

'06 ► '07
GENERAL CATALOGUE

PERFORMANCE CUTTING TOOLS



Tool
Selection
Guide

Grades

Negative
& Positive
Inserts

External
Holders

Boring
Bars

Parting-Off
Grooving
Threading
Holders

Milling
Cutters

Indexable
Endmills

Solid Carbide
Endmills

Multi-Drills

SumiBoron
SumiDia

CBN/PCD
Inserts &
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Spare Parts
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SUMITOMO

CARBIDE - CBN - DIAMOND

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Negative / Positive / CBN / PCD / Ceramic		

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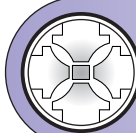
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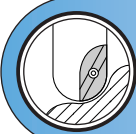



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Network

Sumitomo Electric Hardmetal Corp. is strengthening its global position for high-quality products and services, while contributing technology to market needs around the world.

Approved to ISO9001
Reg. No. 955989



Sumitomo Electric Hardmetal Corp.
(Head Office)



Sumitomo Electric Tool Net, Inc.
(Established in 1979)
Sales and marketing subsidiary for domestic Japanese market.



● Sales Company
● Manufacturing Plant

Company history

- 1931 Started to manufacture and sell carbide cutting tools under the brand name of "IGETALLOY".
- 1977 Started to manufacture and sell sintered CBN cutting tools under the brand name of "SUMIBORON".
- 1978 Started to manufacture and sell sintered Diamond tools under the brand name of "SUMIDIA".
- 1994 Started to manufacture and sell optical lenses for laser applications.
- 1999 Entered into a business alliance with Nachi-Fujikoshi Corp.
- 2003 Established Sumitomo Electric Hardmetal Corp., becoming independent from Sumitomo Electric Industries, Ltd.

Production Network



Approved to ISO9001
Reg. No. 200689



Hokkaido Sumiden Precision Industries, Ltd.
(Established in 1972)
Production of carbide inserts.



ASDEX Corporation
(Established in 2002)
Development, production and sales of forging dies.

Approved to ISO9001
Reg. No. 200689

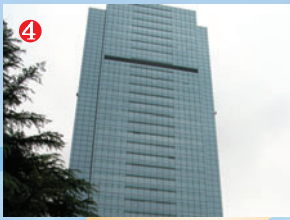


Tokai Seimitsu Co., Ltd.
(Established in 1984)
Production of Multidrill and other carbide tools.

Approved to ISO9002
Reg. No. 200075



Kyushu Sumiden Precision Industries, Ltd.
(Established in 1964)
Production of PCB drills, endmills and other carbide tools.



Sumitomo Electric Hardmetal Trading (Shanghai) Co., Ltd
 (Established in 2004 / Shanghai, China)
 Subsidiary sales company for Chinese market.



Sumitomo Electric Hardmetal Asia Pacific Pte. Ltd.
 (Established in 1998 / Singapore)
 Sales and marketing headquarters for South East Asia market.



SEI Carbide Australia Pty Ltd.
 (Established in 1977 / Sydney, Australia)
 Subsidiary sales company for Australia market.



Sumitomo Electric Hartmetall GmbH
 (Established in 1981 / Düsseldorf, Germany)
 Sales and marketing headquarters for European market.



Sumitomo Electric Hardmetal Ltd.
 (Established in 1984 / London, U.K.)
 Subsidiary sales company for U.K. market.



Sumitomo Electric Carbide, Inc.
 (Established in 1979 / Chicago / U.S.A.)
 Sales and marketing headquarters for North, Central and South American markets.



Korloy Inc.
 (Established in 1969 / Seoul, Korea)
 Production of carbide tools.



Sumiden Carbide Manufacturing (Tianjin) Ltd.
 (Established in 1997 / Tianjin, China)
 Production of carbide and CBN inserts .



Sumiden Precision Tools (Shanghai) Ltd.
 (Established in 2003 / Shanghai, China)
 Production of round tools.



Sumitomo Electric Hardmetal Manufacturing (Thailand), Ltd.
 (Established in 1994 / Bangkok, Thailand)
 Production of drills, inserts and CBN / PCD tools.

Approved to ISO9001
 Reg. No. ESN06473AQ97



Sumitomo Electric Hartmetallfabrik GmbH
 (Established in 1989 / Barden-Württemberg, Germany)
 Production of Multidrill and CBN tools.



Sumitomo Electric Carbide Manufacturing, Inc.
 (Established in 1991 / Milwaukee, U.S.A.)
 Production of Multidrill, CBN and PCD cutting tools.

Japanese Network



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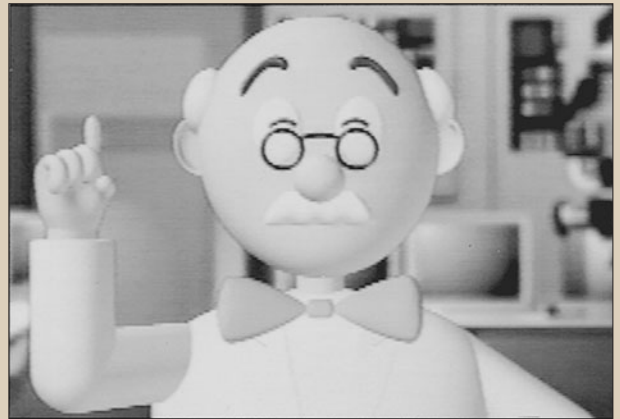
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Tool Selection Guide

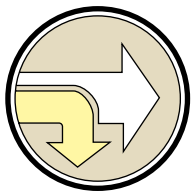
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Selection of Sumitomo Grades (Turning)

● According to Work Materials and Applications

P

Steel (Carbon steel, Alloy steel)					
Application	Finishing ~ Light cutting		Medium cutting	Roughing ~ Heavy roughing	
	P01	P10	P20	P30 (M30)	P40 (M40)
Coated Carbide	AC700G		AC900G	AC2000	AC3000
	AC900G				
	AC2000				
	AC3000				
Coated Cermet	T2000Z		T3000Z		
	T110A		T1200A		
Cermet	T110A		T1200A		
	T1200A				
Coated Ceramic					
Uncoated Ceramic					
Uncoated Carbide	A30				
CBN					

K

Cast iron		
Finishing	Medium cutting	
K01	K10 (M10)	K20 (M20)
AC300G		
AC700G		
AC900G		
EH10Z		
T110A		
T1200A		
NS260C		
NS260		
G10E		
BNS800		
BN700 (BN600) New		
BN500		

H

Hardened steel	
Application	Finishing
Coated CBN	BNC80
	BNC150
	BNC200
	BNC300
CBN	BNX10
	BNX20
	BNX25
	BN300
	NB100C
Ceramic	

M

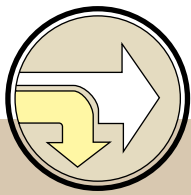
Stainless steel		
Application	Finishing ~ Light	Medium ~ Rough
Coated Carbide	New AC610M	EH10Z
	New AC630M	
		AC3000
Cermet	T1200A	

S

Super Alloy		
Application	Finishing ~ Light	Medium ~ Rough
Coated Carbide	EH510Z	EH510
	EH10Z	
	EH520Z	
Cermet		
CBN	BN700 (BN600)	BNS800

N

Non-Ferrous Metals		
Application	Finishing ~ Light	Medium ~ Rough
PCD	DA2200	H1
	DA150	
Cermet		
Sintered Component		
CBN	BN700 (BN600)	
Coated HM		EH10Z



Selection of Sumitomo Grades (Milling)



● According to Work Materials and Applications

Tool Selection

P

Steel (Carbon steel, Alloy steel)					
Application	Finishing ~ Light cutting		Medium cutting	Roughing ~ Heavy roughing	
	P01	P10	P20	P30 (M30)	P40 (M40)
Coated Carbide	AC230				
	CS3000				
	ACZ330				
	ACZ350				
Cermet	T250A				
Ceramic					
Uncoated Carbide	A30N				
CBN					

K

Cast iron		
Finishing	Medium cutting	
K01	K10 (M10)	K20 (M20)
AC211		
EH20Z		
ACZ310		
NS260		
G10E		
BNS800		
BN700 (BN600) <i>New</i>		
BN500		

H

Hardened steel	
Application	Finishing
CBN	BN700
	BN300
Ceramic	—

M

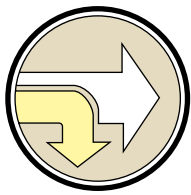
Stainless steel		
Application	Finishing ~ Light	Medium ~ Rough
Coated carbide	EH20Z	ACZ350
		A30N
Uncoated carbide		A30N
Cermet	T250A	

S

Super alloy		
Application	Finishing ~ Light	Medium ~ Rough
Coated carbide	EH520Z	ACZ310
	EH20Z	
Uncoated carbide		EH520 EH20

N

Non-ferrous metals		
Application	Finishing ~ Light	Medium ~ Rough
PCD	DA2200	
Coated carbide	DL1000	
Uncoated carbide	H1	



Grade and Chipbreaker Selection (1)

● According to Work Materials and Applications

P
Steel

Steel

Carbon Steel

- USt 42-2
- C10
- C45
- C55
- etc.

Alloy Steel

- 15CrMo5
- 20Cr4
- 42CrMo4
- etc.

High Alloy Steel

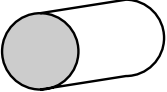
- 40NiCrMo6
- etc.

1 Fine Finishing

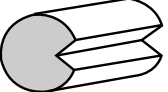
Eg. **FA Type** ← Chipbreaker
T1200A ← Grade

FA Type
T2000Z

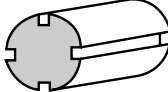
FL Type
T3000Z



Continuous Cut



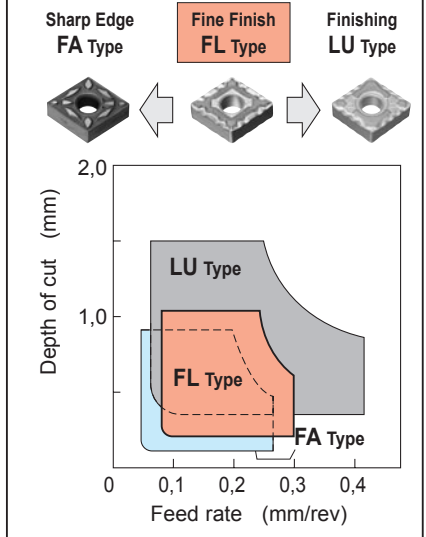
Medium Cut



Interrupted Cut

Work	HB	Cond. Grade	Cutting speed (m/min)			Feed rate (mm/rev)	D.O.C. (mm)
			T2000Z	T3000Z			
Low Carbon Steel	180		210 ~ 400	190 ~ 300	0,05 ~ 0,25	0,2 ~ 1,0	
Carbon Steel, Alloy Steel	250		170 ~ 300	150 ~ 240			
High Alloy Steel	300		140 ~ 250	130 ~ 200			

● Chipbreaker Selection

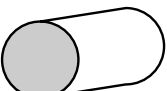


2 Finishing

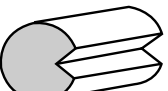
SU Type
AC700G

SU Type
AC900G

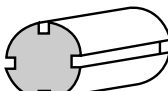
SU Type
AC2000



Continuous Cut



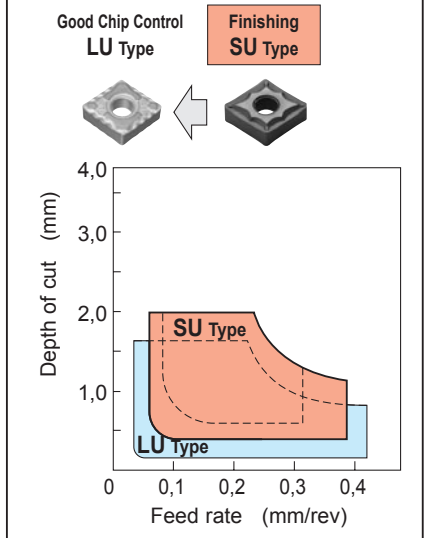
Medium Cut



Interrupted Cut

Work	HB	Cond. Grade	Cutting speed (m/min)			Feed rate (mm/rev)	D.O.C. (mm)
			AC700G	AC900G	AC2000		
Low Carbon Steel	180		260 ~ 420	220 ~ 350	200 ~ 310	0,1 ~ 0,3	0,5 ~ 2,0
Carbon Steel, Alloy Steel	250		210 ~ 340	180 ~ 280	160 ~ 250		
High Alloy Steel	300		170 ~ 280	140 ~ 230	130 ~ 210		

● Chipbreaker Selection





Steel

Carbon Steel

- USt 42-2
- C10
- C45
- C55
- etc.

Alloy Steel

- 15CrMo5
- 20Cr4
- 42CrMo4
- etc.

High Alloy Steel

- 40NiCrMo6
- etc.

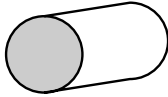
3 Medium Cut

Eg. **GU Type** ← Chipbreaker
AC2000 ← Grade

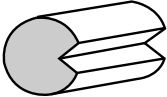
GU Type
AC900G
(UX Type)

GU Type
AC2000
(UX Type)

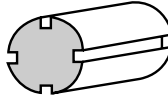
GU Type
AC3000
(UX Type)



Continuous Cut

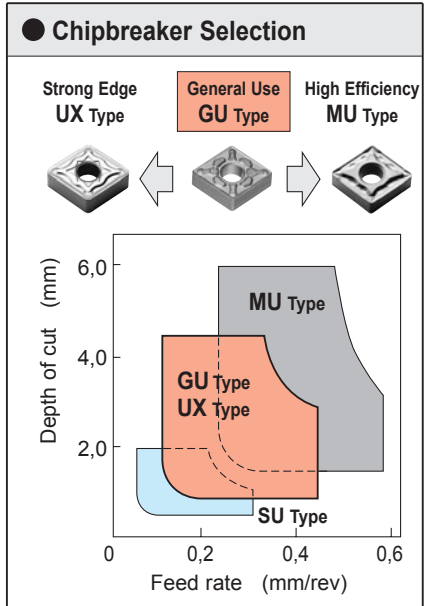


Medium Cut



Interrupted Cut

Work	HB	Cond. Grade	Cutting speed (m/min)			Feed rate (mm/rev)	D.O.C. (mm)
			AC900G	AC2000	AC3000		
Low Carbon Steel	180		250 ~ 390	180 ~ 280	160 ~ 250	0,2 ~ 0,5	1,0 ~ 4,0
Carbon Steel, Alloy Steel	250		200 ~ 310	150 ~ 230	130 ~ 200		
High Alloy Steel	300		170 ~ 260	120 ~ 190	100 ~ 170		

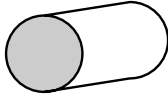


4 Roughing

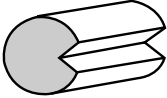
MU Type
AC900G

MU Type
AC2000

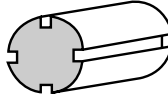
MU Type
AC3000



Continuous Cut

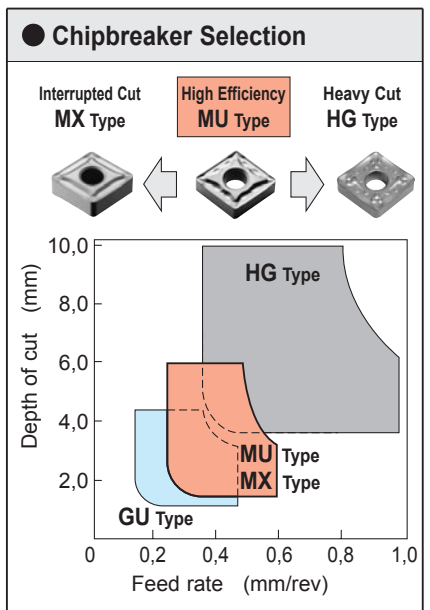


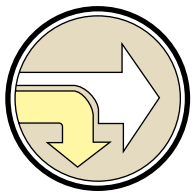
Medium Cut



Interrupted Cut

Work	HB	Cond. Grade	Cutting speed (m/min)			Feed rate (mm/rev)	D.O.C. (mm)
			AC900G	AC2000	AC3000		
Low Carbon Steel	180		210 ~ 340	160 ~ 250	140 ~ 220	0,3 ~ 0,6	2,0 ~ 6,0
Carbon Steel, Alloy Steel	250		170 ~ 280	130 ~ 200	110 ~ 160		
High Alloy Steel	300		140 ~ 230	110 ~ 170	90 ~ 150		





Grade and Chipbreaker Selection (2)

● According to Work Materials and Applications

M
Stainless
Steel

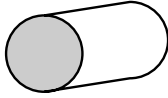
Stainless Steel

- X5CrNi18-10
- X5CrNiMo17-12-2
– etc.

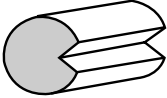
1 Finishing

SU Type **SU Type**

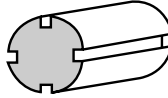
New AC610M **New AC630M**



Continuous Cut



Medium Cut



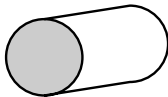
Interrupted Cut

Cutting speed (m/min)		Feed rate (mm/rev)	D.O.C. (mm)
AC610M	AC630M		
160 ~ 260	140 ~ 220	0,1 ~ 0,2	0,2 ~ 1,0

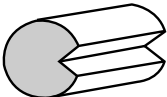
2 Medium Cut

EX Type **GU Type**

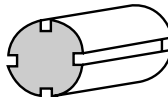
New AC630M **AC3000**



Continuous Cut



Medium Cut



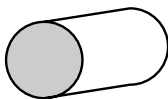
Interrupted Cut

Cutting speed (m/min)		Feed rate (mm/rev)	D.O.C. (mm)
AC630M	AC3000		
120 ~ 190	130 ~ 200	0,1 ~ 0,3	0,5 ~ 2,0

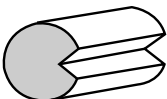
3 Roughing

MU Type **MU Type**

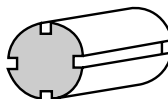
New AC630M **AC3000**



Continuous Cut



Medium Cut

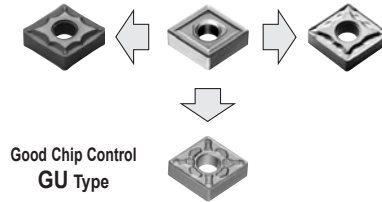


Interrupted Cut

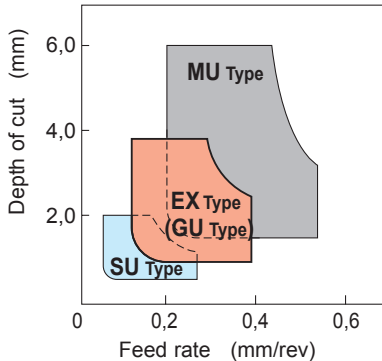
Cutting speed (m/min)		Feed rate (mm/rev)	D.O.C. (mm)
AC630M	AC3000		
110 ~ 180	120 ~ 190	0,2 ~ 0,4	1,5 ~ 4,0

● Chipbreaker Selection

Finishing
SU Type
Medium Cut
EX Type
Roughing
MU Type



Good Chip Control
GU Type



Depth of cut (mm)

Feed rate (mm/rev)



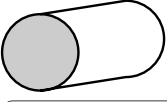
Cast Iron

- GG25
- GGG45
- etc.

