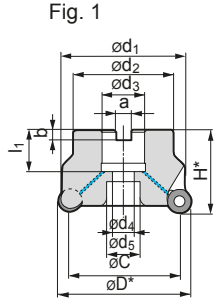
## WRCX Type

Axial rake angle: -3°  
Radial rake angle: 0°



### ■ Body

### ● Standard WRCX Type



\* Note Fig.3 for  $\phi D=160$  : Coolant cap (CCAP-160) with 4 screws (BX0620) and wrench (TH050) is available separately.

Insert IC (mm)	Cat. No.	Stock	Dimensions (mm)					Mounting						No. of teeth	Helical boring $\phi B$ Standard	Ramping $\alpha_{max}$	Weight (Kg)	Fig.
			$\phi D^*$	$\phi C$	$\phi d_1$	$\phi d_2$	$H^*$	a	b	$\phi d_3$	$\phi d_4$	$\phi d_5$	$l_1$					
12	WRCX 12040 RS	●	40	28	36	36	40	8,4	5,6	16	9	14	18	4	68 ± 11	10°	0,2	1
	WRCX 12050 RS	●	50	38	46	40	40	10,4	6,3	22	11	18	20	4	88 ± 11	7°	0,3	
	WRCX 12052 RS	●	52	40	48	40	40	10,4	6,3	22	11	18	20	5	92 ± 11	6°30'	0,3	
	WRCX 12063 RS	●	63	51	59	40	40	10,4	6,3	22	11	18	20	5	114 ± 11	5°	0,4	
	WRCX 12080 RS	●	80	68	76	55	50	12,4	7,0	27	13,5	20	25	6	148 ± 11	3°30'	0,9	
16	WRCX 16063 RS	●	63	47	50	50	40	10,4	6,3	22	11	18	20	3	110 ± 15	8°	0,4	1
	WRCX 16080 RS	●	80	64	70	55	50	12,4	7,0	27	13,5	20	25	4	144 ± 15	5°30'	0,8	
	WRCX 16100 RS	●	100	84	90	70	50	14,4	8,5	32	-	46	32	5	184 ± 15	4°	1,3	2
	WRCX 16125 RS	□	125	109	115	80	63	16,4	9,5	40	-	52	38	5	234 ± 15	3°	2,4	
	WRCX 16160 RS	●	160	140	150	100	63	16,4	9,5	40	-	93	29	8	304 ± 18	2°	4,0	

### ● Fine Pitch WRCXF Type

Insert IC (mm)	Cat. No.	Stock	Dimensions (mm)					Mounting						No. of teeth	Helical boring $\phi B$ Standard	Ramping $\alpha_{max}$	Weight (Kg)	Fig.
			$\phi D^*$	$\phi C$	$\phi d_1$	$\phi d_2$	$H^*$	a	b	$\phi d_3$	$\phi d_4$	$\phi d_5$	$l_1$					
12	WRCXF 12050 RS	□	50	38	46	40	40	10,4	6,3	22	11	18	20	5	88 ± 11	7°	0,3	1
	WRCXF 12063 RS	□	63	51	59	40	40	10,4	6,3	22	11	18	20	6	114 ± 11	5°	0,4	
16	WRCXF 16052 RS	●	52	36	45	45	40	10,4	6,3	22	11	17,7	20	4	88 ± 15	10°	0,3	
	WRCXF 16063 RS	●	63	47	50	50	40	10,4	6,3	22	11	18	20	4	110 ± 15	8°	0,4	
	WRCXF 16080 RS	●	80	64	70	55	50	12,4	7,0	27	13,5	20	25	5	144 ± 15	5°30'	0,8	
	WRCXF 16100 RS	●	100	84	90	70	50	14,4	8,5	32	-	46	32	6	184 ± 15	4°	1,3	
	WRCXF 16125 RS	●	125	109	115	80	63	16,4	9,5	40	29	52	29	6	234 ± 15	3°	2,4	
20	WRCXF 16160 RS	●	160	144	150	100	63	16,4	9,5	40	-	93	29	8	304 ± 18	2°	4,0	3*
	WRCXF 20080 RS	●	80	60	68	55	50	12,4	7,0	27	13,5	20	25	5	140 ± 18	7°	0,7	1
	WRCXF 20100 RS	●	100	80	88	70	50	14,4	8,5	32	-	46	32	6	180 ± 18	5°	1,1	2
	WRCXF 20125 RS	●	125	105	113	80	63	16,4	9,5	40	29	52	29	6	230 ± 18	3°30'	2,3	1
	WRCXF 20160 RS	●	160	140	148	100	63	16,4	9,5	40	-	93	29	8	300 ± 18	2°30'	3,9	3*

### ● Extra Fine Pitch WRCXX Type

Insert IC (mm)	Cat. No.	Stock	Dimensions (mm)					Mounting						No. of teeth	Helical boring $\phi B$ Standard	Ramping $\alpha_{max}$	Weight (Kg)	Fig.
			$\phi D^*$	$\phi C$	$\phi d_1$	$\phi d_2$	$H^*$	a	b	$\phi d_3$	$\phi d_4$	$\phi d_5$	$l_1$					
16	WRCXX 16080 RS	●	80	64	70	55	50	12,4	7,0	27	13,5	20	25	6	144 ± 15	5°30'	0,8	1
	WRCXX 16100 RS	●	100	84	90	70	50	14,4	8,5	32	-	46	32	7	184 ± 15	4°	1,3	2

\* Note : When using CP type anti-vibration inserts / IC = 16, please change above dimensions:  $\phi D^* + 0,3$  &  $H^* + 0,15$  mm  
In case of anti-vibration inserts / IC = 20, please change above dimensions:  $\phi D^* + 0,4$  &  $H^* + 0,2$  mm

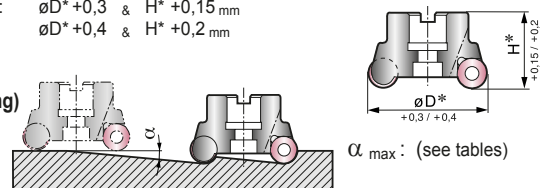
### ■ Maximum Rotation (min<sup>-1</sup>) for Non-ferrous cutting when using QPET Insert

Cutter	Insert IC		
	10	12	16
$\phi D$	n		
25	28.000		
32	25.000		
40		22.000	
50		20.000	14.000
63		18.000	13.000
80		16.000	12.000
100			10.000
125			9.000
160			8.000

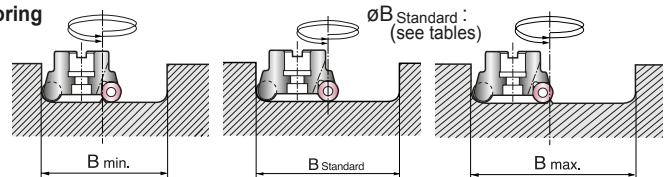
### ■ Spare Parts

Cutter	Screw	Screw
WRCX	12000	BFTX 0409 IP 3,0 TRDR 15 IP
WRCX/F-X	16052 ~ 16100	BFTX 0511 IP 5,0 TRDR 20 IP
	16125 ~ 16160	BFTX 0513 IP 5,0 TRDR 20 IP
WRCX/F	20000	BFTX 0615 IP 5,0 TRDR 25 IP

### Ramping (Slant Milling)



### Helical Boring



### ■ Recommended Cutting Conditions

Material Grade	$\phi D$ (mm)	Carbon steel (ex. C40 ~ C50)	Alloy steel (Below HRC40)	Stainless steel (ex. X10CrNiS18-9)	Cast iron (ex. GG20)	Non-ferrous material
		$v_c$	100-160-200	100-140-180	80-120-160	80-120-160
$f_t$	0,2-0,4-0,6	0,2-0,3-0,4	0,1-0,2-0,3	0,1-0,2-0,4	0,1-0,3-0,4	
100 ~	$v_c$	150-200-250	100-160-200	160-180-200	100-150-200	200-500-1000
160	$f_t$	0,3-0,4-0,6	0,1-0,3-0,5	0,15-0,2-0,3	0,1-0,15-0,2	0,2-0,3-0,6

[ $v_c$  = m/min,  $f_t$  = mm/tooth] [min. - optimum - max.]

# Wave Radius Mill RSX Series



## ■ Features

The Wave Radius Mill RSX Series enables stable machining even when using equipment with low clamp rigidity thanks to its body design achieving excellent cutting performance and rigidity.

In addition to the ACM Series for stainless steel and exotic alloys two grades have been added: ACP200 grade for steel machining and ACK300 grade for cast iron machining. Handle an even wider range of milling needs with the RSX(F)08000 and RSX(F)20000 types.






## ■ Characteristics

Smooth cutting action and low vibration machining provided based on the high rake angle design and high rigidity body.

High reliability achieved with ACM100 / ACM200 / ACM300 adopted for exotic alloy machining.

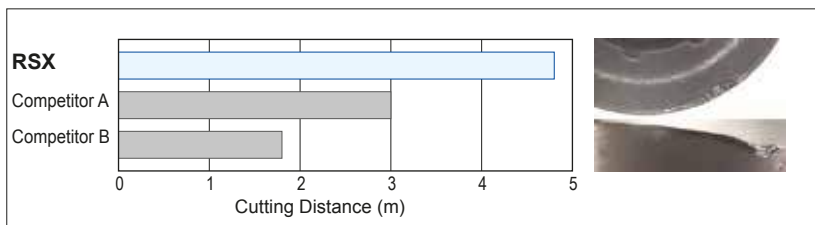
ACP200 for steel and ACK300 for cast iron enable stable machining in a wide range of applications.

## ■ Series

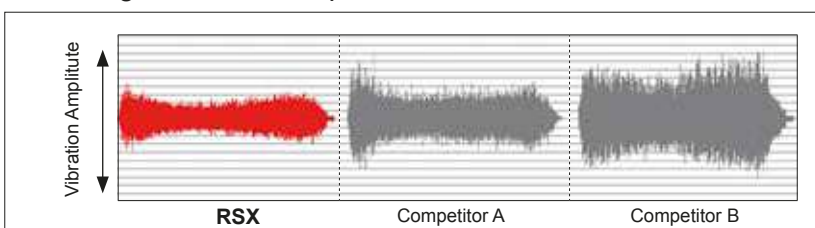
Image	Series	Insert Size	Cat. No.	External Diameter (mm)											
				ø20	ø25	ø32	ø40	ø50	ø52	ø63	ø66	ø80	ø100	ø125	ø160
 H42	Standard	08	RSX 08000 ES	●	●										
		10	RSX 10000 ES		●	●									
		12	RSX 12000 ES			●									
	Fine Pitch	08	RSXF 08000 ES	●	●										
		10	RSXF 10000 ES		●	●									
		12	RSXF 12000 ES			●									
 H42	Standard	10	RSX 10000 RS				●	●	●						
		12	RSX 12000 RS				●	●	●	●	●	●	●	●	
		16	RSX 16000 RS							●	●	●	●	●	
	Fine Pitch	10	RSXF 10000 RS				●	●	●						
		12	RSXF 12000 RS				●	●	●	●	●	●	●	●	
		16	RSXF 16000 RS							●	●	●	●	□	
 H43	Standard	08	RSX 08000 M	●	●	●									
		10	RSX 10000 M		●	●	●								
		12	RSX 12000 M			●	●	●							
	Fine Pitch	08	RSXF 08000 M	●	●	●									
		10	RSXF 10000 M		●	●	●								
		12	RSXF 12000 M			●	●	●							

## ■ Cutting Performance

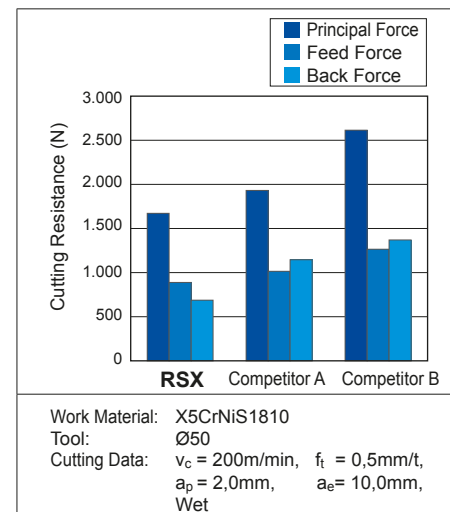
### ● Tool Life Comparison (Fracture Resistance)



### ● Cutting Vibration Comparison



### ● Cutting Resistance Comparison

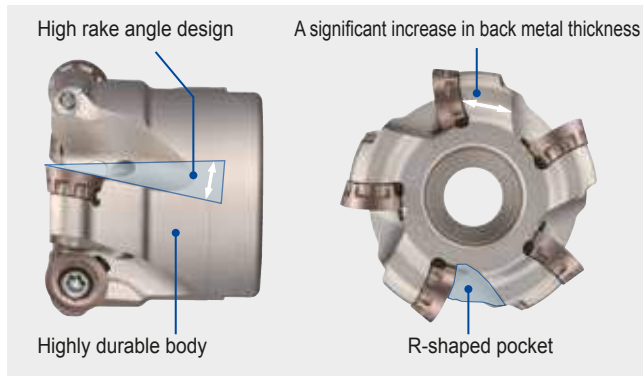




# Wave Radius Mill RSX Series

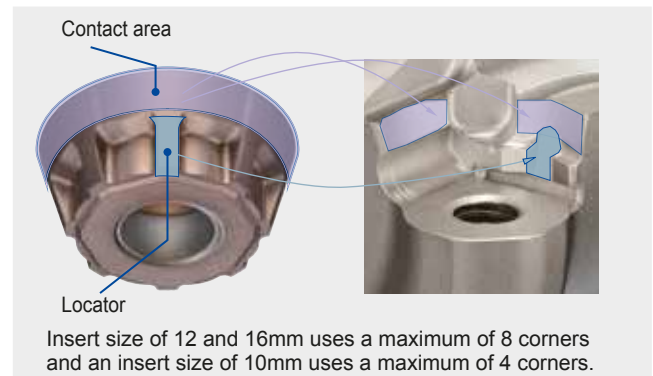
## Low Cutting Resistance, Less Vibration

Low cutting resistance and low vibration machining have been achieved with super high rake angle design + high rigidity body.



## High Operability

Ease of corner control has been achieved with the adoption of a unique positioning mechanism that is highly precise and highly operable.



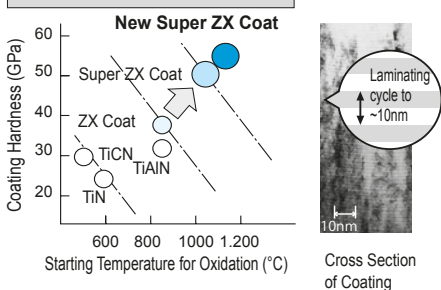
## Stable and Long Tool Life

Work Material	Wear Resistance ← → Fracture Resistance	
	<b>P</b>	ACP200 <b>New</b>
<b>M</b>	ACM100	ACM200
		ACM300
		ACK300 <b>New</b>
<b>S</b>	ACM100	ACM200
		ACM300

Coating Type: ▽ CVD ▲ PVD

A long life ensured with the adoption of the ACM series and significant improvements have been made in processing exotic alloy and stainless steel machining.

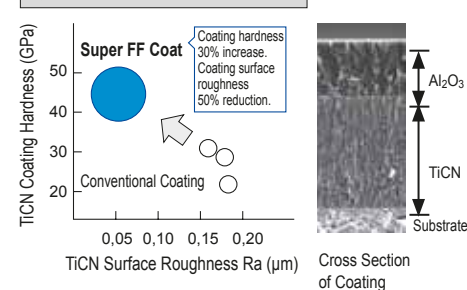
### ▲ ACM100/ACM300



### New Super ZX Coat

The product series with a coating film hardness approximately 40% higher and an oxidation onset temperature 200°C higher than conventional products. Enables machining at least 1.5 times faster and more efficiently than conventional products. A product life at least twice as long as that of conventional products achieved under the same machining conditions.

### ▽ ACM200



### Super FF Coat

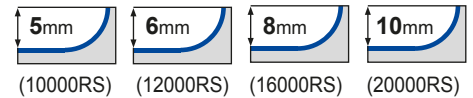
Smooth coating surface provides excellent adhesion and chipping resistance. Improved coating adhesion strength. Harder than conventional coatings with high improvements in wear resistance. High speed, high efficiency machining of more than 1.5 times than of conventional grades possible. Achieving more than double the tool life of conventional grades under the same cutting conditions.



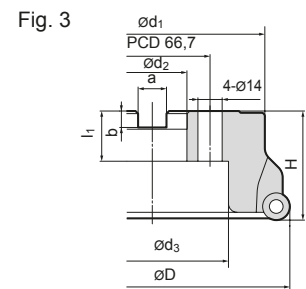
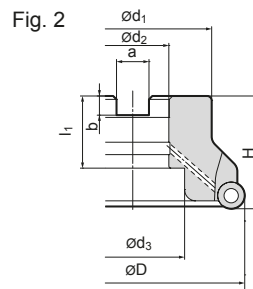
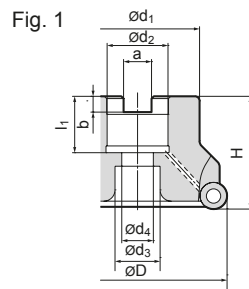
## RSX(F)<sub>10000/12000/16000/20000RS</sub>

Milling of steel, stainless steel, cast iron and exotic alloys

Rake Angle	Radial	-5°
	Axial	10°



### Body – Dimensions



### Body

#### ● RSX...RS, Standard

Cat. No.	Stock	Dimensions (mm)									No. of teeth	Weight (kg)	Fig.
		$\varnothing D$	$\varnothing d_1$	H	$\varnothing d_2$	a	b	$l_1$	$\varnothing d_3$	$\varnothing d_4$			
RSX 10040 RS	●	40	34	40	16	8,4	5,6	18	14	9	4	0,2	1
10050 RS	●	50	40	40	22	10,4	6,3	20	18	11	5	0,3	1
10052 RS	●	52	40	40	22	10,4	6,3	20	18	11	5	0,4	1
RSX 12040 RS	●	40	32	40	16	8,4	5,6	18	13,5	9	3	0,2	1
12050 RS	●	50	40	40	22	10,4	6,3	20	18	11	4	0,3	1
12052 RS	●	52	40	40	22	10,4	6,3	20	18	11	4	0,3	1
12063 RS	●	63	40	40	22	10,4	6,3	20	18	11	5	0,4	1
12066 RS	●	66	55	50	27	12,4	7,0	25	20	14	6	0,7	1
12080 RS	●	80	55	50	27	12,4	7,0	25	20	14	6	1,0	1
12100 RS	●	100	70	50	32	14,4	8,5	32	46	-	6	1,4	2
RSX 16063 RS	●	63	50	40	22	10,4	6,3	20	18	11	4	0,5	1
16080 RS	●	80	55	50	27	12,4	7,0	25	20	14	5	0,9	1
16100 RS	●	100	70	50	32	14,4	8,5	32	46	-	6	1,3	2
16125 RS	●	125	80	63	40	16,4	9,5	29	52	29	6	2,6	1
RSX 20080 RS	●	80	55	50	27	12,4	7,0	22	20	14	4	0,9	1
20100 RS	●	100	70	63	32	14,4	8,0	32	46	-	5	1,8	2
20125 RS	●	125	80	63	40	16,4	9,0	29	52	29	6	2,6	1
20160 RS	●	160	130	63	40	16,4	9,0	29	90	-	7	4,7	3

#### ● RSXF...RS, Fine Pitch

Cat. No.	Stock	Dimensions (mm)									No. of teeth	Weight (kg)	Fig.
		$\varnothing D$	$\varnothing d_1$	H	$\varnothing d_2$	a	b	$l_1$	$\varnothing d_3$	$\varnothing d_4$			
RSXF 10040 RS	●	40	34	40	16	8,4	5,6	18	14	9	5	0,2	1
10050 RS	●	50	40	40	22	10,4	6,3	20	18	11	6	0,3	1
10052 RS	●	52	40	40	22	10,4	6,3	20	18	11	6	0,3	1
RSXF 12040 RS	●	40	32	40	16	8,4	5,6	18	13,5	9	4	0,2	1
12050 RS	●	50	40	40	22	10,4	6,3	20	18	11	5	0,3	1
12052 RS	●	52	40	40	22	10,4	6,3	20	18	11	5	0,3	1
12063 RS	●	63	40	40	22	10,4	6,3	20	18	11	6	0,4	1
12066 RS	●	66	55	50	27	12,4	7,0	25	20	14	7	0,7	1
12080 RS	●	80	55	50	27	12,4	7,0	25	20	14	7	0,9	1
12100 RS	●	100	70	50	32	14,4	8,5	32	46	-	10	1,3	2
RSXF 16063 RS	●	63	50	40	22	10,4	6,3	20	18	11	5	0,4	1
16080 RS	●	80	55	50	27	12,4	7,0	25	20	14	6	0,8	1
16100 RS	●	100	70	50	32	14,4	8,5	32	46	-	7	1,3	2
16125 RS	●	125	80	63	40	16,4	9,5	29	52	29	8	2,5	1
16160 RS	□	160	130	63	40	16,4	9,5	29	88	-	10	4,8	3
RSXF 20080 RS	●	80	55	50	27	12,4	7,0	22	20	14	5	0,9	1
20100 RS	●	100	70	50	32	14,4	8,0	32	46	-	6	1,8	2
20125RS	●	125	80	63	40	16,4	9,0	29	52	29	7	2,6	1
20160RS	●	160	130	63	40	16,4	9,0	29	90	-	9	4,6	3

### Cutter Identification

<b>RSX</b>	<b>F</b>	<b>12</b>	<b>040</b>	<b>R</b>	<b>S</b>
Cutter Series	Fine Pitch Type	Insert Size	Cutter Diameter	Cutting Direction	Metric

● = Euro stock  
□ = Delivery on request

Recommended Tightening Torque (N·m)



### Various Machining Use

Various types of processing, such as mould engraving, slant milling and helical processing.

#### Helical Milling

**≤ Work Diameter**  
Center uncut portion cannot be removed by traverse cutting with the same cutter.

**≥ Work Diameter**  
Center uncut portion can be removed by traverse cutting with the same cutter.

#### Ramping

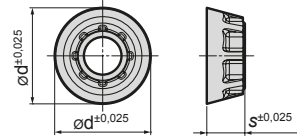
Use at  $\alpha^\circ$  or lower

#### Recommended Values for Helical and Ramping

Insert Cat. No.	Helical				Taper Ramping Angle $\alpha^\circ$ (max)
	Cutter $\varnothing D_c$	Work Diameter			
		Min.	Optimal $\varnothing$	Max.	
RDET10...	25	33,0	40	49	10°30'
	32	46,0	54	63	6°45'
	40	62,0	70	79	4°30'
	50	82,0	90	99	3°15'
RDET12...	52	86,0	94	103	3°10'
	32	41,5	52	63	12°30'
	40	57,5	68	79	8°00'
	50	77,5	88	99	5°30'
	52	81,5	92	103	5°15'
RDET16...	63	103,5	114	125	4°00'
	66	109,5	120	131	3°45'
	80	137,5	148	159	2°50'
	100	177,5	188	199	2°10'
	63	96,0	110	125	6°00'
RDET20...	80	130,0	144	159	4°10'
	100	170,0	184	199	3°00'
	125	220,0	234	249	2°20'
<b>New</b> RDET20...	80	122,0	140	159	4°15'
	100	162,0	180	199	3°00'
	125	212,0	230	249	2°00'
	160	282,0	300	319	1°15'

### Inserts

Application	Grade					Dimens.		Applicable Cutters
	ACP200	ACK300	ACM100	ACM200	ACM300	$\varnothing$ (IC)	S	
High Speed/Light Cut		M S	M S					RSX(F) 10000RS
General Purpose	P M	M S	M S	M S				
Roughing	P M	<b>New</b> K			M S			RSX(F) 12000RS
		<b>New</b> ACP200						
						10	3,97	RSX(F) 16000RS
						12	4,76	
						16	6,5	RSX(F) 20000RS
						20	6,5	



Cutting Edge Cross Section



M0: IC is metric

### Spare Parts

Applicable Cutters	Wrench	Screw	
RSX(F) 10000RS	TRDR15IP	BFTX03584IP	3,0
RSX(F) 12000RS		BFTX0409IP	3,0
RSX(F) 16000RS	TRDR20IP	BFTX0511IP	5,0
RSX(F) 20000RS	TRDR25IP	BFTX0615IP	5,0

### Recommended Cutting Conditions

Min.-Optimum-Max.

ISO	Work Material		Hardness	Cutting Speed $v_c$ (m/min)	Feed Rate $f_t$ (mm/t)	Grade	
<b>P</b>	Carbon Steel		180-280HB	100-160-200	0,20-0,40-0,60	ACP200	
	Alloy Steel		180-280HB	100-140-180	0,20-0,30-0,40	ACP200	
<b>M</b>	Stain- less Steel	Cr Based	Ferritic	200HB	150-180-200	0,15-0,25-0,35	ACM300
			Martensitic	200-330HB	80-120-180	0,15-0,25-0,35	ACM300
	Cr-Ni Based	Austenitic	200HB	150-180-200	0,15-0,25-0,35	ACM300	
		Austenitic, ferritic	230-270HB	80-120-180	0,15-0,25-0,35	ACM200	
		Precipitation hardening	330HB	60-100-160	0,15-0,25-0,35	ACM200	
<b>K</b>	Cast Iron		250HB	80-120-160	0,10-0,30-0,40	ACK300	
<b>S</b>	Heat resistant alloy	Ni based material		250-350HB	20-30-40	0,10-0,20-0,30	ACM100 ACM200
	Titanium	Pure Titanium		(Rm400)	60-80-100	0,10-0,20-0,30	
		$\alpha + \beta$ alloy system		(Rm1050)	40-50-60	0,10-0,20-0,30	

# Sumi Dual Mill

## DFC Type

### General Features

The Sumi Dual Mill DFC type employs cost effective double-sided inserts for high toughness and enhanced accuracy. The double-side inserts are flexible and reduces costs.

### Large Line-up

- Diameter from Ø25mm to Ø200mm
- Available as standard, fine and extra-fine pitch
- Bore diameter: metric
- Insert geometry: L, G, H



### Cutter Body

Type		Cat. No.	Diameter (mm)	No. of Teeth	Image
Shank	Standard Pitch	DFC 09000 E	Ø25~Ø80	2~5	
	H14 Medium Pitch	DFCM 09000 E	Ø32~Ø80	3~7	
Shell	Standard Pitch	DCF 09000 RS	Ø50~Ø200	4~8	
	Medium Pitch	DFCM 09000 RS	Ø50~Ø200	5~12	
	Fine Pitch	DFCF 09000 RS	Ø50~Ø200	6~16	

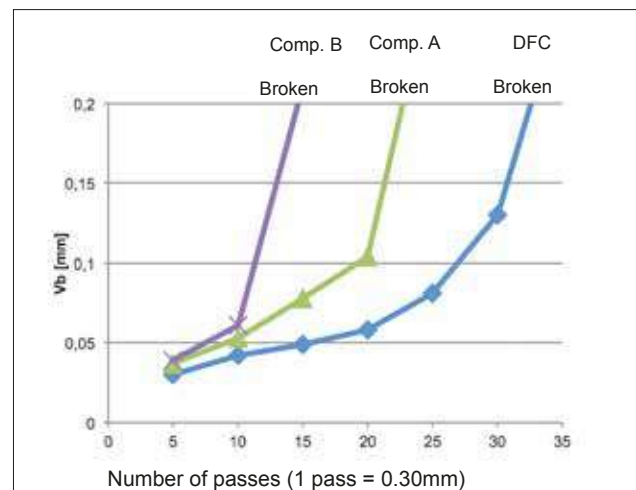
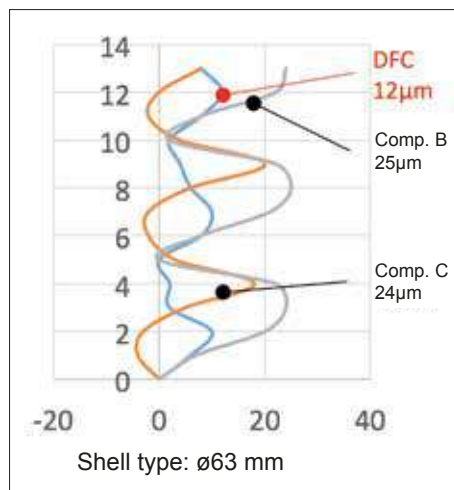
### 90 Degree Accuracy

Work material: Carbon steel

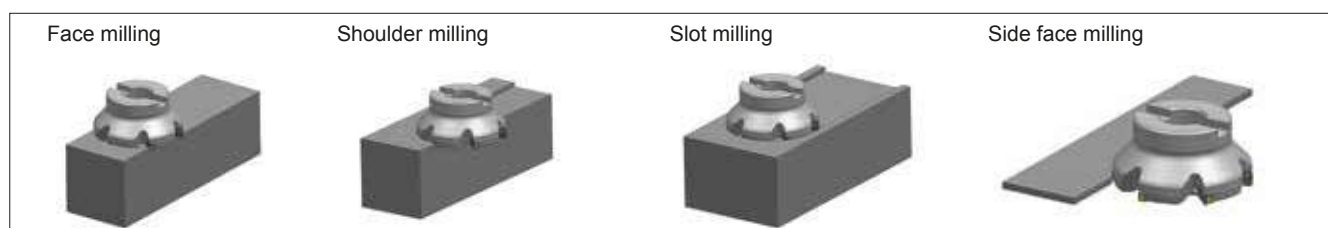
Cutting conditions:

$v_c=200\text{m/min}$ ,  $f_t=0.1\text{mm/t}$

$a_e=5.0\text{mm}$ ,  $a_p=5.0\text{mm} \times 3 \text{ passes}$



### Suitable Applications



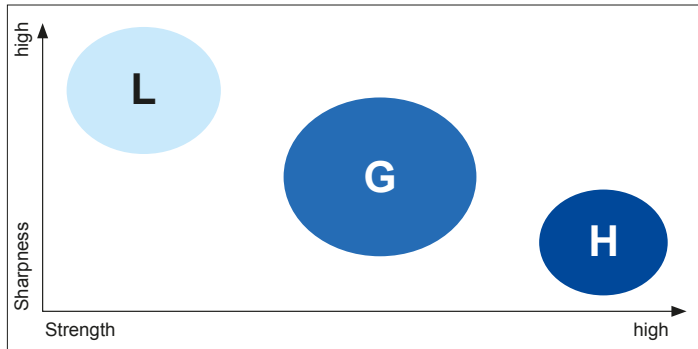
● = Euro stock

# Sumi Dual Mill DFC Type

## ■ New Insert Design Provides Excellent Machining Accuracy

- The new insert design separates the location area and cutting edge producing an optimized solution.
- Machining accuracy is comparable to single sided inserts provided the DOC is less than 3mm.
- The SEC-Sumi Dual Mill design, equips the user with a highly stable cutter for high feed machining applications.

## ● Chipbreaker Selection Map



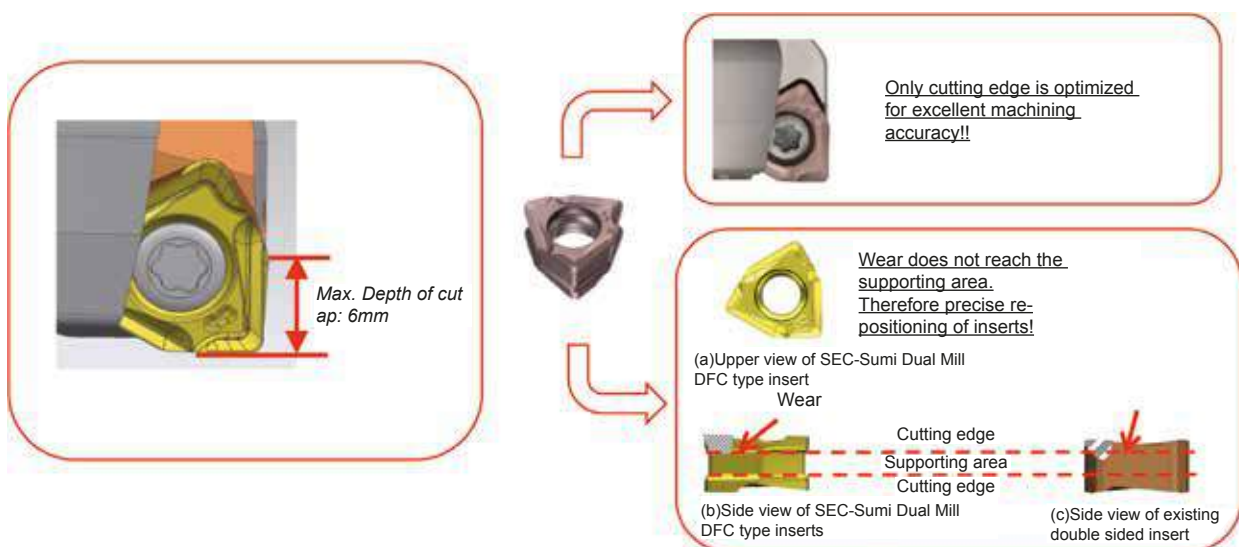
## ● Inserts

Cat. No.	New		New	
	R0,4	R0,8	R1,2	R1,6
XNMMU0606__PNER-L	●	●	●	●
XNMMU0606__PNER-G	●	●	●	●
XNMMU0606__PNER-H	●	●	●	●

Work Material	Steel, Cast Iron		
Chipbreaker	L type	G type	H type
Feature	Low cutting force	General purpose	Strong edge
Cutting edge geometry			
Application	Light cut, low rigidity milling and reduced burrs	Main breaker for general purpose applications	Roughing, heavy interrupted and hardness steel milling

## ■ Stable and High Cutting Performance Combined with High Toughness

- The excellent cutter performance offers efficient machining, enables high feed rate capability.
- The new insert construction provides extremely accurate edge to edge indexing whilst the location area offers high security and stability.



# Sumi Dual Mill

## DFC(M/F) 09000RS Type

### Body – Shell type



Fig.1

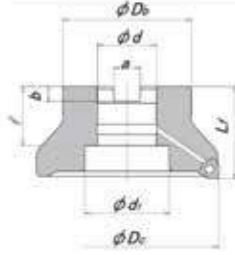


Fig.2

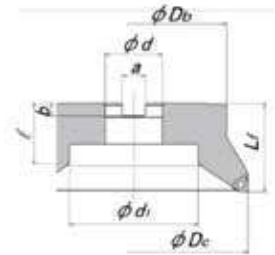


Fig.3

Rake Angle	Radial	-9°
	Axial	-5°

Max.  $a_p$ : 6mm

### Body – Dimensions

#### ● Sumi Dual Mill DFC type, Standard Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Fig.
		$\phi D_c$	$\phi D_b$	$L_f$	$\phi d$	$a$	$b$	$l$	$\phi d_1$	$\phi d_2$			
DFC09050RS	●	50	41	40	22	10,4	6,3	20	18	11	4	0,3	1
DFC09063RS	●	63	50	40	22	10,4	6,3	20	18	11	4	0,5	1
DFC09080RS	●	80	55	50	27	12,4	7	22	20	14	5	1,0	1
DFC09100RS	●	100	70	50	32	14,4	8	26	46	-	6	1,4	2
DFC09125RS	●	125	80	63	40	16,4	9	29	52	29	7	2,8	1
DFC09160RS	●	160	130	63	40	16,4	9	29	90	-	8	4,6	3
DFC09200RS	□	200	150	63	60	25,7	14	35	135	-	10	5,7	

#### ● Sumi Dual Mill DFC type, Medium Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Fig.
		$\phi D_c$	$\phi D_b$	$L_f$	$\phi d$	$a$	$b$	$l$	$\phi d_1$	$\phi d_2$			
DFCM09050RS	●	50	41	40	22	10,4	6,3	20	18	11	5	0,3	1
DFCM09063RS	●	63	50	40	22	10,4	6,3	20	18	11	6	0,5	1
DFCM09080RS	●	80	55	50	27	12,4	7	22	20	14	7	0,9	1
DFCM09100RS	●	100	70	50	32	14,4	8	26	46	-	8	1,4	2
DFCM09125RS	●	125	80	63	40	16,4	9	29	52	29	11	2,7	1
DFCM09160RS	●	160	130	63	40	16,4	9	29	90	-	12	4,5	3
DFCM09200RS	□	200	150	63	60	25,7	14	35	135	-	16	5,6	

#### ● Sumi Dual Mill DFC type, Fine Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Fig.
		$\phi D_c$	$\phi D_b$	$L_f$	$\phi d$	$a$	$b$	$l$	$\phi d_1$	$\phi d_2$			
DFCF09050RS	●	50	41	40	22	10,4	6,3	20	18	11	6	0,3	1
DFCF09063RS	●	63	50	40	22	10,4	6,3	20	18	11	7	0,5	1
DFCF09080RS	●	80	55	50	27	12,4	7	22	20	14	9	0,9	1
DFCF09100RS	●	100	70	50	32	14,4	8	26	46	-	11	1,3	2
DFCF09125RS	●	125	80	63	40	16,4	9	29	52	29	14	2,6	1
DFCF09160RS	●	160	130	63	40	16,4	9	29	90	-	16	4,6	3
DFCF09200RS	□	200	150	63	60	25,7	14	35	135	-	20	5,5	

### Identification Details

**DFC**

Cutter Series

**M**

M: Medium  
F: Fine

**09**

Insert Size

**050**

Cutter Diameter



**R**

Direction

**S**

Metric

### Spare Parts

Screw	Wrench
	
BFTX03512IP	5,0 TRDR151P

# Sumi Dual Mill DFC Type

## ■ Inserts

Grade		Coated Carbide						P	Steel
Application	High Speed / Light Cutting							M	Stainless Steel
	General Purpose Cutting							K	Cast Iron
	Rough Cutting							S	Exotic Alloy
Cat. No.		ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	Radius
								$r\epsilon$	
XNMU 060604 PNER-L			●						0,4
060608 PNER-L			●						0,8
XNMU 060604 PNER-G		●	●	●	●	●	●	●	0,4
060608 PNER-G		●	●	●	●	●	●	●	0,8
060612 PNER-G		●	●	●	●	●	●	●	1,2
060616 PNER-G		●	●	●	●	●	●	●	1,6
XNMU 060608 PNER-H		●	●	●	●	●	●	●	0,8
060612 PNER-H		●	●	●	●	●	●	●	1,2
060616 PNER-H		●	●	●	●	●	●	●	1,6

## ■ Recommended Cutting Conditions

ISO	Work-material	Hardness	Cutting Speed (m/min) Min. - Optimum - Max.	Feed Rate Min. - Optimum - Max.	Depth of Cut (mm)	Grade
P	General Steel	180~280HB	150 - <b>200</b> - 250	0,10 - <b>0,20</b> - 0,30	< 6	ACP200 ACP300
	Soft Steel	≤ 180HB	180 - <b>250</b> - 350	0,15 - <b>0,25</b> - 0,35	< 6	ACP200 ACP300
	Die Steel	200~220HB	100 - <b>150</b> - 200	0,10 - <b>0,18</b> - 0,25	< 4	ACP200 ACP300
M	Stainless Steel	-	160 - <b>205</b> - 250	0,12 - <b>0,18</b> - 0,25	< 6	ACM200 ACM300
K	Cast Iron	250HB	100 - <b>175</b> - 250	0,10 - <b>0,20</b> - 0,30	< 6	ACK200 ACK300

## ■ Application Examples

Work piece		Sumitomo	Comp.
Workpiece material: Steel (HRB 269-330)	<b>Breaker</b>	G	
	<b>Grade</b>	ACP200	
	$v_c$ (m/min)	226	200
	$v_f$ (mm/min)	1260	
	$f_t$ (mm/t)	0,28	0,2
	$a_p$ (mm)	2	2
	$a_e$ (mm)	5	5
	<b>Dry or Wet</b>	Wet	Wet
	<b>Tool diam. Ø</b>	80	
	<b>No. of Teeth</b>	5	
	<b>Result</b>	Efficiency: 158% achieved	
	<b>Evaluation</b>	Wear resistance, efficiency	

Work piece		Sumitomo	Comp.
Workpiece material: S235 (Carbon steel) Face milling	<b>Breaker</b>	G	
	<b>Grade</b>	ACP200	
	$v_c$ (m/min)	180	180
	$v_f$ (mm/min)	1092	910
	$f_t$ (mm/t)	0,3	0,2
	$a_p$ (mm)	2 x 2mm	2 x 2mm
	$a_e$ (mm)	50	50
	<b>Dry or Wet</b>	Dry	Dry
	<b>Tool diam. Ø</b>	63mm	63mm
	<b>No. of Teeth</b>	4	5
	<b>Result</b>	Efficiency: 120% achieved	
	<b>Evaluation</b>	Wear resistance, efficiency	

Work piece		Sumitomo	Comp.
Workpiece material: Cast Iron	<b>Breaker</b>	G	
	<b>Grade</b>	ACP200	
	$v_c$ (m/min)	156	156
	$v_f$ (mm/min)	536	404
	$f_t$ (mm/t)	0,17	0,09
	$a_p$ (mm)	2,2	2,2
	$a_e$ (mm)	63,5	63,5
	<b>Dry or Wet</b>	Dry	Dry
	<b>Tool diam. Ø</b>	80mm	80mm
	<b>No. of Teeth</b>	5	7
	<b>Result</b>	Efficiency: 133% achieved Tool life: 138% achieved	
	<b>Evaluation</b>	Efficiency, tool life	

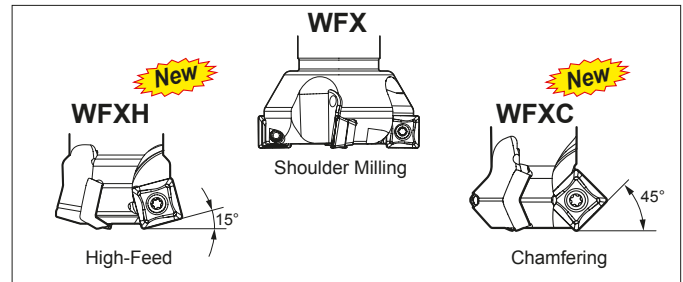
Work piece		Sumitomo	Comp.
Workpiece material: Cr-Mo alloy	<b>Breaker</b>	G	
	<b>Grade</b>	ACP200	
	$v_c$ (m/min)	200	200
	$v_f$ (mm/min)	838	838
	$f_t$ (mm/t)	0,2	0,13
	$a_p$ (mm)	6	6
	$a_e$ (mm)	43	43
	<b>Dry or Wet</b>	Dry	Dry
	<b>Tool diam. Ø</b>	80mm	80mm
	<b>No. of Teeth</b>	5	8
	<b>Result</b>	Efficiency: 120% achieved	
	<b>Evaluation</b>	Efficiency	

# "Wave Mill" Series WFX Type



## General Features

Wave Mill WFX type for shoulder milling is a screw-locking type cutter capable of using four corners. Ideal cutting edge design delivers good squareness. Series expansion with the high-feed **WFXH** type and the **WFXC** type for chamfering. A comprehensive lineup that covers a wide variety of applications.



## Characteristics

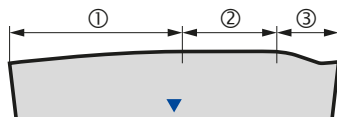
The insert shape, optimized for shoulder milling and combined with a high-precision body, leaves a superior machined surface finish.



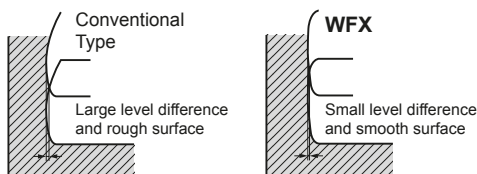
## Max. Depth of Cut



## Optimized Edge Shape



- ① The convex shape ensures the cutting edge strength.
- ② The flat shape minimises differences in step levels.



- ③ The wiper edge function improves the surface roughness.

## Product Range

Application	Type	Cat. No.	No. of Teeth	Cutter Diameter (mm)	Shape
Shoulder Milling	Shell Type	WFX 08000 RS	3 - 8	Ø40 - Ø100	
		WFXM 08000 RS	4 - 10	Ø40 - Ø100	
		WFXF 08000 RS	6 - 12	Ø40 - Ø100	
		WFX 08000 R	6 - 8	Ø80 - Ø100	
		WFXM 08000 R	8 - 10	Ø80 - Ø100	
		WFXF 08000 R	10 - 12	Ø80 - Ø100	
		WFX 12000 RS	3 - 5	Ø60 - Ø100	
		WFXF 12000 RS	4 - 7	Ø60 - Ø100	
		WFX 12000 R	4 - 12	Ø80 - Ø250	
	WFXF 12000 R	6 - 18	Ø80 - Ø250		
	Endmill Type	WFX 08000 E	2 - 5	Ø20 - Ø63	
		WFXM 08000 E	3 - 6	Ø25 - Ø63	
WFX 12000 E		3 - 4	Ø40 - Ø80		
WFXF 12000 E		4 - 6	Ø60 - Ø80		
Modular Type	WFX 08000 M	2 - 3	Ø20 - Ø40		
High Efficiency	Shell Type	WFXH 08000 RS	4 - 6	Ø40 - Ø63	
		WFXH 12000 RS	4 - 5	Ø60 - Ø63	
	Modular Type	WFXH 08000 M	2 - 3	Ø25 - Ø32	
Chamfering	Endmill Type	WFXC 08000 E	1 - 2	Ø8 - Ø16	
		WFXC 12000 E	3	Ø25 - Ø32	
	Modular Type	WFXC 08000 M	2	Ø16	
		WFXC 12000 M	3	Ø25 - Ø32	

H16/17

## Inserts

Cat. No.	R0,2	R0,4	R0,8	R1,2	R1,6
SOMT 0803 __PZER-L		●	●		
0803 __PZER-G		●	●	●	
0803 __PZER-H			●	●	
SOET 0803 __PZER-G		●	●	●	
0803 __PZFR-S	●	●	●		
SOMT 1204 __PDER-L			●		
1204 __PDER-G		●	●	●	●
1204 __PDER-H			●		
SOET 1204 __PDFR-S			●		



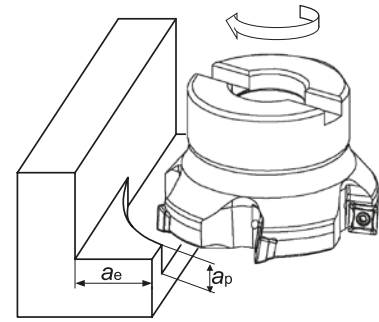
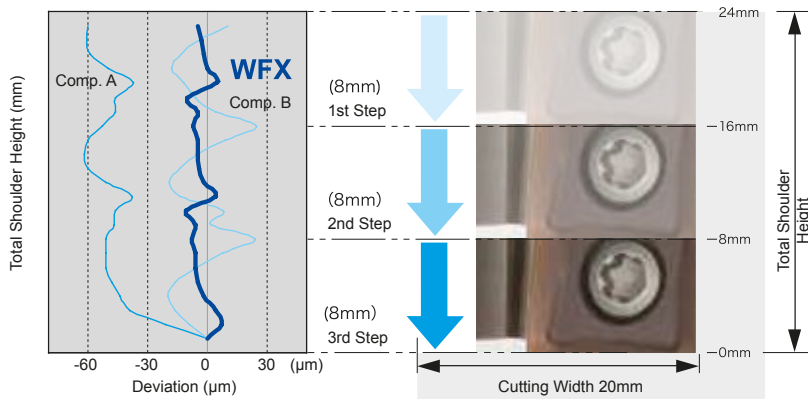
WFX12000 type insert (General Purpose G type chipbreaker)



# "Wave Mill" Series WFX Type

## Cutting Performance

### Squareness of Machined Shoulder



Work Material: C50  
 Tool: WFX12100RS (Ø100mm x 5 teeth)  
 Cutting Conditions:  $v_c = 200\text{m/min}$ ,  $a_p = 8,0\text{mm} \times 3\text{ times}$   
 $f_t = 0,15\text{mm/t}$ ,  $a_e = 20\text{mm}$

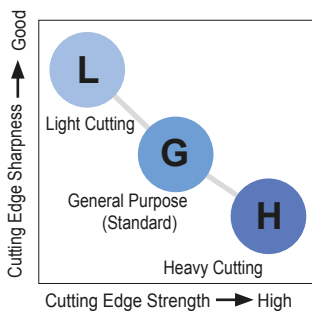
## Grade Selection

ISO	Grade	Finishing to Light Cutting	Medium Cut	Rough to Heavy Cutting
P	Coated Carbide	ACP100	ACP200	ACP300
		ACM200	ACM300	

ISO	Grade	Finishing to Light Cutting	Medium Cut	Rough to Heavy Cutting
K	Coated Carbide	ACK200	ACK300	
N	Coated Carbide	DL1000	H1	

▽ CVD ▲ PVD

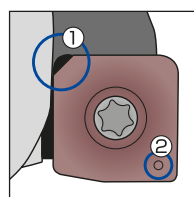
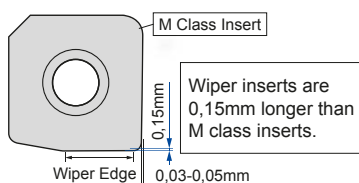
## Chipbreaker Selection



Work Material	Steel, Cast Iron				Aluminium Alloy
	L Type	G Type	H Type	Wiper Type	S Type
Breaker					
Characteristic	Low Cutting Force	General Purpose	Strong Edge	Wiper Edge	Sharp Edge
Cutting Edge Figure					
Work Material-Application	Light Cutting Low rigidity Milling Low-Burr Design	<b>Main Chipbreaker</b> General to Interrupted Milling	Heavy Cut Heavy Interrupted Machining Tempered Steel	Precision Finishing	Non-Ferrous Metal

## Wiper Insert

Optimised wiper edge shape provides superior surface roughness.



Wiper inserts are single-cornered. Attach the wiper insert so that the chamfered corner is in location ① shown in the figure. Be sure to use the corner with the ID mark (② in the figure). (08 size inserts have no marks)

# "Wave Mill" Series

## WFX(M/F) 08000 RS

Shoulder Milling for Steel, Stainless Steel,  
Die Steel, Cast Iron, Non-Ferrous Metal, Exotic Alloy

### Body - Shell Type

Rake Angle	Radial	-6°	6 mm	90°
	Axial	12°		



WFX08000RS



WFXM08000RS



WFXF08000RS

Fig. 1

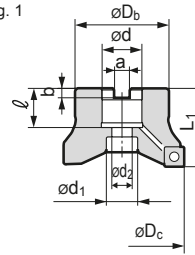
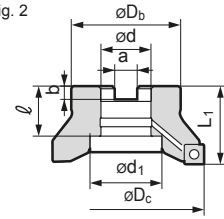


Fig. 2



### Body - WFX, Standard Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Figure
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	$a$	$b$	$\ell$	$\varnothing d_1$	$\varnothing d_2$			
WFX 08040 RS	●	40	33	40	16	8,4	5,6	18	14	9	3	0,2	1
WFX 08050 RS	●	50	41	40	22	10,4	6,3	20	18	11	4	0,3	1
WFX 08063 RS	●	63	50	40	22	10,4	6,3	20	18	11	5	0,6	1
WFX 08080 RS	●	80*	55	50	27	12,4	7,0	25	20	14	6	1,0	1
WFX 08100 RS	●	100*	70	50	32	14,4	8,0	32	46	-	8	1,4	2

### Body - WFXM, Medium Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Figure
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	$a$	$b$	$\ell$	$\varnothing d_1$	$\varnothing d_2$			
WFXM 08040 RS	●	40	33	40	16	8,4	5,6	18	14	9	4	0,2	1
WFXM 08050 RS	●	50	41	40	22	10,4	6,3	20	18	11	5	0,3	1
WFXM 08063 RS	●	63	50	40	22	10,4	6,3	20	18	11	6	0,5	1
WFXM 08080 RS	●	80*	55	50	27	12,4	7,0	25	20	14	8	1,0	1
WFXM 08100 RS	●	100*	70	50	32	14,4	8,0	32	46	-	10	1,4	2

### Body - WFXF, Fine Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Figure
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	$a$	$b$	$\ell$	$\varnothing d_1$	$\varnothing d_2$			
WFXF 08040 RS	●	40	33	40	16	8,4	5,6	18	14	9	6	0,2	1
WFXF 08050 RS	●	50	41	40	22	10,4	6,3	20	18	11	7	0,3	1
WFXF 08063 RS	●	63	50	40	22	10,4	6,3	20	18	11	8	0,5	1
WFXF 08080 RS	●	80*	55	50	27	12,4	7,0	25	20	14	10	0,9	1
WFXF 08100 RS	●	100*	70	50	32	14,4	8,0	32	46	-	12	1,4	2

Inserts are not included.

\*Please use JIS B1176 hexagonal bolt (Ø80: M12x30~35mm, Ø100: M16x40~45mm) for securing Ø80 / Ø100 cutter on the arbor.

### Recommended Cutting Conditions

ISO	Work Material	Hardness (HB)	Cutting Speed	Feed Rate	DOC	Grades
P	General Steel	180~280	150-200-250	0,08-0,12-0,18	<6	ACP200 ACP300
	Soft Steel	≤180	180-250-350	0,10-0,15-0,20	<6	ACP200 ACP300
M	Die Steel	200~220	100-150-200	0,08-0,12-0,18	<4	ACP200 ACP300
	Stainless Steel	-	160-200-250	0,10-0,15-0,20	<6	ACM300
K	Cast Iron	250	100-175-250	0,10-0,15-0,20	<6	ACK200 ACK300
N	Non Ferrous Metal	-	300-500-1000	0,10-0,15-0,20	<6	H1 DL1000

Min. - Optimum - Max.

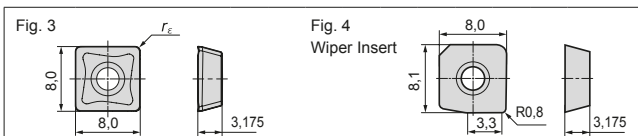
### Identification Details

<b>WFX</b>	<b>F</b>	<b>08</b>	<b>040</b>	<b>R</b>	<b>S</b>
Cutter Series	M: Medium Pitch F: Fine Pitch	Insert Size	Cutter Diameter	Direction	Metric Type

### Spare Parts

Screw	Wrench
BFTX0306IP	TRDR08IP
2,0	

### Inserts



Application	Coated Carbide						Carbide	DLC	Radius	Fig.
	P	M	K	S	N	H				
High Speed / Light cut	●	●	●	●	●	●	●	●	●	
General Purpose	●	●	●	●	●	●	●	●	●	
Roughing	●	●	●	●	●	●	●	●	●	
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	
SOMT 080304 PZER L	●	●	●	●	●	●	●	-	-	0,4 3
080308 PZER L	●	●	●	●	●	●	●	-	-	0,8 3
SOMT 080304 PZER G	●	●	●	●	●	●	●	-	-	0,4 3
080308 PZER G	●	●	●	●	●	●	●	-	-	0,8 3
080312 PZER G	●	●	●	●	●	●	●	-	-	1,2 3
SOMT 080308 PZER H	●	●	●	●	●	●	●	-	-	0,8 3
080312 PZER H	●	●	●	●	●	●	●	-	-	1,2 3
SOET 080304 PZER G	●	●	●	●	●	●	●	-	-	0,4 3
080308 PZER G	●	●	●	●	●	●	●	-	-	0,8 3
080312 PZER G	●	●	●	●	●	●	●	-	-	1,2 3
SOET 080302 PZFR S	-	-	-	-	-	-	-	●	●	0,2 3
080304 PZFR S	-	-	-	-	-	-	-	●	●	0,4 3
080308 PZFR S	-	-	-	-	-	-	-	●	●	0,8 3
XOEW080308 PZTR W	-	-	-	-	●	-	-	-	-	0,8 4

# "Wave Mill" Series WFX(F) 12000 RS

Shoulder Milling for Steel, Stainless Steel,  
Die Steel, Cast Iron, Non-Ferrous Metal, Exotic Alloy

## Body - Shell Type

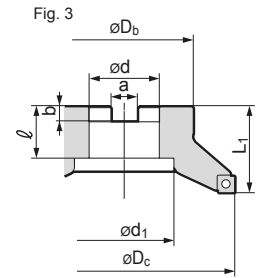
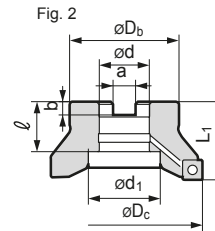
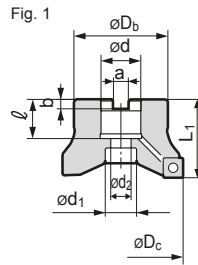
Rake Angle	Radial	-8°	10mm	90°
	Axial	8°		



WFX 12000RS



WFXF12000RS



## Body - WFX, Standard Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Figure
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	$a$	$b$	$\ell$	$\varnothing d_1$	$\varnothing d_2$			
WFX 12050 RS	●	50	40	40	22	10,4	6,3	20	18	11	3	0,2	1
WFX 12063 RS	●	63	50	40	22	10,4	6,3	20	18	11	4	0,4	1
WFX 12080 RS	●	80*	60	50	27	12,4	7,0	25	20	13,5	4	0,9	1
WFX 12100 RS	●	100*	70	50	32	14,4	8,5	32	46	-	5	1,3	2
WFX 12125 RS	●	125	90	63	40	16,4	9,5	29	52	-	6	2,7	2
WFX 12160 RS	●	160	130	63	40	16,4	9,5	29	88	-	8	4,8	3

## Body - WFXF, Fine Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Figure
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	$a$	$b$	$\ell$	$\varnothing d_1$	$\varnothing d_2$			
WFXF 12050 RS	●	50	40	40	22	10,4	6,3	20	18	11	4	0,2	1
WFXF 12063 RS	●	63	50	40	22	10,4	6,3	20	18	11	5	0,4	1
WFXF 12080 RS	●	80*	60	50	27	12,4	7,0	25	20	13,5	6	0,9	1
WFXF 12100 RS	●	100*	70	50	32	14,4	8,5	32	46	-	7	1,2	2
WFXF 12125 RS	●	125	90	63	40	16,4	9,5	29	52	-	8	2,6	2
WFXF 12160 RS	●	160	130	63	40	16,4	9,5	29	88	-	12	4,7	3

Inserts are not included.  
\*Please use JIS B1176 hexagonal bolt ( $\varnothing 80$ : M12x30~35mm,  $\varnothing 100$ : M16x40~45mm) for securing  $\varnothing 80$  /  $\varnothing 100$  cutter on the arbor.  
Cutters  $\geq \varnothing 160$  do not have coolant holes.

## Recommended Cutting Conditions

ISO	Work Material	Hardness (HB)	Cutting Speed	Feed Rate	DOC	Grades
P	General Steel	180~280	150-200-250	0,10-0,15-0,20	<10	ACP200 ACP300
	Soft Steel	$\leq 180$	180-250-350	0,10-0,15-0,20	<10	ACP200 ACP300
	Die Steel	200~220	100-150-200	0,10-0,15-0,20	<6	ACP200 ACP300
M	Stainless Steel	-	160-200-250	0,10-0,15-0,20	<10	ACM300
K	Cast Iron	250	100-175-250	0,10-0,15-0,20	<10	ACK200 ACK300
N	Non Ferrous Metal	-	300-500-1000	0,10-0,15-0,20	<10	H1 DL1000

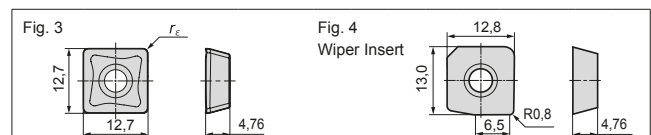
Min. - Optimum - Max.

## Identification Details

<b>WFX</b>	<b>F</b>	<b>12</b>	<b>050</b>	<b>R</b>	<b>S</b>
Cutter Series	F: Fine Pitch	Insert Size	Cutter Diameter	Direction	Metric Type

## Inserts

Application	Coated Carbide							Carbide	DLC
	P	M	K	S	H	N	DL		
High Speed / Light cut	●	●	●	●	●	●	●	●	●
General Purpose	●	●	●	●	●	●	●	●	●
Roughing	●	●	●	●	●	●	●	●	●
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000
SOMT 120408 PDER L	●	●	●	●	●	●	●	-	-
SOMT 120404 PDER G	●	●	●	●	●	●	●	-	-
120408 PDER G	●	●	●	●	●	●	●	-	-
120412 PDER G	●	●	●	●	●	●	●	-	-
120416 PDER G	●	●	●	●	●	●	●	-	-
SOMT 120408 PDER H	●	●	●	●	●	●	●	-	-
SOET 120408 PDFR S	-	-	-	-	-	-	-	●	●
XOEW 120408 PDTR W	-	-	-	-	●	-	-	-	-



## Spare Parts

Shim	Shim Screw	Insert Screw	Insert Wrench	Wrench (Shim)
WFXS4R	BW0507F	BFTX03512IP	3,0	TRDR151P
				LH035



# "Sumi Dual Mill" Series TSX Type

**New**





## ■ General Features

High-efficient and high precision tangential shoulder milling cutter with tangentially mounted carbide inserts.

## ■ Characteristics

- **Tough & Sharp cutting edge**  
Tangentially mounted carbide insert design and optimized edge geometry realize extremely tough and sharp cutting action.
- **Very accurate and excellent surface finish**  
Thanks to newly developed fine carbide press / sintering technology and very accurate grinding technics, very periphery ground inserts generate very accurate and excellent surface finish.
- **Wide product range**  
2 different insert size series, 3 chip breaker range and various carbide grade combination offers wide range of machining application.

## ■ Product Range

	Cat. No.	Series	Diameter Range / No of Teeth											Shape	
			Ø16	Ø20	Ø25	Ø32	Ø40	Ø50	Ø63	Ø80	Ø100	Ø125	Ø160		
Shell Type	TSX 08000RS	Standard Pitch					4	5	6						
	TSXF 08000RS	Fine Pitch					6	8	10						
	TSX 13000RS	Standard Pitch					3	4	5	5	6	7	8		
	TSXM 13000RS	Medium Pitch					4	5	6	7	8	10	12		
Shank Type	TSX 08000E	Standard Pitch	2	2	3	3	4								
	TSXF 08000E	Fine Pitch		3	4	5	6								
	TSX 13000E	Standard Pitch			2	2	3	4							
	TSXM 13000E	Medium Pitch				3	4	5							

 H18

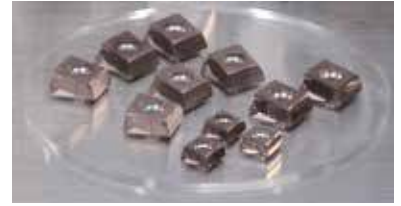
## ■ Special TSX Mills

Special orders repeater and side cutter available.



## ■ Insert Grade Selection

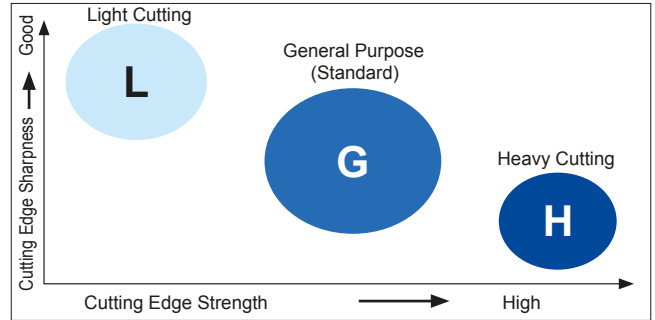
We have released ACP100 / ACP200 / ACP300 grades for steel machining, ACM200 / ACM300 grades for stainless steel machining and ACK200 / ACK300 grades for cast iron machining to cover a wide range of work materials.



ISO	Finishing to Light Cut	Medium Cut	Rough to Heavy Cut
<b>P</b>	ACP100	ACP200	ACP300
<b>M</b>	ACM200	ACM300	
<b>K</b>	ACK200	ACK300	
<b>S</b>	ACM200	ACM300	

▲ PVD
▼ CVD

## ■ Chipbreaker Selection



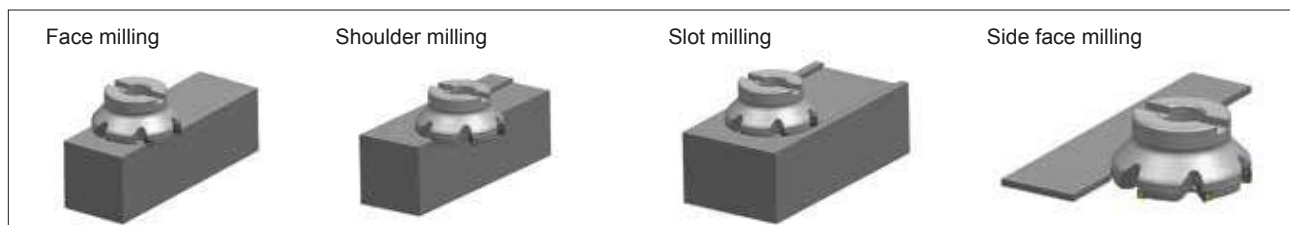
## ■ Inserts

Cat. No.	R0,4	R0,8	R1,2	R1,6	R2,4	R3,2
LNEX0804_PNER-L	●	●				
LNEX0804_PNER-G	●	●	●	●		
LNEX1306_PNER-L	●	●				
LNEX1306_PNER-G		●		●	●	●
LNEX1306_PNER-H	●	●		●	●	●

## ■ Chipbreaker Lineup

Work Material	<b>P M K S</b>		
	L type	G type	H type
Chipbreaker			
Feature	Low cutting force	General purpose	Strong edge
LNEX08 Cutting edge geometry			—
LNEX13 Cutting edge geometry			
Application	Light cut, low rigidity milling and reduced burrs	Main breaker for general purpose applications	Roughing, heavy interrupted and hardness steel milling

## ■ Suitable Applications

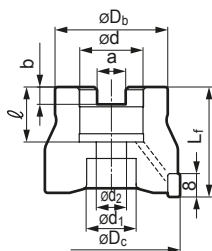


# "Sumi Dual Mill" Series TSX(F) 08000 RS



## ■ Body - Shell Type

Rake Angle	Radial	-20°	8mm	90°
	Axial	-6°		



## ● Body - TSX, Standard Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	a	b	$\ell$	$\varnothing d_1$	$\varnothing d_2$		
TSX 08040 RS	●	40	33	40	16	8,4	5,6	18	14	9	4	0,21
08050 RS	●	50	41	40	22	10,4	6,3	20	18	11	5	0,30
08063 RS	●	63	50	40	22	10,4	6,3	20	18	11	6	0,53

Inserts are not included.

## ● Body - TSXF, Fine Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	a	b	$\ell$	$\varnothing d_1$	$\varnothing d_2$		
TSXF08040 RS	●	40	33	40	16	8,4	5,6	18	14	9	6	0,21
08050 RS	●	50	41	40	22	10,4	6,3	20	18	11	8	0,31
08063 RS	●	63	50	40	22	10,4	6,3	20	18	11	10	0,54

Inserts are not included.

## ■ Inserts

Grade		Coated Carbide						P	Steel
Application	High Speed / Light Cutting	P	M	K	M	S	M	Stainless Steel	
	General Purpose Cutting	P	M	K	M	S	K	Cast Iron	
	Rough Cutting	P	M	K	M	S	S	Exotic Alloy	
Cat. No.		ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	Radius
			●				●	●	$r_\epsilon$
LNEX 080404 PNER-L			●				●	●	0,4
080408 PNER-L			●				●	●	0,8
LNEX 080404 PNER-G			●	●	●		●	●	0,4
080408 PNER-G		●	●	●	●		●	●	0,8
080412 PNER-G			●	●	●		●	●	1,2
080416 PNER-G			●	●	●		●	●	1,6

## ■ Recommended Cutting Conditions

Min. - Optimum - Max.

ISO	Work-material	Hardness	Cutting Speed $v_c$ (m/min)	Feed Rate $f_t$ (mm/T)	Grade
P	Carbon Steel	180~280HB	150 - <b>225</b> - 300	0,08 - <b>0,20</b> - 0,30	ACP100 ACP200 ACP300
		> 280HB	75 - <b>150</b> - 230	0,08 - <b>0,20</b> - 0,30	
	Alloy Steel	180~280HB	100 - <b>175</b> - 250	0,08 - <b>0,15</b> - 0,25	
M	Stainless Steel	220~280HB	90 - <b>135</b> - 180	0,08 - <b>0,15</b> - 0,25	ACM200 ACM300
		>280HB	75 - <b>125</b> - 170	0,08 - <b>0,15</b> - 0,25	
K	Cast Iron Ductile Cast Iron	250HB	100 - <b>175</b> - 250	0,08 - <b>0,20</b> - 0,30	ACK200 ACK300
S	Exotic Material	-	30 - <b>60</b> - 90	0,05 - <b>0,10</b> - 0,15	ACM200 ACM300

## ■ Identification Details

TSX	F	08	050	R	S
Cutter Series	F: Fine Pitch	Insert Size	Cutter Diameter	Direction	Metric Type

## ■ Spare Parts

Screw	Wrench
BFTX0306IP	TRDR08IP
2,0	

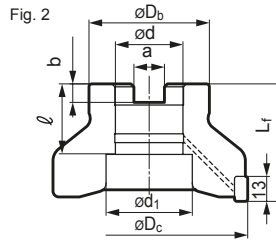
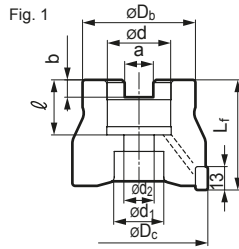
● = Euro stock

Recommended Tightening Torque (N·m)

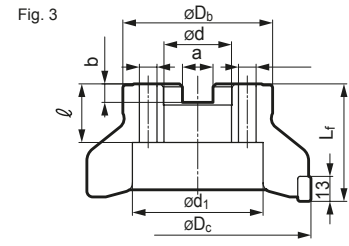
# "Sumi Dual Mill" Series TSX(M) 13000 RS

**New**

## ■ Body - Shell Type



Rake Angle	Radial	-15°	12mm	90°
	Axial	-6°		



## ● Body - TSX, Standard Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Figure
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	$a$	$b$	$\ell$	$\varnothing d_1$	$\varnothing d_2$			
TSX 13040 RS	●	40	33	40	16	8,4	5,6	18	14	9	3	0,20	1
13050 RS	●	50	41	40	22	10,4	6,3	20	18	11	4	0,30	1
13063 RS	●	63	50	40	22	10,4	6,3	20	18	11	5	0,50	1
13080 RS	●	80	55	50	27	12,4	7,0	22	20	14	5	0,92	1
13100 RS	●	100	70	50	32	14,4	8,0	32	46	-	6	1,35	2
13125 RS	●	125	80	63	40	16,4	9,0	29	52	29	7	2,55	1
13160 RS	●	160	130	63	40	16,4	9,0	29	90	-	8	4,97	3

Inserts are not included.

\*Please use JIS B1176 hexagonal bolt ( $\varnothing 80$ : M12x30~35mm,  $\varnothing 100$ : M16x40~45mm) for securing  $\varnothing 80$  /  $\varnothing 100$  cutter on the arbor.

## ● Body - TSXM, Medium Pitch

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Figure
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	$a$	$b$	$\ell$	$\varnothing d_1$	$\varnothing d_2$			
TSXM 13040 RS	●	40	33	40	16	8,4	5,6	18	14	9	4	0,19	1
13050 RS	●	50	41	40	22	10,4	6,3	20	18	11	5	0,28	1
13063 RS	●	63	50	40	22	10,4	6,3	20	18	11	6	0,50	1
13080 RS	●	80	55	50	27	12,4	7,0	22	20	14	7	0,92	1
13100 RS	●	100	70	50	32	14,4	8,0	32	46	-	8	1,36	2
13125 RS	●	125	80	63	40	16,4	9,0	29	52	29	10	2,57	1
13160 RS	●	160	130	63	40	16,4	9,0	29	90	-	12	5,02	3

Inserts are not included.

\*Please use JIS B1176 hexagonal bolt ( $\varnothing 80$ : M12x30~35mm,  $\varnothing 100$ : M16x40~45mm) for securing  $\varnothing 80$  /  $\varnothing 100$  cutter on the arbor.

## ■ Inserts

Application	Grade		Coated Carbide					Steel			
	High Speed / Light Cutting		P	M	K	M <sub>S</sub>	M	K	S		
	General Purpose Cutting		P	M	K	M <sub>S</sub>	M	K	S		
	Rough Cutting		P	M	K	M <sub>S</sub>	M	K	S		
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	Radius			
								$r_\epsilon$			
LNEX 130604 PNER-L	●	●	●	●	●	●	●	0,4			
130608 PNER-L	●	●	●	●	●	●	●	0,8			
LNEX 130604 PNER-G	●	●	●	●	●	●	●	0,4			
130608 PNER-G	●	●	●	●	●	●	●	0,8			
130616 PNER-G	●	●	●	●	●	●	●	1,6			
130624 PNER-G	●	●	●	●	●	●	●	2,4			
130632 PNER-G	●	●	●	●	●	●	●	3,2			
LNEX 130608 PNER-H	●	●	●	●	●	●	●	0,8			
130616 PNER-H	●	●	●	●	●	●	●	1,6			
130624 PNER-H	●	●	●	●	●	●	●	2,4			
130632 PNER-H	●	●	●	●	●	●	●	3,2			

## ■ Recommended Cutting Conditions

G34

## ■ Identification Details

<b>TSX</b>	<b>M</b>	<b>13</b>	<b>100</b>	<b>R</b>	<b>S</b>
Cutter Series	M: Medium Pitch	Insert Size	Cutter Diameter	Direction	Metric Type

## ■ Spare Parts

Screw	Wrench
BFTX03510IP	3,0 TRDR15IP

Milling Cutters

# "Sumi Power Mill" PWS (-F) Type

## ■ Features



### Smooth and stable performance under rough milling conditions

Tangentially mounted inserts, offering positive rake angle and unique curved cutting edge, realize stable and long lasting smooth cutting actions.

### Precision 4 cutting edge inserts

The 4 cutting edge inserts offer maximum cost performance.

### Less vibration under unstable condition

Optimized variable pitch design of the serrated inserts minimizes vibration during unstable conditions.

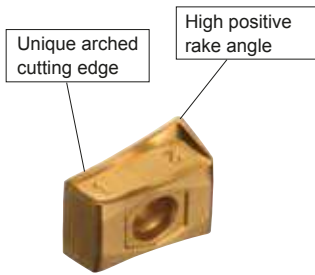
### Tough and durable body

Cutter body shows excellent toughness and durability through special steel and surface treatment.

## ■ Inserts - Design and Performance

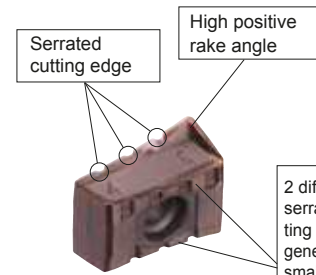
### Comparison of Chip Shape

#### General Purpose: Type G



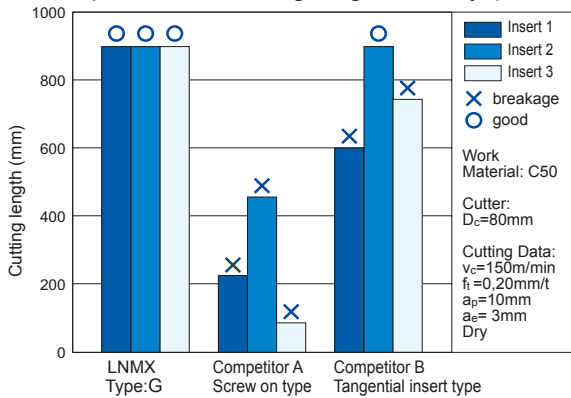
Work Material: C50  
Cutter:  $D_c=100\text{mm}$   
Cutting Data:  $v_c=200\text{m/min}$ ,  $f_t=0,20\text{mm/t}$ ,  $a_p=20\text{mm}$ ,  $a_e=10\text{mm}$   
Coolant: Dry  
Evaluation: The serrated inserts achieve high efficient machining by reducing chattering.

#### Heavy Cut: Type R

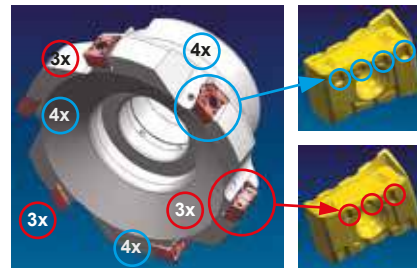


2 different serrated cutting edges generate smaller chips

## ● Comparison of Cutting Edge Stability (Type G)



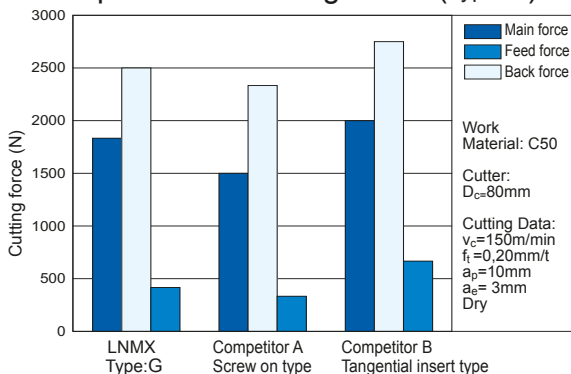
## ● Serrated Insert Application Guidance (Type R)



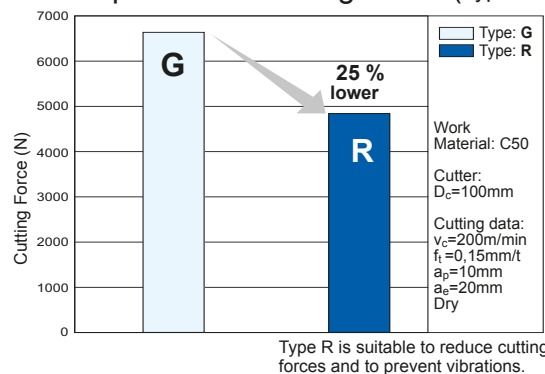
**Setting instruction:**  
Please use two different serrated inserts (3x and 4x) as shown in the left figure.

**Remark about cutting conditions:**  
Adjust feed rate up to  $f_t = 0,25\text{mm/tooth}$ .

## ● Comparison of Cutting Force (Type G)



## ● Comparison of Cutting Force (Type G and R)



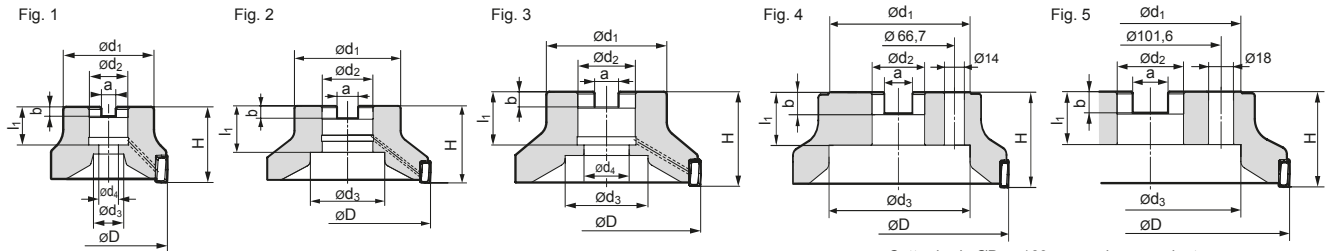


# "Sumi Power Mill" PWS(-F) Type

## Body - Dimensions



Rake Angle	Radial	-15°	16mm	90°
	Axial	-6°		



Cutter body  $\text{ØD}_c \geq 160\text{mm}$ : no inner coolant  
Cutter body  $\text{ØD}_c \geq 200\text{mm}$ : with seat PWSS4R

## Body - PWS, Standard

Type	Cat. No.	Stock	Dimensions (mm)			Mounting						No. of teeth	Weight (kg)	Fig.
			ØD	Ød <sub>1</sub>	H	Ød <sub>2</sub>	Ød <sub>3</sub>	Ød <sub>4</sub>	a	b	l <sub>1</sub>			
PWS 4000	PWS 4080 RS	●	80	60	50	27	20	13,5	12,4	7	25	4	1,0	1
	PWS 4100 RS	●	100	70	50	32	46	-	14,4	8,5	32	6	1,4	2
	PWS 4125 RS	●	125	80	63	40	52	29	16,4	9,5	29	6	2,4	3
	PWS 4160 RS	●	160	100	63	40	88	-	16,4	9,5	29	8	4,2	4
	PWS 4200 RS	□	200	130	63	60	130	-	25,7	14	35	10	6,3	5
	PWS 4250 RS	□	250	130	63	60	160	-	25,7	14	35	12	11,1	5

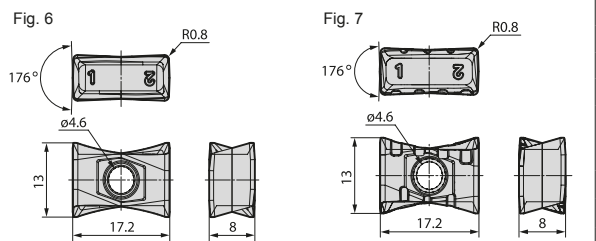
## Body - PWSF, Fine pitch

Type	Cat. No.	Stock	Dimensions (mm)			Mounting						No. of teeth	Weight (kg)	Fig.
			ØD	Ød <sub>1</sub>	H	Ød <sub>2</sub>	Ød <sub>3</sub>	Ød <sub>4</sub>	a	b	l <sub>1</sub>			
PWSF 4000	PWSF 4080 RS	●	80	60	50	27	20	13,5	12,4	7	25	6	0,9	1
	PWSF 4100 RS	●	100	70	50	32	46	-	14,4	8,5	32	8	1,3	2
	PWSF 4125 RS	●	125	80	63	40	52	29	16,4	9,5	29	8	2,3	3
	PWSF 4160 RS	●	160	100	63	40	88	-	16,4	9,5	29	10	4,1	4
	PWSF 4200 RS	□	200	130	63	60	130	-	25,7	14	35	12	6,2	5
	PWSF 4250 RS	□	250	130	63	60	160	-	25,7	14	35	14	11,0	5

Inserts are not included.

## Inserts

Application		Coated Carbide					Application	Remarks	Fig.
High speed/Light cut	General purpose	P	M	K	Other				
High speed/Light cut		●		●			Light cut	6	
General purpose		●	●	●	●		General purpose	6	
Roughing		●	●	●	●		Heavy cut	7	
Cat. No.		ACP100	ACP200	ACP300	ACK200	ACK300			
LNMX170808PNSR-L	●	●	●	●	●	●	Light cut	6	
LNMX170808PNSR-G	●	●	●	●	●	●	General purpose	6	
LNMX170808PNSR-R	●	●	●	●	●	●	Heavy cut	7	



## Recommended Cutting Conditions

ISO	Work Material	Hardness	Cutting Speed v <sub>c</sub> (m/min)	Feed Rate f <sub>t</sub> (mm/t)	Grade
P	Carbon Steel	180-280HB	150-250-350	0,10-0,23-0,35	ACP200
	Alloy Steel	180-280HB	100-175-250	0,10-0,18-0,25	ACP200
M	Stainless Steel	-	100-150-200	0,15-0,18-0,25	ACP300
K	Cast Iron Ductile Iron	250HB	100-175-250	0,10-0,23-0,35	ACK200

Min.-Optimum-Max.

## Spare Parts

Screw	Torx wrench	Sumi-Paste	Seat *
BFTX0412IP	TTR15IP	SUMI-P	PWSS4R

\* from ØD<sub>c</sub> ≥ 200mm

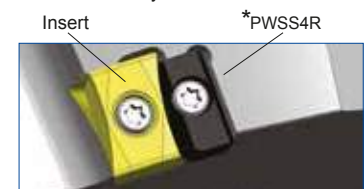
Cutter Body ØD<sub>c</sub> ≥ 200mm  
Please use seat PWSS4R for protection of cutter body.

## Special Cutter Type PWSR



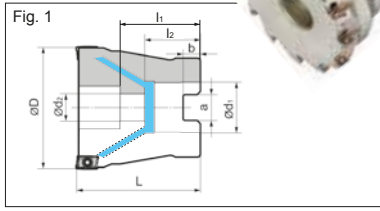
Rake Angle	Radial	-15°	31mm	90°
	Axial	-6°		

Delivery on request

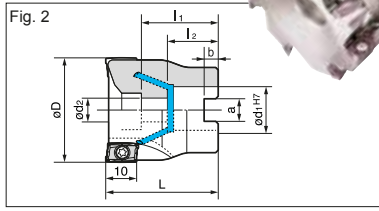


# Wavemill Series WEX (-F) Type

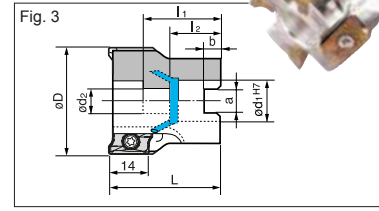
5 mm 90°



10 mm 90°



14 mm 90°



## Body (Shell Type "F")

Cat. No.	Stock	Dimensions (mm)									No. of teeth	Fig.
		ØD	Ød <sub>1</sub>	Ød <sub>2</sub>	a	b	L	l <sub>1</sub>	l <sub>2</sub>			
<b>New</b> WEX 1032 F	●	32	16	9	8,4	5,6	40	26	18	8	1	
WEX1000 1040 F	●	40	16	11	8,4	5,6	40	26	18	10	1	
1050 F	●	50	22	11	10,4	6,3	40	26	18	12	1	
1063 F	●	63	22	11	10,4	6,3	40	26	18	14	1	
WEX2000 2040 F	●	40	16	9	8,4	5,6	40	28	18	6	2	
2050 F	●	50	22	11	10,4	6,3	40	26	20	7	2	
2063 F	●	63	22	11	10,4	6,3	40	26	20	8	2	
2080 F	●	80	27	13,5	12,4	7,0	50	31	25	10	2	
2100 F	□	100	32	32	14,4	8,5	50	32	26	12	2	
WEX3000 3040 F	●	40	16	9	8,4	5,6	40	28	18	4	3	
3050 F	●	50	22	11	10,4	6,3	40	26	20	5	3	
3063 F	●	63	22	11	10,4	6,3	40	26	20	6	3	
3080 F	●	80	27	13,5	12,4	7,0	50	31	25	7	3	
3100 F	●	100	32	32	14,4	8,5	50	32	26	8	3	

## Inserts for WEX1000 / 2000 Type

Application	Coated Carbide								Carbide DLC		Radius
	P	P	K	M	S	M	S	H1	DL1000		
High Speed / Light cut	P										
General Purpose	P	P	K	M	S	M	S				
Roughing		P	P	K	M	S					
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	r <sub>e</sub>	
AXMT 060204 PDER-L	●	●	●	●	●	●	●			0,4	
<b>New</b> 060208 PDER-L	●	●	●	●	●	●	●			0,8	
060212 PDER-L	●	●	●	●	●	●	●			1,2	
AXMT 060204 PDER-G	●	●	●	●	●	●	●			0,4	
<b>New</b> 060208 PDER-G	●	●	●	●	●	●	●			0,8	
060212 PDER-G	●	●	●	●	●	●	●			1,2	
AXMT 060204 PDER-H	●	●	●	●	●	●	●			0,4	
<b>New</b> 060208 PDER-H	●	●	●	●	●	●	●			0,8	
060212 PDER-H	●	●	●	●	●	●	●			1,2	
AXMT 123504 PEER-G	●	●	●	●	●					0,4	
123508 PEER-G	●	●	●	●	●					0,8	
123512 PEER-G	●	●	●	●	●					1,2	
AXMT 123504 PEER-H	●	●	●	●	●					0,4	
123508 PEER-H	●	●	●	●	●					0,8	
123512 PEER-H	●	●	●	●	●					1,2	
AXMT 123504 PEER-E						●	●			0,4	
123508 PEER-E						●	●			0,8	
123512 PEER-E						●	●			1,2	
AXMT 123508 PEER-EH			●			●	●			0,8	
AXET 123502 PEFR-S								●	●	0,2	
123504 PEFR-S								●	●	0,4	
123508 PEFR-S								●	●	0,8	

## Spare Parts

Screw	Wrench	Applicable Endmill
BFTX 01804 IP	TRX 06 IP	0,5 WEX 1000 F
BFTX 0306 IP	TRDR 08 IP	2,0 WEX 2000 F
BFTX 0409 IP	TRDR 15 IP	3,0 WEX 3000 F

## Inserts for WEX3000 Type

Application	Coated Carbide								Carbide DLC		Radius
	P	P	K	M	S	M	S	H1	DL1000		
High Speed / Light cut	P										
General Purpose	P	P	K	M	S	M	S				
Roughing		P	P	K	M	S					
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	r <sub>e</sub>	
AXMT 170508 PEER-L	●	●	●	●	●					0,8	
AXMT 170504 PEER-G	●	●	●	●	●					0,4	
170508 PEER-G	●	●	●	●	●					0,8	
170512 PEER-G	●	●	●	●	●					1,2	
170516 PEER-G	●	●	●	●	●					1,6	
170520 PEER-G*	●	●	●	●	●					2,0	
170530 PEER-G*	●	●	●	●	●					3,0	
AXMT 170508 PEER-H	●	●	●	●	●					0,8	
170512 PEER-H	●	●	●	●	●					1,2	
AXMT 170504 PEER-E						●	●			0,4	
170508 PEER-E						●	●			0,8	
170512 PEER-E						●	●			1,2	
170516 PEER-E						●	●			1,6	
170520 PEER-E*						●	●			2,0	
170530 PEER-E*						●	●			3,0	
AXMT 170508 PEER-EH			●			●	●			0,8	
AXET 170502 PEFR-S								●	●	0,2	
170504 PEFR-S								●	●	0,4	
170508 PEFR-S								●	●	0,8	

\* Cutter body modification is required.



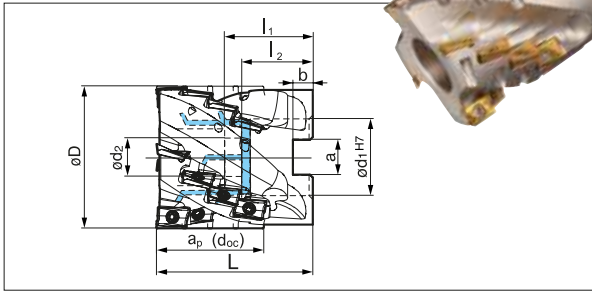
- Unable to produce
- L - Low cutting force
- G - General type
- H - Strong cutting edge
- E - For stainless steel
- EH - Strong edge for stainless steel
- S - For aluminium

## Identification Details

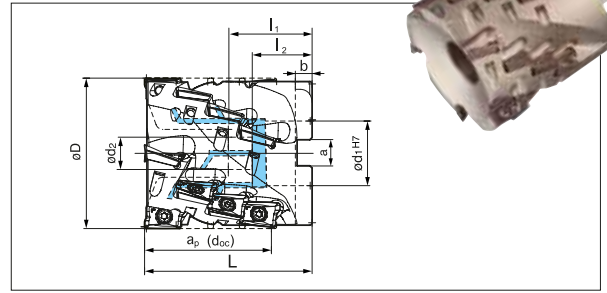
<b>WEX</b>	<b>2</b>	<b>016</b>	<b>F</b>
Cutter Series	2000 Series	Cutter Diameter	Shell Type

# Wave Repeater Mill WRX (-F) Type

18-36 mm 90°



27-53 mm 90°



## Body (Shell Type "F")

Cat. No.	Stock	Depth of cut (d <sub>oc</sub> )	Dimensions (mm)									No. of teeth	No. of rows	Effective teeth
			øD	ød <sub>1</sub>	ød <sub>2</sub>	a	b	l <sub>1</sub>	l	l				
WRX2040RH18F16	□	18	40	16	9	8,4	5,6	50	39	18	10	2	5	
WRX2040RH36F16	●	36	40	16	9	8,4	5,6	55	44	18	16	4	4	
WRX2050RH18F22	□	18	50	22	11	10,4	6,3	50	36	20	10	2	5	
WRX2050RH36F22	●	36	50	22	11	10,4	6,3	55	41,5	20	16	4	4	

## Body (Shell Type "F")

Cat. No.	Stock	Depth of Cut (d <sub>oc</sub> )	Dimensions (mm)									No. of teeth	No. of rows	Effective teeth
			øD	ød <sub>1</sub>	ød <sub>2</sub>	a	b	l <sub>1</sub>	l	l				
WRX3050RH27F22	□	27	50	22	11	10	6,3	50	36	20	8	2	4	
WRX3050RH53F22	●	53	50	22	11	10	6,3	70	56	20	12	4	3	
WRX3063RH27F27	□	27	63	27	13,5	12	7	70	34	2	10	2	5	
WRX3063RH53F27	●	53	63	27	13,5	12	7	70	54	2	16	4	4	
WRX3080RH27F32	□	27	80	32	17	14	8	50	30	2	12	2	6	
WRX3080RH53F32	●	53	80	32	17	14	8	85	63	2	20	4	5	
WRX3100RH27F40	□	27	100	40	21	16	9,5	85	40	30	14	2	7	
WRX3100RH53F40	●	53	100	40	21	16	9,5	85	59	30	24	4	6	

## Inserts (Same as for Wavemill WEX 2000 Type)

Application	Coated Carbide							Carbide		DLC
	P	K	M/S	M/S	M/S	M/S	H1	DL1000		
High Speed / Light cut	●	●	●	●	●	●	●	●	●	
General Purpose	●	●	●	●	●	●	●	●	●	
Roughing	●	●	●	●	●	●	●	●	●	
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	Radius r <sub>ε</sub>
AXMT 123504 PEER-G	●	●	●	●	●	●	●	●	●	0,4
123508 PEER-G	●	●	●	●	●	●	●	●	●	0,8
123512 PEER-G	●	●	●	●	●	●	●	●	●	1,2
AXMT 123504 PEER-H	●	●	●	●	●	●	●	●	●	0,4
123508 PEER-H	●	●	●	●	●	●	●	●	●	0,8
123512 PEER-H	●	●	●	●	●	●	●	●	●	1,2
AXMT 123504 PEER-E	●	●	●	●	●	●	●	●	●	0,4
123508 PEER-E	●	●	●	●	●	●	●	●	●	0,8
123512 PEER-E	●	●	●	●	●	●	●	●	●	1,2
AXMT 123508 PEER-EH	●	●	●	●	●	●	●	●	●	0,8
AXET 123502 PEFR-S	●	●	●	●	●	●	●	●	●	0,2
123504 PEFR-S	●	●	●	●	●	●	●	●	●	0,4
123508 PEFR-S	●	●	●	●	●	●	●	●	●	0,8

- Unable to produce
- L – Low cutting force
- G – General type
- H – Strong cutting edge
- E – For stainless steel
- EH – Strong edge for stainless steel
- S – For aluminium

## Spare Parts

Screw	Wrench	Applicable Endmill
BFTX 0306 IP	TRDR 08 IP	WRX 2_ _ _ RH_ _ F_ _
BFTX 0409 IP	TRDR 15 IP	WRX 3_ _ _ RH_ _ F_ _

## Inserts (Same as for Wavemill WEX 3000 Type)

Application	Coated Carbide							Carbide		DLC
	P	K	M/S	M/S	M/S	M/S	H1	DL1000		
High Speed / Light cut	●	●	●	●	●	●	●	●	●	
General Purpose	●	●	●	●	●	●	●	●	●	
Roughing	●	●	●	●	●	●	●	●	●	
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM800	H1	DL1000	Radius r <sub>ε</sub>
AXMT 170508 PEER-L	●	●	●	●	●	●	●	●	●	0,8
AXMT 170504 PEER-G	●	●	●	●	●	●	●	●	●	0,4
170508 PEER-G	●	●	●	●	●	●	●	●	●	0,8
170512 PEER-G	●	●	●	●	●	●	●	●	●	1,2
170516 PEER-G	●	●	●	●	●	●	●	●	●	1,6
170520 PEER-G*	●	●	●	●	●	●	●	●	●	2,0
170530 PEER-G*	●	●	●	●	●	●	●	●	●	3,0
AXMT 170508 PEER-H	●	●	●	●	●	●	●	●	●	0,8
170512 PEER-H	●	●	●	●	●	●	●	●	●	1,2
AXMT 170504 PEER-E	●	●	●	●	●	●	●	●	●	0,4
170508 PEER-E	●	●	●	●	●	●	●	●	●	0,8
170512 PEER-E	●	●	●	●	●	●	●	●	●	1,2
170516 PEER-E	●	●	●	●	●	●	●	●	●	1,6
170520 PEER-E*	●	●	●	●	●	●	●	●	●	2,0
170530 PEER-E*	●	●	●	●	●	●	●	●	●	3,0
AXMT 170508 PEER-EH	●	●	●	●	●	●	●	●	●	0,8
AXET 170502 PEFR-S	●	●	●	●	●	●	●	●	●	0,2
170504 PEFR-S	●	●	●	●	●	●	●	●	●	0,4
170508 PEFR-S	●	●	●	●	●	●	●	●	●	0,8

\* Cutter body modification is required.



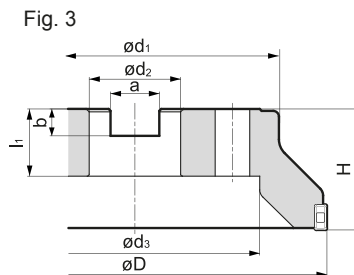
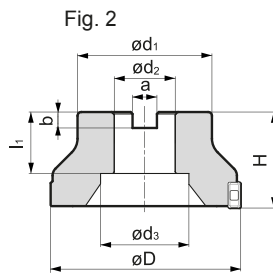
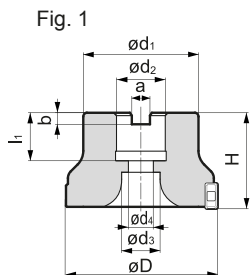
## Identification Details

WRX	20	25	R	H	27	W	25
	Insert Size	Tool øD	Cutting Direction	Inner coolant	Cutting Edge Length	Arbor Type	Arbor Diameter
						↓	
							E - Straight Shank W - Weldon Shank F - Shell Type

# "Sumi Power Mill" PWC Type

## Powerful Tangential Milling System for Cast Iron

Approach angle	: 88°
Axial rake angle	: +5°
Radial rake angle	: -5°



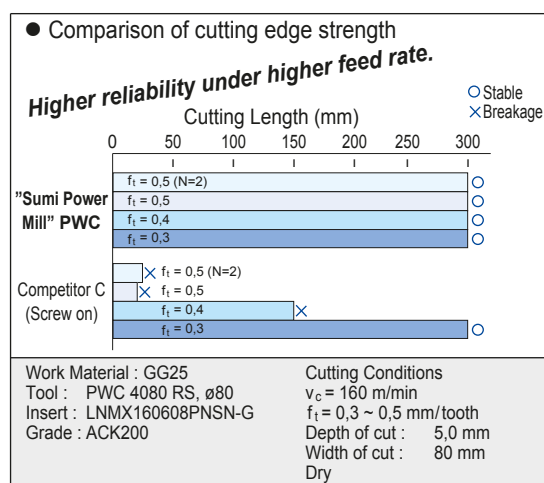
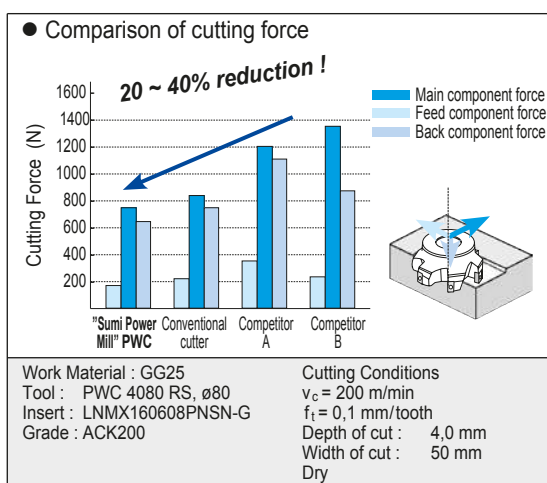
### Body (Standard, PWC Type)

Type	Cat. No.	Stock		Dimensions (mm)			Mounting					Number of teeth	Max. Depth of Cut	Weight (Kg)	Fig.
		R	L	$\phi D$	$\phi d_1$	H	$\phi d_2$	$\phi d_3$	$\phi d_4$	a	b				
PWC 4000	PWC 4080 R/L-S	●	●	80	60	50	27	29,5	13	12,4	7,0	25	12,0	0,9	1.
	PWC 4100 R/L-S	●	●	100	70	50	32	46	-	14,4	8,5	29		1,3	
	PWC 4125 R/L-S	●	●	125	80	63	40	56	-	16,4	9,5	29		2,5	2.
	PWC 4160 R/L-S	●	●	160	100	63	40	88	-	16,4	9,5	29		4,2	
	PWC 4200 R/L-S	●	●	200	150	63	60	130	-	25,7	14,0	35		16	7,2

### Body (Fine Pitch, PWC Type)

Type	Cat. No.	Stock		Dimensions (mm)			Mounting					Number of teeth	Max. Depth of Cut	Weight (Kg)	Fig.	
		R	L	$\phi D$	$\phi d_1$	H	$\phi d_2$	$\phi d_3$	$\phi d_4$	a	b					$l_1$
PWC 4000	PWCF 4080 R/L-S	●	●	80	60	50	27	29,5	13	12,4	7,0	25	12,0	0,9	1.	
	PWCF 4100 R/L-S	●	●	100	70	50	32	46	-	14,4	8,5	29		1,4		
	PWCF 4125 R/L-S	●	●	125	80	63	40	56	-	16,4	9,5	29		15	2,6	2.
	PWCF 4160 R/L-S	●	●	160	100	63	40	88	-	16,4	9,5	29		18	4,3	
	PWCF 4200 R/L-S	●	●	200	150	63	60	130	-	25,7	14,0	35		24	7,4	3.

### Performance



### Recommended cutting Conditions

Material	Grey Cast Iron (GG)	Ductile Cast Iron (GGG)
Cutting speed (m/min)	100 — 200 — 250 — 300	100 — 150 — 200 — 250
Feed rate (mm/tooth)	0,1 — 0,2 — 0,3 — 0,4 — 0,5	0,05 — 0,1 — 0,2 — 0,25 — 0,3
Grade	ACK200, ACK300	

### Spare Parts

Cutter	Screw	Wrench
PWC (F) 4000	BFTX 0412 N 3,0 (Nm)	TTX 15 W

# "Sumi Power Mill" PWC Type

High Metal Removal  
High Volume Insert Capacity  
High Performance Inserts



## ● Geometry



Rake angle  
G type : 20°  
H type : 15°

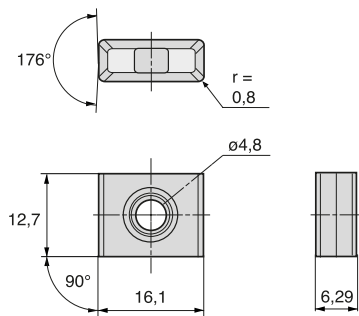


Wiper width = 2,4 mm

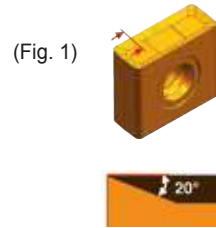
## ■ Advantages

- High volume insert capacity  
The tangential orientation of the strong carbide inserts increases the number of cutting edges (eg 3 edges /inch) maximising edge contact with the workpiece.
- Cost effective tooling  
Using M Class precision sintered inserts with 8 cutting edges both acquisition and operating costs are substantially reduced.
- Increased tool life  
New Cast Iron grades ACK200 for general cutting and ACK300 for heavy cutting provide increased tool life and high productivity
- Durable cutter body  
The robust cutter body is manufactured from a special alloyed steel then coated with a hard surface to resist swarf damage, scratching, and corrosion.

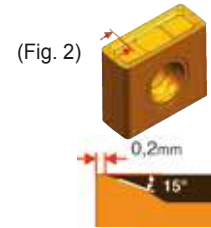
## ■ Inserts



### ● G type insert for light cutting

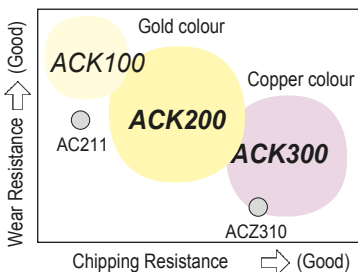


### ● H type insert with strong cutting edge



Cat. No.	Nose Radius	CVD Coated		PVD Coated	Fig.	Application	Remark
		ACK100	ACK200	ACK300			
LNMX 160608 PNSN-G	0,8		●	●	1	General application	First recommendation
LNMX 160608 PNSN-H	0,8	●	●	●	2	Instable machining Heavy interruption	Suitable for instable condition

## ■ New Coated Grade for Cast Iron

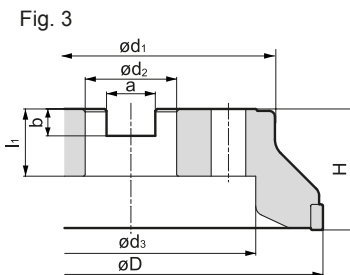
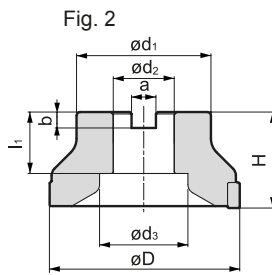
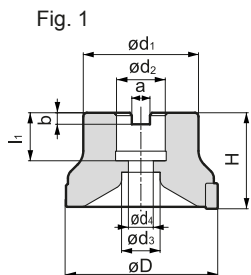


Cast Iron (K) (GG, GGG)					Grade	Characteristic · Application
K 01	K 10	K 20	K 30	K 40		
					ACK100	High wear resistance with special hard substrate and fine Ti-based Al <sub>2</sub> O <sub>3</sub> CVD coating for high speed machining
					ACK200	Excellent wear resistance with fine Ti-based and tough Al <sub>2</sub> O <sub>3</sub> CVD coating
					ACK300	Excellent toughness with fine grain carbide substrate. Cr added new PVD coating could improve hardness and oxidation resistance.

# Shoulder Mill CNP / CNPF Type

## Shoulder Milling for Steel, Stainless Steel & Cast Iron

Approach angle : 90°  
Axial rake angle : +10° ~ 17°  
Radial rake angle : +10° ~ 16°



### ■ Body (Standard, CNP Type)

Type	Cat. No.	Stock	Dimensions (mm)			Mounting						No. of teeth	Max. Depth of Cut	Weight (Kg)	Fig.
			$\phi D$	$\phi d_1$	H	$\phi d_2$	$\phi d_3$	$\phi d_4$	a	b	$l_1$				
CNP13000	CNP 13040 RS	●	40	36	40	22	14	9	8,4	5,6	18	4	12,0	0,3	1.
	CNP 13050 RS	●	50	40	40	27	18	11	10,4	6,3	20				
	CNP 13063 RS	●	63	40	40	22	18	11	10,4	6,3	20				
	CNP 13080 RS	●	80	60	50	27	20	13	12,4	7,0	25	5	7	0,9	2.
	CNP 13100 RS	●	100	70	50	32	-	-	14,4	8,5	32				
	CNP 13125 RS	●	125	80	63	40	-	-	16,4	9,5	38				
	CNP 13160 RS	●	160	100	63	40	-	-	16,4	9,5	38				
CNP 13200 RS	●	200	150	63	60	-	-	25,7	14,0	34	10	7,2	3.		

### ■ Body (Fine Pitch, CNPF Type)

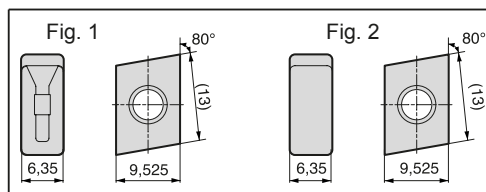
Type	Cat. No.	Stock	Dimensions (mm)			Mounting						No. of teeth	Max. Depth of Cut	Weight (Kg)	Fig.
			$\phi D$	$\phi d_1$	H	$\phi d_2$	$\phi d_3$	$\phi d_4$	a	b	$l_1$				
CNPF13000	CNPF 13063 RS	●	63	40	40	22	18	11	10,4	6,3	20	7	12,0	0,4	1.
	CNPF 13080 RS	●	80	60	50	27	20	13	12,4	7,0	25				
	CNPF 13100 RS	●	100	70	50	32	-	-	14,4	8,5	32				
	CNPF 13125 RS	●	125	80	63	40	-	-	16,4	9,5	38	9	11	2,4	2.
	CNPF 13160 RS	●	160	100	63	40	-	-	16,4	9,5	38				
	CNPF 13200 RS	●	200	150	63	60	-	-	25,7	14,0	34	13			

Milling Cutters



### ■ Inserts

Remarks:  
-G: General purpose  
-H: Strong cutting edge



Cat. No.	Tolerance Class	Nose Radius	Coated Carbide					Fig.
			ACP100	ACP200	ACP300	ACK200	ACK300	
CNMU 130608 N-G	M	0,8	●	●	●	●	●	1.
CNMU 130608 N-H	M	0,8	●	●	●	●	●	
CNMQ 130608 N	M	0,8	●	●	●	●	●	2.
CNMQ 130616 N	M	1,6	●	●	●	●	●	
CNEQ 130608 N	E	0,8	●	●	●	●	●	

### ■ Spare Parts

Cutter	Screw	Wrench
CNP-(F) 13000	BFTX 0412 N	TTX 15 W

### ■ Recommended Cutting Conditions

[ $v_c$  = m/min,  $f_t$  = mm/tooth] [min. – optimum – max.]

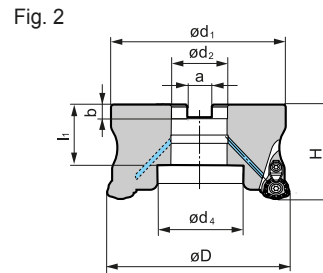
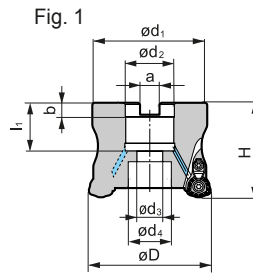
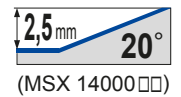
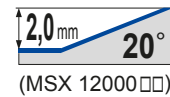
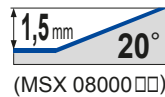
Type	Insert Type	CNMU / CNMQ 130600 N / -G/ -H													
		Grade		ACP100			ACP200			ACP300		ACK200		ACK300	
		Work Material	Low carbon steel	Alloy steel	Die steel	Low carbon steel	Alloy steel	Die steel	Stainless steel		Cast iron	Ductile cast iron	Cast iron	Ductile cast iron	
							austenitic	martensitic							
CNP 13000	$v_c$	100-250-400	80-220-280	80-150-250	80-200-370	70-150-250	60-130-220	120-180-240	100-140-200	220-270-450	150-180-250	180-220-270	130-160-220		
	$f_t$	0,1-0,25-0,4	0,1-0,25-0,35	0,1-0,2-0,3	0,1-0,25-0,4	0,1-0,25-0,35	0,1-0,2-0,3	0,1-0,2-0,25	0,1-0,2-0,25	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,25-0,4	0,1-0,25-0,4		
	$d_{oc}$	-10													

# "Metal Slash Mill" MSX Type

High Feed Milling of Steel, Stainless Steel, Die Steel and Cast Iron



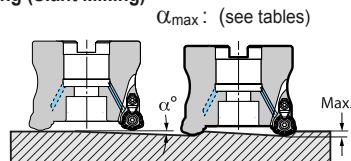
H8-10



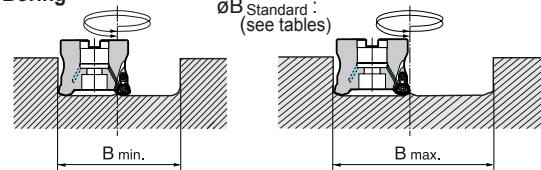
## Body

Cat. No.	Stock	Dimensions (mm)			Mounting						No. of teeth	Helical Boring øB (max-min)	Ramping α <sub>max.</sub>	Weight (Kg)	Fig.	Applicable Insert
		øD	ød <sub>1</sub>	H	a	b	ød <sub>2</sub>	ød <sub>3</sub>	ød <sub>4</sub>	l <sub>1</sub>						
MSX 08040 RS	●	40	37	45	8,4	5,6	16	9	13,5	18	4	65 ~ 78	1°30'	0,2	1	WDMT 0804 ZDTR-H
MSX 12050 RS	●	50	47	50	10,4	6,3	22	11	18	20	4	78 ~ 99	2°30'	0,3	1	WDMT 1205 ZDTR-H
MSX 12052 RS	●	52	47	50	10,4	6,3	22	11	18	20	4	82 ~ 103	2°00'	0,3		
MSX 12063 RS	●	63	60	50	10,4	6,3	22	11	18	20	5	104 ~ 125	1°30'	0,4		
MSX 12066 RS	●	66	60	63	12,4	7,0	27	13,5	20	25	5	110 ~ 131	1°00'	0,4	1	WDMT 1406 ZDTR-H
MSX 14050 RS	●	50	47	50	10,4	6,3	22	11	17	20	3	73 ~ 98	3°30'	0,3		
MSX 14063 RS	●	63	60	50	10,4	6,3	22	11	18	20	4	99 ~ 124	2°00'	0,6		
MSX 14066 RS	●	66	60	63	12,4	7,0	27	13,5	20	25	4	107 ~ 132	2°00'	0,7		
MSX 14080 RS	●	80	76	63	12,4	7,0	27	13,5	20	25	5	133 ~ 158	1°30'	1,2		
MSX 14100 RS	●	100	96	63	14,4	8,5	32	-	44	32	6	173 ~ 198	1°00'	1,8	2	

## Ramping (Slant Milling)



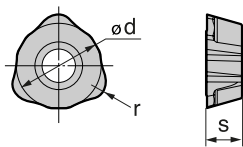
## Helical Boring



## Recommended Cutting Conditions

Depth of cut : d<sub>oc</sub> (mm)  
Feed rate : f<sub>t</sub> (mm/tooth)

## Inserts



Cat. No.	Coated Carbide			Dimensions (mm)			Max. d <sub>oc</sub>
	ACP200	ACP300	ACK300	ød	s	r	
WDMT 0804 ZDTR	●	●	●	8,5	4,0	2,0	1,5
WDMT 0804 ZDTR-H	●	●	●	8,5	4,0	2,0	1,5
WDMT 1205 ZDTR	●	●	●	12	5,0	2,0	2,0
WDMT 1205 ZDTR-H	●	●	●	12	5,0	2,0	2,0
WDMT 1406 ZDTR	●	●	●	14	6,0	2,0	2,5
WDMT 1406 ZDTR-H	●	●	●	14	6,0	2,0	2,5

ZDTR-H : Stronger cutting edge

Work Material	Insert Type	Cutting Speed v <sub>c</sub> (m/min)	Insert Cat. No.	ø40		ø50 ~ 66		ø80 ~ 100	
				d <sub>oc</sub>	f <sub>t</sub>	d <sub>oc</sub>	f <sub>t</sub>	d <sub>oc</sub>	f <sub>t</sub>
General Steel (Below HB200)	ACP200	100-150-200	WDMT 0804	1,0	1,2	-	-	-	-
			WDMT 1205	-	-	1,2	1,4	-	-
			WDMT 1406	-	-	1,5	1,5	1,5	1,5
Alloy Steel (Below HRC45)	ACP200	80-130-180	WDMT 0804	0,8	1,2	-	-	-	-
			WDMT 1205	-	-	1,0	1,4	-	-
			WDMT 1406	-	-	1,3	1,5	1,3	1,5
Stainless Steel (X5CRN11810)	ACP300	80-120-150	WDMT 0804	1,0	0,8	-	-	-	-
			WDMT 1205	-	-	1,2	1,2	-	-
			WDMT 1406	-	-	1,5	1,3	1,5	1,3
Cast Iron GG, GGG	ACK300	100-150-200	WDMT 0804	1,0	1,4	-	-	-	-
			WDMT 1205	-	-	1,2	1,5	-	-
			WDMT 1406	-	-	1,5	1,8	1,5	1,8
Hardened Steel (Below HRC50)	ACK300	40-80-100	WDMT 0804	0,5	0,8	-	-	-	-
			WDMT 1205	-	-	0,6	1,0	-	-
			WDMT 1406	-	-	1,0	1,2	1,0	1,2

- The above recommended cutting conditions may require adjustment according to machine rigidity and work rigidity.
- The above figures are guidelines for use with the BT50 machine tool.

## Spare Parts

Screw	Wrench	Clamp	C Ring	Cramp screw	Applicable endmill
BFTX 0306 IP <b>2,0</b>	TRDR 08 IP	CCH 3,5	CR 03	BFTX 03510 IP 08	MSX 08000RS
BFTX 0409 IP <b>3,0</b>	TRDR 15 IP	CCH 3,5	CR 03	BFTX 03510 IP 15	MSX 12000RS
BFTX 0511 IP <b>5,0</b>	TRDR 20 IP	CCH 4,5	CR 03	BFTX 04513 IP 20	MSX 14000RS

Remark: If depth-of-cut exceeds 5mm, reduce recommended feedrates by 50%.

The conditions above are meant as a guide, please adjust the cutting conditions according to actual work material and machine rigidity.

# "Wave Mill" Series WFXH Type



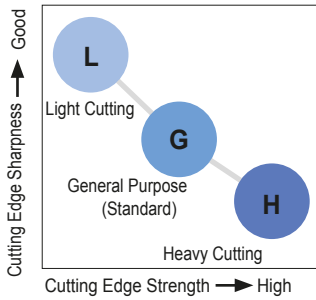
## General Features

WaveMill WFXH type is a high efficiency, multi-purpose cutter, that uses the WFX series inserts for high-feed roughing and a variety of processes.

## Characteristics

Stable, high-efficiency milling with superior cutting edge sharpness. Supports various types of processes (ramping and helical milling). Able to use the selection of inserts from the WFX series.

## Chipbreaker Selection



Work Material	P M K	Steel, Stainless Steel, Cast Iron			N	Aluminium Alloy
Breaker	L Type	G Type	H Type	S Type		
Characteristic	Low Cutting Force	General Purpose	Strong Edge	Sharp Edge		
Cutting Edge Figure						
Work Material Application	Light Cutting Low rigidity Milling Low-Burr Design	<b>Main Chipbreaker</b> General to Interrupted Milling	Heavy Cut Heavy Interrupted Machining Tempered Steel	Non-Ferrous Metal		

## Notes on Corner Finishing - Remaining Material

Actual machined corners will have uncut and overcut portions due to the shape of the inserts.

Fig. 1

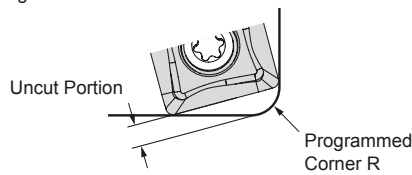
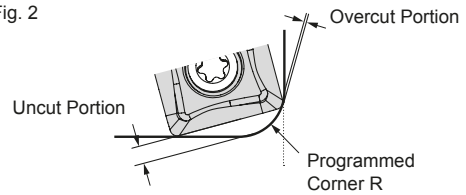


Fig. 2



## WFXH 08000 RS Type

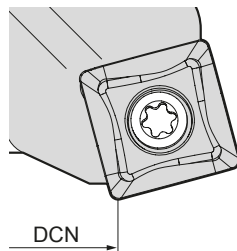
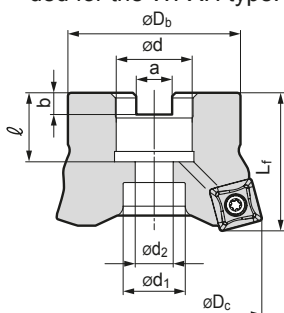
Programmed Corner R	SOMT 080004-□			SOMT 080008-□			SOMT 080012-□		
	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape
2,0	1,41	0	Fig. 1	1,30	0	Fig. 1	1,21	0	Fig. 1
2,5	1,30	0,02	Fig. 2	1,19	0,01	Fig. 2	1,09	0	Fig. 2
3,0	-	-	-	-	-	-	0,98	0,05	Fig. 2

## WFXH 12000 RS Type

Programmed Corner R	SOMT 120004-□			SOMT 120008-□			SOMT 120012-□			SOMT 120016-□		
	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape
2,0	2,58	0	Fig. 1	2,48	0	Fig. 1	2,37	0	Fig. 1	2,25	0	Fig. 1
2,5	2,47	0	Fig. 1	2,37	0	Fig. 1	2,25	0	Fig. 1	2,14	0	Fig. 1
3,0	2,36	0	Fig. 1	2,26	0	Fig. 1	2,14	0	Fig. 1	2,11	0	Fig. 1
3,5	2,24	0,01	Fig. 2	2,14	0	Fig. 1	2,03	0	Fig. 1	1,91	0	Fig. 1
4,0	-	-	-	2,03	0,04	Fig. 2	1,91	0,03	Fig. 2	1,8	0,01	Fig. 2

## Minimum Cutting Diameter

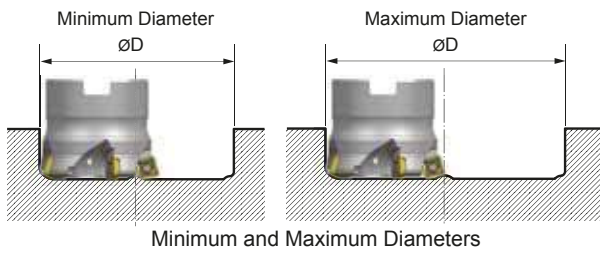
Minimum cutting diameter (DCN) will depend on the insert that is used. Using an insert with a large nose radius is recommended for the WFXH type.



Body Cat. No.	ØDc	DCN based on insert nose			
		R0,4	R0,8	R1,2	R1,6
WFXH 08040 RS	40	24,6	24,4	24,2	-
08050 RS	50	34,6	34,4	34,2	-
08050 RSZ6	50	34,6	34,5	34,2	-
08063 RS	63	47,6	47,5	47,2	-
WFXH 12050 RS	50	25,8	25,6	25,4	25,2
12063 RS	63	38,6	38,4	38,2	38,0



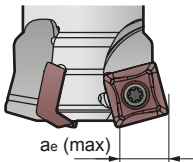
## ■ Taper Cutting and Helical Milling



Insert Cat. No.	$\varnothing D_c$	Helical Milling		Taper Cutting
		Min.	Max.	Max. Ramping Angle
SOMT 080004-□	25	35	49	1°30'
	32	49	63	0°30'
	40	65	79	0°30'
	50	Impossible	Impossible	0°30'
	63	Impossible	Impossible	Impossible
SOMT 080008-□	25	35	48	3°
	32	49	62	1°30'
	40	65	78	1°
	50	85	98	0°30'
	63	111	124	0°30'
SOMT 080012-□	25	34	47	4°30'
	32	48	61	2°30'
	40	64	77	1°30'
	50	84	97	1°
	63	110	123	0°30'

Insert Cat. No.	$\varnothing D_c$	Helical Milling		Taper Cutting
		Min.	Max.	Max. Ramping Angle
SOMT 120004-□	40	56	79	1°
	50	76	99	0°30'
	63	Impossible	Impossible	Impossible
SOMT 120008-□	40	56	78	1°30'
	50	76	98	1°
	63	102	124	0°30'
SOMT 120012-□	40	55	77	2°30'
	50	75	97	1°30'
	63	101	123	1°
SOMT 120016-□	40	55	76	3°30'
	50	75	96	2°
	63	101	122	1°30'

## ■ Maximum Width of Cut when Plunge Milling



Insert Cat. No.	Max. Width of Cut $a_e$ (max)
SOMT08	6mm
SOMT12	10mm

Lower the feed rate when plunge milling.

## ■ Recommended Cutting Conditions

ISO	Work Material	Grade	Cutting Speed ( $v_c$ (m/min))	Insert Cat. No.	$\varnothing 25$		$\varnothing 32$		$\varnothing 40$		$\varnothing 50$		$\varnothing 63$	
					$a_p$ (mm)	$f_t$ (mm/t)	$a_p$ (mm)	$f_t$ (mm/t)	$a_p$ (mm)	$f_t$ (mm/t)	$a_p$ (mm)	$f_t$ (mm/t)	$a_p$ (mm)	$f_t$ (mm/t)
P	General Steel <200HB	ACP200	100 - 150 - 200	SOMT08	0,8	0,8	0,8	0,8	-	-	0,8	0,8	0,8	0,8
				SOMT12	-	-	-	-	1,0	1,0	1,0	1,0	1,0	1,0
P	Alloy Steel <HRC45	ACP200	80 - 130 - 180	SOMT08	0,7	0,8	0,7	0,8	-	-	0,7	0,8	0,7	0,8
				SOMT12	-	-	-	-	0,8	1,0	0,8	1,0	0,8	1,0
K	Stainless Steel (X5CrNiS18 10, other)	ACM300	80 - 120 - 150	SOMT08	0,8	0,7	0,8	0,7	-	-	0,8	0,7	0,8	0,7
				SOMT12	-	-	-	-	1,0	0,8	1,0	0,8	1,0	0,8
M	Cast Iron FC, FCD	ACK300	100 - 150 - 200	SOMT08	0,8	1,0	0,8	1,0	-	-	0,8	1,0	0,8	1,0
				SOMT12	-	-	-	-	1,0	1,2	1,0	1,2	1,0	1,2
H	Hardened Steel <HRC50	ACK300	40 - 80 - 100	SOMT08	0,5	0,5	0,5	0,5	-	-	0,5	0,5	0,5	0,5
				SOMT12	-	-	-	-	0,6	0,8	0,6	0,8	0,6	0,8

The above recommended cutting conditions may require adjustment according to machine rigidity and work rigidity. The above figures are guidelines for use with the BT50 machine tool.

The above conditions assume a tool overhang length of  $L/D=3$  (i.e. overhang length is 3 times tool diameter) or less.

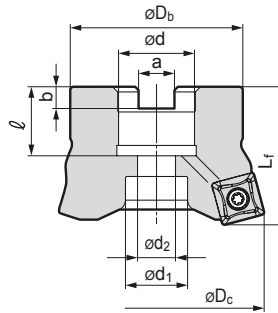
When tool overhang is more than  $L/D=3$  and less or equal  $L/D=5$ , settings should be adjusted to approximately 70% to 80% of those indicated in the above cutting conditions (i.e.  $a_p$  and  $f_z$ ).

When tool overhang is more than  $L/D=5$  and less or equal  $L/D=8$ , settings should be adjusted to approximately 50% to 60% of those indicated in the above cutting conditions (i.e.  $a_p$  and  $f_z$ ).

# "Wave Mill" Series

## WFXH 08000 RS

High Efficiency Machining for Steel, Stainless Steel, Die Steel and Non-Ferrous Metal



Rake Angle	Radial	-6°	1,5 mm 15°
	Axial	6°	

### ■ Body - WFXH08000RS

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	$a$	$b$	$\ell$	$\varnothing d_1$	$\varnothing d_2$		
WFXH 08040 RS	○	40	33	40	16	8,4	5,6	18	14	9	4	0,2
WFXH 08050 RS	○	50	41	40	22	10,4	6,3	20	18	11	5	0,3
WFXH 08050 RSZ6	○	50	41	40	22	10,4	6,3	20	18	11	6	0,3
WFXH 08063 RS	○	63	50	40	22	10,4	6,3	20	18	11	6	0,5

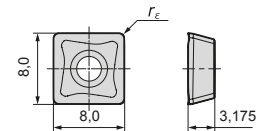
Inserts are not included.

### ■ Identification Details

<b>WFX</b>	<b>H</b>	<b>08</b>	<b>040</b>	<b>R</b>	<b>S</b>	<b>- Z6</b>
Cutter Series	High Efficiency Milling	Insert Size	Cutter Diameter	Direction	Metric Type	Fine Pitch Type (Value is number of teeth)

### ■ Inserts

Application	Coated Carbide							Carbide	DLC	Radius (mm)
High Speed / Light cut	P			K		MS	KN			
General Purpose	PM	PM	K		MS	MS		N		
Roughing	PM	PM		K		MS		N		
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	$r_\epsilon$
SOMT 080304 PZER L	●	●	●	●	●	●	●	-	-	0,4
SOMT 080308 PZER L	●	●	●	●	●	●	●	-	-	0,8
SOMT 080304 PZER G	●	●	●	●	●	●	●	-	-	0,4
SOMT 080308 PZER G	●	●	●	●	●	●	●	-	-	0,8
SOMT 080312 PZER G	●	●	●	●	●	●	●	-	-	1,2
SOMT 080308 PZER H	●	●	●	●	●	●	●	-	-	0,8
SOMT 080312 PZER H	●	●	●	●	●	●	●	-	-	1,2
SOET 080304 PZER G	●	●	●	●	●	●	●	-	-	0,4
SOET 080308 PZER G	●	●	●	●	●	●	●	-	-	0,8
SOET 080312 PZER G	●	●	●	●	●	●	●	-	-	1,2
SOET 080302 PZFR S*	-	-	-	-	-	-	-	●	●	0,2
SOET 080304 PZFR S*	-	-	-	-	-	-	-	●	●	0,4
SOET 080308 PZFR S*	-	-	-	-	-	-	-	●	●	0,8



\* If the cutting edge lacks strength when performing high efficiency milling of non-ferrous metals, try G type chipbreakers (ACK300).

### ■ Spare Parts

Screw	Wrench
BFTX0306IP	TRDR08IP
2,0	

### ■ Recommended Cutting Conditions

G45

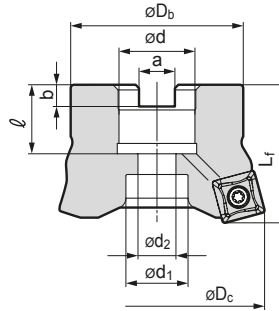
### ■ Programming and Dimension Information

G44

# "Wave Mill" Series WFXH 12000 RS

High Efficiency Machining for Steel, Stainless Steel, Die Steel and Non-Ferrous Metal

**New**



Rake Angle	Radial	-6°	2,5 mm 15°
	Axial	6°	

## ■ Body - WFXH12000RS

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)
		$\varnothing D_c$	$\varnothing D_b$	$L_f$	$\varnothing d$	$a$	$b$	$\ell$	$\varnothing d_1$	$\varnothing d_2$		
WFXH 12050 RS	○	50	41	40	22	10,4	6,3	20	18	11	4	0,3
WFXH 12063 RS	○	63	50	40	22	10,4	6,3	20	18	11	5	0,4

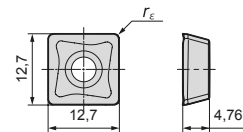
Inserts are not included.

## ■ Identification Details

<b>WFX</b>	<b>H</b>	<b>12</b>	<b>050</b>	<b>R</b>	<b>S</b>
Cutter Series	High Efficiency Milling	Insert Size	Cutter Diameter	Direction	Metric Type

## ■ Inserts

Application	Coated Carbide						Carbide	DLC	Radius (mm)	
	P	P <sub>M</sub>	P <sub>M</sub>	K	K	M <sub>S</sub>				
High Speed / Light cut	P			K		M <sub>S</sub>	K <sub>N</sub>			
General Purpose		P <sub>M</sub>	P <sub>M</sub>	K		M <sub>S</sub>		N		
Roughing		P <sub>M</sub>	P <sub>M</sub>	K		M <sub>S</sub>		N		
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	$r_\epsilon$
SOMT 120408 PDER L	●	●	●	●	●	●	●	-	-	0,8
SOMT 120404 PDER G	●	●	●	●	●	●	●	-	-	0,4
120408 PDER G	●	●	●	●	●	●	●	-	-	0,8
120412 PDER G	●	●	●	●	●	●	●	-	-	1,2
120416 PDER G	●	●	●	●	●	●	●	-	-	1,6
SOMT 120408 PDER H	●	●	●	●	●	●	●	-	-	0,8
SOET 120408 PDFR S*	-	-	-	-	-	-	-	●	●	0,8



\* If the cutting edge lacks strength when performing high efficiency milling of non-ferrous metals, try G type chipbreakers (ACK300).

## ■ Spare Parts

Screw	Wrench
BFTX03512IP 3,0	TRDR15IP

## ■ Recommended Cutting Conditions

G45

## ■ Programming and Dimension Information

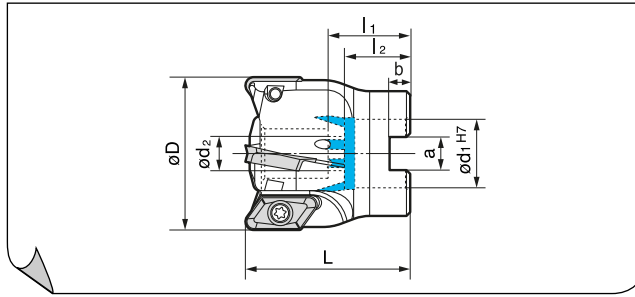
G44

# Wavemill Series WAX 3000 RS Type

16-18mm 90°



(Shellmill)



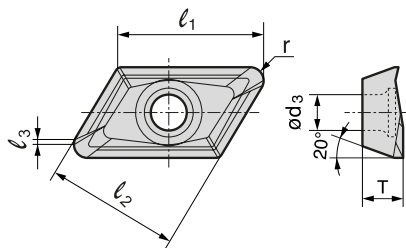
## ■ Body (For inserts with nose radius $\leq 3,2\text{mm}$ )

Cat. No.	Stock	Dimensions (mm)								No. of teeth	Weight (Kg)
		$\varnothing D$	$\varnothing d_1$	L	$\varnothing d_2$	a	b	$l_1$	$l_2$		
WAX 3050 RS-3.2	●	50	22	50	11	10,4	6,3	26	21	4	0,34
WAX 3063 RS-3.2	●	63	22	50	11	10,4	6,3	26	21	5	0,6
WAX 3080 RS-3.2	●	80	27	50	13,5	12,4	7	30	23	5	1,0
WAX 3100 RS-3.2	●	100	32	63	18	14,4	8	32	26	6	2,2
WAX 3125 RS-3.2	●	125	40	63	22	16,4	9	35	29	7	3,5

## ■ Body (For inserts with nose radius $\geq 4,0\text{mm}$ )

Cat. No.	Stock	Dimensions (mm)								No. of teeth	Weight (Kg)
		$\varnothing D$	$\varnothing d_1$	L	$\varnothing d_2$	a	b	$l_1$	$l_2$		
WAX 3050 RS-4.0	●	50	22	50	11	10,4	6,3	26	21	4	0,34
WAX 3063 RS-4.0	●	63	22	50	11	10,4	6,3	26	21	4	0,6
WAX 3080 RS-4.0	●	80	27	50	13,5	12,4	7	30	23	5	1,0
WAX 3100 RS-4.0	●	100	32	63	18	14,4	8	32	26	6	2,2
WAX 3125 RS-4.0	●	125	40	63	22	16,4	9	35	29	7	3,5

## ■ Inserts for WAX 3000 Type



Cat. No.	DLC Coated	Carbide	Dimensions (mm)						$\varnothing d_3$
	DL 1000		H1	$l_1$	$l_2$	$l_3$	r	T	
AECT 160404 PEFRA	●	●	18	16,4	1,4	0,4	5	4,4	
160408 PEFRA	●	●	18	16,4	1	0,8	5	4,4	
160412 PEFRA	●	●	18	16,4	0,6	1,2	5	4,4	
160416 PEFRA	●	●	17,5	16,4	0,5	1,6	5	4,4	
160420 PEFRA	●	●	17,5	16,4	0,5	2	5	4,4	
160430 PEFRA	●	●	17	16,4	0,7	3	5	4,4	
160432 PEFRA	●	●	17	16,4	0,5	3,2	5	4,4	
AECT 160440 PEFRA	●	●	16,5	16,4	0,5	4	5	4,4	
160450 PEFRA	●	●	16	16,4	0,4	5	5	4,4	

## ■ Spare Parts

Screw	Insert Wrench	Applicable Endmill
 3,0 (N·m)		
BFTX 0408	TRD 15	$\varnothing 50 \sim \varnothing 125$

● = Euro stock  
□ = Delivery on request

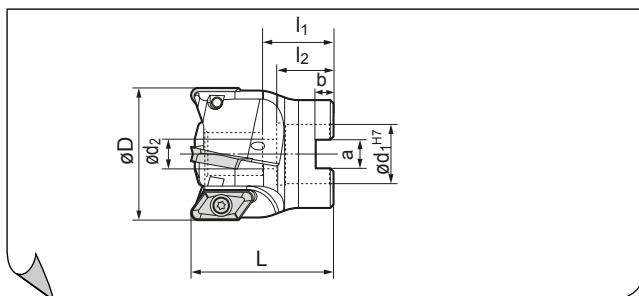


Recommended Tightening Torque (N·m)

# Wavemill Series WAX 4000 RS Type

22-24 mm 90°

(Shellmill)



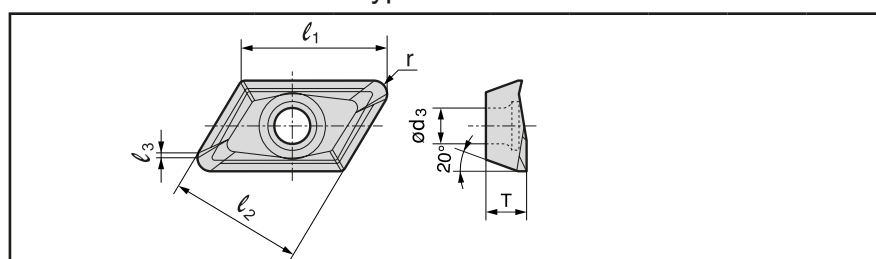
## ■ Body (For inserts with nose radius ≤ 3,2mm)

Cat. No.	Stock	Dimensions (mm)								No. of teeth	Weight (Kg)
		øD	ød <sub>1</sub>	L	ød <sub>2</sub>	a	b	l <sub>1</sub>	l <sub>2</sub>		
WAX4050RS -3.2	☐	50	16	50	9	8,4	5,6	23	18	2	0,37
4063RS -3.2	☐	63	22	50	11	10,4	6,3	26	21	3	0,54
4080RS -3.2	☐	80	27	50	13,5	12,4	7	30	23	4	0,81
4100RS -3.2	☐	100	32	63	18	14,4	8	32	26	5	1,7
4125RS -3.2	☐	125	40	63	22	16,4	9	35	29	6	2,6

## ■ Body (For inserts with nose radius ≥ 4,0mm)

Cat. No.	Stock	Dimensions (mm)								No. of teeth	Weight (Kg)
		øD	ød <sub>1</sub>	L	ød <sub>2</sub>	a	b	l <sub>1</sub>	l <sub>2</sub>		
WAX4050RS -4.0	☐	50	16	50	9	8,4	5,6	23	18	2	0,37
4063RS -4.0	☐	63	22	50	11	10,4	6,3	26	21	3	0,54
4080RS -4.0	☐	80	27	50	13,5	12,4	7	30	23	4	0,81
4100RS -4.0	☐	100	32	63	18	14,4	8	32	26	5	1,7
4125RS -4.0	☐	125	40	63	22	16,4	9	35	29	6	2,6

## ■ Inserts for WAX 4000 Type



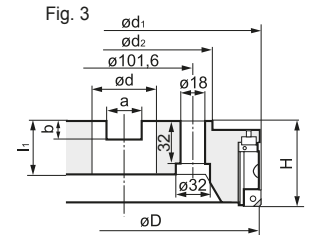
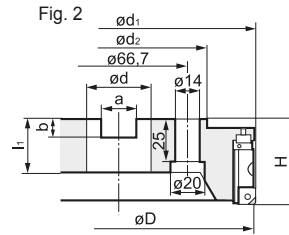
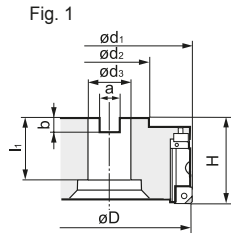
Cat. No.	DLC Coated DL 1000	Carbide H1	Dimensions (mm)						
			l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	r	T	ød <sub>3</sub>	
AECT 220604 PEFRA	☐	☐	24	21,8	1,5	0,4	6,35	6,0	
220608 PEFRA	☐	☐	24	21,8	1,2	0,8	6,35	6,0	
220612 PEFRA	☐	☐	24	21,8	0,8	1,2	6,35	6,0	
220616 PEFRA	☐	☐	24	21,8	0,4	1,6	6,35	6,0	
220620 PEFRA	☐	☐	24	21,8	0,5	2,0	6,35	6,0	
220630 PEFRA	☐	☐	23	21,8	0,6	3,0	6,35	6,0	
220632 PEFRA	☐	☐	23	21,8	0,4	3,2	6,35	6,0	
AECT 220640 PEFRA	☐	☐	22	21,8	1,2	4,0	6,35	6,0	
220650 PEFRA	☐	☐	22	21,8	0,4	5,0	6,35	6,0	

## ■ Spare Parts

Screw	Insert Wrench	Applicable Endmill
 BFTX0511N	 TRD20	

# SUMIDIA Face Mill RF Type

## High Speed Finishing of Aluminium Alloy



### Body

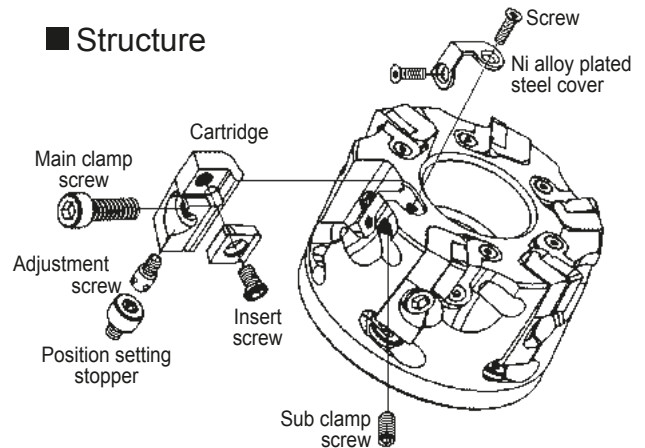
Type	Cat. No.	Stock	Dimensions (mm)				Mounting				No. of teeth	Max. Depth of Cut	Weight (Kg)	Fig.
			$\phi D$	$\phi d_1$	$\phi d_2$	H	$\phi d_3$	a	b	$l_1$				
RF 4000	RF 4080 R-S	●	80	82	60	50	27	12,4	7,0	29	6	3,0	0,7	1.
	RF 4100 R-S	●	100	102	75	50	32	14,4	8,5	29	6		1,0	
	RF 4125 R-S	●	125	127	75	63	40	16,4	9,5	29	8		1,6	
	RF 4160 R-S	□	160	162	100	63	40	16,4	9,5	29	10	2,6	2.	
	RF 4200 R-S	□	200	202	130	63	60	25,7	14,0	38	12	3,6	3.	
	RF 4250 R-S	□	250	252	130	63	60	25,7	14,0	38	16	6,0		
	RF 4315 R-S	□	315	317	240	80	60	25,7	14,0	40	18	11,0		

Remark: PCD blades and inserts are not included.

### Insert for Roughing and Finishing

Shape	Cat. No.	Grade	Stock
	Carbide insert <b>SDET 1204 ZDFR</b>	H1	●
	PCD insert <b>SNEW 1204 ADFR-NF</b>	DA1000 DA2200	● ▲
	PCD insert wiper type <b>SNEW 1204 ADFR-W-NF</b>	DA1000 DA2200	● ▲

### Structure



### "Sumidia" Blade

PCD grade DA2200	Cat. No.	Stock
Standard type	<b>RFB</b>	□
Wiper type	<b>RFBW</b>	□

### Cartridge

Shape	Cat. No.	Stock
For carbide insert	<b>RFR</b>	●
For Sumidia insert	<b>RFF</b>	●

### Dummy Blade

Shape	Cat. No.	Stock
	<b>RFD</b>	□

### Cutting Insert Selection

#### For easy assembling:

PCD blade **RFB**  
PCD blade **RFB** (wiper type)

#### For finishing:

Cartridge **RFF**  
PCD insert SNEW 1204 ADFR-NF (standard type)  
SNEW 1204 ADFR-W-NF (wiper type)  
PCD grade: DA1000

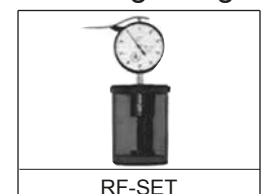
#### For roughing:

Cartridge **RFR**  
Uncoated carbide insert  
SDET 1204 ZDFR, grade: H1

### Spare Parts

RFC	RFS	BX0620	BTD0510	FBUP2-A0-8	RFJ	BFTX0509N	TH050 TH015, TH025 TH015, TH025 TH050	TTX20

### Setting Gauge



Dial-gauge is not included.

● = Euro stock

□ = Delivery on request

▲ = To be replaced by new item

# SUMIDIA Face Mill SRF Type

## High Speed Finishing of Aluminium Alloy



Fig. 1

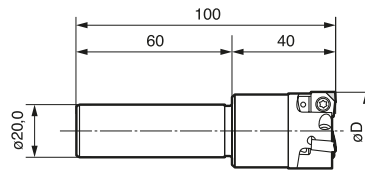
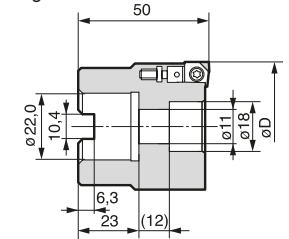


Fig. 2

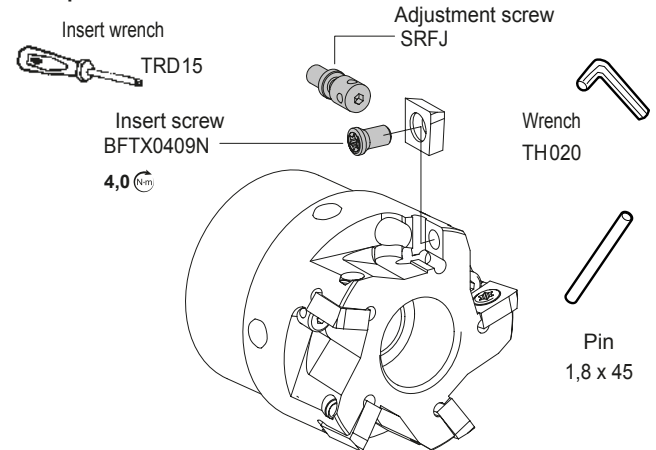


### Body

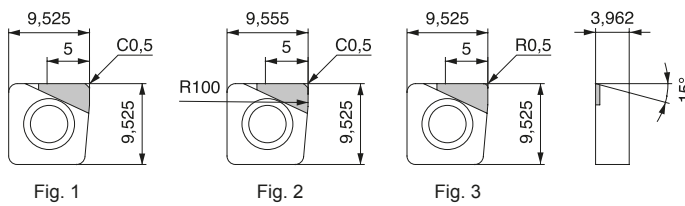
Cat. No.	Stock	øD(mm)	No. of teeth	Fig.	Weight (Kg)
SRF 30 R-ST	☐	30	3	1	0,34
SRF 40 R-ST	☐	40	4	1	0,50
SRF 50 RS	☐	50	5	2	0,59
SRF 63 RS	☐	63	6	2	0,67

Inserts are sold separately.

### Spare Parts



### Insert



### Maximum D.O.C. Guide (SRF50RS, 5 teeth)

The contains guidelines on the maximum D.O.C., determined from internal tests. "O" mark indicates the possible application range. Actual cutting conditions should be set, based on actual machine and work characteristics.

Cat. No.	Cutting Edge	SUMIDIA	Fig.
		DA2200	
SNEW 09T3 ADTR-NF	Standard	☐	1
SNEW 09T3 ADTR-U-NF	Wiper	☐	2
SNEW 09T3 ADTR-R-NF	Nose Radius	☐	3

Feed D.O.C. (mm)	Feed Speed, $v_f$ (mm/min)		
	2.500	4.000	5.000
	Feed Rate, $f_t$ (mm/tooth)		
	0,05	0,08	0,10
0,5	○	○	○
1,0	○	○	○
1,5	○	○	○
2,0	○	○	○
2,5	○	○	○
3,0	○	○	○
3,5	○	○	—
4,0	○	—	—
4,5	○	—	—
5,0	○	—	—

- Standard inserts and Wiper inserts can be used on the same cutter body.
- Standard inserts with nose radius should be used where vibration is present. As such, Wiper-inserts will not be applicable.
- Inserts can be regrind 3 times (up to minimum IC diameter 9,225mm).
- When using reground inserts, it is advisable to reconfirm insert height and cutting diameter with a tool pre-setter.
- Do not mix new and reground inserts, or even inserts with different regrind amount on the same cutter.

### Cutting Conditions

Cutter: SRF 50 RS  
 Insert: SNEW 09T3 ADFR-NF (DA2200)  
 n : 10.000 rpm  
 Width: 35mm at D.O.C. indicated above



### Recommended Cutting Conditions for RF and SRF Type Cutters

Work Material		Process	Grade	Cutting Speed (m/min)		Feed Rate (mm/tooth)	Depth of Cut (mm)	
				RF Type	SRF Type		RF Type	SRF Type
Aluminium Alloy	Si < 13%	Finishing	DA2200 (PCD)	2.000 ~ 5.000	~ 4.000	0,05 ~ 0,2	~ 3,0	~ 5,0
		Roughing	H1 (Carbide)	1.000 ~ 2.500	—			
	Si ≥ 13%	Finishing	DA2200 (PCD)	400 ~ 800	~ 800			
		Roughing	H1 (Carbide)	200 ~ 400	—			

# SUMIBORON "BN Finish Mill" FMU Type

## High Speed Finishing of Grey Cast Iron



### ■ Features

- High speed machining  $v_c=1.500\text{m/min}$
- Excellent surface roughness  $Rz=3,2$  ( $Ra=1,0$ )
- Safety structure for the centrifugal force under high speed cutting conditions
- Run-out is less than  $10\mu\text{m}$
- Easy assembling method using the setting gauge
- Running cost is reduced because of economical insert

## SUMIBORON "BN Finish Mill"

### ■ Application

GG25~GG30 (HB200~250) grey cast iron with pearlite matrix, and ferrite matrix (HB130~160)  
Application examples: engine block, cylinder block, etc

### ■ Specifications

FMU Type:  $\varnothing 80 \sim \varnothing 315 \text{ mm}$   
Insert: SNEW1203ADTR/L  
Low cutting force type: SNEW1203ADTR/L-S

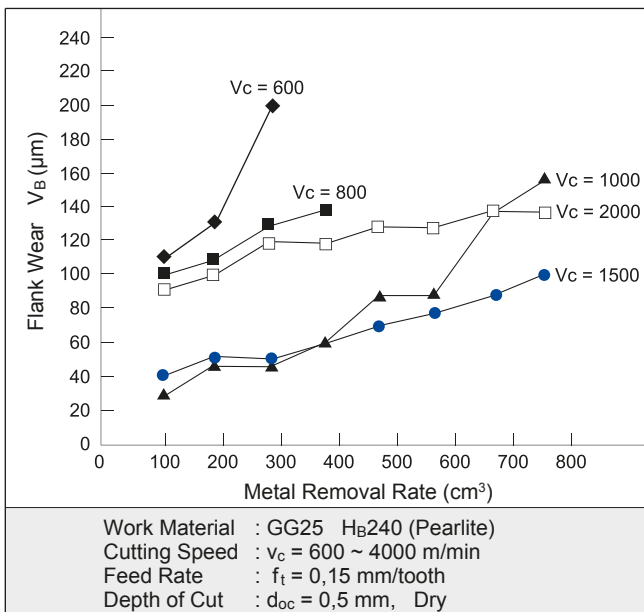
### ■ Recommended Cutting Conditions

Speed:  $v_c = 800 \sim 2000 \text{ m/min}$   
Feed:  $f_t = 0,1 \sim 0,3 \text{ mm/tooth}$   
Depth:  $d_{oc} = 0,5 \text{ mm}$  or less  
Dry cutting

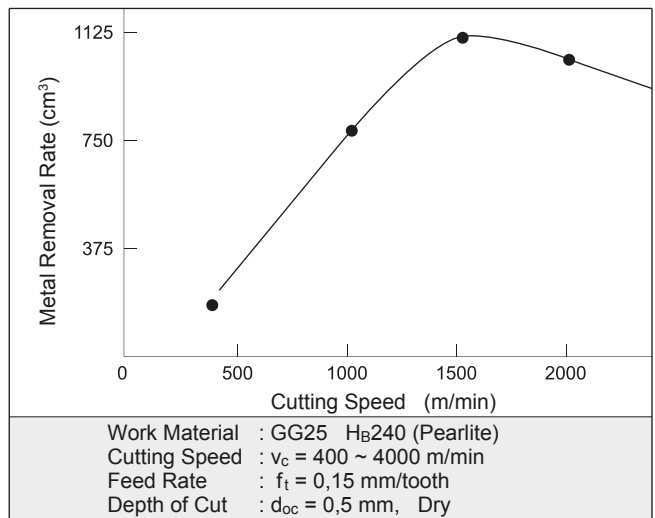


### ■ Performance

#### ● Tool Life Diagram



#### ● Estimated Tool Life



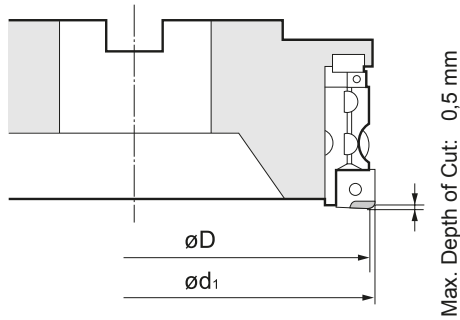
- Milling of ductile cast iron and alloy steel casting do not produce the best results.
- Dry cutting is recommended. Wet cutting will result in chipping of cutting edges in the early stages due to thermal cracking.



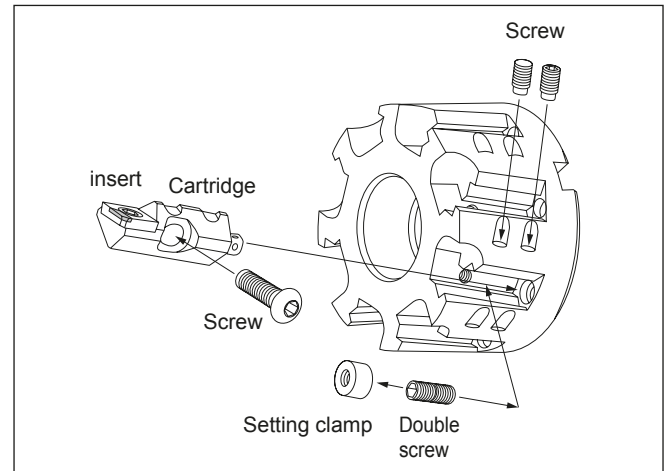
# SUMIBORON "BN Finish Mill" FMU Type

## Specifications

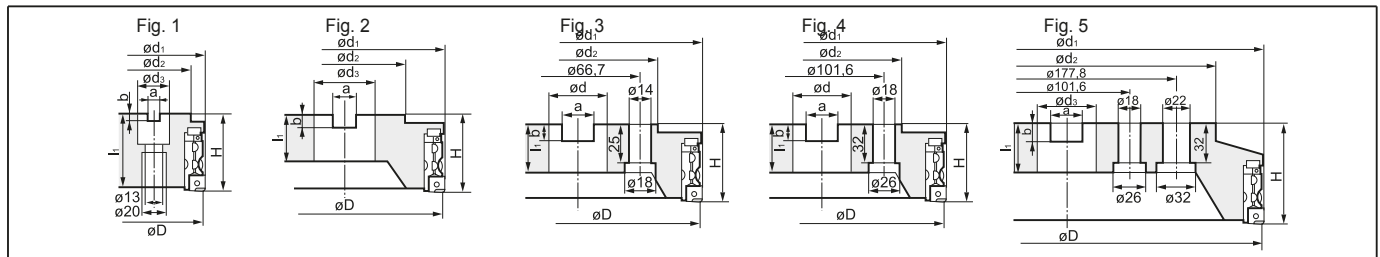
Approach angle: 90°  
Axial rake angle: + 8°  
Radial rake angle: + 2°



## Structure

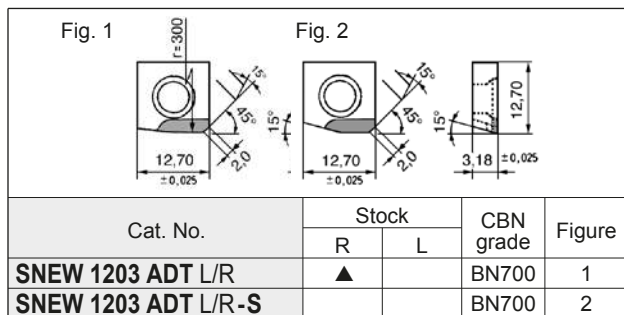


## Body

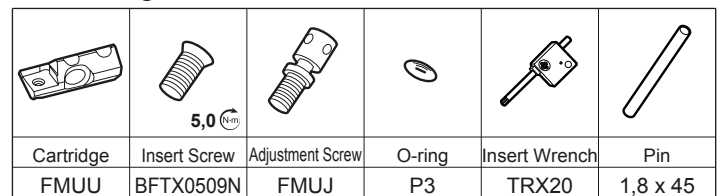


Type	Cat. No.	Stock		Dimensions (mm)				Mounting				No. of teeth	Max. Depth of Cut	Weight (Kg)	Fig.
		R	L	ø D	ø d <sub>1</sub>	ø d <sub>2</sub>	H	ø d <sub>3</sub>	a	b	l <sub>1</sub>				
FMU 4000	FMU 4080 R-S	●		80	82,8	60	63	27	12,4	7,0	25	0,5		1,6	1.
	FMU 4100 R-S	●		100	102,8	76	63	32	14,4	8,5	29			2,4	
	FMU 4125 R-S	□		125	127,8	75	63	40	16,4	9,5	29			3,4	2.
	FMU 4160 R-S	□		160	162,8	100	63	40	16,4	9,5	29			5,6	
	FMU 4200 R-S	□		200	202,8	130	63	60	25,7	14,0	38			9,2	4.
	FMU 4250 R-S	□		250	252,8	130	63	60	25,7	14,0	38			14,3	
	FMU 4315 R-S			315	317,8	240	80	60	25,7	14,0	40			24	27,8

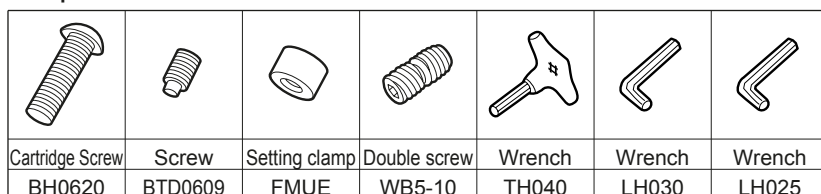
## Insert



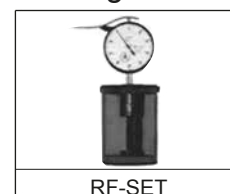
## Cartridge



## Spare Parts



## Gauge

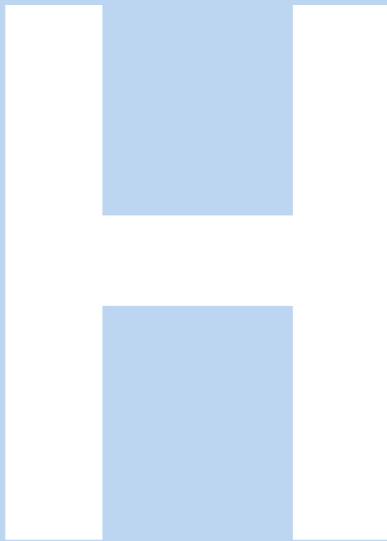


Dial-gauge is not included.



# Indexable Endmills

H1 ~ H48



## Face Milling

General Purpose Face Mills

High Feed Milling

High Feed Milling

## Shoulder Milling

"Sumi Dual Mill"  
"Wave Mill" for Shoulder Milling

"Sumi Dual Mill", tangential

"Sumi Wave" for Shoulder Milling  
"Wave Mill" for Aluminium

"Wave Multi-Function Mill"  
"Wave Repeater Mill"

## Others

"Wave Ball-Mill" for Roughing  
"Wave Ball-Mill" for Finishing

"Wave Radius Mill"

Round Insert Mill

"Wave Mill" for Chamfering

Chamfering Endmill

**Milling Cutter Selection Guide** ..... H 2 -3  
According to Work Materials / Applications  
Modular Tools..... H 4 -5

**DGC 13000 EW** ..... H 6  
**WGX 13000 EW** ..... H 7

**MSX 06000/08000/12000/14000 ES/EM/EW** ..... H 8 -9  
06000/08000/12000/12000 **M** ..... H10-11

**WFXH 08000/12000 M** ..... **New** H12-13

**DFC(M) 09000 E** ..... H14-15

**WFX(F/M) 08000/12000 E**..... H16-17

**WFX 08000 M**..... H16

**TSX(F/M) 08000/13000E**..... **New** H18-19

**New** **WEX 1000/2000/3000 E/EL/EW/M** ..... H20-26

**WAX 3000 E/EL** ..... H27-28

4000 **E/EL** ..... H29

**WMM(H) 2000 / 3000 E/EL/EW/ELW** ..... H30-31

**WRX 2000 / 3000** ..... H32-35

**WBMR 2000/2000L** ..... H36-37

**WBMF 1000** ..... H38-39

**WRCX 08000/10000 E** ..... H40

08000/10000/12000 **M** ..... H41

**RSX(F) 08000/10000/12000 ES** ..... H42

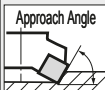

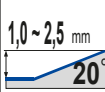

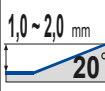
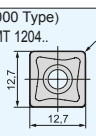
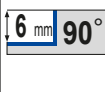
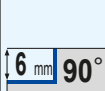
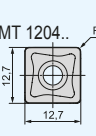
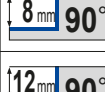
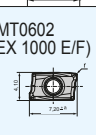
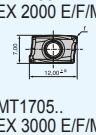
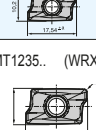
**New** **08000/10000/12000 M** ..... H43

**WFXC 08000/12000 E**..... **New** H44-45

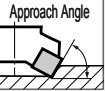

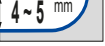

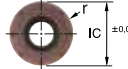






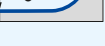





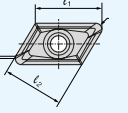

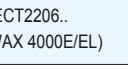


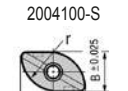


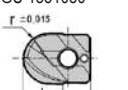
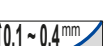
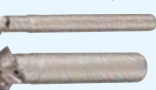
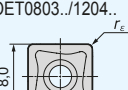


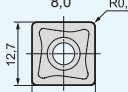


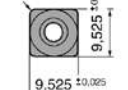

**WFXC 08000/12000 M**..... **New** H46

**SCP 300/400** ..... H47

# Indexable Endmill Selection Guide

Application	Cutter Type	Series	Insert Type	Approach Angle Max. Depth of Cut (mm)	Cutter Diameter (mm)	Application											Work Material						Ref. Page									
						Face Milling			High Feed			Shoulder Milling		Slot Milling		Ramping		Copying		Chamfering		Boring		Finishing		P	M	K	N	S	H	
						General Purpose	Finishing	High Feed	Shoulder Milling	Slot Milling	Ramping	Copying	Chamfering	Boring	Finishing	Carbon Steel / Alloy Steel	Tempered Steel / Die Steel	Stainless Steel	Cast Iron / Ductile Cast Iron	Non-Ferrous Metal	Aluminium Alloy	Ti Alloy / Heat Resistant Alloy		Hardened Steel	HRC 45 ~ 55							
Face Milling	DGC	DGC 13000-EW	SNMU13T6.. ONMU05T6..	 3 ~ 6 mm 45°	ø40 (42,9) ø63 (65,9)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H6					
	WGX	WGX 13000-EW	SEE/MT 13T3..	 6 mm 45°	ø32 ~ ø63	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H7					
High Feed Milling	MSX	MSX(ES/EM/EW) 06000 08000 12000 14000	WDMT0603.. WDMT0804.. WDMT1205.. WDMT1406..	 1,0 ~ 2,5 mm 20°	ø16 ~ ø63	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H9					
	MSX-M	MSX 06000-M 08000-M 12000-M		 1,0 ~ 2,0 mm 20°	ø16 ~ ø40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H10					
	WFXH-M	<b>New</b> WFXH 08000-M WFXH 12000-M	(12000 Type) SOMT 1204..	 1,5 mm 15° 2,5 mm 15°	ø25 ø32 ø40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H13					
Shoulder Milling	DFC	DFC (M) 09000-E	XNMU 0606..	 6 mm 90°	ø25 ~ ø80	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H15					
	WFX	WFX(M/F) 08000-E 12000-E	SOMT 0803..	 6 mm 90°	ø20 ~ ø80	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H16 H17					
	WFX-M	WFX 08000-M	SOMT 1204..	 10 mm 90°	ø20 ~ ø80	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H16 H17					
	TSX	<b>New</b> TSX (-F) 08000E TSX (-M) 13000E	LNEX 0804.. LNEX1306..	 8 mm 90° 12 mm 90°	ø40 ~ ø63 ø40 ~ ø160	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H19					
	WEX	<b>New</b> WEX 1000-E/EL WEX 2000-E/EL WEX 3000-E/EL	AXMT0602 (WEX 1000 E/F) AXMT1235 (WEX 2000 E/F/M)	 5 mm 90° 10 mm 90° 14 mm 90°	ø10 ~ ø25 ø14 ~ ø63 ø25 ~ ø63	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H22 H23 H24					
	WEX-M	WEX 2000-M WEX 3000-M	AXMT1705.. (WEX 3000 E/F/M)	 10 mm 90° 14 mm 90°	ø16 ~ ø40 ø25 ~ ø40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H23 H24					
	WRX	WRX 2000-E/W WRX 3000-E/W	AXMT1235.. (WRX2000) AXMT1705.. (WRX3000)	 18 ~ 36 mm 90° 27 ~ 53 mm 90°	ø20 ~ ø40 ø32 ~ ø50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	H33 H34					

# Indexable Endmill Selection Guide

Application	Cutter Type	Series	Insert Type	Approach Angle Max. Depth of Cut (mm)	Cutter Diameter (mm)	Application										Work Material					Ref. Page					
						Face Milling	Shoulder Milling	Slot Milling	Ramping	Copying	Chamfering	Boring	Finishing	Carbon Steel / Alloy Steel	Tempored Steel / Die Steel	Stainless Steel	Cast Iron / Ductile Cast Iron	Non-Ferrous Metal	Aluminium Alloy	Ti Alloy / Heat Resistant Alloy		Hardened Steel HRC 45 ~ 55				
						General Purpose	Finishing	High Feed	Shoulder Milling	Slot Milling	Ramping	Copying	Chamfering	Boring	Finishing	Carbon Steel / Alloy Steel	Tempored Steel / Die Steel	Stainless Steel	Cast Iron / Ductile Cast Iron	Non-Ferrous Metal	Aluminium Alloy	Ti Alloy / Heat Resistant Alloy	Hardened Steel HRC 45 ~ 55			
Multi-Purpose	WRCX 	WRCX 08000-E 10000-E	QPMT0803../10T3../1204../ QPET 10T35../1204../	 4~5 mm	ø12 ~ ø32	○				○	○	○				○	○	○	○	○	○	○	○	H40		
	WRCX-M 	WRCX 08000-M 12000-M		 4~6 mm	ø20 ~ ø40	○				○	○	○				○	○	○	○	○	○	○	○	H41		
	RSX 	RSX(F) <b>New</b> 08000-ES 10000-ES 12000-ES	RDET0803../ RDET10T3../ RDET1204../	 4 mm	ø20 ~ ø32(ES) ø40(M)	○					○	○	○													
	RSX-M 	RSX(F) <b>New</b> 08000-M 10000-M 12000-M		 5 mm  6 mm																						
	WMM(H) 	WMM(H) 2000 3000	APMT 1035../1605../ APET 1035../1605../ 	 17~26 mm 90°  39 mm 90°	ø20 ~ ø25 ~ ø32 ~ ø40	○					○	○	○	○												H31
Aluminium	WAX 	WAX 3000-E/EL	AECT1604../ (WAX 3000E/EL) 	 16~18 mm 90°	ø20 ~ ø40	○										×	×	×	×	○	○	○	○	H28 H29		
	WAX 4000-E/EL	AECT2206../ (WAX 4000E/EL) 	 22~24 mm 90°	ø25 ~ ø40																						
3D Profiling	WBMR 	WBMR 2000	ZNMT 1804100-C 2004100-S 	 20~43 mm	R10 (ø20) ~ R25 (ø50)																				H37	
	WBMF 	WBMF 1000	ZPGU 1551050 	 0,1~0,4 mm	R5 (ø10) ~ R15 (ø30)											○	○	○	○						H39	
Chamfering	WFXC-E <b>New</b> 	WFXC 08000-E	SOMT0803../1204../ SOET0803../1204../ 	 45°	ø8 ~ ø16 ~ ø25 ~ ø32											○	○	○	○	○	○	○	○		H45	
	WFXC-M <b>New</b> 	WFXC 08000-M		 45°	ø16 ~ ø25 ~ ø32											○	○	○	○	○	○	○	○		H46	
		WFXC 12000-E																								
		WFXC 12000-M																								
	SCP 	SCP	SDMA 0903../ 	 2~3 mm 45°	ø8 ~ ø32											○	○	○	○						H47	

# Exchangeable Head Endmills Modular Tools

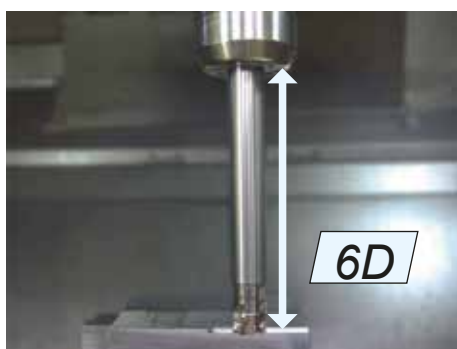


## General Features

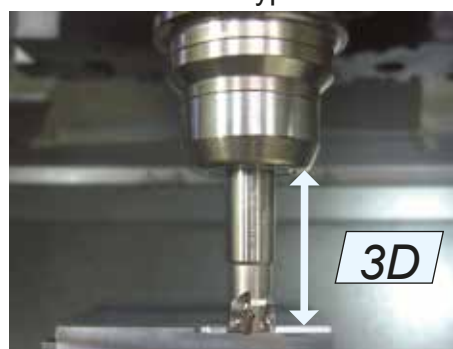
- Exchangeable head endmills are available in 7 types !
  - Endmill for Shoulder Milling
    - WFX** Type
    - WEX** Type
  - High Feed Endmill
    - WFXH** Type
    - MSX** Type
  - Radius Endmill
    - RSX** Type
    - WRCX** Type
  - Endmill for Chamfering
    - WFXC** Type
- A wide variety of possible combinations with carbide arbors (16 items) and steel arbors (4 items) !

## Characteristics ● Up to 6 x D from Modular End Mill with Carbide Arbor

### Modular Head + Carbide Arbor



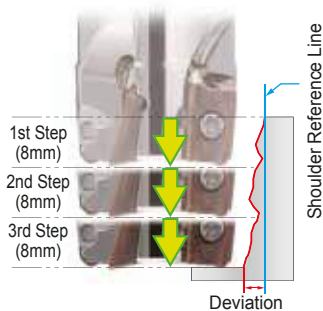
### Standard Shank Type Endmill



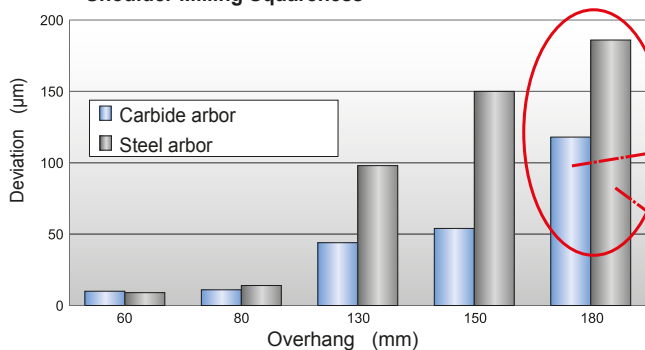
Work Material : C50  
 Tool : WEX2025M12Z4 ( $\phi D=25$ , 4 teeth)  
 Cutting Conditions:  $v_c = 100\text{m/min}$ ,  $f_t = 0,1\text{mm/tooth}$   
 $d_{oc} = 8\text{mm} \times 3$  passes,  $w_{oc} = 2,0\text{mm}$ , Equipment: M/C BT50

Note  
 Cutting conditions can vary according to cutter reach, rigidity of machine tool / workpiece etc.

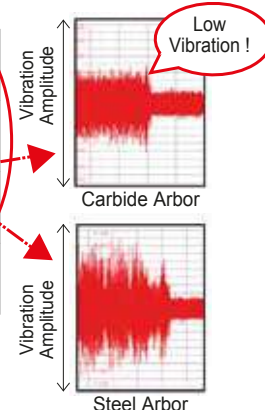
## Performance ● A Carbide Arbor improves feed rates, surface finish, sizing, and tool life.



### Shoulder Milling Squariness



### Carbide Arbor Comparison ...



Work Material : C50  
 Tool : WEX2025M12Z4 ( $\phi D=25$ , 4 teeth)  
 Cutting Conditions:  $v_c = 100\text{m/min}$ ,  $f_t = 0,1\text{mm/tooth}$   
 $d_{oc} = 8\text{mm} \times 3$  passes,  $w_{oc} = 2,0\text{mm}$ , Equipment: M/C BT50

Suitable for milling with **long overhangs** when combined with carbide or steel arbors!

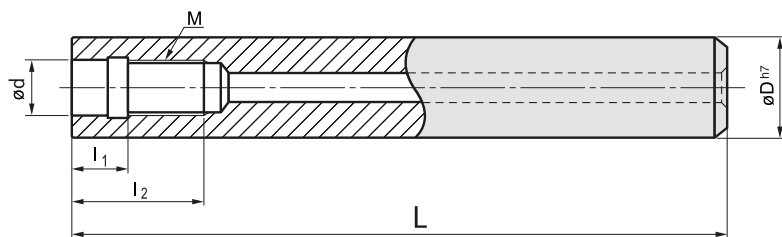
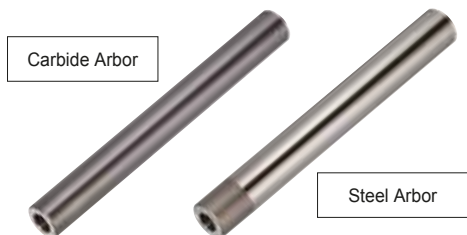
**Economically designed exchangeable head!**



Easy to change screw-on endmill type WEX and carbide arbor

## Modular Type

### Carbide and Steel Arbor



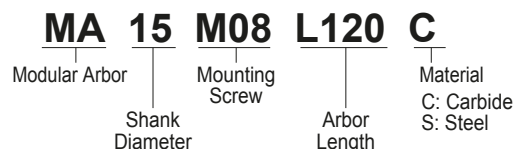
### Carbide Arbor

Cat. No.	Stock	Dimensions (mm)						
		M	ød	øD	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>M</sub>
MA 15 M08 L120C	●	M8	8,5	15	120	10	18	145
MA 15 M08 L160C	●	M8	8,5	15	160	10	18	185
MA 16 M08 L120C	●	M8	8,5	16	120	10	18	145
MA 16 M08 L160C	●	M8	8,5	16	160	10	18	185
MA 18 M10 L150C	●	M10	10,5	18	150	10	20	180
MA 18 M10 L200C	●	M10	10,5	18	200	10	20	230
MA 20 M10 L150C	●	M10	10,5	20	150	10	20	180
MA 20 M10 L200C	●	M10	10,5	20	200	10	20	230
MA 23 M12 L200C	●	M12	12,5	23	200	10	22	235
MA 23 M12 L250C	●	M12	12,5	23	250	10	22	285
MA 25 M12 L200C	●	M12	12,5	25	200	10	22	235
MA 25 M12 L250C	●	M12	12,5	25	250	10	22	285
MA 28 M16 L200C	●	M16	17,0	28	200	10	24	240
MA 28 M16 L300C	●	M16	17,0	28	300	10	24	340
MA 32 M16 L200C	●	M16	17,0	32	200	10	24	240
MA 32 M16 L300C	●	M16	17,0	32	300	10	24	340

### Steel Arbor

Cat. No.	Stock	Dimensions (mm)						
		M	ød	øD	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>M</sub>
MA 16 M08 L120S	●	M8	8,5	16	120	10	18	145
MA 20 M10 L150S	●	M10	10,5	20	150	10	20	180
MA 25 M12 L200S	●	M12	12,5	25	200	10	22	235
MA 32 M16 L200S	●	M16	17,0	32	200	10	24	240

### Identification of Catalogue No.



### Recommended Tightening Torque

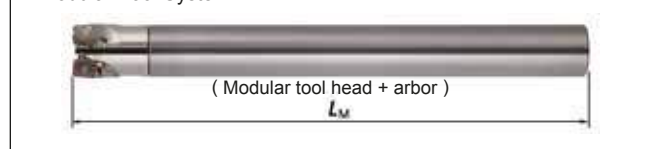
Screw	Wrench		N·m
	W	S	
M 8	8	13	23
M10	8	15	46
M12	10	19	80
M16	10	24	90



Notes about tightening the head:

- Refer to the Head Cat. No. chart on pages H18, H19, H35 and H37 to select the arbor size in the table above.
- Check the mounting screw size of the head and arbor beforehand.
- When attaching head to an arbor, follow the standard tightening torque in the table above.

### Modular Tool System



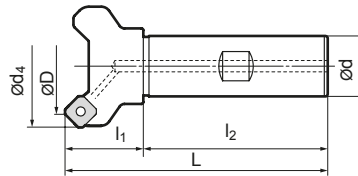
## Product Range

Application	Work Material	Series	Cat. No.	Page
Shoulder Milling	Shoulder milling of Steel, Die Steel, Cast Iron, Stainless Steel and Non-Ferrous Metal	„Wave Mill“ - Series	WFX 08000-M	H16
	High efficiency milling of Steel, Cast Iron, Stainless Steel and Non-Ferrous Metal	„Wave Mill“ - Series	WEX 2000-M 3000-M	H23 H24
High Feed Milling	High feed milling of Steel, Die Steel, Cast Iron, Stainless Steel and Non-Ferrous Metal	„Wave Mill“ - Series	WFXH 08000-M 12000-M	H13
	High feed milling of Steel, Cast Iron and Stainless Steel	„Metal Slash Mill“ - Series	MSX 06000-M 08000-M 12000-M	H10
Radius Milling	Milling of Exotic Alloy	„Wave Radius Mill“ - Series	WRCX 08000-M 12000-M 16000-M	H41
	Milling of Steel, Cast Iron, Stainless Steel and Non-Ferrous Metal	„Wave Radius Mill“ - Series	RSX(F) 10000-M 12000-M	H43
Chamfering	Chamfering of Steel, Die Steel, Cast Iron, Stainless Steel and Non-Ferrous Metal	„Wave Mill“ - Series	WFCX 08000-M	H46

# "Sumi Dual Mill" Face Mill DGC (EW) Type

General Milling for Steel and Cast Iron

## Body – Shank Type



Rake Angle	Radial	-10°
	Axial	-5°

SNMU / SNEU	ONMU / ONEU

## Body

Cat. No.	Stock	Dimensions (mm)						No. of Teeth	Weight (kg)
		$\phi D$	$\phi d_4$	$\phi d$	$l_1$	$l_2$	$L$		
DGC 13040 EW	●	40 (42,90)	54	32	40 (38,44)	85	125	3	0,7
DGC 13050 EW	●	50 (52,90)	65	32	40 (38,44)	85	125	3	0,9
DGC 13063 EW	●	63 (65,90)	77	32	40 (38,44)	85	125	4	1,1

( ) Figures in brackets indicate values for inserts of type ONMU

## Identification Details

<b>DGC</b>	<b>13</b>	<b>040</b>	<b>EW</b>
Cutter Series	Insert Size	Cutter Diameter	Endmill Type Weldon

## Inserts

Application	Coated Carbide						Fig.
	P	M	K	M	S		
High Speed/Light cut	●		●		●		
General Purpose		●	●	●	●	●	
Roughing		●	●	●	●	●	
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300
SNMU 13T6ANER L	●	●	●	●	●		
SNMU 13T6ANER G	●	●	●	●	●		
SNMU 13T6ANER H	●	●	●	●	●		
SNMU 13T6ANER FL	●	●	●	●	●		
SNMU 13T6ANER FG	●	●	●	●	●		
SNEU 13T6ANER L						●	●
SNEU 13T6ANER G						●	●
SNEU 13T6ANER FL						●	●
SNEU 13T6ANER FG						●	●
XNEU 13T6ANEN W		●					
ONMU 05T6ANER L	●	●	●	●	●		
ONMU 05T6ANER G	●	●	●	●	●		
ONEU 05T6ANER L						●	●
ONEU 05T6ANER G						●	●

Fig. 1

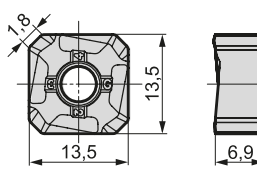


Fig. 2

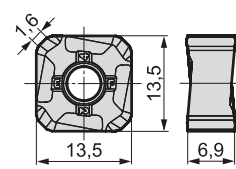


Fig. 3

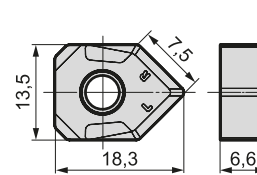
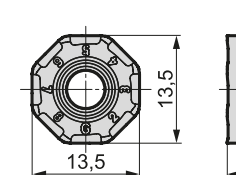


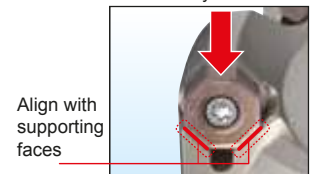
Fig. 4



## Attaching Octagonal Inserts

Firmly align insert with supporting face, press down in the direction of the arrow and tighten the screw to fix the insert.

Press down firmly from above



Align with supporting faces

## Spare Parts

Shim	Shim Screw	L Seat Wrench	Insert Screw	Insert Wrench
DGCS 13 R	BW 0609 F	LH 040	BFTX 0412 IP 3,0 (Nm)	TRDR 15 IP

## Optional

Insert Screw (*)
BFTX 0418 IP

\*Corners can be changed simply by loosening the screw. (Only suitable for DGC / DGCM types with body size  $\geq \phi 80$ ).

## SNMU – Recommended Cutting Conditions

ISO	Work Material	Fit-ness	Cutting Speed $v_c$ (m/min)	Feed Rate $f_t$ (min/t)	Depth of Cut (mm)	Grade
P	General Steel	◎	150-200-250	0,10-0,25-0,40	<4	ACP200 ACP300
	Alloyed Steel	◎	180-250-350	0,10-0,30-0,45	<4	ACP200 ACP300
	Die Steel	◎	100-150-200	0,15-0,25-0,35	<4	ACP200 ACP300
M	Stainless Steel	○	160-200-250	0,15-0,23-0,30	<3	ACM200 ACM300 ACP300
K	GG+GGG	◎	100-200-250	0,10-0,25-0,40	<5	ACK200 ACK300

Min. – Optimum – Max.

## ONMU – Recommended Cutting Conditions

ISO	Work Material	Fit-ness	Cutting Speed $v_c$ (m/min)	Feed Rate $f_t$ (min/t)	Depth of Cut (mm)	Grade
P	General Steel	◎	150-200-250	0,10-0,30-0,50	<2	ACP200 ACP300
	Alloyed Steel	◎	180-250-350	0,10-0,50-0,50	<2	ACP200 ACP300
	Die Steel	◎	100-150-200	0,15-0,25-0,30	<2	ACP200 ACP300
M	Stainless Steel	○	160-200-250	0,15-0,23-0,30	<2	ACM200 ACM300 ACP300
K	GG+GGG	◎	100-200-250	0,10-0,30-0,50	<2	ACK200 ACK300

◎ Preferred choice

○ Suitable

Recommended Tightening Torque (N·m)

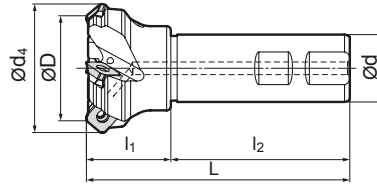


# "Sumi Wave" Face Mill WGX (EW) Type

General Milling for Steel and Cast Iron

## Body – Shank Type

Rake Angle	Radial	-20° ~ 24°	6mm 45°
	Axial	20° ~ 22°	



## Body – Dimensions

Cat. No.	Stock	Dimensions (mm)						No. of Teeth
		$\varnothing D$	$\varnothing d_4$	$\varnothing d$	$l_1$	$l_2$	$L$	
WGX 13032 EW	○	32	44	32	40	85	125	3
WGX 13040 EW	○	40	52	32	40	85	125	3
WGX 13050 EW	○	50	62	32	40	85	125	4
WGX 13063 EW	○	63	76	32	40	85	125	5

Inserts are not included.  
 $\varnothing 32$  mm cutters do not have a seat.

## Identification Details

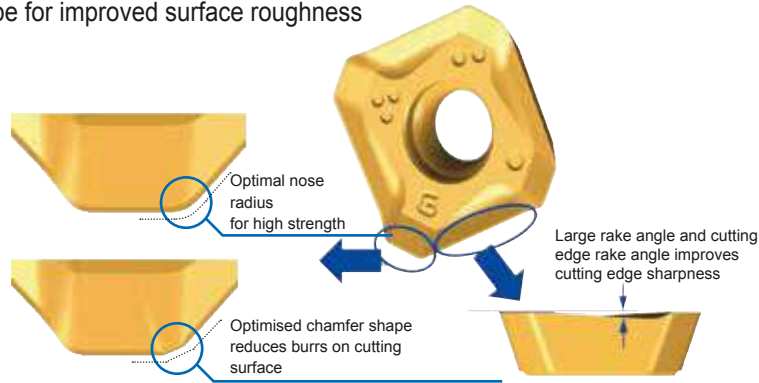
<b>WGX</b>	<b>13</b>	<b>032</b>	<b>EW</b>
Cutter Series	Insert Size	Cutter Diameter	Endmill Type Weldon

## Insert Shape Characteristics

Unique wiper edge shape for improved surface roughness

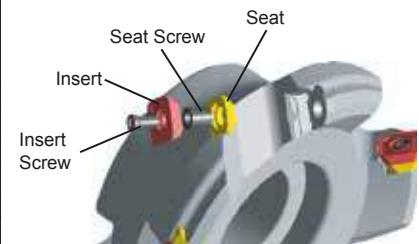
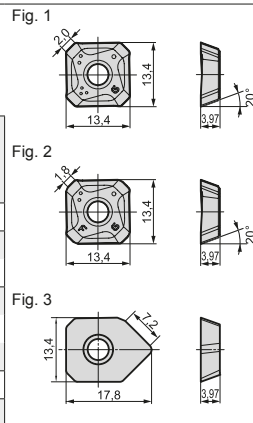
General-purpose  
G type chipbreaker

Low-burr design  
FG type chipbreaker



## Inserts

Application	Coated Carbide						Carb.	DLC	
High Speed/Light Cut	P			K		M	K	N	
General Purpose	P	M	K		M	S		N	
Roughing	P	P	K		M	S			
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000
SEET 13T3AGFR-L								○	○
SEET 13T3AGSR-L	●	●	●	●	●	●	●		
SEET 13T3AGSR-G	●	●	●	●	●	●	●		
SEMT 13T3AGSR-L	●	●	●	●	●	●	●		
SEMT 13T3AGSR-G	●	●	●	●	●	●	●		
SEMT 13T3AGSR-H	●	●	●	●	●	●	●		
SEMT 13T3AGSR-FG	●	●	●	●	●	●	●		
XEEW 13T3AGER-WR		○			○				



## Spare Parts

Applicable Cutters	Seat	Seat Screw	Insert Screw	Insert Wrench	(N·m)	Spanner (for Seat)
WGX 130__EW						
$\varnothing D = 32$	-	-	BFTX 03512 IP	TRDR 15 IP	3,0	-
$\varnothing D = 40-63$	WGCS 13 R	BW 0507 F	BFTX 03512 IP	TRDR 15 IP	3,0	LH 035

## Recommended Cutting Conditions

ISO	Work Material	Hardness	Cutting Speed $v_c$ (m/min)	Feed Rate $f_t$ (mm/tooth)	Grade
P	General Steel	180~280HB	150-200-250	0,15-0,20-0,25	ACP200
	Soft Steel	≤180HB	180-265-350	0,10-0,25-0,40	ACP200
	Die Steel	200~220HB	100-150-200	0,15-0,20-0,25	ACP200
M	Stainless Steel	-	160-205-250	0,15-0,23-0,30	ACM300
K	Cast Iron	250HB	100-175-250	0,15-0,23-0,30	ACK200
S	Exotic Alloy	-	30 - 50- 80	0,10-0,20-0,30	ACM300

Minimum-Optimum-Maximum

# "METAL SLASH MILL" MSX Type

Ultra High Feed

Boosts Productivity – Cuts Costs



## ■ Features

The Metal Slash Mill type MSX is a new multi function high shear milling cutter with ultra high feed capability suitable for face milling, slotting, plunging and helical boring. At 50GPa the ultra hard Super ZX coated inserts feature a sharp cutting edge which demonstrates extreme resistance to wear and heat massively boosting productivity and tool life.

The vibration free cutting action ensures accurate sizing, improved surface finish, and protection of the machine tool/workpiece from damage. Inserts are double clamped in wide chip gullets to maximise rigidity and chip evacuation with temperature at the cutting edge being easily controlled via an optional air blast through integral coolant holes. The MSX cutter is readily applied to general purpose machining across the P (steel) M (stainless) and K (cast iron) range of workpiece materials with impressive results.