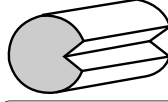
1 Finishing

() 2nd choice

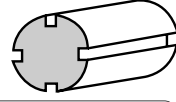
GG	BN700 (BNS800)
GGG	BN500



Continuous Cut



Medium Cut



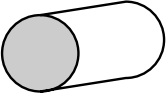
Interrupted Cut

Work	HB	Cond. Grade	Cutting speed (m/min)	Feed rate (mm/rev)	D.O.C. (mm)		
					BN700	BN500	BNS800
GG	200		200 ~ 2000	0,1 ~ 0,5	~ 1,0	–	~ 4,0
GGG	250		100 ~ 350	0,1 ~ 0,4	–	~ 0,5	–

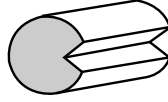
2 Finishing ~ Medium Cut

() 2nd choice

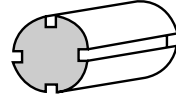
UZ Type AC300G (EH10Z, T110A)	UX Type AC300G	UX Type AC700G
--	---------------------------------	---------------------------------



Continuous Cut



Medium Cut

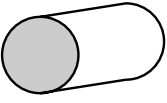


Interrupted Cut

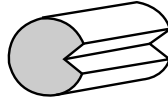
Work	HB	Cond. Grade	Cutting speed (m/min)		Feed rate (mm/rev)	D.O.C. (mm)
			AC300G	AC700G		
GG	200		230 ~ 360	180 ~ 300	0,1 ~ 0,3	0,5 ~ 3,0
GGG	250		200 ~ 310	160 ~ 260		

3 Roughing

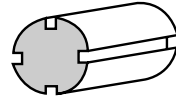
UZ Type AC300G	UX Type AC700G	No Breaker AC900G
---------------------------------	---------------------------------	------------------------------------



Continuous Cut



Medium Cut

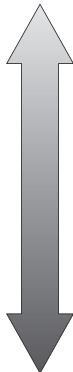


Interrupted Cut

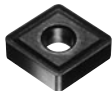
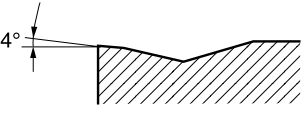
Work	HB	Cond. Grade	Cutting speed (m/min)			Feed rate (mm/rev)	D.O.C. (mm)
			AC300G	AC700G	AC900G		
GG	200		190 ~ 290	150 ~ 240	100 ~ 220	0,3 ~ 0,6	2,0 ~ 6,0
GGG	250		160 ~ 250	130 ~ 210	100 ~ 200		

● Chipbreaker Selection

Sharp Edge

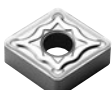
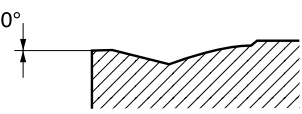


UZ Type

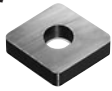
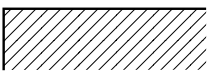
4°

UX Type

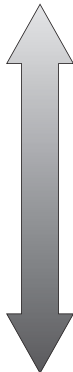



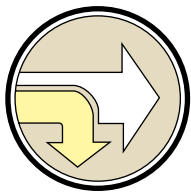
0°

No Breaker

Strong Edge





Grade and Chipbreaker Selection (3)

● According to Work Materials and Applications



Non-Ferrous Metal

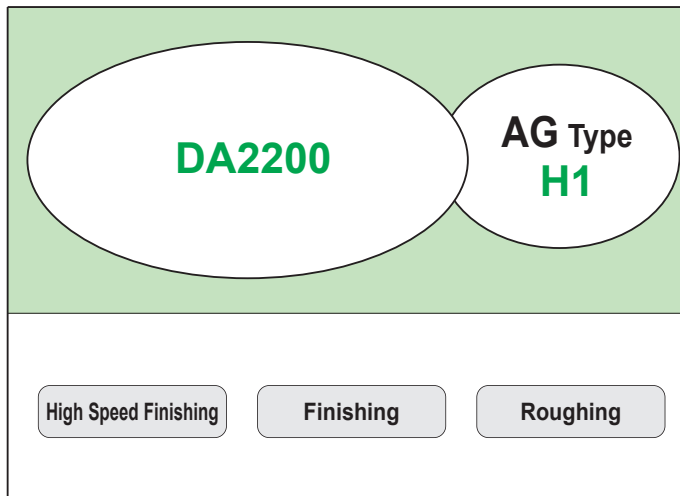
Aluminum Alloy (below Si 13%)

- A6061
- ADC12
- USW.

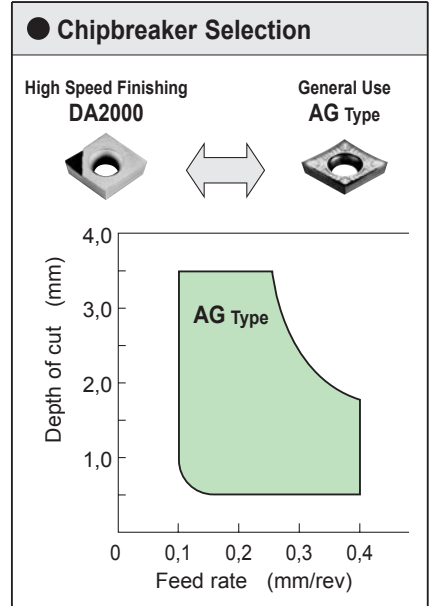
Aluminum Alloy (over Si 13%)

- A390
- USW.

Brass



Process	Cond. Grade	Cutting speed (m/min)		Feed rate (mm/rev)	D.O.C. (mm)
		DA2200	H1		
High Speed Finishing	Al. Alloy (below Si 13%)	~2000		0,05 ~ 0,2	0,1 ~ 3,0
	Al. Alloy (over Si 13%)	~1000		0,05 ~ 0,2	0,1 ~ 3,0
Finishing			400 ~ 1000	0,1 ~ 0,3	0,3 ~ 1,5
Roughing			150 ~ 500	0,1 ~ 0,5	1 ~ 5



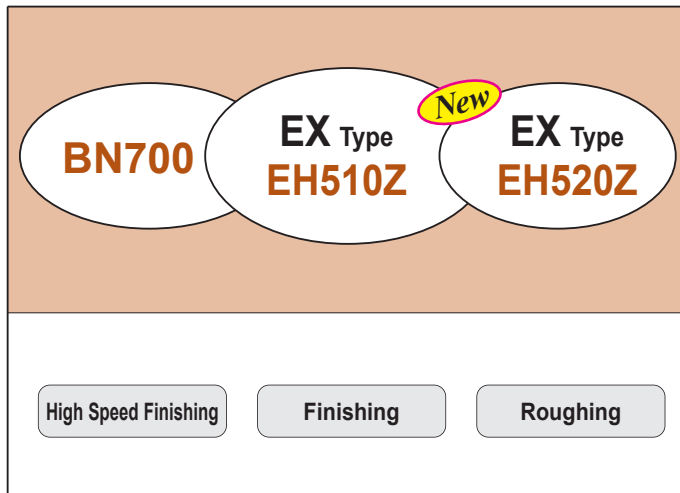
Exotic Metal

Ni-based Alloy

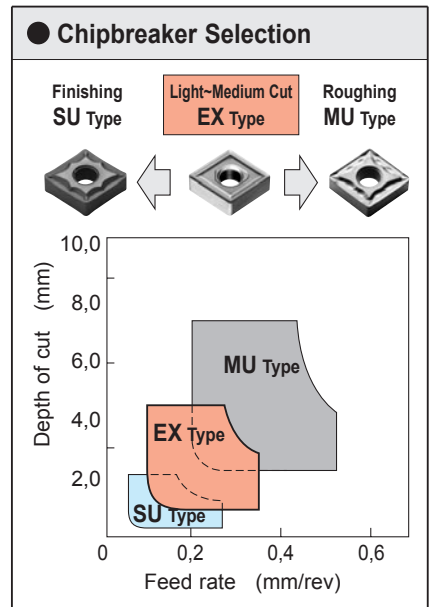
- Inconel718
- Waspaloy
- etc.

Titanium Alloy

- Ti-6Al-4V
- etc.



Process	Cond. Grade	Cutting speed (m/min)			Feed rate (mm/rev)	D.O.C. (mm)
		BN700	EH510Z	EH520Z		
High Speed Finishing		120 ~ 170			0,05 ~ 0,2	0,1 ~ 1,0
Finishing			30 ~ 70	20 ~ 50	0,1 ~ 0,25	0,3 ~ 1,5
Roughing			30 ~ 70	20 ~ 50	0,1 ~ 0,3	1 ~ 5





Hardened Steel

General-Medium Alloy Steel

- C55
- 25CrMo4
- 41Cr4
- etc.

High Alloy Steel

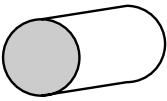
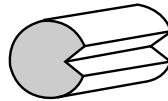
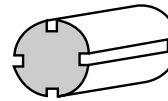
- 100Cr6
- X40CrMoV5-1
- HS18-0-1
- etc.

1 High Speed Finishing

BNX 10

BNC150

BNX25

Continuous Cut

Medium Cut

Interrupted Cut

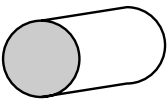
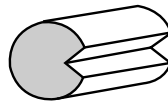
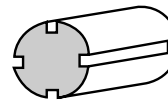
Cutting speed (m/min)			Feed rate (mm/rev)	D.O.C. (mm)
BNX10	BNC150	BNX25		
120 ~ 300	120 ~ 300	120 ~ 220	0,03 ~ 0,15	0,03 ~ 0,20

2 Finishing

() 2nd Choice

BNC200
(BN250)

BNC300

Continuous Cut

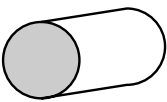
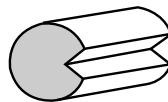
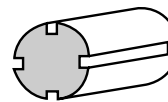
Medium Cut

Interrupted Cut

Cutting speed (m/min)			Feed rate (mm/rev)	D.O.C. (mm)
BN250	BNC200	BNC300		
50 ~ 150	50 ~ 200	50 ~ 120	0,03 ~ 0,20	0,03 ~ 0,30

3 High Efficiency (Removal of Carburised layer)

BNC200
(BNX20)

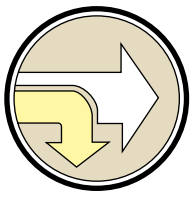




Continuous Cut

Medium Cut

Interrupted Cut

Cutting speed (m/min)		Feed rate (mm/rev)	D.O.C. (mm)
BNC200	BNX20		
50 ~ 170	70 ~ 170	0,03 ~ 0,30	0,03 ~ 0,50



Chipbreaker Selection

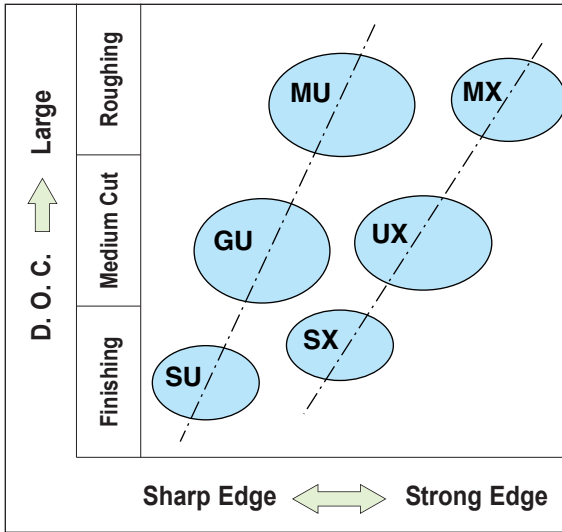
● According to Breaker Types and Applications

Negative Type
Bumpy Type

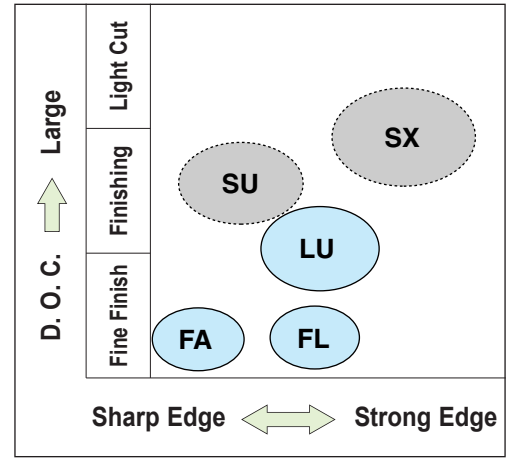
GU Type (Eg.)



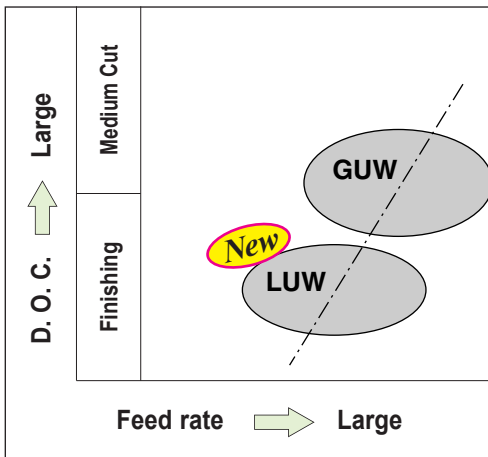
1 Main Chipbreaker for Steel



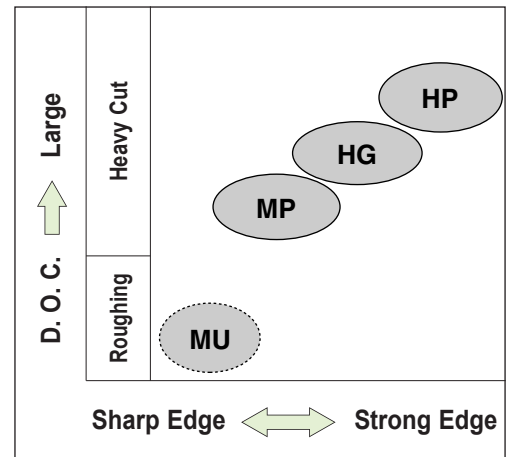
2 Sub-Chipbreaker for Finishing



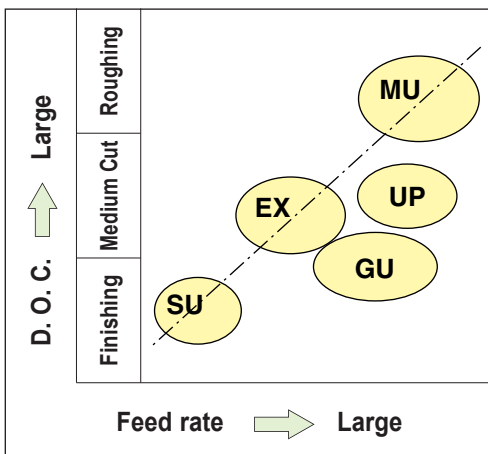
3 Wiper Insert (High Efficiency)



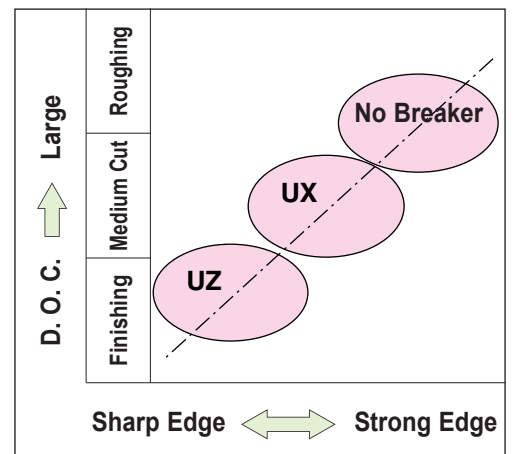
4 Heavy Cutting



5 Stainless Steel, Exotic Metal



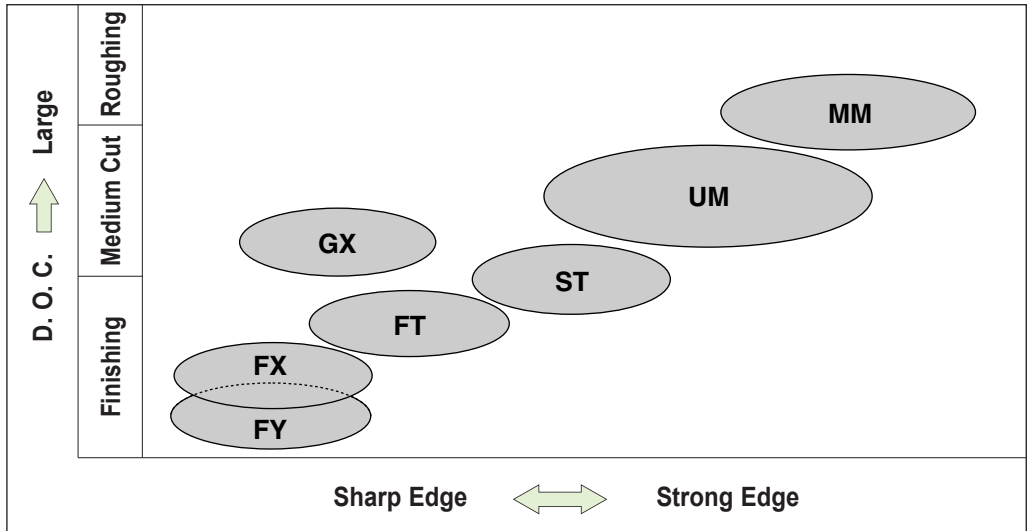
6 Cast Iron





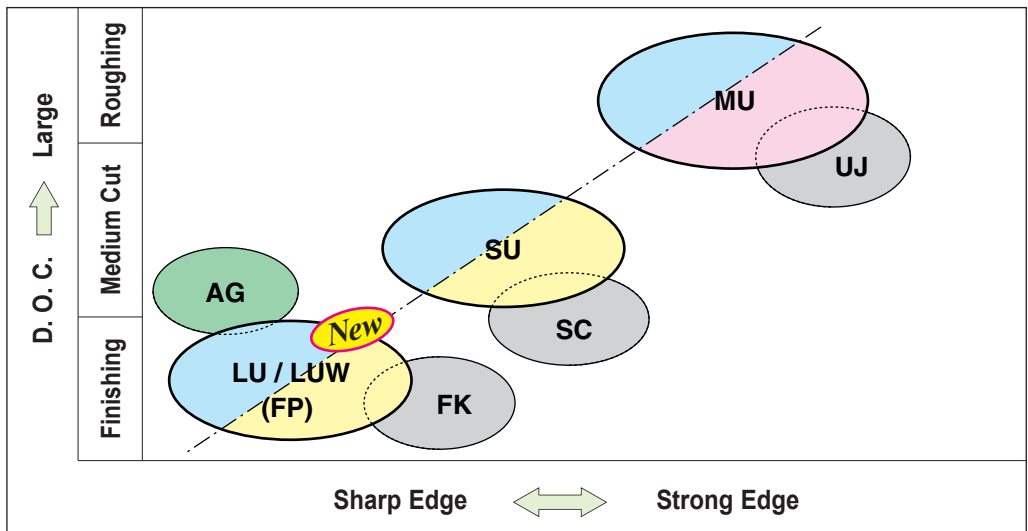
Negative Type
Handed Type

UM Type (Eg.)