## ■ Advantages

Integral Coolant Hole

Otimised chip removal  
– massive chip  
avacuation pockets

Wide Application Range

Face milling, slotting,  
helical boring  
and plunging

Low Cutting Force

Unique insert shape  
reduces cutting force

Durable Cutter Body

Special alloyed steel with  
hard surface

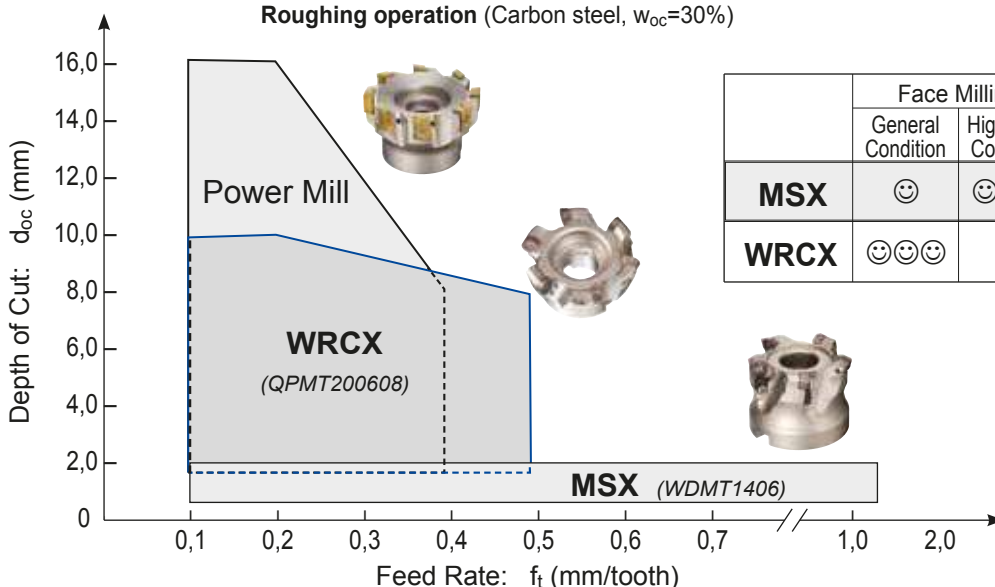
Double Clamp

Secure insert clamping  
for stable cutting



## ■ Application Range

Roughing operation (Carbon steel,  $w_{oc}=30\%$ )



	Face Milling		Slotting	Helical Boring	Profiling
	General Condition	High Feed Condition			
<b>MSX</b>	☺	☺☺☺	☺	☺☺☺	—
<b>WRCX</b>	☺☺☺	☺	☺	☺☺	☺☺

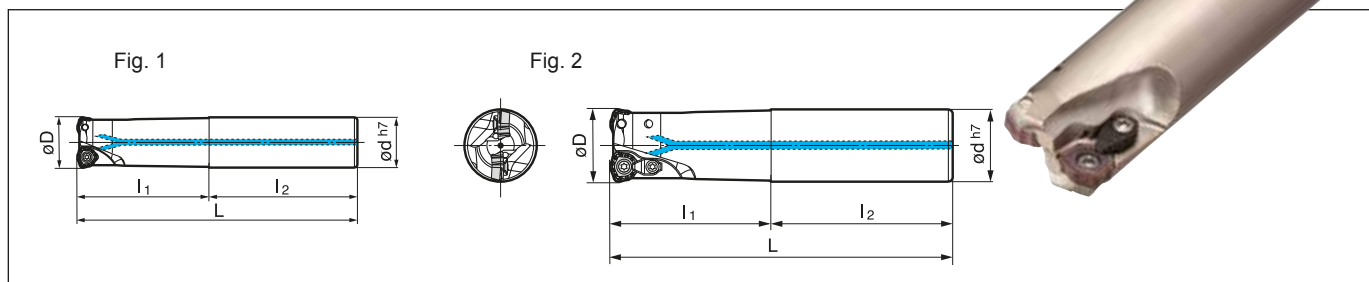
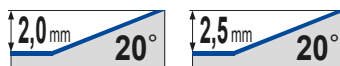
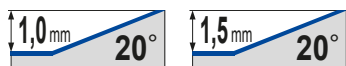
☺☺☺ excellent  
☺☺ very good  
☺ good

● = Euro stock  
□ = Delivery on request

Ⓜ Recommended Tightening Torque (N·m)

# "METAL SLASH MILL" MSX 06000/08000 ES/EM/EW

# "METAL SLASH MILL" MSX 12000/14000 ES/EM/EW



## Body For insert type : WDMT 0603 □□□□

Shank	Cat. No.	Stock	Dimensions (mm)					No. of teeth	Fig.
			øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
□	MSX 06016 ES	□	16	16	30	80	110	2	1
	MSX 06016 EM	●	16	16	70	80	150	2	1
	MSX 06016 EM15	□	16	15	30	120	150	2	1
	MSX 06017 EM	□	17	16	20	130	150	2	1
	MSX 06018 EM	□	18	16	20	130	150	2	1
	MSX 06020 ES	●	20	20	50	80	130	3	1
	MSX 06020 EM	●	20	20	100	80	180	3	1
	MSX 06020 EM19	□	20	19	50	130	180	3	1
	MSX 06022 EM	□	22	20	30	150	180	3	1
	MSX 06025 ES	●	25	25	60	80	140	3	1
	MSX 06025 ES24	□	25	24	60	80	140	3	1
	MSX 06025 EM	●	25	25	120	130	250	3	1
	MSX 06025 EM24	□	25	24	60	190	250	3	1
	MSX 06020 EW	●	20	20	50	80	130	3	1
MSX 06025 EW	●	25	25	60	80	140	3	1	

## Body For insert type : WDMT 0804 □□□□

Shank	Cat. No.	Stock	Dimensions (mm)					No. of teeth	Fig.
			øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
□	MSX 08020 ES	●	20	20	50	80	130	2	1
	MSX 08020 EM	●	20	20	100	80	180	2	1
	MSX 08020 EM19	□	20	19	50	130	180	2	1
	MSX 08022 EM	□	22	20	30	150	180	2	1
	MSX 08025 ES	●	25	25	60	80	140	2	2
	MSX 08025 EM	●	25	25	120	130	250	2	2
	MSX 08025 EM24	□	25	24	60	190	250	2	2
	MSX 08028 EM	□	28	25	40	210	250	2	2
	MSX 08032 ES	□	32	32	70	80	150	3	2
	MSX 08032 EM	□	32	32	120	130	250	3	2
	MSX 08035 EM	□	35	32	50	200	250	3	2
	MSX 08020 EW	●	20	20	50	80	130	2	1
	MSX 08025 EW	●	25	25	60	80	140	2	2
	MSX 08032 EW	●	32	32	70	80	150	3	2

ES : Short type with cylindrical shank  
EM : Long type with cylindrical shank  
EW : Short type with Weldon shank

## Body For insert type : WDMT 1205 □□□□

Shank	Cat. No.	Stock	Dimensions (mm)					No. of teeth	Fig.
			øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
□	MSX 12032 ES	●	32	32	70	80	150	2	2
	MSX 12032 EM	●	32	32	120	130	250	2	2
	MSX 12035 EM	□	35	32	50	200	250	2	2
	MSX 12040 ES	□	40	32	50	100	150	3	2
	MSX 12040 EM	□	40	32	50	200	250	3	2
	MSX 12050 EM	□	50	42	50	200	250	4	2
MSX 12032 EW	●	32	32	70	80	150	2	2	

## Body For insert type : WDMT 1406 □□□□

Shank	Cat. No.	Stock	Dimensions (mm)					No. of teeth	Fig.
			øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
□	MSX 14040 ES	□	40	32	50	100	150	2	2
	MSX 14040 EM	□	40	32	50	200	250	2	2
	MSX 14050 ES	□	50	42	50	100	150	3	2
	MSX 14050 EM	□	50	42	50	200	250	3	2
	MSX 14063 ES	□	63	42	50	100	150	4	2
	MSX 14063 EM	□	63	42	50	200	250	4	2

ES : Short type with cylindrical shank  
EM : Long type with cylindrical shank  
EW : Short type with Weldon shank

## Inserts

Cat. No.	Coated Carbide			Dimensions (mm)			Max. d <sub>oc</sub>
	ACP200	ACP300	ACK300	ød	s	r	
WDMT 0603 ZDTR	●	●	●	6,35	2,0	1,5	1,0
WDMT 0603 ZDTR-H	●	●	●	6,35	2,0	1,5	1,0
WDMT 0804 ZDTR	●	●	●	8,5	4,0	2,0	1,5
WDMT 0804 ZDTR-H	●	●	●	8,5	4,0	2,0	1,5
WDMT 1205 ZDTR	●	●	●	12	5,0	2,0	2,0
WDMT 1205 ZDTR-H	●	●	●	12	5,0	2,0	2,0
WDMT 1406 ZDTR	●	●	●	14	6,0	2,0	2,5
WDMT 1406 ZDTR-H	●	●	●	14	6,0	2,0	2,5

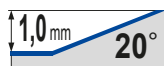
ZDTR-H : Stronger cutting edge

## Spare Parts

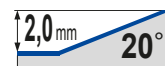
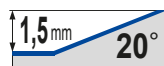
Insert Screw	Insert Wrench	Clamp	C Ring	Clamp Screw	Applicable Endmill
					MSX - EO
BFTX 02505 IP 1,5	TRDR 08 IP	-	-	-	MSX 06000EO
BFTX 0306 IP 2,0	TRDR 08 IP	-	-	-	MSX 08020EO, MSX 08022EO
BFTX 0306 IP 2,0	TRDR 08 IP	CCH 3,5	CR 03	BFTX 03510 IP 08	MSX 08025EO, MSX 08028EO, MSX 08032EO, MSX 08035EO
BFTX 0409 IP 3,0	TRDR 15 IP	CCH 3,5	CR 03	BFTX 03510 IP 15	MSX 12000EO
BFTX 0511 IP 5,0	TRDR 20 IP	CCH 4,5	CR 03	BFTX 04513 IP 20	MSX 14000EO

# Exchangeable Head Endmills MSX 06000/08000 M Type

# Exchangeable Head Endmills MSX 08000/12000 M Type

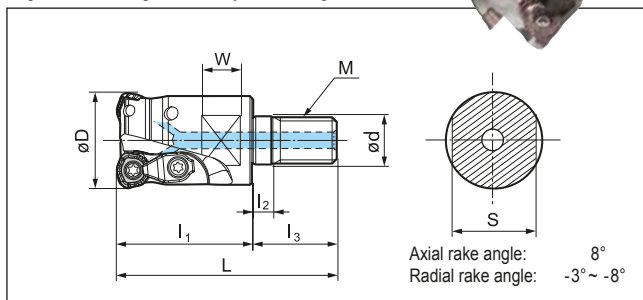
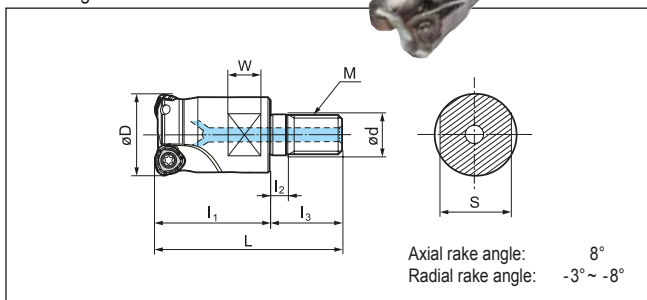


## Modular Type



High feed and high efficiency machining endmills

High feed and high efficiency machining endmills



### Heads

For insert type : WDMT 0603

Cat. No.	Stock	Dimensions (mm)										No. of teeth
		øD	ød	M	L	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	W	S		
MSX06016M08Z2	●	16	8,5	M8	42	25	5	17	8	13	2	
MSX06018M08Z2	□	18	8,5	M8	42	25	5	17	8	13	2	
MSX06020M10Z3	●	20	10,5	M10	49	30	5	19	8	15	3	
MSX06022M10Z3	□	22	10,5	M10	49	30	5	19	8	15	3	
MSX06025M12Z3	●	25	12,5	M12	56	35	5	21	10	19	3	

Inserts are not included.

### Heads

For insert type : WDMT 0804

Cat. No.	Stock	Dimensions (mm)										No. of teeth
		øD	ød	M	L	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	W	S		
MSX08025M12Z2	●	25	12,5	M12	56	35	5	21	10	19	2	
MSX08028M12Z2	□	28	12,5	M12	56	35	5	21	10	19	2	
MSX08030M16Z3	□	30	17,0	M16	63	40	5	23	10	24	3	
MSX08032M16Z3	●	32	17,0	M16	63	40	5	23	10	24	3	
MSX08035M16Z3	□	35	17,0	M16	63	40	5	23	10	24	3	

Inserts are not included.

### Heads

For insert type : WDMT 1205

Cat. No.	Stock	Dimensions (mm)										No. of teeth
		øD	ød	M	L	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	W	S		
MSX12032M16Z2	●	32	17,0	M16	63	40	5	23	10	24	2	
MSX12035M16Z2	□	35	17,0	M16	63	40	5	23	10	24	2	
MSX12040M16Z3	●	40	17,0	M16	63	40	5	23	10	24	3	

Inserts are not included.

### Inserts for MSX 06000M Type

Cat. No.	Coated Carbide			Dimensions (mm)			Max. d <sub>oc</sub>
	ACP 200	ACP 300	ACK 300	ød	s	r	
	WDMT 0603 ZDTR	●	●	●	6,35	3,0	
WDMT 0603 ZDTR-H	●	●	●				

H - Strong Cutting Edge

### Inserts for MSX 08000M/12000M Type

Cat. No.	Coated Carbide			Dimensions (mm)			Max. d <sub>oc</sub>
	ACP 200	ACP 300	ACK 300	ød	s	r	
	WDMT 0804 ZDTR	●	●	●	8,5	4,0	
WDMT 0804 ZDTR-H	●	●	●				
WDMT 1205 ZDTR	●	●	●	12	5,0	2,0	2,0
WDMT 1205 ZDTR-H	●	●	●				

H - Strong Cutting Edge

### Identification of Catalogue No.

**MSX 06 016 M08 Z2**

Cutter type: MSX  
Diameter: 06  
Insert size: 016  
Mounting screw: M08  
No. of teeth: Z2



### Spare Parts

Clamp	C Ring	Clamp Screw	Insert Wrench	Insert Screw	Applicable Endmill
CCH 3,5	CR 03	BFTX 03510 IP 08	TRDR 08 IP	BFTX 0306 IP	MSX 08025M ~ MSX 08035M
CCH 3,5	CR 03	BFTX 03510 IP 15	TRDR 15 IP	BFTX 0409 IP	MSX 12032M ~ MSX 12040M

● = Euro stock  
□ = Delivery on request

(N·m) Recommended Tightening Torque (N·m)

# "METAL SLASH MILL" MSX Type

## Recommended Cutting Conditions

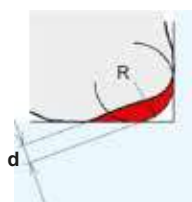
Work Material	Coated Carbide Grade	Cutting Speed $v_c$ (m/min)	Insert Cat. No.	Endmill Type ( $\phi D$ )								Shell Type ( $\phi D$ )					
				$\phi 16$		$\phi 20$		$\phi 25$		$\phi 32$		$\phi 40$		$\phi 50\sim 66$		$\phi 80\sim 100$	
				$d_{oc}$ (mm)	Feed rate (mm/tooth)	$d_{oc}$ (mm)	Feed rate (mm/tooth)	$d_{oc}$ (mm)	Feed rate (mm/tooth)	$d_{oc}$ (mm)	Feed rate (mm/tooth)	$d_{oc}$ (mm)	Feed rate (mm/tooth)	$d_{oc}$ (mm)	Feed rate (mm/tooth)	$d_{oc}$ (mm)	Feed rate (mm/tooth)
General Steel (Below HB200)	ACP200	100-150-200	WDMT 0603	0,8	0,8	0,8	0,8	0,8	0,8	—	—	—	—	—	—	—	
			WDMT 0804	—	—	1,0	1,0	1,0	1,2	1,0	1,2	—	—	—	—	—	
			WDMT 1205	—	—	—	—	—	—	1,2	1,4	1,2	1,4	1,2	1,4	—	
			WDMT 1406	—	—	—	—	—	—	—	—	1,5	1,5	1,5	1,5	1,5	
Alloy Steel (Below HRC45)	ACP200	80-130-180	WDMT 0603	0,7	0,8	0,7	0,8	0,7	0,8	—	—	—	—	—	—		
			WDMT 0804	—	—	0,8	1,0	0,8	1,2	0,8	1,2	—	—	—	—		
			WDMT 1205	—	—	—	—	—	—	1,0	1,4	1,0	1,4	1,0	1,4	—	
			WDMT 1406	—	—	—	—	—	—	—	—	1,3	1,5	1,3	1,5	1,3	
Stainless Steel X5CRNi1810, Others	ACP300	80-120-150	WDMT 0603	0,8	0,7	0,8	0,7	0,8	0,7	—	—	—	—	—	—		
			WDMT 0804	—	—	1,0	0,8	1,0	0,8	1,0	0,8	—	—	—	—		
			WDMT 1205	—	—	—	—	—	—	1,2	1,2	1,2	1,2	1,2	1,2	—	
			WDMT 1406	—	—	—	—	—	—	—	—	1,5	1,3	1,5	1,3	1,5	
Cast Iron GG, GGG	ACK300	100-150-200	WDMT 0603	0,8	1,0	0,8	1,0	0,8	1,0	—	—	—	—	—	—		
			WDMT 0804	—	—	1,0	1,2	1,0	1,4	1,0	1,4	—	—	—	—		
			WDMT 1205	—	—	—	—	—	—	1,2	1,5	1,2	1,5	1,2	1,5	—	
			WDMT 1406	—	—	—	—	—	—	—	—	1,5	1,8	1,5	1,8	1,5	
Hardened Steel (Below HRC50)	ACK300	40-80-100	WDMT 0603	0,5	0,5	0,5	0,5	0,5	0,5	—	—	—	—	—			
			WDMT 0804	—	—	0,5	0,6	0,5	0,8	0,5	0,8	—	—	—	—		
			WDMT 1205	—	—	—	—	—	—	0,6	1,0	0,6	1,0	0,6	1,0	—	
			WDMT 1406	—	—	—	—	—	—	—	—	1,0	1,2	1,0	1,2	1,0	

Insert Cat. No.	Max $d_{oc}$	r
WDMT 0603....	1,0	1,5
WDMT 0804....	1,5	2,0
WDMT 1205....	2,0	2,0
WDMT 1406....	2,5	2,0

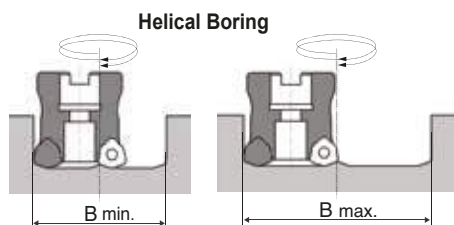
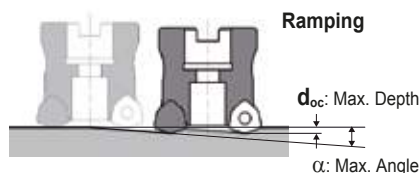
- The above recommended cutting conditions may require adjustment according to machine rigidity and work rigidity. The above figures are guidelines for use with the BT50 machine tool.
- The above cutting conditions assume a tool overhang length of  $L/D=3$  (i.e. overhang length is 3 times tool diameter) or less. When tool overhang is **more than  $L/D=3$  and less than or equal  $L/D=5$** , settings should be adjusted to approximately **70 to 80%** of those indicated in the above cutting conditions (i.e.  $d_{oc}$  and Feed Rate). When tool overhang is **more than  $L/D=5$  and less than or equal  $L/D=8$** , settings should be adjusted to approximately **50 to 60%** of those indicated in the above cutting conditions (i.e.  $d_{oc}$  and Feed Rate).

## Information for Programming

For machine programming, please use the theoretical corner radius (R) shown in the list. Maximum depth (d) between theoretical radius and actual profile will be left on the finished surface, as shown below.

	Body	Insert	Theoretical Radius (R)	Remaining Depth (d)
	MSX 06000	WDMT 0603....	2,0	0,403
	MSX 08000	WDMT 0804....	2,5	0,593
	MSX 12000	WDMT 1205....	3,0	1,030
	MSX 14000	WDMT 1406....	3,5	1,219

## Plunging and Helical Boring



Cutter $\phi$	WDMT0603ZDTR			WDMT0804ZDTR			WDMT1205ZDTR			WDMT1406ZDTR		
	$d_{oc}$ : max 1,0			$d_{oc}$ : max 1,5			$d_{oc}$ : max 2,0			$d_{oc}$ : max 2,5		
	Ramping $\alpha$ max.	Helical boring min. $\phi B$	Helical boring max. $\phi B$	Ramping $\alpha$ max.	Helical boring min. $\phi B$	Helical boring max. $\phi B$	Ramping $\alpha$ max.	Helical boring min. $\phi B$	Helical boring max. $\phi B$	Ramping $\alpha$ max.	Helical boring min. $\phi B$	Helical boring max. $\phi B$
16	6°00'	21	31									
17	5°00'	23	33									
18	4°30'	25	35									
20	3°30'	29	39	7°30'	25	38						
22	3°00'	33	43	5°30'	29	42						
25	2°00'	39	48	4°00'	35	48						
28				3°00'	41	54						
32				2°30'	49	62	6°30'	42	63			
35				2°00'	55	68	5°00'	48	69			
40				1°30'	65	78	4°00'	58	79	6°00'	53	78
50							2°30'	78	99	3°30'	73	98
63							2°00'	103	124	2°00'	99	124
66							1°30'	109	130	1°45'	105	130
80										1°30'	133	158
100										1°00'	173	198

# "Wave Mill" Series

## WFXH - M Type



### General Features

WaveMill WFXH type is a high efficiency, multi-purpose cutter, that uses the WFX series inserts for high-feed roughing and a variety of processes.

### Characteristics

Stable, high-efficiency milling with superior cutting edge sharpness. Supports various types of processes (ramping and helical milling). Able to use the selection of inserts from the WFX series.

### Notes on Corner Finishing - Remaining Material

Actual machined corners will have uncut and overcut portions due to the shape of the inserts.

Fig. 1

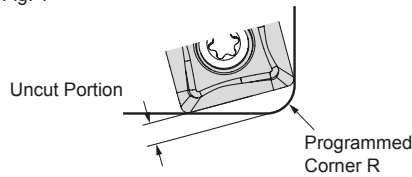
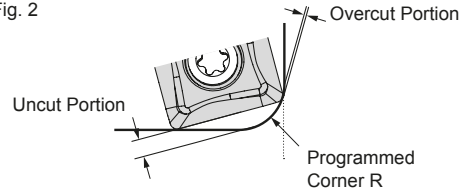


Fig. 2



### WFXH 08000 Type

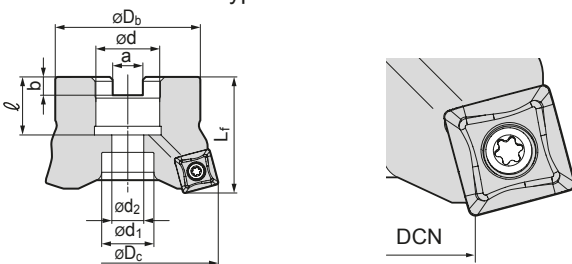
Programmed Corner R	SOMT 080004-□			SOMT 080008-□			SOMT 080012-□		
	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape
2,0	1,41	0	Fig. 1	1,30	0	Fig. 1	1,21	0	Fig. 1
2,5	1,30	0,02	Fig. 2	1,19	0,01	Fig. 2	1,09	0	Fig. 2
3,0	-	-	-	-	-	-	0,98	0,05	Fig. 2

### WFXH 12000 Type

Programmed Corner R	SOMT 120004-□			SOMT 120008-□			SOMT 120012-□			SOMT 120016-□		
	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape	Uncut Portion	Overcut Portion	Shape
2,0	2,58	0	Fig. 1	2,48	0	Fig. 1	2,37	0	Fig. 1	2,25	0	Fig. 1
2,5	2,47	0	Fig. 1	2,37	0	Fig. 1	2,25	0	Fig. 1	2,14	0	Fig. 1
3,0	2,36	0	Fig. 1	2,26	0	Fig. 1	2,14	0	Fig. 1	2,11	0	Fig. 1
3,5	2,24	0,01	Fig. 2	2,14	0	Fig. 1	2,03	0	Fig. 1	1,91	0	Fig. 1
4,0	-	-	-	2,03	0,04	Fig. 2	1,91	0,03	Fig. 2	1,8	0,01	Fig. 2

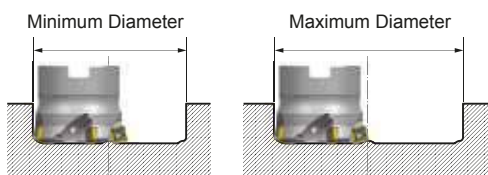
### Minimum Cutting Diameter

Minimum cutting diameter (DCN) will depend on the insert that is used. Using an insert with a large nose radius is recommended for the WFXH type.

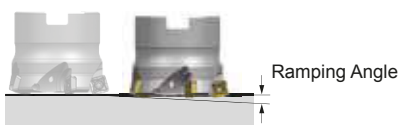


Body Cat. No.	ØDc	DCN based on insert nose			
		R0,4	R0,8	R1,2	R1,6
WFXH 08025 M	25	9,69	9,48	9,27	-
08032 M	32	16,6	16,4	16,2	-
WFXH 12040 M	40	15,8	15,5	15,3	15,1

### Taper Cutting and Helical Milling



Minimum and Maximum Diameters



Ramping Angle

Insert Cat. No.	ØDc	Helical Milling		Taper Cutting
		Min.	Max.	Max. Ramping Angle
SOMT 080004-□	25	35	49	1°30'
	32	49	63	0°30'
SOMT 080008-□	25	35	48	3°
	32	49	62	1°30'
SOMT 080012-□	25	34	47	4°30'
	32	48	61	2°30'
SOMT 120004-□	40	56	79	1°
SOMT 120008-□	40	56	78	1°30'
SOMT 120012-□	40	55	77	2°30'
SOMT 120016-□	40	55	76	3°30'

● = Euro stock

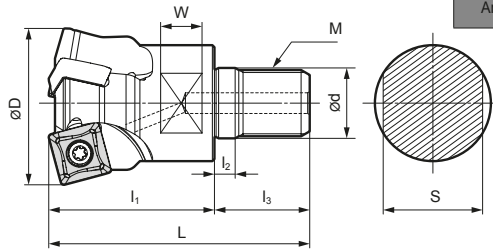


Recommended Tightening Torque (N·m)

**New**

# "Wave Mill" Series WFXH 08000/12000 M Type

## Modular Type



Rake Angle	Radial	-6°	1,5mm 15°	2,5mm 15°
	Axial	6°		

(08000M Type) (12000M Type)

## Head

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)
		$\varnothing D$	$\varnothing d$	M	L	$l_1$	$l_2$	$l_3$	W	S		
WFXH08025M12Z2		25	12,5	M12	56	35	5	21	10	19	2	0,1
08032M12Z3		32	17,0	M16	63	40	5	23	10	24	3	0,2

Inserts are not included.

## Identification Details

WFX	08	020	M10	Z2
Cutter Series	Insert Size	Cutter Diameter	Screw Size	No. of Teeth

## Head

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)
		$\varnothing D$	$\varnothing d$	M	L	$l_1$	$l_2$	$l_3$	W	S		
WFXH12040M12Z3		40	17,0	M16	63	40	5	23	10	24	3	0,2

Inserts are not included.



## Inserts

Application		Coated Carbide						Carbide	DLC			
High Speed / Light cut		P			K		MS	KN				
General Purpose			PM	PM	K		MS	MS	N			
Roughing			PM	PM	K		MS	MS	N			
Cat. No.		ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	Radius (mm)	Fig.
											$r_e$	
SOMT 080304 PZER L		●	●	●	●	●	●	●	-	-	0,4	1
SOMT 080308 PZER L		●	●	●	●	●	●	●	-	-	0,8	1
SOMT 080304 PZER G		●	●	●	●	●	●	●	-	-	0,4	1
SOMT 080308 PZER G		●	●	●	●	●	●	●	-	-	0,8	1
SOMT 080312 PZER G		●	●	●	●	●	●	●	-	-	1,2	1
SOMT 080308 PZER H		●	●	●	●	●	●	●	-	-	0,8	1
SOMT 080312 PZER H		●	●	●	●	●	●	●	-	-	1,2	1
SOET 080304 PZER G		●	●	●	●	●	●	●	-	-	0,4	1
SOET 080308 PZER G		●	●	●	●	●	●	●	-	-	0,8	1
SOET 080312 PZER G		●	●	●	●	●	●	●	-	-	1,2	1
SOET 080302 PZFR S		-	-	-	-	-	-	-	●	●	0,2	1
SOET 080304 PZFR S		-	-	-	-	-	-	-	●	●	0,4	1
SOET 080308 PZFR S		-	-	-	-	-	-	-	●	●	0,8	1
SOMT 120408 PDER L		●	●	●	●	●	●	●	-	-	0,8	2
SOMT 120404 PDER G		●	●	●	●	●	●	●	-	-	0,4	2
SOMT 120408 PDER G		●	●	●	●	●	●	●	-	-	0,8	2
SOMT 120412 PDER G		●	●	●	●	●	●	●	-	-	1,2	2
SOMT 120416 PDER G		●	●	●	●	●	●	●	-	-	1,6	2
SOMT 120408 PDER H		●	●	●	●	●	●	●	-	-	0,8	2
SOET 120408 PDFR S		-	-	-	-	-	-	-	●	●	0,8	2

Fig. 1

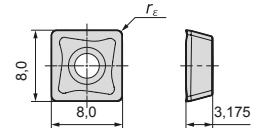
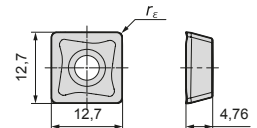


Fig. 2



## Spare Parts

Applicable Cutter	Screw	Insert Wrench
	WFXH08000M	BFTX0306IP 2,0
WFXH12000M	BFTX03512IP 3,0	TRDR15IP

## Recommended Cutting Conditions

ISO	Work Material	Grade	Cutting Speed (vc (m/min))	Insert Cat. No.	$\varnothing 25$		$\varnothing 32$		$\varnothing 40$	
					$a_p$ (mm)	$f_t$ (mm/t)	$a_p$ (mm)	$f_t$ (mm/t)	$a_p$ (mm)	$f_t$ (mm/t)
P	General Steel <200HB	ACP200	100 - 150 - 200	SOMT08	0,8	0,8	0,8	0,8	-	-
				SOMT12	-	-	-	-	1,0	1,0
P	Alloy Steel <HRC45	ACP200	80 - 130 - 180	SOMT08	0,7	0,8	0,7	0,8	-	-
				SOMT12	-	-	-	-	0,8	1,0
M	Stainless Steel (X5CrNiS18 10, other)	ACM300	80 - 120 - 150	SOMT08	0,8	0,7	0,8	0,7	-	-
				SOMT12	-	-	-	-	1,0	0,8
K	Cast Iron FC, FCD	ACK300	100 - 150 - 200	SOMT08	0,8	1,0	0,8	1,0	-	-
				SOMT12	-	-	-	-	1,0	1,2
H	Hardened Steel <HRC50	ACK300	40 - 80 - 100	SOMT08	0,5	0,5	0,5	0,5	-	-
				SOMT12	-	-	-	-	0,6	0,8

The above recommended cutting conditions may require adjustment according to machine rigidity and work rigidity. The above figures are guidelines for use with the BT50 machine tool.

The above conditions assume a tool overhang length of  $L/D=3$  (i.e. overhang length is 3 times tool diameter) or less.

When tool overhang is more than  $L/D=3$  and less or equal  $L/D=5$ , settings should be adjusted to approximately 70% to 80% of those indicated in the above cutting conditions (i.e.  $a_p$  and  $f_t$ ).

When tool overhang is more than  $L/D=5$  and less or equal  $L/D=8$ , settings should be adjusted to approximately 50% to 60% of those indicated in the above cutting conditions (i.e.  $a_p$  and  $f_t$ ).

Indexable Endmills

# Sumi Dual Mill DFC Type

## General Features




The Sumi Dual Mill DFC type employs cost effective double-sided inserts for high toughness and enhanced accuracy.  
The double-side inserts are flexible and reduces costs.

## Large Line-up

- Diameter from Ø25mm to Ø200mm
- Available as standard, fine and extra-fine pitch
- Bore diameter: metric
- Insert geometry: L, G, H



## Cutter Body

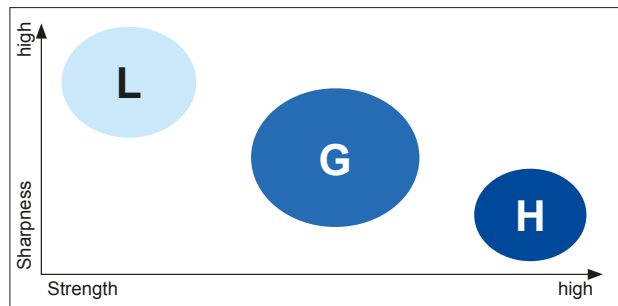
Type		Cat. No.	Diameter (mm)	No. of Teeth	Image
Shank 	Standard Pitch	DFC 09000 E	Ø25~Ø80	2~5	
	Fine Pitch	DFCM 09000 E	Ø32~Ø80	3~7	
Shell	Standard Pitch	DCF 09000 RS	Ø50~Ø200	4~8	
	Fine Pitch	DFCM 09000 RS	Ø50~Ø200	5~12	
	Extra-Fine Pitch	DFCF 09000 RS	Ø50~Ø200	6~16	




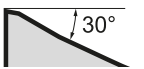
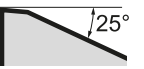
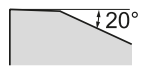
## New Insert Design Provides Excellent Machining Accuracy

### Inserts

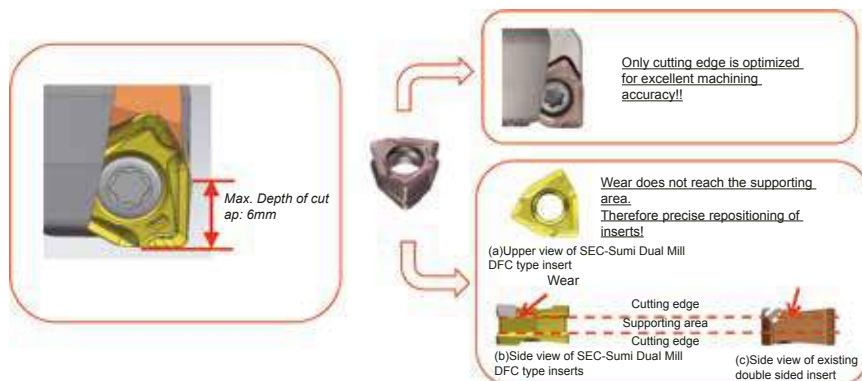
Cat. No.	New		New	
	R0,4	R0,8	R1,2	R1,6
XNMU0606__PNER-L	●	●	●	●
XNMU0606__PNER-G	●	●	●	●
XNMU0606__PNER-H	●	●	●	●

### Chipbreaker Selection Map



Work Material	Steel, Cast Iron		
	L type	G type	H type
Chipbreaker			
Feature	Low cutting force	General purpose	Strong edge
Cutting edge geometry			
Application	Light cut, low rigidity milling and reduced burrs	Main breaker for general purpose applications	Roughing, heavy interrupted and hardness steel milling

## Stable and High Cutting Performance Combined with High Toughness



● = Euro stock  
○ = Japan stock

 Recommended Tightening Torque (N·m)



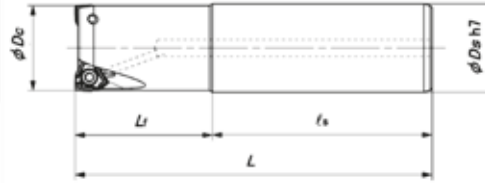
# Sumi Dual Mill DFC(M) 09000 E Type

## Body – Shank Type



Rake Angle	Radial	-9°
	Axial	-5°

Max.  $a_p$ : 6mm



## Body – Dimensions

### DFC type, Standard Pitch

Cat. No.	Stock	Dimensions (mm)					No. of Teeth
		$\phi D_c$	$\phi D_s$	$\phi L_f$	$l_s$	L	
DFC09025E	●	25	25	40	80	120	2
DFC09032E	●	32	32	50	80	130	2
DFC09040E	●	40	32	50	80	130	3
DFC09050E	●	50	32	50	80	130	3
DFC09050E-42	○	50	42	50	100	150	3
DFC09063E	●	63	32	50	80	130	4
DFC09063E-42	○	63	42	50	100	150	4
DFC09080E	●	80	32	50	80	130	5
DFC09080E-42	○	80	42	50	100	150	5

### DFCM type, Medium Pitch

Cat. No.	Stock	Dimensions (mm)					No. of Teeth
		$\phi D_c$	$\phi D_s$	$L_f$	$l_s$	L	
DFCM09032E	●	32	32	50	80	130	3
DFCM09040E	●	40	32	50	80	130	4
DFCM09050E	●	50	32	50	80	130	5
DFCM09050E-42	○	50	42	50	100	150	5
DFCM09063E	●	63	32	50	80	130	6
DFCM09063E-42	●	63	42	50	100	150	6
DFCM09080E	○	80	32	50	80	130	7
DFCM09080E-42	●	80	42	50	100	150	7

## Identification Details

**DFC**  
Cutter Series

**M**  
M: Medium

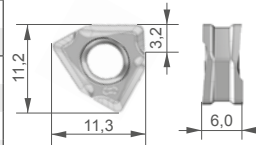
**09**  
Insert Size

**050**  
Cutter Diameter

**E**  
Shank Type

## Inserts

Application	Grade	Coated Carbide						P	Steel
	High Speed / Light Cutting							M	Stainless Steel
	General Purpose Cutting							K	Cast Iron
	Rough Cutting							S	Exotic Alloy
Cat. No.		ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	Radius
									$r\epsilon$
XNMU 060604 PNER-L	<b>New</b>	●	●	●	●	●	●	●	0,4
060608 PNER-L		●	●	●	●	●	●	●	0,8
XNMU 060604 PNER-G	<b>New</b>	●	●	●	●	●	●	●	0,4
060608 PNER-G		●	●	●	●	●	●	●	0,8
060612 PNER-G	<b>New</b>	●	●	●	●	●	●	●	1,2
060616 PNER-G	<b>New</b>	●	●	●	●	●	●	●	1,6
XNMU 060608 PNER-H		●	●	●	●	●	●	●	0,8
060612 PNER-H	<b>New</b>	●	●	●	●	●	●	●	1,2
060616 PNER-H	<b>New</b>	●	●	●	●	●	●	●	1,6



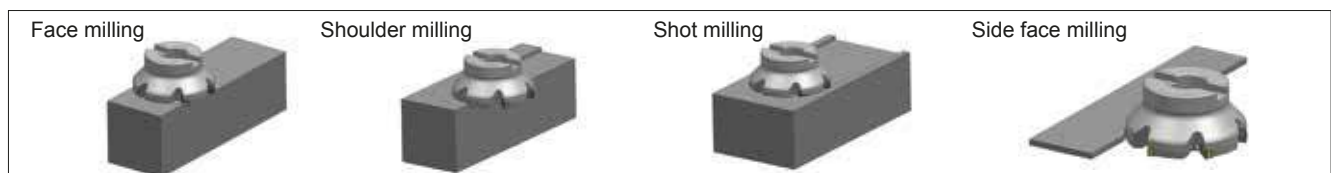
## Spare Parts

Screw	Wrench
BFTX03512IP	TRDR15IP 5,0

## Recommended Cutting Conditions

ISO	Work-material	Hardness	Cutting Speed (m/min) Min. - Optimum - Max.	Feed Rate Min. - Optimum - Max.	Depth of Cut (mm)	Grade
<b>P</b>	General Steel	180~280HB	150 - 200 - 250	0,10 - 0,20 - 0,30	< 6	ACP200 ACP300
	Soft Steel	$\leq$ 180HB	180 - 250 - 350	0,15 - 0,25 - 0,35	< 6	ACP200 ACP300
	Die Steel	200~220HB	100 - 150 - 200	0,10 - 0,18 - 0,25	< 4	ACP200 ACP300
<b>M</b>	Stainless Steel	-	160 - 205 - 250	0,12 - 0,18 - 0,25	< 6	ACM200 ACM300
<b>K</b>	Cast Iron	250HB	100 - 175 - 250	0,10 - 0,20 - 0,30	< 6	ACK200 ACK300

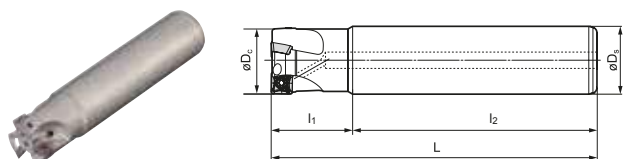
## Suitable Applications



# "Sumi Wave" Shoulder Mill WFX (M) 08000 E Type

# "Sumi Wave" Shoulder Mill WFX 08000 M Type

## Body - Shank Type



WFX08000E

## Body - WFX\_E, Standard Pitch

Cat. No.	Stock	Dimensions (mm)					No. of Teeth
		$\varnothing D_c$	$\varnothing D_s$	$l_1$	$l_2$	L	
WFX 08020 E-16	●	20	16	30	80	110	2
WFX 08020 E	●	20	20	30	80	110	2
08022 E	●	22	20	30	90	120	2
WFX 08025 E-20	●	25	20	30	90	120	2
WFX 08025 E	●	25	25	30	90	120	2
08028 E	●	28	25	30	90	120	2
08030 E	●	30	25	30	90	120	3
WFX 08032 E	●	32	32	30	90	120	3
08033 E	●	33	32	30	90	120	3
08040 E	●	40	32	30	90	120	3
08050 E	●	50	32	30	90	120	4
08063 E	●	63	32	30	90	120	5

Inserts are not included.

## Body - WFXM\_E, Medium Pitch

Cat. No.	Stock	Dimensions (mm)					No. of Teeth
		$\varnothing D_c$	$\varnothing D_s$	$l_1$	$l_2$	L	
WFXM 08025 E	●	25	25	30	90	120	3
WFXM 08032 E	●	32	32	30	90	120	4
08040 E	●	40	32	30	90	120	4
08050 E	●	50	32	30	90	120	5
08063 E	●	63	32	30	90	120	6

Inserts are not included.

## Identification Details

<b>WFX</b>	<b>M</b>	<b>08</b>	<b>025</b>	<b>E</b>
Cutter Series	M: Medium	Insert Size	Cutter Diameter	Endmill Type

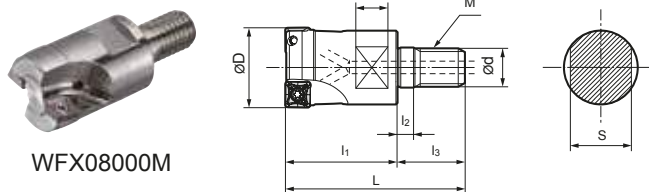
## Recommended Cutting Conditions

ISO	Work Material	Hardness (HB)	Cutting Speed	Feed Rate	DOC	Grades
P	General Steel	180-280	150-200-250	0,08-0,12-0,18	<6	ACP200 ACP300
	Soft Steel	≤180	180-250-350	0,10-0,15-0,20	<6	ACP200 ACP300
M	Die Steel	200-220	100-150-200	0,08-0,12-0,18	<4	ACP200 ACP300
	Stainless Steel	-	160-200-250	0,10-0,15-0,20	<6	ACM300
K	Cast Iron	250	100-175-250	0,10-0,15-0,20	<6	ACK200 ACK300
	Non Ferrous Metal	-	300-500-1000	0,10-0,15-0,20	<6	H1 DL1000

Min. - Optimum - Max.

## Modular Type

Rake Angle	Radial	-6°	6mm	90°
	Axial	12°		



WFX08000M

## Head

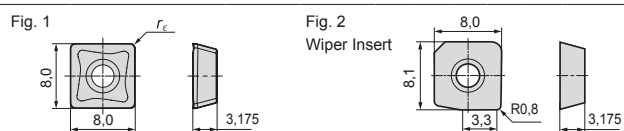
Cat. No.	Stock	Dimensions (mm)										No. of Teeth
		$\varnothing D$	$\varnothing d$	M	L	$l_1$	$l_2$	$l_3$	W	S		
WFX 08020 M10Z2	●	20	10,5	M10	49	30	5	19	8	15	2	
08022 M10Z2	●	22	10,5	M10	49	30	5	19	8	15	2	
WFX 08025 M12Z2	●	25	12,5	M12	56	35	5	21	10	19	2	
08028 M10Z2	●	28	12,5	M12	56	35	5	21	10	19	2	
WFX 08030 M16Z3	●	30	17,0	M16	63	40	5	23	10	24	3	
08032 M16Z3	●	32	17,0	M16	63	40	5	23	10	24	3	
08040 M16Z3	●	40	17,0	M16	63	40	5	23	10	24	3	

## Identification Details

<b>WFX</b>	<b>08</b>	<b>020</b>	<b>M10</b>	<b>Z2</b>
Cutter Series	Insert Size	Cutter Diameter	Screw Size	No. of Teeth



## Inserts



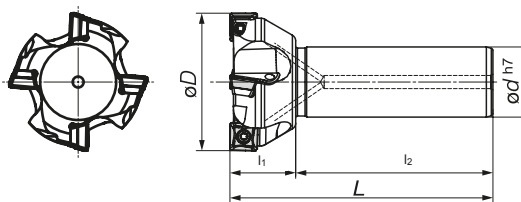
Application	Coated Carbide						Carbide	DLC	Radius $r_f$	Fig.
	P	M	K	S	N	H	N			
High Speed / Light cut	●	●	●	●	●	●	●	●		
General Purpose	●	●	●	●	●	●	●	●		
Roughing	●	●	●	●	●	●	●	●		
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	
SOMT 080304 PZER L	●	●	●	●	●	●	●	-	-	0,4 1
080308 PZER L	●	●	●	●	●	●	●	-	-	0,8 1
SOMT 080304 PZER G	●	●	●	●	●	●	●	-	-	0,4 1
080308 PZER G	●	●	●	●	●	●	●	-	-	0,8 1
080312 PZER G	●	●	●	●	●	●	●	-	-	1,2 1
SOMT 080308 PZER H	●	●	●	●	●	●	●	-	-	0,8 1
080312 PZER H	●	●	●	●	●	●	●	-	-	1,2 1
SOET 080304 PZER G	●	●	●	●	●	●	●	-	-	0,4 1
080308 PZER G	●	●	●	●	●	●	●	-	-	0,8 1
080312 PZER G	●	●	●	●	●	●	●	-	-	1,2 1
SOET 080302 PZFR S	-	-	-	-	-	-	-	●	●	0,2 1
080304 PZFR S	-	-	-	-	-	-	-	●	●	0,4 1
080308 PZFR S	-	-	-	-	-	-	-	●	●	0,8 1
XOEW 080308 PZTR W	-	-	-	●	-	-	-	-	-	- 2

## Spare Parts

Screw	Wrench
BFTX0306IP	TRDR08IP
2,0	

## Body - Shank Type

Rake Angle	Radial	-8°	10mm	90°
	Axial	8°		



## Body - WFX\_E, Standard Pitch

Cat. No.	Stock	Dimensions (mm)					No. of Teeth
		$\phi D_c$	$\phi D_s$	$l_1$	$l_2$	L	
WFX 12040 E	●	40	32	30	90	120	3
12050 E	●	50	32	30	90	120	3
12063 E	●	63	32	30	90	120	4
12080 E	●	80	32	30	90	120	4

Inserts are not included.

## Body - WFXF\_E, Fine Pitch

Cat. No.	Stock	Dimensions (mm)					No. of Teeth
		$\phi D_c$	$\phi D_s$	$l_1$	$l_2$	L	
WFXF 12050 E	●	50	32	30	90	120	4
12063 E	●	63	32	30	90	120	5
12080 E	●	80	32	30	90	120	6

Inserts are not included.

## Identification Details

<b>WFX</b>	<b>F</b>	<b>12</b>	<b>050</b>	<b>E</b>
Cutter Series	F: Fine	Insert Size	Cutter Diameter	Endmill Type

## Recommended Cutting Conditions

ISO	Work Material	Hardness (HB)	Cutting Speed	Feed Rate	DOC	Grades
P	General Steel	180~280	150-200-250	0,10-0,15-0,20	<10	ACP200 ACP300
	Soft Steel	≤180	180-250-350	0,10-0,15-0,20	<10	ACP200 ACP300
	Die Steel	200~220	100-150-200	0,10-0,15-0,20	<6	ACP200 ACP300
M	Stainless Steel	-	160-200-250	0,10-0,15-0,20	<10	ACM300
K	Cast Iron	250	100-175-250	0,10-0,15-0,20	<10	ACK200 ACK300
N	Non Ferrous Metal	-	300-500-1000	0,10-0,15-0,20	<10	H1 DL1000

Min. - Optimum - Max.

## Inserts

Fig. 1

Fig. 2  
Wiper Insert

Application	Coated Carbide						Carbide	DLC	Radius $r_e$	Fig.
High Speed / Light cut	P			K		M S	K N	N		
General Purpose		P M	P M	K		M S	M S	N		
Roughing		P M	P M	K		M S				
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	
SOMT 120408 PDER L	●	●	●	●	●	●	●	-	-	0,8 1
SOMT 120404 PDER G	●	●	●	●	●	●	●	-	-	0,4 1
120408 PDER G	●	●	●	●	●	●	●	-	-	0,8 1
120412 PDER G	●	●	●	●	●	●	●	-	-	1,2 1
120416 PDER G	●	●	●	●	●	●	●	-	-	1,6 1
SOMT 120408 PDER H	●	●	●	●	●	●	●	-	-	0,8 1
SOET 120408 PDFR S	-	-	-	-	-	-	●	●	●	0,8 1
XOEW 120408 PDTR W	-	-	-	●	-	-	-	-	-	- 2

## Spare Parts

Shim	Shim Screw	Insert Screw	Insert Wrench	Seat Wrench
WFXS4R	BW0507F	BFTX03512IP	3,0 TRDR15IP	LH035



# "Sumi Dual Mill" Series TSX Type



## General Features

High-efficient and high precision tangential shoulder milling cutter with tangentially mounted carbide inserts.

## Characteristics

- Tough & Sharp cutting edge
- Very accurate and excellent surface finish
- Wide product range

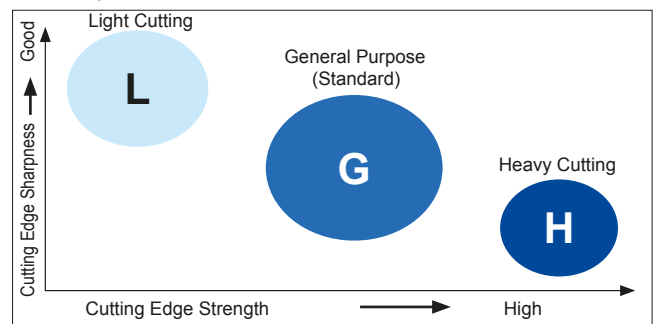
## Product Range

Type	Cat. No.	Diameter Range	No. of Teeth	Shape
Shank Type	Standard Pitch	TSX 08000 E	Ø16 ~ Ø40	
	Fine Pitch	TSXF 08000 E	Ø20 ~ Ø40	
	Standard Pitch	TSX 13000 E	Ø25 ~ Ø50	
	Medium Pitch	TSXM 13000 E	Ø32 ~ Ø50	
Shell Type	Standard Pitch	TSX 08000 RS	Ø40 ~ Ø63	
	Fine Pitch	TSXF 08000 RS	Ø40 ~ Ø63	
	Standard Pitch	TSX 13000 RS	Ø40 ~ Ø160	
	Medium Pitch	TSXM 13000 RS	Ø40 ~ Ø160	

## Inserts

Cat. No.	R0,4	R0,8	R1,2	R1,6	R2,4	R3,2
LNEX0804_PNER-L	●	●				
LNEX0804_PNER-G	●	●	●	●		
LNEX1306_PNER-L	●	●				
LNEX1306_PNER-G		●		●	●	●
LNEX1306_PNER-H	●	●		●	●	●

## Chipbreaker Selection



## Chipbreaker Lineup

Work Material	P M K S		
Chipbreaker	L type	G type	H type
Feature	Low cutting force	General purpose	Strong edge
LNEX08 Cutting edge geometry			-
LNEX13 Cutting edge geometry			
Application	Light cut, low rigidity milling and reduced burrs	Main breaker for general purpose applications	Roughing, heavy interrupted and hardness steel milling

## Recommended Cutting Conditions

ISO	Work Material	Hardness	Cutting Speed $v_c$ (m/min)	Feed Rate $f_t$ (mm/t)	Grade
P	Carbon Steel	180~280HB	150 - <b>225</b> - 300	0,08 - <b>0,20</b> - 0,30	ACP100, ACP200, ACP300
	Alloy Steel	> 280HB	75 - <b>150</b> - 230	0,08 - <b>0,20</b> - 0,30	
M	Stainless Steel	220~280HB	90 - <b>135</b> - 180	0,08 - <b>0,15</b> - 0,25	
		>280HB	75 - <b>125</b> - 170	0,08 - <b>0,15</b> - 0,25	
K	Cast Iron, Ductile Cast Iron	250HB	100 - <b>175</b> - 250	0,08 - <b>0,20</b> - 0,30	ACK200, ACK300
S	Exotic Material	-	30 - <b>60</b> - 90	0,05 - <b>0,10</b> - 0,15	ACM200, ACM300

Min. - Optimum - Max.

● = Euro stock

Recommended Tightening Torque (N·m)

# "Sumi Dual Mill" Series TSX(F) 08000 E Type

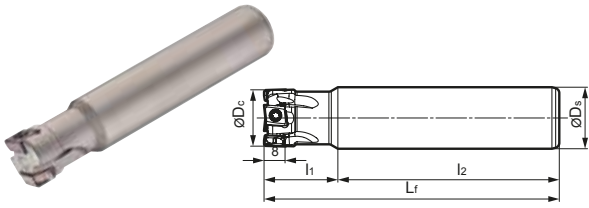


# "Sumi Dual Mill" Series TSX(M) 13000 E Type



## Shank Type

Rake Angle	Radial	-20°	8mm	90°
	Axial	-6°		



## Body - TSX, Standard Pitch

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		$\phi D_c$	$\phi D_s$	$l_1$	$l_2$	$L_f$		
TSX 08016 E	●	16	16	25	75	100	2	0,13
08020 E	●	20	20	30	80	110	2	0,22
08025 E	●	25	25	30	90	120	3	0,40
08032 E	●	32	32	30	90	120	3	0,67
08040 E	●	40	32	30	90	120	4	0,72

Inserts are not included.

## Body - TSXF, Fine Pitch

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		$\phi D_c$	$\phi D_s$	$l_1$	$l_2$	$L_f$		
TSXF 08020 E	●	20	20	30	80	110	3	0,22
08025 E	●	25	25	30	90	120	4	0,40
08032 E	●	32	32	30	90	120	5	0,67
08040 E	●	40	32	30	90	120	6	0,73

Inserts are not included.

## Spare Parts

Insert Screw	Insert Wrench	Applicable Cutters	
BFTX0306IP	2,0	TRDR08IP	TSX08016E, TSX08020E, TSXF08020E
BFTX0308IP			TSX08025E~40E, TSXF08025E~40E
BFTX03510IP	3,0	TRDR15IP	TSX13000E, TSXM13000E

## Inserts

Application	Grade	Coated Carbide						P	Steel	
		P	M	K	M	S	M	M	Stainless Steel	
Application	High Speed / Light Cutting	●	●	●	●	●	●	●	Stainless Steel	
	General Purpose Cutting	●	●	●	●	●	●	●	Cast Iron	
	Rough Cutting	●	●	●	●	●	●	●	Exotic Alloy	
Applicable Cutters	Inserts Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	Radius	LNXE 08000 type
TSX(F) 08000E	LNXE 080404 PNER-L	●	●	●	●	●	●	●	0,4	
	080408 PNER-L	●	●	●	●	●	●	●	0,8	
	LNXE 080404 PNER-G	●	●	●	●	●	●	●	0,4	
	080408 PNER-G	●	●	●	●	●	●	●	0,8	
	080412 PNER-G	●	●	●	●	●	●	●	1,2	
	080416 PNER-G	●	●	●	●	●	●	●	1,6	
TSX(M) 13000E	LNXE 130604 PNER-L	●	●	●	●	●	●	●	0,4	
	130608 PNER-L	●	●	●	●	●	●	●	0,8	
	LNXE 130604 PNER-G	●	●	●	●	●	●	●	0,4	
	130608 PNER-G	●	●	●	●	●	●	●	0,8	
	130616 PNER-G	●	●	●	●	●	●	●	1,6	
	130624 PNER-G	●	●	●	●	●	●	●	2,4	
	130632 PNER-G	●	●	●	●	●	●	●	3,2	
	LNXE 130608 PNER-H	●	●	●	●	●	●	●	0,8	
	130616 PNER-H	●	●	●	●	●	●	●	1,6	
	130624 PNER-H	●	●	●	●	●	●	●	2,4	
130632 PNER-H	●	●	●	●	●	●	●	3,2		

## Recommended Cutting Conditions

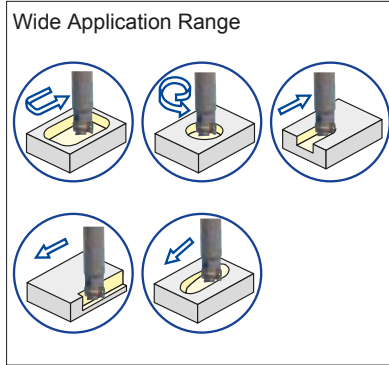


# Wavemill Series WEX Type

For the Smooth and Reliable Cutting Action



## General Features



## Ramping (Slant Milling)

Tool Diam. ØD	Max. Ramping Angle		
	Type 1000	Type 2000	Type 3000
Ø10	2°30'		
Ø12	1°45'		
Ø14	1°25'	1°40'	
Ø16	1°00'	1°20'	
Ø18	0°45'	1°10'	
Ø20	0°30'	1°00'	
Ø25	0°30'	0°45'	1°30'
Ø32	0°25'	0°35'	1°00'
Ø40	0°20'	0°25'	0°45'
Ø50	0°15'	0°20'	0°30'
Ø63	0°10'	0°15'	0°20'
Ø80	<b>New</b>		0°15'
Ø100			-

Maximum ramping angle ( $\alpha$  max. max.) depends on cutter diameter.

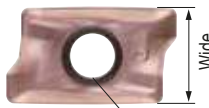
### Precision insert with strong cutting edge and low cutting force

Wave shaped cutting edge design lowers cutting resistance yet improves cutting edge strength.

Achieving high quality finish with high precision cutting edge.

Smooth cutting even for deep grooves and low rigidity machines.

High precision curved cutting edge



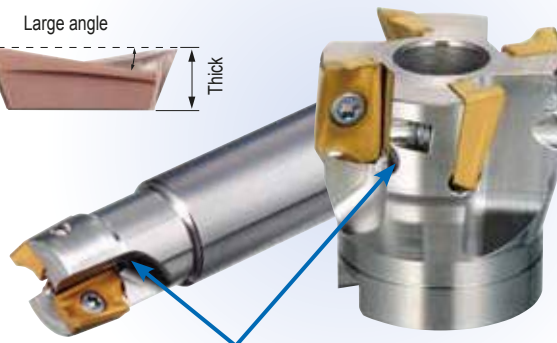
Screw hole size increased

High rake wave cutting edge

Large angle



Thick



### Internal Coolant Holes

Improved chip evacuation with air or coolant supply.

### Wide Variety of Inserts

6 types of chipbreaker design (L, G, H, E, EH and S)

9 milling grades for a wide range of work materials and applications.

- ACP100, ACP200, ACP300 (steel milling grades)

- ACK200, ACK300

(cast iron milling grades)

- ACM200, ACM300

(stainless steel, exotic alloy milling grades)

- DL1000, H1

(aluminium milling grades)

### High Durable Body

Special surface treatment improves corrosion resistance as well as scratch resistance.

Increased screw size improves clamping force and durability.

## Product Range

Type	Cat. No.	Series	Diameter Range (mm)				Image
			Ø10	Ø20	Ø40	Ø60	
Shank	WEX 1000E <b>New</b>	Short Type	10	25			<p>WEX3000    WEX2000    WEX1000</p>
	WEX 1000EL <b>New</b>	Long Type	10	20			
	WEX 2000E	Short Type	14	63			
	WEX 2000EL	Long Type	14	40			
	WEX 2000EW	Weldon Shank Short Type	16	20			
	WEX 3000E	Short Type	25	63			
	WEX 3000EL	Long Type	25	40			
	WEX 3000EW	Weldon Shank Short Type	25	32			
Shell	WEX 1000F <b>New</b>	Shell Type	32	63			<p><b>G38</b></p>
	WEX 2000F	Shell Type	40	63			
	WEX 3000F	Shell Type	40	63			
Modular	WEX 2000M	Modular Type	16	40			
	WEX 3000M	Modular Type	25	40			

# Wavemill Series Inserts for WEX Type



## WEX1000 Type Expansion

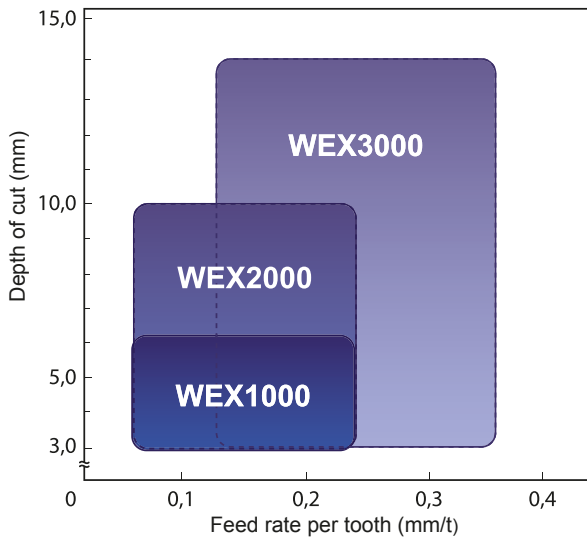
- Efficient machining via high number of inserts
- Precise insert change tolerance provides high surface roughness quality
- High shoulder accuracy due to optimized cutting edge
- Stable cutting conditions when utilising low rigidity machines
- Economic advantages using small AXMT06 inserts



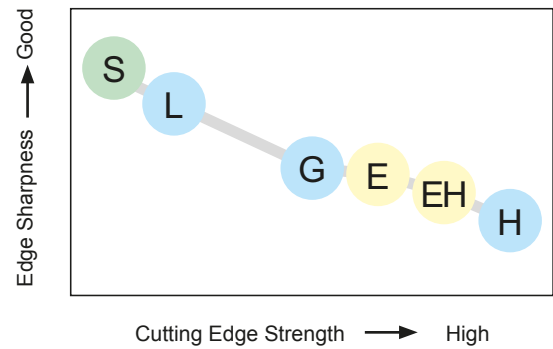
WEX3000      WEX2000      WEX1000

## Application Range

### Shoulder Milling



## Chipbreaker Selection



## Characteristics

Work Material	Steel, Cast Iron			Stainless Steel, Exotic Alloy		Aluminium
	L	G	H	E	EH	S
Chipbreaker						
Features	Low Cutting Force	General Purpose	Strong Edged	General Purpose	Strong Edged	High Rake
Chipbreaker Profile for 1000 Series Insert						
Chipbreaker Profile for 2000 Series Insert						
Chipbreaker Profile for 3000 Series Insert						
Application	Light cut, low rigidity milling and reduced burrs	<b>Main chipbreaker</b> general purpose to interrupted milling	Roughing, heavy interrupted and hardened steel milling	Light cutting to general purpose	Heavy interrupted machining	Aluminium, non-ferrous metal

## Grade Selection

ISO	Grade	Finishing to Light Cutting	Medium Cut	Rough to Heavy Cutting
P	Coated Carbide	ACP100	ACP200	ACP300
		ACM200	ACM300	

ISO	Grade	Finishing to Light Cutting	Medium Cut	Rough to Heavy Cutting
K	Coated Carbide	ACK200	ACK300	
N	Coated Carbide	DL1000		
	Carbide		H1	

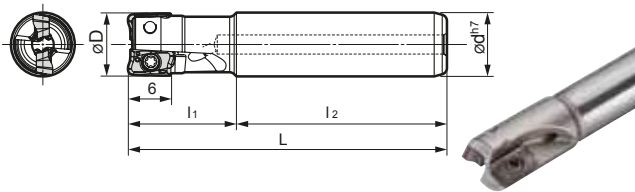
# Wavemill Series WEX 1000 E Type



## WEX 1000 E/EL

### Shank Type

Rake Angle	Radial	8°-15°
	Axial	16°-24°
5mm		90°



### Body (Short Type „E“)

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 1010 E	●	10	10	17	33	50	2	0,03
1012 E	●	12	12	20	60	80	3	0,06
1014 E	●	14	16	22	59	80	3	0,10
1016 E	●	16	16	20	72	90	4	0,12
1018 E	●	18	20	20	80	100	4	0,21
WEX 1020 E	●	20	20	22	78	100	5	0,22
1025 E	●	25	20	25	90	115	7	0,27

### Body (Long Type „EL“)

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 1010 EL	●	10	8	17	83	100	2	0,03
1012 EL	●	12	10	20	100	120	2	0,06
1014 EL	●	14	12	20	125	145	3	0,11
1016 EL	●	16	14	20	140	160	3	0,17
1016 EL15	●	16	15	20	140	160	3	0,19
1018 EL	●	18	16	20	160	180	3	0,25
WEX 1020 EL	●	20	18	25	175	200	4	0,36
1020 EL19	●	20	19	25	175	200	4	0,38

Inserts are not included.

### Inserts for WEX1000 Type

Application	Coated Carbide							
High Speed / Light cut	P			K		MS		
General Purpose		P		K		MS	MS	
Roughing		P	P		K		MS	
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	Radius
								r <sub>ε</sub>
AXMT 060204 PDER-L	●	●	●	●	●	●	●	0,4
060208 PDER-L	●	●	●	●	●	●	●	0,8
060212 PDER-L	●	●	●	●	●	●	●	1,2
AXMT 060204 PDER-G	●	●	●	●	●	●	●	0,4
060208 PDER-G	●	●	●	●	●	●	●	0,8
060212 PDER-G	●	●	●	●	●	●	●	1,2
AXMT 060204 PDER-H	●	●	●	●	●	●	●	0,4
060208 PDER-H	●	●	●	●	●	●	●	0,8
060212 PDER-H	●	●	●	●	●	●	●	1,2

G - General type  
H - Strong cutting edge  
E - For stainless steel / exotic alloy

### Cutter Identification

<b>WEX</b>	<b>1</b>	<b>016</b>	<b>EL</b>	<b>15</b>
Cutter Series	1000 Series	Cutter Diameter	Shank Type	Shank Diameter

### Spare Parts

Screw	Wrench	Applicable Endmill
0,5 Nm BFTX 01804 IP	TRX 06 IP	

● = Euro stock  
□ = Delivery on request

Recommended Tightening Torque (N·m)

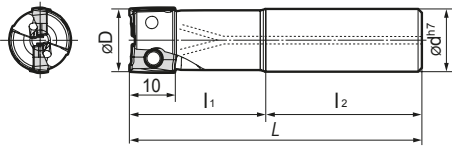


# Wavemill Series WEX 2000 E Type

## WEX 2000 E/EL

### Shank Type

Rake Angle	Radial	8°~15°
	Axial	16°~24°



### Body (Short Type „E“)

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 2014 E	●	14	16	25	55	80	1	0,10
2016 E	●	16	16	25	75	100	2	0,13
2018 E	□	18	16	25	75	100	2	0,14
2020 E	●	20	20	30	80	110	3	0,22
2022 E	●	22	20	30	80	110	3	0,23
WEX 2025 E	●	25	25	35	85	120	4	0,38
2028 E	□	28	25	35	85	120	4	0,39
2030 E	□	30	25	35	85	120	4	0,40
2032 E	●	32	32	40	90	130	5	0,70
2040 E	□	40	32	30	120	150	6	0,91
WEX 2050 E	□	50	32	30	120	150	7	1,02
2063 E	□	63	32	30	120	150	8	1,22

### Body (Long Type „EL“)

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 2014 EL	●	14	16	25	95	120	1	0,14
2016 EL	●	16	16	25	120	145	2	0,19
2018 EL	□	18	16	25	120	145	2	0,19
2020 EL	●	20	20	40	110	150	2	0,32
2022 EL	□	22	20	30	120	150	2	0,33
WEX 2025 EL	●	25	25	50	120	170	2	0,55
2028 EL	□	28	25	30	140	170	2	0,59
2030 EL	□	30	25	30	140	170	2	0,60
2032 EL	□	32	32	60	120	180	2	0,99
2040 EL	□	40	32	30	150	180	2	1,12

### Body (Long Type „E“ + Small Shank)

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 2016 EL15	●	16	15	25	120	145	2	0,17
2020 EL19	●	20	19	40	110	150	2	0,30
2025 EL24	●	25	24	50	120	170	2	0,53
2025 EL24Z3	□	25	24	50	120	170	3	0,50
3032 EL30	□	32	30	60	120	180	2	0,95

### Body (Weldon Shank Short Type „EW“)

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 2016 EW	●	16	16	25	75	100	2	0,12
2020 EW	●	20	20	30	80	110	3	0,21

Inserts are not included.

### Cutter Identification

<b>WEX</b>	<b>2</b>	<b>016</b>	<b>EL</b>	<b>15</b>
Cutter Series	2000 Series	Cutter Diameter	Shank Type	Shank Diameter

### Spare Parts

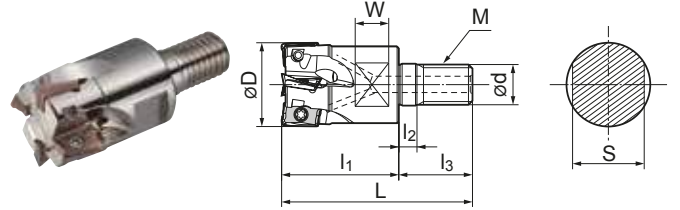
Screw	Wrench	Applicable Endmill
2,0 N <sub>m</sub>		
BFTX 0305 IP BFTX 0306 IP	TRDR 08 IP	WEX 2014 ~ WEX 2018 WEX 2020 ~ WEX 2063

# Wavemill Series WEX 2000 M Type

## WEX 2000 M

### Modular Type

Rake Angle	Radial	10°~18°
	Axial	14°~25°



### Head

Cat. No.	Stock	Dimensions (mm)										No. of Teeth
		øD	ød	M	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	W	S		
WEX 2016M08Z2	●	16	8,5	M8	42	25	5	17	8	13	2	
2018M08Z2	□	18	8,5	M8	42	25	5	17	8	13	2	
WEX 2020M10Z3	●	20	10,5	M10	49	30	5	19	8	15	3	
2022M10Z3	□	22	10,5	M10	49	30	5	19	8	15	3	
WEX 2025M12Z4	●	25	12,5	M12	56	35	5	21	10	19	4	
2028M12Z4	□	28	12,5	M12	56	35	5	21	10	19	4	
WEX 2030M16Z4	□	30	17,0	M16	63	40	5	23	10	24	4	
2032M16Z5	●	32	17,0	M16	63	40	5	23	10	24	5	
2040M16Z6	□	40	17,0	M16	63	40	5	23	10	24	6	

Inserts are not included.

### Inserts for WEX2000 Type

Application	Coated Carbide							Carbide	DLC
	P	P	P	K	K	M/S	M/S		
High Speed / Light cut	●	●	●	●	●	●	●	●	●
General Purpose	●	●	●	●	●	●	●	●	●
Roughing	●	●	●	●	●	●	●	●	●
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000
AXMT 123504 PEER-G	●	●	●	●	●	●	●	-	-
123508 PEER-G	●	●	●	●	●	●	●	-	-
123512 PEER-G	●	●	●	●	●	●	●	-	-
AXMT 123504 PEER-H	●	●	●	●	●	●	●	-	-
123508 PEER-H	●	●	●	●	●	●	●	-	-
123512 PEER-H	●	●	●	●	●	●	●	-	-
AXMT 123504 PEER-E	●	●	●	●	●	●	●	-	-
123508 PEER-E	●	●	●	●	●	●	●	-	-
123512 PEER-E	●	●	●	●	●	●	●	-	-
AXMT 123508 PEER-EH	●	●	●	●	●	●	●	-	-
AXET 123502 PEFR-S	-	-	-	-	-	-	-	●	●
123504 PEFR-S	-	-	-	-	-	-	-	●	●
123508 PEFR-S	-	-	-	-	-	-	-	●	●

G - General type  
H - Strong cutting edge  
E - For stainless steel / exotic alloy  
EH - Strong edge for stainless steel / exotic alloy  
S - For aluminium alloy  
- - Unable to produce

### Cutter Identification

<b>WEX</b>	<b>2</b>	<b>016</b>	<b>M08</b>	<b>Z2</b>
Cutter Series	2000 Series	Cutter Diameter	Mounting Screw Size	No. of Teeth



### Spare Parts

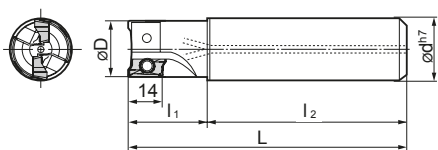
Screw	Wrench	Applicable Endmill
2,0 N <sub>m</sub>		
BFTX 0305 IP BFTX 0306 IP	TRDR 08 IP	WEX 2016M, WEX 2018M WEX 2020M ~ WEX 2040M
BFTX 0407 IP BFTX 0409 IP	TRDR 15 IP	WEX 3025M ~ WEX 3030M WEX 3032M ~ WEX 3040M

# Wavemill Series WEX 3000 E Type

## WEX 3000 E/EL

### Shank Type

Rake Angle	Radial	8°~15°	14mm	90°
	Axial	16°~24°		



### Body (Short Type „E“)

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 3025 E	●	25	25	35	85	120	2	0,37
3028 E	□	28	25	35	85	120	2	0,39
3030 E	□	30	25	40	90	130	3	0,42
WEX 3032 E	●	32	32	40	90	130	3	0,67
3035 E	□	35	32	40	90	130	3	0,69
3040 E	●	40	32	50	120	170	4	1,01
3050 E	□	50	32	50	120	170	5	1,23
3063 E	□	63	32	50	120	170	6	1,58

### Body (Short Type „E“ + Small Shank)

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 3025 E20	□	25	20	35	85	120	2	0,25
3032 E25	□	32	25	40	90	130	3	0,43

### Body (Long Type „EL“)

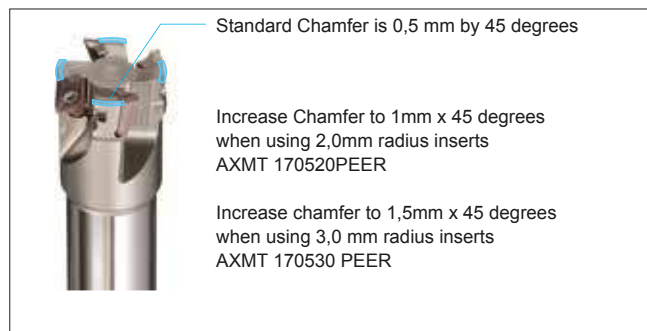
Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 3025 EL	●	25	25	50	120	170	2	0,54
3028 EL	□	28	25	50	120	170	2	0,56
3030 EL	□	30	25	60	120	180	2	0,60
3032 EL	●	32	32	60	120	180	2	0,95
3035 EL	□	35	32	60	120	180	2	0,98
WEX 3040 EL	●	40	32	80	140	220	2	1,38

### Body (Weld on Shank Short Type „EW“)

Cat. No.	Stock	Dimensions (mm)					No. of Teeth	Weight (kg)
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	L		
WEX 3025 EW	●	25	25	35	85	120	2	0,36
3032 EW	●	32	32	40	90	130	3	0,65

Inserts are not included.

\* **ATTENTION:** If nose radius of inserts is 2,0 mm or more please modify cutter body as indicated.



### Spare Parts

Screw	Wrench	Applicable Endmill
3,0 (Nm)		
BFTX 0407 IP BFTX 0409 IP	TRDR 15 IP	WEX 3025 ~ WEX 3030 WEX 3032 ~ WEX 3063

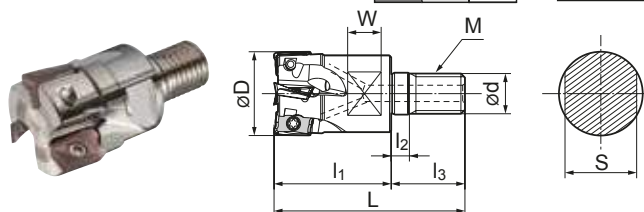
● = Euro stock  
□ = Delivery on request

# Wavemill Series WEX 3000 M Type

## WEX 3000 M

### Modular Type

Rake Angle	Radial	8°~15°	14mm	90°
	Axial	16°~24°		

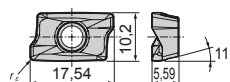


### Head

Cat. No.	Stock	Dimensions (mm)									No. of Teeth
		øD	ød	M	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	W	S	
WEX 3025M12Z2	□	25	12,5	M12	56	35	5	21	10	19	2
3028M12Z2	□	28	12,5	M12	56	35	5	21	10	19	2
WEX 3030M16Z3	□	30	17,0	M16	63	40	5	23	10	24	3
3032M16Z3	□	32	17,0	M16	63	40	5	23	10	24	3
3035M16Z3	□	35	17,0	M16	63	40	5	23	10	24	3
WEX 3040M16Z4	□	40	17,0	M16	63	40	5	23	10	24	4

Inserts are not included.

### Inserts for WEX3000 Type



Application	Coated Carbide						Carbide		DLC		Radius r <sub>ε</sub>
	P	P	K	M	S	K	N	K	N		
High Speed / Light cut	●		●	●	●	●	●	●	●	●	
General Purpose		●	●	●	●	●	●	●	●	●	
Roughing		●	●	●	●	●	●	●	●	●	
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000		
AXMT 170508 PEER-L	●	●	●	●	●			—	—	—	0,8
AXMT 170504 PEER-G	●	●	●	●	●			—	—	—	0,4
170508 PEER-G	●	●	●	●	●			—	—	—	0,8
170512 PEER-G	●	●	●	●	●			—	—	—	1,2
170516 PEER-G	●	●	●	●	●			—	—	—	1,6
170520 PEER-G*	●	●	●	●	●			—	—	—	2,0
170530 PEER-G*	●	●	●	●	●			—	—	—	3,0
AXMT 170508 PEER-H	●	●	●	●	●			—	—	—	0,8
170512 PEER-H	●	●	●	●	●			—	—	—	1,2
AXMT 170504 PEER-E						●	●	—	—	—	0,4
170508 PEER-E			●			●	●	—	—	—	0,8
170512 PEER-E						●	●	—	—	—	1,2
170516 PEER-E						●	●	—	—	—	1,6
170520 PEER-E*						●	●	—	—	—	2,0
170530 PEER-E*						●	●	—	—	—	3,0
AXMT 170508 PEER-EH			●			●	●	—	—	—	0,8
AXET 170502 PEFR-S	—	—	—	—	—	—	—	●	●	—	0,2
170504 PEFR-S	—	—	—	—	—	—	—	●	●	—	0,4
170508 PEFR-S	—	—	—	—	—	—	—	●	●	—	0,8

L - Low cutting force  
G - General type  
H - Strong cutting edge  
E - For stainless steel / exotic alloy  
EH - Strong edge for stainless steel / exotic alloy  
S - For aluminium alloy

— Unable to produce  
\* Cutter body modification is required

### Cutter Identification

<b>WEX</b>	<b>3</b>	<b>025</b>	<b>M12</b>	<b>Z2</b>
Cutter Series	3000 Series	Cutter Diameter	Mounting Screw Size	No. of Teeth



Recommended Tightening Torque (N·m)

# Wavemill Series WEX Type

## Recommended Cutting Conditions

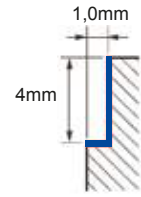
### WEX1000 Series



Cutter: WEX1012E

Insert: AXMT060208PDER - □

Cutting Data:  $a_p = 4\text{mm}$ ,  $a_e = 1\text{mm}$ , dry



ISO	Material	HB	Chipbreaker	Coated Carbide														Diamond like Carbon Coated Carbide			
				ACP100	ACP200		ACP300		ACK200		ACK300		ACM200		ACM300						
				Feed Rate (mm/tooth)																	
				0,08	0,12	0,16	0,08	0,12	0,16	0,08	0,12	0,16	0,10	0,15	0,20	0,10	0,15		0,20	0,08	0,10
Cutting Speed $v_c$ (m/min)																					
P	Unalloyed steel, <0, 15%C, annealed	125	G	280	240	220	240	220	200	220	200	180									
	" , <0, 45%C, annealed	190	G	200	180	160	180	160	140	180	160	140									
	" , <0, 45%C, tempered	250	G	180	120	140	160	140	120	150	130	110									
	" , <0, 75%C, annealed	270	G	160	140	120	150	130	110	130	110	110									
	" , <0, 75%C, tempered	300	G	100	80	70	90	70	60	70	60	50									
	Low alloyed steel, annealed	180	G	200	180	160	180	160	150	160	150	130									
	" , tempered	275	G	130	110	90	120	100	90	100	90	80									
	" , tempered	300	G	120	100	80	100	90	80	90	80	60									
	" , tempered	350	G	90	80	60	80	70	60	70	60	40									
	High alloyed and tool steel, annealed	200	G	180	170	160	170	160	130	150	140	120									
" , tempered	325	G	100	80	60	80	60	50	60	50	30										
M	Stainless steel, ferritic/martensitic, annealed	200	E												175	150	120	140	130	110	
	Martensitic, tempered	240	E												140	120	100	120	100	90	
	Austenitic, plunged	180	E												180	160	140	160	140	130	
K	Grey cast iron		G							240	220	200	220	200	180						
	Nodular cast iron		G							160	140	120	140	120	100						
S	High tempered resist. alloys, Fe based, annealed		E												50	35	45	25			

The above recommended cutting conditions are meant as a guide. Actual conditions will depend on the individual machine, work shape and clamping. They will need to be adjusted according to machine rigidity, work clamp rigidity, cutting depth and other factors.

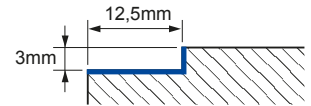
For groove milling, reduce the feed rate approximately 70% of the corresponding value shown above.

### WEX2000 Series

Cutter: WEX2025E

Insert: AXMT123508PEER - □

Cutting Data:  $a_p = 3\text{mm}$ ,  $a_e = 12,5\text{mm}$ , dry



ISO	Material	HB	Chipbreaker	Coated Carbide														Diamond like Carbon Coated Carbide				
				ACP100	ACP200		ACP300		ACK200		ACK300		ACM200		ACM300		DL1000					
				Feed Rate (mm/tooth)																		
				0,08	0,15	0,20	0,08	0,15	0,20	0,08	0,15	0,20	0,08	0,15	0,20	0,08	0,15		0,20	0,08	0,15	0,20
Cutting Speed $v_c$ (m/min)																						
P	Unalloyed steel, <0, 15%C, annealed	125	G	380	350	330	350	330	315	330	315	295										
	" , <0, 45%C, annealed	190	G	285	255	235	255	235	220	235	220	220										
	" , <0, 45%C, tempered	250	G	235	210	190	210	190	170	190	170	150										
	" , <0, 75%C, annealed	270	G	190	162	143	171	152	133	152	133	115										
	" , <0, 75%C, tempered	300	G	145	115	95	115	95	75	95	75	55										
	Low alloyed steel, annealed	180	G	265	235	220	235	220	200	220	200	180										
	" , tempered	275	G	170	145	125	150	130	115	130	115	95										
	" , tempered	300	G	150	125	105	135	115	95	115	95	75										
	" , tempered	350	G	125	95	75	105	85	65	85	65	45										
	High alloyed and tool steel, annealed	200	G	235	210	190	210	190	170	190	170	150										
" , tempered	325	G	125	95	75	95	75	55	75	55	35											
M	Stainless steel, ferritic/martensitic, annealed	200	E												175	155	125	155	140	110		
	Martensitic, tempered	240	EH												160	140	110	145	125	100		
	Austenitic, plunged	180	E												190	170	140	170	150	125		
K	Grey cast iron		G							285	255	235	255	235	220							
	Nodular cast iron		G							190	160	140	160	140	125							
S	High tempered resist. alloys, Fe based, annealed	300	E												50	40	45	35				
	" , hardened	330	E												35	25	30	20				
N	Aluminium alloy, Si < 13%		S																	1000	750	500
	Aluminium alloy, Si > 13%		S																	250	200	170
	Copper alloy		S																	350	330	300

The above recommended cutting conditions are meant as a guide. Actual conditions will depend on the individual machine, work shape and clamping. They will need to be adjusted according to machine rigidity, work clamp rigidity, cutting depth and other factors.

For groove milling, reduce the feed rate approximately 70% of the corresponding value shown above.

# Wavemill Series WEX Type

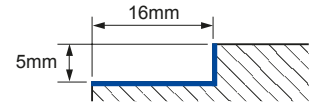
## Recommended Cutting Conditions

### WEX3000 Series

Cutter: WEX30325E

Insert: AXMT170508PEER - □

Cutting Data:  $a_p = 5\text{mm}$ ,  $a_e = 16\text{mm}$ , dry



ISO	Material	HB	Chipbreaker	Coated Carbide											Diamond like Carbon Coated Carbide								
				ACP100			ACP200			ACP300			ACK200		ACK300		ACM200		ACM300		DL1000		
				Feed Rate (mm/tooth)																			
				0,12	0,25	0,35	0,12	0,25	0,35	0,12	0,25	0,35	0,12	0,25	0,35	0,12	0,25	0,35	0,12	0,25	0,35	0,05	0,15
Cutting Speed $v_c$ (m/min)																							
P	Unalloyed steel, <0, 15%C, annealed	125	G	400	370	350	370	350	330	350	330	310											
	" , <0, 45%C, annealed	190	G	300	270	250	270	250	230	250	230	210											
	" , <0, 45%C, tempered	250	G	250	220	200	220	200	180	200	180	160											
	" , <0, 75%C, annealed	270	G	200	170	150	180	160	140	160	140	120											
	" , <0, 75%C, tempered	300	G	150	120	100	120	100	80	100	80	60											
	Low alloyed steel, annealed	180	G	280	250	230	250	230	210	230	210	190											
	" , tempered	275	G	180	150	130	160	140	120	140	120	100											
	" , tempered	300	G	160	130	110	140	120	100	120	100	80											
P	" , tempered	350	G	130	100	80	110	90	70	90	70	50											
	High alloyed and tool steel, annealed	200	G	250	220	200	220	200	180	200	180	160											
P	" , tempered	325	G	130	100	80	100	80	60	80	60	40											
	M	Stainless steel, ferritic/martensitic, annealed	200	E												185	165	135	165	150	120		
Martensitic, tempered		240	EH												170	150	120	150	135	110			
Austenitic, plunged		180	E												200	180	150	180	160	135			
K	Grey cast iron		G										300	270	250	270	250	230					
	Nodular cast iron		G										200	170	150	170	150	130					
S	High tempered resist. alloys, Fe based, annealed	300	E												50	30	45	25					
	" , hardened	330	E												50	30	45	25					
N	Aluminium alloy, Si < 13%		S																1000	750	500		
	Aluminium alloy, Si > 13%		S																250	200	170		
	Copper alloy		S																350	330	300		

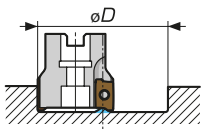
The above recommended cutting conditions are meant as a guide. Actual conditions will depend on the individual machine, work shape and clamping. They will need to be adjusted according to machine rigidity, work clamp rigidity, cutting depth and other factors.

For groove milling, reduce the feed rate approximately 70% of the corresponding value shown above.

## Recommended Values for Helical Milling and Ramping

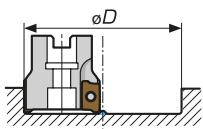
### Helical Boring

≤ Min. Diameter



Center uncut portion cannot be removed by traverse cutting with the same cutter.

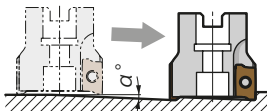
≥ Max. Diameter



Center uncut portion can be removed by traverse cutting with the same cutter.

### Plunging

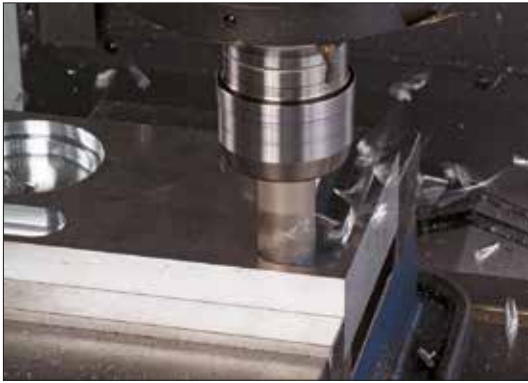
Use at ≤  $\alpha^\circ$



### Recommended Values for Helical and Plunging

Cutter External Diameter $\varnothing D_c$	WEX1000 (AXMT06...)			WEX2000 (AX□T12...)			WEX3000 (AX□T17...)		
	Helical		Plunging	Helical		Plunging	Helical		Plunging
	Work Diameter	Max. Ramping Angle	Work Diameter	Max. Ramping Angle	Work Diameter	Max. Ramping Angle	Work Diameter	Max. Ramping Angle	
10	16,0	18,0	2°30'						
12	20,0	22,0	1°45'						
14	24,0	26,0	1°25'	25,0	27,0	1°40'			
16	28,0	30,0	1°00'	29,0	31,0	1°20'			
18	32,0	34,0	0°45'	33,0	35,0	1°10'			
20	36,0	38,0	0°30'	37,0	39,0	1°00'			
22				41,0	43,0	0°50'			
25	46,0	48,0	0°30'	47,0	49,0	0°45'	44,5	48,0	1°30'
28				53,0	55,0	0°45'	50,5	54,0	1°10'
30				57,0	59,0	0°40'	54,5	58,0	1°10'
32	60,0	62,0	0°25'	61,0	63,0	0°35'	58,5	62,0	1°00'
35							64,5	68,0	0°50'
40	76,0	78,0	0°20'	77,0	79,0	0°25'	74,5	78,0	0°45'
50	96,0	98,0	0°15'	97,0	99,0	0°20'	94,5	98,0	0°30'
63	122,0	124,0	0°10'	123,0	125,0	0°15'	120,5	124,0	0°20'
80							154,5	158,0	0°15'
100									
125									

The above recommended values are for a nose radius of 0,8mm.

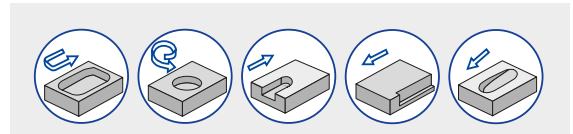


## Overview

Based on our proven Wavemill design this new range of WAX cutters is capable of rough and finishing Aluminium Alloys and other Non Ferrous Metals. It is ideal for high productivity Aluminium machining to exacting tolerances in the Aircraft, Electronics, and Automotive industries. The award winning Auroracoat DLC (diamond like carbon) inserts resist chip adhesion and substantially increase both tool life and productivity when dry machining Aluminium helping customers boost compliance with ISO14001 accreditation standards

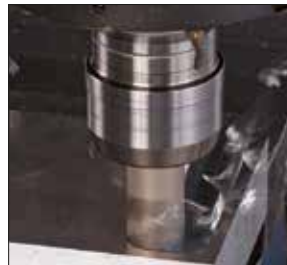
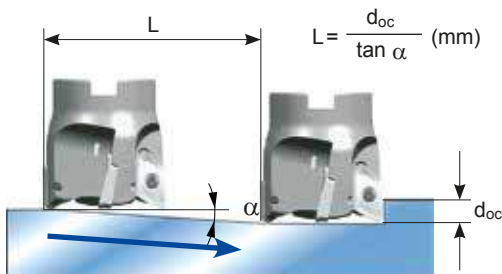
## Advantages

- High Productivity
- Dry machining capability with MQL system
- DLC (diamond like carbon) inserts
- True 90 degree shoulder milling
- Chip adhesion resistance
- Wide range of nose radius



## Ramping (Slant Milling)

Maximum ramping angle ( $\alpha$  max. max.) depends on cutter diameter.  
Minimum milling length (L min) is the ramping distance required to reach the maximum cutting depth ( $d_{oc}$  max) at the maximum ramping angle of that cutter.  
Minimum milling length (L) for any depth can be calculated by the equation below:



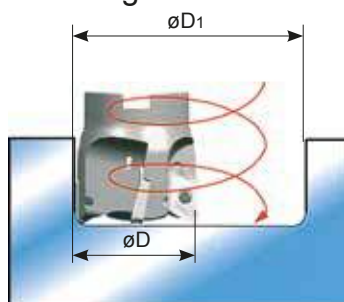
## WAX3000 E/EL Type (mm)

Cutter Diameter $\varnothing D$	Ramping Angle $\alpha$ max.	Depth-of Cut $d_{oc}$ max.	Milling Distance L min.
20	8°	10	72
25	17°	10	33
32	12°	10	47
40	9°	10	64

## WAX3000 RS Type (mm)

Cutter Diameter $\varnothing D$	Ramping Angle $\alpha$ max.	Depth-of Cut $d_{oc}$ max.	Milling Distance L min.
50	7°	10	82
60	5°	10	115
80	3°	10	191
100	3°	10	191
125	2°	10	287

## Helical Milling



## Helical Milling Diameter (mm)

Cutter Diameter $\varnothing D$	Milling Diameter $\varnothing D_1$	
	Min.	Max.
20	22	33
25	29	43
32	43	57
40	59	73
50	79	93
63	105	119
80	139	153
100	179	193
125	229	243

## Maximum Allowable Spindle Speed

Cutter Diameter $\varnothing D$	Spindle Revolution n ( $\text{min}^{-1}$ )	Cutting Speed $v_c$ (m/min)
20	14.000	880
25	29.000	2.200
32	25.000	2.500
40	23.000	2.900
50	20.000	3.100
63	18.000	3.500
80	16.000	4.000
100	14.000	4.400
125	13.000	5.100

## Recommended Cutting Conditions

Work Material	Aluminum Alloy
Cutting Speed	600 ~ 1.200 m/min
Feed Rate	0,05 ~ 0,25 mm/tooth

# Wavemill Series

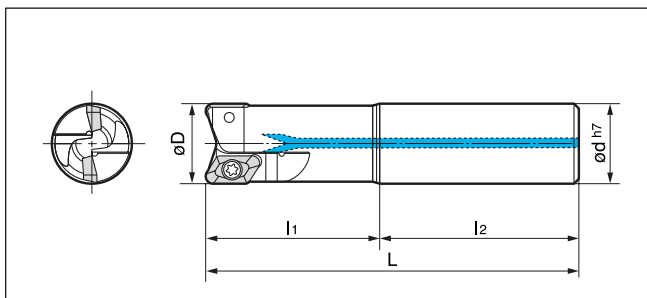
## WAX 3000 E/EL Type

16-18mm 90°

Axial rake angle 6°  
Radial rake angle 19~25°

### (Endmill)

Short Type "E"  
Long Type "EL"



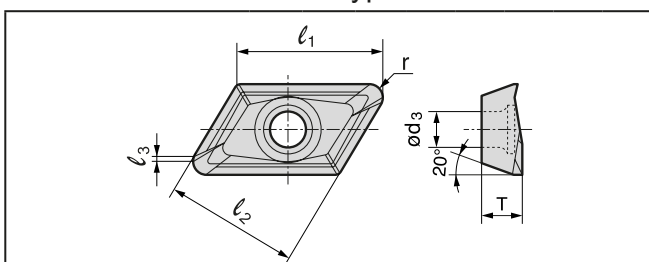
### ■ Body (For inserts with nose radius ≤ 3,2mm)

Cat. No.	Stock	Dimensions (mm)					No. of teeth	Weight (Kg)
		øD	ød	L	l <sub>1</sub>	l <sub>2</sub>		
WAX 3020 E -3.2	●	20	20	130	60	70	1	0,25
WAX 3025 E -3.2	●	25	25	140	60	80	2	0,42
WAX 3025 EL-3.2	●	25	25	200	60	140	2	0,63
WAX 3032 E -3.2	●	32	32	150	70	80	2	0,75
WAX 3032 EL-3.2	●	32	32	220	70	150	2	1,2
WAX 3040 E -3.2	●	40	32	160	70	90	3	1,0
WAX 3040 EL-3.2	●	40	32	220	70	150	3	1,4

### ■ Body (For inserts with nose radius ≥ 4,0mm)


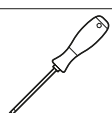
Cat. No.	Stock	Dimensions (mm)					No. of teeth	Weight (Kg)
		øD	ød	L	l <sub>1</sub>	l <sub>2</sub>		
WAX 3020 E -4.0	●	20	20	130	60	70	1	0,25
WAX 3025 E -4.0	●	25	25	140	60	80	2	0,42
WAX 3025 EL-4.0	●	25	25	200	60	140	2	0,63
WAX 3032 E -4.0	●	32	32	150	70	80	2	0,75
WAX 3032 EL-4.0	●	32	32	220	70	150	2	1,2
WAX 3040 E -4.0	●	40	32	160	70	90	3	1,0
WAX 3040 EL-4.0	●	40	32	220	70	150	3	1,4

### ■ Inserts for WAX 3000 Type



Cat. No.	DLC Coated DL 1000	Carbide H1	Dimensions (mm)						
			l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	r	T	ød <sub>3</sub>	
AECT 160404 PEFRA	●	●	18	16,4	1,4	0,4	5	4,4	
160408 PEFRA	●	●	18	16,4	1	0,8	5	4,4	
160412 PEFRA	●	●	18	16,4	0,6	1,2	5	4,4	
160416 PEFRA	●	●	17,5	16,4	0,5	1,6	5	4,4	
160420 PEFRA	●	●	17,5	16,4	0,5	2	5	4,4	
160430 PEFRA	●	●	17	16,4	0,7	3	5	4,4	
160432 PEFRA	●	●	17	16,4	0,5	3,2	5	4,4	
AECT 160440 PEFRA	●	●	16,5	16,4	0,5	4	5	4,4	
160450 PEFRA	●	●	16	16,4	0,4	5	5	4,4	

### ■ Spare Parts

Insert Screw	Insert Wrench	Applicable Endmill
 3,0 (N·m)		
BFTX 0408	TRD 15	WAX 3000 E/EL

# Wavemill Series WAX 4000 E/EL Type

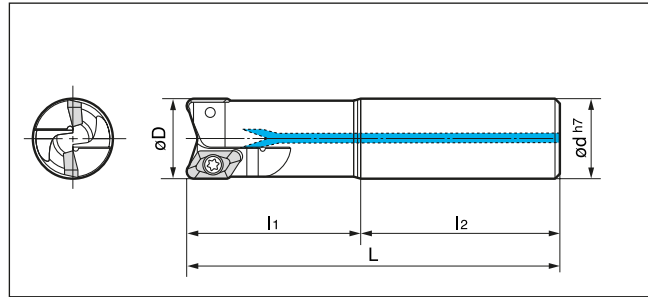


22-24 mm 90°

Axial rake angle 6°  
Radial rake angle 19~25°

## (Endmill)

Short Type "E"  
Long Type "EL"



## Body

(For inserts with nose radius ≤ 3,2mm)

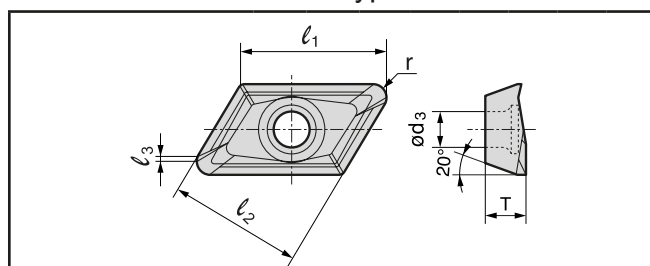
Cat. No.	Stock	Dimensions (mm)					No. of teeth	Weight (Kg)
		øD	ød	L	l <sub>1</sub>	l <sub>2</sub>		
WAX 4025E -3.2	☐	25	25	140	60	80	1	0,41
4025EL-3.2	☐	25	25	200	60	140	1	0,63
4032E -3.2	☐	32	32	150	70	80	1	0,72
4032EL-3.2	☐	32	32	220	70	150	1	1,2
WAX 4040E -3.2	☐	40	32	160	70	90	2	0,88
4040EL-3.2	☐	40	32	220	70	150	2	1,2

## Body

(For inserts with nose radius ≥ 4,0mm)



Cat. No.	Stock	Dimensions (mm)					No. of teeth	Weight (Kg)
		øD	ød	L	l <sub>1</sub>	l <sub>2</sub>		
WAX 4025E -4.0	☐	25	25	140	60	80	1	0,41
4025EL-4.0	☐	25	25	200	60	140	1	0,63
4032E -4.0	☐	32	32	150	70	80	1	0,72
4032EL-4.0	☐	32	32	220	70	150	1	1,2
WAX 4040E -4.0	☐	40	32	160	70	90	2	0,88
4040EL-4.0	☐	40	32	220	70	150	2	1,2

## Inserts for WAX 4000 Type



Cat. No.	DLC Coated DL 1000	Carbide H1	Dimensions (mm)						
			l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	r	T	ød <sub>3</sub>	
AECT 220604 PEFRA	☐	☐	24	21,8	1,5	0,4	6,35	6,0	
220608 PEFRA	☐	☐	24	21,8	1,2	0,8	6,35	6,0	
220612 PEFRA	☐	☐	24	21,8	0,8	1,2	6,35	6,0	
220616 PEFRA	☐	☐	24	21,8	0,4	1,6	6,35	6,0	
220620 PEFRA	☐	☐	24	21,8	0,5	2,0	6,35	6,0	
220630 PEFRA	☐	☐	23	21,8	0,6	3,0	6,35	6,0	
220632 PEFRA	☐	☐	23	21,8	0,4	3,2	6,35	6,0	
AECT 220640 PEFRA	☐	☐	22	21,8	1,2	4,0	6,35	6,0	
220650 PEFRA	☐	☐	22	21,8	0,4	5,0	6,35	6,0	

## Spare Parts

Insert Screw	Insert Wrench	Applicable Endmill
 5,0 (N·m)		
BFTX0509N	TRD20	Ø25 ~ Ø32
BFTX0511N	TRD20	Ø40 ~ Ø125

# Wave Multi-Function Mill WMM Type



## ■ Features

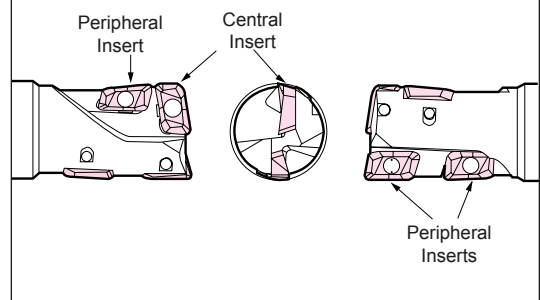
Utilising some of the design features, which made the Wave-Mill so successful, this multi-functional cutter, which utilizes standard wavy shaped inserts mounted radially and axially, performs a variety of operations.

These include slotting, shoulder milling, ramping, pocketing, drilling, helical cutting etc and eliminates the need to stock a variety of application specific tools.

## ■ Advantages

- Multi-functional cutter efficiently performs a number of cutting operations.
- Excellent for ramping, helical cutting, and pocketing.
- Uses standard inserts interchangeable with those used on other Wave-Mill cutters
- Strong high rake inserts gives smooth cutting action.
- Good dimensional stability thanks to long life inserts

## ● Insert Orientation of WMM Type Cutter



## ■ Multi-purpose Applications

<p>● <b>Shoulder Cutting</b></p> <p>DIN X5CrNi810</p> <p><i>Cutting of stainless steel tool</i></p> <p>Tool Dia. : 25mm Insert : APMT103504PDER (Grade : ACZ350) <math>v_c = 200\text{m/min}</math>, <math>f_t = 0,1\text{mm/tooth}</math> Axial <math>d_{oc}</math> : 15mm, Radial <math>w_{oc}</math> : 25mm, Air blow</p>	<p>● <b>Slotting</b></p> <p>GG25</p> <p><i>Deep grooving can be performed easily. Easy chip removal</i></p> <p>Tool Dia. : 25mm Insert : APMT103504PDER (Grade : ACZ310) <math>v_c = 180\text{m/min}</math>, <math>f_t = 0,12\text{mm/tooth}</math> Axial <math>d_{oc}</math> : 15mm, Radial <math>w_{oc}</math> : 25mm, Air blow</p>	<p>● <b>Ramping (Slant Milling)</b></p> <p>C50</p> <p><i>Capable of tapered recess cutting of a prepared hole</i></p> <p>Tool Dia. : 25mm Insert : APMT103504PDER (Grade : ACZ310) <math>v_c = 180\text{m/min}</math>, <math>f_t = 0,12\text{mm/tooth}</math> Axial <math>d_{oc}</math> : 15mm, Radial <math>w_{oc}</math> : 25mm, Air blow</p>
<p>● <b>Pocketing</b></p> <p>C50</p> <p><i>Capable of pocketing with continuous lateral feed from initial drilling or taper cutting process</i></p> <p>Tool Dia. : 25mm Insert : APMT103504PDER (Grade : ACZ350) <math>v_c = 200\text{m/min}</math>, <math>f_t = 0,1\text{mm/tooth}</math> Axial <math>d_{oc}</math> : 15mm, Radial <math>w_{oc}</math> : 25mm Air blow</p>	<p>● <b>Drilling</b></p> <p>C50</p> <p><i>Capable of easy chip removal and drilling without tool damage</i></p> <p>Tool Dia. : 25mm Insert : APMT103504PDER (Grade : ACZ350) Bore size : 25mm, Depth : <math>d = 15\text{mm}</math> <math>v_c = 200\text{m/min}</math>, <math>f = 0,1\text{mm/rev}</math> Step feed : 0,5mm, Air blow</p>	<p>● <b>Helical Cutting</b></p> <p>C50</p> <p><i>Capable of large boring in diameter of 1,2-1,8 times the cutter diameter without prepared hole</i></p> <p>Tool Dia. : 25mm Insert : APMT103504PDER (Grade : ACZ350) Bore size : 40mm, Depth : <math>d = 30\text{mm}</math> <math>v_c = 300\text{m/min}</math>, <math>f = 0,1\text{mm/rev}</math> Axial feed : <math>t = 15\text{mm/pitch}</math>, Air blow</p>

## ■ Recommended Cutting Conditions for WMM(H) 2000

Material Type of milling	Carbon steel (ex. C50)	Stainless steel (ex. 10CrNiS189)	Cast iron (ex. GG20)	Aluminium alloy	
					$\phi D$ (mm)
20 ~ 26	Shoulder milling	80-120-160 0,05-0,20	80-100-120 0,05-0,15	70-150-180 0,05-0,20	200-300-500 0,1-0,15-0,2
	Slotting	0,05-0,12	0,05-0,10	0,05-0,12	0,05-0,10
	Drilling	0,05-0,18	0,05-0,12	0,05-0,18	0,05-0,10
Grade	ACZ330	ACZ350	ACZ310	DL1000 (H1)	

[ $v_c = \text{m/min}$ ,  $f_t = \text{mm/tooth}$ ] [min. - optimum - max.]

## ■ Recommended Cutting Conditions for WMM(H) 3000

Material Type of milling	Carbon steel (ex. C50)	Stainless steel (ex. 10CrNiS189)	Cast iron (ex. GG20)	Aluminium alloy	
					$\phi D$ (mm)
32 ~ 40	Shoulder milling	80-120-160 0,05-0,25	80-100-120 0,05-0,20	70-150-180 0,05-0,25	200-300-500 0,1-0,15-0,2
	Slotting	0,05-0,15	0,05-0,12	0,05-0,15	0,05-0,10
	Drilling	0,05-0,20	0,05-0,18	0,05-0,20	0,05-0,10
Grade	ACZ330	ACZ350	ACZ310	DL1000 (H1)	

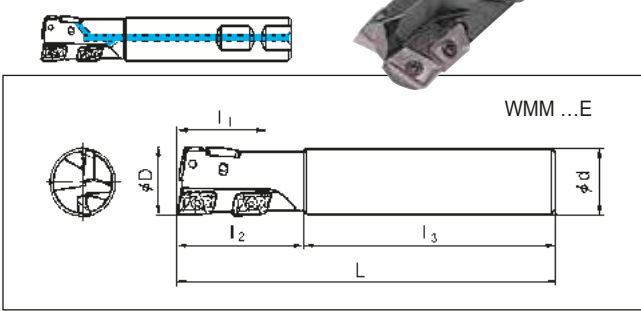
[ $v_c = \text{m/min}$ ,  $f_t = \text{mm/tooth}$ ] [min. - optimum - max.]



# Wavemill Series

## WMM (H) 2000 E/EL EW/ELW Type

WMMH ...EW



### Body

Shank	Cat. No.	Stock	Dimensions (mm)						Total teeth	Effective teeth
			øD	ød	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>		
	<b>WMM 2020E</b>	●	20	20	130	17	35	95	3	1
	<b>WMM 2025E</b>	●	25	25	140	26	40	100	4	1
(Long type)										
	<b>WMM 2020EL</b>	●	20	20	185	17	60	125	3	1
	<b>WMM 2025EL</b>	●	25	25	220	26	75	145	4	1
(Weldon shank type)										
	<b>WMM 2020EW</b>	●	20	20	130	17	35	95	3	1
	<b>WMM 2025EW</b>	●	25	25	140	26	40	100	4	1
(Long type with weldon shank)										
	<b>WMM 2020ELW</b>	●	20	20	185	17	60	125	3	1
	<b>WMM 2025ELW</b>	●	25	25	220	26	75	145	4	1

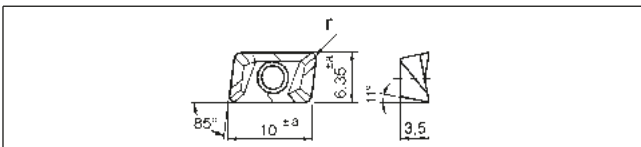
(WMMH Standard type with coolant holes and weldon shank)

	<b>WMMH 2020EW</b>	●	20	20	130	17	35	95	3	1
	<b>WMMH 2025EW</b>	●	25	25	140	26	40	100	4	1

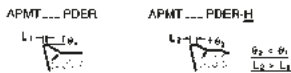
(WMMH Long type with coolant holes and weldon shank)

	<b>WMMH 2020ELW</b>	●	20	20	185	17	60	125	3	1
	<b>WMMH 2025ELW</b>	●	25	25	220	26	75	145	4	1

### Inserts for WMM 2000 Series



Cat. No.	Coated			Diamond coated DL1000	Un-coated H1	Dimensions	
	ACZ310	ACZ330	ACZ350			r	a
<b>APMT 103504 PDER</b>	●	●	●	—	—	0,4	0,08
<b>APMT 103508 PDER</b>	●	●	●	—	—	0,8	0,08
<b>APMT 103512 PDER</b>	○	○	○	—	—	1,2	0,08
<b>APMT 103504 PDER-H</b>	●	●	●	—	—	0,4	0,08
<b>APMT 103508 PDER-H</b>	●	●	○	—	—	0,8	0,08
<b>APMT 103512 PDER-H</b>	○	●	○	—	—	1,2	0,08
<b>APET 103504 PDER-F</b>	●	●	●	—	—	0,4	0,025
<b>APET 103504 PDFR-S</b>	—	—	—	●	●	0,4	0,025



PDER-H : Stronger cutting edge  
 PDER-F : Ground insert for finishing  
 PDFR-S : Round honed sharp cutting edge for aluminium

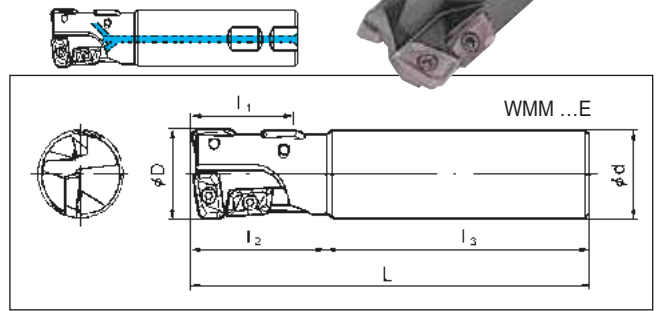
### Spare Parts

Screw	Wrench
1,5 (mm)	
BFTX02506N	TRD08

# Wavemill Series

## WMM (H) 3000 E/EL EW/ELW Type

WMMH ...EW



### Body

Shank	Cat. No.	Stock	Dimensions (mm)						Total teeth	Effective teeth
			øD	ød	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>		
	<b>WMM 3032E</b>	●	32	32	150	39	50	100	4	1
	<b>WMM 3040E</b>	●	40	32	160	39	55	105	4	1
(Long type)										
	<b>WMM 3032EL</b>	●	32	32	230	39	90	140	4	1
	<b>WMM 3040EL</b>	●	40	32	230	39	55	185	4	1
(Weldon shank type)										
	<b>WMM 3032EW</b>	●	32	32	150	39	50	100	4	1
	<b>WMM 3040EW</b>	●	40	32	160	39	55	105	4	1
(Long type with weldon shank)										
	<b>WMM 3032ELW</b>	●	32	32	230	39	90	140	4	1
	<b>WMM 3040ELW</b>	●	40	32	230	39	55	185	4	1

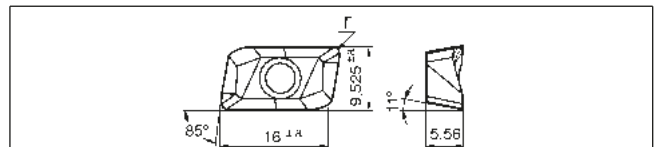
(WMMH Standard type with coolant holes and weldon shank)

	<b>WMMH 3032EW</b>	●	32	32	150	39	50	100	4	1
	<b>WMMH 3040EW</b>	●	40	32	160	39	55	105	4	1

(WMMH Long type with coolant holes and weldon shank)

	<b>WMMH 3032ELW</b>	●	32	32	230	39	90	140	4	1
	<b>WMMH 3040ELW</b>	●	40	32	230	39	55	185	4	1

### Inserts for WMM 3000 Series



Cat. No.	Coated			Diamond coated DL1000	Un-coated H1	Dimensions	
	ACZ310	ACZ330	ACZ350			r	a
<b>APMT 160508 PDER</b>	●	●	●	—	—	0,8	0,08
<b>APMT 160512 PDER</b>	○	○	○	—	—	1,2	0,08
<b>APMT 160516 PDER</b>	○	○	○	—	—	1,6	0,08
<b>APMT 160508 PDER-H</b>	●	●	●	—	—	0,8	0,08
<b>APMT 160512 PDER-H</b>	●	●	●	—	—	1,2	0,08
<b>APMT 160516 PDER-H</b>	○	●	○	—	—	1,6	0,08
<b>APMT 160520 PDER-H</b>	●	●	●	—	—	2,0	0,08
<b>APMT 160530 PDER-H</b>	●	●	●	—	—	3,0	0,08
<b>APMT 160540 PDER-H</b>	●	○	●	—	—	4,0	0,08
<b>APMT 160550 PDER-H</b>	●	○	●	—	—	5,0	0,08
<b>APMT 160560 PDER-H</b>	○	○	●	—	—	6,0	0,08
<b>APET 160508 PDER-F</b>	●	●	●	—	—	0,8	0,025
<b>APET 160504 PDFR-S</b>	—	—	—	●	●	0,4	0,025
<b>APET 160508 PDFR-S</b>	—	—	—	●	●	0,8	0,025

### Spare Parts

Screw	Wrench
3,0 (mm)	
BFTX03584	TRD15



● APET... S, uncoated grade "H1" for Aluminium

# Wave Repeater Mill WRX Type



## General Features

The WRX Wave repeater end mill system features AXMT style inserts vertically mounted and positioned to provide a long continuous cutting edge suitable for deep shoulder milling. Designed to run at elevated feed rates the soft cutting action reduces cutting resistance, vibration and noise to substantially improve tool life and surface finish.

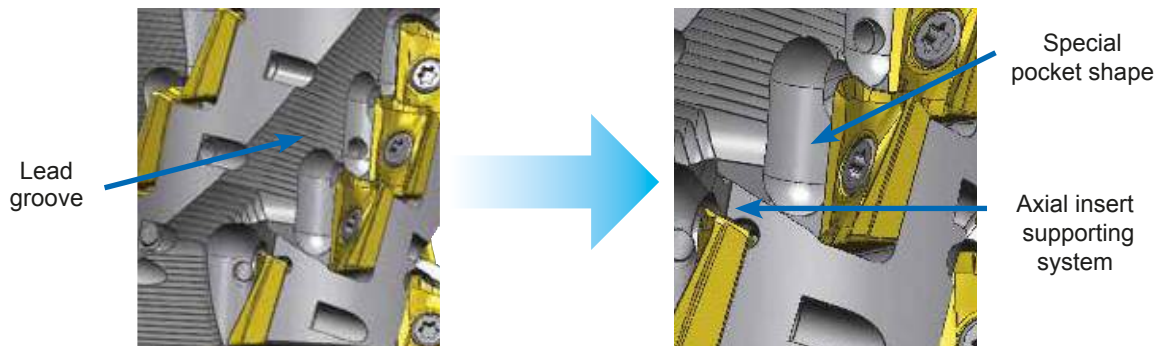
Available with our new generation Super FF and Super ZX coated inserts for unbeatable performance.

## Product Range

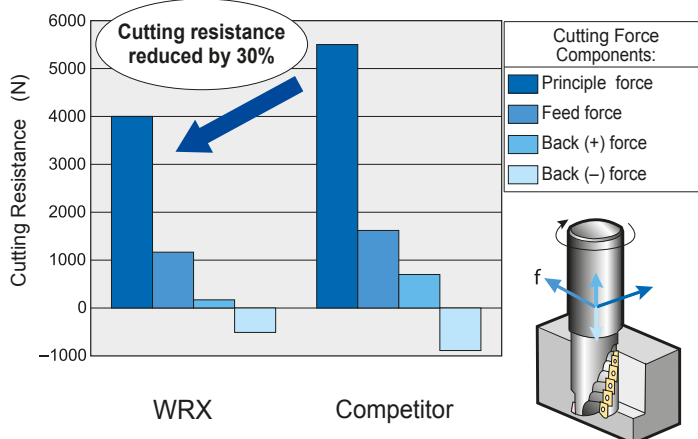
- WRX 2000 series with 12 mm inserts
- WRX 3000 series with 17mm inserts
- Cutter Diameters - 20mm ( $d_{oc} = 18mm$ ) to 100mm ( $d_{oc} = 53mm$ )
- Special Order Options – WRX Cutter with integrated arbor  
Shell type with detachable head
- Wide ISO Application Range – P/M/K/N classification

## Advantages

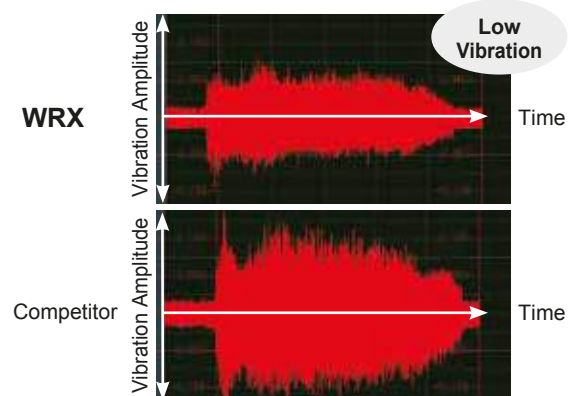
- Optimised insert positions reduce cutting resistance and vibration
- Integral coolant improves chip flow
- Primary chip slot for smooth and fast chip evacuation
- Optimised insert pocket maximises rigidity
- Bottom edge support improves tool life and cutting performance



## Cutting Resistance Comparison



## Vibration Comparison



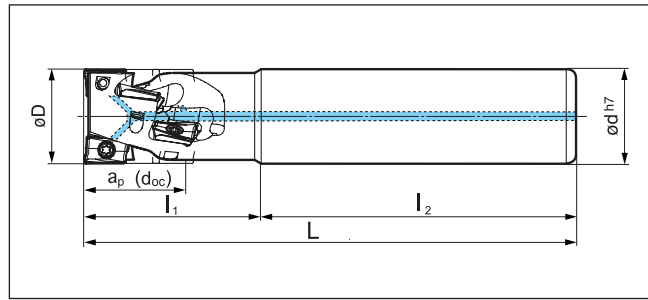
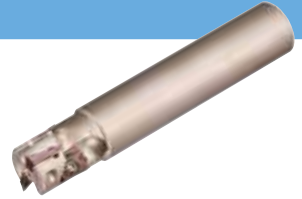
Work Material: C50  
Tool: WRX2025RH27E25  
Cutting Conditions:  $v_c = 100m/min$ ,  $f_t = 0,15mm/tooth$   
 $d_{oc} = 25mm$ ,  $w_{oc} = 10mm$ , Dry

Work Material: C50  
Tool: WRX3080RH53F32  
Cutting Conditions:  $v_c = 150m/min$ ,  $f_t = 0,15mm/tooth$   
 $d_{oc} = 25mm$ ,  $w_{oc} = 10mm$ , Dry

● = Eurostock  
□ = Delivery on request

Recommended Tightening Torque (N·m)

# WRX 2000 Series with AXMT 12 mm inserts



## Body (Cylindrical Shank Type)

Shaft	Cat. No.	Stock	Depth of Cut (doc)	Dimensions (mm)			No. of teeth	No. of rows	Effective teeth		
				øD	ød	L					
	WRX2020RH18E20	●	18	20	20	120	40	80	4	2	2
	WRX2020RH36E20	□	36	20	20	130	45	85	4	4	1
	WRX2025RH18E25	●	18	25	25	130	45	85	6	2	3
	WRX2025RH27E25	●	27	25	25	130	45	85	6	3	2
	WRX2032RH18E32	●	18	32	32	140	50	90	8	2	4
	WRX2032RH27E32	●	27	32	32	130	45	85	9	3	3
	WRX2040RH18E40	□	18	40	40	160	40	120	10	2	5
	WRX2040RH36E40	●	36	40	40	130	45	85	16	4	4

## Body (Weldon Shank Type)

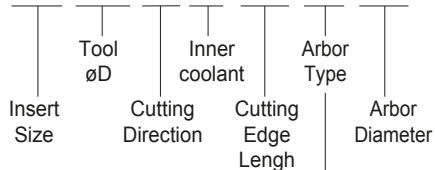
Shaft	Cat. No.	Stock	Depth of Cut (doc)	Dimensions (mm)			No. of teeth	No. of rows	Effective teeth		
				øD	ød	L					
	WRX2020RH18W20	●	18	20	20	120	40	80	4	2	2
	WRX2020RH36W20	□	36	20	20	130	45	85	4	4	1
	WRX2025RH18W25	●	18	25	25	130	45	85	6	2	3
	WRX2025RH27W25	●	27	25	25	130	45	85	6	3	2
	WRX2032RH18W32	●	18	32	32	140	50	90	8	2	4
	WRX2032RH27W32	●	27	32	32	130	45	85	9	3	3
	WRX2040RH18W40	□	18	40	40	160	40	120	10	2	5
	WRX2040RH36W40	●	36	40	40	130	45	85	16	4	4

## Spare Parts (WRX 2000)

Screw	Wrench
BFTX 0306 IP	TRDR 08 IP

## Description Rule

**WRX 20 25 R H 27 W 25**



E - Straight Shank  
W - Weldon Shank  
F - Shell Type

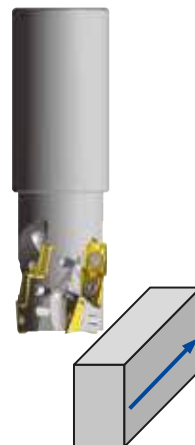
## Inserts (Same as for Wavemill WEX 2000 Type)

Application	Coated Carbide						Carbide		DLC	
	P	P	P	K	M	S	K	N	N	N
High Speed / Light cut	●	●	●	●	●	●	●	●	●	●
General Purpose	●	●	●	●	●	●	●	●	●	●
Roughing	●	●	●	●	●	●	●	●	●	●
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	Radius
AXMT 123504 PEER-G	●	●	●	●	●	●	●	—	—	0,4
123508 PEER-G	●	●	●	●	●	●	●	—	—	0,8
123512 PEER-G	●	●	●	●	●	●	●	—	—	1,2
AXMT 123504 PEER-H	●	●	●	●	●	●	●	—	—	0,4
123508 PEER-H	●	●	●	●	●	●	●	—	—	0,8
123512 PEER-H	●	●	●	●	●	●	●	—	—	1,2
AXMT 123504 PEER-E	●	●	●	●	●	●	●	—	—	0,4
123508 PEER-E	●	●	●	●	●	●	●	—	—	0,8
123512 PEER-E	●	●	●	●	●	●	●	—	—	1,2
AXMT 123508 PEER-EH	●	●	●	●	●	●	●	—	—	0,8
AXET 123502 PEFR-S	—	—	—	—	—	—	—	●	●	0,2
123504 PEFR-S	—	—	—	—	—	—	—	●	●	0,4
123508 PEFR-S	—	—	—	—	—	—	—	●	●	0,8

- Unable to produce
- G - General type
- H - Strong cutting edge
- E - For stainless steel / exotic alloy
- EH - Strong edge for stainless steel / exotic alloy
- S - For aluminium alloy

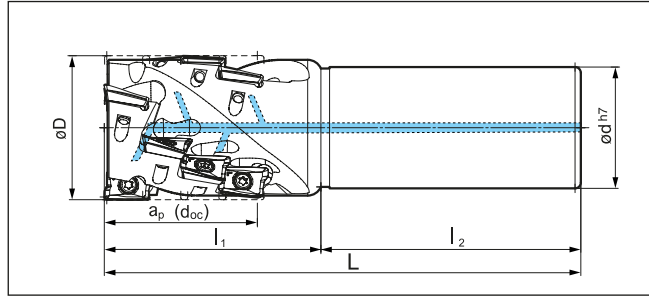
## Application Examples

### Example



Work Material	Construction Machine Parts (UST.42-2)		
	Body	Sumitomo	Competitor
Tool	WRX2000 Weldon shank	Ø 38,1	
	Insert	AXMT	18 mm
	Insert grade	ACP200	PVD Type
	Tool dia. (mm)	38,1	38,1
	Total teeth	24	16
	Effective teeth	4	4
Cutting Data	Cutting speed (m/min)	180	137
	Feed (mm/t)	0,09	0,1
	Axial depth of cut (mm)	38,1	38,1
	Radial width of cut (mm)	3,2	3,2
	Coolant	Wet	Wet
Result	Tool life / Cutting edge	60	40
Benefits	<b>1,5 times longer tool life 30% increased productivity</b>		

# WRX 3000 Series with AXMT 17 mm inserts



## Body (Cylindrical Shank Type)

Shaft	Cat. No.	Stock	Depth of Cut (d <sub>oc</sub> )	Dimensions (mm)			No. of teeth	No. of rows	Effective teeth		
				øD	ød	L					
	WRX3032RH40E32	●	40	32	32	150	65	85	6	3	2
	WRX3040RH27E40	□	27	40	40	180	60	120	6	2	3
	WRX3040RH40E40	●	40	40	40	150	65	85	9	3	3
	WRX3050RH27E40	□	27	50	40	180	60	120	8	2	4
	WRX3050RH53E40	●	53	50	40	165	75	90	12	4	3

## Body (Weldon Shank Type)

Shaft	Cat. No.	Stock	Depth of Cut (d <sub>oc</sub> )	Dimensions (mm)			No. of teeth	No. of rows	Effective teeth		
				øD	ød	L					
	WRX3040RH27W40	□	27	40	40	180	60	120	6	2	3
	WRX3040RH40W40	●	40	40	40	150	65	85	9	3	3
	WRX3050RH27W40	□	27	50	40	180	60	120	8	2	4
	WRX3050RH53W40	●	53	50	40	165	75	90	12	4	3

## Spare Parts (WRX 3000)

Screw	Wrench
3,0	
BFTX 0409 IP	TRDR 15 IP

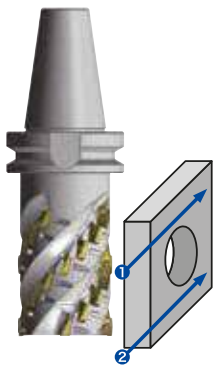
## Inserts (Same as for Wavemill WEX 3000 Type)

Application		Coated Carbide						Carbide	DLC		
High Speed / Light cut		P		K		M	S	K	N		
General Purpose			P	K		M	S	M	N		
Roughing			P	P	K		M	S			
Cat. No.		ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	Radius
AXMT	170508 PEER-L	●	●	●	●	●			-	-	0,8
AXMT	170504 PEER-G	●	●	●	●	●			-	-	0,4
	170508 PEER-G	●	●	●	●	●			-	-	0,8
	170512 PEER-G	●	●	●	●	●			-	-	1,2
	170516 PEER-G	●	●	●	●	●			-	-	1,6
	170520 PEER-G*	●	●	●	●	●			-	-	2,0
	170530 PEER-G*	●	●	●	●	●			-	-	3,0
AXMT	170508 PEER-H	●	●	●	●	●			-	-	0,8
	170512 PEER-H	●	●	●	●	●			-	-	1,2
AXMT	170504 PEER-E						●	●	-	-	0,4
	170508 PEER-E			●			●	●	-	-	0,8
	170512 PEER-E						●	●	-	-	1,2
	170516 PEER-E						●	●	-	-	1,6
	170520 PEER-E*						●	●	-	-	2,0
	170530 PEER-E*						●	●	-	-	3,0
AXMT	170508 PEER-EH			●			●	●	-	-	0,8
AXET	170502 PEFR-S	-	-	-	-	-	-	-	●	●	0,2
	170504 PEFR-S	-	-	-	-	-	-	-	●	●	0,4
	170508 PEFR-S	-	-	-	-	-	-	-	●	●	0,8

L – Low cutting force  
 G – General type  
 H – Strong cutting edge  
 E – For stainless steel  
 EH – Strong edge for stainless steel  
 S – For aluminium  
 \* Cutter body modification is required.  
 – Unable to produce

## Application Examples

### Example 1



Work Material	Automotive Component / Cast Iron		
Tool	Body	Sumitomo WRX3000 Type Integrated Arbor	Competitor ø 50
	Insert	AXMT	18 mm
	Insert grade	ACK300	PVD Type
	Tool dia. (mm)	50	50
	Total teeth	15	12
	Effective teeth	3	3
Cutting Data	Cutting speed (m/min)	78	78
	Feed (mm/t)	0,13	0,13
	Axial depth of cut (mm)	45	45
	Radial width of cut (mm)	5	5
	Coolant	Dry	Dry
Result	Tool life / Cutting edge	500 min.	300 min.
Benefits	<b>1,7 times longer tool life</b>		










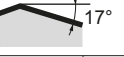
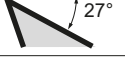






### Example 2



Work Material	Machine Parts / Stainless Steel		
Tool	Body	Sumitomo WRX3040RH40E40	Competitor ø 40
	Insert	AXMT	18 mm
	Insert grade	ACP 300	PVD Type
	Tool dia. (mm)	40	40
	Total teeth	9	6
	Effective teeth	3	2
Cutting Data	Cutting speed (m/min)	125	125
	Feed (mm/t)	0,2	0,2
	Axial depth of cut (mm)	40	40
	Radial width of cut (mm)	5	5
	Coolant	Wet	Wet
Result	Tool life / Cutting edge	20	5 ~ 10
Benefits	<b>Stable machining, double tool life with no breakage</b>		

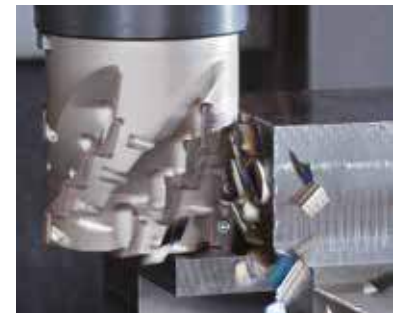
# Wave Repeater Mill WRX Type

## Chipbreaker Selection

Work Material	Steel, Cast Iron			Stainless Steel		Aluminium
	L	G	H	E	EH	S
Chipbreaker Type						
Feature	Low cutting force	General purpose	Strong cutting edge	E type for smooth cutting	Strong cutting edge	Sharp cutting edge
2000 Type Figure	—					
3000 Type Figure						
Application	Light cut, low rigidity milling and less burrs	General to Interrupted milling	Roughing, heavy interrupted and hardened steel milling	Light cutting to general purpose	Heavy interrupted machining	Aluminium alloy and non-ferrous metal

## Ramping (Slant Milling)

Tool Diameter	Max. Ramping Angle	
	WRX 2000 Typ	WRX 3000 Typ
Ø 20	4°	
Ø 25	2°	
Ø 32	1°30'	
Ø 40	1°	2°
Ø 50	0°30'	1°
Ø 63		0°30'
Ø 80		0°30'
Ø100		Not possible



## Recommended Cutting Conditions

Tool: WRX 3050 RH53 F22, øD = 50mm, d<sub>oc</sub> = 50mm

ISO	Work Material	Property, Condition	Hardness (HB)	Grades (optimum grade in bold letters)	Chip Breaker	Recommended cutting speed and feed / tooth according to width of cut (w <sub>oc</sub> / øD) - must be adjusted to actual machine and workpiece conditions.					
						10%		25%		> 50%	
						v <sub>c</sub>	f <sub>t</sub>	v <sub>c</sub>	f <sub>t</sub>	v <sub>c</sub>	f <sub>t</sub>
P	Steel, carbon steel	< 0,15% C, annealed	125	ACP 100 <b>ACP 200</b> ACP 300	L - G	170 – 215 – 240	0,21 – 0,28 – 0,35	160 – 195 – 220	0,16 – 0,21 – 0,26	130 – 160 – 180	0,08 – 0,10 – 0,13
		< 0,45% C, annealed	190	ACP 100 <b>ACP 200</b> ACP 300	L - G	160 – 195 – 220	0,21 – 0,28 – 0,35	140 – 175 – 190	0,16 – 0,21 – 0,26	110 – 140 – 160	0,08 – 0,10 – 0,13
		< 0,45% C, tempered	250	ACP 100 <b>ACP 200</b> ACP 300	L - G - H	140 – 180 – 200	0,19 – 0,26 – 0,32	130 – 165 – 180	0,14 – 0,19 – 0,24	100 – 130 – 140	0,08 – 0,10 – 0,13
		< 0,75% C, annealed	270	ACP 100 <b>ACP 200</b> ACP 300	L - G - H	140 – 170 – 190	0,19 – 0,26 – 0,32	120 – 155 – 170	0,14 – 0,19 – 0,24	100 – 130 – 140	0,07 – 0,10 – 0,12
		< 0,75% C, tempered	300	ACP 100 <b>ACP 200</b> ACP 300	L - G - H	130 – 165 – 180	0,19 – 0,26 – 0,32	120 – 150 – 170	0,14 – 0,19 – 0,24	100 – 120 – 130	0,07 – 0,10 – 0,12
	Low alloyed steel	annealed	180	ACP 100 <b>ACP 200</b> ACP 300	G - H	130 – 165 – 180	0,18 – 0,24 – 0,30	120 – 150 – 170	0,13 – 0,18 – 0,22	100 – 120 – 130	0,07 – 0,09 – 0,11
		tempered	275	ACP 100 <b>ACP 200</b> ACP 300	G - H	130 – 160 – 180	0,17 – 0,23 – 0,28	120 – 145 – 160	0,12 – 0,16 – 0,20	100 – 120 – 130	0,07 – 0,09 – 0,11
		tempered	300	ACP 100 <b>ACP 200</b> ACP 300	G - H	110 – 140 – 160	0,16 – 0,22 – 0,27	100 – 130 – 140	0,11 – 0,15 – 0,19	90 – 110 – 120	0,07 – 0,09 – 0,11
		tempered	350	ACP 100 <b>ACP 200</b> ACP 300	G - H	100 – 130 – 140	0,16 – 0,21 – 0,26	100 – 120 – 130	0,11 – 0,15 – 0,19	80 – 100 – 110	0,06 – 0,08 – 0,10
	High alloyed and tool steel	annealed	200	<b>ACP 100</b> ACP 200	G - H	70 – 85 – 90	0,15 – 0,21 – 0,26	60 – 80 – 90	0,11 – 0,14 – 0,18	60 – 70 – 80	0,06 – 0,08 – 0,10
tempered		325	ACP 100 <b>ACP 200</b>	G - H	30 – 35 – 40	0,14 – 0,19 – 0,24	30 – 35 – 40	0,10 – 0,14 – 0,17	20 – 30 – 30	0,06 – 0,08 – 0,10	
M	Stainless steel, ferritic/martensitic	annealed	200	ACP 200 <b>ACP 300</b>	L - G - H	120 – 150 – 170	0,15 – 0,20 – 0,25	110 – 135 – 150	0,11 – 0,14 – 0,18	90 – 110 – 120	0,07 – 0,09 – 0,11
	Stainless, martensitic	tempered	240	ACP 200 <b>ACP 300</b>	L - G - H	100 – 125 – 140	0,16 – 0,22 – 0,27	90 – 115 – 130	0,12 – 0,16 – 0,20	80 – 100 – 110	0,07 – 0,10 – 0,12
	Stainless, austenitic	plunged	180	ACM 200 <b>ACM 300</b>	L - G	80 – 95 – 110	0,15 – 0,20 – 0,25	70 – 85 – 90	0,11 – 0,14 – 0,18	60 – 70 – 80	0,06 – 0,08 – 0,10
K	Gray cast iron	GG	180	<b>ACK 200</b> ACK 300	G - H	190 – 240 – 270	0,19 – 0,26 – 0,32	180 – 220 – 240	0,14 – 0,19 – 0,24	140 – 170 – 190	0,09 – 0,12 – 0,15
	Nodular cast iron	GGG	250	<b>ACK 200</b> ACK 300	G - H	140 – 170 – 190	0,16 – 0,21 – 0,26	120 – 155 – 170	0,12 – 0,16 – 0,20	100 – 130 – 140	0,07 – 0,10 – 0,12
S	Exotic alloys (Resistant alloys, Ti + Ni alloys)	Fe based, annealed	200	ACK 200 <b>ACK 300</b>	L - G	40 – 45 – 50	0,12 – 0,16 – 0,21	30 – 40 – 45	0,08 – 0,11 – 0,14	30 – 35 – 40	0,07 – 0,09 – 0,11
		hardened	280	ACK 200 <b>ACK 300</b>	L - G	15 – 20 – 25	0,10 – 0,14 – 0,17	10 – 15 – 20	0,07 – 0,10 – 0,12	10 – 15 – 20	0,05 – 0,07 – 0,09
N	Aluminum alloy	Si < 13%		DL 1000 H1	S	510 – 635 – 710	0,23 – 0,31 – 0,38	460 – 580 – 640	0,17 – 0,22 – 0,28	390 – 485 – 540	0,08 – 0,12 – 0,14
		Si ≥ 13%		DL 1000 H1	S	150 – 190 – 210	0,19 – 0,25 – 0,32	140 – 175 – 190	0,14 – 0,18 – 0,23	130 – 165 – 180	0,08 – 0,10 – 0,13
	Copper alloy			DL 1000 H1	S	320 – 405 – 450	0,15 – 0,21 – 0,26	300 – 370 – 410	0,13 – 0,16 – 0,22	240 – 300 – 330	0,07 – 0,10 – 0,12

- Dry machining is recommended (air cooling) - if lubricant is used, we recommend CVD coated grades (ACP100 / ACK200) or tough PVD grades (ACP300 / ACK300).  
 - Insert geometry: L type for low cutting forces, thinly coated components. G type for general application, H type offers high cutting edge stability for rough and heavy cutting conditions.

# Wave Ball Mill™ for Roughing WBMR Type

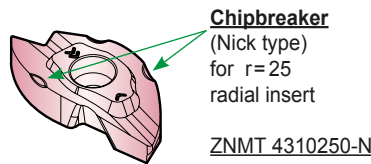


## ■ Features

Particularly suitable for die mold machining the WBMR replaceable insert ball nose endmill efficiently roughs complex profiles.

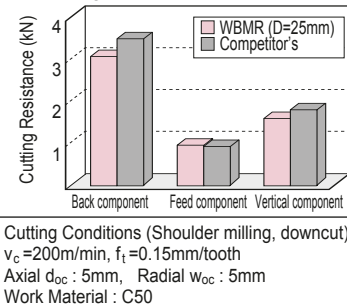
Its high feed rate capability is a direct result of a sharp cutting edge which is maintained during the cutting cycle by the special cemented carbide substrate working in parallel with the ultra hard ZX coating.

- Advantages
  - Wave shaped cutting edge
  - Economical M class insert
  - Precise clamping
  - High feed rate capability

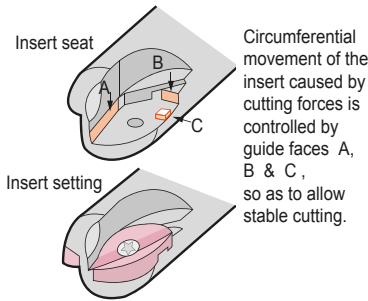


## ■ Performance

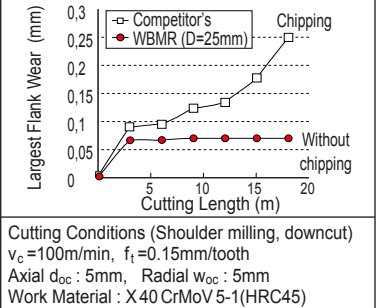
### ● Cutting Resistance



### ● Anti-Rotational Mechanism



### ● Insert Life



## ■ Application Example

### ● Cold Molding Die

Work Material : X155CrMo121

<Results>  
Flank wear after continuous cutting for seven hours was less than other manufacturer's product. Stable cutting was observed.

WBMR 2200S (ø20mm)  
Insert Grade : ACZ350

Cutting Conditions :  
 $n = 2200\text{rpm}$ ,  $v_f = 500\text{mm/min}$   
 Depth of Cut : 0,3~2 mm  
 Non-water soluble cutting oil

### ● Injection Molded Part

(Cr-Mo steel + Stellite-overlay)

<Results>  
Wave ball (ø30mm) could cut without chattering while other manufacturer's products could not cut at all due to chattering.

WBMR 2300M (ø30mm)  
Insert Grade : ACZ350

Cutting Conditions :  
 $n = 500\text{rpm}$ ,  $v_f = 35\text{mm/min}$   
 Depth of Cut : 5 mm  
 Dry cut

## ■ Recommended Cutting Conditions (2 teeth)

Material Condition	Carbon steel (Below HRC25)	Alloy steel (Below HRC45)	Stainless, Die steel etc.	Cast iron
	(A)	$v_c$ : 200-250-300 $f_t$ : 0,1-0,2-0,3	100-150-200 0,1-0,2-0,3	50-80-100 0,1-0,15-0,2

[ $v_c = \text{m/min}$ ,  $f_t = \text{mm/tooth}$ ] [min. - optimum - max.]

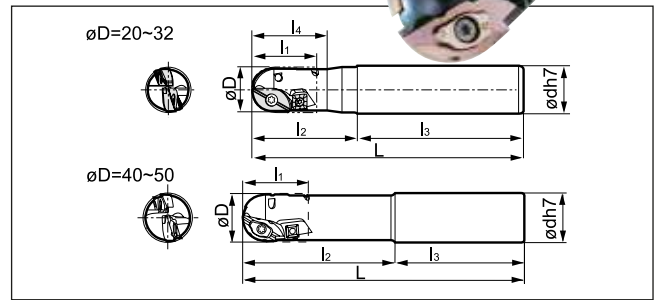
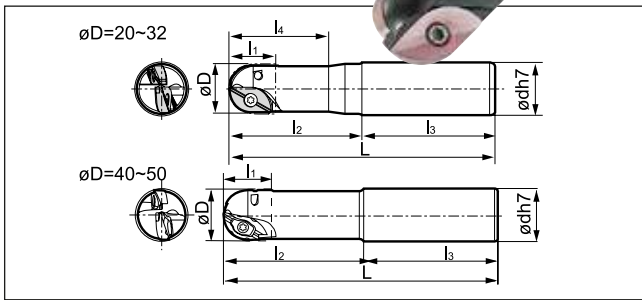
## ■ Recommended Cutting Conditions (4 teeth)

Material Condition	Carbon steel (Below HRC25)	Alloy steel (Below HRC45)	Stainless, Die steel etc.	Cast iron
	(A)	$v_c$ : 200-250-300 $f_t$ : 0,1-0,2-0,3	100-150-200 0,1-0,2-0,3	50-80-100 0,1-0,15-0,2
(B)	$v_c$ : 160-200-240 $f_t$ : 0,1-0,2-0,3	80-120-160 0,1-0,2-0,3	40-60-80 0,1-0,15-0,2	80-100-120 0,2-0,3-0,4

[ $v_c = \text{m/min}$ ,  $f_t = \text{mm/tooth}$ ] [min. - optimum - max.]

# Wave Ball Mill™ for Roughing WBMR 2000 Type

# Wave Ball Mill™ for Roughing WBMR 2000 L Type



■ Body ( Short and middle length type, 2 teeth)

■ Body ( Extra long type, 4 teeth)

Cat. No.	Stock	Dimensions (mm)						
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	L
WBMR 2200 S	●				60	80		140
WBMR 2200 M	●	20	25	20	60	140	40	200
WBMR 2200 MW	●							
WBMR 2250 S	●				70	80		150
WBMR 2250 M	●	25	32	23	73	147	50	220
WBMR 2250 MW	●							
WBMR 2320 S	●				80	80		160
WBMR 2320 M	●	32	32	31	85	155	60	240
WBMR 2320 MW	●							
WBMR 2400 S	□				100	100		200
WBMR 2400 M	□	40	42	35	180	100	-	280
WBMR 2500 S	□				100	100		200
WBMR 2500 M	□	50	42	47	180	100	-	280

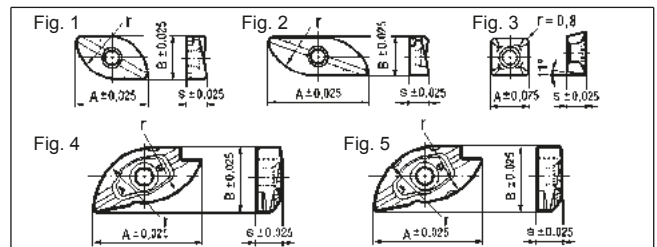
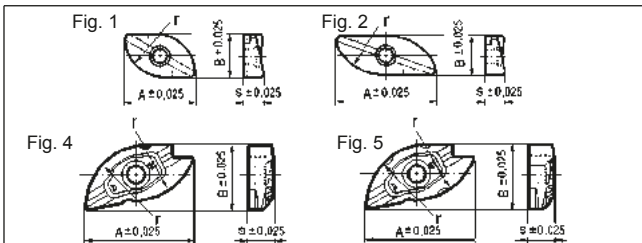
Cat. No.	Stock	Dimensions (mm)						
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	L
WBMR 2200 LL	●	20	25	30	80	170	40	250
WBMR 2200 LLW	●							
WBMR 2250 LL	●	25	32	38	100	200	50	300
WBMR 2250 LLW	●							
WBMR 2320 LL	●	32	32	44	120	230	60	350
WBMR 2320 LLW	●							
WBMR 2400 LL	□	40	42	50	250	100	-	350
WBMR 2400 LLW	□							
WBMR 2500 LL	□	50	42	69	250	100	-	350
WBMR 2500 LLW	□							

- S: Short type with cylindrical shank
- M: Middle length type with cylindrical shank
- MW: Middle length type with Weldon shank

- LL: Extra long type with cylindrical shank
- LLW: Extra long type with Weldon shank

## ■ Inserts

## ■ Inserts



Cat. No.	Coated			Dimensions (mm)				Fig.	No. of teeth	Applicable Endmill
	ACP 200	ACP 300	ACK 300	A	B	s	r			
ZNMT 1804100-C	●	●	●	18,00	9,76	4,76	10	1	1	WBMR2200
ZNMT 2004100-S	●	●	●	20,00	7,50	4,37	10	2	2	
ZNMT 2205125-C	●	●	●	22,50	12,20	5,70	12,5	1	1	WBMR2250
ZNMT 2305125-S	●	●	●	23,00	9,38	5,56	12,5	2	2	
ZNMT 2907160-C	●	●	●	29,00	15,62	7,15	16	1	1	WBMR2320
ZNMT 3006160-S	●	●	●	30,00	12,00	6,70	16	2	2	
ZNMT 3608200	○	○	○	36,00	19,50	6,70	20	4	2	WBMR2400
ZNMT 4310250	○	○	○	43,00	25,70	10,15	25	4	4	
ZNMT 4310250-N	○	○	○	43,00	25,70	10,15	25	5	2	WBMR2500
ZNMT 4310250-N	○	○	○	43,00	25,70	10,15	25	5	2	

Cat. No.	Coated			Dimensions (mm)				Fig.	No. of teeth	Applicable Endmill
	ACP 200	ACP 300	ACK 300	A	B	s	r			
ZNMT 1804100-C	●	●	●	18,00	9,76	4,76	10	1	1	WBMR2200
ZNMT 2004100-S	●	●	●	20,00	7,50	4,37	10	2	2	
SPMT 070308	○	○	○	7,94	-	3,18	-	3	2	WBMR2250
ZNMT 2205125-C	●	●	●	22,50	12,20	5,70	12,5	1	1	
ZNMT 2305125-S	●	●	●	23,00	9,38	5,56	12,5	2	2	
SPMT 09T308	●	●	●	9,53	-	3,97	-	3	2	WBMR2320
ZNMT 2907160-C	●	●	●	29,00	15,62	7,15	16	1	1	
ZNMT 3006160-S	●	●	●	30,00	12,00	6,70	16	2	2	
SPMT 09T308	●	●	●	9,53	-	3,97	-	3	2	WBMR2400
ZNMT 3608200	○	○	○	36,00	19,50	6,70	20	4	2	
SPMT 09T308	●	●	●	9,53	-	3,97	-	3	2	WBMR2500
ZNMT 4310250	○	○	○	43,00	25,70	10,15	25	4	4	
ZNMT 4310250-N	○	○	○	43,00	25,70	10,15	25	5	2	
SPMT 120408	○	○	○	12,7	-	4,76	-	3	2	

## ■ Spare Parts

## ■ Spare Parts

Screw	Wrench	Wrench	Applicable Endmill
BFTX0307N	2,0	TRX10	WBMR 2200
BFTX0409N	3,4	-	WBMR 2250
BFTX0511N	5,0	-	WBMR 2320
BFTX0619N	7,5	-	WBMR 2400
BFTX0619N	7,5	-	WBMR 2500

Screw	Wrench	Wrench	Applicable Endmill
BFTX0307N	2,0	TRX10	WBMR 2200 LL
BFTX0409N	3,4	-	WBMR 2250 LL
BFTX0511N	5,0	-	WBMR 2320 LL
BFTX0407N	3,0	-	WBMR 2320 LL
BFTX0619N	7,5	-	WBMR 2400 LL
BFTX0409N	3,4	-	WBMR 2500 LL

# Wave Ball Mill for Finishing WBMF Type

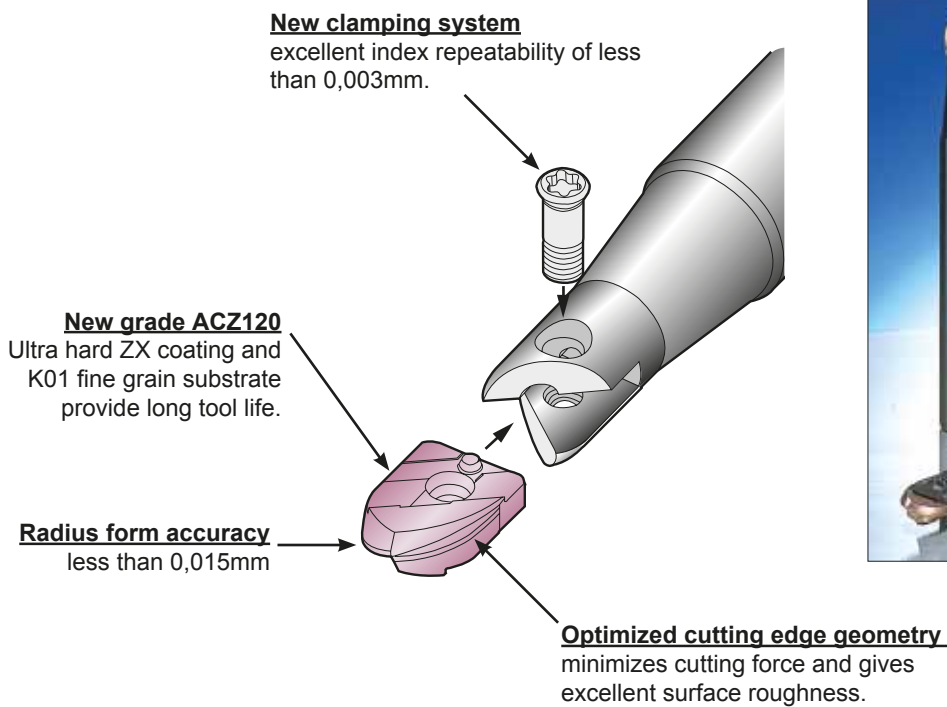


## ■ Features

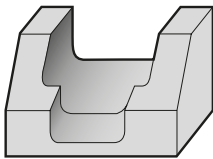
The outstanding results obtained from this finishing cutter are due to the combination of its large sigmoid blade and precise clamping system making it extremely rigid !

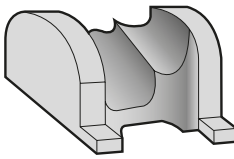
The WBMF achieves an excellent machined finish greatly reducing hand finishing and polishing operations.

- Advantages
- Unique rigid clamping system
  - Large sigmoid blade
  - Smooth cutting action
  - High quality machined surface
  - Ultra hard ZX coated cutting edge



## ■ Application Example

● Bumper Moulding Die	
Work Material : C55	
	
<Results> Surface roughness after continuous cutting for twelve hours was better than other manufacturer's product. Less width of flank wear was observed.	
WBMF1200M (ø20mm) Insert : ZPGU2471100 Grade : ACZ120	Cutting Conditions v <sub>c</sub> = 88 m/min v <sub>f</sub> = 700 mm/min ( f <sub>t</sub> = 0,25 mm/tooth) Width of Cut : 0,5 mm Depth of Cut : 0,5 mm Dry

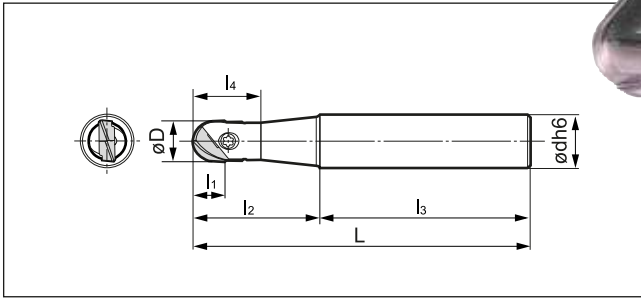
● Bumper Moulding Die	
Work Material : C50	
	
<Results> Smooth cutting and good surface finish after continuous cutting for eight hours	
WBMF1200M (ø20mm) Insert : ZPGU2471100 Grade : ACZ120	Cutting Conditions v <sub>c</sub> = 190 m/min v <sub>f</sub> = 1200 mm/min ( f <sub>t</sub> = 0,21 mm/tooth) Width of Cut : 0,2 mm Depth of Cut : 0,2 mm Dry

● = Euro stock  
□ = Delivery on request

 Recommended Tightening Torque (N·m)



# Wave Ball Mill for Finishing WBMF 1000 Type

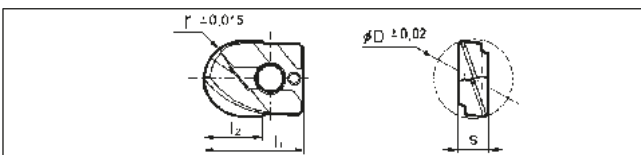


## Body

Cat. No.	Stock	Dimensions (mm)						
		øD	ød	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	L
WBMF 1100 S	□				30	70		100
WBMF 1100 M	●	10	16	9	35	95	17	130
WBMF 1100 L	□				50	130		180
WBMF 1120 S	□		16		40	70		110
WBMF 1120 M	●	12		10,5	40	110	19,5	150
WBMF 1120 MM12N	□		12		40	110		150
WBMF 1120 L	□		16		60	140		200
WBMF 1160 S	□		20		50	80		130
WBMF 1160 M	●	16		12	50	130	25,5	180
WBMF 1160 MM16N	□		16		50	130		180
WBMF 1160 L	□		20		70	150		220
WBMF 1200 S	□		25		60	80		140
WBMF 1200 M	●	20		15	60	140	32	200
WBMF 1200 MM20N	□		20		60	140		200
WBMF 1200 L	□		25		80	170		250
WBMF 1250 S	□				70	80		150
WBMF 1250 M	●	25	32	18,5	73	147	36	220
WBMF 1250 L	□				100	200		300
WBMF 1300 S	□				80	80		160
WBMF 1300 M	●	30	32	22,5	85	155	43	240
WBMF 1300 L	□				120	230		350



S : Short type  
M : Middle length type  
L : Long type

## Inserts



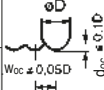
Cat. No.	Coated	Dimensions (mm)					Applicable Endmill	
		ACZ120	øD	l <sub>1</sub>	l <sub>2</sub>	s		r
ZPGU 1551050	●		10	15,6	9	5,1	5,0	WBMF1100
ZPGU 1856060	●		12	18	10,5	5,6	6,0	WBMF1120
ZPGU 2061080	●		16	20,5	12	6,1	8,0	WBMF1160
ZPGU 2471100	●		20	24,5	15	7,1	10,0	WBMF1200
ZPGU 2876125	●		25	28,5	18,5	7,6	12,5	WBMF1250
ZPGU 3486150	●		30	34,4	22,5	8,6	15,0	WBMF1300

## Spare Parts

Screw	Wrench	Applicable Endmill
		
BFTG0408F	3,4 TRD15	WBMF1100
BFTG0409F	3,4 TRD15	WBMF1120
BFTG0513F	5,0 TRD20	WBMF1160
BFTG0617F	7,5 TRD25	WBMF1200
BFTG0621F	7,5 TRD25	WBMF1250
BFTG0825F	7,5 TRD25	WBMF1300

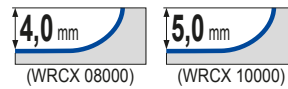
## Recommended Cutting Conditions

Material	Condition			
	Carbon steel (Below HRC25)	Alloy steel (Below HRC45)	Stainless, Die steel etc.	Cast iron
øD	200-250-300	100-150-200	50-80-100	100-120-150
v <sub>c</sub>	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,15-0,2	0,2-0,3-0,4
f <sub>t</sub>				



# Wave Radius Mill WRCX 08000/10000 E Type

## Multi Purpose Endmills with Polygon Inserts



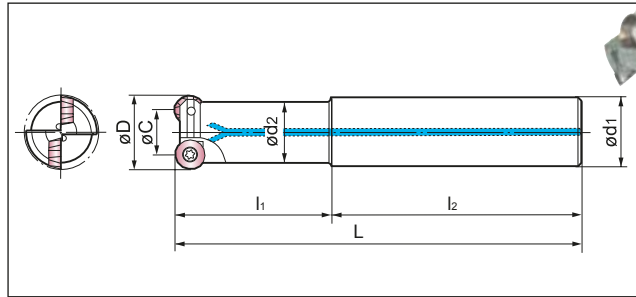
### Shank Type with Small Diameter Inserts

E<sub>-</sub> : Cylindrical straight shank type

ES : Short type with straight shank

EM : Middle length type with straight shank

EL : Long type with straight shank



Axial rake angle: -3°  
Radial rake angle: 0 ~ 35°

#### ■ BODY

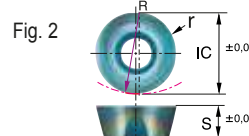
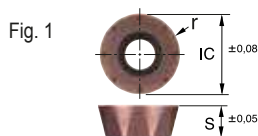
#### ■ Spare Parts

Insert IC (mm)	Cat. No.	Stock	Dimensions (mm)							No. of teeth	Axial Rake	Radial Rake	Helical Boring øB Standard	Plunging α max.		
			øD	øC	ød1	ød2	L	l1	l2							
8	WRCX 08012 ES	●	12	-	12	9,4	110	40	70	1	-3°	-35°	-	0°30'	BFTX 02505 IP	TRDR 08 IP
	WRCX 08012 EM	●	12	-	12	9,4	150	70	80	1	-3°	-10°	24 <sup>+7</sup> <sub>-4</sub>	5°30'		
	WRCX 08016 ES	●	16	-	16	14	120	50	70	1	-3°	-10°	24 <sup>+7</sup> <sub>-4</sub>	5°30'		
	WRCX 08016 EM	●	16	-	16	14	150	70	80	1	-3°	-10°	24 <sup>+7</sup> <sub>-4</sub>	5°30'		
	WRCX 08020 ES	●	20	12	20	18	130	50	80	2	-3°	-3°	32 ± 7	13°	BFTX 02506 IP	TRDR 08 IP
	WRCX 08020 EM	●	20	12	20	18	180	100	80	2	-3°	-3°	32 ± 7	13°		
	WRCX 08020 EL	●	20	12	20	18	250	130	120	2	-3°	-3°	32 ± 7	13°		
	WRCX 08025 ES	●	25	17	25	21	130	50	80	3	-3°	0°	42 ± 7	8°20'		
10	WRCX 08025 EM	●	25	17	25	21	180	100	80	3	-3°	0°	42 ± 7	8°20'	BFTX 03584 IP	TRDR 15 IP
	WRCX 08025 EL	●	25	17	25	21	250	130	120	3	-3°	0°	42 ± 7	8°20'		
	WRCX 10025 ES	●	25	15	25	21	130	50	80	2	-3°	0°	40 ± 8	13°10'		
	WRCX 10025 EM	●	25	15	25	21	180	100	80	2	-3°	0°	40 ± 8	13°10'		
	WRCX 10025 EL	●	25	15	25	21	250	130	120	2	-3°	0°	40 ± 8	13°10'		
	WRCX 10032 ES	●	32	22	32	28	130	50	80	3	-3°	0°	54 ± 8	8°		
WRCX 10032 EM	●	32	22	32	28	200	120	80	3	-3°	0°	54 ± 8	8°			
WRCX 10032 EL	●	32	22	32	28	300	180	120	3	-3°	0°	54 ± 8	8°			

#### ■ Insert

- QPMT... : Standard 16 cornered polygon type
- QPMT...-H : Stronger cutting edge type

- QPET...-S : Polished round insert for non-ferrous material



Rake angle: 25°  
4 corners use  
R : wiper radius

Cat. No.	Coated Carbide					Diamond Coated DL1000	Uncoated carbide H1	IC (mm)	r (mm)	s (mm)	Max. d <sub>oc</sub>		Fig.	Applicable Endmill
	ACP100	ACP200	ACP300	ACK200	ACK300						4 corners application	8 corners application		
QPMT 080330 PPEN	●	●	●	●	●			8	3,0	3,18	3,8	1,0	①	WRCX 08000 E
QPMT 080330 PPEN-H	●	●	●	●	●									
QPMT 10T335 PPEN	●	●	●	●	●			10	3,5	3,97	4,7	1,2	①	WRCX 10000 E
QPMT 10T335 PPEN-H	●	●	●	●	●									
QPET 10T350 PPRF-S						●	●							

#### ■ Recommended Cutting Conditions

[v<sub>c</sub> = m/min, f<sub>t</sub> = mm/tooth] [min. - optimum - max.]

Material Grade	Carbon steel (ex. C40 ~ C50)	Alloy steel (Below HRC40)	Stainless steel (ex. X10CrNiS18-9)	Cast iron (ex. GG20)	Non-ferrous material
	Grade	ACP100, ACP200	ACP100, ACP200	ACP200, ACP300	ACK200, ACK300
12 ~ 32	v <sub>c</sub> : 80-120-160	60-100-140	60-100-120	60-80-120	200-500-1000
	f <sub>t</sub> : 0,1-0,3-0,4	0,1-0,2-0,3	0,1-0,15-0,2	0,1-0,2-0,3	0,1-0,2-0,3

- = Euro stock
- = Delivery on request

G19

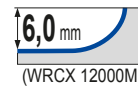
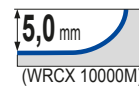
Recommended Tightening Torque (N·m)

# Exchangeable Head Endmills WRCX 08000 M Type

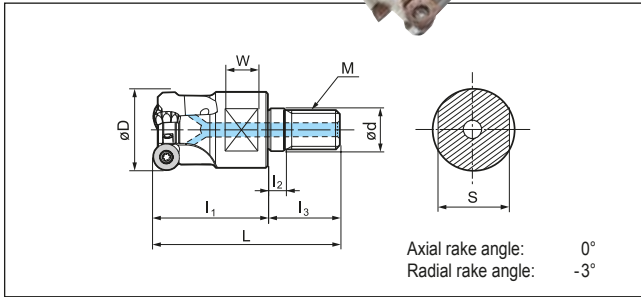
# Exchangeable Head Endmills WRCX 10000/12000 M Type



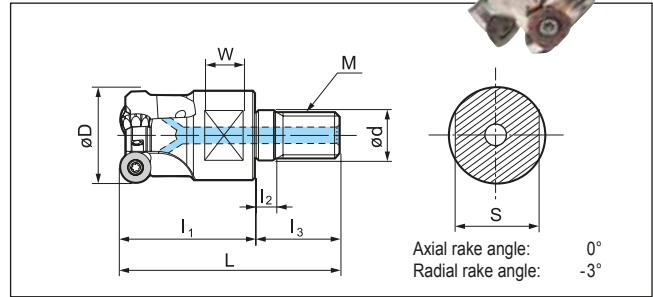
## Modular Type



High efficiency multi purpose endmills



High efficiency multi purpose endmills



### Heads

For insert type : QPMT 0803

Cat. No.	Stock	Dimensions (mm)									No. of teeth
		øD	ød	M	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	W	S	
<b>WRCX08020M10Z2</b>	●	20	10,5	M10	49	30	5	19	8	15	2
<b>WRCX08025M12Z3</b>	●	25	12,5	M12	56	35	5	21	10	19	3

Inserts are not included.

### Heads

For insert type : QPOT 10T3

Cat. No.	Stock	Dimensions (mm)									No. of teeth
		øD	ød	M	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	W	S	
<b>WRCX10025M12Z2</b>	●	25	12,5	M12	56	35	5	21	10	19	2
<b>WRCX10028M12Z2</b>	□	28	12,5	M12	56	35	5	21	10	19	2
<b>WRCX10030M16Z3</b>	□	30	17,0	M16	63	40	5	23	10	24	3
<b>WRCX10032M16Z3</b>	●	32	17,0	M16	63	40	5	23	10	24	3

Inserts are not included.

### Heads

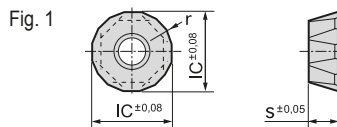
For insert type : QPOT 1204

Cat. No.	Stock	Dimensions (mm)									No. of teeth
		øD	ød	M	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	W	S	
<b>WRCX12040M16Z4</b>	□	40	17,0	M16	63	40	5	23	10	24	4

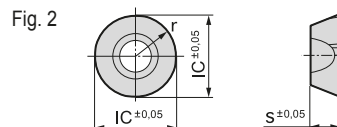
Inserts are not included.

### Inserts

- QPMT – 16 corner insert for General Purpose Application
- QPMT ... H 16 corner insert with Strong cutting edge



- QPET ... S Round insert with Sharp cutting edge for Aluminium



Rake angle: 25°

4 corners use

Cat. No.	Coated Carbide					DLC Coated DL1000	Uncoated Carbide H1	IC (mm)	r (mm)	s (mm)	Max. d <sub>oc</sub>		Fig.	Applicable Endmill
	ACP 100	ACP 200	ACP 300	ACK 200	ACK 300						4 corners application	8 corners application		
QPMT 080330 PPEN	●	●	●	●	●			8	3,0	3,18	3,8	1,0	Ⓐ	WRCX 08000M
QPMT 080330 PPEN-H	●	●	●	●	●									
QPMT 10T335 PPEN	●	●	●	●	●			10	3,5	3,97	4,7	1,2	Ⓐ	WRCX 10000M
QPMT 10T335 PPEN-H	●	●	●	●	●									
QPET 10T350 PPFR-S						●	●						Ⓑ	
QPMT 120440 PPEN	●	●	●	●	●			12	4,0	4,76	5,6	1,5	Ⓐ	WRCX 12000M
QPMT 120440 PPEN-H	●	●	●	●	●									
QPET 120460 PPFR-S						●	●						Ⓑ	

### Identification of Catalogue No.

**WRCX 08 020 M10 Z2**

Cutter Type | Diameter | Mounting Screw | No. of Teeth



### Spare Parts

Wrench	Screw	Applicable Endmill
TRDR 08 IP	BFTX 02506 IP	1,5
		WRCX 08020M ~ WRCX 08025M

### Spare Parts




Wrench	Screw	Applicable Endmill
TRDR 15 IP	BFTX 03584 IP	3,0
	BFTX 0409 IP	3,0
		WRCX 10025M ~ WRCX 10032M
		WRCX 12040M

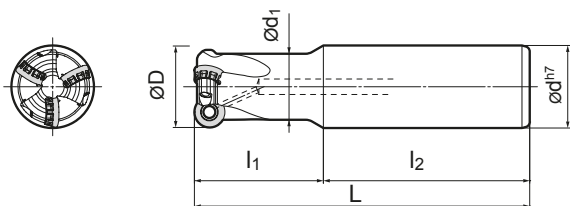
# Wave Radius Mill RSX(F)08000/10000/12000ES

Milling of steel, stainless steel, cast iron and exotic alloys

**New**

## Shank Type

Rake Angle	Radial	-5° ~ -8°			
	Axial	10°	(08000ES)	(10000ES)	(12000ES)



## Body (RSX...ES, Standard)

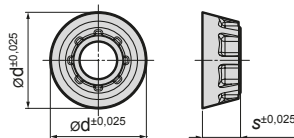
Cat. No.	Stock	Dimensions (mm)					No. of teeth	Weight (kg)	
		ØD	Ød	Ød <sub>1</sub>	L <sub>1</sub>	L <sub>2</sub>			L
RSX 08020 ES	●	20	20	16,9	30	70	100	2	0,3
RSX 08025 ES	●	25	25	21,9	40	80	120	3	0,4
RSX 10025 ES	●	25	25	20,3	50	80	130	2	0,4
RSX 10032 ES	●	32	32	27,1	50	80	130	3	0,7
RSX 12032 ES	●	32	32	25,6	50	80	130	2	0,7

## Body (RSXF...ES, Fine Pitch)

Cat. No.	Stock	Dimensions (mm)					No. of teeth	Weight (kg)	
		ØD	Ød	Ød <sub>1</sub>	L <sub>1</sub>	L <sub>2</sub>			L
RSXF08020 ES	●	20	20	16,9	30	70	100	3	0,3
RSXF08025 ES	●	25	25	21,9	40	80	120	4	0,4
RSXF10025 ES	●	25	25	20,3	50	80	130	3	0,4
RSXF10032 ES	●	32	32	27,1	50	80	130	4	0,7
RSX 12032 ES	●	32	32	25,6	50	80	130	3	0,7

## Inserts

Application	Grade					Dimens.		Applicable Cutters
	ACP200	ACK300	ACM100	ACM200	ACM300	Ød (IC)	S	
High Speed/Light Cut			M S	M S				RSX(F) 08000ES
General Purpose	P M	M S	M S	M S				
Roughing	P M	K			M S			
Cat. No.	ACP200	ACK300	ACM100	ACM200	ACM300	Ød (IC)	S	
RDET 0803M0EN G	●	●	●	●	●	8	3,18	RSX(F) 08000ES
RDET 0803M0EN H	●	●	●	●	●	8	3,18	
RDET 10T3M0EN G	●	●	●	●	●	10	3,97	RSX(F) 10000ES
RDET 10T3M0EN H	●	●	●	●	●	10	3,97	
RDET 1204M0EN G	●	●	●	●	●	12	4,76	RSX(F) 12000ES
RDET 1204M0EN H	●	●	●	●	●	12	4,76	





Cutting Edge Cross Section

G - Type H - Type

M0: IC is metric

## Spare Parts

Applicable Cutters	Wrench	Screw	
			(N·m)
RSX(F) 08000ES	TRDR08IP	BFTX02506IP	1,5
RSX(F) 10000ES	TRDR15IP	BFTX03584IP	3,0
RSX(F) 12000ES		BFTX0409IP	3,0

## Cutter Identification

<b>RSX</b>	<b>F</b>	<b>10</b>	<b>025</b>	<b>ES</b>
Cutter Series	Fine Pitch Type	Insert Size	Cutter Diameter	Endmill Type

## Recommended Cutting Conditions

Min.-Optimum-Max.

ISO	Work Material		Hardness	Cutting Speed v <sub>c</sub> (m/min)	Feed Rate f <sub>t</sub> (mm/t)	Grade	
P	Carbon Steel		180-280HB	100-160-200	0,20-0,40-0,60	ACP200	
	Alloy Steel		180-280HB	100-140-180	0,20-0,30-0,40	ACP200	
M	Stainless Steel	Cr Based	Ferritic	200HB	150-180-200	0,15-0,25-0,35	ACM300
		Cr-Ni Based	Martensitic	200-330HB	80-120-180	0,15-0,25-0,35	ACM300
			Austenitic	200HB	150-180-200	0,15-0,25-0,35	ACM300
			Austenitic, ferritic	230-270HB	80-120-180	0,15-0,25-0,35	ACM200
			Precipitation hardening	330HB	60-100-160	0,15-0,25-0,35	ACM200
K	Cast Iron		250HB	80-120-160	0,10-0,30-0,40	ACK300	
S	Heat resistant alloy		Ni based material	250-350HB	20-30-40	0,10-0,20-0,30	ACM100 ACM200
	Titanium	Pure Titanium	(Rm400)	60-80-100	0,10-0,20-0,30		
		α + β alloy system	(Rm1050)	40-50-60	0,10-0,20-0,30		

● = Euro stock

 G20/G21

 Recommended Tightening Torque (N·m)

# Exchangeable Head Endmills RSX(F)08000/10000/12000 M

**New**

## Modular Type

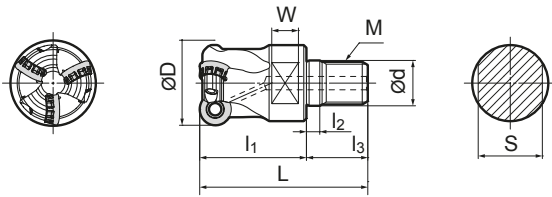
Rake Angle	Radial	-5°~ -8°
	Axial	10°



(08000ES)

(10000ES)

(12000ES)



## Body (RSX...M, Standard)

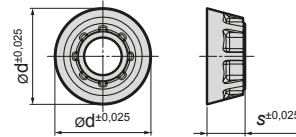
Cat. No.	Stock	Dimensions (mm)										No. of Teeth	Weight (kg)
		ØD	Ød	M	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	W	S			
RSX 08020M10Z2	●	20	10,5	M10	49	30	5	19	8	15	2	0,1	
RSX 08025M12Z3	●	25	12,5	M12	56	35	5	21	10	19	3	0,1	
RSX 08032M16Z4	●	32	17,0	M16	63	40	5	23	10	24	4	0,2	
RSX 10025M12Z2	●	25	12,5	M12	56	35	5	21	10	19	2	0,1	
RSX 10032M16Z3	●	32	17,0	M16	63	40	5	23	10	24	3	0,2	
RSX 12032M16Z2	●	32	17,0	M16	63	40	5	23	10	24	2	0,2	
RSX 12040M16Z3	●	40	17,0	M16	63	40	5	23	10	24	3	0,3	

## Body (RSXF...M, Fine Pitch)

Cat. No.	Stock	Dimensions (mm)										No. of Teeth	Weight (kg)
		ØD	Ød	M	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	W	S			
RSXF 08020M10Z3	●	20	10,5	M10	49	30	5	19	8	15	3	0,1	
RSXF 08025M12Z4	●	25	12,5	M12	56	35	5	21	10	19	4	0,1	
RSXF 08032M16Z5	●	32	17,0	M16	63	40	5	23	10	24	5	0,2	
RSXF 10025M12Z3	●	25	12,5	M12	56	35	5	21	10	19	3	0,1	
RSXF 10032M16Z4	●	32	17,0	M16	63	40	5	23	10	24	4	0,2	
RSXF 12032M16Z3	●	32	17,0	M16	63	40	5	23	10	24	3	0,2	
RSXF 12040M16Z4	●	40	17,0	M16	63	40	5	23	10	24	4	0,3	

## Inserts

Application	Grade					Dimens.		Applicable Cutters
	ACP200	ACK300	ACM100	ACM200	ACM300	Ød (IC)	S	
High Speed/Light Cut			M S	M S				
General Purpose	P M		M S	M S	M S			
Roughing	P M	K			M S			
Cat. No.								
RDET 0803M0EN G	●	●	●	●	●	8	3,18	RSX(F) 08000ES
RDET 0803M0EN H	●	●	●	●	●	8	3,18	
RDET 10T3M0EN G	●	●	●	●	●	10	3,97	RSX(F) 10000ES
RDET 10T3M0EN H	●	●	●	●	●	10	3,97	
RDET 1204M0EN G	●	●	●	●	●	12	4,76	RSX(F) 12000ES
RDET 1204M0EN H	●	●	●	●	●	12	4,76	



Cutting Edge Cross Section



G - Type



H - Type

M0: IC is metric

## Spare Parts

Applicable Cutters	Wrench	Screw	
RSX(F) 08000M	TRDR08IP	BFTX02506IP	1,5
RSX(F) 10000M	TRDR15IP	BFTX03584IP	3,0
RSX(F) 12000M		BFTX0409IP	3,0

## Cutter Identification

<b>RSX</b>	<b>F</b>	<b>10</b>	<b>025</b>	<b>M12</b>	<b>Z3</b>
Cutter Series	Fine Pitch Type	Insert Size	Cutter Diameter	Mounting Screw Size	No. of Teeth

## Recommended Cutting Conditions

Min.-Optimum-Max.

ISO	Work Material		Hardness	Cutting Speed v <sub>c</sub> (m/min)	Feed Rate f <sub>t</sub> (mm/t)	Grade	
P	Carbon Steel		180-280HB	100-160-200	0,20-0,40-0,60	ACP200	
	Alloy Steel		180-280HB	100-140-180	0,20-0,30-0,40	ACP200	
M	Stainless Steel	Cr Based	Ferritic	200HB	150-180-200	0,15-0,25-0,35	ACM300
			Martensitic	200-330HB	80-120-180	0,15-0,25-0,35	ACM300
		Cr-Ni Based	Austenitic	200HB	150-180-200	0,15-0,25-0,35	ACM300
			Austenitic, ferritic	230-270HB	80-120-180	0,15-0,25-0,35	ACM200
			Precipitation hardening	330HB	60-100-160	0,15-0,25-0,35	ACM200
K	Cast Iron		250HB	80-120-160	0,10-0,30-0,40	ACK300	
S	Heat resistant alloy	Ni based material		250-350HB	20-30-40	0,10-0,20-0,30	ACM100 ACM200
		Pure Titanium		(Rm400)	60-80-100	0,10-0,20-0,30	
		α + β alloy system		(Rm1050)	40-50-60	0,10-0,20-0,30	

# "Wave Mill" Series

## WFXC Type



### General Features

The WaveMill WFXC type is a chamfering tool that uses inserts for the WFX series. This allows the WFXC type to support many types of work materials using a variety of grades.

### Grade Selection

ISO	Grade	Finishing to Light Cutting	Medium Cut	Rough to Heavy Cutting
P	Coated Carbide	ACP100	ACP200	ACP300
		ACM200	ACM300	

ISO	Grade	Finishing to Light Cutting	Medium Cut	Rough to Heavy Cutting
K	Coated Carbide	ACK200	ACK300	
N	Carbide	DL1000	H1	

### Application Notes

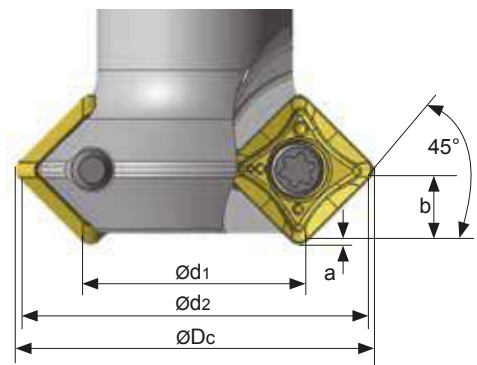
Since chamfering uses the straight cutting edge portion of the insert, the range that can be chamfered will change depending on the corner radius ( $r_\epsilon$ ) of the insert that is attached to the body.

Work diameter: Use in a range greater or equal to  $\varnothing d_1$  and less than or equal to  $\varnothing d_2$ .

Depth: The workpiece can be chamfered from „a“, which is the distance from the tip of the tool to the straight cutting edge at the depth indicated by „b“.

Body	Insert		Min. Work Diameter	Max. Work Diameter	Min. Depth	Max. Depth	Max. Diameter
	Cat. No.	$r_\epsilon$					
WFXC 08008E	SOMT 080304	0,4	7,5	15,8	0,1	4,1	17,8
	SOMT 080308	0,8	8,0	15,8	0,2	3,9	17,5
	SOMT 080312	1,2	8,5	15,8	0,4	3,6	17,2
WFXC 08016E	SOMT 080304	0,4	15,5	23,8	0,1	4,1	25,8
	SOMT 080308	0,8	16,0	23,8	0,2	3,9	25,5
	SOMT 080312	1,2	16,5	23,8	0,3	3,6	25,2
WFXC 12025E	SOMT 120404	0,4	24,6	38,3	0,1	6,8	41,3
	SOMT 120408	0,8	25,0	38,3	0,2	6,6	41,0
	SOMT 120412	1,2	25,6	38,3	0,4	6,3	40,7
	SOMT 120416	1,6	26,1	38,3	0,5	6,1	40,4
WFXC 12032E	SOMT 120404	0,4	31,6	45,3	0,1	6,8	48,3
	SOMT 120408	0,8	32,0	45,3	0,2	6,6	48,0
	SOMT 120412	1,2	32,6	45,3	0,4	6,3	47,7
	SOMT 120416	1,6	33,1	45,3	0,5	6,1	47,4

Dimensions (mm)

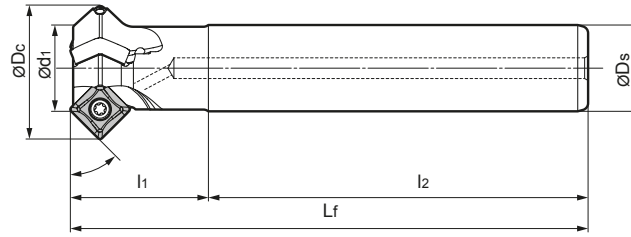


**New**

# "Wave Mill" Series WFXC 08000/12000 E



Rake Angle	Radial	0°
	Axial	0°



## Body WFXC 08000E (Standard Type)

Cat. No.	Stock	Dimensions (mm)						No. of Teeth	Weight (kg)
		$\varnothing d_1$	$\varnothing D_c$	$L_f$	$L_1$	$L_2$	$\varnothing D_s$		
WFCX 08008E		8	17,5	120	30	90	10	1	0,1
08016E		16	25,5	120	30	90	16	2	0,2

## Body WFXC 12000E (Standard Type)

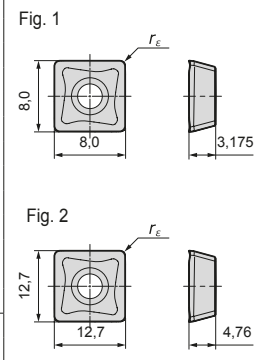
Cat. No.	Stock	Dimensions (mm)						No. of Teeth	Weight (kg)
		$\varnothing d_1$	$\varnothing D_c$	$L_f$	$L_1$	$L_2$	$\varnothing D_s$		
WFCX 12025E		25	41,0	150	40	110	25	3	0,6
12032E		32	48,0	150	40	110	32	3	1,0

## Identification Details

<b>WFX</b>	<b>C</b>	<b>08</b>	<b>016</b>	<b>E</b>
Cutter Series	Chamfering	Insert Size	Cutter Diameter	Endmill Type

## Inserts

Application	Coated Carbide							Carbide	DLC	Radius (mm)	Fig.	Applicable Cutters
	P	PM	PM	K	K	MS	MS	KN	N			
High Speed / Light cut	P					MS		KN				
General Purpose		PM	PM	K		MS	MS		N			
Roughing		PM	PM	K		MS	MS		N			
Cat. No.	ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000	$r_\epsilon$		
SOMT 080304 PZER L	●	●	●	●	●	●	●	-	-	0,4	1	WFXC08000E
080308 PZER L	●	●	●	●	●	●	●	-	-	0,8	1	
SOMT 080304 PZER G	●	●	●	●	●	●	●	-	-	0,4	1	
080308 PZER G	●	●	●	●	●	●	●	-	-	0,8	1	
080312 PZER G	●	●	●	●	●	●	●	-	-	1,2	1	
SOMT 080308 PZER H	●	●	●	●	●	●	●	-	-	0,8	1	
080312 PZER H	●	●	●	●	●	●	●	-	-	1,2	1	
SOET 080304 PZER G	●	●	●	●	●	●	●	-	-	0,4	1	
080308 PZER G	●	●	●	●	●	●	●	-	-	0,8	1	
080312 PZER G	●	●	●	●	●	●	●	-	-	1,2	1	
SOET 080302 PZFR S	-	-	-	-	-	-	-	●	●	0,2	1	WFXC12000E
080304 PZFR S	-	-	-	-	-	-	-	●	●	0,4	1	
080308 PZFR S	-	-	-	-	-	-	-	●	●	0,8	1	
SOMT 120408 PDER L	●	●	●	●	●	●	●	-	-	0,8	2	
SOMT 120404 PDER G	●	●	●	●	●	●	●	-	-	0,4	2	
120408 PDER G	●	●	●	●	●	●	●	-	-	0,8	2	
120412 PDER G	●	●	●	●	●	●	●	-	-	1,2	2	
120416 PDER G	●	●	●	●	●	●	●	-	-	1,6	2	
SOMT 120408 PDER H	●	●	●	●	●	●	●	-	-	0,8	2	
SOET 120408 PDFR S	-	-	-	-	-	-	-	●	●	0,8	2	



## Spare Parts

Applicable Cutter	Screw	Wrench
	WFXC08000E	BFTX0306IP 2,0
WFXC12000E	BFTX03512IP 3,0	TRDR15IP

## Recommended Cutting Conditions

ISO	Work Material	Hardness (HB)	Cutting Speed	Feed Rate
P	General Steel	180 ~ 280	150-200-250	0,05-0,10-0,15
	Soft Steel	≤180	180-265-350	0,10-0,15-0,20
	Die Steel	200 ~ 220	100-150-200	0,05-0,10-0,15
M	Stainless Steel	-	150-200-250	0,05-0,10-0,15
K	Cast Iron	250	100-175-250	0,05-0,10-0,15

Min. - Optimum - Max.

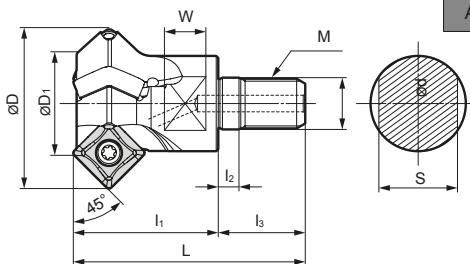
Indexable Endmills

# "Wave Mill" Series


## WFXC 08000/12000 M

**New**

### Modular Type



Rake Angle	Radial	0°
	Axial	0°



### Head (WFXC 08000M)

Cat. No.	Stock	Dimensions (mm)										No. of Teeth	Weight (kg)
		ØD1	ØD	Ød	M	L	l1	l2	l3	W	S		
WFXC08016M08Z2		16	25,5	8,5	M8	42	25	5	17	8	13	2	0,1

### Identification Details

<b>WFX</b>	<b>C</b>	<b>08</b>	<b>016</b>	<b>M08</b>	<b>Z2</b>
Cutter Series	Chamfering	Insert Size	Cutter Diameter	Screw Size	No. of Teeth

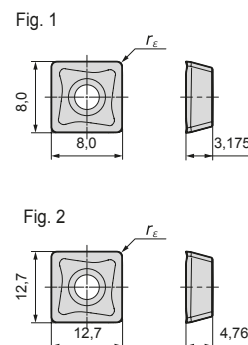
### Head (WFXC 12000M)

Cat. No.	Stock	Dimensions (mm)										No. of Teeth	Weight (kg)
		ØD1	ØD	Ød	M	L	l1	l2	l3	W	S		
WFXC12025M12Z3		25	41,0	12,5	M12	56	32	5	21	10	19	3	0,1
12032M16Z3		32	48,0	17,0	M16	63	40	5	23	10	24	3	0,2





### Inserts

Application		Coated Carbide							Carbide	DLC	Radius (mm) $r_\epsilon$	Fig.
		P	M	K	MS	DL1000	H1	N				
High Speed / Light cut		P										
General Purpose			P/M	P/M	K			MS		N		
Roughing			P/M	P/M		K		MS		N		
Cat. No.		ACP100	ACP200	ACP300	ACK200	ACK300	ACM200	ACM300	H1	DL1000		
SOMT 080304 PZER L		●	●	●	●	●	●	●	-	-	0,4 1	
SOMT 080308 PZER L		●	●	●	●	●	●	●	-	-	0,8 1	
SOMT 080304 PZER G		●	●	●	●	●	●	●	-	-	0,4 1	
SOMT 080308 PZER G		●	●	●	●	●	●	●	-	-	0,8 1	
SOMT 080312 PZER G		●	●	●	●	●	●	●	-	-	1,2 1	
SOMT 080308 PZER H		●	●	●	●	●	●	●	-	-	0,8 1	
SOMT 080312 PZER H		●	●	●	●	●	●	●	-	-	1,2 1	
SOET 080304 PZER G		●	●	●	●	●	●	●	-	-	0,4 1	
SOET 080308 PZER G		●	●	●	●	●	●	●	-	-	0,8 1	
SOET 080312 PZER G		●	●	●	●	●	●	●	-	-	1,2 1	
SOET 080302 PZFR S		-	-	-	-	-	-	●	●	●	0,2 1	
SOET 080304 PZFR S		-	-	-	-	-	-	●	●	●	0,4 1	
SOET 080308 PZFR S		-	-	-	-	-	-	●	●	●	0,8 1	
SOMT 120408 PDER L		●	●	●	●	●	●	●	-	-	0,8 2	
SOMT 120404 PDER G		●	●	●	●	●	●	●	-	-	0,4 2	
SOMT 120408 PDER G		●	●	●	●	●	●	●	-	-	0,8 2	
SOMT 120412 PDER G		●	●	●	●	●	●	●	-	-	1,2 2	
SOMT 120416 PDER G		●	●	●	●	●	●	●	-	-	1,6 2	
SOMT 120408 PDER H		●	●	●	●	●	●	●	-	-	0,8 2	
SOET 120408 PDFR S		-	-	-	-	-	-	●	●	●	0,8 2	



### Spare Parts

Applicable Cutter	Screw		Wrench
			
WFXC08000M	BFTX0306IP	2,0	TRDR08IP
WFXC12000M	BFTX03512IP	3,0	TRDR15IP

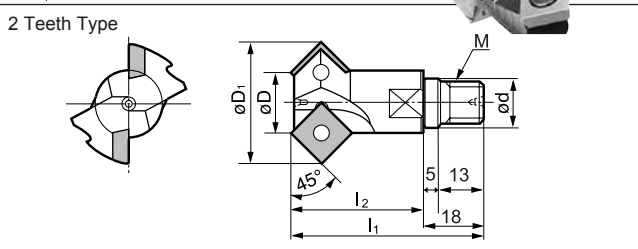
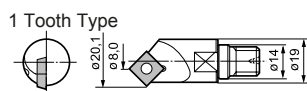
### Recommended Cutting Conditions

ISO	Work Material	Hardness (HB)	Cutting Speed	Feed Rate
P	General Steel	180 ~ 280	150-200-250	0,05-0,10-0,15
	Soft Steel	≤180	180-265-350	0,10-0,15-0,20
	Die Steel	200 ~ 220	100-150-200	0,05-0,10-0,15
M	Stainless Steel	-	150-200-250	0,05-0,10-0,15
K	Cast Iron	250HB	100-175-250	0,05-0,10-0,15

Min. - Optimum - Max.



# Chamfering Endmills SCP Type



## Body

Cat. No.	Stock	Dimensions (mm)					No. of teeth	
		$\phi D$	$\phi D_1$	$\phi d$	$l_1$	$l_2$		M
SCP 308	●	8	20,1	14	50	32	M12	1
SCP 419	●	19	35,6	14	56	38	M12	2
SCP 432	●	32	48,6	20	60	42	M16	3

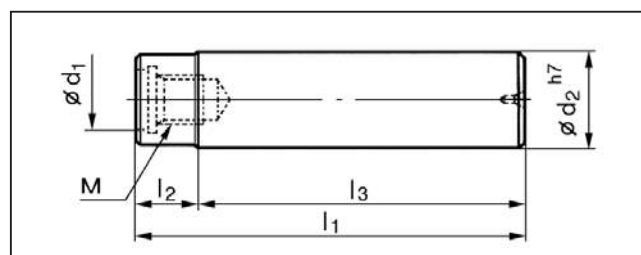
## Inserts

Fig. 1

Fig. 2

Cat. No.	Carbide			Fig.	Applicable Endmill
	A30N	G10E			
SDMA 090308		●		1.	SCP 308
SDMA 090308 T	●				
SPMA 120408		●		2.	SCP 419 SCP 432
SPMA 120408 T	●				

## Holder for SCP

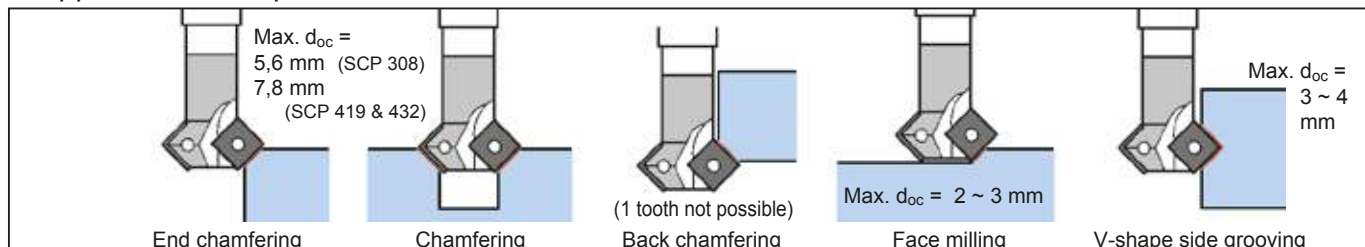


Cat. No.	Stock	Dimensions (mm)					Applicable Endmill	
		$\phi d_1$	$\phi d_2$	M	$l_1$	$l_2$		$l_3$
SCA 20	●	14	20	M12	105	20	85	SCP 308 SCP 419
SCA 32	●	20	32	M16	130	20	110	SCP 432

## Spare Parts

SCP	Screw	Wrench	
308	BFTX 0407 N	3,0	TRX 10
419,432	BFTX 0511 N	5,0	TRX 20

## Application Examples



## Recommended Cutting Conditions for SCP

( min. - optimal - max.)