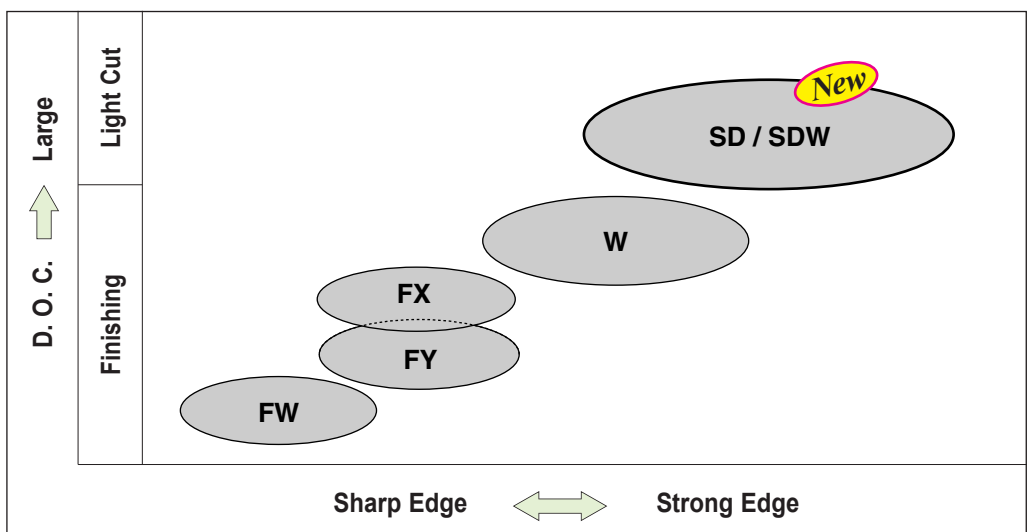
Positive Type
Bumpy Type

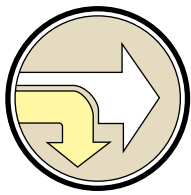
SU Type (Eg.)



Positive Type
Handed Type

FY Type (Eg.)





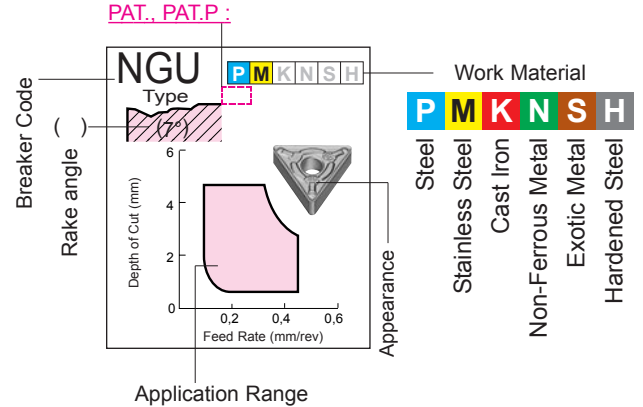
Chipbreaker Application Table

● According to Application

Negative Inserts

- Bumpy chipbreaker
- Standard chipbreaker
- Handed chipbreaker
- Sumiboron/Sumidia Break Master

(Legend)



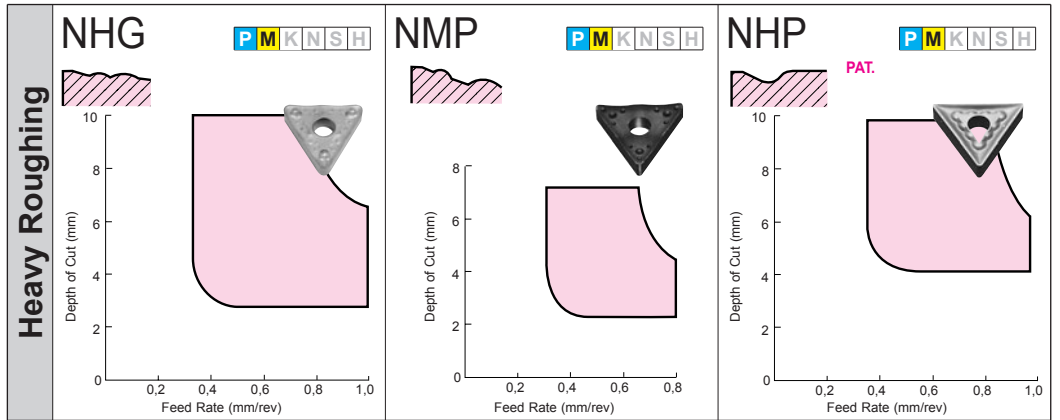
Application	Chipbreaker Type	Code	Angle	Material
Fine Finishing	NFA	P M K N S H	20°	Steel
	NFL	P M K N S H	10°	Steel
Finishing	NSU	P M K N S H	13°	Steel
	NLU	P M K N S H	10°	Steel
	NLU-W	P M K N S H	10°	Steel
	R/LFY	P M K N S H	15°	Steel
	R/LFX	P M K N S H	14°	Steel
Light~Medium Cut	NSX	P M K N S H	3°	Steel
	NEX	P M K N S H	16°	Steel
	NUP	P M K N S H	18°	Steel
	NSV	P M K N S H	35°	Steel
Light~Medium Cut	NGU	P M K N S H	7°	Steel
	NGU-W	P M K N S H	10°	Steel
	NUX	P M K N S H	6°	Steel
	NUG	P M K N S H	4°	Steel
Roughing	NMU	P M K N S H	4°	Steel
	NMX	P M K N S H	15°	Steel
	NUZ	P M K N S H	4°	Steel
	R/LMM	P M K N S H	15°	Steel

Carburized Layer Removal

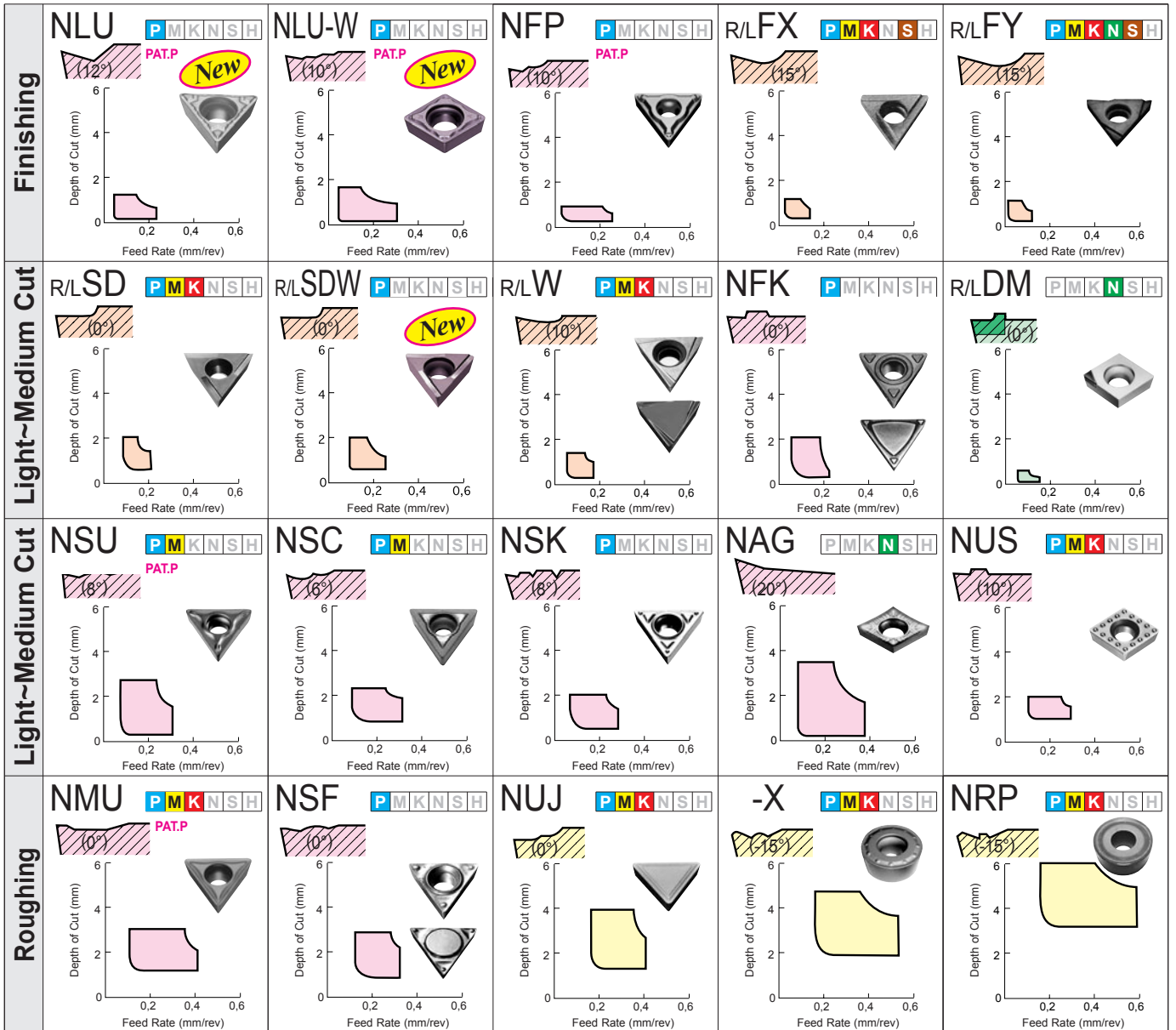
New

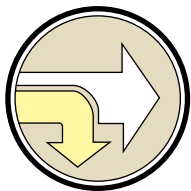


Negative Inserts



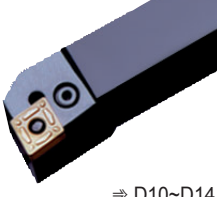



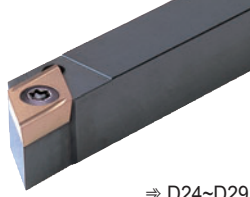


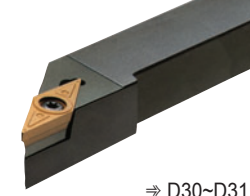

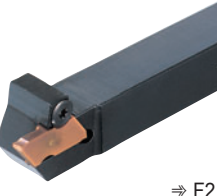

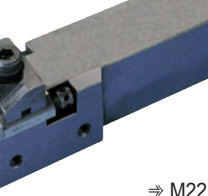
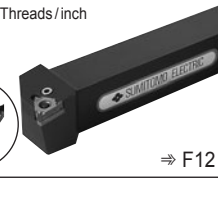
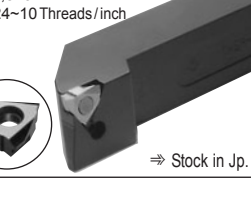
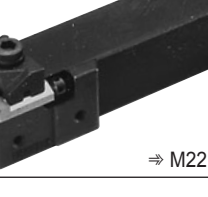
Positive Inserts





External Tool Holder Selection Guide

● According to Applications

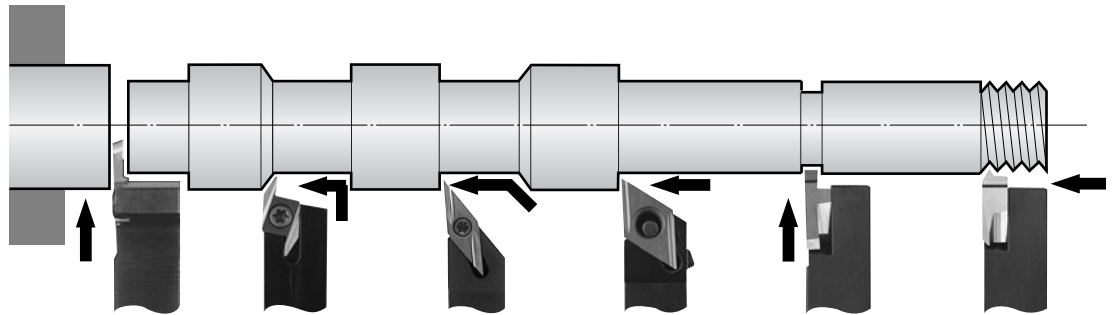
Application	Economical Type for Neg. Inserts	Economical Type for Pos. Inserts	Special Type for Hardened Steel
General Turning	P Type Lever Lock Type  ⇒ D10~D14	P Type Lever Lock Type  ⇒ D24, D25	D Type Double Lock Type  ⇒ D8~D9
	M Type Double Lock Type  ⇒ D15~D17	S Type Screw On Type  ⇒ D24~D29	C Type Top Clamp Type  ⇒ D18~D19
	T-REX  ⇒ D7	S Type Screw On Type  ⇒ D30~D31	M Type Double Lock Type  ⇒ D16
	SCT Type  ⇒ F2	Sumi Grip and Sumi Grip Jr.  ⇒ F4~F8	BNGG Type  ⇒ M22
Parting-Off Grooving	LTE Type Pitch { 1~4 mm / 24~8 Threads/inch }  ⇒ F12	THE Type Pitch { 0.8~3 mm / 24~10 Threads/inch }  ⇒ Stock in Jp.	BNGG-TT Type Pitch 1~3 mm  ⇒ M22
Threading			

Small Product Machining Tool Selection



● According to Applications

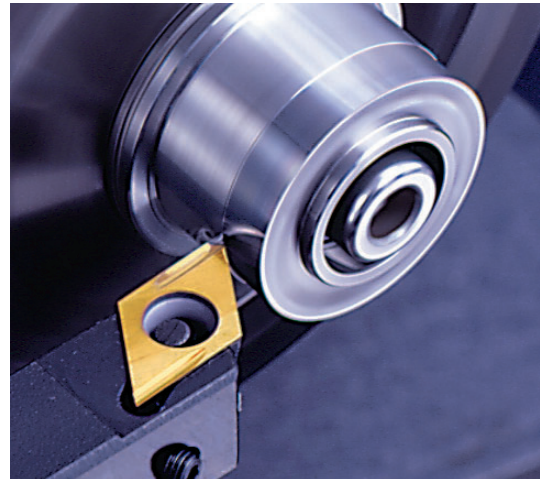
Ext. Turning

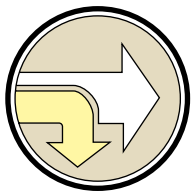


Application / Type	⇒ Stock in Japan	⇒ D23	⇒ D30-D31	⇒ D25-D26	⇒ Stock in Japan	⇒ Stock in Japan
Cut-off SCT Type GME-CU Type	Back-Turning SBT Type	Copying SV Type	General Turning PD Type SD Type	Grooving GME Type GMC Type	Treading GME Type THE Type	
Design						
	Max. Dia. ø0.5-16mm	Max. Dia. ø20-38mm				

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





Boring Bar Selection Guide

● According to Applications / Boring - ϕD

Coloured boxes indicate available size.

Application	Type	Boring Depth (L/D)			Applicable Insert	Tooling	Min. Boring ϕD (mm)																					
		Shank					(Min. cutting diameter is shown when not matched in this table.)																					
		Steel	Carbide	X-Bar (Steel)			1	1.5	2	3	4	5	6	7	8	10	12	13	14	16	18	20	22	25	28	35	44	54
Very Small Dia. Boring	CKB ⇒ Stock in Japan	~ 3			Special		○	○	○	○																		
	DABB ⇒ M23	~ 2			Brazed				●	●	●	●																
Stop Boring	BNBB ⇒ M20	~ 5			Brazed				●	●	●	●	●															
	BNB ⇒ M21	~ 4			Sumiboron insert								●	●	●	●	●	●										
	S-SWUB ⇒ E20	~ 3			Trigon Type 5° Pos.							●																
	C-SWUB ⇒ E20	~ 8										●																
	S-STFC ⇒ E17	~ 3												●		●	●	●	●	●	●	●	●	●	●	●	●	
	S-STUP(B) ⇒ E18	~ 3											●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	B/D-STUP New ⇒ E18			~ 6	Triangle Type 5° & 11° Pos.									●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	C-STUP ⇒ E18	~ 8												●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	CTFP ⇒ Stock in Japan	~ 3			Triangle 11° Pos.											○	○	○	○	○	○	○	○	○	○	○	○	
	S-PTFN ⇒ E10	~ 3																								●	●	●
	BTFN ⇒ E10	~ 3			Triangle Neg. Type																					●	●	●
	Bottom Facing	BNZ ⇒ M21	~ 5			Sumiboron insert								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		S-SCLP ⇒ E13	~ 3												●	●	●	●	●	●	●	●	●	●	●	●	●	●
B-SCLP ⇒ Stock in Japan				~ 6												○	○	○	○	○	○	○	○	○	○	○	○	
C-SCLP ⇒ Stock in Japan		~ 8			80° Diamond 11° Pos. Type																							
S-SCLC ⇒ E12		~ 3														●	●	●	●	●	●	●	●	●	●	●	●	
B/D-SCLC New ⇒ E12				~ 6												●	●	●	●	●	●	●	●	●	●	●	●	
C-SCLC ⇒ Stock in Japan		~ 8			80° Diamond 7° Pos. Type											○	○	○	○	○	○	○	○	○	○	○	○	
S-PCLN ⇒ E7		~ 3																								●	●	●
BCLN ⇒ E7		~ 3			80° Diamond Neg. Type																					●	●	●
S-MWLN ⇒ E11		~ 3			Trigon Neg. Type																						●	●

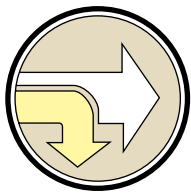
● = Euro stock
○ = Stock item in Japan



Coloured boxes indicate available size.

Application	Type	Boring Depth (L/D)			Applicable Insert	Tooling	Min. Boring ϕ 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	S-SDUC ⇒ E14	~ 3			55° Diamond 7° Pos. Type																					
	New B/D-SDUC ⇒ E14			~ 6																						
	C-SDUC ⇒ Stock in Japan		~ 8																							
	S-SDQC ⇒ E15	~ 3			55° Diamond 7° Pos. Type																					
	New B/D-SDQC ⇒ E15			~ 6																						
	S-SVUB ⇒ E19	~ 3																								
	New B/C-SVUB ⇒ Stock in Japan		~ 8	~ 6	35° Diamond Type 5° & 7° Pos.																					
	S-SVQB ⇒ E19	~ 3																								
	New B/C-SVQB ⇒ Stock in Japan		~ 8	~ 6																						
	S-SVZB ⇒ E19	~ 3			35° Diamond Type 5° & 7° Pos.																					
	New B/C-SVZB ⇒ Stock in Japan		~ 8	~ 6																						
	S-PDUN ⇒ E8	~ 3					55° Diamond Neg. Type																			
	PDZN ⇒ Stock in Japan	~ 3																								
	BDUN ⇒ E8	~ 3																								
	BDZN ⇒ E8	~ 3			55° Diamond Neg. Type																					
S-SSKP ⇒ E16	~ 3			55° Diamond Neg. Type																						
C-SSKP ⇒ E16		~ 8																								
SSKC ⇒ Stock in Japan	~ 3				Square Type 7° Pos.																					
CSKP ⇒ Stock in Japan	~ 3			Square Type 11° Pos.																						
S-PSKN ⇒ E9	~ 3			Square Neg. Type																						
PSYN ⇒ Stock in Japan	~ 3																									
BSKN ⇒ E9	~ 3																									
BSYN ⇒ E9	~ 3																									

● = Euro stock
○ = Stock item in Japan



Milling Cutter Selection Guide

● According to Work Materials / Cutting Conditions

WGC — Cutter
ACZ330 — Grade
T250A

Coating
Cermet
Carbide
SumiBoron
SumiDia

- St 42-2
- C45
- 37Cr4
- etc

Condition	Application				Special Purpose	
	Plate	Heavy~Interrupted	Rough Surface	Welded Part		
Steel	Face Milling	WGC, UFO ACZ330 AC230 T250A A30N		WGC ACZ330 ACZ350	Multi-Purpose WRC ACZ330 ACZ350	High Feed MS1400 ACZ330 ACZ310
		Shoulder Milling	WFM, CNP ACZ330 ACZ350		CPG AC230 A30N	
Cast Iron	Face Milling		DPG(F), WGC AC211 ACZ310 G10E			Finishing FM(F) BN700
		Shoulder Milling	WFM, CNP ACZ310			
Non-ferrous Metals	Face Milling		RF, APG, SRF AC305 H1 DA2200		SAM DA2200	
		Shoulder Milling	RF, CHG, SRF H1 DA2200		SAM DA2200	

● Specifications (● Approach Angle ● Axial Rake Angle ● Max. Depth of Cut (mm) ● Radial Rake Angle)