Multi-Mills	$\phi D$ (mm)	Tooling	Cutting Conditions	General steel			Cast iron
				Less than HRC25	HRC25 ~ 35	HRC35 ~ 45	(GG20)
SCP 308	8,5 ~ 19,5	Chamfering	$v_c$ (m/min)	80 - 100 - 140	50 - 60 - 80	20 - 40 - 60	90 - 110 - 130
SCP 419	19,5 ~ 35,1		$f_t$ (mm/tooth)	0,15 - 0,4	0,1 - 0,25	0,05 - 0,15	0,2 - 0,5
SCP 432	32,5 ~ 48,1	Face milling	$v_c$ (m/min)	80 - 100 - 140	50 - 60 - 80	20 - 40 - 60	90 - 110 - 130
			$f_t$ (mm/tooth)	0,1 - 0,2	0,05 - 0,1	0,04 - 0,08	0,1 - 0,3



# Coated & Solid Endmills

J1 ~ J50

# J



## Coated Endmills

Selection Guide	According to Work Materials.....	J 2 - 3
	New Global Standard Endmills.....	J 4 - 6
GSX MILL Series	<b>GSX</b> 20000 .....	J 7 - 11
	<b>GSX</b> 30000 .....	J12-13
Slotted Type	<b>GSXSLT</b> 30000.....	J14
	<b>GSX</b> 40000 .....	J15-19
Anti-Vibration Type	<b>GSXVL</b> 40000.....	J20-21
SSEH MILL Series for Exotic Alloys	<b>SSEHVL</b> 4000W-R / <b>SSEH</b> 4000W-R.....	J22-24
GS MILL Series, Roughing Type	<b>GSRE</b> 4000SF.....	J25
Hard Type	<b>GSH</b> 4000/6000/8000SF .....	J26
AURORA COAT MILL Series	<b>ASM</b> 2000/4000DL / DL-R .....	J27-28
SSUP MILL Series	<b>SSUP</b> 4000ZX/ZX-R.....	J32-33
Standard Type	<b>SSM</b> 2000/4000ZX .....	J29
Hard Type	<b>LHSM</b> 4000/6000/8000ZX .....	J30
	<b>EHSM</b> 4000/6000/8000ZX .....	J30
Fast Helix Type	<b>HSM</b> 2000/3000/4000ZX.....	J31
GSX Mills Ball Type	<b>GSXB</b> 20000 .....	J34
GS Mills Ball Type	<b>GLB</b> 2000SF .....	J35
Ball Mills "Neo"	<b>SNB</b> 2000ZX .....	J36-37
AURORA COAT Ball Type	<b>SNB</b> 2000DL .....	J38

## Uncoated Endmills

SSEH MILL Series for Exotic Alloys	<b>SSEHVL</b> 4000-R / <b>SSEH</b> 4000-R.....	J39
Standard Type	<b>SSM</b> 2000/4000.....	J40-41
Long Type	<b>LSM</b> 2000/4000.....	J42
Extra LongType	<b>ELSM</b> 2000/4000 .....	J43
Fast Helix Type	<b>HSM</b> 2000/3000/4000 .....	J44
For Aluminium Cutting	<b>ASM</b> 2000 .....	J45
Straight Flute Ball Type	<b>BSM</b> 2000 .....	J45
SUMIBORON "Helical Master" for Hardened Steel	<b>BNES</b> 1000.....	J46
SUMIBORON "Mould Finish Master" for Hardened Steel	<b>BNBP</b> 2R...4/6 .....	J47
SUMIDIA "Mould Finish Master" Binderless	<b>NPDRS</b> / <b>NPDB(S)</b> .....	J48-49

Solid Carbide  
Endmills

# Solid Carbide Endmills Selection Guide

## ● According to Work Materials

### Square Type

**General Steel (Common Use)**

Coated Sharp General

Global Endmills Standard  
**GSX Type**  
ø1~25mm  
• 2 Flutes  
• 3 Flutes  
• 4 Flutes  
⇒ J7~19

Anti-Vibration Radius Corner Endmills  
**GSXVL Type**  
ø2~25mm  
• 4 Flutes  
⇒ J20~21

Coated Sharp General

ZX-COATED  
**SSM-ZX Type**  
ø0,3~32mm  
• 2 Flutes  
• 4 Flutes  
⇒ J29

### Legend

Grade Edge Type Usage

**General Steel (Special Use)**

Plunge Cut Multi-Purpose  
Coated Sharp General

GSX MILL  
**GSXSLT Type**  
ø1~16mm  
• 3 Flutes  
⇒ J14

High Efficiency  
Coated Strong High Efficiency

UPMILL  
**SSUP-ZX Type**  
ø2~20mm  
• 4 Flutes  
⇒ J28~29

High Efficiency  
Coated Strong High Efficiency

ROUGHING ENDMILL  
**GSRE-SF Type**  
ø6~20mm  
• 4 Flutes  
⇒ J27

**Hardened Steel**

High performance Type  
Coated Strong High Efficiency

GS-MILL-HARD  
**GSH-SF Type**  
ø1~20mm  
• 4 Flutes  
• 6 Flutes  
• 8 Flutes  
⇒ J26

High Rigidity Type  
Coated Strong High Efficiency

HARD ENDMILL  
**LHHM...ZX**  
**EHHM...ZX**  
ø3~32mm  
• 4 Flutes  
• 6 Flutes  
• 8 Flutes  
⇒ J30

SumiBoron Endmill  
CBN

"Helical Master"  
**BNES Type**  
ø6~16mm  
• 1 Flute  
⇒ J46, M50

**Exotic Metals**

For Heat Resistant Steel  
Coated Sharp General

Radius Endmills Standard  
**SSEH Type**  
ø4,5~25mm  
• 4 Flutes  
⇒ J22, J24, J39

Anti-Vibration Radius Endmills  
**SSEHVL Type**  
ø4,5~25mm  
• 4 Flut  
⇒ J22~23, J39

For Heat Resistant Steel  
Coated Strong High Efficiency

ZX-COATED HI-HELIX  
**HSM-ZX Type**  
ø2~25mm  
• 2 Flutes  
• 3 Flutes  
• 4 Flutes  
⇒ J31

**Non-ferrous Metal**

SumiDia Endmill  
PCD

SUMIDIA brazed  
**DFE Type**  
ø4~13mm  
• 1 Flute  
• 2 Flutes  
• 4 Flutes  
⇒ Stock in Japan




DLC-Coated Endmill  
Coated Sharp General

AURORA COATED  
**ASM-DL Type**  
ø2~16mm  
• 2 Flutes  
• 4 Flutes  
⇒ J27~28




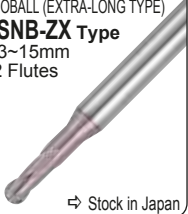
● According to Work Materials

## Ballnose Type




**General Steel (Common Use)**

<p>Coated General</p> <p>GSX MILL BALL <b>GSXB Type</b> R0.2~12,5mm •2 Flutes</p>  <p>⇒ J34</p>	<p>Coated General</p> <p>GS MILL BALL <b>GLB-SF Type</b> R0.5~6mm •2 Flutes</p>  <p>⇒ J35</p>
<p>Coated General</p> <p>NEOBALL <b>SNB-ZX Type</b> R0.5~15mm •2 Flutes</p>  <p>⇒ J36~37</p>	

**General Steel (Short Series)**

<p>Coated Short General</p> <p>NEOBALL SHORT FLUTE <b>S-SNB-ZX Type</b> R1,5~15mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>	<p>Coated Short General</p> <p>ZX-COATED SHORT FLUTE <b>S-SSB-ZX Type</b> R1,5~4mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>	
<p><b>General Steel (Long Series)</b></p> <p>Coated Long General</p> <p>NEOBALL (LONG TYPE) <b>LSNB-ZX Type</b> R0,5~15mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>		<p>Coated Long General</p> <p>NEOBALL (EXTRA-LONG TYPE) <b>ESNB-ZX Type</b> R3~15mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>

**Hardened Steel**


<p>High Rigidity Type</p> <p>Coated Strong High Efficiency</p> <p>HARDBALL <b>SHB-ZX Type</b> R0.5~10mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>	<p>Hardened Steel</p> <p>CBN</p> <p><b>MOULD</b> FINISH MASTER</p> <p>SUMIBORON brazed <b>BNBP Type</b> R0.2~1,0mm •2 Flutes</p>  <p>⇒ J47, M51</p>	<p>PCD <b>New</b></p> <p>SUMIDIA binderless <b>NPDRS Type</b> R0,2~2,0mm •1 Flute Radius Endmill</p> <p><b>NPDB(S) Type</b> R0,1~1,0mm •1 Flute Ballnose Endmill</p>  <p>NPDRS NPDB(S) ⇒ J48-49, M52-53</p>
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**Non-ferrous Metal**

DLC-Coated Endmill

Coated General

AURORA COATED  
**SNB-DL Type**  
R1~8mm  
•2 Flutes



⇒ J38

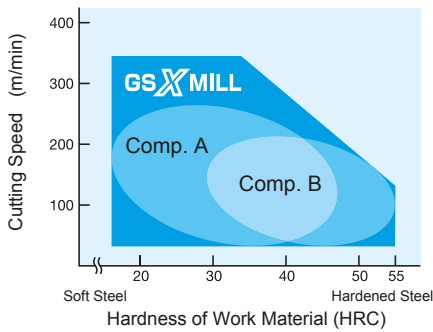
# GSX MILL Series



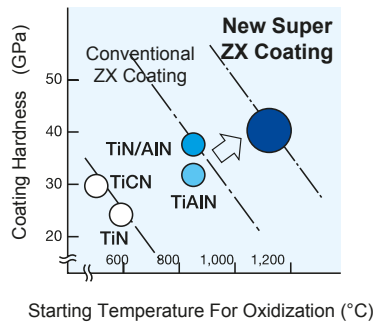
## ■ Characteristics and Applications

- Wide variation of three flute types and four flute lengths enable use in a wide variety of applications.
- Fine carbide substrate provides high transverse rupture strength and excellent thermal shock resistance improving reliability in wet cutting applications.
- GSX Coating provides improved reliability and longer tool life.
- Large rake angle and unique flute design improve sharpness and chip evacuation.
- Cutting teeth with gash land improves corner flute strength.
- Sharper edge S type and fracture resistant C type added to the 2D size series.

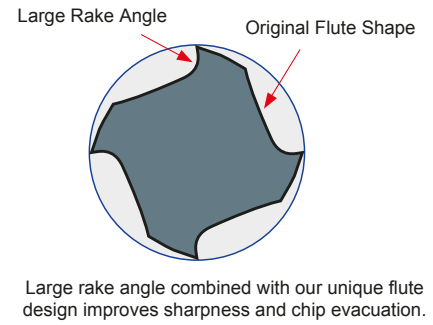
## ● Wear Resistance



## ● Thermal Resistance

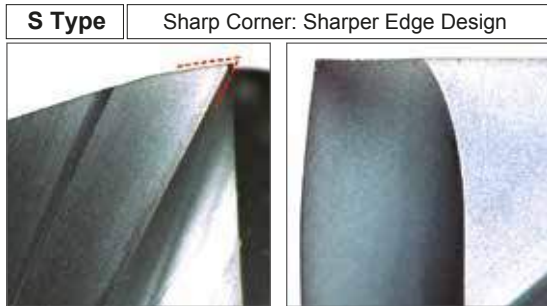


## ● Improved Chip Evacuation

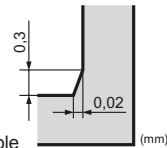


## ■ 2 cutting edge designs expand machining applications

Sharper edge S type and fracture resistant C type added to the 2D size series.



Note: In gash land drilling, some material remains as shown on the right. If you need sharp corners, use the S Type.



Ex.: Corner on a  $\phi 10$ mm hole

## ■ Application Range

P					H			M	S	K	N			
General Structure	Rolled Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Hardened Steel			Stainless Steel	Ti Alloy	Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
					Tempered Die Steel	45 ~ 55 HRC	55 ~ 60 HRC							
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ : Best  
○ : Good

Blank : Not recommended  
\*1: GSXSLT30000C is recommended for 50 HRC or less

## ■ Recommended Milling Examples

Application	Surface Milling		Grooving		Groove Finishing	
	Rough	Finishing	Rough	Finishing	Rough	Finishing
Form						
<b>S Type</b>		○		○		○
<b>C Type</b>	○	○	○	○	○	○

S Type is best for removing inside corners.

\*2: Use with small depth of cut.

# NEW "Global Standard" Endmills GSX MILL Series



Large rake angle and unique flute design improve sharpness and excellent chip evacuation.

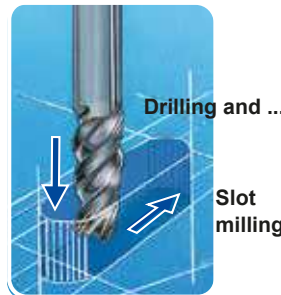
## Product Range

Application	No. of Teeth	Flute Length				
		1,5 D	2 D		3 D	4 D
		C Type	S Type	C Type	C Type	C Type
General Purpose	2 Flutes	GSX20000C-1.5D ⇨ J 7	GSX20000S-2D ⇨ J 8	GSX20000C-2D ⇨ J 9	GSX20000C-3D ⇨ J 10	GSX20000C-4D ⇨ J 11
	3 Flutes	GSX30000C-1.5D ⇨ J 12		GSX30000C-2D ⇨ J 13		
	4 Flutes	GSX40000C-1.5D ⇨ J 15	GSX40000S-2D ⇨ J 16	GSX40000C-2D ⇨ J 17	GSX40000C-3D ⇨ J 18	GSX40000C-4D ⇨ J 19
Compound Endmilling	3 Flutes	GSXSLT30000C-1.5D ⇨ J 14				

## Multi-Purpose "GSX-SLT" Slot Type

- Optimized flute design of slotted 3 flute (1.5D) short type reduces cutting resistance.

- Allows drilling and slot milling and other continuous (compound) applications.
- Perfect for use with thin sheets and small machining centres



## Application Examples

### Carbon Steel Grooving with GSX20000C

GSX 20000C	Competitor	Gash land for stronger cutting edge.
		Tool dimension $\varnothing 6$ (2 Flutes) Work material C50 Cutting speed $v_c = 87$ m/min $n = 4615$ rpm Feed rate $f_t = 0,06$ mm/teeth $v_f = 553$ mm/min Depth of cut $d_{oc} = 3$ mm Wide of cut $w_{oc} = 6$ mm Cooland Dry Vertical machining centre (BT50)
		<b>Breakage</b>

### Cast Iron Grooving with GSX20000C

GSX 20000C	Competitor	GSX coating for improved wear resistance.
		Tool dimension $\varnothing 10$ (2 Flutes) Work material GGG60 Cutting speed $v_c = 66$ m/min $n = 2100$ rpm Feed rate $f_t = 0,072$ mm/teeth $v_f = 302$ mm/min Depth of cut $d_{oc} = 5$ mm, 5 passes Wide of cut $w_{oc} = 10$ mm Cooland Dry Vertical machining centre (BT40)
		<b>High Wear</b>

### Stainless Steel Machining with GSX20000C

GSX 20000C	Competitor	Improved reliability even under wet machining.
		Tool dimension $\varnothing 10$ (2 Flutes) Work material X5 CrNi 1812 Cutting speed $v_c = 50$ m/min $n = 1591$ rpm Feed rate $f_t = 0,04$ mm/teeth $v_f = 27$ mm/min Depth of cut $d_{oc} = 10$ mm Wide of cut $w_{oc} = 0,5$ mm Cooland Wet Vertical machining centre (BT50)
		<b>Coating peel off</b>

### Surface Milling C50 with GSX20000S

GSX 20000S	Competitor	S type delivers optimum cutting performance.
		Tool dimension $\varnothing 6$ (2 Flutes) Work material C50 Cutting speed $v_c = 87$ m/min $n = 4615$ rpm Feed rate $f_t = 0,06$ mm/teeth $v_f = 553$ mm/min Depth of cut $d_{oc} = 10$ mm Wide of cut $w_{oc} = 0,3$ mm Cooland Dry Vertical machining centre (BT50)
		<b>Chipping</b>

# GSX MILL Series



☞ J 20, J 21


## GSX MILL Anti-vibration Type (Square/Radius)

### ■ Characteristics and Applications

- Optimized irregular pitch and lead affords:
  - Drastically improved chattering and fracture resistance !
  - Less cutting force Allows high-speed, high-feed cutting.
- Rounded lands greatly improve machined surface quality (from  $\phi 4$  and up).
- New fine-grained carbide substrate and special coating for better rigidity and thermal and wear resistance.

### ■ Product Range

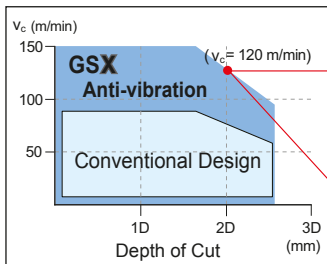
#### GSX MILL Anti-vibration Square Type

Series	No. of Teeth	Series	$\phi D$ (mm)
<b>GSXVL4000-2.5D</b>	4 Flutes		$\phi 2 \sim \phi 20$

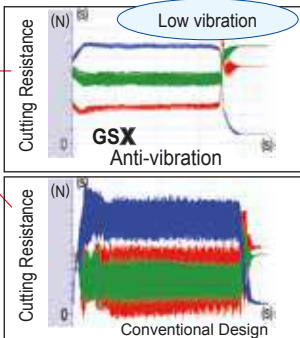
#### GSX MILL Anti-vibration Corner Radius Type

Series	No. of Teeth	Series	$\phi D$ (mm)
<b>GSXVL4000-R-2.5D</b>	4 Flutes		$\phi 3 \sim \phi 20$

### ■ Cutting Range



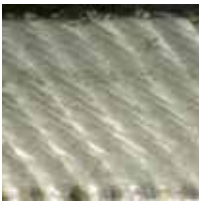


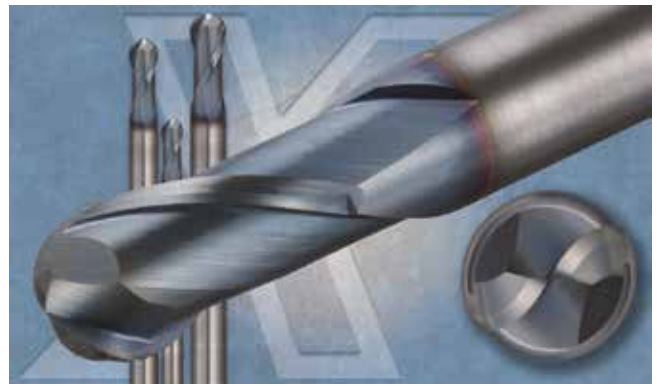
### ■ Cutting Resistance



### ■ Application Range

#### ● Surface Finish Quality

GSX Anti-vibration	Competitor's Anti-vibration	Conventional Design
		
No Chattering Clean Surface	Minute Chattering Poor Surface	Heavy Chattering Poor Surface
Work material: C50 Grooving: $\phi 10$	Cutting Conditions: $n = 4.800$ rpm $v_f = 800$ mm/min $d_{oc} = 10$ mm Equipment: BT50	



☞ J 34


## GSX MILL Ball

### ■ Characteristics and Applications

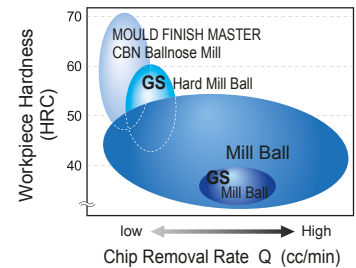
- New coating combined with a fine-grained carbide substrate affords better thermal and wear resistance.
- Large helix angle on cutting edge reduces cutting resistance.
- Unique pocket design and expanded pocket area promotes better chip evacuation.

☞ Expands the range of machineable material from soft to hardened steels, and offers reliability and longer tool life.

### ■ Product Range

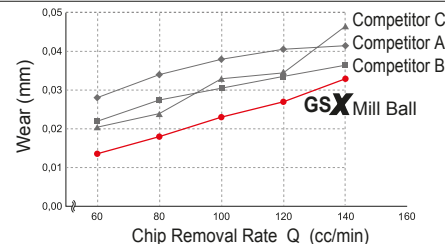
Series	No. of Teeth	Series	$\phi D$ (mm)
<b>GSX-B 20000</b>	2 Flutes		$R\phi 0,2 \sim \phi 15$ $(\phi D=0,2 \sim 30)$

### ■ Application Range



### ■ Application Examples

#### ● Flank Wear



#### GSX Ball (Cutting Length 140 m)



Able to continue

#### Conventional Tool (Cutting Length 80 m)



Unable to continue

Work Material : X40CrVMo5-1 (50HRC)  
Tool Dimensions : R3 (2 Flutes)  
Cutting Conditions :  $v_c = 179$  m/min ( $n = 9.500$  rpm)  
 $v_f = 2.250$  mm/min ( $f_t = 0,12$  mm/t)  
 $d_{oc} = 0,2 \sim 1,0$  mm,  $w_{oc} = 0,3$  mm, Wet  
Equipment Vertical Machining Centre BT40

Chipping in centre  
Heavy wear on flank face

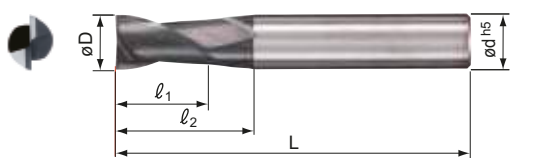


**Coated Carbide**  
Grades

**GSX**  
Coating

Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
○	○	○	○	○	○	○	○	○	○	○	○
					45-55 HRC	55-60 HRC	60-65 HRC				

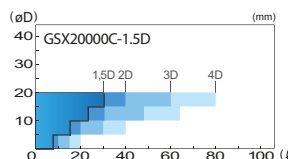
  



Helix Angle: 30°

Corner: C Type

øDc	Tolerance
D ≤ 3,0	0 - 0,015
3,0 < D ≤ 12	0 - 0,020
12,0 < D	0 - 0,030



Grade: ACF20

Endmill Identification (GSX MILL Series)

# GSX 2 0100 C - 1.5D

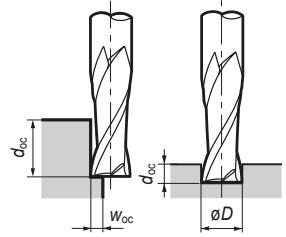
- ① Series Code
  - ② No. of Teeth
  - ③ Diameter
  - ④ Cutting Edge
  - ⑤ Cutting Edge Length
- ( S: Sharp Edge  
C: Gash Land Drilling )

Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 20100C-1.5D	●	1,0	1,5	2,5	40	4
GSX 20150C-1.5D	●	1,5	2,3	3,3	40	4
GSX 20200C-1.5D	●	2,0	3,0	4,0	40	4
GSX 20250C-1.5D	●	2,5	3,8	4,8	40	4
GSX 20300C-1.5D	●	3,0	4,5	6,0	45	6
GSX 20350C-1.5D	●	3,5	5,3	6,8	45	6
GSX 20400C-1.5D	●	4,0	6,0	7,5	45	6
GSX 20450C-1.5D	●	4,5	6,8	8,3	50	6
GSX 20500C-1.5D	●	5,0	7,5	9,5	50	6
GSX 20550C-1.5D	●	5,5	8,3	10,3	50	6
GSX 20600C-1.5D	●	6,0	9,0	-	50	6
GSX 20700C-1.5D	●	7,0	11,0	13,0	60	8
GSX 20800C-1.5D	●	8,0	12,0	-	60	8
GSX 20900C-1.5D	●	9,0	14,0	16,0	70	10
GSX 21000C-1.5D	●	10,0	15,0	-	70	10
GSX 21200C-1.5D	●	12,0	18,0	-	75	12
GSX 21400C-1.5D		14,0	21,0	24,5	90	16
GSX 21500C-1.5D		15,0	23,0	26,5	90	16
GSX 21600C-1.5D		16,0	24,0	-	90	16
GSX 22000C-1.5D		20,0	30,0	-	100	20

Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



Shoulder Milling

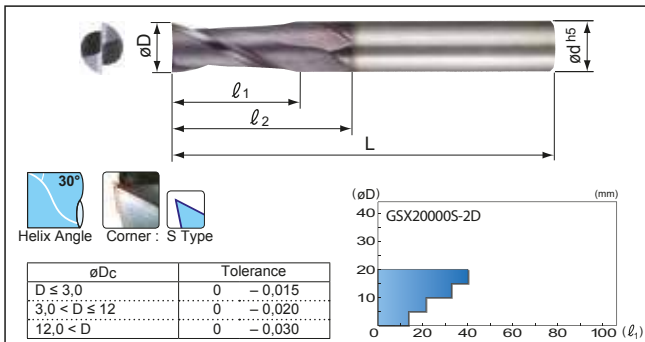
Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	øD (mm)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	
1,0	19.600	250	19.600	250	19.600	250	18.300	180	12.700	100	9.000	60	11.000	70	9.000	50
2,0	11.200	340	11.200	340	11.200	340	10.500	240	7.300	130	5.300	80	6.400	90	5.300	70
4,0	6.400	460	6.400	460	6.400	460	6.000	320	4.200	180	3.000	110	3.600	120	3.000	90
6,0	4.600	560	4.600	560	4.600	560	4.300	400	3.000	210	2.200	130	2.700	140	2.200	100
8,0	3.400	560	3.400	560	3.400	560	3.200	400	2.200	210	1.600	130	2.000	140	1.600	100
10,0	2.800	560	2.800	560	2.800	560	2.600	400	1.800	210	1.300	130	1.600	140	1.300	100
12,0	2.300	560	2.300	560	2.300	560	2.200	400	1.500	210	1.100	130	1.300	140	1.100	100
16,0	1.700	450	1.700	450	1.700	450	1.600	320	1.100	180	800	100	1.000	110	800	85
20,0	1.350	380	1.350	380	1.350	380	1.300	280	900	160	650	90	800	100	650	75
Shoulder cutting	d <sub>oc</sub>	1,5 D										1,0 D				
	W <sub>oc</sub>	0,05 D										0,02 D				

Grooving

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	øD (mm)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	
1,0	19.600	200	19.600	250	19.600	250	18.300	180	12.700	100	9.000	60	11.000	50	4.500	20
2,0	11.200	270	11.200	340	11.200	340	10.500	240	7.300	130	5.300	80	6.400	65	2.650	25
4,0	6.400	370	6.400	460	6.400	460	6.000	320	4.200	180	3.000	110	3.600	80	1.500	35
6,0	4.600	450	4.600	560	4.600	560	4.300	400	3.000	210	2.200	130	2.700	100	1.100	40
8,0	3.400	450	3.400	560	3.400	560	3.200	400	2.200	210	1.600	130	2.000	100	800	40
10,0	2.800	450	2.800	560	2.800	560	2.600	400	1.800	210	1.300	130	1.600	100	650	40
12,0	2.300	450	2.300	560	2.300	560	2.200	400	1.500	210	1.100	130	1.300	100	500	40
16,0	1.700	360	1.700	450	1.700	450	1.600	320	1.100	180	800	100	1.000	80	400	35
20,0	1.350	300	1.350	380	1.350	380	1.300	280	900	160	650	90	800	70	320	30
Grooving	d <sub>oc</sub>	0,2 D		0,5 D				0,2 D		0,05 D		0,2 D				

# GSX 20000S-2D Type

Grades	Coating	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered D2 Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
Grades	Coating	○	○	○	○	○	○	○	○	○	○	○	○



Grade: ACF20

## Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 20050S-2D	●	0,5	1,3	1,7	40	4
GSX 20100S-2D	●	1,0	2,5	3,5	40	4
GSX 20150S-2D	●	1,5	3,8	4,8	40	4
GSX 20200S-2D	●	2,0	5,0	6,0	40	4
GSX 20250S-2D	●	2,5	6,3	7,3	40	4
GSX 20300S-2D	●	3,0	7,5	9,0	45	6
GSX 20350S-2D	●	3,5	8,8	10,3	45	6
GSX 20400S-2D	●	4,0	11,0	14,0	45	6
GSX 20450S-2D	●	4,5	11,3	12,8	50	6
GSX 20500S-2D	●	5,0	13,0	19,6	50	6
GSX 20550S-2D	●	5,5	13,0	19,6	50	6
GSX 20600S-2D	●	6,0	13,0	-	50	6
GSX 20700S-2D	●	7,0	16,0	21,1	60	8
GSX 20800S-2D	●	8,0	19,0	-	60	8
GSX 20900S-2D	●	9,0	19,0	24,1	70	10
GSX 21000S-2D	●	10,0	22,0	-	70	10
GSX 21200S-2D	●	12,0	26,0	-	75	12
GSX 21600S-2D	●	16,0	32,0	-	90	16
GSX 22000S-2D	●	20,0	40,0	-	100	20

## Endmill Identification (GSX MILL Series)

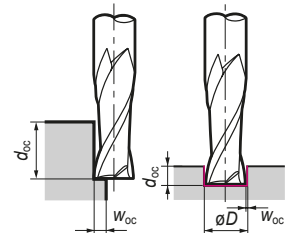
# GSX 2 0050 S - 2D

- ① Series Code
- ② No. of Teeth
- ③ Diameter
- ④ Cutting Edge
- ⑤ Cutting Edge Length

( S: Sharp Edge  
C: Gash Land Drilling )

## Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
- This series is not recommended for grooving.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



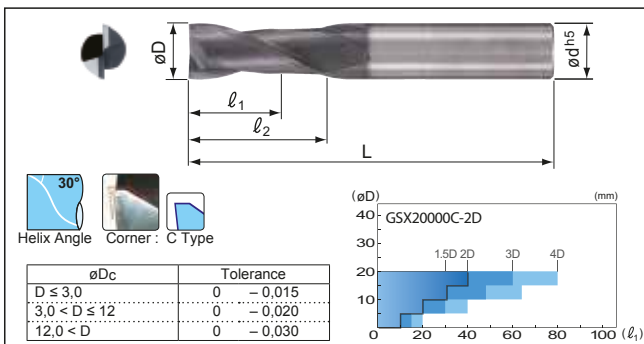
## Shoulder Milling

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	16.600	180	16.600	180	16.600	180	15.500	130	10.500	70	7.500	45	9.400	50	7.500	35
2,0	9.500	250	9.500	250	9.500	250	9.000	200	6.200	100	4.500	60	5.400	70	4.500	50
4,0	5.400	330	5.400	330	5.400	330	5.000	250	3.400	120	2.500	75	3.000	90	2.500	65
6,0	4.000	400	4.000	400	4.000	400	3.700	300	2.550	150	1.900	100	2.300	110	1.900	80
8,0	3.000	400	3.000	400	3.000	400	2.800	300	1.900	150	1.400	100	1.700	110	1.400	80
10,0	2.400	400	2.400	400	2.400	400	2.200	300	1.500	150	1.100	100	1.300	110	1.100	80
12,0	2.000	400	2.000	400	2.000	400	1.850	300	1.300	150	950	100	1.100	110	950	80
16,0	1.500	330	1.500	330	1.500	330	1.400	250	950	120	700	75	850	85	700	60
20,0	1.200	280	1.200	280	1.200	280	1.100	220	750	110	550	65	650	75	550	55
Shoulder cutting	d <sub>oc</sub>		1,5 D		0,05 D								1,0 D		0,02 D	
	w <sub>oc</sub>															

## Groove Finishing

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	16.600	180	16.600	180	16.600	180	15.500	130	10.500	70	7.500	45	9.400	50	7.500	35
2,0	9.500	250	9.500	250	9.500	250	9.000	200	6.200	100	4.500	60	5.400	70	4.500	50
4,0	5.400	330	5.400	330	5.400	330	5.000	250	3.400	120	2.500	75	3.000	90	2.500	65
6,0	4.000	400	4.000	400	4.000	400	3.700	300	2.550	150	1.900	100	2.300	110	1.900	80
8,0	3.000	400	3.000	400	3.000	400	2.800	300	1.900	150	1.400	100	1.700	110	1.400	80
10,0	2.400	400	2.400	400	2.400	400	2.200	300	1.500	150	1.100	100	1.300	110	1.100	80
12,0	2.000	400	2.000	400	2.000	400	1.850	300	1.300	150	950	100	1.100	110	950	80
16,0	1.500	330	1.500	330	1.500	330	1.400	250	950	120	700	75	850	85	700	60
20,0	1.200	280	1.200	280	1.200	280	1.100	220	750	110	550	65	650	75	550	55
Groove finishing	d <sub>oc</sub>		1,5 D													
	w <sub>oc</sub>															

Coated Carbide Grades	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
		○	○	○	○	○	○	○	○	○	○	○	○



Grade: ACF20

Endmill Identification (GSX MILL Series)

**GSX 2 0050 C - 2D**

- ① Series Code
- ② No. of Teeth
- ③ Diameter
- ④ Cutting Edge
- ⑤ Cutting Length

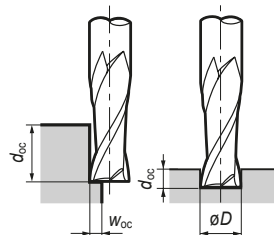
(S: Sharp Edge  
C: Gash Land Drilling)

Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 20050C-2D	●	0,5	1,0	1,4	40	4
GSX 20100C-2D	●	1,0	2,0	3,0	40	4
GSX 20150C-2D	●	1,5	3,0	4,0	40	4
GSX 20200C-2D	●	2,0	4,0	5,0	40	4
GSX 20250C-2D	●	2,5	5,0	6,0	40	4
GSX 20300C-2D	●	3,0	6,0	7,5	45	6
GSX 20350C-2D	●	3,5	7,0	8,5	45	6
GSX 20400C-2D	●	4,0	8,0	9,5	45	6
GSX 20450C-2D	●	4,5	9,0	10,5	50	6
GSX 20500C-2D	●	5,0	10,0	12,0	50	6
GSX 20550C-2D	●	5,5	11,0	13,0	50	6
GSX 20600C-2D	●	6,0	12,0	—	50	6
GSX 20700C-2D	●	7,0	14,0	16,0	60	8
GSX 20800C-2D	●	8,0	16,0	—	60	8
GSX 20900C-2D	●	9,0	18,0	20,0	70	10
GSX 21000C-2D	●	10,0	20,0	—	70	10
GSX 21200C-2D	●	12,0	24,0	—	75	12
GSX 21400C-2D	●	14,0	28,0	31,5	90	16
GSX 21500C-2D	●	15,0	30,0	33,5	90	16
GSX 21600C-2D	●	16,0	32,0	—	90	16
GSX 22000C-2D	●	20,0	40,0	—	100	20

Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



Shoulder Milling

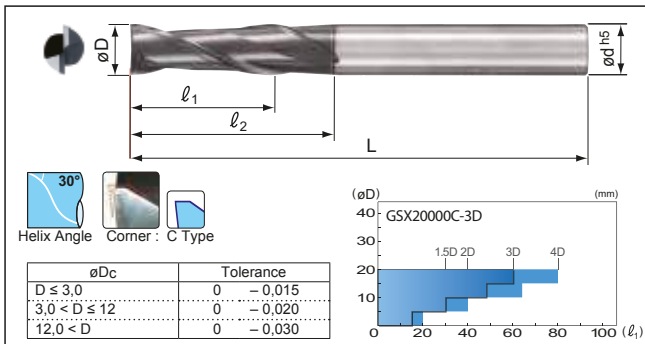
Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	19.600	250	19.600	250	19.600	250	18.300	180	12.700	100	9.000	60	11.000	70	9.000	50
2,0	11.200	340	11.200	340	11.200	340	10.500	240	7.300	130	5.300	80	6.400	90	5.300	70
4,0	6.400	460	6.400	460	6.400	460	6.000	320	4.200	180	3.000	110	3.600	120	3.000	90
6,0	4.600	560	4.600	560	4.600	560	4.300	400	3.000	210	2.200	130	2.700	140	2.200	100
8,0	3.400	560	3.400	560	3.400	560	3.200	400	2.200	210	1.600	130	2.000	140	1.600	100
10,0	2.800	560	2.800	560	2.800	560	2.600	400	1.800	210	1.300	130	1.600	140	1.300	100
12,0	2.300	560	2.300	560	2.300	560	2.200	400	1.500	210	1.100	130	1.300	140	1.100	100
16,0	1.700	450	1.700	450	1.700	450	1.600	320	1.100	180	800	100	1.000	110	800	85
20,0	1.350	380	1.350	380	1.350	380	1.300	280	900	160	650	90	800	100	650	75
Shoulder cutting	d oc / W oc		1,5 D / 0,05 D								1,0 D / 0,02 D					

Grooving

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy			
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)		
øD (mm)																		
1,0	19.600	200	19.600	250	19.600	250	18.300	180	12.700	100	9.000	60	11.000	50	4.500	20		
2,0	11.200	270	11.200	340	11.200	340	10.500	240	7.300	130	5.300	80	6.400	65	2.650	25		
4,0	6.400	370	6.400	460	6.400	460	6.000	320	4.200	180	3.000	110	3.600	80	1.500	35		
6,0	4.600	450	4.600	560	4.600	560	4.300	400	3.000	210	2.200	130	2.700	100	1.100	40		
8,0	3.400	450	3.400	560	3.400	560	3.200	400	2.200	210	1.600	130	2.000	100	800	40		
10,0	2.800	450	2.800	560	2.800	560	2.600	400	1.800	210	1.300	130	1.600	100	650	40		
12,0	2.300	450	2.300	560	2.300	560	2.200	400	1.500	210	1.100	130	1.300	100	500	40		
16,0	1.700	360	1.700	450	1.700	450	1.600	320	1.100	180	800	100	1.000	80	400	35		
20,0	1.350	300	1.350	380	1.350	380	1.300	280	900	160	650	90	800	70	320	30		
Grooving	d oc		0,2 D				0,5 D				0,2 D		0,05 D		0,2 D			

# GSX 20000C-3D Type

Coated Carbide	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered D2 Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
Grades	Coating	○	○	○	○	○	○	○	○	○	○	○	○



Grade: ACF20

## Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 20100C-3D	●	1,0	3,0	4,0	40	4
GSX 20150C-3D	●	1,5	4,5	5,5	40	4
GSX 20200C-3D	●	2,0	6,0	7,0	40	4
GSX 20250C-3D	●	2,5	7,5	8,5	40	4
GSX 20300C-3D	●	3,0	9,0	10,5	50	6
GSX 20400C-3D	●	4,0	12,0	13,5	50	6
GSX 20500C-3D	●	5,0	15,0	17,0	50	6
GSX 20600C-3D	●	6,0	18,0	—	50	6
GSX 20800C-3D	●	8,0	24,0	—	70	8
GSX 21000C-3D	●	10,0	30,0	—	90	10
GSX 21200C-3D	●	12,0	36,0	—	90	12
GSX 21600C-3D	●	16,0	48,0	—	110	16
GSX 22000C-3D	●	20,0	60,0	—	120	20

## Endmill Identification (GSX MILL Series)

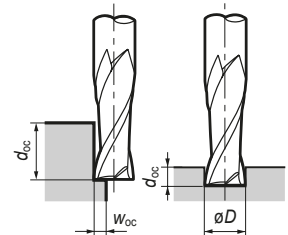
# GSX 2 0100 C - 3D

- ① Series Code
- ② No. of Teeth
- ③ Diameter
- ④ Cutting Edge
- ⑤ Cutting Edge Length

( S: Sharp Edge  
C: Gash Land Drilling )

## Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- In rare cases, chattering may occur in early milling stages, dissipating after 2m of cutting.
- If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



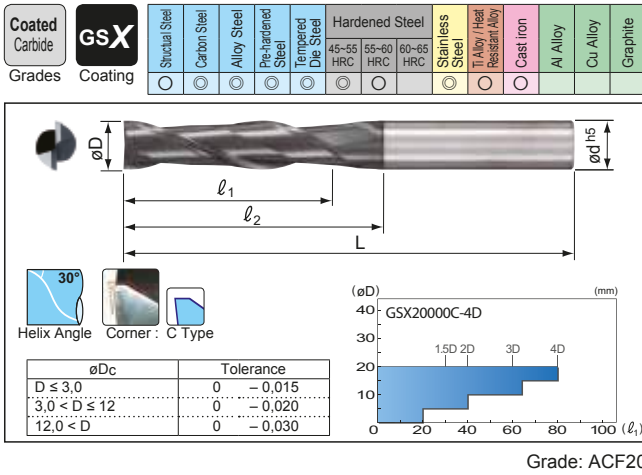
## Shoulder Milling

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	16.600	190	16.600	190	16.600	190	15.500	140	10.500	70	7.500	45	9.400	50	7.500	35
2,0	9.500	250	9.500	250	9.500	250	9.000	200	6.200	120	4.500	60	5.200	70	4.500	50
4,0	5.200	330	5.200	330	5.200	330	4.800	200	3.400	150	2.250	75	2.600	90	2.250	65
6,0	3.500	360	3.500	360	3.500	360	3.200	250	2.550	170	1.500	90	1.700	100	1.500	80
8,0	2.600	320	2.600	320	2.600	320	2.400	240	1.900	170	1.100	90	1.300	105	1.100	80
10,0	2.100	300	2.100	300	2.100	300	1.900	230	1.500	170	900	90	1.000	100	900	80
12,0	1.750	280	1.750	280	1.750	280	1.600	230	1.250	170	750	90	850	100	750	80
16,0	1.300	240	1.300	240	1.300	240	1.200	200	950	150	550	75	650	85	550	65
20,0	1.050	220	1.050	220	1.050	220	950	180	750	140	450	70	500	75	450	60
Shoulder cutting	$d_{oc} < 3,0, W_{oc} < 0,05 D$								$d_{oc} < 2,0 D, W_{oc} < 0,02 D$							

## Grooving

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	16.600	70	16.600	80	16.600	80	15.500	50	10.500	50	7.500	35	9.400	30	3.750	10
2,0	9.500	80	9.500	100	9.500	100	9.000	90	6.200	60	4.500	45	5.200	40	2.250	15
4,0	5.200	120	5.200	150	5.200	150	4.800	120	3.400	80	2.200	50	2.600	50	1.250	20
6,0	3.500	140	3.500	170	3.500	170	3.200	130	2.550	100	1.500	50	1.700	60	950	25
8,0	2.600	140	2.600	160	2.600	160	2.400	130	1.900	100	1.100	50	1.300	60	700	25
10,0	2.100	130	2.100	150	2.100	150	1.900	120	1.500	90	900	50	1.000	60	550	25
12,0	1.750	130	1.750	150	1.750	150	1.600	120	1.250	90	750	50	850	60	450	25
16,0	1.300	110	1.300	130	1.300	130	1.200	110	950	80	550	45	650	50	350	20
20,0	1.050	100	1.050	120	1.050	120	950	100	750	70	450	40	500	40	280	15
Grooving	$d_{oc} < 0,1 D$		$d_{oc} < 0,2 D$				$d_{oc} < 0,05 D$				$d_{oc} < 0,1 D$					

● = Euro stock



Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 20100C-4D	●	1,0	4,0	5,0	40	4
GSX 20150C-4D	●	1,5	6,0	7,0	40	4
GSX 20200C-4D	●	2,0	8,0	9,0	40	4
GSX 20250C-4D	●	2,5	10,0	11,0	50	4
GSX 20300C-4D	●	3,0	12,0	13,5	50	6
GSX 20400C-4D	●	4,0	16,0	17,5	50	6
GSX 20500C-4D	●	5,0	20,0	22,0	60	6
GSX 20600C-4D	●	6,0	24,0	-	60	6
GSX 20800C-4D	●	8,0	32,0	-	80	8
GSX 21000C-4D	●	10,0	40,0	-	90	10
GSX 21200C-4D	●	12,0	48,0	-	100	12
GSX 21600C-4D		16,0	64,0	-	120	16
GSX 22000C-4D		20,0	80,0	-	140	20

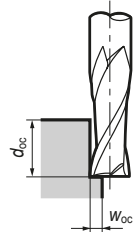
Endmill Identification (GSX MILL Series)

GSX 2 0100 C - 4D

- ① Series Code
  - ② No. of Teeth
  - ③ Diameter
  - ④ Cutting Edge
  - ⑤ Cutting Edge Length
- ( S: Sharp Edge  
C: Gash Land Drilling )

Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- In rear cases, chattering may occur in early milling stages, dissipating after 2m of cutting.
- If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
- This series is not recommended for grooving.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.

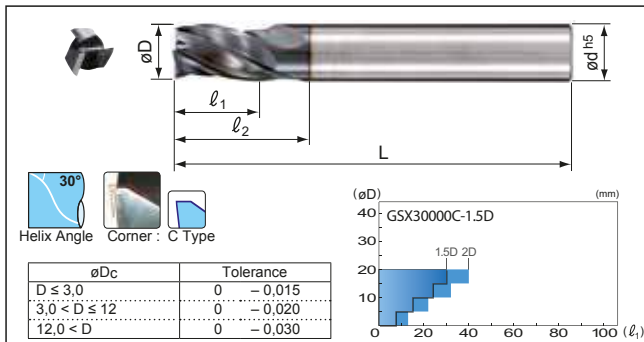


Shoulder Milling

Work Material	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy		
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	
1,0	9.000	130	9.000	130	9.000	130	7.000	95	6.500	50	4.500	30	5.400	40	4.500	25	
2,0	4.500	180	4.500	180	4.500	180	3.500	120	3.200	70	2.300	40	2.700	50	2.300	35	
4,0	2.250	240	2.250	240	2.250	240	1.750	160	1.600	95	1.200	60	1.350	65	1.200	40	
6,0	1.500	300	1.500	300	1.500	300	1.150	170	1.050	110	800	70	900	70	800	50	
8,0	1.100	260	1.100	260	1.100	260	850	170	800	110	600	70	660	70	600	50	
10,0	900	250	900	250	900	250	700	160	650	110	460	70	540	70	460	50	
12,0	750	240	750	240	750	240	580	160	520	110	400	70	450	70	400	50	
16,0	550	200	550	200	550	200	440	140	400	95	300	55	330	60	300	45	
20,0	450	180	450	180	450	180	350	120	320	85	240	45	270	50	240	40	
Shoulder cutting	d <sub>oc</sub>	3,5 D						0,04 D						3,0 D			
	W <sub>oc</sub>	0,08 D															

# GSX 30000C-1.5D Type

Coated Carbide	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered D2 Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
		Grades	Coating	○	○	○	○	○	○	○	○	○	○



Grade: ACF20

## Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 30100C-1.5D	●	1,0	1,5	2,5	40	4
GSX 30150C-1.5D	●	1,5	2,3	3,3	40	4
GSX 30200C-1.5D	●	2,0	3,0	4,0	40	4
GSX 30250C-1.5D	●	2,5	3,8	4,8	40	4
GSX 30300C-1.5D	●	3,0	4,5	6,0	45	6
GSX 30400C-1.5D	●	4,0	6,0	7,5	45	6
GSX 30500C-1.5D	●	5,0	7,5	9,5	50	6
GSX 30600C-1.5D	●	6,0	9,0	-	50	6
GSX 30700C-1.5D	●	7,0	11,0	13,0	60	8
GSX 30800C-1.5D	●	8,0	12,0	-	60	8
GSX 30900C-1.5D	●	9,0	14,0	16,0	70	10
GSX 31000C-1.5D	●	10,0	15,0	-	70	10
GSX 31200C-1.5D	●	12,0	18,0	-	75	12
GSX 31600C-1.5D	●	16,0	24,0	-	90	16
GSX 32000C-1.5D	●	20,0	30,0	-	100	20

## Endmill Identification (GSX MILL Series)

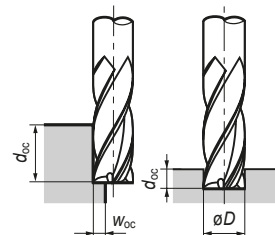
# GSX 3 0100 C - 1.5D

- ① Series Code
- ② No. of Teeth
- ③ Diameter
- ④ Cutting Edge
- ⑤ Cutting Length

( S: Sharp Edge  
C: Gash Land Drilling )

## Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



### Shoulder Milling

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	19.600	300	19.600	300	19.600	300	18.300	210	12.700	130	9.000	80	11.000	90	9.000	65
2,0	11.200	410	11.200	410	11.200	410	10.500	280	7.300	170	5.300	100	6.400	120	5.300	90
4,0	6.400	550	6.400	550	6.400	550	6.000	370	4.200	230	3.000	140	3.600	150	3.000	120
6,0	4.600	670	4.600	670	4.600	670	4.300	460	3.000	270	2.200	170	2.700	180	2.200	130
8,0	3.400	670	3.400	670	3.400	670	3.200	460	2.200	270	1.600	170	2.000	180	1.600	130
10,0	2.800	670	2.800	670	2.800	670	2.600	460	1.800	270	1.300	170	1.600	180	1.300	130
12,0	2.300	670	2.300	670	2.300	670	2.200	460	1.500	270	1.100	170	1.300	180	1.100	130
16,0	1.700	550	1.700	550	1.700	550	1.600	370	1.100	230	800	140	1.000	150	800	100
20,0	1.350	490	1.350	490	1.350	490	1.300	330	900	210	650	120	800	130	650	90
Shoulder cutting	1,5 D 0,05 D								1,0 D 0,02 D							

### Grooving

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	19.600	240	19.600	300	19.600	300	18.300	210	12.700	130	9.000	80	11.000	65	4.500	25
2,0	11.200	320	11.200	410	11.200	410	10.500	280	7.300	170	5.300	100	6.400	85	2.650	35
4,0	6.400	450	6.400	550	6.400	550	6.000	370	4.200	230	3.000	140	3.600	100	1.500	50
6,0	4.600	540	4.600	670	4.600	670	4.300	460	3.000	270	2.200	170	2.650	130	1.150	55
8,0	3.400	540	3.400	670	3.400	670	3.200	460	2.200	270	1.600	170	2.000	130	800	55
10,0	2.800	540	2.800	670	2.800	670	2.600	460	1.800	270	1.300	170	1.600	130	650	55
12,0	2.300	540	2.300	670	2.300	670	2.200	460	1.500	270	1.100	170	1.300	130	500	55
16,0	1.700	440	1.700	550	1.700	550	1.600	370	1.100	230	800	140	1.000	110	400	45
20,0	1.350	390	1.350	490	1.350	490	1.300	330	900	210	650	120	800	90	320	40
Grooving	0,2 D		0,5 D				0,05 D				0,2 D					

● = Euro stock

**Coated Carbide** **GSX**

Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
○	○	○	○	○	○	○	○	○	○	○	○

Grades Coating

Helix Angle: 30°  
Corner: C Type

øDc	Tolerance
D ≤ 3,0	0 - 0,015
3,0 < D ≤ 12	0 - 0,020
12,0 < D	0 - 0,030

Grade: ACF20

■ Endmills (mm)

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 30100C-2D	●	1,0	2,5	3,5	40	4
GSX 30150C-2D	●	1,5	3,8	4,8	40	4
GSX 30200C-2D	●	2,0	5,0	6,0	40	4
GSX 30250C-2D	●	2,5	6,3	7,3	40	4
GSX 30300C-2D	●	3,0	7,5	9,0	45	6
GSX 30400C-2D	●	4,0	11,0	12,5	45	6
GSX 30500C-2D	●	5,0	13,0	15,0	50	6
GSX 30600C-2D	●	6,0	13,0	-	50	6
GSX 30700C-2D	●	7,0	16,0	18,0	60	8
GSX 30800C-2D	●	8,0	19,0	-	60	8
GSX 30900C-2D	●	9,0	19,0	21,0	70	10
GSX 31000C-2D	●	10,0	22,0	-	70	10
GSX 31200C-2D	●	12,0	26,0	-	75	12
GSX 31600C-2D		16,0	32,0	-	90	16
GSX 32000C-2D		20,0	40,0	-	100	20

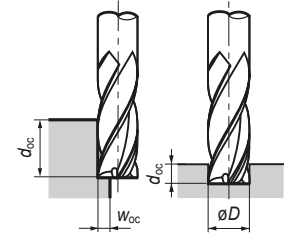
■ Endmill Identification (GSX MILL Series)

**GSX 3 0100 C - 2D**

- ① Series Code
  - ② No. of Teeth
  - ③ Diameter
  - ④ Cutting Edge
  - ⑤ Cutting Edge Length
- ( S: Sharp Edge  
C: Gash Land Drilling )

■ Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



● Shoulder Milling

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	19.600	300	19.600	300	19.600	300	18.300	210	12.700	130	9.000	80	11.000	90	9.000	65
2,0	11.200	410	11.200	410	11.200	410	10.500	280	7.300	170	5.300	100	6.400	120	5.300	90
4,0	6.400	550	6.400	550	6.400	550	6.000	370	4.200	230	3.000	140	3.600	150	3.000	120
6,0	4.600	670	4.600	670	4.600	670	4.300	460	3.000	270	2.200	170	2.700	180	2.200	130
8,0	3.400	670	3.400	670	3.400	670	3.200	460	2.200	270	1.600	170	2.000	180	1.600	130
10,0	2.800	670	2.800	670	2.800	670	2.600	460	1.800	270	1.300	170	1.600	180	1.300	130
12,0	2.300	670	2.300	670	2.300	670	2.200	460	1.500	270	1.100	170	1.300	180	1.100	130
16,0	1.700	550	1.700	550	1.700	550	1.600	370	1.100	230	800	140	1.000	150	800	100
20,0	1.350	490	1.350	490	1.350	490	1.300	330	900	210	650	120	800	130	650	90
Shoulder cutting	$d_{oc}$		$1,5 D$		$0,05 D$						$1,0 D$		$0,02 D$			

● Grooving

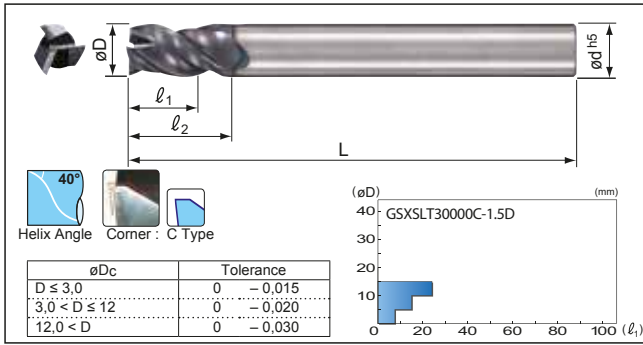
Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	19.600	240	19.600	300	19.600	300	18.300	210	12.700	130	9.000	80	11.000	65	4.500	25
2,0	11.200	320	11.200	410	11.200	410	10.500	280	7.300	170	5.300	100	6.400	85	2.650	35
4,0	6.400	450	6.400	550	6.400	550	6.000	370	4.200	230	3.000	140	3.600	100	1.500	50
6,0	4.600	540	4.600	670	4.600	670	4.300	460	3.000	270	2.200	170	2.650	130	1.150	55
8,0	3.400	540	3.400	670	3.400	670	3.200	460	2.200	270	1.600	170	2.000	130	800	55
10,0	2.800	540	2.800	670	2.800	670	2.600	460	1.800	270	1.300	170	1.600	130	650	55
12,0	2.300	540	2.300	670	2.300	670	2.200	460	1.500	270	1.100	170	1.300	130	500	55
16,0	1.700	440	1.700	550	1.700	550	1.600	370	1.100	230	800	140	1.000	110	400	45
20,0	1.350	390	1.350	490	1.350	490	1.300	330	900	210	650	120	800	90	320	40
Grooving	$d_{gc}$		$0,2 D$		$0,5 D$				$0,2 D$		$0,05 D$		$0,2 D$			

Coated Endmills

GSXSLT 30000C-1.5D Type

For Compound Endmilling

Coated Carbide	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered D2 Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
Grades	Coating	○	○	○	○	○	○	○	○	○	○	○	○



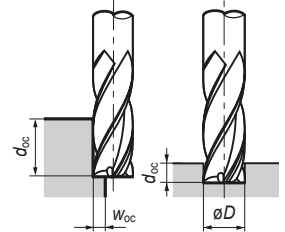
Grade: ACF20

Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSXSLT 30100C-1.5D	●	1,0	1,5	2,5	40	4
GSXSLT 30150C-1.5D	●	1,5	2,3	3,3	40	4
GSXSLT 30200C-1.5D	●	2,0	3,0	4,0	40	4
GSXSLT 30250C-1.5D	●	2,5	3,8	4,8	40	4
GSXSLT 30300C-1.5D	●	3,0	4,5	6,0	45	6
GSXSLT 30400C-1.5D	●	4,0	6,0	7,5	45	6
GSXSLT 30500C-1.5D	●	5,0	7,5	9,5	50	6
GSXSLT 30600C-1.5D	●	6,0	9,0	-	50	6
GSXSLT 30700C-1.5D	●	7,0	11,0	13,0	60	8
GSXSLT 30800C-1.5D	●	8,0	12,0	-	60	8
GSXSLT 30900C-1.5D	●	9,0	14,0	16,0	70	10
GSXSLT 31000C-1.5D	●	10,0	15,0	-	70	10
GSXSLT 31200C-1.5D	●	12,0	18,0	-	75	12
GSXSLT 31600C-1.5D	●	16,0	24,0	-	90	16

Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- Use step machining of 0.1Dc when drilling stainless steel, heat resistant alloy, and titanium alloy.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



Shoulder Milling

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	19.600	300	19.600	300	19.600	300	18.300	210	12.700	130	9.000	80	11.000	90	9.000	65
2,0	11.200	410	11.200	410	11.200	410	10.500	280	7.300	170	5.300	100	6.400	120	5.300	90
4,0	6.400	550	6.400	550	6.400	550	6.000	370	4.200	230	3.000	140	3.600	150	3.000	120
6,0	4.600	670	4.600	670	4.600	670	4.300	460	3.000	270	2.200	170	2.700	180	2.200	130
8,0	3.400	670	3.400	670	3.400	670	3.200	460	2.200	270	1.600	170	2.000	180	1.600	130
10,0	2.800	670	2.800	670	2.800	670	2.600	460	1.800	270	1.300	170	1.600	180	1.300	130
12,0	2.300	670	2.300	670	2.300	670	2.200	460	1.500	270	1.100	170	1.300	180	1.100	130
16,0	1.700	550	1.700	550	1.700	550	1.600	370	1.100	230	800	140	1.000	150	800	100
Shoulder cutting	1.5 D								1.0 D							
W <sub>oc</sub>	0.05 D								0.02 D							

Grooving

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	19.600	240	19.600	300	19.600	300	18.300	210	12.700	130	9.000	80	11.000	65	4.500	25
2,0	11.200	320	11.200	410	11.200	410	10.500	280	7.300	170	5.300	100	6.400	85	2.650	35
4,0	6.400	450	6.400	550	6.400	550	6.000	370	4.200	230	3.000	140	3.600	100	1.500	50
6,0	4.600	540	4.600	670	4.600	670	4.300	460	3.000	270	2.200	170	2.650	130	1.150	55
8,0	3.400	540	3.400	670	3.400	670	3.200	460	2.200	270	1.600	170	2.000	130	800	55
10,0	2.800	540	2.800	670	2.800	670	2.600	460	1.800	270	1.300	170	1.600	130	650	55
12,0	2.300	540	2.300	670	2.300	670	2.200	460	1.500	270	1.100	170	1.300	130	500	55
16,0	1.700	440	1.700	550	1.700	550	1.600	370	1.100	230	800	140	1.000	110	400	45
Grooving	0,2 D		0,5 D				0,2 D				0,05 D		0,2 D			

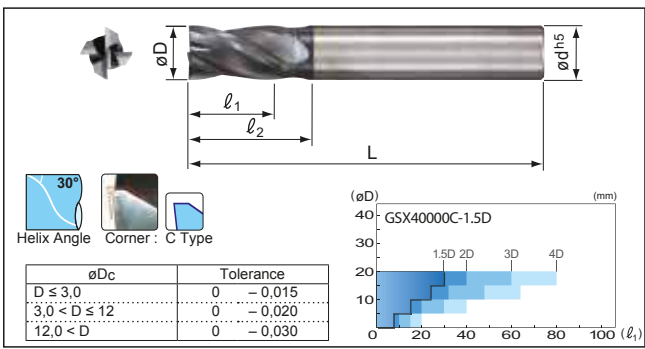
Drilling

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	19.600	70	19.600	90	19.600	90	18.300	60	12.700	40	9.000	25	11.000	20	4.500	10
2,0	11.200	90	11.200	120	11.200	120	10.500	80	7.300	50	5.300	30	6.400	25	2.650	15
4,0	6.400	130	6.400	160	6.400	160	6.000	110	4.200	70	3.000	40	3.600	30	1.500	20
6,0	4.600	160	4.600	200	4.600	200	4.300	130	3.000	80	2.200	50	2.650	40	1.150	20
8,0	3.400	160	3.400	200	3.400	200	3.200	130	2.200	80	1.600	50	2.000	40	800	20
10,0	2.800	160	2.800	200	2.800	200	2.600	130	1.800	80	1.300	50	1.600	40	650	20
12,0	2.300	160	2.300	200	2.300	200	2.200	130	1.500	80	1.100	50	1.300	40	500	20
16,0	1.700	130	1.700	160	1.700	160	1.600	110	1.100	70	800	40	1.000	35	400	15

● = Euro stock



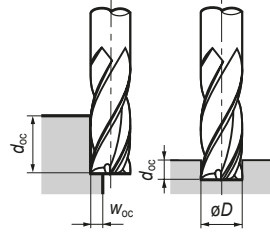
Coated Carbide	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
		Grades	Coating										



Grade: ACF20

Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



Endmills (mm)

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 40100C-1.5D	●	1,0	1,5	2,5	40	4
GSX 40150C-1.5D	●	1,5	2,3	3,3	40	4
GSX 40200C-1.5D	●	2,0	3,0	4,0	40	4
GSX 40250C-1.5D	●	2,5	3,8	4,8	40	4
GSX 40300C-1.5D	●	3,0	4,5	6,0	45	6
GSX 40350C-1.5D	●	3,5	5,3	6,8	45	6
GSX 40400C-1.5D	●	4,0	6,0	7,5	45	6
GSX 40450C-1.5D	●	4,5	6,8	8,3	50	6
GSX 40500C-1.5D	●	5,0	7,5	9,5	50	6
GSX 40550C-1.5D	●	5,5	8,3	10,3	50	6
GSX 40600C-1.5D	●	6,0	9,0	-	50	6
GSX 40700C-1.5D	●	7,0	11,0	13,0	60	8
GSX 40800C-1.5D	●	8,0	12,0	-	60	8
GSX 40900C-1.5D	●	9,0	14,0	16,0	70	10
GSX 41000C-1.5D	●	10,0	15,0	-	70	10
GSX 41200C-1.5D	●	12,0	18,0	-	75	12
GSX 41400C-1.5D		14,0	21,0	24,5	90	16
GSX 41500C-1.5D		15,0	23,0	26,5	90	16
GSX 41600C-1.5D		16,0	24,0	-	90	16
GSX 42000C-1.5D		20,0	30,0	-	100	20

Shoulder Milling

Work Material	Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
		Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																	
1,0		24.000	470	24.000	470	24.000	470	21.000	290	14.500	180	10.500	120	12.600	120	10.500	85
2,0		12.800	570	12.800	570	12.800	570	12.000	380	8.300	230	6.000	150	7.200	160	6.000	110
4,0		6.800	730	6.800	730	6.800	730	6.400	490	4.400	300	3.200	200	3.800	210	3.200	130
6,0		4.600	780	4.600	780	4.600	780	4.300	520	3.000	320	2.200	210	2.650	220	2.200	150
8,0		3.400	780	3.400	780	3.400	780	3.200	520	2.200	320	1.600	210	2.000	220	1.600	150
10,0		2.800	780	2.800	780	2.800	780	2.600	520	1.800	320	1.300	210	1.500	220	1.300	150
12,0		2.300	780	2.300	780	2.300	780	2.200	520	1.500	320	1.100	210	1.300	220	1.100	150
16,0		1.700	650	1.700	650	1.700	650	1.600	420	1.100	280	800	170	1.000	180	800	120
20,0		1.350	600	1.350	600	1.350	600	1.300	380	900	260	650	150	800	160	650	100
Shoulder cutting	d <sub>oc</sub>	1,5 D										1,0 D					
	w <sub>oc</sub>	0,05 D										0,02 D					

Shoulder Milling (High Speed Machining Centre)

Work Material	Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
		Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																	
1,0		60.000	1.200	60.000	1.200	60.000	1.200	60.000	850	60.000	720	48.000	500	32.000	300	-	-
2,0		47.800	2.200	47.800	2.200	47.800	2.200	47.800	1.600	39.800	1.200	31.800	900	15.900	400	-	-
4,0		23.900	2.600	23.900	2.600	23.900	2.600	23.900	1.900	19.900	1.400	15.900	1.100	8.000	490	-	-
6,0		16.000	2.700	16.000	2.700	16.000	2.700	16.000	2.000	13.300	1.500	10.600	1.200	5.300	520	-	-
8,0		12.000	2.700	12.000	2.700	12.000	2.700	12.000	2.000	10.000	1.500	8.000	1.200	4.000	520	-	-
10,0		9.600	2.700	9.600	2.700	9.600	2.700	9.600	2.000	8.000	1.500	6.400	1.200	3.200	520	-	-
12,0		8.000	2.700	8.000	2.700	8.000	2.700	8.000	2.000	6.700	1.500	5.300	1.200	2.700	520	-	-
16,0		6.000	2.200	6.000	2.200	6.000	2.200	6.000	1.600	5.000	1.200	4.000	900	2.000	450	-	-
20,0		4.800	2.000	4.800	2.000	4.800	2.000	4.800	1.400	4.000	1.100	3.200	750	1.600	380	-	-
Shoulder cutting	d <sub>oc</sub>	1,5 D										1,0 D					
	w <sub>oc</sub>	0,05 D										0,02 D					

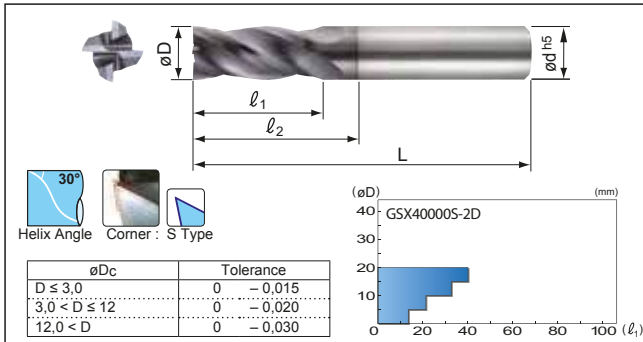
Grooving

Work Material	Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
		Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																	
1,0		24.000	380	24.000	470	24.000	470	21.000	290	14.500	180	10.500	120	12.600	85	5.200	30
2,0		12.800	460	12.800	570	12.800	570	12.000	380	8.300	230	6.000	150	7.200	110	3.000	40
4,0		6.800	580	6.800	730	6.800	730	5.400	490	4.400	300	3.200	200	3.800	130	1.600	55
6,0		4.600	620	4.600	780	4.600	780	4.300	520	3.000	320	2.200	210	2.650	160	1.100	65
8,0		3.400	620	3.400	780	3.400	780	3.200	520	2.200	320	1.600	210	2.000	160	800	65
10,0		2.800	620	2.800	780	2.800	780	2.600	520	1.800	320	1.300	210	1.600	160	650	65
12,0		2.300	620	2.300	780	2.300	780	2.200	520	1.500	320	1.100	210	1.300	160	550	65
16,0		1.700	520	1.700	560	1.700	560	1.600	420	1.100	280	800	170	1.000	130	400	55
20,0		1.350	480	1.350	600	1.350	600	1.300	380	900	260	650	150	800	110	320	50
Grooving	d <sub>oc</sub>	0,2 D		0,5 D				0,2 D		0,05 D		0,2 D					

Coated Endmills

# GSX 4000S-2D Type

Coated Carbide	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered D2s Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
Grades	Coating	○	○	○	○	○	○	○	○	○	○	○	○



Grade: ACF20

## Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 40100S-2D	●	1,0	2,5	3,5	40	4
GSX 40150S-2D	●	1,5	3,8	4,8	40	4
GSX 40200S-2D	●	2,0	5,0	6,0	40	4
GSX 40250S-2D	●	2,5	6,3	7,3	40	4
GSX 40300S-2D	●	3,0	7,5	9,0	45	6
GSX 40350S-2D	●	3,5	8,8	10,0	45	6
GSX 40400S-2D	●	4,0	11,0	14,0	45	6
GSX 40450S-2D	●	4,5	11,3	12,8	50	6
GSX 40500S-2D	●	5,0	13,0	19,6	50	6
GSX 40550S-2D	●	5,5	13,0	19,6	50	6
GSX 40600S-2D	●	6,0	13,0	-	50	6
GSX 40700S-2D	●	7,0	16,0	21,1	60	8
GSX 40800S-2D	●	8,0	19,0	-	60	8
GSX 40900S-2D	●	9,0	19,0	24,1	70	10
GSX 41000S-2D	●	10,0	22,0	-	70	10
GSX 41200S-2D	●	12,0	26,0	-	75	12
GSX 41600S-2D	●	16,0	32,0	-	90	16
GSX 42000S-2D	●	20,0	40,0	-	100	20

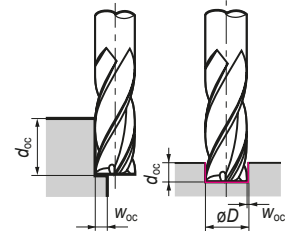
## Endmill Identification (GSX MILL Series)

# GSX 4 1000 S - 2D

- ① Series Code
  - ② No. of Teeth
  - ③ Diameter
  - ④ Cutting Edge
  - ⑤ Cutting Edge Length
- ( S: Sharp Edge  
C: Gash Land Drilling )

## Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
- This series is not recommended for grooving.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



## Shoulder Milling

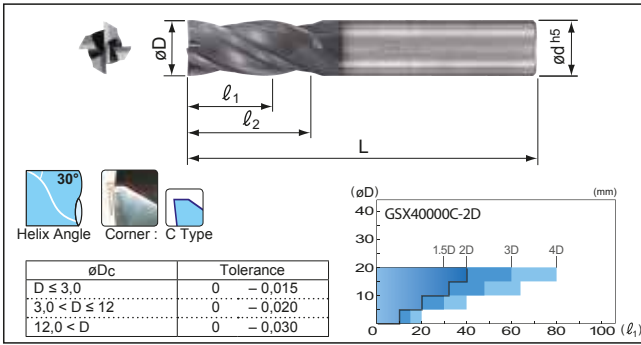
Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	22.000	360	22.000	360	22.000	360	19.000	220	13.000	140	9.500	90	11.300	90	9.500	65
2,0	11.500	440	11.500	440	11.500	440	11.000	290	7.500	180	5.400	110	6.500	120	5.400	85
4,0	6.000	560	6.000	560	6.000	560	5.800	370	4.000	230	2.900	150	3.400	160	2.900	100
6,0	4.200	600	4.200	600	4.200	600	4.000	400	2.700	240	2.000	160	2.400	170	2.000	120
8,0	3.000	600	3.000	600	3.000	600	2.800	400	2.000	240	1.450	160	1.800	170	1.450	120
10,0	2.500	600	2.500	600	2.500	600	2.350	400	1.600	240	1.200	160	1.450	170	1.200	120
12,0	2.100	600	2.100	600	2.100	600	2.000	400	1.350	240	1.000	160	1.200	170	1.000	120
16,0	1.500	500	1.500	500	1.500	500	1.450	320	1.000	210	750	130	900	140	750	90
20,0	1.200	460	1.200	460	1.200	460	1.150	290	800	200	600	110	700	120	600	75
Shoulder cutting	d <sub>oc</sub>		w <sub>oc</sub>		0,03 D		2,0 D						0,01 D			

## Groove Finishing

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	22.000	360	22.000	360	22.000	360	19.000	220	13.000	140	9.500	90	11.300	90	9.500	65
2,0	11.500	440	11.500	440	11.500	440	11.000	290	7.500	180	5.400	110	6.500	120	5.400	85
4,0	6.000	560	6.000	560	6.000	560	5.800	370	4.000	230	2.900	150	3.400	160	2.900	100
6,0	4.200	600	4.200	600	4.200	600	4.000	400	2.700	240	2.000	160	2.400	170	2.000	120
8,0	3.000	600	3.000	600	3.000	600	2.800	400	2.000	240	1.450	160	1.800	170	1.450	120
10,0	2.500	600	2.500	600	2.500	600	2.350	400	1.600	240	1.200	160	1.450	170	1.200	120
12,0	2.100	600	2.100	600	2.100	600	2.000	400	1.350	240	1.000	160	1.200	170	1.000	120
16,0	1.500	500	1.500	500	1.500	500	1.450	320	1.000	210	750	130	900	140	750	90
20,0	1.200	460	1.200	460	1.200	460	1.150	290	800	200	600	110	700	120	600	75
Groove finishing	d <sub>gc</sub>		w <sub>gc</sub>				1,5 D								~ 0,02 D	

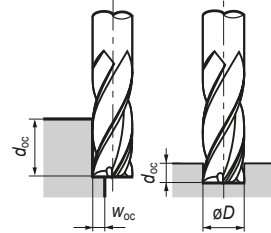
● = Euro stock

Coated Carbide Grades	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
		○	○	○	○	○	○	○	○	○	○	○	○



Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



Endmills (mm)

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 40100C-2D	●	1,0	2,0	3,0	40	4
GSX 40150C-2D	●	1,5	3,0	4,0	40	4
GSX 40200C-2D	●	2,0	4,0	5,0	40	4
GSX 40250C-2D	●	2,5	5,0	6,0	40	4
GSX 40300C-2D	●	3,0	6,0	7,5	45	6
GSX 40350C-2D	●	3,5	7,0	8,5	45	6
GSX 40400C-2D	●	4,0	8,0	9,5	45	6
GSX 40450C-2D	●	4,5	9,0	10,5	50	6
GSX 40500C-2D	●	5,0	10,0	12,0	50	6
GSX 40550C-2D	●	5,5	11,0	13,0	50	6
GSX 40600C-2D	●	6,0	12,0	-	50	6
GSX 40700C-2D	●	7,0	14,0	16,0	60	8
GSX 40800C-2D	●	8,0	16,0	-	60	8
GSX 40900C-2D	●	9,0	18,0	20,0	70	10
GSX 41000C-2D	●	10,0	20,0	-	70	10
GSX 41200C-2D	●	12,0	24,0	-	75	12
GSX 41400C-2D	●	14,0	28,0	31,5	90	16
GSX 41500C-2D	●	15,0	30,0	33,5	90	16
GSX 41600C-2D	●	16,0	32,0	-	90	16
GSX 42000C-2D	●	20,0	40,0	-	100	20

Shoulder Milling

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	24.000	470	24.000	470	24.000	470	21.000	290	14.500	180	10.500	120	12.600	120	10.500	85
2,0	12.800	570	12.800	570	12.800	570	12.000	380	8.300	230	6.000	150	7.200	160	6.000	110
4,0	6.800	730	6.800	730	6.800	730	6.400	490	4.400	300	3.200	200	3.800	210	3.200	130
6,0	4.600	780	4.600	780	4.600	780	4.300	520	3.000	320	2.200	210	2.650	220	2.200	150
8,0	3.400	780	3.400	780	3.400	780	3.200	520	2.200	320	1.600	210	2.000	220	1.600	150
10,0	2.800	780	2.800	780	2.800	780	2.600	520	1.800	320	1.300	210	1.500	220	1.300	150
12,0	2.300	780	2.300	780	2.300	780	2.200	520	1.500	320	1.100	210	1.300	220	1.100	150
16,0	1.700	650	1.700	650	1.700	650	1.600	420	1.100	280	800	170	1.000	180	800	120
20,0	1.350	600	1.350	600	1.350	600	1.300	380	900	260	650	150	800	160	650	100
Shoulder cutting	$d_{oc} = 1,5 D$ $w_{oc} = 0,05 D$										$d_{oc} = 1,0 D$ $w_{oc} = 0,02 D$					

Shoulder Milling (High Speed Machining Centre)

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	60.000	1.200	60.000	1.200	60.000	1.200	60.000	850	60.000	720	48.000	500	32.000	300	-	-
2,0	47.800	2.200	47.800	2.200	47.800	2.200	47.800	1.600	39.800	1.200	31.800	900	15.900	400	-	-
4,0	23.900	2.600	23.900	2.600	23.900	2.600	23.900	1.900	19.900	1.400	15.900	1.100	8.000	490	-	-
6,0	16.000	2.700	16.000	2.700	16.000	2.700	16.000	2.000	13.300	1.500	10.600	1.200	5.300	520	-	-
8,0	12.000	2.700	12.000	2.700	12.000	2.700	12.000	2.000	10.000	1.500	8.000	1.200	4.000	520	-	-
10,0	9.600	2.700	9.600	2.700	9.600	2.700	9.600	2.000	8.000	1.500	6.400	1.200	3.200	520	-	-
12,0	8.000	2.700	8.000	2.700	8.000	2.700	8.000	2.000	6.700	1.500	5.300	1.200	2.700	520	-	-
16,0	6.000	2.200	6.000	2.200	6.000	2.200	6.000	1.600	5.000	1.200	4.000	900	2.000	450	-	-
20,0	4.800	2.000	4.800	2.000	4.800	2.000	4.800	1.400	4.000	1.100	3.200	750	1.600	380	-	-
Shoulder cutting	$d_{oc} = 1,5 D$ $w_{oc} = 0,05 D$										$d_{oc} = 1,0 D$ $w_{oc} = 0,02 D$					

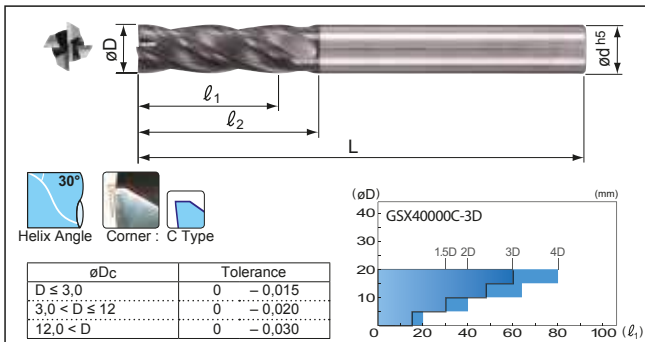
Grooving

Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	24.000	380	24.000	470	24.000	470	21.000	290	14.500	180	10.500	120	12.600	85	5.200	30
2,0	12.800	460	12.800	570	12.800	570	12.000	380	8.300	230	6.000	150	7.200	110	3.000	40
4,0	6.800	580	6.800	730	6.800	730	5.400	490	4.400	300	3.200	200	3.800	130	1.600	55
6,0	4.600	620	4.600	780	4.600	780	4.300	520	3.000	320	2.200	210	2.650	160	1.100	65
8,0	3.400	620	3.400	780	3.400	780	3.200	520	2.200	320	1.600	210	2.000	160	800	65
10,0	2.800	620	2.800	780	2.800	780	2.600	520	1.800	320	1.300	210	1.600	160	650	65
12,0	2.300	620	2.300	780	2.300	780	2.200	520	1.500	320	1.100	210	1.300	160	550	65
16,0	1.700	520	1.700	560	1.700	560	1.600	420	1.100	280	800	170	1.000	130	400	55
20,0	1.350	480	1.350	600	1.350	600	1.300	380	900	260	650	150	800	110	320	50
Grooving	$d_{oc} = 0,2 D$		$d_{oc} = 0,5 D$				$d_{oc} = 0,2 D$				$d_{oc} = 0,05 D$		$d_{oc} = 0,2 D$			

Coated Endmills

# GSX 40000C-3D Type

Coated Carbide	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered D2 Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
		Grades	Coating	○	○	○	○	○	○	○	○	○	○



Grade: ACF20

## Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 40100C-3D	●	1,0	3,0	4,0	40	4
GSX 40150C-3D	●	1,5	4,5	5,5	40	4
GSX 40200C-3D	●	2,0	6,0	7,0	40	4
GSX 40250C-3D	●	2,5	7,5	8,5	40	4
GSX 40300C-3D	●	3,0	9,0	10,5	50	6
GSX 40400C-3D	●	4,0	12,0	13,5	50	6
GSX 40500C-3D	●	5,0	15,0	17,0	50	6
GSX 40600C-3D	●	6,0	18,0	-	50	6
GSX 40800C-3D	●	8,0	24,0	-	70	8
GSX 41000C-3D	●	10,0	30,0	-	90	10
GSX 41200C-3D	●	12,0	36,0	-	90	12
GSX 41600C-3D	●	16,0	48,0	-	110	16
GSX 42000C-3D	●	20,0	60,0	-	120	20

## Endmill Identification (GSX MILL Series)

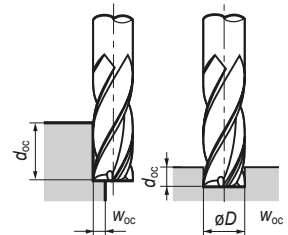
# GSX 4 0100 C - 2D/3D

- ① Series Code
- ② No. of Teeth
- ③ Diameter
- ④ Cutting Edge
- ⑤ Cutting Edge Length

( S: Sharp Edge  
C: Gash Land Drilling )

## Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- In rear cases, chattering may occur in early milling stages, dissipating after 2m of cutting.
- If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



## Shoulder Milling

Work Material	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	21.000	360	21.000	360	21.000	360	19.000	220	13.000	140	9.000	90	10.500	90	9.000	65
2,0	10.500	360	10.500	360	10.500	360	9.600	290	7.500	180	4.500	110	5.200	120	4.500	85
4,0	5.200	500	5.200	500	5.200	500	4.800	370	4.000	280	2.250	150	2.600	160	2.250	100
6,0	3.500	560	3.500	560	3.500	560	3.200	400	2.700	300	1.500	160	1.700	170	1.500	120
8,0	2.600	520	2.600	520	2.600	520	2.400	400	2.000	300	1.100	160	1.300	170	1.100	120
10,0	2.100	500	2.100	500	2.100	500	1.900	400	1.600	300	900	160	1.000	160	900	120
12,0	1.750	500	1.750	500	1.750	500	1.600	400	1.350	300	750	150	850	160	750	120
16,0	1.300	420	1.300	420	1.300	420	1.200	330	1.000	260	550	120	650	140	550	100
20,0	1.050	380	1.050	380	1.050	380	950	290	800	230	450	110	500	120	450	90
Shoulder cutting	2,5 D								2,0 D							
	øD < 3: 0,05 D , 3 ≤ øD < 8: 0,1 D , 8 ≤ øD: 0,15 D								0,02 D							

## Grooving

Work Material	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	16.600	140	16.600	140	16.600	140	15.500	100	10.500	100	7.500	70	9.400	60	3.750	20
2,0	9.500	160	9.500	160	9.500	160	9.000	180	6.200	120	4.500	90	5.200	80	2.250	30
4,0	5.200	160	5.200	180	5.200	180	4.800	160	3.400	110	2.200	65	2.600	70	1.250	25
6,0	3.500	160	3.500	200	3.500	200	3.200	160	2.550	120	1.500	65	1.700	70	950	25
8,0	2.600	160	2.600	200	2.600	200	2.400	160	1.900	120	1.100	65	1.300	70	700	25
10,0	2.100	160	2.100	200	2.100	200	1.900	160	1.500	120	900	65	1.000	70	550	25
12,0	1.750	160	1.750	200	1.750	200	1.600	160	1.250	120	750	65	850	70	450	25
16,0	1.300	160	1.300	200	1.300	200	1.200	160	950	120	550	65	650	70	350	25
20,0	1.050	160	1.050	200	1.050	200	950	160	750	120	450	65	500	70	280	25
Grooving	0,1 D		0,2 D				0,05 D				0,1 D					

● = Euro stock

Coated Carbide **GSX**

Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
○	○	○	○	○	○	○	○	○	○	○	○

Grades Coating

Helix Angle	Corner
30°	C Type

øDc	Tolerance
D ≤ 3,0	0 - 0,015
3,0 < D ≤ 12	0 - 0,020
12,0 < D	0 - 0,030

Grade: ACF20

■ Endmills

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSX 40100C-4D	●	1,0	4,0	5,0	40	4
GSX 40150C-4D	●	1,5	6,0	7,0	40	4
GSX 40200C-4D	●	2,0	8,0	9,0	40	4
GSX 40250C-4D	●	2,5	10,0	11,0	50	4
GSX 40300C-4D	●	3,0	12,0	13,5	50	6
GSX 40400C-4D	●	4,0	16,0	17,5	50	6
GSX 40500C-4D	●	5,0	20,0	22,0	60	6
GSX 40600C-4D	●	6,0	24,0	-	60	6
GSX 40800C-4D	●	8,0	32,0	-	80	8
GSX 41000C-4D	●	10,0	40,0	-	90	10
GSX 41200C-4D	●	12,0	48,0	-	100	12
GSX 41600C-4D	●	16,0	64,0	-	120	16
GSX 42000C-4D	●	20,0	80,0	-	140	20

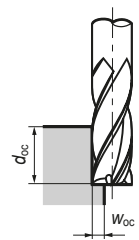
■ Endmill Identification (GSX MILL Series)

**GSX 4 0100 C - 4D**

- ① Series Code
  - ② No. of Teeth
  - ③ Diameter
  - ④ Cutting Edge
  - ⑤ Cutting Edge Length
- ( S: Sharp Edge  
 C: Gash Land Drilling )

■ Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- In rear cases, chattering may occur in early milling stages, dissipating after 2m of cutting.
- If chattering is a problem, reduce the spindle speed and feed rate indicated in the table below by the same ratio, or reduce the depth of cut.
- This series is not recommended for grooving.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



● Shoulder Milling

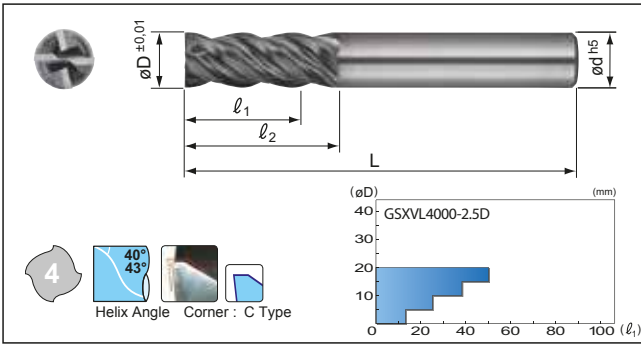
Work Material Cond.	Structural Steel		Carbon Steel (150 to 250HB)		Cast Iron		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (35 to 45HRC)		Hardened Steel (45 to 55HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)																
1,0	9.000	140	9.000	140	9.000	140	7.000	80	6.500	60	4.500	40	5.400	40	4.500	40
2,0	4.500	140	4.500	140	4.500	140	3.500	100	3.200	80	2.300	55	2.700	55	2.300	40
4,0	2.250	200	2.250	200	2.250	200	1.750	120	1.600	100	1.200	60	1.350	50	1.200	35
6,0	1.500	250	1.500	250	1.500	250	1.150	160	1.050	140	800	65	900	45	800	35
8,0	1.100	220	1.100	220	1.100	220	850	160	800	130	600	65	660	45	600	35
10,0	900	210	900	210	900	210	700	140	650	120	460	65	540	45	460	35
12,0	750	200	750	200	750	200	580	140	520	110	400	65	450	45	400	35
16,0	550	170	550	170	550	170	440	120	400	95	300	55	330	45	300	35
20,0	450	150	450	150	450	150	350	100	320	80	240	50	270	45	240	35
Shoulder cutting	3,5 D												3,0 D			
	øD < 3: 0,04 D , 3 ≤ øD < 8: 0,08 D , 8 ≤ øD: 0,1 D												0,02 D			

# Anti-Vibration Typ GSX MILL

## GSXVL 4000-2.5D Type

### SAFE-LOCK™ Applicable Endmills (4 Flutes)

Coated Carbide	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
Grades	Coating	○	○	○	○	○	○	○	○	○	○	○	○



Grade: ACF20

### Endmills

(mm)

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSXVL 4020-2.5D	●	2,0	5	6,5	50	4
GSXVL 4030-2.5D	●	3,0	8	9,5	50	6
GSXVL 4040-2.5D	●	4,0	10	11,5	50	6
GSXVL 4050-2.5D	●	5,0	13	14,5	60	6
GSXVL 4060-2.5D	●	6,0	15	-	60	6
GSXVL 4070-2.5D	●	7,0	18	20,0	70	8
GSXVL 4080-2.5D	●	8,0	20	-	80	8
GSXVL 4090-2.5D	●	9,0	23	25,0	90	10
GSXVL 4100-2.5D	●	10,0	25	-	90	10
GSXVL 4110-2.5D	●	11,0	28	30,5	90	12
GSXVL 4120-2.5D	●	12,0	30	-	90	12
GSXVL 4140-2.5D	●	14,0	35	37,5	110	16
GSXVL 4150-2.5D	●	15,0	38	41,0	110	16
GSXVL 4160-2.5D	●	16,0	40	-	115	16
GSXVL 4180-2.5D	●	18,0	45	48,0	120	20
GSXVL 4200-2.5D	●	20,0	50	-	125	20
GSXVL 4250-2.5D	□	25,0	63	-	140	25

### SAFE-LOCK™ Applicable Endmills



### Endmills

(mm)

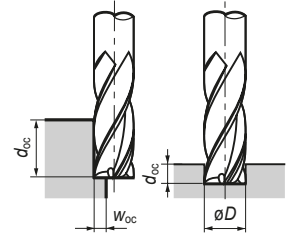
Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSXVL 4120S-2.5D	□	12,0	30	-	90	12
GSXVL 4140S-2.5D	□	14,0	35	37,5	110	16
GSXVL 4150S-2.5D	□	15,0	38	41,0	110	16
GSXVL 4160S-2.5D	□	16,0	40	-	115	16
GSXVL 4180S-2.5D	□	18,0	45	48,0	120	20
GSXVL 4200S-2.5D	□	20,0	50	-	125	20
GSXVL 4250S-2.5D	□	25,0	63	-	140	25

### Recommended Cutting Conditions

1. For stable machining performance use rigid, high-precision machines and holders.
2. Use air blowing when dry machining.
3. Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
4. If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.

### Shoulder Milling

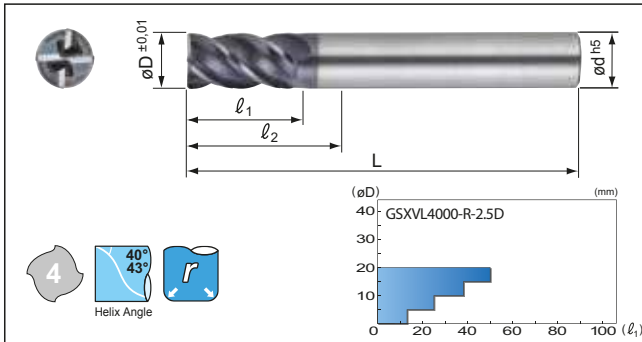
Work Material Cond.	Carbon Steel, Cast Iron (150 to 250HB)		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (40 to 50HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy (20 to 45HRC)	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)										
2,0	13.000	1.000	10.000	800	8.000	700	10.000	580	5.000	200
4,0	9.600	1.200	8.000	1.000	6.000	800	5.500	650	3.000	230
6,0	6.800	1.500	5.600	1.200	4.200	900	3.800	680	2.100	240
8,0	5.200	1.600	4.400	1.300	3.200	950	2.800	650	1.600	250
10,0	4.200	1.500	3.500	1.200	2.600	800	2.300	600	1.300	210
12,0	3.500	1.400	3.000	1.200	2.200	700	1.900	550	1.100	180
14,0	3.000	1.200	2.600	1.100	1.800	600	1.600	500	900	150
16,0	2.700	1.100	2.200	1.000	1.600	600	1.400	480	760	130
18,0	2.400	1.000	2.000	900	1.400	570	1.300	450	680	120
20,0	2.200	900	1.700	800	1.200	550	1.100	400	600	100
25,0	1.700	680	1.400	630	1.000	450	890	310	480	82
Shoulder cutting	$d_{oc}$		$1,5 D$		$0,05 D$		$0,1 D$		$0,05 D$	
	$w_{oc}$		$0,1 D$		$0,05 D$		$0,1 D$		$0,05 D$	



### Shoulder Milling

Work Material Cond.	Carbon Steel, Cast Iron (150 to 250HB)		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (40 to 50HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy (20 to 45HRC)	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)										
2,0	13.000	750	10.000	550	8.400	500	6.500	300	4.000	140
4,0	8.200	800	6.000	600	5.200	500	4.000	330	2.000	130
6,0	6.100	1.100	4.000	600	3.500	580	2.700	350	1.350	150
8,0	4.600	1.000	3.000	580	2.600	570	2.000	330	1.000	140
10,0	3.600	1.000	2.400	550	2.100	510	1.600	200	800	130
12,0	3.100	920	2.000	500	1.700	450	1.300	280	660	110
14,0	2.600	750	1.700	450	1.500	400	1.100	250	570	100
16,0	2.300	670	1.500	420	1.300	350	1.000	230	500	90
18,0	2.000	620	1.300	380	1.100	330	900	200	430	80
20,0	1.900	600	1.200	360	1.000	320	800	180	380	70
25,0	1.500	470	1.000	300	790	250	640	140	300	55
Grooving	$d_{oc}$		$1,0 D$		$0,2 D$		$0,3 D$		$0,2 D$	

Coated Carbide	GSX	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
Grades	Coating	○	○	○	○	○	○	○	○	○	○	○	○



Endmills

Cat. No.	Stock	øD	r	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSXVL 4030-R02-2.5D	□	3,0	0,2	8	9,5	50	6
GSXVL 4030-R05-2.5D	□	3,0	0,5	8	9,5	50	6
GSXVL 4040-R02-2.5D	□	4,0	0,2	10	11,5	50	6
GSXVL 4040-R05-2.5D	□	4,0	0,5	10	11,5	50	6
GSXVL 4040-R10-2.5D	□	4,0	1,0	10	11,5	50	6
GSXVL 4050-R02-2.5D	□	5,0	0,2	13	14,5	60	6
GSXVL 4050-R05-2.5D	□	5,0	0,5	13	14,5	60	6
GSXVL 4050-R10-2.5D	□	5,0	1,0	13	14,5	60	6
GSXVL 4060-R03-2.5D	□	6,0	0,3	15	-	60	6
GSXVL 4060-R05-2.5D	□	6,0	0,5	15	-	60	6
GSXVL 4060-R10-2.5D	□	6,0	1,0	15	-	60	6
GSXVL 4060-R15-2.5D	□	6,0	1,5	15	-	60	6
GSXVL 4080-R03-2.5D	□	8,0	0,3	20	-	80	8
GSXVL 4080-R05-2.5D	□	8,0	0,5	20	-	80	8
GSXVL 4080-R10-2.5D	□	8,0	1,0	20	-	80	8
GSXVL 4080-R15-2.5D	□	8,0	1,5	20	-	80	8
GSXVL 4080-R20-2.5D	□	8,0	2,0	20	-	80	8
GSXVL 4100-R03-2.5D	□	10,0	0,3	25	-	90	10
GSXVL 4100-R05-2.5D	□	10,0	0,5	25	-	90	10
GSXVL 4100-R10-2.5D	□	10,0	1,0	25	-	90	10
GSXVL 4100-R15-2.5D	□	10,0	1,5	25	-	90	10
GSXVL 4100-R20-2.5D	□	10,0	2,0	25	-	90	10
GSXVL 4120-R05-2.5D	□	12,0	0,5	30	-	90	12
GSXVL 4120-R10-2.5D	□	12,0	1,0	30	-	90	12
GSXVL 4120-R15-2.5D	□	12,0	1,5	30	-	90	12
GSXVL 4120-R20-2.5D	□	12,0	2,0	30	-	90	12
GSXVL 4120-R30-2.5D	□	12,0	3,0	30	-	90	12
GSXVL 4160-R10-2.5D	□	16,0	1,0	40	-	115	16
GSXVL 4160-R15-2.5D	□	16,0	1,5	40	-	115	16
GSXVL 4160-R20-2.5D	□	16,0	2,0	40	-	115	16
GSXVL 4160-R30-2.5D	□	16,0	3,0	40	-	115	16
GSXVL 4200-R10-2.5D	□	20,0	1,0	50	-	125	20
GSXVL 4200-R15-2.5D	□	20,0	1,5	50	-	125	20
GSXVL 4200-R20-2.5D	□	20,0	2,0	50	-	125	20
GSXVL 4200-R30-2.5D	□	20,0	3,0	50	-	125	20
GSXVL 4250-R10-2.5D	□	25,0	1,0	63	-	140	25
GSXVL 4250-R15-2.5D	□	25,0	1,5	63	-	140	25
GSXVL 4250-R20-2.5D	□	25,0	2,0	63	-	140	25
GSXVL 4250-R30-2.5D	□	25,0	3,0	63	-	140	25

Grade: ACF20

Shoulder Milling and Grooving

Work Material Cond.	Carbon Steel, Cast Iron (150 to 250HB)		Alloy Steel (25 to 35HRC)		Tempered Steel, Hardened Steel (40 to 50HRC)		Stainless Steel		Heat Resistant Steel, Titanium Alloy (20 to 45HRC)	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)										
2,0	9.000	720	6.000	430	4.000	320	5.500	320	2.600	120
4,0	6.600	800	4.500	450	3.000	380	4.000	320	2.000	120
6,0	4.800	960	3.000	480	2.500	380	3.000	480	1.200	120
8,0	3.600	1.000	2.200	610	2.000	400	2.000	520	1.000	140
10,0	2.800	1.000	1.800	610	1.500	400	1.700	550	800	160
12,0	2.400	950	1.500	550	1.200	380	1.500	500	700	140
14,0	2.200	880	1.300	490	1.000	360	1.200	430	600	130
16,0	1.800	650	1.100	420	800	300	1.000	360	500	120
18,0	1.600	580	1.000	360	750	270	900	340	450	110
20,0	1.400	500	900	330	700	250	820	300	400	100
Shoulder cutting	$d_{oc}$		$1,5 D$		$0,1 D$		$0,05 D$		$0,1 D$	
Grooving	$w_{oc}$		$0,1 D$		$0,05 D$		$0,1 D$		$0,05 D$	
	$d_{oc}$		$1,0 D$		$0,2 D$		$0,3 D$		$0,2 D$	

Endmills

SAFE-LOCK™

Applicable Endmills



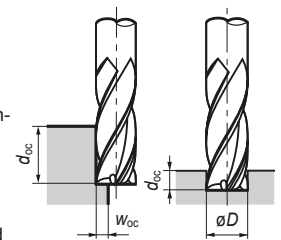
Endmills

Cat. No.	Stock	øD	r	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSXVL 4120S-R05-2.5D	□	12,0	0,5	30	-	90	12
GSXVL 4120S-R10-2.5D	□	12,0	1,0	30	-	90	12
GSXVL 4120S-R15-2.5D	□	12,0	1,5	30	-	90	12
GSXVL 4120S-R20-2.5D	□	12,0	2,0	30	-	90	12
GSXVL 4120S-R30-2.5D	□	12,0	3,0	30	-	90	12
GSXVL 4160S-R10-2.5D	□	16,0	1,0	40	-	115	16
GSXVL 4160S-R15-2.5D	□	16,0	1,5	40	-	115	16
GSXVL 4160S-R20-2.5D	□	16,0	2,0	40	-	115	16
GSXVL 4160S-R30-2.5D	□	16,0	3,0	40	-	115	16
GSXVL 4200S-R10-2.5D	□	20,0	1,0	50	-	125	20
GSXVL 4200S-R15-2.5D	□	20,0	1,5	50	-	125	20
GSXVL 4200S-R20-2.5D	□	20,0	2,0	50	-	125	20
GSXVL 4200S-R30-2.5D	□	20,0	3,0	50	-	125	20
GSXVL 4250S-R10-2.5D	□	25,0	1,0	63	-	140	25
GSXVL 4250S-R15-2.5D	□	25,0	1,5	63	-	140	25
GSXVL 4250S-R20-2.5D	□	25,0	2,0	63	-	140	25
GSXVL 4250S-R30-2.5D	□	25,0	3,0	63	-	140	25

Grade: ACF20

Recommended Cutting Conditions

- For stable machining performance use rigid, high-precision machines and holders.
- Use air blowing when dry machining.
- Use wet machining for stainless steel, heat resistant alloy, and titanium alloy applications.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.



Corner Radius Selection

øD	r0,2	r0,3	r0,5	r1,0	r1,5	r2,0	r3,0
ø3	□		□				
ø4	□		□	□			
ø5	□		□	□			
ø6		□	□	□	□		
ø8		□	□	□	□	□	
ø10		□	□	□	□	□	
ø12			□	□	□	□	□
ø16				□	□	□	□
ø20					□	□	□
ø25						□	□

# SSEH Series



J 24, J 39

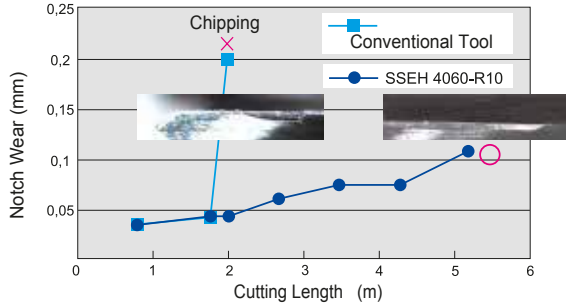
## SSEH Radius

### Characteristics and Applications

- Steep helix (45° helix) improves sharpness.
- Combination of unique flute design and semi-mirrored surface improves chip evacuation and adhesion resistance.
- Ultra-smooth coating with improved hardness and heat resistance combined with tough carbide substrate improves tool life when working with heat resistant alloys.
- Unique, smooth radius shape mitigates cutting impact and improves fracture resistance.
- Both coated and uncoated types are available in stock to meet various conditions.

### Application Examples

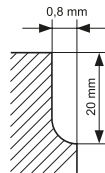
#### ● Inconel 718 (Side Milling)



Tool Diameter:  $\phi 6 \times R1$   
 Cutting Conditions:  $v_c = 20 \text{ m/min}$ ,  $f_t = 0,025 \text{ mm/t}$ ,  
 $d_{oc} = 5 \text{ mm}$ ,  $w_{oc} = 0,5 \text{ mm}$ , wet

#### ● Inconel 713 (Side Milling)

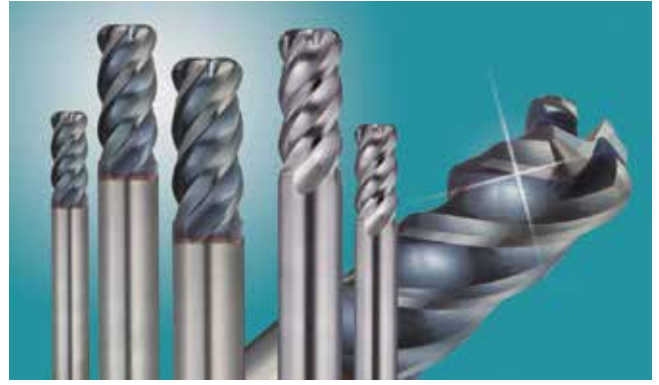
SSEH 4100W-R10	Competitor's Product
Tool Diameter : $\phi 10 \times R1$ Cutting Conditions : $v_c = 32 \text{ m/min}$ , $f_t = 0,018 \text{ mm/t}$ $d_{oc} = 20 \text{ mm}$ , $w_{oc} = 0,8 \text{ mm}$ , Dry	



In Sumitomo Electric Hardmetal tests, the special coating with excellent adhesion resistance provided less cutting edge adhesion than the competitor's product and enabled fracturefree machining. The competitor's product suffered from edge adhesion leading to breakage.

Unique, smooth radius design

- = Euro stock
- = Delivery on request

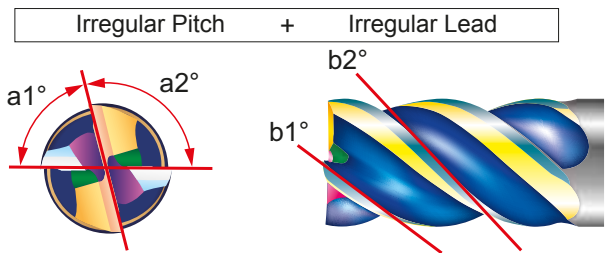


J 23, J 39

## SSEH Radius Anti-vibration Type

### Characteristics and Applications

- New anti-vibration type added to the SSEH type endmill for exotic alloys.
- Builds on the same features of existing endmills by adding an irregular lead for exceptionally good anti-vibration performance.
- Compatible with wide range of milling for exotic alloys including SUS, Inconel, and titanium.
- Reduces chattering for high-speed, high-feed cutting.
- Both coated and uncoated types are available in stock to meet various conditions.



### Application Examples

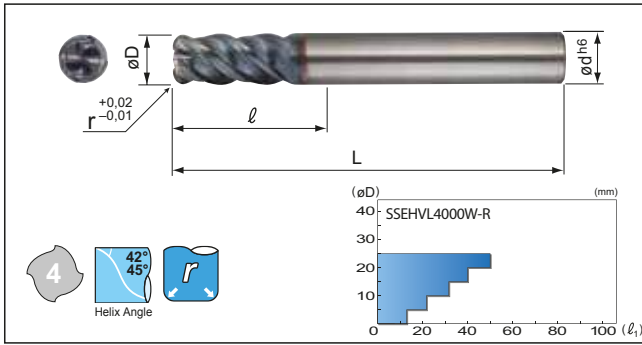
#### ● Surface Roughness Comparison

SSEH Anti-vibration Type	Conventional Tool
Good Surface Quality Ra 0,37 $\mu\text{m}$ Rz 1,86 $\mu\text{m}$	Surface shows chattering Ra 1,52 $\mu\text{m}$ Rz 6,45 $\mu\text{m}$

Work Material: X5CrNi1810 (Surface Milling)  
 Tool Diameter:  $\phi 12 \text{ mm}$   
 Cutting Conditions:  $n = 1.300 \text{ rpm}$ ,  $v_f = 300 \text{ mm/min}$   
 $d_{oc} = 18 \text{ mm}$ ,  $w_{oc} = 1,2 \text{ mm}$   
 Equipment: BT50



Coated Carbide Grades	GS HARD Coating	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
		○	○	○	○	○	○	○	○	○	○	○	○



Grade: ACW52

■ Endmills

Cat. No.	Stock	øD	r	l	L	ød
SSEHVL 4045W-R05	●	4,5	0,5	12	50	6
SSEHVL 4045W-R10	●	4,5	1,0	12	50	6
SSEHVL 4050W-R05	●	5,0	0,5	13	60	6
SSEHVL 4050W-R10	●	5,0	1,0	13	60	6
SSEHVL 4060W-R10	●	6,0	1,0	13	60	6
SSEHVL 4080W-R10	●	8,0	1,0	19	80	8
SSEHVL 4100W-R10	●	10,0	1,0	22	90	10
SSEHVL 4100W-R30	●	10,0	3,0	22	90	10
SSEHVL 4120W-R10	●	12,0	1,0	26	90	12
SSEHVL 4120W-R30	●	12,0	3,0	26	90	12
SSEHVL 4160W-R10	●	16,0	1,0	32	115	16
SSEHVL 4160W-R30	●	16,0	3,0	32	115	16
SSEHVL 4200W-R10	□	20,0	1,0	40	125	20
SSEHVL 4200W-R30	□	20,0	3,0	40	125	20
SSEHVL 4250W-R10	□	25,0	1,0	50	140	25
SSEHVL 4250W-R30	□	25,0	3,0	50	140	25

SAFE-LOCK™

Applicable Endmills



■ Endmills

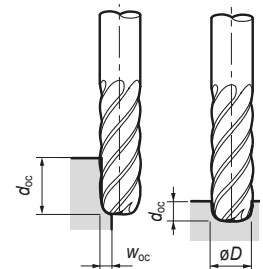
Cat. No.	Stock	øD	r	l	L	ød
SSEHVL 4120WS-R10	□	12,0	1,0	26	90	12
SSEHVL 4120WS-R30	□	12,0	3,0	26	90	12
SSEHVL 4160WS-R10	□	16,0	1,0	32	115	16
SSEHVL 4160WS-R30	□	16,0	3,0	32	115	16
SSEHVL 4200WS-R10	□	20,0	1,0	40	125	20
SSEHVL 4200WS-R30	□	20,0	3,0	40	125	20
SSEHVL 4250WS-R10	□	25,0	1,0	50	140	25
SSEHVL 4250WS-R30	□	25,0	3,0	50	140	25

■ Diameter and Corner Radius Selection Range

øD	r0,5	r1,0	r3,0
ø 4,5	●	●	
ø 5	●	●	
ø 6		●	
ø 8		●	
ø 10		●	●
ø 12		●	●
ø 16		●	●
ø 20		□	□
ø 25		□	□

■ Recommended Cutting Conditions

1. For stable machining, a more rigid machine is recommended.
2. Wet machining is recommended for stainless steel and heat resistant alloy applications.
3. If cutting noise and vibration are present, please change the cutting conditions accordingly.



● Shoulder Milling

Work Material Cond.	Stainless Steel		Titanium Alloy		Heat Resisive Steel	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)						
4,5	3.500	350	3.500	280	2.100	170
5,0	3.200	380	3.200	320	1.900	190
6,0	2.700	430	2.700	320	1.600	190
8,0	2.000	400	2.000	280	1.200	170
10,0	1.600	380	1.600	260	1.000	160
12,0	1.300	360	1.300	230	800	140
16,0	1.000	320	1.000	200	600	120
20,0	800	260	800	160	480	100
25,0	640	200	640	130	380	80
Shoulder cutting	$d_{cc}$		$1,5 D$		$w_{cc}$	
	$0,1 D$		$0,05 D$		$0,05 D$	

● Grooving

Work Material Cond.	Stainless Steel		Titanium Alloy		Heat Resisive Steel	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)						
4,5	4,200	200	3,900	270	1,400	100
5,0	3,800	240	3,500	300	1,300	120
6,0	3,200	260	2,900	300	1,100	140
8,0	2,400	240	2,200	270	800	120
10,0	1,900	220	1,700	250	650	110
12,0	1,600	200	1,400	230	550	100
16,0	1,200	130	1,100	200	400	80
20,0	950	95	890	90	320	60
25,0	760	75	700	70	250	50
Grooving	$d_{cc}$		$0,3 D$		$0,15 D$	

# Radius Endmill for Exotic Alloys

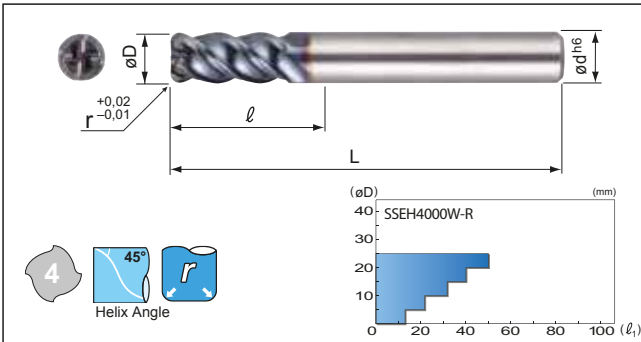
## SSEH 4000W-R Type

4

4 Flutes Endmills with Radius Corner and

HAIMER's SAFE-LOCK™ Applicable Endmills

Coated Carbide	<b>GS</b> HARD	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	45-55 HRC	55-60 HRC	60-65 HRC	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
Grades	Coating	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



Grade: ACW52

### SAFE-LOCK™

Applicable Endmills



### Endmills

(mm)

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
SSEH 4045W-R05	●	4,5	0,5	12	50	6
SSEH 4045W-R10	●	4,5	1,0	12	50	6
SSEH 4050W-R05	●	5,0	0,5	13	60	6
SSEH 4050W-R10	●	5,0	1,0	13	60	6
SSEH 4060W-R10	●	6,0	1,0	13	60	6
SSEH 4080W-R10	●	8,0	1,0	19	80	8
SSEH 4100W-R10	●	10,0	1,0	22	90	10
SSEH 4100W-R30	●	10,0	3,0	22	90	10
SSEH 4120W-R10	●	12,0	1,0	26	90	12
SSEH 4120W-R30	●	12,0	3,0	26	90	12
SSEH 4160W-R10	●	16,0	1,0	32	115	16
SSEH 4160W-R30	●	16,0	3,0	32	115	16
SSEH 4200W-R10	□	20,0	1,0	40	125	20
SSEH 4200W-R30	□	20,0	3,0	40	125	20
SSEH 4250W-R10	□	25,0	1,0	50	140	25
SSEH 4250W-R30	□	25,0	3,0	50	140	25

### Endmills

(mm)

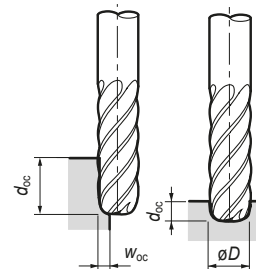
Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
SSEH 4120WS-R10	□	12,0	1,0	26	90	12
SSEH 4120WS-R30	□	12,0	3,0	26	90	12
SSEH 4160WS-R10	□	16,0	1,0	32	115	16
SSEH 4160WS-R30	□	16,0	3,0	32	115	16
SSEH 4200WS-R10	□	20,0	1,0	40	125	20
SSEH 4200WS-R30	□	20,0	3,0	40	125	20
SSEH 4250WS-R10	□	25,0	1,0	50	140	25
SSEH 4250WS-R30	□	25,0	3,0	50	140	25

### Diameter and Corner Radius Selection Range

øD	r0,5	r1,0	r3,0
ø 4,5	●	●	
ø 5	●	●	
ø 6		●	
ø 8		●	
ø 10		●	●
ø 12		●	●
ø 16		●	●
ø 20		□	□
ø 25		□	□

### Recommended Cutting Conditions

- For stable machining, a more rigid machine is recommended.
- Wet machining is recommended for stainless steel and heat resistant alloy applications.
- If cutting noise and vibration are present, please change the cutting conditions accordingly.

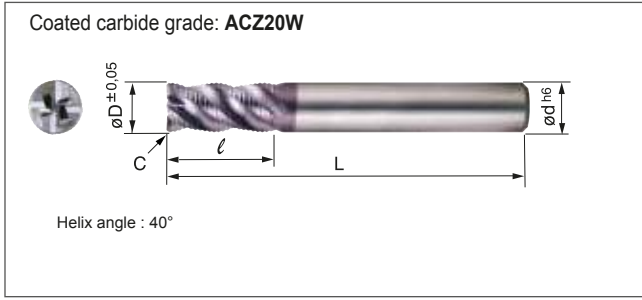


### Shoulder Milling

Work Material	Stainless Steel		Titanium Alloy		Heat Resistant Steel	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)						
4,5	3.500	350	3.500	280	2.100	170
5,0	3.200	380	3.200	320	1.900	190
6,0	2.700	430	2.700	320	1.600	190
8,0	2.000	400	2.000	280	1.200	170
10,0	1.600	380	1.600	260	1.000	160
12,0	1.300	360	1.300	230	800	140
16,0	1.000	320	1.000	200	600	120
20,0	800	260	800	160	480	100
25,0	640	200	640	130	380	80
Shoulder cutting	d <sub>oc</sub>	1,5 D				
	w <sub>oc</sub>	0,1 D	0,05 D	0,05 D		

### Grooving

Work Material	Stainless Steel		Titanium Alloy		Heat Resistant Steel	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)						
4,5	4.200	200	3.900	270	1.400	100
5,0	3.800	240	3.500	300	1.300	120
6,0	3.200	260	2.900	300	1.100	140
8,0	2.400	240	2.200	270	800	120
10,0	1.900	220	1.700	250	650	110
12,0	1.600	200	1.400	230	550	100
16,0	1.200	130	1.100	200	400	80
20,0	950	95	890	90	320	60
25,0	760	75	700	70	250	50
Grooving	d <sub>oc</sub>	0,3 D	0,2 D	0,15 D		

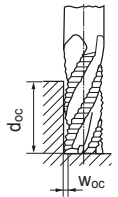


## Endmills (mm)

No. of teeth	Cat. No.	Stock	$\phi D$	$\ell$	L	$\phi d$
4	GSRE 4060 SF	●	6,0	13	50	6
	GSRE 4070 SF	●	7,0	16	60	8
	GSRE 4080 SF	●	8,0	19	60	8
	GSRE 4090 SF	●	9,0	19	70	10
	GSRE 4100 SF	●	10,0	22	70	10
	GSRE 4110 SF	●	11,0	22	75	12
	GSRE 4120 SF	●	12,0	26	75	12
	GSRE 4140 SF	●	14,0	26	90	16
	GSRE 4160 SF	●	16,0	32	90	16
	GSRE 4180 SF	●	18,0	32	100	20
	GSRE 4200 SF	●	20,0	38	100	20

Recommended :

- (1) Cutting performance is improved when using a high rigidity machine.
- (2) Speeds and feeds should be reduced when there is any excessive vibration or strange noise during the operation.



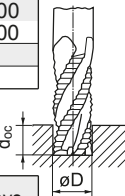
## Recommended Cutting Conditions

### Shoulder cutting

Material Cutting data Tool Dia. (mm)	Carbon steel ( HB150~250)		Cast iron		Alloy steel, Prehardened steel (HRC25~35)		Hardened steel (HRC40~50)		Stainless steel		Heat resistant alloys Titanium alloy	
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
1	4.800	1.200	5.800	1.500	3.200	380	2.600	400	4.300	250	1.600	90
2	4.100	1.200	5.000	1.500	2.700	380	2.200	400	4.500	250	1.350	90
3	3.600	1.200	4.500	1.500	2.400	380	2.000	400	4.000	250	1.250	90
4	3.200	1.200	4.000	1.500	2.100	380	1.800	400	3.500	250	1.050	90
5	2.800	1.200	2.500	1.500	1.900	380	1.600	400	3.200	250	1.000	100
6	2.600	1.200	3.000	1.400	1.700	380	1.500	400	2.900	250	900	100
8	2.400	1.200	2.900	1.400	1.600	400	1.300	400	2.600	250	800	100
10	2.200	1.100	2.600	1.300	1.300	380	1.100	350	2.200	200	700	100
12	1.800	900	2.200	1.100	1.200	380	1.000	350	2.000	180	600	100
16	1.400	700	1.800	900	1.000	380	900	350	1.800	150	550	100
20	1.400	700	1.700	800	850	380	800	350	1.600	150	500	100
Shoulder cutting	$d_{oc}$		1,5D				1,5D					
	$W_{oc}$		0,5D				0,3D					

### Slotting

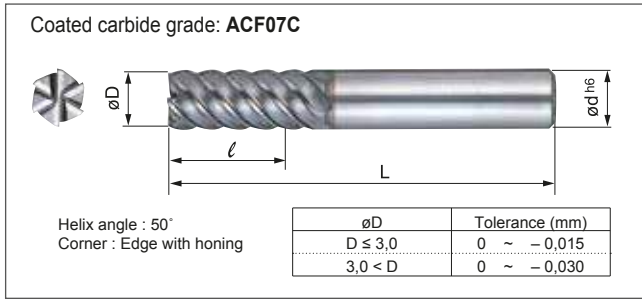
Material Cutting data Tool Dia. (mm)	Carbon steel ( HB150~250)		Cast iron		Alloy steel, Prehardened steel (HRC25~35)		Hardened steel (HRC40~50)		Stainless steel		Heat resistant alloys Titanium alloy	
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
1	3.600	900	4.300	1.100	2.400	300	1.700	260	4.200	250	1.100	60
2	3.000	900	3.700	1.100	2.000	280	1.500	260	3.600	250	900	60
3	2.700	900	3.400	1.100	1.800	280	1.350	260	3.200	250	800	60
4	2.400	900	3.000	1.100	1.600	280	1.200	260	2.800	250	700	60
5	2.100	900	2.600	1.100	1.400	280	1.100	270	2.500	250	650	65
6	2.000	900	2.300	1.100	1.300	280	1.000	270	2.300	250	600	70
8	1.800	900	2.200	1.100	1.200	300	900	270	2.100	250	550	70
10	1.600	800	2.000	1.100	1.000	290	750	240	1.800	180	450	65
12	1.350	650	1.650	850	900	280	700	240	1.600	160	400	65
16	1.200	550	1.500	750	800	280	600	230	1.400	140	350	60
20	1.050	500	1.350	700	700	280	550	210	1.250	125	300	60
Slotting	$d_{oc}$		1,0D				0,5D					



# GS MILL Series

## GSH 4000/6000/8000 SF Type

TiAlN Coated Fast Helix Endmills



### Endmills (mm)

No. of teeth	Cat. No.	Stock	$\phi D$	$l$	L	$\phi d$
4	GSH 4010 SF	●	1,0	3	50	6
	GSH 4015 SF	●	1,5	4	50	6
	GSH 4020 SF	●	2,0	6	50	6
6	GSH 6030 SF	●	3,0	8	50	6
	GSH 6040 SF	●	4,0	11	50	6
	GSH 6050 SF	●	5,0	12	50	6
	GSH 6060 SF	●	6,0	13	50	6
	GSH 6080 SF	●	8,0	19	60	8
	GSH 6100 SF	●	10,0	22	70	10
8	GSH 6120 SF	●	12,0	26	75	12
	GSH 8160 SF	●	16,0	32	90	16
	GSH 8200 SF	●	20,0	38	100	20

Recommended :

- (1) Cutting performance is improved when using a high rigidity machine.
- (2) Speeds and feeds should be reduced when there is any excessive vibration or strange noise during the operation.

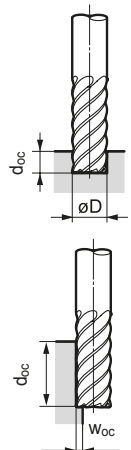
### Recommended Cutting Conditions

#### Conventional Milling Operations

Material Cutting data	Alloy steel, Prehardened steel (~ HRC35)		Heat treated alloy steel, hardened steel (HRC35~45)		Hardened steel (HRC45~55)		Hardened steel (HRC55~60)		Hardened steel (HRC60~65)		Hardened steel (HRC65 ~)		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
1	20.000	540	20.000	390	15.600	260	12.300	160	11.100	140	7.800	95	
2	19.000	1.100	17.200	770	13.400	530	10.500	320	9.500	270	6.700	190	
3	15.000	2.150	13.400	1.540	10.400	1.050	8.200	650	7.400	540	5.200	380	
4	11.200	2.400	10.000	1.740	7.800	1.180	6.100	730	5.600	600	3.900	420	
5	9.000	2.700	8.000	1.930	6.200	1.300	4.900	810	4.400	670	3.100	470	
6	7.500	2.700	6.700	1.930	5.200	1.300	4.100	810	3.700	670	2.600	470	
8	5.600	2.700	5.000	1.930	3.900	1.300	3.050	810	2.800	670	1.950	470	
10	4.500	2.700	4.000	1.930	3.100	1.300	2.450	810	2.200	670	1.550	470	
12	3.750	2.700	3.350	1.930	2.600	1.300	2.050	810	1.850	670	1.300	470	
16	2.800	2.500	2.500	1.800	1.950	1.220	1.530	760	1.400	630	980	440	
20	2.250	2.100	2.000	1.540	1.550	1.050	1.230	650	1.100	540	780	380	
Shoulder cutting	$d_{oc}$	1 ~ 1,5D				1 ~ 1,5D				1 ~ 1,5D			
	$w_{oc}$	0,1D				0,05D				0,02D			
Slotting	$d_{oc}$	0,1D				0,05D				~ 0,05D (Max 0,5)			

#### HSC Machining Centre Operations

Material Cutting data	Alloy steel, Prehardened steel (~ HRC35)		Heat treated alloy steel, hardened steel (HRC35~45)		Hardened steel (HRC45~55)		Hardened steel (HRC55~60)		Hardened steel (HRC60~65)	
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
1	48.000	1.250	48.000	1.250	48.000	1.250	48.000	930	38.000	700
2	48.000	2.850	48.000	2.850	48.000	2.850	36.000	1.600	24.000	1.000
3	32.000	4.900	32.000	4.900	32.000	4.900	24.000	2.740	16.000	1.700
4	24.000	5.200	24.000	5.200	24.000	5.200	18.000	2.900	12.000	1.800
5	19.200	5.800	19.200	5.800	19.200	5.800	14.300	3.200	9.600	2.000
6	16.000	5.800	16.000	5.800	16.000	5.800	12.000	3.200	8.000	2.000
8	12.000	5.800	12.000	5.800	12.000	5.800	9.000	3.200	6.000	2.000
10	9.600	5.800	9.600	5.800	9.600	5.800	7.200	3.200	4.800	2.000
12	8.000	5.800	8.000	5.800	8.000	5.800	6.000	3.200	4.000	2.000
16	6.000	5.400	6.000	5.400	6.000	5.400	4.500	3.000	3.000	1.900
20	4.800	4.600	4.800	4.600	4.800	4.600	3.600	2.580	2.400	1.600
Shoulder cutting	$d_{oc}$	1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D		
	$w_{oc}$	0,1D		0,05D		0,02D		0,12D		



● = Euro stock

# DLC (Diamond Like Carbon) Coating AURORA COAT Series



## ■ Features




Sumitomo Electric's "AURORA" COAT is a high hardness, low coefficient layer of "Diamond Like Carbon" (DLC).

Other than producing excellent surface finish for machining of Aluminium and non-ferrous metals, DLC coat can be used for dry cutting and is environmental friendly.

## ■ Characteristics / Application

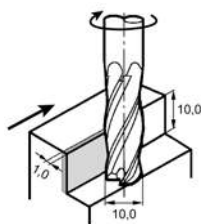
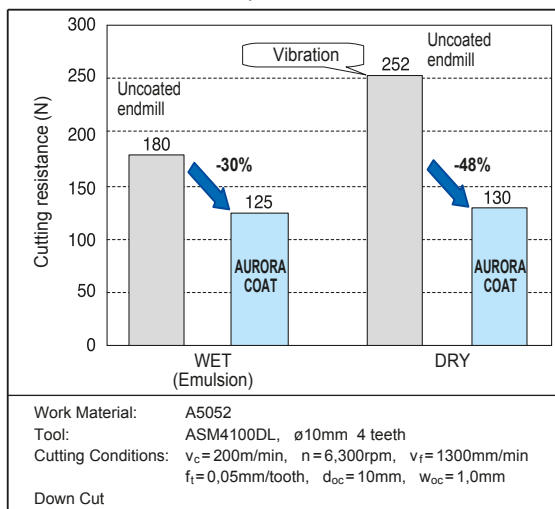
- Very smooth AURORA COAT results in low adhesion as well as good surface finish
- With lower cutting forces and high rigidity, this series is suitable for low rigidity machine
- Available in 2 and 4 flutes square type as well as ballnose type endmills

## ■ Product Range

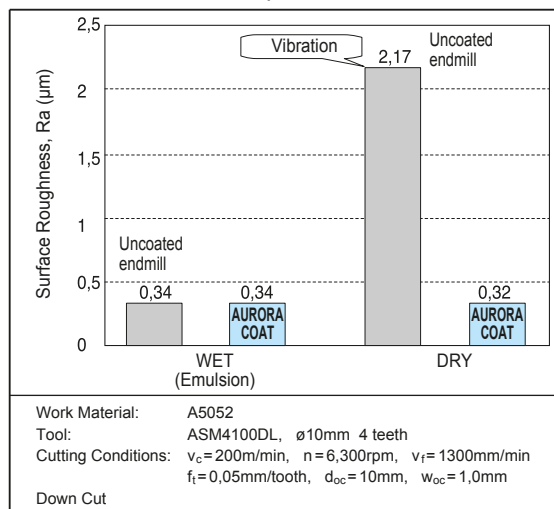
Series	No. of teeth	Shape	Diameter
ASM2000DL	2	Square 	ø2~ø16
ASM4000DL	4	Square 	ø2~ø16
SNB2000DL	2	Ballnose 	ø2~ø16 (R1~R8)

## ■ Efficiency

### ● Performance Comparison



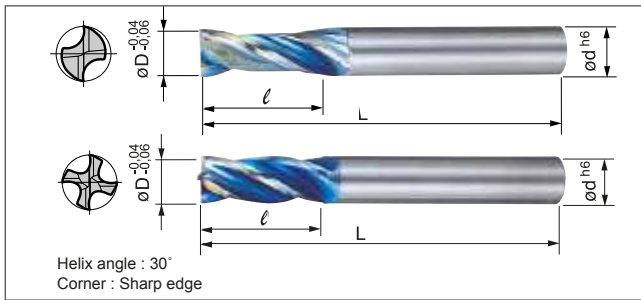
### ● Surface Finish Comparison



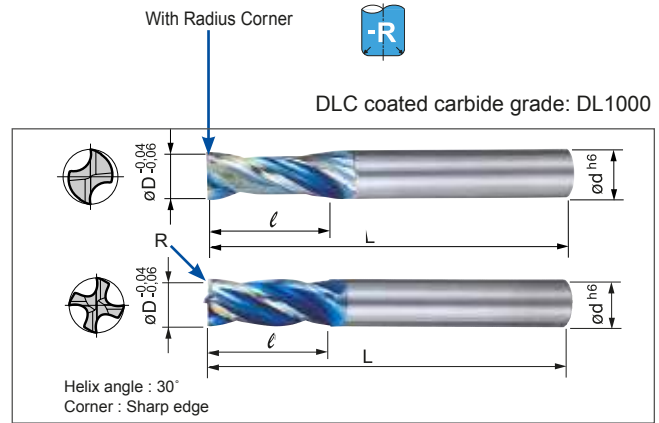
# AURORA Coated Spiral Endmills ASM 2000/4000 DL Type

# AURORA Coated Spiral Endmills ASM 2000/4000 DL-R Type

DLC coated carbide grade: DL1000



DLC coated carbide grade: DL1000



## ■ Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
2	ASM 2020 DL	●	2,0	6	40	4
	ASM 2030 DL	●	3,0	10	45	6
	ASM 2040 DL	●	4,0	12	45	6
	ASM 2050 DL	●	5,0	15	50	6
	ASM 2060 DL	●	6,0	15	50	6
	ASM 2080 DL	●	8,0	18	60	8
	ASM 2100 DL	●	10,0	22	71	10
	ASM 2120 DL	●	12,0	25	75	12
ASM 2160 DL	●	16,0	32	90	16	

4	ASM 4020 DL	●	2,0	6	40	4
	ASM 4030 DL	●	3,0	10	45	6
	ASM 4040 DL	●	4,0	12	45	6
	ASM 4050 DL	●	5,0	15	50	6
	ASM 4060 DL	●	6,0	15	50	6
	ASM 4080 DL	●	8,0	18	60	8
	ASM 4100 DL	●	10,0	22	71	10
	ASM 4120 DL	●	12,0	25	75	12
ASM 4160 DL	●	16,0	32	90	16	

## ■ Endmills (mm)

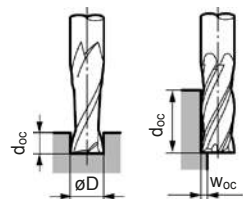
	Cat. No.	Stock	øD	R	l	L	ød
2	ASM 2080 DL-R10	●	8,0	1,0	18	60	8
	ASM 2080 DL-R20	●	8,0	2,0	18	60	8
	ASM 2100 DL-R10	●	10,0	1,0	22	71	10
	ASM 2100 DL-R20	●	10,0	2,0	22	71	10
	ASM 2120 DL-R20	●	12,0	2,0	25	75	12
	ASM 2120 DL-R30	●	12,0	3,0	25	75	12
ASM 2160 DL-R30	●	16,0	3,0	32	90	16	

4	ASM 4080 DL-R10	●	8,0	1,0	18	60	8
	ASM 4080 DL-R20	●	8,0	2,0	18	60	8
	ASM 4100 DL-R10	●	10,0	1,0	22	71	10
	ASM 4100 DL-R20	●	10,0	2,0	22	71	10
	ASM 4120 DL-R20	●	12,0	2,0	25	75	12
	ASM 4120 DL-R30	●	12,0	3,0	25	75	12
ASM 4160 DL-R30	●	16,0	3,0	32	90	16	

## ■ Recommended Cutting Conditions

Recommended :

- (1) Cutting performance is improved when using a high rigidity machine.
- (2) Speeds and feeds should be reduced when there is any excessive vibration or strange noise during the operation.
- (3) In case of chatter first check the cutting conditions.



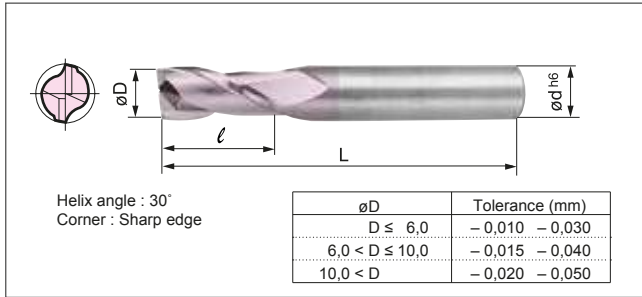
Work Material	Aluminium Alloy								
	Cutting data	Wet (Emulsion)				Dry			
		Side Milling (4 teeth)		Groove Milling (4 teeth)		Side Milling (4 teeth)		Groove Milling (4 teeth)	
øD (mm)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
2,0	40.000	1.400	28.000	280	40.000	980	28.000	200	
3,0	32.000	2.000	22.000	400	32.000	1.400	22.000	280	
4,0	26.000	2.600	18.000	520	26.000	1.800	18.000	360	
5,0	20.000	2.600	14.000	520	20.000	1.800	14.000	360	
6,0	17.000	2.700	12.000	540	17.000	1.900	12.000	370	
8,0	13.000	2.700	9.000	540	13.000	1.900	9.000	370	
10,0	11.000	2.800	7.200	560	11.000	2.000	7.200	390	
12,0	8.500	2.800	6.000	560	8.500	2.000	6.000	390	
16,0	6.400	2.800	4.500	560	6.400	2.000	4.500	390	
Depth and wide of cut	d <sub>oc</sub>	1,5D		1,0D		1,5D		0,5D	
	W <sub>oc</sub>	0,2D		(D)		0,2D		(D)	

● = Euro stock

▲ = To be replaced by new item  
□ = Delivery on request

# ZX Coated Spiral Endmills SSM 2000ZX Type

Coated carbide grade: ACZ50



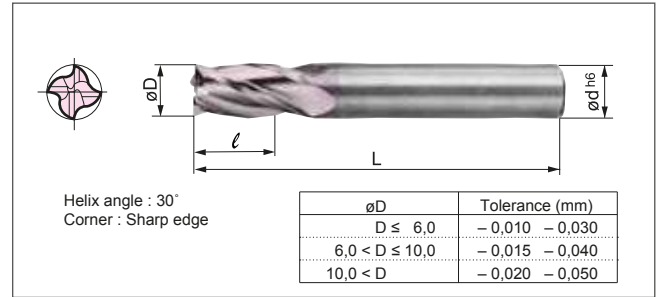
## Endmills

(mm)

	Cat. No.	Stock	øD	ℓ	L	ød
2	SSM 2010ZX	▲	1,0	3	40	4
	SSM 2015ZX	▲	1,5	5	40	4
	SSM 2020ZX	▲	2,0	6	40	4
	SSM 2021ZX		2,1	6	40	4
	SSM 2022ZX		2,2	6	40	4
	SSM 2023ZX		2,3	6	40	4
	SSM 2024ZX		2,4	6	40	4
	SSM 2025ZX	▲	2,5	8	40	4
	SSM 2026ZX		2,6	8	40	4
	SSM 2027ZX		2,7	8	40	4
	SSM 2028ZX		2,8	8	40	4
	SSM 2029ZX		2,9	8	40	4
	SSM 2030ZX	▲	3,0	8	45	6
	SSM 2035ZX	▲	3,5	8	45	6
	SSM 2040ZX	▲	4,0	10	45	6
	SSM 2045ZX	▲	4,5	10	45	6
	SSM 2050ZX	▲	5,0	12	50	6
	SSM 2055ZX	▲	5,5	12	50	6
	SSM 2060ZX	▲	6,0	12	50	6
	SSM 2065ZX	□	6,5	12	50	8
SSM 2070ZX	▲	7,0	15	55	8	
SSM 2075ZX	▲	7,5	15	55	8	
SSM 2080ZX	▲	8,0	15	55	8	
SSM 2085ZX	▲	8,5	15	55	10	
SSM 2090ZX	▲	9,0	15	55	10	
SSM 2095ZX	▲	9,5	15	55	10	
SSM 2100ZX	▲	10,0	18	65	10	
SSM 2105ZX		10,5	18	70	12	
SSM 2110ZX	▲	11,0	18	70	12	
SSM 2115ZX		11,5	18	70	12	
SSM 2120ZX	▲	12,0	18	70	12	
SSM 2130ZX		13,0	20	80	16	
SSM 2140ZX	▲	14,0	20	80	16	
SSM 2150ZX	▲	15,0	25	80	16	
SSM 2160ZX	▲	16,0	35	90	16	
SSM 2180ZX	▲	18,0	40	105	20	
SSM 2200ZX	▲	20,0	40	105	20	

# ZX Coated Spiral Endmills SSM 4000ZX Type

Coated carbide grade: ACZ50



## Endmills

(mm)

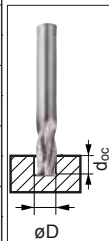
	Cat. No.	Stock	øD	ℓ	L	ød
4	SSM 4015ZX	▲	1,5	5,0	40	4
	SSM 4020ZX	▲	2,0	6,0	40	4
	SSM 4025ZX	▲	2,5	8,0	40	4
	SSM 4030ZX	▲	3,0	8,0	45	6
	SSM 4035ZX	▲	3,5	8,0	45	6
	SSM 4040ZX	▲	4,0	10,0	45	6
	SSM 4045ZX	▲	4,5	10,0	45	6
	SSM 4050ZX	▲	5,0	12,0	50	6
	SSM 4055ZX	▲	5,5	12,0	50	6
	SSM 4060ZX	▲	6,0	12,0	50	6
	SSM 4065ZX	▲	6,5	12,0	50	8
	SSM 4070ZX	▲	7,0	15,0	55	8
	SSM 4075ZX	▲	7,5	15,0	55	8
	SSM 4080ZX	▲	8,0	15,0	55	8
	SSM 4085ZX	▲	8,5	15,0	55	10
	SSM 4090ZX	▲	9,0	15,0	55	10
	SSM 4095ZX	▲	9,5	15,0	55	10
	SSM 4100ZX	▲	10,0	18,0	65	10
	SSM 4105ZX		10,5	18,0	65	12
	SSM 4110ZX	▲	11,0	18,0	70	12
	SSM 4115ZX		11,5	18,0	70	12
	SSM 4120ZX	▲	12,0	18,0	70	12
	SSM 4130ZX	▲	13,0	20,0	80	16
	SSM 4135ZX		13,5	20,0	80	16
	SSM 4140ZX	▲	14,0	20,0	80	16
	SSM 4150ZX	▲	15,0	25,0	80	16
	SSM 4160ZX	▲	16,0	35,0	90	16
	SSM 4170ZX		17,0	35,0	90	20
	SSM 4180ZX		18,0	40,0	105	20
	SSM 4190ZX		19,0	40,0	105	20
	SSM 4200ZX	▲	20,0	40,0	105	20
	SSM 4220ZX		22,0	40,0	105	25
SSM 4240ZX	▲	24,0	45,0	115	25	
SSM 4250ZX		24,0	50,0	120	25	
SSM 4300ZX		30,0	55,0	130	32	
SSM 4320ZX		32,0	55,0	130	32	

## Recommended conditions

(Slotting) øD < ø3 ; d<sub>oc</sub> = 0,5 x øD  
øD ≥ ø3 ; d<sub>oc</sub> = 1,0 x øD

øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel,
		(BelowHRC25)	(BelowHRC45)		Ti-alloy etc.
1,0 ~ 2,9	v <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,003-0,010	0,002-0,005	0,005-0,016	0,002-0,005
3,0 ~ 5,9	v <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,012-0,024	0,006-0,011	0,018-0,040	0,006-0,011
6,0 ~ 12,9	v <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,025-0,050	0,013-0,025	0,045-0,105	0,013-0,025
13,0 ~ 20,0	v <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,055-0,085	0,030-0,050	0,110-0,170	0,030-0,050

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

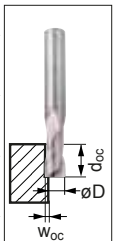


## Recommended conditions

(Shoulder processing) d<sub>oc</sub> = 1,5 x øD  
w<sub>oc</sub> = 0,1 x øD

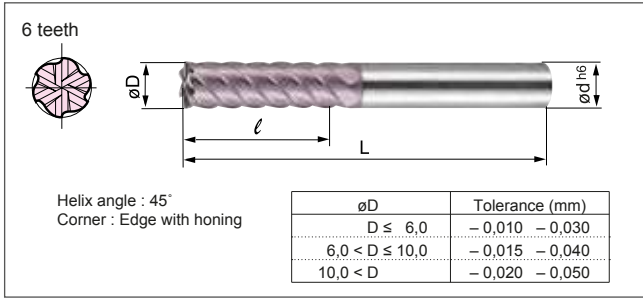
øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel,
		(BelowHRC25)	(BelowHRC45)		Ti-alloy etc.
1,0 ~ 2,9	v <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,004-0,017	0,002-0,008	0,008-0,020	0,002-0,008
3,0 ~ 5,9	v <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,018-0,036	0,009-0,018	0,027-0,060	0,009-0,018
6,0 ~ 12,9	v <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,038-0,070	0,019-0,035	0,065-0,157	0,019-0,035
13,0 ~ 19,9	v <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,075-0,125	0,040-0,075	0,160-0,250	0,040-0,075
20,0 ~ 32,0	v <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,135-0,170	0,085-0,110	0,257-0,390	0,085-0,110

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth



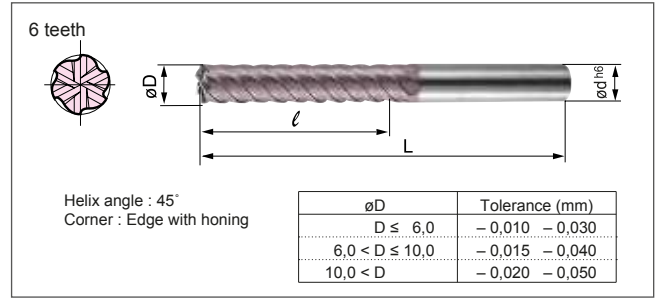
# ZX Coated Long Fast Helix Endmills LHHM 4000/6000/8000 ZX Type

Coated carbide grade: ACZ10M



# ZX Coated Extra Long Fast Helix Endmills EHHM 4000/6000/8000 ZX Type

Coated carbide grade: ACZ10M

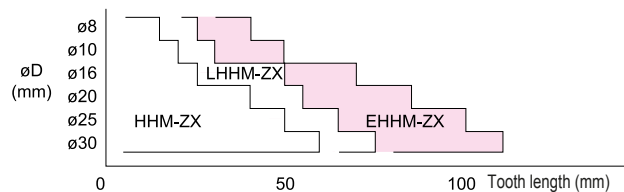
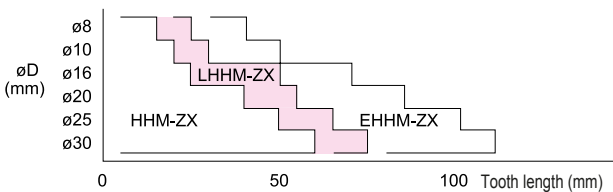


## Endmills (mm)

	Cat. No.	Stock	øD	ℓ	L	ød
4	LHHM 4030ZX	☐	3,0	12	55	6
	LHHM 4040ZX	☐	4,0	15	60	6
	LHHM 4050ZX	☐	5,0	18	60	6
6	LHHM 6060ZX	☐	6,0	18	60	6
	LHHM 6080ZX	☐	8,0	25	75	8
	LHHM 6100ZX	☐	10,0	30	80	10
	LHHM 6120ZX	☐	12,0	30	100	12
8	LHHM 8160ZX	☐	16,0	50	105	16
	LHHM 8200ZX	☐	20,0	55	120	20
	LHHM 8250ZX	☐	25,0	65	140	25
	LHHM 8300ZX	☐	30,0	75	160	32
	LHHM 8320ZX	☐	32,0	85	170	32

## Endmills (mm)

	Cat. No.	Stock	øD	ℓ	L	ød
4	EHHM 4030ZX	☐	3,0	20	60	6
	EHHM 4040ZX	☐	4,0	25	65	6
	EHHM 4050ZX	☐	5,0	30	70	6
6	EHHM 6060ZX	☐	6,0	30	70	6
	EHHM 6080ZX	☐	8,0	40	90	8
	EHHM 6100ZX	☐	10,0	50	100	10
	EHHM 6120ZX	☐	12,0	50	120	12
8	EHHM 8160ZX	☐	16,0	70	140	16
	EHHM 8200ZX	☐	20,0	85	165	20
	EHHM 8250ZX	☐	25,0	100	185	25
	EHHM 8300ZX	☐	30,0	110	205	32
	EHHM 8320ZX	☐	32,0	110	205	32



Recommended conditions (Shoulder processing)  $d_{oc} = 1,5 \times \phi D$   
 $w_{oc} = 0,025(\text{HRC}56-65) \sim 0,2(\text{below HRC}25) \times \phi D$

øD	Material	Carbon steel, Alloy steel		Hardened steel	Cast iron
		(Below HRC25)	(Below HRC45)	(Below HRC65)	
3,0 ~ 5,0	$v_c$	200-250-300	100-150-200	80-100-120	60-75-90
	$f_t$	0,030~0,060	0,022~0,037	0,007~0,015	0,030~0,060
6,0 ~ 12,0	$v_c$	200-250-300	100-150-200	80-100-120	40-50-60
	$f_t$	0,061~0,090	0,037~0,067	0,015~0,028	0,060~0,165
16,0 ~ 32,0	$v_c$	200-250-300	100-150-200	80-100-120	40-50-60
	$f_t$	0,090~0,098	0,067~0,075	0,028~0,038	0,187~0,262

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$

Recommended conditions (Shoulder processing)  $d_{oc} = 1,5 \times \phi D$   
 $w_{oc} = 0,025(\text{HRC}56-65) \sim 0,2(\text{below HRC}25) \times \phi D$

øD	Material	Carbon steel, Alloy steel		Hardened steel	Cast iron
		(Below HRC25)	(Below HRC45)	(Below HRC65)	
3,0 ~ 5,0	$v_c$	200-250-300	100-150-200	80-100-120	100-120-150
	$f_t$	0,020~0,040	0,015~0,025	0,005~0,010	0,020~0,040
6,0 ~ 12,0	$v_c$	200-250-300	100-150-200	80-100-120	100-120-150
	$f_t$	0,041~0,060	0,025~0,045	0,010~0,019	0,040~0,110
16,0 ~ 32,0	$v_c$	200-250-300	100-150-200	80-100-120	100-120-150
	$f_t$	0,060~0,065	0,045~0,050	0,019~0,025	0,125~0,175

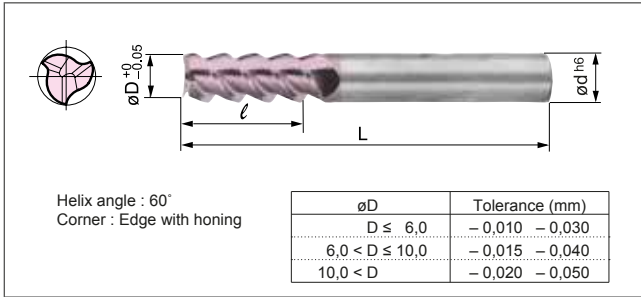
$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$



# ZX Coated Fast Helix Endmills

## HSM 2000/3000/4000 ZX Type

Coated carbide grade: ACZ50



### Endmills

(mm)

	Cat. No.	Stock	øD	ℓ	L	ød
2	HSM 2020ZX	<input type="checkbox"/>	2,0	6	40	4
	HSM 2030ZX	<input type="checkbox"/>	3,0	8	45	6
	HSM 2040ZX	<input type="checkbox"/>	4,0	10	45	6

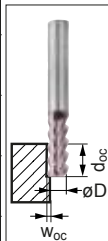
3	HSM 3030ZX	▲	3,0	12	45	6
	HSM 3040ZX	▲	4,0	15	45	6
	HSM 3050ZX	▲	5,0	12	50	6
	HSM 3060ZX	▲	6,0	15	50	6
	HSM 3070ZX	□	7,0	18	60	8
	HSM 3080ZX	▲	8,0	18	60	8
	HSM 3090ZX	□	9,0	20	65	10
	HSM 3100ZX	▲	10,0	25	70	10
	HSM 3110ZX		11,0	25	75	12
	HSM 3120ZX	▲	12,0	30	75	12
	HSM 3130ZX		13,0	30	80	16
	HSM 3140ZX	□	14,0	30	90	16
	HSM 3150ZX	▲	15,0	30	95	16
	HSM 3160ZX	▲	16,0	35	95	16
	HSM 3180ZX		18,0	40	110	20
HSM 3200ZX	□	20,0	40	110	20	

4	HSM 4200ZX	□	20,0	40	110	20
	HSM 4250ZX		25,0	50	120	25

Recommended conditions (Shoulder processing)  $d_{oc} = 1,5 \times \phi D$   
 $w_{oc} = 0,1 \times \phi D$

øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel,
		(BelowHRC25)	(BelowHRC45)		Ti-alloy etc.
1,0 ~ 2,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,010-0,035	0,005-0,017	0,015-0,055	0,005-0,017
3,0 ~ 5,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,040-0,050	0,020-0,025	0,060-0,070	0,020-0,025
6,0 ~ 12,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,055-0,110	0,028-0,055	0,080-0,220	0,028-0,055
13,0 ~ 19,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,120-0,180	0,060-0,090	0,250-0,350	0,060-0,090
20,0 ~ 25,0	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,190-0,245	0,095-0,125	0,380-0,490	0,095-0,125

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$



# High Efficient Endmills SSUP MILL Series



## ■ Features

ZX coated general use endmill for high efficient slotting and side cutting of steels, stainless steels, high temperature alloys and cast irons.

Unique flute design and strong cutting edge ensure excellent chip control even when rough machining slots.

Feed rate up to 2000 mm/min with and without coolant

## ■ Advantages

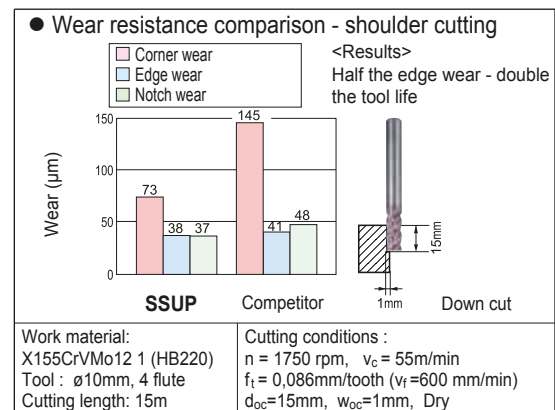
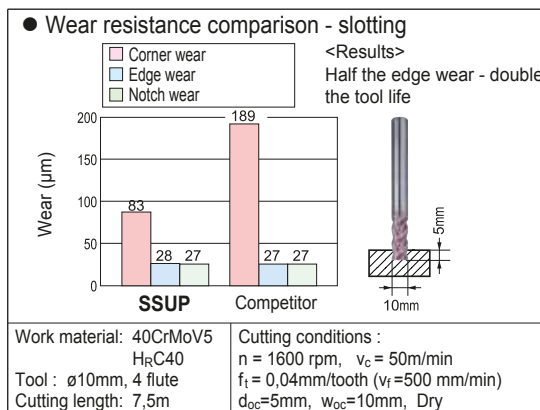
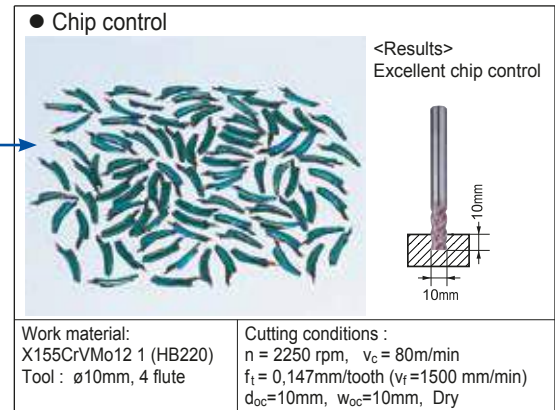
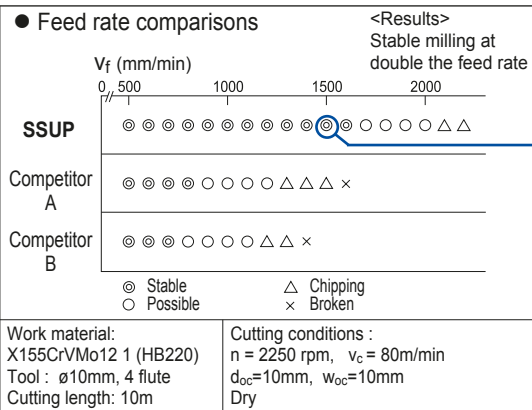
- Unique flute design for excellent chip removal
- Extra strong cutting edge
- 40° high helix angle for high feed rates
- New ZX coating for excellent wear resistance
- Smooth cutting
- Excellent rigid wide cutting land



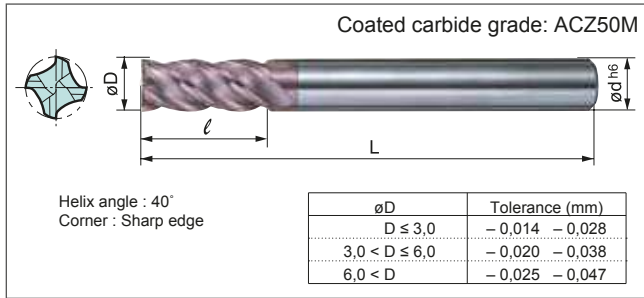
SSUP 4000ZX-R Series  
Diameter and Corner Radius Range

∅D	R	R0,2	R0,3	R0,5	R1,0	R1,5	R2,0	R3,0
∅3		●		●				
∅4		●			●			
∅5		●		●	●			
∅6			●	●	●	●		
∅8			●	●	●	●		
∅10			●	●	●	●	●	
∅12				●	●	●	●	●
∅16					●	●	●	●
∅20						●	●	●

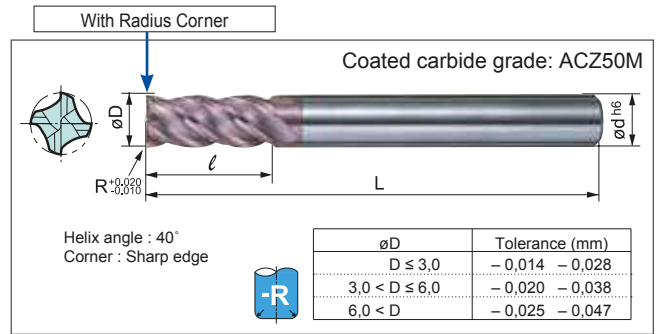
## ■ Performance



# ZX Coated SSUP MILL SSUP 4000ZX Type



# ZX Coated SSUP MILL SSUP 4000ZX-R Type



## Endmills (mm)

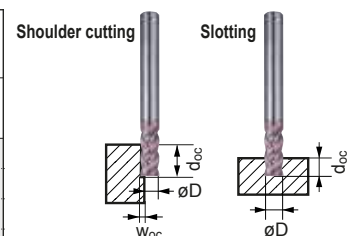
	Cat. No.	Stock	øD	l	L	ød
4	SSUP 4020ZX	●	2,0	6	50	4
	SSUP 4030ZX	●	3,0	8	50	6
	SSUP 4040ZX	●	4,0	11	50	6
	SSUP 4050ZX	●	5,0	13	60	6
	SSUP 4060ZX	●	6,0	13	60	6
	SSUP 4070ZX	●	7,0	16	70	8
	SSUP 4080ZX	●	8,0	19	80	8
	SSUP 4090ZX	●	9,0	19	90	10
	SSUP 4100ZX	●	10,0	22	90	10
	SSUP 4110ZX	●	11,0	22	90	12
	SSUP 4120ZX	●	12,0	26	90	12
	SSUP 4140ZX	●	14,0	26	110	16
	SSUP 4150ZX	□	15,0	26	110	16
	SSUP 4160ZX	●	16,0	32	115	16
	SSUP 4180ZX	□	18,0	32	120	20
	SSUP 4200ZX	●	20,0	38	125	20

## Endmills (mm)

	Cat. No.	Stock	øD	R	l	L	ød
4	SSUP 4030ZX-R02	●	3,0	0,2	8	50	6
	SSUP 4030ZX-R05	□	3,0	0,5	8	50	6
	SSUP 4040ZX-R02	●	4,0	0,2	11	50	6
	SSUP 4040ZX-R05	●	4,0	0,5	11	50	6
	SSUP 4040ZX-R10	□	4,0	1,0	11	50	6
	SSUP 4050ZX-R02	●	5,0	0,2	13	60	6
	SSUP 4050ZX-R05	●	5,0	0,5	13	60	6
	SSUP 4050ZX-R10	□	5,0	1,0	13	60	6
	SSUP 4060ZX-R03	●	6,0	0,3	13	60	6
	SSUP 4060ZX-R05	●	6,0	0,5	13	60	6
	SSUP 4060ZX-R10	●	6,0	1,0	13	60	6
	SSUP 4060ZX-R15	□	6,0	1,5	13	60	6
	SSUP 4080ZX-R03	●	8,0	0,3	13	80	8
	SSUP 4080ZX-R05	●	8,0	0,5	13	80	8
	SSUP 4080ZX-R10	●	8,0	1,0	19	80	8
	SSUP 4080ZX-R15	□	8,0	1,5	19	80	8
	SSUP 4080ZX-R20	□	8,0	2,0	19	80	8
	SSUP 4100ZX-R03	●	10,0	0,3	22	90	10
	SSUP 4100ZX-R05	●	10,0	0,5	22	90	10
	SSUP 4100ZX-R10	●	10,0	1,0	22	90	10
	SSUP 4100ZX-R15	□	10,0	1,5	22	90	10
	SSUP 4100ZX-R20	□	10,0	2,0	22	90	10
	SSUP 4120ZX-R05	●	12,0	0,5	26	90	12
	SSUP 4120ZX-R10	●	12,0	1,0	26	90	12
	SSUP 4120ZX-R15	●	12,0	1,5	26	90	12
	SSUP 4120ZX-R20	□	12,0	2,0	26	90	12
	SSUP 4120ZX-R30	□	12,0	3,0	26	90	12
	SSUP 4160ZX-R10	●	16,0	1,0	32	115	16
	SSUP 4160ZX-R15	●	16,0	1,5	32	115	16
	SSUP 4160ZX-R20	□	16,0	2,0	32	115	16
	SSUP 4160ZX-R30	□	16,0	3,0	32	115	16
	SSUP 4200ZX-R10	●	20,0	1,0	38	125	20
	SSUP 4200ZX-R15	□	20,0	1,5	38	125	20
	SSUP 4200ZX-R20	□	20,0	2,0	38	125	20
	SSUP 4200ZX-R30	□	20,0	3,0	38	125	20

## Recommended Cutting Conditions

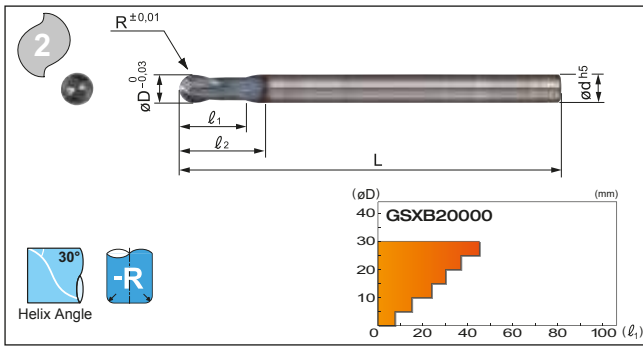
Material	Carbon steel, Cast iron (H <sub>B</sub> 150~250)		Alloy steel, Prehardened steel (HRC25~35)		Hardened steel (HRC40~50)		Stainless steel		Heat resistant alloys Titanium alloy (HRC20~45)	
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
2	9000	720	6000	430	4000	320	5500	320	2600	120
4	6600	800	4500	450	3000	380	4000	320	2000	120
6	4800	960	3000	480	2500	380	3000	480	1200	120
8	3600	1000	2200	610	2000	400	2000	520	1000	140
10	2800	1000	1800	610	1500	400	1700	550	800	160
12	2400	950	1500	550	1200	380	1500	500	700	140
14	2200	880	1300	490	1000	360	1200	430	600	130
16	1800	650	1100	420	800	300	1000	360	500	120
18	1600	580	1000	360	750	270	900	340	450	110
20	1400	500	900	330	700	250	820	300	400	100
Shoulder cutting	d <sub>oc</sub>	1,5D								
	W <sub>oc</sub>	0,1D		0,05D		0,1D		0,05D		
Slotting	d <sub>oc</sub>	1,0D		0,2D		0,3D		0,2D		



- (1) Cutting performance is improved when using a high rigidity machine.
- (2) Speeds and feeds should be reduced when slotting some stainless steels.
- (3) In case of chatter first check the cutting conditions.

# GSX MILL Ball Endmills GSXB 20000 Type

Coated Carbide Grades	GSX Coating	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
		○	○	○	○	○	○	○	○	○	○	○	○



## Endmills

Cat. No.	Stock	R	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
GSXB 20020	●	0,20	0,4	0,6	0,8	50	4
GSXB 20030	●	0,30	0,6	0,9	1,2	50	4
GSXB 20050	●	0,50	1,0	1,5	2,0	50	4
GSXB 20075	●	0,75	1,5	2,5	3,0	50	4
GSXB 20100	●	1,00	2,0	3,0	4,0	60	6
GSXB 20125	●	1,25	2,5	4,0	5,0	60	6
GSXB 20150	●	1,50	3,0	4,5	6,0	60	6
GSXB 20200	●	2,00	4,0	6,0	8,0	70	6
GSXB 20250	●	2,50	5,0	7,5	10,0	80	6
GSXB 20300	●	3,00	6,0	9,0	—	80	6
GSXB 20350	●	3,50	7,0	11,0	20,0	90	8
GSXB 20400	●	4,00	8,0	12,0	—	90	8
GSXB 20500	●	5,00	10,0	15,0	—	100	10
GSXB 20600	●	6,00	12,0	18,0	—	110	12
GSXB 20700	●	7,00	14,0	21,0	38,0	110	16
GSXB 20800	●	8,00	16,0	24,0	—	140	16
GSXB 20900	●	9,00	18,0	27,0	50,0	140	20
GSXB 21000	●	10,00	20,0	30,0	—	160	20
GSXB 21250	●	12,50	25,0	38,0	—	180	25
GSXB 21500	●	15,00	30,0	45,0	80,0	180	32

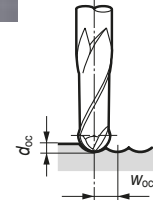
## Endmill Identification (GSXB Type)

# GSXB 2 0200

- ① Series Code
- ② No. of Teeth
- ③ Radius of Ballnose



New "Global Standard" Mills  
Ball nose type with 2 teeth



## Recommended Cutting Conditions

- If cutting noise and vibration are present, please change the cutting conditions accordingly.
- If the machine is not designed to achieve the recommended spindle speed, please use the max. spindle speed available.

## Radius Milling

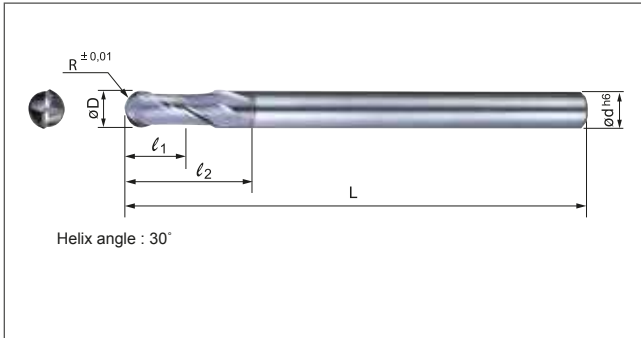
Work Material	Carbon Steel, Alloy Steel (Below 25HRC)		Carbon Steel, Alloy Steel (Below 50HRC)		Cast Iron Special Cast Iron		Stainless Steel Titanium Alloy	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
0,20	50.000	2.100	35.000	1.150	50.000	2.100	50.000	1.750
0,30	50.000	2.500	35.000	1.350	50.000	2.500	50.000	2.100
0,50	50.000	3.000	35.000	1.600	50.000	3.000	50.000	2.500
0,75	35.000	3.000	24.000	1.650	35.000	3.200	34.000	2.500
1,00	27.500	3.000	19.000	1.700	35.000	3.900	26.000	2.500
1,25	22.500	3.000	15.500	1.700	28.000	3.900	21.000	2.500
1,50	19.000	3.000	13.000	1.700	24.000	3.900	17.500	2.500
2,00	17.000	3.800	12.000	2.100	20.000	4.100	15.000	2.700
2,50	15.500	4.300	11.000	2.200	18.000	4.600	12.000	2.500
3,00	14.000	4.700	10.500	2.500	16.500	5.300	10.500	2.500
3,50	12.500	4.200	9.000	2.100	14.000	4.500	9.000	2.200
4,00	11.000	3.500	7.900	1.900	12.500	4.000	7.800	1.900
5,00	9.000	2.800	6.300	1.500	10.500	3.300	6.300	1.500
6,00	7.500	2.400	5.200	1.250	8.700	2.800	5.200	1.250
7,00	6.400	2.100	4.500	1.100	7.400	2.400	4.500	1.100
8,00	5.600	1.800	3.900	950	6.500	2.100	3.900	950
9,00	5.000	1.600	3.500	850	5.800	1.900	3.500	850
10,00	4.500	1.450	3.100	750	5.200	1.700	3.150	750
12,50	3.600	1.150	2.500	600	4.200	1.350	2.500	600
15,00	3.000	960	2.100	500	3.500	1.150	2.100	500

Depth and wide of cut	d <sub>oc</sub>	0,02 D	0,02 D	0,02 D	0,02 D
	W <sub>oc</sub>	0,05 D	0,05 D	0,05 D	0,05 D

- = Euro stock
- ▲ = To be replaced by new item

# GS MILL Ball Endmills GLB 2000SF Type

Coated carbide grade: **ACZ20W**



## Endmills

(mm)

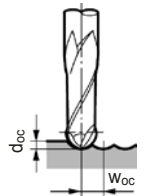
	Cat. No.	Stock	R	øD	ℓ <sub>1</sub>	ℓ <sub>2</sub>	L	øD
2	GLB 2010 SF	▲	0,5	1,0	1,5	2	50	4
	GLB 2015 SF	▲	0,75	1,5	2,5	3	50	4
	GLB 2020 SF	▲	1,0	2,0	3	4	60	6
	GLB 2025 SF	▲	1,25	2,5	4	5	60	6
	GLB 2030 SF	▲	1,5	3,0	4,5	6	60	6
	GLB 2040 SF	▲	2,0	4,0	6	8	70	6
	GLB 2050 SF	▲	2,5	5,0	7,5	10	80	6
	GLB 2060 SF	▲	3,0	6,0	9	-	80	6
	GLB 2080 SF	▲	4,0	8,0	12	-	90	8
	GLB 2100 SF	▲	5,0	10,0	15	-	100	10
GLB 2120 SF	▲	6,0	12,0	21	-	110	12	

## Recommended Cutting Conditions

### Conventional Milling Operations

Recommended :

- (1) Cutting performance is enhanced when using a high quality machine and rigid set up.
- (2) In case of chatter check immediately rigidity of set up and the cutting conditions.



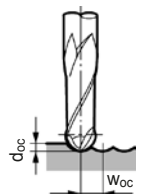
## ● GS Mill, 2 teeth ball nose type endmill, GLB 2000SF

Material Cutting data R (mm)	Carbon steel, Cast iron (HB150~250)		Alloy steel, Prehardened steel (HRC25~35)		Heat treated alloy steel, hardened steel (HRC35~45)		Hardened steel (HRC45~55)		Stainless steel		Heat resistant alloys Titanium alloy		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
R = 1	19.100	770	12.800	370	10.200	270	8.900	190	8.900	210	6.400	120	
R = 2	10.800	1.100	7.200	550	5.700	400	5.000	280	5.000	310	3.600	180	
R = 3	7.700	1.300	5.200	660	4.100	480	3.600	330	3.600	380	2.600	210	
R = 4	6.000	1.400	4.000	700	3.200	510	2.800	360	2.800	400	2.000	230	
R = 5	4.800	1.400	3.200	700	2.600	520	2.300	370	2.300	410	1.600	230	
R = 6	4.000	1.400	2.700	710	2.200	530	1.900	370	1.900	410	1.400	240	
Depth and width of cut	d <sub>oc</sub>	0,1D				0,05D				0,1D		0,05D	
	W <sub>oc</sub>	0,2D				0,05D				0,2D		0,1D	

### HSC Machining Centre Operations

## ● GS Mill, HSC operations with 2 teeth ball nose type endmill, GLB 2000SF

Material Cutting data R (mm)	Carbon steel, Cast iron (HB150~250)		Alloy steel, Prehardened steel (HRC25~35)		Heat treated alloy steel, hardened steel (HRC35~45)		Hardened steel (HRC45~55)		Stainless steel		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
R = 1	51.000	2.100	39.800	1.300	35.700	960	23.700	640	35.700	960	
R = 2	25.500	2.700	19.900	1.700	17.900	1.300	11.900	830	17.900	1.300	
R = 3	17.000	3.000	13.300	1.900	11.900	1.400	7.900	920	11.900	1.400	
R = 4	12.800	3.100	10.000	2.000	9.000	1.500	6.000	960	9.000	1.500	
R = 5	10.200	3.100	8.000	2.000	7.200	1.500	4.800	960	7.200	1.500	
R = 6	8.500	3.100	6.700	2.000	6.000	1.500	4.000	960	6.000	1.500	
Depth and width of cut	d <sub>oc</sub>	0,05D				0,02D				0,05D	
	W <sub>oc</sub>	0,1D				0,05D				0,1D	



# High Efficient Endmills Ball Endmills "Neo"

Extreme Hard ZX Coated Ball Endmills

Grade: ACZ10M



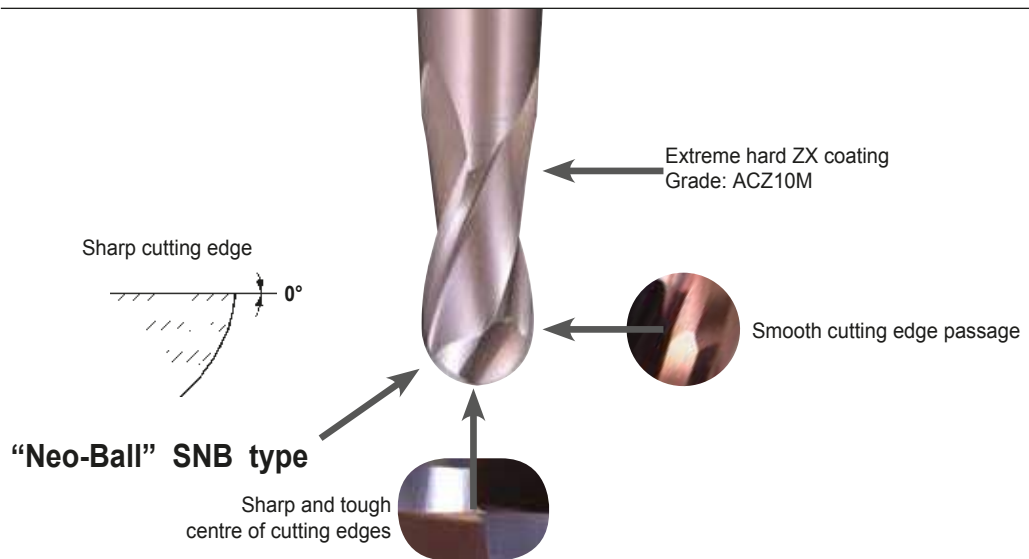
## ■ Features

ZX coated ball-nose endmill "Neo" features the wave shaped sharp cutting edge for optimized chip control and performs a variety of high performance machining steels, stainless steels and high temperature alloys.

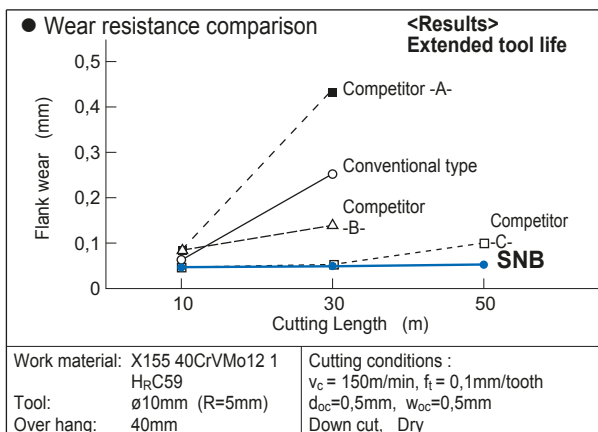
Extended tool life is realized even when hard machining thanks to a special stiff substrate and new ultra hard ZX coating.

## ■ Advantages

- Smooth cutting due to sharp cutting edge
- Smooth passage at the cutting edge of radius part and straight part
- Sharp and tough ball-nose centre
- Extra durable due to the combination of extreme hard ZX coating (Hv4000) and stiff substrate
- Possible to high precision cutting with this high young ratio substrate



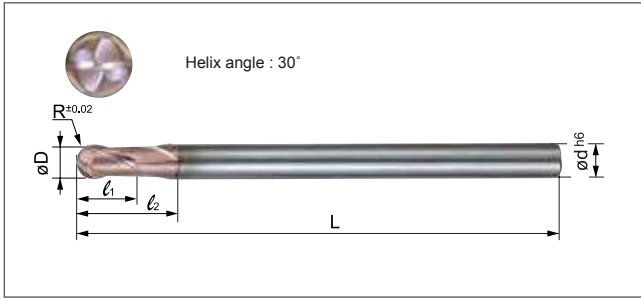
## ■ Performance



# ZX Coated "Neo Ball" Endmills SNB 2000ZX Type

2

Coated carbide grade: ACZ10M



## Endmills

(mm)

	Cat. No.	Stock	R	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
2	SNB 2010ZX	●	0,5	1	1,5	3	50	4
	SNB 2020ZX	●	1,0	2	3,0	5	60	6
	SNB 2030ZX	●	1,5	3	4,5	8	80	6
	SNB 2040ZX	●	2,0	4	6,0	12	80	6
	SNB 2050ZX	●	2,5	5	7,5	14	90	6
	SNB 2060ZX	●	3,0	6	9,0	-	100	6
	SNB 2070ZX	□	3,5	7	11,0	20	100	8
	SNB 2080ZX	●	4,0	8	12,0	-	100	8
	SNB 2100ZX	●	5,0	10	15,0	-	120	10
	SNB 2120ZX	●	6,0	12	18,0	-	120	12
	SNB 2140ZX	●	7,0	14	21,0	38	160	16
	SNB 2160ZX	●	8,0	16	24,0	-	160	16
	SNB 2180ZX	●	9,0	18	27,0	50	180	20
	SNB 2200ZX	●	10,0	20	30,0	-	180	20
	SNB 2250ZX		12,5	25	38,0	-	200	25
	SNB 2300ZX		15,0	30	45,0	80	200	32



## Recommended conditions

$d_{oc} = 0,3 \times \text{øD}$ , (Below R1,0 ;  $0,2 \times \text{øD}$ )  
 $w_{oc} = 0,7 \times \text{øD}$ , (Below R1,0 ;  $0,6 \times \text{øD}$ )

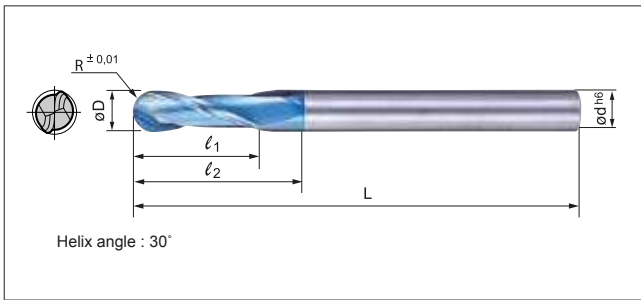
R	Material	Carbon steel, Alloy steel		Hardened steel	Cast iron	Stainless steel, Ti-alloy etc.
		(BelowHRC25)	(BelowHRC45)			
R0,5 ~ R1,4	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,005~0,010	0,003~0,005	0,002~0,003	0,008~0,015	0,003~0,005
R1,5 ~ R2,9	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,013~0,025	0,007~0,013	0,005~0,008	0,017~0,042	0,007~0,013
R3,0 ~ R6,4	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,030~0,050	0,017~0,033	0,010~0,020	0,056~0,136	0,017~0,033
R6,5 ~ R9,9	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,070~0,100	0,040~0,057	0,020~0,040	0,167~0,238	0,040~0,057
R10,0 ~ R15,0	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,118~0,167	0,085~0,095	0,045~0,080	0,250~0,350	0,085~0,095

$v_c$  =m/min  $f_t$  =mm/tooth

# AURORA Coated Ball Endmills SNB 2000DL Type

## DLC (Diamond Like Carbon) Coating

DLC coated carbide grade: DL1200

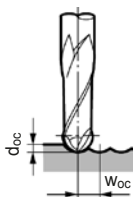


### Endmills (mm)

	Cat. No.	Stock	R	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
2	SNB 2020 DL	●	1,0	2,0	3	5	60	6
	SNB 2030 DL	●	1,5	3,0	4,5	8	80	6
	SNB 2040 DL	●	2,0	4,0	6	12	80	6
	SNB 2050 DL	●	2,5	5,0	7,5	14	90	6
	SNB 2060 DL	●	3,0	6,0	9	—	100	6
	SNB 2080 DL	●	4,0	8,0	12	—	100	8
	SNB 2100 DL	●	5,0	10,0	15	—	120	10
	SNB 2120 DL	●	6,0	12,0	18	—	120	12
	SNB 2160 DL	●	8,0	16,0	24	—	160	16

### Characteristics / Application

- Very smooth AURORA COAT results in low adhesion as well as good surface finish
- With lower cutting forces and high rigidity, this series is suitable for low rigidity machine



### Recommended Cutting Conditions

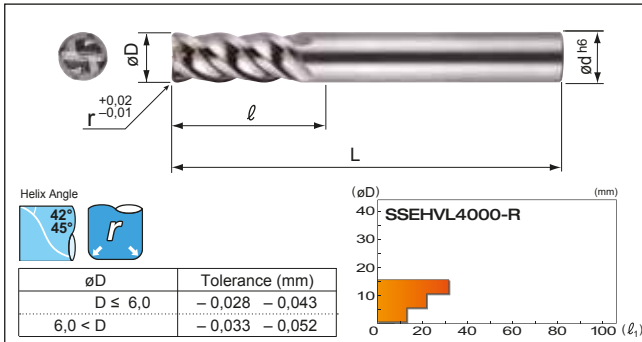
Work Material	Aluminum Alloy				
	Cutting data	Wet (Emulsion)		Dry	
		Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
R = 1	48.000	1.500	48.000	1.000	
R = 1,5	48.000	2.100	48.000	1.500	
R = 2	31.000	2.800	31.000	2.000	
R = 2,5	24.000	2.800	24.000	2.000	
R = 3	20.000	2.800	20.000	2.000	
R = 4	15.000	2.800	15.000	2.000	
R = 5	13.000	3.000	13.000	2.100	
R = 6	10.000	3.000	10.000	2.100	
R = 8	7.700	3.000	7.700	2.100	
Depth and wide of cut	d <sub>oc</sub>	1,5D		1,0D	
	w <sub>oc</sub>	0,2D		(D)	

● = Euro stock



# SSEHVL 4000-R Type

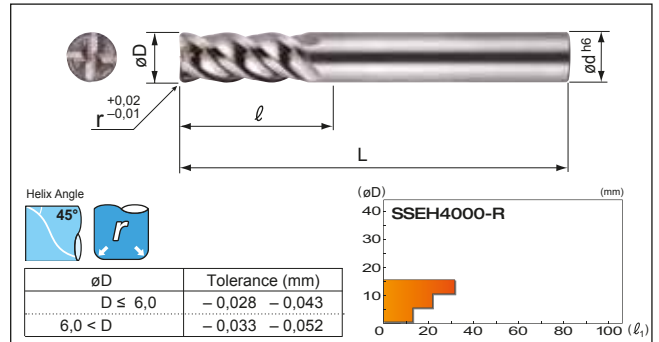
Uncoated Carbide	4	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
							45-55 HRC	55-60 HRC	60-65 HRC				



Carbide grade: EH520

# SSEH 4000-R Type

Uncoated Carbide	4	Structural Steel	Carbon Steel	Alloy Steel	Pre-hardened Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	Graphite
							45-55 HRC	55-60 HRC	60-65 HRC				



Carbide grade: EH520

## Endmills

(mm)

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
SSEHVL 4045-R05	●	4,5	0,5	12	50	6
SSEHVL 4045-R10	●	4,5	1,0	12	50	6
SSEHVL 4050-R05	●	5,0	0,5	13	60	6
SSEHVL 4050-R10	●	5,0	1,0	13	60	6
SSEHVL 4060-R10	●	6,0	1,0	13	60	6
SSEHVL 4080-R10	●	8,0	1,0	19	80	8
SSEHVL 4100-R10	●	10,0	1,0	22	90	10
SSEHVL 4100-R30	●	10,0	3,0	22	90	10
SSEHVL 4120-R10	●	12,0	1,0	26	90	12
SSEHVL 4120-R30	●	12,0	3,0	26	90	12
SSEHVL 4160-R10	●	16,0	1,0	32	115	16
SSEHVL 4160-R30	●	16,0	3,0	32	115	16

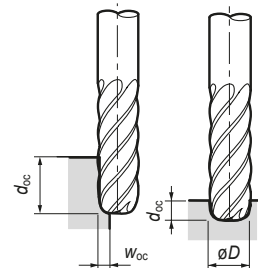
## Endmills

(mm)

Cat. No.	Stock	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
SSEH 4045-R05	●	4,5	0,5	12	50	6
SSEH 4045-R10	●	4,5	1,0	12	50	6
SSEH 4050-R05	●	5,0	0,5	13	60	6
SSEH 4050-R10	●	5,0	1,0	13	60	6
SSEH 4060-R10	●	6,0	1,0	13	60	6
SSEH 4080-R10	●	8,0	1,0	19	80	8
SSEH 4100-R10	●	10,0	1,0	22	90	10
SSEH 4100-R30	●	10,0	3,0	22	90	10
SSEH 4120-R10	●	12,0	1,0	26	90	12
SSEH 4120-R30	●	12,0	3,0	26	90	12
SSEH 4160-R10	●	16,0	1,0	32	115	16
SSEH 4160-R30	●	16,0	3,0	32	115	16

## Characteristics / Application

- For stable machining, a more rigid machine is recommended.
- Wet machining is recommended for stainless steel and heat resistant alloy applications.
- If cutting noise and vibration are present, please change the cutting conditions accordingly.



### Shoulder Milling

Work Material Cond.	Stainless Steel		Titanium Alloy		Heat Resisive Steel	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)						
4,5	2.300	120	4.600	370	1.600	130
5,0	2.000	130	4.100	410	1.500	150
6,0	1.700	130	3.400	400	1.200	140
8,0	1.300	130	2.600	360	900	130
10,0	1.000	130	2.100	340	700	110
12,0	800	110	1.700	300	600	100
16,0	600	90	1.300	260	500	100
Shoulder cutting	$d_{oc}$		$1,5 D$		$0,05 D$	
	$w_{oc}$		$0,1 D$		$0,05 D$	

### Shoulder Milling

Work Material Cond.	Stainless Steel		Titanium Alloy		Heat Resisive Steel	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)						
4,5	1.800	90	3.500	280	1.400	110
5,0	1.600	100	3.200	320	1.300	130
6,0	1.300	100	2.700	320	1.100	130
8,0	1.000	100	2.000	280	800	110
10,0	800	100	1.600	260	600	100
12,0	700	100	1.300	230	500	90
16,0	500	80	1.000	200	400	80
Shoulder cutting	$d_{oc}$		$1,5 D$		$0,05 D$	
	$w_{oc}$		$0,1 D$		$0,05 D$	

### Grooving

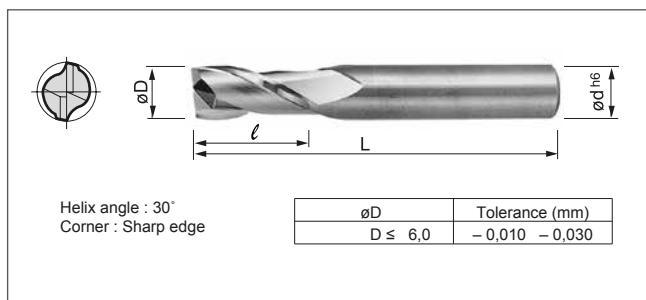
Work Material Cond.	Stainless Steel		Titanium Alloy		Heat Resisive Steel	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)						
4,5	1.800	50	3.200	250	1.300	110
5,0	1.600	50	2.900	290	1.200	120
6,0	1.400	50	2.400	290	1.000	120
8,0	1.000	50	1.800	250	700	90
10,0	800	50	1.400	230	600	100
12,0	600	50	1.200	210	500	90
16,0	500	40	900	180	400	80
Grooving	$d_{oc}$		$0,3 D$		$0,15 D$	

### Grooving

Work Material Cond.	Stainless Steel		Titanium Alloy		Heat Resisive Steel	
	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)	Spindle Speed (rpm)	Feed Rate (mm/min)
øD (mm)						
4,5	1.400	40	2.500	200	1.100	90
5,0	1.300	40	2.200	220	1.000	100
6,0	1.100	40	1.900	230	800	100
8,0	800	40	1.400	200	600	80
10,0	600	40	1.100	180	500	80
12,0	500	40	900	160	400	70
16,0	400	30	700	140	300	60
Grooving	$d_{oc}$		$0,3 D$		$0,15 D$	

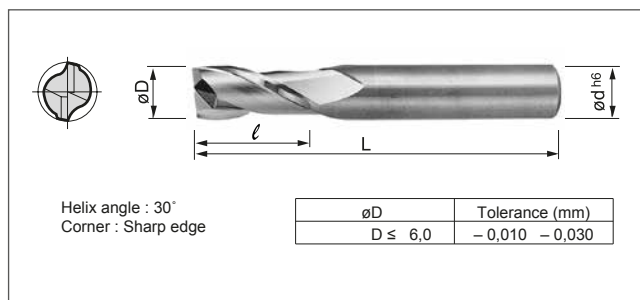
# Solid Carbide Spiral Endmills SSM 2000 Type ( $\phi 0,2 \sim \phi 4,3$ )

Carbide grade: A1 (Micrograin)



# Solid Carbide Spiral Endmills SSM 2000 Type ( $\phi 4,4 \sim \phi 8,5$ )

Carbide grade: A1 (Micrograin)



## Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	<b>SSM 2002</b>	●		0,5	40	3
	<b>SSM 2003</b>	●	0,3	1	40	3
	<b>SSM 2004</b>	●	0,4	1	40	3
	<b>SSM 2005</b>	●	0,5	1,5	40	3
	<b>SSM 2006</b>	●	0,6	1,5	40	3
	<b>SSM 2007</b>	●	0,7	1,5	40	3
	<b>SSM 2008</b>	●	0,8	2	40	3
	<b>SSM 2009</b>	●	0,9	2	40	3
	<b>SSM 2010</b>	●	1,0	3	40	
	<b>SSM 2011</b>	□	1,1		40	
	<b>SSM 2012</b>	□	1,2		40	
	<b>SSM 2013</b>		1,3		40	
	<b>SSM 2014</b>		1,4		40	
	<b>SSM 2015</b>	●	1,5	5	40	4
	<b>SSM 2016</b>		1,6	5	40	4
	<b>SSM 2017</b>		1,7	5	40	4
	<b>SSM 2018</b>		1,8	5	40	4
	<b>SSM 2019</b>		1,9	5	40	4
	<b>SSM 2020</b>	●	2,0	6	40	4
	<b>SSM 2021</b>		2,1	6	40	4
	<b>SSM 2022</b>	□	2,2	6	40	4
	<b>SSM 2023</b>	□	2,3	6	40	4
	<b>SSM 2024</b>	□	2,4	6	40	4
	<b>SSM 2025</b>	●	2,5	8	40	4
	<b>SSM 2026</b>		2,6	8	40	4
	<b>SSM 2027</b>	●	2,7	8	40	4
	<b>SSM 2028</b>	□	2,8	8	40	4
	<b>SSM 2029</b>		2,9	8	40	4
	<b>SSM 2030</b>	●	3,0	8	45	6
	<b>SSM 2031</b>	□	3,1	8	45	6
	<b>SSM 2032</b>	□	3,2	8	45	6
	<b>SSM 2033</b>		3,3	8	45	6
	<b>SSM 2034</b>	□	3,4	8	45	6
	<b>SSM 2035</b>	●	3,5	8	45	6
	<b>SSM 2036</b>		3,6	10	45	6
	<b>SSM 2037</b>		3,7	10	45	6
	<b>SSM 2038</b>	□	3,8	10	45	6
	<b>SSM 2039</b>	□	3,9	10	45	6
	<b>SSM 2040</b>	●	4,0	10	45	6
	<b>SSM 2041</b>	□	4,1	10	45	6
	<b>SSM 2042</b>	□	4,2	10	45	6
	<b>SSM 2043</b>		4,3	10	45	6

## Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	<b>SSM 2044</b>	□	4,4	10	45	6
	<b>SSM 2045</b>	●	4,5	10	45	6
	<b>SSM 2046</b>		4,6	12	50	6
	<b>SSM 2047</b>		4,7	12	50	6
	<b>SSM 2048</b>		4,8	12	50	6
	<b>SSM 2049</b>		4,9	12	50	6
	<b>SSM 2050</b>	●	5,0	12	50	6
	<b>SSM 2051</b>	□	5,1	12	50	6
	<b>SSM 2052</b>		5,2	12	50	
	<b>SSM 2053</b>		5,3		50	
	<b>SSM 2054</b>		5,4	12	50	6
	<b>SSM 2055</b>	●	5,5	12	50	6
	<b>SSM 2056</b>		5,6	12	50	6
	<b>SSM 2057</b>		5,7	12	50	6
	<b>SSM 2058</b>		5,8	12	50	6
	<b>SSM 2059</b>		5,9	12	50	6
	<b>SSM 2060</b>	●	6,0	12	50	6
	<b>SSM 2061</b>		6,1	12	50	6
	<b>SSM 2062</b>	□	6,2	12	50	6
	<b>SSM 2063</b>	□	6,3	12	50	6
	<b>SSM 2064</b>		6,4	12		6
	<b>SSM 2065</b>	●	6,5	12	50	8
	<b>SSM 2066</b>	□	6,6		55	8
	<b>SSM 2067</b>		6,7	15	55	8
	<b>SSM 2068</b>		6,8	15	55	8
	<b>SSM 2069</b>		6,9	15	55	8
	<b>SSM 2070</b>	●	7,0	15	55	8
	<b>SSM 2071</b>	□	7,1	15	55	8
	<b>SSM 2072</b>		7,2	15	55	8
	<b>SSM 2073</b>		7,3	15	55	8
	<b>SSM 2074</b>		7,4	15	55	8
	<b>SSM 2075</b>	●	7,5	15	55	8
	<b>SSM 2076</b>		7,6	15	55	8
	<b>SSM 2077</b>		7,7	15	55	8
	<b>SSM 2078</b>		7,8	15	55	8
	<b>SSM 2079</b>		7,9	15	55	8
	<b>SSM 2080</b>	●	8,0	15	55	8
	<b>SSM 2081</b>	□	8,1	15	55	8
	<b>SSM 2082</b>	□	8,2	15	55	8
	<b>SSM 2083</b>		8,3	15	55	8
	<b>SSM 2084</b>		8,4	15	55	8
	<b>SSM 2085</b>	●	8,5	15	55	10

Recommended Conditions (Slotting) øD < ø3 ; d<sub>oc</sub> = 0,5 x øD  
øD ≥ ø3 ; d<sub>oc</sub> = 1,0 x øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
0,2 ~ 0,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	~ 0,002	~ 0,002	~ 0,001	0,002~0,004
1,0 ~ 2,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,003~0,010	0,003~0,010	0,002~0,005	0,005~0,017
3,0 ~ 4,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,012~0,024	0,012~0,024	0,006~0,011	0,018~0,040

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

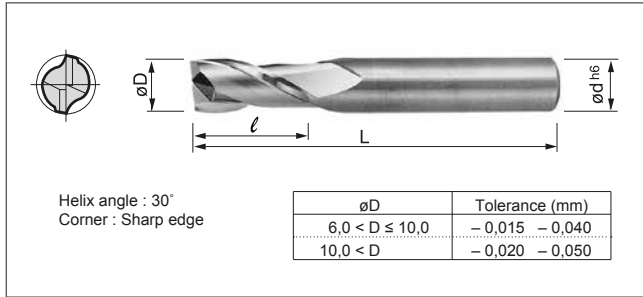
Recommended Conditions (Slotting) øD ≥ ø3 ; d<sub>oc</sub> = 1,0 x øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
5 ~ 5,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,012~0,024	0,012~0,024	0,006~0,011	0,018~0,040
6 ~ 8,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,025~0,050	0,025~0,050	0,013~0,025	0,045~0,105

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

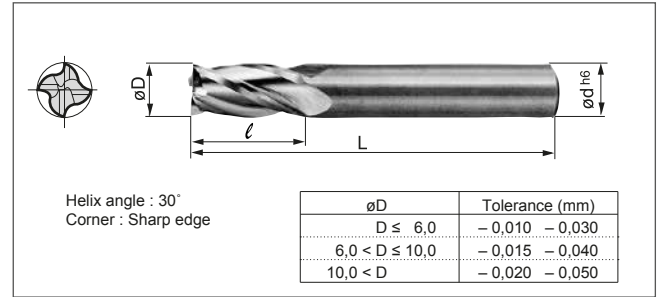
# Solid Carbide Spiral Endmills SSM 2000 Type (ø8,6~ø30)

Carbide grade: A1 (Micrograin)



# Solid Carbide Spiral Endmills SSM 4000 Type (ø1,5~ø25)

Carbide grade: A1 (Micrograin)



## Endmills (mm)

	Cat. No.	Stock	øD	ℓ	L	ød
2	SSM 2086	○	8,6	15	55	10
	SSM 2087		8,7	15	55	10
	SSM 2088		8,8	15	55	10
	SSM 2089		8,9	15	55	10
	SSM 2090	●	9,0	15	55	10
	SSM 2091		9,1	15	55	10
	SSM 2092		9,2	15	55	10
	SSM 2093		9,3	15	55	10
	SSM 2094		9,4	15	55	10
	SSM 2095		9,5	15	55	10
	SSM 2096		9,6	18	65	10
	SSM 2097		9,7	18	65	10
	SSM 2098		9,8	18	65	10
	SSM 2099		9,9	18	65	10
	SSM 2100	●	10,0	18	65	10
	SSM 2105	□	10,5	18	70	12
	SSM 2110	●	11,0	18	70	12
	SSM 2115	●	11,5	18	70	12
	SSM 2120	●	12,0	18	70	12
	SSM 2125		12,5	20	80	16
SSM 2130	●	13,0	20	80	16	
SSM 2135		13,5		80	16	
SSM 2140	●	14,0	20	80	16	
SSM 2145		14,5	25	80	16	
SSM 2150	●	15,0	25	80	16	
SSM 2155		15,5	35	90	16	
SSM 2160	●	16,0	35	90	16	
SSM 2165		16,5	35	90	20	
SSM 2170	●	17,0	35	90	20	
SSM 2175		17,5	40	105	20	
SSM 2180	●	18,0	40	105	20	
SSM 2185		18,5	40	105	20	
SSM 2190		19,0	40	105	20	
SSM 2195		19,5	40	105	20	
SSM 2200	●	20,0	40	105	20	
SSM 2210	●	21,0	40	105	25	
SSM 2220	●	22,0	40		25	
SSM 2230	●		45	115	25	
SSM 2240		24,0	45	115	25	
SSM 2250	●		50		25	
SSM 2300			55	130	32	

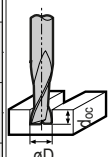
## Endmills (mm)

	Cat. No.	Stock	øD	ℓ	L	ød
4	SSM 4015	●	1,5	5	40	4
	SSM 4020	●	2,0	6	40	4
	SSM 4025	●	2,5	8	40	4
	SSM 4030	●	3,0	8	45	6
	SSM 4035	●	3,5	8	45	6
	SSM 4040	●	4,0	10	45	6
	SSM 4045	●	4,5	10	45	6
	SSM 4050	●	5,0	12	50	6
	SSM 4055	●	5,5	12	50	6
	SSM 4060	●	6,0	12	50	6
	SSM 4065	●	6,5	12	50	8
	SSM 4070	●	7,0	15	55	8
	SSM 4075	●	7,5	15	55	8
	SSM 4080	●	8,0	15	55	8
	SSM 4085	●	8,5	15	55	10
	SSM 4090	●	9,0	15	55	10
	SSM 4095	●	9,5	15	55	10
	SSM 4100	●	10,0	18	65	10
	SSM 4105		10,5	18	65	12
	SSM 4110	●	11,0	18	70	12
	SSM 4120	●	12,0	18	70	12
	SSM 4130		13,0	20	80	16
	SSM 4140	●	14,0	20	80	16
	SSM 4150	●	15,0	25	80	16
	SSM 4160	●	16,0	35	90	16
	SSM 4170	□	17,0	35	90	20
	SSM 4180	●	18,0	40	105	20
	SSM 4190		19,0	40	105	20
	SSM 4200	●	20,0	40	105	20
	SSM 4210		21,0	40	105	25
	SSM 4220		22,0	40	105	25
	SSM 4230		23,0	45	115	25
	SSM 4240		24,0	45	115	25
	SSM 4250	●	25,0	50	120	25

## Recommended Conditions (Slotting) øD ≥ ø3 ; d<sub>oc</sub> = 1,0 x øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
9 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,025~0,050	0,025~0,050	0,013~0,025	0,045~0,105
13 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,055~0,085	0,055~0,085	0,030~0,050	0,110~0,170
20 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,095~0,120	0,095~0,120	0,055~0,070	0,185~0,260

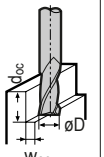
v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth



## Recommended Conditions (Shoulder processing) d<sub>oc</sub> = 1,5 x øD W<sub>oc</sub> = 0,1 x øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
1 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,004~0,017	0,004~0,017	0,002~0,008	0,008~0,020
3 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,018~0,036	0,018~0,036	0,009~0,018	0,027~0,060
6 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,038~0,070	0,038~0,070	0,019~0,035	0,065~0,157
13 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,075~0,125	0,075~0,125	0,040~0,075	0,160~0,250
20 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,135~0,170	0,135~0,170	0,085~0,110	0,257~0,390

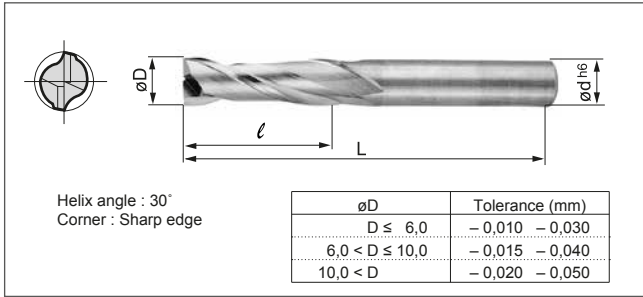
v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth



Uncoated  
Endmills

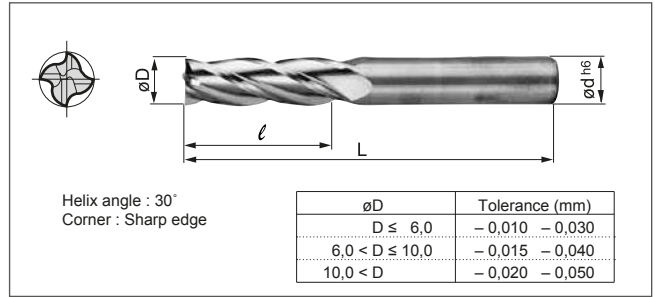
# Long Spiral Endmills LSM 2000 Type

Carbide grade: A1 (Micrograin)



# Long Spiral Endmills LSM 4000 Type

Carbide grade: A1 (Micrograin)



## ■ Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
2	LSM 2030	●	3,0	12	50	6
	LSM 2035	●	3,5	12	50	6
	LSM 2040	●	4,0	15	50	6
	LSM 2045	●	4,5	15	50	6
	LSM 2050	●	5,0	18	55	6
	LSM 2055	●	5,5	18	55	6
	LSM 2060	●	6,0	18	55	6
	LSM 2065	●	6,5	18	55	8
	LSM 2070	●	7,0	25	65	8
	LSM 2075	●	7,5	25	65	8
	LSM 2080	●	8,0	25	65	8
	LSM 2085	●	8,5	25	65	10
	LSM 2090	●	9,0	25	65	10
	LSM 2095	□	9,5	25	65	10
	LSM 2100	●	10,0	30	75	10
	LSM 2105		10,5	30	80	12
	LSM 2110	●	11,0	30	80	12
	LSM 2120	●	12,0	30	80	12
	LSM 2130	●	13,0	35	95	16
	LSM 2140	●	14,0	40	95	16
	LSM 2150	●	15,0	40	95	16
	LSM 2160	●	16,0	50	105	16
	LSM 2170	●	17,0	50	105	20
	LSM 2180	●	18,0	50	115	20
	LSM 2190	●	19,0	55	120	20
LSM 2200	●	20,0	55	120	20	
LSM 2210		21,0	60	125	25	
LSM 2220		22,0	60	135	25	
LSM 2230		23,0	60	135	25	
LSM 2240	□	24,0	65	140	25	
LSM 2250	□	25,0	65	140	25	

## ■ Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
4	LSM 4030	●	3,0	12	50	6
	LSM 4035	●	3,5	12	50	6
	LSM 4040	●	4,0	15	50	6
	LSM 4045	□	4,5	15	50	6
	LSM 4050	●	5,0	18	55	6
	LSM 4055	●	5,5	18	55	6
	LSM 4060	●	6,0	18	55	6
	LSM 4065	●	6,5	18	55	8
	LSM 4070	●	7,0	25	65	8
	LSM 4075	●	7,5	25	65	8
	LSM 4080	●	8,0	25	65	8
	LSM 4085	●	8,5	25	65	10
	LSM 4090	●	9,0	25	65	10
	LSM 4095	□	9,5	25	65	10
	LSM 4100	●	10,0	30	75	10
	LSM 4105		10,5	30	80	12
	LSM 4110	●	11,0	30	80	12
	LSM 4120	●	12,0	30	80	12
	LSM 4130	●	13,0	35	95	16
	LSM 4140	●	14,0	40	95	16
	LSM 4150	●	15,0	40	95	16
	LSM 4160	●	16,0	50	105	16
	LSM 4170	●	17,0	50	105	20
	LSM 4180	●	18,0	50	115	20
	LSM 4190	●	19,0	55	120	20
	LSM 4200	●	20,0	55	120	20
	LSM 4210		21,0	60	125	25
	LSM 4220		22,0	60	135	25
	LSM 4230		23,0	60	135	25
	LSM 4240	●	24,0	65	140	25
LSM 4250	●	25,0	65	140	25	

Uncoated Endmills

### Recommended Conditions (Slotting) øD ≥ ø3 ; d<sub>oc</sub> = 1,0 × øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
3 ~ 5,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,009~0,018	0,009~0,018	0,005~0,008	0,014~0,030
6 ~ 12,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,019~0,038	0,019~0,038	0,009~0,019	0,034~0,079
13 ~ 19,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,041~0,064	0,041~0,064	0,023~0,038	0,083~0,128
20 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,071~0,090	0,071~0,090	0,041~0,052	0,139~0,195

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

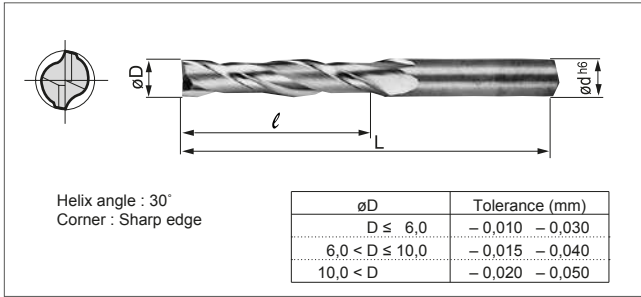
### Recommended Conditions (Shoulder processing) d<sub>oc</sub> = 1,5 × øD ; w<sub>oc</sub> = 0,1 × øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
3 ~ 5,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,014~0,027	0,014~0,027	0,007~0,014	0,020~0,045
6 ~ 12,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,028~0,053	0,028~0,053	0,014~0,026	0,048~0,118
13 ~ 19,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,056~0,094	0,056~0,094	0,030~0,056	0,120~0,188
20 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,101~0,127	0,101~0,127	0,064~0,082	0,193~0,292

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

# Extra Long Spiral Endmills ELSM 2000 Type

Carbide grade: A1 (Micrograin)



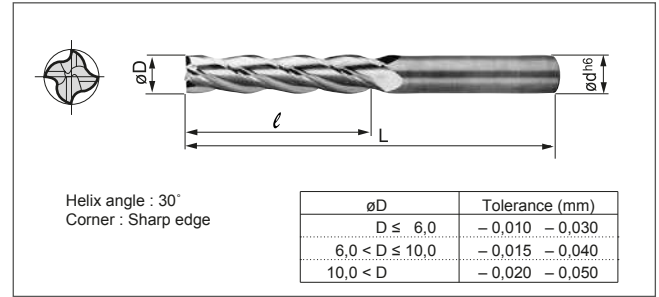
## Endmills

(mm)

	Cat. No.	Stock	øD	l	L	ød
2	ELSM 2030	●	3,0	20	55	6
	ELSM 2040	●	4,0	25	60	6
	ELSM 2050	●	5,0	30	65	6
	ELSM 2060	●	6,0	30	65	6
	ELSM 2070	●	7,0	40	85	8
	ELSM 2080	●	8,0	40	85	8
	ELSM 2090	●	9,0	40	85	10
	ELSM 2100	●	10,0	50	100	10
	ELSM 2110	●	11,0	50	100	12
	ELSM 2120	●	12,0	50	100	12
	ELSM 2130	●	13,0	70	140	16
	ELSM 2140	●	14,0	70	140	16
	ELSM 2150	□	15,0	70	140	16
	ELSM 2160	□	16,0	70	140	16
	ELSM 2180	□	18,0	80	160	20
	ELSM 2200	●	20,0	85	165	20
	ELSM 2220	●	22,0	95	180	25
	ELSM 2250	□	25,0	100	185	25

# Extra Long Spiral Endmills ELSM 4000 Type

Carbide grade: A1 (Micrograin)



## Endmills

(mm)

	Cat. No.	Stock	øD	l	L	ød
4	ELSM 4030	●	3,0	20	55	6
	ELSM 4040	●	4,0	25	60	6
	ELSM 4050	●	5,0	30	65	6
	ELSM 4060	●	6,0	30	65	6
	ELSM 4070	●	7,0	40	85	8
	ELSM 4080	●	8,0	40	85	8
	ELSM 4090	●	9,0	40	85	10
	ELSM 4100	●	10,0	50	100	10
	ELSM 4110	●	11,0	50	100	12
	ELSM 4120	●	12,0	50	100	12
	ELSM 4130	●	13,0	70	140	16
	ELSM 4140	●	14,0	70	140	16
	ELSM 4150	●	15,0	70	140	16
	ELSM 4160	●	16,0	70	140	16
	ELSM 4170	●	17,0	80	160	20
	ELSM 4180	●	18,0	80	160	20
	ELSM 4190	●	19,0	85	165	20
	ELSM 4200	●	20,0	85	165	20
	ELSM 4210	●	21,0	95	180	25
	ELSM 4220	●	22,0	95	180	25
	ELSM 4230	●	23,0	95	180	25
	ELSM 4240	●	24,0	100	180	25
	ELSM 4250	●	25,0	100	180	25

## Recommended Conditions

(Slotting) øD ≥ ø3 ; d<sub>oc</sub> = 1,0 × øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
3 ~ 5,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,006~0,012	0,006~0,012	0,003~0,006	0,009~0,020
6 ~ 12,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,013~0,025	0,013~0,025	0,006~0,013	0,023~0,053
13 ~ 19,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,028~0,043	0,028~0,043	0,015~0,025	0,055~0,085
20 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,048~0,060	0,048~0,060	0,027~0,035	0,092~0,130

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

## Recommended Conditions

(Shoulder processing) d<sub>oc</sub> = 1,5 × øD  
w<sub>oc</sub> = 0,05 × øD

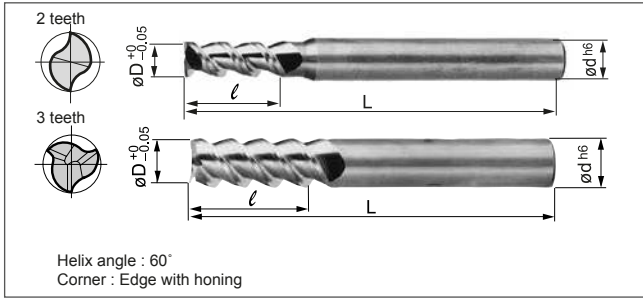
øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
3 ~ 5,9	v <sub>c</sub>	40-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,009~0,018	0,009~0,018	0,005~0,009	0,014~0,030
6 ~ 12,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,019~0,035	0,019~0,035	0,010~0,018	0,033~0,079
13 ~ 19,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,038~0,063	0,038~0,063	0,020~0,038	0,080~0,125
20 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,067~0,085	0,067~0,085	0,042~0,055	0,128~0,195

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

# Fast Helix Spiral Endmills

## HSM 2000/3000/4000 Type

Carbide grade: A1 (Micrograin)

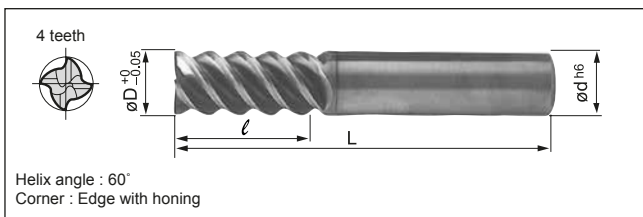


### Endmills (mm)

	Cat. No.	Stock	$\varnothing D$	$\ell$	L	$\varnothing d$
2	HSM 2020		2.0	6	40	4
	HSM 2030		3.0	8	45	6
	HSM 2040		4.0	10	45	6
	HSM 2050		5.0	12	50	6

3	HSM 3030		3.0	12	45	6
	HSM 3040		4.0	12	45	6
	HSM 3045		4.5	12	45	6
	HSM 3050	□	5.0	12	50	6
	HSM 3060	□	6.0	12	50	6
	HSM 3070		7.0	18	60	8
	HSM 3080		8.0	18	60	8
	HSM 3090		9.0	20	65	10
	HSM 3100	□	10.0	25	70	10
	HSM 3110		11.0	25	75	12
	HSM 3120	□	12.0	30	75	12
	HSM 3130		13.0	30	80	16
	HSM 3140	□	14.0	30	90	16
	HSM 3150		15.0	30	95	16
	HSM 3160		16.0	35	95	16
	HSM 3180		18.0	40	110	20
HSM 3200		20.0	40	110	20	

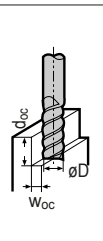
4	HSM 4200		20.0	40	110	20
	HSM 4320		32.0	55	130	32



### Recommended Conditions (Shoulder processing) $d_{oc} = 1,5 \times \varnothing D$ $w_{oc} = 0,1 \times \varnothing D$

$\varnothing D$	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
1 ~ 2,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,009~0,024	0,009~0,024	0,004~0,011	0,018~0,040
3 ~ 5,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,040~0,050	0,040~0,050	0,020~0,025	0,060~0,070
6 ~ 12,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,055~0,110	0,055~0,110	0,028~0,055	0,080~0,220
13 ~ 19,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,120~0,180	0,120~0,180	0,060~0,090	0,250~0,350
20 ~	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,216~0,245	0,216~0,245	0,127~0,132	0,321~0,546

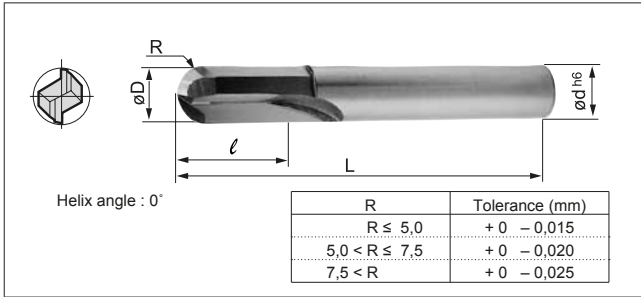
$v_c = m/min$   $f_t = mm/tooth$



▲ = To be replaced by new item  
□ = Delivery on request

# Straight Flute Ball Endmills BSM 2000 Type

Carbide grade: A1 (Micrograin)



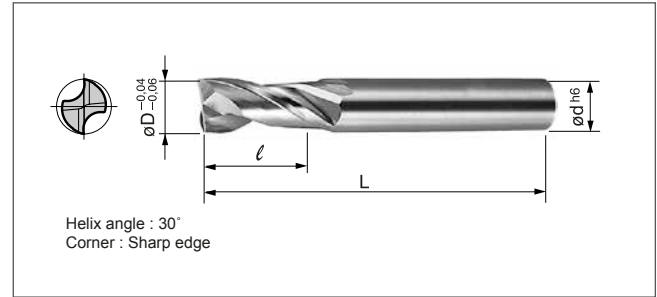
## Endmills

(mm)

	Cat. No.	Stock	R	øD	ℓ	L	ød
2	<b>BSM 2010</b>		0,5	1,0	4	40	4
	<b>BSM 2020</b>	▲	1,0	2,0	7	40	4
	<b>BSM 2030</b>		1,5	3,0	9	45	6
	<b>BSM 2040</b>	▲	2,0	4,0	15	45	6
	<b>BSM 2050</b>	▲	2,5	5,0	15	50	6
	<b>BSM 2060</b>	▲	3,0	6,0	20	50	6
	<b>BSM 2080</b>	▲	4,0	8,0	20	60	8
	<b>BSM 2100</b>	▲	5,0	10,0	20	70	10
	<b>BSM 2120</b>	▲	6,0	12,0	25	75	12
	<b>BSM 2140</b>		7,0	14,0	25	90	16
	<b>BSM 2160</b>		8,0	16,0	35	110	16
	<b>BSM 2200</b>		10,0	20,0	35	110	20

# Spiral Endmills for Non-Ferrous Cutting ASM 2000 Type

Carbide grade: H1 (Micrograin)



## Endmills

(mm)

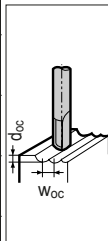
	Cat. No.	Stock	øD	ℓ	L	ød
2	<b>ASM 2020</b>	□	2,0	6	40	4
	<b>ASM 2030</b>	□	3,0	10	45	6
	<b>ASM 2040</b>	□	4,0	12	45	6
	<b>ASM 2050</b>	□	5,0	15	50	6
	<b>ASM 2060</b>	□	6,0	15	50	6
	<b>ASM 2080</b>	□	8,0	18	60	8
	<b>ASM 2100</b>	□	10,0	22	71	10
	<b>ASM 2120</b>	□	12,0	25	75	12
	<b>ASM 2160</b>	□	16,0	32	90	16

## Recommended Conditions

$d_{oc} = 0,3 \times \text{øD}$ , (Below R1,0 ;  $0,2 \times \text{øD}$ )  
 $w_{oc} = \text{Max}0,7 \times \text{øD}$ , (Below R1,0 ;  $0,6 \times \text{øD}$ )

R	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
R0,5 ~ R1,25	$v_c$	40~60	30-40-50	20~40	40-50-60
	$f_t$	0,004~0,010	0,004~0,010	0,002~0,005	0,008~0,015
R1,5 ~ R2,5	$v_c$	40-50-60	30~50	20-30-40	40~60
	$f_t$	0,013~0,025	0,013~0,025	0,007~0,013	0,017~0,042
R3 ~ R6	$v_c$	40-50-60	30~50	20-30-40	40~60
	$f_t$	0,030~0,050	0,030~0,050	0,017~0,033	0,056~0,136
R6,5 ~ R9,5	$v_c$	40-50-60	30~50	20~40	40-50-60
	$f_t$	0,070~0,100	0,070~0,100	0,040~0,057	0,167~0,238
R10 ~	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,118~0,167	0,118~0,167	0,085~0,095	0,250~0,350

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$

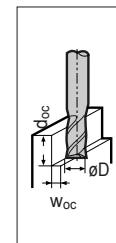


## Recommended Conditions

(Shoulder processing)  $d_{oc} = 1,5 \times \text{øD}$   
 $w_{oc} = 0,1 \times \text{øD}$

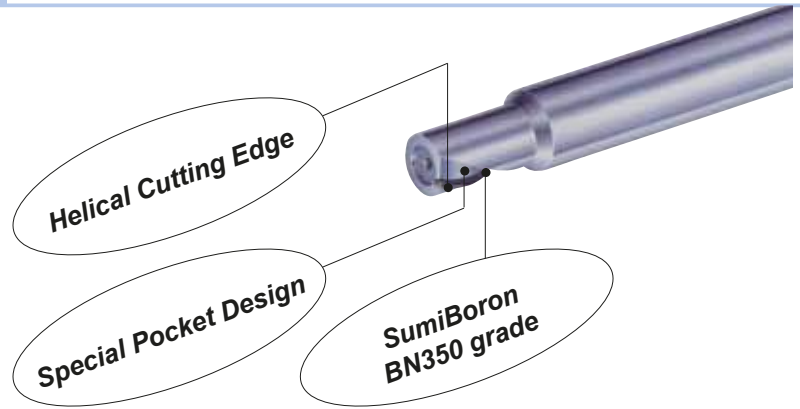
øD	Material	Material	
		Al-alloy	Cast iron
1 ~ 2,5	$v_c$	100-200-300	100-120-150
	$f_t$	0,004~0,017	0,008~0,020
3 ~ 5	$v_c$	100-200-300	100-120-150
	$f_t$	0,018~0,036	0,027~0,060
6 ~ 12	$v_c$	100-200-300	100-120-150
	$f_t$	0,038~0,070	0,065~0,157
14 ~ 16	$v_c$	100-200-300	100-120-150
	$f_t$	0,075~0,125	0,160~0,250

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$



# SUMIBORON "Helical Master" BNES Type

Spiral CBN Endmill for Hardened Steel



## Endmills BNES Type with 1 Spiral Flute

<p>Helix angle : 15° right-hand cut, right-hand helix</p>	Cat. No.	Stock	Dimensions (mm)				
		BN350	$\phi D$	$\phi d$	$l_1$	$l_2$	L
	<b>BNES 1060</b>	☐	6,0	10	7,0	11	60
	<b>BNES 1080</b>	☐	8,0	10	10,0	14	70
	<b>BNES 1100</b>	☐	10,0	12	12,0	17	75
	<b>BNES 1120</b>	☐	12,0	12	14,0	20	80
	<b>BNES 1140</b>	☐	14,0	16	16,0	21,5	80
	<b>BNES 1160</b>	☐	16,0	16	18,0	24	80

## Recommended Cutting Conditions

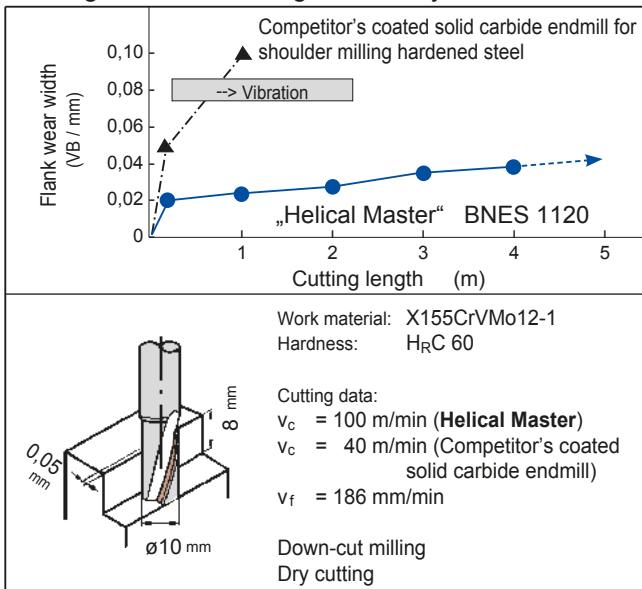
Cutting speed:  $v_c$  (m/min), Spindle revolutions:  $n$  (rpm), Feed per tooth:  $f_t$  (mm/tooth), Feed speed:  $v_f$  (mm/min)

Tooling example	$\phi D$	Hardened steel (H <sub>R</sub> C 50 ~ 57)			Hardened steel (H <sub>R</sub> C 58 ~ 65)		
		$v_c = 100 \sim 170$ m/min			$v_c = 80 \sim 150$ m/min		
<p>Depth of cut : <math>d_{oc} \leq D</math></p>	$\phi 6 \sim 8$	$W_{oc} \leq 0,1$ mm	$n = 4000 \sim 9000$	$V_f$ (mm/min) = 240 ~ 540	$W_{oc} \leq 0,08$ mm	$n = 3200 \sim 8000$	$V_f$ (mm/min) = 150 ~ 370
	$\phi 10 \sim 12$	$W_{oc} \leq 0,15$ mm	$n = 2700 \sim 5400$	$V_f$ (mm/min) = 180 ~ 360	$W_{oc} \leq 0,12$ mm	$n = 2100 \sim 4800$	$V_f$ (mm/min) = 120 ~ 270
	$\phi 14 \sim 16$	$W_{oc} \leq 0,2$ mm	$n = 2000 \sim 3800$	$V_f$ (mm/min) = 140 ~ 260	$W_{oc} \leq 0,15$ mm	$n = 1600 \sim 3400$	$V_f$ (mm/min) = 110 ~ 230

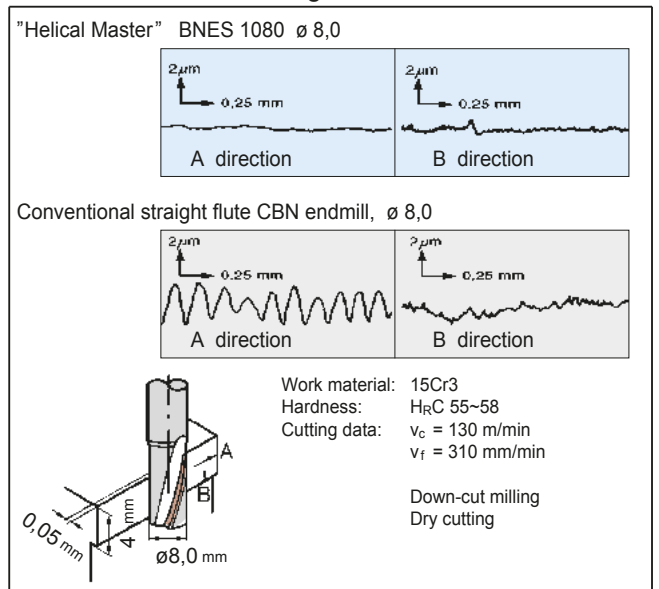
Recommendation: Dry cutting (Air coolant)  
Down-cut milling  
Minimise the overhang  
Use a rigid machine

## Performance

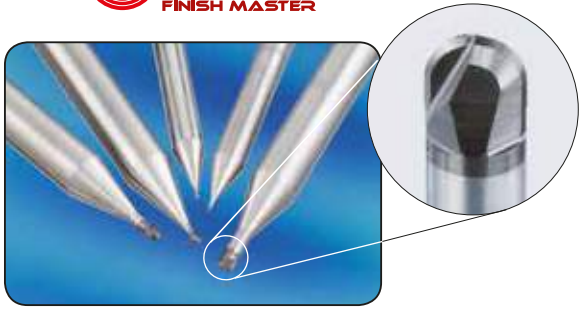
### Long Tool Life and High Efficiency



### Excellent Surface Roughness







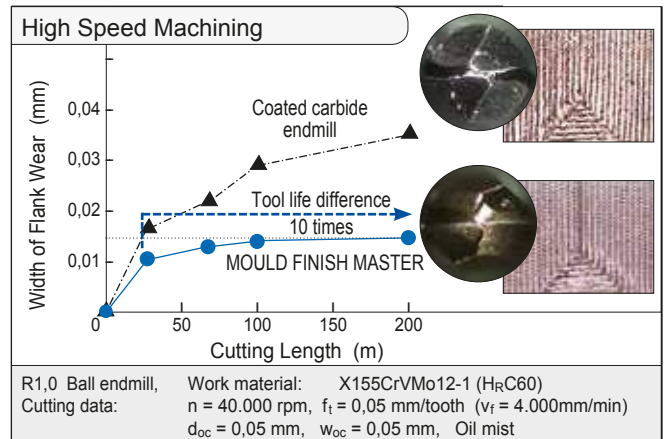
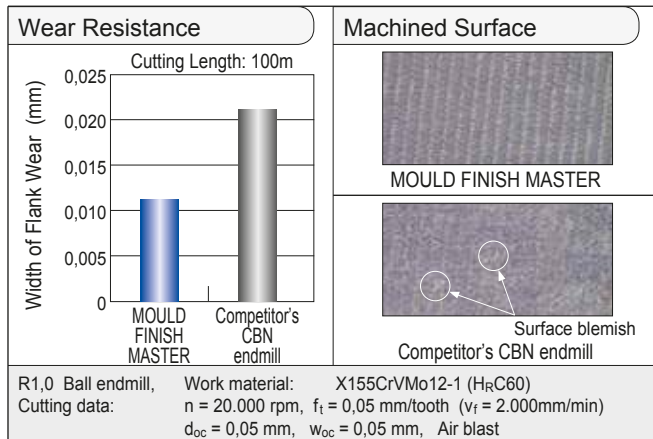
### ■ Characteristics / Application

- High precision machining of hardened steels < HRC70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy : ±0,005mm

### ■ Endmills

<p>✳ Endmill Identification</p> <p><b>BNBP 2 R020-012 4</b></p> <p>Shank Diam. _____</p> <p>Neck length (L<sub>2</sub>) _____</p> <p>Number of teeth _____</p> <p>Radius of ball nose _____</p>	Cat. No.	Stock	Dimensions (mm)						
		BN350	R	ØD	L	Ød <sub>1</sub>	Ød	L <sub>1</sub>	L <sub>2</sub>
4,0 mm (Shank Diam.)	<b>BNBP 2 R020-012 4</b>	●	0,2	0,4	50	0,37	4	0,3	1,2
	<b>BNBP 2 R030-015 4</b>	●	0,3	0,6	50	0,57	4	0,4	1,5
	<b>BNBP 2 R050-025 4</b>	●	0,5	1,0	50	0,97	4	0,6	2,5
	<b>BNBP 2 R075-040 4</b>	●	0,75	1,5	50	1,47	4	0,9	4,0
	<b>BNBP 2 R100-055 4</b>	●	1,0	2,0	50	1,97	4	1,4	5,5
6,0 mm (Shank Diam.)	<b>BNBP 2 R020-012 6</b>	●	0,2	0,4	50	0,37	6	0,3	1,2
	<b>BNBP 2 R030-015 6</b>	●	0,3	0,6	50	0,57	6	0,4	1,5
	<b>BNBP 2 R050-025 6</b>	●	0,5	1,0	50	0,97	6	0,6	2,5
	<b>BNBP 2 R075-040 6</b>	●	0,75	1,5	50	1,47	6	0,9	4,0
	<b>BNBP 2 R100-055 6</b>	●	1,0	2,0	50	1,97	6	1,4	5,5

### ■ Performance



Excellent surface finish compared with competitor's CBN and coated carbide endmills

### ■ Recommended Cutting Conditions

Spindle revolutions: n (rpm), Feed rate per tooth: f<sub>t</sub> (mm/tooth), Depth of cut: d<sub>oc</sub> (mm), Wide of cut: w<sub>oc</sub> (mm)

Material Cutting data	Pre-hardened steel, Die steel (~ HRC52)				Die steel (~ HRC62)				High speed tool steel (~ HRC70)			
	n (rpm)	f <sub>t</sub> (mm/tooth)	d <sub>oc</sub> (mm)	W <sub>oc</sub> (mm)	n (rpm)	f <sub>t</sub> (mm/tooth)	d <sub>oc</sub> (mm)	W <sub>oc</sub> (mm)	n (rpm)	f <sub>t</sub> (mm/tooth)	d <sub>oc</sub> (mm)	W <sub>oc</sub> (mm)
R 0,2	20.000~50.000	0,02	0,03	0,03	20.000~50.000	0,02	0,01	0,02	20.000~50.000	0,015	0,01	0,02
R 0,3	20.000~50.000	0,02	0,03	0,03	20.000~50.000	0,02	0,01	0,02	20.000~50.000	0,015	0,01	0,02
R 0,5	20.000~50.000	0,03	0,05	0,05	20.000~50.000	0,03	0,03	0,04	20.000~50.000	0,02	0,02	0,03
R 0,75	20.000~50.000	0,04	0,08	0,1	20.000~50.000	0,04	0,05	0,05	20.000~50.000	0,03	0,02	0,05
R 1,0	20.000~50.000	0,05	0,1	0,1	17.000~50.000	0,05	0,05	0,05	17.000~50.000	0,03	0,03	0,05

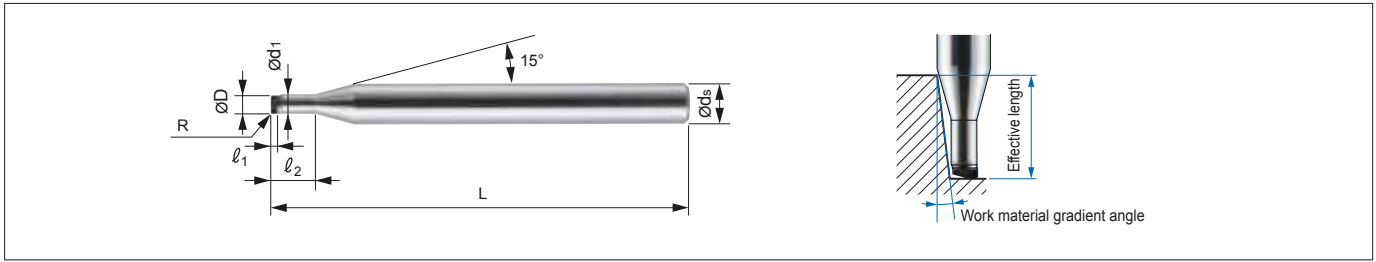
### ■ Important Notes

- (1) For stable machining, a more rigid machine is recommended.
- (2) Air blast or oil mist coolant is recommended.
- (3) Shorten overhang as much as possible.





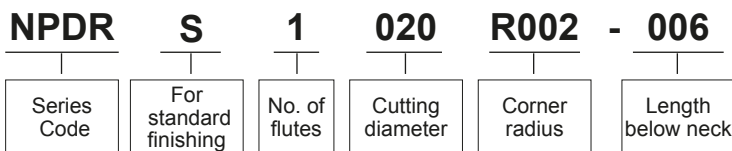
## SUMIDIA Binderless Radius Endmill NPDRS Type



### NPDRS Type Body (for Standard Finishing)

Cat. No.	Stock	Dimensions (mm)							Real effective length with respect to work material gradient angle				
	NPDRS	ØD	R	l <sub>1</sub>	l <sub>2</sub>	L	Ød <sub>1</sub>	Ød <sub>s</sub>	0,5°	1°	1,5°	2°	3°
<b>NPDRS 1020 R002-006</b>	○	0,2	0,02	0,10	0,6	40	0,175	4	0,61	0,62	0,63	0,64	0,66
<b>1020 R005-006</b>	○	0,2	0,05	0,10	0,6	40	0,175	4	0,61	0,62	0,63	0,64	0,66
<b>1030 R002-010</b>	○	0,3	0,02	0,15	1,0	40	0,27	4	1,01	1,03	1,04	1,06	1,09
<b>1030 R005-010</b>	○	0,3	0,05	0,15	1,0	40	0,27	4	1,01	1,03	1,04	1,06	1,09
<b>1050 R005-015</b>	○	0,5	0,05	0,25	1,5	40	0,47	4	1,61	1,66	1,72	1,78	1,92
<b>NPDRS 1050 R010-015</b>	○	0,5	0,10	0,25	1,5	40	0,47	4	1,61	1,66	1,71	1,77	1,91
<b>1100 R005-030</b>	○	1,0	0,05	0,55	3,0	40	0,95	4	3,40	3,52	3,65	3,78	4,08
<b>1100 R010-030</b>	○	1,0	0,10	0,55	3,0	40	0,95	4	3,40	3,52	3,64	3,77	4,07
<b>1100 R020-030</b>	○	1,0	0,20	0,55	3,0	40	0,95	4	3,40	3,51	3,63	3,76	4,05
<b>1200 R005-040</b>	○	2,0	0,05	0,55	4,0	40	1,95	4	4,44	4,59	4,75	4,93	5,33
<b>NPDRS 1200 R010-040</b>	○	2,0	0,10	0,55	4,0	40	1,95	4	4,43	4,59	4,75	4,92	5,31
<b>1200 R020-040</b>	○	2,0	0,20	0,55	4,0	40	1,95	4	4,43	4,58	4,74	4,91	5,29

### Identification Details



### Cutting Diameter and Nose Radius Combinations

ØD	r0,02	r0,05	r0,1	r0,2
0,2	○	○		
0,3	○	○		
0,5		○	○	
1,0		○	○	○
2,0		○	○	○

### Recommended Cutting Conditions

- Use a machine with high rigidity for stable cutting.
- Non-water soluble coolant recommended. Supply as a mist or external coolant. Take fire prevention precautions to avoid fire hazards caused by sparks igniting during machining or tool breakage.
- Shorten overhang as much as possible.
- Adjust cutting conditions as necessary as machine rigidity and other conditions may vary.
- Depth of cut shown in the table of conditions are maximum depths. Adjust the actual depth of cut to the desired machined surface finish.

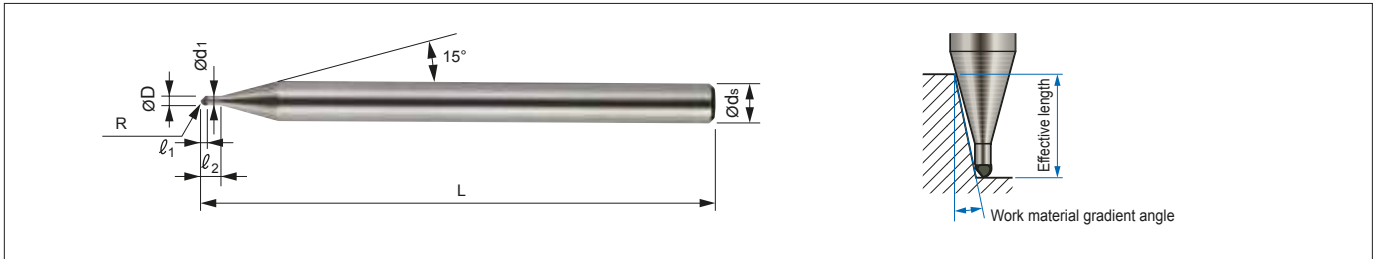
Work Material		Carbide				
R (mm)	l <sub>2</sub>	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	
0,2	0,10	40.000	100	0,001	0,001	
0,3	0,15	40.000	150	0,002	0,001	
0,5	0,25	40.000	200	0,003	0,001	
1,0	0,55	40.000	400	0,005	0,003	
2,0	0,55	40.000	600	0,010	0,005	





# SUMIDIA "MOULD Finish Master" NPDB(S) Type

## SUMIDIA Binderless Ballnose Endmill NPDBS Type / NPDB Type



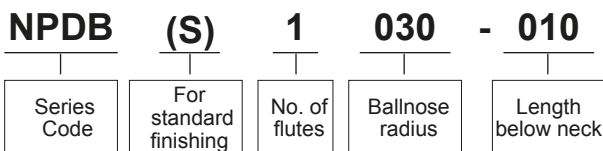
### NPDBS Type Body (for Standard Finishing)

Cat. No.	Stock	Dimensions (mm)							Real effective length with respect to work material gradient angle				
	NPDB10	R	ØD	l <sub>1</sub>	l <sub>2</sub>	L	Ød <sub>1</sub>	Ød <sub>s</sub>	0,5°	1°	1,5°	2°	3°
<b>NPDBS 1010-004</b>	○	0,1	0,2	0,1	0,4	40	0,18	4	0,44	0,45	0,46	0,47	0,49
<b>1020-008</b>	○	0,2	0,4	0,2	0,8	40	0,38	4	0,83	0,84	0,85	0,86	0,89
<b>1030-010</b>	○	0,3	0,6	0,3	1,0	40	0,58	4	1,05	1,08	1,10	1,13	1,20
<b>1050-020</b>	○	0,5	1,0	0,5	2,0	40	0,95	4	2,08	2,13	2,19	2,24	2,38
<b>1100-030</b>	○	1,0	2,0	1,0	3,0	40	1,95	4	3,13	3,20	3,27	3,35	3,53

### NPDB Type Body (for Precision Finishing)

Cat. No.	Stock	Dimensions (mm)							Real effective length with respect to work material gradient angle				
	NPDB10	R	ØD	l <sub>1</sub>	l <sub>2</sub>	L	Ød <sub>1</sub>	Ød <sub>s</sub>	0,5°	1°	1,5°	2°	3°
<b>NPDB 1010-004</b>	○	0,1	0,2	0,1	0,4	40	0,18	4	0,44	0,45	0,46	0,47	0,49
<b>1020-008</b>	○	0,2	0,4	0,2	0,8	40	0,38	4	0,83	0,84	0,85	0,86	0,89
<b>1030-010</b>	○	0,3	0,6	0,3	1,0	40	0,58	4	1,05	1,08	1,10	1,13	1,20
<b>1050-020</b>	○	0,5	1,0	0,5	2,0	40	0,95	4	2,08	2,13	2,19	2,24	2,38
<b>1100-030</b>	○	1,0	2,0	1,0	3,0	40	1,95	4	3,13	3,20	3,27	3,35	3,53

### Identification Details



### Recommended Cutting Conditions

- Use a machine with high rigidity for stable cutting.
- Non-water soluble coolant recommended. Supply as a mist or external coolant.  
Take fire prevention precautions to avoid fire hazards caused by sparks igniting during machining or tool breakage.
- Shorten overhang as much as possible.
- Adjust cutting conditions as necessary as machine rigidity and other conditions may vary.
- Depth of cut shown in the table of conditions are maximum depths. Adjust the actual depth of cut to the desired machined surface finish.

#### ● Flat Surface Finishing

Work Material		Carbide			
R (mm)	l <sub>2</sub>	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)
0,1	0,4	40.000	100	0,001	0,001
0,2	0,8	40.000	150	0,001	0,001
0,3	1,0	40.000	200	0,001	0,001
0,5	2,0	40.000	400	0,001	0,003
1,0	3,0	40.000	600	0,001	0,005

#### ● Copy Finishing

Work Material		Carbide			
R (mm)	l <sub>2</sub>	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)
0,1	0,4	40.000	100	0,001	0,001
0,2	0,8	40.000	150	0,002	0,001
0,3	1,0	40.000	200	0,003	0,001
0,5	2,0	40.000	400	0,005	0,003
1,0	3,0	40.000	600	0,010	0,005





# K



# Multi-Drills

K1 ~ K76



Selection Guide	<b>MULTI-DRILLS</b> .....	K 2 - 5
<b>Solid Type Drills</b>	<b>SDP ... U3/5/7 -HAK</b> .....	K 6 -11
	<b>SDM ... U3/5 -HAK</b> .....	K12-17
	<b>MDW ... GS 2/4</b> .....	K18-21
	<b>MDS ... S/M K-HAK</b> .....	K22-23
	<b>MDS ... S/M K</b> .....	K24-27
	<b>MDS ... S/M G</b> .....	K24-27
	<b>Flat MultiDrill</b> <b>MDF</b> .....	K28-35
	<b>Deep Hole Drills</b> <b>MDW... XHG S / PHT</b> .....	K36-37
	for Steels <b>MDW ... XHG S</b> .....	K38
	for Aluminium <b>MDW ... XHT A</b> .....	K39
	Pilot Hole Drills <b>MDW ... PHT</b> .....	K38-39
AURORA COAT Drills	<b>MDW ... NHGS</b> .....	K40~41
MINI-Drills	<b>MLDH ... L/P</b> .....	K42~43
	<b>MDUS / MDSS</b> .....	K44
SUMIDIA Coated Drills	<b>MDS ... SDC</b> .....	K45
<b>Brazed Type Drills</b>	<b>KDS</b> .....	K47
Series	<b>KDS ... MAK</b> .....	K48~49
	<b>KDS ... LAK</b> .....	K50~51
	<b>KDS ... DAK</b> .....	K52~53
	<b>KDS ... FA</b> .....	K54
<b>Replaceable Head Type Drills</b>	<b>SMD</b> .....	K55
Drill Holder	<b>SMDH ... (D)</b> .....	K56/61/63
Drill Head for Steels	<b>SMDT ... D MTL</b> .....	K57
for Stainless Steels	<b>SMDT ... D MEL</b> .....	K58~59
for Spot Facing	<b>SMDT ... MFS</b> .....	K60~61
Large Holes	<b>SMDT ... MTL</b> .....	K62~63
<b>Insert Type Drills</b>	<b>WDX (2D, 3D, 4D, 5D)</b> .....	K64~73
Eccentric Sleeve	<b>WAS</b> .....	K70
Plunge Drills	<b>PDL (2D, 3D)</b> .....	K74~76
Multi-Function Mills	<b>PCT (3D, 5D)</b> .....	K75~76

# Multi-Drill Series



## General Features

MultiDrill series is Sumitomo's original brand of high performance drills that have a special cutting edge design coupled with an advance carbide substrate.

The series has a comprehensive selection of diameters and drill lengths to cover a wide range of work materials and requirements, providing high efficiency, high precision and cost effectiveness.

## Solid Carbide Type Multi-Drills Selection

	SDP ...	<b>New</b> SDM ...	MDW ...	MDS ...	<b>New</b> MDF ...	MDW ... 000		MLDH	MDUS / MDSS	MDS ...		
Type	...U3/5/7 -HAK (DIN)	...U3/5 -HAK (DIN)	GS 2/4	S/M K-HAK (DIN)	... SK/SG	...S2D, L2D ...H3D, H5D	<b>New</b> ... PHT ... XHGS ... XHTA	... NHGS	... P / L	-	... SDC	
Page	⇒ K 6~11	⇒ K 12~17	⇒ K18~21	⇒ K22~23	⇒ K24~27	⇒ K28~35	⇒ K36~39	⇒ K40~41	⇒ K42~43	⇒ K44	⇒ K45	
Application	<b>PK</b>	<b>PM</b>	<b>P</b>	<b>PMK</b>	<b>KN</b>	<b>P</b>	<b>PMKN</b>	<b>N</b>	<b>PMK</b>	<b>PMKH</b>	<b>N</b>	
Form	m7 drill DIN type		h8 drill cylindric	m7 drill DIN type	h8 drill, cylindric	h8 drill cylindric	Extra long DIN type	Super Multi-Drill	Long Micro Drill	Mini Multi-Drill	Diamond Coated	
Length (The ratio to øD)	3D/5D/7D	3D / 5D	2 / 4D	3D / 5D	2,5D / 4D	S2D/ L2D	3D	10D ~ 30D	3D/5D/10D	5/12/20/30 D	10D	3D
Coolant holes	Yes		No	Yes	No	No	Yes	Yes	Yes	No	No	
Coating	AlCrTiN		DEX (TiAlCrTiSi)	TiAlN	-	PVD	TiAlN	-	DLC	TiAlN	TiAlN / ZX	SUMIDIA
Diameter range	ø 3,0 ~ ø16,0	ø 2,0 ~ ø16,0	ø 4,0 ~ ø12,0	ø 2,0 ~ ø14,0	ø 0,3 ~ ø 3,0 ø20,0 ø16,0	ø 4,0 ~ ø 8,0	ø 3,0 ~ ø 12,0	ø 3,0 ~ ø 16,0	ø 0,8 ~ ø 2,0	ø 0,03 ~ ø 1,0	ø 2,0 ~ ø 10,0	

# Multi-Drill Series

## Advantages

- Unique curved flute design with proven enhanced chip formation and removal, resulting in better hole accuracy.
- High speed and high efficient drilling is made possible with the combination of a special substrate with an advanced PVD coating. (10x tool life of HSS drills, 5x the efficiency)
- Wide selection range (Diameter: 0,03 ~ 65mm, Drilling depths L/D: 2 ~ 30)
- Other diameters and length can be asked and offered



## Brazed Carbide Type and Insert Type Multi-Drills Selection

	KDS ...000 ⇨ K47				SMD ... ⇨ K55, K60, K62			WDX ...00		PDL ...00	PCT ...00
Type	MAK	LAK	DAK	FA	 SMDT ... (D) MTL ⇨ K57, K63	WAS ..... ⇨ K70					
Page	⇨ K48~49	⇨ K50~51	⇨ K52~53	⇨ K54	 SMDT ... D MEL ⇨ K58~59	⇨ K64~73		⇨ K74~76	⇨ K75~76		
					 SMDT ... MFS <b>New</b> ⇨ K61						
					 SMDH ... M-3/5/8 ⇨ K56, K60						
					 SMDH ... M / L / D ⇨ K63						
Application	<b>PMKS</b>			<b>KN</b>	<b>PMK</b>			<b>PMKN</b>			
Form	h7 drill			h8 drill	SMDT type carbide head			Indexable insert drill	Straight flute insert drill	Insert mill	
Length (The ratio to øD)	3D	5D	7D	10D	1.5D / 3D / 5D / 8D / 12D			2D / 3D / 4D / 5D	2D / 3D	3D / 5D	
Coolant holes	Yes			Yes	Yes			Yes			
Coating	TiAlN			-	TiAlN			WDXT type insert			
Diameter range	ø 9,5 ~ ø 40,5		ø 8,0 ~ ø 30,5		ø 12,0 ~ ø 42,5			ø 13,0 ~ ø 65,0		ø 16,0 ~ ø 40,0	

# Multi-Drill Series Selection Guide

## ● According to Drill Types / Applications

Application		General	↔	Special
Solid Type	"Super Multi-Drill" MDS/MDW Type	m7 DIN Type "Super Multi-Drill" <b>SDP...U HAK Type</b> AlCrTiN coated general purpose drill with coolant holes øD : 3,0 ~ 16mm L/D : 3, 5, 7 ⇒ K6 ~ 11	"Super Multi-Drill" <b>MDW...GS Type</b> DEX (TiAlCr/TiSi) coated general purpose drill without coolant holes øD : 2,0 ~ 16mm L/D : ~ 2, ~ 4 ⇒ K18 ~ 21	—
		m7 DIN Type "Super Multi-Drill" <b>MDS...K-HAK Type</b> TiAlN coated general purpose drill with coolant holes øD : 2,0 ~ 12mm L/D : ~ 2, ~ 4 ⇒ K22 ~ 23	"Super Multi-Drill" <b>MDS...G Type</b> For Cast Iron & Aluminum øD : 2,8 ~ 20mm L/D : ~ 3 ⇒ K24 ~ 27	"Super Multi-Drill" <b>MDS...D Type</b> Hardened Steel Exotic Metals øD : 1,0 ~ 16,1mm L/D : ~ 3 (Stock in Japan)
		"Super Multi-Drill" <b>KDS... MAK Type</b> General Purpose Drill øD : 12 ~ 26mm L/D : ~ 3 ⇒ K48 ~ 49	Long Type "Super Multi-Drill" <b>KDS... LAK Type</b> Deep Hole Drilling øD : 12 ~ 26mm L/D : ~ 5 ⇒ K50 ~ 51	—
		—	Long Type "Super Multi-Drill" <b>KDS... DAK Type</b> Good Chip Removal øD : 9 ~ 22mm L/D : ~ 7 ⇒ K52 ~ 53	Extra Long Typ "Super Multi-Drill" <b>KDS... FA Type</b> For Cast Irons and Aluminium Alloys øD : 9 ~ 22mm L/D : ~ 7 Delivery on request ⇒ K54

## ■ Recommended Cutting Conditions by Work Materials




Drill		Steel	Stainless Steel	Cast Iron	Non-ferrous Metals
Solid Type	<b>SDP...U HAK</b> <b>MDW...GS</b>	50  120 0,35 0,21	15  70 0,1  0,2	50  110 0,35 0,21	—
	<b>MDS...G</b>	—	—	25  80 0,4 0,25	80  200 0,45 0,25
Brazed Type	<b>KDS...AK</b> (MAK/LAK/DAK)	50  90 0,35 0,15	35  50 0,25 0,15	60  100 0,35 0,21	—
	<b>KDS...FA</b>	—	—	30  70 0,5 0,21	60  150 0,5 0,21

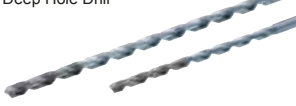
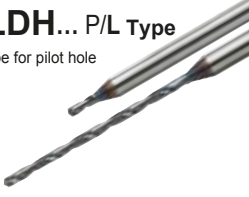



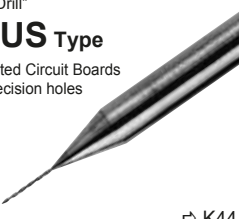
Cutting speed  $v_c$  (m/min)  
 Feed  $f$  (mm/rev)






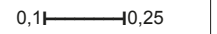


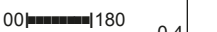




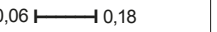



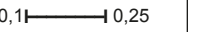



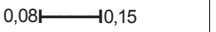




# Multi-Drill Series Selection Guide



## ● According to Drill Types / Applications

Application	General		↔	Special
Indexable Drills	Insert Type Drills <b>WDX Type</b> High Efficiency and Deep Holes  $\phi D$ : 13,0 ~ 65,0mm L/D: 2, 3, 4, 5 $\Rightarrow$ K64 ~ 73	Replaceable Head Type Drills <b>SMD Type</b>  $\phi D$ : 12,0 ~ 42,5mm L/D: 3, 5, 8 $\Rightarrow$ K55 ~ 63	"Multi-Function" Types <b>PDL &amp; PCT</b> Plunge Drills and Plunge Mills  $\phi D$ : 16,0 ~ 40,0mm L/D: 2, 3, 5 $\Rightarrow$ K74 ~ 76	

Application	Deep Hole	Very Small Hole	Precision Hole
Special Purpose Drills	"Super Long Multi-Drill" <b>MDW...XHGS/XHTA Type</b> New General Purpose Deep Hole Drill  $\phi D$ : 4,0 ~ 12,0mm $\Rightarrow$ K36 ~ 39 L/D: 10/15/20/25/30	"Long Micro Drill" <b>MLDH... P/L Type</b> "P" type for pilot hole  $\phi D$ : 0,8 ~ 2,0mm $\Rightarrow$ K42 ~ 43 L/D: 5/12/20/30	AURORA-Coat Drill <b>MDW...NHGS Type</b> For Aluminium Alloy  $\phi D$ : 3,0 ~ 16,0mm $\Rightarrow$ K40 ~ 41 L/D: 3 / 5 / 10
	—	"Mini-MultiDrill" <b>MDSS Type</b>  $\phi D$ : 0,20 ~ 1,00mm $\Rightarrow$ K44 L/D: 10	"SUMI-DIA" coated Drill <b>MDS...SDC Type</b> For Aluminium & CFRP*  CFRP* (Carbon Fibre Reinforced Plastic) $\phi D$ : 2 ~ 10mm $\Rightarrow$ K45 L/D: ~ 3
	—	"Micro Drill" <b>MDUS Type</b> For Printed Circuit Boards High precision holes  $\phi D$ : 0,05 ~ 0,19mm $\Rightarrow$ K44 L/D: ~ 8	—

## ■ Recommended Cutting Conditions by Work Materials

Drill \ Work	Steel	Stainless Steel	Cast Iron	Non-ferrous Metals
<b>SMD</b> ( $\phi 20$ )	50  120 0,12  0,35	50  90 0,1  0,25	50  100 0,2  0,45	100  180 0,2  0,4
<b>WDX</b> ( $\phi 18$ )	100  220 0,15  0,25	80  180 0,06  0,18	120  200 0,1  0,32	100  200 0,1  0,25
<b>MDW...XHT</b> ( $\phi 5$ )	80  120 0,15  0,25	30  60 0,08  0,15	50  90 0,15  0,3	80  160 0,12  0,35

 Cutting speed  $v_c$  (m/min)  
 Feed  $f$  (mm/rev)

# SumiDrill Power Series SDP Type (DIN)

AlCrTiN Coated Solid Carbide Drills to DIN 6537

## General Features

New designed double margin  
Excellent hole accuracy

Shank

DIN 6535 HAK

Sumi-Power Coating

Excellent wear resistance  
and anti-adhesion

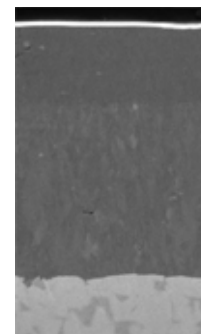
Elliptical flute design

Improved chip formation  
and chip evacuation

Curved cutting edge,  
optimized edge preparation

Low cutting force

Coating Structure



Improved anti-adhesion  
AlCrTiN lubricant layer  
coating with high Al content  
improves friction condition.

High wear resistance  
Tough and hard  
AlCrTiN super multilayer

Substrate

Stock Size

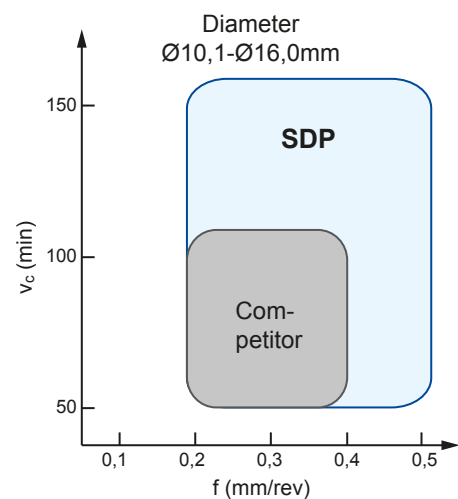
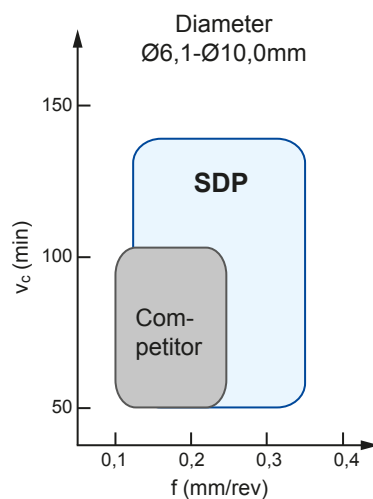
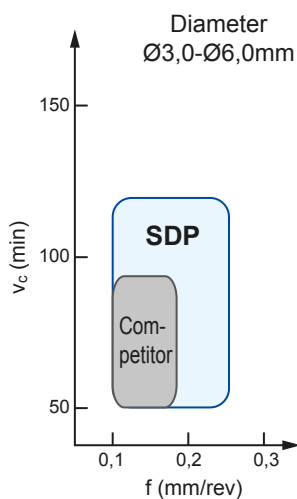
Ø3,0 ~ Ø12,0  
Increment 0,1mm  
Ø12,1 ~ Ø16,0  
Standard diameter



## Advantages

- The specific and optimum solution for a wide range of application conditions
- Top performance parameters, maximum feed and stable long tool life
- Double margin design for high-precision holes
- Good balance of high wear resistance and toughness
- Curved cutting edge - ideal for removing chips
- Reliable and high productivity performance

## Application Range



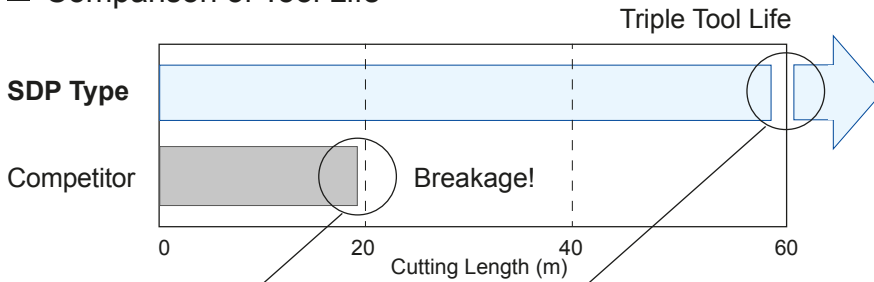
## Maximum Feed Rate Result

Feed Rate (mm/rev)	0,30	0,40	0,50	0,55	0,60	0,65	0,70	0,75	0,80
SDP Type	OK	OK	OK	OK	OK	OK	OK	OK	OK
Competitor	OK	Breakage!							

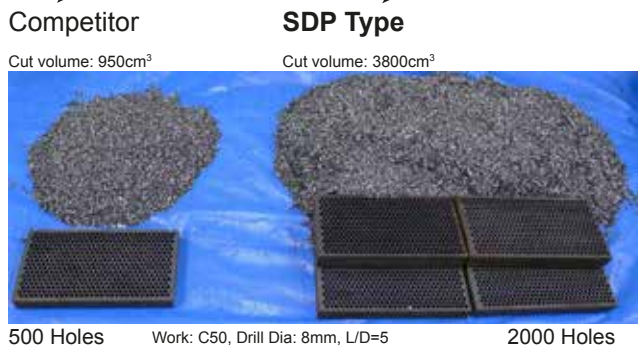
Internal test conditions

Drill:  $\varnothing 4$ , L/D=5  
Work Material: Carbon Steel (C50)  
Cutting Data:  $v_c=80$ m/rev,  $a_p=18$ mm

## Comparison of Tool Life



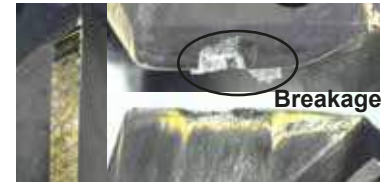
Drill:  $\varnothing 8$ , L/D=5  
Work Material: Carbon Steel (C50)  
Cutting Data:  $v_c=80$ m/min,  $f=0,15$ mm/rev,  $a_p=38$ mm, Through hole, Internal coolant



### SDP Type



### Competitor



## Excellent Hole Accuracy

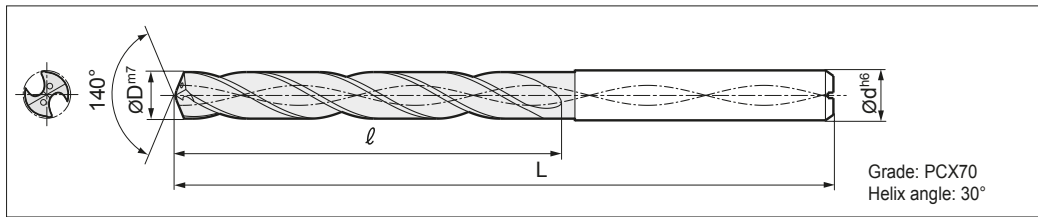
	Hole Accuracy	Chip Shape
SDP Type	 	<p>Compact cutting chips</p>
Competitor	 	<p>Longer cutting chips</p>

Drill:  $\varnothing 8$ , L/D=5  
Workpiece: Carbon Steel (C50)  
Cutting Data:  $v_c=80$ m/min,  $f=0,25$ mm/rev,  $a_p=24$ mm, Blind-hole, Internal coolant

# SumiDrill Power Series SDP (DIN) Type

AlCrTiN Coated Solid Carbide Drills to DIN 6537

■ Solid Carbide Drill with Internal Coolant Supply, ØD: 3,0 ~ 7,5mm, 3D / 5D / 7D



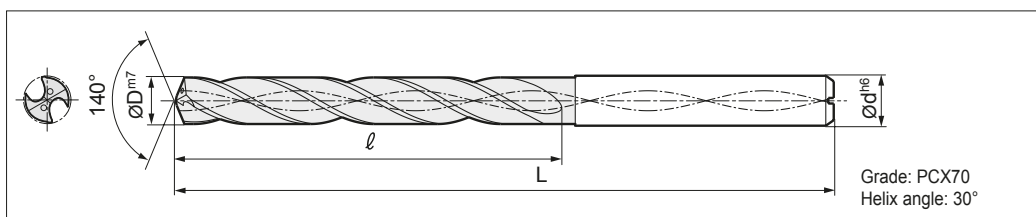
ØD (mm)	Shank Ød (mm)	Cat. No. (L/D) 3, 5, 7	3D Type			5D Type			7D Type			
			Stock	Dimensions (mm)		Stock	Dimensions (mm)		Stock	Dimensions (mm)		
			3	L	ℓ	5	L	ℓ	7	L	ℓ	
3,0	6	SDP 0300 U □ HAK	●	17	62	●	66	24	●	70	29	
3,1		SDP 0310 U □ HAK	●			●			●			●
3,2		SDP 0320 U □ HAK	●			●			●			●
3,25		SDP 0325 U □ HAK	●			●			●			●
3,3		SDP 0330 U □ HAK	●			●			●			●
3,4		SDP 0340 U □ HAK	●			●			●			●
3,5		SDP 0350 U □ HAK	●			●			●			●
3,6		SDP 0360 U □ HAK	●			●			●			●
3,7		SDP 0370 U □ HAK	●			●			●			●
3,8		SDP 0380 U □ HAK	●			21			66			●
3,9		SDP 0390 U □ HAK	●	●	●		●					
4,0		SDP 0400 U □ HAK	●	●	●		●					
4,1		SDP 0410 U □ HAK	●	●	●		●					
4,2		SDP 0420 U □ HAK	●	●	●		●					
4,3		SDP 0430 U □ HAK	●	25	66	●	82	41	●	85	44	
4,4		SDP 0440 U □ HAK	●			●			●			●
4,5		SDP 0450 U □ HAK	●			●			●			●
4,6		SDP 0460 U □ HAK	●			●			●			●
4,65		SDP 0465 U □ HAK	●			●			●			●
4,7		SDP 0470 U □ HAK	●			●			●			●
4,8		SDP 0480 U □ HAK	●			●			●			●
4,9		SDP 0490 U □ HAK	●			●			●			●
5,0		SDP 0500 U □ HAK	●			●			●			●
5,1		SDP 0510 U □ HAK	●			●			●			●
5,2		SDP 0520 U □ HAK	●	31	79	●	91	50	●	90	49	
5,3		SDP 0530 U □ HAK	●			●			●			●
5,4		SDP 0540 U □ HAK	●			●			●			●
5,5		SDP 0550 U □ HAK	●			●			●			●
5,55		SDP 0555 U □ HAK	●			●			●			●
5,6		SDP 0560 U □ HAK	●			●			●			●
5,7	SDP 0570 U □ HAK	●	●			●			●			
5,8	SDP 0580 U □ HAK	●	●			●			●			
5,9	SDP 0590 U □ HAK	●	●			●			●			
6,0	SDP 0600 U □ HAK	●	●			●			●			
6,1	SDP 0610 U □ HAK	●	37	79	●	91	50	●	97	56		
6,2	SDP 0620 U □ HAK	●			●			●			●	
6,3	SDP 0630 U □ HAK	●			●			●			●	
6,4	SDP 0640 U □ HAK	●			●			●			●	
6,5	SDP 0650 U □ HAK	●			●			●			●	
6,6	SDP 0660 U □ HAK	●			●			●			●	
6,7	SDP 0670 U □ HAK	●			●			●			●	
6,8	SDP 0680 U □ HAK	●			●			●			●	
6,9	SDP 0690 U □ HAK	●			●			●			●	
7,0	SDP 0700 U □ HAK	●			●			●			●	
7,1	SDP 0710 U □ HAK	●	37	79	●	91	50	●	106	65		
7,2	SDP 0720 U □ HAK	●			●			●			●	
7,3	SDP 0730 U □ HAK	●			●			●			●	
7,4	SDP 0740 U □ HAK	●			●			●			●	
7,5	SDP 0750 U □ HAK	●			●			●			●	

※ Remarks:

□ Non-Stock Items will be required minimum order quantity for 30 pcs.

● = Euro stock  
□ = Delivery on request

### ■ Solid Carbide Drill with Internal Coolant Supply, $\varnothing D$ : 7,6 ~ 12,5mm, 3D / 5D / 7D



$\varnothing D$ (mm)	Shank $\varnothing d$ (mm)	Cat. No. (L/D) 3, 5, 7	3D Type			5D Type			7D Type		
			Stock	Dimensions (mm)		Stock	Dimensions (mm)		Stock	Dimensions (mm)	
			3	L	l	5	L	l	7	L	l
7,6	8	SDP 0760 U □ HAK	●			●			●		
7,7		SDP 0770 U □ HAK	●			●			●		
7,8		SDP 0780 U □ HAK	●	79	37	●	91	50	●	116	75
7,9		SDP 0790 U □ HAK	●			●			●		
8,0		SDP 0800 U □ HAK	●			●			●		
8,1	10	SDP 0810 U □ HAK	●			●			●		
8,2		SDP 0820 U □ HAK	●			●			●		
8,3		SDP 0830 U □ HAK	●			●			□		
8,4		SDP 0840 U □ HAK	●			●			●		
8,5		SDP 0850 U □ HAK	●			●			●	131	85
8,6		SDP 0860 U □ HAK	●			●			●		
8,7		SDP 0870 U □ HAK	●			●			●		
8,8		SDP 0880 U □ HAK	●			●			●		
8,9		SDP 0890 U □ HAK	●			●			□		
9,0		SDP 0900 U □ HAK	●			●			●		
9,1		SDP 0910 U □ HAK	●	89	43	●	103	57	●		
9,2		SDP 0920 U □ HAK	●			●			●		
9,25		SDP 0925 U □ HAK	●			●			□		
9,3		SDP 0930 U □ HAK	●			●			●		
9,4		SDP 0940 U □ HAK	●			●			●		
9,5	SDP 0950 U □ HAK	●			●			●	139	93	
9,6	SDP 0960 U □ HAK	●			●			□			
9,7	SDP 0970 U □ HAK	●			●			●			
9,8	SDP 0980 U □ HAK	●			●			●			
9,9	SDP 0990 U □ HAK	●			●			●			
10,0	SDP 1000 U □ HAK	●			●			●			
10,1	12	SDP 1010 U □ HAK	●			●			□		
10,2		SDP 1020 U □ HAK	●			●			●		
10,3		SDP 1030 U □ HAK	●			●			□		
10,4		SDP 1040 U □ HAK	●			●			□		
10,5		SDP 1050 U □ HAK	●			●			●	155	104
10,6		SDP 1060 U □ HAK	●			●			□		
10,7		SDP 1070 U □ HAK	●			●			□		
10,8		SDP 1080 U □ HAK	●			●			●		
10,9		SDP 1090 U □ HAK	●			●			□		
11,0		SDP 1100 U □ HAK	●	102	51	●	118	67	●		
11,1		SDP 1110 U □ HAK	●			●			□		
11,2		SDP 1120 U □ HAK	●			●			●		
11,3		SDP 1130 U □ HAK	●			●			□		
11,4		SDP 1140 U □ HAK	●			●			□		
11,5		SDP 1150 U □ HAK	●			●			●	163	112
11,6	SDP 1160 U □ HAK	●			●			□			
11,7	SDP 1170 U □ HAK	●			●			□			
11,8	SDP 1180 U □ HAK	●			●			●			
11,9	SDP 1190 U □ HAK	●			●			□			
12,0	SDP 1200 U □ HAK	●			●			●			
12,1	14	SDP 1210 U □ HAK	□			□			□		
12,2		SDP 1220 U □ HAK	●			●			●		
12,3		SDP 1230 U □ HAK	□	107	56	□	124	73	□	182	131
12,4		SDP 1240 U □ HAK	□			□			□		
12,5		SDP 1250 U □ HAK	●			●			●		

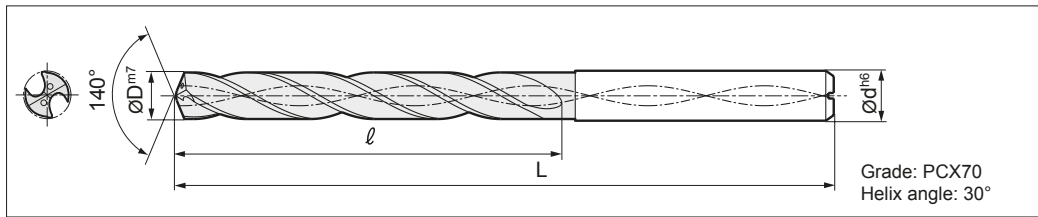
※ Remarks:

□ Non-Stock Items will be required minimum order quantity for 30 pcs.

# SumiDrill Power Series SDP (DIN) Type

AlCrTiN Coated Solid Carbide Drills to DIN 6537

■ Solid Carbide Drill with Internal Coolant Supply, ØD: 12,6 ~ 16,0mm, 3D / 5D / 7D



ØD (mm)	Shank Ød (mm)	Cat. No. (L/D) 3, 5, 7	3D Type			5D Type			7D Type		
			Stock	Dimensions (mm)		Stock	Dimensions (mm)		Stock	Dimensions (mm)	
			3	L	ℓ	5	L	ℓ	7	L	ℓ
12,6	14	SDP 1260 U □ HAK	□			□			□		
12,7		SDP 1270 U □ HAK	□			□			□		
12,8		SDP 1280 U □ HAK	□			□			□		
12,9		SDP 1290 U □ HAK	□			□			□		
13,0		SDP 1300 U □ HAK	●			●			●		
13,1		SDP 1310 U □ HAK	□			□			□		
13,2		SDP 1320 U □ HAK	□			□			□		
13,3		SDP 1330 U □ HAK	□	107	56	□	124	73	□	182	131
13,4		SDP 1340 U □ HAK	□			□			□		
13,5		SDP 1350 U □ HAK	●			●			●		
13,6		SDP 1360 U □ HAK	□			□			□		
13,7		SDP 1370 U □ HAK	●			●			●		
13,8		SDP 1380 U □ HAK	□			□			□		
13,9		SDP 1390 U □ HAK	□			□			□		
14,0	SDP 1400 U □ HAK	●			●			●			
14,1	16	SDP 1410 U □ HAK	□			□			□		
14,2		SDP 1420 U □ HAK	●			●			●		
14,3		SDP 1430 U □ HAK	□			□			□		
14,4		SDP 1440 U □ HAK	□			□			□		
14,5		SDP 1450 U □ HAK	●			●			●		
14,6		SDP 1460 U □ HAK	□			□			□		
14,7		SDP 1470 U □ HAK	●			●			●		
14,8		SDP 1480 U □ HAK	□			□			□		
14,9		SDP 1490 U □ HAK	□			□			□		
15,0		SDP 1500 U □ HAK	●			●			●		
15,1		SDP 1510 U □ HAK	□	115	60	□	133	78	□	204	149
15,2		SDP 1520 U □ HAK	●			●			●		
15,3		SDP 1530 U □ HAK	□			□			□		
15,4		SDP 1540 U □ HAK	□			□			□		
15,5		SDP 1550 U □ HAK	●			●			●		
15,6		SDP 1560 U □ HAK	□			□			□		
15,7	SDP 1570 U □ HAK	●			●			●			
15,8	SDP 1580 U □ HAK	□			□			□			
15,9	SDP 1590 U □ HAK	□			□			□			
16,0	SDP 1600 U □ HAK	●			●			●			

※ Remarks:

□ Non-Stock Items will be required minimum order quantity for 30 pcs.

● = Euro stock  
□ = Delivery on request

### Recommended Cutting Conditions

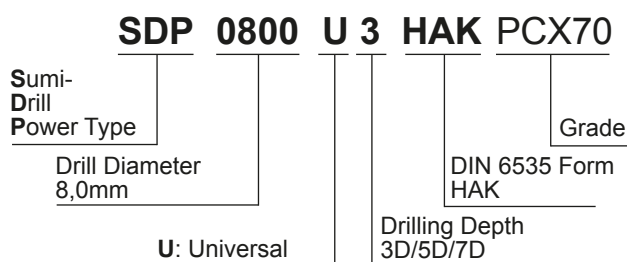
Material Group						SDP ____ U_HAK PCX70					
ISO 513	Work Material	Type/ Structure	R <sub>m</sub> N/mm <sup>2</sup>	Hardness HB30	Fitness	$\varnothing$ D: 3,0 - 6,0		$\varnothing$ D: 6,1 - 10,0		$\varnothing$ D: 10,1 - 16,0	
						v <sub>c</sub> =m/min	Feed rate (mm/rev)	v <sub>c</sub> =m/min	Feed rate (mm/rev)	v <sub>c</sub> =m/min	Feed rate (mm/rev)
P	Carbon steel Cast steel	free cutting steel	420	125	◎	50 - 80 - 120	0,15 - 0,20 - 0,31	70 - 110 - 140	0,20 - 0,25 - 0,42	80 - 120 - 160	0,25 - 0,30 - 0,53
		construction steel	650	190	◎	50 - 80 - 120	0,15 - 0,20 - 0,31	70 - 110 - 140	0,20 - 0,25 - 0,42	80 - 120 - 160	0,25 - 0,30 - 0,53
		case-hardened steel	850	250	◎	50 - 80 - 120	0,15 - 0,20 - 0,31	70 - 110 - 140	0,20 - 0,25 - 0,42	80 - 120 - 160	0,25 - 0,30 - 0,53
		heat-treatable steel	750	270	◎	50 - 80 - 120	0,15 - 0,20 - 0,31	70 - 110 - 140	0,20 - 0,25 - 0,42	80 - 120 - 160	0,25 - 0,30 - 0,50
		spring steel	1000	300	◎	10 - 20 - 30	0,05 - 0,06 - 0,11	15 - 22 - 30	0,08 - 0,09 - 0,14	20 - 28 - 35	0,08 - 0,09 - 0,16
	Low alloy steel Cast steel	case-hardened steel	600	180	◎	50 - 70 - 90	0,10 - 0,14 - 0,24	60 - 80 - 110	0,15 - 0,20 - 0,32	70 - 100 - 120	0,20 - 0,25 - 0,40
		heat-treatable steel	930	275	◎	45 - 65 - 85	0,10 - 0,14 - 0,24	60 - 80 - 110	0,15 - 0,22 - 0,34	65 - 95 - 120	0,20 - 0,25 - 0,37
		bearing steel	1000	300	○	40 - 60 - 80	0,10 - 0,15 - 0,26	60 - 80 - 110	0,15 - 0,20 - 0,32	60 - 90 - 120	0,20 - 0,25 - 0,37
		nitriding steel	1200	350	◎	35 - 55 - 75	0,10 - 0,15 - 0,26	55 - 75 - 110	0,15 - 0,22 - 0,32	55 - 80 - 110	0,20 - 0,27 - 0,38
	High alloy steel	tool steel	680	200	○	30 - 40 - 50	0,10 - 0,15 - 0,25	30 - 40 - 50	0,12 - 0,20 - 0,28	30 - 40 - 50	0,12 - 0,20 - 0,32
hot work steel		1100	325	○	20 - 30 - 40	0,10 - 0,12 - 0,23	20 - 30 - 40	0,12 - 0,15 - 0,27	20 - 30 - 40	0,14 - 0,18 - 0,32	
M	Stainless steel Cast steel	martensitic/ferritic	680	200	○	40 - 55 - 70	0,08 - 0,10 - 0,21	40 - 60 - 75	0,10 - 0,12 - 0,25	50 - 70 - 80	0,10 - 0,12 - 0,25
		martensitic	820	240	◎	30 - 45 - 60	0,08 - 0,10 - 0,20	40 - 60 - 70	0,10 - 0,12 - 0,24	50 - 60 - 80	0,10 - 0,12 - 0,24
		austenitic	600	180	◎	30 - 45 - 60	0,08 - 0,10 - 0,20	40 - 60 - 70	0,10 - 0,12 - 0,24	50 - 60 - 80	0,10 - 0,12 - 0,24
		Duplex	740	230	◎	30 - 45 - 60	0,06 - 0,08 - 0,18	40 - 60 - 70	0,08 - 0,10 - 0,23	50 - 60 - 80	0,10 - 0,10 - 0,23
K	Cast iron GG	ferritic/pearlitic		180	◎	50 - 70 - 90	0,15 - 0,20 - 0,36	60 - 80 - 100	0,20 - 0,25 - 0,40	70 - 100 - 120	0,25 - 0,30 - 0,42
		pearlitic		260	◎	40 - 60 - 80	0,15 - 0,20 - 0,36	50 - 70 - 90	0,20 - 0,25 - 0,40	60 - 80 - 100	0,25 - 0,30 - 0,42
	Cast iron GGG	ferritic		160	◎	50 - 70 - 90	0,15 - 0,18 - 0,31	60 - 80 - 100	0,20 - 0,25 - 0,40	70 - 100 - 120	0,25 - 0,30 - 0,42
		pearlitic		250	◎	40 - 60 - 80	0,15 - 0,18 - 0,31	50 - 70 - 90	0,20 - 0,25 - 0,40	70 - 80 - 100	0,25 - 0,30 - 0,42
S	Heat resisting alloys	Fe-based			○	10 - 20 - 30	0,08 - 0,09 - 0,13	15 - 22 - 32	0,08 - 0,10 - 0,15	20 - 28 - 35	0,10 - 0,12 - 0,19
		Ni / Co-based			○	10 - 20 - 30	0,08 - 0,09 - 0,13	15 - 22 - 32	0,08 - 0,10 - 0,15	20 - 28 - 35	0,10 - 0,12 - 0,19
	Titanium Titanium alloys	pure Titanium	430								
N	Aluminium Al-wrought alloys	pure aluminium									
		wrought alloys									
	Aluminium Cast alloys	Si ≤ 12%									
		Si ≥ 12%			◎	70 - 90 - 100	0,15 - 0,20 - 0,25	80 - 100 - 120	0,20 - 0,25 - 0,30	100 - 120 - 140	0,25 - 0,30 - 0,35
		Al - Mg alloys									
	Zinc die-cast	Zn alloys									
Copper alloys	Copper										
	Brass			○	80 - 100 - 120	0,15 - 0,20 - 0,25	110 - 130 - 180	0,20 - 0,25 - 0,30	160 - 180 - 200	0,25 - 0,30 - 0,35	
	Bronze										
H	Hardened steel	45 HRC			○	10 - 20 - 30	0,08 - 0,09 - 0,10	15 - 22 - 32	0,08 - 0,10 - 0,12	20 - 28 - 35	0,12 - 0,15 - 0,20
		55 HRC									
		60 HRC									
		> 60 HRC									

◎ Preferred choice

○ Suitable

◎ Possible

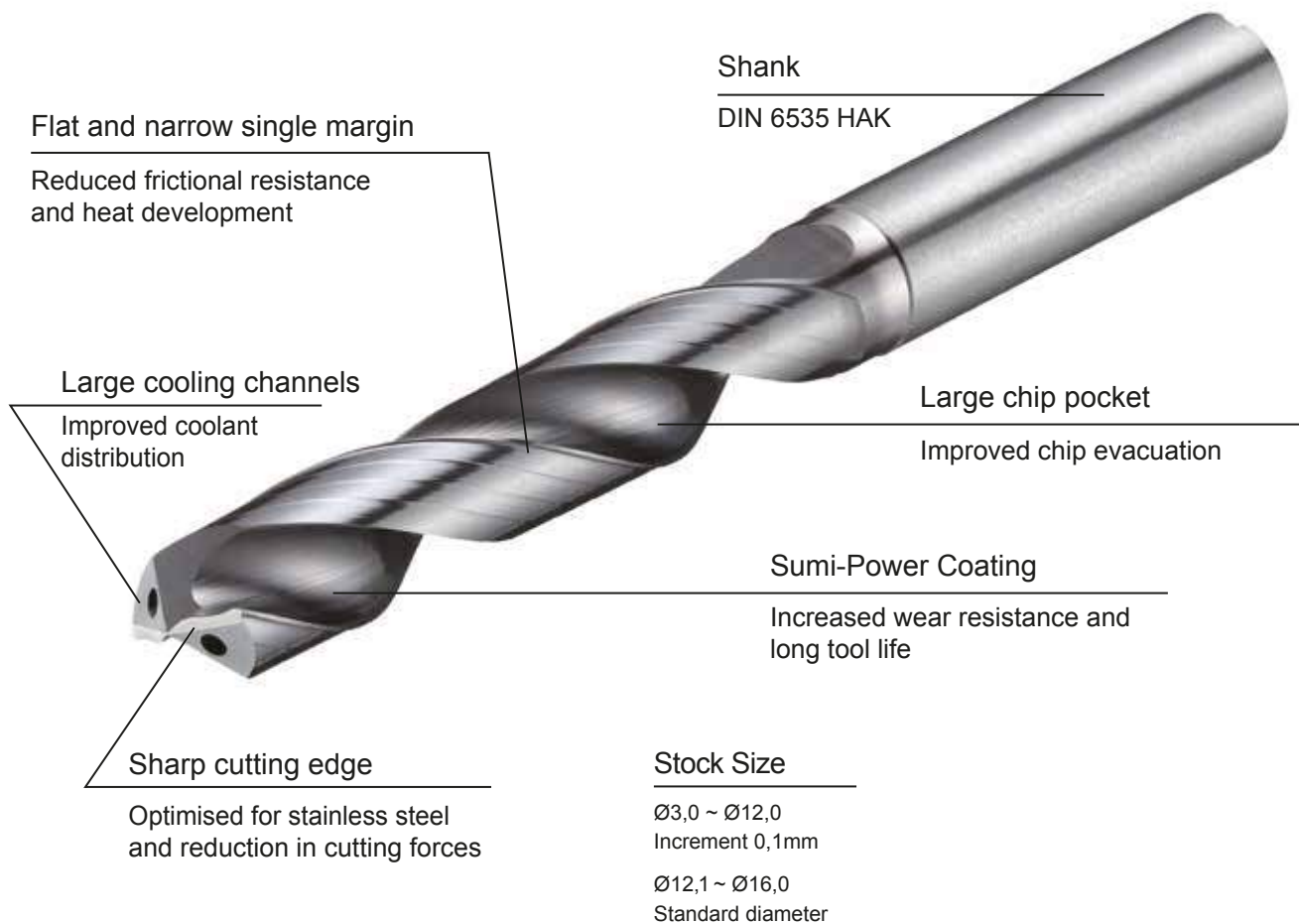
### SDP-Identification



# SumiDrill Power Series SDM Type

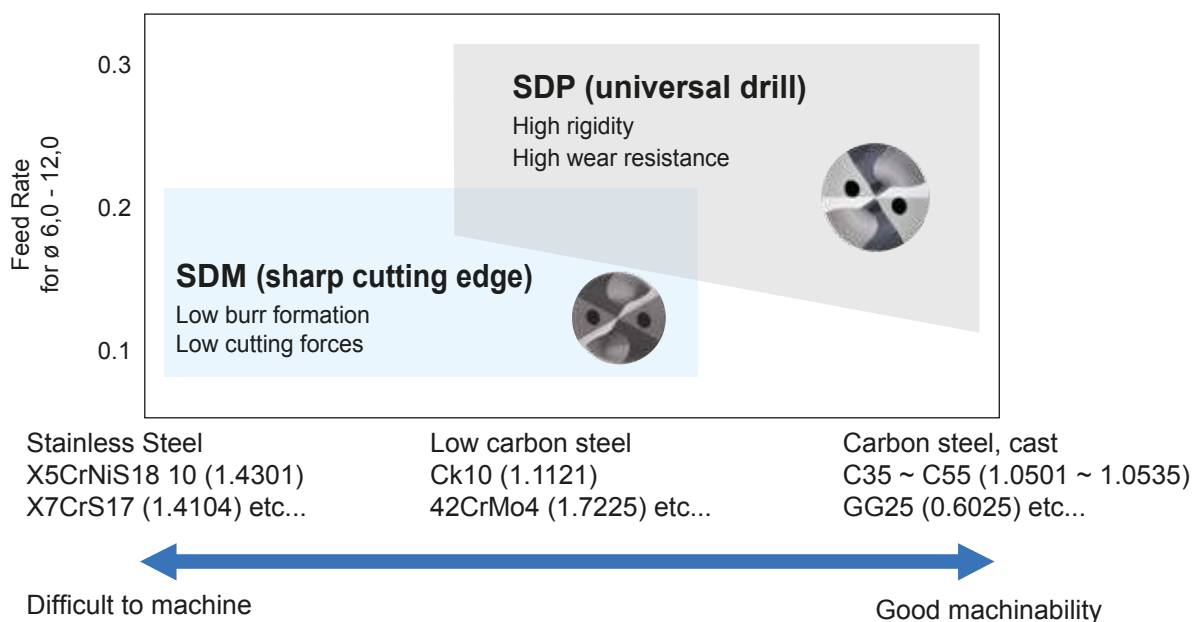


## General Features



## Advantages

- High process reliability in stainless steel and low carbon steel
- Can be used on low-performance machines! (→avoids overload!)
- High surface quality in the bore
- Sharp cutting edge
- High adhesion resistance by Sumi-Power Coating







# SumiDrill Power Series SDM Type

## Chip Control

Drill:	Ø 8mm, L/D=5
Work Material:	X5CrNiS18 10 (1.4301)
Cutting Data:	$v_c=60\text{m/min}$ , $f=0,10\text{mm/rev}$ , $a_p=19\text{mm}$ Internal coolant (2,0MPa)

### SDM



Short chips,  
good chip evacuation

### Competitor A



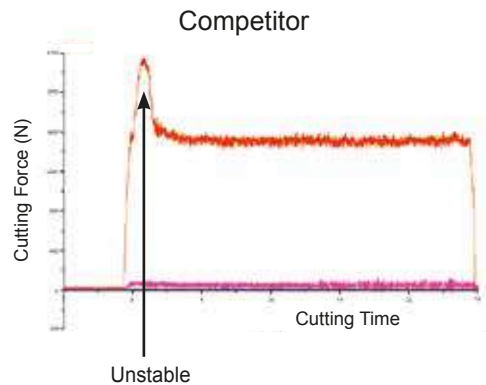
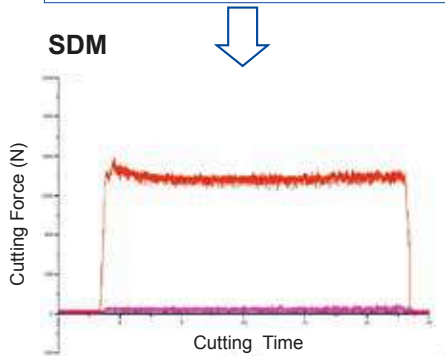
Partial long chips,  
risk of tool breakage  
by poor chip evacuation



## Optimal Cutting Forces

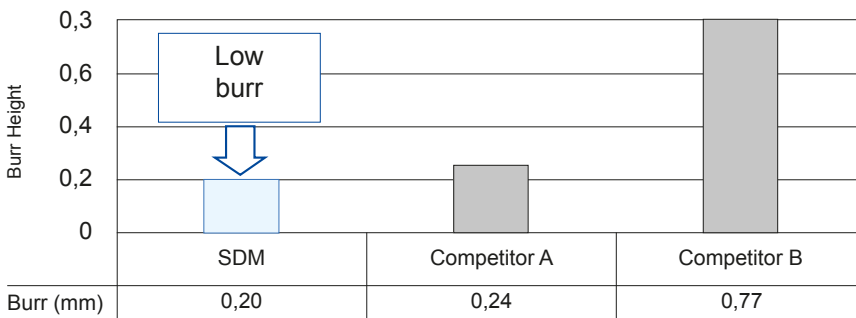
Drill:	Ø 8mm, L/D=5
Work Material:	X5CrNiS18 10 (1.4301)
Cutting Data:	$v_c=60\text{m/min}$ , $f=0,20\text{mm/rev}$ , $a_p=40\text{mm}$ Internal coolant (2,0MPa)

10% lower than competitor A



## Low Burr Formation

Drill:	Ø 8mm, L/D=5
Work Material:	X5CrNiS18 10 (1.4301)
Cutting Data:	$v_c=60\text{m/min}$ , $f=0,20\text{mm/rev}$ , $a_p=40\text{mm}$ Internal coolant (2,0MPa)



### SDM



### Competitor A



### Competitor B



# SumiDrill Power Series SDM Type



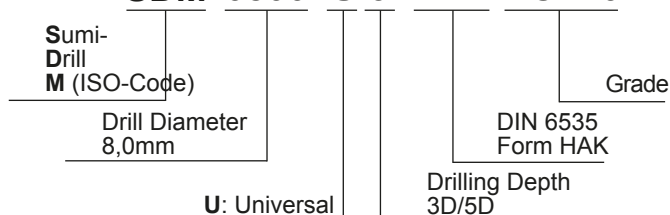
## Recommended Cutting Conditions

Material Group						SDM ____ U_HAK PCX70					
ISO 513	Work Material	Type/ Structure	R <sub>m</sub> N/mm <sup>2</sup>	Hardness HB30	Fitness	ØD: 3,0 - 6,0		ØD: 6,1 - 10,0		ØD: 10,1 - 16,0	
						v <sub>c</sub> =m/min	Feed rate (mm/rev)	v <sub>c</sub> =m/min	Feed rate (mm/rev)	v <sub>c</sub> =m/min	Feed rate (mm/rev)
P	Carbon steel Cast steel	free cutting steel	420	125	○	80 - 100 - 120	0,08 - 0,11 - 0,14	80 - 100 - 120	0,10 - 0,15 - 0,20	80 - 100 - 120	0,20 - 0,25 - 0,30
		construction steel	650	190	○	80 - 100 - 120	0,08 - 0,11 - 0,14	80 - 100 - 120	0,10 - 0,15 - 0,20	80 - 100 - 120	0,20 - 0,25 - 0,30
		case-hardened steel	850	250	○	80 - 100 - 120	0,08 - 0,11 - 0,14	80 - 100 - 120	0,10 - 0,15 - 0,20	80 - 100 - 120	0,20 - 0,25 - 0,30
		heat-treatable steel	750	270	○	40 - 60 - 100	0,08 - 0,10 - 0,12	40 - 60 - 100	0,10 - 0,12 - 0,16	40 - 60 - 100	0,15 - 0,17 - 0,20
	spring steel	1000	300								
	Low alloy steel Cast steel	case-hardened steel	600	180	○	80 - 100 - 120	0,08 - 0,11 - 0,14	80 - 100 - 120	0,10 - 0,15 - 0,20	80 - 100 - 120	0,20 - 0,25 - 0,30
		heat-treatable steel	930	275	○	40 - 60 - 100	0,08 - 0,10 - 0,12	40 - 60 - 100	0,10 - 0,12 - 0,16	40 - 60 - 100	0,15 - 0,17 - 0,20
		bearing steel	1000	300							
	High alloy steel / Cast steel	nitriding steel	1200	350							
		cold work steel									
M	Stainless steel Cast steel	tool steel	680	200	○	40 - 60 - 100	0,08 - 0,10 - 0,12	40 - 60 - 100	0,10 - 0,12 - 0,16	40 - 60 - 100	0,15 - 0,17 - 0,20
		hot work steel	1100	325							
		martensitic/ferritic	680	200	●	40 - 60 - 100	0,08 - 0,10 - 0,12	40 - 60 - 100	0,10 - 0,14 - 0,18	40 - 60 - 100	0,15 - 0,20 - 0,25
		martensitic/ferritic		> 200	●	30 - 50 - 80	0,08 - 0,10 - 0,12	30 - 50 - 80	0,10 - 0,14 - 0,18	30 - 50 - 80	0,15 - 0,20 - 0,25
		martensitic	820	240	●	30 - 50 - 80	0,08 - 0,10 - 0,12	30 - 50 - 80	0,10 - 0,14 - 0,18	30 - 50 - 80	0,15 - 0,20 - 0,25
		austenitic	600	180	●	40 - 60 - 100	0,08 - 0,10 - 0,12	40 - 60 - 100	0,10 - 0,14 - 0,18	40 - 60 - 100	0,15 - 0,20 - 0,25
		austenitic		> 200	●	30 - 50 - 80	0,08 - 0,10 - 0,12	30 - 50 - 80	0,10 - 0,14 - 0,18	30 - 50 - 80	0,15 - 0,20 - 0,25
K	Cast iron GG	ferritic/pearlitic		180							
		pearlitic		260							
S	Cast iron GGG	ferritic		160							
		pearlitic		250							
S	Heat resisting alloys	Fe-based			○	20 - 30 - 40	0,06 - 0,08 - 0,10	20 - 30 - 40	0,08 - 0,10 - 0,12	20 - 30 - 40	0,10 - 0,12 - 0,15
		Ni / Co-based			○	20 - 30 - 40	0,06 - 0,08 - 0,10	20 - 30 - 40	0,08 - 0,10 - 0,12	20 - 30 - 40	0,10 - 0,12 - 0,15
	Titanium Titanium alloys	pure Titanium	430								
Ti-Basis				○	20 - 30 - 40	0,06 - 0,08 - 0,10	20 - 30 - 40	0,08 - 0,10 - 0,12	20 - 30 - 40	0,10 - 0,12 - 0,15	
N	Aluminium	precipitation hardened		≤ 450	●	30 - 45 - 70	0,08 - 0,10 - 0,12	30 - 45 - 70	0,10 - 0,14 - 0,18	30 - 45 - 70	0,15 - 0,20 - 0,25
	Aluminium Cast alloys	pure aluminium									
		wrought alloys									
		Si ≤ 12%									
Zinc die-cast	Si ≥ 12%										
	Al - Mg alloys										
	Zn alloys										
H	Copper alloys	Copper									
		Brass									
		Bronze									
H	Hardened steel	45 HRC									
		55 HRC									
		60 HRC									
		> 60 HRC									

● Preferred choice ○ Possible

## SDM-Identification

**SDM 0800 U 3 HAK PCX70**

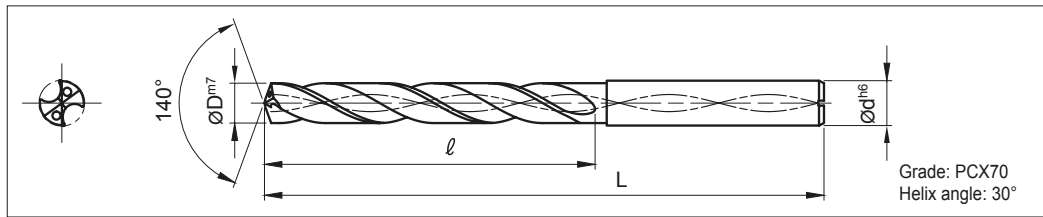


● = Euro stock  
□ = Delivery on request



# SumiDrill Power Series SDM Type

■ Solid Carbide Drill with Internal Coolant Supply, ØD: 3,0 ~ 7,5mm, 3D / 5D

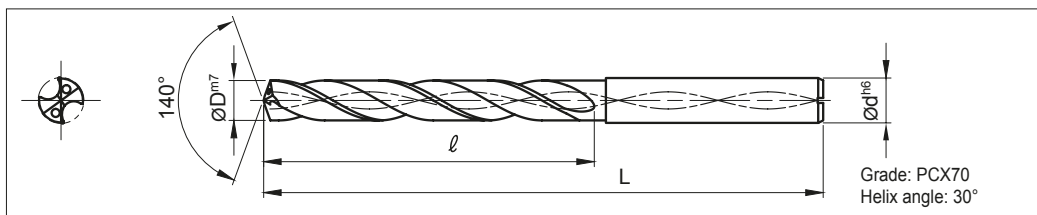


ØD (mm)	Shank Ød (mm)	Cat. No. (L/D) 3/5	3D Type		5D Type			
			Stock	Dimensions (mm)	Stock	Dimensions (mm)		
			3	L    l	5	L    l		
3,0	6	SDM 0300 U □ HAK	●	62	17	●	66	24
3,1		SDM 0310 U □ HAK	●					
3,2		SDM 0320 U □ HAK	●					
3,25		SDM 0325 U □ HAK	□					
3,3		SDM 0330 U □ HAK	●					
3,4		SDM 0340 U □ HAK	●					
3,5		SDM 0350 U □ HAK	●					
3,6		SDM 0360 U □ HAK	●					
3,7		SDM 0370 U □ HAK	●					
3,8		SDM 0380 U □ HAK	●	66	21	●	74	33
3,9		SDM 0390 U □ HAK	●					
4,0		SDM 0400 U □ HAK	●					
4,1		SDM 0410 U □ HAK	●					
4,2		SDM 0420 U □ HAK	●					
4,3		SDM 0430 U □ HAK	●					
4,4		SDM 0440 U □ HAK	●					
4,5		SDM 0450 U □ HAK	●					
4,6		SDM 0460 U □ HAK	●					
4,65		SDM 0465 U □ HAK	□					
4,7		SDM 0470 U □ HAK	●					
4,8		SDM 0480 U □ HAK	●			25		
4,9		SDM 0490 U □ HAK	●					
5,0		SDM 0500 U □ HAK	●					
5,1		SDM 0510 U □ HAK	●					
5,2		SDM 0520 U □ HAK	●					
5,3		SDM 0530 U □ HAK	●					
5,4		SDM 0540 U □ HAK	●					
5,5		SDM 0550 U □ HAK	●					
5,55		SDM 0555 U □ HAK	□					
5,6		SDM 0560 U □ HAK	●					
5,7		SDM 0570 U □ HAK	●					
5,8		SDM 0580 U □ HAK	●	79	31		●	91
5,9		SDM 0590 U □ HAK	●					
6,0	SDM 0600 U □ HAK	●						
6,1	SDM 0610 U □ HAK	●						
6,2	SDM 0620 U □ HAK	●						
6,3	SDM 0630 U □ HAK	●						
6,4	SDM 0640 U □ HAK	●						
6,5	SDM 0650 U □ HAK	●						
6,6	SDM 0660 U □ HAK	●						
6,7	SDM 0670 U □ HAK	●						
6,8	SDM 0680 U □ HAK	●	37	●	●	●		
6,9	SDM 0690 U □ HAK	●						
7,0	SDM 0700 U □ HAK	●						
7,1	SDM 0710 U □ HAK	●						
7,2	SDM 0720 U □ HAK	●						
7,3	SDM 0730 U □ HAK	●						
7,4	SDM 0740 U □ HAK	●						
7,5	SDM 0750 U □ HAK	●						

# SumiDrill Power Series SDM Type

**New**

■ Solid Carbide Drill with Internal Coolant Supply, ØD: 7,6 ~ 12,0mm, 3D / 5D



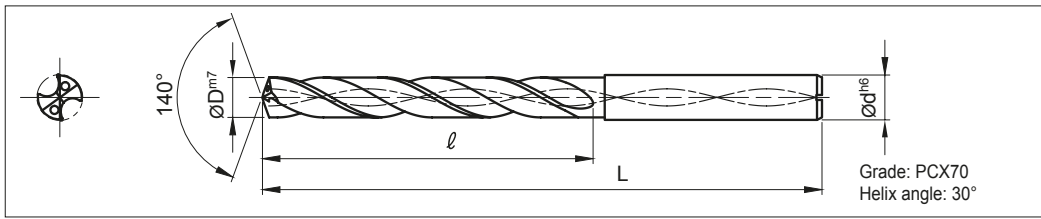
ØD (mm)	Shank Ød (mm)	Cat. No. (L/D) 3/5	3D Type			5D Type		
			Stock	Dimensions (mm)		Stock	Dimensions (mm)	
			3	L	ℓ	5	L	ℓ
7,6	8	SDM 0760 U □ HAK	●	79	37	●	91	50
7,7		SDM 0770 U □ HAK	●					
7,8		SDM 0780 U □ HAK	●					
7,9		SDM 0790 U □ HAK	●					
8,0		SDM 0800 U □ HAK	●					
8,1	10	SDM 0810 U □ HAK	●	89	43	●	103	57
8,2		SDM 0820 U □ HAK	●					
8,3		SDM 0830 U □ HAK	●					
8,4		SDM 0840 U □ HAK	●					
8,5		SDM 0850 U □ HAK	●					
8,6		SDM 0860 U □ HAK	●					
8,7		SDM 0870 U □ HAK	●					
8,8		SDM 0880 U □ HAK	●					
8,9		SDM 0890 U □ HAK	●					
9,0		SDM 0900 U □ HAK	●					
9,1		SDM 0910 U □ HAK	●					
9,2		SDM 0920 U □ HAK	●					
9,25		SDM 0925 U □ HAK	□					
9,3		SDM 0930 U □ HAK	●					
9,4		SDM 0940 U □ HAK	●					
9,5		SDM 0950 U □ HAK	●					
9,6		SDM 0960 U □ HAK	●					
9,7		SDM 0970 U □ HAK	●					
9,8		SDM 0980 U □ HAK	●					
9,9		SDM 0990 U □ HAK	●					
10,0	SDM 1000 U □ HAK	●						
10,1	12	SDM 1010 U □ HAK	●	102	51	●	118	67
10,2		SDM 1020 U □ HAK	●					
10,3		SDM 1030 U □ HAK	●					
10,4		SDM 1040 U □ HAK	●					
10,5		SDM 1050 U □ HAK	●					
10,6		SDM 1060 U □ HAK	●					
10,7		SDM 1070 U □ HAK	●					
10,8		SDM 1080 U □ HAK	●					
10,9		SDM 1090 U □ HAK	●					
11,0		SDM 1100 U □ HAK	●					
11,1		SDM 1110 U □ HAK	●					
11,2		SDM 1120 U □ HAK	●					
11,3		SDM 1130 U □ HAK	●					
11,4		SDM 1140 U □ HAK	●					
11,5		SDM 1150 U □ HAK	●					
11,6		SDM 1160 U □ HAK	●					
11,7		SDM 1170 U □ HAK	●					
11,8	SDM 1180 U □ HAK	●						
11,9	SDM 1190 U □ HAK	●						
12,0	SDM 1200 U □ HAK	●						

● = Euro stock  
□ = Delivery on request



# SumiDrill Power Series SDM Type

■ Solid Carbide Drill with Internal Coolant Supply, ØD: 12,0 ~ 16,0mm, 3D / 5D



ØD (mm)	Shank Ød (mm)	Cat. No. (L/D) 3/5	3D Type		5D Type			
			Stock	Dimensions (mm)	Stock	Dimensions (mm)		
			3	L    ℓ	5	L    ℓ		
12,1	14	SDM 1210 U □ HAK	□	107	56	□	124	73
12,2		SDM 1220 U □ HAK	□			□		
12,3		SDM 1230 U □ HAK	□			□		
12,4		SDM 1240 U □ HAK	□			□		
12,5		SDM 1250 U □ HAK	●			●		
12,6		SDM 1260 U □ HAK	□			□		
12,7		SDM 1270 U □ HAK	□			□		
12,8		SDM 1280 U □ HAK	□			□		
12,9		SDM 1290 U □ HAK	□			□		
13,0		SDM 1300 U □ HAK	●			●		
13,1		SDM 1310 U □ HAK	□			□		
13,2		SDM 1320 U □ HAK	□			□		
13,3		SDM 1330 U □ HAK	□			□		
13,4		SDM 1340 U □ HAK	□			□		
13,5	SDM 1350 U □ HAK	●	●					
13,6	SDM 1360 U □ HAK	□	□					
13,7	SDM 1370 U □ HAK	□	□					
13,8	SDM 1380 U □ HAK	□	□					
13,9	SDM 1390 U □ HAK	□	□					
14,0	SDM 1400 U □ HAK	●	●					
14,1	16	SDM 1410 U □ HAK	□	115	60	□	133	78
14,2		SDM 1420 U □ HAK	□			□		
14,3		SDM 1430 U □ HAK	□			□		
14,4		SDM 1440 U □ HAK	□			□		
14,5		SDM 1450 U □ HAK	●			●		
14,6		SDM 1460 U □ HAK	□			□		
14,7		SDM 1470 U □ HAK	□			□		
14,8		SDM 1480 U □ HAK	□			□		
14,9		SDM 1490 U □ HAK	□			□		
15,0		SDM 1500 U □ HAK	●			●		
15,1		SDM 1510 U □ HAK	□			□		
15,2		SDM 1520 U □ HAK	□			□		
15,3		SDM 1530 U □ HAK	□			□		
15,4		SDM 1540 U □ HAK	□			□		
15,5		SDM 1550 U □ HAK	●			●		
15,6		SDM 1560 U □ HAK	□			□		
15,7	SDM 1570 U □ HAK	□	□					
15,8	SDM 1580 U □ HAK	□	□					
15,9	SDM 1590 U □ HAK	□	□					
16,0	SDM 1600 U □ HAK	●	●					

# Drill Coating

## DEX Coating



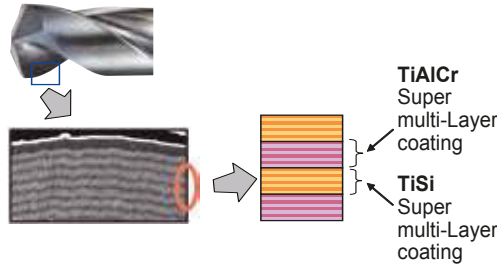
### General Features

- Sumitomo Electric Hardmetal's next-generation drill coating utilises nano-coating technology to provide more than double the tool life of conventional coatings.
- Silicon and chrome improve usure, heat, and adhesion resistance.
- New super multi-layered structure offers significantly improved chip resistance (coating strength).

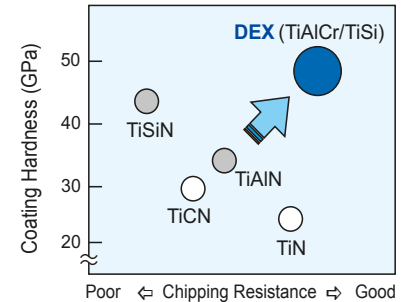
### Characteristics

#### Coating Design

World's first combined super multi-layered coating is made from alternate layers of super multilayered substrates.



#### Characteristics of Films



### DEX Coat Application Examples

#### MultiDrill GS Type Drilling Examples

Comparison of Usure Resistance		Comparison of Adhesion Resistance	
<p><b>Edge Usure Comparison for 70m Drilling</b></p> <p>Shoulder and rake face feature improved usure resistance enabling long tool life.</p> <p><b>DEX Coating MultiDrill GS Type</b></p> <p><b>Concurrent A Drill</b></p> <p>GS Type MultiDrill with DEX Coating: ~100m</p> <p>Company A's drill: ~60m</p>		<p><b>Edge Usure Comparison for 100m Drilling</b></p> <p>Offers significantly improved fracture resistance to counter problems caused by shoulder and flute adhesion in soft steel drilling.</p> <p><b>DEX Coating MultiDrill GS Type</b></p> <p><b>Competitor B Drill</b></p> <p>GS Type MultiDrill with DEX Coating: Able to continue</p> <p>Company A's drill: Breakage</p>	
Tool:	MDW 0800 GS4	Tool:	MDW 0600 GS4
Work Material:	C50 (HB200)	Work Material:	15CrMo5 (HB120)
Cutting Conditions:	$v_c=70\text{m/min}$ , $f=0,25\text{mm/rev}$ , $d_{oc}=32\text{mm}$ External coolant (Water soluble)	Cutting Conditions:	$v_c=60\text{m/min}$ , $f=0,18\text{mm/rev}$ , $d_{oc}=18\text{mm}$ External coolant (Water soluble)

#### Long MultiDrill XHT Type Drilling Examples

<p>Reduced margin usure during deep hole MQL drilling increases number of regrinds.</p> <p><b>DEX Coating</b></p> <p><b>Conventional Coating</b></p>	
Tool:	MDW 0497 XHT20 ( $\phi 4,97$ L/D=29)
Work Material:	42CrMo4 (HB275) Crank Shaft
Cutting Conditions:	$v_c=70\text{m/min}$ , $f=0,23\text{mm/rev}$ , $d_{oc}=75\text{mm}$ MQL

#### MultiDrill SMD Type Drilling Examples

<p>Offers longer tool life with SEC MultiDrills as well.</p> <p><b>1,4x Life!</b></p>	
Tool:	SMDH 210 M ( $\phi 21,0$ )
Work Material:	36Mn5 (HB350) Construction Mashine Component
Cutting Conditions:	$v_c=60\text{m/min}$ , $f=0,25\text{mm/rev}$ , $d_{oc}=25\text{mm}$ Water soluble Coolant



## General Features

Super MultiDrill GS types are solid carbide drills that employ a new flute design and wide chip pocket to achieve excellent chip management and evacuation. DEX coating enables stable and long tool life over a wide range of work materials and applications.

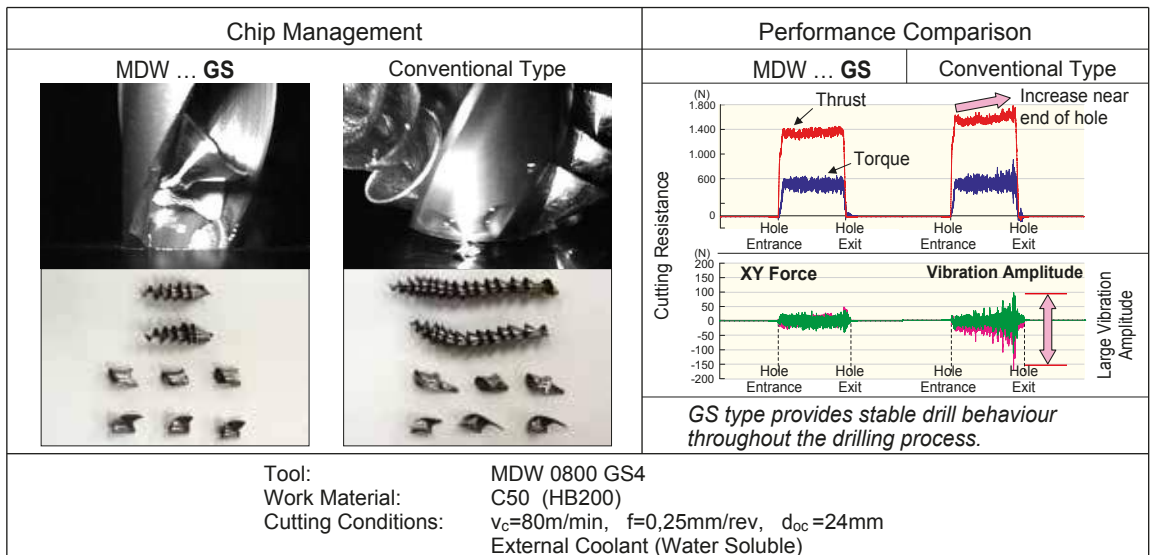
## Characteristics and Applications

- **Long tool life**  
New cutting edge design and special DEX coating provide long tool life with a wide variety of work materials.
- **Stable chip evacuation**  
New flute shape significantly improves chip management and evacuation.
- **Quiet cutting and stable cutting resistance**  
Stable drilling with little wobble even in small machine applications.
- **Environmentally-friendly**  
Compatible with the MQL (Minimum Quantity Lubrication) system.

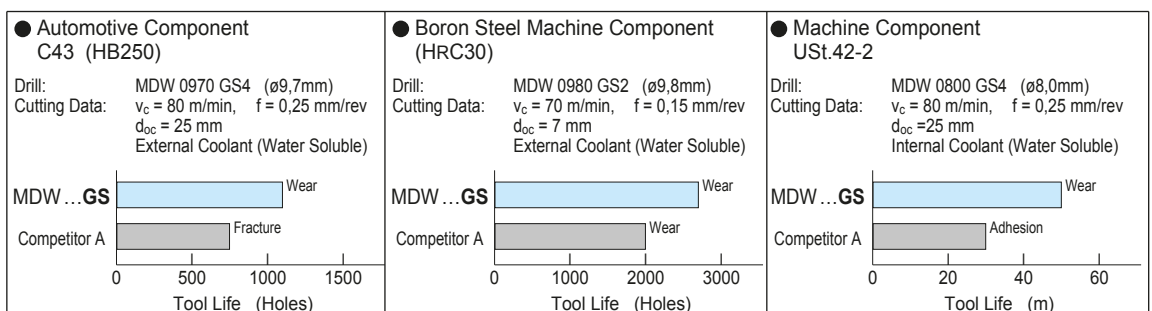
## Series

Coolant Supply	Type	Diameter Range (mm)	Hole Depth (L/D)
External (GS Type)	MDW <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> GS2	ø2,0~ø16,0	~ 2
	MDW <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> GS4		~ 4

## Performance



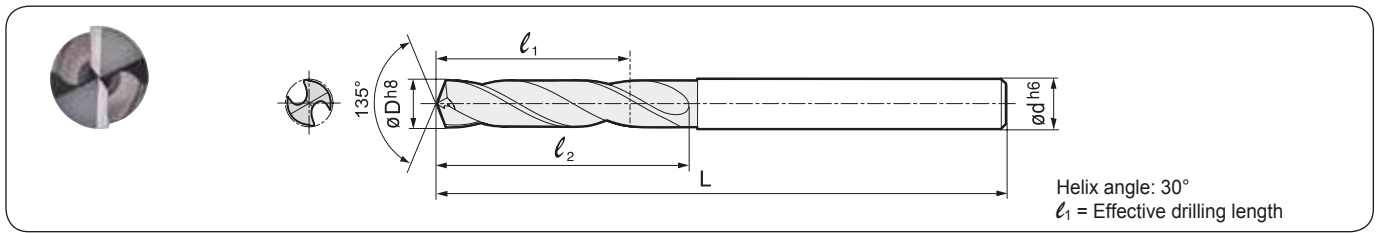
## Application Examples



# GS Type SUPER MULTI-DRILLS

## MDW ... GS Type

Without Coolant Holes (2D/4D) "Super Multi-Layer" DEX (TiAlCr/TiSi) Coated Solid Carbide Drills



### ● Diameter ø2,0~6,0mm (mm)

Dimensions		Cat. No.	Short Type (2D)				Long Type (4D)			
øD	ød		Stock	Dimensions			Stock	Dimensions		
			2	L	l <sub>1</sub>	l <sub>2</sub>	4	L	l <sub>1</sub>	l <sub>2</sub>
2,0	3,0	MDW 0200 GS	○	45,4	6,0	8,4	○	49,4	13,0	15,4
2,1	3,0	MDW 0210 GS	○	45,6	7,3	10,5	○	49,6	14,5	17,5
2,2		MDW 0220 GS	○							
2,3		MDW 0230 GS	○							
2,4		MDW 0240 GS	○							
2,5		MDW 0250 GS	●							
2,6		MDW 0260 GS	●							
2,7		MDW 0270 GS	○							
2,8		MDW 0280 GS	●							
2,9		MDW 0290 GS	○							
3,0		MDW 0300 GS	○							
3,1	4,0	MDW 0310 GS	●	54,8	15,5	19,7	○	60,8	20,5	24,7
3,2		MDW 0320 GS	○							
3,3		MDW 0330 GS	●							
3,4		MDW 0340 GS	●							
3,5		MDW 0350 GS	●							
3,6		MDW 0360 GS	○							
3,7		MDW 0370 GS	○							
3,8		MDW 0380 GS	○							
3,9		MDW 0390 GS	○							
4,0		MDW 0400 GS	●							
4,1	5,0	MDW 0410 GS	○	62,0	18,5	23,9	○	77,0	25,5	31,9
4,2		MDW 0420 GS	●							
4,3		MDW 0430 GS	○							
4,4		MDW 0440 GS	○							
4,5		MDW 0450 GS	●							
4,6		MDW 0460 GS	○							
4,7		MDW 0470 GS	○							
4,8		MDW 0480 GS	○							
4,9		MDW 0490 GS	○							
5,0		MDW 0500 GS	●							
5,1	6,0	MDW 0510 GS	●	66,2	19,5	26,1	○	82,2	33,5	40,1
5,2		MDW 0520 GS	●							
5,3		MDW 0530 GS	○							
5,4		MDW 0540 GS	○							
5,5		MDW 0550 GS	●							
5,6		MDW 0560 GS	○							
5,7		MDW 0570 GS	○							
5,8		MDW 0580 GS	○							
5,9		MDW 0590 GS	○							
6,0		MDW 0600 GS	●							

### ● Diameter ø6,1~10,0mm (mm)

Dimensions		Cat. No.	Short Type (2D)				Long Type (4D)			
øD	ød		Stock	Dimensions			Stock	Dimensions		
			2	L	l <sub>1</sub>	l <sub>2</sub>	4	L	l <sub>1</sub>	l <sub>2</sub>
6,1	7,0	MDW 0610 GS	○	24,5	32,3	○	74,5	84,3	35,5	43,3
6,2		MDW 0620 GS	○							
6,3		MDW 0630 GS	○							
6,4		MDW 0640 GS	○							
6,5		MDW 0650 GS	●							
6,6		MDW 0660 GS	○							
6,7		MDW 0670 GS	○							
6,8		MDW 0680 GS	●							
6,9		MDW 0690 GS	○							
7,0		MDW 0700 GS	●							
7,1	8,0	MDW 0710 GS	○	25,6	34,6	○	79,7	91,7	37,6	46,6
7,2		MDW 0720 GS	○							
7,3		MDW 0730 GS	○							
7,4		MDW 0740 GS	○							
7,5		MDW 0750 GS	●							
7,6		MDW 0760 GS	○							
7,7		MDW 0770 GS	○							
7,8		MDW 0780 GS	○							
7,9		MDW 0790 GS	○							
8,0		MDW 0800 GS	●							
8,1	9,0	MDW 0810 GS	○	27,4	37,8	○	83,9	99,9	34,4	54,8
8,2		MDW 0820 GS	○							
8,3		MDW 0830 GS	○							
8,4		MDW 0840 GS	○							
8,5		MDW 0850 GS	●							
8,6		MDW 0860 GS	○							
8,7		MDW 0870 GS	○							
8,8		MDW 0880 GS	○							
8,9		MDW 0890 GS	○							
9,0		MDW 0900 GS	●							
9,1	10,0	MDW 0910 GS	○	28,6	40,0	○	89,0	107,0	48,6	60,0
9,2		MDW 0920 GS	○							
9,3		MDW 0930 GS	○							
9,4		MDW 0940 GS	○							
9,5		MDW 0950 GS	●							
9,6		MDW 0960 GS	○							
9,7		MDW 0970 GS	○							
9,8		MDW 0980 GS	○							
9,9		MDW 0990 GS	○							
10,0		MDW 1000 GS	●							

### ■ Recommended Cutting Conditions for Multi-Drills GS Type

Diameter (mm)		Soft Steels (~ HB200)	General Steels (~ HB300)	Stainless Steels (~ HB200)	Grey Cast Irons	Ductile Cast Irons
~ ø 3	v <sub>c</sub>	30 - 50 - 70	30 - 45 - 60	10 - 30 - 40	40 - 70 - 90	35 - 55 - 75
	f	0,12 - 0,20	0,10 - 0,20	0,06 - 0,12	0,15 - 0,30	0,12 - 0,20
~ ø 5	v <sub>c</sub>	40 - 70 - 100	40 - 60 - 80	15 - 40 - 55	40 - 70 - 90	40 - 60 - 80
	f	0,15 - 0,25	0,15 - 0,25	0,08 - 0,15	0,15 - 0,30	0,15 - 0,25
~ ø 10	v <sub>c</sub>	50 - 80 - 130	50 - 70 - 110	15 - 45 - 60	50 - 80 - 120	50 - 70 - 100
	f	0,20 - 0,35	0,20 - 0,35	0,10 - 0,20	0,20 - 0,35	0,20 - 0,35
~ ø 16	v <sub>c</sub>	60 - 90 - 140	60 - 80 - 120	20 - 50 - 60	60 - 90 - 120	50 - 70 - 100
	f	0,25 - 0,35	0,25 - 0,35	0,10 - 0,20	0,25 - 0,35	0,25 - 0,35

(v<sub>c</sub>: Cutting Speed (m/min), f: Feed Rate (mm/rev)) (Min - Standard - Max)

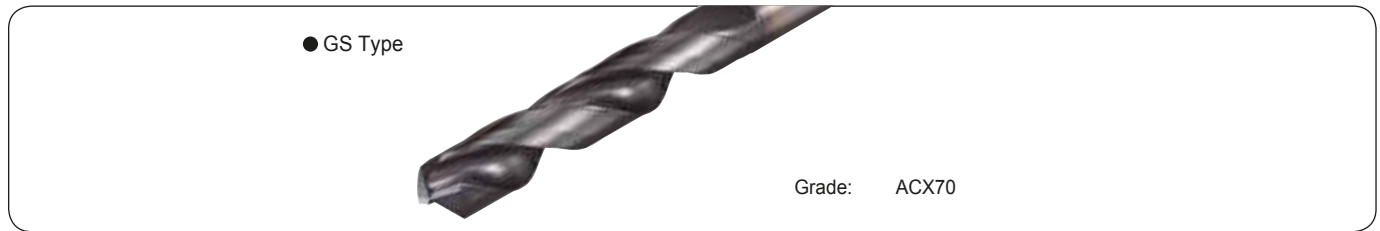
○ = Japan stock



# GS Type SUPER MULTI-DRILLS

## MDW ... GS Type

GS Type for General Purpose Drilling of Steels



### ● Diameter $\varnothing 10,1 \sim 13,0$ mm (mm)

Dimensions		Cat. No.	Short Type (2D)				Long Type (4D)					
$\varnothing D$	$\varnothing d$		Stock	Dimensions			Stock	Dimensions				
		2, 4 $\nabla$	2	L	$l_1$	$l_2$	4	L	$l_1$	$l_2$		
10,1	11,0	MDW 1010 GS <input type="checkbox"/>	●				○					
10,2		MDW 1020 GS <input type="checkbox"/>	●				●					
10,3		MDW 1030 GS <input type="checkbox"/>	○		30,6	43,2	○		55,6	68,2		
10,4		MDW 1040 GS <input type="checkbox"/>	○				○					
10,5		MDW 1050 GS <input type="checkbox"/>	●				●					
10,6		MDW 1060 GS <input type="checkbox"/>	○	95,3				116,2				
10,7		MDW 1070 GS <input type="checkbox"/>	○						○			
10,8		MDW 1080 GS <input type="checkbox"/>	○			34,1	47,3		○		57,1	70,3
10,9		MDW 1090 GS <input type="checkbox"/>	○						○			
11,0		MDW 1100 GS <input type="checkbox"/>	●						●			
11,1	MDW 1110 GS <input type="checkbox"/>	○					○					
11,2	MDW 1120 GS <input type="checkbox"/>	○					○					
11,3	MDW 1130 GS <input type="checkbox"/>	○			33,6	47,4	○			59,6	73,4	
11,4	MDW 1140 GS <input type="checkbox"/>	○					○					
11,5	MDW 1150 GS <input type="checkbox"/>	●	102,5						123,5			
11,6	MDW 1160 GS <input type="checkbox"/>	○					○					
11,7	MDW 1170 GS <input type="checkbox"/>	○					○					
11,8	MDW 1180 GS <input type="checkbox"/>	○			35,1	49,5	○			61,1	75,5	
11,9	MDW 1190 GS <input type="checkbox"/>	○					○					
12,0	MDW 1200 GS <input type="checkbox"/>	●					●					
12,1	MDW 1210 GS <input type="checkbox"/>	○					○					
12,2	MDW 1220 GS <input type="checkbox"/>	○					○					
12,3	MDW 1230 GS <input type="checkbox"/>	○			34,6	49,6	○			63,6	78,6	
12,4	MDW 1240 GS <input type="checkbox"/>	○					○					
12,5	MDW 1250 GS <input type="checkbox"/>	○	102,7				139,7					
12,6	MDW 1260 GS <input type="checkbox"/>	○						○				
12,7	MDW 1270 GS <input type="checkbox"/>	○						○				
12,8	MDW 1280 GS <input type="checkbox"/>	○			36,1	51,7		○		65,1	80,7	
12,9	MDW 1290 GS <input type="checkbox"/>	○						○				
13,0	MDW 1300 GS <input type="checkbox"/>	○						○				

### ● Diameter $\varnothing 13,1 \sim 16,0$ mm (mm)

Dimensions		Cat. No.	Short Type (2D)				Long Type (4D)					
$\varnothing D$	$\varnothing d$		Stock	Dimensions			Stock	Dimensions				
		2, 4 $\nabla$	2	L	$l_1$	$l_2$	4	L	$l_1$	$l_2$		
13,1	14,0	MDW 1310 GS <input type="checkbox"/>	<input type="checkbox"/>				○					
13,2		MDW 1320 GS <input type="checkbox"/>	<input type="checkbox"/>				○					
13,3		MDW 1330 GS <input type="checkbox"/>	<input type="checkbox"/>		36,6	52,8	○		70,2	86,8		
13,4		MDW 1340 GS <input type="checkbox"/>	<input type="checkbox"/>				○					
13,5		MDW 1350 GS <input type="checkbox"/>	<input type="checkbox"/>	107,9				149,9				
13,6		MDW 1360 GS <input type="checkbox"/>	<input type="checkbox"/>						○			
13,7		MDW 1370 GS <input type="checkbox"/>	<input type="checkbox"/>						○			
13,8		MDW 1380 GS <input type="checkbox"/>	<input type="checkbox"/>			38,1	54,9		○		72,1	88,9
13,9		MDW 1390 GS <input type="checkbox"/>	<input type="checkbox"/>						○			
14,0		MDW 1400 GS <input type="checkbox"/>	<input type="checkbox"/>						○			
14,1	MDW 1410 GS <input type="checkbox"/>	<input type="checkbox"/>					○					
14,2	MDW 1420 GS <input type="checkbox"/>	<input type="checkbox"/>					○					
14,3	MDW 1430 GS <input type="checkbox"/>	<input type="checkbox"/>			37,6	55,0	○			74,6	92,0	
14,4	MDW 1440 GS <input type="checkbox"/>	<input type="checkbox"/>					○					
14,5	MDW 1450 GS <input type="checkbox"/>	<input type="checkbox"/>	111,1				156,1					
14,6	MDW 1460 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
14,7	MDW 1470 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
14,8	MDW 1480 GS <input type="checkbox"/>	<input type="checkbox"/>			38,1	56,1		○		76,1	94,1	
14,9	MDW 1490 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
15,0	MDW 1500 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
15,1	MDW 1510 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
15,2	MDW 1520 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
15,3	MDW 1530 GS <input type="checkbox"/>	<input type="checkbox"/>			37,6	56,2		○		78,6	97,2	
15,4	MDW 1540 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
15,5	MDW 1550 GS <input type="checkbox"/>	<input type="checkbox"/>	115,5				169,3					
15,6	MDW 1560 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
15,7	MDW 1570 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
15,8	MDW 1580 GS <input type="checkbox"/>	<input type="checkbox"/>			39,1	58,3		○		80,1	99,3	
15,9	MDW 1590 GS <input type="checkbox"/>	<input type="checkbox"/>						○				
16,0	MDW 1600 GS <input type="checkbox"/>	<input type="checkbox"/>						○				

### ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.  
Please specify the Cat. No. For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

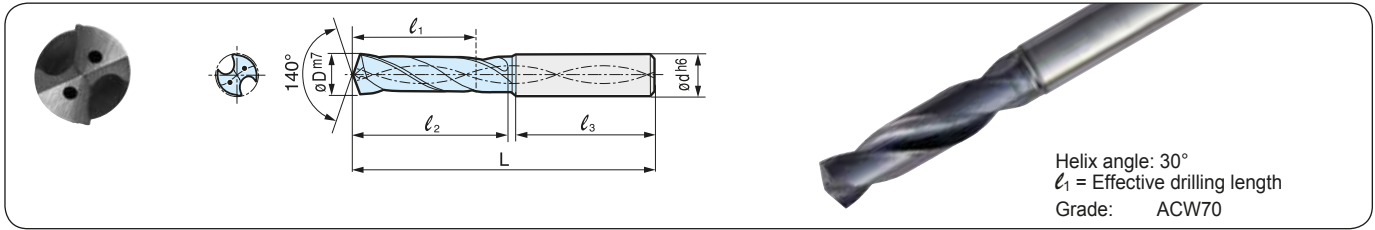
E.g., **MDW 1020 GS 2/4, ACX70**  
(Grade)

SUPER MULTI-DRILLS	Drilling depth (The ratio to $\varnothing D$ ): ~2 / ~4
Drill diameter 10,2 mm	GS type MULTI-DRILLS

# K Type SUPER MULTI-DRILLS (DIN) MDS ... SK-HAK Type

Short Type

TiAlN Coated Solid Carbide Drills to DIN6537 (  $\phi$ -Tolerance: m7 )



## ● Diameter $\phi 4,0 \sim 8,0$ mm

Dimensions (mm)			Cat. No.	DIN 6537 K (Short Type)						
$\phi D$ (mm)	Shank			Stock	Dimensions (mm)					
	$\phi d$	$l_3$			SK-HAK	L	$l_1$	$l_2$		
4,0	6	36	MDS 040 SKHAK	●	66	17	24			
4,1			MDS 041 SKHAK	●						
4,2			MDS 042 SKHAK	●						
4,3			MDS 043 SKHAK							
4,4			MDS 044 SKHAK							
4,5			MDS 045 SKHAK	●						
4,6			MDS 046 SKHAK							
4,7			MDS 047 SKHAK							
4,8	6	36	MDS 048 SKHAK		66	20	28			
4,9			MDS 049 SKHAK							
5,0			MDS 050 SKHAK	●						
5,1			MDS 051 SKHAK	●						
5,2			MDS 052 SKHAK							
5,3			MDS 053 SKHAK							
5,4			MDS 054 SKHAK	●						
5,5			MDS 055 SKHAK	●						
5,6	MDS 056 SKHAK									
5,7	MDS 057 SKHAK									
5,8	MDS 058 SKHAK									
5,9	MDS 059 SKHAK									
6,0	MDS 060 SKHAK	●								
6,1	8	36	MDS 061 SKHAK		79	24	34			
6,2			MDS 062 SKHAK							
6,3			MDS 063 SKHAK							
6,4			MDS 064 SKHAK							
6,5			MDS 065 SKHAK	●						
6,6			MDS 066 SKHAK							
6,7			MDS 067 SKHAK							
6,8			MDS 068 SKHAK	●						
6,9			MDS 069 SKHAK							
7,0			MDS 070 SKHAK	●						
7,1			MDS 071 SKHAK					79	29	41
7,2			MDS 072 SKHAK							
7,3	MDS 073 SKHAK									
7,4	MDS 074 SKHAK									
7,5	MDS 075 SKHAK	●								
7,6	MDS 076 SKHAK									
7,7	MDS 077 SKHAK									
7,8	MDS 078 SKHAK									
7,9	MDS 079 SKHAK									
8,0	MDS 080 SKHAK	●								

## ● Diameter $\phi 8,1 \sim 12,0$ mm

Dimensions (mm)			Cat. No.	DIN 6537 K (Short Type)						
$\phi D$ (mm)	Shank			Stock	Dimensions (mm)					
	$\phi d$	$l_3$			SK-HAK	L	$l_1$	$l_2$		
8,1	10	40	MDS 081 SKHAK		89	35	47			
8,2			MDS 082 SKHAK							
8,3			MDS 083 SKHAK							
8,4			MDS 084 SKHAK							
8,5			MDS 085 SKHAK	●						
8,6			MDS 086 SKHAK							
8,7			MDS 087 SKHAK							
8,8			MDS 088 SKHAK							
8,9			MDS 089 SKHAK							
9,0			MDS 090 SKHAK	●						
9,1			MDS 091 SKHAK					89	35	47
9,2			MDS 092 SKHAK							
9,3	MDS 093 SKHAK									
9,4	MDS 094 SKHAK									
9,5	MDS 095 SKHAK	●								
9,6	MDS 096 SKHAK									
9,7	MDS 097 SKHAK									
9,8	MDS 098 SKHAK									
9,9	MDS 099 SKHAK									
10,0	MDS 100 SKHAK	●								
10,1	12	45	MDS 101 SKHAK		102	40	55			
10,2			MDS 102 SKHAK	●						
10,3			MDS 103 SKHAK							
10,4			MDS 104 SKHAK							
10,5			MDS 105 SKHAK	●						
10,6			MDS 106 SKHAK							
10,7			MDS 107 SKHAK							
10,8			MDS 108 SKHAK							
10,9			MDS 109 SKHAK							
11,0			MDS 110 SKHAK	●						
11,1			MDS 111 SKHAK					102	40	55
11,2			MDS 112 SKHAK							
11,3	MDS 113 SKHAK									
11,4	MDS 114 SKHAK									
11,5	MDS 115 SKHAK	●								
11,6	MDS 116 SKHAK									
11,7	MDS 117 SKHAK									
11,8	MDS 118 SKHAK									
11,9	MDS 119 SKHAK									
12,0	MDS 120 SKHAK	●								

## ■ Recommended Cutting Conditions for K-HAK Type Multi-Drills

Diameter (mm)		Steels	Steels	Alloy Steels	Hardened Steels	Stainless Steels	Ductile	Grey	Titanium Alloys	Inconel
		(< HB200)	(HB 200~300)	(> HB300)	(HRC45)	(< HB200)	Cast Irons	Cast Irons	(Ti-6Al-4V)	(Inconel 718)
~ $\phi 5$	$v_c$	50 - 80 - 120	50 - 75 - 100	40 - 65 - 80	20 - 35 - 50	30 - 45 - 60	40 - 60 - 100	80 - 100 - 120	20 - 30 - 40	10 - 20 - 30
	f	0,15 - 0,25	0,15 - 0,25	0,10 - 0,20	0,08 - 0,10	0,10 - 0,20	0,15 - 0,25	0,15 - 0,30	0,08 - 0,10	0,05 - 0,08
~ $\phi 10$	$v_c$	50 - 120 - 140	70 - 110 - 140	40 - 70 - 80	30 - 40 - 60	50 - 70 - 90	70 - 90 - 125	100 - 130 - 140	25 - 30 - 40	15 - 25 - 30
	f	0,20 - 0,35	0,20 - 0,35	0,10 - 0,25	0,10 - 0,15	0,10 - 0,25	0,20 - 0,35	0,20 - 0,35	0,08 - 0,12	0,08 - 0,10
~ $\phi 16$	$v_c$	90 - 140 - 170	80 - 120 - 150	40 - 80 - 100	30 - 45 - 60	50 - 80 - 110	80 - 100 - 130	100 - 150 - 160	25 - 35 - 40	20 - 30 - 35
	f	0,25 - 0,35	0,25 - 0,35	0,15 - 0,30	0,12 - 0,20	0,15 - 0,30	0,25 - 0,35	0,25 - 0,40	0,10 - 0,15	0,08 - 0,10
~ $\phi 20$	$v_c$	100 - 150 - 180	80 - 130 - 160	50 - 90 - 120	30 - 45 - 60	50 - 80 - 110	80 - 110 - 140	100 - 150 - 160	25 - 35 - 40	20 - 30 - 35
	f	0,30 - 0,40	0,25 - 0,40	0,15 - 0,30	0,15 - 0,25	0,15 - 0,30	0,25 - 0,40	0,25 - 0,40	0,10 - 0,15	0,08 - 0,10

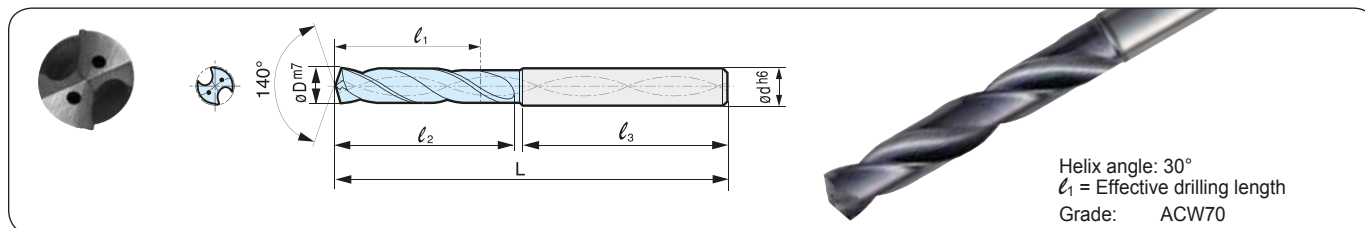
(  $v_c$  : Cutting Speed (m/min), f : Feed Rate (mm/rev)) (Min - Standard - Max)

● = Euro stock

# K Type SUPER MULTI-DRILLS (DIN) MDS ... MK-HAK Type

## Long Type

TiAlN Coated Solid Carbide Drills to DIN6537 (  $\phi$ -Tolerance: m7 )



### ● Diameter $\phi 4,0 \sim 8,0$ mm

Dimensions (mm)			Cat. No.	DIN 6537 L (Long Type)			
$\phi D$ (mm)	Shank			Stock	Dimensions (mm)		
	$\phi d$	$\ell_3$			MK-HAK	L	$\ell_1$
4,0	6	36	MDS 040 MKHAK	●	74	29	36
4,1			MDS 041 MKHAK				
4,2			MDS 042 MKHAK	●			
4,3			MDS 043 MKHAK				
4,4			MDS 044 MKHAK				
4,5			MDS 045 MKHAK	●			
4,6			MDS 046 MKHAK				
4,7			MDS 047 MKHAK				
4,8	6	36	MDS 048 MKHAK		82	35	44
4,9			MDS 049 MKHAK				
5,0			MDS 050 MKHAK	●			
5,1			MDS 051 MKHAK				
5,2			MDS 052 MKHAK				
5,3			MDS 053 MKHAK				
5,4			MDS 054 MKHAK	●			
5,5			MDS 055 MKHAK				
5,6	MDS 056 MKHAK						
5,7	MDS 057 MKHAK						
5,8	MDS 058 MKHAK						
5,9	MDS 059 MKHAK						
6,0	MDS 060 MKHAK	●					
6,1	8	36	MDS 061 MKHAK		91	43	53
6,2			MDS 062 MKHAK				
6,3			MDS 063 MKHAK				
6,4			MDS 064 MKHAK				
6,5			MDS 065 MKHAK	●			
6,6			MDS 066 MKHAK				
6,7			MDS 067 MKHAK				
6,8			MDS 068 MKHAK	●			
6,9			MDS 069 MKHAK				
7,0			MDS 070 MKHAK	●			
7,1			MDS 071 MKHAK				
7,2			MDS 072 MKHAK				
7,3	MDS 073 MKHAK						
7,4	MDS 074 MKHAK						
7,5	MDS 075 MKHAK						
7,6	MDS 076 MKHAK						
7,7	MDS 077 MKHAK						
7,8	MDS 078 MKHAK						
7,9	MDS 079 MKHAK						
8,0	MDS 080 MKHAK	●					

### ● Diameter $\phi 8,1 \sim 12,0$ mm

Dimensions (mm)			Cat. No.	DIN 6537 L (Long Type)						
$\phi D$ (mm)	Shank			Stock	Dimensions (mm)					
	$\phi d$	$\ell_3$			MK-HAK	L	$\ell_1$	$\ell_2$		
8,1	10	40	MDS 081 MKHAK		103	49	61			
8,2			MDS 082 MKHAK							
8,3			MDS 083 MKHAK							
8,4			MDS 084 MKHAK							
8,5			MDS 085 MKHAK	●						
8,6			MDS 086 MKHAK							
8,7			MDS 087 MKHAK							
8,8			MDS 088 MKHAK							
8,9			MDS 089 MKHAK							
9,0			MDS 090 MKHAK	●						
9,1			MDS 091 MKHAK					103	49	61
9,2			MDS 092 MKHAK							
9,3	MDS 093 MKHAK									
9,4	MDS 094 MKHAK									
9,5	MDS 095 MKHAK	●								
9,6	MDS 096 MKHAK									
9,7	MDS 097 MKHAK									
9,8	MDS 098 MKHAK									
9,9	MDS 099 MKHAK									
10,0	MDS 100 MKHAK	●								
10,1	12	45	MDS 101 MKHAK		118	56	71			
10,2			MDS 102 MKHAK	●						
10,3			MDS 103 MKHAK							
10,4			MDS 104 MKHAK							
10,5			MDS 105 MKHAK	●						
10,6			MDS 106 MKHAK							
10,7			MDS 107 MKHAK							
10,8			MDS 108 MKHAK							
10,9			MDS 109 MKHAK							
11,0			MDS 110 MKHAK	●						
11,1			MDS 111 MKHAK					118	56	71
11,2			MDS 112 MKHAK							
11,3	MDS 113 MKHAK									
11,4	MDS 114 MKHAK									
11,5	MDS 115 MKHAK	●								
11,6	MDS 116 MKHAK									
11,7	MDS 117 MKHAK									
11,8	MDS 118 MKHAK									
11,9	MDS 119 MKHAK									
12,0	MDS 120 MKHAK	●								

### ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs. Please specify the Cat. No. For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

E.g., **MDS 102 MK-HAK**, (Grade) **ACW70**

Multi-Drill  
Solid type

Drill diameter  
10,2 mm

Cylindrical shank and spiral coolant holes:  
DIN6535 Form HAK

S : 3 ~ 3,5 D  
M : ~ 5 D

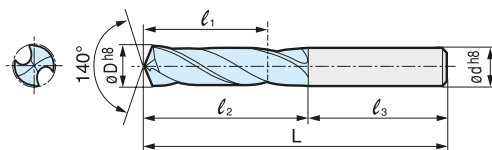
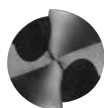


# SUPER MULTI-DRILLS

## MDS ... SK/SG Type

### Short Type

Cylindrical Solid Carbide Drills without Coolant Holes



Helix angle: 30°  
l<sub>1</sub> = Effective drilling length

#### ● Diameter ø2,0~6,0mm

Dimensions (mm)			Cat. No.	Short Type																																																																																																																																																																																																																																																									
øD	Shank			Stock																																																																																																																																																																																																																																																									
	ød	l <sub>3</sub>		SK	SG	L	l <sub>1</sub>	l <sub>2</sub>																																																																																																																																																																																																																																																					
2,0	2,0	30	MDS 020			42	9,5	12																																																																																																																																																																																																																																																					
2,1	2,1		MDS 021						2,2	2,2	30	MDS 022			43	10,2	13	2,3	2,3	MDS 023			2,4	2,4	30	MDS 024			44	10,9	14	2,5	2,5	MDS 025	▲		2,6	2,6	MDS 026	▲		2,7	2,7	MDS 027			2,8	2,8	30	MDS 028	▲		46	12,4	16	2,9	2,9	MDS 029			3,0	3,0	MDS 030	▲	▲	3,1	3,1	31	MDS 031			49	14,0	18	3,2	3,2	MDS 032			3,3	3,3	MDS 033			3,4	3,4	32	MDS 034	▲		52	15,6	20	3,5	3,5	MDS 035	▲	▲	3,6	3,6	MDS 036			3,7	3,7	MDS 037			3,8	3,8	33	MDS 038			55	17,0	22	3,9	3,9	MDS 039			4,0	4,0	MDS 040	▲	▲	4,1	4,1	MDS 041			4,2	4,2	34	MDS 042	▲		58	18,4	24	4,3	4,3	MDS 043			4,4	4,4	MDS 044			4,5	4,5	MDS 045	▲	▲	4,6	4,6	36	MDS 046			62	19,6	26	4,7	4,7	MDS 047			4,8	4,8	MDS 048			4,9	4,9	MDS 049			5,0	5,0	36	MDS 050	▲	▲	66	22,8	30	5,1	5,1	MDS 051	▲	▲	5,2	5,2	MDS 052	▲	▲	5,3	5,3	MDS 053			5,4	5,4	36	MDS 054			66	22,8	30	5,5	5,5	MDS 055	▲		5,6	5,6	MDS 056			5,7	5,7	MDS 057			5,8	5,8	MDS 058			5,9	5,9	MDS 059			6,0	6,0	MDS 060	▲	▲										
2,2	2,2	30	MDS 022			43	10,2	13																																																																																																																																																																																																																																																					
2,3	2,3		MDS 023						2,4	2,4	30	MDS 024			44	10,9	14	2,5	2,5	MDS 025	▲		2,6	2,6		MDS 026	▲					2,7	2,7	MDS 027			2,8	2,8	30	MDS 028	▲		46	12,4	16	2,9	2,9	MDS 029				3,0				3,0	MDS 030	▲	▲	3,1	3,1	31	MDS 031			49	14,0		18	3,2	3,2				MDS 032			3,3	3,3	MDS 033			3,4	3,4	32	MDS 034		▲		52				15,6	20	3,5	3,5	MDS 035	▲	▲	3,6	3,6	MDS 036			3,7	3,7	MDS 037				3,8	3,8	33				MDS 038			55	17,0	22	3,9	3,9	MDS 039			4,0	4,0	MDS 040	▲	▲	4,1		4,1	MDS 041						4,2	4,2	34	MDS 042	▲		58	18,4	24	4,3	4,3	MDS 043			4,4	4,4		MDS 044						4,5	4,5	MDS 045	▲	▲	4,6	4,6	36	MDS 046			62	19,6	26	4,7	4,7	MDS 047				4,8				4,8	MDS 048			4,9	4,9	MDS 049			5,0	5,0	36	MDS 050	▲	▲	66	22,8		30	5,1	5,1				MDS 051	▲	▲	5,2	5,2	MDS 052	▲	▲	5,3	5,3	MDS 053			5,4	5,4	36	MDS 054			66	22,8	30	5,5	5,5	MDS 055	▲		5,6	5,6	MDS 056			5,7	5,7	MDS 057			5,8	5,8	MDS 058
2,4	2,4	30	MDS 024			44	10,9	14																																																																																																																																																																																																																																																					
2,5	2,5		MDS 025	▲																																																																																																																																																																																																																																																									
2,6	2,6		MDS 026	▲																																																																																																																																																																																																																																																									
2,7	2,7		MDS 027																																																																																																																																																																																																																																																										
2,8	2,8	30	MDS 028	▲		46	12,4	16																																																																																																																																																																																																																																																					
2,9	2,9		MDS 029																																																																																																																																																																																																																																																										
3,0	3,0		MDS 030	▲	▲																																																																																																																																																																																																																																																								
3,1	3,1	31	MDS 031			49	14,0	18																																																																																																																																																																																																																																																					
3,2	3,2		MDS 032																																																																																																																																																																																																																																																										
3,3	3,3		MDS 033																																																																																																																																																																																																																																																										
3,4	3,4	32	MDS 034	▲		52	15,6	20																																																																																																																																																																																																																																																					
3,5	3,5		MDS 035	▲	▲																																																																																																																																																																																																																																																								
3,6	3,6		MDS 036																																																																																																																																																																																																																																																										
3,7	3,7		MDS 037																																																																																																																																																																																																																																																										
3,8	3,8	33	MDS 038			55	17,0	22																																																																																																																																																																																																																																																					
3,9	3,9		MDS 039																																																																																																																																																																																																																																																										
4,0	4,0		MDS 040	▲	▲																																																																																																																																																																																																																																																								
4,1	4,1		MDS 041																																																																																																																																																																																																																																																										
4,2	4,2	34	MDS 042	▲		58	18,4	24																																																																																																																																																																																																																																																					
4,3	4,3		MDS 043																																																																																																																																																																																																																																																										
4,4	4,4		MDS 044																																																																																																																																																																																																																																																										
4,5	4,5		MDS 045	▲	▲																																																																																																																																																																																																																																																								
4,6	4,6	36	MDS 046			62	19,6	26																																																																																																																																																																																																																																																					
4,7	4,7		MDS 047																																																																																																																																																																																																																																																										
4,8	4,8		MDS 048																																																																																																																																																																																																																																																										
4,9	4,9		MDS 049																																																																																																																																																																																																																																																										
5,0	5,0	36	MDS 050	▲	▲	66	22,8	30																																																																																																																																																																																																																																																					
5,1	5,1		MDS 051	▲	▲																																																																																																																																																																																																																																																								
5,2	5,2		MDS 052	▲	▲																																																																																																																																																																																																																																																								
5,3	5,3		MDS 053																																																																																																																																																																																																																																																										
5,4	5,4	36	MDS 054			66	22,8	30																																																																																																																																																																																																																																																					
5,5	5,5		MDS 055	▲																																																																																																																																																																																																																																																									
5,6	5,6		MDS 056																																																																																																																																																																																																																																																										
5,7	5,7		MDS 057																																																																																																																																																																																																																																																										
5,8	5,8		MDS 058																																																																																																																																																																																																																																																										
5,9	5,9		MDS 059																																																																																																																																																																																																																																																										
6,0	6,0		MDS 060	▲	▲																																																																																																																																																																																																																																																								

#### ● Diameter ø6,1~10,0mm

Dimensions (mm)			Cat. No.	Short Type				
øD	Shank			Stock				
	ød	l <sub>3</sub>		SK	SG	L	l <sub>1</sub>	l <sub>2</sub>
6,1	6,1	39	MDS 061			70	23,0	31
6,2	6,2		MDS 062					
6,3	6,3		MDS 063					
6,4	6,4		MDS 064					
6,5	6,5		MDS 065	▲	▲			
6,6	6,6		MDS 066					
6,7	6,7		MDS 067					
6,8	6,8	40	MDS 068	▲	▲	74	25,0	34
6,9	6,9		MDS 069					
7,0	7,0		MDS 070	▲	▲			
7,1	7,1		MDS 071					
7,2	7,2		MDS 072					
7,3	7,3		MDS 073					
7,4	7,4		MDS 074					
7,5	7,5	MDS 075	▲					
7,6	7,6	42	MDS 076			79	26,8	37
7,7	7,7		MDS 077					
7,8	7,8		MDS 078					
7,9	7,9		MDS 079					
8,0	8,0		MDS 080	▲	▲			
8,1	8,1		MDS 081					
8,2	8,2		MDS 082					
8,3	8,3	MDS 083						
8,4	8,4	MDS 084						
8,5	8,5	MDS 085	▲	▲				
8,6	8,6	44	MDS 086			84	28,6	40
8,7	8,7		MDS 087					
8,8	8,8		MDS 088					
8,9	8,9		MDS 089					
9,0	9,0		MDS 090	▲	▲			
9,1	9,1		MDS 091					
9,2	9,2		MDS 092					
9,3	9,3	MDS 093						
9,4	9,4	MDS 094						
9,5	9,5	MDS 095	▲					
9,6	9,6	46	MDS 096			89	30,3	43
9,7	9,7		MDS 097					
9,8	9,8		MDS 098					
9,9	9,9		MDS 099					
10,0	10,0		MDS 100	▲	▲			

#### ■ Recommended Cutting Conditions for K Type Multi-Drills

Diameter (mm)		Soft Steels (under HB250)	General Steels, Alloy Steels	Die Steels (about HB250)	Stainless Steels (< HB200)	Ductile Cast Irons	Grey Cast Irons
~ ø 5	V <sub>c</sub>	40 - 60 - 80	40 - 60 - 80	15 - 30 - 45	15 - 40 - 55	40 - 60 - 80	40 - 70 - 90
	f	0,15 - 0,25	0,15 - 0,25	0,10 - 0,20	0,08 - 0,15	0,15 - 0,25	0,15 - 0,30
~ ø10	V <sub>c</sub>	50 - 70 - 120	50 - 70 - 110	20 - 40 - 50	15 - 45 - 60	50 - 70 - 100	50 - 80 - 120
	f	0,20 - 0,35	0,20 - 0,35	0,10 - 0,20	0,10 - 0,20	0,20 - 0,35	0,20 - 0,35
~ ø15	V <sub>c</sub>	60 - 80 - 120	50 - 70 - 120	20 - 40 - 60	20 - 50 - 70	50 - 70 - 100	60 - 90 - 120
	f	0,25 - 0,35	0,25 - 0,35	0,15 - 0,25	0,10 - 0,20	0,25 - 0,35	0,25 - 0,35
~ ø20	V <sub>c</sub>	60 - 90 - 120	60 - 80 - 120	30 - 40 - 60	20 - 50 - 70	60 - 80 - 100	60 - 90 - 120
	f	0,30 - 0,40	0,25 - 0,40	0,15 - 0,25	0,10 - 0,20	0,25 - 0,40	0,25 - 0,45

(V<sub>c</sub>: Cutting Speed (m/min), f: Feed Rate (mm/rev)) (Min - Standard - Max)



# SUPER MULTI-DRILLS MDS ... SK/SG Type

K Type: Coated Multi-Drill for General Purpose Drilling of Steels  
G Type: Uncoated Multi-Drill for Cast Irons and Aluminium Alloys



## ● Diameter $\phi 10,1 \sim 12,0 \text{ mm}$

Dimensions (mm)			Cat. No. SK, SG ▾	Short Type				
$\phi D$	Shank			Stock		Dimensions (mm)		
	$\phi d$	$\ell_3$		SK	SG	L	$\ell_1$	$\ell_2$
10,1	10,1	46	MDS 101 □□	▲		89	30,3	43
10,2	10,2		MDS 102 □□					
10,3	10,3		MDS 103 □□					
10,4	10,4		MDS 104 □□					
10,5	10,5		MDS 105 □□	▲				
10,6	10,6		MDS 106 □□					
10,7	10,7	48	MDS 107 □□			95	32,8	47
10,8	10,8		MDS 108 □□					
10,9	10,9		MDS 109 □□					
11,0	11,0		MDS 110 □□	▲	▲			
11,1	11,1		MDS 111 □□					
11,2	11,2		MDS 112 □□					
11,3	11,3		MDS 113 □□					
11,4	11,4		MDS 114 □□					
11,5	11,5		MDS 115 □□	▲				
11,6	11,6		MDS 116 □□					
11,7	11,7		MDS 117 □□					
11,8	11,8		MDS 118 □□					
11,9	11,9	51	MDS 119 □□			102	35,2	51
12,0	12,0		MDS 120 □□	▲	▲			

## ● Diameter $\phi 12,1 \sim 14,0 \text{ mm}$

Dimensions (mm)			Cat. No. SK, SG ▾	Short Type				
$\phi D$	Shank			Stock		Dimensions (mm)		
	$\phi d$	$\ell_3$		SK	SG	L	$\ell_1$	$\ell_2$
12,1	12,1	51	MDS 121 □□			102	35,2	51
12,2	12,2		MDS 122 □□					
12,3	12,3		MDS 123 □□					
12,4	12,4		MDS 124 □□					
12,5	12,5		MDS 125 □□					
12,6	12,6		MDS 126 □□					
12,7	12,7		MDS 127 □□					
12,8	12,8		MDS 128 □□					
12,9	12,9		MDS 129 □□					
13,0	13,0		MDS 130 □□					
13,1	13,1		MDS 131 □□					
13,2	13,2		MDS 132 □□					
13,3	13,3	53	MDS 133 □□			107	37,2	54
13,4	13,4		MDS 134 □□					
13,5	13,5		MDS 135 □□					
13,6	13,6		MDS 136 □□					
13,7	13,7		MDS 137 □□					
13,8	13,8		MDS 138 □□					
13,9	13,9		MDS 139 □□					
14,0	14,0		MDS 140 □□					

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.  
Please specify the Cat. No. For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

E.g., **MDS 102 SK ACW70**  
(Grade)  
K : K-Type drill  
G : G-Type drill  
S : 2,5 ~ 3D

Multi-Drill  
Solid type  
Drill diameter  
10,2 mm

## ■ Recommended Cutting Conditions for G Type Multi-Drills

( $v_c$  : Cutting Speed (m/min),  $f$  : Feed Rate (mm/rev)) (Min - Standard - Max)

Diameter (mm)		Ductile Cast Irons	Grey Cast Irons	Aluminium Alloys
~ $\phi 6$	$v_c$	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	$f$	0,15 - 0,2 - 0,25	0,2 - 0,25 - 0,3	0,2 - 0,3 - 0,4
~ $\phi 10$	$v_c$	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	$f$	0,2 - 0,3 - 0,35	0,25 - 0,35 - 0,4	0,25 - 0,35 - 0,45
~ $\phi 14$	$v_c$	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	$f$	0,2 - 0,35 - 0,4	0,25 - 0,4 - 0,5	0,25 - 0,45 - 0,6
~ $\phi 20$	$v_c$	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	$f$	0,2 - 0,4 - 0,5	0,25 - 0,4 - 0,6	0,25 - 0,45 - 0,7

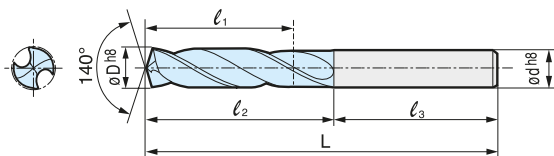
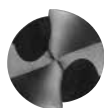


# SUPER MULTI-DRILLS

## MDS ... MK/MG Type

### Long Type

Cylindrical Solid Carbide Drills without Coolant Holes



Helix angle: 30°  
l<sub>1</sub> = Effective drilling length

#### ● Diameter ø2,0~6,0mm

Dimensions (mm)			Cat. No.	Long Type																																																																																																																																																																																																																																																					
øD	Shank			Stock																																																																																																																																																																																																																																																					
	ød	l <sub>3</sub>		MK	MG	L	l <sub>1</sub>	l <sub>2</sub>																																																																																																																																																																																																																																																	
2,0	2,0	30	MDS 020			45,4	12,9	15,4																																																																																																																																																																																																																																																	
2,1	2,1		MDS 021						2,2	2,2	30	MDS 022			46,4	13,6	16,4	2,3	2,3	MDS 023			2,4	2,4	30	MDS 024			47,5	14,4	17,5	2,5	2,5	MDS 025			2,6	2,6	MDS 026			2,7	2,7	30	MDS 027			49,5	15,9	19,5	2,8	2,8	MDS 028			2,9	2,9	MDS 029			3,0	3,0	MDS 030			3,1	3,1	31	MDS 031			52,6	17,6	21,6	3,2	3,2	MDS 032			3,3	3,3	MDS 033			3,4	3,4	32	MDS 034			56,7	20,3	24,7	3,5	3,5	MDS 035			3,6	3,6	MDS 036			3,7	3,7	MDS 037			3,8	3,8	33	MDS 038			60,8	22,8	27,8	3,9	3,9	MDS 039			4,0	4,0	MDS 040			4,1	4,1	MDS 041			4,2	4,2	MDS 042			4,3	4,3	34	MDS 043			65,9	26,3	31,9	4,4	4,4	MDS 044			4,5	4,5	MDS 045			4,6	4,6	MDS 046			4,7	4,7	36	MDS 047			69,9	28,0	33,9	4,8	4,8	MDS 048			4,9	4,9	MDS 049			5,0	5,0	38	MDS 050	▲	▲	77,0	32,4	39,0	5,1	5,1	MDS 051	▲		5,2	5,2	MDS 052			5,3	5,3	MDS 053			5,4	5,4	MDS 054			5,5	5,5	MDS 055	▲	▲	5,6	5,6	40	MDS 056			82,1	34,9	42,1	5,7	5,7	MDS 057			5,8	5,8	MDS 058			5,9	5,9	MDS 059			6,0	6,0	MDS 060	▲	▲						
2,2	2,2	30	MDS 022			46,4	13,6	16,4																																																																																																																																																																																																																																																	
2,3	2,3		MDS 023						2,4	2,4	30	MDS 024			47,5	14,4	17,5	2,5	2,5	MDS 025			2,6	2,6		MDS 026						2,7	2,7	30	MDS 027			49,5	15,9	19,5	2,8	2,8	MDS 028				2,9				2,9	MDS 029			3,0	3,0	MDS 030			3,1	3,1	31	MDS 031			52,6	17,6		21,6	3,2	3,2				MDS 032			3,3	3,3	MDS 033			3,4	3,4	32	MDS 034				56,7				20,3	24,7	3,5	3,5	MDS 035			3,6	3,6	MDS 036			3,7	3,7	MDS 037				3,8	3,8	33				MDS 038			60,8	22,8	27,8	3,9	3,9	MDS 039			4,0	4,0	MDS 040			4,1	4,1	MDS 041			4,2		4,2	MDS 042						4,3	4,3	34	MDS 043			65,9	26,3	31,9	4,4	4,4	MDS 044			4,5	4,5		MDS 045						4,6	4,6	MDS 046			4,7	4,7	36	MDS 047			69,9		28,0	33,9	4,8				4,8	MDS 048			4,9	4,9	MDS 049			5,0	5,0	38	MDS 050	▲	▲	77,0	32,4	39,0	5,1	5,1	MDS 051	▲		5,2	5,2	MDS 052				5,3	5,3				MDS 053			5,4	5,4	MDS 054			5,5	5,5	MDS 055	▲	▲	5,6	5,6	40	MDS 056			82,1	34,9	42,1	5,7	5,7	MDS 057	
2,4	2,4	30	MDS 024			47,5	14,4	17,5																																																																																																																																																																																																																																																	
2,5	2,5		MDS 025																																																																																																																																																																																																																																																						
2,6	2,6		MDS 026																																																																																																																																																																																																																																																						
2,7	2,7	30	MDS 027			49,5	15,9	19,5																																																																																																																																																																																																																																																	
2,8	2,8		MDS 028																																																																																																																																																																																																																																																						
2,9	2,9		MDS 029																																																																																																																																																																																																																																																						
3,0	3,0		MDS 030																																																																																																																																																																																																																																																						
3,1	3,1	31	MDS 031			52,6	17,6	21,6																																																																																																																																																																																																																																																	
3,2	3,2		MDS 032																																																																																																																																																																																																																																																						
3,3	3,3		MDS 033																																																																																																																																																																																																																																																						
3,4	3,4	32	MDS 034			56,7	20,3	24,7																																																																																																																																																																																																																																																	
3,5	3,5		MDS 035																																																																																																																																																																																																																																																						
3,6	3,6		MDS 036																																																																																																																																																																																																																																																						
3,7	3,7		MDS 037																																																																																																																																																																																																																																																						
3,8	3,8	33	MDS 038			60,8	22,8	27,8																																																																																																																																																																																																																																																	
3,9	3,9		MDS 039																																																																																																																																																																																																																																																						
4,0	4,0		MDS 040																																																																																																																																																																																																																																																						
4,1	4,1		MDS 041																																																																																																																																																																																																																																																						
4,2	4,2		MDS 042																																																																																																																																																																																																																																																						
4,3	4,3	34	MDS 043			65,9	26,3	31,9																																																																																																																																																																																																																																																	
4,4	4,4		MDS 044																																																																																																																																																																																																																																																						
4,5	4,5		MDS 045																																																																																																																																																																																																																																																						
4,6	4,6		MDS 046																																																																																																																																																																																																																																																						
4,7	4,7	36	MDS 047			69,9	28,0	33,9																																																																																																																																																																																																																																																	
4,8	4,8		MDS 048																																																																																																																																																																																																																																																						
4,9	4,9		MDS 049																																																																																																																																																																																																																																																						
5,0	5,0	38	MDS 050	▲	▲	77,0	32,4	39,0																																																																																																																																																																																																																																																	
5,1	5,1		MDS 051	▲																																																																																																																																																																																																																																																					
5,2	5,2		MDS 052																																																																																																																																																																																																																																																						
5,3	5,3		MDS 053																																																																																																																																																																																																																																																						
5,4	5,4		MDS 054																																																																																																																																																																																																																																																						
5,5	5,5		MDS 055	▲	▲																																																																																																																																																																																																																																																				
5,6	5,6	40	MDS 056			82,1	34,9	42,1																																																																																																																																																																																																																																																	
5,7	5,7		MDS 057																																																																																																																																																																																																																																																						
5,8	5,8		MDS 058																																																																																																																																																																																																																																																						
5,9	5,9		MDS 059																																																																																																																																																																																																																																																						
6,0	6,0		MDS 060	▲	▲																																																																																																																																																																																																																																																				

#### ● Diameter ø6,1~10,0mm

Dimensions (mm)			Cat. No.	Long Type				
øD	Shank			Stock				
	ød	l <sub>3</sub>		MK	MG	L	l <sub>1</sub>	l <sub>2</sub>
6,1	6,1	40	MDS 061			82,1	34,9	42,1
6,2	6,2		MDS 062					
6,3	6,3		MDS 063					
6,4	6,4		MDS 064					
6,5	6,5		MDS 065	▲	▲			
6,6	6,6	40	MDS 066			84,2	35,8	44,2
6,7	6,7		MDS 067					
6,8	6,8		MDS 068	▲	▲			
6,9	6,9		MDS 069					
7,0	7,0		MDS 070	▲	▲	88,3	37,3	46,3
7,1	7,1		MDS 071					
7,2	7,2		MDS 072					
7,3	7,3		MDS 073					
7,4	7,4		MDS 074					
7,5	7,5	42	MDS 075	▲	▲	91,4	39,8	49,4
7,6	7,6		MDS 076					
7,7	7,7		MDS 077					
7,8	7,8		MDS 078					
7,9	7,9	43	MDS 079			97,5	44,3	54,5
8,0	8,0		MDS 080	▲	▲			
8,1	8,1		MDS 081					
8,2	8,2		MDS 082					
8,3	8,3		MDS 083					
8,4	8,4	43	MDS 084			99,6	45,8	56,6
8,5	8,5		MDS 085	▲	▲			
8,6	8,6		MDS 086					
8,7	8,7		MDS 087					
8,8	8,8	45	MDS 088			103,7	48,3	59,7
8,9	8,9		MDS 089					
9,0	9,0		MDS 090	▲	▲			
9,1	9,1	44	MDS 091			106,8	49,8	61,8
9,2	9,2		MDS 092					
9,3	9,3		MDS 093					
9,4	9,4		MDS 094					
9,5	9,5		MDS 095	▲	▲			
9,6	9,6	45	MDS 096			106,8	49,8	61,8
9,7	9,7		MDS 097					
9,8	9,8		MDS 098					
9,9	9,9		MDS 099					
10,0	10,0		MDS 100	▲	▲			

#### ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.  
Please specify the Cat. No. For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

E.g., **MDS 102 MK** , **ACW70**  
(Grade)

Multi-Drill  
Solid type

Drill diameter  
10,2 mm

K : K-Type drill  
G : G-Type drill

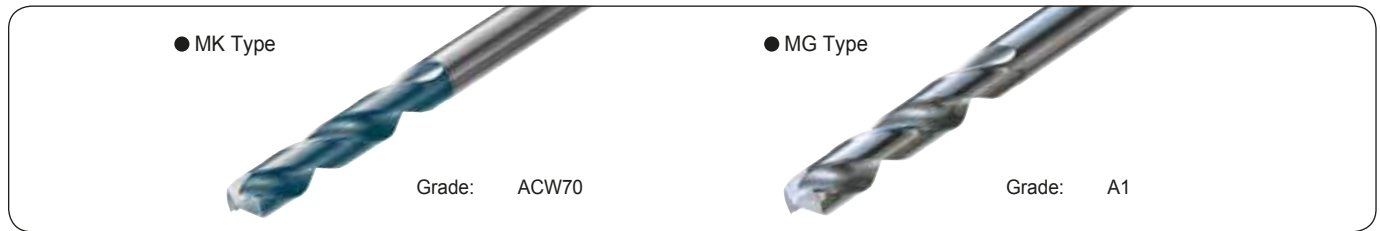
M : ~ 4D

▲ = To be replaced by new item

# SUPER MULTI-DRILLS

## MDS ... MK/MG Type

K Type: Coated Multi-Drill for General Purpose Drilling of Steels  
 G Type: Uncoated Multi-Drill for Cast Irons and Aluminium Alloys



### ● Diameter $\phi 10,1 \sim 12,0 \text{mm}$

Dimensions (mm)			Cat. No. MK, MG ▾	Long Type				
$\phi D$	Schaft			Stock		Dimensions (mm)		
	$\phi d$	$\ell_3$		MK	MG	L	$\ell_1$	$\ell_2$
10,1	10,1	46	MDS 101 □□			113,9	55,3	67,9
10,2	10,2		MDS 102 □□					
10,3	10,3		MDS 103 □□					
10,4	10,4		MDS 104 □□					
10,5	10,5		MDS 105 □□	▲				
10,6	10,6	46	MDS 106 □□			116,0	56,8	70,0
10,7	10,7		MDS 107 □□					
10,8	10,8		MDS 108 □□					
10,9	10,9		MDS 109 □□					
11,0	11,0		MDS 110 □□	▲	▲			
11,1	11,1	47	MDS 111 □□			120,2	59,4	73,2
11,2	11,2		MDS 112 □□					
11,3	11,3		MDS 113 □□					
11,4	11,4		MDS 114 □□					
11,5	11,5		MDS 115 □□	▲	▲			
11,6	11,6	48	MDS 116 □□			123,2	60,8	75,2
11,7	11,7		MDS 117 □□					
11,8	11,8		MDS 118 □□					
11,9	11,9		MDS 119 □□					
12,0	12,0		MDS 120 □□	▲	▲			

### ● Diameter $\phi 12,1 \sim 14,0 \text{mm}$

Dimensions (mm)			Cat. No. MK, MG ▾	Long Type				
$\phi D$	Schaft			Stock		Dimensions (mm)		
	$\phi d$	$\ell_3$		MK	MG	L	$\ell_1$	$\ell_2$
12,1	12,1	59	MDS 121 □□			137,3	73,3	78,3
12,2	12,2		MDS 122 □□					
12,3	12,3		MDS 123 □□					
12,4	12,4		MDS 124 □□					
12,5	12,5		MDS 125 □□					
12,6	12,6	59	MDS 126 □□			139,4	84,8	80,4
12,7	12,7		MDS 127 □□					
12,8	12,8		MDS 128 □□					
12,9	12,9		MDS 129 □□					
13,0	13,0		MDS 130 □□					
13,1	13,1	60	MDS 131 □□			146,5	70,3	86,5
13,2	13,2		MDS 132 □□					
13,3	13,3		MDS 133 □□					
13,4	13,4		MDS 134 □□					
13,5	13,5		MDS 135 □□					
13,6	13,6	61	MDS 136 □□			149,6	71,8	88,6
13,7	13,7		MDS 137 □□					
13,8	13,8		MDS 138 □□					
13,9	13,9		MDS 139 □□					
14,0	14,0		MDS 140 □□					

### ■ Recommended Cutting Conditions for K Type Multi-Drills

( $v_c$ : Cutting Speed (m/min),  $f$ : Feed Rate (mm/rev)) (Min - Standard - Max)

Diameter (mm)		Soft Steels (under HB250)	General Steels, Alloy Steels	Die Steels (about HB250)	Stainless Steels	Ductile Cast Irons	Grey Cast Irons
~ $\phi 5$	$v_c$	40 - 60 - 80	40 - 60 - 80	15 - 30 - 45	15 - 40 - 55	40 - 60 - 80	40 - 70 - 90
	$f$	0,15 - 0,25	0,15 - 0,25	0,10 - 0,20	0,08 - 0,15	0,15 - 0,25	0,15 - 0,30
~ $\phi 10$	$v_c$	50 - 70 - 120	50 - 70 - 110	20 - 40 - 50	15 - 45 - 60	50 - 70 - 100	50 - 80 - 120
	$f$	0,20 - 0,35	0,20 - 0,35	0,10 - 0,20	0,10 - 0,20	0,20 - 0,35	0,20 - 0,35
~ $\phi 15$	$v_c$	60 - 80 - 120	50 - 70 - 120	20 - 40 - 60	20 - 50 - 70	50 - 70 - 100	60 - 90 - 120
	$f$	0,25 - 0,35	0,25 - 0,35	0,15 - 0,25	0,10 - 0,20	0,25 - 0,35	0,25 - 0,35
~ $\phi 20$	$v_c$	60 - 90 - 120	60 - 80 - 120	30 - 40 - 60	20 - 50 - 70	60 - 80 - 100	60 - 90 - 120
	$f$	0,30 - 0,40	0,25 - 0,40	0,15 - 0,25	0,10 - 0,20	0,25 - 0,40	0,25 - 0,45



### ■ Recommended Cutting Conditions for G Type Multi-Drills

( $v_c$ : Cutting Speed (m/min),  $f$ : Feed Rate (mm/rev)) (Min - Standard - Max)

Diameter (mm)		Ductile Cast Irons	Grey Cast Irons	Aluminium Alloys
~ $\phi 6$	$v_c$	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	$f$	0,15 - 0,2 - 0,25	0,2 - 0,25 - 0,3	0,2 - 0,3 - 0,4
~ $\phi 10$	$v_c$	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	$f$	0,2 - 0,3 - 0,35	0,25 - 0,35 - 0,4	0,25 - 0,35 - 0,45
~ $\phi 14$	$v_c$	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	$f$	0,2 - 0,35 - 0,4	0,25 - 0,4 - 0,5	0,25 - 0,45 - 0,6
~ $\phi 20$	$v_c$	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	$f$	0,2 - 0,4 - 0,5	0,25 - 0,4 - 0,6	0,25 - 0,45 - 0,7



# Flat MultiDrill MDF Type

Coated Carbide Drills for Spot Facing



## General Features

The flat MultiDrill MDF type is a solid carbide drill that can be used for various purposes including high-efficiency spot facing and drilling in inclined and curved surfaces.



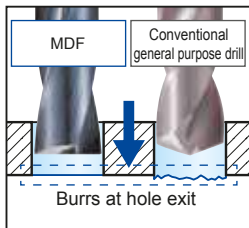
## Advantages

- Can be used in a variety of drilling applications thanks to its point angle of 180°**  
 Applicable to high-efficiency spot facing, drilling in non-horizontal surfaces such as inclined and cylindrical surfaces and interrupted drilling. It also reduces burrs at hole exits.
- Improved machining stability**  
 Achieves high rigidity by employing RS THINNING, which ensures web thickness on the bottom face.
- Excellent chip evacuation performance**  
 Achieves excellent chip evacuation thanks to its wide chip pocket and high-quality rake face shape.
- Excellent cutting edge strength**  
 Achieves excellent cutting edge strength thanks to optimized cutting edge design.
- Expanded lineup of long type**  
 An expanded lineup of long type drills with diameters between  $\varnothing 3,0$  and  $\varnothing 20,0$ mm that are capable of drilling with an overhang length up to  $L/D=10$ .
- Expanded lineup of types with oil hole**  
 Supports internal coolant. For deeper drilling (3D, 5D).

Improves drilling stability by ensuring web thickness.

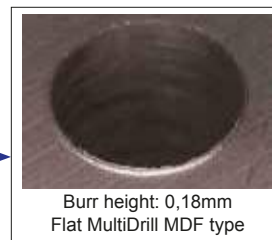


## Reduction of Burrs at Hole Exit

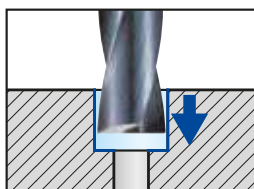


Work Material: 15CrMo5  
 Drill: MDF0500S2D ( $\varnothing 5,0$ mm 2D)  
 Cutting Conditions:  $v_c = 65$ m/min,  $f = 0,12$ mm/rev  
 $H = 10$ mm, 150 holes, wet  
 Equipment: Vertical machining center

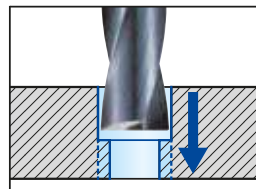
Reduces exit burrs by more than half compared to general-purpose drills



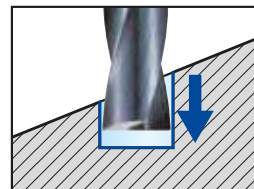
## Applications



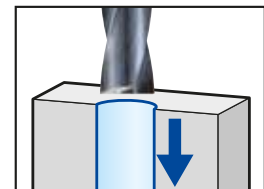
High-efficient spot facing



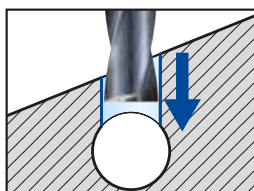
Hole expansion drilling



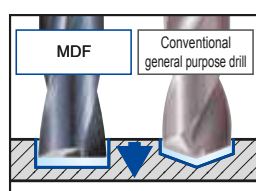
Drilling in non-horizontal surfaces (such as inclined and cylindrical)



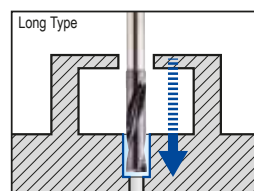
Interrupted drilling



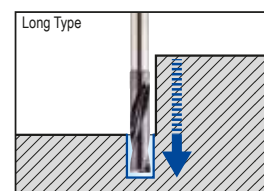
Cross drilling



Pre-tap hole drilling in thin sheets



Deep spot facing



Avoiding interference with work materials

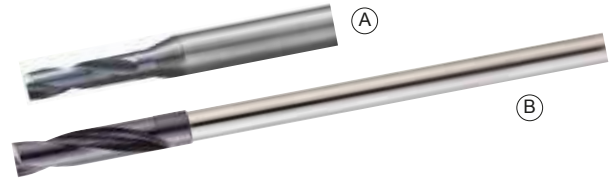




## Long Type (L2D)

For flat base drilling in long overhang conditions, hole expansion, burr prevention.  
For deep flat base drilling and to avoid interference with workpiece.  
Drilling that uses the long shank type requires a guide hole of the same diameter or a centering hole larger than the tool diameter.

- Two types    (A)  $\varnothing D_c < 6\text{mm}$     Stepped Shank Products  
                  (B)  $\varnothing D_c \geq 6\text{mm}$     Relief Shank Products

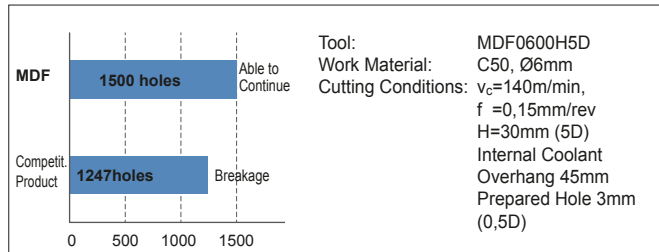


## With Oil Hole (H3D Type / H5D Type)

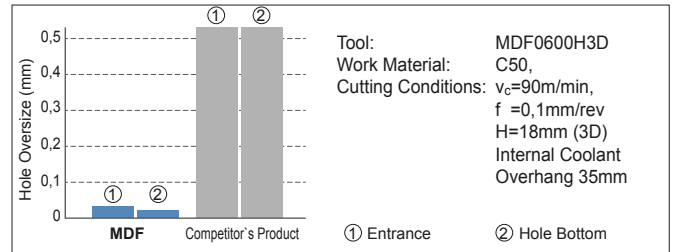
Support for internal coolant allows for deeper flat hole drilling.  
Drilling that uses oil hole L/D=5 requires a guide hole of the same diameter or a centering hole larger than the tool diameter.



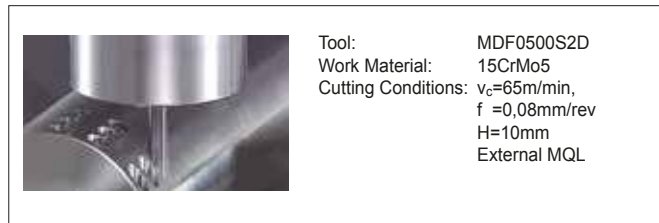
### Deep Spot Facing



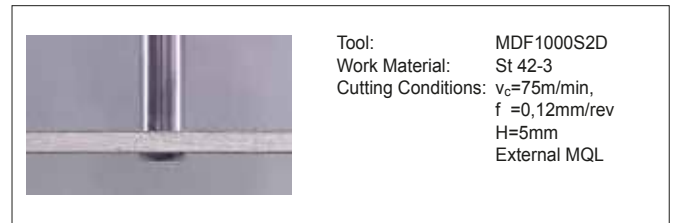
### Long Overhang Spot Facing



### Inclined Surface Drilling



### Controlling Burrs and Chips when Withdrawn



## Using Flat Drills, General-Purpose Drills and Endmills

Tool	Flat Drill MDF Type	General Purpose Drill GS/HGS Type	Endmill for Spot Facing GSX MILL Slot
Hole Bottom Shape	Convex Shape (180°) Nearly Flat (Concave Shape) 0-0,5°	Convex Shape (135°) Concave Shape	Concave Shape (2° - 3° concavity) Convex Shape (Cannot be used for prepared hole drilling.)
Drilling in horizontal surfaces	⊙ Feed rate approximately half of a general-purpose drill	⊙ Optimal	✗ Within 1D, limited to low feed rate Feed rate one-fifth or lower of a general-purpose drill
Drilling in non-horizontal surfaces	⊙ Optimal (within 2D is recommended)	✗ Unusable	⊙ Within 1D, limited to low feed rate Feed rate half or lower of a flat drill
Traversing	✗ Unusable	✗ Unusable	⊙ Optimal

## Series

Application	Series	Diameter Range (mm)	Hole Depth (L/D)
External	MDF □□□□ S2D	$\varnothing 0,3 - \varnothing 20,0$	$\leq 2,0$
	MDF □□□□ L2D	$\varnothing 0,3 - \varnothing 20,0$	$\leq 2,0$
Internal	MDF □□□□ H3D	$\varnothing 0,3 - \varnothing 16,0$	$\leq 3,0$
	MDF □□□□ H5D	$\varnothing 0,3 - \varnothing 16,0$	$\leq 5,0$

# Flat MultiDrill MDF Type

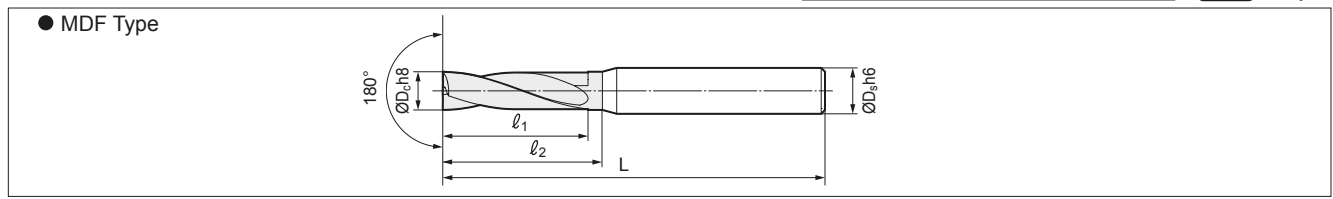
MDF S2D Type



Carbon Steel	Alloy Steel	Tempered Steel	Hardened Steel	Stainless Steel	Cast Iron	Ductile Cast Iron	Aluminium Alloy
≤0.28%	>0.28%	Steel	<45HRC	>45HRC	Steel	Iron	Alloy



## External Coolant Supply (MDF S2D Type)



### ● Diameter ØD<sub>c</sub>: 0,3 ~ 7,0mm

Diameter ØD <sub>c</sub> (mm)	Shank ØD <sub>s</sub> (mm)	Cat. No.	Stock	Dimensions (mm)		
				L	l <sub>1</sub>	l <sub>2</sub>
0,3*	3,0	MDF 0030S2D	○	40	1,0	1,3
0,4*		MDF 0040S2D	○		1,4	1,8
0,5	3,0	MDF 0050S2D	○	40	2,0	2,2
0,6		MDF 0060S2D	○		2,4	2,6
0,7		MDF 0070S2D	○		2,8	3,1
0,8		MDF 0080S2D	○		3,2	3,5
0,9		MDF 0090S2D	○		3,6	4,0
1,0	3,0	MDF 0100S2D	●	45	4,0	4,4
1,1		MDF 0110S2D	○		4,4	4,8
1,2		MDF 0120S2D	○		4,8	5,3
1,3		MDF 0130S2D	○		5,2	5,7
1,4		MDF 0140S2D	○		5,6	6,2
1,5	3,0	MDF 0150S2D	●	45	6,0	6,6
1,6		MDF 0160S2D	○		6,4	7,0
1,7		MDF 0170S2D	○		6,8	7,5
1,8		MDF 0180S2D	○		7,2	7,9
1,9		MDF 0190S2D	○		7,6	8,4
2,0	4,0	MDF 0200S2D	●	50	8,0	8,8
2,1		MDF 0210S2D	●		8,4	9,2
2,2		MDF 0220S2D	●		8,8	9,7
2,3		MDF 0230S2D	●		9,2	10,1
2,4		MDF 0240S2D	●		9,6	10,6
2,5	4,0	MDF 0250S2D	●	50	10,0	11,0
2,6		MDF 0260S2D	●		10,4	11,4
2,7		MDF 0270S2D	●		10,8	11,9
2,8		MDF 0280S2D	●		11,2	12,3
2,9		MDF 0290S2D	●		11,6	12,8
3,0	6,0	MDF 0300S2D	●	50	12,0	13,2
3,1		MDF 0310S2D	●		12,4	13,6
3,2		MDF 0320S2D	●		12,8	14,1
3,3		MDF 0330S2D	●		13,2	14,5
3,4		MDF 0340S2D	●		13,6	15,0
3,5	MDF 0350S2D	●	14,0	15,4		
3,6	6,0	MDF 0360S2D	●	50	14,4	15,8
3,7		MDF 0370S2D	●		14,8	16,3
3,8		MDF 0380S2D	●		15,2	16,7
3,9		MDF 0390S2D	●		15,6	17,2
4,0		MDF 0400S2D	●		16,0	17,6
4,1	6,0	MDF 0410S2D	●	60	16,4	18,0
4,2		MDF 0420S2D	●		16,8	18,5
4,3		MDF 0430S2D	●		17,2	18,9
4,4		MDF 0440S2D	●		17,6	19,4
4,5		MDF 0450S2D	●		18,0	19,8
4,6	6,0	MDF 0460S2D	●	60	18,4	20,2
4,7		MDF 0470S2D	●		18,8	20,7
4,8		MDF 0480S2D	●		19,2	21,1
4,9		MDF 0490S2D	●		19,6	21,6
5,0		MDF 0500S2D	●		20,0	22,0
5,1	6,0	MDF 0510S2D	●	60	20,4	22,4
5,2		MDF 0520S2D	●		20,8	22,9
5,3		MDF 0530S2D	●		21,2	23,3
5,4		MDF 0540S2D	●		21,6	23,8
5,5		MDF 0550S2D	●		22,0	24,2
5,6	6,0	MDF 0560S2D	●	60	22,4	24,6
5,7		MDF 0570S2D	●		22,8	25,1
5,8		MDF 0580S2D	●		23,2	25,5
5,9		MDF 0590S2D	●		23,6	26,0
6,0		MDF 0600S2D	●		24,0	26,4
6,1	8,0	MDF 0610S2D	●	70	24,4	26,8
6,2		MDF 0620S2D	●		24,8	27,3
6,3		MDF 0630S2D	●		25,2	27,7
6,4		MDF 0640S2D	●		25,6	28,2
6,5		MDF 0650S2D	●		26,0	28,6
6,6	8,0	MDF 0660S2D	●	70	26,4	29,0
6,7		MDF 0670S2D	●		26,8	29,5
6,8		MDF 0680S2D	●		27,2	29,9
6,9		MDF 0690S2D	●		27,6	30,4
7,0		MDF 0700S2D	●		28,0	30,8

### ● Diameter ØD<sub>c</sub>: 7,1 ~ 20,0mm

Diameter ØD <sub>c</sub> (mm)	Shank ØD <sub>s</sub> (mm)	Cat. No.	Stock	Dimensions (mm)		
				L	l <sub>1</sub>	l <sub>2</sub>
7,1	8,0	MDF 0710S2D	●	70	28,4	31,2
7,2		MDF 0720S2D	●		28,8	31,7
7,3		MDF 0730S2D	●		29,2	32,1
7,4		MDF 0740S2D	●		29,6	32,6
7,5		MDF 0750S2D	●		30,0	33,0
7,6	8,0	MDF 0760S2D	●	70	30,4	33,4
7,7		MDF 0770S2D	●		30,8	33,9
7,8		MDF 0780S2D	●		31,2	34,3
7,9		MDF 0790S2D	●		31,6	34,8
8,0		MDF 0800S2D	●		32,0	35,2
8,1	10,0	MDF 0810S2D	○	80	32,4	35,6
8,2		MDF 0820S2D	○		32,8	36,1
8,3		MDF 0830S2D	○		33,2	36,5
8,4		MDF 0840S2D	○		33,6	37,0
8,5		MDF 0850S2D	●		34,0	37,4
8,6	10,0	MDF 0860S2D	○	80	34,4	37,8
8,7		MDF 0870S2D	○		34,8	38,3
8,8		MDF 0880S2D	○		35,2	38,7
8,9		MDF 0890S2D	○		35,6	39,2
9,0		MDF 0900S2D	●		36,0	39,6
9,1	10,0	MDF 0910S2D	○	80	36,4	40,0
9,2		MDF 0920S2D	○		36,8	40,5
9,3		MDF 0930S2D	○		37,2	40,9
9,4		MDF 0940S2D	○		37,6	41,4
9,5		MDF 0950S2D	●		38,0	41,8
9,6	10,0	MDF 0960S2D	○	80	38,4	42,2
9,7		MDF 0970S2D	○		38,8	42,7
9,8		MDF 0980S2D	○		39,2	43,1
9,9		MDF 0990S2D	○		39,6	43,6
10,0		MDF 1000S2D	●		40,0	44,0
10,1	12,0	MDF 1010S2D	○	90	40,4	44,4
10,2		MDF 1020S2D	○		40,8	44,9
10,3		MDF 1030S2D	○		41,2	45,3
10,4		MDF 1040S2D	○		41,6	45,8
10,5		MDF 1050S2D	●		42,0	46,2
10,6	12,0	MDF 1060S2D	○	90	42,4	46,6
10,7		MDF 1070S2D	○		42,8	47,1
10,8		MDF 1080S2D	○		43,2	47,5
10,9		MDF 1090S2D	○		43,6	48,0
11,0		MDF 1100S2D	●		44,0	48,4
11,1	12,0	MDF 1110S2D	○	90	44,4	48,8
11,2		MDF 1120S2D	○		44,8	49,3
11,3		MDF 1130S2D	○		45,2	49,7
11,4		MDF 1140S2D	○		45,6	50,2
11,5		MDF 1150S2D	●		46,0	50,6
11,6	12,0	MDF 1160S2D	○	90	46,4	51,0
11,7		MDF 1170S2D	○		46,8	51,5
11,8		MDF 1180S2D	○		47,2	51,9
11,9		MDF 1190S2D	○		47,6	52,4
12,0		MDF 1200S2D	●		48,0	52,8
12,5	14,0	MDF 1250S2D	○	100	50,0	54,0
13,0		MDF 1300S2D	○		52,0	56,8
13,5		MDF 1350S2D	○		54,0	59,6
14,0	14,0	MDF 1400S2D	○	110	56,0	62,4
14,5		MDF 1450S2D	○		58,0	65,2
15,0	16,0	MDF 1500S2D	○	110	60,0	68,0
15,5		MDF 1550S2D	○		62,0	70,8
16,0		MDF 1600S2D	○		64,0	73,6
16,5	18,0	MDF 1650S2D	○	125	66,0	72,4
17,0		MDF 1700S2D	○		68,0	75,2
17,5		MDF 1750S2D	○		70,0	78,0
18,0		MDF 1800S2D	○		72,0	80,8
18,5	20,0	MDF 1850S2D	○	140	74,0	83,6
19,0		MDF 1900S2D	○		76,0	86,4
19,5		MDF 1950S2D	○		78,0	89,2
20,0		MDF 2000S2D	○		80,0	92,0

\*RS Thinning is used for ØD<sub>c</sub> ≥ 0,5mm.