WGC ⇒ G6	UFO ⇒ G8	WRC ⇒ G24	WFM ⇒ G20	CPG ⇒ Stock in Japan	New CNP ⇒ G19	CHG ⇒ Stock in Japan
 Axial: +20°~22° Radial: -20°~24°	 Axial: +27° Radial: -7°	 Axial: +3° Radial: -0°	 Axial: +10°~17° Radial: +10°~16°	 Axial: +6° Radial: -0°	 Axial: +5° Radial: -9°~ -15°	 Axial: +15° Radial: +4°
FMU ⇒ G16, M27	FM(F) ⇒ Stock in Japan	APG ⇒ Stock in Japan	RF ⇒ G14, M24	New SRF ⇒ G15, M25	SAM ⇒ Stock in Japan	GRC ⇒ G22
 Axial: +8° Radial: +2°	 Axial: +8° Radial: +2°	 Axial: +18° Radial: -2°	 Axial: +10° Radial: +4°	 Axial: +6° Radial: -2°~+4°	 Axial: +10° Radial: +6°	 Axial: +25° Radial: +10°



Condition	Plate	Heavy~Interrupted	Rough Surface	Welded Part	Special Purpose	
					—	
Work						
Die Steel ● X155CrVMo12-1 ● X40CrMoV5-1 - etc	Face Milling WGC, UFO ACZ330 ACZ350 T250A A30N		Face Milling WGC ACZ310 ACZ330 T250A A30N		Multi-Purpose WRC ACZ330 ACZ30	
	Shoulder Milling WFM, CNP New ACZ330 ACZ350		Shoulder Milling CPG EH20Z G10E			
Stainless Steel ● X5CrNi1810 ● X5CrNiMo17122 - etc	Face Milling WGC, UFO ACZ350 T250A A30N		Face Milling WRC ACZ330 A30N			
	Shoulder Milling WFM, CNP New ACZ330 ACZ350		Shoulder Milling CPG EH20Z A30N			
Heat Resistant Alloy ● Ti-Alloy Inconel - etc	Face Milling GRC EH20Z EH20					
	Shoulder Milling CHG EH20Z G10E		Shoulder Milling CPG EH20Z G10E			

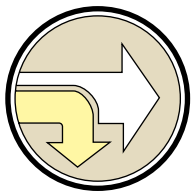
Recommended cutting conditions

— Cutting speed v_c (m/min), |—| Feed f_t (mm/tooth)

Grade		Work	Steel	Cast Iron	Non-ferrous Metals	Die Steel	Stainless Steel	Heat Resistant Alloy
CVD Coating	AC211			150 \rightarrow 250 0,1 \rightarrow 0,3				
	AC230	○	120 \rightarrow 300 0,1 \rightarrow 0,3			80 \rightarrow 230 0,1 \rightarrow 0,25		
PVD Coating	ACZ310	○		70 \rightarrow 220 0,15 \rightarrow 0,4				
	ACZ330	○	80 \rightarrow 250 0,1 \rightarrow 0,35			50 \rightarrow 220 0,1 \rightarrow 0,3	70 \rightarrow 230 0,1 \rightarrow 0,3	
	ACZ350	○	80 \rightarrow 200 0,1 \rightarrow 0,35				50 \rightarrow 180 0,1 \rightarrow 0,3	
	EH20Z	○					50 \rightarrow 200 0,15 \rightarrow 0,25	20 \rightarrow 50 0,1 \rightarrow 0,2
Cermet	T250A	○	120 \rightarrow 250 0,1 \rightarrow 0,3			80 \rightarrow 180 0,1 \rightarrow 0,3	80 \rightarrow 230 0,1 \rightarrow 0,3	
Carbide	P	○	100 \rightarrow 150 0,1 \rightarrow 0,35					
	K	G10E	○	80 \rightarrow 140 0,1 \rightarrow 0,3				15 \rightarrow 30 0,1 \rightarrow 0,2
		H1	○			400 \rightarrow 1600 0,1 \rightarrow 0,3		
SumiDia	DA2200	○			400 \rightarrow 3000 0,1 \rightarrow 0,15			

○ : 1-st Choice

○ : 2-nd Choice



Solid Carbide Endmill Selection Guide

● According to Work Materials

Square Type

Legend

Grade (Yellow) Edge Type (Blue) Usage (Pink)

General Steel (Common Use)

Coated Sharp General

GS MILL
GLM-SF Type
ø0.5~12mm
• 2 Flutes
• 4 Flutes



⇒ J7

Coated Sharp General

ZX-COATED
SSM-ZX Type
ø0.3~32mm
• 2 Flutes
• 4 Flutes



⇒ J12

Coated Sharp General

ZX-COATED (JIS)
JSM-ZX Type
ø3~15mm
• 2 Flutes
• 4 Flutes



⇒ Stock in Japan

Coated Strong General

SUPER ENDMILL
USM-ZX Type
ø3~25mm
• 2 Flutes
• 4 Flutes



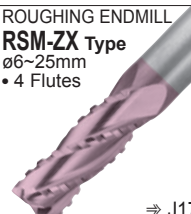
⇒ Stock in Japan

General Steel (Special Use)

High Efficiency

Coated Strong High Efficiency

ROUGHING ENDMILL
RSM-ZX Type
ø6~25mm
• 4 Flutes




⇒ J17

High Efficiency

Coated Strong High Efficiency

UPMILL
SSUP-ZX Type
ø2~20mm
• 4 Flutes




⇒ J9

Plunge Cut Multi-Purpose

Coated Strong Pocketing

UPMILL SLOT
SSUP-ZX Type
ø2~16mm
• 3 Flutes




⇒ Stock in Japan

Deep Shoulder

Coated Strong Deep Edge

UPMILL
SSUPR-ZX Type
ø3~20mm
• 4 Flutes




⇒ Stock in Japan

Hardened Steel

High performance Type

Coated Strong High Efficiency

GS-MILL-HARD
GSH-SF Type
ø1~20mm
• 4 Flutes
• 6 Flutes
• 8 Flutes




⇒ Stock in Japan

High Rigidity Type

Coated Strong High Efficiency

HARD ENDMILL
HHM-ZX Type
ø3~32mm
• 4 Flutes
• 6 Flutes
• 8 Flutes




⇒ J4

SumiBoron Endmill

CBN

"Helical Master"
BNES Type
ø6~16mm
• 1 Flute




⇒ J28, M28

Exotic Metals

For Heat Resistant Steel

Coated Strong High Efficiency

ZX-COATED HI-HELIX
HSM-ZX Type
ø2~25mm
• 2 Flutes
• 3 Flutes
• 4 Flutes




⇒ J16

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




⇒ J11

Special Purpose

Opto-electronics Machining

Coated Strong General

IT MILL
SIT-ZX Type
S-SIT-ZX Type
ø0.5~3mm
• 2 Flutes
• 4 Flutes

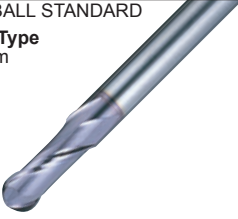




⇒ Stock in Japan

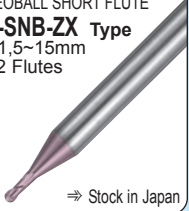


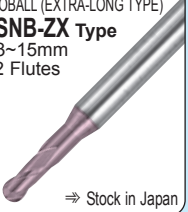


Ballnose Type



General Steel (Common Use)

<p>Coated General</p> <p>GSMILL BALL STANDARD GLB-SF Type R0.5~6mm • 2 Flutes</p>  <p>⇒ J19</p>	
<p>Coated General</p> <p>NEOBALL SNB-ZX Type R0.5~15mm • 2 Flutes</p>  <p>⇒ J20</p>	<p>Coated General</p> <p>ZX-COATED SSB-ZX Type R0.5~12.5mm • 2 Flutes</p>  <p>⇒ J21</p>

General Steel (Short Series)

<p>Coated Short General</p> <p>NEOBALL SHORT FLUTE S-SNB-ZX Type R1.5~15mm • 2 Flutes</p>  <p>⇒ Stock in Japan</p>	<p>Coated Short General</p> <p>ZX-COATED SHORT FLUTE S-SSB-ZX Type R1.5~4mm • 2 Flutes</p>  <p>⇒ Stock in Japan</p>
<p>Coated Long General</p> <p>NEOBALL (LONG TYPE) LSNB-ZX Type R0.5~15mm • 2 Flutes</p>  <p>⇒ Stock in Japan</p>	<p>Coated Long General</p> <p>NEOBALL (EXTRA-LONG TYPE) ESNB-ZX Type 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 SHB-ZX Type R0.5~10mm • 2 Flutes</p>  <p>⇒ Stock in Japan</p>	<p>Hardened Steel</p> <p>CBN</p> <p>SUMIBORON brazed BNBS Type R1~10mm • 2 Flutes</p>  <p>⇒ Stock in Japan</p>
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Non-ferrous Metal

DLC-Coated Endmill

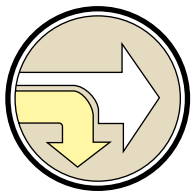
Coated General

AURORA COATED
SNB-DL Type
R1~8mm
• 2 Flutes



New

⇒ J19



Indexable Endmill Selection Guide

● According to Work Materials / Applications

Work	Standard Milling					
	Finish—Light	Light—Rough	Rough—Heavy	Deep Stop Milling	Face Milling	Multi Purpose
General Steel	WEX ^{New}				WGC-EW	WMM WRC
Stainless Steel	—	WEX ^{New}		WRM	WGC-EW	WMM WRC
Hardened Steel	—	—	—	—	—	—
Cast Iron Ductile cast Iron	SUMBORON Plunge Master	WEX ^{New}		WRM	WGC-EW	WMM WRC
Non-ferrous Metals	WEX ^{New} SAM-E	—	—	—	^{New} WGC-EW WEX SAM-E	WMM

● Product Range

WaveMill WEX Type ø14~ø100mm ^{New} ⇒ H6~H7	WaveRepeater WRM Type ø20~ø80mm ⇒ H11	WaveMill WFM-E Type ø40~ø80mm ⇒ Stock in Japan	WaveMulti WMM Type ø20~ø40mm ⇒ H9	Multi Use CHE Type ø16~ø100mm ⇒ Stock in Japan
Wave Mill WGC-EW Type ø20~ø63mm ⇒ Stock in Japan	UFO Mill UFO-E Type ø50~ø100mm ⇒ Stock in Japan	—	SUMBORON PLUNGEMASTER ⇒ Stock in Japan	SUMIDIA SAM-E Type ø50~ø80mm ⇒ Stock in Japan



Work	3D Profiling		
	Finish—Light	Light—Rough	Rough—Heavy
General Steel	WBMF		
		WBMR	
		WRC-E	
Stainless Steel	WBMF		
		WBMR	
		WRC-E	
Hardened Steel	—	—	—
Cast Iron Ductile cast iron	BES	WBMR	
		WRC-E	
	WBMF		
Non-ferrous Metals	—	—	—

Application Examples

WaveMill WEX

<ul style="list-style-type: none"> • Work UST42-2 • Holder WEX3025E • Insert APMT160508PDER (ACZ330) 	<ul style="list-style-type: none"> • Conditions $v_c=95\text{m/min}$ $f=0,12\text{mm/t}$ $d_{oc}=2,0\text{mm}$ $w_{oc}=20\text{mm}$ Dry
<ul style="list-style-type: none"> • Results Achieving 1.6 times the efficiency of competitor's with 1,5 times tool life 	

WaveMill WGC-EW

<ul style="list-style-type: none"> • Work X5CrNi18-10 • Holder WGC3032EW • Insert SEET0903AGSN-G (ACZ330) 	<ul style="list-style-type: none"> • Conditions $v_c=181\text{m/min}$ $f=0,143\text{mm/t}$ $d_{oc}=2,0\text{mm}$ Dry
<ul style="list-style-type: none"> • Results : Due to low machines rigidity, machining under cond. $Ad=2,0\text{mm}$ was impossible using competitor's. But WGC3000 type face mill achieved smooth machining. 	

WaveMultiMill WMM

<ul style="list-style-type: none"> • Work UST42-2 • Holder WMM3033E • Insert APMT160508PDER (ACZ330) 	<ul style="list-style-type: none"> • Conditions $v_c=124\text{m/min}$ $f=0,2\text{mm/t}$ $d_{oc}=2,0\text{mm}$ Wet Helical milling
<ul style="list-style-type: none"> • Results Double the tool life of competitor's with less wear observed 	

WaveBallMill WBMR

<ul style="list-style-type: none"> • Work X155CrVMo12-1 • Holder WBMR2300S • Insert (ACZ330) ZNMT2706150-C ZNMT2806150-S 	<ul style="list-style-type: none"> • Conditions $v_c=113\text{m/min}$ $f=0,1\text{mm/t}$ $w_{oc}=8\text{mm}$ Profiling Dry
<ul style="list-style-type: none"> • Results Can machine up to 1,5 times longer than competitor's with less chipping 	

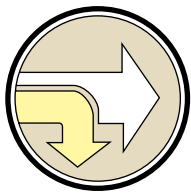
WaveBallMill WBMF

<ul style="list-style-type: none"> • Work GGG70 • Holder WBMF1300M • Insert ZPGU3486150 (ACZ120) 	<ul style="list-style-type: none"> • Conditions $v_c=283\text{m/min}$ $f=0,3\text{mm/t}$ $F=1800\text{mm/min}$ $d_{oc}=0,8\text{mm}$ $w_{oc}=0,8\text{mm}$ Dry
<ul style="list-style-type: none"> • Results Better surface finish and minimal wear with 2 times the efficiency. Machining time is reduced from 12hrs to only 4hrs. 	

SumiBoron BallnoseEndmill BES



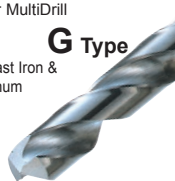
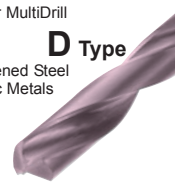




<ul style="list-style-type: none"> • Work GG25 • Holder BES300S • Insert BEST300S (SumiBoronBN500) 	<ul style="list-style-type: none"> • Conditions $v_c=750\text{m/min}$ $f=0,3\text{mm/t}$ $F=4700\text{mm/min}$ $d_{oc}=0,2\sim 0,5\text{mm}$ $w_{oc}=0,9\text{mm}$ Dry
<ul style="list-style-type: none"> • Results Good finishing and tool life. Only requires 2/3 of the normal machining time. 	



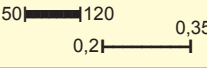
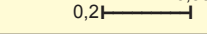
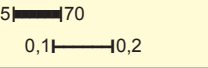
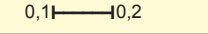
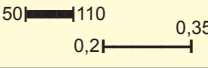
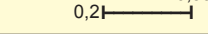




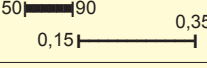
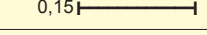
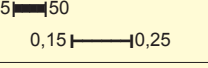
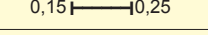
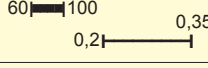
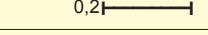
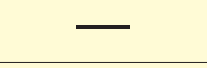
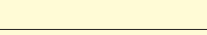






Drill Selection Guide

● According to Drill Types / Applications

Application		General		Special	
Solid Type	"Super Multi-Drill" MDS Type	m7 DIN Type "Super Multi-Drill" K Type TiAlN coated general purpose drill  øD: 2,0 ~ 12mm L/D: ~ 2, ~ 4 ⇒ K6-7	"Super Multi-Drill" K Type TiAlN coated general purpose drill  øD: 1,0 ~ 20mm L/D: ~ 2, ~ 3 ⇒ K8-11	Super MultiDrill G Type For Cast Iron & Aluminum  øD: 2,8 ~ 20mm L/D: ~ 3 ⇒ K8-11	
				Super MultiDrill D Type Hardened Steel Exotic Metals  øD: 1,0 ~ 16,1mm L/D: ~ 3 (Stock in Japan)	
Brazed Type	"Super Multi-Drill" KDS Type	"Super Multi-Drill" MAK Type General Purpose Drill  øD: 12 ~ 26mm L/D: ~ 3 ⇒ K18-19	Long Type "Super Multi-Drill" LAK Type Deep Hole Drilling  øD: 12 ~ 26mm L/D: ~ 5 ⇒ K20-21		
			Long Type "Super Multi-Drill" DAK Type Good Chip Removal  øD: 9 ~ 22mm L/D: ~ 7 ⇒ K22-23	Extra Long Typ "Super Multi-Drill" FA Type For Cast Irons and Aluminium Alloys  øD: 9 ~ 22mm L/D: ~ 7 ⇒ K24-25 Delivery on request	

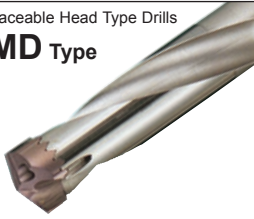

Recommended Cutting Conditions by Work Materials

Drill		Steel	Stainless Steel	Cast Iron	Non-ferrous Metals
Solid Type	K Type	50  120 0,2  0,35	15  70 0,1  0,2	50  110 0,2  0,35	—
	G Type	—	—	25  80 0,25  0,4	80  200 0,25  0,45
Brazed Type	AK Type (MAK/LAK/DAK)	50  90 0,15  0,35	35  50 0,15  0,25	60  100 0,2  0,35	—
	FA Type	—	—	30  70 0,2  0,5	60  150 0,2  0,5




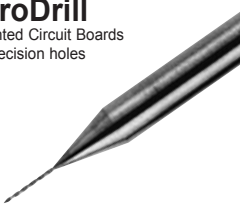

 Cutting speed v_c (m/min)
 Feed f (mm/rev.)



Application	General	↔	Special
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Indexable Drills	Replaceable Head Type Drills SMD Type  $\phi D: 13,5 \sim 30,5\text{mm}$ L/D: 3, 5, 8 ⇒ K26-27	Insert Type Drills WDS Type High Efficiency and Deep Holes  $\phi D: 14 \sim 50\text{mm}$ L/D: 3, 5 ⇒ K28-31	—
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Application	Deep Hole	Very Small Hole	Precision Hole
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Special Purpose Drills	"Super Long Multi-Drill" XHT Type New General Purpose Deep Hole Drill  $\phi D: 4,0 \sim 8,0\text{mm}$ L/D: 10/15/20/25/30 ⇒ K12-13	"Mini-MultiDrill" MDSS Type  $\phi D: 0,20 \sim 1,00\text{mm}$ L/D: 10 ⇒ K16 (Stock in Japan)	AURORA-Coat Drill DHL Type (For Aluminium)  $\phi D: 3,0 \sim 16,0\text{mm}$ L/D: 3, 5 ⇒ K14-15 (Stock in Japan)
		MicroDrill For Printed Circuit Boards High precision holes  $\phi D: 0,05 \sim 3,20\text{mm}$ L/D: ~ 5 (Stock in Japan)	PCD Brazed Drill SumiDia Drill  $\phi D: 5 \sim 12\text{mm}$ L/D: ~ 3 ⇒ K32-33 (Stock in Japan)

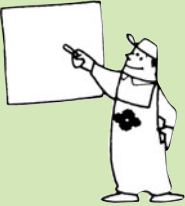
■ Recommended Cutting Conditions by Work Materials

Drill	Work			
	Steel	Stainless Steel	Cast Iron	Non-ferrous Metals
SMD Type ($\phi 20$)	$50 \text{---} 120$ $0,15 \text{---} 0,35$	$50 \text{---} 90$ $0,1 \text{---} 0,25$	$50 \text{---} 100$ $0,2 \text{---} 0,45$	$100 \text{---} 180$ $0,2 \text{---} 0,4$
WDS Type ($\phi 18$)	$100 \text{---} 180$ $0,15 \text{---} 0,25$	$80 \text{---} 150$ $0,1 \text{---} 0,2$	$100 \text{---} 150$ $0,1 \text{---} 0,25$	$100 \text{---} 200$ $0,1 \text{---} 0,25$
XHT Type ($\phi 5$)	$80 \text{---} 120$ $0,15 \text{---} 0,25$	$30 \text{---} 60$ $0,08 \text{---} 0,15$	$50 \text{---} 90$ $0,15 \text{---} 0,3$	$80 \text{---} 160$ $0,12 \text{---} 0,35$
SumiDia Drill	—	—	—	$80 \text{---} 200$ $0,05 \text{---} 0,2$

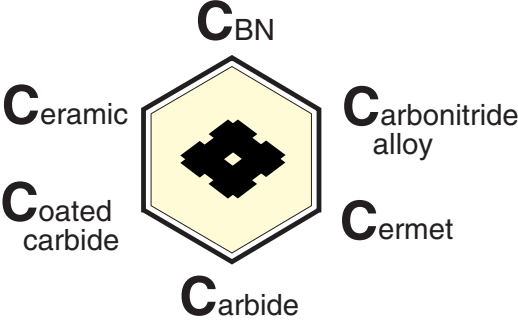
 Cutting speed v_c (m/min)
 Feed f (mm/rev.)