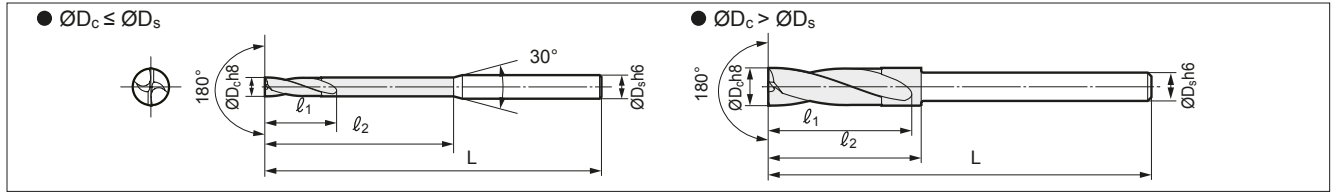
Grade: ACF75



Carbon Steel ≤0.28%	Alloy Steel >0.28%	Tempered Steel <45HRC	Hardened Steel >45HRC	Stainless Steel	Cast Iron	Ductile Cast Iron	Aluminum Alloy
○	○	○	○	○	○	○	○



### External Coolant Supply (L2D Type, Long Type)



#### ● Diameter $\varnothing D_c$ : 3,0 ~ 9,5mm

Diameter $\varnothing D_c$ (mm)	Shank $\varnothing D_s$ (mm)	Cat. No.	Stock	Dimensions (mm)			
				L	$l_1$	$l_2$	
3,0	6,0	MDF 0300L2D	○	100	13,5	30,0	
3,1		0310L2D	○		14,0	31,0	
3,2		0320L2D	○		14,4	32,0	
3,3		0330L2D	○		14,9	33,0	
3,4		0340L2D	○		15,3	34,0	
3,5		0350L2D	○		15,8	35,0	
3,6	6,0	MDF 0360L2D	○	100	16,2	36,0	
3,7		0370L2D	○		16,7	37,0	
3,8		0380L2D	○		17,1	38,0	
3,9		0390L2D	○		17,6	39,0	
4,0		0400L2D	○		18,0	40,0	
4,1		6,0	MDF 0410L2D		○	100	18,5
4,2	0420L2D		○	18,9	42,0		
4,3	0430L2D		○	19,4	43,0		
4,4	0440L2D		○	19,8	44,0		
4,5	0450L2D		○	20,3	45,0		
4,6	6,0		MDF 0460L2D	○	100		20,7
4,7		0470L2D	○	21,2		47,0	
4,8		0480L2D	○	21,6		48,0	
4,9		0490L2D	○	22,1		49,0	
5,0		0500L2D	○	22,5		50,0	
5,1		6,0	MDF 0510L2D	○		110	23,0
5,2	0520L2D		○	23,4	52,0		
5,3	0530L2D		○	23,9	53,0		
5,4	0540L2D		○	24,3	54,0		
5,5	0550L2D		○	24,8	55,0		
5,6	6,0		MDF 0560L2D	○	110		25,2
5,7		0570L2D	○	25,7		57,0	
5,8		0580L2D	○	26,1		58,0	
5,9		0590L2D	○	26,6		59,0	
6,0		MDF 0600L2DS5	○	110		27,0	30,0
6,0		MDF 0600L2D	○	110		27,0	60,0
6,1	6,0	MDF 0610L2D	○	120	27,5	30,5	
6,2		0620L2D	○		27,9	30,9	
6,3		0630L2D	○		28,4	31,4	
6,4		0640L2D	○		28,8	31,8	
6,5		0650L2D	○		29,3	32,3	
6,6		6,0	MDF 0660L2D		○	120	29,7
6,7	0670L2D		○	30,2	33,2		
6,8	0680L2D		○	30,6	33,6		
6,9	0690L2D		○	31,1	34,1		
7,0	0700L2D		○	31,5	34,5		
7,1	6,0		MDF 0710L2D	○	130		32,0
7,2		0720L2D	○	32,4		35,4	
7,3		0730L2D	○	32,9		35,9	
7,4		0740L2D	○	33,3		36,3	
7,5		0750L2D	○	33,8		36,8	
7,6		6,0	MDF 0760L2D	○		130	34,2
7,7	0770L2D		○	34,7	37,7		
7,8	0780L2D		○	35,1	38,1		
7,9	0790L2D		○	35,6	38,6		
8,0	MDF 0800L2DS6		○	130	36,0		39,0
8,0	MDF 0800L2D		○	130	36,0		80,0
8,1	8,0	MDF 0810L2D	○	140	36,5	39,5	
8,2		0820L2D	○		36,9	39,9	
8,3		0830L2D	○		37,4	40,4	
8,4		0840L2D	○		37,8	40,8	
8,5		0850L2D	○		38,3	41,3	
8,6		8,0	MDF 0860L2D		○	140	38,7
8,7	0870L2D		○	39,2	42,2		
8,8	0880L2D		○	39,6	42,6		
8,9	0890L2D		○	40,1	43,1		
9,0	0900L2D		○	40,5	43,5		
9,1	8,0		MDF 0910L2D	○	150		41,0
9,2		0920L2D	○	41,4		41,4	
9,3		0930L2D	○	41,9		41,9	
9,4		0940L2D	○	42,3		42,3	
9,5		0950L2D	○	42,8		42,8	

#### ● Diameter $\varnothing D_c$ : 9,6 ~ 20,0mm

Diameter $\varnothing D_c$ (mm)	Shank $\varnothing D_s$ (mm)	Cat. No.	Stock	Dimensions (mm)			
				L	$l_1$	$l_2$	
9,6	8,0	MDF 0960L2D	○	150	43,2	46,2	
9,7		0970L2D	○		43,7	46,7	
9,8		0980L2D	○		44,1	47,1	
9,9		0990L2D	○		44,6	47,6	
10,0		MDF 1000L2DS8	○		150	45,0	48,0
10,0		MDF 1000L2D	○		150	45,0	100,0
10,1	10,0	MDF 1010L2D	○	160	45,5	48,5	
10,2		1020L2D	○		45,9	48,9	
10,3		1030L2D	○		46,4	49,4	
10,4		1040L2D	○		46,8	49,8	
10,5		1050L2D	○		47,3	50,3	
10,6		10,0	MDF 1060L2D		○	160	47,7
10,7	1070L2D		○	48,2	51,2		
10,8	1080L2D		○	48,6	51,6		
10,9	1090L2D		○	49,1	52,1		
11,0	1100L2D		○	49,5	52,5		
11,1	10,0		MDF 1110L2D	○	170		50,0
11,2		1120L2D	○	50,4		53,4	
11,3		1130L2D	○	50,9		53,9	
11,4		1140L2D	○	51,3		54,3	
11,5		1150L2D	○	51,8		54,8	
11,6		10,0	MDF 1160L2D	○		170	52,2
11,7	1170L2D		○	52,7	55,7		
11,8	1180L2D		○	53,1	56,1		
11,9	1190L2D		○	53,6	56,6		
12,0	MDF 1200L2DS10		○	170	54,0		57,0
12,0	MDF 1200L2D		○	170	54,0		120,0
12,5	12,0	MDF 1250L2D	○	180	56,3	59,3	
13,0		1300L2D	○		58,5	61,5	
13,5		1350L2D	○		190	60,8	63,8
14,0		MDF 1400L2DS12	○		190	63,0	66,0
14,0		MDF 1400L2D	○		190	63,0	140,0
14,5		14,0	MDF 1450L2D		○	200	65,3
15,0	1500L2D		○	67,5	70,5		
15,5	1550L2D		○	210	69,8		72,8
16,0	MDF 1600L2DS14		○	210	72,0		75,0
16,0	MDF 1600L2D		○	210	72,0		160,0
16,5	16,0		MDF 1650L2D	○	220		74,3
17,0		1700L2D	○	76,5		79,5	
17,5		1750L2D	○	230		78,8	81,8
18,0		MDF 1800L2DS16	○	230		81,0	84,0
18,0		MDF 1800L2D	○	230		81,0	180,0
18,5		18,0	MDF 1850L2D	○		240	83,3
19,0	1900L2D		○	85,5	88,5		
19,5	1950L2D		○	250	87,8		90,8
20,0	MDF 2000L2DS18		○	250	90,0		93,0
20,0	MDF 2000L2D		○	250	90,0		200,0

Grade: ACF75

Drilling that uses this tool requires a guide hole of the same diameter or a centering hole larger than the tool diameter.



### Recommended Cutting Conditions

#### MDF S2D Type

- The recommended hole depth is 2 x D<sub>c</sub>. The depth shall be the depth from the highest point of the hole when drilling inclined surfaces.
- The recommended cutting conditions are those for drilling in flat horizontal surfaces.
- Adjust the feed rate according to the inclination angle when drilling in an inclined surface.
  - Set the feed rate at ≤ 70% when the inclination angle is ≤ 30°
  - Set the feed rate at ≤ 50% when the inclination angle is > 30°
- This product is a drilling tool. Do not use it for traversing or helical milling

(v<sub>c</sub>: Cutting Speed m/min f: Feed Rate mm/rev)

Drill Diam. ØD <sub>c</sub> (mm)	Cutting Conditions	Soft Steel / General Steel (~250HB)	Alloy Steel (~300HB)	Hardened Steel (~50HRC)	Stainless Steel (~200HB)	Gray Cast Iron FC250	Ductile Cast Iron	Aluminium Alloy
~ Ø0,5	v <sub>c</sub>	30 - 40 - 50	30 - 35 - 40	15 - 20 - 25	15 - 20 - 25	30 - 40 - 50	20 - 30 - 40	60 - 80 - 100
	f	0,004 - 0,005 - 0,006	0,004 - 0,005 - 0,006	0,001 - 0,002 - 0,003	0,003 - 0,004 - 0,005	0,004 - 0,005 - 0,006	0,001 - 0,003 - 0,005	0,003 - 0,005 - 0,007
~ Ø1,0	v <sub>c</sub>	45 - 55 - 65	35 - 45 - 55	20 - 30 - 40	20 - 25 - 30	45 - 55 - 65	30 - 40 - 50	80 - 100 - 120
	f	0,01 - 0,03 - 0,05	0,01 - 0,03 - 0,05	0,002 - 0,006 - 0,01	0,005 - 0,007 - 0,01	0,01 - 0,03 - 0,05	0,005 - 0,01 - 0,015	0,01 - 0,02 - 0,03
~ Ø2,0	v <sub>c</sub>	50 - 60 - 70	40 - 50 - 60	20 - 30 - 40	20 - 30 - 40	50 - 60 - 70	45 - 55 - 65	90 - 110 - 130
	f	0,02 - 0,04 - 0,06	0,02 - 0,04 - 0,06	0,01 - 0,018 - 0,025	0,01 - 0,015 - 0,02	0,02 - 0,04 - 0,06	0,015 - 0,03 - 0,045	0,03 - 0,05 - 0,07
~ Ø4,0	v <sub>c</sub>	60 - 75 - 90	50 - 65 - 80	20 - 30 - 40	20 - 30 - 40	60 - 75 - 90	55 - 65 - 75	90 - 110 - 130
	f	0,06 - 0,08 - 0,10	0,05 - 0,08 - 0,10	0,01 - 0,02 - 0,03	0,01 - 0,02 - 0,03	0,06 - 0,08 - 0,10	0,04 - 0,06 - 0,08	0,06 - 0,08 - 0,10
~ Ø6,0	v <sub>c</sub>	60 - 75 - 90	50 - 65 - 80	20 - 30 - 40	20 - 30 - 50	60 - 75 - 90	60 - 70 - 80	90 - 110 - 130
	f	0,05 - 0,10 - 0,15	0,05 - 0,10 - 0,15	0,04 - 0,06 - 0,08	0,03 - 0,04 - 0,05	0,05 - 0,10 - 0,15	0,06 - 0,09 - 0,12	0,05 - 0,10 - 0,15
~ Ø8,0	v <sub>c</sub>	60 - 75 - 90	50 - 65 - 80	20 - 30 - 40	20 - 30 - 50	60 - 75 - 90	60 - 70 - 80	90 - 110 - 130
	f	0,10 - 0,15 - 0,20	0,10 - 0,15 - 0,20	0,06 - 0,08 - 0,10	0,04 - 0,06 - 0,08	0,10 - 0,15 - 0,20	0,10 - 0,12 - 0,15	0,10 - 0,15 - 0,20
~ Ø10,0	v <sub>c</sub>	60 - 75 - 90	50 - 65 - 80	20 - 30 - 40	20 - 30 - 50	60 - 75 - 90	60 - 70 - 80	90 - 110 - 130
	f	0,12 - 0,17 - 0,22	0,12 - 0,17 - 0,22	0,08 - 0,10 - 0,12	0,06 - 0,08 - 0,10	0,12 - 0,17 - 0,22	0,12 - 0,15 - 0,18	0,12 - 0,17 - 0,22
~ Ø12,0	v <sub>c</sub>	60 - 75 - 90	50 - 65 - 80	20 - 30 - 40	20 - 30 - 50	60 - 75 - 90	60 - 70 - 80	90 - 110 - 130
	f	0,15 - 0,20 - 0,25	0,15 - 0,20 - 0,25	0,12 - 0,15 - 0,18	0,08 - 0,10 - 0,12	0,15 - 0,20 - 0,25	0,15 - 0,18 - 0,20	0,15 - 0,20 - 0,25
~ Ø16,0	v <sub>c</sub>	60 - 75 - 90	50 - 65 - 80	20 - 30 - 40	20 - 30 - 50	60 - 75 - 90	60 - 70 - 80	90 - 110 - 130
	f	0,20 - 0,25 - 0,30	0,20 - 0,25 - 0,30	0,14 - 0,17 - 0,20	0,10 - 0,15 - 0,20	0,17 - 0,22 - 0,27	0,15 - 0,20 - 0,25	0,20 - 0,25 - 0,30
~ Ø20,0	v <sub>c</sub>	60 - 75 - 90	50 - 65 - 80	20 - 30 - 40	20 - 30 - 50	60 - 75 - 90	60 - 70 - 80	90 - 110 - 130
	f	0,25 - 0,30 - 0,35	0,25 - 0,30 - 0,35	0,16 - 0,19 - 0,22	0,15 - 0,20 - 0,25	0,25 - 0,30 - 0,35	0,20 - 0,25 - 0,30	0,25 - 0,30 - 0,35

Min. - Optimum - Max.

#### MDF L2D Type, Long Type

- Drilling that uses this tool requires a guide hole of the same diameter.
- The cutting conditions are the recommended conditions with a guide hole.
- The recommended hole depth is 5 x D<sub>c</sub>. The depth is measured from the highest point of the hole on drilling in inclined surfaces.
- This product is a drilling tool. Do not use it for traversing or helical milling.

(v<sub>c</sub>: Cutting Speed m/min f: Feed Rate mm/rev)

Drill Diam. ØD <sub>c</sub> (mm)	Cutting Conditions	Soft Steel / General Steel (~250HB)	Alloy Steel (~300HB)	Hardened Steel (~50HRC)	Stainless Steel (~200HB)	Gray Cast Iron FC250	Ductile Cast Iron	Aluminium Alloy
~ Ø4,0	v <sub>c</sub>	60 - 80 - 100	50 - 70 - 90	20 - 30 - 40	20 - 30 - 40	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,06 - 0,08 - 0,10	0,05 - 0,08 - 0,10	0,01 - 0,02 - 0,03	0,01 - 0,02 - 0,03	0,06 - 0,08 - 0,10	0,04 - 0,06 - 0,08	0,06 - 0,08 - 0,10
~ Ø6,0	v <sub>c</sub>	60 - 80 - 100	50 - 70 - 90	20 - 30 - 40	20 - 30 - 50	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,05 - 0,10 - 0,15	0,05 - 0,10 - 0,15	0,04 - 0,06 - 0,08	0,03 - 0,04 - 0,05	0,05 - 0,10 - 0,15	0,06 - 0,09 - 0,12	0,05 - 0,10 - 0,15
~ Ø8,0	v <sub>c</sub>	60 - 80 - 100	50 - 70 - 90	20 - 30 - 40	20 - 30 - 50	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,10 - 0,15 - 0,20	0,10 - 0,15 - 0,20	0,06 - 0,08 - 0,10	0,04 - 0,06 - 0,08	0,10 - 0,15 - 0,20	0,10 - 0,12 - 0,15	0,10 - 0,15 - 0,20
~ Ø10,0	v <sub>c</sub>	60 - 80 - 100	50 - 70 - 90	20 - 30 - 40	20 - 30 - 50	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,15 - 0,20 - 0,25	0,15 - 0,20 - 0,25	0,08 - 0,10 - 0,12	0,06 - 0,08 - 0,10	0,15 - 0,20 - 0,25	0,12 - 0,15 - 0,18	0,15 - 0,20 - 0,25
~ Ø12,0	v <sub>c</sub>	60 - 80 - 100	50 - 70 - 90	20 - 30 - 40	20 - 30 - 50	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,20 - 0,25 - 0,30	0,20 - 0,25 - 0,30	0,12 - 0,15 - 0,18	0,08 - 0,10 - 0,12	0,17 - 0,22 - 0,27	0,15 - 0,20 - 0,25	0,20 - 0,25 - 0,30
~ Ø16,0	v <sub>c</sub>	60 - 80 - 100	50 - 70 - 90	20 - 30 - 40	20 - 30 - 50	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,20 - 0,25 - 0,30	0,20 - 0,25 - 0,30	0,14 - 0,17 - 0,20	0,10 - 0,15 - 0,20	0,20 - 0,25 - 0,30	0,20 - 0,25 - 0,30	0,25 - 0,30 - 0,35
~ Ø20,0	v <sub>c</sub>	60 - 80 - 100	50 - 70 - 90	20 - 30 - 40	20 - 30 - 50	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,25 - 0,30 - 0,35	0,25 - 0,30 - 0,35	0,16 - 0,19 - 0,22	0,15 - 0,20 - 0,25	0,30 - 0,35 - 0,40	0,25 - 0,30 - 0,35	0,35 - 0,40 - 0,45

Min. - Optimum - Max.

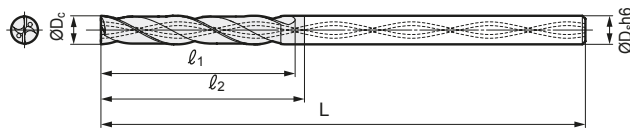


Carbon Steel	Alloy Steel	Tempered Steel	Hardened Steel	Stainless Steel	Cast Iron	Ductile Cast Iron	Aluminum Alloy
<0.28%	>0.28%	Steel	<45HRC	>45HRC	Steel	Cast Iron	Alloy

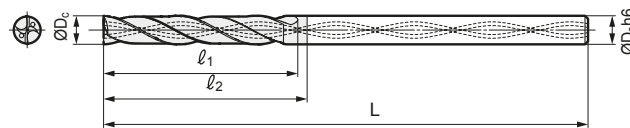


Internal Coolant Supply (MDF H3D/H5D Type)

MDF Type 3D Single Margin



MDF Type 5D Double Margin



Diameter ØDc: 3,0 ~ 6,0mm

Diameter ØDc (mm)	Shank ØDs (mm)	Hole Depth (L/D)	Cat. No.	Stock	Dimensions (mm)		
					L	l <sub>1</sub>	l <sub>2</sub>
3,0	3	3	MDF 0300H3D	●	68	13,5	16,5
		5	0300H5D	●	78	20,1	23,1
3,1	4	3	MDF 0310H3D	○	72	14,0	17,0
		5	0310H5D	○	86	20,8	23,8
3,2	4	3	0320H3D	○	72	14,4	17,4
		5	0320H5D	○	86	21,4	24,4
3,3	4	3	0330H3D	○	72	14,9	17,9
		5	0330H5D	○	86	22,1	25,1
3,4	4	3	0340H3D	○	72	15,3	18,3
		5	0340H5D	○	86	22,8	25,8
3,5	4	3	0350H3D	●	72	15,8	18,8
		5	0350H5D	●	86	23,5	26,5
3,6	4	3	MDF 0360H3D	○	72	16,2	19,2
		5	0360H5D	○	86	24,1	27,1
3,7	4	3	0370H3D	○	72	16,7	19,7
		5	0370H5D	○	86	24,8	27,8
3,8	4	3	0380H3D	○	72	17,1	20,1
		5	0380H5D	○	86	25,5	28,5
3,9	4	3	0390H3D	○	72	17,6	20,6
		5	0390H5D	○	86	26,1	29,1
4,0	4	3	0400H3D	●	72	18,0	21,0
		5	0400H5D	●	86	26,8	29,8
4,1	5	3	MDF 0410H3D	○	80	18,5	21,5
		5	0410H5D	○	98	27,5	30,5
4,2	5	3	0420H3D	○	80	18,9	21,9
		5	0420H5D	○	98	28,1	31,1
4,3	5	3	0430H3D	○	80	19,4	22,4
		5	0430H5D	○	98	28,8	31,8
4,4	5	3	0440H3D	○	80	19,8	22,8
		5	0440H5D	○	98	29,5	32,5
4,5	5	3	0450H3D	●	80	20,3	23,3
		5	0450H5D	●	98	30,2	33,2
4,6	5	3	MDF 0460H3D	○	80	20,7	23,7
		5	0460H5D	○	98	30,8	33,8
4,7	5	3	0470H3D	○	80	21,2	24,2
		5	0470H5D	○	98	31,5	34,5
4,8	5	3	0480H3D	○	80	21,6	24,6
		5	0480H5D	○	98	32,2	35,2
4,9	5	3	0490H3D	○	80	22,1	25,1
		5	0490H5D	○	98	32,8	35,8
5,0	5	3	0500H3D	●	80	22,5	25,5
		5	0500H5D	●	98	33,5	36,5
5,1	6	3	MDF 0510H3D	○	82	23,0	26,0
		5	0510H5D	○	100	34,2	37,2
5,2	6	3	0520H3D	○	82	23,4	26,4
		5	0520H5D	○	100	34,8	37,8
5,3	6	3	0530H3D	○	82	23,9	26,9
		5	0530H5D	○	100	35,5	38,5
5,4	6	3	0540H3D	○	82	24,3	27,3
		5	0540H5D	○	100	36,2	39,2
5,5	6	3	0550H3D	●	82	24,8	27,8
		5	0550H5D	●	100	36,9	39,9
5,6	6	3	MDF 0560H3D	○	82	25,2	28,2
		5	0560H5D	○	100	37,5	40,5
5,7	6	3	0570H3D	○	82	25,7	28,7
		5	0570H5D	○	100	38,2	41,2
5,8	6	3	0580H3D	○	82	26,1	29,1
		5	0580H5D	○	100	38,9	41,9
5,9	6	3	0590H3D	○	82	26,6	29,6
		5	0590H5D	○	100	39,5	42,5
6,0	6	3	0600H3D	●	82	27,0	30,0
		5	0600H5D	●	100	40,2	43,2

Diameter ØDc: 6,1 ~ 9,0mm

Diameter ØDc (mm)	Shank ØDs (mm)	Hole Depth (L/D)	Cat. No.	Stock	Dimensions (mm)		
					L	l <sub>1</sub>	l <sub>2</sub>
6,1	7	3	MDF 0610H3D	○	88	27,5	30,5
		5	0610H5D	○	109	40,9	43,9
6,2	7	3	0620H3D	○	88	27,9	30,9
		5	0620H5D	○	109	41,5	44,5
6,3	7	3	0630H3D	○	88	28,4	31,4
		5	0630H5D	○	109	42,2	45,2
6,4	7	3	0640H3D	○	88	28,8	31,8
		5	0640H5D	○	109	42,9	45,9
6,5	7	3	0650H3D	●	88	29,3	32,3
		5	0650H5D	●	109	43,6	46,6
6,6	7	3	MDF 0660H3D	○	88	29,7	32,7
		5	0660H5D	○	109	44,2	47,2
6,7	7	3	0670H3D	○	88	30,2	33,2
		5	0670H5D	○	109	44,9	47,9
6,8	7	3	0680H3D	○	88	30,6	33,6
		5	0680H5D	○	109	45,6	48,6
6,9	7	3	0690H3D	○	88	31,1	34,1
		5	0690H5D	○	109	46,2	49,2
7,0	7	3	0700H3D	●	88	31,5	34,5
		5	0700H5D	●	109	46,9	49,9
7,1	8	3	MDF 0710H3D	○	94	32,0	35,0
		5	0710H5D	○	118	47,6	50,6
7,2	8	3	0720H3D	○	94	32,4	35,4
		5	0720H5D	○	118	48,2	51,2
7,3	8	3	0730H3D	○	94	32,9	35,9
		5	0730H5D	○	118	48,9	51,9
7,4	8	3	0740H3D	○	94	33,3	36,3
		5	0740H5D	○	118	49,6	52,6
7,5	8	3	0750H3D	●	94	33,8	36,8
		5	0750H5D	●	118	50,3	53,3
7,6	8	3	MDF 0760H3D	○	94	34,2	37,2
		5	0760H5D	○	118	50,9	53,9
7,7	8	3	0770H3D	○	94	34,7	37,7
		5	0770H5D	○	118	51,6	54,6
7,8	8	3	0780H3D	○	94	35,1	38,1
		5	0780H5D	○	118	52,3	55,3
7,9	8	3	0790H3D	○	94	35,6	38,6
		5	0790H5D	○	118	52,9	55,9
8,0	8	3	0800H3D	●	94	36,0	39,0
		5	0800H5D	●	118	53,6	56,6
8,1	9	3	MDF 0810H3D	○	100	36,5	39,5
		5	0810H5D	○	127	54,3	57,3
8,2	9	3	0820H3D	○	100	36,9	39,9
		5	0820H5D	○	127	54,9	57,9
8,3	9	3	0830H3D	○	100	37,4	40,4
		5	0830H5D	○	127	55,6	58,6
8,4	9	3	0840H3D	○	100	37,8	40,8
		5	0840H5D	○	127	56,3	59,3
8,5	9	3	0850H3D	●	100	38,3	41,3
		5	0850H5D	●	127	57,0	60,0
8,6	9	3	MDF 0860H3D	○	100	38,7	41,7
		5	0860H5D	○	127	57,6	60,6
8,7	9	3	0870H3D	○	100	39,2	42,2
		5	0870H5D	○	127	58,3	61,3
8,8	9	3	0880H3D	○	100	39,6	42,6
		5	0880H5D	○	127	59,0	62,0
8,9	9	3	0890H3D	○	100	40,1	43,1
		5	0890H5D	○	127	59,6	62,6
9,0	9	3	0900H3D	●	100	40,5	43,5
		5	0900H5D	●	127	60,3	63,3

Grade: ACF75

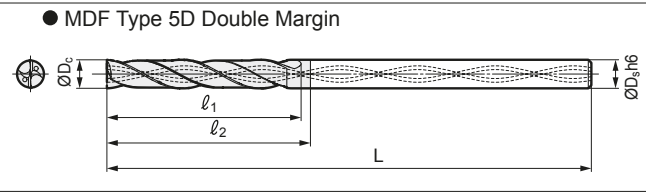
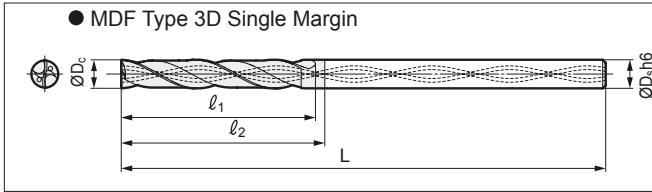
# Flat MultiDrill MDF Type

MDF Type with Oil Hole - H3D / H5D



## Internal Coolant Supply (MDF H3D/H5D Type)

Carbon Steel	Alloy Steel	Tempered Steel	Hardened Steel	Stainless Steel	Cast Iron	Ductile Cast Iron	Aluminium Alloy
<0.28%	>0.28%	<45HRC	>45HRC	Steel	Iron	Iron	Alloy



### ● Diameter ØDc: 9,1 ~ 12,0mm

Diameter ØDc (mm)	Shank ØDs (mm)	Hole Depth (L/D)	Cat. No.	Stock	Dimensions (mm)		
					L	l <sub>1</sub>	l <sub>2</sub>
9,1	10	3	MDF 0910H3D	○	106	41,0	44,0
		5	0910H5D	○	136	61,0	64,0
9,2	10	3	0920H3D	○	106	41,4	44,4
		5	0920H5D	○	136	61,6	64,6
9,3	10	3	0930H3D	○	106	41,9	44,9
		5	0930H5D	○	136	62,3	65,3
9,4	10	3	0940H3D	○	106	42,3	45,3
		5	0940H5D	○	136	63,0	66,0
9,5	10	3	0950H3D	●	106	42,8	45,8
		5	0950H5D	●	136	63,7	66,7
9,6	10	3	MDF 0960H3D	○	106	43,2	46,2
		5	0960H5D	○	136	64,3	67,3
9,7	10	3	0970H3D	○	106	43,7	46,7
		5	0970H5D	○	136	65,0	68,0
9,8	10	3	0980H3D	○	106	44,1	47,1
		5	0980H5D	○	136	65,7	68,7
9,9	10	3	0990H3D	○	106	44,6	47,6
		5	0990H5D	○	136	66,3	69,3
10,0	10	3	1000H3D	●	106	45,0	48,0
		5	1000H5D	●	136	67,0	70,0
10,1	11	3	MDF 1010H3D	○	116	45,5	48,5
		5	1010H5D	○	149	67,7	70,7
10,2	11	3	1020H3D	○	116	45,9	48,9
		5	1020H5D	○	149	68,3	71,3
10,3	11	3	1030H3D	○	116	46,4	49,4
		5	1030H5D	○	149	69,0	72,0
10,4	11	3	1040H3D	○	116	46,8	49,8
		5	1040H5D	○	149	69,7	72,7
10,5	11	3	1050H3D	●	116	47,3	50,3
		5	1050H5D	●	149	70,4	73,4
10,6	11	3	MDF 1060H3D	○	116	47,7	50,7
		5	1060H5D	○	149	71,0	74,0
10,7	11	3	1070H3D	○	116	48,2	51,2
		5	1070H5D	○	149	71,7	74,7
10,8	11	3	1080H3D	○	116	48,6	51,6
		5	1080H5D	○	149	72,4	75,4
10,9	11	3	1090H3D	○	116	49,1	52,1
		5	1090H5D	○	149	73,0	76,0
11,0	11	3	1100H3D	●	116	49,5	52,5
		5	1100H5D	●	149	73,7	76,7
11,1	12	3	MDF 1110H3D	○	122	50,0	53,0
		5	1110H5D	○	158	74,4	77,4
11,2	12	3	1120H3D	○	122	50,4	53,4
		5	1120H5D	○	158	75,0	78,0
11,3	12	3	1130H3D	○	122	50,9	53,9
		5	1130H5D	○	158	75,7	78,7
11,4	12	3	1140H3D	○	122	51,3	54,3
		5	1140H5D	○	158	76,4	79,4
11,5	12	3	1150H3D	●	122	51,8	54,8
		5	1150H5D	●	158	77,1	80,1
11,6	12	3	MDF 1160H3D	○	122	52,2	55,2
		5	1160H5D	○	158	77,7	80,7
11,7	12	3	1170H3D	○	122	52,7	55,7
		5	1170H5D	○	158	78,4	81,4
11,8	12	3	1180H3D	○	122	53,1	56,1
		5	1180H5D	○	158	79,1	82,1
11,9	12	3	1190H3D	○	122	53,6	56,6
		5	1190H5D	○	158	79,7	82,7
12,0	12	3	1200H3D	●	122	54,0	57,0
		5	1200H5D	●	158	80,4	83,4

### ● Diameter ØDc: 12,5 ~ 16,0mm

Diameter ØDc (mm)	Shank ØDs (mm)	Hole Depth (L/D)	Cat. No.	Stock	Dimensions (mm)		
					L	l <sub>1</sub>	l <sub>2</sub>
12,5	13	3	MDF 1250H3D	○	128	56,3	59,3
		5	1250H5D	○	167	83,8	86,8
13,0	13	3	1300H3D	○	128	58,5	61,5
		5	1300H5D	○	167	87,1	90,1
13,5	14	3	MDF 1350H3D	○	134	60,8	63,8
		5	1350H5D	○	176	90,5	93,5
14,0	14	3	1400H3D	○	134	63,0	66,0
		5	1400H5D	○	176	93,8	96,8
14,5	15	3	MDF 1450H3D	○	140	65,3	68,3
		5	1450H5D	○	185	97,2	100,2
15,0	15	3	1500H3D	○	140	67,5	70,5
		5	1500H5D	○	185	100,5	103,5
15,5	16	3	MDF 1550H3D	○	146	69,8	72,8
		5	1550H5D	○	194	103,9	106,9
16,0	16	3	1600H3D	○	146	72,0	75,0
		5	1600H5D	○	194	107,2	110,2

Grade: ACF75



## Recommended Cutting Conditions

### ● MDF H3D Type with Oil Hole

1. The recommended hole depth is  $3 \times D_c$ . The depth is measured from the highest point of the hole on drilling in inclined surfaces.
2. The recommended cutting conditions are those for drilling on flat horizontal surfaces.
3. Adjust the feed rate according to the inclination angle when drilling in an inclined surface.
  - 3.1 Set the feed rate at  $\leq 70\%$  when the inclination angle is  $\leq 30^\circ$ .
  - 3.2 Set the feed rate at  $\leq 50\%$  when the inclination angle is  $> 30^\circ$ .
4. This product is a drilling tool. Do not use it for traversing or helical milling.
5. A guide hole of the same diameter is recommended when drilling stainless steel.

(v<sub>c</sub>: Cutting Speed m/min f: Feed Rate mm/rev)

Drill Diam. ØD <sub>c</sub> (mm)	Cutting Conditions	Soft Steel / General Steel (~250HB)	Alloy Steel (~300HB)	Hardened Steel (~50HRC)	Stainless Steel (~200HB)	Gray Cast Iron FC250	Ductile Cast Iron	Aluminium Alloy
~ Ø4,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,06 - 0,08 - 0,10	0,05 - 0,08 - 0,10	0,01 - 0,02 - 0,03	0,01 - 0,02 - 0,03	0,06 - 0,08 - 0,10	0,04 - 0,06 - 0,08	0,06 - 0,08 - 0,10
~ Ø6,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	70 - 80 - 90	90 - 120 - 150
	f	0,05 - 0,10 - 0,15	0,05 - 0,10 - 0,15	0,04 - 0,06 - 0,08	0,03 - 0,04 - 0,05	0,05 - 0,10 - 0,15	0,06 - 0,09 - 0,12	0,05 - 0,10 - 0,15
~ Ø8,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	70 - 80 - 90	90 - 120 - 150
	f	0,10 - 0,15 - 0,20	0,10 - 0,15 - 0,20	0,06 - 0,08 - 0,10	0,04 - 0,06 - 0,08	0,10 - 0,15 - 0,20	0,10 - 0,12 - 0,15	0,10 - 0,15 - 0,20
~ Ø10,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	70 - 80 - 90	90 - 120 - 150
	f	0,12 - 0,17 - 0,22	0,12 - 0,17 - 0,22	0,08 - 0,10 - 0,12	0,06 - 0,08 - 0,10	0,12 - 0,17 - 0,22	0,12 - 0,15 - 0,18	0,15 - 0,20 - 0,25
~ Ø12,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	70 - 80 - 90	90 - 120 - 150
	f	0,15 - 0,20 - 0,25	0,15 - 0,20 - 0,25	0,12 - 0,15 - 0,18	0,08 - 0,10 - 0,12	0,15 - 0,20 - 0,25	0,15 - 0,18 - 0,20	0,20 - 0,25 - 0,30
~ Ø16,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	70 - 80 - 90	90 - 120 - 150
	f	0,15 - 0,20 - 0,25	0,15 - 0,20 - 0,25	0,12 - 0,15 - 0,18	0,10 - 0,15 - 0,20	0,17 - 0,22 - 0,27	0,15 - 0,20 - 0,25	0,25 - 0,30 - 0,40

Min. - Optimum - Max.

### ● MDF H5D Type with Oil Hole

1. Drilling that uses this tool requires a guide hole of the same diameter.
2. The cutting conditions are the recommended conditions with a guide hole.
3. The recommended hole depth is  $5 \times D_c$ . The depth is measured from the highest point of the hole on drilling in inclined surfaces.
4. This product is a drilling tool. Do not use it for traversing or helical milling.

(v<sub>c</sub>: Cutting Speed m/min f: Feed Rate mm/rev)

Drill Diam. ØD <sub>c</sub> (mm)	Cutting Conditions	Soft Steel / General Steel (~250HB)	Alloy Steel (~300HB)	Hardened Steel (~50HRC)	Stainless Steel (~200HB)	Gray Cast Iron FC250	Ductile Cast Iron	Aluminium Alloy
~ Ø4,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,06 - 0,08 - 0,10	0,05 - 0,08 - 0,10	0,01 - 0,02 - 0,03	0,01 - 0,02 - 0,03	0,06 - 0,08 - 0,10	0,04 - 0,06 - 0,08	0,06 - 0,08 - 0,10
~ Ø6,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,05 - 0,10 - 0,15	0,05 - 0,10 - 0,15	0,04 - 0,06 - 0,08	0,03 - 0,04 - 0,05	0,05 - 0,10 - 0,15	0,06 - 0,09 - 0,12	0,05 - 0,10 - 0,15
~ Ø8,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,10 - 0,15 - 0,20	0,10 - 0,15 - 0,20	0,06 - 0,08 - 0,10	0,04 - 0,06 - 0,08	0,10 - 0,15 - 0,20	0,10 - 0,12 - 0,15	0,10 - 0,15 - 0,20
~ Ø10,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,15 - 0,20 - 0,25	0,15 - 0,20 - 0,25	0,08 - 0,10 - 0,12	0,06 - 0,08 - 0,10	0,15 - 0,20 - 0,25	0,12 - 0,15 - 0,18	0,15 - 0,20 - 0,25
~ Ø12,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,20 - 0,25 - 0,30	0,20 - 0,25 - 0,30	0,12 - 0,15 - 0,18	0,08 - 0,10 - 0,12	0,17 - 0,22 - 0,27	0,15 - 0,20 - 0,25	0,20 - 0,25 - 0,30
~ Ø16,0	v <sub>c</sub>	70 - 85 - 100	60 - 75 - 90	30 - 40 - 50	25 - 35 - 45	70 - 85 - 100	65 - 75 - 85	90 - 120 - 150
	f	0,20 - 0,25 - 0,30	0,20 - 0,25 - 0,30	0,14 - 0,17 - 0,20	0,10 - 0,15 - 0,20	0,20 - 0,25 - 0,30	0,20 - 0,25 - 0,30	0,25 - 0,30 - 0,35

Min. - Optimum - Max.

# Extra Long SUPER MULTI-DRILLS MDW ... XHGS/PHT

## Solid Carbide Drills for Deep Hole Drilling



### ■ XGHS Series



Applications	Series	Diameter Range (mm)	Hole Depth (L/D)
Deep Hole Drilling	MDW□□□□XHGS12	∅3,0 ~ 12,0	~12
	MDW□□□□XHGS15	∅3,0 ~ 12,0	~15
	MDW□□□□XHGS20	∅3,0 ~ 12,0	~20
	MDW□□□□XHGS25	∅3,0 ~ 12,0	~25
	MDW□□□□XHGS30	∅3,0 ~ 10,0	~30
Pilot Hole Drilling	MDW□□□□PHT	∅3,0 ~ 12,0	~2

### ■ General Features

Super MultiDrill XHGS series is a next-generation drill for deep hole drilling, features stable chip control and improved strength to further enhance efficiency of deep hole drilling.

### ■ Characteristics and Applications

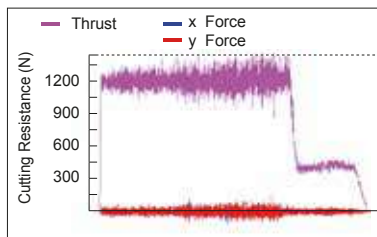
#### Low Cutting Resistance

The application of a new special thinning shape „RX thinning“ reduces cutting resistance during high efficiency drilling.

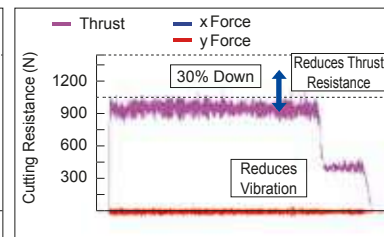
**RX**  
THINNING



#### Conventional Drill



#### XHGS Series



Work Material: C45  
Tools: MDW050XHT20 (conventional), MDW0500XHGS20 (∅5,0mm, 20D)  
Cutting Cond.:  $v_c=80\text{m/min}$ ,  $f=0,35\text{mm/rev}$  ( $\Rightarrow$  at the time of entry penetration  $f=0,08\text{mm/rev}$ ),  $H=90\text{mm}$   
Coolant: MQL

#### Chip Control

New groove shape „J flute“ with improved chip control stability when drilling deep holes.

**J-flute**



XHGS Series



Conv. Drill



$f = 0,35\text{mm/rev}$

$f = 0,40\text{mm/rev}$

$f = 0,45\text{mm/rev}$

Work Material: C45  
Tools: MDW050XHT20 (conventional), MDW0500XHGS20 (∅5,0mm, 20D)  
Cutting Cond.:  $v_c=80\text{m/min}$ ,  $H=90\text{mm}$   
Coolant: MQL

#### High Precision & Stability

The XHGS series provides excellent guide performance due to the unique design when compared to the conventional drill.

Conventional Drill



Excellent Guide Performance

XHGS Series





Recommended Cutting Conditions

Min. - Optimum - Max.

Drill Diameter ØD (mm)	Cutting Conditions	Soft Steel (~200HB)	General Steel (~250HB)	Alloy Steel (~300HB)	Hardened Steel (~40HRC)	Cast Iron FC FCD
~Ø3,0	v <sub>c</sub>	50 - <b>60</b> - 80	60 - <b>80</b> - 100	40 - <b>55</b> - 70	30 - <b>40</b> - 50	40 - <b>55</b> - 70
	f	0,12 - <b>0,15</b> - 0,20	0,12 - <b>0,15</b> - 0,20	0,10 - <b>0,13</b> - 0,16	0,06 - <b>0,08</b> - 0,12	0,15 - <b>0,18</b> - 0,23
~Ø5,0	v <sub>c</sub>	50 - <b>60</b> - 80	60 - <b>80</b> - 100	50 - <b>60</b> - 70	30 - <b>45</b> - 55	50 - <b>60</b> - 70
	f	0,15 - <b>0,20</b> - 0,25	0,15 - <b>0,23</b> - 0,30	0,12 - <b>0,15</b> - 0,20	0,08 - <b>0,10</b> - 0,14	0,17 - <b>0,25</b> - 0,35
~Ø10,0	v <sub>c</sub>	50 - <b>70</b> - 90	60 - <b>80</b> - 110	50 - <b>65</b> - 80	30 - <b>50</b> - 60	50 - <b>65</b> - 80
	f	0,20 - <b>0,25</b> - 0,30	0,20 - <b>0,25</b> - 0,32	0,15 - <b>0,20</b> - 0,25	0,10 - <b>0,15</b> - 0,20	0,25 - <b>0,28</b> - 0,35
~Ø12,0	v <sub>c</sub>	60 - <b>80</b> - 100	60 - <b>90</b> - 120	50 - <b>65</b> - 80	40 - <b>55</b> - 70	50 - <b>65</b> - 80
	f	0,25 - <b>0,30</b> - 0,35	0,25 - <b>0,30</b> - 0,35	0,15 - <b>0,23</b> - 0,27	0,12 - <b>0,15</b> - 0,23	0,25 - <b>0,30</b> - 0,35

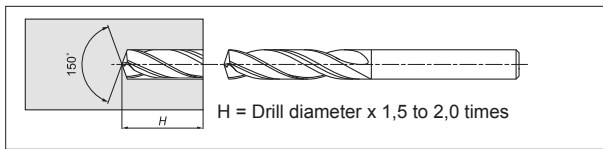
Note: Use lower speed when using MQL coolant and higher speed when using internal coolant.

V<sub>c</sub>: Cutting speed (m/min), f: Feed Rate (mm/rev)

Recommended Drilling Method

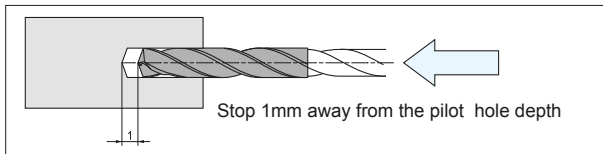
1. Drill a pilot hole using the dedicated PHT

Select the same nominal diameter for the dedicated pilot hole drill PHT type as the deep hole drill XHGS type. (The pilot drill diameter is designed +0,02mm to +0,05mm larger than the long drill diameter)



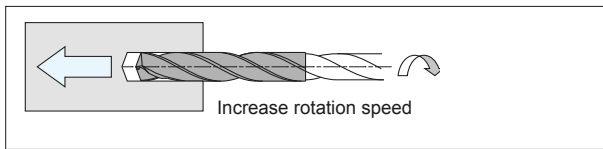
2 Enter the pilot hole at reduced cutting data

Rotation speed: 500min<sup>-1</sup>  
Feed rate: 1000 to 2000mm/min



Important:  
DO NOT enter pilot hole at higher cutting data, this will cause damage to the drill.

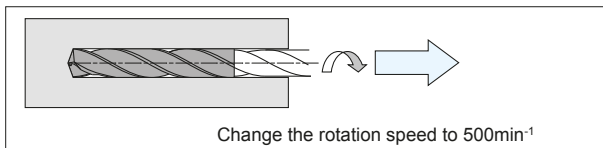
3. Increase rotation speed until the set cutting speed is reached, and start normal drilling operation



When using a NC machine, only begin drilling operation once full rotation speed is reached.

4. After drilling rotation speed is reduced and the drill is retracted from the work material

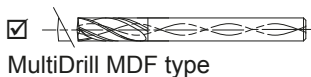
Rotation speed: 500min<sup>-1</sup>  
Feed rate: 1.000 to 2.000mm/min



Retracting a drill from the work material at a high rotation speed is dangerous as doing so may result in breakage due to run-out.

5. Other Notes

A flat base should be prepared when the surface for the pilot tool is slanted. Spot face using:



When the deep hole drill exits through an angle surface, decrease the feed rate to f=0,05mm/rev just before drilling through.

Coolant

1. Internal coolant supply

Use suitable coolant / emulsion

Pump pressure: Steel: 1,5 to 2,0MPa (cooling effect increases at higher pressure, affecting chips/wear)  
Cast iron & aluminium alloy: 4,0 to 6,0MPa (priority on cooling)

2. Internal MQL

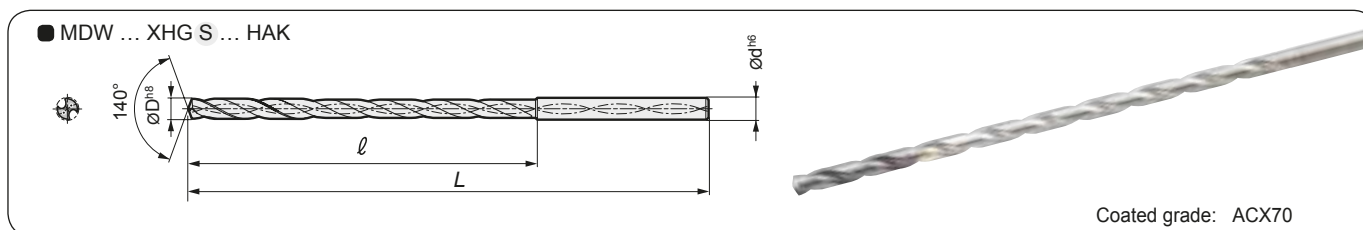
Airpressure: 0,5MPa or higher

Discharge volume: It is recommended to set the maximum discharge volume possible on the machine.

\*Consult the manufacturer before using with aluminium alloy.

# Extra Long SUPER MULTI-DRILLS MDW ... XHGS/PHT Type

## Solid Carbide Drills for Deep Hole Drilling



Coated grade: ACX70

### P ● MDW...XHGS Type for Deep Hole Drilling, Diameter ØD: 3,0 ~ 12,0mm

(mm)

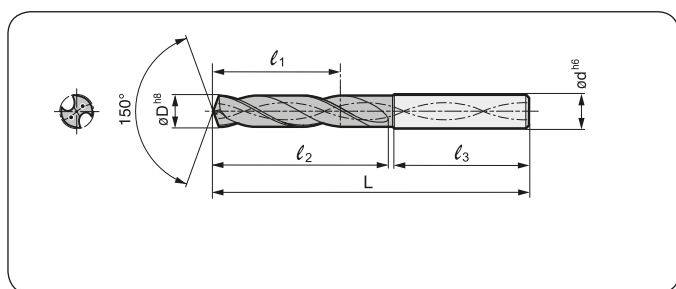
Dimensions		Cat. No. 12, 15, 20, 25, 30	For 12 x D		For 15 x D		For 20 x D		For 25 x D		For 30 x D						
ØD	Shank Ø		Stock	Dimensions		Stock	Dimensions		Stock	Dimensions		Stock	Dimensions				
				L	l		L	l		L	l		L	l	L	l	
3,0	4,0	MDW 0300XHGS □□ HAK	●	85	57	●	94	66	●	109	81	●	124	96	●	139	111
3,5		0350XHGS □□ HAK	●	89	61	●	100	72	●	117	89	●	135	107	●	152	124
4,0		0400XHGS □□ HAK	●	95	67	●	107	79	●	127	99	●	147	119	●	167	139
4,5	5,0	MDW 0450XHGS □□ HAK	●	104	76	●	118	90	●	140	112	●	163	135	●	184	156
5,0		0500XHGS □□ HAK <sup>5*</sup>	●	108	80	●	123	95	●	148	120	●	173	145	●	198	170
5,0	6,0	MDW 0500XHGS □□ HAK	●	116	80	●	131	95	●	156	120	●	181	145	●	206	170
5,5		0550XHGS □□ HAK	●	124	88	●	141	105	●	168	132	●	196	160	●	223	187
6,0		0600XHGS □□ HAK	●	130	94	●	148	112	●	178	142	●	208	172	●	238	202
6,5	8,0	MDW 0650XHGS □□ HAK	●	138	102	●	158	122	●	190	154	●	223	187	●	255	219
6,8		0680XHGS □□ HAK	●	144	108	●	164	128	●	198	162	●	236	200	●	266	230
7,0		0700XHGS □□ HAK	●	145	109	●	166	130	●	201	165	●	236	200	●	271	235
7,5		0750XHGS □□ HAK	●	151	115	●	174	138	●	211	175	●	249	213	●	286	250
8,0		0800XHGS □□ HAK	●	157	121	●	181	145	●	221	185	●	261	225	●	301	265
8,5		MDW 0850XHGS □□ HAK	●	171	131	●	197	157	●	239	199	●	282	242	●	324	284
9,0	10,0	0900XHGS □□ HAK	●	177	137	●	204	164	●	249	209	●	294	254	●	339	299
9,5		0950XHGS □□ HAK	●	183	143	●	212	172	●	259	219	●	305	265	●	352	312
10,0		1000XHGS □□ HAK	●	187	147	●	217	177	●	267	227	●	317	277	●	367	327
10,5		MDW 1050XHGS □□ HAK	●	202	157	●	234	189	●	286	241	●	339	294	-	-	-
11,0	12,0	1100XHGS □□ HAK	●	208	163	●	241	196	●	296	251	●	351	306	-	-	-
11,5		1150XHGS □□ HAK	●	213	168	●	248	203	●	305	260	●	363	318	-	-	-
12,0		1200XHGS □□ HAK	●	219	174	●	255	210	●	315	270	●	375	330	-	-	-

(\* ) Cat. No. description: Drill-Ø = 5mm, shank-Ø = 5mm (E.g. for 20xD: MDW050XHGS20HAK5)

Non-standard diameters and lengths on request (Ø2,5 ~ Ø16,0 possible)



### ● MDW...PHT Type for Pilot Hole



#### ■ How to Order

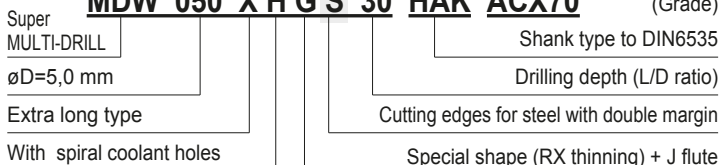
Non stock items – minimum order 6 pieces

Always specify the catalogue number and drill diameter as shown

- eg drill diameter 5,0mm = MDW 050

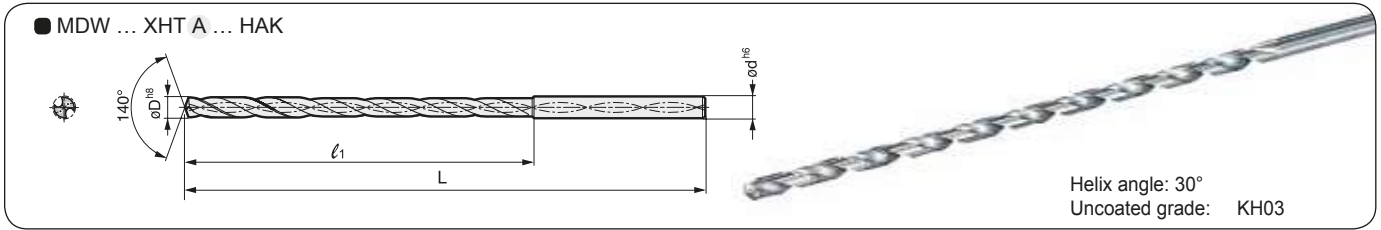
E.g.,

**MDW 050 X H G S 30 HAK ACX70** (Grade)



Dimensions		Cat. No.	Stock	For Pilot Hole			
ØD (mm)	ød (mm)			L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>
3,03	4,0	MDW 0303 PHT	●	52	9	22	28
3,53		0353 PHT	●	52	9	22	28
4,03	5,0	MDW 0403 PHT	●	59	12	29	28
4,53		0453 PHT	●	59	12	29	28
5,03	6,0	MDW 0503 PHT	●	71	15	33	36
5,53		0553 PHT	●	71	15	33	36
6,03	8,0	MDW 0603 PHT	●	76	18	38	36
6,53		0653 PHT	●	76	18	38	36
6,83		0683 PHT	●	76	18	38	36
7,03		0703 PHT	●	82	21	43	36
7,53		0753 PHT	●	82	21	43	36
8,03		10,0	MDW 0803 PHT	●	88	24	46
8,53	0853 PHT		●	88	24	46	40
9,03	0903 PHT		●	88	24	46	40
9,53	0953 PHT		●	88	24	46	40
10,03	12,0	MDW 1003 PHT	●	104	30	55	45
10,53		1053 PHT	●	104	30	55	45
11,03		1103 PHT	●	104	30	55	45
11,53		1153 PHT	●	104	30	55	45
12,03	14,0	MDW 1203 PHT	●	117	42	68	45

● = Euro stock



## N ● MDW...XHT A Type for Aluminium and Copper Alloys

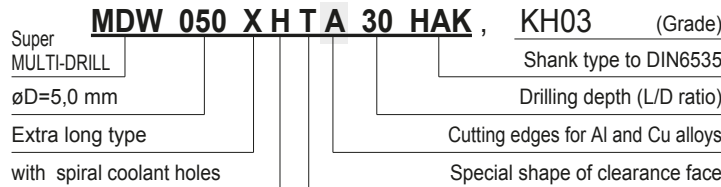
Dimensions		Cat. No. 20, 30	For 20 x D			For 30 x D		
$\varnothing D$ (mm)	$\varnothing d$ (mm)		Stock	Dimensions		Stock	Dimensions	
			20	L	$\ell_1$	30	L	$\ell_1$
4,0	4,0	MDW 040XHT A□□ HAK	●	127	97	●	167	137
5,0	6,0	MDW 050XHT A□□ HAK	●	156	118	●	206	168
6,0		060XHT A□□ HAK	●	178	138	●	238	198
7,0	8,0	MDW 070XHT A□□ HAK	●	201	162	●	271	232
8,0		080XHT A□□ HAK	●	221	182	●	301	262
9,0	10,0	MDW 090XHT A□□ HAK	●	249	205	●	339	295
10,5		100XHT A□□ HAK	●	267	225	●	367	325

⇒ All Long Drill series include an allowance to accommodate regrinding!  
⇒ Uncoated carbide grade: KH03

### How to Order

Non stock items – minimum order 6 pieces  
Always specify the catalogue number and drill diameter as shown  
- eg drill diameter 5,0mm = MDW 050

E.g.,



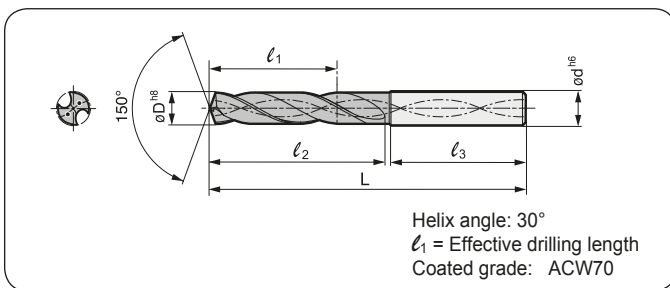
### Recommended Cutting Conditions

Vc: Cutting speed (m/min), f: Feed Rate (mm/rev)

Drill $\varnothing$ (mm)	Work material	
	Aluminium Alloy	
~ $\varnothing 5,0$	Vc	80 ~ 160
	f	0,08 ~ 0,30
~ $\varnothing 6,0$	Vc	80 ~ 160
	f	0,12 ~ 0,35
~ $\varnothing 8,0$	Vc	80 ~ 180
	f	0,15 ~ 0,40
~ $\varnothing 10,0$	Vc	80 ~ 180
	f	0,20 ~ 0,50
~ $\varnothing 12,0$	Vc	80 ~ 180
	f	0,20 ~ 0,45



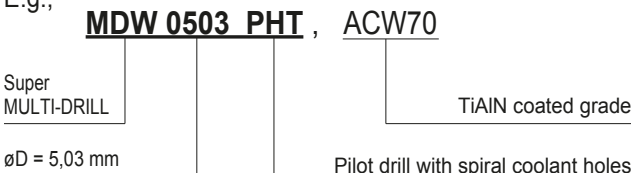
## ● MDW...PHT Type for Pilot Hole



### How to Order

Non stock items – minimum order 6 pieces  
Always specify the catalogue number and drill diameter as shown -  
eg. drill diameter 5,03mm = MDW 0503

E.g.,

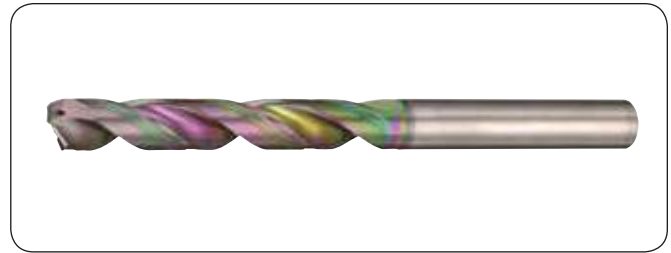


Dimensions		Cat. No.	Stock	For Pilot Hole			
$\varnothing D$ (mm)	$\varnothing d$ (mm)			Dimensions (mm)			
				L	$\ell_1$	$\ell_2$	$\ell_3$
3,03	4,0	MDW 0303 PHT	●	52	9	22	28
3,53		0353 PHT	●	52	9	22	28
4,03	5,0	MDW 0403 PHT	●	59	12	29	28
4,53		0453 PHT	●	59	12	29	28
5,03	6,0	MDW 0503 PHT	●	71	15	33	36
5,53		0553 PHT	●	71	15	33	36
6,03	8,0	MDW 0603 PHT	●	76	18	38	36
6,53		0653 PHT	●	76	18	38	36
6,83		0683 PHT	●	76	18	38	36
7,03		0703 PHT	●	82	21	43	36
7,53		0753 PHT	●	82	21	43	36
8,03		10,0	MDW 0803 PHT	●	88	24	46
8,53	0853 PHT		●	88	24	46	40
9,03	0903 PHT		●	88	24	46	40
9,53	0953 PHT		●	88	24	46	40
10,03	12,0		MDW 1003 PHT	●	104	30	55
10,53		1053 PHT	●	104	30	55	45
11,03		1103 PHT	●	104	30	55	45
11,53		1153 PHT	●	104	30	55	45
12,03		14,0	MDW 1203 PHT	●	117	42	68

# AURORA COAT SERIES MDW ... NHGS Type

DLC (Diamond Like Carbon) Coated Multi-Drills

With Coolant Holes (3D/5D/10D)



● Diameter  $\phi 3,0 \sim 8,0$ mm

(mm)

Dimensions $\phi D$	$\phi d$	Cat. No. 3, 5, 10	3D Type		5D Type		10D Type								
			Stock	Dimensions	Stock	Dimensions	Stock	Dimensions							
			3	L	$\ell$	5	L	$\ell$	10	L	$\ell$				
3,0	3,0	MDW 0300 NHGS	○	68,6	18,1	○	78,6	28,6	○	92,6	42,6				
3,1	4,0	MDW 0310 NHGS	○	72,8	○	86,8	○	106,8	○	106,8					
3,2		MDW 0320 NHGS	○												
3,3		MDW 0330 NHGS	○								20,7	○	32,7	○	49,7
3,4		MDW 0340 NHGS	○												
3,5		MDW 0350 NHGS	○												
3,6		MDW 0360 NHGS	○												
3,65		MDW 0365 NHGS	○												
3,66		MDW 0366 NHGS	○												
3,7		MDW 0370 NHGS	○								23,3	○	36,8	○	56,8
3,8		MDW 0380 NHGS	○												
3,9	MDW 0390 NHGS	○													
4,0	MDW 0400 NHGS	○													
4,1	5,0	MDW 0410 NHGS	○	81,0	○	99,0	○	125,0	○	125,0					
4,2		MDW 0420 NHGS	○												
4,3		MDW 0430 NHGS	○								25,9	○	40,9	○	63,9
4,4		MDW 0440 NHGS	○												
4,5		MDW 0450 NHGS	○												
4,6		MDW 0460 NHGS	○												
4,7		MDW 0470 NHGS	○												
4,8		MDW 0480 NHGS	○								28,5	○	45,0	○	71,0
4,9		MDW 0490 NHGS	○												
5,0		MDW 0500 NHGS	○												
5,1	6,0	MDW 0510 NHGS	○	83,2	○	101,2	○	137,2	○	137,2					
5,2		MDW 0520 NHGS	○												
5,3		MDW 0530 NHGS	○								28,6	○	45,1	○	88,1
5,4		MDW 0540 NHGS	○												
5,5		MDW 0550 NHGS	○												
5,6		MDW 0560 NHGS	○												
5,7		MDW 0570 NHGS	○												
5,8		MDW 0580 NHGS	○								31,2	○	49,2	○	85,2
5,9		MDW 0590 NHGS	○												
6,0		MDW 0600 NHGS	○												
6,1	7,0	MDW 0610 NHGS	○	89,5	○	110,5	○	152,5	○	152,5					
6,2		MDW 0620 NHGS	○												
6,3		MDW 0630 NHGS	○								33,8	○	53,3	○	92,3
6,4		MDW 0640 NHGS	○												
6,5		MDW 0650 NHGS	○												
6,6		MDW 0660 NHGS	○												
6,7		MDW 0670 NHGS	○												
6,8		MDW 0680 NHGS	○								36,5	○	57,5	○	99,5
6,9		MDW 0690 NHGS	○												
7,0		MDW 0700 NHGS	○												
7,1	8,0	MDW 0710 NHGS	○	95,7	○	119,7	○	167,7	○	167,7					
7,2		MDW 0720 NHGS	○												
7,3		MDW 0730 NHGS	○								39,1	○	61,6	○	116,6
7,35		MDW 0735 NHGS	○												
7,4		MDW 0740 NHGS	○												
7,5		MDW 0750 NHGS	○												
7,6		MDW 0760 NHGS	○												
7,7		MDW 0770 NHGS	○												
7,8		MDW 0780 NHGS	○								41,7	○	65,7	○	113,7
7,9		MDW 0790 NHGS	○												
8,0	MDW 0800 NHGS	○													

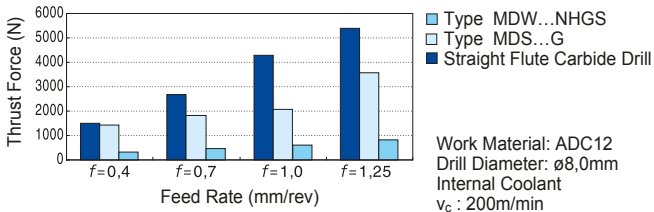
## ■ Characteristics

- High efficiency drilling  
AURORA COAT and strong helix design reduces cutting forces and improves edge sharpness.
- Precision drilling  
Special cutting edge design improves hole precision and quality.
- Longer tool life  
With AURORA COAT coupled with the cutting edge design, long and stable tool life can be achieved.
- Deep hole (L/D=20) drilling  
Drills for deep hole drilling can be custom-made.  
Production range:  $\phi 3,0 \sim \phi 16,0$ mm  
total length: 50 times drill diameter (max. 290mm)

## ■ Applicable Work Materials

- Aluminium Die Casting
- Aluminium Alloy
- Aluminium Alloy Casting
- Brass Casting
- Bronze Casting

## ■ Comparison of Cutting Force (Thrust Force)

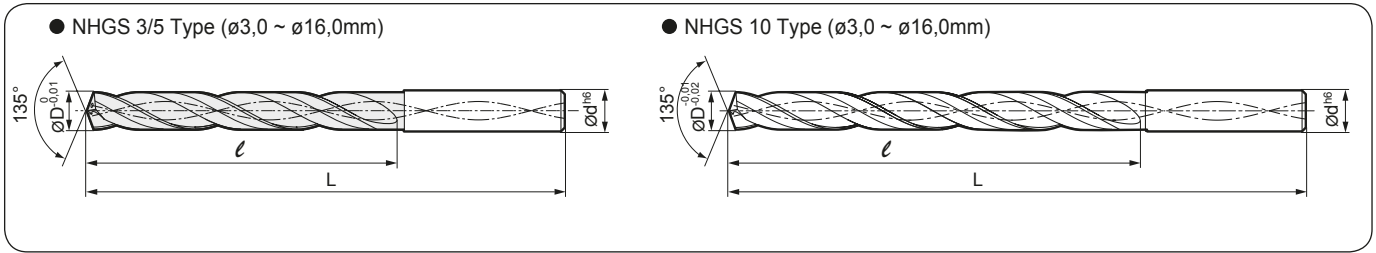


## ■ Recommended Cutting Conditions

$\phi D$ (mm)		Aluminium Alloy	Aluminium Die Casting	Copper Alloy
~ $\phi 5$	$v_c$	80 ~ 160	80 ~ 180	80 ~ 160
	f	0,08 ~ 0,3	0,1 ~ 0,3	0,08 ~ 0,15
~ $\phi 10$	$v_c$	80 ~ 180	80 ~ 200	60 ~ 180
	f	0,1 ~ 0,3	0,1 ~ 0,35	0,1 ~ 0,2
~ $\phi 16$	$v_c$	80 ~ 200	80 ~ 200	80 ~ 200
	f	0,15 ~ 0,4	0,1 ~ 0,4	0,1 ~ 0,25

( $v_c$ : Cutting Speed (m/min), f: Feed rate (mm/rev), Min ~ Max)

AURORA Coated NHGS Type, Grade: DL1300



● Diameter ø8,1~13,0mm (mm)

Dimensions		Cat. No.	3D Type		5D Type			10D Type		
øD	ød		Stock	Dimensions	Stock	Dimensions	Stock	Dimensions	Stock	Dimensions
		3, 5, 10	3	L	5	L	ℓ	10	L	ℓ
8,1	9,0	MDW 0810 NHGS□□			○					
8,2		MDW 0820 NHGS□□			○					
8,3		MDW 0830 NHGS□□		44,3	○		69,8			118,8
8,4		MDW 0840 NHGS□□			○					
8,5		MDW 0850 NHGS□□	○	101,9	○		128,9	○		182,9
8,6		MDW 0860 NHGS□□	○		○					
8,7		MDW 0870 NHGS□□			○					
8,8		MDW 0880 NHGS□□	○	46,9	○		73,9			127,9
8,9		MDW 0890 NHGS□□			○					
9,0		MDW 0900 NHGS□□	○		○			○		
9,1	10,0	MDW 0910 NHGS□□			○					
9,2		MDW 0920 NHGS□□			○					
9,21		MDW 0921 NHGS□□	○		○					
9,3		MDW 0930 NHGS□□		49,5	○		78,0			135,0
9,4		MDW 0940 NHGS□□	○		○					
9,5		MDW 0950 NHGS□□	○	108,0	○		138,0	○		198,0
9,6		MDW 0960 NHGS□□			○					
9,7		MDW 0970 NHGS□□			○					
9,8		MDW 0980 NHGS□□		52,0	○		82,0	○		142,0
9,9		MDW 0990 NHGS□□			○					
10,0	MDW 1000 NHGS□□	○		○			○			
10,1	11,0	MDW 1010 NHGS□□	○							
10,2		MDW 1020 NHGS□□								
10,3		MDW 1030 NHGS□□	○	54,7	○		86,2			149,2
10,4		MDW 1040 NHGS□□			○					
10,5		MDW 1050 NHGS□□	○	168,3	○		151,3	○		217,3
10,6		MDW 1060 NHGS□□	○		○					
10,7		MDW 1070 NHGS□□								
10,8		MDW 1080 NHGS□□		57,3			90,3			156,3
10,9		MDW 1090 NHGS□□								
11,0		MDW 1100 NHGS□□	○			○			○	
11,08	12,0	MDW 1108 NHGS□□	○			○				
11,1		MDW 1110 NHGS□□	○			○				
11,2		MDW 1120 NHGS□□	○			○				
11,3		MDW 1130 NHGS□□		59,9			94,4			163,4
11,4		MDW 1140 NHGS□□	○			○				
11,5		MDW 1150 NHGS□□	○	124,5			160,5	○		232,5
11,6		MDW 1160 NHGS□□								
11,7		MDW 1170 NHGS□□								
11,8		MDW 1180 NHGS□□		62,5			98,5			170,5
11,9		MDW 1190 NHGS□□								
12,0	MDW 1200 NHGS□□	○			○			○		
12,1	13,0	MDW 1210 NHGS□□	○			○				
12,2		MDW 1220 NHGS□□	○			○				
12,3		MDW 1230 NHGS□□	○	65,1	○		102,6			177,6
12,4		MDW 1240 NHGS□□								
12,5		MDW 1250 NHGS□□	○			○			○	
12,6		MDW 1260 NHGS□□		130,7			169,7			247,7
12,7		MDW 1270 NHGS□□								
12,8		MDW 1280 NHGS□□								
12,9		MDW 1290 NHGS□□		67,7			106,7			184,7
12,96		MDW 1296 NHGS□□	○			○				
13,0	MDW 1300 NHGS□□	○			○			○		

● Diameter ø13,1~16,0mm (mm)

Dimensions		Cat. No.	3D Type		5D Type			10D Type			
øD	ød		Stock	Dimensions	Stock	Dimensions	Stock	Dimensions	Stock	Dimensions	
		3, 5, 10	3	L	ℓ	5	L	ℓ	10	L	ℓ
13,1	14,0	MDW 1310 NHGS□□									
13,2		MDW 1320 NHGS□□									
13,3		MDW 1330 NHGS□□			70,8		110,8				191,8
13,4		MDW 1340 NHGS□□									
13,5		MDW 1350 NHGS□□	○		136,9	○	178,9				262,9
13,6		MDW 1360 NHGS□□									
13,7		MDW 1370 NHGS□□									
13,8		MDW 1380 NHGS□□		72,9			114,9				198,9
13,9		MDW 1390 NHGS□□									
14,0		MDW 1400 NHGS□□	○				○				
14,1	15,0	MDW 1410 NHGS□□	○			○					
14,2		MDW 1420 NHGS□□									
14,3		MDW 1430 NHGS□□		75,5			119,0				206
14,4		MDW 1440 NHGS□□									
14,5		MDW 1450 NHGS□□	○				○				
14,6		MDW 1460 NHGS□□		141,1			188,1				278,1
14,7		MDW 1470 NHGS□□									
14,8		MDW 1480 NHGS□□									
14,9		MDW 1490 NHGS□□	○	78,1			123,1				213,1
14,96		MDW 1496 NHGS□□	○				○				
15,0	MDW 1500 NHGS□□	○				○					
15,1	16,0	MDW 1510 NHGS□□									
15,2		MDW 1520 NHGS□□									
15,3		MDW 1530 NHGS□□		80,7			127,2				220,2
15,4		MDW 1540 NHGS□□									
15,5		MDW 1550 NHGS□□	○				○				293,3
15,6		MDW 1560 NHGS□□		149,3			197,3				
15,7		MDW 1570 NHGS□□									
15,8		MDW 1580 NHGS□□		83,3			131,3				227,3
15,9		MDW 1590 NHGS□□									
16,0		MDW 1600 NHGS□□	○				○				

AURORA Coated NHGS Type, Grade: DL1300

■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs.

Please specify the Cat. No.

For example, if the diameter of the drill is 10,3mm and the ratio to øD is 5, please indicate as follow.

E.g.,

**MDW 1030 NHGS 5, DL1300** (Grade)

Super MULTI-DRILL

øD=10,3 mm

Applicable work materials with spiral coolant holes

Drilling depth (The ratio to øD): ~3 / ~5 / ~10

NHGS type Multi-Drills

# Micro Long Drills

## MLDH ...L/P Type



### ■ General Features

Micro Long Drills are oil-hole drills for high efficiency drilling that were developed for drilling deep, small-diameter holes. These next-generation, small-diameter hole drills feature improved strength - often a problem area with small-diameter drills.

### ■ Characteristics and Applications

#### ● Deep-hole drilling

New groove shape ensures good drill rigidity and chip evacuation.  
High efficiency drilling to depths of over 20x drill diameter at over  $v_f = 500\text{mm/min}$  (drill diameter 1,3mm, X12CrS13 equivalent).  
Optimal thinning and edge balance for stable chip control.

#### ● Long tool life

Special coating provides long tool life with a wide variety of work materials.  
Improved chip evacuation makes it possible to reduce spindle load fluctuation, ensuring stable tool life.

### ■ Series

Application	Type	Diameter range (mm)	Hole depth (L/D)
Guide Hole Drilling	MLDH □□□□ P	ø 0,8 ~ 2,0	~ 2
Deep Hole Drilling	MLDH □□□□ L5	ø 0,8 ~ 2,0	~ 5
	MLDH □□□□ L12	ø 0,8 ~ 2,0	~ 12
	MLDH □□□□ L20	ø 0,8 ~ 2,0	~ 20
	MLDH □□□□ L30	ø 0,8 ~ 2,0	~ 30

### ■ Recommended Cutting Conditions

#### ● MLDH ... P / L5

(  $v_c$  : Cutting Speed (m/min),  $f$  : Feed rate (mm/rev), Min - **Optimum** - Max )

Drill-ø (mm)	Cutting Cond.	Soft Steel (~ HB200)	General Steel (HB200~250)	Alloy Steel (HB250~300)	Stainless Steel (~ HB200)	Cast Iron	Aluminium Alloy	Heat-Resistant Steels
~ 1,0	$v_c$	40 - <b>50</b> - 60	40 - <b>50</b> - 60	40 - <b>50</b> - 60	20 - <b>30</b> - 40	40 - <b>50</b> - 60	50 - <b>60</b> - 70	5 - <b>10</b> - 15
	$f$	0,01 - <b>0,02</b> - 0,03	0,01 - <b>0,02</b> - 0,03	0,01 - <b>0,02</b> - 0,03	0,01 - <b>0,02</b> - 0,03	0,02 - <b>0,03</b> - 0,04	0,03 - <b>0,04</b> - 0,06	0,005 - <b>0,01</b> - 0,02
~ 1,5	$v_c$	40 - <b>50</b> - 60	40 - <b>50</b> - 60	40 - <b>50</b> - 60	20 - <b>30</b> - 40	40 - <b>50</b> - 60	50 - <b>60</b> - 70	5 - <b>10</b> - 15
	$f$	0,04 - <b>0,08</b> - 0,12	0,04 - <b>0,08</b> - 0,12	0,04 - <b>0,08</b> - 0,12	0,02 - <b>0,05</b> - 0,10	0,04 - <b>0,08</b> - 0,12	0,05 - <b>0,10</b> - 0,15	0,01 - <b>0,03</b> - 0,05
~ 2,0	$v_c$	40 - <b>50</b> - 60	40 - <b>50</b> - 60	40 - <b>50</b> - 60	20 - <b>30</b> - 40	40 - <b>50</b> - 60	50 - <b>60</b> - 70	5 - <b>10</b> - 15
	$f$	0,06 - <b>0,08</b> - 0,12	0,06 - <b>0,08</b> - 0,12	0,06 - <b>0,08</b> - 0,12	0,04 - <b>0,06</b> - 0,10	0,06 - <b>0,08</b> - 0,12	0,08 - <b>0,12</b> - 0,15	0,01 - <b>0,03</b> - 0,05

#### ● MLDH ... L12 / L20 / L30

(  $v_c$  : Cutting Speed (m/min),  $f$  : Feed rate (mm/rev), Min - **Optimum** - Max )

Drill-ø (mm)	Cutting Cond.	Soft Steel (~ HB200)	General Steel (HB200~250)	Alloy Steel (HB250~300)	Stainless Steel (~ HB200)	Cast Iron	Aluminium Alloy	Heat-Resistant Steels
~ 1,0	$v_c$	40 - <b>50</b> - 60	40 - <b>50</b> - 60	40 - <b>50</b> - 60	20 - <b>30</b> - 40	40 - <b>50</b> - 60	50 - <b>60</b> - 70	5 - <b>10</b> - 15
	$f$	0,01 - <b>0,02</b> - 0,03	0,01 - <b>0,02</b> - 0,03	0,01 - <b>0,02</b> - 0,03	0,01 - <b>0,02</b> - 0,03	0,02 - <b>0,03</b> - 0,04	0,03 - <b>0,04</b> - 0,06	0,005 - <b>0,01</b> - 0,02
~ 1,5	$v_c$	40 - <b>50</b> - 60	40 - <b>50</b> - 60	40 - <b>50</b> - 60	20 - <b>30</b> - 40	40 - <b>50</b> - 60	50 - <b>60</b> - 70	5 - <b>10</b> - 15
	$f$	0,03 - <b>0,05</b> - 0,07	0,03 - <b>0,05</b> - 0,07	0,03 - <b>0,05</b> - 0,07	0,02 - <b>0,04</b> - 0,07	0,04 - <b>0,07</b> - 0,10	0,05 - <b>0,08</b> - 0,12	0,01 - <b>0,02</b> - 0,03
~ 2,0	$v_c$	40 - <b>50</b> - 60	40 - <b>50</b> - 60	40 - <b>50</b> - 60	20 - <b>30</b> - 40	40 - <b>50</b> - 60	50 - <b>60</b> - 70	5 - <b>10</b> - 15
	$f$	0,04 - <b>0,06</b> - 0,08	0,04 - <b>0,06</b> - 0,08	0,04 - <b>0,06</b> - 0,08	0,04 - <b>0,06</b> - 0,08	0,04 - <b>0,07</b> - 0,10	0,05 - <b>0,08</b> - 0,12	0,01 - <b>0,02</b> - 0,03

○ = Japan stock

MLDH-P



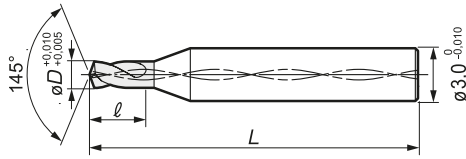
MLDH-L



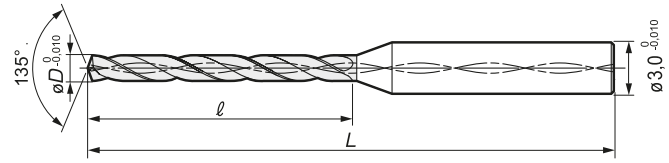
# Micro Long Drills MLDH ....L/P Type

## Internal Coolant Supply

● MLDH-P For Pilot Hole Drilling



● MLDH-L For Deep Hole Drilling



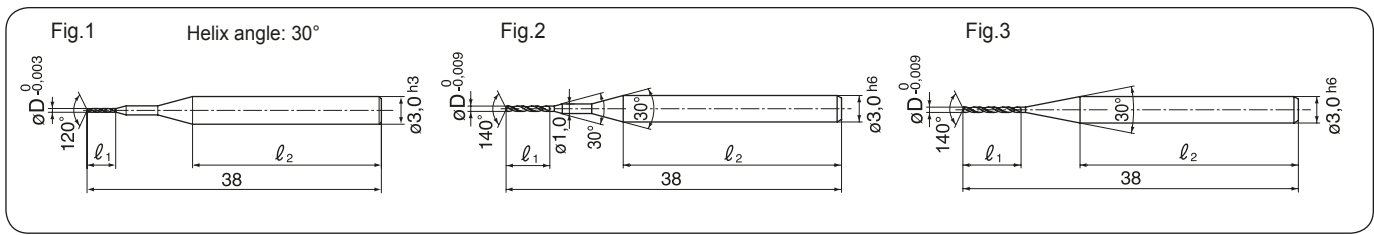
## Stock

(mm)

$\varnothing D$ (mm)	P Type for Pilot Hole Drilling			L Type for Deep Hole Drilling											
	Cat. No.	Stock	Dimensions		Cat. No. 5, 12, 20, 30 ↓	5x D		12x D		20x D		30x D			
			L	$\ell$		Stock [5]	Dimensions L $\ell$	Stock [1][2]	Dimensions L $\ell$	Stock [2][0]	Dimensions L $\ell$	Stock [3][0]	Dimensions L $\ell$		
0,80	MLDH 0800P	○	45	3,2	MLDH 0800L□□	○	8	○	○	○	19	○	28		
0,81	0810P	○			MLDH 0810L□□	○								○	○
0,82	MLDH 0820P	○	3,3	MLDH 0820L□□	○	9	○	14	○	60	20	○	29		
0,83	0830P	○		MLDH 0830L□□	○									○	○
0,84	MLDH 0840P	○	3,4	MLDH 0840L□□	○	55	○	○	○	○	○	○	30		
0,85	0850P	○		MLDH 0850L□□	○									○	○
0,86	0860P	○	3,5	MLDH 0860L□□	○	10	○	15	○	65	21	○	31		
0,87	MLDH 0870P	○		MLDH 0870L□□	○									○	○
0,88	0880P	○	3,6	MLDH 0880L□□	○	50	○	○	○	○	○	○	32		
0,89	MLDH 0890P	○		MLDH 0890L□□	○									○	○
0,90	0900P	○	3,7	MLDH 0900L□□	○	10	○	16	○	70	22	○	33		
0,91	0910P	○		MLDH 0910L□□	○									○	○
0,92	MLDH 0920P	○	3,8	MLDH 0920L□□	○	55	○	20	○	75	23	○	34		
0,93	0930P	○		MLDH 0930L□□	○									○	○
0,94	MLDH 0940P	○	3,9	MLDH 0940L□□	○	12	○	21	○	80	24	○	36		
0,95	0950P	○		MLDH 0950L□□	○									○	○
0,96	0960P	○	4,0	MLDH 0960L□□	○	14	○	22	○	85	25	○	37		
0,97	MLDH 0970P	○		MLDH 0970L□□	○									○	○
0,98	0980P	○	4,2	MLDH 0980L□□	○	55	○	23	○	90	26	○	38		
0,99	MLDH 0990P	○		MLDH 0990L□□	○									○	○
1,00	1000P	○	4,4	MLDH 1000L□□	○	16	○	24	○	95	27	○	39		
1,05	MLDH 1050P	○		MLDH 1050L□□	○									○	○
1,10	MLDH 1100P	○	4,6	MLDH 1100L□□	○	18	○	25	○	100	28	○	40		
1,15	MLDH 1150P	○		MLDH 1150L□□	○									○	○
1,20	MLDH 1200P	○	4,8	MLDH 1200L□□	○	60	○	26	○	103	29	○	41		
1,25	MLDH 1250P	○		MLDH 1250L□□	○									○	○
1,30	MLDH 1300P	○	5,0	MLDH 1300L□□	○	20	○	27	○	105	30	○	42		
1,35	MLDH 1350P	○		MLDH 1350L□□	○									○	○
1,40	MLDH 1400P	○	5,2	MLDH 1400L□□	○	14	○	28	○	110	31	○	43		
1,45	MLDH 1450P	○		MLDH 1450L□□	○									○	○
1,50	MLDH 1500P	○	5,4	MLDH 1500L□□	○	16	○	29	○	115	32	○	44		
1,55	MLDH 1550P	○		MLDH 1550L□□	○									○	○
1,60	MLDH 1600P	○	5,6	MLDH 1600L□□	○	18	○	30	○	120	33	○	45		
1,65	MLDH 1650P	○		MLDH 1650L□□	○									○	○
1,70	MLDH 1700P	○	5,8	MLDH 1700L□□	○	20	○	31	○	125	34	○	46		
1,75	MLDH 1750P	○		MLDH 1750L□□	○									○	○
1,80	MLDH 1800P	○	6,0	MLDH 1800L□□	○	60	○	32	○	130	35	○	47		
1,85	MLDH 1850P	○		MLDH 1850L□□	○									○	○
1,90	MLDH 1900P	○	6,2	MLDH 1900L□□	○	18	○	33	○	135	36	○	48		
1,95	MLDH 1950P	○		MLDH 1950L□□	○									○	○
2,00	MLDH 2000P	○	6,4	MLDH 2000L□□	○	20	○	34	○	140	37	○	49		
				MLDH 2000L□□	○									○	○

PVD Coated Grade: ACV70

# Solid Carbide Micro / MINI-DRILLS MDUS / MDSS Type



## ● Diameter $\varnothing 0,03\sim 0,19\text{mm}$

$\varnothing D$ (mm)	Cat. No.	Stock	Dimensions		Fig.	Pcs./ Pack- ing
			$l_1$	$l_2$		
0,030	MDUS 0030-30C	○	0,3		28	1
0,035	MDUS 0035-30C	○	0,4			
0,040	MDUS 0040-30C	○	0,5			
0,045	MDUS 0045-30C	○	0,6			
0,050	MDUS 0050-30C	○	0,7			
0,055	MDUS 0055-30C	○	0,8			
0,060	MDUS 0060-30C	○	0,9			
0,065	MDUS 0065-30C	○	1,0			
0,070	MDUS 0070-30C	○	1,1			
0,075	MDUS 0075-30C	○	1,2			
0,080	MDUS 0080-30C	○	1,3			
0,085	MDUS 0085-30C	○	1,4			
0,090	MDUS 0090-30C	○	1,5			
0,095	MDUS 0095-30C	○	1,6			
0,100	MDUS 0100-30C	○	1,7			
0,110	MDUS 0110-30C	○	1,8			
0,120	MDUS 0120-30C	○	1,9			
0,130	MDUS 0130-30C	○				
0,140	MDUS 0140-30C	○				
0,150	MDUS 0150-30C	○				
0,160	MDUS 0160-30C	○				
0,170	MDUS 0170-30C	○				
0,180	MDUS 0180-30C	○				
0,190	MDUS 0190-30C	○				

## ● Diameter $\varnothing 0,20\sim 0,59\text{mm}$

$\varnothing D$ (mm)	Cat. No.	Stock	Dimensions		Fig.	Pcs./ Pack- ing
			$l_1$	$l_2$		
0,20	MDSS 0020	○			2	1
0,21	MDSS 0021	○				
0,22	MDSS 0022	○				
0,23	MDSS 0023	○				
0,24	MDSS 0024	○				
0,25	MDSS 0025	○				
0,26	MDSS 0026	○				
0,27	MDSS 0027	○				
0,28	MDSS 0028	○				
0,29	MDSS 0029	○				
0,30	MDSS 0030	○			3	1
0,31	MDSS 0031	○				
0,32	MDSS 0032	○				
0,33	MDSS 0033	○				
0,34	MDSS 0034	○				
0,35	MDSS 0035	○				
0,36	MDSS 0036	○				
0,37	MDSS 0037	○				
0,38	MDSS 0038	○				
0,39	MDSS 0039	○				
0,40	MDSS 0040	○			6	27
0,41	MDSS 0041	○				
0,42	MDSS 0042	○				
0,43	MDSS 0043	○				
0,44	MDSS 0044	○				
0,45	MDSS 0045	○				
0,46	MDSS 0046	○				
0,47	MDSS 0047	○				
0,48	MDSS 0048	○				
0,49	MDSS 0049	○				
0,50	MDSS 0050	○			11	22
0,51	MDSS 0051	○				
0,52	MDSS 0052	○				
0,53	MDSS 0053	○				
0,54	MDSS 0054	○				
0,55	MDSS 0055	○				
0,56	MDSS 0056	○				
0,57	MDSS 0057	○				
0,58	MDSS 0058	○				
0,59	MDSS 0059	○				

## ● Diameter $\varnothing 0,60\sim 1,00\text{mm}$

$\varnothing D$ (mm)	Cat. No.	Stock	Dimensions		Fig.	Pcs./ Pack- ing
			$l_1$	$l_2$		
0,60	MDSS 0060	○			7	26
0,61	MDSS 0061	○				
0,62	MDSS 0062	○				
0,63	MDSS 0063	○				
0,64	MDSS 0064	○				
0,65	MDSS 0065	○				
0,66	MDSS 0066	○				
0,67	MDSS 0067	○				
0,68	MDSS 0068	○				
0,69	MDSS 0069	○				
0,70	MDSS 0070	○			9	24
0,71	MDSS 0071	○				
0,72	MDSS 0072	○				
0,73	MDSS 0073	○				
0,74	MDSS 0074	○				
0,75	MDSS 0075	○				
0,76	MDSS 0076	○				
0,77	MDSS 0077	○				
0,78	MDSS 0078	○				
0,79	MDSS 0079	○				
0,80	MDSS 0080	○			10	23
0,81	MDSS 0081	○				
0,82	MDSS 0082	○				
0,83	MDSS 0083	○				
0,84	MDSS 0084	○				
0,85	MDSS 0085	○				
0,86	MDSS 0086	○				
0,87	MDSS 0087	○				
0,88	MDSS 0088	○				
0,89	MDSS 0089	○				
0,90	MDSS 0090	○			12	21
0,91	MDSS 0091	○				
0,92	MDSS 0092	○				
0,93	MDSS 0093	○				
0,94	MDSS 0094	○				
0,95	MDSS 0095	○				
0,96	MDSS 0096	○				
0,97	MDSS 0097	○				
0,98	MDSS 0098	○				
0,99	MDSS 0099	○				
1,00	MDSS 0100	○				



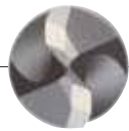
## ■ MDSS Recommended Cutting Conditions (Wet)

Work Cond.	Alloy Steel, Pre-hardened Steel			Die Steel, Tempered Steel (HRC30~40)			Stainless Steel		
	Drill- $\varnothing$ (mm)	Spindle (rpm)	Feed rate (mm/min)	Spindle (rpm)	Feed rate (mm/min)	Step-feed (mm)	Spindle (rpm)	Feed rate (mm/min)	Step-feed (mm)
0,2	26500	50	0,1D	21200	40	0,1D	10600	20	0,1D
0,3	26500	80		21200	60		10600	30	
0,4	25900	100		19900	80		9500	40	
0,5	25500	150		19100	110		9500	50	
1,0	15900	240		12700	190		5600	80	

- The above conditions are recommended under wet conditions, using water-soluble coolant.
- If machine noises and vibrations are present, please adjust the cutting conditions accordingly.
- If the machine cannot achieve the recommended spindle speed, please use the max. spindle speed available.

※ Step feed is recommended for drilling of holes deeper than 3xD.





# SUMIDIA Coated Drills SDC Type

MDS...SDC



## General Features

SUMIDIA Coated SDC type drills for Carbon Fibre Reinforced Plastic (CFRP) employ Sumitomo Electric Hardmetal's proprietary multi-step point angle.

Combined with a diamond coating, this technology improves the quality of machined surfaces and extends tool life.

## Characteristics and Applications

- Excellent drilled-hole quality
  - Sharp cutting edge shape reduces delamination of fibre layers and burrs.
  - Continuously changing point angle disperses load placed on cutting edge and prevents breakage.
- Long tool life
  - Use of high-strength diamond coating with excellent adhesion delivers high quality and long tool life.

## Performance

**Comparison of Machined Surface Finish**

Excellent Machined Face Quality (Prevents Delamination And Burrs)

	SDC	Concurrent A	Concurrent B	Concurrent C
Hole Entrance				
Hole Exit				

Tool: SUMIDIA coated drill SDC type,  $\phi D=6,375$   
 Competitor A B C's drill  $\phi D=6,35$  &  $\phi D=6,5$   
 Work Material: CFRP  
 Cutting Conditions:  $n = 6.000\text{rpm}$ ,  $f=0,1\text{mm/rev}$ ,  $d_{oc}=28\text{mm}$  (Through)  
 Dry

**Tool Life Comparison**

Effects of Diamond Coating

SDC type (After drilling 600 holes)	Competitor's product (After drilling 50 holes)
No delamination Low flank wear	More delamination from cutting edge to flank

Stable diamond layer adhesion prevents delamination.  
 Excellent wear resistance enables high-quality drilling with long tool life.

**SDC**

Tool	Hole
SDC	0 - 600
Competitor A's Diamond Coated Drill	0 - 100
Carbide Drill	0 - 100

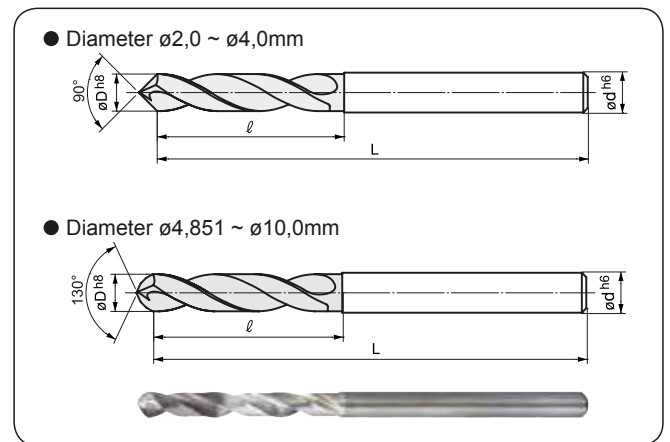
Tool: SUMIDIA coated drill SDC type,  $\phi D=6,375$   
 Competitor A B C's drill  $\phi D=6,35$  &  $\phi D=6,5$   
 Work Material: CFRP  
 Cutting Conditions:  $n = 6.000\text{rpm}$ ,  $f=0,1\text{mm/rev}$ ,  $d_{oc}=28\text{mm}$  (Through)  
 Dry

## Series

Type	Diameter Range (mm)	Point angle	Hole Depth ( $l/d$ )
MDS□□□□□SDC 3	$\phi 2,0 \sim \phi 4,0$	90°	~ 3
	$\phi 4,851 \sim \phi 10,0$	130°	

DCX20	SUMI-DIA	Structural Steel	Carbon Steel	Alloy Steel	Prefinished Steel	Tempered Die Steel	Hardened Steel	Stainless Steel	Ti Alloy / Heat Resistant Alloy	Cast Iron	Al Alloy	Cu Alloy	CFRP *
Grade	Coating						45-55 HRC	55-60 HRC	60-65 HRC				○

\* CFRP (Carbon Fibre Reinforced Plastic)



## Diameter $\phi 2,0 \sim 10,0\text{mm}$

Dimensions		Cat. No.	3D Type		
$\phi D$ (mm)	$\phi d$ (mm)		Stock	Dimensions	
				L	$l$
2,0	3,0	MDS 02000SDC3	○	49	12,5
2,489		02489SDC3	○		15,0
3,0		03000SDC3	○		17,5
3,3	4,0	MDS 03300SDC3	○	60	20,0
4,0		04000SDC3	○		22,5
4,851	4,851	MDS 04851SDC3	○	76	27,5
5,0		05000SDC3	○		
5,6	5,6	MDS 05600SDC3	○	81	30,0
6,0		06000SDC3	○		
6,375	6,375	MDS 06375SDC3	○	83	32,5
7,0		07000SDC3	○		35,0
7,938	7,938	MDS 07938SDC3	○	90	40,0
8,0		08000SDC3	○		
9,0	9,0	MDS 09000SDC3	○	98	45,0
9,550		MDS 09550SDC3	○		
10,0	10,0	10000SDC3	○	105	50,0

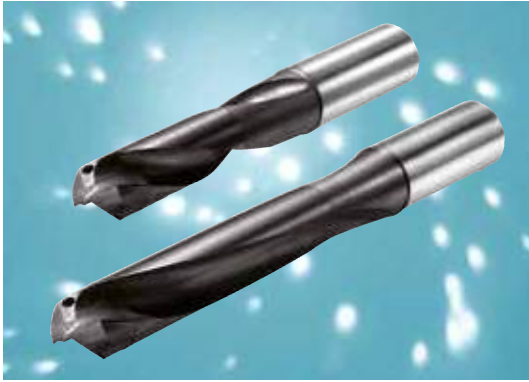
## Recommended Cutting Conditions

$\phi D$	Work Cond.	CFRP Only (Dry Machining)		Stacked Plates of CFRP, Aluminium Alloys (Dry Machining)	
		$v_c$	f	$v_c$	f
~ $\phi 6,0$	$v_c$	80 - 120	0,05 - 0,10	40 - 60	0,05 - 0,10
	f	80 - 120	0,05 - 0,10	40 - 60	0,05 - 0,10
~ $\phi 10,0$	$v_c$	80 - 100	0,05 - 0,10	40 - 60	0,05 - 0,10
	f	80 - 100	0,05 - 0,10	40 - 60	0,05 - 0,10

( $v_c$ : Cutting Speed (m/min), f: Feed rate (mm/rev), Min - Optimum - Max )



# Brazed Carbide MULTI-DRILLS KDS Type



## ■ Description

The new AK type drill features an extra long carbide drill head, new cutting geometry, coolant holes and ultra hard TiAlN coating for reliable high productivity drilling.

- ## ■ Advantages
- General purpose drill for steels, stainless steels, cast irons
  - High productivity drilling even on deep holes up to 7 x D
  - Twice the tool life of conventionally coated drills
  - Self centering
  - Surface finish and tolerances comparable to solid carbide
  - Regrindable extra long carbide head halves drill replacement costs

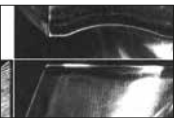
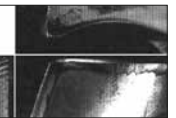


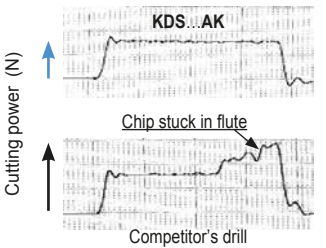
## ■ Series

Type	Diameter range (mm)	Hole depth (L/D)	Remark
Short type (MAK Type)	ø9,5~ø40,5	~ 3	First choice general purpose drill
Long type (LAK Type)	ø9,5~ø40,5	~ 5	
Extra long type (DAK Type)	ø9,5~ø40,5	~ 7	Helix angle: 25° ---> 0°

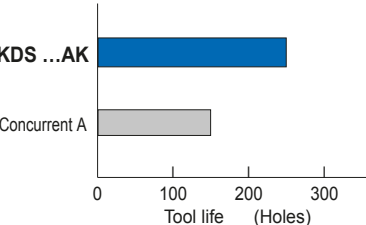
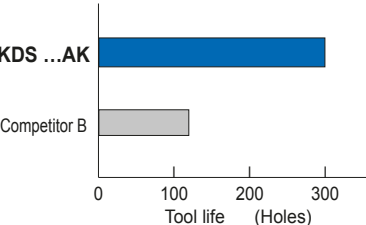


## Series

## ■ Performance

● High efficiency drilling Comparison of coating damage when high speed drilling	● Optimized drill geometry Comparison of damage to drill margin After 40 min. cut length	● Comparison of cutting power (chip removal capability)
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>TiAlN coated <b>KDS...AK</b></p>  <p><math>v_c = 120</math> m/min After 30 m cut length (600 holes)</p> </div> <div style="text-align: center;"> <p>TiN coated type</p>  <p><math>v_c = 60</math> m/min After 30 m cut length (600 holes)</p> </div> </div> <p>Drill dia.: 18,0 mm Work material: C50 (HB230) <math>f = 0,3</math> mm/rev <math>d_{oc} = 50</math> mm</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>KDS...AK</b></p>  </div> <div style="text-align: center;"> <p>Competitor's drill</p>  </div> </div> <p>Drill dia.: 18,0 mm Work material: C50 (HB230) <math>v_c = 50</math> m/min <math>f = 0,25</math> mm/rev <math>d_{oc} = 38</math> mm</p>	 <p>Drill dia.: 18,0 mm Work material: C50 (HB230) <math>v_c = 50</math> m/min <math>f = 0,3</math> mm/rev <math>d_{oc} = 90</math> mm (L/D=5)</p>

## ■ Application examples

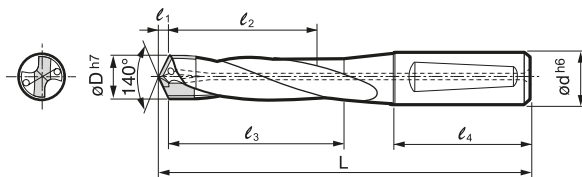
● Workpiece material	● Automotive parts Work material: C50 (HB250)	● Automotive parts Work material: 42CrMo4 (HB250)
<ul style="list-style-type: none"> <li>- General steel and alloy steel</li> <li>- Low carbon steel</li> <li>- Die steel</li> <li>- Stainless steel</li> <li>- Ductile cast iron</li> <li>- Grey cast iron</li> </ul>	 <p>Drill: KDS 180 LAK (ø18,0mm) Conditions: <math>v_c = 55</math> m/min, <math>f = 0,25</math> mm/rev <math>d_{oc} = 70</math> mm</p>	 <p>Drill: KDS 250 MAK (ø25,0mm) Conditions: <math>v_c = 60</math> m/min, <math>f = 0,25</math> mm/rev <math>d_{oc} = 65</math> mm</p>

# Brazed Carbide MULTI-DRILLS

## KDS ... MAK Type

Short Type ( 3 x D )

Brazed Carbide Drills with Coolant Holes



Helix angle: 20°  
l<sub>2</sub> = Effective drilling length

### ● Diameter ø9,5~15,5mm

Dimensions (mm)			Cat. No.	Short Series (3D)				
øD (mm)	Shank			Drill Head	Dimensions (mm)			
	ød	l <sub>4</sub>			l <sub>1</sub>	Stock	L	l <sub>2</sub>
9,5~10,0	16	48	1,8	KDS 095 MAK	96,8	32	37	
~10,5				KDS 100 MAK				
10,6~11,0				KDS 105 MAK				
~11,5	16	48	2	KDS 106 MAK	102,0	35	40	
11,1				KDS 110 MAK				
11,2				KDS 115 MAK				
11,6	16	48	2,2	KDS 116 MAK	107,2	38	44	
11,7				KDS 117 MAK				
11,8				KDS 118 MAK				
11,9				KDS 119 MAK				
12,0				KDS 120 MAK				
12,1				KDS 121 MAK				
12,2				KDS 122 MAK				
12,3				KDS 123 MAK				
12,4				KDS 124 MAK				
12,5				KDS 125 MAK				
12,6	16	48	2,4	KDS 126 MAK	112,4	41	47	
12,7				KDS 127 MAK				
12,8				KDS 128 MAK				
12,9				KDS 129 MAK				
13,0				KDS 130 MAK				
13,1				KDS 131 MAK				
13,2				KDS 132 MAK				
13,3				KDS 133 MAK				
13,4				KDS 134 MAK				
13,5				KDS 135 MAK				
13,6	16	48	2,5	KDS 136 MAK	117,5	44	51	
13,7				KDS 137 MAK				
13,8				KDS 138 MAK				
13,9				KDS 139 MAK				
14,0				KDS 140 MAK				
14,1				KDS 141 MAK				
14,2				KDS 142 MAK				
14,3				KDS 143 MAK				
14,4				KDS 144 MAK				
14,5				KDS 145 MAK				
14,6	20	50	2,7	KDS 146 MAK	127,7	47	54	
14,7				KDS 147 MAK				
14,8				KDS 148 MAK				
14,9				KDS 149 MAK				
15,0				KDS 150 MAK				
15,1				KDS 151 MAK				
15,2				KDS 152 MAK				
15,3				KDS 153 MAK				
15,4				KDS 154 MAK				
15,5				KDS 155 MAK				

### ● Diameter ø15,6~20,0mm

Dimensions (mm)			Cat. No.	Short Series (3D)				
øD (mm)	Shank			Drill Head	Dimensions (mm)			
	ød	l <sub>4</sub>			l <sub>1</sub>	Stock	L	l <sub>2</sub>
15,6	20	50	2,9	KDS 156 MAK	132,9	50	58	
15,7				KDS 157 MAK				
15,8				KDS 158 MAK				
15,9				KDS 159 MAK				
16,0				KDS 160 MAK				
16,1				KDS 161 MAK				
16,2				KDS 162 MAK				
16,3				KDS 163 MAK				
16,4				KDS 164 MAK				
16,5				KDS 165 MAK				
16,6	20	50	3,1	KDS 166 MAK	138,1	53	61	
16,7				KDS 167 MAK				
16,8				KDS 168 MAK				
16,9				KDS 169 MAK				
17,0				KDS 170 MAK				
17,1				KDS 171 MAK				
17,2				KDS 172 MAK				
17,3				KDS 173 MAK				
17,4				KDS 174 MAK				
17,5				KDS 175 MAK				
17,6	20	50	3,3	KDS 176 MAK	143,3	56	65	
17,7				KDS 177 MAK				
17,8				KDS 178 MAK				
17,9				KDS 179 MAK				
18,0				KDS 180 MAK				
18,1				KDS 181 MAK				
18,2				KDS 182 MAK				
18,3				KDS 183 MAK				
18,4				KDS 184 MAK				
18,5				KDS 185 MAK				
18,6	25	56	3,5	KDS 186 MAK	158,5	59	68	
18,7				KDS 187 MAK				
18,8				KDS 188 MAK				
18,9				KDS 189 MAK				
19,0				KDS 190 MAK				
19,1				KDS 191 MAK				
19,2				KDS 192 MAK				
19,3				KDS 193 MAK				
19,4				KDS 194 MAK				
19,5				KDS 195 MAK				
19,6	25	56	3,6	KDS 196 MAK	158,6	62	72	
19,7				KDS 197 MAK				
19,8				KDS 198 MAK				
19,9				KDS 199 MAK				
20,0				KDS 200 MAK				

### ■ Recommended Cutting Conditions

( v<sub>c</sub> : Cutting Speed (m/min), f : Feed rate (mm/rev) ) (Min - Standard - Max)

Diameter (mm)		Steels (under HB250)	Steels (HB250~320)	Hardened Steels (HRC45)	Stainless Steels (< HB200)	Ductile Cast Irons	Cast Irons	Aluminium Alloys	Titanium Alloys (Ti-6Al-4V)	Inconel (Inconel 718)
~ ø15	v <sub>c</sub>	50 - 65 - 75	50 - 60 - 70	30 - 35 - 45	35 - 45 - 50	55 - 65 - 75	60 - 80 - 100	70 - 85 - 100	20 - 25 - 35	10 - 20 - 30
	f	0,15 - 0,3	0,15 - 0,3	0,1 - 0,2	0,1 - 0,2	0,15 - 0,3	0,2 - 0,3	0,25 - 0,35	0,1 - 0,15	0,08 - 0,1
~ ø20	v <sub>c</sub>	50 - 65 - 75	50 - 60 - 70	35 - 40 - 50	35 - 45 - 50	60 - 70 - 80	60 - 80 - 100	70 - 90 - 110	20 - 30 - 40	10 - 20 - 30
	f	0,15 - 0,35	0,15 - 0,35	0,15 - 0,25	0,15 - 0,25	0,15 - 0,35	0,2 - 0,35	0,25 - 0,4	0,1 - 0,15	0,08 - 0,1
~ ø30,5	v <sub>c</sub>	55 - 70 - 90	55 - 65 - 90	35 - 40 - 50	35 - 45 - 50	60 - 70 - 90	60 - 90 - 110	75 - 100 - 120	25 - 35 - 40	15 - 25 - 35
	f	0,2 - 0,4	0,2 - 0,4	0,15 - 0,25	0,15 - 0,25	0,2 - 0,4	0,25 - 0,4	0,3 - 0,4	0,1 - 0,2	0,08 - 0,12

If the drilling operation is completely satisfactory with the above condition and the rigidity of the machine is sufficient, the cutting data can be raised. For more guidance, please contact our technical representative.

● = Euro stock

# Brazed Carbide MULTI-DRILLS KDS ... MAK Type

TiAlN Coated Brazed Carbide Multi-Drills for General Steels, Cast Iron & Ductile Cast Iron



Specification:

- Brazed carbide drill TiAlN coated (Grade: ACW30) with coolant holes
- Shank with whistle notch

## ● Diameter $\varnothing 20,1 \sim 24,5 \text{ mm}$

Dimensions (mm)				Cat. No.	Short Series (3D)			
$\varnothing D$ (mm)	Shank		Drill Head $\ell_1$		Stock MAK	Dimensions (mm)		
	$\varnothing d$	$\ell_4$				L	$\ell_2$	$\ell_3$
20,1	25	56	3,6	KDS 201 MAK	158,6	62	72	
20,2				KDS 202 MAK				
20,3				KDS 203 MAK				
20,4				KDS 204 MAK				
20,5				KDS 205 MAK				
20,6	25	56	3,8	KDS 206 MAK	158,8	65	75	
20,7				KDS 207 MAK				
20,8				KDS 208 MAK				
20,9				KDS 209 MAK				
21,0				KDS 210 MAK				
21,1				KDS 211 MAK				
21,2				KDS 212 MAK				
21,3				KDS 213 MAK				
21,4				KDS 214 MAK				
21,5				KDS 215 MAK				
21,6	25	56	4,0	KDS 216 MAK	164,0	68	79	
21,7				KDS 217 MAK				
21,8				KDS 218 MAK				
21,9				KDS 219 MAK				
22,0				KDS 220 MAK				
22,1				KDS 221 MAK				
22,2				KDS 222 MAK				
22,3				KDS 223 MAK				
22,4				KDS 224 MAK				
22,5				KDS 225 MAK				
22,6	25	56	4,2	KDS 226 MAK	164,2	71	82	
22,7				KDS 227 MAK				
22,8				KDS 228 MAK				
22,9				KDS 229 MAK				
23,0				KDS 230 MAK				
23,1				KDS 231 MAK				
23,2				KDS 232 MAK				
23,3				KDS 233 MAK				
23,4				KDS 234 MAK				
23,5				KDS 235 MAK				
23,6	32	60	4,4	KDS 236 MAK	174,4	74	86	
23,7				KDS 237 MAK				
23,8				KDS 238 MAK				
23,9				KDS 239 MAK				
24,0				KDS 240 MAK				
24,1				KDS 241 MAK				
24,2				KDS 242 MAK				
24,3				KDS 243 MAK				
24,4				KDS 244 MAK				
24,5				KDS 245 MAK				

## ● Diameter $\varnothing 24,6 \sim 40,5 \text{ mm}$

Dimensions (mm)				Cat. No.	Short Series (3D)			
$\varnothing D$ (mm)	Shank		Drill Head $\ell_1$		Stock MAK	Dimensions (mm)		
	$\varnothing d$	$\ell_4$				L	$\ell_2$	$\ell_3$
24,6	32	60	4,5	KDS 246 MAK	174,5	76	88	
24,7				KDS 247 MAK				
24,8				KDS 248 MAK				
24,9				KDS 249 MAK				
25,0				KDS 250 MAK				
25,1				KDS 251 MAK				
25,2				KDS 252 MAK				
25,3				KDS 253 MAK				
25,4				KDS 254 MAK				
25,5				KDS 255 MAK				
25,6	32	60	4,7	KDS 256 MAK	179,7	79	92	
25,7				KDS 257 MAK				
25,8				KDS 258 MAK				
25,9				KDS 259 MAK				
26,0				KDS 260 MAK				
26,1				KDS 261 MAK				
~26,5				~265 MAK				
26,6				KDS 266 MAK				
~27,5				~275 MAK				
27,6				KDS 276 MAK				
~28,5	~285 MAK							
28,6	32	60	5,3	KDS 286 MAK	190,3	86	100	
~29,5				~295 MAK				
29,6				KDS 296 MAK				
~30,5				~305 MAK				
30,6				KDS 306 MAK				
~31,5				~315 MAK				
31,6				KDS 316 MAK				
~32,5				~325 MAK				
32,6				KDS 326 MAK				
~33,5				~335 MAK				
33,6	40	70	6,2	KDS 336 MAK	226,2	104	122	
~34,5				~345 MAK				
34,6				KDS 346 MAK				
~35,5				~355 MAK				
35,6				KDS 356 MAK				
~36,5				~365 MAK				
36,6				KDS 366 MAK				
~37,5				~375 MAK				
37,6				KDS 376 MAK				
~38,5				~385 MAK				
38,6	40	70	7,1	KDS 386 MAK	247,1	119	168	
~39,5				~395 MAK				
39,6				KDS 396 MAK				
~40,5				~405 MAK				

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs. Please specify the Cat. No.  
For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

E.g., **KDS 102 MAK**, **ACW30** (Grade)

**KDS series:** Brazed carbide drill with coolant holes

Drill diameter  
**10,2 mm**

**AK:** Brazed carbide and TiAlN coated drill

**M :** 3 x D

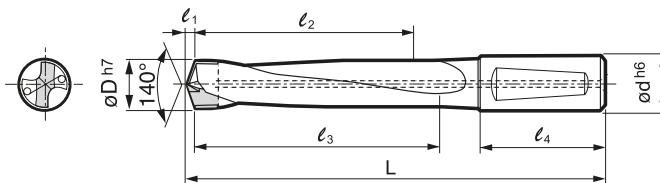


# Brazed Carbide MULTI-DRILLS

## KDS ... LAK Type

Long Type (5 x D)

Brazed Carbide Drills with Coolant Holes



Helix angle: 20° ---> 6°  
l<sub>2</sub> = Effective drilling length

### ● Diameter ø9,5~15,5mm

Dimensions (mm)			Cat. No.	Long Series (5D)					
øD (mm)	Shank			Drill Head	Stock	Dimensions (mm)			
	ød	l <sub>4</sub>			l <sub>1</sub>	LAK	L	l <sub>2</sub>	l <sub>3</sub>
9,5~10,0	16	48	1,8	KDS 095 LAK					
~10,5				KDS 100 LAK		116,8	52	57	
				KDS 105 LAK					
10,6~11,0	16	48	2	KDS 106 LAK					
~11,5				KDS 110 LAK		127,0	57	63	
				KDS 115 LAK					
11,6	16	48	2,2	KDS 116 LAK					
11,7				KDS 117 LAK					
11,8				KDS 118 LAK					
11,9				KDS 119 LAK					
12,0				KDS 120 LAK	●	132,2	63	69	
12,1				KDS 121 LAK					
12,2				KDS 122 LAK					
12,3				KDS 123 LAK					
12,4				KDS 124 LAK					
12,5				KDS 125 LAK	●				
12,6	16	48	2,4	KDS 126 LAK					
12,7				KDS 127 LAK					
12,8				KDS 128 LAK					
12,9				KDS 129 LAK					
13,0				KDS 130 LAK	●	142,4	67	74	
13,1				KDS 131 LAK					
13,2				KDS 132 LAK					
13,3				KDS 133 LAK					
13,4				KDS 134 LAK					
13,5				KDS 135 LAK	●				
13,6	16	48	2,5	KDS 136 LAK					
13,7				KDS 137 LAK					
13,8				KDS 138 LAK					
13,9				KDS 139 LAK					
14,0				KDS 140 LAK	●	147,5	73	80	
14,1				KDS 141 LAK	●				
14,2				KDS 142 LAK					
14,3				KDS 143 LAK					
14,4				KDS 144 LAK					
14,5				KDS 145 LAK	●				
14,6	20	50	2,7	KDS 146 LAK					
14,7				KDS 147 LAK					
14,8				KDS 148 LAK					
14,9				KDS 149 LAK					
15,0				KDS 150 LAK	●	157,7	77	85	
15,1				KDS 151 LAK					
15,2				KDS 152 LAK					
15,3				KDS 153 LAK					
15,4				KDS 154 LAK					
15,5				KDS 155 LAK	●				

### ● Diameter ø15,6~20,0mm

Dimensions (mm)			Cat. No.	Long Series (5D)					
øD (mm)	Shank			Drill Head	Stock	Dimensions (mm)			
	ød	l <sub>4</sub>			l <sub>1</sub>	LAK	L	l <sub>2</sub>	l <sub>3</sub>
15,6	20	50	2,9	KDS 156 LAK					
15,7				KDS 157 LAK					
15,8				KDS 158 LAK					
15,9				KDS 159 LAK					
16,0				KDS 160 LAK	●	167,9	83	91	
16,1				KDS 161 LAK					
16,2				KDS 162 LAK					
16,3				KDS 163 LAK					
16,4				KDS 164 LAK					
16,5				KDS 165 LAK	●				
16,6	KDS 166 LAK								
16,7	KDS 167 LAK								
16,8	KDS 168 LAK								
16,9	KDS 169 LAK								
17,0	20	50	3,1	KDS 170 LAK	●	173,1	87	96	
17,1				KDS 171 LAK					
17,2				KDS 172 LAK					
17,3				KDS 173 LAK					
17,4				KDS 174 LAK					
17,5				KDS 175 LAK	●				
17,6				KDS 176 LAK					
17,7				KDS 177 LAK					
17,8				KDS 178 LAK					
17,9				KDS 179 LAK					
18,0	20	50	3,3	KDS 180 LAK	●	178,3	93	102	
18,1				KDS 181 LAK					
18,2				KDS 182 LAK					
18,3				KDS 183 LAK					
18,4				KDS 184 LAK					
18,5				KDS 185 LAK	●				
18,6				KDS 186 LAK					
18,7				KDS 187 LAK					
18,8				KDS 188 LAK					
18,9				KDS 189 LAK					
19,0	25	56	3,5	KDS 190 LAK	●	193,5	97	107	
19,1				KDS 191 LAK					
19,2				KDS 192 LAK					
19,3				KDS 193 LAK					
19,4				KDS 194 LAK					
19,5				KDS 195 LAK	●				
19,6				KDS 196 LAK					
19,7				KDS 197 LAK					
19,8				KDS 198 LAK					
19,9				KDS 199 LAK					
20,0	KDS 200 LAK	●							

### ■ Recommended Cutting Conditions

(v<sub>c</sub> : Cutting Speed (m/min), f : Feed rate (mm/rev)) (Min - Standard - Max)

Diameter (mm)		Steels (under HB250)	Steels (HB250~320)	Hardened Steels (HRC45)	Stainless Steels (< HB200)	Ductile Cast Irons	Cast Irons	Aluminium Alloys	Titanium Alloys (Ti-6Al-4V)	Inconel (Inconel 718)
~ ø15	v <sub>c</sub>	50 - 65 - 75	50 - 60 - 70	30 - 35 - 45	35 - 45 - 50	55 - 65 - 75	60 - 80 - 100	70 - 85 - 100	20 - 25 - 35	10 - 20 - 30
	f	0,15 - 0,3	0,15 - 0,3	0,1 - 0,2	0,1 - 0,2	0,15 - 0,3	0,2 - 0,3	0,25 - 0,35	0,1 - 0,15	0,08 - 0,1
~ ø20	v <sub>c</sub>	50 - 65 - 75	50 - 60 - 70	35 - 40 - 50	35 - 45 - 50	60 - 70 - 80	60 - 80 - 100	70 - 90 - 110	20 - 30 - 40	10 - 20 - 30
	f	0,15 - 0,35	0,15 - 0,35	0,15 - 0,25	0,15 - 0,25	0,15 - 0,35	0,2 - 0,35	0,25 - 0,4	0,1 - 0,15	0,08 - 0,1
~ ø30,5	v <sub>c</sub>	55 - 70 - 90	55 - 65 - 90	35 - 40 - 50	35 - 45 - 50	60 - 70 - 90	60 - 90 - 110	75 - 100 - 120	25 - 35 - 40	15 - 25 - 35
	f	0,2 - 0,4	0,2 - 0,4	0,15 - 0,25	0,15 - 0,25	0,2 - 0,4	0,25 - 0,4	0,3 - 0,4	0,1 - 0,2	0,08 - 0,12

If the drilling operation is completely satisfactory with the above condition and the rigidity of the machine is sufficient, the cutting data can be raised. For more guidance, please contact our technical representative.

● = Euro stock

# Brazed Carbide MULTI-DRILLS KDS ... LAK Type

TiAlN Coated Brazed Carbide Multi-Drills for General Steels, Cast Iron & Ductile Cast Iron



Specification:

- Brazed carbide drill TiAlN coated (Grade: ACW30) with coolant holes
- Shank with whistle notch

## ● Diameter $\varnothing 20,1 \sim 24,5 \text{ mm}$

Dimensions (mm)				Cat. No.	Long Series (5D)			
$\varnothing D$ (mm)	Shank		Drill Head $\ell_1$		Stock LAK	Dimensions (mm)		
	$\varnothing d$	$\ell_4$				L	$\ell_2$	$\ell_3$
20,1	25	56	3,6	KDS 201 LAK		198,6	103	113
20,2				KDS 202 LAK				
20,3				KDS 203 LAK				
20,4				KDS 204 LAK				
20,5				KDS 205 LAK	●			
20,6	25	56	3,8	KDS 206 LAK		198,8	107	118
20,7				KDS 207 LAK				
20,8				KDS 208 LAK				
20,9				KDS 209 LAK				
21,0				KDS 210 LAK	●			
21,1				KDS 211 LAK				
21,2				KDS 212 LAK				
21,3				KDS 213 LAK				
21,4				KDS 214 LAK				
21,5				KDS 215 LAK	●			
21,6	25	56	4,0	KDS 216 LAK		204,0	113	124
21,7				KDS 217 LAK				
21,8				KDS 218 LAK				
21,9				KDS 219 LAK				
22,0				KDS 220 LAK	●			
22,1				KDS 221 LAK				
22,2				KDS 222 LAK				
22,3				KDS 223 LAK				
22,4				KDS 224 LAK				
22,5				KDS 225 LAK				
22,6	25	56	4,2	KDS 226 LAK		214,2	117	129
22,7				KDS 227 LAK				
22,8				KDS 228 LAK				
22,9				KDS 229 LAK				
23,0				KDS 230 LAK	●			
23,1				KDS 231 LAK				
23,2				KDS 232 LAK				
23,3				KDS 233 LAK				
23,4				KDS 234 LAK				
23,5				KDS 235 LAK				
23,6	32	60	4,4	KDS 236 LAK		224,4	123	135
23,7				KDS 237 LAK				
23,8				KDS 238 LAK				
23,9				KDS 239 LAK				
24,0				KDS 240 LAK	●			
24,1				KDS 241 LAK				
24,2				KDS 242 LAK				
24,3				KDS 243 LAK				
24,4				KDS 244 LAK				
24,5				KDS 245 LAK				

## ● Diameter $\varnothing 24,6 \sim 40,5 \text{ mm}$

Dimensions (mm)				Cat. No.	Long Series (5D)			
$\varnothing D$ (mm)	Shank		Drill Head $\ell_1$		Stock LAK	Dimensions (mm)		
	$\varnothing d$	$\ell_4$				L	$\ell_2$	$\ell_3$
24,6	32	60	4,5	KDS 246 LAK		229,5	127	140
24,7				KDS 247 LAK				
24,8				KDS 248 LAK				
24,9				KDS 249 LAK				
25,0				KDS 250 LAK	●			
25,1				KDS 251 LAK				
25,2				KDS 252 LAK				
25,3				KDS 253 LAK				
25,4				KDS 254 LAK				
25,5				KDS 255 LAK				
25,6	32	60	4,7	KDS 256 LAK		234,7	133	146
25,7				KDS 257 LAK				
25,8				KDS 258 LAK				
25,9				KDS 259 LAK				
26,0				KDS 260 LAK	●			
26,1				KDS 261 LAK				
~26,5				~265 LAK				
26,6				KDS 266 LAK				
~27,5				~275 LAK				
27,6				KDS 276 LAK				
~28,5	~285 LAK							
28,6	KDS 286 LAK							
~29,5	~295 LAK							
29,6	KDS 296 LAK							
~30,5	~305 LAK							
30,6	KDS 306 LAK							
~31,5	~315 LAK							
31,6	KDS 316 LAK							
~32,5	~325 LAK							
32,6	KDS 326 LAK							
~33,5	~335 LAK							
33,6	KDS 336 LAK							
~34,5	~345 LAK							
34,6	KDS 346 LAK							
~35,5	~355 LAK							
35,6	KDS 356 LAK							
~36,5	~365 LAK							
36,6	KDS 366 LAK							
~37,5	~375 LAK							
37,6	KDS 376 LAK							
~38,5	~385 LAK							
38,6	KDS 386 LAK							
~39,5	~395 LAK							
39,6	KDS 396 LAK							
~40,5	~405 LAK							

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs. Please specify the Cat. No.  
For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

E.g., **KDS 102 LAK**, **ACW30** (Grade)

**KDS series:** Brazed carbide drill with coolant holes

Drill diameter  
10,2 mm

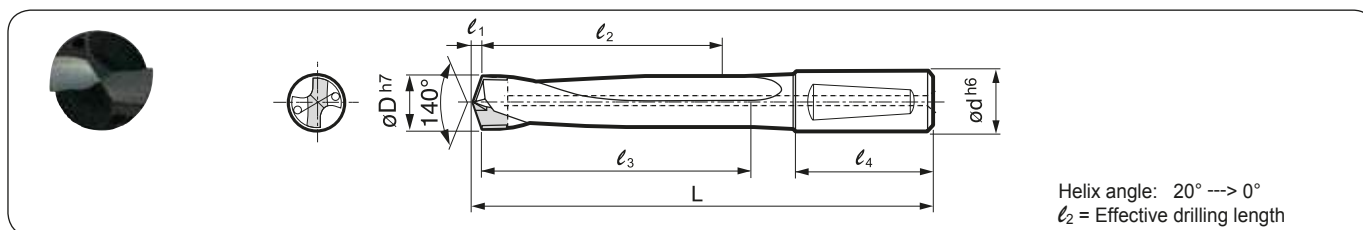
**AK:** Brazed carbide and TiAlN coated drill

**L :** 5 x D



# Brazed Carbide MULTI-DRILLS KDS ... DAK Type

## Extra Long Type ( 7 x D ) Brazed Carbide Drills with Coolant Holes



### ● Diameter ø9,5~15,5mm

Dimensions (mm)			Cat. No.	Extra Long Series (7D)					
øD (mm)	Shank			Drill Head	Stock				
	ød	l4			l1	DAK	L	l2	l3
9,5~10,0	16	48	1,8	KDS 095 DAK					
~10,5				KDS 100 DAK		141,8	75	80	
				KDS 105 DAK					
10,6~11,0	16	48	2	KDS 106 DAK					
~11,5				KDS 110 DAK		152,0	81	87	
				KDS 115 DAK					
11,6	16	48	2,2	KDS 116 DAK					
11,7				KDS 117 DAK					
11,8				KDS 118 DAK					
11,9				KDS 119 DAK					
12,0				KDS 120 DAK	●	162,2	91	97	
12,1				KDS 121 DAK					
12,2				KDS 122 DAK					
12,3				KDS 123 DAK					
12,4				KDS 124 DAK					
12,5				KDS 125 DAK	●				
12,6	16	48	2,4	KDS 126 DAK					
12,7				KDS 127 DAK					
12,8				KDS 128 DAK					
12,9				KDS 129 DAK					
13,0				KDS 130 DAK	●	177,4	99	106	
13,1				KDS 131 DAK					
13,2				KDS 132 DAK					
13,3				KDS 133 DAK					
13,4				KDS 134 DAK					
13,5				KDS 135 DAK					
13,6	16	48	2,5	KDS 136 DAK					
13,7				KDS 137 DAK					
13,8				KDS 138 DAK					
13,9				KDS 139 DAK					
14,0				KDS 140 DAK	●	182,5	106	113	
14,1				KDS 141 DAK					
14,2				KDS 142 DAK					
14,3				KDS 143 DAK					
14,4				KDS 144 DAK					
14,5				KDS 145 DAK					
14,6	20	50	2,7	KDS 146 DAK					
14,7				KDS 147 DAK					
14,8				KDS 148 DAK					
14,9				KDS 149 DAK					
15,0				KDS 150 DAK	●	197,7	114	122	
15,1				KDS 151 DAK					
15,2				KDS 152 DAK					
15,3				KDS 153 DAK					
15,4				KDS 154 DAK					
15,5				KDS 155 DAK					

### ● Diameter ø15,6~20,0mm

Dimensions (mm)			Cat. No.	Extra Long Series (7D)					
øD (mm)	Shank			Drill Head	Stock				
	ød	l4			l1	DAK	L	l2	l3
15,6	20	50	2,9	KDS 156 DAK					
15,7				KDS 157 DAK					
15,8				KDS 158 DAK					
15,9				KDS 159 DAK					
16,0				KDS 160 DAK	●	207,9	121	129	
16,1				KDS 161 DAK					
16,2				KDS 162 DAK					
16,3				KDS 163 DAK					
16,4				KDS 164 DAK					
16,5				KDS 165 DAK					
16,6	20	50	3,1	KDS 166 DAK					
16,7				KDS 167 DAK					
16,8				KDS 168 DAK					
16,9				KDS 169 DAK					
17,0				KDS 170 DAK	●	218,1	129	138	
17,1				KDS 171 DAK					
17,2				KDS 172 DAK					
17,3				KDS 173 DAK					
17,4				KDS 174 DAK					
17,5				KDS 175 DAK	●				
17,6	20	50	3,3	KDS 176 DAK					
17,7				KDS 177 DAK					
17,8				KDS 178 DAK					
17,9				KDS 179 DAK					
18,0				KDS 180 DAK	●	223,3	136	145	
18,1				KDS 181 DAK					
18,2				KDS 182 DAK					
18,3				KDS 183 DAK					
18,4				KDS 184 DAK					
18,5				KDS 185 DAK					
18,6	25	56	3,5	KDS 186 DAK					
18,7				KDS 187 DAK					
18,8				KDS 188 DAK					
18,9				KDS 189 DAK					
19,0				KDS 190 DAK	●	243,5	144	154	
19,1				KDS 191 DAK					
19,2				KDS 192 DAK					
19,3				KDS 193 DAK					
19,4				KDS 194 DAK					
19,5				KDS 195 DAK					
19,6	25	56	3,6	KDS 196 DAK					
19,7				KDS 197 DAK					
19,8				KDS 198 DAK		248,6	151	161	
19,9				KDS 199 DAK					
20,0				KDS 200 DAK	●				

### ■ Recommended Cutting Conditions

( $v_c$  : Cutting Speed (m/min),  $f$  : Feed rate (mm/rev)) (Min - Standard - Max)

Diameter (mm)	Steels (under HB250)	Steels (HB250~320)	Die Steels (about HB250)	Ductile Cast Irons	Remarks
~ ø15	40 - 65 - 90 0,15 - 0,2 - 0,3	40 - 60 - 90 0,1 - 0,2 - 0,25	40 - 50 - 70 0,1 - 0,2 - 0,25	50 - 70 - 100 0,2 - 0,3 - 0,35	To avoid the drill bending, which can cause breakage, please pre-drill or reduce the cutting conditions at the entrance of hole:  RPM: 100~300 f: 0,05~0,08 mm/rev
~ ø20	40 - 65 - 90 0,2 - 0,3 - 0,4	40 - 60 - 90 0,15 - 0,25 - 0,35	40 - 50 - 70 0,15 - 0,25 - 0,3	50 - 70 - 100 0,2 - 0,35 - 0,4	
~ ø40,5	40 - 70 - 90 0,2 - 0,35 - 0,45	40 - 65 - 90 0,2 - 0,3 - 0,4	40 - 55 - 70 0,2 - 0,3 - 0,35	50 - 70 - 100 0,25 - 0,4 - 0,5	

● = Euro stock



# Brazed Carbide MULTI-DRILLS KDS ... DAK Type

TiAlN Coated Brazed Carbide Multi-Drills for General Steels & Ductile Cast Iron



Specification:

- Brazed carbide drill TiAlN coated (Grade: ACW30) with coolant holes
- Shank with whistle notch

## ● Diameter ø20,1~24,5mm

Dimensions (mm)				Cat. No.	Extra Long Series (7D)			
øD (mm)	Shank		Drill Head		Stock	Dimensions (mm)		
	ød	ℓ				ℓ	DAK	L
20,1	25	56	3,6	KDS 201 DAK		248,6	151	161
20,2				KDS 202 DAK				
20,3				KDS 203 DAK				
20,4				KDS 204 DAK				
20,5				KDS 205 DAK				
20,6	25	56	3,8	KDS 206 DAK		248,8	155	166
20,7				KDS 207 DAK				
20,8				KDS 208 DAK				
20,9				KDS 209 DAK				
21,0				KDS 210 DAK	●			
21,1				KDS 211 DAK				
21,2				KDS 212 DAK				
21,3				KDS 213 DAK				
21,4				KDS 214 DAK				
21,5				KDS 215 DAK				
21,6	25	56	4,0	KDS 216 DAK		259,0	166	177
21,7				KDS 217 DAK				
21,8				KDS 218 DAK				
21,9				KDS 219 DAK				
22,0				KDS 220 DAK	●			
22,1				KDS 221 DAK				
22,2				KDS 222 DAK				
22,3				KDS 223 DAK				
22,4				KDS 224 DAK				
22,5				KDS 225 DAK				
22,6	25	56	4,2	KDS 226 DAK		274,2	174	186
22,7				KDS 227 DAK				
22,8				KDS 228 DAK				
22,9				KDS 229 DAK				
23,0				KDS 230 DAK				
23,1				KDS 231 DAK				
23,2				KDS 232 DAK				
23,3				KDS 233 DAK				
23,4				KDS 234 DAK				
23,5				KDS 235 DAK				
23,6	32	60	4,4	KDS 236 DAK		284,4	178	190
23,7				KDS 237 DAK				
23,8				KDS 238 DAK				
23,9				KDS 239 DAK				
24,0				KDS 240 DAK				
24,1				KDS 241 DAK				
24,2				KDS 242 DAK				
24,3				KDS 243 DAK				
24,4				KDS 244 DAK				
24,5				KDS 245 DAK	●			

## ● Diameter ø24,6~40,5mm

Dimensions (mm)				Cat. No.	Extra Long Series (7D)			
øD (mm)	Shank		Drill Head		Stock	Dimensions (mm)		
	ød	ℓ <sub>4</sub>				ℓ <sub>1</sub>	DAK	L
24,6	32	60	4,5	KDS 246 DAK		294,5	187	200
24,7				KDS 247 DAK				
24,8				KDS 248 DAK				
24,9				KDS 249 DAK				
25,0				KDS 250 DAK				
25,1				KDS 251 DAK				
25,2				KDS 252 DAK				
25,3				KDS 253 DAK				
25,4				KDS 254 DAK				
25,5				KDS 255 DAK				
25,6	32	60	4,7	KDS 256 DAK		304,7	197	210
25,7				KDS 257 DAK				
25,8				KDS 258 DAK				
25,9				KDS 259 DAK				
26,0				KDS 260 DAK				
26,1				KDS 261 DAK				
~26,5				~265 DAK				
26,6				KDS 266 DAK				
~27,5				~275 DAK				
27,6				KDS 276 DAK				
~28,5	~285 DAK							
28,6	32	60	5,3	KDS 286 DAK		325,3	215	230
~29,5				~295 DAK				
29,6				KDS 296 DAK				
~30,5				~305 DAK				
30,6				KDS 306 DAK				
~31,5				~315 DAK				
31,6				KDS 316 DAK				
~32,5				~325 DAK				
32,6				KDS 326 DAK				
~33,5				~335 DAK				
33,6	40	70	6,2	KDS 336 DAK		381,2	253	270
~34,5				~345 DAK				
34,6				KDS 346 DAK				
~35,5				~355 DAK				
35,6				KDS 356 DAK				
~36,5				~365 DAK				
36,6				KDS 366 DAK				
~37,5				~375 DAK				
37,6				KDS 376 DAK				
~38,5				~385 DAK				
38,6	40	70	7,1	KDS 386 DAK		422,1	296	343
~39,5				~395 DAK				
39,6				KDS 396 DAK				
~40,5				~405 DAK				

## ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs. Please specify the Cat. No.  
For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

E.g., **KDS 102 DAK**, **ACW30** (Grade)

**KDS series:** Brazed carbide drill with coolant holes

Drill diameter  
10,2 mm

**AK:** Brazed carbide and TiAlN coated drill

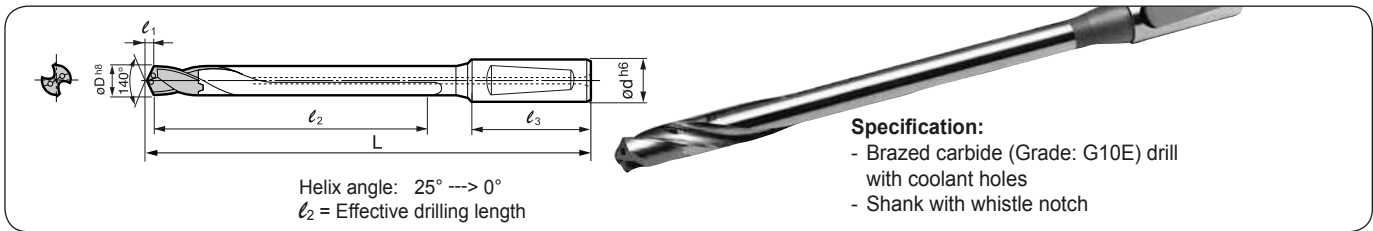
**D :** 7 x D



# Brazed Carbide MULTI-DRILLS KDS ... FA Type

( Available on Request )

## Extra Long Type (10 x D) Brazed Carbide Drills with Coolant Holes



### ● Diameter $\varnothing 8.0 \sim 15.0$ mm

Dimensions (mm)				Cat. No.	Extra Long Series (10D)		
$\varnothing D$ (mm)	Shank		Drill Head $\ell_1$		Stock	Dimensions (mm)	
	$\varnothing d$	$\ell_3$			FA10	L	$\ell_2$
8,0	16	48	1,5	KDS 080 FA10		156,5	93
~8,5				~085 FA10			
8,6	16	48	1,6	KDS 086 FA10		171,6	104
~9,5				~095 FA10			
9,6	16	48	1,8	KDS 096 FA10		181,8	115
~10,5				~105 FA10			
10,6	16	48	2,0	KDS 106 FA10		197,0	126
~11,5				~115 FA10			
11,6	16	48	2,2	KDS 116 FA10		207,2	137
~12,5				~125 FA10			
12,6	16	48	2,4	KDS 126 FA10		222,4	148
~13,5				~135 FA10			
13,6	16	48	2,5	KDS 136 FA10		232,5	159
~14,5				~145 FA10			
14,6	20	50	2,7	KDS 146 FA10		247,7	170
~15,5				~155 FA10			
15,6	20	50	2,9	KDS 156 FA10		262,9	181
~16,5				~165 FA10			
16,6	20	50	3,1	KDS 166 FA10		273,1	192
~17,5				~175 FA10			
17,6	20	50	3,3	KDS 176 FA10		288,3	203
~18,5				~185 FA10			
18,6	25	56	3,5	KDS 186 FA10		303,5	214
~19,5				~195 FA10			

### ● Diameter $\varnothing 15,1 \sim 19,5$ mm

Dimensions (mm)				Cat. No.	Extra Long Series (10D)		
$\varnothing D$ (mm)	Shank		Drill Head $\ell_1$		Stock	Dimensions (mm)	
	$\varnothing d$	$\ell_3$			FA10	L	$\ell_2$
19,6	25	56	3,6	KDS 196 FA10		318,6	225
~20,5				~205 FA10			
20,6	25	56	3,8	KDS 206 FA10		328,8	236
~21,5				~215 FA10			
21,6	25	56	4,0	KDS 216 FA10		344,0	247
~22,5				~225 FA10			
22,6	25	56	4,2	KDS 226 FA10		354,2	258
~23,5				~235 FA10			
23,6	32	60	4,4	KDS 236 FA10		374,4	269
~24,5				~245 FA10			
24,6	32	60	4,5	KDS 246 FA10		384,5	280
~25,5				~255 FA10			
25,6	32	60	4,7	KDS 256 FA10		399,7	291
~26,5				~265 FA10			
26,6	32	60	4,9	KDS 266 FA10		409,9	302
~27,5				~275 FA10			
27,6	32	60	5,1	KDS 276 FA10		425,1	313
~28,5				~285 FA10			
28,6	32	60	5,3	KDS 286 FA10		435,3	324
~29,5				~295 FA10			
29,6	32	60	5,5	KDS 296 FA10		450,5	335
~30,5				~305 FA10			

## Brazed Carbide Multi-Drills for Cast Irons and Aluminium Alloys

### ■ How to Order

Non-Stock Items will be required minimum order quantity for 6 pcs. Please specify the Cat. No. For example, if the diameter of the drill is 10,2 mm, please indicate as follow.

E.g., **KDS 102 FA 10 ,G10E** (Grade)

**KDS series:** Brazed carbide drill with coolant holes

Drill diameter  
**10,2 mm**

**10:** Effective drilling length

**FA:** Extra long type brazed carbide drill with special flutes (Helix angle: 25°  $\leftrightarrow$  0°)



### ■ Recommended Cutting Conditions

(  $v_c$  : Cutting Speed (m/min),  $f$  : Feed rate (mm/rev) ) (Min - Standard - Max)

Diameter (mm)		Cast Irons	Aluminium Alloys	Remarks
~ $\varnothing 12$	$v_c$	30 - <b>55</b> - 60	50 - <b>70</b> - 90	To avoid the drill bending, which can cause breakage, please pre-drill or reduce the cutting conditions at the entrance of hole; RPM: 100 ~ 300, $f$ : 0,05 ~ 0,08 mm/rev.
	$f$	0,1 - <b>0,2</b> - 0,25	0,1 - <b>0,2</b> - 0,3	
~ $\varnothing 20$	$v_c$	40 - <b>60</b> - 70	60 - <b>70</b> - 100	Higher feed rates and deep holes require high coolant pressure. Cutting fluid : Water soluble oil Cutting fluid pressure : 4 ~ 10 bar
	$f$	0,2 - <b>0,3</b> - 0,4	0,3 - <b>0,35</b> - 0,5	
~ $\varnothing 30$	$v_c$	40 - <b>60</b> - 70	70 - <b>100</b> - 150	
	$f$	0,3 - <b>0,4</b> - 0,5	0,3 - <b>0,4</b> - 0,5	

# Replaceable Head Type MULTI-DRILLS SMD Type

## General Features

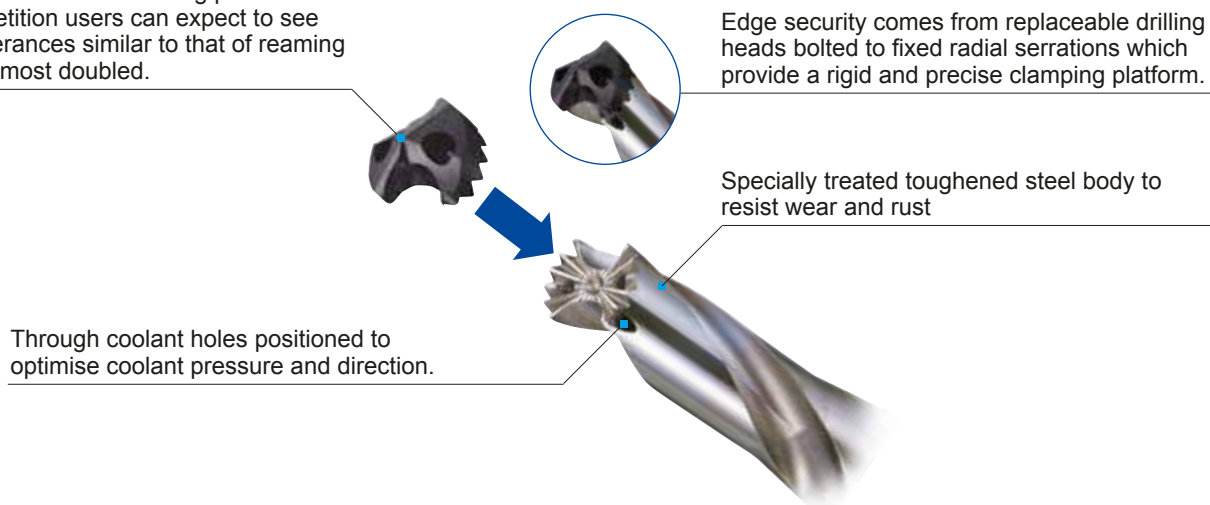
Fast accurate and ideal for drilling steels, this newly developed drill from SUMITOMO gives similar hole accuracy to that of regrindable drills renowned within the industry as being the ultimate hole making tool.



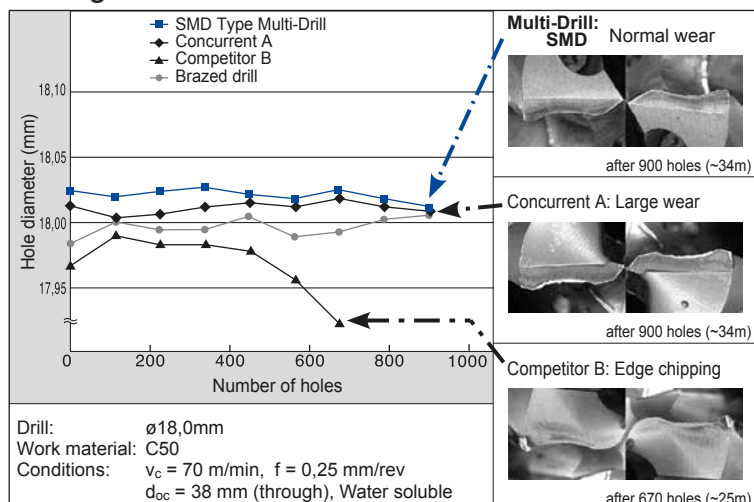
## Advantages

- Available in diameters ranging from 12,0~42,5mm
- New** ● Drilling Depths 1,5 ~ 12 x Diameter
- Optimised heat dissipation via precisely located coolant holes
- Maximised rigidity from newly developed clamping system
- High performance drilling of precision holes from solid
- New** ● 3 different types of head for general and smooth cutting (MTL type, MEL type) and new MFS type for drilling in non-flat surfaces.

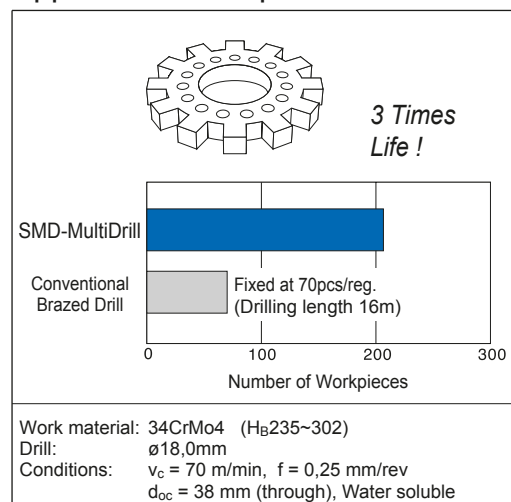
The newly developed tungsten carbide substrate with its ultra hard smooth coating proved that against competition users can expect to see holes with tolerances similar to that of reaming and tool life almost doubled.



## Drilling Precision



## Application Example

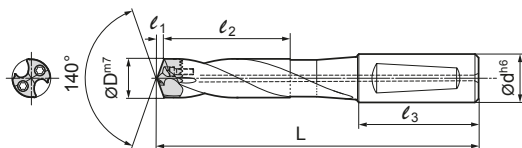


# Replaceable Head Type Drill Holder

## SMDH Type

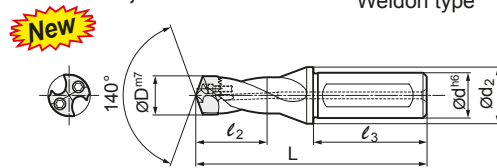
### ● Holder 3D / 5D / 8D

Shank Type:  
Whistle notch type



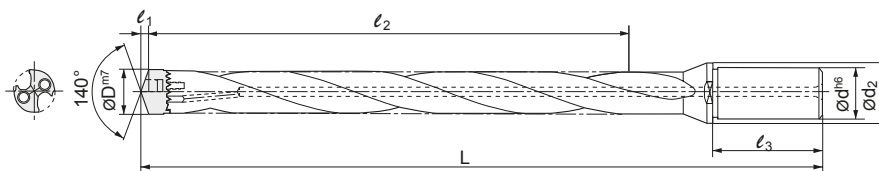
### ● Holder 1,5D

Shank Type:  
Weldon type



### ● Holder 12D

Shank Type:  
Cylindrical type



$l_2$  = Effective drilling length

## ■ Holder

(mm)

Dimensions				Cat. No.	Series (1,5D)				Series (3D)			Series (5D)			Series (8D)			Series (12D)				Related Drill Heads DMTL / DMEL		
Drill Head	Shank	Ø D	l <sub>1</sub>		Stock	Dimensions			Stock	Dimensions		Stock	Dimensions		Stock	Dimensions		Stock	Dimensions					
Ø D	l <sub>1</sub>					Ø d	l <sub>3</sub>	S		L	l <sub>2</sub>		Ø d <sub>2</sub>	M3		L	l <sub>2</sub>		M5	L	l <sub>2</sub>		M8	L
12,0	2,2	16	48	SMDH 120□□	○	91	25,5	20	●	107,2	43,5	●	132,2	68,5									1200~1249	
12,5	2,3			SMDH 125□□	○	91	25,5	20	●	107,3	43,5	●	132,3	68,5										1250~1299
13,0	2,4			SMDH 130□□	○	92	27,5	20	●	112,4	46,5	●	142,4	73,5										1300~1349
14,0	2,5			SMDH 140□□□	○	96	31,5	20	●	119,0	52,5	●	149,0	81,5	●	194,0	124,5	●	238,5	168,5	20			
15,0	2,7	20	50	SMDH 150□□□	○	100	32,0	25	●	129,2	55,0	●	159,2	86,0	●	204,2	133,0	●	253,0	180,0	25			1451~1550
16,0	2,9			SMDH 160□□□	○	103	35,0	25	●	134,4	59,0	●	169,4	92,0	●	214,4	141,0	●	265,5	192,0	25			1551~1650
17,0	3,1			SMDH 170□□□	○	105	35,5	25	●	139,6	62,5	●	174,6	97,5	●	224,6	150,5	●	278,1	203,5	25			1651~1750
18,0	3,3			SMDH 180□□□	○	107	39,7	25	●	144,8	66,5	●	179,8	103,5	●	229,8	158,5	●	290,5	215,5	25			1751~1850
19,0	3,5	25	56	SMDH 190□□□	○	115	40,5	30	●	160,1	69,5	●	195,0	108,5	●	255,0	167,5	●	309,1	228,5	30			1851~1950
20,0	3,6			SMDH 200□□□	○	118	43,0	30	●	160,1	73,0	●	200,1	114,0	●	265,1	175,0	●	321,4	240,0	30			1951~2050
21,0	3,8			SMDH 210□□□	○	119	44,0	30	●	160,3	76,0	●	200,3	119,0	●	270,3	184,0	●	333,9	252,0	30			2051~2150
22,0	4,0			SMDH 220□□□	○	121	47,0	30	●	165,1	80,0	●	205,1	125,0	●	275,1	192,0	●	347,0	264,0	30			2151~2280
23,0	4,2	32	60	SMDH 230□□□	○	122	46,5	30	●	164,8	82,5	●	214,8	129,5	●	284,8	200,5	●	359,0	275,5	30			2281~2380
24,0	4,4			SMDH 240□□□	○	129	49,5	37	●	174,6	86,5	●	224,6	135,5	●	299,6	208,5	●	376,1	284,5	37			2381~2480
25,0	4,6			SMDH 250□□□	○	129	49,0	37	●	174,6	88,0	●	229,6	140,0	●	304,6	217,0	●	388,4	300,0	37			2481~2580
26,0	4,7			SMDH 260□□□	○	132	52,0	37	●	179,7	92,0	●	234,7	146,0	●	314,7	225,0							2581~2680
27,0	4,9	32	60	SMDH 270□□□	○	133	53,0	37	●	179,9	94,0	●	239,9	151,0	●	324,9	234,0							2681~2780
28,0	5,1			SMDH 280□□□	○	135	54,5	37	●	185,1	96,5	●	245,1	156,5	●	330,1	241,5							2781~2880
29,0	5,3			SMDH 290□□□	○	136	55,5	37	●	190,3	99,5	●	250,3	161,5	●	340,3	250,5							2881~2980
30,0	5,5			SMDH 300□□□	○	139	58,5	37	●	190,5	104,5	●	260,5	167,5	●	350,5	259,5							2981~3050

Drill order description example: SMDH210M3, drill heads ⇨ K59/H60

## ■ Recommended Torque

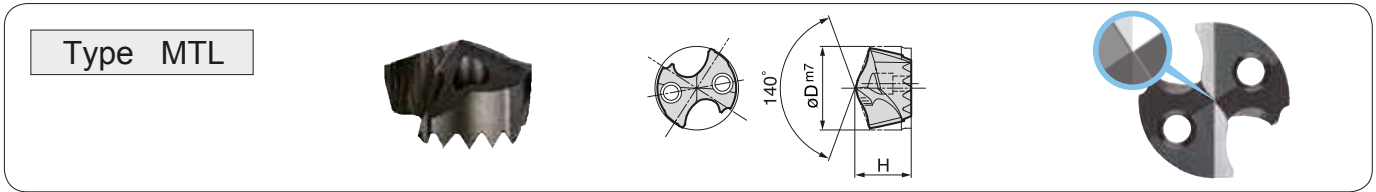
Screw		Applicable Insert
	(N·m)	
BXD 02208 IP	0,8 ~ 1,0	SMDT 1200 ~ 1550 D M□L
BXD 02509 IP	0,9 ~ 1,2	SMDT 1551 ~ 1850 D M□L
BXD 03011 IP	1,8 ~ 2,4	SMDT 1851 ~ 2150 D M□L
BXD 03512 IP	2,8 ~ 3,7	SMDT 2151 ~ 2480 D M□L
BXD 04014 IP	4,1 ~ 5,5	SMDT 2481 ~ 2780 D M□L
BXD 04515 IP	5,0 ~ 6,6	SMDT 2781 ~ 3050 D M□L

## ■ Spare Parts

Screw	Wrench	Applicable Holder
BXD 02208 IP	TRDR 08 IP	SMDH 120 ~ 150 M□
BXD 02509 IP	TRDR 10 IP	SMDH 160 ~ 180 M□
BXD 03011 IP	TRDR 15 IP	SMDH 190 ~ 210 M□
BXD 03512 IP	TRDR 15 IP	SMDH 220 ~ 240 M□
BXD 04014 IP	TRDR 20 IP	SMDH 250 ~ 270 M□
BXD 04515 IP	TRDR 25 IP	SMDH 280 ~ 300 M□



PVD coated grade: **ACX70**



Type MTL

### ■ Drill Head (Insert)

#### ● øD: 12,0~15,3mm

øD (mm)	Cat. No.	Stock	H (mm)
12,0	SMDT 1200 D MTL	●	9,1
12,1	SMDT 1210 D MTL	●	9,1
12,2	SMDT 1220 D MTL	●	9,1
12,3	SMDT 1230 D MTL	●	9,1
12,4	SMDT 1240 D MTL	●	9,1
12,5	SMDT 1250 D MTL	●	9,4
12,6	SMDT 1260 D MTL	●	9,4
12,7	SMDT 1270 D MTL	●	9,4
12,8	SMDT 1280 D MTL	●	9,4
12,9	SMDT 1290 D MTL	●	9,4
13,0	SMDT 1300 D MTL	●	9,7
13,1	SMDT 1310 D MTL	●	9,7
13,2	SMDT 1320 D MTL	●	9,7
13,3	SMDT 1330 D MTL	●	9,7
13,4	SMDT 1340 D MTL	●	9,7
13,5	SMDT 1350 D MTL	●	10,3
13,6	SMDT 1360 D MTL	●	10,3
13,7	SMDT 1370 D MTL	●	10,3
13,8	SMDT 1380 D MTL	●	10,3
13,9	SMDT 1390 D MTL	●	10,3
14,0	SMDT 1400 D MTL	●	10,3
14,1	SMDT 1410 D MTL	●	10,3
14,2	SMDT 1420 D MTL	●	10,3
14,3	SMDT 1430 D MTL	●	10,3
14,4	SMDT 1440 D MTL	●	10,3
14,5	SMDT 1450 D MTL	●	10,3
14,6	SMDT 1460 D MTL	●	10,3
14,7	SMDT 1470 D MTL	●	10,3
14,8	SMDT 1480 D MTL	●	10,3
14,9	SMDT 1490 D MTL	●	10,3
15,0	SMDT 1500 D MTL	●	11,0
15,1	SMDT 1510 D MTL	●	11,0
15,2	SMDT 1520 D MTL	●	11,0
15,3	SMDT 1530 D MTL	●	11,0

#### ● øD: 15,4~18,7mm

øD (mm)	Cat. No.	Stock	H (mm)
15,4	SMDT 1540 D MTL	●	11,0
15,5	SMDT 1550 D MTL	●	11,0
15,6	SMDT 1560 D MTL	●	11,0
15,7	SMDT 1570 D MTL	●	11,0
15,8	SMDT 1580 D MTL	●	11,0
15,9	SMDT 1590 D MTL	●	11,0
16,0	SMDT 1600 D MTL	●	11,6
16,1	SMDT 1610 D MTL	●	11,6
16,2	SMDT 1620 D MTL	●	11,6
16,3	SMDT 1630 D MTL	●	11,6
16,4	SMDT 1640 D MTL	●	11,6
16,5	SMDT 1650 D MTL	●	11,6
16,6	SMDT 1660 D MTL	●	11,6
16,7	SMDT 1670 D MTL	●	11,6
16,8	SMDT 1680 D MTL	●	11,6
16,9	SMDT 1690 D MTL	●	11,6
17,0	SMDT 1700 D MTL	●	12,2
17,1	SMDT 1710 D MTL	●	12,2
17,2	SMDT 1720 D MTL	●	12,2
17,3	SMDT 1730 D MTL	●	12,2
17,4	SMDT 1740 D MTL	●	12,2
17,5	SMDT 1750 D MTL	●	12,2
17,6	SMDT 1760 D MTL	●	12,2
17,7	SMDT 1770 D MTL	●	12,2
17,8	SMDT 1780 D MTL	●	12,2
17,9	SMDT 1790 D MTL	●	12,2
18,0	SMDT 1800 D MTL	●	12,9
18,1	SMDT 1810 D MTL	●	12,9
18,2	SMDT 1820 D MTL	●	12,9
18,3	SMDT 1830 D MTL	●	12,9
18,4	SMDT 1840 D MTL	●	12,9
18,5	SMDT 1850 D MTL	●	12,9
18,6	SMDT 1860 D MTL	●	12,9
18,7	SMDT 1870 D MTL	●	12,9

#### ● øD: 18,8~30,5mm

øD (mm)	Cat. No.	Stock	H (mm)
18,8	SMDT 1880 D MTL	●	12,9
18,9	SMDT 1890 D MTL	●	12,9
19,0	SMDT 1900 D MTL	●	13,5
19,1	SMDT 1910 D MTL	●	13,5
19,2	SMDT 1920 D MTL	●	13,5
19,3	SMDT 1930 D MTL	●	13,5
19,4	SMDT 1940 D MTL	●	13,5
19,5	SMDT 1950 D MTL	●	13,5
19,6	SMDT 1960 D MTL	●	13,5
19,7	SMDT 1970 D MTL	●	13,5
19,8	SMDT 1980 D MTL	●	13,5
19,9	SMDT 1990 D MTL	●	13,5
20,0	SMDT 2000 D MTL	●	14,1
20,5	SMDT 2050 D MTL	●	14,1
21,0	SMDT 2100 D MTL	●	14,8
21,5	SMDT 2150 D MTL	●	14,8
22,0	SMDT 2200 D MTL	●	15,0
22,5	SMDT 2250 D MTL	●	15,0
23,0	SMDT 2300 D MTL	●	15,1
23,5	SMDT 2350 D MTL	●	15,1
24,0	SMDT 2400 D MTL	●	15,4
24,5	SMDT 2450 D MTL	●	15,4
25,0	SMDT 2500 D MTL	●	15,8
25,5	SMDT 2550 D MTL	●	15,8
26,0	SMDT 2600 D MTL	●	16,4
26,5	SMDT 2650 D MTL	●	16,4
27,0	SMDT 2700 D MTL	●	17,1
27,5	SMDT 2750 D MTL	●	17,1
28,0	SMDT 2800 D MTL	●	17,7
28,5	SMDT 2850 D MTL	●	17,7
29,0	SMDT 2900 D MTL	●	18,3
29,5	SMDT 2950 D MTL	●	18,3
30,0	SMDT 3000 D MTL	●	19,0
30,5	SMDT 3050 D MTL	●	19,0

### ■ Recommended Cutting Conditions

#### ● For using 3xD and 5xD type drills

Work material Drill Ø (mm)		General steel (HB250~320)	Harden steel (HRC45)	Nodular cast iron
		~ 16,0	<b>v<sub>c</sub></b> 70 - 100 - 120 <b>f</b> 0,15 - 0,2 - 0,3	40 - 60 - 90 0,1 - 0,15 - 0,2
~ 20,0	<b>v<sub>c</sub></b> 70 - 100 - 120 <b>f</b> 0,15 - 0,25 - 0,35	40 - 70 - 90 0,15 - 0,2 - 0,25	50 - 70 - 90 0,2 - 0,25 - 0,35	
~ 30,8	<b>v<sub>c</sub></b> 70 - 100 - 120 <b>f</b> 0,2 - 0,25 - 0,35	40 - 60 - 90 0,15 - 0,2 - 0,25	50 - 70 - 90 0,25 - 0,3 - 0,35	

Note: High cutting performance is enhanced when using a high quality machine and rigid set up.



#### ● For using 8xD and 12xD type drills

Work material Drill Ø (mm)		General steel (HB250~320)	Harden steel (HRC45)	Nodular cast iron
		~ 16,0	<b>v<sub>c</sub></b> 50 - 70 - 80 <b>f</b> 0,15 - 0,2 - 0,3	30 - 50 - 70 0,1 - 0,15 - 0,2
~ 20,0	<b>v<sub>c</sub></b> 50 - 70 - 80 <b>f</b> 0,15 - 0,25 - 0,35	30 - 50 - 70 0,15 - 0,2 - 0,25	40 - 60 - 80 0,2 - 0,25 - 0,35	
~ 25,0 (12D) ~ 30,5 (8D)	<b>v<sub>c</sub></b> 50 - 70 - 80 <b>f</b> 0,2 - 0,25 - 0,35	30 - 50 - 70 0,15 - 0,2 - 0,25	40 - 60 - 80 0,25 - 0,3 - 0,35	

[ v<sub>c</sub> : Cutting Speed (m/min), f : Feed rate (mm/rev), Min - Optimum - Max ]

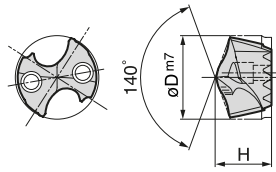
# Regrindable Drill Head Insert SMDT... D MEL Type

MEL Type for Smooth Cutting

(Soft Steel, Stainless Steel, Grey Cast Iron)

PVD coated grade: **ACX80**

Type MEL



## ■ Drill Head (Insert)

●  $\phi D$ : 12,0~15,3mm

$\phi D$ (mm)	Cat. No.	Stock	H (mm)
12,0	SMDT 1200 D MEL	●	9,1
12,1	SMDT 1210 D MEL	●	9,1
12,2	SMDT 1220 D MEL	●	9,1
12,3	SMDT 1230 D MEL	●	9,1
12,4	SMDT 1240 D MEL	●	9,1
12,5	SMDT 1250 D MEL	●	9,4
12,6	SMDT 1260 D MEL	●	9,4
12,7	SMDT 1270 D MEL	●	9,4
12,8	SMDT 1280 D MEL	●	9,4
12,9	SMDT 1290 D MEL	●	9,4
13,0	SMDT 1300 D MEL	●	9,7
13,1	SMDT 1310 D MEL	●	9,7
13,2	SMDT 1320 D MEL	●	9,7
13,3	SMDT 1330 D MEL	●	9,7
13,4	SMDT 1340 D MEL	●	9,7
13,5	SMDT 1350 D MEL	●	10,3
13,6	SMDT 1360 D MEL	●	10,3
13,7	SMDT 1370 D MEL	●	10,3
13,8	SMDT 1380 D MEL	●	10,3
13,9	SMDT 1390 D MEL	●	10,3
14,0	SMDT 1400 D MEL	●	10,3
14,1	SMDT 1410 D MEL	●	10,3
14,2	SMDT 1420 D MEL	●	10,3
14,3	SMDT 1430 D MEL	●	10,3
14,4	SMDT 1440 D MEL	●	10,3
14,5	SMDT 1450 D MEL	●	10,3
14,6	SMDT 1460 D MEL	●	10,3
14,7	SMDT 1470 D MEL	●	10,3
14,8	SMDT 1480 D MEL	●	10,3
14,9	SMDT 1490 D MEL	●	10,3
15,0	SMDT 1500 D MEL	●	11,0
15,1	SMDT 1510 D MEL	●	11,0
15,2	SMDT 1520 D MEL	●	11,0
15,3	SMDT 1530 D MEL	●	11,0

●  $\phi D$ : 15,4~18,7mm

$\phi D$ (mm)	Cat. No.	Stock	H (mm)
15,4	SMDT 1540 D MEL	●	11,0
15,5	SMDT 1550 D MEL	●	11,0
15,6	SMDT 1560 D MEL	●	11,0
15,7	SMDT 1570 D MEL	●	11,0
15,8	SMDT 1580 D MEL	●	11,0
15,9	SMDT 1590 D MEL	●	11,0
16,0	SMDT 1600 D MEL	●	11,6
16,1	SMDT 1610 D MEL	●	11,6
16,2	SMDT 1620 D MEL	●	11,6
16,3	SMDT 1630 D MEL	●	11,6
16,4	SMDT 1640 D MEL	●	11,6
16,5	SMDT 1650 D MEL	●	11,6
16,6	SMDT 1660 D MEL	●	11,6
16,7	SMDT 1670 D MEL	●	11,6
16,8	SMDT 1680 D MEL	●	11,6
16,9	SMDT 1690 D MEL	●	11,6
17,0	SMDT 1700 D MEL	●	12,2
17,1	SMDT 1710 D MEL	●	12,2
17,2	SMDT 1720 D MEL	●	12,2
17,3	SMDT 1730 D MEL	●	12,2
17,4	SMDT 1740 D MEL	●	12,2
17,5	SMDT 1750 D MEL	●	12,2
17,6	SMDT 1760 D MEL	●	12,2
17,7	SMDT 1770 D MEL	●	12,2
17,8	SMDT 1780 D MEL	●	12,2
17,9	SMDT 1790 D MEL	●	12,2
18,0	SMDT 1800 D MEL	●	12,9
18,1	SMDT 1810 D MEL	●	12,9
18,2	SMDT 1820 D MEL	●	12,9
18,3	SMDT 1830 D MEL	●	12,9
18,4	SMDT 1840 D MEL	●	12,9
18,5	SMDT 1850 D MEL	●	12,9
18,6	SMDT 1860 D MEL	●	12,9
18,7	SMDT 1870 D MEL	●	12,9

●  $\phi D$ : 18,8~30,5mm

$\phi D$ (mm)	Cat. No.	Stock	H (mm)
18,8	SMDT 1880 D MEL	●	12,9
18,9	SMDT 1890 D MEL	●	12,9
19,0	SMDT 1900 D MEL	●	13,5
19,1	SMDT 1910 D MEL	●	13,5
19,2	SMDT 1920 D MEL	●	13,5
19,3	SMDT 1930 D MEL	●	13,5
19,4	SMDT 1940 D MEL	●	13,5
19,5	SMDT 1950 D MEL	●	13,5
19,6	SMDT 1960 D MEL	●	13,5
19,7	SMDT 1970 D MEL	●	13,5
19,8	SMDT 1980 D MEL	●	13,5
19,9	SMDT 1990 D MEL	●	13,5
20,0	SMDT 2000 D MEL	●	14,1
20,5	SMDT 2050 D MEL	●	14,1
21,0	SMDT 2100 D MEL	●	14,8
21,5	SMDT 2150 D MEL	●	14,8
22,0	SMDT 2200 D MEL	●	15,0
22,5	SMDT 2250 D MEL	●	15,0
23,0	SMDT 2300 D MEL	●	15,1
23,5	SMDT 2350 D MEL	●	15,1
24,0	SMDT 2400 D MEL	●	15,4
24,5	SMDT 2450 D MEL	●	15,4
25,0	SMDT 2500 D MEL	●	15,8
25,5	SMDT 2550 D MEL	●	15,8
26,0	SMDT 2600 D MEL	●	16,4
26,5	SMDT 2650 D MEL	●	16,4
27,0	SMDT 2700 D MEL	●	17,1
27,5	SMDT 2750 D MEL	●	17,1
28,0	SMDT 2800 D MEL	●	17,7
28,5	SMDT 2850 D MEL	●	17,7
29,0	SMDT 2900 D MEL	●	18,3
29,5	SMDT 2950 D MEL	●	18,3
30,0	SMDT 3000 D MEL	●	19,0
30,5	SMDT 3050 D MEL	●	19,0

## ■ Recommended Cutting Conditions

● For using 3xD and 5xD type drills

Work material		Soft steel (~HB250)	Stainless steel (~HB200)	Grey cast iron
Drill $\phi$ (mm)				
~ 16,0	$v_c$	80 - 100 - 120	50 - 60 - 80	50 - 70 - 90
	f	0,15 - 0,2 - 0,35	0,1 - 0,15 - 0,2	0,2 - 0,25 - 0,3
~ 20,0	$v_c$	80 - 100 - 120	60 - 70 - 90	60 - 80 - 100
	f	0,15 - 0,25 - 0,35	0,15 - 0,2 - 0,25	0,25 - 0,3 - 0,35
~ 30,8	$v_c$	80 - 100 - 120	60 - 70 - 90	60 - 80 - 100
	f	0,2 - 0,3 - 0,35	0,15 - 0,2 - 0,25	0,2 - 0,35 - 0,40

Note: High cutting performance is enhanced when using a high quality machine and rigid set up.

**New**

● For using 8xD and 12xD type drills

Work material		Soft steel (~HB250)	Stainless steel (~HB200)	Grey cast iron
Drill $\phi$ (mm)				
~16,0	$v_c$	50 - 70 - 80	40 - 50 - 60	40 - 60 - 80
	f	0,15 - 0,2 - 0,35	0,1 - 0,15 - 0,2	0,2 - 0,25 - 0,3
~20,0	$v_c$	50 - 70 - 80	40 - 60 - 70	50 - 70 - 90
	f	0,15 - 0,25 - 0,35	0,15 - 0,2 - 0,25	0,25 - 0,3 - 0,35
~25,0 (12D)	$v_c$	60 - 70 - 80	40 - 60 - 70	50 - 70 - 90
	f	0,2 - 0,3 - 0,35	0,15 - 0,2 - 0,25	0,2 - 0,35 - 0,4

[  $v_c$  : Cutting Speed (m/min), f : Feed rate (mm/rev), Min - Optimum - Max ]

● = Euro stock

# Regrindable Drill Head Insert SMDT... MEL Type

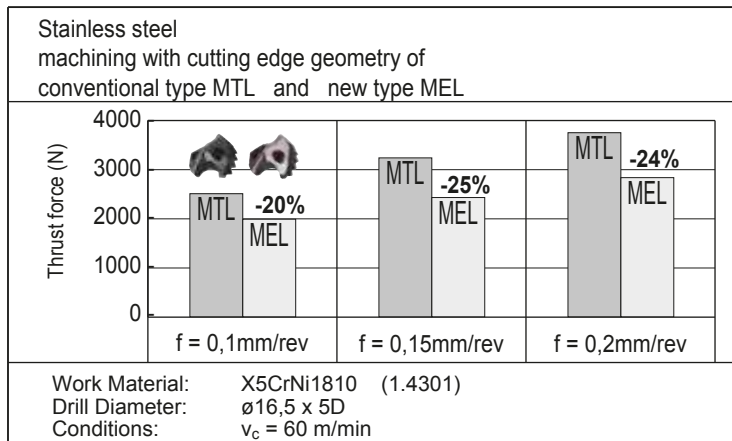
## Advantages

- Replaceable and regrindable drill head
- New design decreases cutting force by 25%
- Ideal for stainless steels - soft steels etc
- Excellent tool life when drilling cast iron
- Improves drilling performance on low powered machines
- Increases productivity

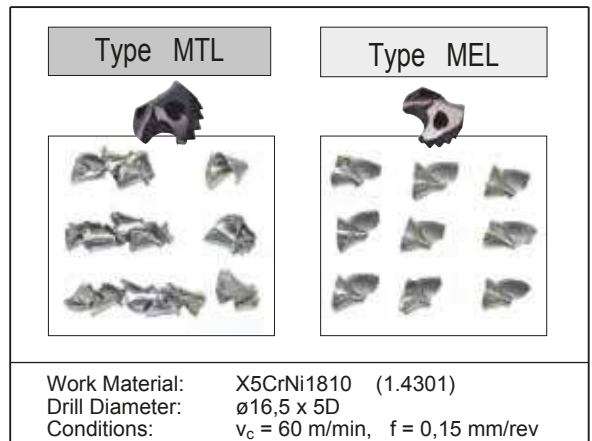


## Performance (Stainless steel machining)

### Comparison of cutting force

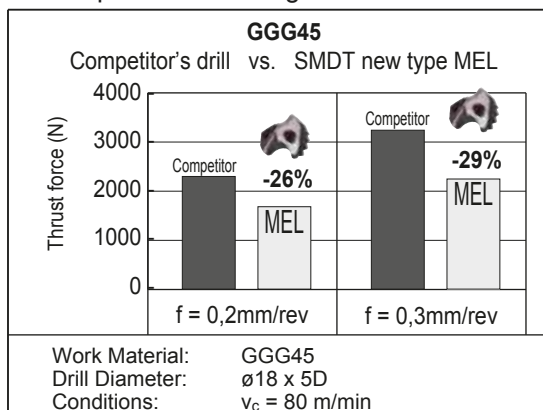


### Chip comparison

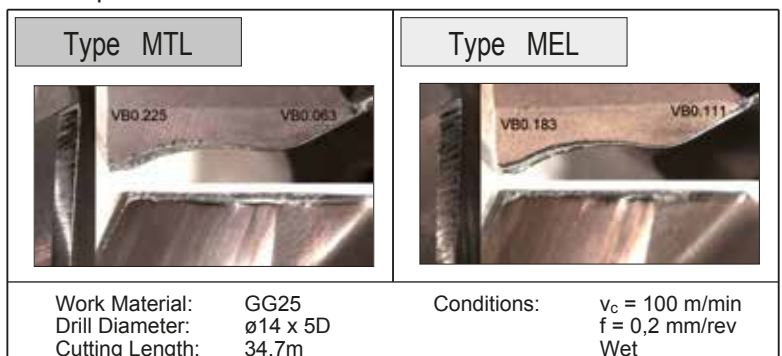


## Performance (Cast iron machining)

### Comparison of cutting force

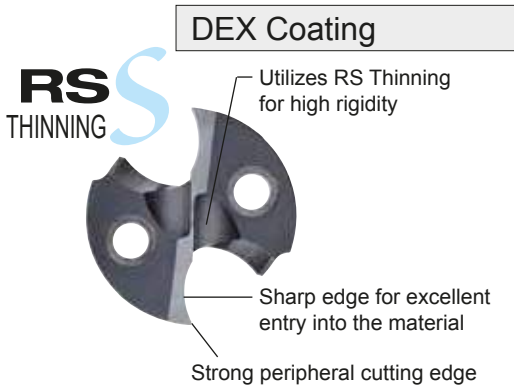


### Comparison of wear resistance





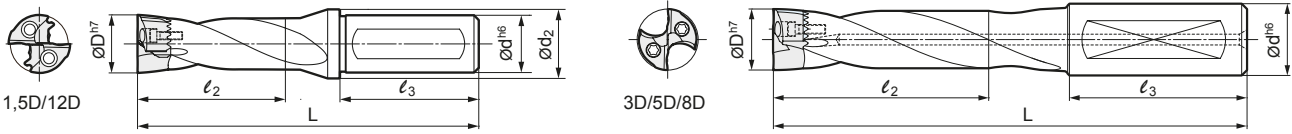
## MFS Type Ideal for Drilling in Non-Flat Surfaces and Less Burr



### Advantages

- Various Drilling Operations Thanks to a Point Angle of 180°**  
 Applicable to high-efficiency spot facing, drilling in non-flat surfaces such as inclined and cylindrical surfaces and interrupted drilling. Also reduces burrs at the hole exit.
- Improves Machining Stability**  
 Achieves high rigidity by employing RS Thinning, which ensures thick web at the bottom.

### Holder



No flat face for side lock clamping on the shank of 12D holders.

### Holder

Dimensions				Cat. No.	Series (1,5D)			Series (3D)			Series (5D)			Series (8D)			Series (12D)			Related Drill Heads MFS			
Drill Head	Shank				Stock	Dimensions		Stock	Dimensions		Stock	Dimensions		Stock	Dimensions		Stock	Dimensions					
Ø D	ℓ <sub>1</sub>	Ø d	ℓ <sub>3</sub>		S	L	ℓ <sub>2</sub>	Ø d <sub>2</sub>	M3	L	ℓ <sub>2</sub>	M5	L	ℓ <sub>2</sub>	M8	L	ℓ <sub>2</sub>	12D	L		ℓ <sub>2</sub>	Ø d <sub>2</sub>	
12,0	2,2	16	48	SMDH 120	91	25,5	20	●	107,2	43,5	●	132,2	68,5								1200~1249		
12,5	2,3			SMDH 125	91	25,5	20	●	107,3	43,5	●	132,3	68,5									1250~1299	
13,0	2,4			SMDH 130	92	27,5	20	●	112,4	46,5	●	142,4	73,5									1300~1349	
14,0	2,5			SMDH 140	96	31,5	20	●	119,0	52,5	●	149,0	81,5	●	194,0	124,5	●	238,5	168,5	20			1350~1450
15,0	2,7	20	50	SMDH 150	100	32,0	25	●	129,2	55,0	●	159,2	86,0	●	204,2	133,0	●	253,0	180,0	25		1451~1550	
16,0	2,9			SMDH 160	103	35,0	25	●	134,4	59,0	●	169,4	92,0	●	214,4	141,0	●	265,5	192,0	25		1551~1650	
17,0	3,1			SMDH 170	105	35,5	25	●	139,6	62,5	●	174,6	97,5	●	224,6	150,5	●	278,1	203,5	25		1651~1750	
18,0	3,3			SMDH 180	107	39,7	25	●	144,8	66,5	●	179,8	103,5	●	229,8	158,5	●	290,5	215,5	25		1751~1850	
19,0	3,5	25	56	SMDH 190	115	40,5	30	●	160,1	69,5	●	195,0	108,5	●	255,0	167,5	●	309,1	228,5	30		1851~1950	
20,0	3,6			SMDH 200	118	43,0	30	●	160,1	73,0	●	200,1	114,0	●	265,1	175,0	●	321,4	240,0	30		1951~2050	
21,0	3,8			SMDH 210	119	44,0	30	●	160,3	76,0	●	200,3	119,0	●	270,3	184,0	●	333,9	252,0	30		2051~2150	
22,0	4,0			SMDH 220	121	47,0	30	●	165,1	80,0	●	205,1	125,0	●	275,1	192,0	●	347,0	264,0	30		2151~2280	
23,0	4,2	32	60	SMDH 230	122	46,5	30	●	164,8	82,5	●	214,8	129,5	●	284,8	200,5	●	359,0	275,5	30		2281~2380	
24,0	4,4			SMDH 240	129	49,5	37	●	174,6	86,5	●	224,6	135,5	●	299,6	208,5	●	376,1	284,5	37		2381~2480	
25,0	4,6			SMDH 250	129	49,0	37	●	174,6	88,0	●	229,6	140,0	●	304,6	217,0	●	388,4	300,0	37		2481~2580	
26,0	4,7			SMDH 260	132	52,0	37	●	179,7	92,0	●	234,7	146,0	●	314,7	225,0							2581~2680
27,0	4,9	36	66	SMDH 270	133	53,0	37	●	179,9	94,0	●	239,9	151,0	●	324,9	234,0						2681~2780	
28,0	5,1			SMDH 280	135	54,5	37	●	185,1	96,5	●	245,1	156,5	●	330,1	241,5							2781~2880
29,0	5,3			SMDH 290	136	55,5	37	●	190,3	99,5	●	250,3	161,5	●	340,3	250,5							2881~2980
30,0	5,5			SMDH 300	139	58,5	37	●	190,5	104,5	●	260,5	167,5	●	350,5	259,5							

Drill order description example: SMDH210M3, drill heads → K63

### Recommended Torque

Screw		Applicable Insert
	(N·m)	
BXD 02208 IP	0,8 ~ 1,0	SMDT 1200 ~ 1550 MFS
BXD 02509 IP	0,9 ~ 1,2	SMDT 1551 ~ 1850 MFS
BXD 03011 IP	1,8 ~ 2,4	SMDT 1851 ~ 2150 MFS
BXD 03512 IP	2,8 ~ 3,7	SMDT 2151 ~ 2480 MFS
BXD 04014 IP	4,1 ~ 5,5	SMDT 2481 ~ 2780 MFS
BXD 04515 IP	5,0 ~ 6,6	SMDT 2781 ~ 3050 MFS

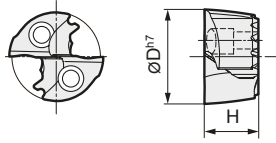
### Spare Parts

Screw	Wrench	Applicable Holder
BXD 02208 IP	TRDR 08 IP	SMDH 120 ~ 150 □□
BXD 02509 IP	TRDR 10 IP	SMDH 160 ~ 180 □□
BXD 03011 IP	TRDR 15 IP	SMDH 190 ~ 210 □□
BXD 03512 IP	TRDR 15 IP	SMDH 220 ~ 240 □□
BXD 04014 IP	TRDR 20 IP	SMDH 250 ~ 270 □□
BXD 04515 IP	TRDR 25 IP	SMDH 280 ~ 300 □□





Type MFS



PVD coated grade: **ACX70**

■ Drill Head (Insert)

●  $\varnothing D$ : 12,0~21,5mm

$\varnothing D$ (mm)	Cat. No.	Stock	H (mm)	Applicable Holders
12,0	<b>SMDT 1200 MFS</b>	○	7,1	SMDH120 □□
12,5	<b>SMDT 1250 MFS</b>	○	7,2	SMDH125 □□
13,0	<b>SMDT 1300 MFS</b>	○	7,5	SMDH130 □□
13,5	<b>SMDT 1350 MFS</b>	○		
14,0	<b>SMDT 1400 MFS</b>	○	7,9	SMDH140 □□
14,5	<b>SMDT 1450 MFS</b>	○		
15,0	<b>SMDT 1500 MFS</b>	○	8,3	SMDH150 □□
15,5	<b>SMDT 1550 MFS</b>	○		
16,0	<b>SMDT 1600 MFS</b>	○	8,8	SMDH160 □□
16,5	<b>SMDT 1650 MFS</b>	○		
17,0	<b>SMDT 1700 MFS</b>	○	9,3	SMDH170 □□
17,5	<b>SMDT 1750 MFS</b>	○		
18,0	<b>SMDT 1800 MFS</b>	○	9,8	SMDH180 □□
18,5	<b>SMDT 1850 MFS</b>	○		
19,0	<b>SMDT 1900 MFS</b>	○	10,2	SMDH190 □□
19,5	<b>SMDT 1950 MFS</b>	○		
20,0	<b>SMDT 2000 MFS</b>	○	10,7	SMDH200 □□
20,5	<b>SMDT 2050 MFS</b>	○		
21,0	<b>SMDT 2100 MFS</b>	○	11,2	SMDH210 □□
21,5	<b>SMDT 2150 MFS</b>	○		

●  $\varnothing D$ : 22,0~30,0mm

$\varnothing D$ (mm)	Cat. No.	Stock	H (mm)	Applicable Holders
22,0	<b>SMDT 2200 MFS</b>	○	11,2	SMDH220 □□
22,5	<b>SMDT 2250 MFS</b>	○		
23,0	<b>SMDT 2300 MFS</b>	○	11,2	SMDH230 □□
23,5	<b>SMDT 2350 MFS</b>	○		
24,0	<b>SMDT 2400 MFS</b>	○	11,3	SMDH240 □□
24,5	<b>SMDT 2450 MFS</b>	○		
25,0	<b>SMDT 2500 MFS</b>	○	11,7	SMDH250 □□
25,5	<b>SMDT 2550 MFS</b>	○		
26,0	<b>SMDT 2600 MFS</b>	○	12,2	SMDH260 □□
26,5	<b>SMDT 2650 MFS</b>	○		
27,0	<b>SMDT 2700 MFS</b>	○	12,7	SMDH270 □□
27,5	<b>SMDT 2750 MFS</b>	○		
28,0	<b>SMDT 2800 MFS</b>	○	13,2	SMDH280 □□
28,5	<b>SMDT 2850 MFS</b>	○		
29,0	<b>SMDT 2900 MFS</b>	○	13,6	SMDH290 □□
29,5	<b>SMDT 2950 MFS</b>	○		
30,0	<b>SMDT 3000 MFS</b>	○	14,1	SMDH300 □□

■ MFS Type Head Important Notes

Application	No Guide Hole (Solid Workpiece Hole Drilling)	With Guide Hole	Flat Finishing of Hole Bottom
	<p>Flat Surface      Non-Flat Surface</p>	<p>Guide Holes</p>	
1,5D Holder	○	○ (Guide Hole not required)	○
3D ~ 12D Holder	X	X	○

■ Recommended Cutting Conditions

$v_c$ : Cutting speed (m/min)  
f: Feed rate (mm/rev)

Work Material		Soft Steel (up to 250HB)	General Steel (250 to 320HB)	Hardened Steel (45HRC)	Stainless Steel (up to 200HB)	Gray Cast Iron	Ductile Cast Iron	Aluminum Alloy (*)
Drill Diameter DC (mm)	Cutting Conditions	Min.-Optimum-Max.	Min.-Optimum-Max.	Min.-Optimum-Max.	Min.-Optimum-Max.	Min.-Optimum-Max.	Min.-Optimum-Max.	Min.-Optimum-Max.
Up to $\varnothing 16,0$	$v_c$	60 - 100 - 120	70 - 100 - 120	40 - 60 - 90	50 - 60 - 80	50 - 70 - 90	50 - 60 - 80	200 - 240 - 260
	f	0,15 - 0,20 - 0,35	0,15 - 0,20 - 0,30	0,10 - 0,15 - 0,20	0,10 - 0,15 - 0,20	0,20 - 0,25 - 0,30	0,20 - 0,25 - 0,30	0,35 - 0,45 - 0,55
Up to $\varnothing 20,0$	$v_c$	80 - 100 - 120	70 - 100 - 120	40 - 60 - 90	60 - 70 - 90	60 - 80 - 100	50 - 70 - 90	200 - 240 - 260
	f	0,15 - 0,25 - 0,35	0,15 - 0,25 - 0,35	0,15 - 0,20 - 0,25	0,15 - 0,20 - 0,25	0,20 - 0,30 - 0,35	0,20 - 0,25 - 0,35	0,35 - 0,50 - 0,60
Up to $\varnothing 30,8$	$v_c$	80 - 100 - 120	70 - 100 - 120	40 - 60 - 90	60 - 70 - 90	60 - 80 - 100	50 - 70 - 90	200 - 240 - 260
	f	0,20 - 0,30 - 0,35	0,20 - 0,25 - 0,35	0,15 - 0,20 - 0,25	0,15 - 0,20 - 0,25	0,20 - 0,30 - 0,40	0,25 - 0,30 - 0,35	0,35 - 0,50 - 0,60

Note: The recommended hole depth is 2xDC. The depth is measured from the highest point of the hole when drilling on inclined surfaces. The recommended cutting conditions above are for drilling on flat horizontal surfaces. Adjust the feed rate according to the inclination angle when drilling on an inclined surface. Set the feed rate at 70% of lower when inclination angle is 30° or less. Set the feed rate at 50% or lower when the inclination angle is larger than 30°. This product is a drilling tool. Do not use it for traverse or helical milling.

(\*) Inquire about drills specifically for aluminum alloy.

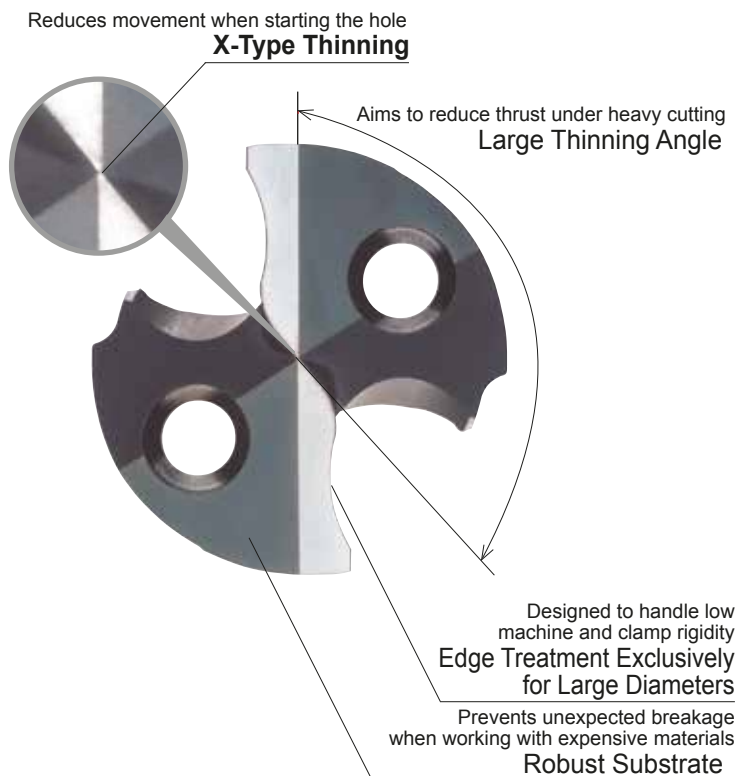
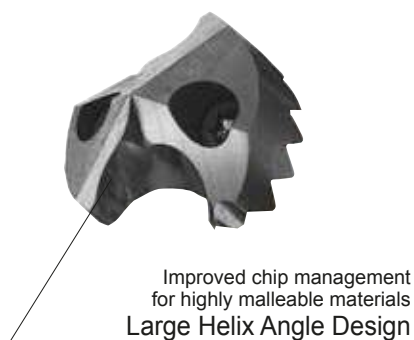
# Replaceable Head Type MULTI-DRILLS SMD Type

Large Hole MTL Type

For Large Holes



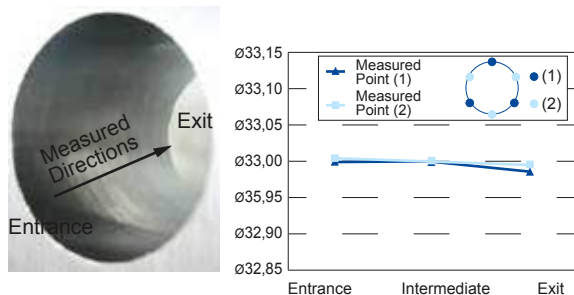
Tool edge design ideal for malleable material used for large casings, etc.  
Edge design suitable for malleable material commonly used for large hole drilling.



## ■ Machined Surface Accuracy

Work Material: St 52-3 (Base substrate for construction use)  
Drill Size:  $\varnothing 33,0\text{mm} \times 5\text{D}$   
Cutting Conditions:  $v_c=120\text{m/min}$ ,  $f=0,25\text{mm/rev}$   
Cutting Environment: Emulsion Type

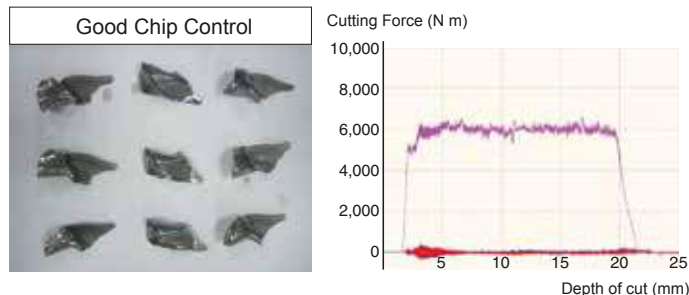
High drilling accuracy with large diameters



## ■ Cutting Force Comparison (Thrust)

Work Material: St 42-2 (Laminated plates)  
Drill Size:  $\varnothing 37,5\text{mm} \times 5\text{D}$   
Cutting Conditions:  $v_c=90\text{m/min}$ ,  $f=0,35\text{mm/rev}$   
Cutting Environment: Emulsion Type

Stable even when machining laminated plates



## ■ Recommended Cutting Conditions

$v_c$ =Cutting Speed (m/min)  $f$ =Feed Rate (mm/rev)

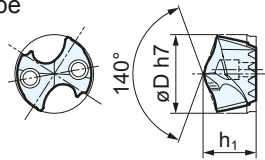
Work Material	Recommended Head Drill $\varnothing$ (mm)	Cutt. Conditions	Soft Steel (~HB250)	General Steel (HB250~320)	Hardened Steel (HRC45)	Stainless Steel (~HB200)	Grey Cast Iron	Ductile Cast Iron
			MTL Type	MTL Type	MTL Type	MTL Type	MTL Type	MTL Type
~ 36,5		$v_c$	60 ~ 120 (40 ~ 80)	60 ~ 120 (40 ~ 80)	40 ~ 80 (30 ~ 60)	40 ~ 80 (30 ~ 60)	50 ~ 100 (40 ~ 90)	50 ~ 90 (40 ~ 70)
		$f$	0,25 ~ 0,4	0,2 ~ 0,35	0,15 ~ 0,3	0,15 ~ 0,25	0,25 ~ 0,45	0,25 ~ 0,35
~ 42,5		$v_c$	60 ~ 120 (40 ~ 80)	60 ~ 120 (40 ~ 80)	40 ~ 80 (30 ~ 60)	40 ~ 80 (30 ~ 60)	50 ~ 100 (40 ~ 90)	50 ~ 90 (40 ~ 70)
		$f$	0,25 ~ 0,4	0,2 ~ 0,35	0,15 ~ 0,3	0,15 ~ 0,25	0,25 ~ 0,45	0,25 ~ 0,35

Note: Where machining and work clamp rigidity are good, conditions may be increased up to the maximum.  
For 8D drills, please use feed rates stated within the ( ). Before drilling 8D holes, a guide hole of similar diameter must be made.

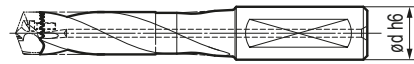
# Regrindable Drill Head Insert SMDT... MTL Type

For Large Holes

● Indexable Head MTL Type



● Toolholder

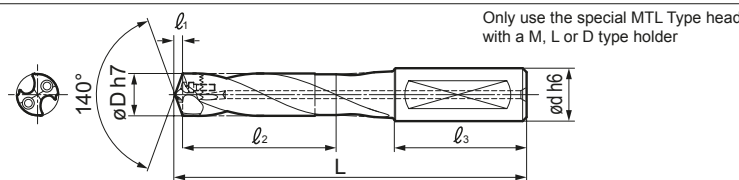


■ Drill Head (Ø31,0 to Ø42,5mm) Grade MTL Type - ACX80

■ Holders M (3D), L (5D), D (8D)

Drill Diameter ØD	Heads			Toolholder					
	MTL Type		h1	M (3D)		L (5D)		D (8D)	
	Cat. No.	Stock		Cat. No.	Stock	Cat. No.	Stock	Cat. No.	Stock
31,0	SMDT 3100 MTL	○	15,2	SMDH 320 M	○	SMDH 320 L	○	SMDH 320 D	○
31,5	SMDT 3150 MTL	○							
32,0	SMDT 3200 MTL	○							
32,5	SMDT 3250 MTL	○	15,2	SMDH 335 M	○	SMDH 335 L	○	SMDH 335 D	○
33,0	SMDT 3300 MTL	○							
33,5	SMDT 3350 MTL	○							
34,0	SMDT 3400 MTL	○	16,6	SMDH 350 M	○	SMDH 350 L	○	SMDH 350 D	○
34,5	SMDT 3450 MTL	○							
35,0	SMDT 3500 MTL	○							
35,5	SMDT 3550 MTL	○	16,4	SMDH 365 M	○	SMDH 365 L	○	SMDH 365 D	○
36,0	SMDT 3600 MTL	○							
36,5	SMDT 3650 MTL	○							
37,0	SMDT 3700 MTL	○	18,1	SMDH 380 M	○	SMDH 380 L	○	SMDH 380 D	○
37,5	SMDT 3750 MTL	○							
38,0	SMDT 3800 MTL	○							
38,5	SMDT 3850 MTL	○	17,8	SMDH 395 M	○	SMDH 395 L	○	SMDH 395 D	○
39,0	SMDT 3900 MTL	○							
39,5	SMDT 3950 MTL	○							
40,0	SMDT 4000 MTL	○	19,5	SMDH 410 M	○	SMDH 410 L	○	SMDH 410 D	○
40,5	SMDT 4050 MTL	○							
41,0	SMDT 4100 MTL	○							
41,5	SMDT 4150 MTL	○	19,3	SMDH 425 M	○	SMDH 425 L	○	SMDH 425 D	○
42,0	SMDT 4200 MTL	○							
42,5	SMDT 4250 MTL	○							

● Mounted Figure



Dimensions (mm)		M (3D)		L (5D)		D (8D)		Shank		Cap Screw	Wrench	N·m			
Drill Head		Dimensions (mm)		Dimensions (mm)		Dimensions (mm)		Dimensions (mm)							
ØD	$l_1$	$l_2$	L	$l_2$	L	$l_2$	L	$l_3$	Ød						
31,0	5,7	97,9	200,7	163	265,7	257,9	360,7	60	32,0	BXD04515IP	TRDR25IP	5 ~ 6,6			
31,5															
32,0															
32,5	6,0	103,3	206,0	171,5	276,0	273,3	376,0	60	32,0						
33,0															
33,5															
34,0	6,3	106,8	221,3	182	296,3	287	401,3	70	40,0				BX0515	HD040	7,2
34,5															
35,0															
35,5	6,6	112,3	226,6	187,5	301,6	297,3	411,6	70	40,0						
36,0															
36,5															
37,0	6,8	115,8	231,8	195,8	311,8	310,8	426,8	70	40,0						
37,5															
38,0															
38,5	7,1	121,3	237,1	206,3	322,1	321,3	437,1	70	40,0						
39,0															
39,5															
40,0	7,4	129,8	252,4	209,8	332,4	334,8	457,4	70	40,0						
40,5															
41,0															
41,5	7,6	135,3	257,6	220,3	342,6	345,3	467,6	70	40,0						
42,0															
42,5															

# Indexable Insert Type "SumiDrill" WDX Type

ECONOMICAL - FAST - ACCURATE - RIGID

High Feed Drilling - 4 Edge Inserts



## General Features

The newly designed WDX drill features indexable inserts with 4 cutting edges and a range of optimised chipbreakers; light (L) - general purpose (G) - heavy (H) for rapid chip removal.

The balanced cut design maximises feed rates and accuracy whilst the super ZX ultra hard coated inserts double the tool life.

## Advantages

### Rigid - Economical - Multi-function

Drills - Bores - External Turns  
Diameter range 13,0 ~ 55,0 mm  
Drilling depth ~ 2D, ~ 3D, ~ 4D, ~ 5D

### Excellent chip control

Wide application suitability - choose from 3 styles of chipbreaker



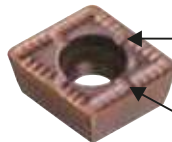
L Type

- Excellent chip control under low feed rate conditions
- Excellent hole accuracy
- Excellent surface finish



G Type

- General purpose chipbreaker
- Excellent chip control
- Low cutting force
- Low / medium feed rates



H Type

- Strong cutting edge at higher feed rates
- Stable machining ~ eliminates vibration and noise

Additional grooves for optimised swarf control



Outer cutting edge Inner cutting edge

Inner cutting edge Outer cutting edge

### One insert style for both pockets

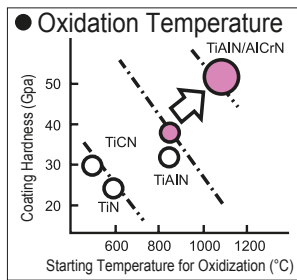
4 Edge insert provides both Inner and Outer cutting edges  
Newly designed insert style simplifies insert management.

### Ultra hard Super ZX inserts double tool life

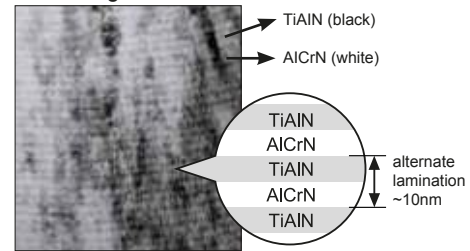
**ACP300** for steels - stainless steels - difficult to cut materials  
**ACK300** for cast irons

## Features of Super ZX Coating

- Super-multi layered coating with ultra-thin (nanometer) layers of TiAlN and AlCrN, alternately stacked up to 1.000 layers.
- 40% increase in coating hardness and 200% increase in oxidation temperature as compared with conventional grades



### Coating Structure



## "AURORA" Coating DLC (Diamond Like Carbon)

Coated Grade **DL1500** for Aluminium

G Type



### Super smooth surface and low coefficient of friction

Achieving beautiful finishing on Aluminium and non-ferrous metallals with its high resistance to build-up edge.

Peripheral Insert		Central Insert	
DL1500	ACK300	DL1500	ACK300

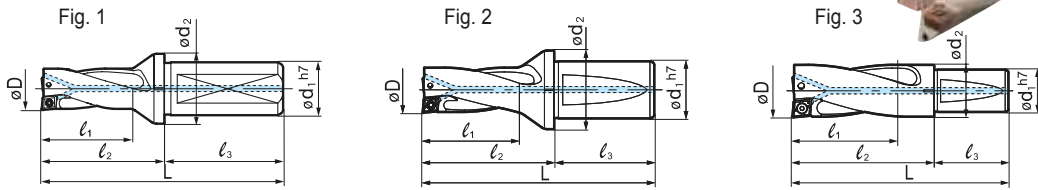
● = Euro stock  
○ = Japan stock

Recommended Tightening Torque (N·m)

# Indexable Insert Type "SumiDrill" WDX Type (2D)



Max. Depth : 2 x  $\phi D$



## Holder

$\phi D$ (mm)	Cat. No.	Stock	Dimensions (mm)						Applicable Insert	Fig.
			L	$l_1$	$l_2$	$\phi d_1$	$\phi d_2$	$l_3$		
13.0	WDX 130D2S20	●	88	29	44	20	28	44	WDX 042004	1
13.5	WDX 135D2S20	●	89	30	45	20	28	44		
14.0	WDX 140D2S20	●	90	31	46	20	28	44	WDX 052504	1
14.5	WDX 145D2S20	●	91	32	47	20	28	44		
15.0	WDX 150D2S20	●	92	33	48	20	28	44	WDX 052504	1
15.5	WDX 155D2S20	●	93	34	49	20	28	44		
16.0	WDX 160D2S20	●	94	35	50	20	30	44	WDX 052504	1
16.5	WDX 165D2S20	●	95	36	51	20	30	44		
17.0	WDX 170D2S20	●	96	37	52	20	30	44	WDX 052504	1
17.5	WDX 175D2S25	●	109	38	53	25	32	56		
18.0	WDX 180D2S25	●	110	39	54	25	32	56	WDX 063006	1
18.5	WDX 185D2S25	●	111	40	55	25	32	56		
19.0	WDX 190D2S25	●	112	41	56	25	32	56	WDX 063006	1
19.5	WDX 195D2S25	●	113	42	57	25	32	56		
20.0	WDX 200D2S25	●	114	43	58	25	32	56	WDX 063006	1
20.5	WDX 205D2S25	●	115	44	59	25	33	56		
21.0	WDX 210D2S25	●	116	45	60	25	33	56	WDX 063006	1
21.5	WDX 215D2S25	●	117	46	61	25	33	56		
22.0	WDX 220D2S25	●	118	47	62	25	33	56	WDX 063006	1
22.5	WDX 225D2S25	●	119	48	63	25	33	56		
23.0	WDX 230D2S25	●	123	49	67	25	37	56	WDX 073506	1
23.5	WDX 235D2S25	●	124	50	68	25	37	56		
24.0	WDX 240D2S25	●	125	51	69	25	37	56	WDX 073506	1
24.5	WDX 245D2S25	●	126	52	70	25	37	56		
25.0	WDX 250D2S25	●	127	53	71	25	37	56	WDX 073506	1
25.5	WDX 255D2S32	●	134	54	74	25	37	56		
26.0	WDX 260D2S32	●	135	55	75	25	37	56	WDX 073506	1
26.5	WDX 265D2S32	●	136	56	76	25	37	56		
27.0	WDX 270D2S32	●	137	57	77	25	37	56	WDX 073506	1
27.5	WDX 275D2S32	●	138	58	78	25	37	56		
28.0	WDX 280D2S32	●	139	59	79	25	37	56	WDX 073506	1
28.5	WDX 285D2S32	●	140	60	80	25	37	56		
29.0	WDX 290D2S32	●	143	62	83	32	41	60	WDX 094008	2
29.5	WDX 295D2S32	●	144	63	84	32	41	60		
30.0	WDX 300D2S40	●	158	64	88	32	41	60	WDX 094008	2
31.0	WDX 310D2S40	●	160	66	90	32	41	60		
32.0	WDX 320D2S40	●	162	68	92	32	41	60	WDX 094008	2
33.0	WDX 330D2S40	●	164	70	94	32	41	60		
34.0	WDX 340D2S40	●	166	72	96	32	41	60	WDX 094008	2
35.0	WDX 350D2S40	●	168	74	98	32	41	60		
36.0	WDX 360D2S40	●	170	76	100	32	41	60	WDX 094008	2
37.0	WDX 370D2S40	●	179	79	109	32	41	60		
38.0	WDX 380D2S40	●	181	81	111	32	41	60	WDX 125012	2
39.0	WDX 390D2S40	●	183	83	113	32	41	60		
40.0	WDX 400D2S40	●	185	85	115	32	41	60	WDX 125012	2
41.0	WDX 410D2S40	●	187	87	117	32	41	60		
42.0	WDX 420D2S40	●	189	89	119	32	41	60	WDX 125012	2
43.0	WDX 430D2S40	●	191	91	121	32	41	60		
44.0	WDX 440D2S40	●	193	93	123	32	41	60	WDX 125012	2
45.0	WDX 450D2S40	●	195	95	125	32	41	60		
46.0	WDX 460D2S40	●	197	97	127	32	41	60	WDX 125012	2
47.0	WDX 470D2S40	●	199	99	129	32	41	60		
48.0	WDX 480D2S40	●	201	101	131	32	41	60	WDX 125012	2
49.0	WDX 490D2S40	●	203	103	133	32	41	60		
50.0	WDX 500D2S40	●	205	105	135	32	41	60	WDX 125012	2
51.0	WDX 510D2S40	●	207	107	137	32	41	60		
52.0	WDX 520D2S40	●	209	109	139	32	41	60	WDX 125012	2
53.0	WDX 530D2S40	●	211	111	141	32	41	60		
54.0	WDX 540D2S40	●	213	113	143	32	41	60	WDX 125012	2
55.0	WDX 550D2S40	●	215	115	145	32	41	60		
56.0	WDX 560D2S40	○	222	120	152	32	41	60	WDX 186012	3
57.0	WDX 570D2S40	○	224	122	154	32	41	60		
58.0	WDX 580D2S40	○	226	124	156	32	41	60	WDX 186012	3
59.0	WDX 590D2S40	○	228	126	158	32	41	60		
60.0	WDX 600D2S40	○	230	128	160	32	41	60	WDX 186012	3
61.0	WDX 610D2S40	○	232	130	162	32	41	60		
62.0	WDX 620D2S40	○	234	132	164	32	41	60	WDX 186012	3
63.0	WDX 630D2S40	○	236	134	166	32	41	60		
64.0	WDX 640D2S40	○	238	136	168	32	41	60	WDX 186012	3
65.0	WDX 650D2S40	○	240	138	170	32	41	60		

## Inserts

Cat. No.	Coated				Fig.	Dimensions (mm)			Applicable Holder
	ACP100	ACP300	ACK300	DL1500		$l$	Thickness	$r_E$	
WDX 042004-L	●	●	●	●	4	4,2	2,0	0,4	WDX 130 ~ 150
WDX 042004-G	●	●	●	●	5				
WDX 042004-H	●	●	●	●	6				
WDX 052504-L	●	●	●	●	4	5,0	2,5	0,4	WDX 155 ~ 180
WDX 052504-G	●	●	●	●	5				
WDX 052504-H	●	●	●	●	6				
WDX 063006-L	●	●	●	●	4	6,0	3,0	0,6	WDX 185 ~ 225
WDX 063006-G	●	●	●	●	5				
WDX 063006-H	●	●	●	●	6				
WDX 073506-L	●	●	●	●	4	7,5	3,5	0,6	WDX 230 ~ 285
WDX 073506-G	●	●	●	●	5				
WDX 073506-H	●	●	●	●	6				
WDX 094008-L	●	●	●	●	4	9,6	4,0	0,8	WDX 290 ~ 360
WDX 094008-G	●	●	●	●	5				
WDX 094008-H	●	●	●	●	6				
WDX 125012-L	●	●	●	●	4	12,4	5,0	1,2	WDX 370 ~ 450
WDX 125012-G	●	●	●	●	5				
WDX 125012-H	●	●	●	●	6				
WDX 156012-L	●	●	●	●	4	15,2	6,0	1,2	WDX 460 ~ 550
WDX 156012-G	●	●	●	●	5				
WDX 156012-H	●	●	●	●	6				
WDX 186012-G	○	○	○	○	5	18,0	6,0	1,2	WDX 560 ~ 650

## Spare Parts

Screw	Wrench	Wrench	Applicable Holders	N·m
BFTX 01604 N	TRX 06	-	WDX 130D2S20 ~ 150D2S20	0,3
BFTX 0204 N	TRX 06	-	WDX 155D2S20 ~ 180D2S25	0,5
BFTX 02206	-	TRD 07	WDX 185D2S25 ~ 225D2S25	1,0
BFTX 02506 N	-	TRD 08	WDX 230D2S25 ~ 285D2S32	1,5
BFTX 03584	-	TRD 15	WDX 290D2S32 ~ 360D2S40	3,5
BFTX 0511 N	-	TRD 20	WDX 370D2S40 ~ 450D2S40	5,0
BFTX 0615 N	-	TRD 25	WDX 460D2S40 ~ 650D2S40	7,5

Identification of Drill Body

### WDX 200 D2 S25

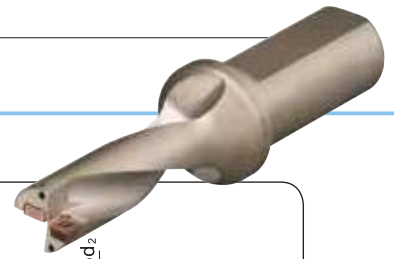
Drill Diameter ( $\phi 20,0$  mm)      Flute Length L/D ( $2 \times D$ )      Shank Size ( $\phi 25,0$  mm)

Identification of Indexable Insert

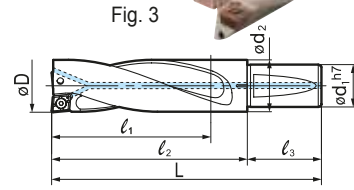
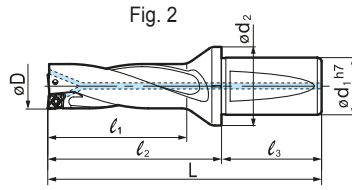
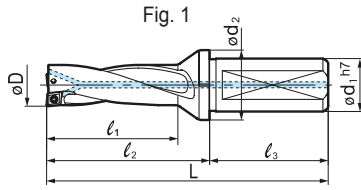
### WDX 06 30 06 -G

Width Across Flats (6,0 mm)      Thickness (3,0 mm)      Breaker Type  
Corner Radius (0,6 mm)

# Indexable Insert Type "SumiDrill" WDX Type (3D)



Max. Depth : 3 x  $\phi D$



## Holder

$\phi D$ (mm)	Cat. No.	Stock	Dimensions (mm)			$\phi d_1$	$\phi d_2$	$\phi d_3$	Applicable Insert	Fig.
			L	$l_1$	$l_2$					
13.0	WDX 130D3S20	●	101.0	42.0	57.0	20	28	44	WDXT 042004	1
13.5	WDX 135D3S20	●	102.5	43.5	58.5					
14.0	WDX 140D3S20	●	104.0	45.0	60.0					
14.5	WDX 145D3S20	●	105.5	46.5	61.5					
15.0	WDX 150D3S20	●	107.0	58.0	63.0	20	30	44	WDXT 052504	1
15.5	WDX 155D3S20	●	108.5	49.5	64.5					
16.0	WDX 160D3S20	●	110.0	51.0	66.0					
16.5	WDX 165D3S20	●	111.5	52.5	67.5					
17.0	WDX 170D3S20	●	113.0	54.0	69.0	25	32	56	WDXT 063006	2
17.5	WDX 175D3S25	●	126.5	55.5	70.5					
18.0	WDX 180D3S25	●	128.0	57.0	72.0					
18.5	WDX 185D3S25	●	129.5	58.5	73.5					
19.0	WDX 190D3S25	●	131.0	60.0	75.0	25	37	56	WDXT 073506	2
19.5	WDX 195D3S25	●	132.5	61.5	76.5					
20.0	WDX 200D3S25	●	134.0	63.0	78.0					
20.5	WDX 205D3S25	●	135.5	64.5	79.5					
21.0	WDX 210D3S25	●	137.0	66.0	81.0	32	41	60	WDXT 094008	2
21.5	WDX 215D3S25	●	138.5	67.5	82.5					
22.0	WDX 220D3S25	●	140.0	69.0	84.0					
22.5	WDX 225D3S25	●	141.5	70.5	85.5					
23.0	WDX 230D3S25	●	146.0	72.0	90.0	40	54	70	WDXT 125012	2
23.5	WDX 235D3S25	●	147.5	73.5	91.5					
24.0	WDX 240D3S25	●	149.0	75.0	93.0					
24.5	WDX 245D3S25	●	150.5	76.5	94.5					
25.0	WDX 250D3S25	●	152.0	78.0	96.0	40	49.5	70	WDXT 156012	3
25.5	WDX 255D3S32	●	159.5	79.5	97.5					
26.0	WDX 260D3S32	●	161.0	81.0	101.0					
26.5	WDX 265D3S32	●	162.5	82.5	102.5					
27.0	WDX 270D3S32	●	164.0	84.0	104.0	40	50	60	WDXT 186012	3
27.5	WDX 275D3S32	●	165.5	85.5	105.5					
28.0	WDX 280D3S32	●	167.0	87.0	107.0					
28.5	WDX 285D3S32	●	168.5	88.5	108.5					
29.0	WDX 290D3S32	●	172.0	91.0	112.0	54	54	54	WDXT 186012	3
29.5	WDX 295D3S32	●	173.5	92.5	113.5					
30.0	WDX 300D3S40	●	188.0	94.0	118.0					
31.0	WDX 310D3S40	●	191.0	97.0	121.0					
32.0	WDX 320D3S40	●	194.0	100.0	124.0	54	55	55	WDXT 186012	3
33.0	WDX 330D3S40	●	197.0	103.0	127.0					
34.0	WDX 340D3S40	●	200.0	106.0	130.0					
35.0	WDX 350D3S40	●	203.0	109.0	133.0					
36.0	WDX 360D3S40	●	206.0	112.0	136.0	54	56	56	WDXT 186012	3
37.0	WDX 370D3S40	●	216.0	116.0	146.0					
38.0	WDX 380D3S40	●	219.0	119.0	149.0					
39.0	WDX 390D3S40	●	222.0	122.0	152.0					
40.0	WDX 400D3S40	●	225.0	125.0	155.0	54	57	57	WDXT 186012	3
41.0	WDX 410D3S40	●	228.0	128.0	158.0					
42.0	WDX 420D3S40	●	231.0	131.0	161.0					
43.0	WDX 430D3S40	●	234.0	134.0	164.0					
44.0	WDX 440D3S40	●	237.0	137.0	167.0	54	58	58	WDXT 186012	3
45.0	WDX 450D3S40	●	240.0	140.0	170.0					
46.0	WDX 460D3S40	●	243.0	143.0	173.0					
47.0	WDX 470D3S40	●	246.0	146.0	176.0					
48.0	WDX 480D3S40	●	249.0	149.0	179.0	54	59	59	WDXT 186012	3
49.0	WDX 490D3S40	●	252.0	152.0	182.0					
50.0	WDX 500D3S40	●	255.0	155.0	185.0					
51.0	WDX 510D3S40	●	258.0	158.0	188.0					
52.0	WDX 520D3S40	●	261.0	161.0	191.0	54	60	60	WDXT 186012	3
53.0	WDX 530D3S40	●	264.0	164.0	194.0					
54.0	WDX 540D3S40	●	267.0	167.0	197.0					
55.0	WDX 550D3S40	●	270.0	170.0	200.0					
56.0	WDX 560D3S40	○	278.0	176.0	208.0	54	61	61	WDXT 186012	3
57.0	WDX 570D3S40	○	281.0	179.0	211.0					
58.0	WDX 580D3S40	○	284.0	182.0	214.0					
59.0	WDX 590D3S40	○	287.0	185.0	217.0					
60.0	WDX 600D3S40	○	290.0	188.0	220.0	54	62	62	WDXT 186012	3
61.0	WDX 610D3S40	○	293.0	191.0	223.0					
62.0	WDX 620D3S40	○	296.0	194.0	226.0					
63.0	WDX 630D3S40	○	299.0	197.0	229.0					
64.0	WDX 640D3S40	○	302.0	200.0	232.0	54	63	63	WDXT 186012	3
65.0	WDX 650D3S40	○	305.0	203.0	235.0					

## Inserts

Cat. No.	Coated				Fig.	Dimensions (mm)			Applicable Holder
	ACP100	ACP300	ACK300	DL1500		$l$	Thickness	$r_\epsilon$	
WDXT 042004-L	●	●	●	●	4	4,2	2,0	0,4	WDX 130 ~ 150
WDXT 042004-G	●	●	●	●	5				
WDXT 042004-H	●	●	●	●	6				
WDXT 052504-L	●	●	●	●	4	5,0	2,5	0,4	WDX 155 ~ 180
WDXT 052504-G	●	●	●	●	5				
WDXT 052504-H	●	●	●	●	6				
WDXT 063006-L	●	●	●	●	4	6,0	3,0	0,6	WDX 185 ~ 225
WDXT 063006-G	●	●	●	●	5				
WDXT 063006-H	●	●	●	●	6				
WDXT 073506-L	●	●	●	●	4	7,5	3,5	0,6	WDX 230 ~ 285
WDXT 073506-G	●	●	●	●	5				
WDXT 073506-H	●	●	●	●	6				
WDXT 094008-L	●	●	●	●	4	9,6	4,0	0,8	WDX 290 ~ 360
WDXT 094008-G	●	●	●	●	5				
WDXT 094008-H	●	●	●	●	6				
WDXT 125012-L	●	●	●	●	4	12,4	5,0	1,2	WDX 370 ~ 450
WDXT 125012-G	●	●	●	●	5				
WDXT 125012-H	●	●	●	●	6				
WDXT 156012-L	●	●	●	●	4	15,2	6,0	1,2	WDX 460 ~ 550
WDXT 156012-G	●	●	●	●	5				
WDXT 156012-H	●	●	●	●	6				
WDXT 186012-G	○	○	○	○	5	18,0	6,0	1,2	WDX 560 ~ 650

## Spare Parts

Screw	Wrench	Wrench	Applicable Holders	(N·m)
BFTX 01604 N	TRX 06	-	WDX 130D3S20 ~ 150D3S20	0,3
BFTX 0204 N	TRX 06	-	WDX 155D3S20 ~ 180D3S25	0,5
BFTX 02206	-	TRD 07	WDX 185D3S25 ~ 225D3S25	1,0
BFTX 02506 N	-	TRD 08	WDX 230D3S25 ~ 285D3S32	1,5
BFTX 03584	-	TRD 15	WDX 290D3S32 ~ 360D3S40	3,5
BFTX 0511 N	-	TRD 20	WDX 370D3S40 ~ 450D3S40	5,0
BFTX 0615 N	-	TRD 25	WDX 460D3S40 ~ 650D3S40	7,5

Identification of Drill Body

### WDX 200 D3 S25

Drill Diameter ( $\phi 20,0$  mm)      Flute Length L/D ( $3 \times D$ )      Shank Size ( $\phi 25,0$  mm)

Identification of Indexable Insert

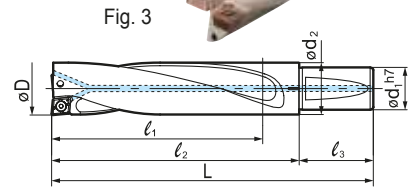
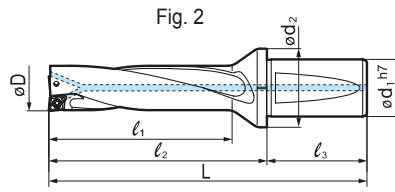
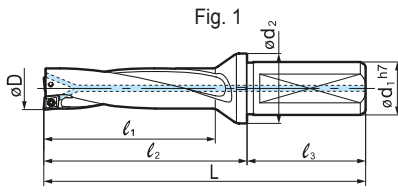
### WDXT 06 30 06 -G

Width Across Flats (6,0 mm)      Thickness (3,0 mm)      Corner Radius (0,6 mm)      Breaker Type

# Indexable Insert Type "SumiDrill" WDX Type (4D)



Max. Depth : 4 x  $\phi D$



## Holder

$\phi D$ (mm)	Cat. No.	Stock	Dimensions (mm)						Applicable Insert	Fig.	
			L	$l_1$	$l_2$	$\phi d_1$	$\phi d_2$	$l_3$			
13.0	WDX 130D4S20	●	114	55	70				WDX 042004	1	
13.5	WDX 135D4S20	●	116	57	72						
14.0	WDX 140D4S20	●	118	59	74		20	28			44
14.5	WDX 145D4S20	●	120	61	76						
15.0	WDX 150D4S20	●	122	63	78						
15.5	WDX 155D4S20	●	124	65	80						
16.0	WDX 160D4S20	●	126	67	82		20	30			44
16.5	WDX 165D4S20	●	128	69	84						
17.0	WDX 170D4S20	●	130	71	86						
17.5	WDX 175D4S25	●	144	73	88		25	32			56
18.0	WDX 180D4S25	●	146	75	90						
18.5	WDX 185D4S25	●	148	77	92						
19.0	WDX 190D4S25	●	150	79	94						
19.5	WDX 195D4S25	●	152	81	96						
20.0	WDX 200D4S25	●	154	83	98						
20.5	WDX 205D4S25	●	156	85	100		25	33			56
21.0	WDX 210D4S25	●	158	87	102						
21.5	WDX 215D4S25	●	160	89	104						
22.0	WDX 220D4S25	●	162	91	106						
22.5	WDX 225D4S25	●	164	93	108						
23.0	WDX 230D4S25	●	169	95	113						
23.5	WDX 235D4S25	●	171	97	115						
24.0	WDX 240D4S25	●	173	99	117		25	37	56		
24.5	WDX 245D4S25	●	175	101	119						
25.0	WDX 250D4S25	●	177	103	121						
25.5	WDX 255D4S32	●	185	105	125						
26.0	WDX 260D4S32	●	187	107	127						
26.5	WDX 265D4S32	●	189	109	129						
27.0	WDX 270D4S32	●	191	111	131		32	41	60		
27.5	WDX 275D4S32	●	193	113	133						
28.0	WDX 280D4S32	●	195	115	135						
28.5	WDX 285D4S32	●	197	117	137						
29.0	WDX 290D4S32	●	201	120	141		32	50	60		
29.5	WDX 295D4S32	●	203	122	143						
30.0	WDX 300D4S40	●	218	124	148						
31.0	WDX 310D4S40	●	222	128	152						
32.0	WDX 320D4S40	●	226	132	156						
33.0	WDX 330D4S40	●	230	136	160		40	54	70		
34.0	WDX 340D4S40	●	234	140	164						
35.0	WDX 350D4S40	●	238	144	168						
36.0	WDX 360D4S40	●	242	148	172						
37.0	WDX 370D4S40	●	253	153	183						
38.0	WDX 380D4S40	●	257	157	187						
39.0	WDX 390D4S40	●	261	161	191						
40.0	WDX 400D4S40	●	265	165	195						
41.0	WDX 410D4S40	●	269	169	199		40	49,5	70		
42.0	WDX 420D4S40	●	273	173	203						
43.0	WDX 430D4S40	●	277	177	207						
44.0	WDX 440D4S40	●	281	181	211						
45.0	WDX 450D4S40	●	285	185	215						
46.0	WDX 460D4S40	●	289	189	219						
47.0	WDX 470D4S40	●	293	193	223						
48.0	WDX 480D4S40	●	297	197	227						
49.0	WDX 490D4S40	●	301	201	231		49,5				
50.0	WDX 500D4S40	●	305	205	235						
51.0	WDX 510D4S40	●	309	209	239		40	70			
52.0	WDX 520D4S40	●	313	213	243						
53.0	WDX 530D4S40	●	317	217	247		50,5				
54.0	WDX 540D4S40	●	321	221	251		51,5				
55.0	WDX 550D4S40	●	325	225	255		52,5				
56.0	WDX 560D4S40	○	334	232	264		53,5				
57.0	WDX 570D4S40	○	338	236	268		54				
58.0	WDX 580D4S40	○	342	240	272		55				
59.0	WDX 590D4S40	○	346	244	276		56				
60.0	WDX 600D4S40	○	350	248	280		57				
							58				

## Inserts

Cat. No.	Coated				Fig.	Dimensions (mm)			Applicable Holder	
	ACP100	ACP300	ACK300	DL1500		l	Thickness	$r_E$		
WDXT 042004-L	●	●	●		4				WDX 130 ~ 150	
WDXT 042004-G	●	●	●	●	5	4,2	2,0	0,4		
WDXT 042004-H	●	●	●		6					
WDXT 052504-L	●	●	●		4					WDX 155 ~ 180
WDXT 052504-G	●	●	●	●	5	5,0	2,5	0,4		
WDXT 052504-H	●	●	●		6					
WDXT 063006-L	●	●	●		4				WDX 185 ~ 225	
WDXT 063006-G	●	●	●	●	5	6,0	3,0	0,6		
WDXT 063006-H	●	●	●		6					
WDXT 073506-L	●	●	●		4					WDX 230 ~ 285
WDXT 073506-G	●	●	●	●	5	7,5	3,5	0,6		
WDXT 073506-H	●	●	●		6					
WDXT 094008-L	●	●	●		4				WDX 290 ~ 360	
WDXT 094008-G	●	●	●	●	5	9,6	4,0	0,8		
WDXT 094008-H	●	●	●		6					
WDXT 125012-L	●	●	●		4					WDX 370 ~ 450
WDXT 125012-G	●	●	●	●	5	12,4	5,0	1,2		
WDXT 125012-H	●	●	●		6					
WDXT 156012-L	●	●	●		4				WDX 460 ~ 550	
WDXT 156012-G	●	●	●	●	5	15,2	6,0	1,2		
WDXT 156012-H	●	●	●		6					
WDXT 186012-G	○	○	○		5	18,0	6,0	1,2		WDX 560 ~ 650

## Spare Parts

Screw	Wrench	Wrench	Applicable Holders	Recommended Torque (Nm)
BFTX 01604 N	TRX 06	-	WDX 130D(S)20 ~ 150D(S)20	0,3
BFTX 0204 N	TRX 06	-	WDX 155D(S)20 ~ 180D(S)25	0,5
BFTX 02206	-	TRD 07	WDX 185D(S)25 ~ 225D(S)25	1,0
BFTX 02506 N	-	TRD 08	WDX 230D(S)25 ~ 285D(S)32	1,5
BFTX 03584	-	TRD 15	WDX 290D(S)32 ~ 360D(S)40	3,5
BFTX 0511 N	-	TRD 20	WDX 370D(S)40 ~ 450D(S)40	5,0
BFTX 0615 N	-	TRD 25	WDX 460D(S)40 ~ 600D(S)40	7,5

Identification of Drill Body

**WDX 200 D4 S25**

Drill Diameter ( $\phi 20,0$  mm)      Flute Length L/D (4 x D)      Shank Size ( $\phi 25,0$  mm)

Identification of Indexable Insert

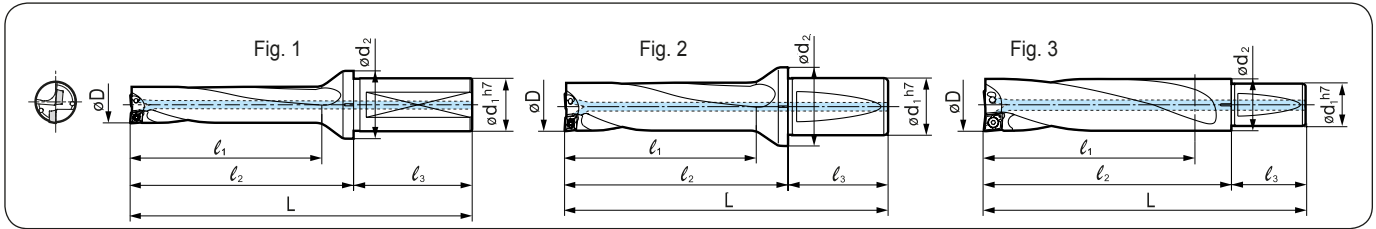
**WDXT 06 30 06 -G**

Width Across Flats (6,0 mm)      Thickness (3,0 mm)      Breaker Type      Corner Radius (0,6 mm)

# Indexable Insert Type "SumiDrill" WDX Type (5D)



Max. Depth : 5 x  $\phi D$



## Holder

$\phi D$ (mm)	Cat. No.	Stock	Dimensions (mm)						Applicable Insert	Fig.
			L	$l_1$	$l_2$	$\phi d_1$	$\phi d_2$	$l_3$		
13,0	WDX 130D5S20	●	127,0	68,0	83,0				WDX 042004	1
13,5	WDX 135D5S20	●	129,5	70,5	85,5					
14,0	WDX 140D5S20	●	132,0	73,0	88,0	20	28	44	WDX 052504	1
14,5	WDX 145D5S20	●	134,5	75,5	90,5					
15,0	WDX 150D5S20	●	137,0	78,0	93,0				WDX 052504	1
15,5	WDX 155D5S20	●	139,5	80,5	95,5					
16,0	WDX 160D5S20	●	142,0	83,0	98,0	20	30	44	WDX 063006	1
16,5	WDX 165D5S20	●	144,5	85,5	100,5					
17,0	WDX 170D5S20	●	147,0	88,0	103,0				WDX 073506	1
17,5	WDX 175D5S25	●	161,5	90,5	105,5	25	32	56		
18,0	WDX 180D5S25	●	164,0	93,0	108,0				WDX 073506	1
18,5	WDX 185D5S25	●	166,5	95,5	110,5					
19,0	WDX 190D5S25	●	169,0	98,0	113,0				WDX 094008	2
19,5	WDX 195D5S25	●	171,5	100,5	115,5					
20,0	WDX 200D5S25	●	174,0	103,0	118,0				WDX 094008	2
20,5	WDX 205D5S25	●	176,5	105,5	120,5	25	33	56		
21,0	WDX 210D5S25	●	179,0	108,0	123,0				WDX 094008	2
21,5	WDX 215D5S25	●	181,5	110,5	125,5					
22,0	WDX 220D5S25	●	184,0	113,0	128,0				WDX 094008	2
22,5	WDX 225D5S25	●	186,5	115,5	130,5					
23,0	WDX 230D5S25	●	192,0	118,0	136,0				WDX 094008	2
23,5	WDX 235D5S25	●	194,5	120,5	138,5					
24,0	WDX 240D5S25	●	197,0	123,0	141,0	25	37	56	WDX 094008	2
24,5	WDX 245D5S25	●	199,5	125,5	143,5					
25,0	WDX 250D5S25	●	202,0	128,0	146,0				WDX 094008	2
26,0	WDX 260D5S32	●	213,0	133,0	153,0					
27,0	WDX 270D5S32	●	218,0	138,0	158,0	32	41	60	WDX 094008	2
28,0	WDX 280D5S32	●	223,0	143,0	163,0					
29,0	WDX 290D5S32	●	230,0	149,0	170,0	32	50	60	WDX 094008	2
30,0	WDX 300D5S40	●	248,0	154,0	178,0					
31,0	WDX 310D5S40	●	253,0	159,0	183,0				WDX 094008	2
32,0	WDX 320D5S40	●	258,0	164,0	188,0					
33,0	WDX 330D5S40	●	263,0	169,0	193,0	40	54	70	WDX 094008	2
34,0	WDX 340D5S40	●	268,0	174,0	198,0					
35,0	WDX 350D5S40	●	273,0	179,0	203,0				WDX 094008	2
36,0	WDX 360D5S40	●	278,0	184,0	208,0					

## Inserts

Cat. No.	Coated				Fig.	Dimensions (mm)			Applicable Holder
	ACP100	ACP300	ACK300	DL1500		$l$	Thickness	$r_\epsilon$	
WDX 042004-L	●	●	●	●	4				WDX 130 ~ 150
WDX 042004-G	●	●	●	●	5	4,2	2,0	0,4	
WDX 042004-H	●	●	●	●	6				
WDX 052504-L	●	●	●	●	4				WDX 155 ~ 180
WDX 052504-G	●	●	●	●	5	5,0	2,5	0,4	
WDX 052504-H	●	●	●	●	6				
WDX 063006-L	●	●	●	●	4				WDX 185 ~ 225
WDX 063006-G	●	●	●	●	5	6,0	3,0	0,6	
WDX 063006-H	●	●	●	●	6				
WDX 073506-L	●	●	●	●	4				WDX 230 ~ 285
WDX 073506-G	●	●	●	●	5	7,5	3,5	0,6	
WDX 073506-H	●	●	●	●	6				
WDX 094008-L	●	●	●	●	4				WDX 290 ~ 360
WDX 094008-G	●	●	●	●	5	9,6	4,0	0,8	
WDX 094008-H	●	●	●	●	6				
WDX 125012-L	●	●	●	●	4				WDX 370 ~ 450
WDX 125012-G	●	●	●	●	5	12,4	5,0	1,2	
WDX 125012-H	●	●	●	●	6				
WDX 156012-L	●	●	●	●	4				WDX 460 ~ 550
WDX 156012-G	●	●	●	●	5	15,2	6,0	1,2	
WDX 156012-H	●	●	●	●	6				

## Spare Parts

Screw	Wrench	Wrench	Applicable Holders	N·m
BFTX 01604 N	TRX 06	-	WDX 130D S20 ~ 150D S20	0,3
BFTX 0204 N	TRX 06	-	WDX 155D S20 ~ 180D S25	0,5
BFTY 02206	-	TRD 07	WDX 185D S25 ~ 225D S25	1,0
BFTX 02506 N	-	TRD 08	WDX 230D S25 ~ 285D S32	1,5
BFTX 03584	-	TRD 15	WDX 290D S32 ~ 360D S40	3,5
BFTX 0511 N	-	TRD 20	WDX 370D S40 ~ 450D S40	5,0
BFTX 0615 N	-	TRD 25	WDX 460D S40 ~ 550D S40	7,5

Identification of Drill Body

### WDX 200 D5 S25

Drill Diameter ( $\phi 20,0$  mm) | Flute Length L/D (5 x D) | Shank Size ( $\phi 25,0$  mm)

Identification of Indexable Insert

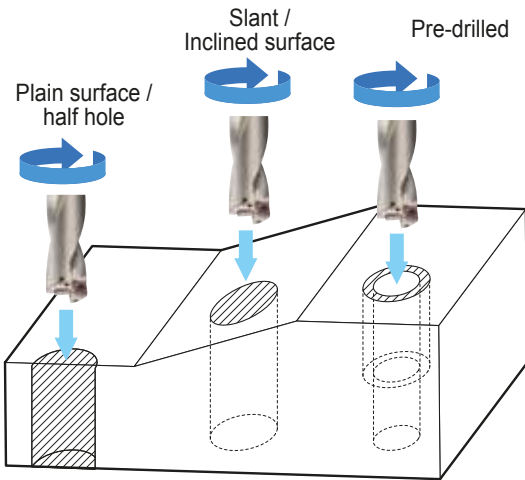
### WDX 06 30 06 -G

Width Across Flats (6,0 mm) | Thickness (3,0 mm) | Corner Radius (0,6 mm) | Breaker Type



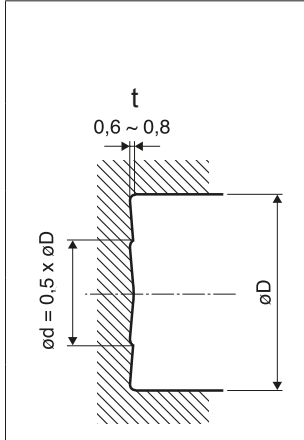
## Multi-Purpose Functionality

### ● Applications for machining centre



Recommended conditions - reduce feed rate to 70%

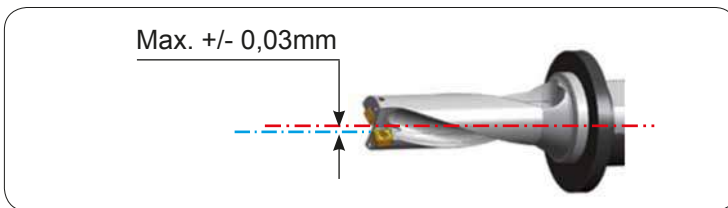
### ● Hole profile

	Drill Diameter	t (mm)
	13,0 - 18,0	0,4
18,5 - 28,5	0,6	
29,0 - 36,0	0,8	
37,0 - 55,0	1,2	

## Applications for Lathes

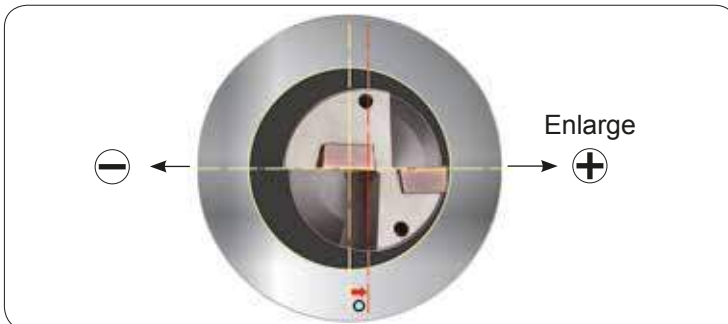
### ● Setting Instruction

Ensure the face of the drill flange is hard against the face of the tool holder.  
Align the centreline of the drill to the centreline of the lathes Y axis



### Drilling Over Holes

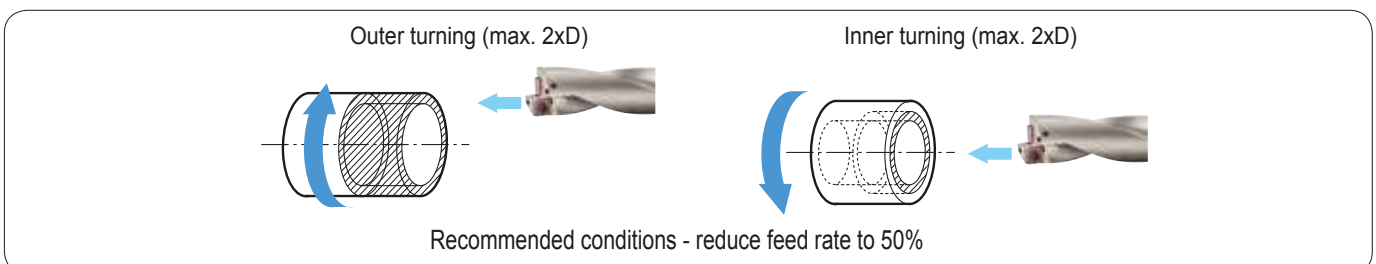
Offset the lathes X axis within the maximum amount stated in the table



Drill description	Max. Offset (mm)	Drill description	Max. Offset (mm)
WDX130...	0,35	WDX280...	0,15
WDX135...	0,30	WDX285...	0,10
WDX140...	0,25	WDX290...	1,00
WDX145...	0,20	WDX295...	0,95
WDX150...	0,15	WDX300...	0,90
WDX155...	0,40	WDX310...	0,80
WDX160...	0,40	WDX320...	0,70
WDX165...	0,35	WDX330...	0,55
WDX170...	0,30	WDX340...	0,45
WDX175...	0,25	WDX350...	0,35
WDX180...	0,20	WDX360...	0,20
WDX185...	0,50	WDX370...	1,00
WDX190...	0,45	WDX380...	1,00
WDX195...	0,40	WDX390...	0,90
WDX200...	0,30	WDX400...	0,80
WDX205...	0,30	WDX410...	0,70
WDX210...	0,20	WDX420...	0,60
WDX215...	0,15	WDX430...	0,50
WDX220...	0,10	WDX440...	0,50
WDX225...	0,06	WDX450...	0,40
WDX230...	0,70	WDX460...	1,50
WDX235...	0,70	WDX470...	1,40
WDX240...	0,60	WDX480...	1,30
WDX245...	0,50	WDX490...	1,20
WDX250...	0,50	WDX500...	1,10
WDX255...	0,45	WDX510...	1,00
WDX260...	0,40	WDX520...	0,90
WDX265...	0,35	WDX530...	0,80
WDX270...	0,25	WDX540...	0,60
WDX275...	0,20	WDX550...	0,50

Recommended conditions - reduce feed rate to 30%

### Turning by lathes

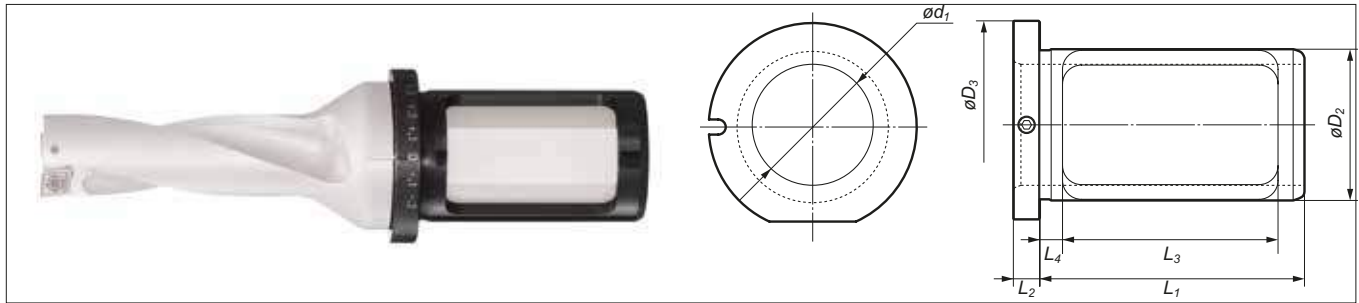


Recommended conditions - reduce feed rate to 50%

# WDX Type

## Eccentric Sleeve WAS Type

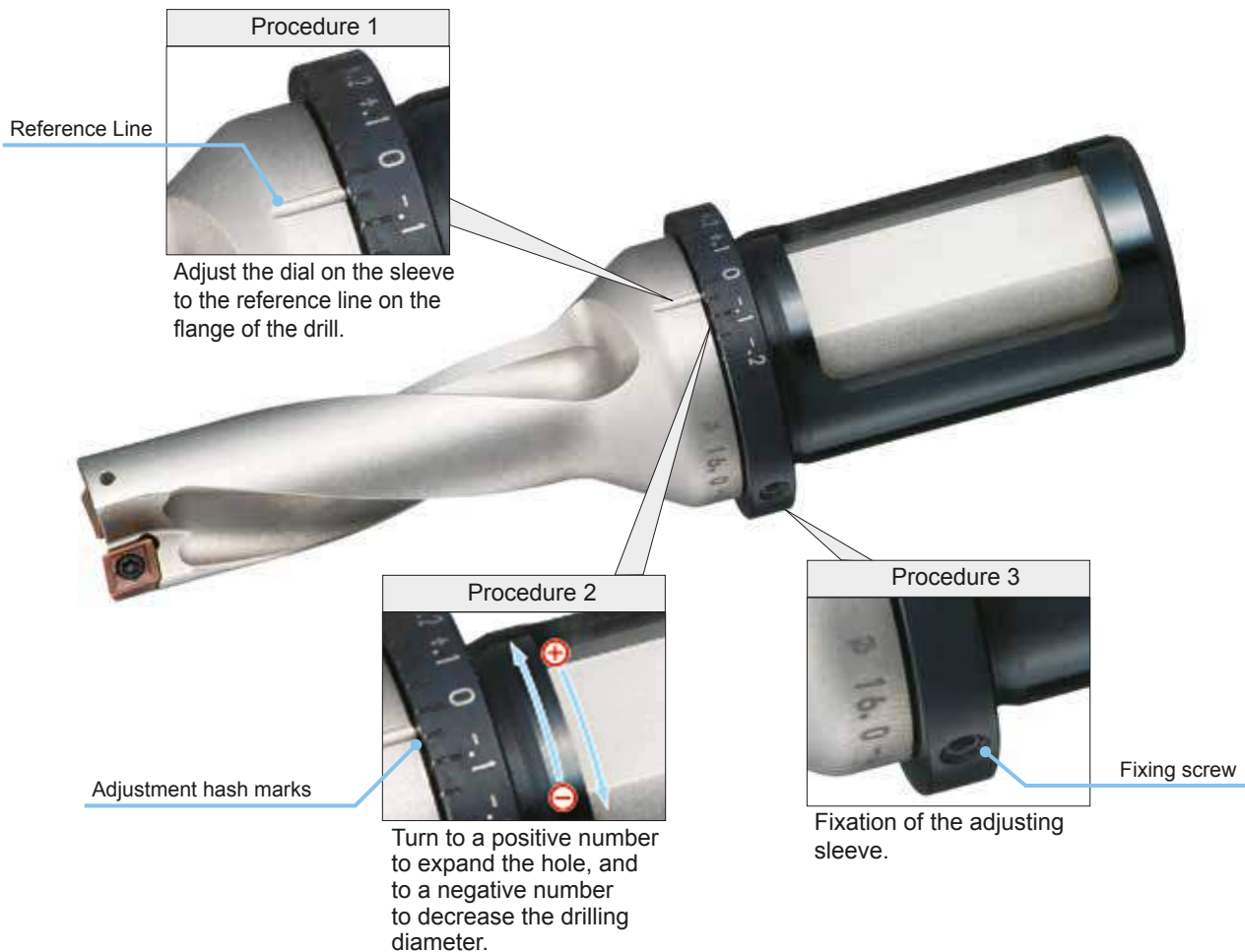
The Eccentric Sleeve WAS Type, exclusively designed for "SumiDrill" WDX Type, provides up to  $\pm 0,3$ mm of hole size adjustment.



### ■ Dimensions

Cat. No.	Stock	$\varnothing d_1$	$\varnothing D_2$	$\varnothing D_3$	$L_1$	$L_2$	$L_3$	$L_4$	Diameter Adjustment Range (max.)
WAS 2025-48	●	20	25	33	43	5	32	5	+0,3 ~ -0,2
WAS 2532-60	●	25	32	42	60	7	46	6	+0,3 ~ -0,3
WAS 3240-70	●	32	40	55	70	7	57	6	+0,3 ~ -0,3
WAS 4050-85	●	40	50	60	80	7	64	6	+0,3 ~ -0,3





### ■ Diameter Adjustment





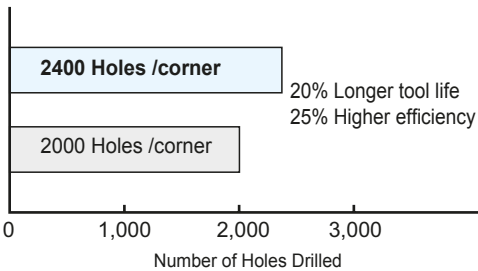
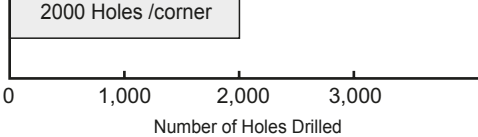
Note 1: The dial is for reference purposes. Always measure the actual drilling diameter and adjust accordingly.  
 Note 2: Not usable with collet chuck type holders. Only use with a side-locking holder like Weldon.


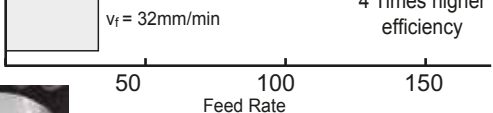
# Indexable Insert Type "SumiDrill" WDX Type


## Application Examples

"SumiDrill" WDX type	Normal wear	Good chip control
		
Competitor	Breakage	Long chips
		
Drill Body:	Automotive Component (SUS304) WDX220D2S25	
Drill Insert:	WDXT063006-L(ACP300)	
Conditions:	$v_c=125\text{m/min}$ , $f=0,07\text{mm/rev}$ , $H=5\text{mm}$ , through, Wet	
Insert breakage was eliminated with improved chip control and better surface finish.		

"SumiDrill" WDX type	Good chip form
	
Competitor	Entangled chips
	
Drill Body:	Structural Steel WDX190D4S25
Drill Insert:	WDXT063006-L(ACP300)
Conditions:	$v_c=100\text{m/min}$ , $f=0,06\text{mm/rev}$ , $H=40\text{mm}$ , through, Wet
Eliminated the problem of entangled chips.	



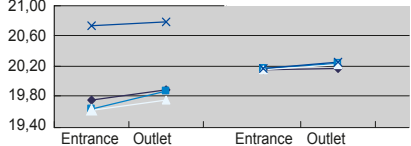
"SumiDrill" WDX type	2400 Holes /corner	20% Longer tool life 25% Higher efficiency
		
Competitor	2000 Holes /corner	
		
Drill Body:	Machine Component (SCM440) WDX220D3S25	
Drill Insert:	WDXT063006-G(ACP300)	
Conditions (Sumitomo):	$v_c=157\text{m/min}$ , $f=0,19\text{mm/rev}$ , $H=19\text{mm}$ , through, Wet	
Conditions (Comp.):	$v_c=157\text{m/min}$ , $f=0,15\text{mm/rev}$ , $H=19\text{mm}$ , through, Wet	
Good chip control even under high efficiency conditions. Better stability through lower cutting force, resulting in 25% higher efficiency and 20% higher tool life.		


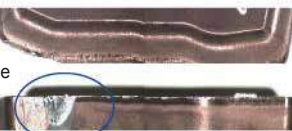
"SumiDrill" WDX type	$v_f = 32\text{mm/min}$	4 Times higher efficiency
		
Competitor	$v_f = 32\text{mm/min}$	
		
Drill Body:	Plate (S48C) WDX600D3S40	
Drill Insert:	WDXT186012-G(ACP300)	
Conditions (Sumitomo):	$v_c=150\text{m/min}$ , $f=0,16\text{mm/rev}$ , $H=60\text{mm}$ , through, Wet	
Conditions (Comp.):	$v_c=30\text{m/min}$ , $f=0,20\text{mm/rev}$ , $H=60\text{mm}$ , through, Wet	
Stable drilling performance. 4 times higher efficiency.		

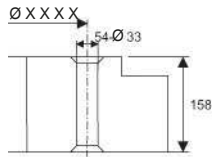


Entrance:  $\varnothing 60,155$   
Outlet:  $\varnothing 60,157$

Good surface finish and good hole tolerance.

Competitor		Good surface and hole tolerance.
"SumiDrill" WDX type		
		
Drill Body:	Automotive Component (SCM415) WDX200D5S25	
Drill Insert:	WDXT063006-G(ACP300)	
Conditions:	$v_c=185\text{m/min}$ , $f=0,12\text{mm/rev}$ , $H=87\text{mm}$ , through, Wet	
Good surface roughness. Stable hole diameter.		

"SumiDrill" WDX type	Normal flank wear
	
Competitor	Breakage
	
Drill Body:	Bearing Component for Windmill (42CrMo) WDX330D5S40
Drill Insert:	WDXT094008-L(ACP300)
Conditions:	$v_c=146\text{m/min}$ , $f=0,10\text{mm/rev}$ , $H=158\text{mm}$ , through, Wet
WDX shows stable drilling performance, no cutting edge breakage.	



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154  $\varnothing 33$

158

# Indexable Insert Type "SumiDrill" WDX Type

## Recommended Cutting Conditions

### Recommended Cutting Conditions (2D)

[ min. - optimal - max. ]

Material Group		Hardness (HB)	Chip breaker & Grade	Cutting Speed Vc (m/min)	Feed rate (mm/rev)				
ISO	Work material				ø13,0 ~ ø18,0	ø18,5 ~ ø29,0	ø29,5 ~ ø36,0	ø37,0 ~ ø55,0	ø56,0 ~ ø65,0
P	Carbon steel	125	L ACP300	150 - 220 - 250	0,04 - 0,08 - 0,12	0,04 - 0,08 - 0,12	0,04 - 0,08 - 0,13	0,05 - 0,10 - 0,15	0,06 - 0,11 - 0,17
		190	G ACP300	150 - 220 - 250	0,08 - 0,13 - 0,24	0,08 - 0,13 - 0,24	0,08 - 0,14 - 0,26	0,09 - 0,16 - 0,29	0,10 - 0,17 - 0,32
		250	G ACP300	125 - 170 - 230	0,06 - 0,11 - 0,18	0,06 - 0,11 - 0,18	0,06 - 0,12 - 0,19	0,07 - 0,13 - 0,22	0,08 - 0,14 - 0,24
		270	G ACP300	125 - 170 - 230	0,08 - 0,13 - 0,22	0,08 - 0,14 - 0,24	0,08 - 0,14 - 0,23	0,09 - 0,16 - 0,26	0,10 - 0,17 - 0,29
		300	G ACP300	100 - 130 - 170	0,06 - 0,11 - 0,17	0,06 - 0,12 - 0,18	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	0,08 - 0,14 - 0,22
	Low alloyed steel	180	L ACP300	150 - 180 - 220	0,05 - 0,08 - 0,14	0,05 - 0,08 - 0,14	0,05 - 0,08 - 0,16	0,06 - 0,09 - 0,17	0,07 - 0,10 - 0,19
		275	G ACP300	125 - 150 - 200	0,06 - 0,11 - 0,17	0,06 - 0,11 - 0,17	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	0,08 - 0,14 - 0,22
		300	G ACP300	100 - 140 - 170	0,06 - 0,11 - 0,17	0,06 - 0,11 - 0,17	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	0,08 - 0,14 - 0,22
	High alloyed steel	350	G ACP300	80 - 120 - 150	0,06 - 0,11 - 0,17	0,06 - 0,11 - 0,17	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	0,08 - 0,14 - 0,22
		200	G ACP300	100 - 150 - 200	0,08 - 0,13 - 0,24	0,08 - 0,13 - 0,24	0,08 - 0,14 - 0,26	0,09 - 0,16 - 0,29	0,10 - 0,17 - 0,32
325		G ACP300	80 - 120 - 160	0,06 - 0,11 - 0,18	0,06 - 0,11 - 0,18	0,06 - 0,12 - 0,19	0,07 - 0,13 - 0,22	0,08 - 0,14 - 0,24	
M	Stainless steel, martensitic / ferritic martensitic / tempered austenitic / quenched austenitic / ferritic (Duplex)	200	L/G ACP300	100 - 150 - 200	0,06 - 0,11 - 0,18	0,06 - 0,11 - 0,18	0,06 - 0,12 - 0,19	0,07 - 0,13 - 0,22	0,08 - 0,14 - 0,24
		240	L/G ACP300	90 - 120 - 150	0,06 - 0,11 - 0,18	0,06 - 0,11 - 0,18	0,06 - 0,12 - 0,19	0,07 - 0,13 - 0,22	0,08 - 0,14 - 0,24
		180	L/G ACP300	100 - 150 - 200	0,04 - 0,08 - 0,18	0,06 - 0,11 - 0,18	0,06 - 0,12 - 0,19	0,07 - 0,13 - 0,22	0,08 - 0,14 - 0,24
		230	L/G ACP300	80 - 120 - 150	0,04 - 0,08 - 0,18	0,06 - 0,11 - 0,18	0,06 - 0,12 - 0,19	0,07 - 0,13 - 0,22	0,08 - 0,14 - 0,24
K	Cast iron (GG)	180	H ACK300	120 - 160 - 200	0,09 - 0,20 - 0,32	0,10 - 0,22 - 0,36	0,11 - 0,24 - 0,39	0,12 - 0,26 - 0,44	0,13 - 0,29 - 0,48
		260	H ACK300	120 - 160 - 200	0,09 - 0,20 - 0,32	0,10 - 0,22 - 0,36	0,11 - 0,24 - 0,39	0,12 - 0,26 - 0,44	0,13 - 0,29 - 0,48
	Nodular cast iron (GGG)	160	H ACK300	90 - 120 - 250	0,09 - 0,20 - 0,32	0,10 - 0,22 - 0,36	0,11 - 0,24 - 0,39	0,12 - 0,26 - 0,44	0,13 - 0,29 - 0,48
		250	H ACK300	90 - 120 - 150	0,09 - 0,20 - 0,32	0,10 - 0,22 - 0,36	0,11 - 0,24 - 0,39	0,12 - 0,26 - 0,44	0,13 - 0,29 - 0,48
S	Heat resistant alloy	200	L/G ACP300	25 - 50 - 70	0,06 - 0,11 - 0,18	0,06 - 0,11 - 0,18	0,06 - 0,12 - 0,19	0,07 - 0,13 - 0,22	0,08 - 0,14 - 0,24
N	Aluminium alloy		G DL1500	200 - 260 - 320	0,06 - 0,11 - 0,17	0,06 - 0,11 - 0,17	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	0,08 - 0,14 - 0,22
	Copper alloy		G DL1500	180 - 230 - 280	0,06 - 0,11 - 0,17	0,06 - 0,11 - 0,17	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	0,08 - 0,14 - 0,22

### Recommended Cutting Conditions (3D)

[ min. - optimal - max. ]

Material Group		Hardness (HB)	Chip breaker & Grade	Cutting Speed Vc (m/min)	Feed rate (mm/rev)				
ISO	Work material				ø13,0 ~ ø18,0	ø18,5 ~ ø29,0	ø29,5 ~ ø36,0	ø37,0 ~ ø55,0	ø56,0 ~ ø65,0
P	Carbon steel	125	L ACP300	150 - 220 - 250	0,04 - 0,07 - 0,1	0,04 - 0,07 - 0,10	0,04 - 0,08 - 0,11	0,05 - 0,09 - 0,12	0,06 - 0,10 - 0,13
		190	G ACP300	150 - 220 - 250	0,08 - 0,12 - 0,2	0,08 - 0,12 - 0,20	0,08 - 0,13 - 0,22	0,09 - 0,14 - 0,24	0,10 - 0,16 - 0,27
		250	G ACP300	125 - 170 - 230	0,06 - 0,10 - 0,15	0,06 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,07 - 0,12 - 0,18	0,08 - 0,13 - 0,20
		270	G ACP300	125 - 170 - 230	0,08 - 0,12 - 0,18	0,08 - 0,12 - 0,18	0,08 - 0,13 - 0,19	0,09 - 0,14 - 0,22	0,10 - 0,16 - 0,24
		300	G ACP300	100 - 130 - 170	0,06 - 0,10 - 0,14	0,06 - 0,10 - 0,14	0,06 - 0,11 - 0,15	0,07 - 0,12 - 0,17	0,08 - 0,13 - 0,19
	Low alloyed steel	180	L ACP300	150 - 180 - 220	0,05 - 0,07 - 0,12	0,05 - 0,07 - 0,12	0,05 - 0,08 - 0,13	0,06 - 0,08 - 0,15	0,07 - 0,09 - 0,16
		275	G ACP300	125 - 150 - 200	0,06 - 0,10 - 0,14	0,06 - 0,10 - 0,14	0,06 - 0,11 - 0,15	0,07 - 0,12 - 0,17	0,08 - 0,13 - 0,19
		300	G ACP300	100 - 140 - 170	0,06 - 0,10 - 0,14	0,06 - 0,10 - 0,14	0,06 - 0,11 - 0,15	0,07 - 0,12 - 0,17	0,08 - 0,13 - 0,19
	High alloyed steel	350	G ACP300	80 - 120 - 150	0,06 - 0,10 - 0,14	0,06 - 0,10 - 0,14	0,06 - 0,11 - 0,15	0,07 - 0,12 - 0,17	0,08 - 0,13 - 0,19
		200	G ACP300	100 - 150 - 200	0,08 - 0,12 - 0,2	0,08 - 0,12 - 0,20	0,08 - 0,13 - 0,22	0,09 - 0,14 - 0,24	0,10 - 0,16 - 0,27
325		G ACP300	80 - 120 - 160	0,06 - 0,10 - 0,15	0,06 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,07 - 0,12 - 0,18	0,08 - 0,13 - 0,20	
M	Stainless steel, martensitic / ferritic martensitic / tempered austenitic / quenched austenitic / ferritic (Duplex)	200	L/G ACP300	100 - 150 - 200	0,06 - 0,10 - 0,15	0,06 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,07 - 0,12 - 0,18	0,08 - 0,13 - 0,20
		240	L/G ACP300	90 - 120 - 150	0,06 - 0,10 - 0,15	0,06 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,07 - 0,12 - 0,18	0,08 - 0,13 - 0,20
		180	L/G ACP300	100 - 150 - 200	0,04 - 0,10 - 0,15	0,06 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,07 - 0,12 - 0,18	0,08 - 0,13 - 0,20
		230	L/G ACP300	80 - 120 - 150	0,04 - 0,10 - 0,15	0,06 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,07 - 0,12 - 0,18	0,08 - 0,13 - 0,20
K	Cast iron (GG)	180	H ACK300	120 - 160 - 200	0,09 - 0,18 - 0,27	0,10 - 0,20 - 0,30	0,11 - 0,22 - 0,32	0,12 - 0,24 - 0,36	0,13 - 0,26 - 0,40
		260	H ACK300	120 - 160 - 200	0,09 - 0,18 - 0,27	0,10 - 0,20 - 0,30	0,11 - 0,22 - 0,32	0,12 - 0,24 - 0,36	0,13 - 0,26 - 0,40
	Nodular cast iron (GGG)	160	H ACK300	90 - 120 - 250	0,09 - 0,18 - 0,27	0,10 - 0,20 - 0,30	0,11 - 0,22 - 0,32	0,12 - 0,24 - 0,36	0,13 - 0,26 - 0,40
		250	H ACK300	90 - 120 - 150	0,09 - 0,18 - 0,27	0,10 - 0,20 - 0,30	0,11 - 0,22 - 0,32	0,12 - 0,24 - 0,36	0,13 - 0,26 - 0,40
S	Heat resistant alloy	200	L/G ACP300	25 - 50 - 70	0,06 - 0,10 - 0,15	0,06 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,07 - 0,12 - 0,18	0,08 - 0,13 - 0,20
N	Aluminium alloy		G DL1500	200 - 260 - 320	0,06 - 0,11 - 0,17	0,06 - 0,11 - 0,17	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	0,08 - 0,14 - 0,22
	Copper alloy		G DL1500	180 - 230 - 280	0,06 - 0,11 - 0,17	0,06 - 0,11 - 0,17	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	0,08 - 0,14 - 0,22

## Recommended Cutting Conditions (4D)

[ min. - optimal - max. ]

Material Group		Hardness (HRC)	Chip breaker & Grade	Cutting Speed		Feed rate (mm/rev)				
ISO	Work material			Vc (m/min)	Ø13,0 ~ Ø18,0	Ø18,5 ~ Ø29,0	Ø29,5 ~ Ø36,0	Ø37,0 ~ Ø55,0	Ø56,0 ~ Ø65,0	
P	Carbon steel	125	L ACP300	150 - 220 - 250	0,04 - 0,07 - 0,09	0,04 - 0,07 - 0,09	0,04 - 0,07 - 0,09	0,05 - 0,08 - 0,10	0,05 - 0,08 - 0,10	
		190	G ACP300	150 - 220 - 250	0,08 - 0,11 - 0,17	0,08 - 0,11 - 0,17	0,08 - 0,12 - 0,18	0,09 - 0,14 - 0,21	0,09 - 0,14 - 0,21	
		250	G ACP300	125 - 170 - 230	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,14	0,07 - 0,11 - 0,15	0,07 - 0,11 - 0,15	
		270	G ACP300	125 - 170 - 230	0,08 - 0,11 - 0,15	0,08 - 0,11 - 0,15	0,08 - 0,12 - 0,17	0,09 - 0,14 - 0,19	0,09 - 0,14 - 0,19	
		300	G ACP300	100 - 130 - 170	0,06 - 0,10 - 0,12	0,06 - 0,10 - 0,12	0,06 - 0,10 - 0,13	0,07 - 0,11 - 0,14	0,07 - 0,11 - 0,14	
	Low alloyed steel	180	L ACP300	150 - 180 - 220	0,05 - 0,07 - 0,10	0,05 - 0,07 - 0,10	0,05 - 0,07 - 0,11	0,06 - 0,08 - 0,12	0,06 - 0,08 - 0,12	
		275	G ACP300	125 - 150 - 200	0,06 - 0,10 - 0,12	0,06 - 0,10 - 0,12	0,06 - 0,10 - 0,13	0,07 - 0,11 - 0,14	0,07 - 0,11 - 0,14	
		300	G ACP300	100 - 140 - 170	0,06 - 0,10 - 0,12	0,06 - 0,10 - 0,12	0,06 - 0,10 - 0,13	0,07 - 0,11 - 0,14	0,07 - 0,11 - 0,14	
		350	G ACP300	80 - 120 - 150	0,06 - 0,10 - 0,12	0,06 - 0,10 - 0,12	0,06 - 0,10 - 0,13	0,07 - 0,11 - 0,14	0,07 - 0,11 - 0,14	
	High alloyed steel	200	G ACP300	100 - 150 - 200	0,08 - 0,11 - 0,17	0,08 - 0,11 - 0,17	0,08 - 0,12 - 0,18	0,09 - 0,14 - 0,21	0,09 - 0,14 - 0,21	
325		G ACP300	80 - 120 - 160	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,14	0,07 - 0,11 - 0,15	0,07 - 0,11 - 0,15		
M	Stainless steel, martensitic / ferritic, martensitic / tempered austenitic / quenched austenitic / ferritic (Duplex)	200	L/G ACP300	100 - 150 - 200	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,14	0,07 - 0,11 - 0,15	0,07 - 0,11 - 0,15	
		240	L/G ACP300	90 - 120 - 150	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,14	0,07 - 0,11 - 0,15	0,07 - 0,11 - 0,15	
		180	L/G ACP300	100 - 150 - 200	0,04 - 0,10 - 0,13	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,14	0,07 - 0,11 - 0,15	0,07 - 0,11 - 0,15	
		230	L/G ACP300	80 - 120 - 150	0,04 - 0,10 - 0,13	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,14	0,07 - 0,11 - 0,15	0,07 - 0,11 - 0,15	
K	Cast iron (GG)	180	H ACK300	120 - 160 - 200	0,09 - 0,17 - 0,23	0,10 - 0,19 - 0,26	0,11 - 0,21 - 0,28	0,12 - 0,23 - 0,31	0,12 - 0,23 - 0,31	
		260	H ACK300	120 - 160 - 200	0,09 - 0,17 - 0,23	0,10 - 0,19 - 0,26	0,11 - 0,21 - 0,28	0,12 - 0,23 - 0,31	0,12 - 0,23 - 0,31	
	Nodular cast iron (GGG)	160	H ACK300	90 - 120 - 250	0,09 - 0,17 - 0,23	0,10 - 0,19 - 0,26	0,11 - 0,21 - 0,28	0,12 - 0,23 - 0,31	0,12 - 0,23 - 0,31	
		250	H ACK300	90 - 120 - 150	0,09 - 0,17 - 0,23	0,10 - 0,19 - 0,26	0,11 - 0,21 - 0,28	0,12 - 0,23 - 0,31	0,12 - 0,23 - 0,31	
S	Heat resistant alloy	200	L/G ACP300	25 - 50 - 70	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,13	0,06 - 0,10 - 0,14	0,07 - 0,11 - 0,15	0,07 - 0,11 - 0,15	
N	Aluminium alloy		G DL1500	200 - 260 - 320	0,05 - 0,10 - 0,15	0,05 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	
	Copper alloy		G DL1500	180 - 230 - 280	0,05 - 0,10 - 0,15	0,05 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,06 - 0,12 - 0,18	0,07 - 0,13 - 0,20	

## Recommended Cutting Conditions (5D)

[ min. - optimal - max. ]

Material Group		Hardness (HRC)	Chip breaker & Grade	Cutting Speed		Feed rate (mm/rev)				
ISO	Work material			Vc (m/min)	Ø13,0 ~ Ø18,0	Ø18,5 ~ Ø29,0	Ø29,5 ~ Ø36,0	Ø37,0 ~ Ø55,0	Ø56,0 ~ Ø65,0	
P	Carbon steel	125	L ACP300	150 - 220 - 250	0,04 - 0,06 - 0,09	0,04 - 0,06 - 0,08	0,04 - 0,06 - 0,08	0,05 - 0,07 - 0,09		
		190	G ACP300	150 - 220 - 250	0,07 - 0,10 - 0,15	0,07 - 0,10 - 0,15	0,08 - 0,11 - 0,17	0,09 - 0,12 - 0,19		
		250	G ACP300	125 - 170 - 230	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,14		
		270	G ACP300	125 - 170 - 230	0,07 - 0,10 - 0,14	0,07 - 0,10 - 0,14	0,08 - 0,11 - 0,15	0,09 - 0,12 - 0,17		
		300	G ACP300	100 - 130 - 170	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,13		
	Low alloyed steel	180	L ACP300	150 - 180 - 220	0,05 - 0,06 - 0,09	0,05 - 0,06 - 0,09	0,05 - 0,06 - 0,10	0,05 - 0,07 - 0,11		
		275	G ACP300	125 - 150 - 200	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,13		
		300	G ACP300	100 - 140 - 170	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,13		
		350	G ACP300	80 - 120 - 150	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,13		
	High alloyed steel	200	G ACP300	100 - 150 - 200	0,07 - 0,10 - 0,15	0,07 - 0,10 - 0,15	0,08 - 0,11 - 0,17	0,09 - 0,12 - 0,19		
325		G ACP300	80 - 120 - 160	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,14			
M	Stainless steel, martensitic / ferritic, martensitic / tempered austenitic / quenched austenitic / ferritic (Duplex)	200	L/G ACP300	100 - 150 - 200	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,14		
		240	L/G ACP300	90 - 120 - 150	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,14		
		180	L/G ACP300	100 - 150 - 200	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,14		
		230	L/G ACP300	80 - 120 - 150	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,07 - 0,12 - 0,18		
K	Cast iron (GG)	180	H ACK300	120 - 160 - 200	0,08 - 0,15 - 0,21	0,09 - 0,17 - 0,23	0,09 - 0,18 - 0,25	0,11 - 0,20 - 0,28		
		260	H ACK300	120 - 160 - 200	0,08 - 0,15 - 0,21	0,09 - 0,17 - 0,23	0,09 - 0,18 - 0,25	0,11 - 0,20 - 0,28		
	Nodular cast iron (GGG)	160	H ACK300	90 - 120 - 250	0,08 - 0,15 - 0,21	0,09 - 0,17 - 0,23	0,09 - 0,18 - 0,25	0,11 - 0,20 - 0,28		
		250	H ACK300	90 - 120 - 150	0,08 - 0,15 - 0,21	0,09 - 0,17 - 0,23	0,09 - 0,18 - 0,25	0,11 - 0,20 - 0,28		
S	Heat resistant alloy	200	L/G ACP300	25 - 50 - 70	0,05 - 0,09 - 0,11	0,05 - 0,09 - 0,11	0,06 - 0,09 - 0,12	0,06 - 0,10 - 0,14		
N	Aluminium alloy		G DL1500	200 - 260 - 320	0,05 - 0,10 - 0,15	0,05 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,06 - 0,12 - 0,18		
	Copper alloy		G DL1500	180 - 230 - 280	0,05 - 0,10 - 0,15	0,05 - 0,10 - 0,15	0,06 - 0,11 - 0,16	0,06 - 0,12 - 0,18		



# Indexable Plunge Drill / Plunge Mill

## PDL Type / PCT Type

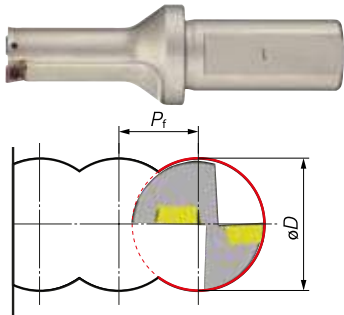


### ■ Description

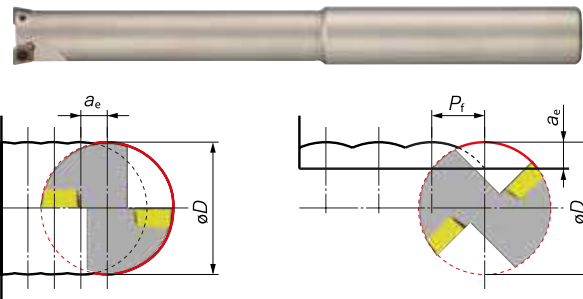
The tool cuts in the Z axis direction where tool rigidity is highest, allowing high efficiency roughing for aeronautic components and dies with long tool overhang must be used to machine deep holes and pockets.

### ■ Characteristics

- The flat cutting edge design produces near-flat bottom profiles to reduce depth of cut variation during finishing.
  - All sizes come with an air hole for supplying coolant internally to improve chip evacuation.
  - Durable body with special surface treatment offers improved tool life and reliability.
  - The tools use SumiDrill WDX type inserts for handling a wide range of work materials, from steel to non-ferrous metals and exotic alloys.
- The PDL type has a central insert making it possible to make radial cuts beyond the tool's radius, pitch feed cutting, and drilling. (Pocket milling, etc.)
  - Although the PCT type has limited radial cutting ability, the tool has many effective teeth enabling it to perform high feed cutting. (Medium finishing of corners, hole expansion, deep grooving, etc.)



Keep the value of  $P_f$  for PDL type tools to less than 70% of the tool diameter ( $\phi D$ ).



Keep the value of  $P_f$  for PCT type tools to less than 50% of the tool diameter ( $\phi D$ ).

For  $a_e$  ( $W_{oc}$ ), refer to the dimension under " $a_e$  max" in the stock / dimensions tables titled "Holders Max, Depth: 3D/5D".



### ■ Application examples

**PDL** Pocketing  
Work Material: Ti Alloy

Tool: PDL400D2S40 (ø40)  
Insert: WDXT125012-G  
Grade: ACK300

Cutting Conditions:  
 $v_c = 40$  m/min  
 $f = 0,07$  mm/rev  
( $v_f = 22,3$  mm/min)  
 $P_f = 25$  mm

**PCT** Corner Finishing  
Work Material: Ti Alloy

Tool: PCT320D3S32 (ø32)  
PCT250D3S25 (ø25)  
PCT200D3S20 (ø20)  
Grade: ACK300

Insert: WDXT094008-G  
WDXT073506-G  
WDXT063006-G

Cutting Conditions:  
 $v_c = 50$  m/min  
 $f_t = 0,08$  mm/tooth  
( $v_f = 80-127$  mm/min)  
 $a_e$  ( $W_{oc}$ ) = 3,2 ~ 6,5 mm

**PCT** Grooving  
Work Material: Ti Alloy

Tool: PCT320D5S32 (ø32)  
Insert: WDXT094008-G  
Grade: ACK300

Cutting Conditions:  
 $v_c = 40$  m/min  
 $f_t = 0,07$  mm/tooth  
( $v_f = 56$  mm/min)  
 $a_e$  ( $P_f$ ) = 5,0 mm

**PDL** Drilling  
Work Material: X4 CrNiMo 17 12 2

Tool: PDL200D3S25 (ø20)  
Insert: WDXT063006-G  
Grade: ACP300

Cutting Conditions:  
 $v_c = 180$  m/min  
 $f = 0,10$  mm/rev  
( $v_f = 286$  mm/min)  
 $\phi D = 20$  mm

**PCT** Aeronautic Components  
Work Material: X5 CrNi 18 10

Tool: PCT320D3S32 (ø32)  
Insert: WDXT094008-G  
Grade: ACP300

Cutting Conditions:  
 $v_c = 180$  m/min  
 $f_t = 0,15$  mm/tooth  
( $v_f = 537$  mm/min)  
 $a_e$  ( $W_{oc}$ ) = 7,0 mm,  $P_f = 5,0$  mm

**PCT** Machine Components  
Work Material: 34 Cr Ni 4

Tool: PCT200D5S20 (ø20)  
Insert: WDXT063006-G  
Grade: ACK300

Cutting Conditions:  
 $v_c = 150$  m/min  
 $f_t = 0,15$  mm/tooth  
( $v_f = 716$  mm/min)  
 $a_e$  ( $W_{oc}$ ) = 3,5 mm

# Indexable Plunge Drill PDL Type (2D, 3D)



2D	3D	Carbon Steel, Alloy Steel	Tempered Steel	Hardened Steel	Stainless Steel	Ti Alloy	Heat Resist. alloy	Cast Iron	Ductile Cast Iron	Al Alloy	Cu Alloy	Composite CFRP*
		C≤0.28%, C>0.28%		HRC≤45, HRC>45								
W												

Fig 1

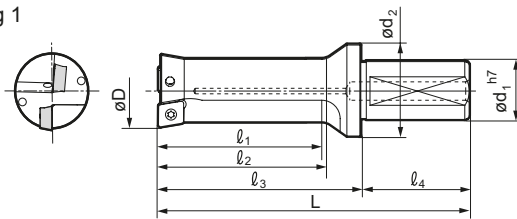
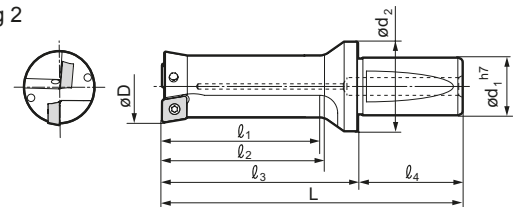


Fig 2



### Holder (Max D<sub>oc</sub> : 2 D)

Cat. No.	Stock	Dimensions (mm)								Applicable Insert	Fig.
		øD	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	ød <sub>1</sub>	ød <sub>2</sub>		
PDL 160D2S20	●	16,0	94	32	35	50	44	20	20	WDXT052504	1
200D2S25	●	20,0	114	40	43	58	56	25	25	WDXT063006	
250D2S25	●	25,0	127	50	53	71	56	25	25	WDXT073506	
PDL 320D2S40	●	32,0	162	64	68	92	70	40	40	WDXT094008	2
400D2S40	●	40,0	185	80	85	115	70	40	40	WDXT125012	

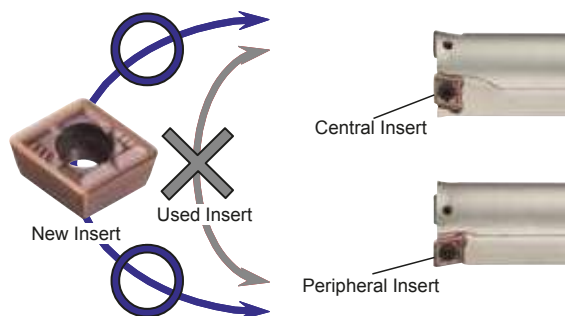
### Holder (Max D<sub>oc</sub> : 3 D)

Cat. No.	Stock	Dimensions (mm)								Applicable Insert	Fig.
		øD	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	ød <sub>1</sub>	ød <sub>2</sub>		
PDL 160D3S20	●	16,0	110	48	51	66	44	20	20	WDXT052504	1
200D3S25	●	20,0	134	60	63	78	56	25	25	WDXT063006	
250D3S25	●	25,0	152	75	78	96	56	25	25	WDXT073506	
PDL 320D3S40	●	32,0	194	96	100	124	70	40	40	WDXT094008	2
400D3S40	●	40,0	225	120	125	155	70	40	40	WDXT125012	

### Spare Parts

Screw	Wrench	Wrench	(N·m)	Applicable Holders
BFTX0204N	TRX06	-	0,5	PDL 160 D2 S20 160 D3 S20 PCT 160 D3 S16 160 D5 S16
BFTY02206	-	TRD07	1,0	PDL 200 D2 S25 200 D3 S25 PCT 200 D3 S20 200 D5 S20
BFTX02506N	-	TRD08	1,5	PDL 250 D2 S25 250 D3 S25 PCT 250 D3 S25 250 D5 S25
BFTX03584	-	TRD15	3,5	PDL 320 D2 S40 320 D3 S40 PCT 320 D3 S32 320 D5 S32
BFTX0511N	-	TRD20	5,0	PDL 400 D2 S40 400 D3 S40 PCT 400 D3 S42 400 D5 S42

### Notes About Mounting Inserts



PDL type: Inserts can be used on either the centre or the outside.  
 Inserts used on the outside cannot be used in the centre. Similarly, inserts used in the centre cannot be used on the outside.  
 PCT type: 2 corners can be used only for the outer inserts.

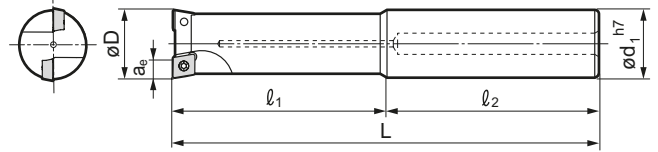
# Indexable Plunge Mill PCT Type (3D, 5D)



3D	5D	Carbon Steel, Alloy Steel	Tempered Steel	Hardened Steel	Stainless Steel	Ti Alloy	Heat Resist. alloy	Cast Iron	Ductile Cast Iron	Al Alloy	Cu Alloy	Composite CFRP*
		C≤0.28%, C>0.28%		HRC≤45, HRC>45								
W												

\* CFRP (Carbon Fibre Reinforced Plastic)

Fig 3



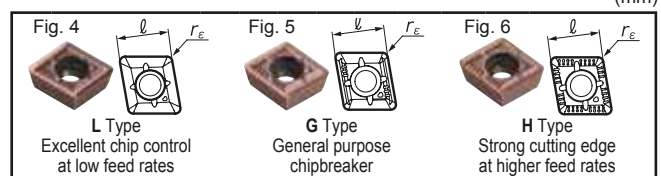
### Holder (Max D<sub>oc</sub> : 3 D)

Cat. No.	Stock	Dimensions (mm)								No. of teeth	Applicable Insert	Fig.
		øD	a <sub>e</sub> max	L	l <sub>1</sub>	l <sub>2</sub>	ød <sub>1</sub>					
PCT 160D3S16	●	16,0	4,0	123	53	70	16	2	WDXT052504	3		
200D3S20	●	20,0	5,0	145	65	80	20	2	WDXT063006			
250D3S25	●	25,0	6,5	160	80	80	25	2	WDXT073506			
320D3S32	●	32,0	8,5	191	101	90	32	2	WDXT094008	3		
400D3S42	●	40,0	11,0	225	125	100	42	3	WDXT125012			

### Holder (Max D<sub>oc</sub> : 5 D)

Cat. No.	Stock	Dimensions (mm)								No. of teeth	Applicable Insert	Fig.
		øD	a <sub>e</sub> max	L	l <sub>1</sub>	l <sub>2</sub>	ød <sub>1</sub>					
PCT 160D5S16	●	16,0	4,0	155	85	70	16	2	WDXT052504	3		
200D5S20	●	20,0	5,0	185	105	80	20	2	WDXT063006			
250D5S25	●	25,0	6,5	210	130	80	25	2	WDXT073506			
320D5S32	●	32,0	8,5	255	165	90	32	2	WDXT094008	3		
400D5S42	●	40,0	11,0	305	205	100	42	3	WDXT125012			

### Inserts



Application	Grade	Coated				Fig.	Dimensions (mm)			Applicable Holder
		High Speed / Light Cutting	General Purpose	Roughing	Application		l	Thickness	r <sub>E</sub>	

PCT, PDL Type Identification

**PCT 250 D3 S25**

Tool Diameter (ø25,0) | Max Depth L/D (3D) | Shank Size (ø25,0)

PCT, PDL Type Insert Identification

**WDXT 07 35 06 -G**

Width Across Flats (7,5) | Thickness x 10 (3,5) | Corner Radius x 10 (R0,6) | Breaker Type

# Recommended Cutting Conditions PDL Type / PCT Type

PDL

PCT (ø40)

## Recommended Cutting Conditions (2D)

Material Group		Hardness (HB)	Chip breaker & Grade	Cutting Speed	PDL Type: f (mm/rev)			
ISO	Work material				Vc (m/min)	ø16,0	ø20,0 ~ ø25,0	ø32,0
P	Carbon steel	125	G ACP300	120-180-240	0,05-0,08-0,10	0,05-0,08-0,10	0,05-0,08-0,11	0,05-0,08-0,12
		125	L ACP300	130-170-220	0,04-0,08-0,12	0,04-0,08-0,12	0,04-0,08-0,13	0,05-0,10-0,15
		190	G ACP300	100-150-200	0,08-0,13-0,24	0,08-0,13-0,24	0,08-0,14-0,26	0,09-0,16-0,29
		250	G ACP300	80-120-160	0,06-0,11-0,18	0,06-0,11-0,18	0,06-0,12-0,19	0,07-0,13-0,22
		270	G ACP300	100-130-160	0,08-0,13-0,22	0,08-0,13-0,22	0,08-0,14-0,23	0,09-0,16-0,26
	Low alloyed steel	300	G ACP300	70-100-140	0,06-0,11-0,17	0,06-0,11-0,17	0,06-0,12-0,18	0,07-0,13-0,20
		180	L ACP300	100-140-180	0,05-0,08-0,14	0,05-0,08-0,14	0,05-0,08-0,16	0,06-0,09-0,17
		275	G ACP300	80-120-160	0,06-0,11-0,17	0,06-0,11-0,17	0,06-0,12-0,18	0,07-0,13-0,20
		300	G ACP300	75-110-140	0,06-0,11-0,17	0,06-0,11-0,17	0,06-0,12-0,18	0,07-0,13-0,20
		350	G ACP300	60-85-110	0,06-0,11-0,17	0,06-0,11-0,17	0,06-0,12-0,18	0,07-0,13-0,20
High alloyed steel	200	G ACP300	100-130-160	0,08-0,13-0,24	0,08-0,13-0,24	0,08-0,14-0,26	0,09-0,16-0,29	
	325	G ACP300	80-100-120	0,06-0,11-0,18	0,06-0,11-0,18	0,06-0,12-0,19	0,07-0,13-0,22	
M	Stainless steel, martensitic / ferritic / martensitic / tempered austenitic / quenched austenitic / ferritic (Duplex)	200	G ACP300	100-140-180	0,06-0,11-0,18	0,06-0,11-0,18	0,06-0,12-0,19	0,07-0,13-0,22
		240	G ACP300	90-120-150	0,06-0,11-0,18	0,06-0,11-0,18	0,06-0,12-0,19	0,07-0,13-0,22
		180	G ACP300	100-140-180	0,06-0,08-0,18	0,06-0,11-0,18	0,06-0,12-0,19	0,07-0,13-0,22
		230	G ACP300	80-120-150	0,04-0,08-0,18	0,06-0,11-0,18	0,06-0,12-0,19	0,07-0,13-0,22
K	Cast iron (GG)	180	H ACK300	120-160-200	0,09-0,20-0,32	0,10-0,22-0,36	0,11-0,24-0,39	0,12-0,26-0,44
		260	H ACP300	90-120-150	0,09-0,20-0,32	0,10-0,22-0,36	0,11-0,24-0,39	0,12-0,26-0,44
S	Heat resistant alloy	200	G ACP300	25-50-70	0,06-0,11-0,18	0,06-0,11-0,18	0,06-0,12-0,19	0,07-0,13-0,22
		200	G ACP300	25-50-70	0,06-0,11-0,18	0,06-0,11-0,18	0,06-0,12-0,19	0,07-0,13-0,22
N	Aluminium alloy	200-260-320	G DL1500	200-260-320	0,06-0,11-0,17	0,06-0,11-0,17	0,06-0,12-0,18	0,07-0,13-0,20
		180-230-280	G DL1500	180-230-280	0,06-0,11-0,17	0,06-0,11-0,17	0,06-0,12-0,18	0,07-0,13-0,20

## Recommended Cutting Conditions (3D)

Material Group		Hardness (HB)	Chip breaker & Grade	Cutting Speed	PDL Type: f (mm/rev) / PCT Type: f <sub>t</sub> (mm/tooth)			
ISO	Work material				Vc (m/min)	ø16,0	ø20,0 ~ ø25,0	ø32,0
P	Carbon steel	125	G ACP300	120-180-240	0,05-0,07-0,10	0,05-0,07-0,10	0,05-0,08-0,11	0,05-0,08-0,12
		125	L ACP300	130-170-220	0,04-0,07-0,10	0,04-0,07-0,10	0,04-0,08-0,11	0,05-0,09-0,12
		190	G ACP300	100-150-200	0,08-0,12-0,20	0,08-0,12-0,20	0,08-0,13-0,22	0,09-0,14-0,24
		250	G ACP300	80-120-160	0,06-0,10-0,15	0,06-0,10-0,15	0,06-0,11-0,16	0,07-0,12-0,18
		270	G ACP300	100-130-160	0,08-0,12-0,18	0,08-0,12-0,18	0,08-0,13-0,19	0,09-0,14-0,22
	Low alloyed steel	300	G ACP300	70-100-140	0,06-0,10-0,14	0,06-0,10-0,14	0,06-0,11-0,15	0,07-0,12-0,17
		180	L ACP300	100-140-180	0,05-0,07-0,12	0,05-0,07-0,12	0,05-0,07-0,13	0,06-0,07-0,15
		275	G ACP300	80-120-160	0,06-0,10-0,14	0,06-0,10-0,14	0,06-0,11-0,15	0,07-0,12-0,17
		300	G ACP300	75-110-140	0,06-0,10-0,14	0,06-0,10-0,14	0,06-0,11-0,15	0,07-0,12-0,17
		350	G ACP300	60-85-110	0,06-0,10-0,14	0,06-0,10-0,14	0,06-0,11-0,15	0,07-0,12-0,17
High alloyed steel	200	G ACP300	100-130-160	0,08-0,12-0,20	0,08-0,12-0,20	0,08-0,13-0,22	0,09-0,14-0,24	
	325	G ACP300	80-100-120	0,06-0,10-0,15	0,06-0,10-0,15	0,06-0,11-0,16	0,07-0,12-0,18	
M	Stainless steel, martensitic / ferritic / martensitic / tempered austenitic / quenched austenitic / ferritic (Duplex)	200	G ACP300	100-140-180	0,06-0,10-0,15	0,06-0,10-0,15	0,06-0,11-0,16	0,07-0,12-0,18
		240	G ACP300	90-120-150	0,06-0,10-0,15	0,06-0,10-0,15	0,06-0,11-0,16	0,07-0,12-0,18
		180	G ACP300	100-140-180	0,06-0,10-0,15	0,06-0,10-0,15	0,06-0,11-0,16	0,07-0,12-0,18
		230	G ACP300	80-120-150	0,04-0,10-0,15	0,06-0,10-0,15	0,06-0,11-0,16	0,07-0,12-0,18
K	Cast iron (GG)	180	H ACK300	120-160-200	0,09-0,18-0,27	0,10-0,20-0,30	0,11-0,22-0,32	0,12-0,24-0,36
		260	H ACP300	90-120-150	0,09-0,18-0,27	0,10-0,20-0,30	0,11-0,22-0,32	0,12-0,24-0,36
S	Heat resistant alloy	200	G ACP300	25-50-70	0,06-0,10-0,15	0,06-0,10-0,15	0,06-0,11-0,16	0,07-0,12-0,18
		200	G ACP300	25-50-70	0,06-0,10-0,15	0,06-0,10-0,15	0,06-0,11-0,16	0,07-0,12-0,18
N	Aluminium alloy	200-260-320	G DL1500	200-260-320	0,06-0,11-0,17	0,06-0,11-0,17	0,06-0,12-0,18	0,07-0,13-0,20
		180-230-280	G DL1500	180-230-280	0,06-0,11-0,17	0,06-0,11-0,17	0,06-0,12-0,18	0,07-0,13-0,20

## Recommended Cutting Conditions (5D)

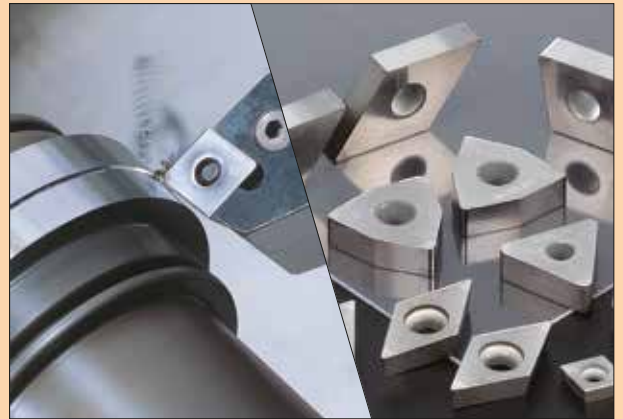
Material Group		Hardness (HB)	Chip breaker & Grade	Cutting Speed	PCT Type: f <sub>t</sub> (mm/tooth)			
ISO	Work material				Vc (m/min)	ø16,0	ø20,0 ~ ø25,0	ø32,0
P	Carbon steel	125	G ACP300	120-180-240	0,05-0,06-0,09	0,05-0,06-0,09	0,05-0,06-0,09	0,05-0,07-0,09
		125	L ACP300	130-170-220	0,04-0,06-0,08	0,04-0,06-0,08	0,04-0,06-0,08	0,05-0,07-0,09
		190	G ACP300	100-150-200	0,07-0,10-0,15	0,07-0,10-0,15	0,08-0,11-0,17	0,09-0,12-0,19
		250	G ACP300	80-120-160	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,14
		270	G ACP300	100-130-160	0,07-0,10-0,14	0,07-0,10-0,14	0,08-0,11-0,15	0,09-0,12-0,17
	Low alloyed steel	300	G ACP300	70-100-140	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,13
		180	L ACP300	100-140-180	0,05-0,06-0,09	0,05-0,06-0,09	0,05-0,06-0,10	0,05-0,07-0,11
		275	G ACP300	80-120-160	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,13
		300	G ACP300	75-110-140	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,13
		350	G ACP300	60-85-110	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,13
High alloyed steel	200	G ACP300	100-130-160	0,07-0,10-0,15	0,07-0,10-0,15	0,08-0,11-0,17	0,09-0,12-0,19	
	325	G ACP300	80-100-120	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,14	
M	Stainless steel, martensitic / ferritic / martensitic / tempered austenitic / quenched austenitic / ferritic (Duplex)	200	G ACP300	100-140-180	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,14
		240	G ACP300	90-120-150	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,14
		180	G ACP300	100-140-180	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,14
		230	G ACP300	80-120-150	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,14
K	Cast iron (GG)	180	H ACK300	120-160-200	0,08-0,15-0,21	0,09-0,17-0,23	0,09-0,18-0,25	0,11-0,20-0,28
		260	H ACP300	90-120-150	0,08-0,15-0,21	0,09-0,17-0,23	0,09-0,18-0,25	0,11-0,20-0,28
S	Heat resistant alloy	200	G ACP300	25-50-70	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,14
		200	G ACP300	25-50-70	0,05-0,09-0,11	0,05-0,09-0,11	0,06-0,09-0,12	0,06-0,10-0,14
N	Aluminium alloy	200-260-320	G DL1500	200-260-320	0,05-0,10-0,15	0,05-0,10-0,15	0,06-0,11-0,16	0,06-0,12-0,18
		180-230-280	G DL1500	180-230-280	0,05-0,10-0,15	0,05-0,10-0,15	0,06-0,11-0,16	0,06-0,12-0,18

Multi-Drills



# SUMIBORON SUMIDIA

L1 ~ L28



CBN Grades	<b>SUMIBORON Series</b> .....	L2
	<b>Recommended Grades</b> .....	L3
	<b>New</b> <b>Edge Specification of SUMIBORON Inserts</b> .....	L4
Insert types and cutting edge geometries	<b>LE / LT / LF / LS / ES / HS</b> .....	L5
	<b>New</b> <b>New</b> <b>New</b> <b>New</b>	
SUMIBORON Chipbreaker "Break Master" Type	<b>FV / LV &amp; SV Types</b> .....	L6
One-Use "Wiper" Insert Type	<b>WG / WH &amp; W Types</b> .....	L7
Uncoated SUMIBORON Grades	<b>BN1000 / BN2000</b> .....	L8-9
	<b>BN350</b> .....	L17
Coated SUMIBORON Grades	<b>BNC2010 / BNC2020</b> .....	L10-13
	<b>BNC100</b> .....	L14
	<b>BNC160</b> .....	L15
	<b>BNC200</b> .....	L16
	<b>BNC300</b> .....	L17
	<b>BNC500</b> .....	L18
Uncoated SUMIBORON Grades	<b>BN7000</b> .....	L19
	<b>BN7500</b> .....	L20
	<b>BNS800</b> .....	L21
SUMIBORON / SUMIDIA	<b>Production Process</b> .....	L22
SUMIDIA Binderless	<b>New</b> <b>SUMIDIA Binderless NPD10</b> .....	L23-25
SUMIDIA PCD Grades	<b>DA1000</b> .....	L26
SUMIDIA Insert	<b>NF Type</b> .....	L26
SUMIDIA Chipbreaker "Break Master"	<b>LD / GD Type</b> .....	L27
	<b>DM Type</b> .....	L28

## New generation Sumiboron inserts – an even better way to machine hardened steels



### ■ General

Building on its global success machining hardened steels with Sumiboron inserts the addition of heat and wear resistant coatings to a variety of tough new CBN substrates has resulted in a new generation of high performance grades. With economy in mind the new inserts are multi cornered.

Choose the coated insert suitable for your application and take your hard part machining operations to the new industry standard.

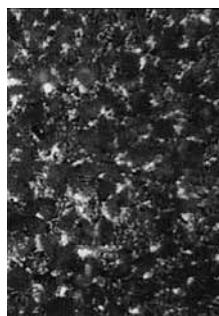
### ■ Types and application

Microstructure



Type	ISO	Grade	Application	Characteristic	Hardness(Hv) (GPa)	TRS (GPa)
Uncoated CBN	H	<b>BN1000</b>	High speed Continuous cutting	Best wear resistance grade and suitable for high speed continuous cutting	27 ~ 31	0,90 ~ 1,00
		<b>BN2000</b>	Continuous and Interrupted cutting	Micro-grain CBN with Ceramic binder improves fracture toughness and wear resistance	31 ~ 34	1,05 ~ 1,15
		<b>BNX20</b>	High efficiency cutting (Continuous-Interrupted)	Binder with high heat resistance improves tool life during high speed machining	31 ~ 33	0,95 ~ 1,10
		<b>BNX25</b>	High speed Interrupted cutting	Superior fracture toughness in high speed cutting and suitable for high speed interrupted hard turning	29 ~ 31	1,00 ~ 1,10
		<b>BN350</b>	Interrupted cutting (Heavy)	Micro-grain CBN with higher fracture toughness that improves cutting edge strength	33 ~ 35	1,20 ~ 1,30
Coated CBN	H	<b>BNC2010</b>	High precision continuous cutting	New generation TiCN layer improves notch wear resistance and provides an excellent surface finish.	30 ~ 32	1,10 ~ 1,20
		<b>BNC100</b>	High speed continuous and light interrupted cutting	High speed finishing grade for continuous and light interrupted cutting applications	29 ~ 32	1,00 ~ 1,10
		<b>BNC160</b>	High precision continuous cutting	High precision grade for continuous cutting - ideal when an excellent surface finish is required	31 ~ 33	1,10 ~ 1,20
		<b>BNC2020</b>	High efficiency general purpose	New coating technology offers excellent adhesion during both continuous and interrupted cut applications.	34 ~ 36	1,20 ~ 1,30
		<b>BNC200</b>	Continuous and Interrupted cutting (Light-Medium Interrupted)	General purpose grade with low to high speed cutting capability and extended tool life - removes the carburised layer on heat treated components	33 ~ 35	1,10 ~ 1,20
		<b>BNC300</b>	Interrupted cutting (Heavy)	Tough grade for heavy interrupted cutting applications	33 ~ 35	1,15 ~ 1,25
		<b>BNC500</b>	GG and GGG machining	For Cast Iron machining with a good balance of wear and fracture resistance	32 ~ 34	1,00 ~ 1,10

Microstructure



Type	ISO	Grade	Application	Characteristic	Hardness(Hv) (GPa)	TRS (GPa)
Uncoated CBN	S PM	<b>BN7000</b>	High speed machining of GG Cast Iron machining Iron based products Rolls of high hardness Heat resistant alloy	First choice for high speed finishing of grey cast iron	41 ~ 44	1,25 ~ 1,35
	PM	<b>BN7500</b>	High efficiency machining of powdered metal	Less burrs when machining sintered parts due to excellent edge sharpness	41 ~ 44	1,40 ~ 1,50
	K S	<b>BNS800</b>	High speed machining of GG Machining rolls of high hardness Sintered component roughing Special cast Iron machining	High thermal impact resistance with high heat transfer ability and higher CBN content ratio	39 ~ 42	0,95 ~ 1,10

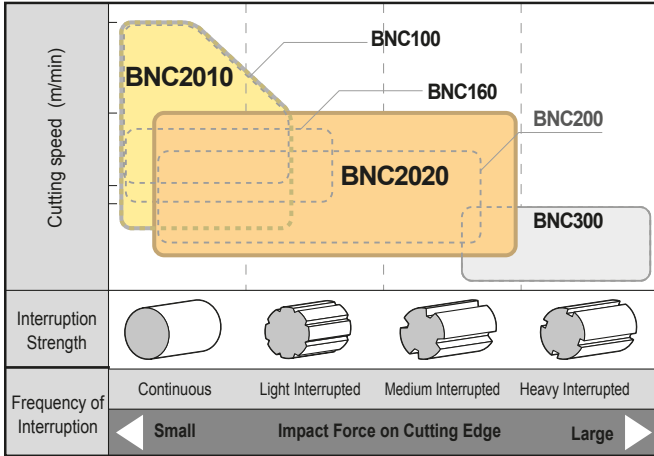
## H

### HARDENED STEEL MACHINING

#### ● Advantages of using CBN

In terms of cost investment, it is much lower in machine cost and overhead cost due to the fact that a CNC lathe is cheaper than a grinding machine. As for the quality of finish, inserts can machine different profiles and the finishing is also commendable as compared to grinding. Environmentally, sludge treatment for grinding is a hazard to the environment but for turning, the chips can be collected and recycled.

#### ■ Application Range



Application	Conditions	Recommended Cutting Speed (m/min)			
		100	200	300	400
Hardened Steel	General Purpos (Continuous to Light interrupted Rz = above 3,2)	BNC2020 / BNC2010		BNC200 / BNC100	
		BNC300			
	Heavy Interrupted	BNC2010			
	High Precision (Rz = 1,6 to 3,2)	BNC160			
	High Efficiency (Carburized layer removal)	BNC2020		BNC200	
BNC500					
Cast Iron	Ductile Cast Iron	BNC500			

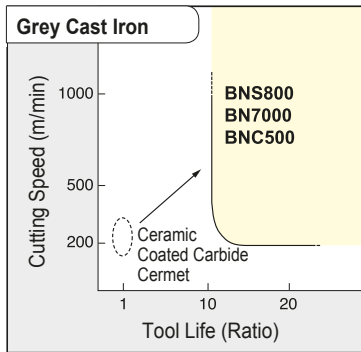
## K

### CAST IRON MACHINING

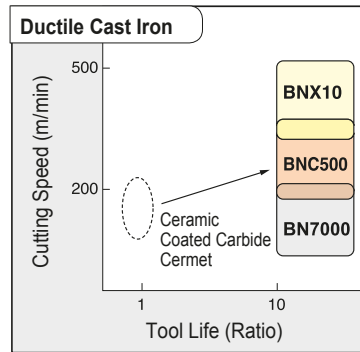
#### ● Advantages of using CBN

Following charts show merits of using CBN in cast iron machining compared with conventional tools, such as carbide, cermet or ceramics. SumiBoron performs longer tool life than conventional tools in high speed machining and brings higher efficiency and superior precision.

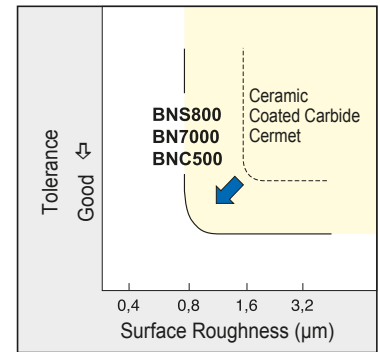
#### ● High Speed Machining



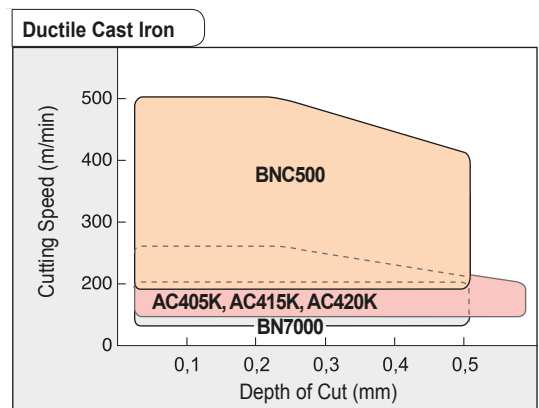
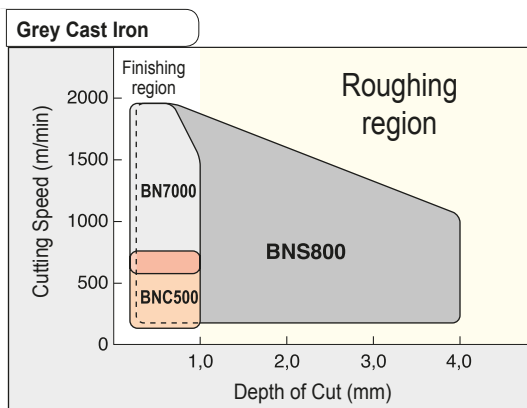
#### ● High Speed Machining



#### ● High Precision Machining



#### ■ Application Range



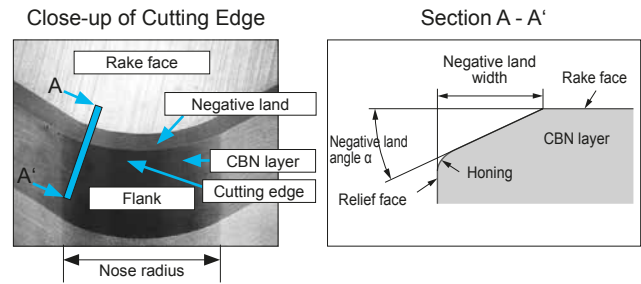
# Edge Specification of SUMIBORON Inserts

## Sumiboron Inserts and Edge Preparation

All SUMIBORON inserts are enhanced with the optimum cutting edge preparation for various grades and geometries (shown on the right).

This is to avoid cutting edge fracture caused by the heavy loads generated during the machining of high hardness materials such as Hardened Steel.

As the pioneer of CBN tools „SUMIBORON“, various selection of grades and edge preparation combinations is our strong point for Hardened Steel machining.



## SUMIBORON Insert Cutting Edge Specification

Series	Work Material	Grade	Negative / Positive	Standard				Low Resistance Type L / High Efficiency Type E				Strong Edge Type H						
				Identification Code	$\alpha$	W	Honing	Notation	Identification Code	$\alpha$	W	Honing	Notation	Identification Code	$\alpha$	W	Honing	
Uncoated SUMIBORON	Hardened Steel	<b>BNX10</b>	Neg./Pos.	T01225	25°	0,12	No	-	-	-	-	-	-	-	-	-	-	
		<b>BNX20</b>	Neg./Pos.	S01225	25°	0,12	Yes	<b>LT</b>	T01215*	15°	0,12	No	-	-	-	-	-	
		<b>BNX25</b>	Neg./Pos.	S01725	25°	0,17	Yes	-	-	-	-	-	-	-	-	-	-	
		<b>BN1000</b>	Neg./Pos.	S01225	25°	0,12	Yes	-	-	-	-	-	-	-	-	-	-	
		<b>BN2000</b>	Neg./Pos.	S01225	25°	0,12	Yes	<b>LT</b>	T01215	15°	0,12	No	<b>HS</b>	S01235	35°	0,12	Yes	
		<b>BN350</b>	Neg./Pos.	T01225	25°	0,12	No	-	-	-	-	-	<b>HT</b>	T01235	35°	0,12	No	
	Cast Iron	Cast Iron	<b>BN700</b>	Neg./Pos.	T01215	15°	0,12	No	<b>LF</b>	(Sharp edge)	0°	0	No	<b>HS</b>	S01225	25°	0,12	Yes
			<b>BN7000</b>	Neg./Pos.	T01215	15°	0,12	No	<b>LF</b>	(Sharp edge)	0°	0	No	<b>HS</b>	S01225	25°	0,12	Yes
		Exotic Alloy	<b>BN7500</b>	Neg./Pos.	T01215	15°	0,12	No	<b>LE</b>	(Sharp edge)	0°	0	Yes	<b>HS</b>	S00525	25°	0,05	Yes
			<b>BNS800</b>	Neg.	T02020	20°	0,20	No	<b>LF</b>	(Sharp edge)	0°	0	No	-	-	-	-	-
Coated SUMIBORON	Hardened Steel	<b>BNC2010</b>	Neg./Pos.	S01225	25°	0,12	Yes	<b>LE</b>	(Sharp edge)	0°	0	Yes	<b>HS</b>	S01730	30°	0,17	Yes	
		<b>BNC2020</b>	Neg./Pos.	S01225	25°	0,12	Yes	<b>LT</b>	T00515	15°	0,05	No	<b>HS</b>	S02735	35°	0,27	Yes	
		<b>BNC100</b>	Neg./Pos.	S01225	25°	0,12	Yes	<b>LS</b>	S01715	15°	0,17	Yes	-	-	-	-		
		<b>BNC160</b>	Neg./Pos.	S01225	25°	0,12	Yes	<b>LS</b>	S01020	20°	0,10	Yes	<b>HS</b>	S01730	30°	0,17	Yes	
		<b>BNC200</b>	Neg./Pos.	S01225	25°	0,12	Yes	<b>LS</b>	S01015	15°	0,10	Yes	<b>HS</b>	S01735	35°	0,17	Yes	
		<b>BNC300</b>	Neg./Pos.	S01225	25°	0,12	Yes	<b>LS</b>	S00515	15°	0,05	Yes	<b>HS</b>	S01735	35°	0,17	Yes	
	Cast Iron	<b>BNC500</b>	Neg./Pos.	S01215	15°	0,12	Yes	-	-	-	-	-	<b>HS</b>	S01225	25°	0,12	Yes	

\* BNX20 Identification code will be T00715 for inserts with inscribed circle of less than Ø4,76.

## Cutting Edge Preparation of Inserts with Wiper / Chipbreakers

Series	Work Material	Grade	Other Types					
			Notation	Identification Code	$\alpha$	W	Honing	Type
Uncoated SUMIBORON	Hardened Steel	<b>BN2000</b>	WG	S01215	15°	0,12	Yes	Wiper
			WH	S01215	15°	0,12	Yes	Wiper
			N-FV	-	0°	0	Yes	With breaker
			N-LV	S00535	35°	0,05	Yes	With breaker
Cast Iron Exotic Alloy	<b>BNS800</b>	W	T02020	20°	0,20	No	Wiper	
		LFW	(Sharp edge)	0°	0	No	With sharpe edge	
Coated SUMIBORON	Hardened Steel	<b>BNC2010</b> <b>BNC2020</b>	WG	S01215	15°	0,12	Yes	Wiper
			WH	S01215	15°	0,12	Yes	Wiper
			N-FV	-	0°	0	Yes	With breaker
			N-LV	S00535	35°	0,05	Yes	With breaker
			N-SV	S01235	35°	0,12	Yes	With breaker
			<b>BNC100</b>	W	S01715	15°	0,17	Yes
	Cast Iron	<b>BNC160</b> <b>BNC200</b>	WG	S01215	15°	0,12	Yes	Wiper
			WH	S01215	15°	0,12	Yes	Wiper
			W	S01215	15°	0,12	Yes	Wiper
			N-FV	-	0°	0	Yes	With breaker
			N-LV	S00535	35°	0,05	Yes	With breaker
			N-SV	S01235	35°	0,12	Yes	With breaker

## Cutting Edge Specification Identification Code

Notation of Edge Preparation			
No.	Standard Type		
L	Low cutting forces	F	Sharp edge
E		E	Honing
E	High efficiency	T	Negative land
H		S	Negative land + honing
WG / WH / W		Wiper	
N-FV / N-LV / N-SV		With Chipbreaker	

## Edge Preparation Identification Code

**S 0 1 2 2 5**

W: Negative land width     $\alpha$ : Negative land angle

Cutting edge: T - Negative land  
S - Negative land + R - Honing

Example: **S01225**  
→ 25°/0,12mm width negative land with honing

## Insert Types and Cutting Edge Geometries

### Multi Cornered One-Use Type Inserts

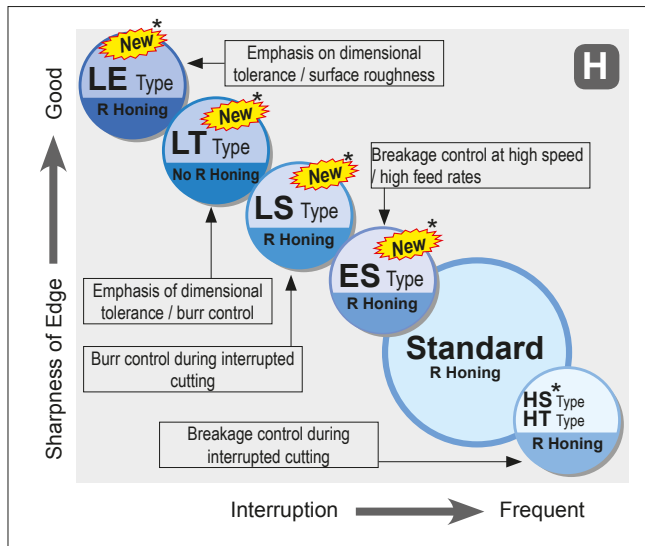


#### ■ Characteristics

- One-use type inserts improve machining efficiency by using each cutting edge to its full potential following the numbering system on each cutting edge then throwing the insert away.
- Multi cornered inserts have a single piece of Sumiboron mounted on every useable corner. Single sided inserts use the top corners whilst double sided inserts use both top and bottom corners. Diamond shaped inserts have 4 corners and triangular inserts have 6 corners.
- A variety of Sumiboron coated grades readily replace expensive grinding operations for high precision tolerances outstanding surface finish, heavy interrupted cutting and efficient cost effective machining of hardened parts.

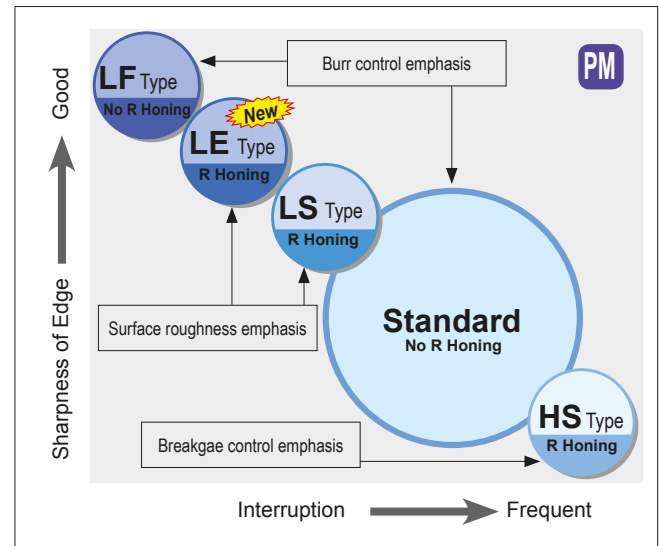
### Cutting Edge Preparation

#### Machining of Hardened Steel



\* For limited grades only.

#### Sintered Alloy Machining



### One-Use Wiper Insert



#### ■ Characteristics

- New lineup includes:
  - WG Type** ⇨ for low-feed cutting
  - WH Type** ⇨ for high-feed cutting
- SUMIBORON one-use insert with wiper edge for hardened steel machining
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds

### Break Master N-FV, N-LV, N-SV



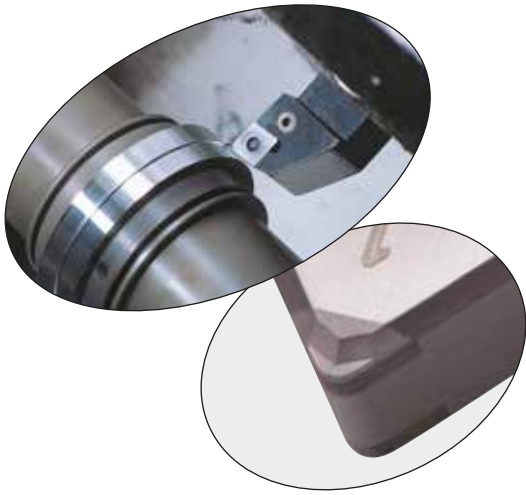
Break Master N-SV Type

#### ■ Characteristics

- N-SV type is perfect for carburised layer removal while N-FV / N-LV types are best suited to finishing of hardened steel.
- First CBN insert to feature an integral chipbreaker
- Ideal for removing carburised layer - can be used on both hardened and unhardened materials.
- Effective chip control solution protects component from swarf damage.

# SUMIBORON Insert With Chipbreaker Break Master N-FV /-LV /-SV

**H** Hardened Steel

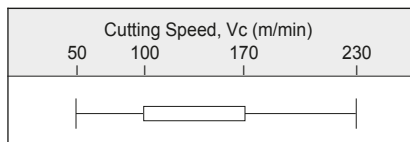
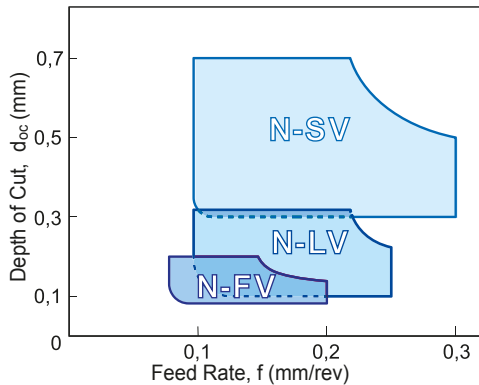


## Characteristics

- SUMIBORON one-use insert with chipbreaker.
- N-SV type is perfect for carburised layer removal while N-FV / N-LV types are best suited to finishing of hardened steel.
- Breaker included on the CBN edge, chipbreaking effect can be maintained throughout machining process.
- Unique breaker design can be applied to both hardened and non-hardened parts with effective chip control.
- SV type lineup now includes BNC2010 / BNC160 for good wear resistance, while SUMIBORON BNC2020 / BNC200 allows high efficiency machining.

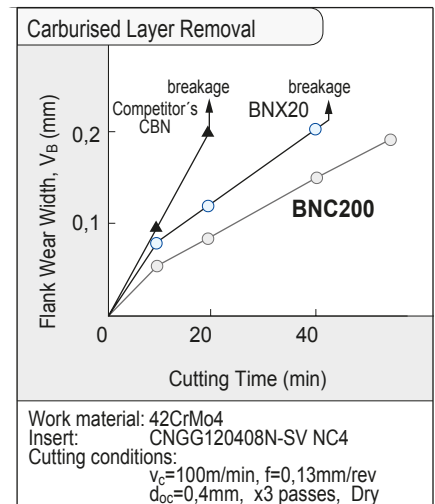
In addition to general purpose SUMIBORON BNC2020 / BNC200, the N-FV / N-LV type lineup includes BNC2010 / BNC160 for excellent wear resistance and general purpose uncoated SUMIBORON BN2000.

## Application Range



\* When machining heat treated steel harder than H<sub>R</sub>C50 the depth of cut should not exceed 0,5 mm.

## Cutting Performance



● Stable tool life with BNC200

## Application Examples

### External Carburised Layer Removal

**Break Master N-SV**  
Tool life = 200pcs

**BNC200 (no breaker)**  
Tool life = 200pcs

**Comp. CBN (no breaker)**  
Tool life = 100pcs

No constant stopages or incorrect part dimension problem and the chips are small.  
Double the tool life of competitor's CBN

Work material: 42CrMo4, Carburised steel (shaft)  
Insert: CNGG 120408 N-SV NC4 (BNC200)  
Conditions: v<sub>c</sub>=150m/min, f=0,15mm/rev, d<sub>oc</sub>=0,5mm, x 2 passes, Wet

### Carburised Face Layer Removal

Break Master N-SV type improves chip control with increased productivity until the pre-set tool life.

**Break Master N-SV**

No chip control problem

**No breaker**

Constant chip control problem

No. of pcs / unit of time (relative)

Work material: 42CrMo4 (HRC30-62)  
Insert: CNGG 120408 N-SV NC4 (BNC200)  
Conditions: v<sub>c</sub>=140m/min, f=0,15mm/rev, d<sub>oc</sub>=0,3mm, Wet

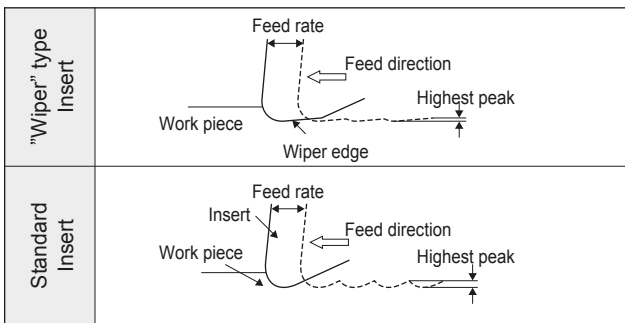


### ■ Characteristics

- SUMIBORON one-use insert with wiper edge for hardened steel machining
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds
- New lineup includes:
  - WG** type ⇨ for low-feed cutting
  - WH** type ⇨ for high-feed cutting



### ■ Purpose of Wiper Edge



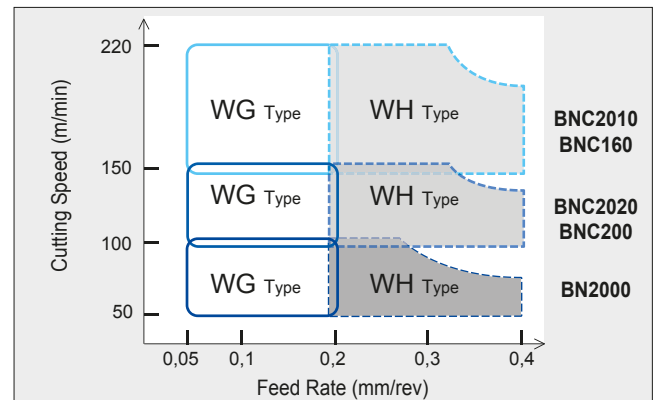
### ■ Surface Roughness of Wiper Insert

	"Wiper" Insert (r=0,8)		Standard Insert (r=0,8)	
	Finishing (f=0,10mm/rev)	High feed cutting (f=0,30mm/rev)	Finishing (f=0,10mm/rev)	High feed cutting (f=0,30mm/rev)
Surface Roughness Profile	<b>WG</b> Type	<b>WH</b> Type		
Surface Roughness R <sub>z</sub>	0,63µm	1,39µm	1,98µm	9,20µm

### ■ Recommended Cutting Conditions (Surface Roughness Standard: R<sub>z</sub> = 1,6 ~ 3,2µm)

- For optimum effectiveness, use wiper inserts for continuous cutting.
- For copy turning, inserts with nose-radius is recommended.
- Chattering and undulation may occur, please use work and machine with high rigidity.

Two types are available depending on the feed rate:  
**WG** type: Recommended feed rate: less than  $f \leq 0,20\text{mm/rev}$   
**WH** type: Recommended feed rate: more than  $f \geq 0,20\text{mm/rev}$   
 Range of good surface roughness:  $R_z=1,6\mu\text{m to }3,2\mu\text{m}$   
 Available grades: BN2000, BNC2010, BNC160, BNC2020, BNC200

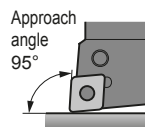


### ■ Tool-Setup WG / WH Wiper

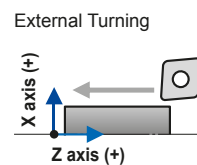
#### CNGA / CCGW / WNGA Type Wiper

1. Use a holder with a 95° approach angle.
2. Tool **compensation required**.

CNGA / CCGW / WNGA type wiper inserts do not follow the ISO standard. Correction of the tool offset of the cutting edge as explained on the right.



#### Cutting Edge Position Compensation, Outer Processing



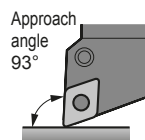
Nose Radius	Type	X-Direction	Z-Direction
R0,4	WG	-0,02	-0,02
	WH	-0,06	-0,06
R0,8/R1,2	WG	-0,01	-0,01
	WH	-0,06	-0,06

#### DNGA / DCGW Type Wiper

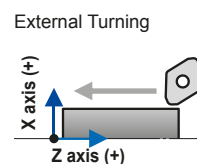
1. Use a holder with a 93° approach angle.
2. Tool **compensation required**.

DNGA / DCGW type wiper inserts do not follow the ISO standard. Correction of the tool offset of the cutting edge as explained on the right.

**Note:** DNGA/DCGW type wiper inserts are only possible for external and internal turning, not for facing.



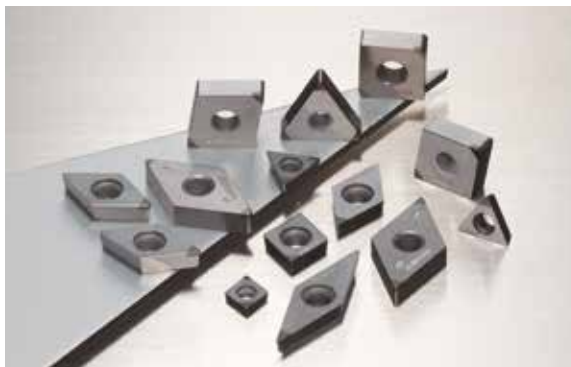
#### Cutting Edge Position Compensation, Outer Processing



Nose Radius	Type	X-Direction	Z-Direction
R0,4	WG	-0,17	-0,01
	WH	-0,70	-0,06
R0,8	WG	-0,05	0
	WH	-0,58	-0,05

# Uncoated SUMIBORON BN1000/BN2000

**H** Hardened Steel



## Uncoated CBN grades for hardened steel machining

### General Features

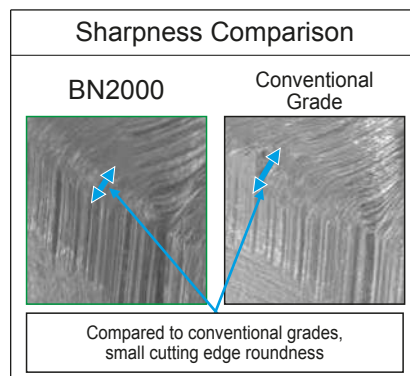
A new uncoated type of SUMIBORON that has a newly developed high-purity ceramic binder.

Both fracture and wear resistance are combined to achieve a stable tool life in a wide variety of hardened steel machining.

Available in single corner and multi-corner type inserts.

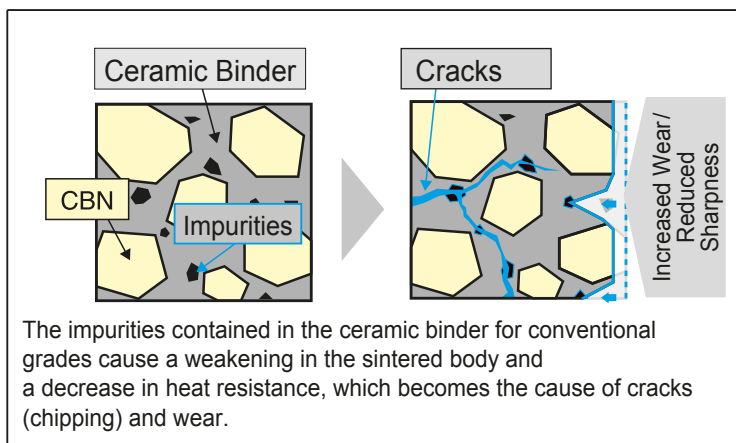
### Characteristics

- **BN1000** - Superior high-speed machining grade with the highest wear resistance of any uncoated SUMIBORON.  
Delivers excellent tool life in continuous cutting to light-interrupted cutting.
- Improved fracture resistance while also emphasizing wear resistance.  
Improved hardness and heat resistance from the high-purity TiCN ceramic binder.
- **BN2000** - General purpose grade suitable for typical hardened steel machining applications.  
Provides stable tool life in everything from continuous cutting to light-to-medium interrupted cutting.
- High degrees of both fracture resistance and wear resistance.  
Significant improvements in the performance of both by employing a high-purity ceramic binder.
- Stable surface roughness by increasing sharpness (Figure on right).

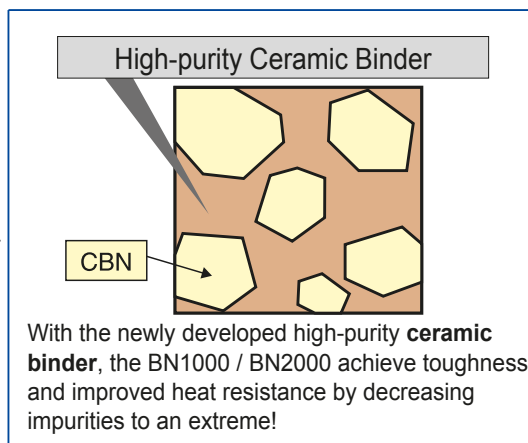


### Newly Developed High-Purity Ceramic Binder

#### Conventional Grade

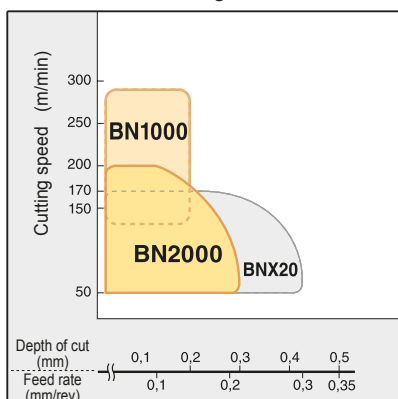


#### BN1000 / BN2000

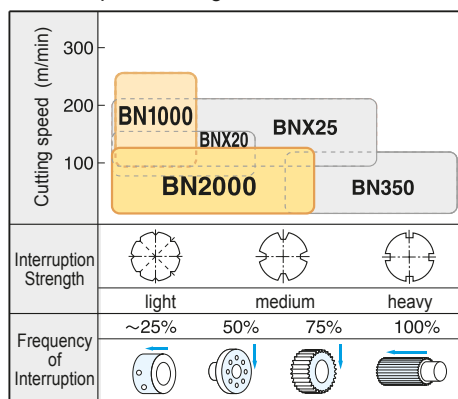


### Recommended Application Range

#### Continuous Cutting



#### Interrupted Cutting



### Cutting Conditions

#### BN1000

$v_c$ (m/min)	$f$ (mm/rev)	$d_{oc}$ (mm)
100 - 300	0.03 - 0.15	0.03 - 0.2

#### BN2000

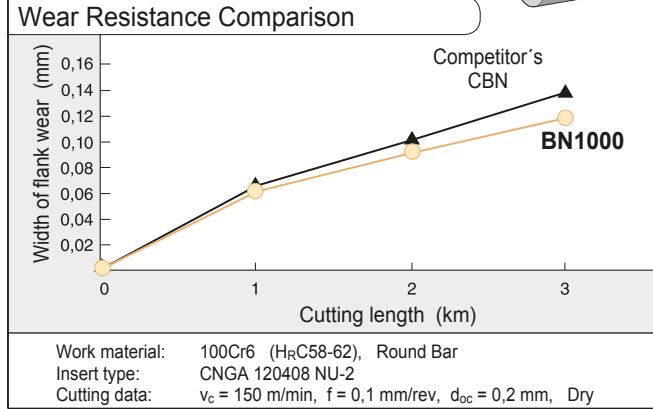
$v_c$ (m/min)	$f$ (mm/rev)	$d_{oc}$ (mm)
50 - 250	0.03 - 0.2	0.03 - 0.3

\* Coolant ... Continuous cutting: Dry or Wet  
Interrupted cutting: Dry

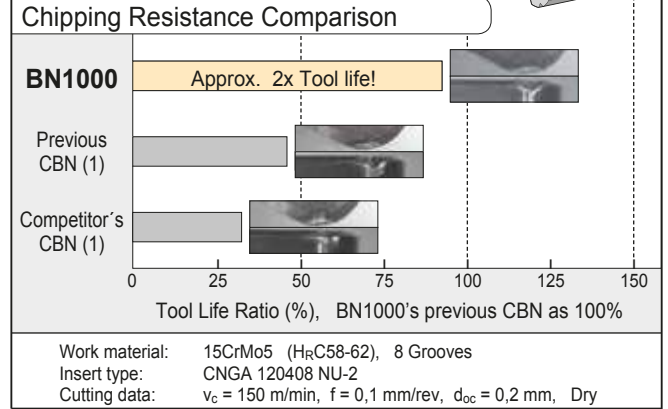


**■ Cutting Performance**

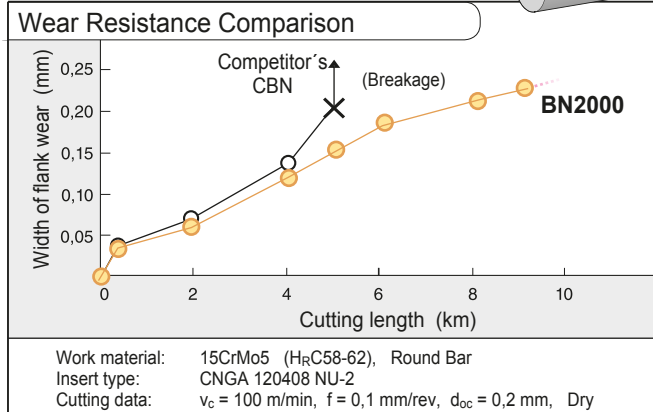
● **BN1000**



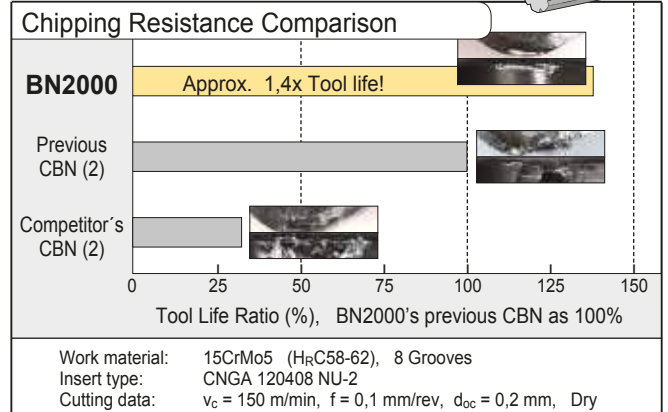
● **BN1000**



● **BN2000**

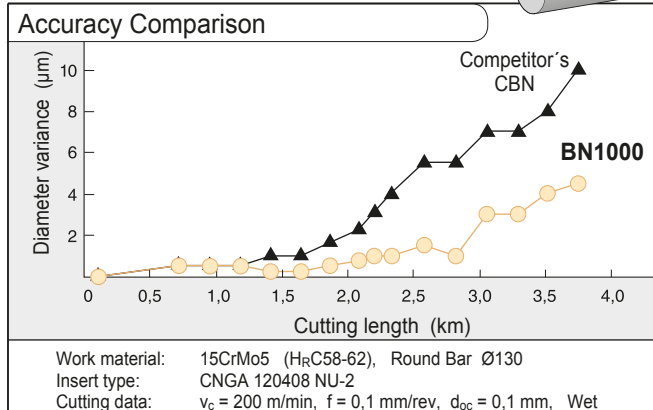


● **BN2000**

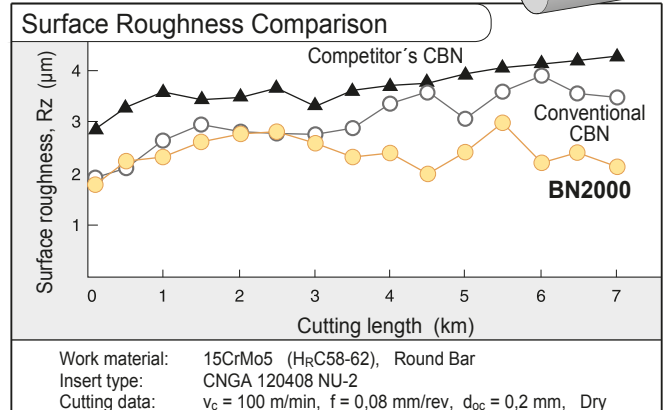


**■ Machining Precision**

● **BN1000**



● **BN2000**



# Coated SUMIBORON Characteristics

## H Hardened Steel



**BNC2010**

**BNC2020**



**BNC100**

**BNC160**

**BNC200**

**BNC300**

**BNC500**

### New Coated SUMIBORON Series achieving

- higher speed
- higher efficiency and
- higher precision

### ■ General Features

Using a high heat resistant and tough CBN substrate coupled with a special ceramic coating, this series caters to a wide variety of applications with improved precision and longer tool life as compared to conventional CBN.

There is a comprehensive lineup of economical and easy-to-use insert selection, such as the cost effective double-sided, multi-cornered, one-use type inserts.

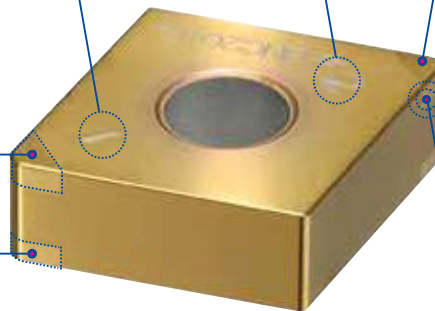
BNC2010 and BNC2020 are the latest additions to the Coated SUMIBORON series, to provide even better stability and longer tool life for hardened steel machining.

### ■ Characteristics

Double sided, Multi-cornered One-use Insert  
More cost effective than conventional one-use inserts.

Easy Edge Management  
Numbering of cutting edges.

Strong Brazing  
Utilizing a new brazing method with improved strength.



Special Ceramic Coating and Newly Developed CBN Substrate  
Provides longer tool life.

### ■ Cutting Performance

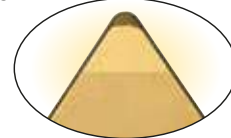
Application		Conditions	Recommended Cutting Speed (m/min)			
			100	200	300	400
Hardened Steel	Finishing	General Purpos (Continuous to Light interrupted Rz = above 3,2)	BNC2020 / BNC2010		BNC200 / BNC100	
			BNC300			
		Heavy Interrupted	BNC2010			
	High Precision (Rz = 1,6 to 3,2)	BNC160				
Cast Iron	Ductile Cast Iron	High Efficiency (Carburized layer removal)	BNC2020		BNC200	
			BNC500			

### ■ Cutting Edge Management

Before usage

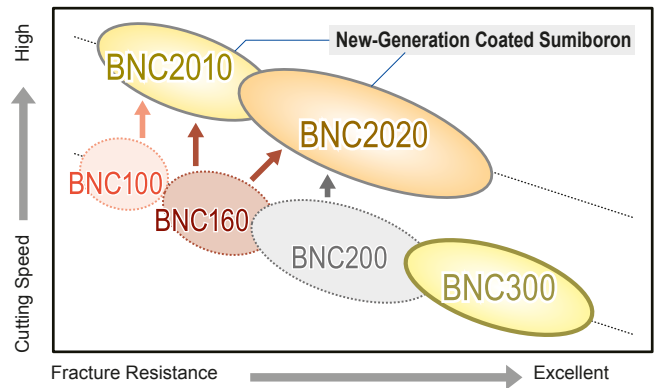


After usage



The edge numbers are still visible after machining, which makes the management of used cutting edges easy.

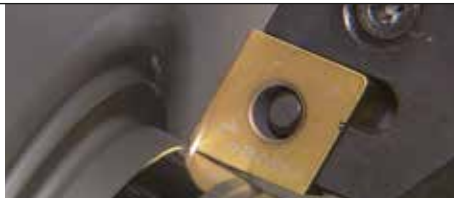
BNC2010 and BNC2020 are coated in gold, which makes it easy to distinguish used edges.



## Characteristics of Grades

### BNC2010

CBN Content: 50~55%  
 Grain Size: 2 $\mu$ m  
 Hardness HV: 30~32GPa  
 TRS: 1,10~1,20GPa  
 Main Coating Components: Multi-layered TiCN  
 Coating Thickness: 1,5 $\mu$ m



High Precision Machining

Newly developed CBN substrate with high crater wear resistance coated with special multi-layered TiCN, which exhibits excellent notch wear resistance. Ideal for finishing of hardened steel requiring excellent accuracy or surface roughness. Able to stably maintain 1,6R<sub>z</sub> finishing.

### BNC2020

CBN Content: 70~75%  
 Grain Size: 5 $\mu$ m  
 Hardness HV: 34~36GPa  
 TRS: 1,20~1,30GPa  
 Main Coating Components: Multi-layered TiAlN  
 Coating Thickness: 1,5 $\mu$ m



General and High Efficiency Cutting

Newly developed tough CBN substrate with highly wear resistant TiAlN coating. Provides improved stability by inserting a highly adhesive layer between the substrate and the TiAlN layer. Ideal for general machining including finishing and interrupted cutting as well as high-efficiency machining such as carburi- sed layer removal.

### BNC100

CBN Content: 40~45%  
 Grain Size: 1 $\mu$ m  
 Hardness HV: 29~32GPa  
 TRS: 1,05~1,15GPa  
 Main Coating Components: TiAlN/TiCN  
 Coating Thickness: 2,5 $\mu$ m



High Speed Cutting

### BNC160

CBN Content: 60~65%  
 Grain Size: 3 $\mu$ m  
 Hardness HV: 31~33GPa  
 TRS: 1,10~1,20GPa  
 Main Coating Components: TiAlN/TiCN  
 Coating Thickness: 2,0 $\mu$ m



High Precision Machining

### BNC200

CBN Content: 65~70%  
 Grain Size: 4 $\mu$ m  
 Hardness HV: 33~35GPa  
 TRS: 1,15~1,25GPa  
 Main Coating Components: TiAlN  
 Coating Thickness: 2,0 $\mu$ m



General and High Efficiency Cutting

### BNC300

CBN Content: 60~65%  
 Grain Size: 1 $\mu$ m  
 Hardness HV: 33~35GPa  
 TRS: 1,15~1,25GPa  
 Main Coating Components: TiAlN  
 Coating Thickness: 1,0 $\mu$ m



Heavy Interrupted Cutting

## Recommended Cutting Conditions

Grade	Cutting Speed v <sub>c</sub> (m/min)								
	50	100	(120)	150	(180)	200	(220)	250	300
<b>BNC2010</b>									
<b>BNC2020</b>									
<b>BNC300</b>									
<b>BNC100</b>									
<b>BNC160</b>									
<b>BNC200</b>									

Grade	Feed Rate (mm/rev)		Depth of Cut (mm)			
	0	0,1	0,2	0,3	0,4	0,5
<b>BNC2010</b>	0,03	0,03	0,25			0,35
<b>BNC2020</b>	0,03	0,03	0,40			0,50
<b>BNC300</b>	0,03	0,03	0,20			0,30
<b>BNC100</b>	0,03	0,03	0,20			0,30
<b>BNC160</b>	0,03	0,03	0,20			0,35
<b>BNC200</b>	0,05	0,05	0,35			0,50



### Characteristics

#### BNC2010 - High Precision

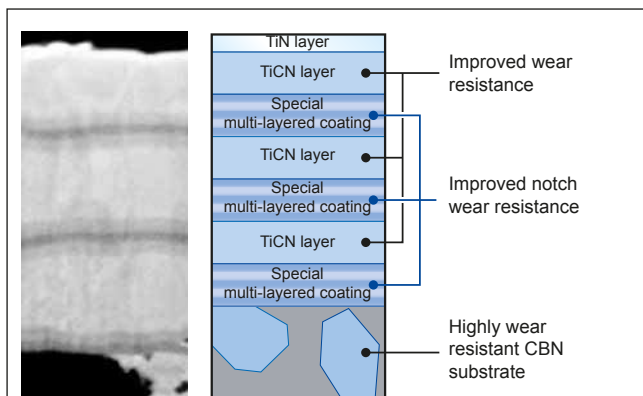
A grade for high-precision machining applicable for finishing requiring good surface roughness and dimensional accuracy. Provides further improved wear resistance thanks to a newly developed CBN substrate coated with a TiCN layer. Reduces flank wear and achieves excellent surface finish thanks to newly developed special stable multi-layered coating.

#### BNC2020 - General Purpose & High Efficiency

A general-purpose grade applicable to general hardened steel machining. A newly developed tough CBN-substrate coated with a highly wear-resistant TiAlN layer. Achieves more stable machining and longer tool life by employing a highly adhesive layer for high chipping resistance.

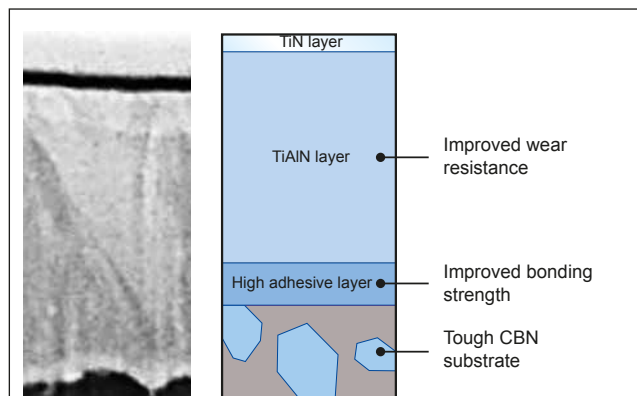
### CBN-Substrate and Coating Structure of BNC2010 and BNC2020

#### BNC2010



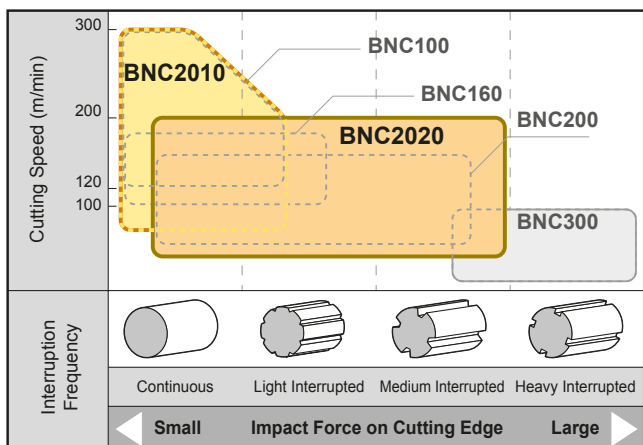
Achieves excellent flank wear resistance thanks to a laminated structure of a TiCN-layer and special multi-layer coating.

#### BNC2020



Achieves further stability thanks to TiAlN coating layers with high bonding strength.

### Application Range



### Recommended Cutting Conditions

#### BNC2010

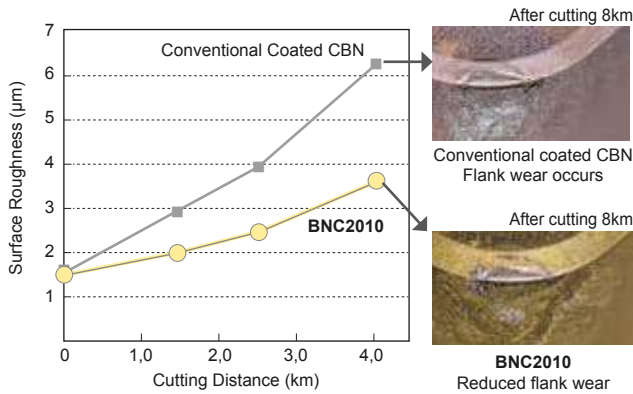
Cutting Speed (m/min)	
120	150
200	250
300	
Feed Rate (mm/rev)	Depth of Cut (mm)
0,03 ~ 0,25	0,03 ~ 0,35

#### BNC2020

Cutting Speed (m/min)	
50	100
150	200
220	
Feed Rate (mm/rev)	Depth of Cut (mm)
0,03 ~ 0,40	0,03 ~ 0,50

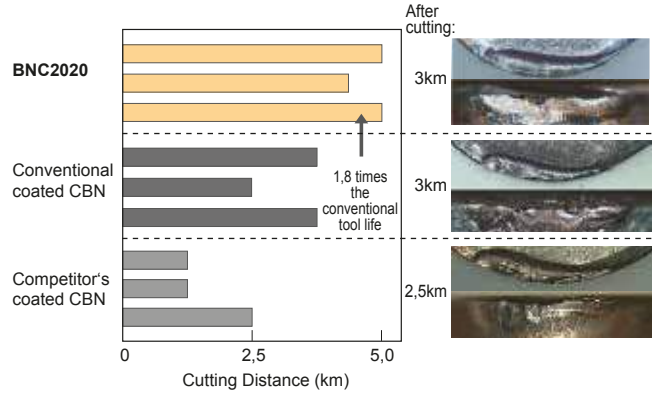
## Cutting Performance

### BNC2010



Work Material: 15CrMo5, 58-62HRC, Continuous  
 Insert: DNGA150408NC4 (BNC2010)  
 Cutting Edge Treatment: S01225  
 Cutting Conditions:  $v_c=160\text{m/min}$ ,  $f=0,08\text{mm/rev}$ ,  $a_p=0,1\text{mm}$ , Wet

### BNC2020

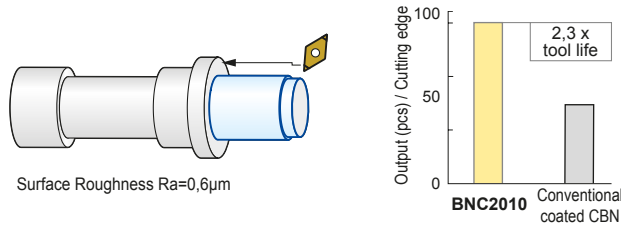


Work Material: SCM415-5V, 58-62HRC, Interrupted  
 Insert: CNGA120412NC4 (BNC2020)  
 Cutting Edge Treatment: S01225  
 Cutting Conditions:  $v_c=130\text{m/min}$ ,  $f=0,1\text{mm/rev}$ ,  $a_p=0,6\text{mm}$ , Dry

## Application Example

### Continuous External Turning of Main Shaft

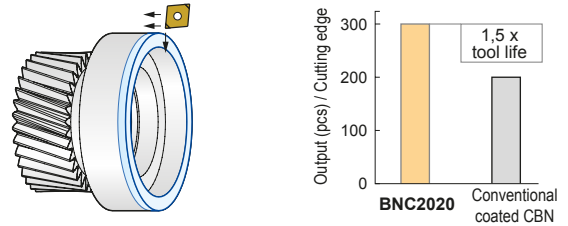
BNC2010 provides excellent wear resistance and achieves excellent surface roughness.



Insert: DNGA150408NC4 (BNC2010)  
 Cutting Conditions:  $v_c=200\text{m/min}$ ,  $f=0,10\text{mm/rev}$ ,  $a_p=0,35\text{mm}$ , Dry

### Carburised Layer Removal for Sun Gears

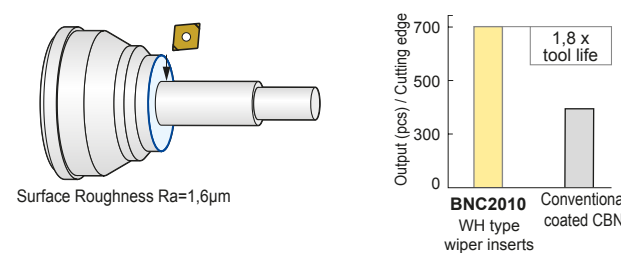
BNC2020 achieves a longer tool life in high load cutting.



Insert: DNGA120408NC4 (BNC2020)  
 Cutting Conditions:  $v_c=100\text{m/min}$ ,  $f=0,15\text{mm/rev}$ ,  $a_p=0,5\text{mm}$ , Wet

### Facing of CVJ Outer Race

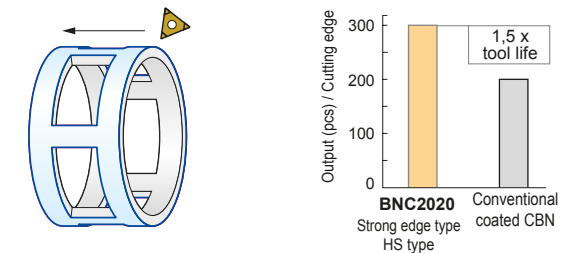
BNC2010 with a WH type wiper insert maintains excellent surface finish for an extended time.



Insert: CNGA120412NCWH2 (BNC2010)  
 Cutting Conditions:  $v_c=150\text{m/min}$ ,  $f=0,2\text{mm/rev}$ ,  $a_p=0,2\text{mm}$ , Dry

### Interrupted Machining of CVJ Cage Window

BNC2020 strong edge HS type provides stable performance in interrupted cutting.



Insert: TNGA160420HSNC3 (BNC2020)  
 Cutting Conditions:  $v_c=120\text{m/min}$ ,  $f=0,10\text{mm/rev}$ ,  $a_p=0,15\text{mm}$ , Dry

## Cutting Edge Preparation

Grade	General Edge Treatment	Strong Edge Type: HS
	Edge Treatment	Edge Treatment
BNC2010	S01225	S01730
BNC2020	S01225	S02735

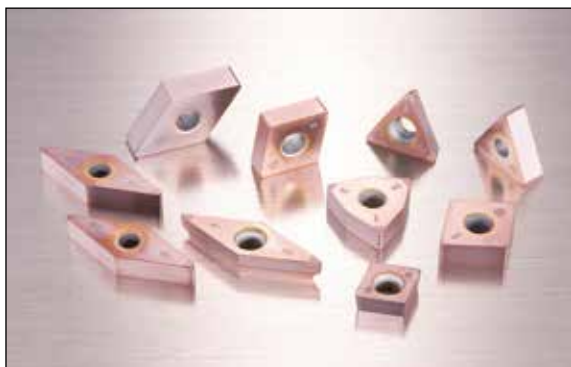
**Edge Treatment Identification Code**

S 0 1 2 2 5

W: Negative land width      α: Negative land angle

Cutting edge: T - Negative land  
 S - Negative land + R - Honing

### Coated Sumiboron premium grade for high speed machining of hardened steels



#### General Features

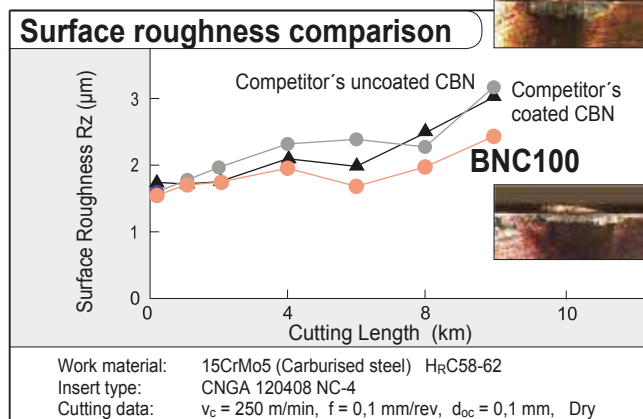
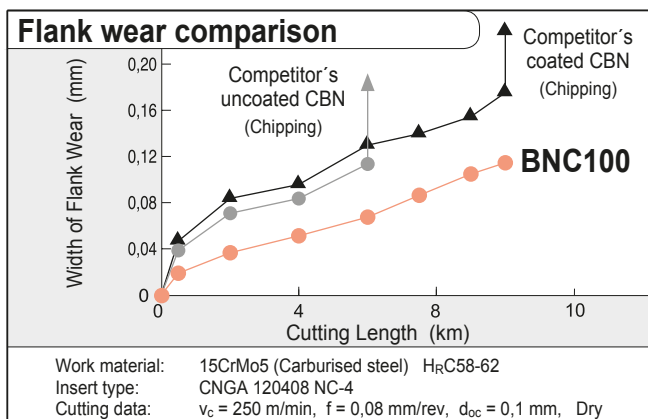
Our copper coloured Sumiboron grade BNC 100 resists premature plastic deformation of the cutting edge by withstanding the high temperatures that occur when machining hardened steels. This new grade features a heat resistant CBN substrate and a special TiCN based ceramic coating to enhance surface finish across a broad range of finishing applications at elevated cutting speeds.

Ideal for higher speed machining and suitable for continuous or light interrupted cuts BNC100 delivers reliable performance and excellent tool life

#### Advantages

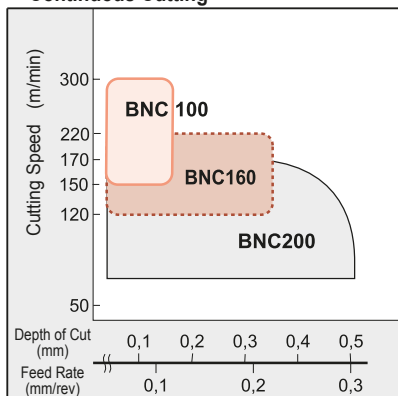
- **High speed machining!**  
Suitable for continuous to light interrupted high speed cutting with  $v_c = 150 \sim 300$  m/min.
- **Extended tool life!**  
Wear resistant ceramic coating and tough CBN substrate considerably extends tool life.
- **Excellent surface finish!**  
A consistent surface finish to values less than 6,3 Rz is easily achieved on both continuous and light interrupted cut applications.

#### Performance

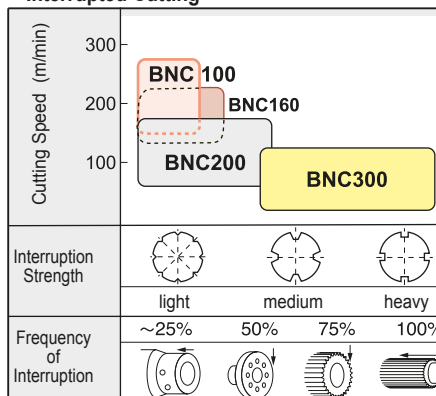


#### Application Range

##### Continuous Cutting



##### Interrupted Cutting

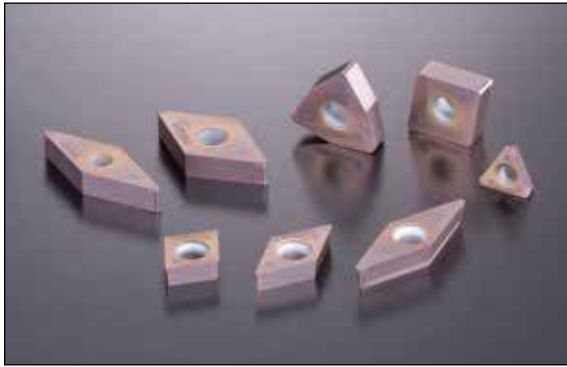


#### Recommended Cutting Conditions

$v_c$ (m/min)	$f$ (mm/rev)	$d_{oc}$ (mm)
100 - 300	0,03-0,2	0,03-0,3

Coolant ... Continuous cutting: Dry or Wet  
 Interrupted cutting: Dry

**High precision machining with surface finishes down to 1,6 Rz possible thanks to smooth coating!**



■ General

Use the copper coloured Sumiboron grade BNC160 to improve surface integrity as well as machining accuracy. The TiCN based smooth surface ceramic coating and the newly developed Sumiboron substrate enhances edge strength and wear resistance making high precision machining with surface finishes as low as 1,6Rz readily achievable.

This new grade is ideal for turning components that previously relied on precision grinding machines for final machining.

■ Advantages

● **Excellent surface roughness!**

A consistent surface roughness is maintained for hours because wear at the boundary is so gradual.

● **High Precision Machining**

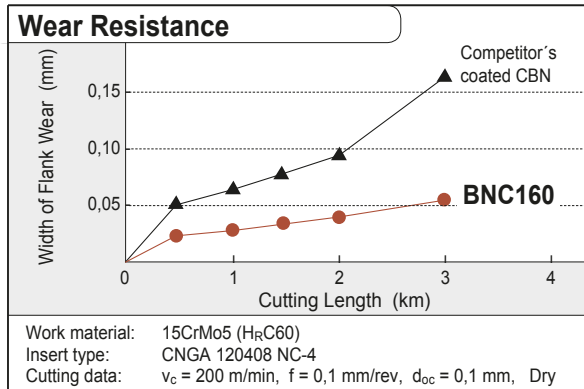
High precision work previously ground, can now be turned.

● **Enlarged scope of application!**

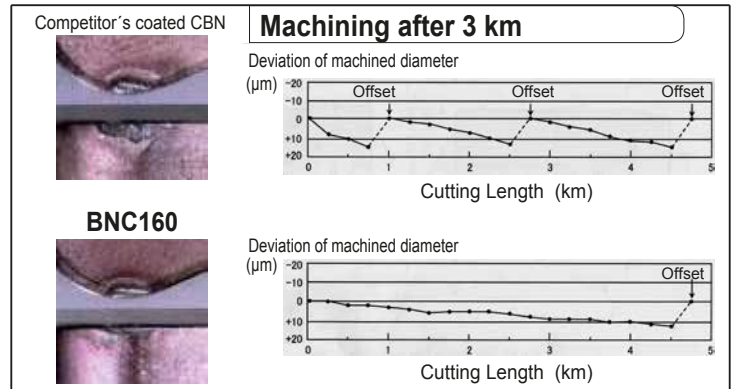
A wider range of hardened steels can be cut using Sumiboron the result being high productivity on close tolerance machining applications.

■ Performance

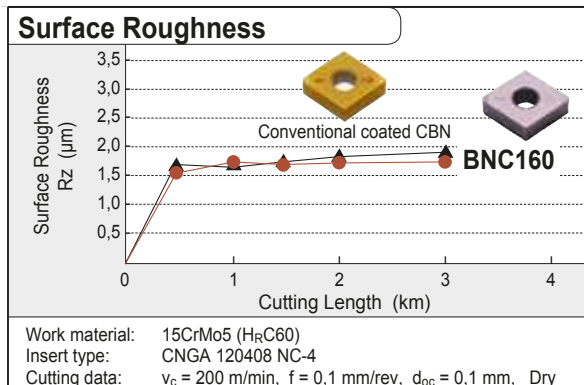
● Continuous Cutting



● Machining Accuracy



● Continuous Cutting



■ Recommended cutting Conditions

v <sub>c</sub> (m/min)					f (mm/rev)	d <sub>oc</sub> (mm)
120	150	200	220	250		
----- ----- ----- ----- -----					0,03-0,2	0,03-0,35

Feed rate and nose radius are set such that the theoretical surface roughness is 1/2 to 1/3 of the required surface roughness.

Coolant ... Continuous cutting: Dry or Wet  
Interrupted cutting: Dry

**Most suitable for high speed finishing !**

**Excellent wear and fracture resistance!  
Predictable tool life on a wide range of applications!**



### ■ General

Our silver coloured Sumiboron insert grade BNC200 offers safe reliable cutting and predictable tool life.

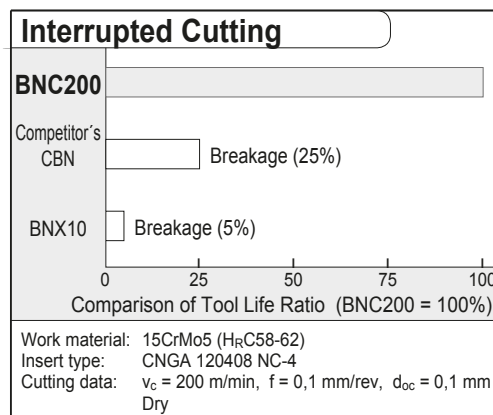
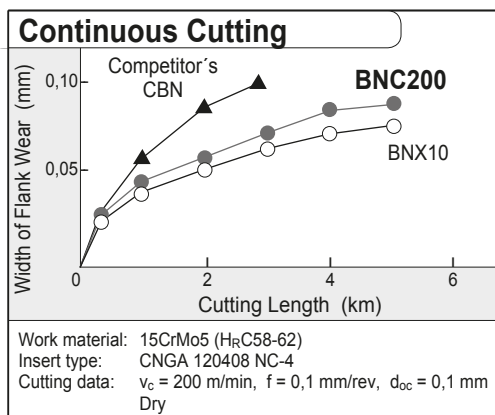
The newly developed cutting material with enhanced edge strength is coated with TiAlN based ceramic for excellent wear resistance and realises extended tool life even when interrupted cutting.

This grade is especially suitable for medium speed machining of carburised surfaces.

### ■ Advantages

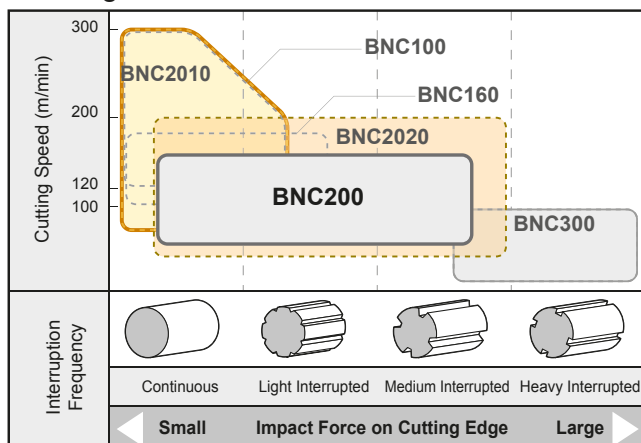
- **Predictable tool life!**  
Extended tool life is realised even when high speed cutting thanks to excellent wear resistance.
- **Wide range of applications!**  
Sumiboron is suitable for a wide range of applications eg. from low to high speed interrupted cutting.
- The newly developed brazing technology maximises edge strength making Sumiboron suitable for interrupted and continuous cutting.

### ■ Performance



- **BNC200 features excellent wear resistance comparable with BNX10, plus outstanding fracture resistance.**

### ■ Application Range



### ■ Recommended Cutting Conditions

$v_c$ (m/min)	$f$ (mm/rev)	$d_{oc}$ (mm)
50 80 170 220	0,03-0,25	0,05-0,5

Coolant ... Continuous cutting: Dry or Wet  
Interrupted cutting: Dry

**Can be used in a wide range of applications from low to high speed operation.**



The ultimate grades BNC300 and BN350 in interrupted machining of hardened steel



■ General Features

- **BNC300**  
CBN substrate that emphasizes on toughness coupled with a highly wear resistant TiAlN based coating layer that has improved adhesion strength. With a good balance of fracture and wear resistance, stable and longer tool life can be achieved in interrupted cut or in a mixture of continuous and interrupted cutting.
- **BN350**  
SUMIBORON series highest fracture resistance and toughest CBN. Reliable grade for achieving stable tool life in heavy interrupted cutting conditions.

■ Characteristics

**BNC300** ● Stable and long tool life in interrupted cutting

Achieving stable and long tool life in heavy interrupted cutting, with superior fracture resistance.

● Superior dimensional precision

Good adhesion strength, TiAlN based, high wear resistance coating. Achieving superior dimensional precision even in interrupted cutting.

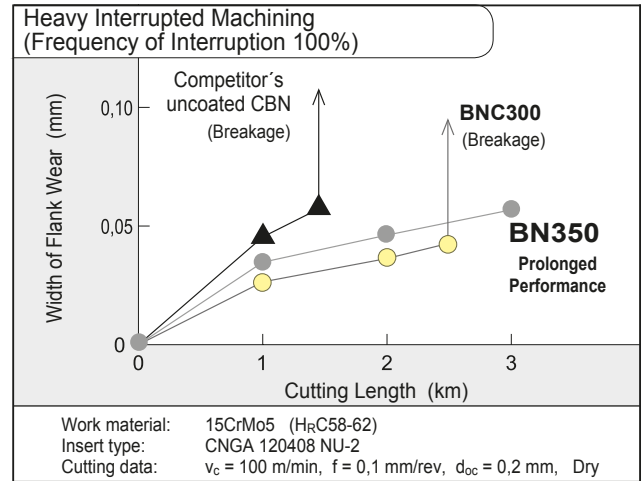
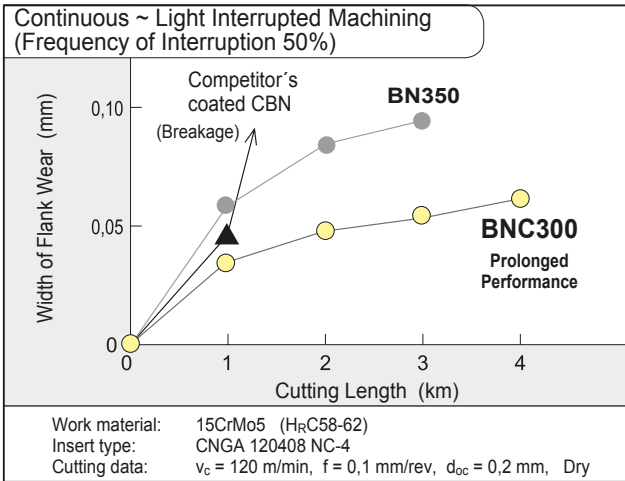
● Suitable for different types of workpieces

Achieving significantly longer tool life even on workpieces that have a mixture of continuous and interrupted cutting.

**BN350** ● Stable and long tool life in interrupted cutting

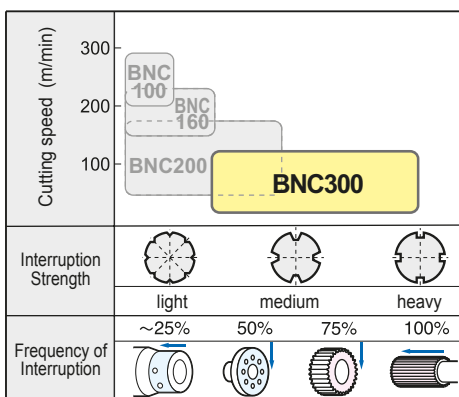
Stable and long tool life with superior fracture resistance, that prevents fractures which commonly occurs during interrupted cutting.

■ Performance

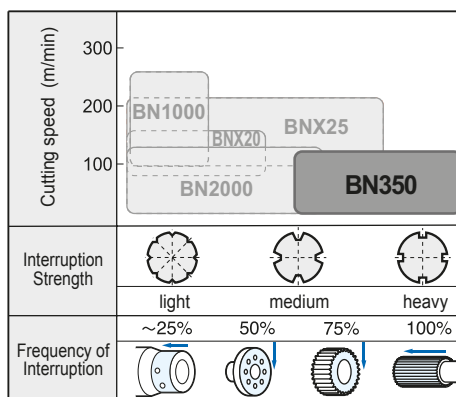


■ Recommended Application Range

● Coated SUMIBORON



● Uncoated SUMIBORON

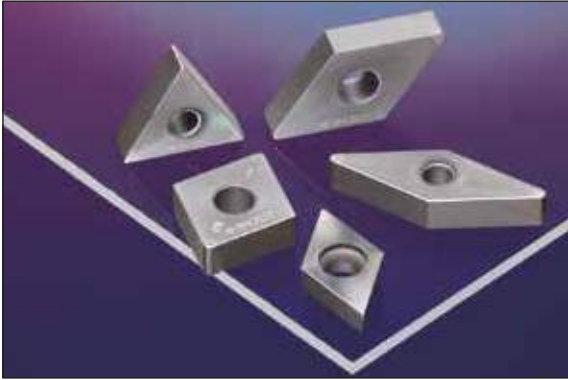


■ Recommended Cutting Conditions (BNC300, BN350)

v <sub>c</sub> (m/min)	f (mm/rev)	d <sub>oc</sub> (mm)
50 100 150 200	80 120	0,03-0,2 0,03-0,3

■ Coolant ... Interrupted cutting: Dry

## Coated CBN grade for ductile cast iron machining

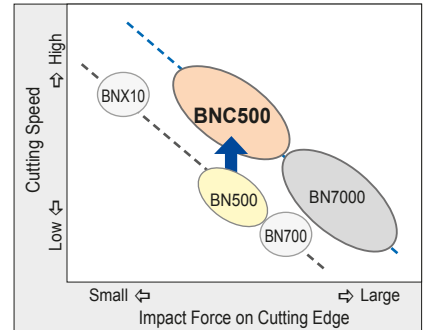


### General Features

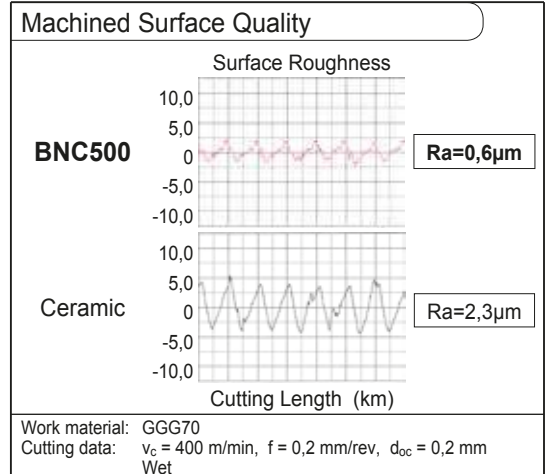
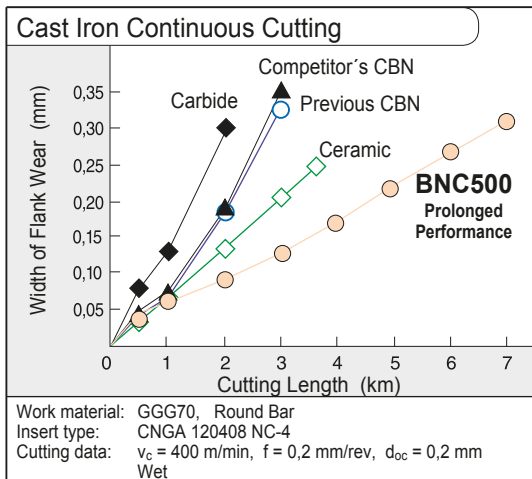
Further improvements in the toughness of the sintered CBN and wear resistance from the application of a newly developed high-purity TiC binder. In addition, it demonstrates exceptional wear resistance by combining a ceramic coating with excellent heat resistance. High-speed and high-precision machining is achieved when finishing ductile cast iron. It also provides a long, stable tool life in machining high-strength ductile cast iron, special cast irons such as vermicular cast iron, and centrifugal cast iron.

### Characteristics

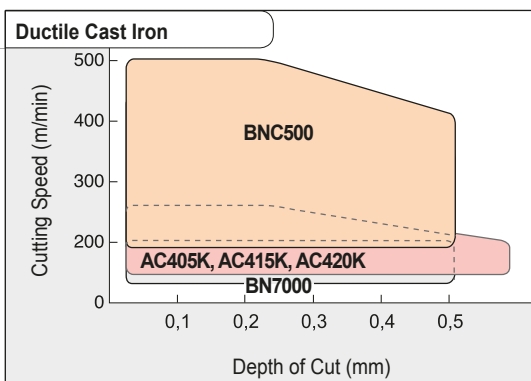
- **Achieves a Long, Stable Tool Life at  $v_c=400$  m/min**  
Superior wear resistance, makes stable machining possible under high-speed conditions.
- **Supports High-precision Machining**  
Can maintain excellent dimensional tolerance and surface roughness.



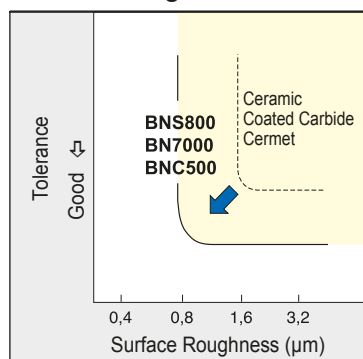
### Cutting Performance



### Application Range



### High Precision Machining

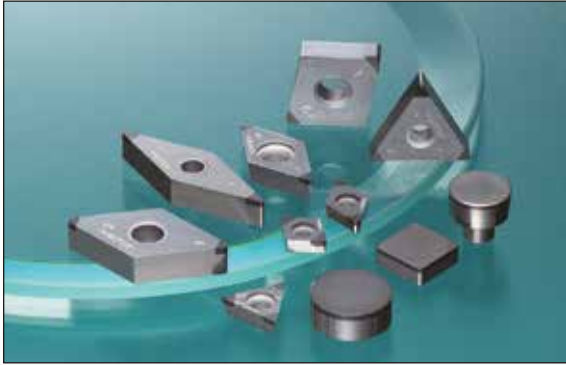


### Recommended Cutting Conditions

$v_c$ (m/min)	
100	200 300 400 500
$f$ (mm/rev)	$d_{oc}$ (mm)
0,1 - 0,4	0,03 - 0,5

\* Coolant ... Wet

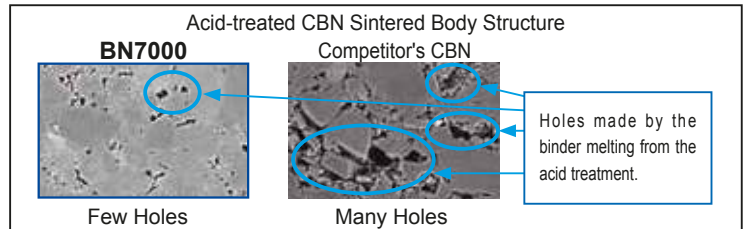
## Uncoated CBN grade for high-speed finishing of cast iron, powdered metals, and difficult-to-machine materials!



### General Features

Medium-grain CBN sintered to a high density to achieve the maximum content percentage.

Also delivers superior fracture resistance by increasing the binding strength between CBN particles. Provides stable, long tool life for high-speed finishing work with cast iron, powdered metals, and difficult-to-machine materials.



### Characteristics

#### ● Excellent for high speed finishing of Cast Iron!

Good wear and fracture resistance in high speed machining of Grey Cast Iron.

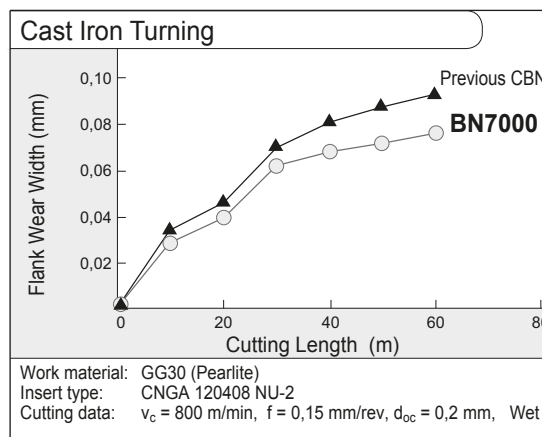
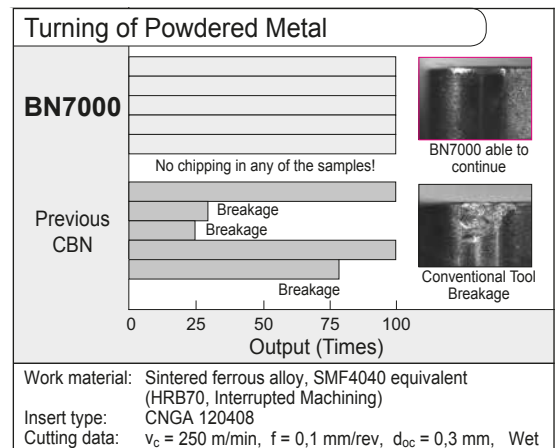
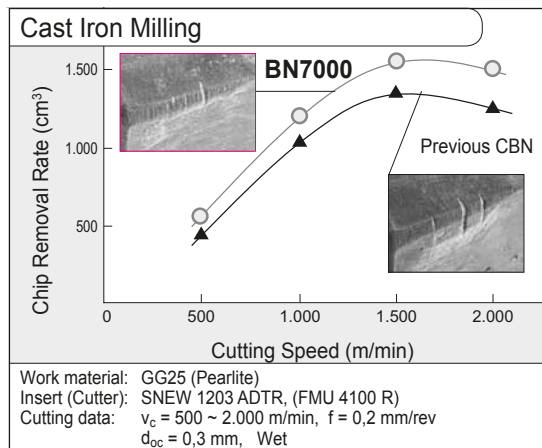
#### ● High efficiency machining of powdered metal

With 4 different types of edge treatment, stable and long tool life can be achieved from machining of Sintered Alloys of any shape or hardness.

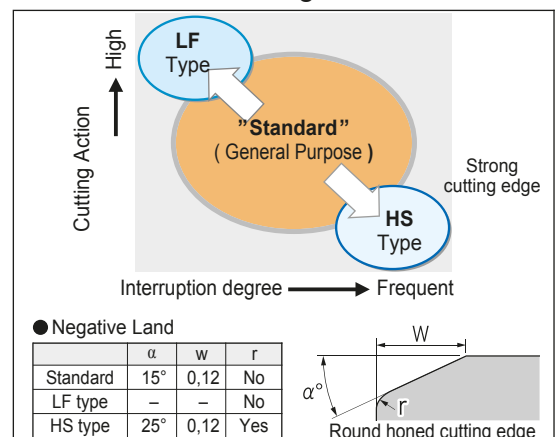
#### ● Able to machine any Exotic Metals.

Long tool life can also be achieved for the machining of exotic materials such as Roll, HSS and Heat-Resistive Alloy etc.

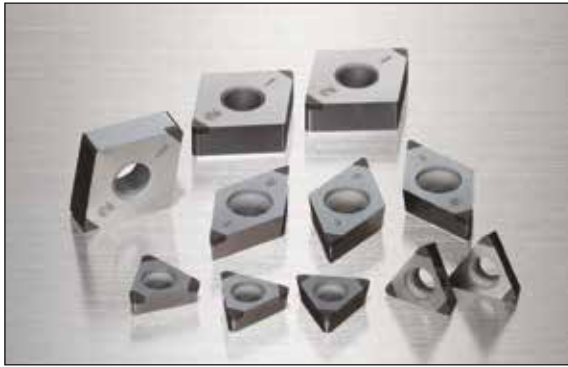
### Cutting Performance



### Recommended Edge Treatment

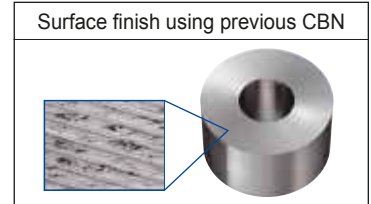
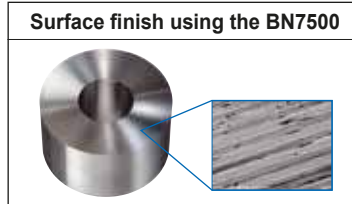


## Uncoated CBN grade for high precision and high efficiency machining of powdered metal



### General Features

High density sintered material made of micro-grained CBN grains provide excellent sharpness and wear resistance for high quality surfaces in sintered alloy finishing.



The previous CBN left white blemishes on the finished surface whereas the BN7500 leaves a better, glossy surface finish.

### Characteristics

#### Excellent for finishing of powdered metal

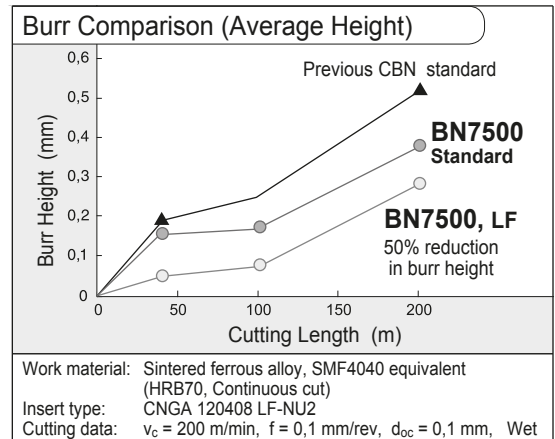
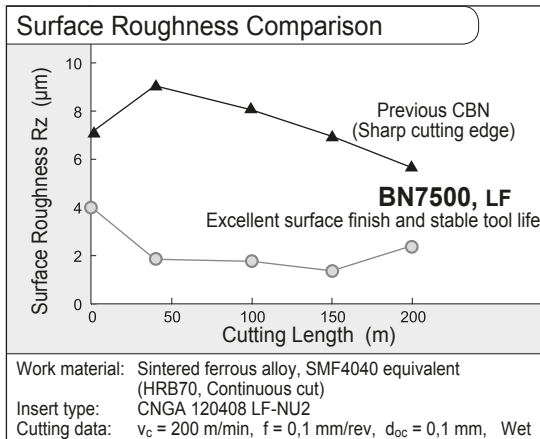
Excellent machined surface finish and surface appearance.

#### Available with 5 different types of edge treatment for machining sintered alloys of any shape or hardness

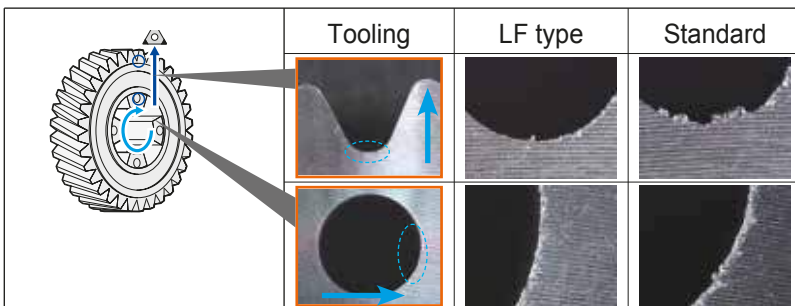
The LF type has a sharper edge designed specifically for machining sintered alloys with minimal burr and improved machining precision.

The HS Type has a strengthened cutting edge for stable chipping resistance during interrupted cutting and finishing.

### Cutting Performance



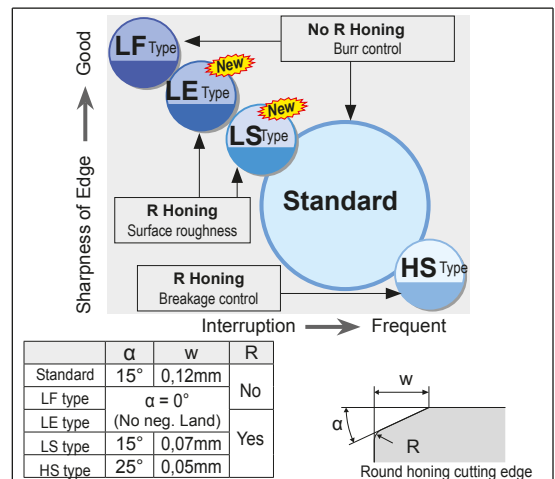
### Feed and Burr Relationship



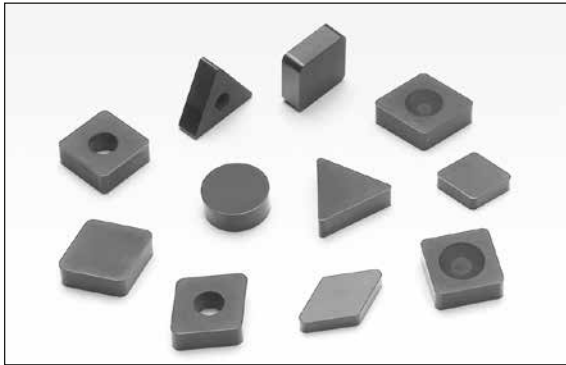
The LF Type without negative land has a cutting edge sharpness superior to the standard type and can control burrs better.