Grades

B



B1 ~ B22



Grades

- Coated Grade "ACE-Coat Series" B2
- Cermet / Coated Cermet B3
- "Igetalloy" Carbides B4
- Advanced Ceramics B5
- ACE-Coat AC700G / AC2000 / AC3000 B6
- ACE-Coat AC300G / AC700G B8
- ACE-Coat AC610M / AC630M B10
- ZX-Coating Series B11
- ACE-Coat ACZ330 B12
- EH510Z / EH520Z B13
- Coated Cermet T2000Z / T3000Z B14
- Cermet T1200A / T250A B15
- AURORA COAT Series B16
- Chipbreaker Comparison Chart B17
- Grade Comparison Chart B18
- Properties of Sumitomo Grades B20
- Material Properties B21
- Recommended Cutting Conditions B22

Refer to page L1 ~ and M1 ~ for SumiBoron and SumiDia Products.

"ACE-Coat" Series

High Efficiency & High Reliability Grades

Grades



General Features

Sumitomo's "ACE-Coat" series for turning features a special substrate with an extra tough layer coated with super hard thin films. All these components enable the insert to have excellent wear resistance, toughness and hardness properties.

Consequently, steels and cast irons can be machined with higher efficiency.

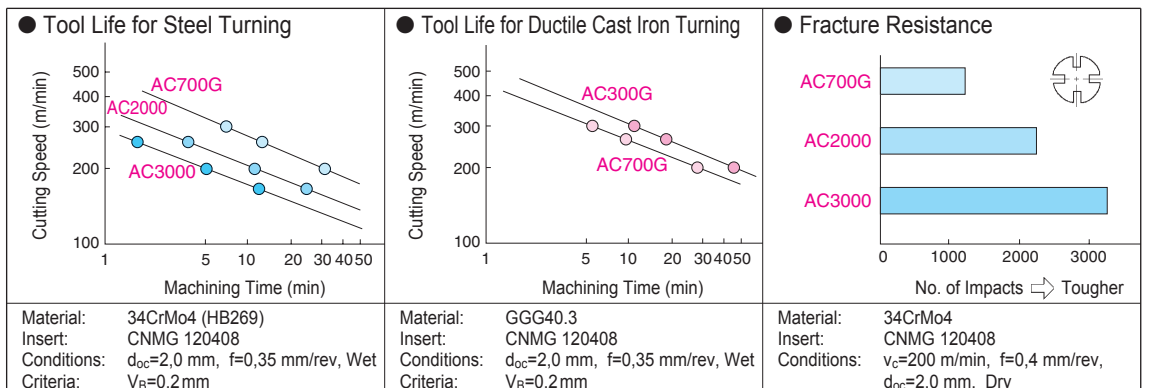
Turning Application

	Material	Grade	Characteristic · Application
High Speed Finishing - Light Cutting	Steel	AC700G	• Premium grade for "High-Speed" machining of steel.
		AC900G	• New grade with high wear resistant and toughness for "High-Speed" machining of steel.
		AC2000	• Excellent plastic deformation and fracture resistance. • Main grade for general machining of steel.
Medium Cutting	Cast Iron	AC3000	• Very tough grade for strong interrupted cutting and rough machining of steel
		AC300G	• K01 grade provides high wear resistance. • Grey cast iron and ductile cast iron high speed continuous machining.
		AC700G	• High toughness substrate with high adhesive coating for roughing of grey and ductile cast iron.
Heavy Roughing	Stainless Steel	AC900G	• New extremely tough grade for hard roughing and heavy interrupted cut of grey and ductile cast iron.
		AC610M	• M10 grade provides high wear resistance. • Suitable for high performance machining of stainless steel.
		AC630M	• Special substrate with high toughness and special wear resist CVD coating. • Main grade for stainless steel.

Milling Application

	Material	Grade	Characteristic · Application
High Speed Finishing - Light Cutting	Steel	AC230	• Excellent thermal cracking resistance and high wear resistance suitable for high speed wet machining of steel
		ACZ330	• PVD coating provides excellent wear resistance. • Medium to high speed milling of steel.
Medium Cutting	Cast Iron	ACZ310	• Tough fine grades substrate with PVD ZX-coating • For milling of cast iron
		AC211	• Insert has excellent notch wear resistance. • High speed, high feed milling of cast iron.
Heavy Roughing	Stainless Steel	ACZ350	• Super tough substrate with PVD ZX-coating • For milling of stainless steel
		EH20Z	• Special substrate with high toughness coated with special PVD coating. • For hard-to-cut material and stainless steel.

Performance





General Features

Cermets are used to produce excellent surface finish and high precision machining because of their low adhesion with steels. The most versatile cermets developed by Sumitomo are the latest T1200A for turning and T250A for milling. In addition, PVD coated cermet grades also widen the range of applications.

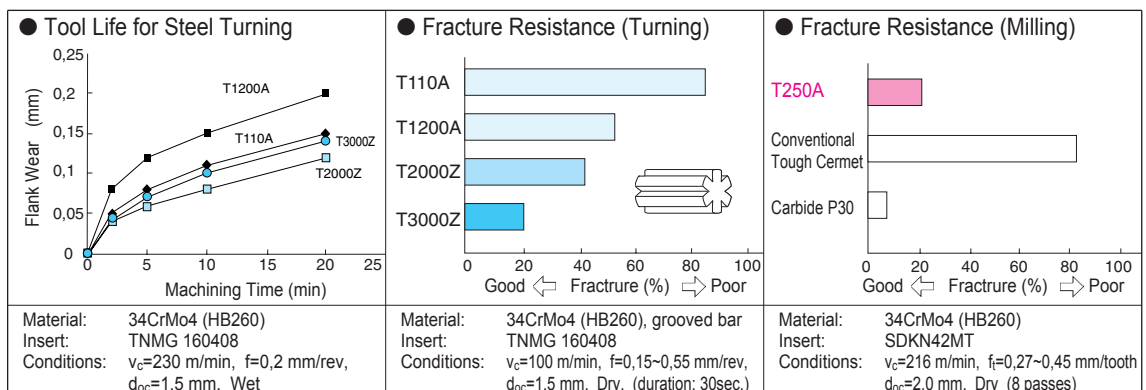
Turning Application

		Type	Grade	Characteristic · Application
	Cermet	Cermet	T110A	<ul style="list-style-type: none"> High wear resistance and toughness. For finishing of steels and cast iron.
	Coated Cermet		T1200A	<ul style="list-style-type: none"> Excellent high wear resistance with good toughness. Finishing to medium speed machining of steel.
	Cermet		T130A	<ul style="list-style-type: none"> High content, fine cermet grain improve toughness. Medium to low speed machining of steel.
		Coated Cermet	T2000Z	<ul style="list-style-type: none"> ZX-Coating improves adhesion resistance. High speed machining of steel.
			T3000Z	<ul style="list-style-type: none"> ZX-Coating with good adhesion strength. Medium to finish interrupted machining of steel

Milling Application

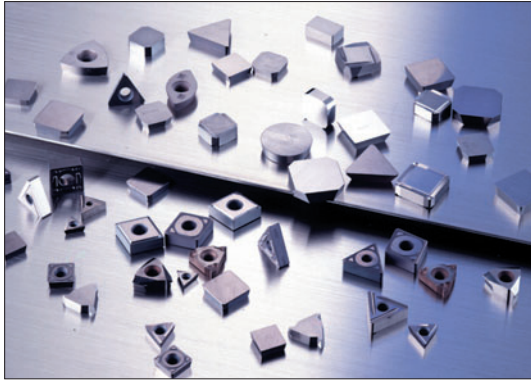
		Type	Grade	Characteristic · Application
	Cermet	Cermet	T250A	<ul style="list-style-type: none"> Strong cutting edge enhances chipping resistance. General steel and stainless steel.

Performance



"Igetalloy" Carbides

Grades

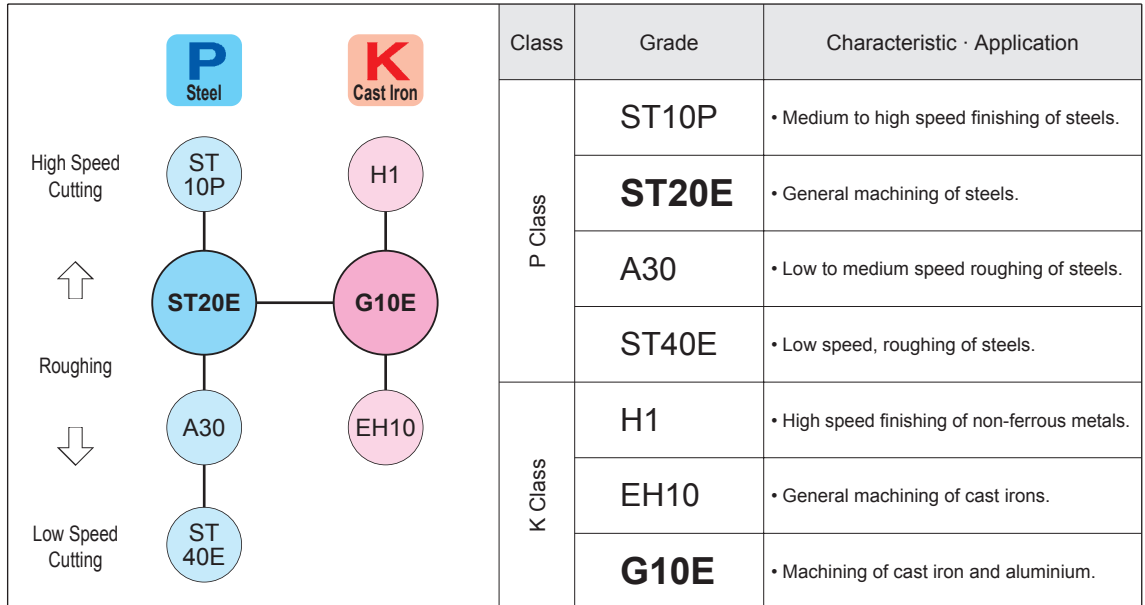


General Features

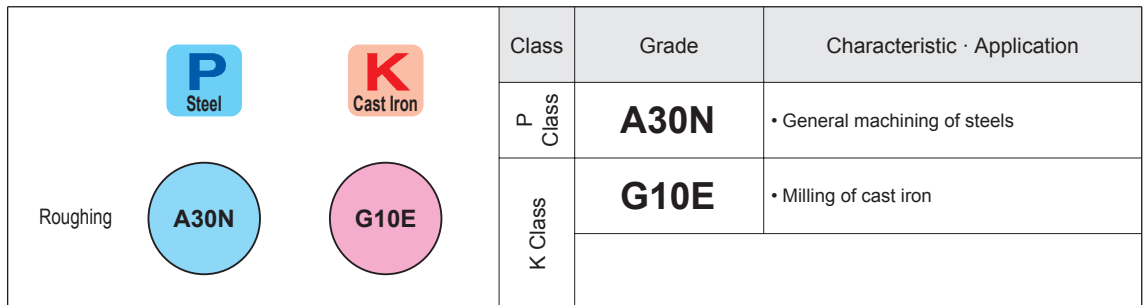
Sumitomo has been developing carbide grades for the past 70 years. Since then many grades have been developed, improved as well as terminated, all with respect to the ever changing industrial needs.

With this vast experience, the development of the high toughness A30 for steel machining, EH10 and EH20 for hard-to-cut materials are just some examples of our achievements.

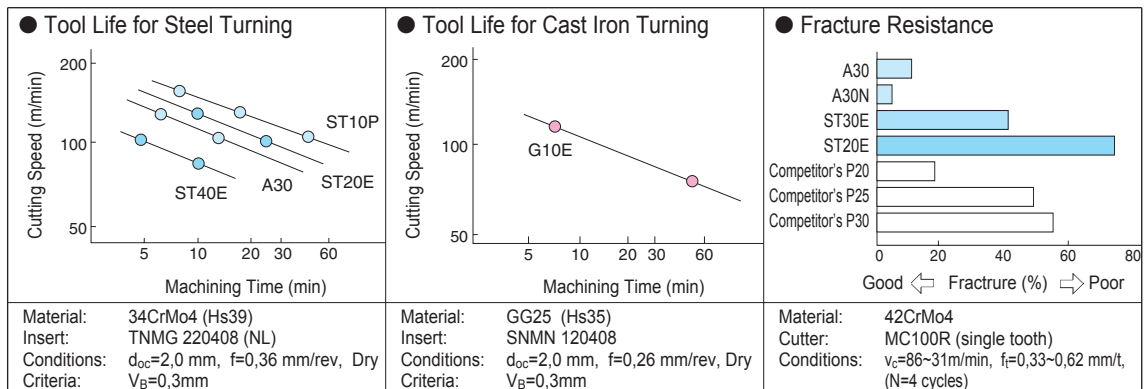
Turning Application



Milling Application



Performance










General Features

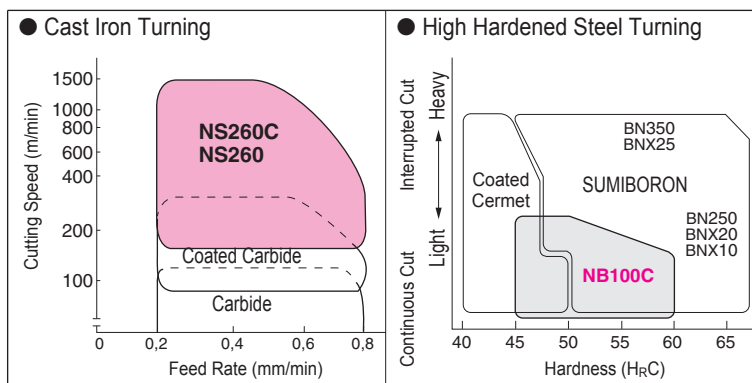
Sumitomo's "Advanced Ceramic" utilizes a special process and materials to enhance the toughness of ceramic cutting tools. This new development permits ultra-high speed machining of cast iron with high reliability.

All this and more can be found in our latest NS260 and NS260C, with improved grain boundary microstructure for higher hot hardness and good notch wear resistance.

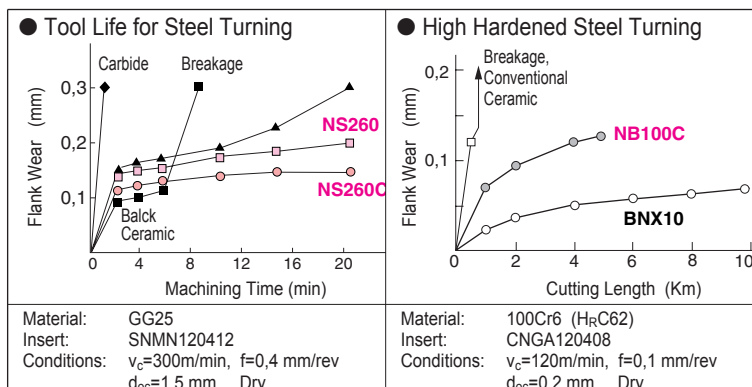
Application

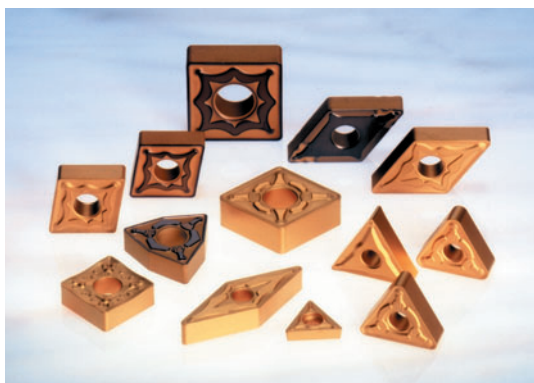
	 Cast Iron	 Hardened Steel	Type	Grade	Characteristic · Application
			High Speed Cutting	 NS260C	 NS260
↑				NS260C	<ul style="list-style-type: none"> High wear resistance coating. Suitable for high speed continuous cutting.
Roughing		 NB100C	Al ₂ O ₃ Ceramic	NB100C	<ul style="list-style-type: none"> Very tough Al₂O₃ based ceramic with new ZX-coating. Low speed, continuous turning of Hardened Steel

Application Range



Performance



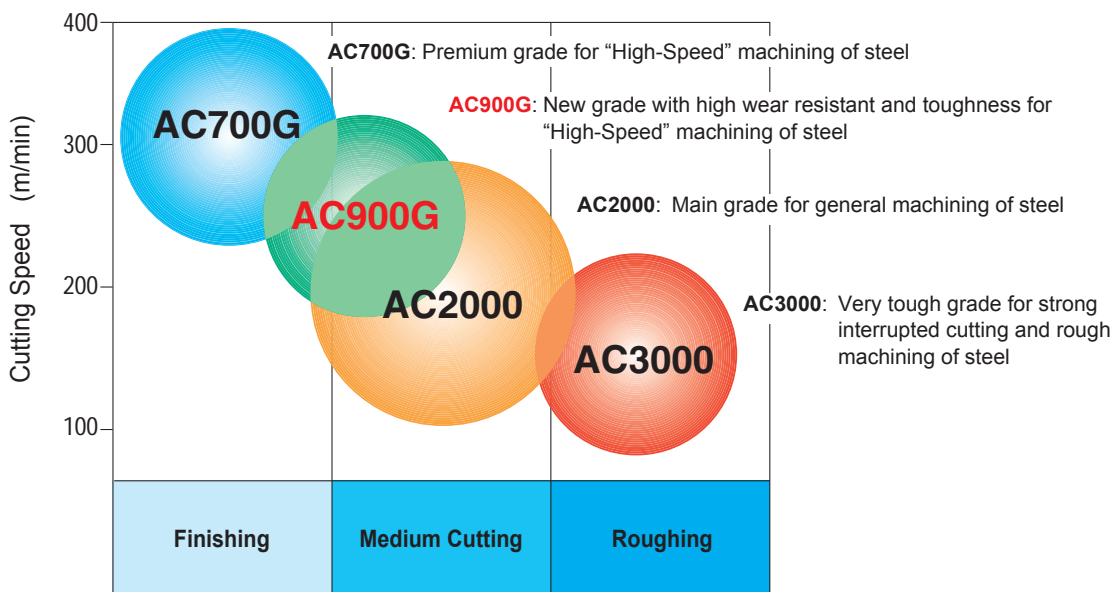


■ General Features

AC700G and new AC900G with its tough alumina coating, are suitable of both high speed machining of steel and roughing of cast iron.