Work material: VVT Facing  
 Insert type: TNGA 160404 NU3  
 Cutting data:  $v_c = 200$  m/min,  $f = 0,1$  mm/rev,  $d_{oc} = 0,1$  mm, Wet

### Recommended Edge Treatment



## Solid CBN grade for high speed rough and finish machining of cast iron



### General

Solid CBN grade with high content CBN and special binder phase provide high fracture toughness and high thermal conductivity.

Solid inserts for roughing with high depth of cut and also for finishing of cast iron and alloyed cast iron at wet and dry conditions.

### Advantages

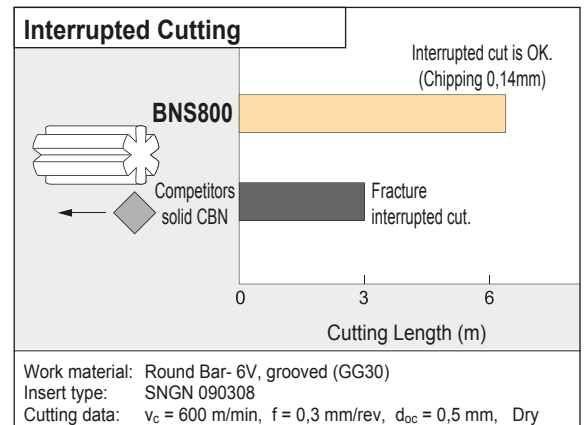
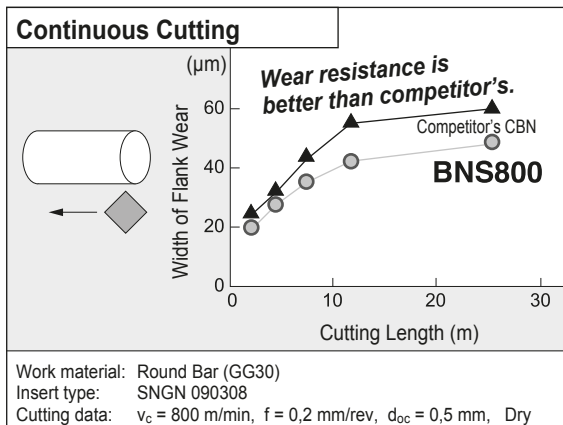
#### High wear resistance !

High CBN-content and special binder phase provide a excellent wear resistance and a tight dimensional control in finish machining.

#### High edge stability !

High thermal conductivity of BNS800 and high edge stability provide a long tool life at wet and dry machining.

### Performance



### Application Example

● Cylinder Bore		● Brake Disc		● Carbide Roll		● Sprayed Face Bore	
<p>Light Cut <b>GG25</b> Finishing</p>		<p><b>GG25</b> Turning</p>		<p>Carbide (Co 15%) Turning</p>		<p>Colmonoy Boring</p>	
Tool life criteria: Finishing <b>BNS800</b> 7500 Bore Comp. sold CBN 2500 Bore		Tool life criteria: Breakage <b>BNS800</b> 400 pcs Comp. sold CBN 200 pcs		Tool life criteria: Breakage <b>BNS800</b> 5 pass Comp. CBN 1 pass Breakage		Tool life criteria: Breakage <b>BNS800</b> 10 pcs Comp. CBN 6 pcs	
Tooling	Light Cut   Finishing	Tooling	Finishing	Tooling	Finishing	Tooling	Roughing   Finishing
Grade	BNS800	Grade	BNS800	Grade		Grade	BNS800
Insert	SNGN090308	Insert	DNGN110312	Insert	RNGN090300	Insert	SNGN090312   SNGN090308
$v_c$	1000m/min	$v_c$	600m/min	$v_c$	40m/min	$v_c$	80m/min
$f$	0,3mm/rev   0,25mm/rev	$f$	0,3mm/rev	$f$	0,15mm/rev	$f$	0,04mm/rev   0,03mm/rev
$d_{oc}$	0,2mm	$d_{oc}$	0,5mm	$d_{oc}$	0,2mm	$d_{oc}$	~3mm   0,5mm
Coolant	Wet	Coolant	Dry	Coolant	Wet	Coolant	Wet

# SUMIBORON / SUMIDIA Production Process



## ■ General

Since 1970s, Sumitomo has pioneered the development of sintered cubic boron nitride (CBN) and sintered diamond (PCD) tools successfully used in the tool making industries. These tool materials can be epoch-making in a sense of broadening the cutting application range.

## ■ Production Process

In the production process of **SUMIBORON / SUMIDIA**, CBN powder / diamond powder is firstly synthesized under the ultra - high pressure, and secondly, the synthesized crystalline grains are sintered.

Fig. 2 shows a diagram of high temperature high pressure apparatus for processing the ultra - high pressure sintering operation.

This apparatus is basically composed of a piston and a cylinder to generate ultra - high pressure as high as 5000 N/mm<sup>2</sup> with a special device. The piston and cylinder are made of cemented carbide.

To manufacture final products round discs of SUMIBORON and SUMIDIA material are cut into specific shapes and brazed on to tool bodies made of cemented carbide, or steel, etc., and after that finished by grinding the edge.

In another process the final product can be obtained only by cutting blanks and finishing them.

Fig. 1

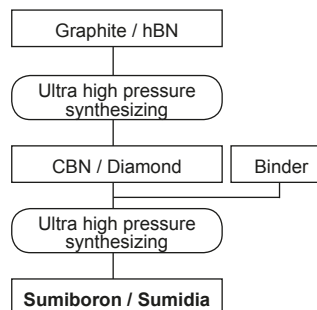
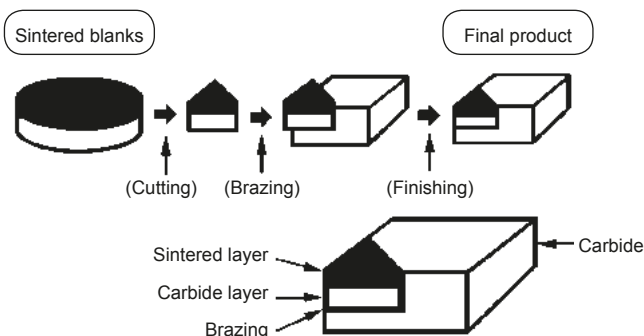
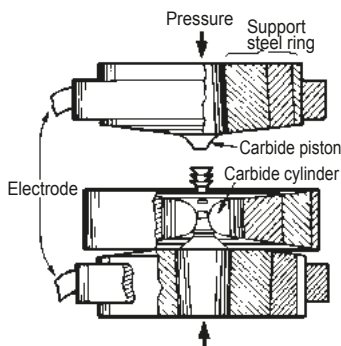


Fig. 2



## ■ SumiBoron / SumiDia Grinding Method

Items		SumiBoron	SumiDia
Grinding machine	-	1) Carbide grinding machine is applicable. 2) R Pointer should be used. 3) Should be wet grinding.	1) Special-purpose high rigidity grinding machine is desirable. 2) Be sure of applying with wet system.
Wheel	Abrasive	Diamond	Diamond
	Grain size	D 25 - medium, D20 - fine (#400 ~ 800)	Rough grinding: D 35 (#400 mesh) Finish grinding: D 25 (#800 ~ 1500 mesh)
	Bond	Resinoid or vitrified	Special-purpose metal bond for diamond sintered tool or vitrified
	Concentration	100	100 ~ 125
	Dressing	Use #400 WA stick	Execute dressing with a WA stick of about 400 mesh.
Grinding condition	Wheel speed	800 ~ 1000 m/min.	800 ~ 1000 m/min.
	Table cycle	30 ~ 60 cycles/min.	30 ~ 60 cycles/min.
	Grinding oil	Water soluble grinding coolant oil	Water soluble grinding coolant (Solution type)
Others	-	1) Check chipping of the cutting edge with microscope after finishing. 2) Blank surface cut by EDM should be ground more than 0,05 mm	1) Rake surface is lapped generally 2) Inspect with microscope of magnification of 30-50 times if there is edge chipping. 3) Edge treatment of tool should be sharp for cutting non-ferrous metals. 4) Remove the wire-cut surface of blank by 0,05 mm or more in grinding operation.

# SUMIDIA Series



## General Features

SUMIDIA is a polycrystalline diamond material developed by using our proprietary technologies.

SUMIDIA is available in two grades: DA1000 and DA150, each having different characteristics depending on the size of the diamond grains and the combination of binder materials.

In addition, a new grade NPD10 made by nano-level diamond grains without binder material with direct conversion sintering has been newly added to our product line.

SUMIDIA can be used for all types of applications, from machining aluminium alloys to brittle materials such as carbide.

## Series • Features • Application

Grade	Features	Application	Average size of Diamond grains (μm)	Hardness Hv	TRS (GPa)
SUMIDIA	DA1000	High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear resistance, and excellent edge sharpness.	~ 0,5	110 ~ 120	≈ 2,60
	DA150	Micro-grained sintered diamond grade with strong diamond-to-diamond bonding. It is suitable for the machining of non-ferrous metals and other very hard materials.	5	100 ~ 120	≈ 1,95
SUMIDIA Binderless <b>New</b>	NPD10	A 100% diamond grade made by nano-level diamond grains with direct conversion sintering. Has the highest wear resistance and fracture resistance and the best edge sharpness.	< 0,5	120 ~ 130	≈ 3,15

## Application Range

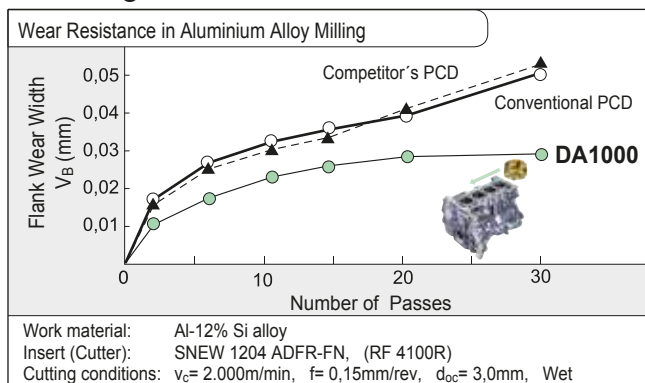
### Aluminium

Machinability	Work Material	Turning		Milling	Example Part	
		Roughing	Finishing			
Good ↑ ↓ Difficult	Sintered aluminium	DA1000			Cylinder liner	
	Die cast aluminium (ADC12)				Transmission case, oil pan, cylinder block, aluminium wheel	
	Low silicon (AC2B-T6, AC4C-T6)				DA150	Cylinder head
	High silicon (T6)					Cylinder block

### Non-Aluminium

Machinability	Work Material	Turning		Milling	Example Part
		Roughing	Finishing		
Good ↑ ↓ Difficult	Non-ferrous sintered alloy	DA1000			Bushing
	Gunmetal carbon				Connection rod
	Carbide				NPD10 <b>New</b>
	Iron combined		DA150	Cylinder block, bearing cap	

## Cutting Performance



## Recommended Cutting Conditions

Work Materials		Aluminium Alloys	Copper Alloy	Reinforced Plastics	Wood or Organic Materials	Carbide	Carbon
Cutting Speed	$v_c$ (m/min)	~ 3.000	~ 1.000	~ 1.000	~ 4.000	10 ~ 30	100 ~ 600
Feed rate	$f$ (mm/rev)	~ 0.2	~ 0.2	~ 0.4	~ 0.4	~ 0.2	~ 1.0
Depth of cut	$d_{oc}$ (mm)	~ 3.0	~ 3.0	~ 2.0	-	~ 0.5	~ 2.0



## Nano-Polycrystalline Diamond



### ■ General Features

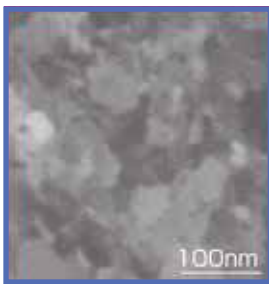
Nano-polycrystalline diamond is a type of polycrystalline diamond, produced by directly binding nano-level diamond grains without using any binders.

This material is unique to our company and as compared to conventional diamond grades containing binders, it exhibits higher strength, excellent wear resistance and fracture resistance.

SUMIDIA Binderless is the series of tools with cutting edges made from this high performance nano-polycrystalline diamond.

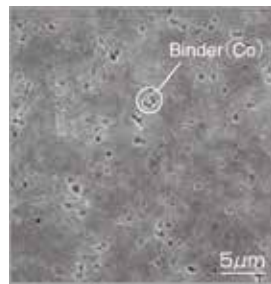
### ■ Micro-Structure Comparison

Nano-Polycrystalline Diamond  
SEM Structure



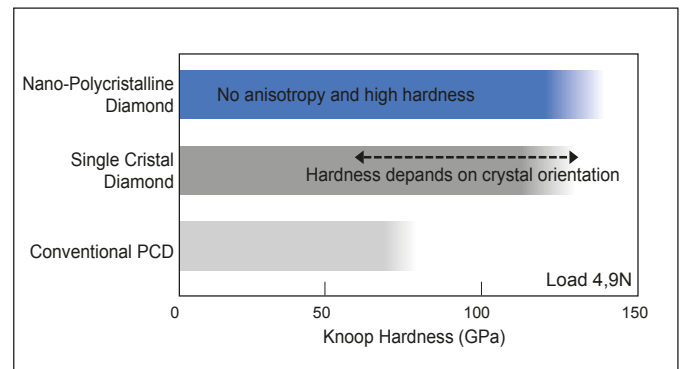
Diamond particle average grain diameter (30-50nm)

Conventional PCD  
SEM Structure



Diamond particle average grain diameter (1-10µm)

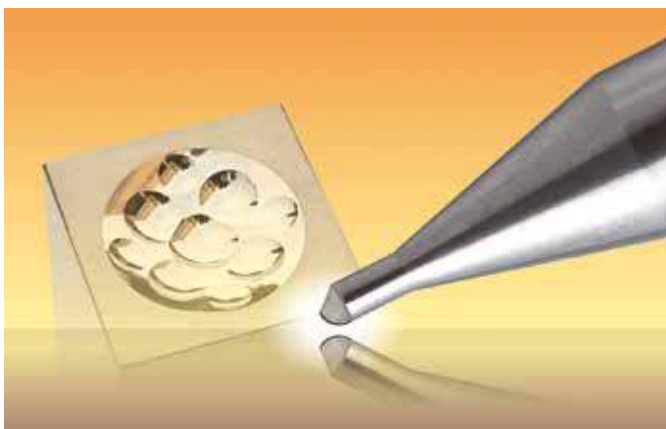
### ■ Hardness



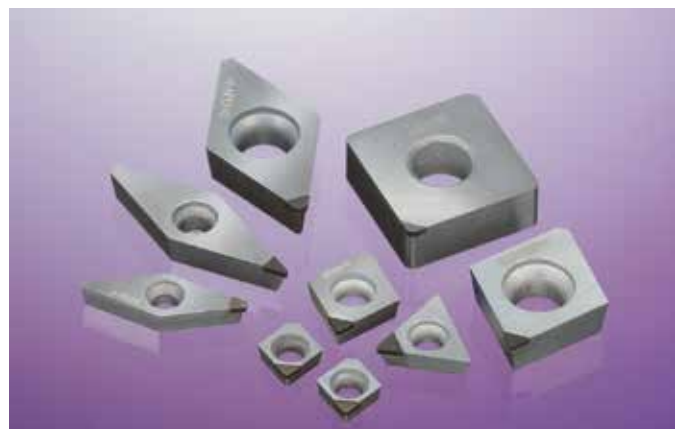
## SUMIDIA Binderless

### ■ Application Examples

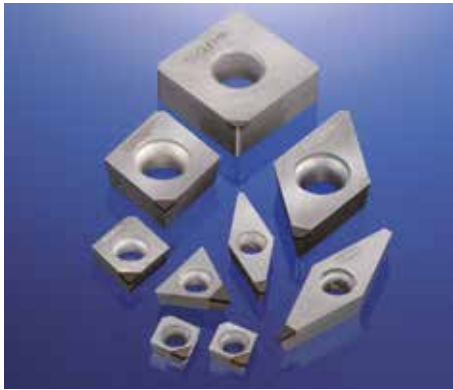
- Ballnose Endmill / Radius Endmill (Carbide Machining)



- Indexable Inserts (Carbide Machining)







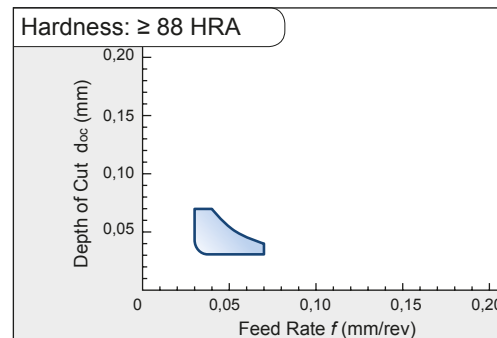
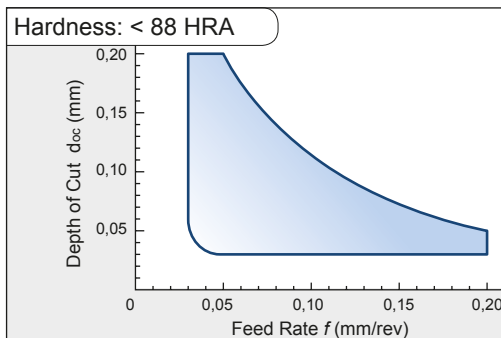
## General Features

By using nano-polycrystalline diamond for the cutting edge, these tools achieve excellent wear resistance and fracture resistance compared to tools made with previous polycrystalline diamond. In particular, nano-polycrystalline diamond makes it possible to achieve improved machining accuracy and longer tool life for machining brittle materials such as carbide, etc.

## Characteristics

- Best suited for high precision machining of carbide  
Achieves high precision machining of carbide with nano-polycrystalline diamond, which has excellent wear resistance.
- Maintain excellent dimensional accuracy over long periods  
Greatly reduces the number of times that the tool must be replaced compared to previous diamond tools, improving work efficiency and reducing total cost.
- Applicable to machining brittle materials  
Makes it possible to perform turning on brittle materials (ceramics, etc.) that could previously only be machined through grinding.

## Applicable Range (Carbide Machining)

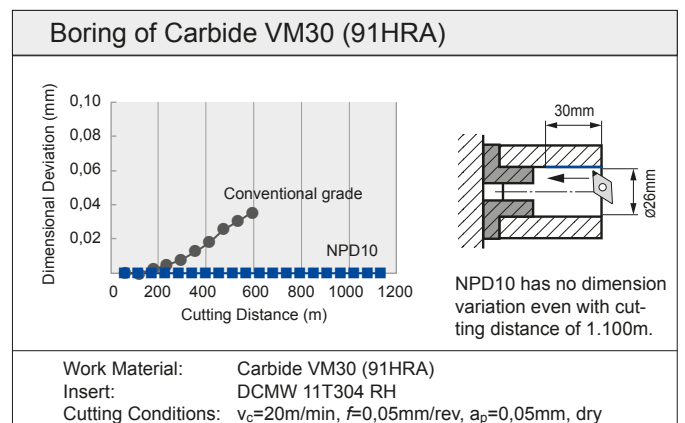
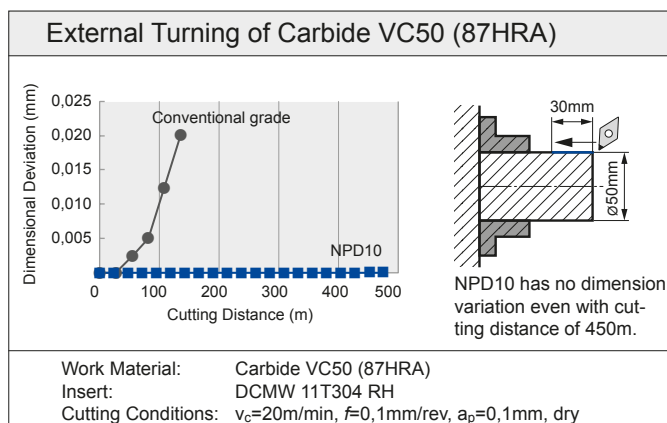


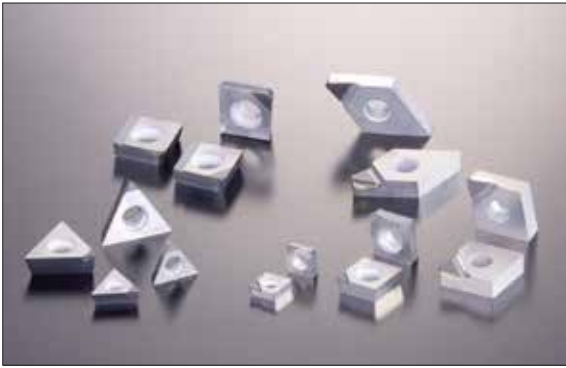
## Recommended Cutting Conditions (Carbide Machining)

Work Material				Cutting Conditions		
Class		Hardness (HRA)	SEI Grades	Cutting Speed $v_c$ (m/min)	Feed Rate $f$ (mm/rev)	Depth of Cut $d_{oc}$ (mm/rev)
VM VC	70	≥ 83 ~ < 88	G7 G6	5 - 20 - 30	0,03 - 0,10 - 0,20	0,03 - 0,10 - 0,20
	60					
	50					
VM VC	40	≥ 88	G5 D2	5 - 15 - 20	0,03 - 0,05 - 0,07	0,03 - 0,05 - 0,07

Lower limit value - recommended value - upper limit value, cutting conditions: dry

## Machining Accuracy





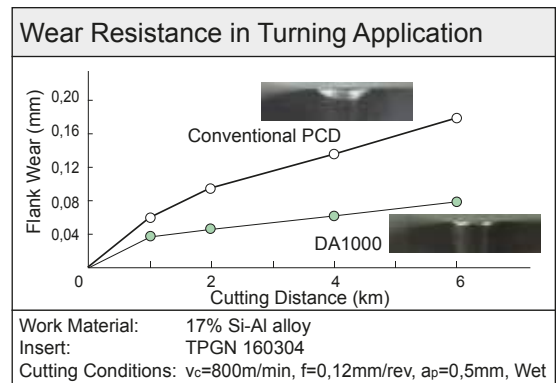
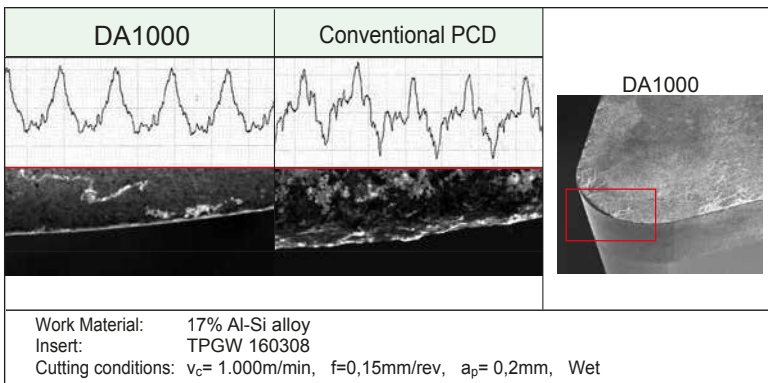
### General Features

SumiDia DA1000 is a high density, ultra fine grained sintered PCD with high toughness similar to that of cemented carbides.

SumiDia DA1000, with its great improvement in fracture resistance, eliminates the breakage problems faced by conventional PCD tools especially during the milling of Aluminium alloys and achieves a longer and more stable tool life.

Furthermore, the NF type inserts makes it even more cost effective.

### Cutting Performance



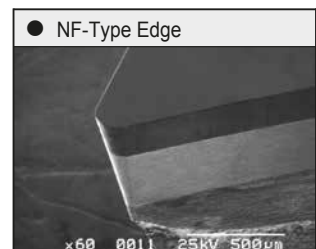
## NF Type Inserts

### General Features

- Total Cost Effectiveness with High Performance and Lower Price
  - Long, stable tool life and good fracture resistance with high toughness grade DA2200.
  - Optimum design utilizing improved mass production techniques provides a relatively lower cost.
  - Regrindable type results in huge total cost reduction.
- Wide Application Range
  - Wide range of stocked items for small hole boring, OD turning to milling processes.
  - Negative and positive type inserts that are applicable on standard lever-lock, pin-lock type holders.

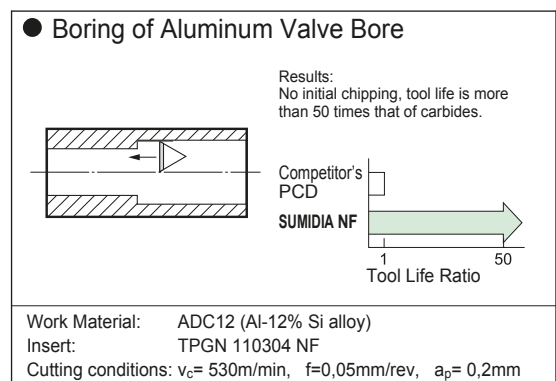
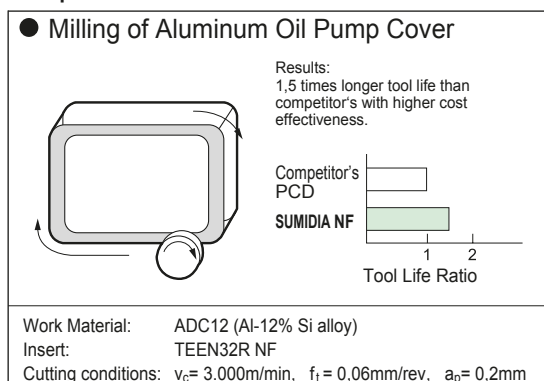
### Efficiency

SumiDia NF-type inserts preserve the excellent basic performance of DA1000 while achieving high cost performance through optimal design and development of mass production technology. These inserts achieve the high performance of SUMIDIA DA1000, including excellent fracture resistance, wear resistance and smooth work material surface finishing.



(NF-type is precision ground just like conventional inserts.)

### Application Examples



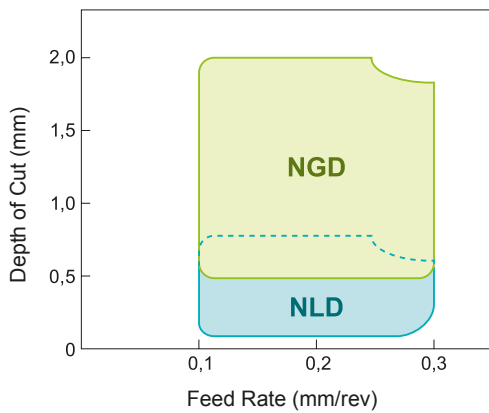


### ■ Characteristics

- Provides excellent chip control in semi finishing and finishing of aluminium alloy.
- Solves chip control problems and dramatically improves work efficiency.
- Achieves stable tool life by employing high toughness grade DA1000.

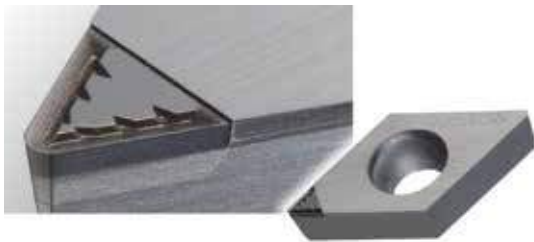
### ■ Applications Range

- Wrought Aluminium Alloy (A6061)

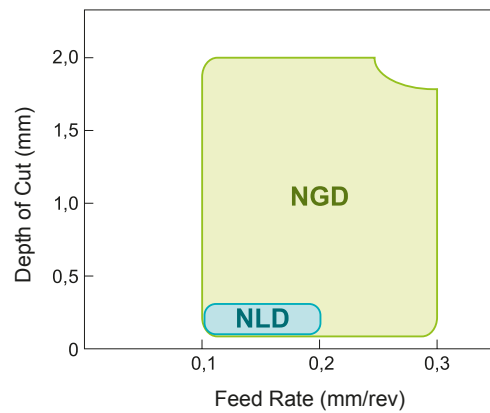


#### NLD Type Chipbreaker

Achieves excellent chip control for finishing.

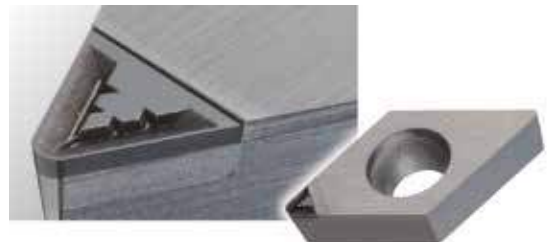


- Casted Aluminium Alloy (ADC12)



#### NGD Type Chipbreaker

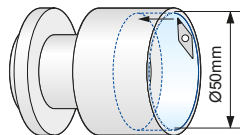
Achieves excellent chip control for semi finishing.



### ■ Application Examples

#### Internal Turning of Machine Component

Provides good chip control in small-depth cutting of wrought Al alloy.



Breakmaster **NLD** type

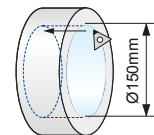


Without chip breaker

Work Material: A6061  
Insert: VCMT110302 **NLD** NF (DA1000)  
Cutting Conditions:  $v_c=200\text{m/min}$ ,  $f=0,20\text{mm/rev}$ ,  $a_p=0,10\text{mm}$ , wet

#### Internal Turning of Transmission Component

Offers good chip control in casted material. Small chips - easy to remove.



Breakmaster **NGD** type

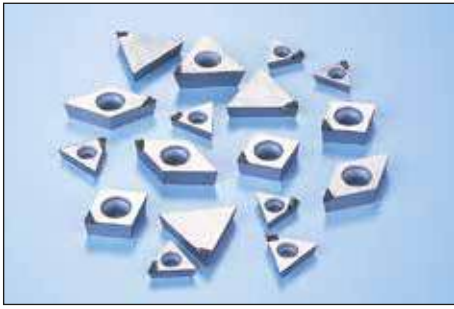


Without chip breaker

Work Material: ADC12  
Insert: TPMT110304 **NGD** NF (DA1000)  
Cutting Conditions:  $v_c=400\text{m/min}$ ,  $f=0,23\text{mm/rev}$ ,  $a_p=1,20\text{mm}$ , wet

# SUMIDIA One-Use Inserts Break Master DM Type

**N** Non-ferrous Metal



## General Features

Economy One-Use Insert

- Similar to SumiBoron One-Use type inserts

With Built-in Chipbreaker for Effective Chip Removal

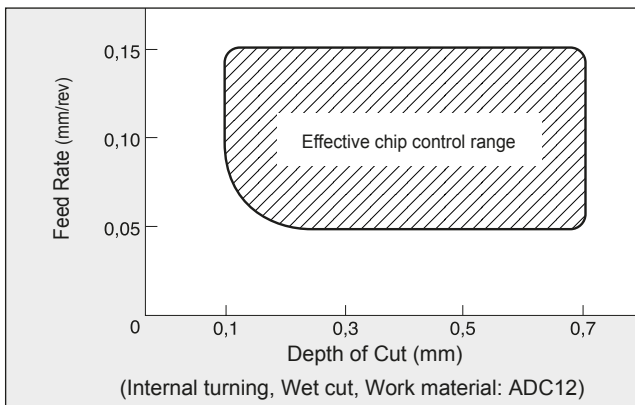
- Solving chip control problems and improving efficiency with DM-type chipbreaker.

Extensive Insert Range for External and Facing Operation

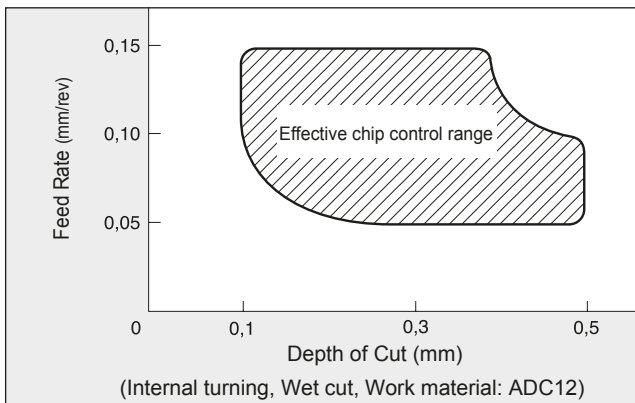
- 80° and 55° diamond shaped inserts are added to expand the application range of this series.

## Application Range

### Triangular Type Insert (Boring)



### CCMT/DCMT Type (External Turning & Facing)



## Chip Control

### Break Master



### No Chipbreaker



## Application

Machining Details	Cutting Conditions	Results
Work Material: AC2A-T6  Operation: Internal Boring	$v_c = 300$ m/min $f = 0,06$ mm/rev $d_{oc} = 0,35$ mm Wet cut	Surface finish of the bore hole was less than $Ra=1\mu\text{m}$ . Chips formed was of a uniform curl of about 2mm in length. There was almost no chips left inside the bore hole.

## Recommended Conditions

### Boring (Triangular Insert)

Feed Rate	Depth of Cut	Type
~ 0.15 mm/rev.	~ 0,7 mm	Wet cut

### External Copying (55°, 80° Diamond Shaped Inserts)

Feed Rate	Depth of Cut	Type
~ 0.15 mm/rev.	~ 0,5 mm	Wet cut

For facing process, D.O.C. should be less than 0,4mm

## Series

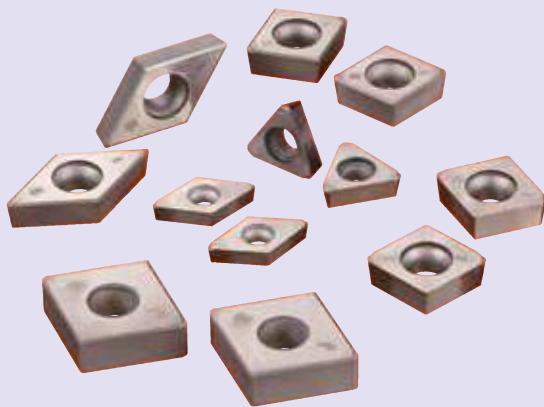
External Turning & Facing		Boring	
	CCMT 0602__ L/R-DM NU CCMT 09T3__ L/R-DM NU		TPMT 0802__ L/R-DM NU TPMT 0902__ L/R-DM NU
	DCMT 0702__ L/R-DM NU DCMT 11T3__ L/R-DM NU		TPMR 1103__ L/R-DM NU <sup>(*)</sup> TPMR 1603__ L/R-DM NU <sup>(*)</sup>

(\*) Stock in Japan  
Delivery on request

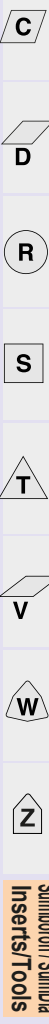
# SUMIBORON / SUMIDIA Indexable Inserts & Tools

M1 ~ M56

# M



SUMIBORON / SUMIDIA Insert	Insert Identification .....	M2-3	
C / 80° Diamond	<b>CC</b> _ _ 7° pos. Type .....	M4,6-8	<b>C</b>
	<b>CP</b> _ _ 11° pos. Type .....	M5	
	<b>CN</b> _ _ neg. Type .....	M9-11	
D / 55° Diamond	<b>DC</b> _ _ 7° pos. Type .....	M12-14	<b>D</b>
	<b>DN</b> _ _ neg. Type .....	M15-18	
R / Round	<b>RN</b> _ _ neg. Type .....	M18	<b>R</b>
S / Square	<b>SC</b> _ _ 7° pos. Type .....	M18	<b>S</b>
	<b>SN</b> _ _ neg. Type .....	M19-20	
T / Triangle	<b>TB</b> _ _ 5° pos. Type .....	M20	<b>T</b>
	<b>TC</b> _ _ 7° pos. Type .....	M21	
	<b>TN</b> _ _ neg. Type .....	M22-24	
	<b>TP</b> _ _ 11° pos. Type (Without Hole) .....	M24	
	<b>TP</b> _ _ 11° pos. Type (With Hole) .....	M24-27	
V / 35° Diamond	<b>VB</b> _ _ 5° pos. Type .....	M28	<b>V</b>
	<b>VC</b> _ _ 7° pos. Type .....	M29	
	<b>VN</b> _ _ neg. Type .....	M30-31	
W / Polygon	<b>WN</b> _ _ neg. Type .....	M32	<b>W</b>
Special	<b>ZNEX</b> neg.-pos. Type .....	M32	<b>Z</b>
SUMIDIA Binderless <sup>New</sup>	Neg.-pos. Type .....	M33	
SUMIBORON / SUMIDIA Precision Tools	Guidance .....	M34-35	<b>V</b>
SUMIBORON	<b>BSME / SEXC</b> Type Small Hole Boring Bars .....	M36-39	<b>W</b>
	<b>BNBB</b> Type Small Hole Boring Bars .....	M40	
	<b>BNZ / BNB</b> Type Small Hole Boring Bars .....	M41	
	<sup>New</sup> <b>GWB / PSC</b> Type Grooving Holder .....	M42-43	
	<b>BNGG</b> Type Threading Holder .....	M44	
SUMIDIA	<b>DABB</b> Type Small Hole Boring Bars .....	M45	<b>Z</b>
	<b>RF</b> Type Face Mill .....	M46	
	<b>SRF</b> Type Face Mill .....	M47	
SUMIBORON "BN Finish Mill"	<b>FMU</b> Type Face Mill .....	M48-49	
"Helical Master"	<b>BNES</b> Type Endmill .....	M50	
"Mould Finish Master"	<b>BNBP</b> Type Micro Ball Nose Endmill .....	M51	
SUMIDIA "Mould Finish Master" Binderless <sup>New</sup>	<b>NPDRS / NPDB(S)</b> Type .....	M52-53	
SUMIDIA Drills	<b>DAL / DDL / DML</b> Type Drills .....	M54-55	



Sumiboron / Sumidia  
Inserts/Tools

# SUMIBORON Insert Identification

## Regrindable Type

# CNMA 120408 B



Chart 1

Symbol	Description
B	Full-top CBN insert

## One-Use Type

# CNGG 120408 N-SV NC WG 4

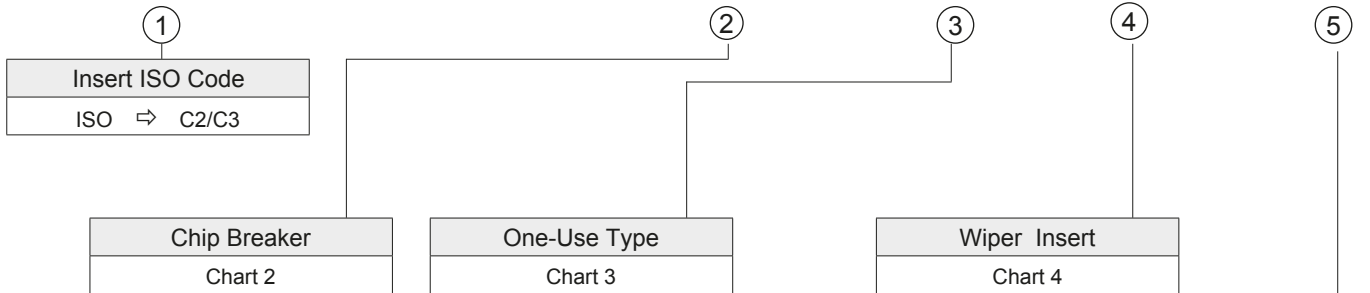


Chart 2

Symbol	Description
–	Standard Type
LF LE	Sharp cutting edge
LT	Small edge treatment type
LS	Low cutting force
ES	High efficiency type
HS	Strong cutting edge
N-FV N-LV N-SV	Chipbreaker Type

Chart 3

Symbol	One-Use Type	Grade
NC	Coated SUMIBORON	BNC2010, 2020 BNC100, 160 BNC200, 300 BNC500
NU	Uncoated CBN	BNX10, 20 BN1000, 2000 BN350, BN7000, 7500
NS		BNX25

Chart 4

Symbol	Wiper Insert
WG	Finishing $0,05 \leq f \leq 0,20$
WH	High feed cutting $0,20 \leq f < 0,40$
W	Surface Roughness Standard: $R_z 1,6 \sim 3,2\mu\text{m}$

f : Feed Rate (mm/rev)

No. of Cutting Edges

Chart 5
---------

Chart 5

Symbol	No. of Cutting Edges	Type
–	1 cutting edge	Single-corner
2	2 cutting edges	Multi-corner
3	3 cutting edges	
4	4 cutting edges	
6	6 cutting edges	

C

D

R

S

T

V

W

Z

SUMIBORON

Regrindable Type

**CNMA 120408 RH**

①

Insert ISO Code
ISO ⇨ C2/C3

②

Additional Information
Chart 1

Chart 1

Symbol	Description
RH	Honing specification (treated cutting edge)

One-Use Type

**CNMA 120408 N-LD NF**

①

Insert ISO Code
ISO ⇨ C2/C3

②

Additional Information
Chart 2

③

Type
Chart 3

Chart 2

Symbol	Description
N-LD	Chipbreaker type (neutral)
N-GD	
R-DM	Chipbreaker type (right handed)
L-DM	Chipbreaker type (left handed)

Chart 3

Symbol	Description
NF	NF insert ⇨ L26
NU	One use insert



# SUMIBORON / SUMIDIA Indexable Inserts

CC-- Type 7° pos. Inserts

80° Diamond Type 7° Relief  
With Insert Hole








Coated

Dimensions (mm)				
CC--	ℓ	ød (IC)	s	d <sub>1</sub>
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## CCGT / CCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		Uncoated		Uncoated													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 CBN with chipbreaker with 2 CBN cutting edges	CCGT 060204 N-FV NC2	0,4	●	●	●	●																		
	CCGT 09T304 N-FV NC2	0,4	●	●	●	●																		
	CCGT 09T308 N-FV NC2	0,8	●	●	●	●																		
	CCGT 09T304 N-LV NC2	0,4	●	●	●	●																		
	CCGT 09T308 N-LV NC2	0,8	●	●	●	●																		
 Standard - Normal cut geometry with 2 CBN cutting edges (Wiper Type)	CCGW 060202 NC2	0,2	●	●	●	●	●																	
	CCGW 060204 NC2	0,4	●	●	●	●	●	●																
	CCGW 060208 NC2	0,8	●	●	●	●	●	●																
	CCGW 09T302 NC2	0,2	●	●	●	●	●	●																
	CCGW 09T304 NC2	0,4	●	●	●	●	●	●																
	CCGW 09T308 NC2	0,8	●	●	●	●	●	●																
 (Wiper Type)	CCGW 09T304 NC-W2	0,4	●	●	●	●	●																	
	CCGW 09T308 NC-W2	0,8	●	●	●	●	●																	
	CCGW 09T304 NC-WG2	0,4	●	●	●	●	●																	
	CCGW 09T308 NC-WG2	0,8	●	●	●	●	●																	
 LE - Type Low cutting force with 2 CBN cutting edges	CCGW 060202 LE-NC2	0,2	●	●	●	●	●																	
	CCGW 060204 LE-NC2	0,4	●	●	●	●	●																	
	CCGW 09T302 LE-NC2	0,2	●	●	●	●	●																	
	CCGW 09T304 LE-NC2	0,4	●	●	●	●	●																	
	CCGW 09T308 LE-NC2	0,8	●	●	●	●	●																	
 LT - Type Sharp cutting edge with 2 CBN cutting edges	CCGW 060202 LT-NC2	0,2	●	●	●	●	●																	
	CCGW 060204 LT-NC2	0,4	●	●	●	●	●																	
	CCGW 09T302 LT-NC2	0,2	○	●	●	●	●																	
	CCGW 09T304 LT-NC2	0,4	●	●	●	●	●																	
	CCGW 09T308 LT-NC2	0,8	●	●	●	●	●																	
 LS - Type Low cutting force with 2 CBN cutting edges	CCGW 060202 LS-NC2	0,2	●	●	●	●	●																	
	CCGW 060204 LS-NC2	0,4	●	●	●	●	●																	
	CCGW 09T304 LS-NC2	0,4	●	●	●	●	●																	
	CCGW 09T308 LS-NC2	0,8	●	●	●	●	●																	
 HS - Type Strong cutting edge with 2 CBN cutting edges	CCGW 09T304 HS-NC2	0,4	●	●	●	●	●																	
	CCGW 09T308 HS-NC2	0,8	●	●	●	●	●																	

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts



80° Diamond Type      11° Relief  
With Insert Hole


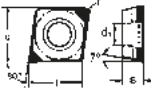
Coated

Dimensions (mm)				
CP--	ℓ	ød (IC)	s	d <sub>1</sub>
0602--	6,45	6,35	2,38	2,8
0802--		7,94	2,38	3,4
w0903--		9,525	3,18	4,4

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## CPGW


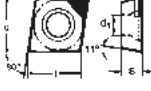
● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		Uncoated		Uncoated														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000		
  CPGW 080202 NC2 CPGW 080204 NC2		0,2	○	○																					
		0,4	○	○																					
		0,2	○	○																					
		0,4	○	○																					

Uncoated

## CPMW

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		Uncoated		Uncoated														
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000		
  CPMW 060202 NF CPMW 060204 NF CPMW 060208 NF		0,2																							
		0,4																							
		0,8																						●	●
																								●	●

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z

SumiBoron / SumiDia  
Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

CC-- Type 7° pos. Inserts

80° Diamond Type 7° Relief  
With Insert Hole






Uncoated

Dimensions (mm)				
CC--	ℓ	∅d (IC)	s	d <sub>1</sub>
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## CCGT / CCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN										PCD										
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
<b>Break Master - FV, LV</b>  CBN with chipbreaker with 2 CBN cutting edges	CCGT 060204 N-FV NU2	0,4																					
	CCGT 09T304 N-FV NU2 CCGT 09T308 N-FV NU2	0,4 0,8							●														
 CBN with chipbreaker with 2 CBN cutting edges	CCGT 09T304 N-LV NU2 CCGT 09T308 N-LV NU2	0,4 0,8						●															
	CCGW 060204 NU2 CCGW 060208 NU2	0,4 0,8																	●				
 with 2 CBN cutting edges	CCGW 09T304 NU2 CCGW 09T308 NU2	0,4 0,8						●	●	▲	●	▲	▲	●				●					
	CCGW 09T304 NU-WG2 CCGW 09T308 NU-WG2	0,4 0,8						●											●				
 (Wiper Type)	CCGW 09T304 NU-WH2 CCGW 09T308 NU-WH2	0,4 0,8						●											●				
	CCGW 09T304 LF-NU2 CCGW 09T308 LF-NU2	0,4 0,8																	○				
 HS - Type Strong cutting edge with 2 CBN cutting edges	CCGW 09T304 HS-NU2 CCGW 09T308 HS-NU2	0,4 0,8																	○				

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

80° Diamond Type      7° Relief  
With Insert Hole

Uncoated

Dimensions (mm)				
CC--	ℓ	∅d (IC)	s	d <sub>1</sub>
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4
1204--	12,9	12,7	4,76	5,5

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## CCGW

● G-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		K		N													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	<b>CCGW 09T304</b> <b>CCGW 09T308</b>	0,4 0,8										●	●		▲									

● G-Class SumiBoron (CBN, One-Use Type)

	<b>CCGW 060204 NS</b> <b>CCGW 060208 NS</b>	0,4 0,8																						
	<b>CCGW 09T304 NS</b> <b>CCGW 09T308 NS</b>	0,4 0,8										●	●											
	<b>CCGW 060202 NU</b> <b>CCGW 060204 NU</b> <b>CCGW 060208 NU</b>	0,2 0,4 0,8							●	●	●	●	●	●	▲	▲	▲	▲	▲	●	●			
	<b>CCGW 09T302 NU</b> <b>CCGW 09T304 NU</b> <b>CCGW 09T308 NU</b>	0,2 0,4 0,8						●	●	●	●	●	●	●	▲	▲	▲	▲	▲	●	●			
	<b>CCGW 120408 NU</b>	0,8						●		▲	●													

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts

C

D

R

S

T

V

W

Z

SumiBoron / Sumidia  
Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

CC-- Type 7° pos. Inserts

80° Diamond Type 7° Relief  
With Insert Hole

Uncoated

Dimensions (mm)				
CC--	ℓ	∅d (IC)	s	d <sub>1</sub>
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## CCMT

### ● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	r	Material																				
			Coated		Uncoated										PCD								
			CBN																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	CCMT 060202	0,2																				●	
	CCMT 060204	0,4																				●	
	CCMT 09T302	0,2																				●	

### ● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	Material																				
			Coated		Uncoated										PCD								
			CBN																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	CCMT 060201 NF	0,1																					●
	CCMT 060202 NF	0,2																					●
	CCMT 060204 NF	0,4																					●
	CCMT 09T301 NF	0,1																					●
	CCMT 09T302 NF	0,2																					●
	CCMT 09T304 NF	0,4																					●
	CCMT 09T308 NF	0,8																					●

### ● M-Class SumiDia (PCD, One-Use "Break Master" Type)

Break Master Type	Shape	ISO Cat. No.	r	Material																				
				Coated		Uncoated										PCD								
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
Break Master - DM		CCMT 060202 L-DM NU	0,2																				●	
		CCMT 060204 L-DM NU	0,4																					●
		CCMT 09T302 L-DM NU	0,2																					●
		CCMT 09T304 L-DM NU	0,4																					●
Break Master - DM		CCMT 060202 R-DM NU	0,2																			○		
		CCMT 060204 R-DM NU	0,4																			○		
		CCMT 09T302 R-DM NU	0,2																			○		
		CCMT 09T304 R-DM NU	0,4																			○		
Break Master - LD		CCMT 060202 N-LD NF	0,2																			○		
		CCMT 060204 N-LD NF	0,4																			○		
		CCMT 09T302 N-LD NF	0,2																			○		
		CCMT 09T304 N-LD NF	0,4																			○		
Break Master - LD		CCMT 09T308 N-LD NF	0,8																			○		
																						○		
	Break Master - GD		CCMT 060202 N-GD NF	0,2																			○	
			CCMT 060204 N-GD NF	0,4																			○	
		CCMT 09T302 N-GD NF	0,2																			○		
		CCMT 09T304 N-GD NF	0,4																			○		
Break Master - GD		CCMT 09T308 N-GD NF	0,8																			○		
																						○		

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts

80° Diamond Type      0° Relief  
With Insert Hole


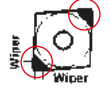







Coated

Dimensions (mm)				
CN_	ℓ	ød (IC)	s	d <sub>1</sub>
1204-	12,9	12,7	4,76	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## CNGA / CNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		Uncoated		PCD													
			BN2010	BN2020	BN100	BN160	BN200	BN300	BN500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 Standard - Normal cut geometry  (Wiper Type)	CNGA 120402 NC4 CNGA 120404 NC4 CNGA 120408 NC4 CNGA 120412 NC4	0,2 0,4 0,8 1,2	● ● ● ●	○ ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	
	CNGA 120404 NC-W4 CNGA 120408 NC-W4 CNGA 120412 NC-W4	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●
	CNGA 120404 NC-WG4 CNGA 120408 NC-WG4 CNGA 120412 NC-WG4	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●
	CNGA 120404 NC-WH4 CNGA 120408 NC-WH4 CNGA 120412 NC-WH4	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●
 LE - Type Low cutting force	CNGA 120404 LE-NC2 CNGA 120408 LE-NC2 CNGA 120412 LE-NC2	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	
 LT - Type Sharp cutting edge	CNGA 120402 LT-NC2 CNGA 120404 LT-NC2 CNGA 120408 LT-NC2 CNGA 120412 LT-NC2	0,2 0,4 0,8 1,2	● ● ● ●	○ ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	
 LS - Type Low cutting force	CNGA 120404 LS-NC2 CNGA 120408 LS-NC2 CNGA 120412 LS-NC2	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	
 ES - Type Crater wear stability	CNGA 120404 ES-NC4 CNGA 120408 ES-NC4 CNGA 120412 ES-NC4	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	
 HS - Type Strong cutting edge	CNGA 120404 HS-NC2 CNGA 120408 HS-NC2 CNGA 120412 HS-NC2	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	
 Break Master - FV, LV, SV	CNGG 120404 N-FV NC4 CNGG 120408 N-FV NC4 CNGG 120412 N-FV NC4	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	
 CBN with chipbreaker	CNGG 120404 N-LV NC4 CNGG 120408 N-LV NC4 CNGG 120412 N-LV NC4	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	
	CNGG 120404 N-SV NC4 CNGG 120408 N-SV NC4 CNGG 120412 N-SV NC4	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	
	CNGG 120404 N-SV NC4 CNGG 120408 N-SV NC4 CNGG 120412 N-SV NC4	0,4 0,8 1,2	● ● ●	○ ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z

Sumiboron / Sumidia Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

CN\_ \_ Type neg. Inserts

80° Diamond Type 0° Relief  
With Insert Hole

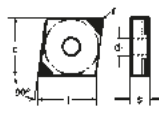

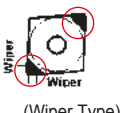


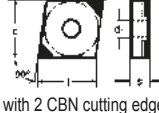

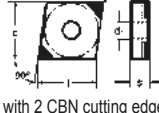

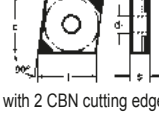
Uncoated

Dimensions (mm)				
CN_ _	ℓ	∅d (IC)	s	d <sub>1</sub>
1204--	12,9	12,7	4,76	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## CNGA / CNGM

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		PCD		PCD													
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BNZ50	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 with 2 CBN cutting edges     (Wiper Type)  	<b>CNGA 120404 NS2</b> <b>CNGA 120408 NS2</b> <b>CNGA 120412 NS2</b>	0,4 0,8 1,2																						
	<b>CNGA 120404 NU2</b> <b>CNGA 120408 NU2</b> <b>CNGA 120412 NU2</b>	0,4 0,8 1,2																						
	<b>CNGA 120404 NU-W2</b> <b>CNGA 120408 NU-W2</b>	0,4 0,8																						
	<b>CNGA 120404 NU-WG2</b> <b>CNGA 120408 NU-WG2</b> <b>CNGA 120412 NU-WG2</b>	0,4 0,8 1,2																						
	<b>CNGA 120404 NU-WH2</b> <b>CNGA 120408 NU-WH2</b> <b>CNGA 120412 NU-WH2</b>	0,4 0,8 1,2																						
 LF - Type Sharp cutting edge   with 2 CBN cutting edges	<b>CNGA 120404 LF-NU2</b> <b>CNGA 120408 LF-NU2</b>	0,4 0,8																						
 HS - Type Strong cutting edge   with 2 CBN cutting edges	<b>CNGA 120408 HS-NU2</b>	0,8																						
 Break Master - LV CBN with chipbreaker   with 2 CBN cutting edges	<b>CNGM 120404 N-LV NU2</b> <b>CNGM 120408 N-LV NU2</b> <b>CNGM 120412 N-LV NU2</b>	0,4 0,8 1,2																						

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

80° Diamond Type      0° Relief  
—

Uncoated

Dimensions (mm)				
CN_	ℓ	∅d (IC)	s	d <sub>1</sub>
0903--	9,7	9,525	3,18	4,4
1204--	12,9	12,7	4,76	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## CNGN / CNGX

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Coated		Uncoated		PCD													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	CNGN 090308 CNGN 090312	0,8 1,2																						
	CNGN 120412 CNGN 120416	1,2 1,6																				●	●	●

● G-Class SumiBoron (Solid CBN, "Dimple" Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Coated		Uncoated		PCD													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	CNGX 120412 CNGX 120416	1,2 1,6																				●	●	

## CNMA / CNMX

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Coated		Uncoated		PCD													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	CNMA 120404 CNMA 120408 CNMA 120412	0,4 0,8 1,2											●											
													●											
													●											

● M-Class SumiBoron (CBN, One-use Type)

Shape	ISO Cat. No.	r	H		K		H		K		N												
			Coated		Uncoated		Coated		Uncoated		PCD												
			CBN																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	CNMA 120404 NS CNMA 120408 NS CNMA 120412 NS	0,4 0,8 1,2																					
	CNMA 120404 NU CNMA 120408 NU CNMA 120412 NU	0,4 0,8 1,2								●	●	●	●		▲	▲	▲	▲	▲	●			
	CNMA 120408 NU-W	0,8										▲	●										

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	H		K		H		K		N												
			Coated		Uncoated		Coated		Uncoated		PCD												
			CBN																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	CNMX 120402 NF CNMX 120404 NF CNMX 120408 NF	0,2 0,4 0,8																				●	●

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z

SumiBoron / SumiDia  
Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

DC-- Type 7° pos. Inserts

55° Diamond Type 7° Relief  
With Insert Hole



Coated

Dimensions (mm)				
DC--	ℓ	ød (IC)	s	d <sub>1</sub>
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## DCGT / DCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Material																					
			Coated						Uncoated															
			CBN										K		N		PCD							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
<b>Break Master - FV, LV</b>  CBN with chipbreaker with 2 CBN cutting edges	DCGT 070204 N-FV NC2	0,4	●	●	●	●	●																	
	DCGT 11T304 N-FV NC2	0,4	●	●		●	●																	
	DCGT 11T308 N-FV NC2	0,8	●	●		●	●																	
	DCGT 11T304 N-LV NC2	0,4	●	●		●	●																	
DCGT 11T308 N-LV NC2	0,8	●	●		●	●																		
Standard - Normal cut geometry  with 2 CBN cutting edges Wiper (Wiper Type)	DCGW 070202 NC2	0,2	●	●	●	●	●	●																
	DCGW 070204 NC2	0,4	●	●	●	●	●	●																
	DCGW 070208 NC2	0,8	○	●	●	●	●	●																
	DCGW 11T302 NC2	0,2	●	●		●	●	●	●															
	DCGW 11T304 NC2	0,4	●	●	●	●	●	●	●															
	DCGW 11T308 NC2	0,8	●	●	●	●	●	●	●															
Wiper (Wiper Type)	DCGW 11T304 NC-WG2	0,4	●	●		●	●																	
	DCGW 11T308 NC-WG2	0,8	●	●		●	●																	
Wiper (Wiper Type)	DCGW 11T304 NC-WH2	0,4	●	●		●	●																	
	DCGW 11T308 NC-WH2	0,8	●	●		●	●																	
<b>New</b> LE - Type Low cutting force	DCGW 11T302 LE-NC2	0,2	○	●																				
	DCGW 11T304 LE-NC2	0,4	●	●																				
	DCGW 11T308 LE-NC2	0,8	●	●																				
<b>New</b> LT - Type Sharp cutting edge	DCGW 070202 LT-NC2	0,2		●																				
	DCGW 070204 LT-NC2	0,4		●																				
	DCGW 11T302 LT-NC2	0,2		●																				
	DCGW 11T304 LT-NC2	0,4		●																				
DCGW 11T308 LT-NC2	0,8		●																					
LS - Type Low cutting force	DCGW 070202 LS-NC2	0,2			●	●	●																	
	DCGW 070204 LS-NC2	0,4			●	●	●																	
	DCGW 11T304 LS-NC2	0,4			●	●	●	●																
	DCGW 11T308 LS-NC2	0,8			●	●	●	●																
HS - Type Strong cutting edge	DCGW 11T304 HS-NC2	0,4		●				●	●															
	DCGW 11T308 HS-NC2	0,8		●				●	●															

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z  
SumiBoron / SumiDia  
Inserts



55° Diamond Type 7° Relief  
With Insert Hole







Uncoated

Dimensions (mm)				
DC--	ℓ	∅d (IC)	s	d <sub>1</sub>
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4

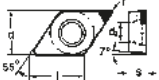

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## DCGT / DCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Material																					
			H Coated		H Uncoated										K		N							
			CBN														PCD							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
<b>Break Master - FV, LV</b>  CBN with chipbreaker with 2 CBN cutting edges	DCGT 070204 N-FV NU2	0,4									●													
	DCGT 11T304 N-FV NU2	0,4									●													
	DCGT 11T308 N-FV NU2	0,8									●													
	DCGT 11T304 N-LV NU2	0,4									●													
DCGT 11T308 N-LV NU2	0,8									●														
 with 2 CBN cutting edges	DCGW 070202 NU2	0,2									●													
	DCGW 070204 NU2	0,4								●	●	▲			▲	▲	●				●			
	DCGW 070208 NU2	0,8								●	●	▲	●		▲	▲	●				●			
	DCGW 11T302 NU2	0,2									●										●			
	DCGW 11T304 NU2	0,4								●	●	▲	●		▲	▲	●				●			
	DCGW 11T308 NU2	0,8								●	●	▲	●		▲	▲	●				●			
 (Wiper Type)	DCGW 11T304 NU-WG2	0,4									●													
	DCGW 11T308 NU-WG2	0,8									●													
 LF - Type Sharp cutting edge	DCGW 070204 LF-NU2	0,4																			●			
	DCGW 070208 LF-NU2	0,8																				●		
 HS - Type Strong cutting edge	DCGW 11T304 LF-NU2	0,4																			●			
	DCGW 11T308 LF-NU2	0,8																				●		
 HS - Type Strong cutting edge	DCGW 070204 HS-NU2	0,4																			●			
	DCGW 070208 HS-NU2	0,8																				●		
	DCGW 11T304 HS-NU2	0,4																				●		
	DCGW 11T308 HS-NU2	0,8																				●		

● G-Class SumiBoron (CBN, One-Use Type)

 with 2 CBN cutting edges	DCGW 11T304 NS	0,4																						
	DCGW 11T308 NS	0,8																						
 with 2 CBN cutting edges	DCGW 070202 NU	0,2									●	●	▲	●		▲	▲	●						
	DCGW 070204 NU	0,4								●	●	▲	●		▲	▲	●				●			
	DCGW 070208 NU	0,8								●	●	▲	●		▲	▲	●				●			
	DCGW 11T302 NU	0,2									●											●		
DCGW 11T304 NU	0,4								●	●	▲	●		▲	▲	●				●				
DCGW 11T308 NU	0,8								●	●	▲	●		▲	▲	●				●				

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

C  
 D  
 R  
 S  
 T  
 V  
 W  
 Z

Sumiboron / Sumidia Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

DC-- Type 7° pos. Inserts

55° Diamond Type 7° Relief With Insert Hole

Uncoated

Dimensions (mm)				
DC--	ℓ	ød (IC)	s	d <sub>1</sub>
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## DCMT

### ● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	r	Material																				
			Coated		Uncoated										PCD								
			CBN																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	DCMT 070202 DCMT 070204	0,2 0,4																				●	
	DCMT 11T302 DCMT 11T304 DCMT 11T308	0,2 0,4 0,8																				●	

### ● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	Material																				
			Coated		Uncoated										PCD								
			CBN																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	DCMT 070201 NF DCMT 070202 NF DCMT 070204 NF DCMT 070208 NF	0,1 0,2 0,4 0,8																				●	
	DCMT 11T301 NF DCMT 11T302 NF DCMT 11T304 NF DCMT 11T308 NF	0,1 0,2 0,4 0,8																					●

### ● M-Class SumiDIA (PCD, One-Use "Break Master" Type)

Break Master Type	Shape	ISO Cat. No.	r	Material																			
				Coated		Uncoated										PCD							
			CBN																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
Break Master - DM		DCMT 070202 L-DM NU DCMT 070204 L-DM NU	0,2 0,4																			○	
		DCMT 11T302 L-DM NU DCMT 11T304 L-DM NU	0,2 0,4																				●
Break Master - DM		DCMT 070202 R-DM NU DCMT 070204 R-DM NU	0,2 0,4																			○	
		DCMT 11T302 R-DM NU DCMT 11T304 R-DM NU	0,2 0,4																				●
Break Master - LD		DCMT 070202 N-LD NF DCMT 070204 N-LD NF	0,2 0,4																			○	
		DCMT 11T302 N-LD NF DCMT 11T304 N-LD NF DCMT 11T308 N-LD NF	0,2 0,4 0,8																				○
Break Master - GD		DCMT 070202 N-GD NF DCMT 070204 N-GD NF	0,2 0,4																			○	
		DCMT 11T302 N-GD NF DCMT 11T304 N-GD NF DCMT 11T308 N-GD NF	0,2 0,4 0,8																				○

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z  
Sumiboron / SumiDia Inserts

55° Diamond Type 0° Relief  
With Insert Hole

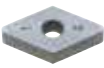

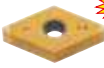
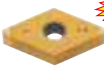




Coated

Dimensions (mm)				
DN_	ℓ	ød (IC)	s	d <sub>1</sub>
1104--	11,6	9,525	4,76	3,81
1504--	15,5	12,7	4,76	5,16
1506--	15,5	12,7	6,35	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## DNGA / DNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		PCD															
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 Standard - Normal cut geometry with 2 CBN cutting edges	DNGA 110404 NC2	0,4	○	●			●																	
	DNGA 110408 NC2	0,8	○	●			●																	
	DNGA 110412 NC2	1,2	○	○																				
	DNGA 150604 NC2	0,4							○															
 Standard - Normal cut geometry with 4 CBN cutting edges (Wiper Type)	DNGA 150402 NC4	0,2	○	○																				
	DNGA 150404 NC4	0,4	○	○																				
	DNGA 150408 NC4	0,8	○	○																				
	DNGA 150412 NC4	1,2	○	○					○															
	DNGA 150604 NC4	0,4	●	●	●	●	●	●	●	●														
	DNGA 150608 NC4	0,8	●	●	●	●	●	●	●	●														
	DNGA 150612 NC4	1,2	●	●	●	●	●	●	●	●														
	DNGA 150404 NC-WG4	0,4					○	○																
	DNGA 150408 NC-WG4	0,8					○	○																
	DNGA 150604 NC-WG4	0,4	●	●	●	●	●	●	●	●														
	DNGA 150608 NC-WG4	0,8	●	●	●	●	●	●	●	●														
	DNGA 150612 NC-WG4	1,2	●	●	●	●	●	●	●	●														
DNGA 150404 NC-WH4	0,4					○	○																	
DNGA 150408 NC-WH4	0,8					○	○																	
DNGA 150604 NC-WH4	0,4	●	●	●	●	●	●	●	●															
DNGA 150608 NC-WH4	0,8	●	●	●	●	●	●	●	●															
DNGA 150612 NC-WH4	1,2	●	●	●	●	●	●	●	●															
 LE - Type Low cutting force with 2 CBN cutting edges	DNGA 150604 LE-NC2	0,4	●																					
	DNGA 150608 LE-NC2	0,8	●																					
	DNGA 150612 LE-NC2	1,2	●																					
 LT - Type Sharp cutting edge with 2 CBN cutting edges	DNGA 150604 LT-NC2	0,4		●																				
	DNGA 150608 LT-NC2	0,8		●																				
	DNGA 150612 LT-NC2	1,2		●																				
 LS - Type Low cutting force with 2 CBN cutting edges	DNGA 150404 LS-NC2	0,4							○															
	DNGA 150408 LS-NC2	0,8							○															
	DNGA 150412 LS-NC2	1,2							○															
DNGA 150604 LS-NC2	0,4			●	●	●	●	●	●															
DNGA 150608 LS-NC2	0,8			●	●	●	●	●	●															
DNGA 150612 LS-NC2	1,2			●	●	●	●	●	●															
 ES - Type Crater wear stability with 2 CBN cutting edges	DNGA 150604 ES-NC2	0,4		●																				
	DNGA 150608 ES-NC2	0,8		●																				
	DNGA 150612 ES-NC2	1,2		●																				
 HS - Type Strong cutting edge with 2 CBN cutting edges	DNGA 150604 HS-NC2	0,4	●	●		●	●	●	●															
	DNGA 150608 HS-NC2	0,8	●	●		●	●	●	●															
	DNGA 150612 HS-NC2	1,2	●	●		●	●	●	●															
 HS - Type Strong cutting edge with 4 CBN cutting edges	DNGA 150412 HS-NC4	1,2							○															

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z

SumiBoron / Sumidia Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

DN\_ \_ Type neg. Inserts

55° Diamond Type 0° Relief  
With Insert Hole


Coated

Dimensions (mm)				
DN_ _	ℓ	∅d (IC)	s	d <sub>1</sub>
1504--	15,5	12,7	4,76	5,16
1506--	15,5	12,7	6,35	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## DNGA / DNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		PCD																
			CBN																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000		
 CBN with chipbreaker with 4 CBN cutting edges	DNGG 150404 N-FV NC4	0,4	○	○	○	○																			
	DNGG 150408 N-FV NC4	0,8	○	○	○	○																			
	DNGG 150412 N-FV NC4	1,2	○	○	○	○																			
	DNGG 150604 N-FV NC4	0,4	●	●	●	●																			
	DNGG 150608 N-FV NC4	0,8	●	●	●	●																			
	DNGG 150612 N-FV NC4	1,2	●	●	●	●																			
	DNGG 150404 N-LV NC4	0,4	○	○	○	○																			
	DNGG 150408 N-LV NC4	0,8	○	○	○	○																			
	DNGG 150412 N-LV NC4	1,2	○	○	○	○																			
	DNGG 150604 N-LV NC4	0,4	●	●	●	●																			
	DNGG 150608 N-LV NC4	0,8	●	●	●	●																			
	DNGG 150612 N-LV NC4	1,2	●	●	●	●																			
DNGG 150408 N-SV NC4	0,4	○	○																						
DNGG 150412 N-SV NC4	1,2	○	○																						
DNGG 150608 N-SV NC4	0,8		●																						
DNGG 150612 N-SV NC4	1,2		●		●																				

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

55° Diamond Type      0° Relief  
With Insert Hole

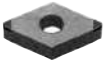
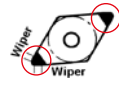
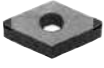

Uncoated

Dimensions (mm)				
DN_ _	ℓ	ød (IC)	s	d <sub>1</sub>
1504--	15,5	12,7	4,76	5,16
1506--	15,5	12,7	6,35	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## DNGA / DNGM ○○○○○○

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		K		N													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BNZ250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 with 2 CBN cutting edges  (Wiper Type)	DNGA 150604 NU2 DNGA 150608 NU2 DNGA 150612 NU2	0,4 0,8 1,2								●	●	●	●		▲	▲	●							
	DNGA 150404 NU-WG2 DNGA 150408 NU-WG2	0,4 0,8									○	○												
	DNGA 150604 NU-WG2 DNGA 150608 NU-WG2 DNGA 150612 NU-WG2	0,4 0,8 1,2									●	●	●											
	DNGA 150404 NU-WH2 DNGA 150408 NU-WH2	0,4 0,8									○	○												
	DNGA 150604 NU-WH2 DNGA 150608 NU-WH2 DNGA 150612 NU-WH2	0,4 0,8 1,2									●	●	●											
	Break Master - LV  	DNGM 150404 N-LV NU2 DNGM 150408 N-LV NU2 DNGM 150412 N-LV NU2	0,4 0,8 1,2									○	○	○										
DNGM 150604 N-LV NU2 DNGM 150608 N-LV NU2 DNGM 150612 N-LV NU2		0,4 0,8 1,2									●	●	●											

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z

Sumiboron / Sumidia  
Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

DN--, RN-- neg. Type and SC-- Type 7° pos. Inserts

55° Diamond Type 0° Relief With Insert Hole

Coated / Uncoated

Dimensions (mm)				
DN--	ℓ	ød (ic)	s	d <sub>1</sub>
1506--	15,5	12,7	6,35	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## DNMA

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			H	K	CBN																			
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	DNMA 150604	0,4											●											
	DNMA 150608	0,8											●											
	DNMA 150612	1,2											●											

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			H	K	CBN																			
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	DNMA 150604 NS	0,4																						
	DNMA 150608 NS	0,8																						
	DNMA 150604 NU	0,4										●												
	DNMA 150608 NU	0,8									●													
	DNMA 150612 NU	1,2									●													

Dimensions (mm)

RN--	ℓ	ød (ic)	s	d <sub>1</sub>
0903--	9,525	9,525	3,18	-
1203--	12,7	12,7	3,18	-
1204--	12,7	12,7	4,76	-

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

Round Type 0° Relief Without Insert Hole

## RNGN

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			H	K	CBN																			
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	RNGN 090300	-																						
	RNGN 120300	-																						
	RNGN 120400	-																						

● G-Class SumiBoron (CBN, Full Top Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			H	K	CBN																			
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	RNGN 090300 B	-																						

Square Type 7° Relief With Insert Hole

Dimensions (mm)				
SC--	ℓ	ød (ic)	s	d <sub>1</sub>
09T3--	9,525	9,525	3,97	4,4

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## SCGW

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			H	K	CBN																			
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	SCGW 09T304 NU	0,4																						
	SCGW 09T308 NU	0,8																						

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z

SumiBoron / SumiDia Inserts

**Square Type** 0° Relief  
With Insert Hole

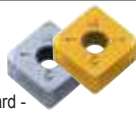
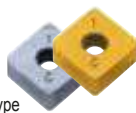

Coated

Dimensions (mm)				
SN_	ℓ	∅d (IC)	s	d <sub>1</sub>
1204--	12,7	12,7	4,76	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## SNGA

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN													PCD							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
 Standard - Normal cut geometry with 4 CBN cutting edges	<b>SNGA 120408 NC4</b> <b>SNGA 120412 NC4</b>	0,8	●			●	●																
		1,2	●			●	●																
 HS - Type Strong cutting edge with 2 CBN cutting edges	<b>SNGA 120408 HS-NC2</b> <b>SNGA 120412 HS-NC2</b>	0,8				●	●																
		1,2				●	●																
 HS - Type Strong cutting edge with 4 CBN cutting edges	<b>SNGA 120408 HS-NC4</b> <b>SNGA 120412 HS-NC4</b>	0,8	○																				
		1,2	○																				

**Square Type** 0° Relief  
Without Insert Hole


Uncoated

Dimensions (mm)				
SN_	ℓ	∅d (IC)	s	d <sub>1</sub>
0903--	9,525	9,525	3,18	-
1204--	12,7	12,7	4,76	-


**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## SNGN / SNGX

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			CBN													PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 with dimensions d, l, s	<b>SNGN 090308</b> <b>SNGN 090312</b>  <b>SNGN 120412</b> <b>SNGN 120416</b>	0,8																						
		1,2																			●			
		1,6																			●			

● G-Class SumiBoron (Solid CBN, "Dimple" Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			CBN													PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 with dimensions d, l, s	<b>SNGX 120412</b> <b>SNGX 120416</b>	1,2																						
		1,6																			●			

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z

Sumiboron / Sumidia Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

SN-- neg. Type and TB-- Type 5° pos. Inserts

Square Type

0° Relief  
With Insert Hole


Coated / Uncoated

Dimensions (mm)				
SN--	ℓ	∅d <sub>(IC)</sub>	s	d <sub>1</sub>
1204--	12,7	12,7	4,76	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## SNMA

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Dimensions (mm)																				
			Coated								Uncoated												
			CBN																				
																PCD							
	SNMA 120408 NS SNMA 120412 NS	0,8 1,2	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
	SNMA 120408 NU SNMA 120412 NU	0,8 1,2									●		●		▲	▲	●	▲	●				

60° Triangle Type


5° Relief

Dimensions (mm)				
TBGN	ℓ	∅d <sub>(IC)</sub>	s	d <sub>1</sub>
0601--	6,9	3,97	1,59	-
TBGW				
0601--	6,9	3,97	1,59	2,8


**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## TBGN / TBGW


● G-Class SumiBoron (CBN, Full Top Type)

Shape	ISO Cat. No.	r	Dimensions (mm)																				
			Coated								Uncoated												
			CBN																				
																PCD							
	TBGN 060102 B TBGN 060104 B	0,2 0,4	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
						●					●	▲	●			▲							

● G-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Dimensions (mm)																				
			Coated								Uncoated												
			CBN																				
																PCD							
	TBGN 060102 NF TBGN 060104 NF	0,2 0,4	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
																							●

● G-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Dimensions (mm)																				
			Coated								Uncoated												
			CBN																				
																PCD							
	TBGW 060102 NF TBGW 060104 NF	0,2 0,4	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
																							●

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z  
SumiBoron / SumiDIA Inserts



60° Triangle Type

7° Relief  
With Insert Hole


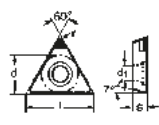

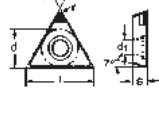
Coated / Uncoated

Dimensions (mm)				
TC__	ℓ	∅d (IC)	s	d <sub>1</sub>
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
16T3--	16,5	9,525	3,97	4,3

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component


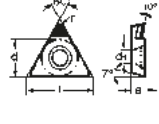
## TCGW

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			CBN													PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 	TCGW 090204 NC TCGW 090208 NC	0,4 0,8	●	●																				
	TCGW 110202 NC TCGW 110204 NC TCGW 110208 NC	0,2 0,4 0,8	●	●		●		●																
	TCGW 16T304 NC3 TCGW 16T308 NC3	0,4 0,8	●			●																		
	TCGW 090204 NU TCGW 090208 NU	0,4 0,8																▲	▲	▲	▲			
  with 3 CBN cutting edges	TCGW 110202 NU TCGW 110204 NU TCGW 110208 NU	0,2 0,4 0,8						●	●	▲	●		▲				▲	▲	▲	▲				
	TCGW 16T304 NU TCGW 16T308 NU	0,4 0,8					●		▲	●							▲	●	●	●				

## TCMT

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																			
			CBN													PCD								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 	TCMT 090202 NF TCMT 090204 NF	0,2 0,4																						
	TCMT 110201 NF TCMT 110202 NF TCMT 110204 NF	0,1 0,2 0,4																				●	●	●

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 Edge Specification of SUMIBORON Inserts

C

D

R

S

T

V

W

Z

SumiBoron / SumiDia  
Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

TN-- Type neg. Inserts

60° Triangle Type 0° Relief With Insert Hole







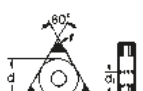

Coated

Dimensions (mm)				
TN--	ℓ	∅d (IC)	s	d <sub>1</sub>
1604--	16,5	9,525	4,76	3,81

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## TNGA / TNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Coated		Uncoated																		
			CBN										PCD										
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
 Standard - Normal cut geometry with 6 CBN cutting edges	TNGA 160402 NC6	0,2	○	○																			
	TNGA 160404 NC6	0,4	●	●	●	●	●																
	TNGA 160408 NC6	0,8	●	●	●	●	●																
	TNGA 160412 NC6	1,2	●	●	●	●	●																
 LE - Type Low cutting force with 3 CBN cutting edges	TNGA 160404 LE-NC3	0,4	●																				
	TNGA 160408 LE-NC3	0,8	●																				
	TNGA 160412 LE-NC3	1,2	●																				
 LT - Type Sharp cutting edge with 3 CBN cutting edges	TNGA 160402 LT-NC3	0,2		○																			
	TNGA 160404 LT-NC3	0,4		○																			
	TNGA 160408 LT-NC3	0,8		●																			
	TNGA 160412 LT-NC3	1,2		○																			
 LS - Type Low cutting force with 3 CBN cutting edges	TNGA 160404 LS-NC3	0,4			●	●	●																
	TNGA 160408 LS-NC3	0,8			●	●	●																
	TNGA 160412 LS-NC3	1,2			●	●	○																
 ES - Type Crater wear stability with 6 CBN cutting edges	TNGA 160404 ES-NC6	0,4		●																			
	TNGA 160408 ES-NC6	0,8		●																			
	TNGA 160412 ES-NC6	1,2		●																			
 HS - Type Strong cutting edge with 3 CBN cutting edges	TNGA 160404 HS-NC3	0,4	●	●	●	●																	
	TNGA 160408 HS-NC3	0,8	●	●	●	●																	
 HS - Type Strong cutting edge with 6 CBN cutting edges	TNGA 160412 HS-NC6	1,2					○																
	TNGG 160404 N-FV NC6	0,4	●	●	●	●																	
 Break Master - FV, LV, SV CBN with chipbreaker with 6 CBN cutting edges	TNGG 160408 N-FV NC6	0,8	●	●	●	●																	
	TNGG 160412 N-FV NC6	1,2	●	●	●	●																	
	TNGG 160404 N-LV NC6	0,4	●	●	●	●																	
	TNGG 160408 N-LV NC6	0,8	●	●	●	●																	
	TNGG 160412 N-LV NC6	1,2	●	●	●	●																	
	TNGG 160408 N-SV NC6	0,8		●		●																	
TNGG 160412 N-SV NC6	1,2		○																				

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

60° Triangle Type

7° Relief  
With Insert Hole


Uncoated

Dimensions (mm)				
TN_ _	ℓ	∅d (IC)	s	d <sub>1</sub>
1604--	16,5	9,525	4,76	3,81

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## TNGA / TNGM

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N														
			Coated		Uncoated		Uncoated		K		N														
			CBN												PCD										
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000		
 with 3 CBN cutting edges	TNGA 160404 NU3 TNGA 160408 NU3 TNGA 160412 NU3	0,4 0,8 1,2																							
	TNGA 160404 LF-NU3 TNGA 160408 LF-NU3  TNGA 160404 HS-NU3 TNGA 160408 HS-NU3	0,4 0,8  0,4 0,8																							
	TNGM 160404 N-LV NU3 TNGM 160408 N-LV NU3 TNGM 160412 N-LV NU3	0,4 0,8 1,2																							

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z

Sumiboron / Sumidia  
Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

TN\_\_ Type neg. Inserts

TP\_\_ Type 11° pos. Inserts

60° Triangle Type 0° Relief  
With Insert Hole

Uncoated

Dimensions (mm)				
TN__	ℓ	ød (IC)	s	d <sub>1</sub>
1604--	16,5	9,525	4,76	3,81

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## TNMA

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Coated		Uncoated		PCD													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	TNMA 160404 TNMA 160408	0,4 0,8											●											

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Coated		Uncoated		PCD													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	TNMA 160404 NU TNMA 160408 NU TNMA 160412 NU	0,4 0,8 1,2											●	●										

60° Triangle Type 11° Relief  
Without Insert Hole

Dimensions (mm)				
TP__	ℓ	ød (IC)	s	d <sub>1</sub>
1103--	11,0	6,35	3,18	-
1603--	16,5	9,525	3,18	-

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## TPGN

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Coated		Uncoated		PCD													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	TPGN 110304 NU TPGN 110308 NU	0,4 0,8											●	●					▲	●				
	TPGN 160304 NU TPGN 160308 NU	0,4 0,8											●	●					▲	●				

● G-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Coated		Uncoated		PCD													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
	TPGN 110304 NF TPGN 110308 NF	0,4 0,8																						●
	TPGN 160302 NF TPGN 160304 NF TPGN 160308 NF	0,2 0,4 0,8																						●

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts

60° Triangle Type 11° Relief With Insert Hole

Coated

Dimensions (mm)				
TP__	ℓ	ød (IC)	s	d <sub>1</sub>
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1103--	11,0	6,35	3,18	3,4

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## TPGT / TPGW

### ● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		Uncoated		Uncoated													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS600	DA150	DA1000	
<b>Break Master - FV</b>  CBN with chipbreaker with 3 CBN cutting edges	TPGT 110304 N-FV NC3 TPGT 110308 N-FV NC3	0,4 0,8	●	●		●	●																	
Standard - Normal cut geometry 	TPGW 080202 NC TPGW 080204 NC	0,2 0,4		●			●																	
	TPGW 110304 NC TPGW 110308 NC	0,4 0,8		●			●																	
<b>New</b> Standard Type  with 3 CBN cutting edges	TPGW 080202 NC3 TPGW 080204 NC3	0,2 0,4	●	●																				
	TPGW 090202 NC3 TPGW 090204 NC3	0,2 0,4	○	○																				
<b>New</b> LE - Type Low cutting force  with 3 CBN cutting edges	TPGW 110302 LE-NC3 TPGW 110304 LE-NC3 TPGW 110308 LE-NC3	0,2 0,4 0,8	○	○																				
<b>New</b> LT - Type Sharp cutting edge  with 3 CBN cutting edges	TPGW 110302 LT-NC3 TPGW 110304 LT-NC3 TPGW 110308 LT-NC3	0,2 0,4 0,8		○																				
<b>New</b> LS - Type Low cutting force  with 3 CBN cutting edges	TPGW 110304 LS-NC3 TPGW 110308 LS-NC3	0,4 0,8																						

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts

C  
 D  
 R  
 S  
 T  
 V  
 W  
 Z

Sumiboron Sumidia Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

TP-- Type 11° pos. Inserts

60° Triangle Type 11° Relief  
With Insert Hole

Dimensions (mm)

TP--	ℓ	ød (IC)	s	d <sub>1</sub>
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
1103--			3,18	3,4
1604--	16,5	9,525	4,76	4,3

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

Uncoated

## TPGT / TPGW

### ● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K										N									
			Coated		Uncoated										PCD									
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
<b>Break Master - FV</b>  CBN with chipbreaker with 3 CBN cutting edges	TPGT 110304 N-FV NU3 TPGT 110308 N-FV NU3	0,4								●														
		0,8									●													
 TPGW 080202 NU TPGW 080204 NU  TPGW 110304 NU TPGW 110308 NU	0,2	0,4							●		●			▲										
		0,8							●		●	▲			▲									
	0,4								●		●			▲										
	0,8								●		●			▲			●							

### ● G-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	H		K										N									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 TPGW 110304 TPGW 110308		0,4																						
		0,8												●		▲								

### ● G-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	H		K										N										
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000		
 TPGW 080202 NF TPGW 080204 NF  TPGW 110202 NF TPGW 110204 NF TPGW 110208 NF  TPGW 110302 NF TPGW 110304 NF TPGW 110308 NF  TPGW 160402 NF TPGW 160404 NF TPGW 160408 NF	0,2	0,4																						●	
		0,8																							●
	0,2	0,4																							●
		0,8																							●
	0,2	0,4																							●
		0,8																							●
	0,2	0,4																							●
		0,8																							●

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts

60° Triangle Type 11° Relief  
With Insert Hole

Uncoated

Dimensions (mm)

TP__	ℓ	∅d (IC)	s	d <sub>1</sub>
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
1103--			3,18	3,4
1604--	16,5	9,525	4,76	4,3

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## TPMT ○○○○○○

● M-Class SumiDia (PCD, One-Use "Break Master" Type)

Shape	ISO Cat. No.	r	H		K		H		K		N												
			Coated		Uncoated		Uncoated		K		N												
			CBN																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
<b>Break Master - DM</b> 	TPMT 080204 L-DM NU	0,4																				●	
	TPMT 090204 L-DM NU	0,4																					●
<b>Break Master - LD</b> 	TPMT 080202 N-LD NF	0,2																					○
	TPMT 080204 N-LD NF	0,4																					○
	TPMT 090202 N-LD NF	0,2																					○
	TPMT 090204 N-LD NF	0,4																					○
	TPMT 110202 N-LD NF	0,2																					○
	TPMT 110204 N-LD NF	0,4																					○
	TPMT 110302 N-LD NF	0,2																					○
	TPMT 110304 N-LD NF	0,4																					○
	TPMT 110308 N-LD NF	0,8																					○
	TPMT 160402 N-LD NF	0,2																					○
TPMT 160404 N-LD NF	0,4																					○	
TPMT 160408 N-LD NF	0,8																					○	
<b>Break Master - GD</b> 	TPMT 080202 N-GD NF	0,2																					○
	TPMT 080204 N-GD NF	0,4																					○
	TPMT 090202 N-GD NF	0,2																					○
	TPMT 090204 N-GD NF	0,4																					○
	TPMT 110202 N-GD NF	0,2																					○
	TPMT 110204 N-GD NF	0,4																					○
TPMT 110302 N-GD NF	0,2																					○	
TPMT 110304 N-GD NF	0,4																					○	
TPMT 110308 N-GD NF	0,8																					○	
TPMT 160402 N-GD NF	0,2																						○
TPMT 160404 N-GD NF	0,4																					○	
TPMT 160408 N-GD NF	0,8																					○	

C

D

R

S

T

V

W

Z

Sumiboron / Sumidia  
Inserts

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

VB-- Type 5° pos. Inserts

35° Diamond Type 5° Relief With Insert Hole

Coated / Uncoated

Dimensions (mm)				
VB--	ℓ	ød (IC)	s	d <sub>1</sub>
1102--	11,0	6,35	2,38	2,8
1103--			3,18	
1604--	16,6	9,525	4,76	4,4

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## VBGW

### ● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K										N									
			Coated		Uncoated										PCD									
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
Standard - Normal cut geometry	VBGW 110202 NC	0,2	●				●																	
	VBGW 110204 NC	0,4	●				●																	
	VBGW 110208 NC	0,8	●				●																	
Standard - Normal cut geometry	VBGW 110202 NU	0,2									●		●											
	VBGW 110204 NU	0,4									●		●											
	VBGW 110208 NU	0,8									●		●											
Standard - Normal cut geometry	VBGW 160402 NU	0,2								●	●	▲	●		▲	▲	●	▲	●					
	VBGW 160404 NU	0,4								●	●	▲	●		▲	▲	●	▲	●					
	VBGW 160408 NU	0,8								●	●	▲	●		▲	▲	●	▲	●					

### ● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K										N									
			Coated		Uncoated										PCD									
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
Standard - Normal cut geometry with 2 CBN cutting edges	VBGW 110204 NC2	0,4		○																				
	VBGW 160404 NC2	0,4	●	●	●	●	●	●	●															
	VBGW 160408 NC2	0,8	●	●	●	●	●	●	●															
	VBGW 160412 NC2	1,2		○																				
LE - Type Low cutting force	VBGW 160402 LE-NC2	0,2	●																					
	VBGW 160404 LE-NC2	0,4	●																					
	VBGW 160408 LE-NC2	0,8	●																					
LT - Type Sharp cutting edge	VBGW 110302 LT-NC2	0,2		○																				
	VBGW 110304 LT-NC2	0,4		●																				
	VBGW 160402 LT-NC2	0,2		○																				
	VBGW 160404 LT-NC2	0,4		●																				
VBGW 160408 LT-NC2	0,8		●																					
LS - Type Low cutting force with 2 CBN cutting edges	VBGW 160404 LS-NC2	0,4			●	●	●																	
	VBGW 160408 LS-NC2	0,8			●	●																		
HS - Type Strong cutting edge with 2 CBN cutting edges	VBGW 160404 HS-NC2	0,4	●				●	●																
	VBGW 160408 HS-NC2	0,8	●				●	●																
Standard - Normal cut geometry with 2 CBN cutting edges	VBGW 160404 NU2	0,4								●	●	▲	●		▲									
	VBGW 160408 NU2	0,8								●	●	▲	●		▲									

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

L4, L5 Edge Specification of SUMIBORON Inserts



35° Diamond Type 7° Relief  
With Insert Hole




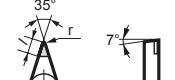

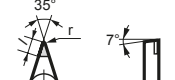

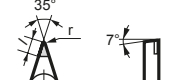

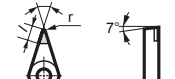

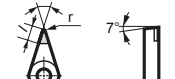
Coated / Uncoated

Dimensions (mm)				
VC--	ℓ	∅d (IC)	s	d <sub>1</sub>
0802--	8,3	4,76	2,38	2,3
1103--	11,0	6,35	3,18	2,8
1604--	16,6	9,525	4,76	4,4


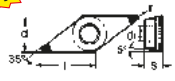
**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## VCMT / VCGW

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		K		N													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	DA150	DA1000	
 	VCMT 110301 NF	0,1																					●	
	VCMT 110302 NF	0,2																					●	
	VCMT 110304 NF	0,4																					●	
 	VCMT 160404 NF	0,4																					●	
	VCMT 160408 NF	0,8																					●	
	VCMT 160412 NF	1,2																					●	
 	VCMT 110302 N-LD NF	0,2																					○	
	VCMT 110304 N-LD NF	0,4																					○	
	VCMT 160404 N-LD NF	0,4																					○	
 	VCMT 160408 N-LD NF	0,8																				○		
	VCMT 160412 N-LD NF	1,2																					○	
	VCMT 110302 N-GD NF	0,2																					○	
 	VCMT 110304 N-GD NF	0,4																				○		
	VCMT 160404 N-GD NF	0,4																					○	
	VCMT 160408 N-GD NF	0,8																					○	
 	VCMT 160412 N-GD NF	1,2																				○		

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

 	VCGW 080202 NC2	0,2	○	○																				
	VCGW 080204 NC2	0,4	○	○																				

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

C

D

R

S

T

V

W

Z

SumiBoron / SumiDia  
Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

VN\_A, VNGG neg. Type Inserts

35° Diamond Type 0° Relief  
With Insert Hole


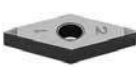
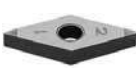
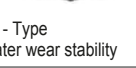
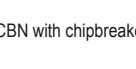


Coated / Uncoated

Dimensions (mm)				
VN_	ℓ	∅d (IC)	s	d <sub>1</sub>
1604--	16,6	9,525	4,76	3,81

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## VNGA / VNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Material																					
			Coated		Uncoated										PCD									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 with 2 CBN cutting edges	VNGA 160404 NU2 VNGA 160408 NU2	0,4 0,8							●	●									○	○				
	 with 2 CBN cutting edges	VNGA 160402 NC2 VNGA 160404 NC2 VNGA 160408 NC2	0,2 0,4 0,8	○	○																			
 with 4 CBN cutting edges		VNGA 160404 NC4 VNGA 160408 NC4	0,4 0,8	●	●																			
	 LT - Type Sharp cutting edge	VNGA 160402 LT-NC2 VNGA 160404 LT-NC2 VNGA 160408 LT-NC2 VNGA 160412 LT-NC2	0,2 0,4 0,8 1,2		○																			
 ES - Type Crater wear stability		VNGA 160404 ES-NC4 VNGA 160408 ES-NC4 VNGA 160412 ES-NC4	0,4 0,8 1,2		●																			
		 Break Master - FV, - LV	VNGG 160404 N-FV NC4 VNGG 160408 N-FV NC4	0,4 0,8	●	●	●	●																
			VNGG 160404 N-LV NC4 VNGG 160408 N-LV NC4	0,4 0,8	●	●	●	●																
 CBN with chipbreaker																								

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

35° Diamond Type 0° Relief  
With Insert Hole


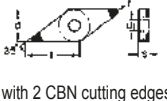
Uncoated

Dimensions (mm)				
VN_	ℓ	∅d (IC)	s	d <sub>1</sub>
1604--	16,6	9,525	4,76	3,81

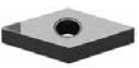
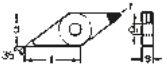
**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## VNGM / VNMA

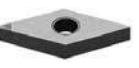

● M-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		K		N													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
<b>Break Master - LV</b>  CBN with chipbreaker  with 2 CBN cutting edges	<b>VNGM 160404 N-LV NU2</b> <b>VNGM 160408 N-LV NU2</b>	0,4									●													
		0,8										●												

● M-Class SumiBoron (CBN, Regrindable Type)


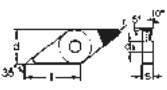
Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		K		N													
			CBN																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
  <b>VNMA 160404</b> <b>VNMA 160408</b>		0,4																						
		0,8											●				▲							

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K		H		K		N												
			Coated		Uncoated		Uncoated		K		N												
			CBN																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
  <b>VNMA 160404 NU</b> <b>VNMA 160408 NU</b>		0,4							●	●	▲	●		▲	▲	●							
		0,8								●	●	▲	●		▲	▲	●						

## VNMX

● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	r	H		K		H		K		N													
			Coated		Uncoated		Uncoated		K		N													
			PCD																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
  <b>VNMX 160404 NF</b> <b>VNMX 160408 NF</b>		0,4																						
		0,8																						●

● = Euro stock  
 ○ = Stock item in Japan  
 ▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z

SumiBoron / SumiDia Inserts

# SUMIBORON / SUMIDIA Indexable Inserts

WN\_ neg. Type and ZN\_ Special Inserts

80° Trigon Type

0° Relief  
With Insert Hole

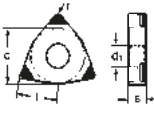



Coated

Dimensions (mm)				
WN_	ℓ	ød (IC)	s	d <sub>1</sub>
0804--	8,69	12,7	4,76	5,16

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## WNGA

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Dimensions (mm)																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000	
 <b>WNGA 080408 LT-NC3</b> 0,8				○																				
	 <b>WNGA 080404 NC6</b> <b>WNGA 080408 NC6</b> <b>WNGA 080412 NC 6</b> with 6 CBN cutting edges	0,4	○	●																				
		0,8	●	●		●																		
		1,2	○	●		●																		
 <b>WNGA 080408 NC-WG6</b> 0,8			●	●		○	○																	
	 <b>WNGA 080408 NC-WH6</b> (Wiper Type) 0,8		●	●		○	○																	

80° Special Type

7° Relief  
With Insert Hole


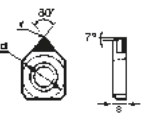

Coated / Uncoated

Dimensions (mm)				
ZN_	ℓ	ød (IC)	s	d <sub>1</sub>
0401--	-	4,76	1,59	2,3

**H** Hardened Steel  
**K** Cast Iron  
**N** Non-Ferrous Metal  
**PM** Sintered Component

## ZNEX

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Dimensions (mm)																				
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000
 <b>ZNEX 040102 NC</b> <b>ZNEX 040104 NC</b> 0,2 0,4			●	●	●	●																	
	 <b>ZNEX 040102 LE-NC</b> <b>ZNEX 040104 LE-NC</b> 0,2 0,4	0,2	○																				
		0,4	○																				
	 <b>ZNEX 040102 LT-NC</b> <b>ZNEX 040104 LT-NC</b> 0,2 0,4	0,2																					
0,4			○																				
<b>ZNEX 040102 NU</b> <b>ZNEX 040104 NU</b> 0,2 0,4	0,2							●	●	▲	●		▲										
	0,4							●	●	▲	●		▲										

● = Euro stock  
○ = Stock item in Japan  
▲ = To be replaced by new item

 L4, L5 Edge Specification of SUMIBORON Inserts

C  
D  
R  
S  
T  
V  
W  
Z  
SumiBoron / SumiDia Inserts



# SUMIDIA Binderless Indexable Inserts

## SUMIDIA Binderless PCD - Insert Grade NPD10

### Negative Inserts

Application: Hard brittle material

	Shape	ISO Cat. No.	Dimensions (mm)					NPD10
			Inscribed Circle (IC)	Thick-ness	Hole Size	Nose Radius	Cutting Edge Length	
 55° Diamond Type		<b>DNMA 150408 RH</b> <b>150412 RH</b>	12,70	4,76	5,16	0,8	1,8	○
						1,2	1,8	○
 Square Type		<b>SNMA 120408 RH</b> <b>120412 RH</b>	12,70	4,76	5,16	0,8	1,7	○
						1,2	1,7	○
 35° Diamond Type		<b>VNMA 160408 RH</b> <b>160412 RH</b>	9,525	4,76	3,81	0,8	1,8	○
						1,2	1,5	○

Note: Clearance angle of cutting edge tip can show deviation due to the production process.

### Positive Inserts

Application: Hard brittle material

	Rake Angle	Shape	ISO Cat. No.	Dimensions (mm)					NPD10			
				Inscribed Circle (IC)	Thick-ness	Hole Size	Nose Radius	Cutting Edge Length				
 80° Diamond Type	7°		<b>CCMW 03X102 RH</b> <b>03X104 RH</b>	3,50	1,40	1,9	0,2	1,3	○			
			<b>CCMW 04X102 RH</b> <b>04X104 RH</b>				4,30	1,80	2,3	0,2	1,7	○
			<b>CCMW 060202 RH</b> <b>060204 RH</b>	6,35	2,38	2,8	0,2	1,7	○			
			<b>CCMW 09T302 RH</b> <b>09T304 RH</b> <b>09T308 RH</b>				9,525	3,97	4,4	0,2	1,7	○
			<b>CCMW 09T302 RH</b> <b>09T304 RH</b> <b>09T308 RH</b>	9,525	3,97	4,4	0,2	1,7	○			
			<b>DCMW 070202 RH</b> <b>070204 RH</b>				6,35	2,38	2,8	0,2	2,1	○
<b>DCMW 11T302 RH</b> <b>11T304 RH</b> <b>11T308 RH</b>	9,525		3,97				4,4	0,2	2,1	○		
<b>DCMW 11T302 RH</b> <b>11T304 RH</b> <b>11T308 RH</b>	9,525		3,97				4,4	0,2	2,1	○		
 Triangular Type	11°		<b>TPMW 080202 RH</b> <b>080204 RH</b>	4,76	2,38	2,3	0,2	1,2	○			
			<b>TPMW 110302 RH</b> <b>110304 RH</b> <b>110308 RH</b>				6,35	3,18	3,4	0,2	1,5	○
			<b>TPMW 110302 RH</b> <b>110304 RH</b> <b>110308 RH</b>	9,525	4,76	4,4	0,2	1,3	○			
			<b>TPMW 160402 RH</b> <b>160404 RH</b> <b>160408 RH</b>				9,525	4,76	4,4	0,8	1,0	○
			<b>TPMW 160402 RH</b> <b>160404 RH</b> <b>160408 RH</b>				9,525	4,76	4,4	0,2	2,2	○
			<b>TPMW 160402 RH</b> <b>160404 RH</b> <b>160408 RH</b>				9,525	4,76	4,4	0,4	2,0	○
 35° Diamond Type	7°		<b>VCMW 080201 RH</b> <b>080202 RH</b> <b>080204 RH</b>	4,76	2,38	2,3	0,1	2,2	○			
			<b>VCMW 110302 RH</b> <b>110304 RH</b>				6,35	3,18	2,8	0,2	1,9	○
			<b>VCMW 110302 RH</b> <b>110304 RH</b>	9,525	4,76	4,4	0,2	1,5	○			
			<b>VCMW 160402 RH</b> <b>160404 RH</b> <b>160408 RH</b> <b>160412 RH</b>				9,525	4,76	4,4	0,2	2,1	○
			<b>VCMW 160402 RH</b> <b>160404 RH</b> <b>160408 RH</b> <b>160412 RH</b>				9,525	4,76	4,4	0,4	1,7	○
			<b>VCMW 160402 RH</b> <b>160404 RH</b> <b>160408 RH</b> <b>160412 RH</b>				9,525	4,76	4,4	0,2	2,1	○

- = Euro stock
- = Stock item in Japan
- ▲ = To be replaced by new item

Note: Clearance angle of cutting edge tip can show deviation due to the production process.

C

D

R

S

T

V

W

Z

Sumidia Inserts

# SUMIBORON / SUMIDIA Precision Tools



## BSME

M36-38

**Very small boring bar - brazed type**

- Solid carbide shank boring bar with brazed CBN tip and inner coolant supply.
- For tiny hole diameter boring in hardened steel.
- Min. boring dia. is  $\varnothing$  2,5 mm.



## SEXC

M36-39

**CBN boring tool for small diameter boring**

- Solid carbide shank boring bar with indexable CBN insert and inner coolant supply.
- For small hole diameter boring in hardened steel.
- Min. boring dia. is  $\varnothing$  4,0 mm.



## BNBB

M40

**Small hole boring tools**

- CBN cutting edge is brazed on to a solid carbide shank.
- Small hole boring for hardened steels.
- Min. boring dia. is  $\varnothing$  3,5 mm.



## BNZ

M41

**Small hole boring bars**

- Solid carbide boring bars with economical CBN insert.
- Small hole boring for hardened steels.
- Min. boring dia. is  $\varnothing$  7,0 mm.



## BNB

M41

**Small hole boring bars**

- Solid carbide boring bars with economical CBN and PCD insert.
- Min. boring dia. is  $\varnothing$  10,0 mm.



## GWB / PSC

M42-43

**CBN Grooving System for Hardened Steels**

- Tangential Inserts – Double clamp holder
- Groove Widths from 1,5 – 6,0mm
- New CBN grade for interrupted grooving
- **New** ISO-PSC polygon modular grooving system

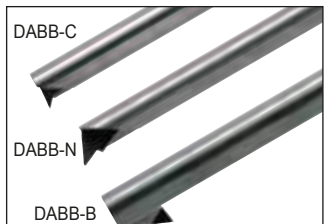


## BNGG

M44

**Threading holders**

- CBN cutting edge for hardened steel
- Adjustable threading after regrinding.



## DABB

M45

**Small hole boring tools**

- PCD cutting edge for finishing of small non-ferrous parts
- Min. boring dia. is  $\varnothing$  3,0 mm.
- DABB-C for boring
- DABB-N for profiling and corner grooving
- DABB-B for back boring



**RF** M46

**High speed face mill for Aluminium**

- Finishing and roughing aluminium alloys and non-ferrous materials
- High precision and highspeed machining  $vc= 5000$  m/min
- Aluminum alloy body
- Run-out less than  $10\mu m$
- Easy assembling



**SRF** M47

**High speed face mill for Aluminium**

- Small diameter cutter for small machines
- High speed roughing and finishing with SumiDia DA2200
- High speed capability of  $rpm = 20.000$
- Economical PCD insert NF type



**FMU** M48-49

**"BN Finish Mill" for finishing grey cast iron**

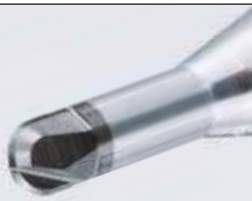
- High speed machining  $vc= 1500$  m/min
- Excellent surface roughness  $Rz=3,2$
- Run-out less than  $10\mu m$
- Easy assembling



**BNES** M50

**"Helical Master" SUMIBORON Endmill**

- Spiral CBN brazed cutting edge for super finishing hardened steel (HRC50~60)
- Dry machining
- Stable cutting
- High accuracy
- Excellent swarf evacuation



**BNBP** M51

**"Mould Finish Master" SUMIBORON Micro Ball Nose Endmills**

- High precision machining of hardened steels < HRC70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy :  $\pm 0,005mm$



**NPDRS / NPDB(S)** M52-53

**"Mould Finish Master" SUMIDIA Binderless Endmills**

- NPDRS - radius endmills
- NPDB(S) - ball nose endmills
- For finishing of carbide and brittle materials
- High precision machining and long tool life



**DAL / DDL / DML** M54-55

**High precision SUMIDIA Drills**

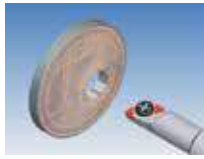
- PCD cutting edge is brazed on to a solid carbide shank.
- From general to high precision drilling of Aluminium alloys
- DML type is suitable for chamfering and stepped drilling

# CBN Small Hole Boring Bar Systems

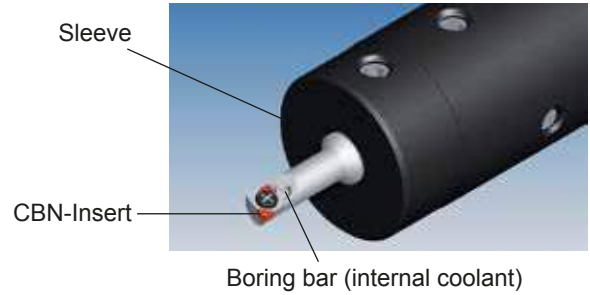
## BSME/SEXC Series

### ■ Features

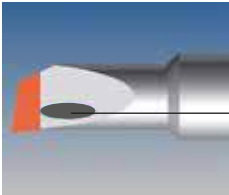
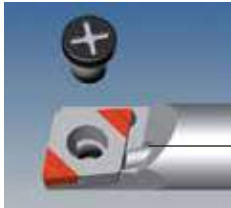
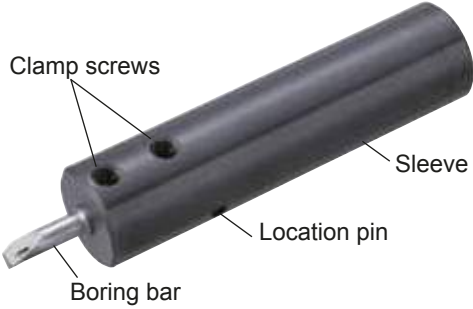

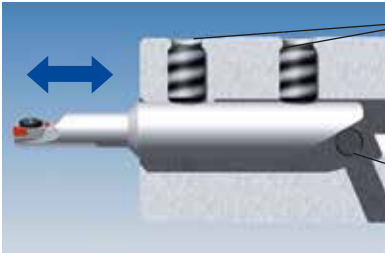
- New ultra small boring bar with CBN cutting edge
- Internal coolant
- Easy setting and handling
- High accuracy
- Carbide body for high rigidity
- One sleeve for different diameters



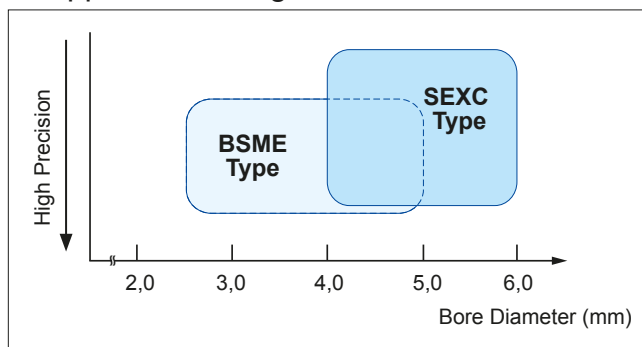
### ■ Basic System



### ■ 2 Types of CBN Small Hole Boring Bar System

BSME - CBN Brazed Cutting Edge Type	SEXC - Indexable CBN Insert Type
Min. bore diameter: $\varnothing 2,5-5,0\text{mm}$	Min. bore diameter: $\varnothing 4,0-6,0\text{mm}$
<p>Unique cutting edge shape with high quality and sharpness</p>  <p>Internal coolant hole (standard)</p>	<p>2 corner inserts</p>  <p>Internal coolant hole (standard)</p>
 <p>Clamp screws</p> <p>Sleeve</p> <p>Location pin</p> <p>Boring bar</p>	 <p>Clamp screws</p> <p>Sleeve</p> <p>Location pin</p> <p>Boring bar</p>
<p>Excellent repeatability of boring bar (deviation within 0,020mm)</p>  <p>Clamp screws</p> <p>Location pin for controlled cutting edge position</p>	

### ■ Application Range

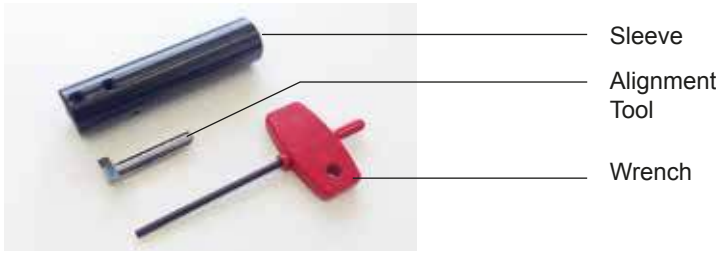


### ■ Recommended Cutting Conditions




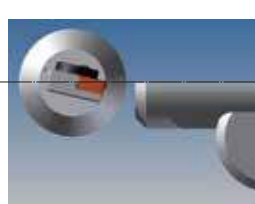
Spindle Speed ( $n$ )	$>2000\text{min}^{-1}$	Low speed may cause chattering and chipping on the cutting edge.
Depth of Cut ( $a_p$ )	0,01 - 0,15mm	Excessive depth of cut may cause larger tool deflection resulting in deterioration of bore accuracy.
Feed Rate ( $f$ )	0,01 - 0,1mm/rev	-



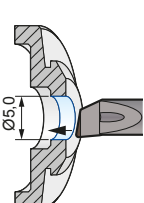
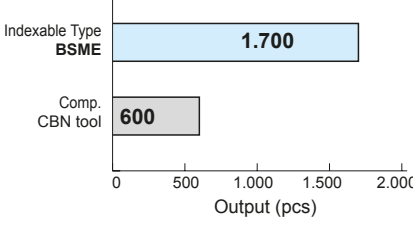
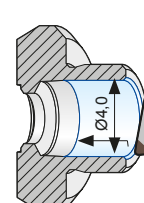
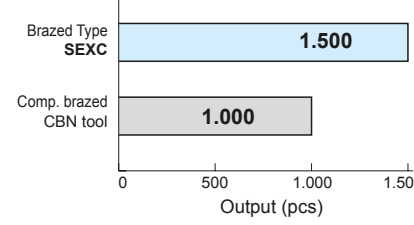
### Accessories



### Mounting Instruction

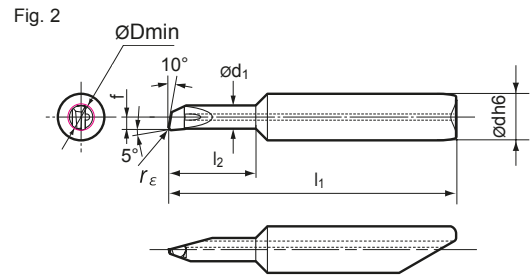
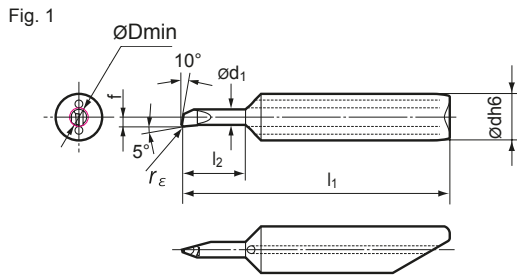
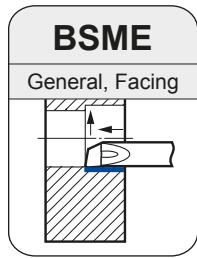
<p>1. Insert alignment tool into the sleeve until you connect with the pin inside. Gently lock the screws to hold.</p>	
<p>2. Locate the sleeve into your tool-holding system. Gently lock the screws to hold.</p>	
<p>3. Clock the flat of the alignment tool into a straight position.</p> 	<p>After adjustment, equipped boring bar has automatically cutting peak height of zero on the center of tool.</p> 
<p>4. Use pre setting machine to set the diameter of the boring bar.</p>	

### Application Example

BSME Hardened Alloy Steel Valve Component	SEXC Bearing Steel Small Automotive Component												
<p>The BSME type provides stable machining. Tool life is over 2 times longer than competitor's CBN tool.</p>   <table border="1"> <caption>Output Comparison for BSME</caption> <tr> <th>Tool Type</th> <th>Output (pcs)</th> </tr> <tr> <td>Indexable Type BSME</td> <td>1.700</td> </tr> <tr> <td>Comp. CBN tool</td> <td>600</td> </tr> </table>	Tool Type	Output (pcs)	Indexable Type BSME	1.700	Comp. CBN tool	600	<p>The SEXC type provides drastically reduced tool costs. Tool life is 1,5 times longer than competitor's brazed CBN tool.</p>   <table border="1"> <caption>Output Comparison for SEXC</caption> <tr> <th>Tool Type</th> <th>Output (pcs)</th> </tr> <tr> <td>Brazed Type SEXC</td> <td>1.500</td> </tr> <tr> <td>Comp. brazed CBN tool</td> <td>1.000</td> </tr> </table>	Tool Type	Output (pcs)	Brazed Type SEXC	1.500	Comp. brazed CBN tool	1.000
Tool Type	Output (pcs)												
Indexable Type BSME	1.700												
Comp. CBN tool	600												
Tool Type	Output (pcs)												
Brazed Type SEXC	1.500												
Comp. brazed CBN tool	1.000												
<p>Work Material: Hardened alloy steel valve component (automotive component) Tool: BSME R50020D2S6 Grade: BN2000 Cutting Conditions: <math>v_c = 135\text{m/min}</math> <math>f = 0,02\text{mm/rev}</math> <math>a_p = 0,10\text{mm}</math> Dry</p>	<p>Work Material: Bearing steel small automotive component (60HRC) Holder: E06D2 SEXC R/L03-04P Insert: ECXA 030X02LF (BN2000) Cutting Conditions: <math>v_c = 50\text{m/min}</math> (4.000rpm) <math>f = 0,02\text{mm/rev}</math> <math>a_p = 0,02\text{mm}</math> Wet</p>												

# BSME Series

## BSME-Type with Internal Coolant



Sharp edge (no honing)

### Boring Bar

Description	Grade		Dimensions (mm)							Fig.	Applicable Sleeve		
	BN2000		$\varnothing D_{min}$	$\varnothing d_1$	f	$l_2$	$l_1$	$\varnothing dh6$	$r_\epsilon$				
	R	L											
BSME R/L 25020D2S6	●	●	2,5	2,0	1,20	5,3	32,0	6,0	0,2	1	HBSM6020		
BSME R/L 25020D3S6	●	●										7,8	34,5
BSME R/L 25020D4S6	□	□										10,3	37,0
BSME R/L 30020D2S6	●	●	3,0	2,5	1,45	6,3	32,8						
BSME R/L 30020D3S6	●	●								9,3		35,8	
BSME R/L 30020D4S6	□	□								12,3		38,8	
BSME R/L 35020D2S6	●	●	3,5	3,0	1,70	7,3	33,5						
BSME R/L 35020D3S6	●	●								10,8		37,0	
BSME R/L 35020D4S6	□	□								14,3		40,5	
BSME R/L 40020D2S6	●	●	4,0	3,5	1,95	8,3	33,9						
BSME R/L 40020D3S6	●	●								12,3		37,9	
BSME R/L 40020D4S6	□	□								16,3		41,9	
BSME R/L 45020D2S6	●	●	4,5	4,0	2,20	9,3	35,0						
BSME R/L 45020D3S6	●	●								13,8		39,5	
BSME R/L 45020D4S6	□	□								18,3		44,0	
BSME R/L 50020D2S6	●	●	5,0	4,5	2,45	10,3	35,8						
BSME R/L 50020D3S6	●	●						15,3	40,8				
BSME R/L 50020D4S6	□	□						20,3	45,8				

### Adapter Sleeve and Parts

Description	Stock	Dimensions (mm)		Sleeve Screw	Wrench
		$\varnothing D_s$	$l_1$		
HBSM6020	●	6,0	80	BT0506	TH025

### Alignment Tool

Description	Stock
AFBSM60	●

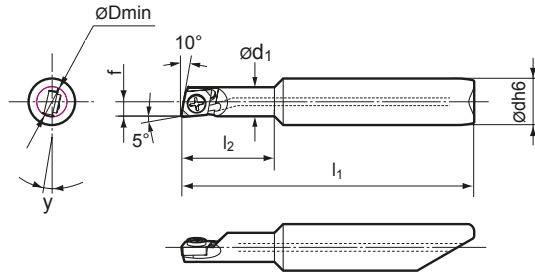
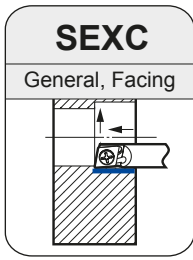
### Identification

<b>B S M</b>	<b>E</b>	<b>R/L</b>	<b>3 5 0</b>	<b>2 0</b>	<b>D 3</b>	<b>S 6</b>
Sumitomo CBN Product Special Mini	Solid Carbide Bar with Inner Coolant	R: Right Hand L: Left Hand	Minimum Bore Diameter ( $\varnothing 3,5\text{mm}$ )	Nose Radius of Edge ( $\varnothing 0,20\text{mm}$ )	L/D - Ratio of Working Length	Shank Diameter

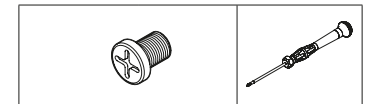
● = Euro stock  
□ = Delivery on request

# SEXC Series

## SEXC-Type with Internal Coolant



### Spare Parts



### Boring Bar

Description	Stock		Dimensions (mm)						Applicable Sleeve	Insert Screw	N·m	Wrench	
	R	L	ØDmin	ød1	f	l2	l1	ødh6					y
E06D2 SEXC R/L 03-04P	●	●	4,0	3,75	1,95	8	33,75	6,0	13°	HBSM6020	MIB1,6-2,0	0,2	SDBSM
E06D3 SEXC R/L 03-04P	●	●				12	37,75						
E06D2 SEXC R/L 03-05P	●	●	5,0	4,75	2,45	10	35,25						
E06D3 SEXC R/L 03-05P	●	●				15	40,25						
E06D2 SEXC R/L 03-06P	●	●	6,0	5,75	2,95	12	36,75	11°			MIB1,6-3,0		
E06D3 SEXC R/L 03-06P	●	●				18	42,75						

### Adapter Sleeve and Parts

Description	Stock	Dimensions (mm)		Sleeve Screw	Wrench
		ØDs	l1		
HBSM6020	●	6,0	80	BT0506	TH025

### Alignment Tool

Description	Stock
AFBSM60	●

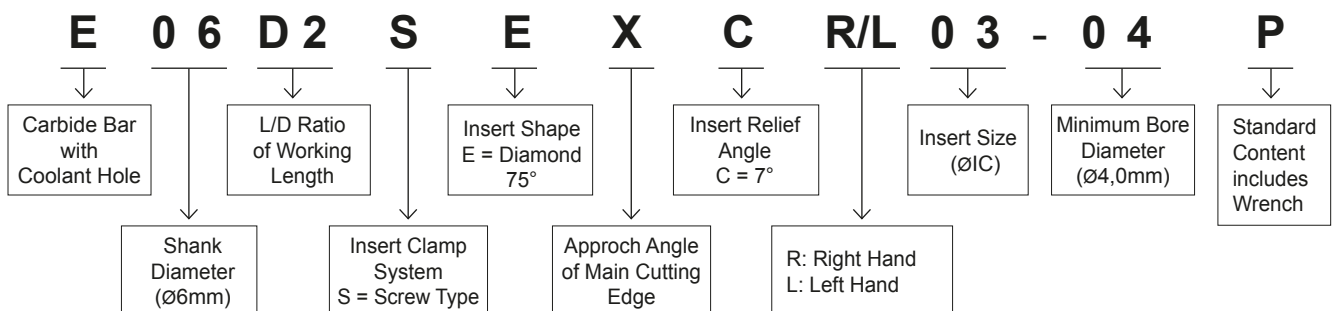
### CBN Insert

Description	Grade		Nose Radius r <sub>ε</sub> (mm)	Cutting Edge Preparation
	BN2000	BN7000		
ECXA030X02 LE NU2	●		0,2	sharp + hone
ECXA030X02 LF NU2	●	●	0,2	sharp

#### Notes:

Applicable wrench SDBSM is recommended when fastening the insert screw. Please check insert screw occasionally and replace it in time.

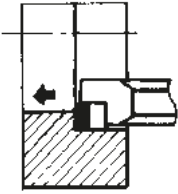
### Identification



# SUMIBORON Small Hole Boring Tools BNBB Type

For Hardened Steel

BNBB type small hole boring tools for hardened work pieces up to diameter 3,5 mm



## ■ „Sumiboron“ Brazed Boring Tools for Small Hole Boring

	Cat. No.	Stock	Dimensions (mm)					Applicable holder	Grade of brazed cutting edge
			D <sub>min</sub>	d	l <sub>1</sub>	h	r		
BNBB (Carbide shank) 	<b>BNBB 03 R</b>	●	3,5	3	60	2,4	0,2	HBB 316	<b>SUMIBORON (CBN)</b>  <b>BN250</b>
	<b>BNBB 04 R</b>	●	4,5	4	60	3,4	0,2	HBB 416	
	<b>BNBB 05 R</b>	●	5,5	5	80	4,4	0,2	HBB 516	
	<b>BNBB 06 R</b>	●	6,5	6	80	5,4	0,2	HBB 616	
	<b>BNBB 08 R</b>	●	8,5	8	100	7,4	0,2	HBB 816	

## ■ Holder

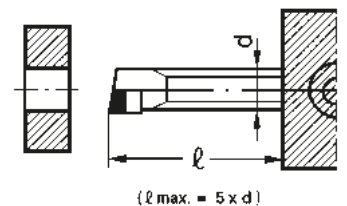
	Cat. No.	Stock	Dimensions (mm)				Screw	Wrench
			d <sub>1</sub>	L	d <sub>2</sub>	H		
	<b>HBB 316</b>	●	16	100	3	15		
	<b>HBB 416</b>	●			4			
	<b>HBB 516</b>	●			5			
	<b>HBB 616</b>	●			6			
	<b>HBB 816</b>	●			8			
						BT 0404	TH 020	

## ■ Spare Parts

## ■ Recommended Cutting Conditions

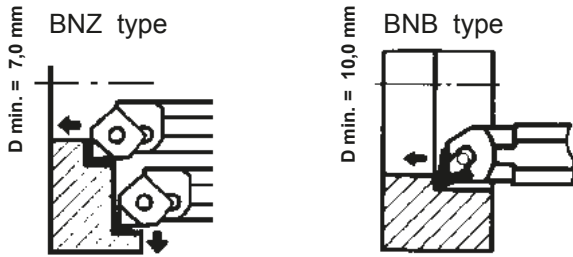
Work Material	SUMIBORON BN250		Notes
Hardened steels (H <sub>R</sub> C45~68)	Cutting speed (v <sub>c</sub> )	30 ~ 150 / min	Low speed may cause chattering in cutting process and chipping occurrence on the cutting edge.
	Feed rate (f)	0,03 ~ 0,1 mm/rev	-
	Depth of cut (d <sub>oc</sub> )	0,03 ~ 0,2 mm	Excessive depth of cut may cause larger deformation of tool, resulting in deterioration of bore accuracy.

## ■ Precaution On Use



- Adjust overhang to achieve absolute minimum.
- For use of a small diameter brazed boring tool, select high speed and small feed rate, as much as possible.

● = Euro stock



## ■ Boring Bars for Small Hole Boring

	Cat. No.	Stock	Dimensions (mm)					Applicable insert	
			D <sub>min</sub>	d	l <sub>1</sub>	h	γ		
<b>BNZ (Carbide shank)</b> 	<b>BNZ 606 R</b>	●	7	6	80	5,5	-14°	ZNEX 040100	 ZNEX (CBN)
	<b>BNZ 608 R</b>	●	9	8	100	7,5	-12°		
	<b>BNZ 610 R</b>	●	11	10	125	9,5	-10°		
	<b>BNZ 612 R</b>	●	13	12	130	11	-8°		
	Holder "HBB616" for BNZ606 (ød=6mm)								
<b>BNB (Carbide shank)</b> 	<b>BNB 508 R/L</b>	● ●	10	8	140	7	-9°	TBGN 060100	 TBGN (CBN)
	<b>BNB 512 R/L</b>	● ●	14	12	160	11	-6°		
	<b>BNB 516 R/L</b>	● ●	18	16	180	14	-5°		
	<b>BNB 520 R/L</b>	● ●	22	20	180	18	-4°		

## ■ Spare Parts for BNZ

Holder	Screw	Wrench
BNZ 606 R		
BNZ 608 R	BFTX 0204 N	TRX 06
BNZ 610 R	<b>0,5</b> (Nm)	

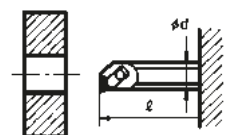
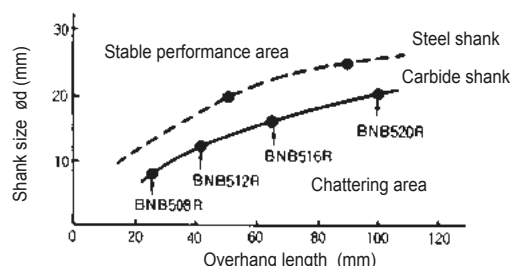
## ■ Spare Parts for BNB

Holder	Clamp	Clamp bolt	Nut	Wrench
BNB 508 R/L	BNBC	BH 0306	BNBW-2	TH 020
BNB 512 R/L	BNBC	FBUP-3-A0-9	BNBW-4	TH 020
BNB 516 R/L	BNBC	BH 0310	BNBW-4	TH 020
BNB 520 R/L	BNBC	BH 0310	BNBW-7	TH 020

## ■ Recommended Cutting Conditions

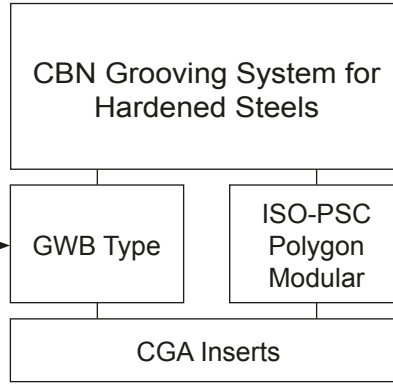
Cutting speed	80 ~ 120 m/min
Feed rate	0,03 ~ 0,1 mm/rev
Depth of cut	0,03 ~ 0,2 mm

## ■ Holders Performance Area



Work material: Alloy steel (H<sub>R</sub>C 60)  
 Cutting conditions: v<sub>c</sub> = 100 m/min  
 f = 0,1 mm/rev  
 d<sub>oc</sub> = 0,2 mm

# SUMIBORON Grooving Tool Holder GWB / PSC Type



## Features

### Tangential insert

80 degree tangentially mounted insert improves rigidity



### Double clamping system

The double clamping system increases stability so even axial feeds are possible.

### Coated CBN grade BNC30G


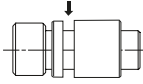

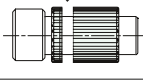
Tough new coated CBN grade for interrupted hard grooving



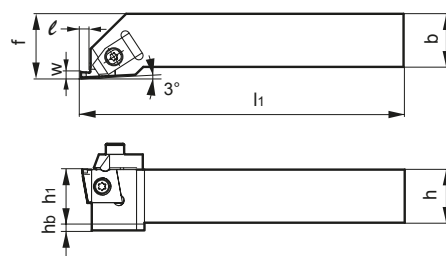
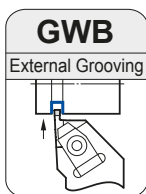
### Wide insert range 1,5 – 6,0mm

Wide range of width's and grades for continuous and interrupted cut grooving operations






## Grades

Grade	Application	Features
BN250 	Continuous grooving 	Uncoated CBN grade for continuous cut grooving applications
BNC30G 	Interrupted grooving 	Tough new CBN coated grade developed for interrupted cut grooving applications

## Grooving Tool Holder GWB Type



## Spare Parts

Clamp finger	Clamp screw	Insert screw	Spring	Wrench
	 5,0 Nm			
TF 72 (Right handed)	BX 0520T	BFTX 0511N	GSP 06	TRX 20
TF 73 (Left handed)				

## Holders

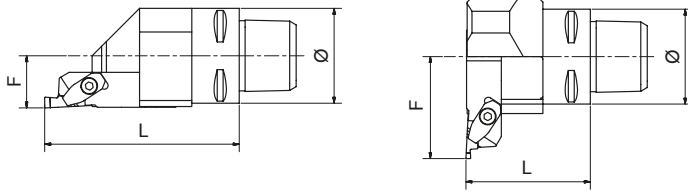
Cat. No.	Stock		Dimensions (mm)								Appl. Insert No.
	R	L	h	b	l <sub>1</sub>	f	h <sub>1</sub>	h <sub>b</sub>	w (*)	ℓ	
<b>GWB R/L 2020-45</b>	<input type="checkbox"/>	<input type="checkbox"/>	20	20	151 (150)	25	20	5	1,5 ≤ cw ≤ 4,5	3,5 ~ 5,0	①
<b>GWB R/L 2525-45</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25	25	151 (150)	30	25	-			
<b>GWB R/L 2525-60</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25	25	151	30	25	-	4,5 ≤ cw ≤ 6,0	5,0	②

Right handed tool holders are applicable with right handed inserts.

Remark: Inserts are not included.

# SUMIBORON Grooving Tool Holder GWB / PSC Type



## ISO-PSC Polygon Modular CGA Grooving System







**New**



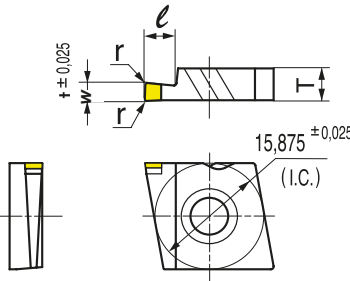
### ■ Holders

Cat. No.	R	L	Ø (mm)	F (mm)	L (mm)	 7,5 (Nm) 	
						Cap Screw	Wrench
PSC 40GM00 R/L	●	●	40	22	82,0	BFTX0619N	LT25
PSC 50GM00 R/L	●	●	50	27			
PSC 40GM90 R/L	●	●	40	43	52,5		
PSC 50GM90 R/L	●	●	50	48	55,0		

### ■ Cassette

Cat. No.	R	L	Grooving Width w (mm)	Grooving Depth ℓ (mm)	Inserts	 5,0 (Nm) 		Clamp Finger	 3,0 (Nm) 	
						Insert Screw	Wrench		Cap Screw	Wrench
GWBCM R/L 45	●	●	1,5 - 2,0	3,5	CGA1504□□0	BFTX0511N	TRX20	CLWN01	BX0414	LH030
			2,5 - 3,0	4,0						
GWBCM R/L 60	●	●	3,5 - 6,0	5,0	CGA1506□□0					

### ■ CGA Inserts

	Cat. No.	Stock				Dimensions (mm)					Insert No.	Applicable Holder
		BN250		BNC30G		w (*)	ℓ	r	I.C.	T		
		R	L	R	L							
CGA R/L 1504 150	●	●	●	●	1,5	3,5	0,2	15,875	4,76	①	GWB R/L 2020 - 45 GWB R/L 2525 - 45 GWBCM R/L - 45	
CGA R/L 1504 200	●	●	●	●	2,0							
CGA R/L 1504 250	●	●	●	●	2,5							
CGA R/L 1504 300	●	●	●	●	3,0							
CGA R/L 1504 350	●	●	●	●	3,5							
CGA R/L 1504 400	●	●	●	●	4,0							
CGA R/L 1504 450	●	●	●	●	4,5							
CGA R/L 1506 500	●	●	●	●	5,0	5,0	6,35	②	GWB R/L 2525 - 60 GWBCM R/L - 60			
CGA R/L 1506 550	●	●	●	●	5,5							
CGA R/L 1506 600	●	●	●	●	6,0							

\*) Special widths available on request

### ■ Recommended Cutting Conditions

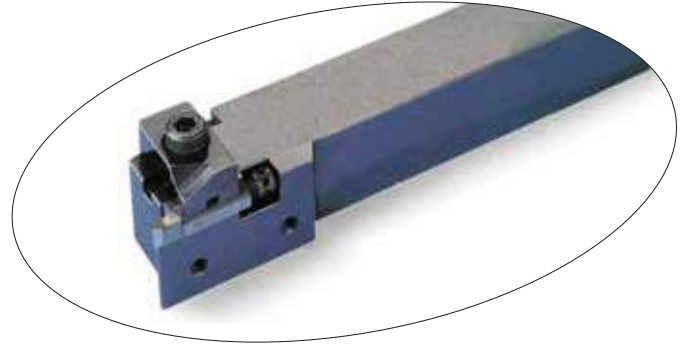
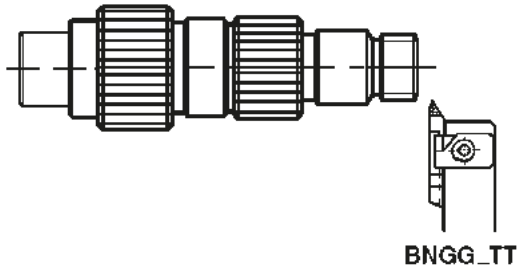
Material	Hardened steel
Cutting speed (m/min)	60 — 80 — 120 — 150
Feed rate (mm/rev)	0,03 — 0,04 — 0,08 — 0,1
Grade	BN250, BNC30G

Coolant:  
Dry / wet (for continuous cut)  
Dry only (for interrupted cut)

Remarks:  
To avoid thermal cracking of the cutting edge when interrupted cutting please ensure workpiece remains dry.

# SUMIBORON Threading Tool Holder BNGG Type

For Hardened Steel



## „Sumiboron“ Holders

	Cat. No.	Stock		Dimensions (mm)			Applicable Insert
		R	L	f	l <sub>2</sub>	l <sub>1</sub>	
	<b>BNGG R/L 2525-TT</b>	●	□	28,5	5	150	BNTT 1020 R/L BNTT 1530 R/L

## Inserts

	Cat. No.	Stock						Dimensions (mm)				Applicable Holder
		BN250		BN300		BNX20		Pitch	r	l <sub>1</sub>	s	
		R	L	R	L	R	L					
	<b>BNTT 1020 R/L</b>	●	□			●	□	1,0 ~ 2,0	0,13	25	6,0	BNGG R/L 2525 - TT
	<b>BNTT 1530 R/L</b>	●	□			●	□	1,5 ~ 3,0	0,13	25	6,0	

● Inserts also suitable for existing BNG2525R type holders

## Spare Parts

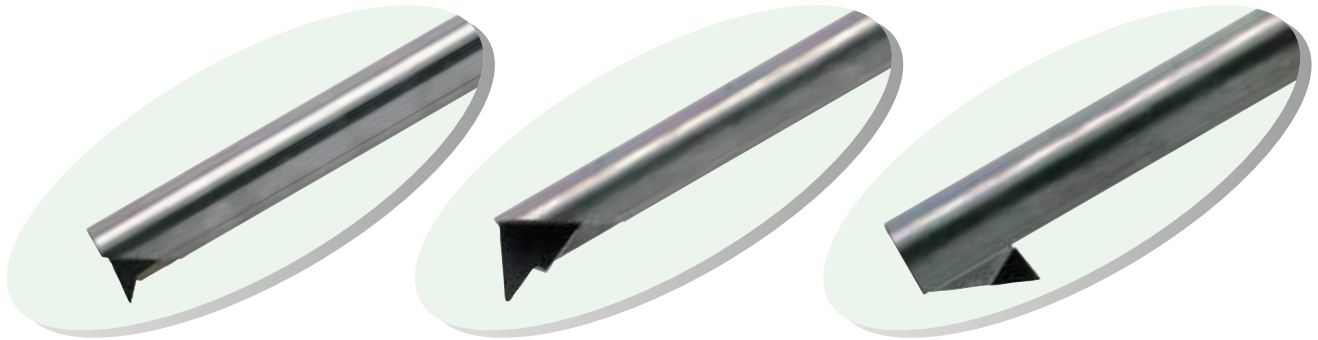
Holder	Support	Clamp	Adjust screw	Spring	Screw	Wrench	
BNGG R/L 2525 - TT	BNGS R/L TT	BNGC R/L	FMJ	GSP 6	BX 0615 LH 050 (for clamp )	LH 030 (for support)	
						ø1,8x45	

## Recommended Cutting Conditions

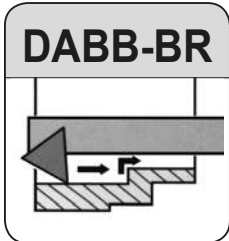
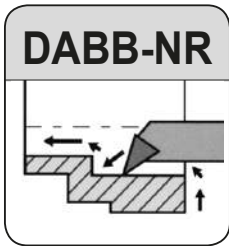
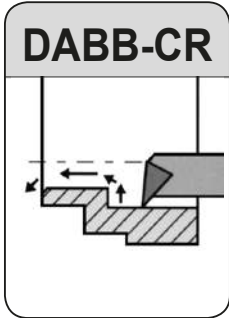
Threading	
Cutting speed (v <sub>c</sub> )	80 ~ 120 m/min
Feed rate (f)	Max. pitch: 3,0 mm

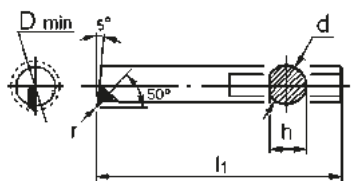
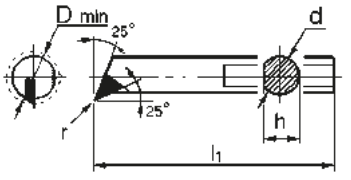
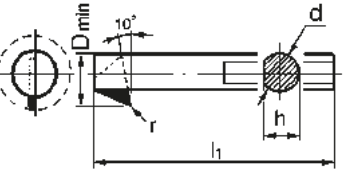
● = Euro stock  
□ = Delivery on request





## ■ „Sumidia“ Brazed Boring Tools for Small Hole Boring

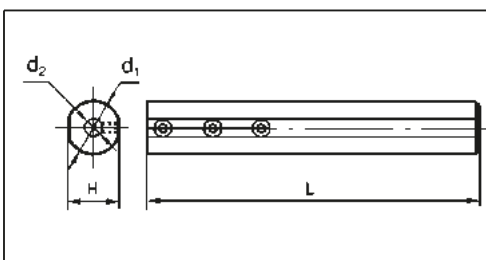


DABB (Solid carbide shank)	Cat. No.	Stock	Dimensions (mm)					Applicable Holder
		DA2200	D <sub>min</sub>	d	l <sub>1</sub>	h	r	
For small boring 	DABB 025 CR	●	3,0	2,5	60	2,2	0,1	HBB 2516
	DABB 035 CR	□	4,0	3,5	60	3,2	0,1	HBB 3516
	DABB 045 CR	●	5,0	4,5	80	4,1	0,1	HBB 4516
	DABB 060 CR	□	7,0	6,0	80	5,2	0,1	HBB 616
For profiling and corner grooving 	DABB 025 NR	□	3,0	2,5	60	2,2	0,1	HBB 2516
	DABB 035 NR	●	4,0	3,5	60	3,2	0,1	HBB 3516
	DABB 045 NR	□	5,0	4,5	80	4,1	0,1	HBB 4516
	DABB 060 NR	□	7,0	6,0	80	5,2	0,1	HBB 616
For back boring 	DABB 045 BR	□	7,0	4,5	80	4,0	0,1	HBB 4516
	DABB 060 BR		9,0	6,0	80	5,5	0,1	HBB 616

## ■ Recommended Cutting Conditions


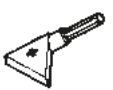
Spindle revolution	Feed rate	Depth of cut	Coolant
> 2000 rpm	0,03 ~ 0,1 mm/rev	0,03 ~ 0,2 mm	Wet

## ■ Holder



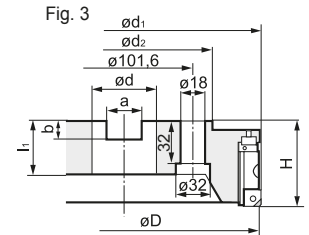
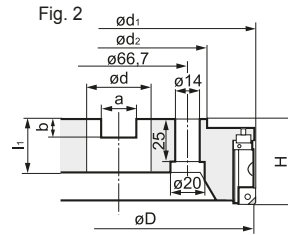
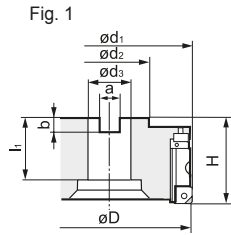
Cat. No.	Stock	Dimensions (mm)			
		d <sub>1</sub>	L	d <sub>2</sub>	H
HBB 2516	●	16	100	2,5	15
HBB 3516	●			3,5	
HBB 4516	●			4,5	
HBB 616	●			6,0	

## ■ Spare Parts

Screw	Wrench
 BT 0404	 TH 020

# SUMIDIA Face Mill RF Type

## High Speed Finishing of Aluminium Alloy



### Body

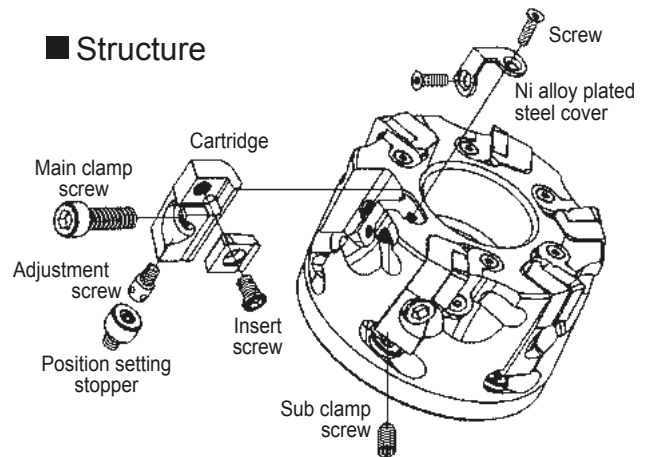
Type	Cat. No.	Stock	Dimensions (mm)				Mounting				Number of teeth	max. depth of cut	Weight (Kg)	Fig.
			$\phi D$	$\phi d_1$	$\phi d_2$	H	$\phi d_3$	a	b	$l_1$				
RF 4000	RF 4080 R-S	●	80	82	60	50	27	12,4	7,0	29	6	3,0	0,7	1.
	RF 4100 R-S	●	100	102	75	50	32	14,4	8,5	29	6		1,0	
	RF 4125 R-S	●	125	127	75	63	40	16,4	9,5	29	8		1,6	
	RF 4160 R-S	□	160	162	100	63	40	16,4	9,5	29	10	2,6	2.	
	RF 4200 R-S	□	200	202	130	63	60	25,7	14,0	38	12	3,6	3.	
	RF 4250 R-S	□	250	252	130	63	60	25,7	14,0	38	16	6,0		
	RF 4315 R-S	□	315	317	240	80	60	25,7	14,0	40	18	11,0		

Remark: PCD blades and inserts are not included.

### Insert for Roughing and Finishing

Shape	Cat. No.	Grade	Stock
	Carbide insert SDET 1204 ZDFR	H1	●
	PCD insert SNEW 1204 ADFR-NF	DA1000 DA2200	● ▲
	PCD insert wiper type SNEW 1204 ADFR-W-NF	DA1000 DA2200	● ▲

### Structure



### "Sumidia" Blade

PCD grade DA2200	Cat. No.	Stock
Standard type	RFB	▲
Wiper type	RFBW	▲

### Cartridge

Shape	Cat. No.	Stock
For carbide insert	RFR	●
For Sumidia insert	RFF	●

### Cutting Insert Selection

- For easy assembling:
  - PCD blade RFB
  - PCD blade RFB (wiper type)
- For finishing:
  - Cartridge RFF
  - PCD insert SNEW 1204 ADFR-NF (standard type)
  - SNEW 1204 ADFR-W-NF (wiper type)
  - PCD grade: DA2200
- For roughing:
  - Cartridge RFR
  - Uncoated carbide insert SDET 1204 ZDFR, grade: H1

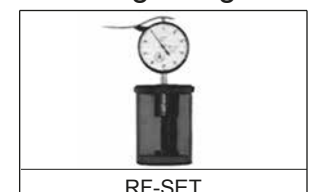
### Dummy Blade

Shape	Cat. No.	Stock
	RFD	□

### Spare Parts

RFC	RFS	BX0620	BTD0510	FBUP2-A0-8	RFJ	BFTX0509N	TH050 TH015, TH025	TTX20
		10,0 (Nm)	3,0 (Nm)			5,0 (Nm)	TH015, TH025 TH050	

### Setting Gauge



Dial-gauge is not included.

● = Euro stock  
□ = Delivery on request

▲ = To be replaced by new item

# SUMIDIA Face Mill SRF Type

## High Speed Finishing of Aluminium Alloy



Fig. 1

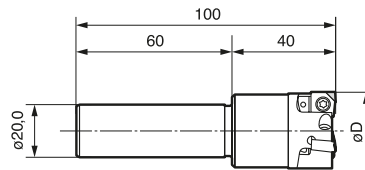
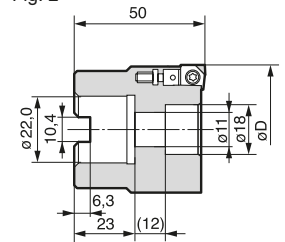


Fig. 2

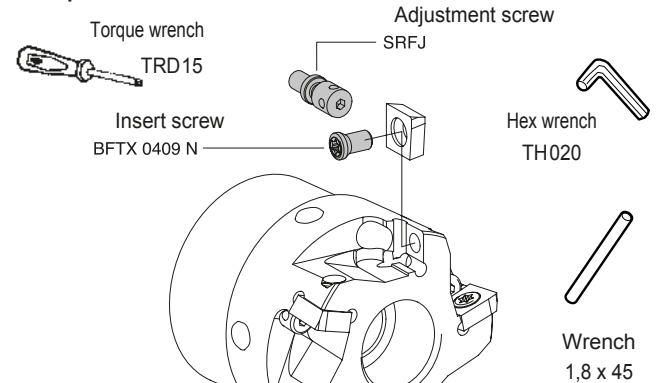


### Body

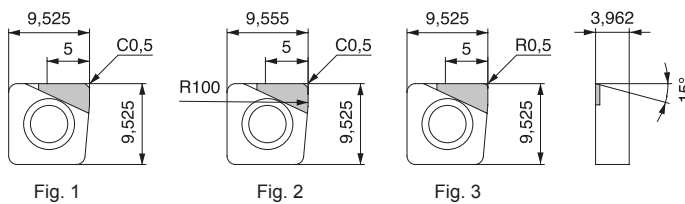
Cat. No.	Stock	øD(mm)	No. of teeth	Fig.	Weight (Kg)
<b>SRF 30 R-ST</b>	<input type="checkbox"/>	30	3	1	0,34
<b>SRF 40 R-ST</b>	<input type="checkbox"/>	40	4	1	0,50
<b>SRF 50 RS</b>	<input type="checkbox"/>	50	5	2	0,59
<b>SRF 63 RS</b>	<input type="checkbox"/>	63	6	2	0,67

Inserts are sold separately.

### Spare Parts



### Insert



### Maximum D.O.C. Guide (SRF50RS, 5 teeth)

The contains guidelines on the maximum D.O.C., determined from internal tests. "O" mark indicates the possible application range. Actual cutting conditions should be set, based on actual machine and work characteristics.

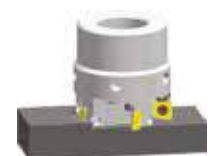
Cat. No.	Cutting Edge	SUMIDIA	Fig
		DA2200	
<b>SNEW 09T3 ADTR-NF</b>	Standard	▲	1
<b>SNEW 09T3 ADTR-U-NF</b>	Wiper	▲	2
<b>SNEW 09T3 ADTR-R-NF</b>	Nose Radius	▲	3

Feed	Feed Speed, $v_f$ (mm/min)		
	2.500	4.000	5.000
	Feed Rate, $f_t$ (mm/tooth)		
D.O.C. (mm)	0,05	0,08	0,10
0,5	○	○	○
1,0	○	○	○
1,5	○	○	○
2,0	○	○	○
2,5	○	○	○
3,0	○	○	○
3,5	○	○	-
4,0	○	-	-
4,5	○	-	-
5,0	○	-	-

- Standard inserts and Wiper inserts can be used on the same cutter body.
- Standard inserts with nose radius should be used where vibration is present. As such, Wiper-inserts will not be applicable.
- Inserts can be regrind 3 times (up to minimum IC diameter 9,225mm).
- When using reground inserts, it is advisable to reconfirm insert height and cutting diameter with a tool pre-setter.
- Do not mix new and reground inserts, or even inserts with different regrind amount on the same cutter.

### Cutting Conditions

Cutter: SRF 50 RS  
 Insert: SNEW 09T3 ADFR-NF (DA2200)  
 n : 10.000 rpm  
 Width: 35mm at D.O.C. indicated above



### Recommended Cutting Conditions for RF and SRF Type Cutters

Work Material		Process	Grade	Cutting Speed (m/min)		Feed Rate (mm/tooth)	Depth of Cut (mm)	
				RF Type	SRF Type		RF Type	SRF Type
Aluminium Alloy	Si < 13%	Finishing	<b>DA2200</b> (PCD)	2.000 ~ 5.000	~ 4.000	0,05 ~ 0,2	~ 3,0	~ 5,0
		Roughing	H1 (Carbide)	1.000 ~ 2.500	-			
	Si ≥ 13%	Finishing	<b>DA2200</b> (PCD)	400 ~ 800	~ 800			
		Roughing	H1 (Carbide)	200 ~ 400	-			

# SUMIBORON "BN Finish Mill" FMU Type

## High Speed Finishing of Grey Cast Iron



### ■ Features

- High speed machining  $v_c = 1.500$  m/min
- Excellent surface roughness  $Rz=3,2$  ( $Ra=1,0$ )
- Safety structure for the centrifugal force under high speed cutting conditions
- Run-out is less than  $10\mu m$
- Easy assembling method using the setting gauge
- Running cost is reduced because of economical insert

### ■ Application

GG25~GG30 (HB200~250) grey cast iron with pearlite matrix, and ferrite matrix (HB130~160)  
Application examples: engine block, cylinder block, etc

### ■ Specifications

FMU Type:  $\varnothing 80 \sim \varnothing 315$  mm  
Insert: SNEW1203ADTR/L  
Low cutting force type: SNEW1203ADTR/L-S

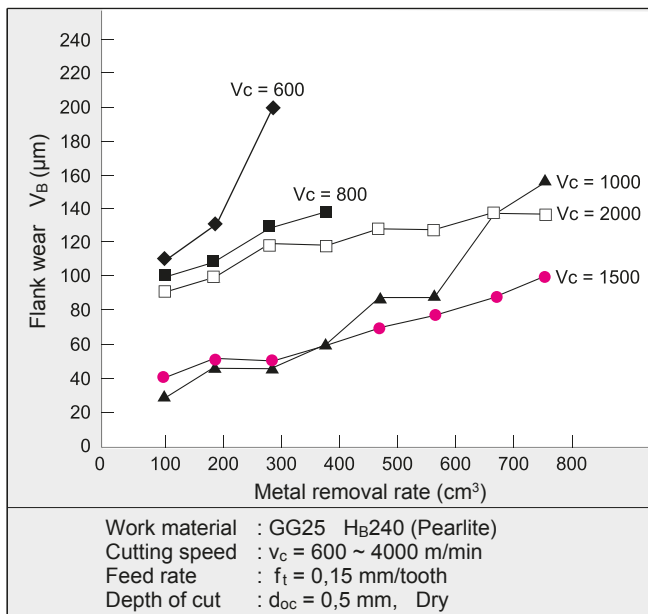
### ■ Recommended Cutting Conditions

Speed:  $v_c = 800 \sim 2000$  m/min  
Feed:  $f_t = 0,1 \sim 0,3$  mm/tooth  
Depth:  $d_{oc} = 0,5$  mm or less  
Dry cutting

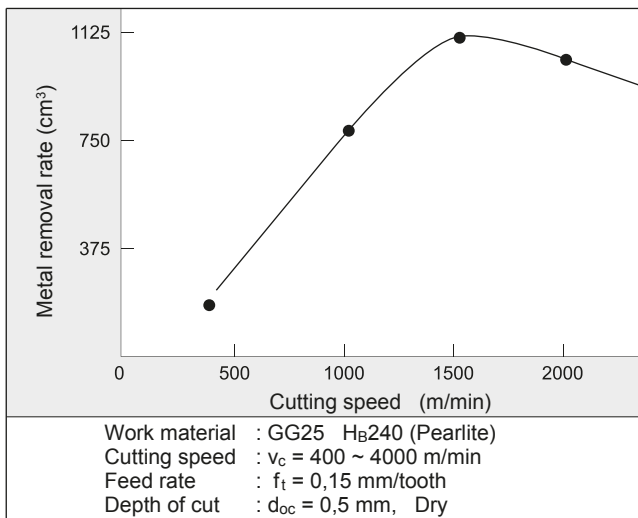


### ■ Performance

#### ● Tool Life Diagram



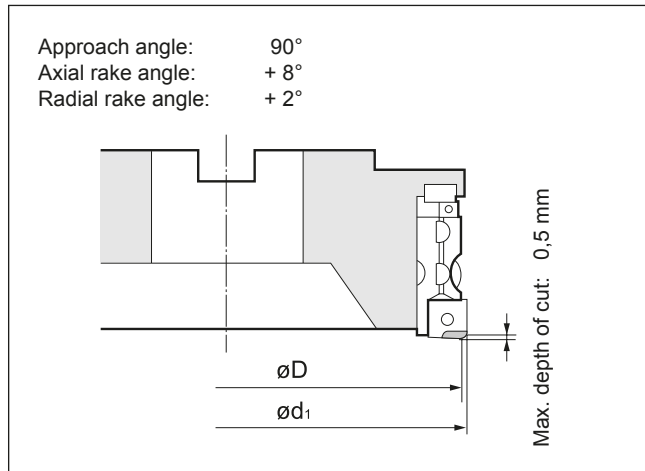
#### ● Estimated Tool Life



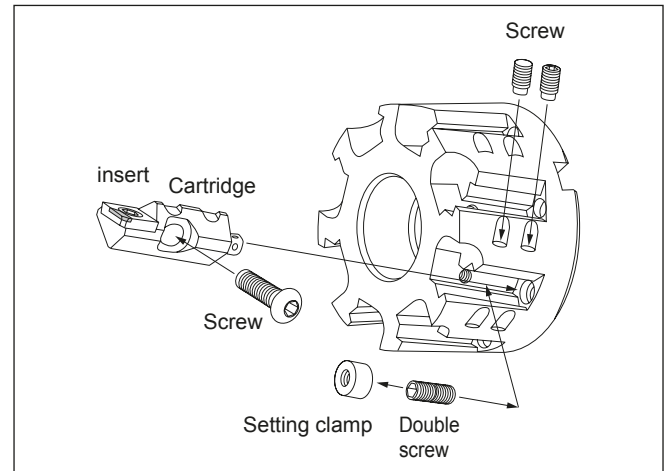
- Milling of ductile cast iron and alloy steel casting do not produce the best results.
- Dry cutting is recommended. Wet cutting will result in chipping of cutting edges in the early stages due to thermal cracking.

# SUMIBORON "BN Finish Mill" FMU Type

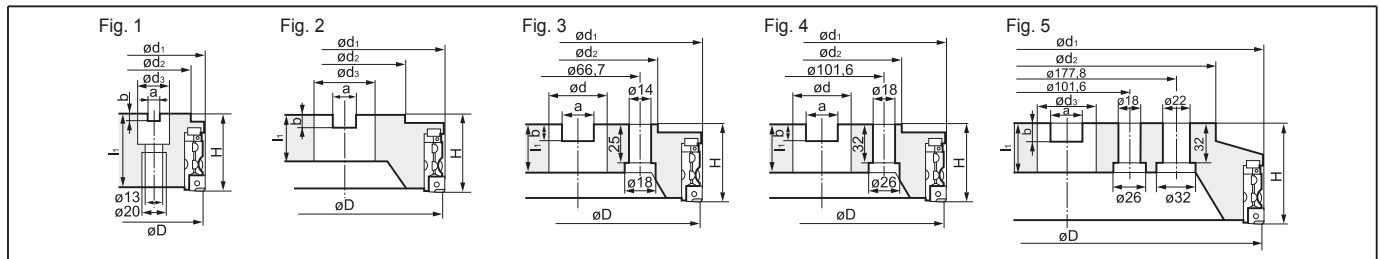
## ■ Specifications



## ■ Structure

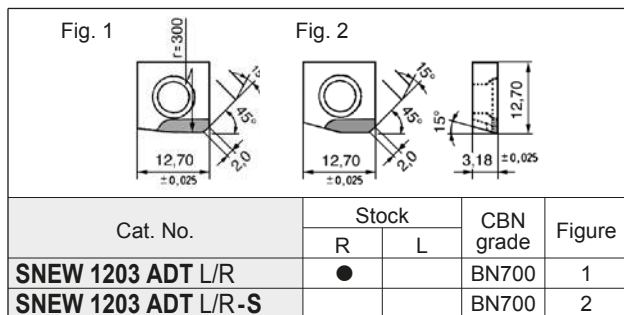


## ■ Body

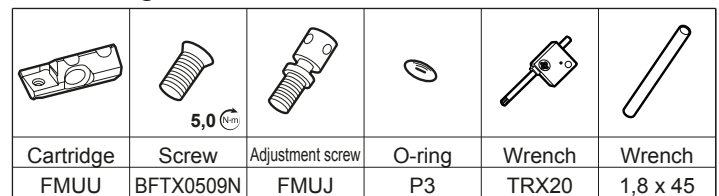


Type	Cat. No.	Stock		Dimensions (mm)				Mounting				Number of teeth	max. depth of cut	Weight (Kg)	Fig.	
		R	L	ø D	ø d <sub>1</sub>	ø d <sub>2</sub>	H	ø d <sub>3</sub>	a	b	l <sub>1</sub>					
FMU 4000	FMU 4080 R-S	●		80	82,8	60	63	27	12,4	7,0	25	6	0,5	1,6	1.	
	FMU 4100 R-S	●		100	102,8	76	63	32	14,4	8,5	29			2,4		
	FMU 4125 R-S	□		125	127,8	75	63	40	16,4	9,5	29			3,4	2.	
	FMU 4160 R-S	□		160	162,8	100	63	40	16,4	9,5	29			5,6		
	FMU 4200 R-S	□		200	202,8	130	63	60	25,7	14,0	38			16	9,2	4.
	FMU 4250 R-S	□		250	252,8	130	63	60	25,7	14,0	38			20	14,3	
	FMU 4315 R-S			315	317,8	240	80	60	25,7	14,0	40			24	27,8	

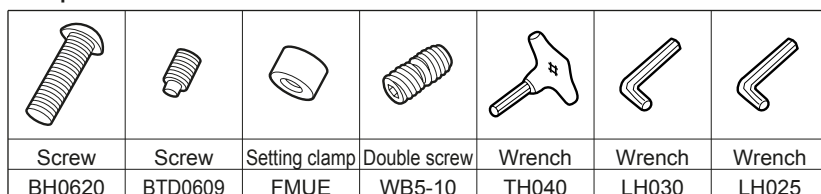
## ■ Inserts



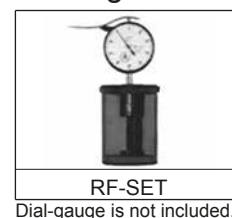
## ■ Cartridge



## ■ Spare Parts

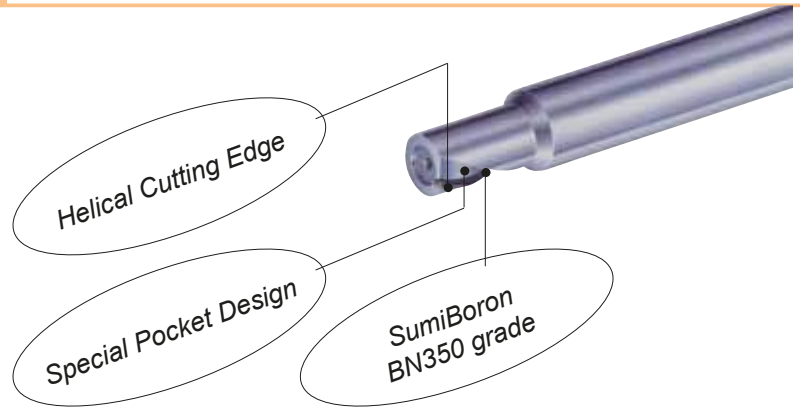


## ■ Gauge



# SUMIBORON "Helical Master" BNES Type

## Spiral CBN Endmill for Hardened Steel



### Endmills BNES Type with 1 Spiral Flute

	Cat. No.	Stock	Dimensions (mm)				
		BN350	$\phi D$	$\phi d$	$l_1$	$l_2$	L
	<b>BNES 1060</b>	☐	6,0	10	7,0	11	60
	<b>BNES 1080</b>	☐	8,0	10	10,0	14	70
	<b>BNES 1100</b>	☐	10,0	12	12,0	17	75
	<b>BNES 1120</b>	☐	12,0	12	14,0	20	80
	<b>BNES 1140</b>	☐	14,0	16	16,0	21,5	80
	<b>BNES 1160</b>	☐	16,0	16	18,0	24	80

Helix angle : 15°  
right-hand cut, right-hand helix

### Recommended Cutting Conditions

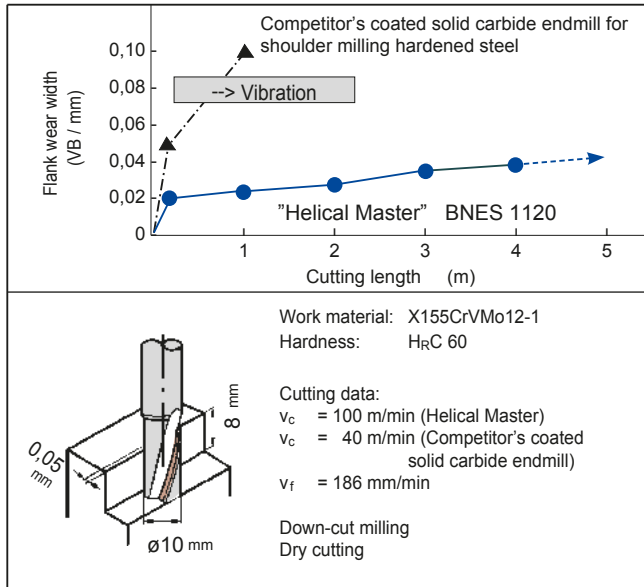
Cutting speed:  $v_c$  (m/min), Spindle revolutions:  $n$  (rpm), Feed per tooth:  $f_t$  (mm/tooth), Feed speed:  $v_f$  (mm/min)

Tooling example	$\phi D$	Hardened steel (H <sub>R</sub> C 50 ~ 57)			Hardened steel (H <sub>R</sub> C 58 ~ 65)		
		$v_c = 100 \sim 170$ m/min			$v_c = 80 \sim 150$ m/min		
<p>Depth of cut : <math>d_{oc} \leq D</math></p>	$\phi 6 \sim 8$	$W_{oc} \leq 0,1$ mm	$n = 4000 \sim 9000$	$V_f$ (mm/min) = 240 ~ 540	$W_{oc} \leq 0,08$ mm	$n = 3200 \sim 8000$	$V_f$ (mm/min) = 150 ~ 370
	$\phi 10 \sim 12$	$W_{oc} \leq 0,15$ mm	$n = 2700 \sim 5400$	$V_f$ (mm/min) = 180 ~ 360	$W_{oc} \leq 0,12$ mm	$n = 2100 \sim 4800$	$V_f$ (mm/min) = 120 ~ 270
	$\phi 14 \sim 16$	$W_{oc} \leq 0,2$ mm	$n = 2000 \sim 3800$	$V_f$ (mm/min) = 140 ~ 260	$W_{oc} \leq 0,15$ mm	$n = 1600 \sim 3400$	$V_f$ (mm/min) = 110 ~ 230

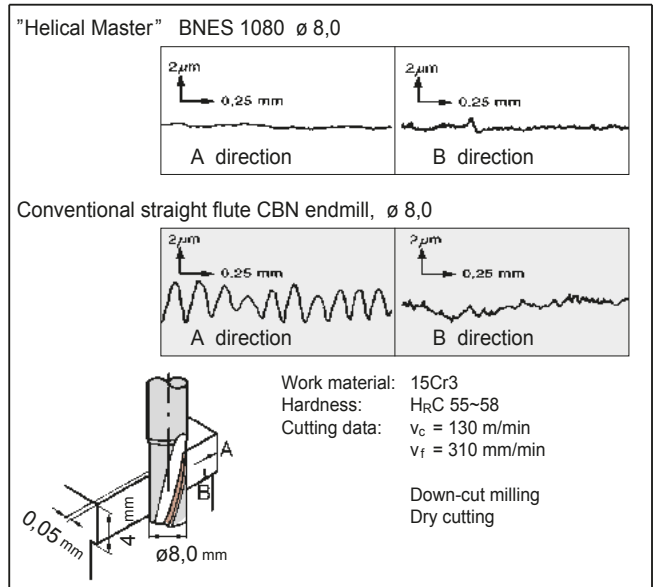
Recommendation: Dry cutting (Air coolant)  
Down-cut milling  
Minimise the overhang  
Use a rigid machine

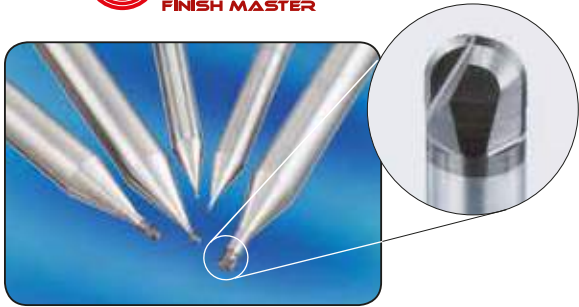
### Performance

#### Long Tool Life and High Efficiency



#### Excellent Surface Roughness





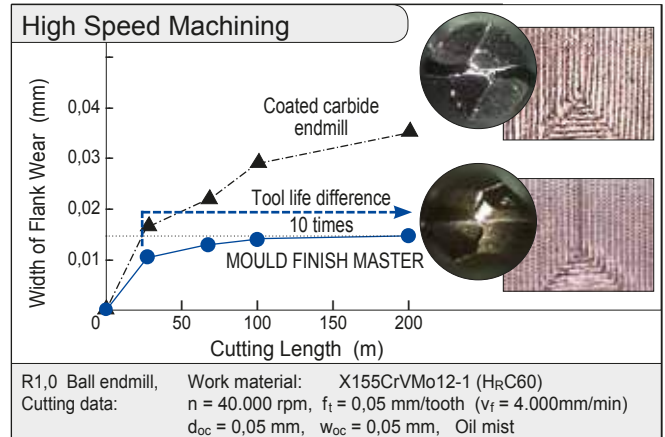
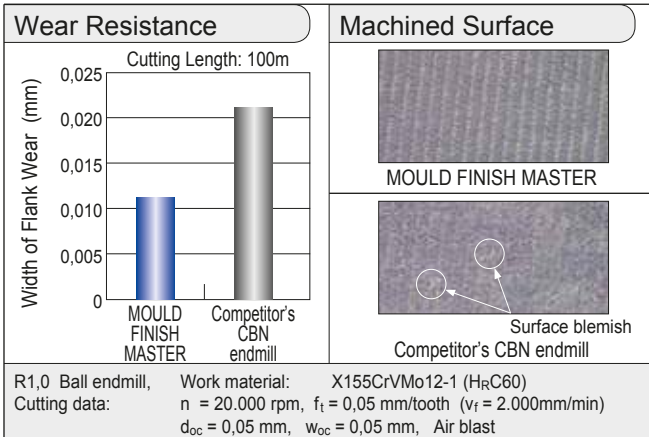
■ Characteristics / Application

- High precision machining of hardened steels < HRC70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy : ±0,005mm

■ Endmills

	Cat. No.	Stock	Dimensions (mm)						
		BN350	R	ØD	L	Ød1	Ød	ℓ1	ℓ2
✳ Endmill Identification <b>BNBP 2 R020-012 4</b> MOULD FINISH MASTER Number of teeth Radius of ball nose Shank Diam. Neck length (ℓ2)	4,0 mm (Shank Diam.)	●	0,2	0,4	50	0,37	4	0,3	1,2
	●	0,3	0,6	50	0,57	4	0,4	1,5	
	●	0,5	1,0	50	0,97	4	0,6	2,5	
	●	0,75	1,5	50	1,47	4	0,9	4,0	
	●	1,0	2,0	50	1,97	4	1,4	5,5	
	6,0 mm (Shank Diam.)	●	0,2	0,4	50	0,37	6	0,3	1,2
	●	0,3	0,6	50	0,57	6	0,4	1,5	
	●	0,5	1,0	50	0,97	6	0,6	2,5	
	●	0,75	1,5	50	1,47	6	0,9	4,0	
	●	1,0	2,0	50	1,97	6	1,4	5,5	

■ Performance



Excellent surface finish compared with competitor's CBN and coated carbide endmills

■ Recommended Cutting Conditions

Spindle revolutions: N (rpm), Feed rate per tooth: f<sub>t</sub> (mm/tooth), Depth of cut: d<sub>oc</sub> (mm), Wide of cut: w<sub>oc</sub> (mm)

Material Cutting data	Pre-hardened steel, Die steel (~ HRC52)				Die steel (~ HRC62)				High speed tool steel (~ HRC70)			
	n (rpm)	f <sub>t</sub> (mm/tooth)	d <sub>oc</sub> (mm)	W <sub>oc</sub> (mm)	n (rpm)	f <sub>t</sub> (mm/tooth)	d <sub>oc</sub> (mm)	W <sub>oc</sub> (mm)	n (rpm)	f <sub>t</sub> (mm/tooth)	d <sub>oc</sub> (mm)	W <sub>oc</sub> (mm)
R 0,2	20.000~50.000	0,02	0,03	0,03	20.000~50.000	0,02	0,01	0,02	20.000~50.000	0,015	0,01	0,02
R 0,3	20.000~50.000	0,02	0,03	0,03	20.000~50.000	0,02	0,01	0,02	20.000~50.000	0,015	0,01	0,02
R 0,5	20.000~50.000	0,03	0,05	0,05	20.000~50.000	0,03	0,03	0,04	20.000~50.000	0,02	0,02	0,03
R 0,75	20.000~50.000	0,04	0,08	0,1	20.000~50.000	0,04	0,05	0,05	20.000~50.000	0,03	0,02	0,05
R 1,0	20.000~50.000	0,05	0,1	0,1	17.000~50.000	0,05	0,05	0,05	17.000~50.000	0,03	0,03	0,05

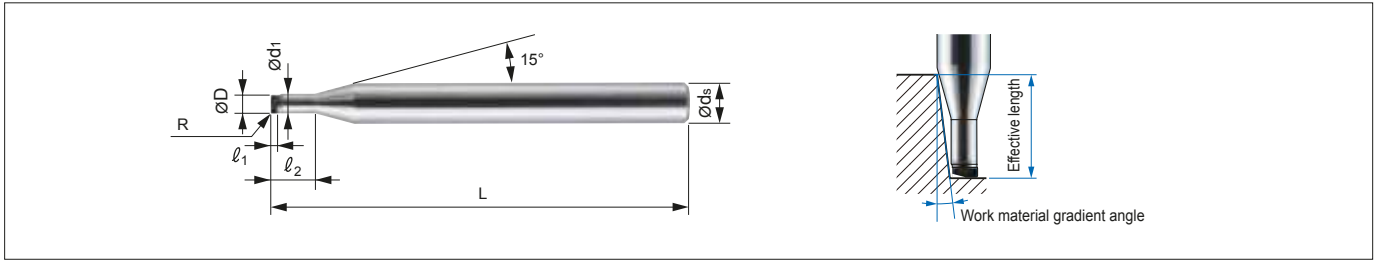
■ Important Notes

- (1) For stable machining, a more rigid machine is recommended.
- (2) Air blast or oil mist coolant is recommended.
- (3) Shorten overhang as much as possible.





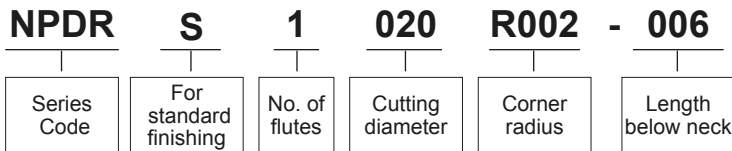
## SUMIDIA Binderless Radius Endmill NPDRS Type



### NPDRS Type Body (for Standard Finishing)

Cat. No.	Stock	Dimensions (mm)							Real effective length with respect to work material gradient angle				
	NPDRS	ØD	R	l <sub>1</sub>	l <sub>2</sub>	L	Ød <sub>1</sub>	Ød <sub>s</sub>	0,5°	1°	1,5°	2°	3°
<b>NPDRS 1020 R002-006</b>	○	0,2	0,02	0,10	0,6	40	0,175	4	0,61	0,62	0,63	0,64	0,66
<b>1020 R005-006</b>	○	0,2	0,05	0,10	0,6	40	0,175	4	0,61	0,62	0,63	0,64	0,66
<b>1030 R002-010</b>	○	0,3	0,02	0,15	1,0	40	0,27	4	1,01	1,03	1,04	1,06	1,09
<b>1030 R005-010</b>	○	0,3	0,05	0,15	1,0	40	0,27	4	1,01	1,03	1,04	1,06	1,09
<b>1050 R005-015</b>	○	0,5	0,05	0,25	1,5	40	0,47	4	1,61	1,66	1,72	1,78	1,92
<b>NPDRS 1050 R010-015</b>	○	0,5	0,10	0,25	1,5	40	0,47	4	1,61	1,66	1,71	1,77	1,91
<b>1100 R005-030</b>	○	1,0	0,05	0,55	3,0	40	0,95	4	3,40	3,52	3,65	3,78	4,08
<b>1100 R010-030</b>	○	1,0	0,10	0,55	3,0	40	0,95	4	3,40	3,52	3,64	3,77	4,07
<b>1100 R020-030</b>	○	1,0	0,20	0,55	3,0	40	0,95	4	3,40	3,51	3,63	3,76	4,05
<b>1200 R005-040</b>	○	2,0	0,05	0,55	4,0	40	1,95	4	4,44	4,59	4,75	4,93	5,33
<b>NPDRS 1200 R010-040</b>	○	2,0	0,10	0,55	4,0	40	1,95	4	4,43	4,59	4,75	4,92	5,31
<b>1200 R020-040</b>	○	2,0	0,20	0,55	4,0	40	1,95	4	4,43	4,58	4,74	4,91	5,29

### Identification Details



### Cutting Diameter and Nose Radius Combinations

ØD	r0,02	r0,05	r0,1	r0,2
0,2	○	○		
0,3	○	○		
0,5		○	○	
1,0		○	○	○
2,0		○	○	○

### Recommended Cutting Conditions

- Use a machine with high rigidity for stable cutting.
- Non-water soluble coolant recommended. Supply as a mist or external coolant. Take fire prevention precautions to avoid fire hazards caused by sparks igniting during machining or tool breakage.
- Shorten overhang as much as possible.
- Adjust cutting conditions as necessary as machine rigidity and other conditions may vary.
- Depth of cut shown in the table of conditions are maximum depths. Adjust the actual depth of cut to the desired machined surface finish.

Work Material		Carbide				
R (mm)	l <sub>2</sub>	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	
0,2	0,10	40.000	100	0,001	0,001	
0,3	0,15	40.000	150	0,002	0,001	
0,5	0,25	40.000	200	0,003	0,001	
1,0	0,55	40.000	400	0,005	0,003	
2,0	0,55	40.000	600	0,010	0,005	



○ = Japan stock

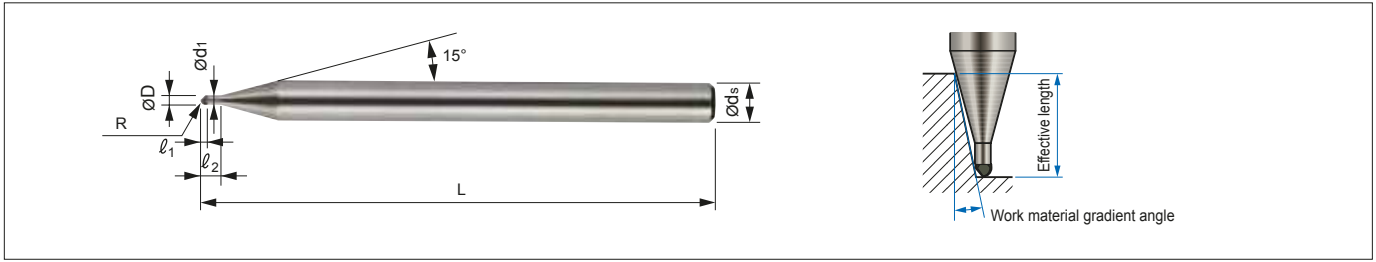




# SUMIDIA "MOULD Finish Master" NPDB(S) Type



## SUMIDIA Binderless Ballnose Endmill NPDBS Type / NPDB Type



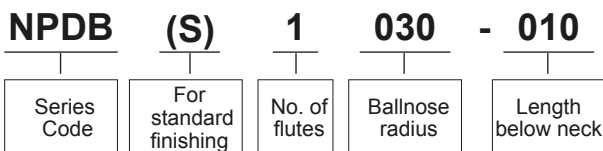
### NPDBS Type Body (for Standard Finishing)

Cat. No.	Stock	Dimensions (mm)							Real effective length with respect to work material gradient angle				
	NPD10	R	ØD	l <sub>1</sub>	l <sub>2</sub>	L	Ød <sub>1</sub>	Ød <sub>s</sub>	0,5°	1°	1,5°	2°	3°
<b>NPDBS 1010-004</b>	○	0,1	0,2	0,1	0,4	40	0,18	4	0,44	0,45	0,46	0,47	0,49
<b>1020-008</b>	○	0,2	0,4	0,2	0,8	40	0,38	4	0,83	0,84	0,85	0,86	0,89
<b>1030-010</b>	○	0,3	0,6	0,3	1,0	40	0,58	4	1,05	1,08	1,10	1,13	1,20
<b>1050-020</b>	○	0,5	1,0	0,5	2,0	40	0,95	4	2,08	2,13	2,19	2,24	2,38
<b>1100-030</b>	○	1,0	2,0	1,0	3,0	40	1,95	4	3,13	3,20	3,27	3,35	3,53

### NPDB Type Body (for Precision Finishing)

Cat. No.	Stock	Dimensions (mm)							Real effective length with respect to work material gradient angle				
	NPD10	R	ØD	l <sub>1</sub>	l <sub>2</sub>	L	Ød <sub>1</sub>	Ød <sub>s</sub>	0,5°	1°	1,5°	2°	3°
<b>NPDB 1010-004</b>	○	0,1	0,2	0,1	0,4	40	0,18	4	0,44	0,45	0,46	0,47	0,49
<b>1020-008</b>	○	0,2	0,4	0,2	0,8	40	0,38	4	0,83	0,84	0,85	0,86	0,89
<b>1030-010</b>	○	0,3	0,6	0,3	1,0	40	0,58	4	1,05	1,08	1,10	1,13	1,20
<b>1050-020</b>	○	0,5	1,0	0,5	2,0	40	0,95	4	2,08	2,13	2,19	2,24	2,38
<b>1100-030</b>	○	1,0	2,0	1,0	3,0	40	1,95	4	3,13	3,20	3,27	3,35	3,53

### Identification Details



### Recommended Cutting Conditions

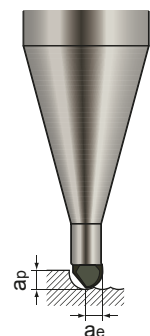
- Use a machine with high rigidity for stable cutting.
- Non-water soluble coolant recommended. Supply as a mist or external coolant.  
Take fire prevention precautions to avoid fire hazards caused by sparks igniting during machining or tool breakage.
- Shorten overhang as much as possible.
- Adjust cutting conditions as necessary as machine rigidity and other conditions may vary.
- Depth of cut shown in the table of conditions are maximum depths. Adjust the actual depth of cut to the desired machined surface finish.

#### Flat Surface Finishing

Work Material		Carbide			
R (mm)	l <sub>2</sub>	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)
0,1	0,4	40.000	100	0,001	0,001
0,2	0,8	40.000	150	0,001	0,001
0,3	1,0	40.000	200	0,001	0,001
0,5	2,0	40.000	400	0,001	0,003
1,0	3,0	40.000	600	0,001	0,005

#### Copy Finishing

Work Material		Carbide			
R (mm)	l <sub>2</sub>	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)
0,1	0,4	40.000	100	0,001	0,001
0,2	0,8	40.000	150	0,002	0,001
0,3	1,0	40.000	200	0,003	0,001
0,5	2,0	40.000	400	0,005	0,003
1,0	3,0	40.000	600	0,010	0,005



# SUMIDIA Drills

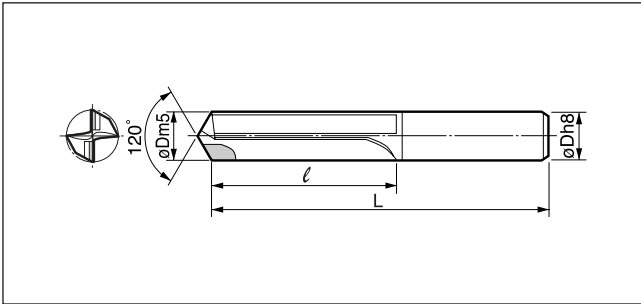
## DAL/DDL/DML Type



From general to High Precision Drilling of Aluminum Alloys!

- High precision DAL type is able to produce holes of IT Class of 7~8.
- General DDL type is able to produce holes of IT class of 11~12, mainly for drilling of pre-tap holes.
- DML type is DDL type with a chamfer edge, incorporating 2 processes in one operation.

### ■ DAL Type



Cat. No.	Stock	$\phi D$	L	$\ell$
	DA2200			
DAL 0500H ~ 0600H		$\phi 5 \leq D \leq \phi 6$	80	30
DAL 0601H ~ 0700H		$\phi 6 < D \leq \phi 7$	90	35
DAL 0701H ~ 0800H		$\phi 7 < D \leq \phi 8$	90	35
DAL 0801H ~ 0900H		$\phi 8 < D \leq \phi 9$	100	40
DAL 0901H ~ 1000H		$\phi 9 < D \leq \phi 10$	100	40
DAL 1001H ~ 1100H		$\phi 10 < D \leq \phi 11$	110	50
DAL 1101H ~ 1200H		$\phi 11 < D \leq \phi 12$	110	50

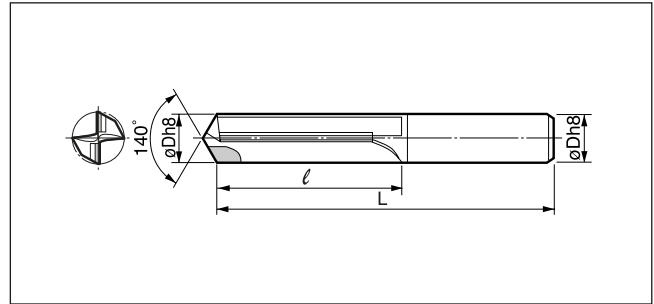
### ■ Recommended Conditions

	Cutting Speed (m/min)	Feed Rate (mm/rev)	Drilling Length L/D	Oil
$\phi D < 8$	80 ~ 250	0,05 ~ 0,2	Below 3 x D	Water soluble
$8 \leq \phi D$		0,1 ~ 0,3		

### ■ Application Examples (DAL Type)

Work Shape	Work	Conditions	Results
	A390 High silicon Aluminum	$V_c=100\text{m/min}$ $f=0,1\text{mm/rev}$	<ul style="list-style-type: none"> <li>• Holes by carbide drill was out of specifications after 2.000 holes/reg.</li> <li>• SumiDia drill could drill up to 30.000 holes/reg.</li> <li>• 15 times tool life that of carbide drills.</li> </ul>
	A390 High silicon Aluminum (pre-cast hole of $\phi 10$ )	$V_c=120\text{m/min}$ $f=0,12\text{mm/rev}$	<ul style="list-style-type: none"> <li>• Average 40,000 holes/reg</li> <li>• Surface roughness <math>R_y = 1\mu\text{m}</math></li> </ul>
	ADC10 Aluminum Die Cast	$V_c=90\text{m/min}$ $f=0,08\text{mm/rev}$	<ul style="list-style-type: none"> <li>• More than 50.000 holes and still running</li> </ul>

### ■ DDL Type



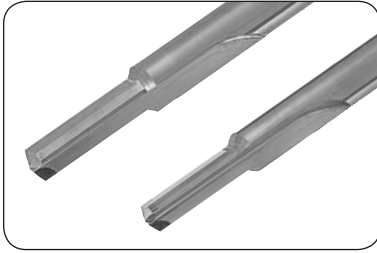
Cat. No.	Stock	$\phi D$	L	$\ell$
	DA2200			
DDL 050V ~ 060V		$\phi 5 \leq D \leq \phi 6$	80	30
DDL 061V ~ 070V		$\phi 6 < D \leq \phi 7$	90	35
DDL 071V ~ 080V		$\phi 7 < D \leq \phi 8$	90	35
DDL 081V ~ 090V		$\phi 8 < D \leq \phi 9$	100	40
DDL 091V ~ 100V		$\phi 9 < D \leq \phi 10$	100	40
DDL 101V ~ 110V		$\phi 10 < D \leq \phi 11$	110	50
DDL 111V ~ 120V		$\phi 11 < D \leq \phi 12$	110	50

### ■ Important Notes

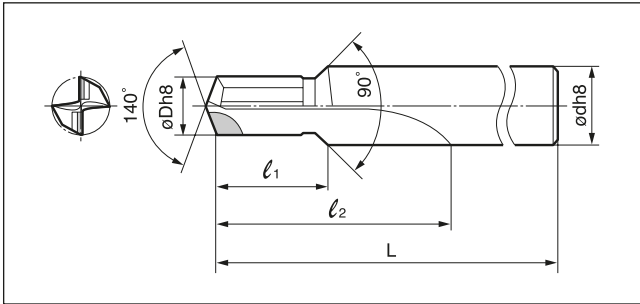
- Select a high rigidity machine and high precision tool holder.
- Enough coolant to drilled hole.

### ■ Application Examples (DDL Type)

Work Shape	Work	Conditions	Results
	ADC12 Aluminum Die Cast M8 Pre-tap holes	$V_c=214\text{m/min}$ $f=0,14\text{mm/rev}$	<ul style="list-style-type: none"> <li>• Regrind after 100.000 holes</li> </ul>
	ADC12 Aluminum Die Cast	$V_c=200\text{m/min}$ $f=0,17\text{mm/rev}$	<ul style="list-style-type: none"> <li>• Regrind after 74.000 holes (2.000m) (Preset tool change)</li> </ul>
	AC2A Aluminum Casting	$V_c=234\text{m/min}$ $f=0,28\text{mm/rev}$	<ul style="list-style-type: none"> <li>• Regrind after 80.000 holes (Preset tool change)</li> </ul>



## ■ DML Type

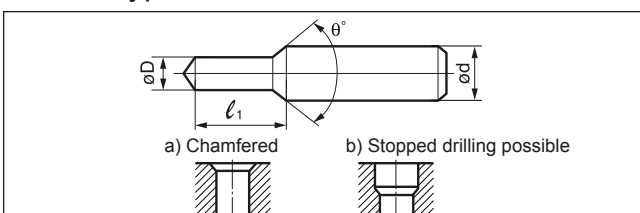


Applicable Tap Size	Cat. No.	Stock	$\phi D$	$\phi d$	L	$l_1$	$l_2$
		DA2200					
M6	<b>DML 050V</b>		5	8	90	18	36
M8	<b>DML 068V</b>		6,8	10	104	24	48
M10	<b>DML 085V</b>		8,5	12	122	30	60
M12	<b>DML 103V</b>		10,3	14	136	36	72

## ■ Application Examples (DML Type)

Work Shape	Work	Conditions	Results
	AC4C-T6 Aluminum Casting M6 Pre-tap holes	$V_c=100\text{m/min}$ $f=0,1\text{mm/rev}$ $m/c=6$ spindles	<ul style="list-style-type: none"> <li>• Regrind after 150.000 holes</li> <li>• Tool life for carbide drill is 500 holes.</li> <li>• 30 times tool life that of carbide drills</li> </ul>
	AC2C-T2 Aluminum Casting M8 Pre-tap holes	$V_c=210\text{m/min}$ $f=0,15\text{mm/rev}$	<ul style="list-style-type: none"> <li>• 100.000 holes/reg (2.000m) and still running.</li> <li>• Drilling and chamfering in the same process</li> </ul>
	AC4C-T6 Aluminum Casting M10 Pre-tap holes	$V_c=250\text{m/min}$ $f=0,2\text{mm/rev}$	<ul style="list-style-type: none"> <li>• 80.000 holes/reg (1,840m) and still running.</li> <li>• Drilling and chamfering in the same process</li> </ul>

## ■ DML Type Possible Profiles



- (1) Tolerance for dimension L is more than 0,2mm.
- (2)  $\theta^\circ$  is less than  $180^\circ$ .

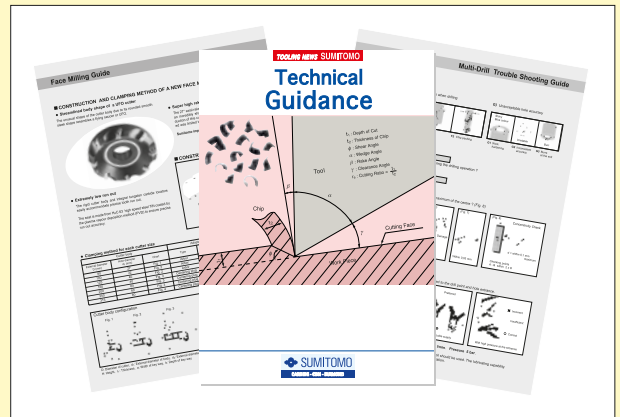


# Technical Guidance References

# N



N1 ~ N24



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Chip Control.....	N 5
<b>Basics of Milling</b> .....	N 6 - 8
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Cast Iron Machining .....	N18
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# Technical Guidance

## Basics of Turning

### Calculating Power Requirement

$P_c = \frac{d_{oc} \cdot f \cdot v_c \cdot K_c}{60 \times 10^3 \times \eta}$	$H = \frac{P_c}{0,75}$	$P_c$ : Net power requirement (KW) $v_c$ : Cutting speed (m/min) $f$ : Feed rate (mm/rev) $d_{oc}$ : Depth of cut (mm) $\eta$ : Machine efficiency (0,70 ~ 0,85) $K_c$ : Specific cutting force (N/mm <sup>2</sup> ) $H$ : Required horsepower (HP)
---	------------------------	---

● Rough value of specific cutting force ( $K_c$ )

General steel :	2.500 ~ 3.000 N/mm <sup>2</sup>
Cast iron :	1.500 N/mm <sup>2</sup>
Aluminum :	800 N/mm <sup>2</sup>

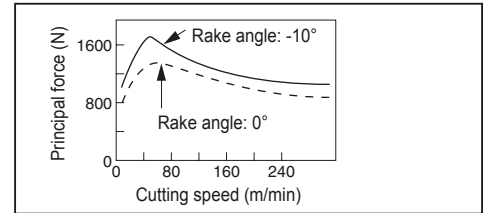
### Cutting Force

$F_1$  : Principal force  
 $F_2$  : Feed force  
 $F_3$  : Back force

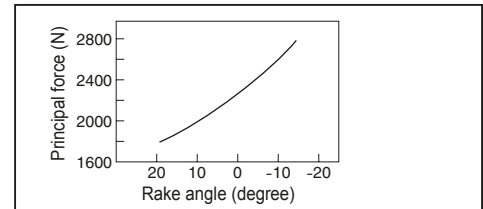
● Calculating cutting force

$P = K_c \cdot q$	$P = \frac{K_c \times d_{oc} \times f}{1000}$	$P$ : Cutting force (N) $K_c$ : Specific cutting force (N/mm <sup>2</sup> ) $q$ : Chip area (mm <sup>2</sup> ) $d_{oc}$ : Depth of cut (mm) $f$ : Feed rate (mm/rev)
-------------------	---	--

### Cutting Speed and Cutting Force



### Rake Angle and Cutting Force



### Calculating Cutting Speed

① Calculating rotational speed from cutting speed

$n = \frac{1000 \cdot v_c}{\pi \cdot D}$	$n$ : Spindle speed (min <sup>-1</sup> ) $v_c$ : Cutting speed (m/min) $D$ : Diameter of workpiece (mm) $\pi \approx 3,14$
--	---

(Eg.)  $v_c = 150$  m/min,  $D = 100$  mm

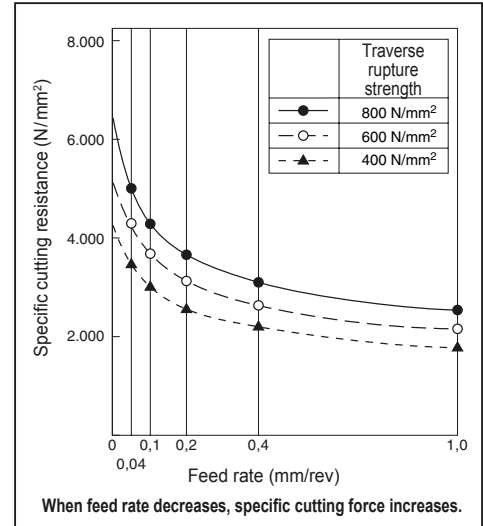
$$n = \frac{1000 \times 150}{3,14 \times 100} = 478 \text{ (min}^{-1}\text{)}$$

② Calculating cutting speed from rotational speed

$v_c = \frac{\pi \cdot D \cdot n}{1.000}$	Refer to the above table
---	--------------------------

$n$  : Spindle speed (min<sup>-1</sup>)  
 $v_c$  : Cutting speed (m/min)  
 $f$  : Feed rate (mm/rev)  
 $d_{oc}$  : Depth of cut (mm)  
 $D_m$  : Diameter of workpiece (mm)

### Feed Rate and Specific Cutting Force (For carbon steel)



### Roughness

● Theoretical Surface Finish

$R_z = \frac{f^2}{8 \times r}$	$R_z$ : Surface finish (mm) $f$ : Feed rate (mm/rev) $r$ : Nose radius (mm)
--------------------------------	---

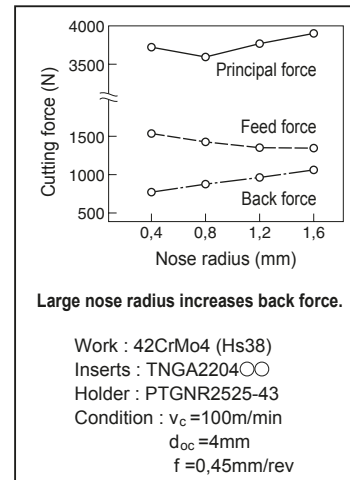
● Actual surface roughness

Steel : Theoretical surface finish x 1,5 ~ 3  
 Cast iron : Theoretical surface finish x 3 ~ 5

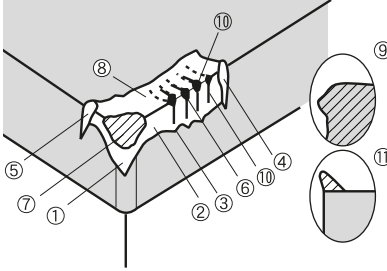
● Ways to Improve Surface Finish

- Use an insert with a larger nose radius.
- Optimize the cutting speed and feed rate so that built-up edge does not occur.
- Select an appropriate insert grade.
- Use wiper insert.

### Nose Radius and Cutting Force

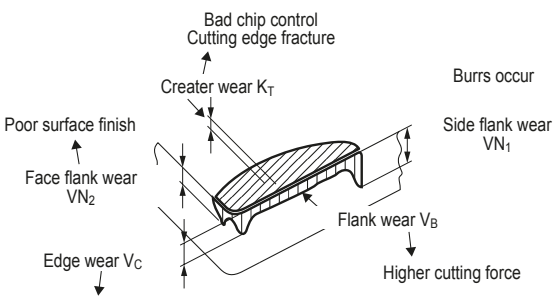


## Forms of Tool Failures

	Cat.	No.	Name of Failure	Cause of Failure
	Resulting from Mechanical causes	1-5	6	Flank Wear
		7	Chipping Fracture	Fine breakages caused by high cutting loads or chattering.
				Due to the impact of an excessive mechanical force acting on the cutting edge.
Resulting from Chemical reactions	8	8	Crater Wear	Swift chips removing tool material as it flow over the top face at high temperatures.
	9	9	Plastic Deformation	Cutting edge is depressed due to softening at high temperatures.
	10	10	Thermal Crack	Fatigue from rapid, repeated heating and cooling cycles during machining.
	11	11	Built-up Edge	Work material is pressure welded on the top face of the cutting edge.

## Tool Wear

### Forms of Tool Wear



Bad chip control  
Cutting edge fracture

Creater wear  $K_T$

Burs occur

Poor surface finish

Face flank wear  $V_{N2}$

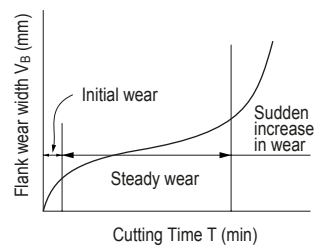
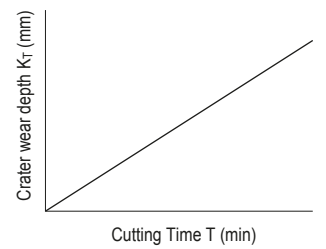
Side flank wear  $V_{N1}$

Edge wear  $V_c$

Flank wear  $V_B$

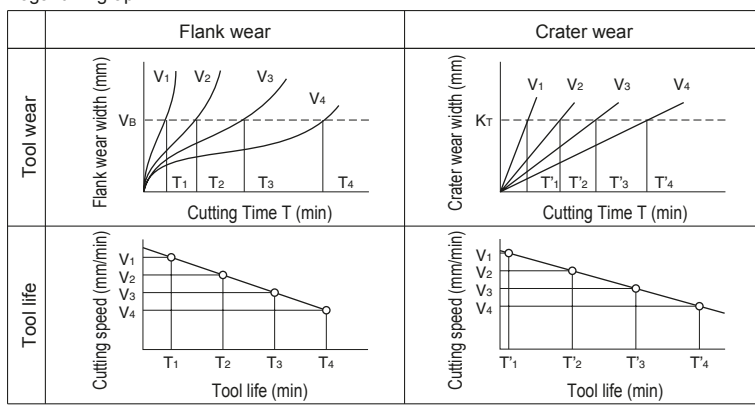
Higher cutting force

Poor machining accuracy  
Burs occur

Flank wear	Crater wear
	
<p>Wear is rapid initially, then it proceeds more gradually in proportion with cutting time until a certain limit, beyond which it increases rapidly again.</p>	<p>Crater wear is more progressive with no sudden breakdown pattern.</p>

## Tool Life (V-T)

Measure the relative tool lives of the specified wear, over a range of cutting speeds, then plot the tool life along the X-axis and the cutting speed along the Y-axis on a double logarithm graph.



# Technical Guidance

## Tool Failure and Remedies

### ■ Trouble Shooting Guide for Turning

	Damage	Cause	Countermeasures
Tool Edge Failure	<p>Excessive flank wear</p> 	<ul style="list-style-type: none"> <li>- Grade lacks wear resistance.</li> <li>- Cutting speed is too fast.</li> <li>- Feed rate is far too slow.</li> </ul>	<ul style="list-style-type: none"> <li>- Select a wear resistant grade. P30 ⇨ P20 ⇨ P10 K20 ⇨ K10 ⇨ K01</li> <li>- Use an insert with a larger rake angle.</li> <li>- Decrease the cutting speed.</li> <li>- Increase feed rates.</li> </ul>
	<p>Excessive crater wear</p> 	<ul style="list-style-type: none"> <li>- Grade lacks crater wear resistance.</li> <li>- Rake angle is too small.</li> <li>- Cutting speed is too fast.</li> <li>- Feed rate and depth of cut are too large.</li> </ul>	<ul style="list-style-type: none"> <li>- Select a more crater-resistant grade.</li> <li>- Use an insert with a larger rake angle.</li> <li>- Select an appropriate chipbreaker.</li> <li>- Decrease the cutting speed.</li> <li>- Decrease the D.O.C. and feed rate.</li> </ul>
	<p>Cutting edge chipping</p> 	<ul style="list-style-type: none"> <li>- Grade lacks toughness.</li> <li>- Insert falls off due to chip build-up.</li> <li>- Cutting edge lacks toughness.</li> <li>- Feed rate and depth of cut are too large.</li> </ul>	<ul style="list-style-type: none"> <li>- Change to tougher grades. P10 ⇨ P20 ⇨ P30 K01 ⇨ K10 ⇨ K20</li> <li>- Increase amount of honing on cutting edge.</li> <li>- Reduce rake angle.</li> <li>- Reduce feed rates and depth of cut.</li> </ul>
	<p>Cutting edge fracture</p> 	<ul style="list-style-type: none"> <li>- Grades lacks toughness.</li> <li>- Cutting edge lacks toughness.</li> <li>- Holder lacks toughness.</li> <li>- Feed rate is too fast.</li> <li>- Depth of cut is too large.</li> </ul>	<ul style="list-style-type: none"> <li>- Change to tougher grades. P10 ⇨ P20 ⇨ P30 K01 ⇨ K10 ⇨ K20</li> <li>- Select a chipbreaker with a strong cutting edge.</li> <li>- Select a holder with a larger approach angle.</li> <li>- Select a holder with a larger shank size.</li> <li>- Decrease the D.O.C. and feed rate.</li> </ul>
	<p>Build-up edge</p> 	<ul style="list-style-type: none"> <li>- Inappropriate grade selection.</li> <li>- Dull cutting edge.</li> <li>- Cutting speed is too slow.</li> <li>- Feed rate is too slow.</li> </ul>	<ul style="list-style-type: none"> <li>- Select a grade with less affinity to the work material. Coated carbide or cermet grades.</li> <li>- Select a grade with a smooth coating.</li> <li>- Use an insert with a larger rake angle.</li> <li>- Reduce amount of honing.</li> <li>- Increase cutting speeds.</li> <li>- Increase feed rates.</li> </ul>
	<p>Plastic deformation</p> 	<ul style="list-style-type: none"> <li>- Grade lacks thermal resistance.</li> <li>- Cutting speed is too fast.</li> <li>- Feed rate is too fast.</li> <li>- Depth of cut is too large.</li> <li>- Not enough cutting fluid.</li> </ul>	<ul style="list-style-type: none"> <li>- Select a more crater-wear-resistant grade.</li> <li>- Use an insert with a larger rake angle.</li> <li>- Decrease the cutting speed.</li> <li>- Reduce feed rates and depth of cut.</li> <li>- Supply a sufficient amount of coolant.</li> </ul>
	<p>Notch wear</p> 	<ul style="list-style-type: none"> <li>- Grade lacks wear resistance.</li> <li>- Rake angle is too small.</li> <li>- Cutting speed is too fast.</li> </ul>	<ul style="list-style-type: none"> <li>- Select a wear resistant grade. P30 ⇨ P20 ⇨ P10 K20 ⇨ K10 ⇨ K01</li> <li>- Use an insert with a larger rake angle.</li> <li>- Alter depth of cut to shift the notch location.</li> </ul>



## ■ Type of Chip Generation

	a	b	c	d
Shape				
Condition	Continuous chips with good surface finish.	Chip is sheared and separated by the shear angle.	Chips appear to be torn from the surface.	Chips crack before reaching the cutting point.
Application	Steel, Stainless steel	Steel, Stainless steel (Low speed)	Steel, Cast iron (Very low speed, very small feedrate)	Cast iron, Carbon
Influence factor	Easy ← Work deformation → Difficult Large ← Rake angle → Small Small ← D.O.C. → Large Fast ← Cutting speed → Slow			

## ■ Type of Chip Control

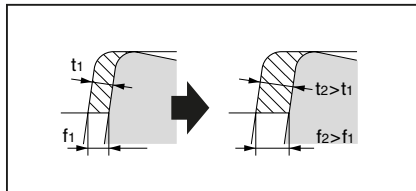
Feed rate	A	B	C	D	E
Large feed rate					
Small feed rate					
NC lathe (For automation)	×	×	○	○	△
General lathe (For safety)	×	○	○	○ ~ △	×

Good : C type, D type

- Poor
- A type : Twines around the tool or workpiece, damages the machined surface and affects safety.
  - B type : Bulky, causes problems in the automatic chip conveyor and chipping occurs easily.
  - E type : Causes spraying of chips, poor machined surface due to chattering, chipping, large cutting force and high temperatures.

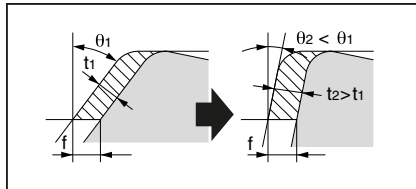
## ■ Factor of Improvement Chip Control

### ① Increase feed rate



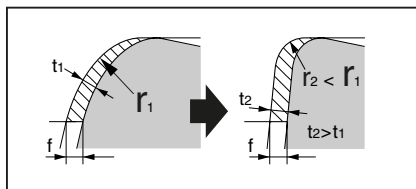
When feedrate increase, chips become thick and chip control improves.

### ② Decrease side cutting edge



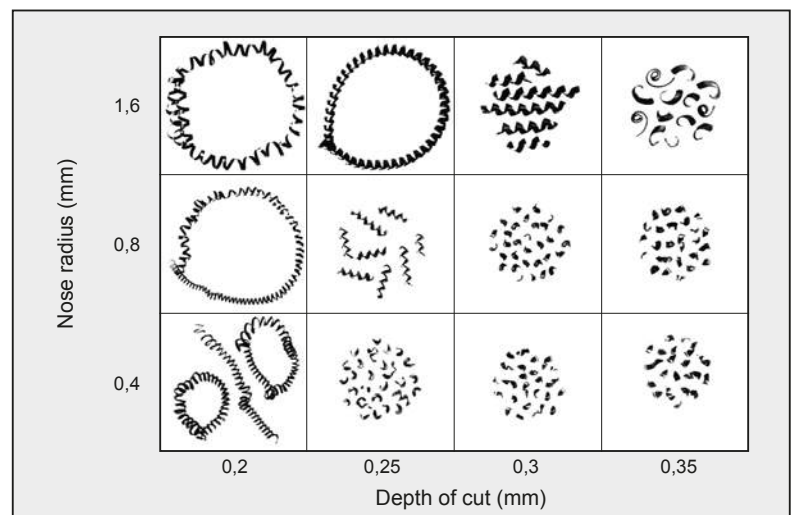
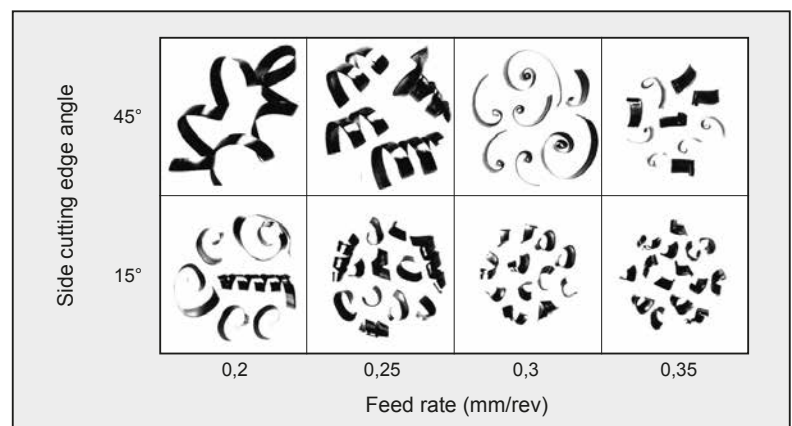
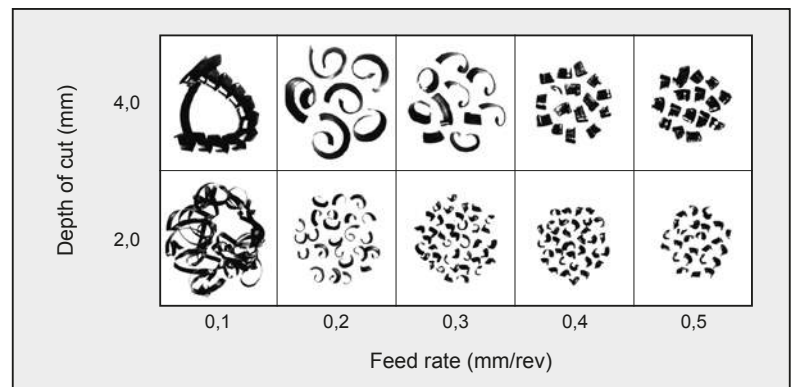
Even if feed rate is the same, smaller side cutting edge angle makes chips thick and chip control improves.

### ③ Decrease nose radius



Even if depth of cut is the same, smaller nose radius makes chip thick and chip control improves.

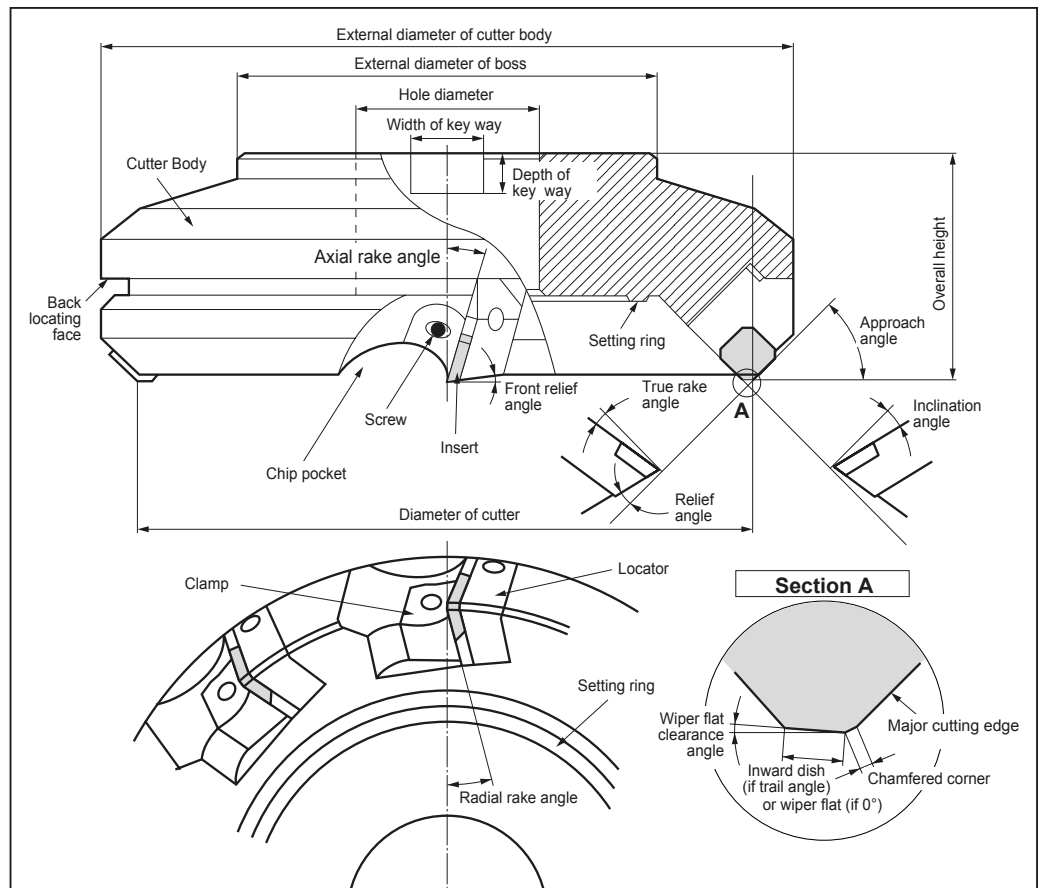
\* Cutting resistance increases in proportion with the width of the contact surface. Therefore, with a larger nose radius, cutting resistance and back force increases, chattering may also occur. However, with the same feedrate, a smaller nose radius would produce a poorer surface finish.



# Technical Guidance

## Basics of Milling

### Parts of a Milling Cutter



### Power Requirement

#### Calculating cutting force

$$P_c = \frac{d_{oc} \cdot w_{oc} \cdot v_f \cdot K_c}{60 \times 10^6 \times \eta} \text{ (kW)}$$

#### Horsepower

$$H = \frac{P_c}{0,75}$$

#### Chip removal amount

$$Q = \frac{d_{oc} \times w_{oc} \times v_f}{1.000} \text{ (cm}^3\text{/min)}$$

$P_c$  : Net power requirement (kW)

$H$  : Horsepower requirement (HP)

$Q$  : Chip removal amount (cm<sup>3</sup>/min)

$w_{oc}$  : Cutting width (mm)

$v_f$  : Feed speed (mm/min)

$d_{oc}$  : Depth of cut (mm)

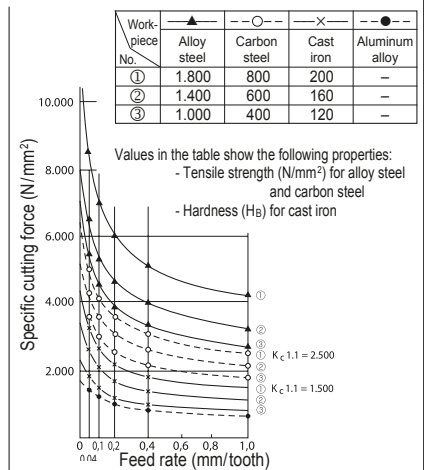
$\eta$  : Machine efficiency (0,70~0,85)

$K_c$  : Specific cutting force (N/mm<sup>2</sup>)

Eg. rough value

Steel : 2.500 ~ 3.000  
Cast iron : 1.500

#### Relation between feed rate, work material, specific cutting force



#### Calculating cutting speed

$$v_c = \frac{\pi \times D \times n}{1.000}$$

$v_c$  : Cutting speed (m/min)

$\pi \approx 3,14$

$D$  : Cutter diameter (mm)

$n$  : Rotation speed (rpm)

$v_f$  : Feed speed (mm/min)

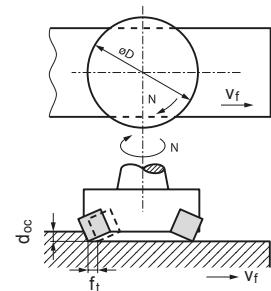
$f_t$  : Feed rate (mm/tooth)

$z$  : Number of teeth

#### Calculating feed rate

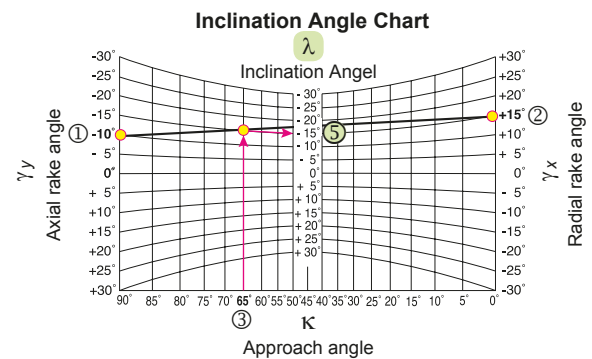
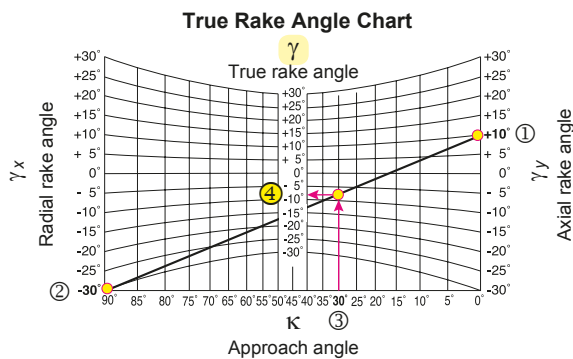
$$v_f = f_t \times z \times n$$

$$f_t = \frac{v_f}{z \times n}$$



## Functions of the Various Cutting Angles

	Description	Code	Functions	Influences
①	Axial rake angle	$\gamma_y$	Controls chip removal direction, effects adhesion of the chips and thrust force etc.	Rake angles can vary from positive to negative (large to small) with typical combinations of positive and negative, positive and positive or negative and negative configurations.
②	Radial rake angle	$\gamma_x$		
③	Approach angle	$\kappa$	Controls chip thickness and chip removal direction	The effect of the small approach angle is to reduce the chip thickness and cutting force.
④	True rake angle (Effective rake angle)	$\gamma$	Controls cutting performance and ability to retain a cutting edge	<ul style="list-style-type: none"> <li>- With a positive (large) angle, cutting ability and adhesion resistance are improved but the strength of the cutting edge is weakened.</li> <li>- With negative (small) angle, the strength of the cutting edge is improved but chips will tend to adhere more easily.</li> </ul>
⑤	Inclination angle	$\lambda$	Controls chip removal direction	- With a positive (large) angle, the chip removal is satisfactory with less cutting resistance but the strength of the corner is weaker.
⑥	Wiper flat clearance angle	$\alpha_f$	Controls surface finish	A smaller clearance angle will produce a better surface finish.
⑦	Clearance angle	$\alpha$	Controls edge strength, tool life and chattering, etc	



Example in using the above chart:	Solution:
① $\gamma_y$ : Axial rake angle = +10°	True rake angle
② $\gamma_x$ : Radial rake angle = -30°	④ $\gamma = -8^\circ$
③ $\kappa$ : Approach angle = 30°	

Formula :  $\tan \gamma = \tan \gamma_x \cdot \sin \kappa + \tan \gamma_y \cdot \cos \kappa$

Example in using the above chart :	Solution:
① $\gamma_y$ : Axial rake angle = -10°	Inclination angle
② $\gamma_x$ : Radial rake angle = +10°	⑤ $\lambda = -15^\circ$
③ $\kappa$ : Approach angle = 65°	

Formula :  $\tan \lambda = \tan \gamma_y \cdot \sin \kappa - \tan \gamma_x \cdot \cos \kappa$

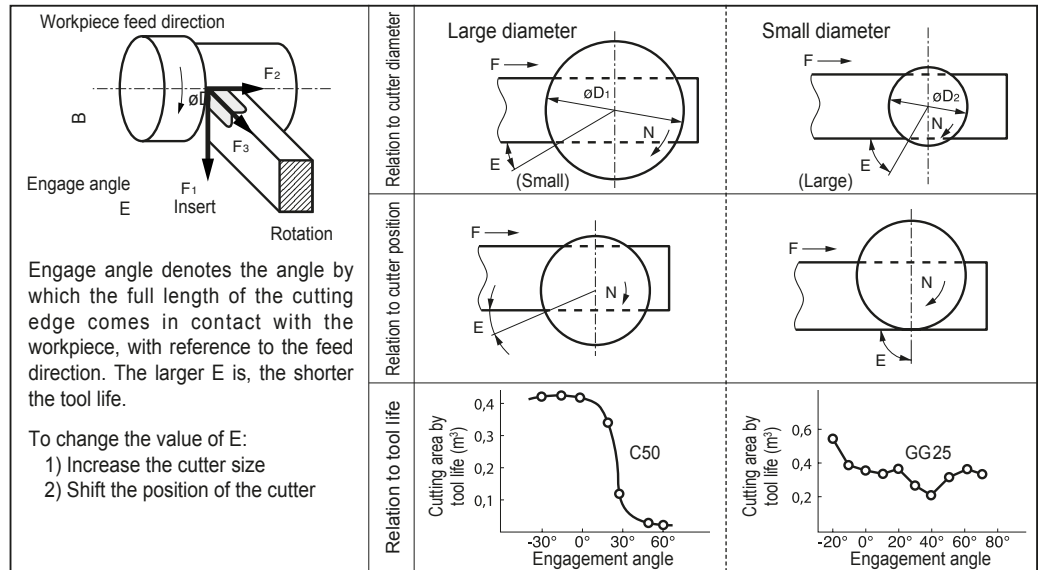
## Rake Angle Combination

	Negative - Positive Type	Double Positive Type	Double Negative Type
<p>The effects of the various angle configurations with relation to chip formation and chip removal.</p> <p>Chip removal direction</p> <p>Rotation</p>			
Advantage	Excellent chip removal and good cutting action	Good cutting action	Double-sided inserts can be use and higher cutting edge strength
Disadvantage	Only single-sided inserts can be use	Lower cutting edge strength and only single-sided inserts can be use	Dull cutting action
Application	For Steel, Cast iron, Stainless steel, Alloy steel	For general milling of steel For low rigidly work piece	For light milling of cast iron and steel
Typical cutter	WGX, WGC, UFO	DPG	DNX, DGC, DNF
Chips (Eg.) Workpiece: 37Cr4 $v_c = 130$ m/min $f_t = 0.23$ mm/tooth $d_{oc} = 3$ mm			

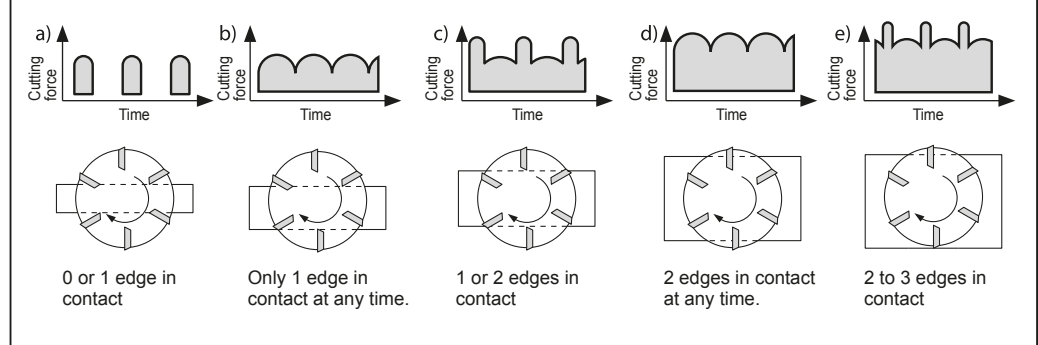
# Technical Guidance

## Basics of Milling

### Relation Between Engage Angle and Tool Life



### Relation between the number of simultaneously engaged cutting edges and cutting force:



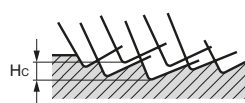
### To Improve Surface Roughness

#### ① Milling inserts with wiper flat

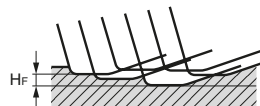
When all the cutting edges have wiper flats, a few teeth are intentionally elevated to play the role of a wiper insert.

- Insert equipped with straight wiper flat (Face angle: Approx  $15^\circ - 1^\circ$ )
- Insert equipped with curved wiper flat (Eg. curvature R500)

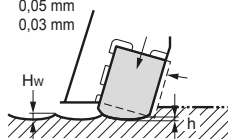
#### ● Surface roughness without wiper flat



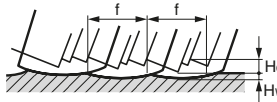
#### ● Surface roughness with straight wiper flat



h : Projected value of wiper insert  
 Steels : 0,05 mm  
 Al : 0,03 mm

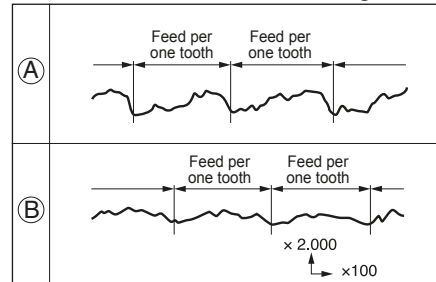


f : Feed rate per revolution



Hc : Surface roughness with only normal teeth  
 Hw : Surface roughness with wiper insert

#### ● Influence of different face angles on surface finish



- Workpiece: 34CrMo4  
 - Cutter: DPG 5160 R (Single tooth)

-  $v_c = 154$  m/min  
 $f_t = 0,234$  mm/tooth  
 $d_{oc} = 2$  mm

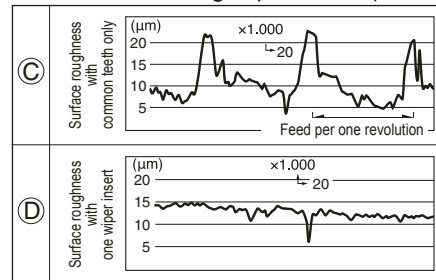
- Face angle  
 (A) :  $28^\circ$   
 (B) :  $6^\circ$

#### ② Integral wiper insert system

A system to protrude one or two inserts (wiper insert) with a smooth curved edge just a little beyond the other teeth to wipe the milled surface.

- (Applies to WGC, RF types etc.)

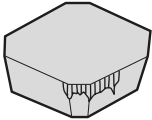
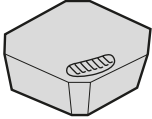
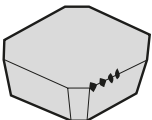
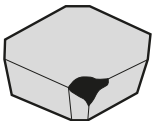
#### ● Effects of having wiper insert (example)



- Workpiece: GG25  
 - Cutter: DPG 4100 R  
 - Insert: SPKN 1203  
 - Axial run-out: 0,015 mm  
 - Radial run-out: 0,04 mm

-  $v_c = 105$  m/min  
 $f_t = 0,29$  mm/tooth (1,45 mm/rev)  
 (C) : Only normal teeth  
 (D) : with 1 wiper insert

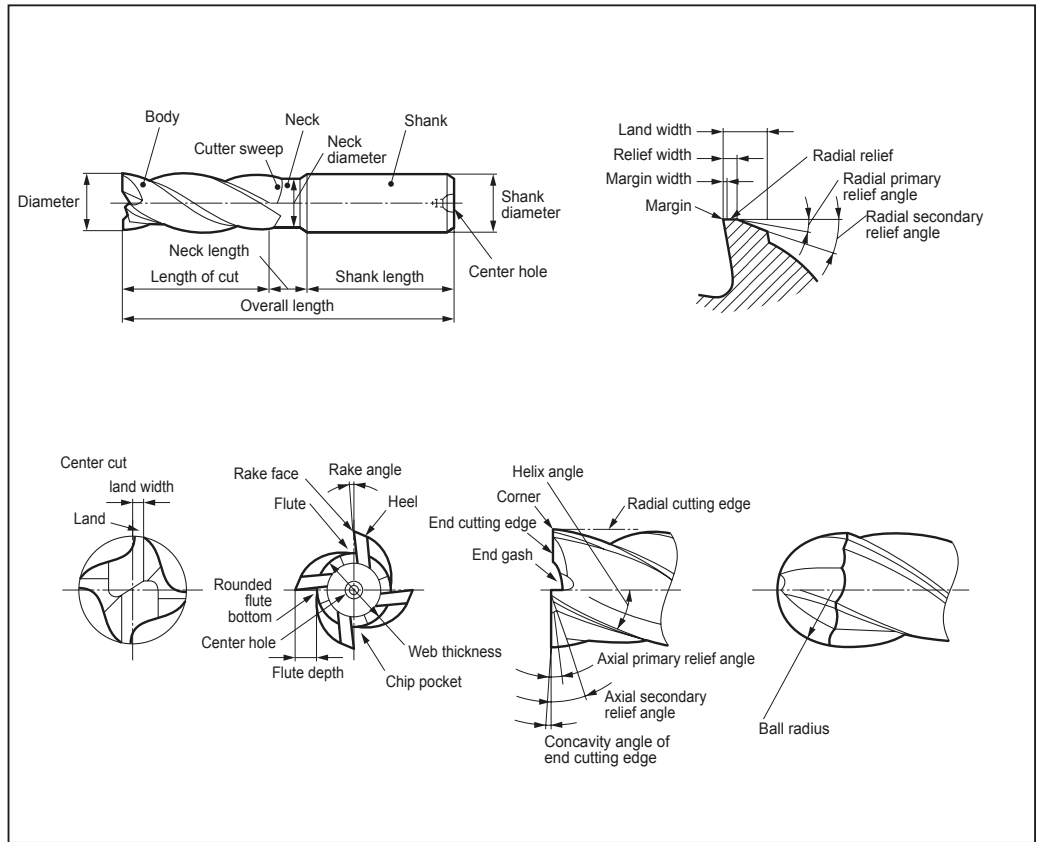
### ■ Trouble Shooting Guide for Milling

Trouble		Basic Remedies		Remedy Examples															
Cutting Edge Failure	Excessive Flank Wear 	Tool Material	<ul style="list-style-type: none"> <li>Select a more wear resistant grade. Carbide</li> <li>P30 ⇨ P20 ⇨ P30</li> <li>K20 ⇨ K10 ⇨ K10</li> <li>Coated Cermet</li> </ul>	<ul style="list-style-type: none"> <li>Recommended insert grades</li> </ul> <table border="1"> <thead> <tr> <th></th> <th>Steel</th> <th>Cast Iron</th> <th>Non-Ferrous Alloy</th> </tr> </thead> <tbody> <tr> <td>Finishing</td> <td>T250A (Cermet)</td> <td>ACK200 (Coated Carbide) BN700 (SUMIBORON)</td> <td>DA1000 (SUMIDIA)</td> </tr> <tr> <td>Roughing</td> <td>ACP100 (Coated Carbide)</td> <td>ACK200 (Coated Carbide)</td> <td>DL1000 (Coated Carbide)</td> </tr> </tbody> </table>					Steel	Cast Iron	Non-Ferrous Alloy	Finishing	T250A (Cermet)	ACK200 (Coated Carbide) BN700 (SUMIBORON)	DA1000 (SUMIDIA)	Roughing	ACP100 (Coated Carbide)	ACK200 (Coated Carbide)	DL1000 (Coated Carbide)
		Steel	Cast Iron	Non-Ferrous Alloy															
	Finishing	T250A (Cermet)	ACK200 (Coated Carbide) BN700 (SUMIBORON)	DA1000 (SUMIDIA)															
	Roughing	ACP100 (Coated Carbide)	ACK200 (Coated Carbide)	DL1000 (Coated Carbide)															
Excessive Crater Wear 	Tool Material	<ul style="list-style-type: none"> <li>Select a crater resistant grade.</li> </ul>	<ul style="list-style-type: none"> <li>Recommended insert grades</li> </ul> <table border="1"> <thead> <tr> <th></th> <th>Steel</th> <th>Cast Iron</th> <th>Non-Ferrous Alloy</th> </tr> </thead> <tbody> <tr> <td>Finishing</td> <td>T250A (Cermet)</td> <td>ACK200 (Coated Carbide)</td> <td>DA1000 (SUMIDIA)</td> </tr> <tr> <td>Roughing</td> <td>ACP100 (Coated Carbide)</td> <td>ACK200 (Coated Carbide)</td> <td>DL1000 (Coated Carbide)</td> </tr> </tbody> </table>					Steel	Cast Iron	Non-Ferrous Alloy	Finishing	T250A (Cermet)	ACK200 (Coated Carbide)	DA1000 (SUMIDIA)	Roughing	ACP100 (Coated Carbide)	ACK200 (Coated Carbide)	DL1000 (Coated Carbide)	
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Roughing	ACP100 (Coated Carbide)	ACK200 (Coated Carbide)	DL1000 (Coated Carbide)																
Cutting Edge Chipping 	Tool Material	<ul style="list-style-type: none"> <li>Select tougher grade. P10 ⇨ P20 ⇨ P30</li> <li>K01 ⇨ K10 ⇨ K20</li> </ul>	<ul style="list-style-type: none"> <li>Recommended insert grades</li> </ul> <table border="1"> <thead> <tr> <th></th> <th>Steel</th> <th>Cast Iron</th> </tr> </thead> <tbody> <tr> <td>Finishing</td> <td>ACP200 (Coated Carbide)</td> <td>ACK200 (Coated Carbide)</td> </tr> <tr> <td>Roughing</td> <td>ACP300 (Coated Carbide)</td> <td>ACK300 (Coated Carbide)</td> </tr> </tbody> </table>					Steel	Cast Iron	Finishing	ACP200 (Coated Carbide)	ACK200 (Coated Carbide)	Roughing	ACP300 (Coated Carbide)	ACK300 (Coated Carbide)				
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Finishing	ACP200 (Coated Carbide)	ACK200 (Coated Carbide)																	
Roughing	ACP300 (Coated Carbide)	ACK300 (Coated Carbide)																	
Partial Fracture of Cutting Edges 	Tool Material	<ul style="list-style-type: none"> <li>If it is due to excessive low speeds or very low feed rates, select an adhesion resistant grade.</li> <li>If it is due to thermal cracking, select a thermal impact resistant grade.</li> </ul>	<ul style="list-style-type: none"> <li>Recommended insert grades</li> </ul> <table border="1"> <thead> <tr> <th></th> <th>Steel</th> <th>Cast Iron</th> </tr> </thead> <tbody> <tr> <td>Roughing</td> <td>ACP300 (Coated Carbide)</td> <td>ACK300 (Coated Carbide)</td> </tr> </tbody> </table>					Steel	Cast Iron	Roughing	ACP300 (Coated Carbide)	ACK300 (Coated Carbide)							
	Steel	Cast Iron																	
Roughing	ACP300 (Coated Carbide)	ACK300 (Coated Carbide)																	
Others	Unsatisfactory Machined Surface Finish	Tool Material	<ul style="list-style-type: none"> <li>Select an adhesion resistant grade. Carbide → Cermet</li> </ul>	<ul style="list-style-type: none"> <li>Recommended insert grades</li> </ul> <table border="1"> <thead> <tr> <th></th> <th>Steel</th> <th>Cast Iron</th> <th>Non-Ferrous Alloy</th> </tr> </thead> <tbody> <tr> <td>Roughing</td> <td>WGX type* ACP200 (Coated Carbide)</td> <td>DGC type* ACK200 (Coated Carbide)</td> <td>FF type* H1 (Carbide) DL1000 (Coated Carbide)</td> </tr> <tr> <td>Finishing</td> <td>WGC type T250A (Cermet)</td> <td>FMU type BN700 (SUMIBORON)</td> <td>RF type DA1000 (SUMIDIA)</td> </tr> </tbody> </table>					Steel	Cast Iron	Non-Ferrous Alloy	Roughing	WGX type* ACP200 (Coated Carbide)	DGC type* ACK200 (Coated Carbide)	FF type* H1 (Carbide) DL1000 (Coated Carbide)	Finishing	WGC type T250A (Cermet)	FMU type BN700 (SUMIBORON)	RF type DA1000 (SUMIDIA)
		Steel	Cast Iron	Non-Ferrous Alloy															
	Roughing	WGX type* ACP200 (Coated Carbide)	DGC type* ACK200 (Coated Carbide)	FF type* H1 (Carbide) DL1000 (Coated Carbide)															
	Finishing	WGC type T250A (Cermet)	FMU type BN700 (SUMIBORON)	RF type DA1000 (SUMIDIA)															
	Chattering	Cutting Conditions	<ul style="list-style-type: none"> <li>Increase cutting speeds.</li> </ul>	<ul style="list-style-type: none"> <li>Recommended cutters:</li> </ul> <p>For steel: WaveMill WGX type For cast iron: DNX type For Non-ferrous alloy: High speed cutter for aluminium RF type</p>															
Unsatisfactory Chip Control	Tool Design	<ul style="list-style-type: none"> <li>Improve axial run-out of cutting edges. (Use a cutter with less run-out) (Attach correct inserts)</li> <li>Use wiper inserts.</li> <li>Use special purpose cutters designed for finishing.</li> </ul>	<ul style="list-style-type: none"> <li>Recommended cutter: WaveMill WGX type</li> </ul>																
Edge Chipping on Workpiece	Tool Design	<ul style="list-style-type: none"> <li>Select a large approach angle.</li> <li>Select a sharp cutting edge insert (G → L).</li> <li>Reduce feed rates.</li> </ul>	<ul style="list-style-type: none"> <li>Recommended cutter: WaveMill WGX type</li> </ul>																
Burr on Workpiece	Tool Design	<ul style="list-style-type: none"> <li>Select a cutter with sharp cutting edges.</li> <li>Increase feed rates.</li> </ul>	<ul style="list-style-type: none"> <li>Recommended cutter: WaveMill WGX type + FG breaker DGC type + FG breaker</li> </ul>																

# Technical Guidance

## Basics of Endmilling

### Parts of an Endmill



### Calculating Cutting Conditions

#### ● Cutting speed

$$v_c = \frac{\pi \cdot D \cdot n}{1.000} \quad n = \frac{1.000 \cdot v_c}{\pi \cdot D}$$

#### ● Feed rate

$$v_f = f \times n$$

$$v_f = f_t \times z \times n \quad f_t = \frac{v_f}{z \times n}$$

#### ● Depth of cut (D.O.C)

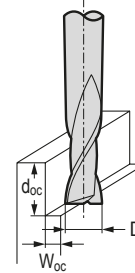
$d_{oc}$  : Axial D.O.C. (depth)  
 $w_{oc}$  : Radial D.O.C. (width)

#### ● Notch width ( $D_1$ )

$$D_1 = 2 \times \sqrt{2 \times R \times d_{oc} - d_{oc}^2}$$

#### ● Cutting speed and feedrate are calculated using the same formula as square endmill.

Side milling



$v_c$  : Cutting speed (m/min)

$\pi \approx 3,14$

$D$  : Endmill diameter (mm)

$n$  : Rotational speed ( $\text{min}^{-1}$ )

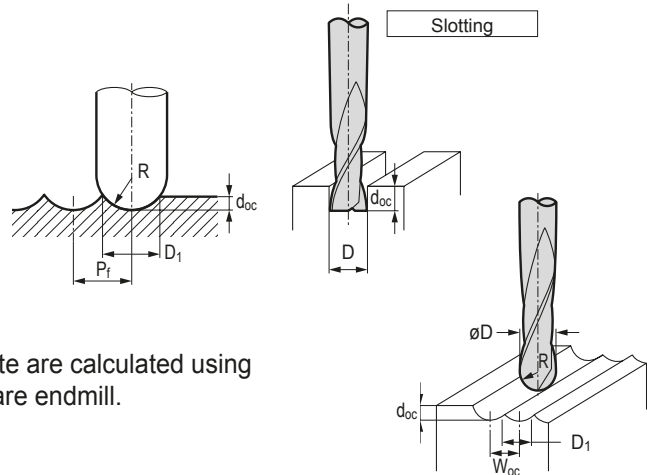
$v_f$  : Feed speed (mm/min)

$f_r$  : Feed rate per revolution (mm/rev)

$f_t$  : Feed rate per tooth (mm/tooth)

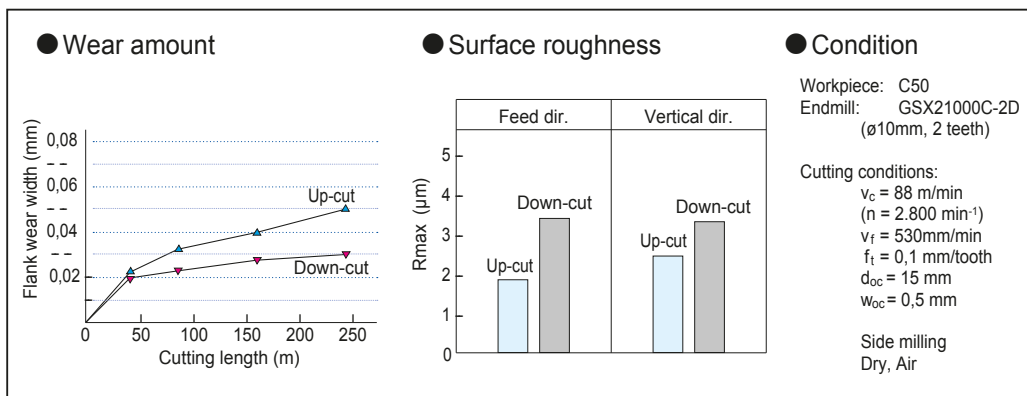
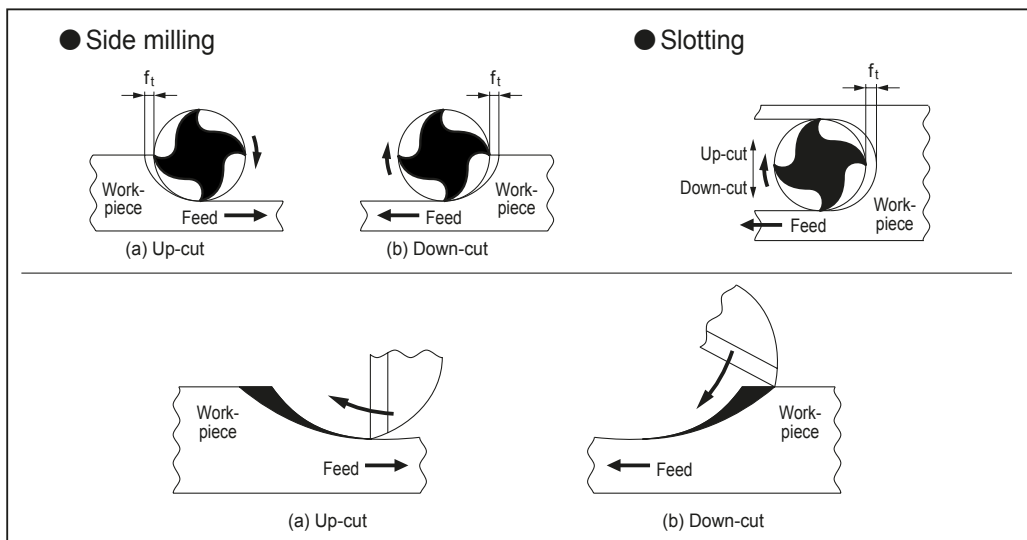
$z$  : Number of teeth

Slotting



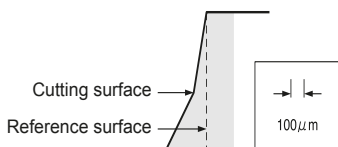
(Ball Endmill)

### Up-cut and Down-cut



### Relation Between Cutting Condition and Deflection

Endmill			Side milling		Slotting					
			Work material: Pre-hardened steel (40HRC) Cutting data: $v_c = 25 \text{ m/min}$ $d_{oc} = 12 \text{ mm}$ $W_{oc} = 0,8 \text{ mm}$		Work material: Pre-hardened steel (40HRC) Cutting data: $v_c = 25 \text{ m/min}$ $d_{oc} = 8 \text{ mm}$ $W_{oc} = 8 \text{ mm}$		Up-cut side	Down-cut side	Down-cut side	Up-cut side
Cat. No.	Number of teeth	Helix angle	Feed rate		Feed rate		Feed rate		Feed rate	
			0,16 mm/rev		0,11 mm/rev		0,05 mm/rev		0,03 mm/rev	
			Style		Style		Style		Style	
			Up-cut	Down-cut	Up-cut	Down-cut	Up-cut	Down-cut	Up-cut	Down-cut
SSM 2080	2	30°								
SSM 4080	4	30°								



# Technical Guidance

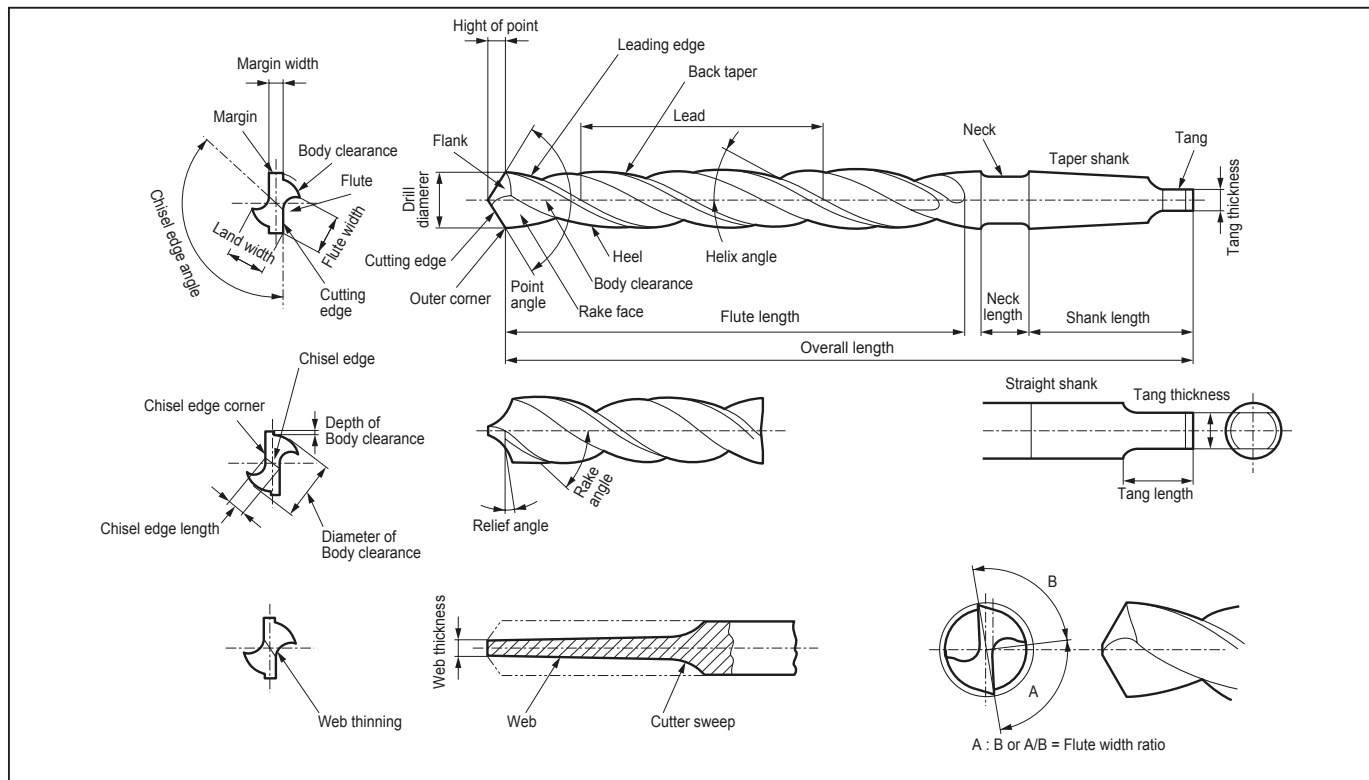
## Tool Failure and Remedies

### ■ Trouble Shooting Guide for Endmilling

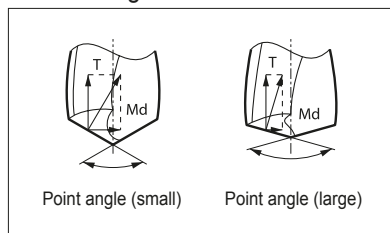
Failure		Cause		Remedies
Cutting Edge Failure	Excessive Wear	Cutting Conditions Tool Shape Tool Material	<ul style="list-style-type: none"> <li>- Cutting speed is too fast</li> <li>- Feed rate is too fast</li> <li>- The flank relief angle ist too small</li> <li>- Insufficient wear resistance</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease cutting speed and feed rate.</li> <li>- Change to an appropriate flank relief angle.</li> <li>- Select a substrate with more wear resistance</li> <li>- Use a coated tool</li> </ul>
	Chipping	Cutting Conditions Machine Area	<ul style="list-style-type: none"> <li>- Feed rate ist too fast</li> <li>- Cutting depth is too deep</li> <li>- Tool overhang ist too long</li> <li>- Work clamps are weak</li> <li>- Tool is not firmly attached</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease cutting speed.</li> <li>- Reduce depth of cut</li> <li>- Adjust tool overhang for correct length</li> <li>- Clamp the work piece firmly</li> <li>- Make sure the tool is seated in the chuck properly</li> </ul>
	Tool Fracture	Cutting Conditions	<ul style="list-style-type: none"> <li>- Feed rate ist too fast</li> <li>- Cutting depth is too deep</li> <li>- Tool overhang ist too long</li> <li>- Cutting edge is too long</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease cutting speed.</li> <li>- Reduce depth of cut</li> <li>- Reduce tool overhang as much as possible</li> <li>- Select a tool with a shorter cutting edge</li> </ul>
Others	Shoulder Deflection	Cutting Conditions Tool Shape	<ul style="list-style-type: none"> <li>- Feed rate is too fast</li> <li>- Cutting depth is too deep</li> <li>- Tool overhang is too long</li> <li>- Cutting on the down-cut</li> <li>- Helix angle is large</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease cutting speed.</li> <li>- Reduce depth of cut</li> <li>- Adjust tool overhang for correct length</li> <li>- Change directions to up-cut</li> <li>- Use a tool with a smaller helix angle</li> </ul>
	Unsatisfactory Machined Surface Finish	Cutting Conditions	<ul style="list-style-type: none"> <li>- Feed rate is too fast</li> <li>- Packing of chips</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease cutting speed.</li> <li>- Use air blow</li> <li>- Use an insert with a larger relief pocket.</li> </ul>
	Chattering	Cutting Conditions Tool Shape Machine Area	<ul style="list-style-type: none"> <li>- Cutting speed is too fast</li> <li>- Cutting on the up-cut</li> <li>- Tool overhang is too long</li> <li>- Rake angle is large</li> <li>- Work clamps are weak</li> <li>- Tool is not firmly attached</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease cutting speed.</li> <li>- Change directions to down-cut</li> <li>- Adjust tool overhang for correct length</li> <li>- Use a tool with an appropriate rake angle</li> <li>- Clamp the work piece firmly</li> <li>- Make sure the tool is seated in the chuck properly</li> </ul>
	Packing of Chip	Cutting Conditions Tool Shape	<ul style="list-style-type: none"> <li>- Feed rate is too fast</li> <li>- Cutting depth is too deep</li> <li>- Too many teeth</li> <li>- Packing of chips</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease cutting speed.</li> <li>- Reduce depth of cut</li> <li>- Reduce number of teeth</li> <li>- Use air blow</li> </ul>



## Parts of a Drill

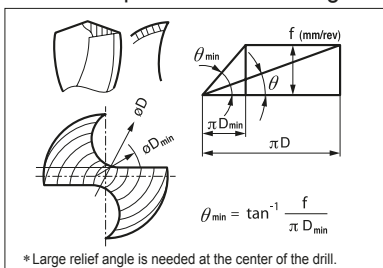


### Point Angle and Force

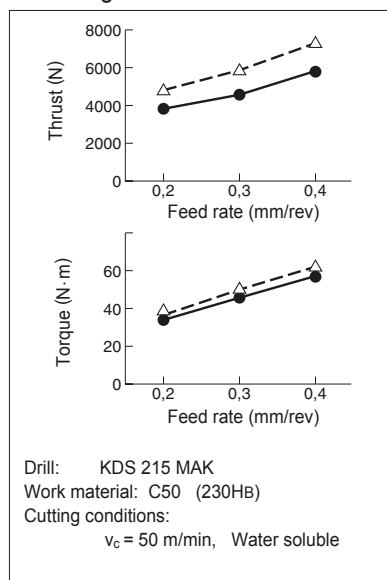


When point angle is large, thrust becomes large but torque becomes small.

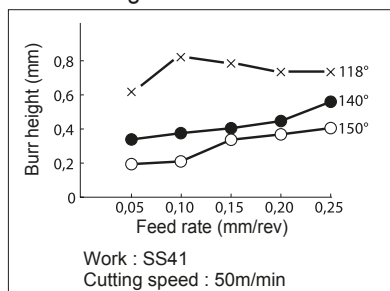
### Min. Requirement Relief Angle



### Width of Edge Treatment and Cutting Force

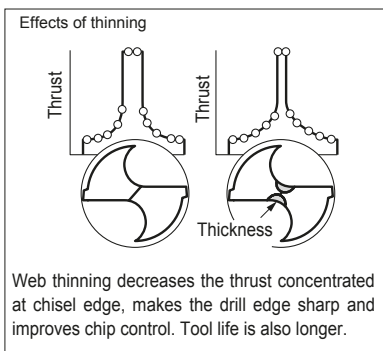


### Point Angle and Burr

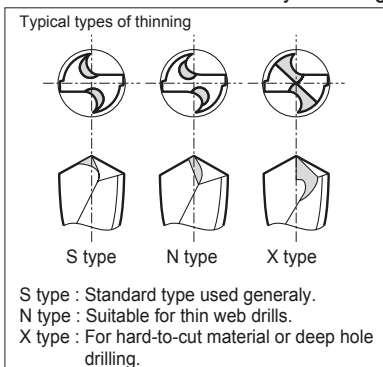


When point angle is large, burr height becomes low.

### Web Thickness and Thrust



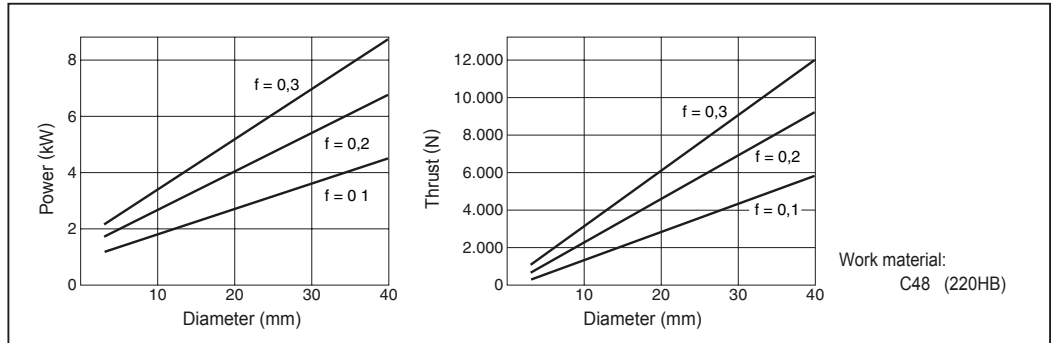
### Decrease Chisel Width by Thinning



# Technical Guidance

## Basics of Drilling

### Reference of Power Requirement and Thrust



### Cutting Condition Selection

- Control cutting force for low rigid machine

The following table shows the relation between edge treatment width and cutting force. If a problem caused by cutting force occurs, reduce either the feedrate or the edge treatment width.

Condition		Edge treatment width			
		0,15mm		0,05mm	
$V_c$ (m/min)	$f$ (mm/rev)	Torque (N·m)	Thrust (N)	Torque (N·m)	Thrust (N)
40	0,38	12,8	2820	12,0	2520
50	0,30	10,8	2520	9,4	1920
60	0,25	9,2	2320	7,6	1640
60	0,15	6,4	1640	5,2	1.100

Drill :  $\phi 10$   
Work material:  
C50 (230HB)

- High speed machining recommendation

When there is surplus capacity with enough machine power and rigidity drilling at normal recommended cutting conditions, we recommend higher drilling speeds.

Wear example

$V_c=60\text{m/min}$

$V_c=120\text{m/min}$

Work material: C50 (230HB)  
Cutting data:  $f = 0,3$  mm/rev  
 $d_{oc} = 50\text{mm}$   
Tool life: 600 holes (Cutting length : 30m)

### Explanation of Margins (Difference between single and double margins)

● Single Margin (2 guides: circled parts)

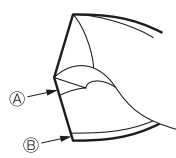
● Shape used on most drills

● D Double Margin (4 guides: circled parts)

● 4-point guiding reduces hole bending and undulation for improved stability and accuracy during deep hole drilling.

### Run-out Accuracy

Run-out of the lip height B and thinning point A are important.



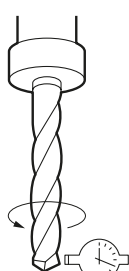
Ⓐ : The run-out accuracy of thinning point  
Ⓑ : The difference of lip height

Hole expansion (mm)	
Ⓐ	0,005    0,02    0,05    0,1
Ⓑ	0,005    0,02    0,1    0,05    0,02    0,1

MDS 140 MK  
50C  
vc = 50m/min  
f = 0,3mm/rev

### Peripheral Run-out Accuracy when Tool Rotates

Drill run-out when mounted on the machine spindle must be within 0,03mm. If the run-out is large, the drilled hole will also be large causing an increase in the horizontal cutting force, which may result in drill breakage if the machine or work clamping is not rigid.



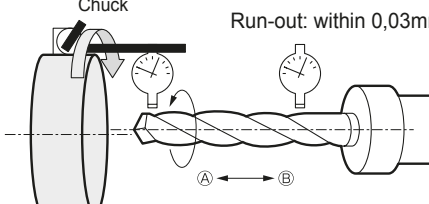
Run-out: within 0,03mm

Peripheral run-out (mm)	Hole expansion (mm)	Horizontal cutting force (kg)
0,005	0    0,05	0    10
0,09	0,05    0,1	10    10

Drill: MDS120MK  
Work material: C50 (230HB)  
Cutting data:  $v_c=50$  m/min,  $f=0,3$  mm/rev,  $d_{oc}=38$ mm  
Water soluble

### Peripheral Run-out Accuracy when Workpiece Rotates

When use on a lathe, run-out at point A must be within 0,03mm, this value must be similar when taken at position B.

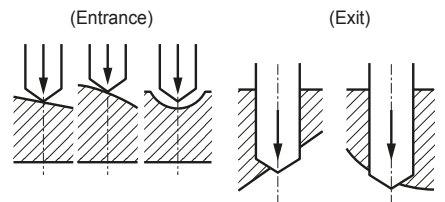


Run-out: within 0,03mm

### Influence of Workpiece Surface

● Workpiece with slanted or uneven surface

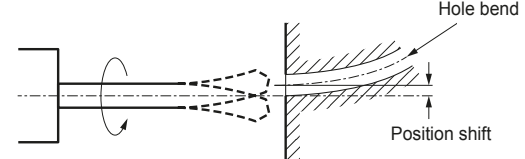
If the surface of the hole entrance or exit is slanted or uneven, decrease the feedrate to 0,1~0,15mm/rev at these points.



### How to Use Long Drill

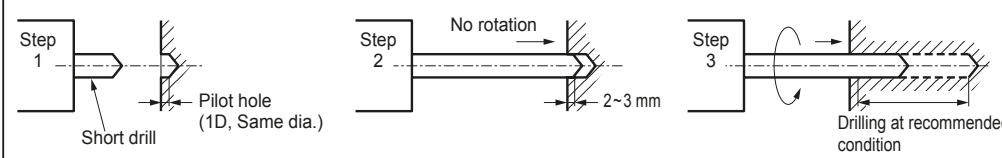
● Problem

When using a long drill (e.g. XHGS type and XHT type), DAK type or SMDH-D type drills at high rotational speeds, the run-out of the drill tip may cause a position shift at the entry point making the drill hole bent and resulting in drill breakage.

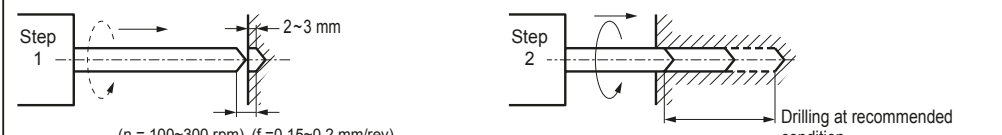


● Remedies

Method 1.



Method 2. Low rotational speed minimizes centrifugal forces and prevents drill bending.



(n = 100~300 rpm) (f = 0,15~0,2 mm/rev)

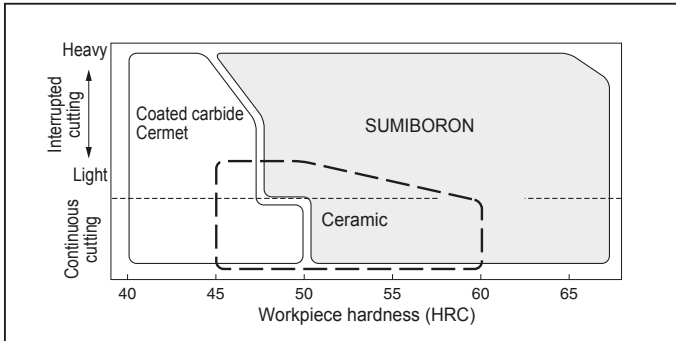
# Technical Guidance

## Tool Failure and Remedies

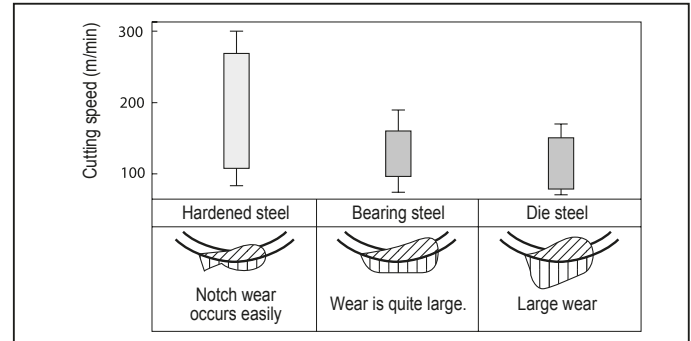
### ■ Trouble Shooting Guide for Drilling

Failure		Basic Remedies		Remedies Examples
Drill Failure	Excessive Wear on Cutting Edge	Cutting Conditions Cutting Fluid	- Use higher cutting speeds. - Increase feed rates. - Reduce pressure if using internal coolant. - Use cutting fluid with more lubricity.	- Vc=80~100m/min - Refer to recommended cutting conditions listed in the general catalogue. - Below 1,5MPa.
	Chisel Point Chipping	Tool Design Cutting Conditions Others	- Increase size of chisel width. - Increase amount of honing on cutting edge. - Reduce depth-of cut. - Reduce feed rate at entry point. - Improve workpiece clamping rigidity.	- f = 0,05~0,1 mm/rev .
	Chipping on Peripheral Cutting Edge	Tool Design Cutting Conditions Cutting Fluid Others	- Increase amount of honing on cutting edge. - Reduce the amount of front flank angle. - Reduce cutting speeds. - Increase feed rates. - Use cutting fluid with more lubricity. - Improve workpiece clamp rigidity.	- Refer to recommended cutting conditions listed in the general catalogue.
	Margin Wear	Tool Design Cutting Conditions Cutting Fluid Others	- Increase amount of back taper. - Reduce margin width. - Reduce cutting speeds. - Increase feed rates. - Use cutting fluid with more lubricity. - Schedule for earlier regrind.	- Refer to recommended cutting conditions listed in the general catalogue.
	Drill Breakage	Tool Design Cutting Conditions Cutting Fluid Others	- Increase amount of back taper. - Reduce margin width. - Reduce cutting speeds. - Use cutting fluid with more lubricity. - Improve workpiece clamp rigidity.	- Refer to recommended cutting conditions listed in the general catalogue.
Unsatisfactory Hole Accuracy	Oversized Holes	Tool Design Cutting Conditions Cutting Fluid Others	- Improve overall drill rigidity. (large web, small flute). - Reduce drill point angle. - Reduce feed rate at entry phase. - Reduce cutting speeds. - Improve workpiece clamp rigidity. - Improve drill clamp precision. - Improve drill clamp rigidity.	- 130°~120° - f = 0,05~0,1 mm/rev - Refer to recommended cutting conditions listed in the general catalogue. - Drill run-out below 0,02mm
	Poor Surface Finish	Tool Design Cutting Conditions Cutting Fluid	- Increase amount of back taper. - Increase cutting speeds. - Use cutting fluid with more lubricity.	- Refer to recommended cutting conditions listed in the general catalogue.
	Holes are Not Straight	Tool Design Cutting Conditions Others	- Reduce amount of edge honing. - Reduce feedrates. - Improve workpiece clamp rigidity. - Improve drill clamp precision. - Improve drill clamp rigidity.	- Refer to recommended cutting conditions listed in the general catalogue. - Drill run-out below 0,02mm
Unsatisfactory Chip Control	Packing of Chips	Cutting Conditions Cutting Fluid	- Increase cutting speeds. - Increase feed rates. - Reduce pressure if using internal coolant.	- Refer to recommended cutting conditions listed in the general catalogue. - Below 1,5MPa.
	Long Stringy Chips	Tool Design Cutting Conditions Cutting Fluid	- Reduce amount of edge honing. - Increase feed rates. - Reduce pressure if using internal coolant.	- Refer to recommended cutting conditions listed in the general catalogue. - Below 1,5MPa.

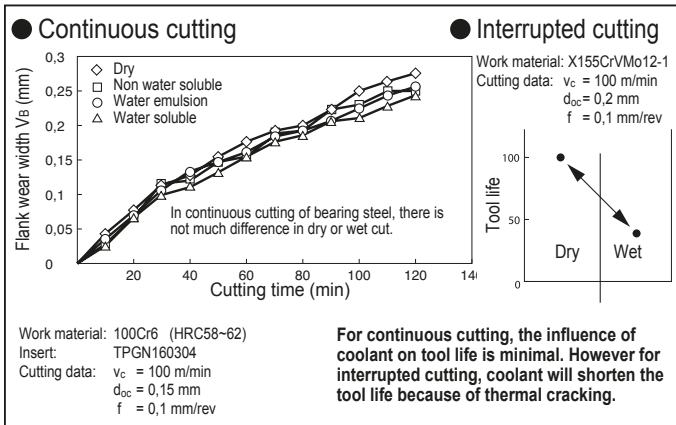
## Application Map of the Various Tool Materials



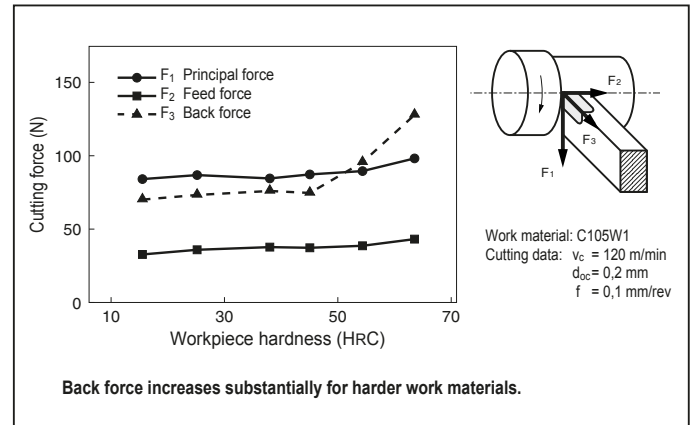
## Work Materials and Cutting Speed Recommendations



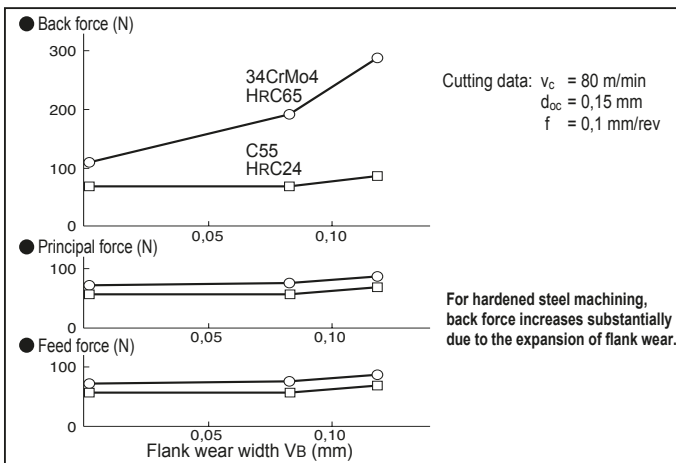
## Influence of Coolant on Tool Life



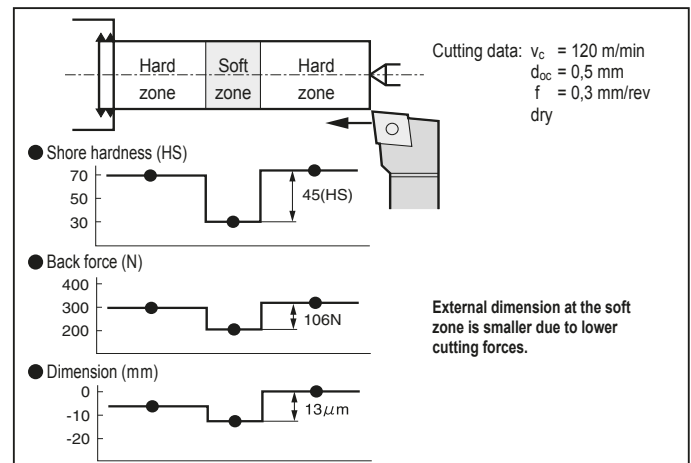
## Relation Workpiece Hardness and Cutting Forces



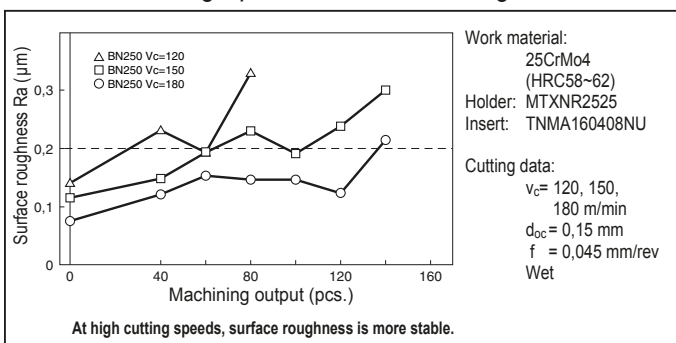
## Relation between Flank Wear and Cutting Force



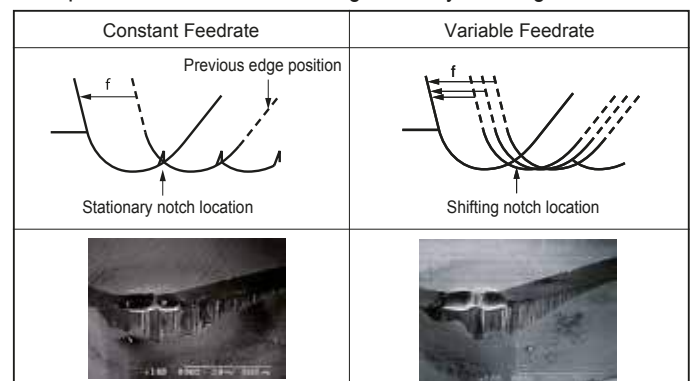
## Workpiece Hardness on Cutting Force and Accuracy



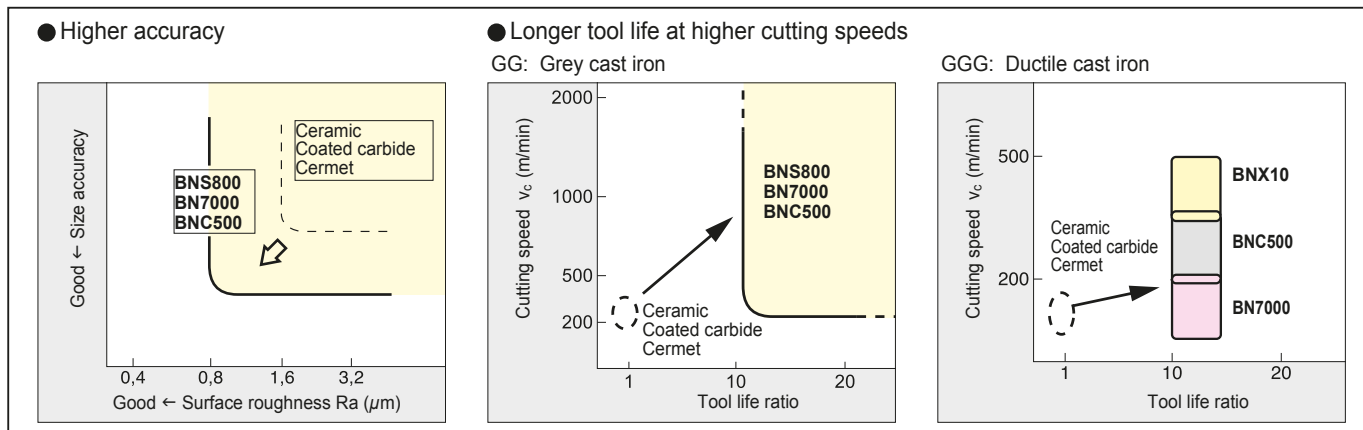
## Relation Cutting Speed and Surface Roughness



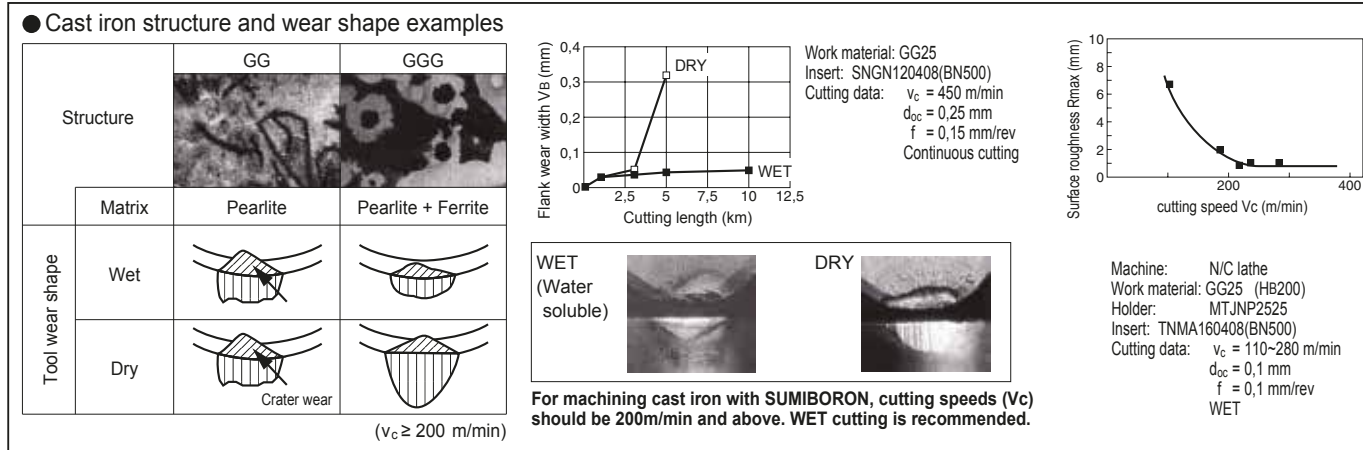
## Improvement of Surface Roughness by Altering the Feedrate



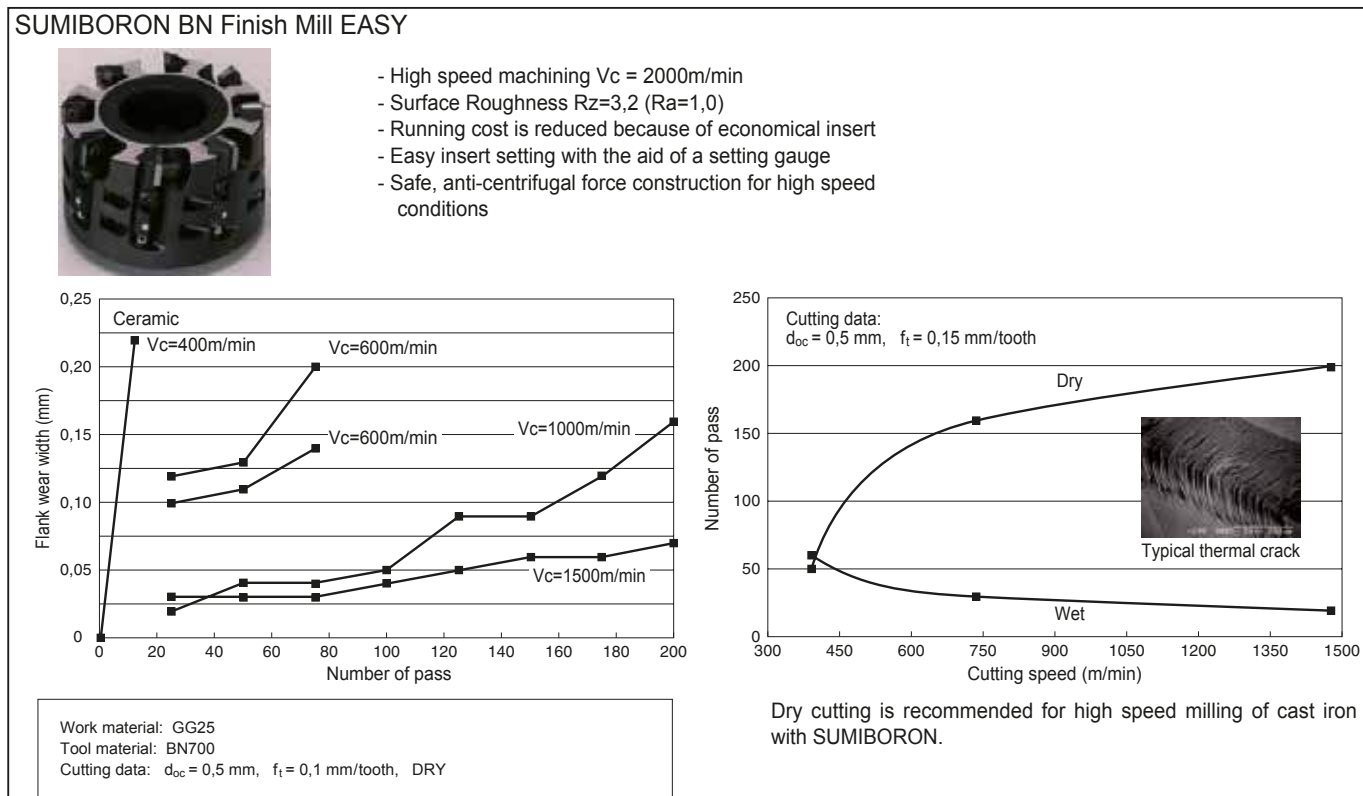
## Advantages of Using SUMIBORON for Cast Iron Machining



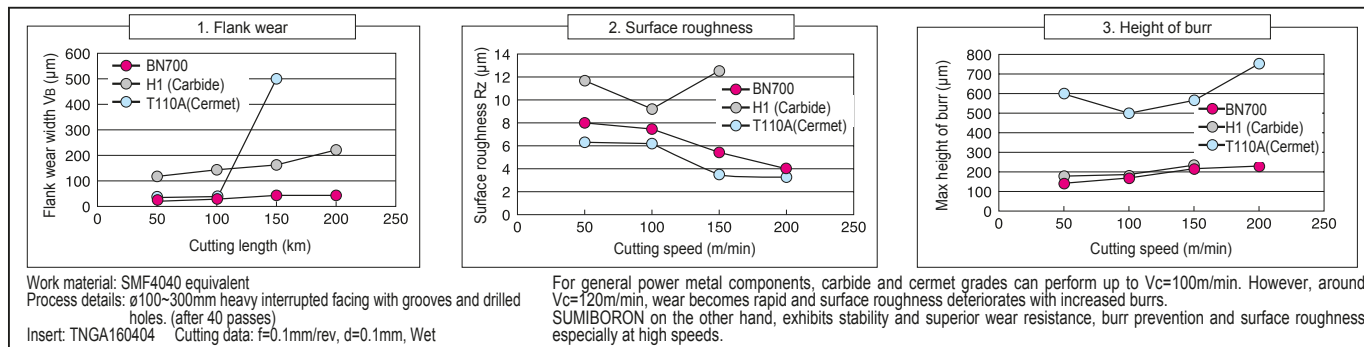
## Turning



## Milling

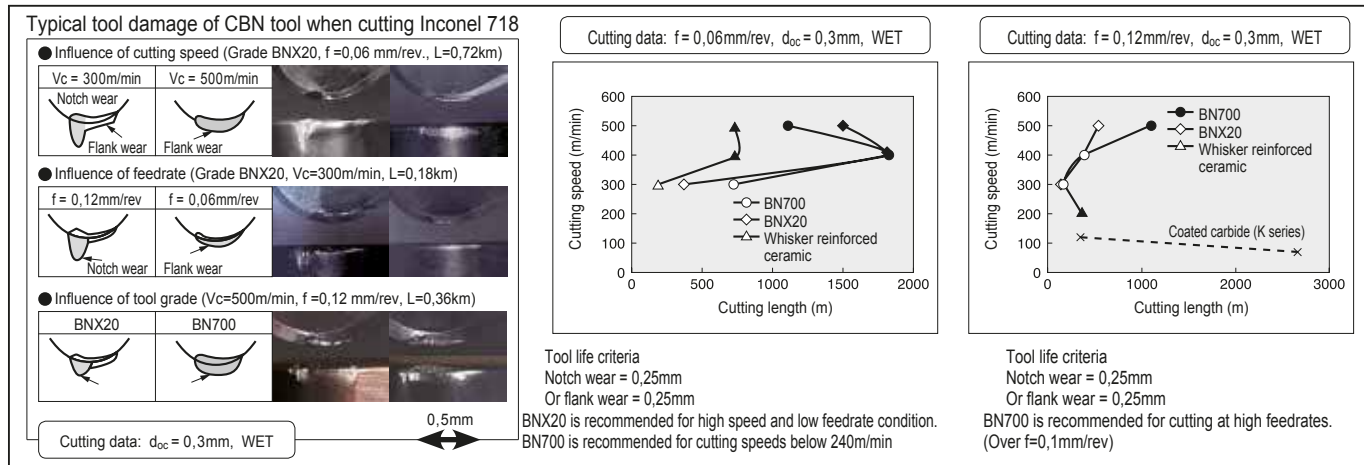


■ Powder Metal

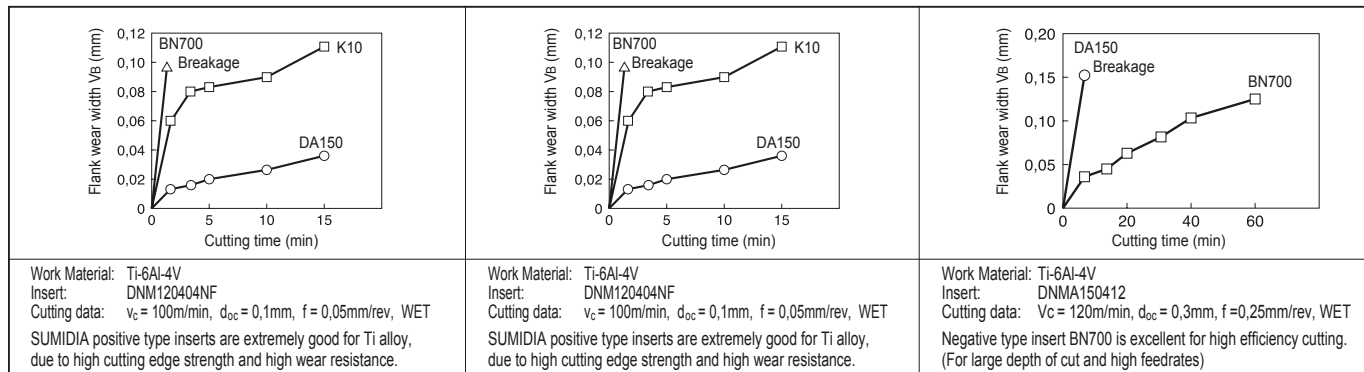


■ Heat Resistant Alloy

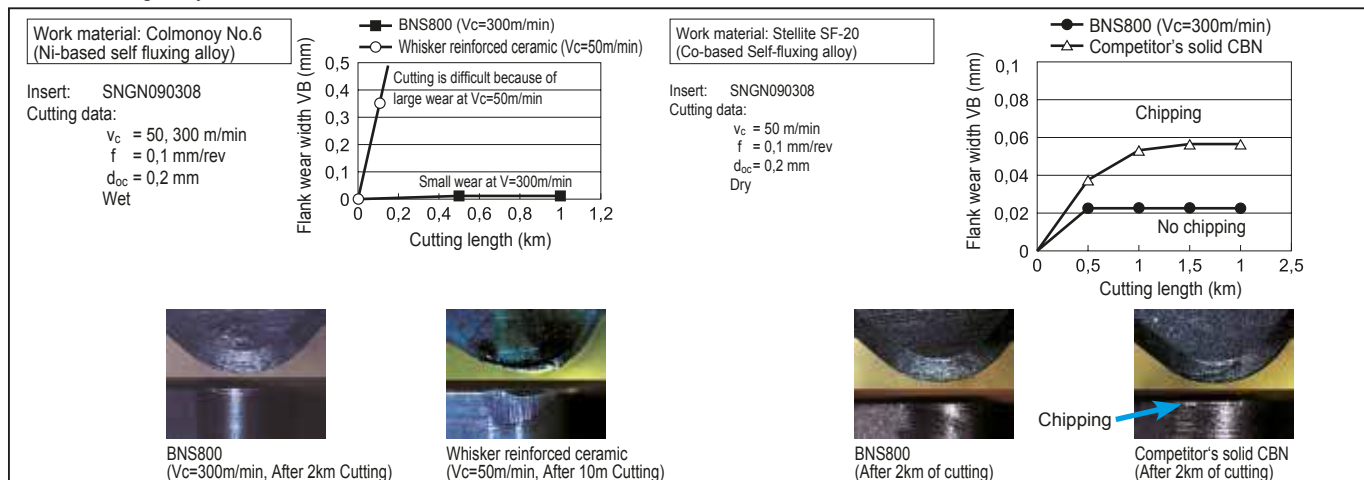
● Ni based alloy

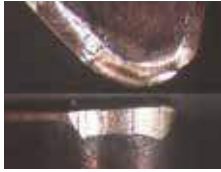









● Ti based alloy



● Hard facing alloys



		Damage	Remedies
Cutting Edge Failure		<p>Large flank wear</p> 	<p>Tool material</p> <p>Tool design</p> <p>Cutting condition</p> <ul style="list-style-type: none"> <li>☞ Select a more wear resistant grade.</li> <li>☞ Reduce the cutting force.</li> <li>☞ Reduce the NL width and angle.</li> <li>☞ Positive inserts preferred</li> <li>☞ Check the cutting speed.</li> <li>☞ Reduce the cutting speed to less than 200m/min.</li> <li>☞ Higher feed rate reduces the overall tool-to-work contact time.</li> </ul>
		<p>Large crater wear</p> 	<p>Tool material</p> <p>Tool design</p> <p>Cutting condition</p> <ul style="list-style-type: none"> <li>☞ Crater wear resistant grades are recommended. Continuous ~ Light interrupted cutting = BNC2010 Light ~ Medium interrupted cutting = BNX20 Medium ~ Heavy interrupted cutting = BNX25</li> <li>☞ Determine the cutting edge geometry after inspecting the used inserts closely.</li> <li>☞ Sharpen the cutting edge to prevent crater wear.</li> <li>☞ Strengthen the cutting edge to prevent crater breakage.</li> <li>☞ Check the cutting speed.</li> <li>☞ Reduce the cutting speed to less than 200m/min.</li> <li>☞ Higher feed rates are recommended.</li> </ul>
		<p>Breakage at bottom of crater</p> 	
		<p>Flaking</p> 	<p>Tool material</p> <p>Tool design</p> <p>Cutting condition</p> <ul style="list-style-type: none"> <li>☞ Flaking is caused by high back forces and back force is related to flank wear.</li> <li>☞ Select a more wear resistant grade.</li> <li>☞ A sharper cutting edge helps prevent flaking.</li> <li>☞ Reduce the NL angle and width</li> <li>☞ Positive inserts preferred</li> <li>☞ Reduce flank wear with lower speed and higher feed rates.</li> <li>☞ Reducing tool-to-work contact time effectively reduces flank wear.</li> </ul>
		<p>Chipping at notch position</p> 	<p>Cutting condition</p> <ul style="list-style-type: none"> <li>☞ If surface finish is affected, consider using the "Variable Feed rate" method to improve finishing.</li> <li>☞ For other cases, use remedies similar to that for normal wear.</li> </ul>
		<p>Chipping at notch position</p> 	<p>Tool material</p> <p>Tool design</p> <p>Cutting condition</p> <ul style="list-style-type: none"> <li>☞ Caused by impact shocks to the cutting edge. Chattering may also be a contributing factor.</li> <li>☞ Select a tougher grade.</li> <li>☞ Strengthen the cutting edge.</li> <li>☞ Large NL angle, Honing.</li> <li>☞ Higher feed rates are recommended to lessen the number of impacts.</li> </ul>
		<p>Chipping at nose position</p> 	<p>Tool material</p> <p>Tool design</p> <p>Cutting condition</p> <ul style="list-style-type: none"> <li>☞ Caused by impact shocks to the cutting edge. Chattering may also be a contributing factor.</li> <li>☞ Select a tougher grade.</li> <li>☞ Strengthen the cutting edge.</li> <li>☞ Large NL angle, Honing.</li> <li>☞ Higher feedrates are recommended to lessen the number of impacts.</li> </ul>
		<p>Thermal crack</p> 	<p>Cutting condition</p> <p>Tool design</p> <p>Tool material</p> <ul style="list-style-type: none"> <li>☞ Thermal shocks generate vertical crack lines across the cutting edge. Completely dry condition is recommended.</li> <li>☞ If dry condition machining is already observed, then reduction of cutting temperatures and cutting force is necessary.</li> <li>☞ Decrease cutting speed, feedrate, depth of cut.</li> <li>☞ Sharpen cutting edge.</li> <li>☞ Select more thermal conductivity grade.</li> </ul>



## ■ Steel and Non-Ferrous Metal Symbols Chart

### ● Carbon Steels

JIS	AISI	DIN
S10C	1010	C10
S15C	1015	C15
S20C	1020	C22
S25C	1025	C25
S30C	1030	C30
S35C	1035	C35
S40C	1040	C40
S45C	1045	C45
S50C	1049	C50
S55C	1055	C55

### ● Ni-Cr-Mo Steels

JIS	AISI	DIN
SNCM220	8620	21NiCrMo2
SNCM240	8640	—
SNCM415	—	—
SNCM420	4320	—
SNCM439	4340	40NiCrMo6
SNCM447	—	34NiCrMo6

### ● Cr Steels

JIS	AISI	DIN
SCr415	—	15CrMo5
SCr420	5120	20Cr4
SCr430	5130	34Cr4
SCr435	5132	37Cr4
SCr440	5140	41Cr4
SCr445	5147	—

### ● Cr-Mo Steels

JIS	AISI	DIN
SCM415	—	15CrMo5
SCM420	—	20CrMo5
SCM430	4131	25CrMo4
SCM435	4137	34CrMo4
SCM440	4140	42CrMo4
SCM445	4145	—

### ● Mn Steels and Mn-Cr Steels for Structural Use

JIS	AISI	DIN
SMn420	1522	—
SMn433	1534	—
SMn438	1541	—
SMn443	1541	—
SMnC420	—	—
SMnC443	—	—

### ● Cr-Mo Steels

JIS	AISI	DIN
SK1	—	—
SK2	W1-11 1/2	—
SK3	W1-10	C105W1
SK4	W1-9	—
SK5	W1-8	C80W1
SK6	—	C80W1
SK7	—	C70W2

### ● High Speed Steels

JIS	AISI	DIN
SKH2	T1	—
SKH3	T4	S18-1-2-5
SKH10	T15	S12-1-4-5
SKH51	M2	S6-5-2
SKH52	M3-1	—
SKH53	M3-2	S6-5-3
SKH54	M4	—
SKH56	M36	—

### ● Alloy Tool Steels

JIS	AISI	DIN
SKS11	F2	—
SKS51	L6	—
SKS43	W2-9 1/2	—
SKD1	D3	X210Cr12
SKD11	D2	X155CrVMo12-1
SKD61	—	X40CrVMo5-1

### ● Grey Cast Iron

JIS	AISI	DIN
FC100	No 20B	GG-10
FC150	No 25B	GG-15
FC200	No 30B	GG-20
FC250	No 35B	GG-25
FC300	No 45B	GG-30
FC350	No 50B	GG-35

### ● Nodular Cast Iron

JIS	AISI	DIN
FCD400	60-40-18	GGG-40
FCD450	—	GGG-40.3
FCD500	80-55-06	GGG-50
FCD600	—	GGG-60
FCD700	100-70-03	GGG-70

### ● Ferritic Stainless Steels

JIS	AISI	DIN
SUS405	405	X10CrAl13
SUS429	429	—
SUS430	430	X6Cr17
SUS430F	430F	X7CrMo18
SUS434	434	X6CrMo17 1

### ● Martensitic Stainless Steels

JIS	AISI	DIN
SUS403	403	—
SUS410	410	X10Cr13
SUS416	416	—
SUS420JI	420	X20Cr13
SUS420F	420F	—
SUS431	431	X20CrNi17 2
SUS440A	440A	—
SUS440B	440B	—
SUS440C	440C	—

### ● Austenitic Stainless Steels

JIS	AISI	DIN
SUS201	201	—
SUS202	202	—
SUS301	301	X12CrNi17 7
SUS302	302	—
SUS302B	302B	—
SUS303	303	X10CrNi18 9
SUS303Se	303Se	—
SUS304	304	X5CrNi18 10
SUS304L	304L	X2CrNi19 11
SUS304NI	304N	—
SUS305	305	X5CrNi18 12
SUS308	308	—
SUS309S	309S	—
SUS310S	310S	—
SUS316	316	X5CrMo17 12 2
SUS316L	316L	X2CrNiMo17 13 2
SUS316N	316N	—
SUS317	317	—
SUS317L	317L	X2CrNiMo18 16 4
SUS321	321	X6CrNiTi18 10
SUS347	347	X6CrNiNb18 10
SUS384	384	—

### ● Heat Resisting Steels

JIS	AISI	DIN
SUH31	—	—
SUH35	—	—
SUH36	—	X53CrMnNi21 9
SUH37	—	—
SUH38	—	—
SUH309	309	—
SUH310	310	CrNi2520
SUH330	N08330	—

### ● Ferritic Heat Resisting Steels

JIS	AISI	DIN
SUH21	—	CrAl1205
SUH409	409	X6CrTi12
SUH446	446	—

### ● Martensitic Heat Resisting Steels

JIS	AISI	DIN
SUH1	—	X45CrSi9 3
SUH3	—	—
SUH4	—	—
SUH11	—	—
SUH600	—	—

# References

## ■ Hardness Scale Comparison Chart

● Approx. metric value and Brinell hardness of steel

Brinell Hardness 10mm Ball 3.000kgf (HB)	Rockwell Hardness				Vickers Hardness 50kgf (HV)	Shore Hardness (HS)	Traverse Rupture Strength (N/mm <sup>2</sup> )
	„A“ Scale Diamond, brale 60kgf (HRA)	„B“ Scale 100kgf 1/10" Ball (HRB)	„C“ Scale Diamond, brale 150kgf (HRC)	„D“ Scale Diamond, brale 100kgf (HRD)			
—	85,6	—	68,0	76,9	940	97	—
—	85,3	—	67,5	76,5	920	96	—
—	85,0	—	67,0	76,1	900	95	—
767	84,7	—	66,4	75,7	880	93	—
757	84,4	—	65,9	75,3	860	92	—
745	84,1	—	65,3	74,8	840	91	—
733	83,8	—	64,7	74,3	820	90	—
722	83,4	—	64,0	73,8	800	88	—
712	—	—	—	—	—	—	—
710	83,0	—	63,3	73,3	780	87	—
698	82,6	—	62,5	72,6	760	86	—
684	82,2	—	61,8	72,1	740	—	—
682	82,2	—	61,7	72,0	737	84	—
670	81,8	—	61,0	71,5	720	83	—
656	81,3	—	60,1	70,8	700	—	—
653	81,2	—	60,0	70,7	697	81	—
647	81,1	—	59,7	70,5	690	—	—
638	80,8	—	59,2	70,1	680	80	—
630	80,6	—	58,8	69,8	670	—	—
627	80,5	—	58,7	69,8	667	79	—
601	79,8	—	57,3	68,7	640	77	—
578	79,1	—	56,0	67,7	615	75	—
555	78,4	—	54,7	66,7	591	73	2055
534	77,8	—	53,5	65,8	569	71	1985
514	76,9	—	52,1	64,7	547	70	1890
495	76,3	—	51,0	63,8	528	68	1820
477	75,6	—	49,6	62,7	508	66	1730
461	74,9	—	48,5	61,7	491	65	1670
444	74,2	—	47,1	60,8	472	63	1585
429	73,4	—	45,7	59,7	455	61	1510
415	72,8	—	44,5	58,8	440	59	1460
401	72,0	—	43,1	57,8	425	58	1390
388	71,4	—	41,8	56,8	410	56	1330
375	70,6	—	40,4	55,7	396	54	1270
363	70,0	—	39,1	54,6	383	52	1220
352	69,3	(110,0)	37,9	53,8	372	51	1180
341	68,7	(109,0)	36,6	52,8	360	50	1130
331	68,1	(108,5)	35,5	51,9	350	48	1095

Brinell Hardness 10mm Ball 3.000kgf (HB)	Rockwell Hardness				Vickers Hardness 50kgf (HV)	Shore Hardness (HS)	Traverse Rupture Strength (N/mm <sup>2</sup> )
	„A“ Scale Diamond, brale 60kgf (HRA)	„B“ Scale 100kgf 1/10" Ball (HRB)	„C“ Scale Diamond, brale 150kgf (HRC)	„D“ Scale Diamond, brale 100kgf (HRD)			
321	67,5	(108,0)	34,3	50,1	339	47	1060
311	66,9	(107,5)	33,1	50,0	328	46	1025
302	66,3	(107,0)	32,1	49,3	319	45	1005
293	65,7	(106,0)	30,9	48,3	309	43	970
285	65,3	(105,5)	29,9	47,6	301	—	950
277	64,6	(104,5)	28,8	46,7	292	41	925
269	64,1	(104,0)	27,6	45,9	284	40	895
262	63,6	(103,0)	26,6	45,0	276	39	875
255	63,0	(102,0)	25,4	44,2	269	38	850
248	62,6	(101,0)	24,2	43,2	261	37	825
241	61,8	100,0	22,8	42,0	253	36	800
235	61,4	99,0	21,7	41,4	247	35	785
229	60,8	98,2	20,5	40,5	241	34	765
223	—	97,3	(18,8)	—	234	—	—
217	—	96,4	(17,5)	—	228	33	725
212	—	95,5	(16,0)	—	222	—	705
207	—	94,6	(15,2)	—	218	32	690
201	—	93,8	(13,8)	—	212	31	675
197	—	92,8	(12,7)	—	207	30	655
192	—	91,9	(11,5)	—	202	29	640
187	—	90,7	(10,0)	—	196	—	620
183	—	90,0	(9,0)	—	192	28	615
179	—	89,0	(8,0)	—	188	27	600
174	—	87,8	(6,4)	—	182	—	585
170	—	86,8	(5,4)	—	178	26	570
167	—	86,0	(4,4)	—	175	—	560
163	—	85,0	(3,3)	—	171	25	545
156	—	82,9	(0,9)	—	163	—	525
149	—	80,8	—	—	156	23	505
143	—	78,7	—	—	150	22	490
137	—	76,4	—	—	143	21	460
131	—	74,0	—	—	137	—	450
126	—	72,0	—	—	132	20	435
121	—	69,8	—	—	127	19	415
116	—	67,6	—	—	122	18	400
111	—	65,7	—	—	117	15	385

- 1) Figures within the ( ) are not commonly used
- 2) Rockwell A, C and D scales utilises a diamond brale
- 3) 1 N/mm<sup>2</sup> = 1 MPa

## ■ Finished Surface Roughness

### ● Types of Surface Roughness Measurements

Types	Symbol	Method of Determination	Descriptive Figure
Maximum Height	* 1) Ry	This is the value (expressed in $\mu\text{m}$ ) measured from the deepest valley to the highest peak of the reference line, $\ell$ , extracted from the profile.  (Disregard unusually high peaks and deep valleys as they are considered as flaws.)	
Ten-point Mean Roughness	* 2) Rz	From the profile, extract a portion to be the reference line, $\ell$ .  Select the 5 highest peak and 5 deepest valleys. Measure the distance between the two lines and express it in $\mu\text{m}$ . (1 $\mu\text{m}$ = 0,001mm)	
Calculated Roughness	Ra	This method is to obtain a center line between the peaks and valleys within the reference line, $\ell$ . Fold along the center line to superimpose the valleys against the peaks. (Shaded portions with dashed outline on the right figure). Take the total shaded area and divided it by $\ell$ in $\mu\text{m}$ .	

Designated values of the above types of surface roughness, standard reference length values and the triangular symbol classifications are shown on the table on the right.

- \* 1) Ry : According to new JIS B 0601:2001 (Old symbol: Rz)  
 \* 2) Rz : According to new JIS B 0601:2001 (Old symbol: Rz<sub>JIS</sub>)

Designated values for * 1) Ry	Designated values for * 2) Rz	Designated values for Ra	Standard reference length values, $\ell$ (mm)	Triangular Symbols
(0,05S) 0,1S 0,2S 0,4S	(0,05Z) 0,1Z 0,2Z 0,4Z	(0,013a) 0,025a 0,05a 0,10a	—	
0,8S	0,8Z	0,20a	0,25	
1,6S 3,2S 6,3S	1,6Z 3,2Z 6,3Z	0,4a 0,8a 1,6a	0,8	
12,5S (18S) 25S	12,5Z (18Z) 25Z	3,2a 6,3a	2,5	
(35S) 50S (70S) 100S	(35Z) 50Z (70Z) 100Z	12,5a 25a	—	
(140S) 200S (280S) 400S (560S)	(140Z) 200Z (280Z) 400Z (560Z)	(50a) (100a)	—	—

Remarks: The designated values in the brackets do not apply unless otherwise stated.



# Spare Parts

P1 ~ P8

# P



Screw .....	P2-P4
Lever Pin, Shim, Nut.....	P4-P6
Shim Pin, Eccentric Pin .....	P7
Wrench .....	P8

# SPARE PARTS

## Screw

### Screw

High Precision Screw	Cat. No.	Stock	Dimensions (mm)						$\alpha^\circ$	$\text{Nm}$
			d	Pitch	L	D	B			
	BFTG0408F	●	M4	0,5	7,5	5,7	T15	61	3,4	
	BTTG0409F	●	M4	0,5	8,4	6,15	T15	61	3,4	
	BFTG0513F	●	M5	0,5	13	6,8	T20	61	5,0	
	BFTG0617F	●	M6	0,75	16,5	8	T25	61	7,5	
	BFTG0621F	●	M6	0,75	21	9,5	T25	61	7,5	
	BFTG0825F	●	M8	0,75	24,5	12	T25	61	7,5	

Torx Flat Head Screw	Cat. No.	Stock	Dimensions (mm)						$\alpha^\circ$	$\text{Nm}$
			d	Pitch	L	D	B			
	BFTX02506		M							
	BFTX02508	●	M2,5	0,45	7,5	3,45	T8	60	-	
	BFTX0309	●	M3	0,5	8,8	4,2	T10	60	-	
	BFTX03508	●	M3,5	0,6	8	5,1	T10	52	2,0	
	BFTX03584	●	M3,5	0,6	7,4	5,2	T15	60	3,0	
	BFTX03588	●	M3,5	0,6	8,8	5,2	T15	60	3,4	
	BFTX0408	●	M4	0,7	8	5,5	T15	60	-	
	BFTX0414	●	M4	0,7	14,5	5,5	T15	60	3,0	
	BFTX0515		M5	0,8	15	7	T20	60	-	
	BFTX0613		M6	1,0	13	9	T25	60	-	
	BFTX0615		M6	1,0	15	9	T25	60	-	
	BFTX0617		M6	1,0	17	9	T25	60	-	

Torx Flat Head Screw	Cat. No.	Stock	Dimensions (mm)						$\alpha^\circ$	$\text{Nm}$
			d	Pitch	L	D	B			
	BFTX0203A	●	M2	0,4	3	2,7	T6	90	0,5	
	BFTX0204A	●	M2	0,4	4,3	2,7	T6	90	0,5	
	BFTX0305A	●	M3	0,5	5,3	4,3	T10	90	-	
	BFTX0306A	●	M3	0,5	5,8	4,3	T10	90	2,0	
	BFTX0307A	●	M3	0,5	6,8	4,3	T10	90	2,0	
	BFTX0407A	●	M4	0,7	7,3	5,6	T15	90	3,4	
	BFTX0410A	●	M4	0,7	10,3	5,6	T15	90	3,4	
	BFTX0509A	●	M5	0,8	9,3	6,9	T20	90	5,0	

Torx Flat Head Screw	Cat. No.	Stock	Dimensions (mm)						$\alpha^\circ$	$\text{Nm}$
			d	Pitch	L	D	B			
	BFTX01604N	●	M1,6	0,35	4,2	2,4	T6	60	0,2	
	BFTX0203N	●	M2	0,4	3	2,7	T6	60	0,5	
	BFTX0204N	●	M2	0,4	4,3	2,7	T6	60	0,5	
	BFTX02205N	●	M2,5	0,45	4,5	3	T6	60	0,5	
	BFTX02505N	●	M2,5	0,45	4,5	3,45	T8	60	1,1	
	BFTX02506N	●	M2,5	0,45	5,5	3,45	T8	60	1,5	
	BFTX02508NV	●	M2,5	0,45	7,5	3,5	T8	60	1,5	
	BFTX0306N	●	M3	0,5	5,8	4,2	T10	60	2,0	
	BFTX0307N	●	M3	0,5	6,5	4,2	T10	60	2,0	
	BFTX0309N	●	M3	0,5	9	4,2	T10	60	3,0	
	BFTX0312N		M3	0,5	12	5,4	T10	60	-	
	BFTX03509N	●	M3,5	0,6	8,5	4,9	T10	60	-	
	BFTX0406N	●	M4	0,7	6	5,6	T15	60	-	
	BFTX0407N	●	M4	0,7	7	5,6	T15	60	3,0	
	BFTX0409N	●	M4	0,7	9	5,6	T15	60	3,4	
	BFTX0412N	●	M4	0,7	12	5,5	T15	60	3,0	
	BFTX0509N	●	M5	0,8	9	7	T20	60	5,0	
	BFTX0511N	●	M5	0,8	11,5	7	T20	60	5,0	
	BFTX0513N	●	M5	0,8	13	7	T20	60	5,0	
	BFTX0515N	●	M5	0,8	15	7	T20	60	-	
	BFTX0615N	●	M6	1,0	15	9	T25	60	5,0	
	BFTX0619N	○	M6	1,0	19	9	T25	60	5,0	

Torx Flat Head Screw	Cat. No.	Stock	Dimensions (mm)						$\alpha^\circ$	$\text{Nm}$
			d	Pitch	L	D	B			
	BFTX0410T8L	●	M4	0,7	9,6	5,6	T8	60	1,1	
	BFTX0410T8R	●	M4	0,7	9,6	5,6	T8	60	1,1	

### Screw

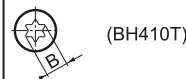
Torx Plus Flat Head Screw	Cat. No.	Stock	Dimensions (mm)						$\alpha^\circ$	$\text{Nm}$
			d	Pitch	L	D	B			
	BFTX01804IP	●	M1,8	0,35	3,7	2,45	6IP	60	0,5	
	BFTX02505IP	●	M2,5	0,45	4,5	3,45	8IP	60	-	
	BFTX02506IP	●	M2,5	0,45	5,5	3,45	8IP	60	-	
	BFTX0305IP	●	M3	0,5	5,3	3,8	8IP	60	2,0	
	BFTX0306IP	●	M3	0,5	6	3,8	8IP	60	2,0	
	BFTX0307IP		M3	0,5	7	4,3	10IP	55	2,0	
	BFTX03512IP	●	M3,5	0,6	11,5	5,3	15IP	60	3,0	
	BFTX03584IP	●	M3,5	0,6	7,4	5,1	15IP	60	-	
	BFTX03510IP08	●	M3,5	0,6	10	5,3	8IP	60	-	
	BFTX03510IP15	●	M3,5	0,6	10	5,3	15IP	60	-	
	BFTX0407IP	●	M4	0,7	8,0	5,6	15IP	60	3,0	
	BFTX0409IP	●	M4	0,7	9,0	5,6	15IP	60	3,0	
	BFTX0412IP	●	M4	0,7	12	5,5	15IP	56	3,0	
	BFTX0418IP	●	M4	0,7	18	5,5	15IP	60	-	
	BFTX04513IP20	●	M4,5	0,75	13,1	6,8	20IP	60	-	
	BFTX0511IP	●	M5	0,8	11,5	7	20IP	60	-	
	BFTX0513IP	●	M5	0,8	13	7	20IP	60	-	
	BFTX0615IP	●	M6	1,0	15	9	25IP	60	-	

Torx Flat Head Screw	Cat. No.	Stock	Dimensions (mm)						$\alpha^\circ$	$\text{Nm}$
			d	Pitch	L	D	B			
	BFTX03510SD	□	M3,5	0,6	10	5,3	T10	60	2,0	
	BFTX03517SD	□	M3,5	0,6	17	5,3	T10	60	2,0	
	BFTX0517SD	□	M5	0,8	17	7,2	T20	60	5,0	
	BFTX0618SD	□	M6	1,0	18		T25	60	7,5	

Torx Flat Head Screw	Cat. No.	Stock	Dimensions (mm)						$\alpha^\circ$	$\text{Nm}$
			d	Pitch	L	D	B			
	BFTY02205	●	M2,2	0,45	5,0	3,05	T7	60	-	
	BFTY02206	●	M2,2	0,45	5,6	3,05	T7	60	1,0	

Button Head Cap Screw	Cat. No.	Stock	Dimensions (mm)						$\text{Nm}$
			d	Pitch	L	$\ell$	D	B	
	BH0304	●	M3	0,5	4	Full	5,5	2	-
	BH0306	●	M3	0,5	6	Full	5,5	2	-
	BH0308 (FBUP3-A0-9)	●	M3	0,5	8	Full	5,5	2	1,0
	BH0310	●	M3	0,5	10	Full	5,5	2	-
	BH03504	●	M3,5	0,6	4	Full	7	2	-
	BH0408	●	M4	0,7	8	Full	6	2,5	-
	BH0410T	□	M4	0,7	10	Full	7,5	T15	-
	BH0415	□	M4	0,7	15	Full	7,5	2,5	-
	BH0510	●	M5	0,8	10	Full	9,5	3	-
	BH0516	●	M5	0,8	16	14,4	9,5	3	-
	BH0616	●	M6	1,0	16	14	10,5	4	-
	BH0620	●	M6	1,0	20	Full	10,5	4	-
	BH0824R	●	M8	1,25	24	20	12	4	-
	BH0824L	●	M8	1,25	24	20	12	4	-
	BH0825	□	M8	1,25	25	22,5	14	5	-
	BH0830R	●	M8	1,25	30	26	12	4	-
	BH0830L	●	M8	1,25	30	26	12	4	-
	BH0832	●	M8	1,25	32	29,5	14	5	-
	BH1030R	●	M10	1,5	30	26	14	5	-
	BH1030L	●	M10	1,5	30	26	14	5	-
	BH1036R	●	M10	1,5	36	32	14	5	-
	BH1036L	●	M10	1,5	36	32	14	5	-

T Type with Torx Hole



# SPARE PARTS

## Screw

### ■ Screw

Phillip Head Cap Screw	Cat. No.	Stock	Dimensions (mm)							
			d	Pitch	L	ℓ	D	B	(Nm)	
	BHA0525	●	M5	0,8	25,5	9,5	8,5	3	4,0	
	BHA0625	●	M6	1,0	30	11,3	10,5	4	4,5	
	BHA0834	□	M8	1,25	34,2	12,7	12,0	5	-	
	BHE0407	□	M4	0,7	9,5	2	5,7	2,5	1,8	
	BHE0510	□	M5	0,8	13	3	7,7	3	2,7	

Button Head Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	D	B	α°	(Nm)
	BHF0203L		M2	0,4	4	3	1,5	90	
	BHF0203B		M2	0,4	5,5	3,5	1,5	90	
	BHF0306R		M3	0,5	6,3	4,2	2	90	1,0
	BHF0308R		M3	0,5	8	4,2	2	90	1,0
	BHF0623	□	M6	1,0	23	12	4	90	7,0

Set Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	D	B	α°	(Nm)
	BT0306		M3	0,5	6	-	1,5	-	-
	BT0310	□	M3	0,5	10	-	1,5	-	-
	BT0404	●	M4	0,7	4	-	2	-	-
	BT0506	●	M5	0,8	6	-	2,5	-	-
	BT0510	□	M5	0,8	10	-	2,5	-	-
	BT0610		M6	1,0	10	-	3	-	-
	BT0612		M6	1,0	12	-	3	-	-
	BT0620		M6	1,0	20	-	3	-	-
	BT06035T		M6	1,0	3,5	-	T15	-	-

Set Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	(Nm)
	BTD0408		M4	0,7	8	2	2,8	2	-
	BTD0410		M4	0,7	10	2	2,8	2	-
	BTD0412		M4	0,7	12	2	2,8	2	-
	BTD0508		M5	0,8	8	3	3,5	2,5	-
	BTD05F09		M5	0,5	9	2	4	T15	-
	BTD0510	□	M5	0,8	10	3	3,5	2,5	3,0
	BTD0518		M5	0,8	18	4	3,5	2,5	-
	BTD0609	●	M6	1,0	9	2	4	3	-
	BTD0615		M6	1,0	15	5	4	3	-
	BTD0618		M6	1,0	18	5	4	3	-
	BTD0620		M6	1,0	20	5	4	3	-
	BTD0812		M8	1,25	12	2	5	4	-
	BTD0818		M8	1,25	18	6	5	4	-
	BTD0820		M8	1,25	20	6	5	4	-
	BTD0825		M8	1,25	25	8,5	5	4	-
BTD0615T		M6	1,0	15	5	4,3	T20	-	

Set Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	B	α°	(Nm)
	BTT0407	●	M4	0,5	7	2,6	2	60	-
	BTT0411	●	M4	0,5	11	2,6	2	60	-
	BTT0511		M5	0,8	11	5	2	20	-
	BTT0615		M6	1,0	15	6	2,5	20	-

Special Hollow Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	(Nm)
	BW0507F	●	M5	0,5	7	1,2	6,3	3,5	-
	BW0609F		M6	0,75	9	1,5	7,7	4	-
	BW0508F-SD		M5	0,5	8	1,2	6,3	3,5	-
	BW0810F-SD	□	M8	0,75	10	1,8	10	5	-
	BW0912F-SD		M9	0,75	12				-

### ■ Screw

Cap Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	(Nm)
	BX0304		M3	0,5	4	Full	5,5	2,5	-
	BX0308		M3	0,5	8	Full	5,5	2,5	-
	BX0315		M3	0,5	15	Full	5,5	2,5	-
	BX0320		M3	0,5	20	Full	5,5	2,5	-
	BX0408		M4	0,7	8	Full	7	3	-
	BX0410		M4	0,7	10	Full	7	3	-
	BX0414	●	M4	0,7	14	Full	7	3	-
	BX0425		M4	0,7	25	20	7	3	-
	BX0508	●	M5	0,8	8	Full	8,5	4	-
	BX0510	●	M5	0,8	10	Full	8,5	4	-
	BX0512	●	M5	0,8	12	Full	8,5	4	-
	BX0515	○	M5	0,8	15	Full	8,5	4	-
	BX0520	●	M5	0,8	20	Full	8,5	4	5,0
	BX0520T	●	M5	0,8	20	16	8,5	T20	-
	BX0615	□	M6	1,0	15	Full	10	5	-
	BX0620	○	M6	1,0	20	Full	10	5	-
	BX0622	●	M6	1,0	22	18	10	5	-
	BX0625	●	M6	1,0	25	18	10	5	-
	BX0820		M8	1,25	20	Full	13	6	-

Cap Screw (Torx Plus)	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	(Nm)
	BXD02208IP	●	M2,2	0,45	7,5	5,7	3,5	8IP	-
	BXD02509IP	●	M2,5	0,45	9	7	4,1	10IP	-
	BXD03011IP	●	M3	0,5	10,5	8	4,9	15IP	-
	BXD03512IP	●	M3,5	0,6	11,5	8,8	5,5	15IP	-
	BXD04014IP	●	M4	0,7	12,5	9,5	6	20IP	-
	BXD04515IP	●	M4,5	0,75	14,3	10,8	6,8	25IP	-

Cap Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	(Nm)
	EHBX0512	●	M5	0,8	12	10,5	8	4	-

Fastener Bolt	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	(Nm)
	FBH0512	●	M5	0,8	12	2	7,3	3	-
	FBX0811	●	M8	1,25	11,1	4,9	8,5	4	-
	FBX0817	●	M8	1,25	17,1	4,9	8,5	4	-

Flat Head Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	B	α°	(Nm)
	FBUP2-A0-8	□	M3	0,5	10	5,5	2	82	1,0
	FBUP3-A0-8		M3,5	0,6	12	7	2	82	1,0
	FBUP4-A0-8		M5	0,8	15	9,3	3	82	2,7
	BFX0307R		M3	0,5	7	4	2	60	1,0
	BFX0407R		M4	0,7	6,5	5,8	2,5	90	1,8
	BFX0410R		M4	0,7	9,5	5,8	2,5	90	1,8
	BFX0508		M5	0,8	8	7,5	3	90	2,7
	BFX0511R		M5	0,8	10,5	7,5	3	90	2,7
	BFX0611R		M6	1,0	11	9,5	3	90	2,7

Button Head Cap Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	(Nm)
	FBUP3-A0-9	●	M3	0,5	8	Full	5,5	2	1,0

# SPARE PARTS

## Screw, Lever Pin

### ■ Screw

Axial adjustment Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	
	FMJ	●	M4	0,5	15	5	6	3	-
	FMUJ	●	M4	0,7	17	6,5	6	1	-
	RFJ	□	M4	0,7	12	6	6	2	-
	SRFJ	□	M4	0,7	17	6,5	6	2	-

Special Hollow Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	
	KGBS1111	●	M5	0,5	8	1,2	6	3,5	-
	KGBS1221	●	M6	0,75	9	1,5	7,5	4,5	-

Torx Flat Head Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	D	B	α°	
	KSS1111	●	3,5	0,6	11	5,2	T15	55	3,5
	KSS1221	●	4,5	0,75	12	6,6	T15,3	55	4,5

Screw for Lever Lock	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	
	LCS2B		M3	0,5	10	3,05	3,6	2	-
	LCS3	●	M6	1,0	17	10	6	2,5	-
	LCS3B-SD	●	M5	0,8	9,5	4,2	5	2	-
	LCS3DB-SD	●	M5	0,8	12	6	5	2	-
	LCS3S		M6	1,0	15	10	6	2,5	-
	LCS3TB-SD	●	M6	1,0	16,7	9,6	6	2,5	-
	LCS3TE	●	M6	1,0	15,5	8,5	6	2,5	-
	LCS4	●	M8	1,0	21	10	8	3	-
	LCS4B-SD	●	M6	1,0	13,4	9	6	2,5	-
	LCS41BS-SD	●	M8	1,0	17	9,3	8	3	-
	LCS42BS-SD	●	M8	1,0	20,7	9,8	8	3	-
	LCS4CA	●	M8	1,0	17,5	10	8	3	-
	LCS5	●	M8	1,0	25	12	8	3	-
	LCS5B-SD	□	M8	1,0	20,5	12,3	8	3	-
	LCS5DB-SD	□	M8	1,0	21,1	11,4	8	3	-
	LCS6	□	M10	1,0	27,2	14,4	9,8	4	-
	LCS6B-SD	●	M10	1,0	27,2	14,4	10	4	-
	LCS10	●	M5	0,8	14,5	8,5	5	2	-
	LCS12	●	M6	1,0	17	9,6	6	2,5	-
	LCS16	●	M6	1,0	21	13,6	6	2,5	-
	LCS20	●	M8	1,0	23,5	13,2	8	3	-
	LCS25		M10	1,0	30	17,4	10	4	-
LCS32		M12	1,0	36	19,3	12	5	-	

	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	-	D	-	
	MIB1.6-2	●	M1,6	0,35	2,0	-	2,4	-	0,2
	MIB1.6-2.5	●	M1,6	0,35	2,5	-	2,4	-	0,2
	MIB1.6-3	●	M1,6	0,35	3,0	-	2,4	-	0,2

### ■ Double Screw

Double Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	
	WB4-8		M4	0,7	7,5	3	3,0	2	-
	WB5-10	●	M5	0,8	10	4	3,8	2,5	-
	WB5-12	●	M5	0,8	12	5	3,8	2,5	-
	WB6-13	□	M6	1,0	13	5	4,5	3	-
	WB6-16	●	M6	1,0	16	6	4,5	3	-
	WB6-20	□	M6	1,0	20	8,5	4,5	3	-
	WB6-30		M6	1,0	30	12	4,5	3	-
	WB8-20		M8	1,25	20	8,5	6,2	4	-
	WB8-24		M8	1,25	24	8,5	6,2	4	-
	WB8-30	●	M8	1,25	30	11,5	6,2	4	-
	WB8F-30	□	M8	1,0	30	11,5	6,2	4	-

Torx Double Screw	Cat. No.	Stock	Dimensions (mm)						
			d	Pitch	L	ℓ	D	B	α°
	WB6-16T	□	M6	1,0	16	6	4,5	T20	-
	WB7-15T	●	M7	1,0	15	5,5	5	T25	-
	WB7F-15T	●	M7	0,75	15	8,5	5,5	T25	-
	WB7F-20TL	●	M7	0,75	20	8,5	5,5	T25	-
	WB8-22T	●	M8	1,25	22	8,5	6,2	T27	-
	WB8-22TL		M8	1,25	22	8,5	6,2	T27	-
	WB8-30T	●	M8	1,25	30	11,5	6,2	T27	-
	WB8-30TL		M8	1,25	30	11,5	6,2	T27	-
	WB8R-16T	□	M8	1,25	14	5,5	6,2	T27	-

### ■ Lever Pin

	Cat. No.	Stock	Dimensions (mm)			
			A	H	L	C
	LCL3		3,7	12	10	3,6
	LCL3-SD	●	3,7	12	10	3,55
	LCL3C-SD	□	3,1	7,8	9,9	3,1
	LCL3D-SD	●	3,7	11,5	12	3,55
	LCL3DB-SD	●	3,1	9,4	11,5	3,1
	LCL3S		3,7	10,6	10	3,6
	LCL3T-SD	●	2,6	6,3	7,2	2,15
	LCL4		4,7	14	14,55	4,7
	LCL4-SD	●	4,65	13,2	13,35	4,7
	LCL4C-SD	●	4,65	10	13,35	4,7
	LCL4D-SD	●	4,65	14,8	16	4,7
	LCL4T-SD	●	4,65	13,2	13,35	4,7
	LCL5		6	17	17,1	6
	LCL5-SD	●	6	17,3	16,65	6
	LCL5C-SD	□	7,5	18,1	20,5	7,5
	LCL6-SD	●	7,5	21	20,5	7,5

	LCL06	●	2,5	6,28	7,0	2
	LCL09	●	3,5	9,3	10,75	3
	LCL10	●	3,4	11,8	10,8	3
	LCL12	●	3,7	13,4	12,9	3,5
	LCL16	●	4,6	17,6	18,4	4,4
	LCL20	□	6	18,9	20,4	5,6
	LCL32		8,5	26,8	29,8	8



# SPARE PARTS Shim

## Shim

Cat. No.	Stock	Dimensions (mm)			
		A	T	d <sub>1</sub>	d <sub>2</sub>
<b>CCS09T3</b>	●	8,525	2,38	5,4	6,4
<b>CNS1204</b>	●	12,57	4,76	4,4	6,0
<b>CNS1606</b>	●	15,75	4,76	5,5	7,5
<b>CNS1906</b>	●	18,70	6,35	5,5	7,5
<b>CNS2509</b>	●	25,27	6,35	6,6	9,5
<b>CNS1203B</b>	●	12,57	3,18	3,4	4,5
<b>CNS1204B</b>	●	12,57	4,76	4,4	6,0
<b>DCS11T3</b>	●	8,5	2,38	5,3	6,4
<b>DNS1504</b>	●	12,57	6,35	4,4	6,0
<b>DNS1506</b>	●	12,57	4,76	4,4	6,0
<b>DNS1104B</b>	●	9,45	4,73	3,4	4,5
<b>DNS1504B</b>	●	12,57	6,35	4,4	6,0
<b>DNS1506B</b>	●	12,57	4,76	4,4	6,0
<b>HE060011E</b>	●				
<b>LST317SD</b>	●	9,5	2,7	5,2	
<b>LST42SD</b>	●	12,65	3,18	6,9	
<b>LSS32SD</b>	●	9,48	3,18	5	
<b>LSS42SD</b>	●	12,65	3,18	6,9	
<b>LSS53SD</b>	□	15,85	4,76	7,9	
<b>LSS63SD</b>	●	19	4,76	10	
<b>LSC32SD</b>	●	9,48	3,18	5	
<b>LSC42SD</b>	●	12,65	3,18	6,9	
<b>LSC53SD</b>	●	15,85	4,76	7,9	
<b>LSC63SD</b>	□	19	4,76	10	
<b>LSD32SD</b>	●	8,5	3,18	5	
<b>LSD42SD</b>	●	12,65	3,18	6,9	

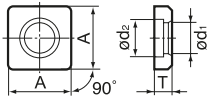
## Shim

Cat. No.	Stock	Dimensions (mm)			
		A	T	d	
<b>LSR817</b>	□	8,4	2,7	5,2	
<b>LSR10</b>	●	8,4	3,18	4,7	
<b>LSR12</b>	●	10	3,18	4,7	
<b>LSR16</b>	●	13,5	4,76	6,3	
<b>LSR20</b>	●	17,2	4,76	7,9	
<b>LSR25</b>	●	22	6,35	9,5	
<b>LSTE31-0</b>	●	9,5	2,7	2,7	5,2
<b>LSTE31-1</b>	●	9,5	2,67	2,91	5,2
<b>LSTE31-2</b>	●	9,5	2,64	3,11	5,2
<b>SCND433</b>	□	12,65	4,76	3,4	80°
<b>SCN0903</b>	□	9,5	3,18	3,4	
<b>SCS1204</b>	●	11,5	3,18	6,4	7,9
<b>SNS1204</b>	●	12,57	4,76	4,4	6,0
<b>SNS1506</b>	●	15,75	4,76	5,5	7,5
<b>SNS1906</b>	●	18,92	6,35	5,5	7,5
<b>SNS2507</b>	●	25,27	7,93	6,6	9,5
<b>SNS2509</b>	●	25,27	6,35	6,6	9,5
<b>SVW322</b>	●	9,5	3,18	4,7	6,5
<b>SFW433</b>	●	12,65	4,76	6,2	8,0
<b>SDW323</b>	●	9,5	3,18	4,7	6,5
<b>SDW423</b>	●	12,65	3,18	6,2	8,0
<b>SDW433</b>	●	12,65	3,18	6,2	8,0
<b>SCW423</b>	●	12,65	3,18	6,2	8,0
<b>SCW433</b>	●	12,65	3,18	6,2	8,0
<b>SCW635</b>	●	19	4,76	9	11,5
<b>SRND32</b>	●	9,5			
<b>SRND42</b>	●	12,7			
<b>SSND423</b>	●	12,5	3,18	3,4	
<b>SSN0903</b>	□				

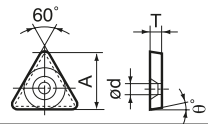
# SPARE PARTS

## Shim, Nut

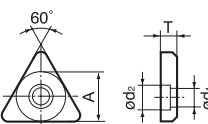
### Shim

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d <sub>1</sub>	d <sub>2</sub>
	<b>SSW423</b>	●	12,65	3,18	6,2	8
	<b>SSW433</b>	●	12,65	4,76	6,2	8
	<b>SSW635</b>	●	19	4,76	9	11,5

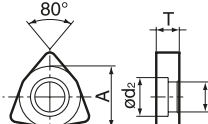
  

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d	θ°
	<b>STPD322</b>	●	8,4	3,18	3,4	6
	<b>STPD422</b>	●	11,0	3,18	3,4	6

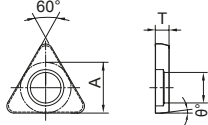
  

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d <sub>1</sub>	d <sub>2</sub>
	<b>STW323</b>	●	9,5	3,18	4,7	6,5
	<b>STW434</b>	●	12,65	4,76	6,2	8

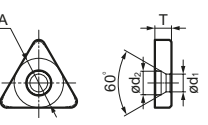
  

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d <sub>1</sub>	d <sub>2</sub>
	<b>SWW433</b>	●	12,65	5,15	6,2	8
	<b>SWW444</b>	●				
	<b>LSW317</b>	●				

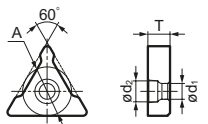
  

	Cat. No.	Stock	Dimensions (mm)				
			A	T	d <sub>1</sub>	d <sub>2</sub>	θ°
	<b>TCS16T3</b>	●	8,8	2,38	5,3	6,3	7

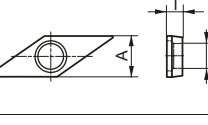
  

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d <sub>1</sub>	d <sub>2</sub>
	<b>TNS1604</b>	●	9,45	4,76	3,4	4,5
	<b>TNS1603B</b>	●	9,45	3,18	3,4	4,5
	<b>TNS1604B</b>	●	9,45	4,76	3,4	4,5

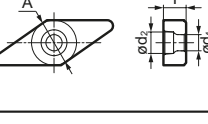
  

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d <sub>1</sub>	d <sub>2</sub>
	<b>TRW5505</b>	●	10,5	4,76	3,4	4,5


  

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d <sub>1</sub>	d <sub>2</sub>
	<b>VCS1604</b>	●	8,25	3,18	5,3	6,4

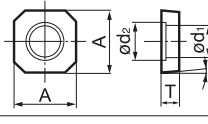
  

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d <sub>1</sub>	d <sub>2</sub>
	<b>VNS1604</b>	●	9,45	4,76	3,4	4,5

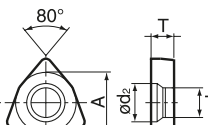
### Shim

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d <sub>1</sub>	d <sub>2</sub>
	<b>WFXS4R</b>	●	10,17	3,0	5,5	7,5

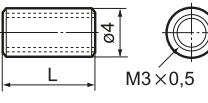
  

	Cat. No.	Stock	Dimensions (mm)				
			A	T	d <sub>1</sub>	d <sub>2</sub>	θ°
	<b>WGCS13R</b>	●	10,7	3,0	5,5	7,5	5

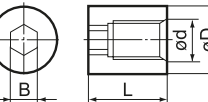
  

	Cat. No.	Stock	Dimensions (mm)			
			A	T	d <sub>1</sub>	d <sub>2</sub>
	<b>WNS0604</b>	●	9,52	3,18	3,5	4,5
	<b>WNS0804</b>	●	12,57	4,76	4,4	6,3
	<b>WNS0603B</b>	●	9,27	3,18	3,4	4,5
	<b>WNS0803B</b>	●	12,57	3,18	3,4	4,5
	<b>WNS0804B</b>	●	12,57	4,76	4,4	6,0

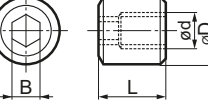
### Nut

	Cat. No.	Stock	Dimensions (mm)			
			L	d	D	B
	<b>BNBW-2</b>	●	3			
	<b>BNBW-4</b>	□	4			
	<b>BNBW-7</b>	□	7			

	Cat. No.	Stock	Dimensions (mm)			
			d	L	D	B
	<b>CPM32N</b>	●	M4	7,5	7	3
	<b>CPM43N</b>	●	M5	8,5	7	3
	<b>CPM43S</b>	●	M5	6	7	3
	<b>CPM54N</b>	□				

	Cat. No.	Stock	Dimensions (mm)				
			d	Pitch	L	D	B
	<b>CPV33N</b>	●	M4	0,5	6,0	6,0	2,5

# SPARE PARTS

## Shim Pin, Eccentric Pin

### Shim Pin

	Cat. No.	Stock	Dimensions (mm)					
	HE060011P	●	M6	0,75	14,5	7,8	5,0	2,5
	Cat. No.	Stock	Dimensions (mm)					
	LP04	●	0,4	1,1	4,7			
	LP06	●	0,4	1,1	6,0			
	LP07	●	0,4	1,1	7,7			
	Cat. No.	Stock	Dimensions (mm)					
	LSP3		5	3,5	5,5			
	LSP3SD	●	5	3,5	5,5			
	LSP4		6,7	4	7			
	LSP4SD	●	6,7	4	7			
	LSP5SD	●	7,7	4,5	8,5			
	LSP6SD	●	9,85	5,9	11,1			
	LSP8		13,05	10	12			
	LSP10	●	5	3,3	6,5			
	LSP16	●	6,6	4,5	9			
	LSP20	●	8,2	5,5	9			
	LSP25		9,8	6,5	11			
LSP32		13	10	12				
	Cat. No.	Stock	Dimensions (mm)					
	MP317		M4	0,7	15,5	6	4	3,7
	MP320	●	M4	0,7	19,5	6	4	3,7
	MP416	●	M5	0,8	14	7,5	6	5
	MP420	●	M5	0,8	20	7,5	6	5
	MP432	●	M5	0,8	32	7,5	6	5
	MP531	●						
	MP534	□						
	Cat. No.	Stock	Dimensions (mm)					
	SPP308	●	3,2		8	4,8		120
	Cat. No.	Stock	Dimensions (mm)					
	SPP3	●			14	3,2		
	Cat. No.	Stock	Dimensions (mm)					
	VP20	●	M3,5	M4	12,0	5,0	≥4,5	≥4,5
	VP25	●	M3,5	M4	17,0	5,0	≥4,5	≥4,5
	VP32	●	M3,5	M4	24,0	5,0	≥4,5	≥4,5
	Cat. No.	Stock	Dimensions (mm)					
	VP32B	●	M3,5	0,6	8,0	1,4	5,0	6,5
VP40B	●	M3,5	0,6	11,5	1,4	5,0	6,5	

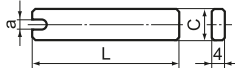
### Eccentric Pin

	Cat. No.	Stock	Dimensions (mm)					
	CPB34	●	3,4	4,1	5,5	14	5	2,5
	CPB35	□	3,4	4,1	5,5	17	5	2,5
	CPB42	●	4,5	5,5	7	14	5	3
	CPB43	●	4,5	5,5	7	16	5	3
	CPB43S	●	4,5	5,5	7	19	5	3
	CPB44T	□	4,5	5,5	7	22	5	3
	CPB45T	●	4,5	5,5	7	27	5	3
CPB64	●	6,8	8,2	10,5	24	6,6	4	
	Cat. No.	Stock	Dimensions (mm)					
	CPU304C	□	3,3	5,5	-	10	3,5	3


# SPARE PARTS

## Wrench

### Wrench

Key Wrench	Cat. No.	Stock	Dimensions (mm)			
			L	a	C	
	KY25		45	2,5	10	
	KY40		60	4	13	

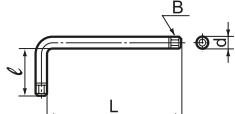
  

Hex Wrench (Hexagonal)	Cat. No.	Stock	Dimensions (mm)			
			B	L	ℓ	
	LH020	●	2	50	16	
	LH025	●	2,5	56	18	
	LH030	●	3	63	20	
	LH035	●	3,5	68	22	
	LH040	●	4	70	25	
	LH050	□	5	80	28	
	LH060	□	6	90	32	

	Cat. No.	Stock	Dimensions (mm)			
			B	C	b <sub>1</sub>	
	LH035K	●				
	LH045K	●				

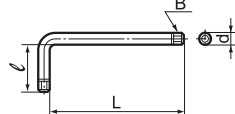
  

Torx Wrench	Cat. No.	Stock	Dimensions (mm)			
			B	d	L	ℓ
	LT0806		T8	2,3	45,0	6,0
	LT20	□	T20	3,9	57,2	19,1
	LT25	□	T25	4,4	60,3	20,2
	LT27	●	T27	4,96	63,5	21,5
	LT1510	○	T15	3,26	62	10

	Cat. No.	Stock	Dimensions (mm)			
			B	C	b <sub>1</sub>	
	LT15K	●				

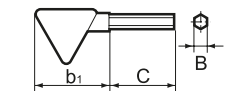
  

Torx Plus Wrench	Cat. No.	Stock	Dimensions (mm)			
			B	d	L	ℓ
	LT20IP		T20	4,0	57	18,5
	LT25IP		T25	4,5	60	19,5

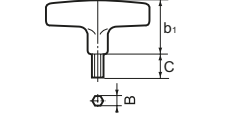
  

	Cat. No.	Stock	Dimensions (mm)			
			B	C	b <sub>1</sub>	
	SDBSM	●				

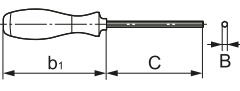
  

Hex Wrench (Hexagonal)	Cat. No.	Stock	Dimensions (mm)		
			B	b <sub>1</sub>	C
	TH015	●	1,5	35	30
	TH020	●	2	35	39
	TH025	●	2,5	35	39

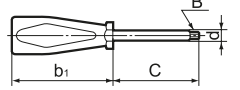
  

Hex Wrench (Hexagonal)	Cat. No.	Stock	Dimensions (mm)		
			B	b <sub>1</sub>	C
	TH030	●	3	48	28
	TH040	●	4	48	37
	TH050	●	5	48	45

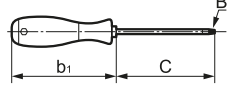
### Wrench

Hex Wrench (Hexagonal)	Cat. No.	Stock	Dimensions (mm)		
			B	C	b <sub>1</sub>
	HD040	○	4	75	111

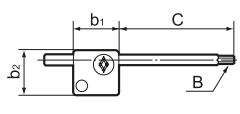
  

Torx Wrench	Cat. No.	Stock	Dimensions (mm)			
			B	d	C	B <sub>1</sub>
	TRD07	●	T7	2,0	45	70
	TRD08	●	T8	2,3	55	70
	TRD15	□	T15	3,3	70	100
	TRD20	●	T20	3,9	100	90
	TRD25	●	T25	5,3	80	110

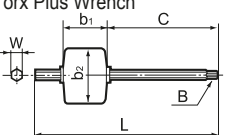
  

Torx Plus Wrench	Cat. No.	Stock	Dimensions (mm)		
			B	C	b <sub>1</sub>
	TRDR08IP	●	8IP	60	104
	TRDR10IP	●	10IP	80	111
	TRDR15IP	●	15IP	80	111
	TRDR20IP	●	20IP	100	118
	TRDR25IP	●	25IP	100	118

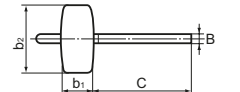
  

Torx Wrench	Cat. No.	Stock	Dimensions (mm)			
			B	C	b <sub>1</sub>	b <sub>2</sub>
	TRX06	●	T6	35,5	15	15
	TRX08	●	T8	38,5	19	19
	TRX10	●	T10	42,1	22	22
	TRX15	●	T15	46	22	27
	TRX20	●	T20	49	22	30

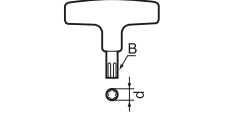
  

Torx Plus Wrench	Cat. No.	Stock	Dimensions (mm)					
			B	W	L	C	b <sub>1</sub>	b <sub>2</sub>
	TRX06IP	●						
	TRX08IP	●						
	TRX10IP	●						
	TRX15IP	●	T15	3,5	85,5	47	23	29

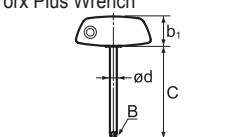
  

Hex Wrench (Hexagonal)	Cat. No.	Stock	Dimensions (mm)			
			B	C	b <sub>1</sub>	b <sub>2</sub>
	TSW040	●	4	60	20	40

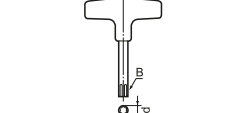
  

Torx Wrench	Cat. No.	Stock	Dimensions (mm)		
			B	d	
	TT25	●	T25	4,4	
	TT27	●	T27	5,0	

Torx Plus Wrench	Cat. No.	Stock	Dimensions (mm)			
			B	d	C	b <sub>1</sub>
	TTR15IP	●	15IP	4,0	80	25,5

Torx Wrench	Cat. No.	Stock	Dimensions (mm)		
			B	d	
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	TTX20	●	T20	3,9	

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SOMT*****PDER-H	G28, G31, G47, H13,	Indexable insert
	H17, H45, H46	Indexable insert
SOMT*****PZER-L	G28, G30, G46, H13,	Indexable insert
	H16, H45, H46	Indexable insert
SOMT*****PZER-G	G28, G30, G46, H13,	Indexable insert
	H16, H45, H46	Indexable insert
SOMT*****PZER-H	G28, G30, G46, H13,	Indexable insert
	H16, H45, H46	Indexable insert
SPGN*****	C69	Indexable insert
SPGT*****LSD/RSD	C68	Indexable insert
SPGW*****T	C68	Indexable insert
SPMA*****	H47	Indexable insert
SPMA*****T	H47	Indexable insert
SPMN*****	C69	Indexable insert
SPMR*****NFK	C69	Indexable insert
SPMR*****NSF	C69	Indexable insert
SPMR*****NUJ	C69	Indexable insert
SPMT*****	H37	Indexable insert
SPMT*****NFB	C68	Indexable insert
SPMT*****NFK	C68	Indexable insert
SPMT*****NLB	C68	Indexable insert
SPMT*****NLU	C68	Indexable insert
SPMT*****NSF	C68	Indexable insert
SPP*	D25, D26, D27, P7	Spare parts
SPP**	P7	Spare parts
SRDC N ****_**	D35	Tool holder
SRF**R-ST	G51, M47	Cutter
SRF**RS	G51, M47	Cutter
SRFJ	G51, M47, P4	Spare parts
SRND**	D26, P5	Spare parts
SRNS**SD	D35	Spare parts
SRSC R/L ****_**	D35	Tool holder
SSBC R/L ****_**	D36	Tool holder
SSEH***R**	J39	Solid endmill
SSEH***W-R**	J24	Solid endmill
SSEH***WS-R**	J24	Solid endmill
SSEHVL ****-R**	J39	Solid endmill
SSEHVL ****W-R**	J23	Solid endmill
SSEHVL ****WS-R**	J23	Solid endmill
SSM***	J40, J41	Solid endmill
SSM***ZX	J29	Solid endmill
SSN****	D25, P5	Spare parts
SSND***	D25, D27, P5	Spare parts
SSUP***ZX	J33	Solid endmill
SSUP***ZX-R**	J33	Solid endmill
SSW***	P6	Spare parts
STAC R/L ****_**	D37	Tool holder
STER****	F46	Tool holder
STFH**_*	F38	Tool holder
STFS R/L ****_*	F38	Tool holder
STGC R/L ****_**	D37	Tool holder
STIR***	F47	Tool holder
STPD***	P6	Spare parts
STW***	D23, P6	Spare parts
SUF*S R/L	G14	Spare parts
SVJB R/L ****_**	D38	Tool holder
SVLC R/L ****_**	D39	Tool holder
SVP**	D38, E21, E22	Spare parts
SVPB R/L ****_**	D38	Tool holder
SVPC R/L ****_**	D39	Tool holder
SVVB N ****_**	D38	Tool holder
SVW***	P5	Spare parts
SWW***	D24, P6	Spare parts
TBGN*****	C78	Indexable insert
TBGN*****B	M20	SUMIBORON Insert
TBGN*****NF	M20	SUMIDIA Insert
TBGR*****LW	C78	Indexable insert
TBGT*****LFW/RFW	C70	Indexable insert
TBGT*****LFX/RFX	C70	Indexable insert
TBGT*****LFY/RFY	C70	Indexable insert
TBGT*****LW/RW	C70	Indexable insert
TBGW*****	C70	Indexable insert

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TBGW*****NF.....	M20.....	SUMIDIA Insert	TNMG*****NFA.....	C40.....	Indexable insert
TCGT*****LFX/RFX.....	C71.....	Indexable insert	TNMG*****NFB.....	C40.....	Indexable insert
TCGT*****LFY/RFY.....	C71.....	Indexable insert	TNMG*****NFE.....	C40.....	Indexable insert
TCGT*****M NSC.....	C71.....	Indexable insert	TNMG*****NFL.....	C40.....	Indexable insert
TCGT*****M NSI.....	C71.....	Indexable insert	TNMG*****NGE.....	C41.....	Indexable insert
TCGT*****NAG.....	C71.....	Indexable insert	TNMG*****NGU.....	C41.....	Indexable insert
TCGW*****NC.....	M21.....	SUMIBORON Insert	TNMG*****NGZ.....	C44.....	Indexable insert
TCGW*****NC-3.....	M21.....	SUMIBORON Insert	TNMG*****NLU.....	C40.....	Indexable insert
TCGW*****NU.....	M21.....	SUMIBORON Insert	TNMG*****NME.....	C43.....	Indexable insert
TCMT*****NF.....	M21.....	SUMIDIA Insert	TNMG*****NMU.....	C43.....	Indexable insert
TCMT*****NFB.....	C72.....	Indexable insert	TNMG*****NMX.....	C43.....	Indexable insert
TCMT*****NFP.....	C72.....	Indexable insert	TNMG*****NSE.....	C41.....	Indexable insert
TCMT*****NLB.....	C72.....	Indexable insert	TNMG*****NSU.....	C40.....	Indexable insert
TCMT*****NLU.....	C72.....	Indexable insert	TNMG*****NSX.....	C41.....	Indexable insert
TCMT*****NSK.....	C72.....	Indexable insert	TNMG*****NUG.....	C42.....	Indexable insert
TCMT*****NSU.....	C72.....	Indexable insert	TNMG*****NUP.....	C42.....	Indexable insert
TCMW*****.....	C72.....	Indexable insert	TNMG*****NUX.....	C43.....	Indexable insert
TCS**T*.....	D44, P6.....	Spare parts	TNMG*****NUZ.....	C44.....	Indexable insert
TEGN*****.....	C79.....	Indexable insert	TNMM*****NHG.....	C45.....	Indexable insert
TGA R/L ****BF.....	F35.....	Indexable insert	TNMM*****NHP.....	C45.....	Indexable insert
TF**.....	M42.....	Spare parts	TNMM*****NMP.....	C45.....	Indexable insert
TH**.....	D31, D32, G50, G51, G53.....	Spare parts	TNS****.....	D15, D42, P6.....	Spare parts
.....	M38, M39, M40, M41, M45.....	.....	TNS****B.....	E12, P6.....	Spare parts
.....	M46, M47, M49, P8.....	.....	TPGN*****.....	C78.....	Indexable insert
TME****R.....	F46.....	Indexable Insert	TPGN*****NF.....	M24.....	SUMIDIA Insert
TME**R.....	F46.....	Indexable Insert	TPGN*****NU.....	M24.....	SUMIBORON Insert
TMI****R.....	F47.....	Indexable Insert	TPGR*****LW/RW.....	C78.....	Indexable insert
TMI**R.....	F47.....	Indexable Insert	TPGT*****LFW/RFW.....	C73.....	Indexable insert
TNGA*****.....	C48.....	Indexable insert	TPGT*****LFX/RFX.....	C73.....	Indexable insert
TNGA*****ES-NC6.....	M22.....	SUMIBORON insert	TPGT*****LFY/RFY.....	C74.....	Indexable insert
TNGA*****HS-NC3.....	M22.....	SUMIBORON insert	TPGT*****LSD/RSD.....	C75.....	Indexable insert
TNGA*****HS-NC6.....	M22.....	SUMIBORON insert	TPGX*****L/R-SDW.....	C75.....	Indexable insert
TNGA*****HS-NU3.....	M23.....	SUMIBORON insert	TPGT*****LW/RW.....	C75.....	Indexable insert
TNGA*****LE-NC3.....	M22.....	SUMIBORON insert	TPGT*****M NFC.....	C73.....	Indexable insert
TNGA*****LS-NC3.....	M22.....	SUMIBORON insert	TPGT*****N-FV NC3.....	M25.....	SUMIBORON Insert
TNGA*****LT-NC3.....	M22.....	SUMIBORON insert	TPGT*****N-FV NU3.....	M26.....	SUMIBORON Insert
TNGA*****LF-NU3.....	M23.....	SUMIBORON insert	TPGW*****.....	C74.....	Indexable insert
TNGA*****NC-6.....	M22.....	SUMIBORON Insert	TPGW*****.....	M26.....	SUMIBORON Insert
TNGA*****NU-3.....	M23.....	SUMIBORON Insert	TPGW*****LE-NC3.....	M25.....	SUMIBORON Insert
TNGG*****LFT/RFT.....	C47.....	Indexable insert	TPGW*****LS-NC3.....	M25.....	SUMIBORON Insert
TNGG*****LFY/RFY.....	C47.....	Indexable insert	TPGW*****LT-NC3.....	M25.....	SUMIBORON Insert
TNGG*****LFX/RFX.....	C47.....	Indexable insert	TPGW*****NC.....	M25.....	SUMIBORON Insert
TNGG*****LST/RST.....	C47.....	Indexable insert	TPGW*****NC3.....	M25.....	SUMIBORON Insert
TNGG*****LUM/RUM.....	C48.....	Indexable insert	TPGW*****NF.....	M26.....	SUMIDIA Insert
TNGG*****N-FV NC6.....	M22.....	SUMIBORON Insert	TPGW*****NU.....	M26.....	SUMIBORON Insert
TNGG*****N-LV NC6.....	M22.....	SUMIBORON Insert	TPMH*****NSF.....	C77.....	Indexable insert
TNGG*****NGH.....	C48.....	Indexable insert	TPMN*****.....	C79.....	Indexable insert
TNGG*****NSU.....	C47.....	Indexable insert	TPMR*****NFK.....	C79.....	Indexable insert
TNGG*****N-SV NC6.....	M22.....	SUMIBORON Insert	TPMR*****NSF.....	C79.....	Indexable insert
TNGM*****N-LV NU3.....	M23.....	SUMIBORON Insert	TPMR*****NUJ.....	C79.....	Indexable insert
TNMA*****.....	C46.....	Indexable insert	TPMT*****L-DM NU.....	M27.....	SUMIDIA Insert
TNMA*****.....	M24.....	SUMIBORON Insert	TPMT*****NFB.....	C76.....	Indexable insert
TNMA*****NU.....	M24.....	SUMIBORON Insert	TPMT*****NFK.....	C76.....	Indexable insert
TNMG*****LHM/RHM.....	C44.....	Indexable insert	TPMT*****N-GD NF.....	M27.....	SUMIDIA Insert
TNMG*****LUM/RUM.....	C42.....	Indexable insert	TPMT*****N-LD NF.....	M27.....	SUMIDIA Insert
TNMG*****NEF.....	C40.....	Indexable insert	TPMT*****NLB.....	C76.....	Indexable insert
TNMG*****NEG.....	C42.....	Indexable insert	TPMT*****NLU.....	C76.....	Indexable insert
TNMG*****NEM.....	C43.....	Indexable insert	TPMT*****NMU.....	C77.....	Indexable insert
TNMG*****NEX.....	C42.....	Indexable insert	TPMT*****NSF.....	C77.....	Indexable insert

TPMT*****NSU.....	C77.....	Indexable insert	VBGW*****NC-2.....	M28.....	SUMIBORON Insert
TPMW*****RH.....	M33.....	SUMIDIA Insert	VBGW*****NU.....	M28.....	SUMIBORON Insert
TRCP*.....	D11, E11.....	Spare parts	VBGW*****NU-2.....	M28.....	SUMIBORON Insert
TRD**.....	D12, D14, E24, G48, G49,.....	Spare parts	VBMT*****NFB.....	C80.....	Indexable insert
	G51, H28, H29, H31, H37, H39.....		VBMT*****NFP.....	C80.....	Indexable insert
	K65, K66, K67, K68, K75, M47,.....		VBMT*****NLB.....	C80.....	Indexable insert
	P8.....		VBMT*****NLU.....	C80.....	Indexable insert
TRDR**IP.....	G9, G11, G12, G16, G19.....	Spare parts	VBMT*****NMU.....	C80.....	Indexable insert
	G23, G26, G30, G31, G34,.....		VBMT*****NSK.....	C80.....	Indexable insert
	G35, G38, G39, G43, G46, G47,.....		VBMT*****NSU.....	C80.....	Indexable insert
	H6, H7, H9, H10, H13,.....		VBMW*****.....	C80.....	Indexable insert
	H15, H16, H17, H19, H33,.....		VCGT*****LFX/RFX.....	C82.....	Indexable insert
	H34, H40, H41, H42, H43,.....		VCGT*****LFY/RFY.....	C82.....	Indexable insert
	H45, H46, K56, K60, K63, P8.....		VCGT*****M NFC.....	C82.....	Indexable insert
TRM*****-FL.....	C46, D11, E11.....	Indexable insert	VCGT*****M NSI.....	C82.....	Indexable insert
TRM*****-GU.....	C46, D11, E11.....	Indexable insert	VCGT*****NAG.....	C82.....	Indexable insert
TRM*****-LU.....	C46, D11, E11.....	Indexable insert	VCGW*****NC2.....	M29.....	SUMIBORON Insert
TRM*****-SU.....	C46, D11, E11.....	Indexable insert	VCMT*****NF.....	M29.....	SUMIDIA Insert
TRW****.....	D11, E11, P6.....	Spare parts	VCMT*****NFB.....	C83.....	Indexable insert
TRX**.....	D11, D12, D13, D14, D15, D16.....	Spare parts	VCMT*****N-LD NF.....	M29.....	SUMIDIA Insert
	D17, D30, D31, D32, D33, D36.....		VCMT*****N-GD NF.....	M29.....	SUMIDIA Insert
	D37, D38, D39, D41, D42.....		VCMT*****NLB.....	C83.....	Indexable insert
	E8, E9, E11, E12, E13.....		VCMT*****NLU.....	C83.....	Indexable insert
	E14, E15, E16, E17, E18.....		VCMT*****NSK.....	C83.....	Indexable insert
	E19, E20, E21, E22, E23.....		VCMT*****NSU.....	C83.....	Indexable insert
	F34, F35, F36, F46, F47,.....		VCMW*****RH.....	M33.....	SUMIDIA Insert
	G53, H37, H47, K65, K66, K67.....		VCS****.....	D44, P6.....	Spare parts
	K68, K75, M41, M42, M43, M49.....		VNGA*****ES-NC4.....	M30.....	SUMIBORON Insert
	P8.....		VNGA*****LT-NC2.....	M30.....	SUMIBORON Insert
TRX**IP.....	G38, H22, P8.....	Spare parts	VNGA*****NC2.....	M30.....	SUMIBORON Insert
TRX**IP**.....	D35.....	Spare parts	VNGA*****NC4.....	M30.....	SUMIBORON Insert
TSX*****E.....	G32, H18, H19.....	Indexable endmill	VNGA*****NU2.....	M30.....	SUMIBORON Insert
TSXF*****E.....	G32, H18, H19.....	Indexable endmill	VNGG*****N-FV NC2.....	M30.....	SUMIBORON Insert
TSXM*****E.....	G32, H18, H19.....	Indexable endmill	VNGG*****N-LV NC2.....	M30.....	SUMIBORON Insert
TSX*****RS.....	G32, G34, G35, H18.....	Cutter	VNGM*****N-LV NU2.....	M31.....	SUMIBORON Insert
TSXF*****RS.....	G32, G34, H18.....	Cutter	VNMA*****.....	C49.....	Indexable insert
TSXM*****RS.....	G32, G35, H18.....	Cutter	VNMA*****.....	M31.....	SUMIBORON Insert
TSW***.....	D11, E11, P8.....	Spare parts	VNMA*****NU.....	M31.....	SUMIBORON Insert
TT**.....	G14, P8.....	Spare parts	VNMA*****RH.....	M33.....	SUMIDIA Insert
TTR**IP.....	G37, P8.....	Spare parts	VNMG*****NEF.....	C49.....	Indexable insert
TTX**.....	G50, M46, P8.....	Spare parts	VNMG*****NEG.....	C50.....	Indexable insert
TTX**W.....	G40, G42, P8.....	Spare parts	VNMG*****NEX.....	C51.....	Indexable insert
TWE****R.....	F26.....	Insert	VNMG*****NFA.....	C49.....	Indexable insert
UF*K R/L.....	G14.....	Spare parts	VNMG*****NFB.....	C49.....	Indexable insert
UF*S R/L.....	G14.....	Spare parts	VNMG*****NFE.....	C49.....	Indexable insert
UFKW R/L.....	G14.....	Spare parts	VNMG*****NFL.....	C49.....	Indexable insert
UFO**** R/L-S.....	G14.....	Cutter	VNMG*****NGE.....	C50.....	Indexable insert
UFO**** R/L-S.....	G15.....	Cutter	VNMG*****NGU.....	C50.....	Indexable insert
UFTW R/L.....	G14.....	Spare parts	VNMG*****NGZ.....	C51.....	Indexable insert
UW*****R.....	G15.....	Indexable Insert	VNMG*****NLU.....	C49.....	Indexable insert
VBGT*****LFX/RFX.....	C81.....	Indexable insert	VNMG*****NSE.....	C50.....	Indexable insert
VBGT*****LFY/RFY.....	C81.....	Indexable insert	VNMG*****NSU.....	C50.....	Indexable insert
VBGT*****LFYS/RFYS.....	C81.....	Indexable insert	VNMG*****NSX.....	C50.....	Indexable insert
VBGT*****M NSI.....	C81.....	Indexable insert	VNMG*****NUG.....	C50.....	Indexable insert
VBGW*****HS-NC2.....	M28.....	SUMIBORON insert	VNMG*****NUP.....	C51.....	Indexable insert
VBGW*****LE-NC2.....	M28.....	SUMIBORON insert	VNMG*****NUX.....	C51.....	Indexable insert
VBGW*****LS-NC2.....	M28.....	SUMIBORON insert	VNMG*****NUZ.....	C51.....	Indexable insert
VBGW*****LT-NC2.....	M28.....	SUMIBORON insert	VNMX*****NF.....	M31.....	SUMIDIA Insert
VBGW*****NC.....	M28.....	SUMIBORON Insert	VNS****.....	D16, P6.....	Spare parts

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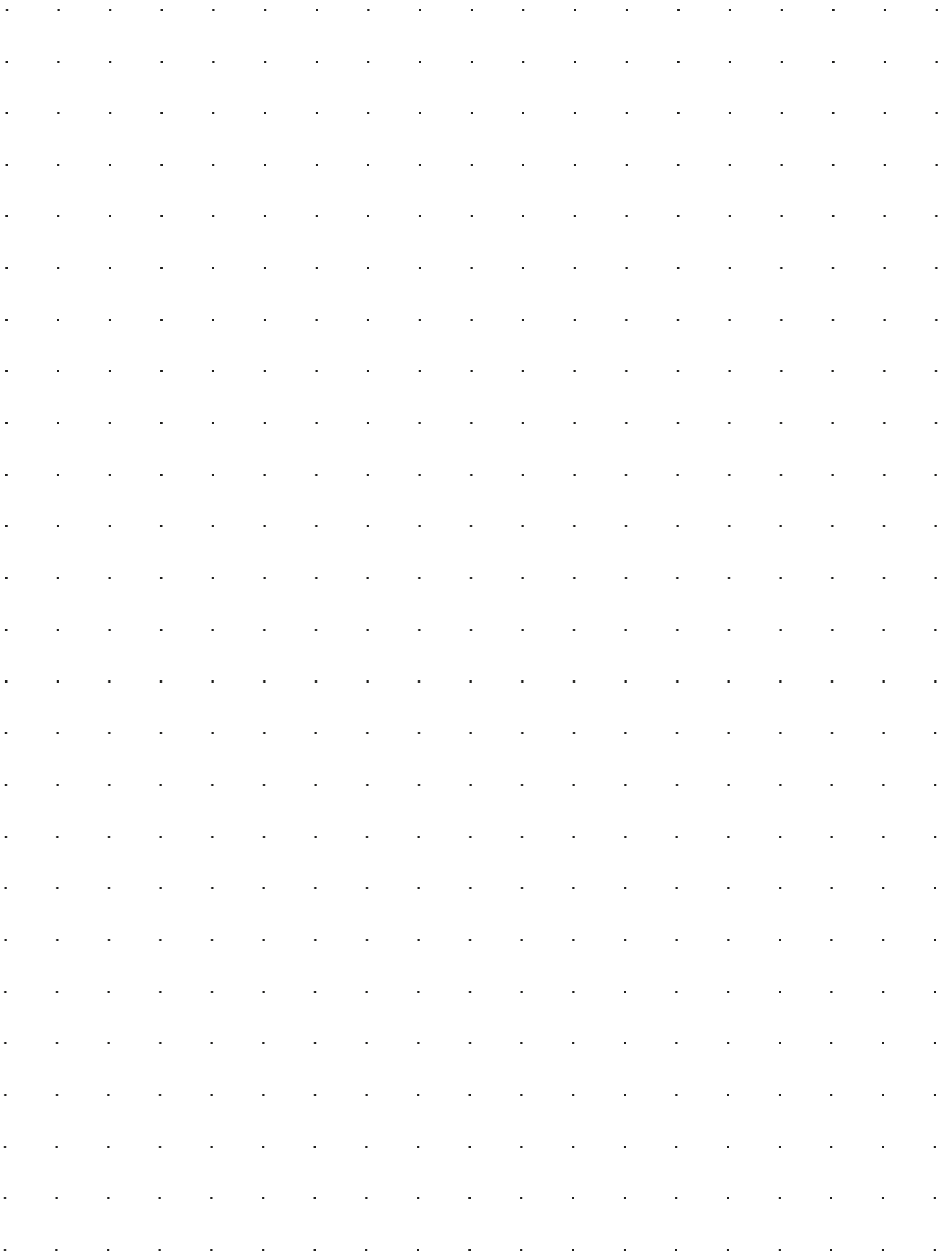
VP**	D38, P7	Spare parts	WFXM****E	G28, H16	Indexable endmill
VP*B	E21, E22, P7	Spare parts	WFX****M	G28	Indexable endmill
WAS*****	K70	Eccentric sleeve	WFX****M**Z*	H16	Indexable endmill
WAX****E**	H28, H29	Indexable endmill	WFX****RS	G28, G30, G31	Cutter
WAX****EL**	H28, H29	Indexable endmill	WFXC****E	G28, H44, H45	Cutter
WAX****RS	G48, G49	Indexable endmill	WFXC****M	G28, H46	Cutter
WB*-*	P4	Spare parts	WFXF****R	G28	Cutter
WB*-**	D25, E13, F39, F41, G53	Spare parts	WFXF****RS	G28, G30, G31	Cutter
	M49, P4		WFXH****M	G28, H12	Cutter
WB*F-**	P4	Spare parts	WFXH****M**Z*	H13	Cutter
WB**T	D25, D26, F34, G14, P4	Spare parts	WFXH****RS	G28, G44, G46, G47	Cutter
WB*F**T	P4	Spare parts	WFXH****RSZ6	G44, G46	Cutter
WB*-**TL	F34, P4	Spare parts	WFXM****R	G28	Cutter
WB*F**TL	P4	Spare parts	WFXM****RS	G28, G30	Cutter
WB*R**T	P4	Spare parts	WFXS*R	G31, H17, P6	Spare parts
WBG****LFW/RFW	C84	Indexable insert	WGC****RS	G12	Cutter
WBG****LFX/RFX	C84	Indexable insert	WGC****RS	G12	Cutter
WBG****LFY/RFY	C84	Indexable insert	WGCM****RS	G12	Cutter
WBG****LW/RW	C84	Indexable insert	WGCS**R	G11, G12, H7, P6	Spare parts
WBMF****L	H39	Indexable endmill	WGX****EW	H7	Indexable endmill
WBMF****M	H39	Indexable endmill	WGX****RS	G10	Cutter
WBMF****MM**N	H39	Indexable endmill	WGX****RS	G10	Cutter
WBMF****S	H39	Indexable endmill	WGX****RS	G10	Cutter
WBMR****LL	H37	Indexable endmill	WGX****RS	G10	Cutter
WBMR****LLW	H37	Indexable endmill	WMM****E	H31	Indexable endmill
WBMR****M	H37	Indexable endmill	WMM****EL	H31	Indexable endmill
WBMR****MW	H37	Indexable endmill	WMM****ELW	H31	Indexable endmill
WBMR****S	H37	Indexable endmill	WMM****EW	H31	Indexable endmill
WCFH**.*	F41, F42	Tool holder	WMMH****ELW	H31	Indexable endmill
WCFL*	F37	Indexable Inserts	WMMH****EW	H31	Indexable endmill
WCFL*A/B	F37	Indexable Inserts	WNGA****LT-NC3	M32	SUMIBORON Insert
WCFN*	F37	Indexable Inserts	WNGA****NC6	M32	SUMIBORON Insert
WCFN*A/B	F37	Indexable Inserts	WNGA****NC-WG6	M32	SUMIBORON Insert
WCFN*T	F37	Indexable Inserts	WNGA****NC-WH6	M32	SUMIBORON Insert
WCFR*	F37	Indexable Inserts	WNGG****NSU	C56	Indexable insert
WCFR*A/B	F37	Indexable Inserts	WNMA****	C56	Indexable insert
WCFS R/L **.*	F42	Tool holder	WNMG****NEF	C53	Indexable insert
WCFS R/L ****.*	F42	Tool holder	WNMG****NEG	C54	Indexable insert
WDMT****ZDTR	G43, H9, H10	Indexable insert	WNMG****NEM	C54	Indexable insert
WDMT****ZDTR-H	G43, H9, H10	Indexable insert	WNMG****NEX	C54	Indexable insert
WDX**D2S**	K65, K72	Multi-Drill	WNMG****NFA	C52	Indexable insert
WDX**D3S**	K66, K72	Multi-Drill	WNMG****NFB	C52	Indexable insert
WDX**D4S**	K67, K73	Multi-Drill	WNMG****NFE	C52	Indexable insert
WDX**D5S**	K68, K73	Multi-Drill	WNMG****NFL	C52	Indexable insert
WDXT****G	K65, K66, K67, K68, K75	Indexable insert	WNMG****NGE	C54	Indexable insert
WDXT****H	K65, K66, K67, K68, K75	Indexable insert	WNMG****NGU	C53	Indexable insert
WDXT****L	K65, K66, K67, K68, K75	Indexable insert	WNMG****NGU-W	C53	Indexable insert
WEX****E	H22, H23, H24	Indexable endmill	WNMG****NGZ	C55	Indexable insert
WEX****E**	H24	Indexable endmill	WNMG****NLU	C52	Indexable insert
WEX****EL	H22, H23, H24	Indexable endmill	WNMG****NLU-W	C52	Indexable insert
WEX****EL**	H22, H23	Indexable endmill	WNMG****NME	C55	Indexable insert
WEX****EL**Z*	H23	Indexable endmill	WNMG****NMU	C55	Indexable insert
WEX****EW	H23, H24	Indexable endmill	WNMG****NMX	C55	Indexable insert
WEX****F	G38	Indexable endmill	WNMG****NSE	C53	Indexable insert
WEX****M**Z*	H23, H24	Indexable endmill	WNMG****NSE-W	C53	Indexable insert
WFX****E	G28, H16, H17	Indexable endmill	WNMG****NSU	C53	Indexable insert
WFX****R	G28	Indexable endmill	WNMG****NSX	C53	Indexable insert
WFX****E**	H16	Indexable endmill	WNMG****NUG	C54	Indexable insert
WFXF****E	G28, H17	Indexable endmill	WNMG****NUP	C54	Indexable insert
			WNMG****NUX	C55	Indexable insert



WNMG*****NUZ .....	C55 .....	Indexable insert
WNMM*****NHG .....	C56 .....	Indexable insert
WNMM*****NMP .....	C56 .....	Indexable insert
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WNS****B .....	E13, P6 .....	Spare parts
WPMT*****NLB .....	C85 .....	Indexable Insert
WRCX****EL .....	H40 .....	Indexable endmill
WRCX****EM .....	H40 .....	Indexable endmill
WRCX****ES .....	H40 .....	Indexable endmill
WRCX****M*Z* .....	H35 .....	Indexable endmill
WRCX****RS .....	G19 .....	Cutter
WRCXF****RS .....	G19 .....	Cutter
WRCX****RS .....	G19 .....	Cutter
WRX****RH **E** .....	H33, H34 .....	Indexable endmill
WRX****RH **F** .....	G39 .....	Indexable endmill
WRX****RH **W** .....	H33, H34 .....	Indexable endmill
XCLN R/L ****_* .....	D27 .....	Tool holder
XEEW****AGER-W .....	G13, .....	Indexable Insert
XEEW****AGER-WR .....	G11, H7 .....	Indexable Insert
XEEW****AGFR-W-NF .....	G13 .....	Indexable Insert
XNEU****ANEN-W .....	G9, H6 .....	Indexable Insert
XNMM****PNER-G .....	G25, G27, H14, H15 .....	Indexable Insert
XNMM****PNER-H .....	G25, G27, H14, H15 .....	Indexable Insert
XNMM****PNER-L .....	G25, G27, H14, H15 .....	Indexable Insert
XOEW****PDTR-W .....	G31, H17 .....	Indexable Insert
XOEW****PZTR-W .....	G30, H16 .....	Indexable Insert
XSBN R/L ****_* .....	D27 .....	Tool holder
ZNEX*****LE-NC .....	M32 .....	SUMIBORON Insert
ZNEX*****LT-NC .....	M32 .....	SUMIBORON Insert
ZNEX*****NC .....	M32 .....	SUMIBORON Insert
ZNEX*****NU .....	M32 .....	SUMIBORON Insert
ZNMT***** .....	H37 .....	Indexable Insert
ZNMT*****-C .....	H37 .....	Indexable Insert
ZNMT*****-N .....	H37 .....	Indexable Insert
ZNMT*****-S .....	H37 .....	Indexable Insert
ZPGU***** .....	H39 .....	Indexable Insert

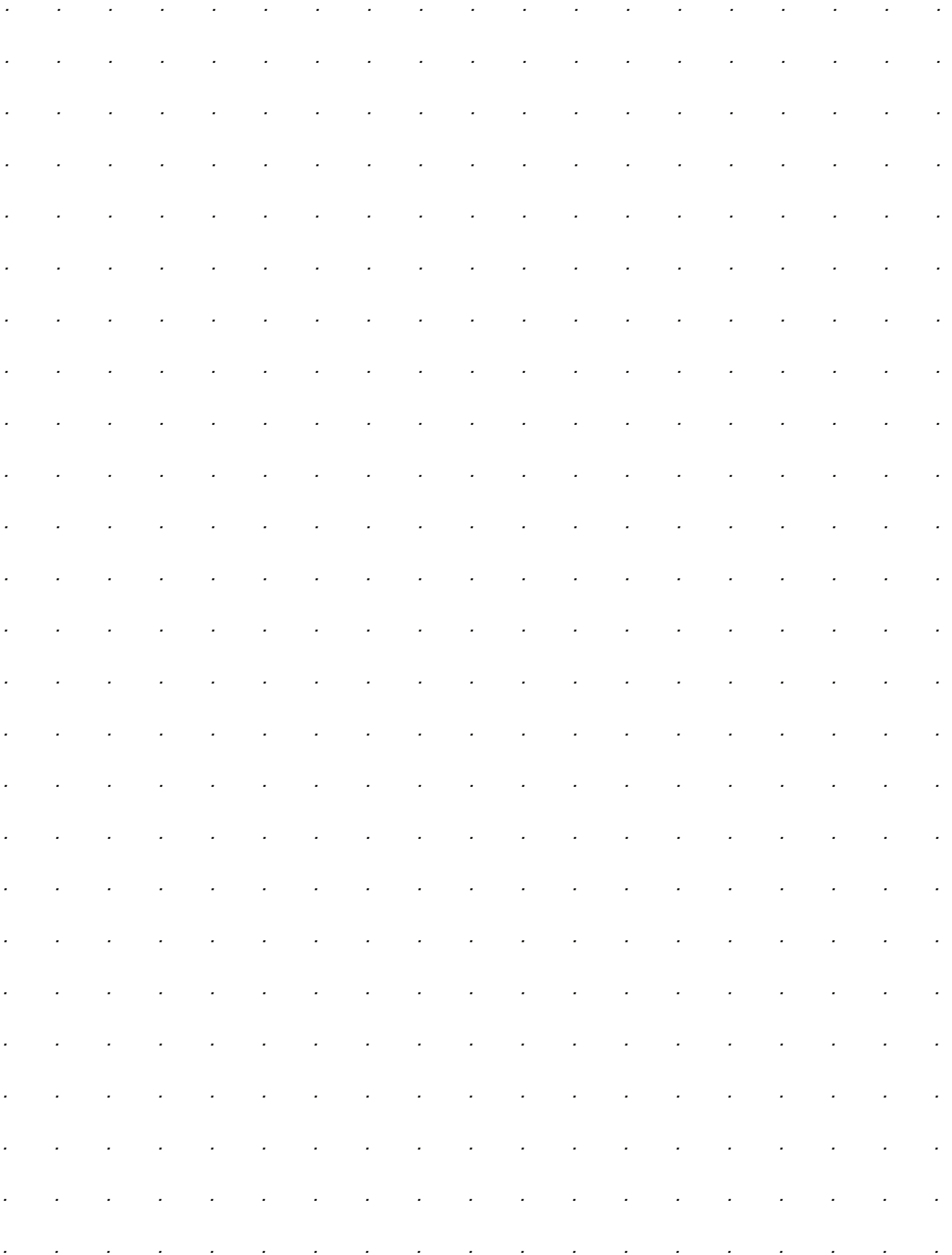
# Notes

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# Notes

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# SAFETY INSTRUCTIONS

Target Products	Hazards	Measures
<b>General precautions for cutting tools</b>	The tools have sharp cutting edges. There is a risk of injury if held directly with bare hands.	Always wear protective equipment, such as protective tools when removing the tool from the case or mounting it onto a machine.
	Improper use or incorrect use conditions may cause the tool to break or scatter, and could cause injury.	Always use protective equipment such as safety covers and protective eyewear. Always use within the scope of the recommended conditions. Refer to the instruction manual, catalogue and other relevant documents.
	The tool could break and fly off if the cutting force increases suddenly because of impact loads or excessive wear and could cause injury.	Always use protective equipment such as safety covers and protective eyewear. Replace the tool at an early stage.
	Very hot chips could scatter or elongated chips could be discharged, and cause injury or burns.	Always use protective equipment such as safety covers and protective eyewear. When removing the chips, always stop the machine, wear protective gloves, and use tools such as nippers or clippers.
	The tool and work materials will become very hot during turning. There is a risk of burn if these are touched directly with bare hands immediately after machining.	Always wear protective equipment such as protective gloves.
	There is a risk of igniting or fires from the sparks generated during turning, or the heat generated from broken pieces and chips.	Do not use in an area where there is a risk of fires or explosions. Always provide fire prevention measures when using water-insoluble turning oil solution.
	When using at a high rotation speed, if the balance including the machine tool holder is poor, the deflection or vibration could cause tool damage and injury.	Always use protective equipment such as safety covers and protective eyewear. Always carry out trial operation, and confirm that there is no deflection, vibration or abnormal noise.
	There is a risk of injury if you touch the burrs formed on the workpiece with bare hands.	Do not touch with bare hands.
<b>General precautions for cutting edge indexable tools</b>	If insert or parts are not properly clamped, they could come off or fly off during turning and cause injury.	Clean the mounting surface and fixing parts free of foreign matter, before mounting the insert. When mounting, use the enclosed spanner and confirm that the insert and parts are securely clamped. Never use parts other than the designated inserts or parts.
	If the parts are tightened excessively with an auxiliary tool such as a pipe, the insert or part could break and come off or fly off.	Do not use auxiliary tools such as pipes. Use the enclosed spanner.
	Using the tool with high-speed rotation is extremely dangerous as the parts or inserts could fly off with the centrifugal force. Pay special attention to safety when handling.	Always use within the scope of the recommended conditions. Refer to the instruction manual, catalog and other relevant documents.
<b>Various cutters and other tools used with rotation</b>	The cutters have very sharp cutting edges. Touching these with bare hands could result in injury.	Always wear protective equipment such as protective gloves.
	Tools could sway or vibrate if the eccentric rotation or balance is poor. There is a risk of injury if they break or fly off.	Keep the rotation speed within the scope of the recommended conditions. Periodically adjust the accuracy and balance of the rotating sections so that eccentric rotation or deflection do not occur because of bearing wear, etc.
<b>Drills</b>	When machining a through hole while rotating the workpiece, a disc-shaped uncut section may fly off at the point of penetration. This disc is sharp and very dangerous.	Always use protective equipment such as safety covers and protective eyewear. Also take measures such as attaching a cover to the chuck section.
	The very small drill has a pointed end, and is very sharp. It could stab or break when directly touched with a finger, and be difficult to remove. The end could fly off if it breaks.	Take special care to safety when handling. Always wear protective gloves and protective eyewear, etc.
<b>Brazing tool</b>	There is a risk of injury if the insert comes off or breaks, etc.	Confirm that the insert is properly brazed before using. Do not use in conditions that could become very hot.
<b>Others</b>	Repeated brazing is dangerous as the insert could break during use.	Do not use an insert that has been repeatedly brazed as the strength will have dropped.
	Using this product for a purpose other than the designated application can break the machine or tool and is very dangerous.	Observe the designated usage.

Finally, this brochure describes the basic safety information. For further information, refer to the instruction manual, catalog and other relevant documents for each tool, or contact Sumitomo Electric Hardmetal. Sumitomo Electric Hardmetal will not be held liable for any damage and injuries resulting from changes to the specifications, including alterations and modifications, made without consent from Sumitomo Electric Hardmetal.

# Tool Engineering Services

In order to provide a higher level of support and satisfaction for our customers, Sumitomo Electric Industries has created the Tool Engineering Service system.

We have created several Tool Engineering Centers around the world as bases for this support. The Tool Engineering Centers provide a wide range of support to assist user manufacturing activities, with services including training (at the Center), test cuts, technical consulting, line diagnostics (at the user's site) and tooling proposals.



## Tool Engineering Center Locations

### Japan

- ▶ Itami Tool Engineering Center (I-TEC)
- ▶ Yokohama Tool Engineering Center (Y-TEC)
- ▶ Hokkaido Igetalloy Tool Engineering Center (H-TEC)
- ▶ Tokai Tool Engineering Center (T-TEC)
- ▶ Kyushu Tool Engineering Center (K-TEC)

### Overseas

- ▶ Germany / European Design & Engineering Center (E-DEC)
- ▶ Thailand / Thailand Tool Engineering Center (Ti-TEC)
- ▶ Shanghai / Shanghai Tool Engineering Center (S-TEC)
- ▶ U.S.A. / Americas Tool Engineering Center (A-TEC)
- ▶ Indonesia / Indonesia Tool Engineering Center (In-TEC)
- ▶ India Tool Engineering Center

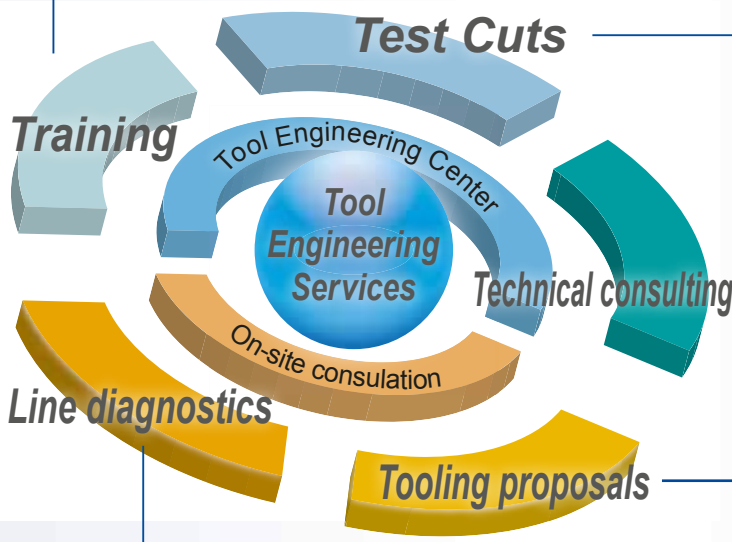
## 1 Training

To make it easy for anyone to take part, the Centers offer training courses designed for a variety of different training objectives and participants.

\*Contact your nearest SEI sales office for detailed training curricula.

## 2 Performance evaluation technology

To attain improvements in machining on sites, manufacturers must rely on more than just the subjective guidance provided by experience and instinct. Today's advanced measuring instruments can make machining phenomena observable, and clarify problems.



## 3 Test cuts and technical consulting

The Tool Engineering Centers can make test cuts on user workpieces, and work with users to create more detailed technical proposals. The Centers can also provide solutions to various machining problems, general line diagnostics for machining lines, and tooling support for new lines.

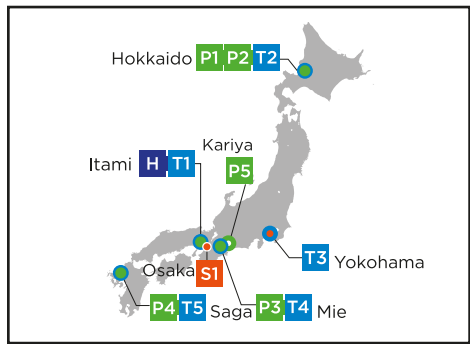
\*Contact your nearest SEI sales office for more information.

**CUTTING TOOLS**
**WORLDWIDE LOCATIONS**

We are strengthening its global position for high-quality products and services, while contributing technology to market needs around the world.

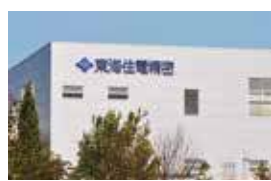


- Sales Network     ●
- Production Network
- Tool Engineering Center


**H** Sumitomo Electric Industries Ltd. Hardmetal Div. Sumitomo Electric Hardmetal Corp.

**Production Network**

**P1** Hokkaido Sumiden Precision Co., Ltd.

**P2** Hokkaido Precision Tool Co., Ltd.

**P3** Tokai Sumiden Precision Tool Co., Ltd.

**P4** Kyushu Sumiden Seimitsu Ltd.

**P5** Asdex Corporation

**P6** Sumitomo Electric Hartmetallfabrik GmbH

**P7** Sumitomo Electric Hartmetallfabrik GmbH, organizačni složka.

**P8** Sumitomo Electric Hardmetal Manufacturing (Changzhou) Co., Ltd

**P9** Sumitomo Electric Hardmetal Manufacturing (Thailand), Ltd

**P10** PT. Sumiden Hardmetal Manufacturing Indonesia

**P11** Motherson Techno Tools Ltd.

**P12** Sumitomo Electric Carbide Manufacturing, Inc. (WI)

**P13** Sumitomo Electric Carbide Manufacturing, Inc. (OH)

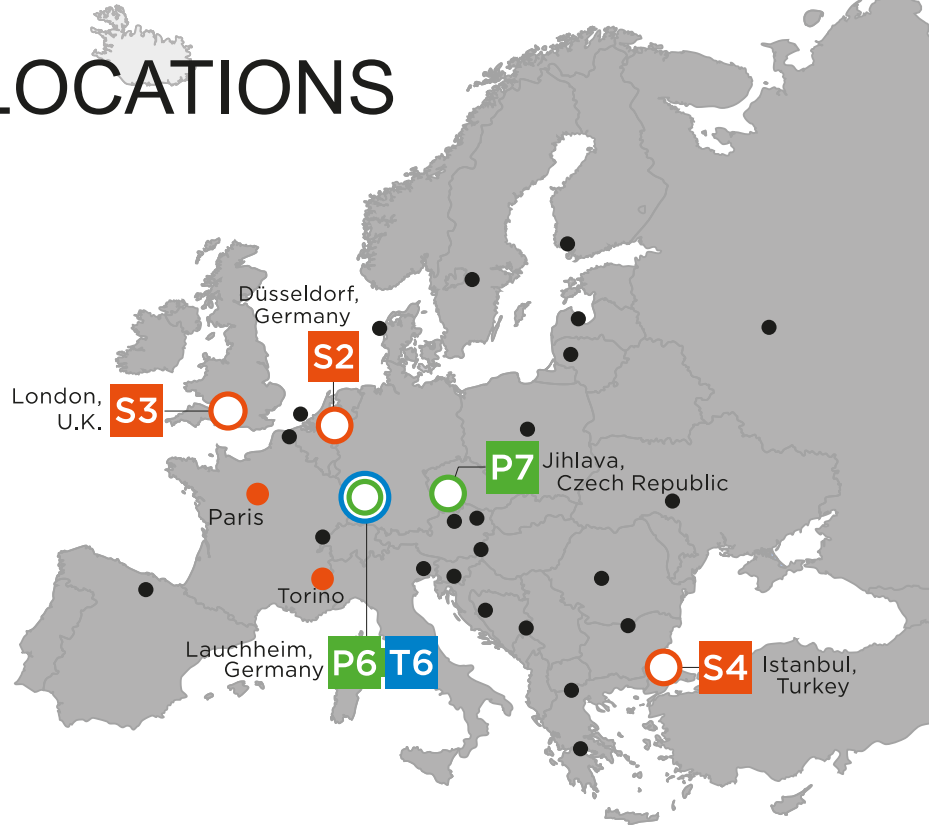
# HARDMETAL GROUP

## CUTTING TOOLS

# EUROPEAN LOCATIONS



**S2** Sumitomo Electric Hartmetall GmbH



- T1** Itami Tool Engineering Center (I-Tec)
- T2** Hokkaido Tool Engineering Center (H-Tec)
- T3** Yokohama Tool Engineering Center (Y-Tec)
- T4** Tokai Tool Engineering Center (T-Tec)
- T5** Kyushu Tool Engineering Center (K-Tec)

- T6** European Design & Engineering Center (E-DEC)
- T7** Shanghai Tool Engineering Center (S-Tec)
- T8** Thai Tool Engineering Center (Ti-Tec)
- T9** Indonesia Tool Engineering Center (In-Tec)
- T10** Americas Tool Engineering Center (A-Tec)
- T11** India Tool Engineering Center

- Sales Network      (●●)
- Production Network
- Tool Engineering Center

## Sales Network



**S1** Sumitomo Electric Tool Net, Inc.



**S3** Sumitomo Electric Hardmetal Ltd.



**S4** SumiSermetal Ticaret ve Sanayi Limited Şirketi



**S5** Sumitomo Electric Hardmetal Trading (Shanghai) Co., Ltd.



**S6** Superior Engineering Tool Trading (Shanghai) Co., Ltd.



**S7** Sumitomo Electric Hardmetal Asia Pacific Pte Ltd.



**S8** Sumitomo Electric Hardmetal (Thailand) Ltd.



**S9** PT. Sumitomo Electric Hardmetal Indonesia



**S10** SEI Carbide Australia Pty Ltd.



**S11** Motherson Techno Tools Ltd.



**S12** Sumitomo Electric Carbide, Inc.



**S13** Sumicarbide Canada Inc.



**S14** Sumitomo Electric Hardmetal de Mexico, S.A. de C.V.



**S15** Sumitomo Electric Hardmetal do Brasil Ltda.



**S16** Taiwan Hong-Yu Precision Tool Co., Ltd.



**CARBIDE - CBN - DIAMOND**

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