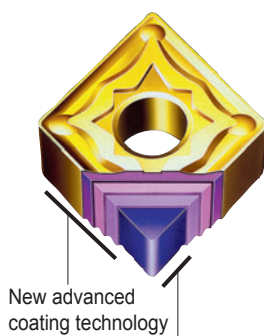
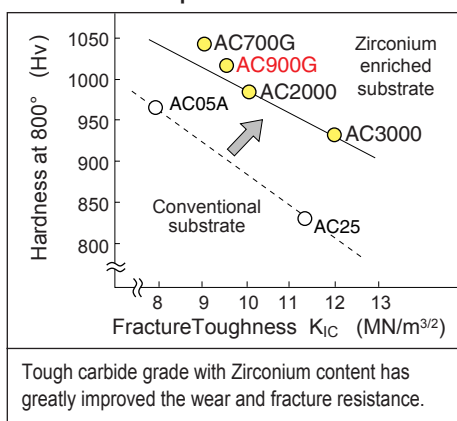
The new AC2000 is an improved version with better-coating strength for higher reliability. Along with AC3000, this highly efficient series exhibits longer tool life from high speed to heavy interrupted of steel.

■ Application Range

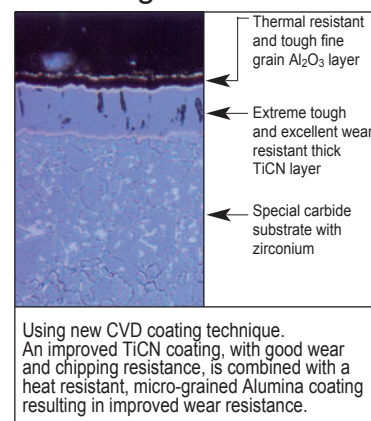


■ Characteristics

● Grade Map



● Coating Structure



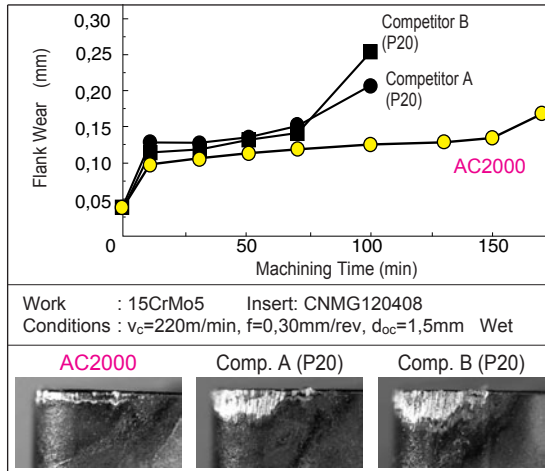
■ Recommended Conditions

Reference to using CNMG120408 insert
Depth of cut: 1~5mm

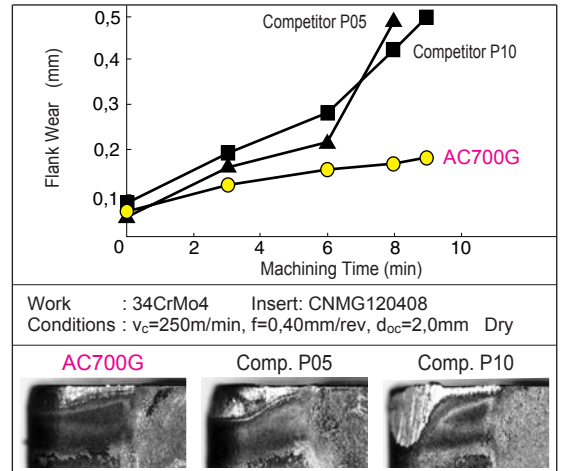
Material	AC700G		AC900G		AC2000		AC3000	
	Cutting Speed (m/min)	Feed rate (mm/rev)	Cutting Speed (m/min)	Feed rate (mm/rev)	Cutting Speed (m/min)	Feed rate (mm/rev)	Cutting Speed (m/min)	Feed rate (mm/rev)
General Steel Alloy Steel	150 — 300	0,15 — 0,5	150 — 280	0,15 — 0,5	100 — 250	0,15 — 0,5	80 — 200	0,15 — 0,5
Low Carbon Steel	200 — 350	0,15 — 0,5	180 — 300	0,15 — 0,5	150 — 280	0,15 — 0,5	90 — 250	0,15 — 0,5

Performance

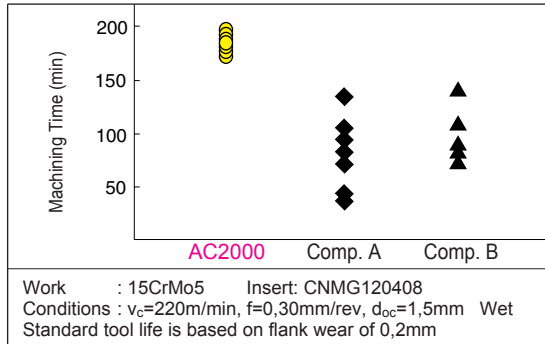
Wear Resistance of AC2000



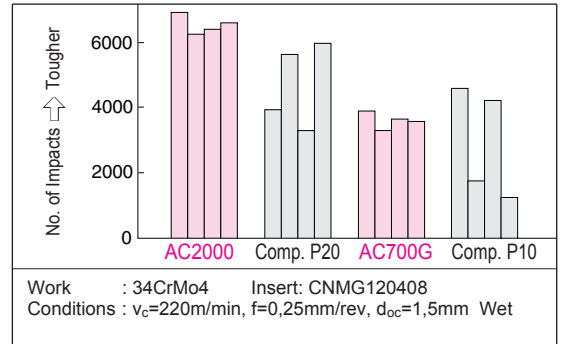
Wear Resistance of AC700G



Tool Life Stability of AC2000

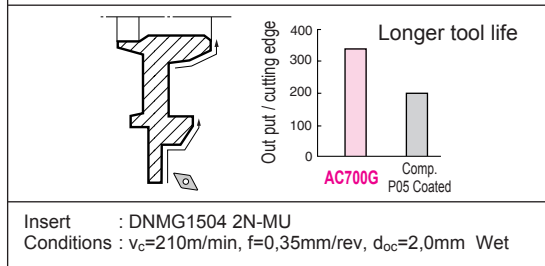


Fracture Resistance of AC2000

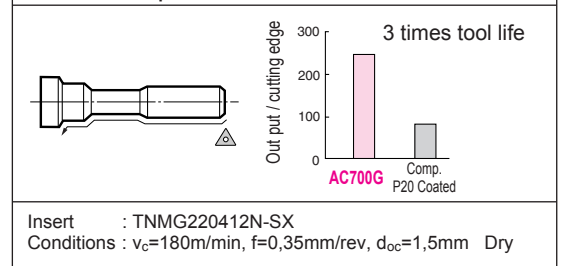


Application Example of AC700G

C45 / Hub

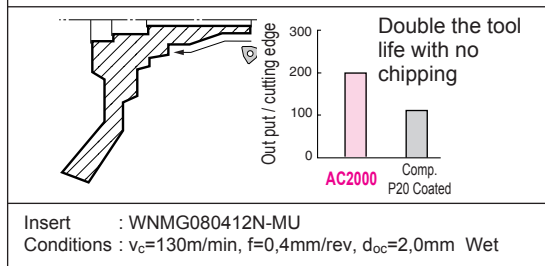


C30 / Propeller Shaft

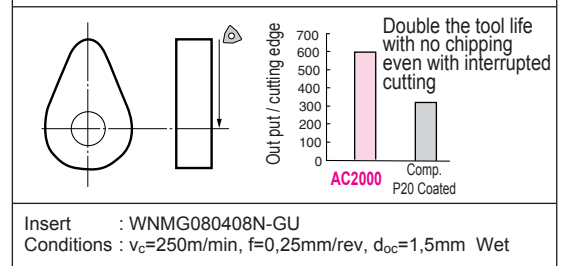


Application Example of AC2000

C40 / Knuckle

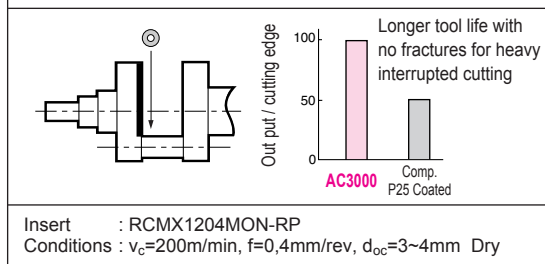


20Cr4 / Cam Part

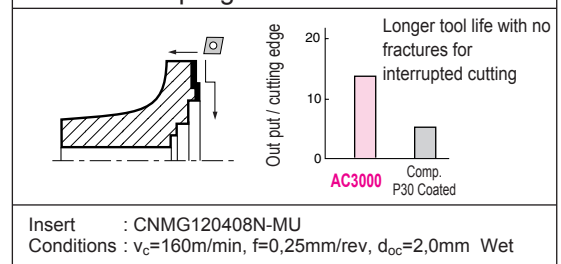


Application Example of AC3000

C40 / Crank Shaft



Ck45 / Coupling





General Features

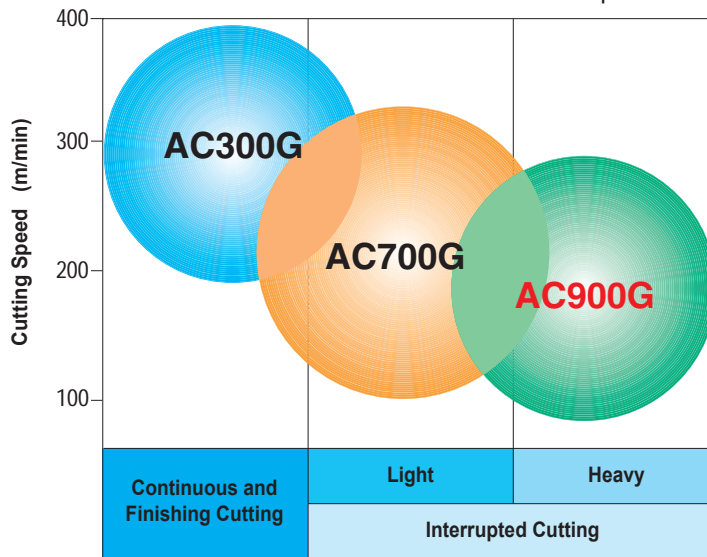
The ultimate grades for grey and ductile cast iron machining. ACE-coat AC300G and AC700G feature newly developed ultra tough zirconium enriched substrates, plus a new thick Al₂O₃ layered CVD coating, which provides superior wear resistance and protection against delamination and chipping under extreme conditions.

AC300G first choice for continuous cutting at higher speeds machining of ductile and grey cast iron

AC700G multi-grade for roughing of ductile and grey cast iron also in medium interrupted cutting

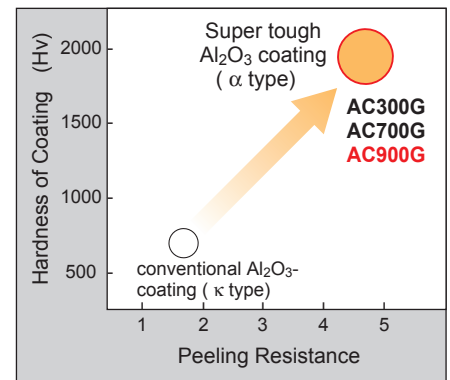
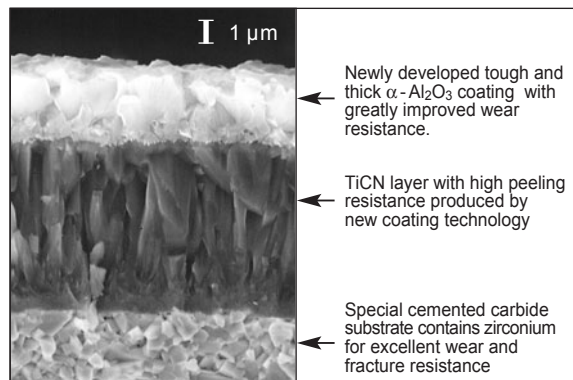
AC900G extremely tough grade for heavy roughing and interrupted cuts.

Application Range



Features

- The newly developed super tough α -Al₂O₃ film at high temperatures is 30% harder and 150% more resistant to chipping and peeling.
- Compared with a competitors grade the tool life was double.
- The cutting efficiency is improved by 50% substantially improving productivity.
- Suitable for dry machining.



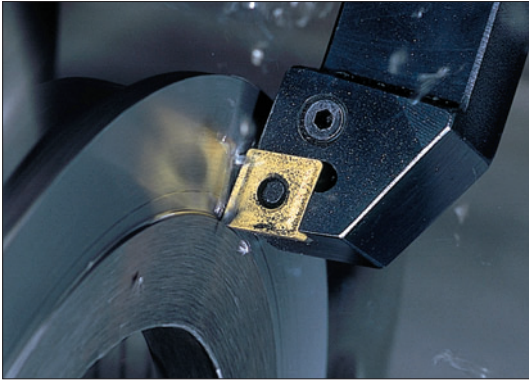
Recommended Cutting Condition

● Grey Cast Iron (GG)

Application	Recommended		Cutting Speed (m/min)		Feed (mm/rev)	
	Grade	Chipbreaker	100	350	0,1	0,6
Continuous & Light Cutting	AC300G	NUZ	100 ————— 350		0,1 ————— 0,6	
Medium ~ Rough Cutting	AC700G	Non-breaker (NUZ)	100 ————— 350		0,1 ————— 0,8	
Interrupted Cutting	AC900G	NUX (NUZ)	100 ————— 300		0,1 ————— 0,6	
Heavy Duty Cutting	AC900G	Non-breaker (NUX)	100 ————— 250		0,1 ————— 0,6	

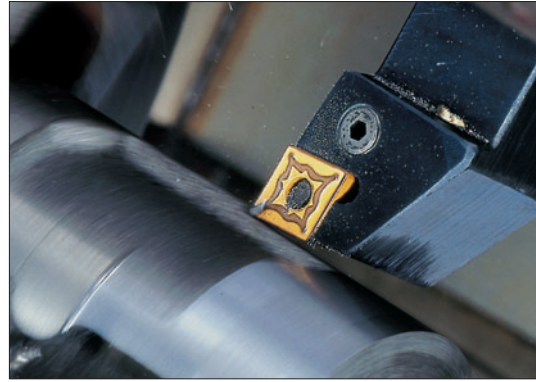
● Ductile Cast Iron (GGG)

Application	Recommended		Cutting Speed (m/min)		Feed (mm/rev)	
	Grade	Chipbreaker	150	300	0,1	0,5
Continuous & Light Cutting	AC300G	NUZ	150 ————— 300		0,1 ————— 0,5	
Medium ~ Rough Cutting	AC700G	NUX	100 ————— 280		0,1 ————— 0,4	
Interrupted Cutting	AC900G	NUX (NUZ)	100 ————— 280		0,1 ————— 0,4	
Heavy Duty Cutting	AC2000	NUX (NMU)	100 ————— 200		0,1 ————— 0,4	



AC300G

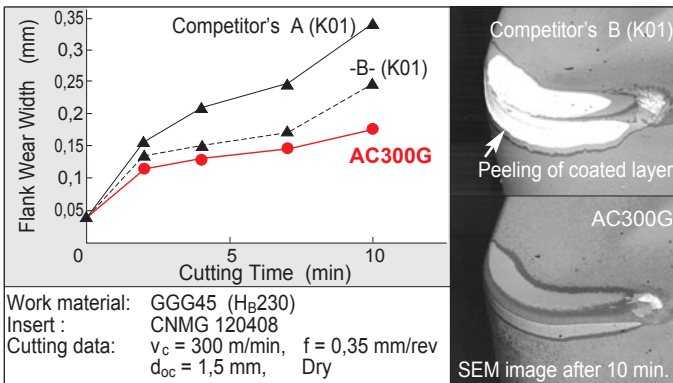
Use AC300G for high speed continuous cutting. The highly wear resistant grade AC300G was specifically developed for continuous and light interrupted cutting applications of ductile and grey cast irons. Extended tool life is realised even when high speed machining thanks to a special cemented carbide substrate and thick layer CVD coating.



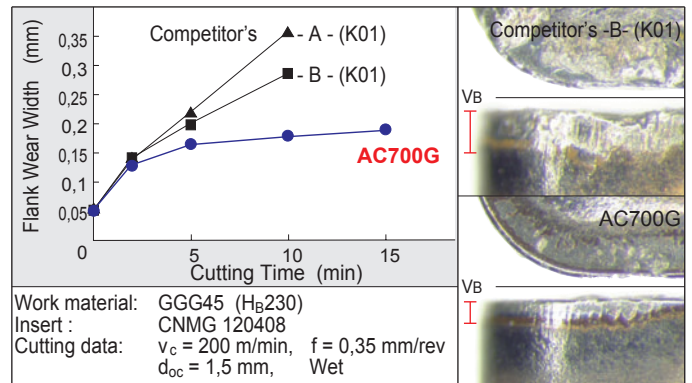
AC700G / AC900G

The reliable grades AC700G and AC900G were developed for roughing of ductile and grey cast irons and employed a new technology which smooths the surface film and improves resistance to fusion peeling. The new AC700G and AC900G offer reliable edge security under extreme conditions, and can be used on roughing and medium to heavy interrupted cut applications.

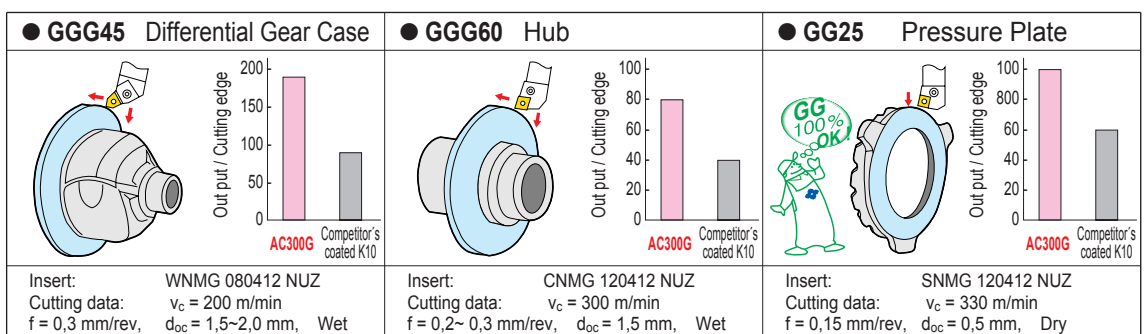
■ AC300G Performance (Continuous Cutting)



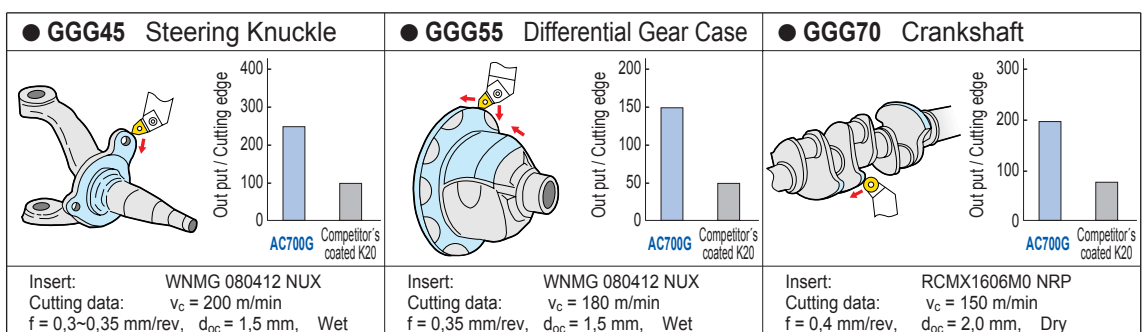
■ AC700G Performance (Interrupted Cutting)



■ Application eg. of AC300G



■ Application eg. of AC700G





New

General Features

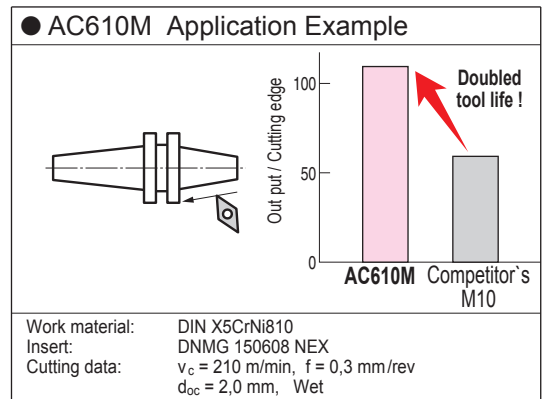
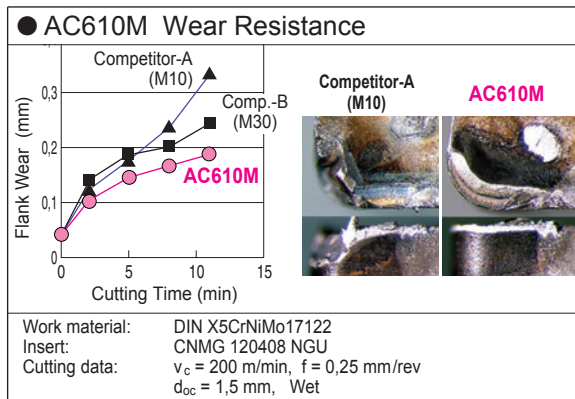
AC610M and AC630M are special coated grades for the machining of stainless steel.

Due to improved welding resistance and notch wear resistance resulting from the latest coating technology, improved notch wear resistance leads to a more stable and long tool life.

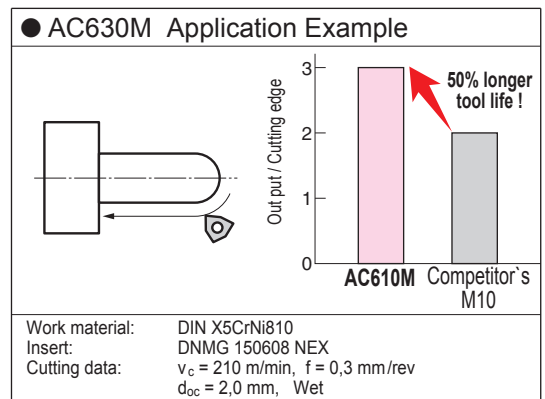
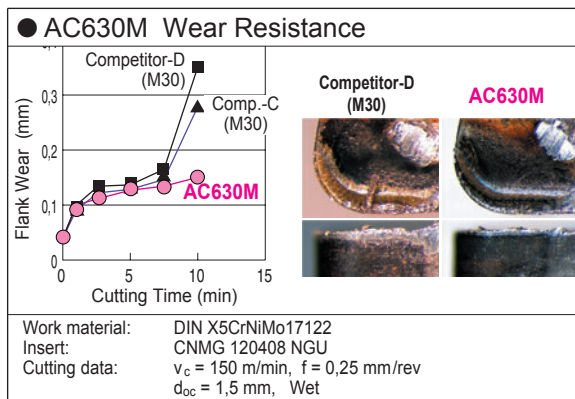
Advantages

- Fine grain TiCN layer provides high peeling resistance to special carbide substrate and excellent wear resistance
- Newly developed fine grain α -Al₂O₃ coating with high hardness and high adhesion resistance
- **AC610M** : High wear resistance grade for high performance machining of stainless steel
- **AC630M** : Main grade with special tough substrate provides smooth and reliable machining of stainless steel

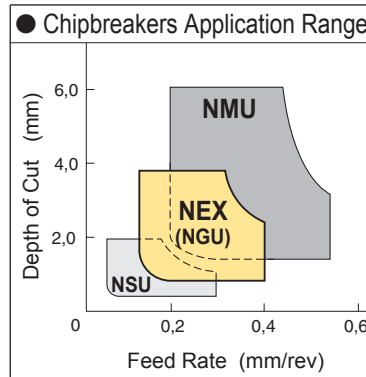
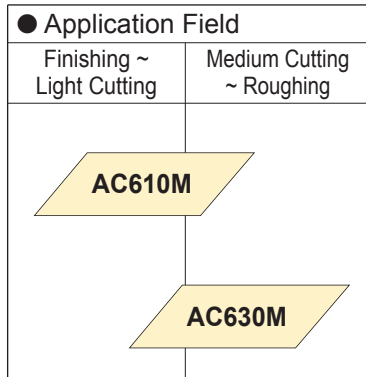
Efficiency of AC610M



Efficiency of AC630M



Recommended Conditions



Recommended Conditions

Grade	v_c (m/min)		f (mm/rev)	
	AC610M	130	210	0,1
AC630M	100	160	0,1	0,4

ZX-Coating Series



■ Features

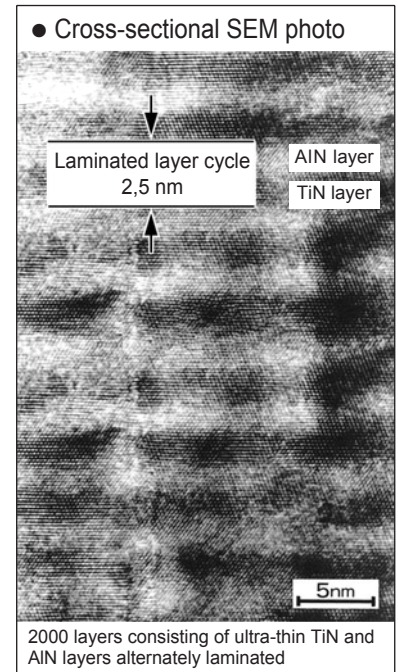
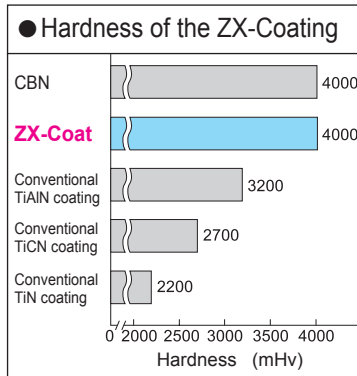
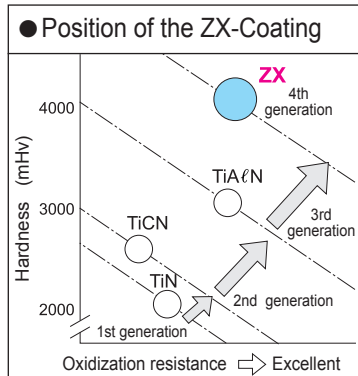
ZX is the worlds first 2000 layer TiN/AlN ultra hard coating, available on a wide range of milling and drilling tools developed specifically for high feed machining a broad range of workpiece materials including steels, stainless steels, high temperature alloys and irons.

The super lattice ZX-Coating is only 2,5 microns thick (1,25 nanometres x 2000) and at Hv4000 has a hardness approaching that of CBN. In addition the ZX-Coating has a smooth surface which improves the finish on machined workpieces. Its resistance to high temperatures results in high feed rates and greatly extended tool life.

■ Advantages

- Almost as hard as CBN
- Greatly extended tool life due to extreme hardness of ZX-Coating (Hv4000) compared to TiCN (Hv2700) and Ti/AlN (Hv3200)
- Smooth coating surface generates improved finish on workpiece.
- Available on a wide range of milling and drilling tools

■ Performance



■ Applicable Grades and Products

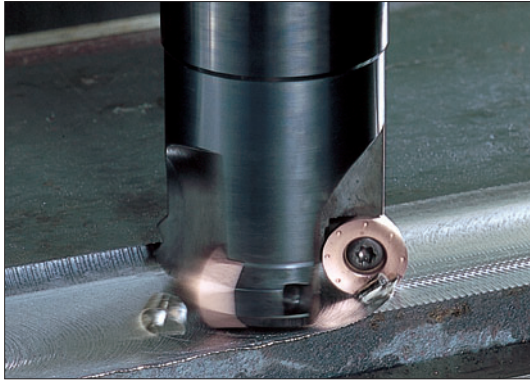
ACZ310	<p>Inserts for milling of cast irons</p> <ul style="list-style-type: none"> - Good wear resistance from ZX-Coating - Toughness through fine grain substrate
ACZ330	<p>New high efficiency and high reliability grade for milling of steels</p> <ul style="list-style-type: none"> - New super tough and wear resistant grade
ACZ350	<p>Inserts for milling of stainless steel</p> <ul style="list-style-type: none"> - Good thermal crack resistance through new substrate

● Super Multi-Drills HK Type



● ZX-Coated Endmills



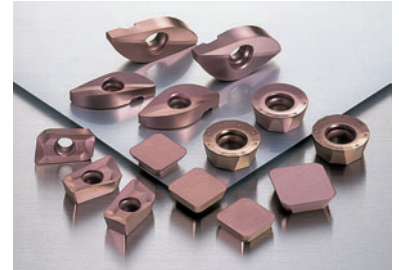


■ Features

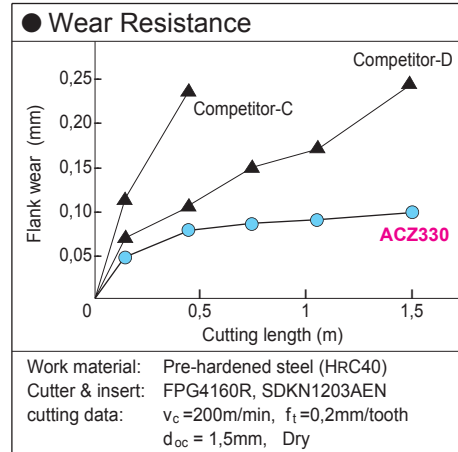
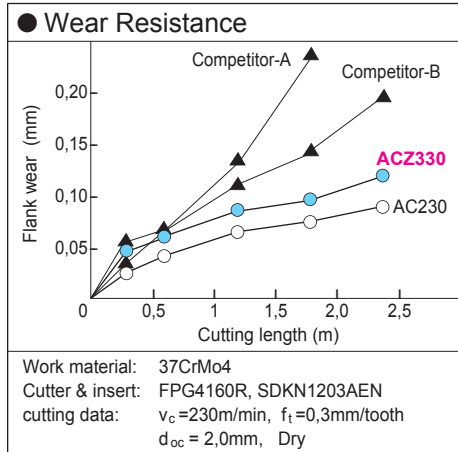
ACZ330 is developed for the milling of general steels to die steel. It has a super tough carbide substrate coated with the new ZX-Coating that exhibits both high fracture and high wear resistance at the same time.

■ Advantages

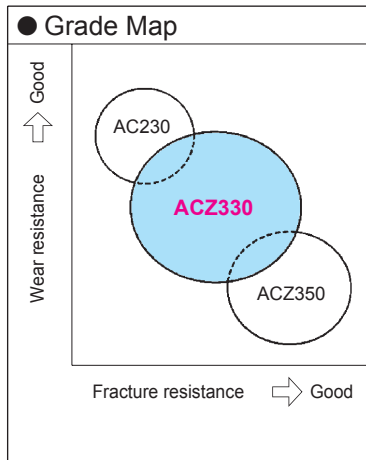
- Extremely tough substrate with high heat resistance and fracture resistance
- New ZX-Coating which is as hard as CBN
- Excellent for milling of general steel to die steel



■ Performance



■ Application eg. and Recommended Cutting Conditions



● Recommended Conditions

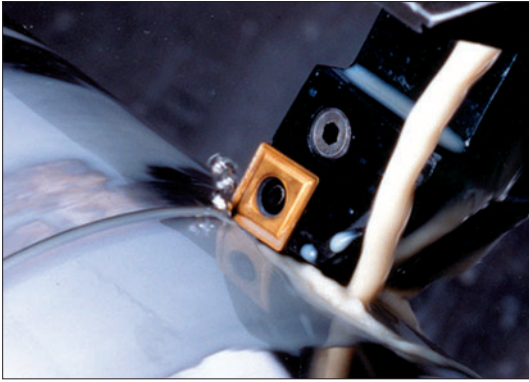
Work material	Cutting speed (m/min)	Feed rate (mm/rev)
Carbon steel	80 — 250	0,1 — 0,4
Alloy steel	70 — 230	0,1 — 0,3
Stainless steel	80 — 220	0,07 — 0,3
Die steel (~ HRC30)	50 — 200	0,07 — 0,3
Die steel (HRC30~50)	-	-

● Application Example

Double the tool life with 1,5 times the efficiency of conv. cutters.

Work material: Die mold steel (HRC32)
 Cutter: WRCF16100R (6 teeth)
 Insert: QPMT160660PPEN, ACZ330
 cutting data: $n=630\text{rpm}$, $v_f=1900\text{mm/min}$
 $d_{oc} = 2,0\text{mm}$, $w_{oc} = 25\text{mm}$

EH510Z / EH520Z



General Features

EH510Z and EH520Z are special grades for the machining of exotic metals such as Heat Resisting Steels and Titanium Alloys.

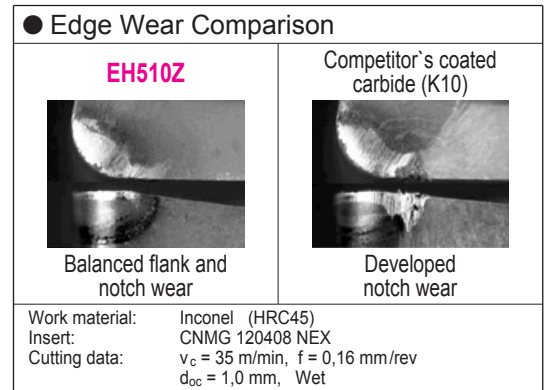
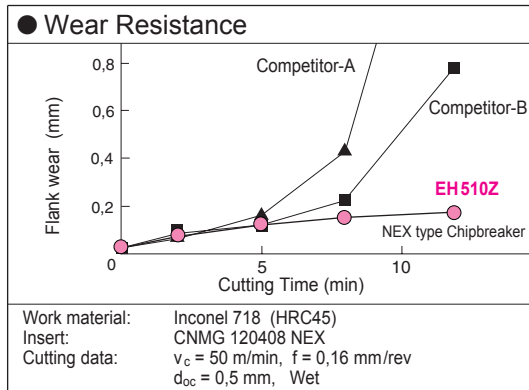
With better wear and notch-wear resistance, these grades exhibit a more stable tool life as compared to conventional grades.

Advantages

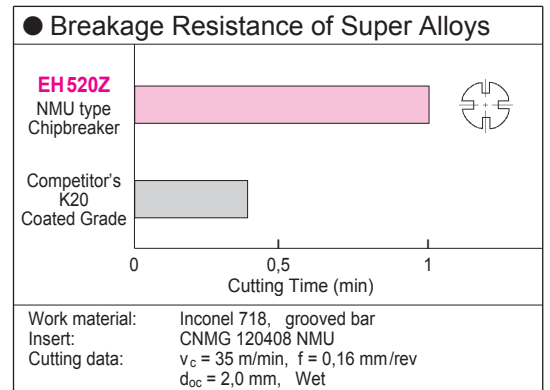
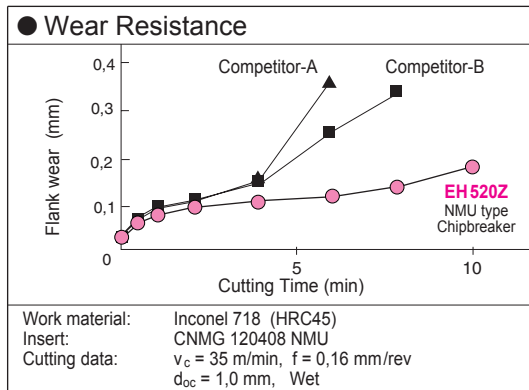
- For exotic metals such as Heat Resisting Steel and Titanium Alloy
- Notch wear is greatly reduced resulting in longer tool life
- New ZX-coating with excellent wear and adhesion resistance
- Special chipbreaker series for hard-to-cut materials
- **EH510Z**: For continuous cutting
- **EH520Z**: For roughing, interrupted cut and milling operations



Efficiency of EH510Z



Efficiency of EH520Z



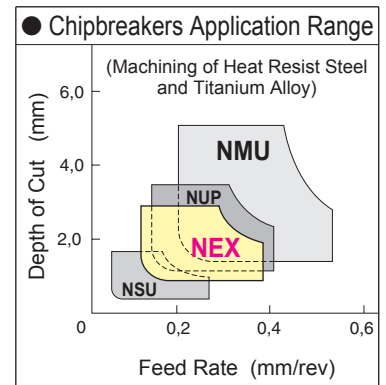
Recommended Conditions

Application Field

Finishing ~ Light Cutting	Medium ~ Interrupted Cutting
EH510Z	
	EH520Z

Recommended Conditions

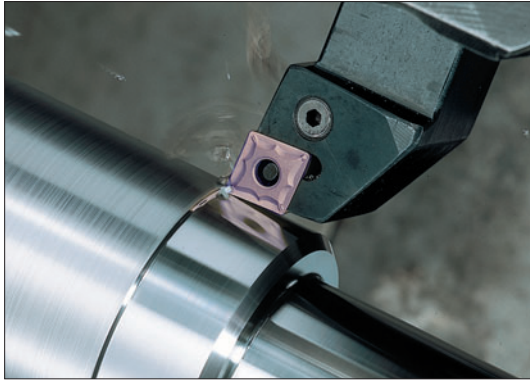
Work material	v_c (m/min)	f (mm/rev)
Ni - based alloys (Inconel718/x750, Waspalloy)	30 — 60	0,1 — 0,3
Fe - based alloys (A286, Incoloy800/801)	30 — 70	0,1 — 0,3
Co - based alloys (Stellite, S816, HS30)	20 — 70	0,1 — 0,2
Ti - based alloys (Ti-6Al-4V)	30 — 80	0,1 — 0,3



T2000Z / T3000Z

ZX-Coated Grade for Turning of Steels

Grades



General Features

ZX-Coated new cermet grades are suitable for light to medium turning of alloy steels, carbon steels, and soft steels at depths of cut up to 3mm.

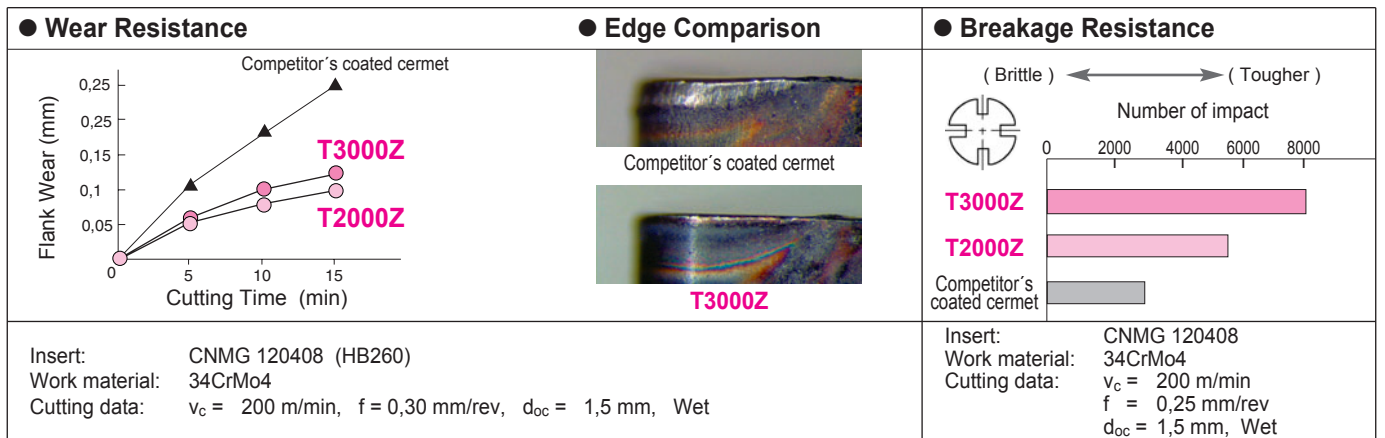
T2000Z makes holding size more reliable, increases tool life, gives excellent surface finish, and can be used wet or dry.
T3000Z is a new tough grade for roughing and interrupted cuts.

Advantages

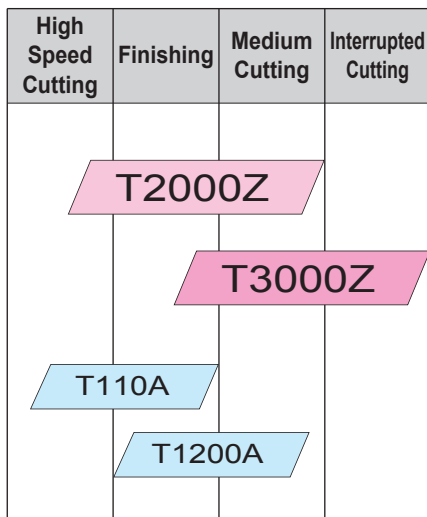
- New high hardness ZX-coating doubles the tool life as compared to conventional cermets.
- Improvements on the density and smoothness of the coating results in consistent beautiful finishing.
- **T2000Z**: For continuous machining, from high speed cutting to medium cutting.
- **T3000Z**: Special tough cermet substrate for medium to interrupted cutting



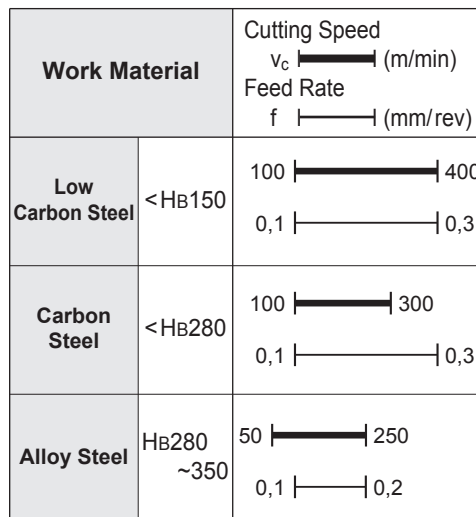
Performance



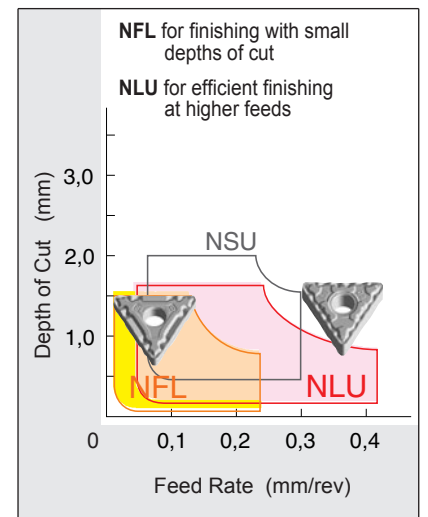
Application Range



Recommended Cutting Condition

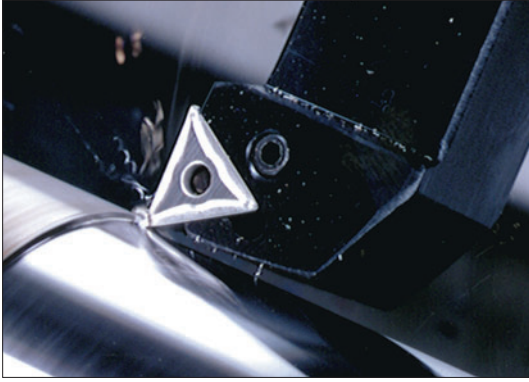


New Chip Breakers



For Steel Turning T1200A

PAT.



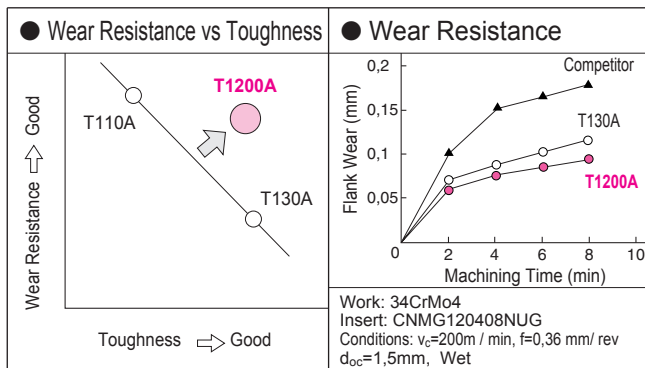
General Features

T1200A was developed for a wide application range from finishing to rough machining. With its improved wear and fracture resistance, high speed machining of steel is also possible. Furthermore, with good thermal cracking resistance, wet cutting can be performed.

Advantages

- High efficiency high speed machining with improved wear resistance.
- Sharp cutting edge that produces excellent surface finish.
- Wet cut possible with good thermal cracking resistance.
- Stable tool life with good fracture resistance
- Available in a variety of chipbreakers.

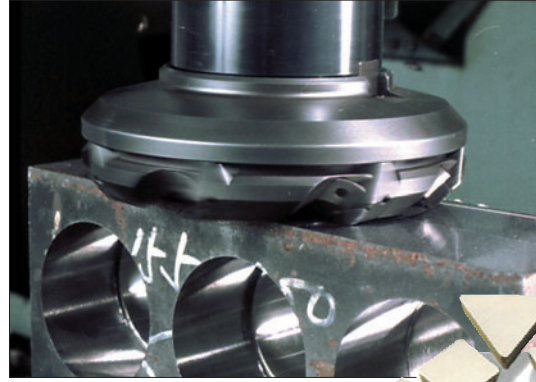
Performance



Recommended conditions

Application Range					Recommended conditions	
Application	P05	P10	P20	P30	Cutting speed (m/min) Feed (mm/rev)	
Grade			T1200A		Soft Steel (Below HB150)	100 — 300 0,1 — 0,3
		T110A			Carbon Steel Alloy Steel (Below HB280)	100 — 250 0,1 — 0,3
			T130A		Carbon Steel Alloy Steel (Above HB280)	50 — 200 0,1 — 0,2

For Steel Milling T250A



Grades

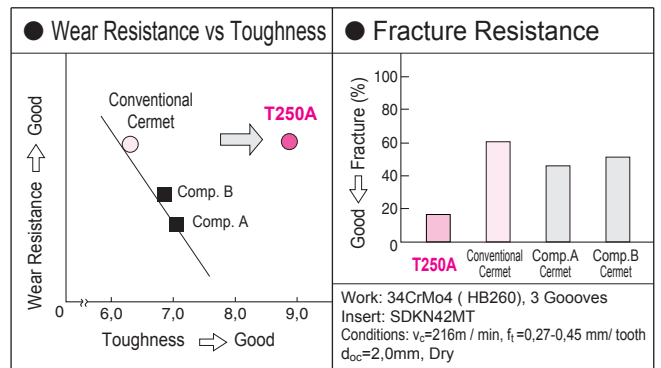
General Features

T250A features a strong cutting edge and excellent wear resistance with a tool life 2 to 3 times that of conventional cermets. With its high toughness properties, high efficiency and excellent tool life can be expected in the milling of Alloy steel, Carbon steel, Stainless steel, Die steel as well as some special materials.

Advantages

- 30% higher K_{1C} value, as compared to conventional cermets, improves edge toughness and tool life.
- High toughness and hardness improve wear resistance.
- Stable milling of general steel, stainless steel and die steel etc.

Performance



Recommended conditions

Application Range					Recommended conditions	
Application	P05	P10	P20	P30	Cutting speed (m/min) Feed (mm/tooth)	
Grade					Carbon Steel Alloy Steel	120 — 250 0,1 — 0,3
			T250A		Soft Steel	150 — 300 0,1 — 0,3
					Stainless Steel	80 — 230 0,1 — 0,2
					Die Steel	60 — 180 0,1 — 0,2

Aurora Coat Series

DLC-Coated Grade for Aluminium

Grades



■ Features

Sumitomo'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.

■ Advantages and Applications

- **Super smooth surface and low coefficient of friction**
Achieving beautiful finishing on Aluminium and non-ferrous metals with its high resistance to build-up edge.
- **High coating strength withstand tough cutting conditions**
Special DLC coating technique that improves coating adhesion. It is the world's first application of DLC coat on cutting tools.
- **Wide application possibilities**
- **A Spectrum of colours**
Glittering colours are result of the special coating technique.

* There are 7 interfacing colours in the AURORA COAT but have no effects on cutting performance.

■ Performance of DLC coating

Grade	Rake Face	Surface Roughness	Conditions
Aurora Coated DL1000		 Ra = 0,68 µm	Work material: ADC12 Tool: WEM3032E Cutting data: v _c = 300 m/min f _t = 0,15 mm/tooth d _{oc} = 5 mm w _{oc} = 5 mm Cutting length: 36 m Dry
Uncoated Carbide		 Ra = 1,22 µm	

■ Applicable Products

- WaveMill Insert (DL1000)



- Aurora Coated Endmills (ASM2000/4000DL, SNB2000DL)



- Aurora Coated Drills (DLH Type)



Chipbreaker Comparison

■ Negative Type

Class	Application	Sumitomo	Mitsubishi	Walter	Sandvik	Seco	Kennametal	Iscar
P Steel	Fine · Finishing	FA	FH	NF3	QF	FF1	MG-FF	SF
		FL	FS	NF3		FF1	MG-FF	SF
	Finishing	SU	SH,C	NS6	PF	MF2	MG-FN	NF
		LU	SA	NS6		MF2	MG-FN	NF
	Wiper Edge	LUW	SW	NF	WF	W-MF2	MG-FW	WF
	Light to Medium Cut	SX				MF3	MG-FL	TF / SM
	Medium Cut	GU	MA,MZ,MV	NM4	PM,QM	M3	MG-MG	GN / PP
		UX	MH	NM4	SM	MG-MN	MG-MN	NR
	Wiper Edge	GUW	MW	NM	WM	W-M3	MG-MW	WG
	Roughing	MU	GH	NM6	MG-PR	M5 / MR5	MG-RN	TNM / GN
		MX	MAT,MT			MG	MG	
	Heavy Cut	MP	HA,HZ	NR6	MM-PR,QR	R4	MM-RH	NM
		HG	HA,HZ	NR6	MM-PR,QR	R4 / R6	MM-RH	NM
HP		HH,HV,HX		HR	RR9 / R8	MM-M		
M Stainless Steel	Finishing	SU	SH	NF4	MF	MF1	MG-FP	
	Light to Medium Cut	EX	MS	NM4	23	MF3	MP	PP
		GU		NM4	MM	MF3	MP	PP
Roughing	MU	GH	NR4	MR	M5 / MR5	MG-MP		
K Cast Iron		UZ		NM5	KF		MG-UN	
		UX	GH,Standard	NM5	KM,KR		UM	

■ Positive Type

Class	Application	Sumitomo	Mitsubishi	Walter	Sandvik	Seco	Kennametal	Iscar
-	Finishing	LU	FV,SQ	PF4	PF,UF	FF1 / F1	UF / 11	PF
		Wiper Edge	LUW	SW	PF4	WF	W-F1	-FW
	Light Cut	SU	MQ,SV	PS5	PM,UM	F2	LF	SM
	Light to Medium Cut	MU	MV	PM5	PR,UR		MF	17
N Non-ferrous Metal		AG		PM2	AL	AL	HP	AS

Grade Comparison Chart

Grades

Coated Carbide

Application	Class	Grade	Sumitomo	Mitsubishi	Tungaloy	Sandvik	Walter	Iscar	Kyocera	Kennametal	Valenite	SECO
Turning	P Steel	P01	AC700G	UE6005 UE6010	T9005	GC4005	WPP10 WAP01	IC530N IC9015	CR7015	KC9110	SV305	TP1000
		P10	AC2000 AC900G	UE6010 UC6010	T9015	GC4015 GC4025	WPP10 WAP10	IC570 IC9015	CR7015 CA5025	KC9315 KC9110 KC9125	SV310 SV315	TP1000 TP150 TP2000
		P20	AC2000 AC900G	UC6010 UE6020	T9015 T9025	GC4025 GC4225	WPP20 WAP20	IC9025	CA5025 CR7025	KC9125 KC8050	SV320 SV325	TP2000
		P30	AC3000	UE6035 VP20MF VP15TF	T9035	GC4035	WPP30 WAP30	IC9025 IC635	CR7025 PR630	KC8050	SV325 SV330	TP3000
		P40	AC3000	UE6035 US735 UH6400	T9035	GC4035	WPP30 WAP30	IC3028 IC9025	PR660	KC9040	SV230 VIN VC911	TP3000 TP400
	M Stainless Steel	M10,S10	AC610M EH10Z EH510Z	US7020	T6020 AH110	GC1005	WAM10	IC907 IC570	CA6015 PR915	KC9225 KC5010	V05 V88 VC929	TP1000
		M20,S20	AC630M EH20Z EH520Z	US7020 VP20MF VP15TF	T6020 AH120	GC1025 GC2015	WAM20	IC908 IC907	CA6015 PR930	KC5525 KC5010	V88 VX8 VC928	TP2000
		M30	AC630M	US735	T6030	GC2025	WAM30	IC907 IC908 IC3028	PR660	KC9225 KC9240	V88 VX8 VC928 V1N	TP3000 TP400 TP40
		M40	AC3000 AC630M	US735	T6030	GC2035		IC908 IC3028	PR660	KC9240 KC9245	V1N	TP3000 TP40
	K Cast Iron	K01	AC300G	UC5105 UC5005 UC5015	T5010	GC3205 GC3215	WAK10	IC9007 IC428	CA4115 CA4010	KC9315	SV405 SV510	TK1000
		K10	AC700G EH10Z	UC5115 UC5015 UC6010	T5010 T5020 AH110 GH110	GC3005 GC3015 GC3215	WAK10	IC4028 IC428 IC9007	CA4010 CR7015 PR610	KC9325	SV410 SV515	TK1000
		K20	AC900G EH20Z	UC6010 VP15TF	T5020 AH120 GH120	GC3025	WAK20	IC4028 IC428 IC9015	CA4120	KC9325	SV415 SV515	TK2000
	Milling	P Steel	AC230 / ACP100	F7030	T3030	GC4020 GC4030 GC4040	WAP25	IC520M		KC930M	V1N	T20M T25M T250M
ACZ330 / ACP200 ACZ350 / ACP300			VP15TF UP20M VP30RT	AH120 GH330 AH330	GC1025 GC2030	WAP35 WKP35 WTP35 WXP45	IC4050 IC450 IC635	PR630 PR660 PR730 PR830	KC792M KC725M KC735M	VC935	F20M F25M F40M	
M Stainless Steel		EH20Z ACZ350 / ACP300	F7030 VP15TF VP30RT	GH330 AH120 AH140	GC1025 GC2030 GC2040	WXM35		PR660	KC930M KC725M	V1N VC935	T25M F25M	
K Cast Iron		AC211 / ACK100	F5010 F5020	T1015 T1020	GC3020	WAK15	IC4010 IC418 IC520M		KC920M KC925M	VN5	T150M	
	EH20Z ACZ310 / ACK100	VP15TF	AH110 AH120	GC3040	QAK25	IC4050 IC450	PR510	KC520M KC525M	VC928	F20M		




Cermet

Application	Class	Sumitomo	Mitsubishi	Tungaloy	Sandvik	Dijet	Hitachi	Kyocera	Kennametal	Ceramtec	SECO
Turning	P Steel	T110A	NX33 NX1010	NS520	CT5005	LN10 CX50	CH350	TN30 PV30*	KT125	SC15	
		T1200A T2000Z*	NX2525 AP25N* UP35N* NX55	NS530 GT530* AT530*	CT5015	NIT CX75	CH550 CZ25*	TN60 PV60*	KT175 KT315*	SC15 SC35	CM
		T130A T3000Z*	NX99	NS540		NAT	CH625	TN90 PV90*	KZ205	SC35 SC45	
	K Cast Iron	T110A	NX33 NX1010	NS520	CT5015 CT515	LN10	CH350	TN30 PV30*	KT125	SC15 SC35	
Milling	P Steel	T250A	NX2525 NX4545	NS540 NS740	CT530	CX90	CH550 CH570	TC60M TN100M	KT530M* HT7	SC60	C15M



* denotes coated cermet

Grade Comparison Chart

■ Uncoated Carbide

Class	Grade	Sumitomo	Mitsubishi	Tungaloy	Sandvik	Dijet	Hitachi	Kyocera	Kennametal	Valenite	SECO
	P10	ST10P	STi10T	TX10S	S1P	SR10 SRT	WS10		K5H K45	VC7 VC165	S10M
	P20	ST20E	STi20	TX20 TX25 UX25	SMA	SRT SR20 DX30	EX35		K29 K45 K2885	VC7	S25M
	P30	A30 A30N		TX30 UX30	SM30	SR30 DX30 DX25	EX35 EX40	PW30	K420 KM K21	VC5 VC35M	S25M
	P40	ST40E		TX40	S6	SR30 DX35	EX45		K420 KM GX	VC111	S60M
	M10	U10E		TU10	H10A	UMN UM10	WA10B			VC29 VC2	S10M
	M20	U2	UTi20T	TU20	H13A	UM20 DX25 DTU	EX35		K313 K40 PVA	VC28 VC901	HX
	M30	A30 A30N	UTi20T	UX30	H10F	DTU UMS	EX40 EX45	PW30	K2885 K2S	VC35M	HX
	K01	H2 H1	HTi05T	TH03	H1P	KG03	WH05				
	K10	EH10 EH510	HTi10	TH10	H10 HM	KG10 KT9 CR1	WH10	KW10	K6 K313 K68,KM1	VC3 VC29	HX
	K20	G10E EH20 EH520	HTi20T	G2 KS20	H13A	KG20 KT9 CR1	WH20		K1 K8735	VC2 VC29 VC28	883
	K30	G3		G3		LF12 KG30	WH30		KMF	VC111 VC101	
Fine-grained Carbide		F0,BL130		F							
		F1,AFU AF0,SF2	MF10	MD08F MD10	6UF,8UF PN90,H6FF	FB10 FB15,FZ15	NM10,EXH EX15	FW30			
		AF1	MF20,UF20	M,EM10,MD20	12UF	FB20	BRM20				
		A1,CC	UF30,TF15	UM,MD30	N6F,H10F		NM25				

■ Ceramic

Class	Sumitomo	Tungaloy	Dijet	Nippon Tungsten	NTK	Kyocera	Sandvik	Kennametal	Valenite
	NB100C	LX11	CA100	NPC-A2	HC4 HC5	A66N A65	CC650	MC2 KYON2000 KYON2100	Q32 V44
	NS260C NS260	LX21 FX105	CA010 CS100	NAICON-NXA NAICON-NX	HC1 HC2 HC6 SX1 SX2 SP2 SX8	SN60 KA30 KS500 KS6000 KS7000	CC620 CC690 CC6090 GC1690	KW80 AC5 KB90 KB90X KYON3000 KYON3400 KYON3500	Q6

Grade Properties Chart

Grades

Coated Carbide Grades

Class	Grade	Hardness (HRA)	T.R.S. (GPa)	Coating Type	Layer Compositions	Coating Thickness (µm)
P Steel	AC700G	91,0	2,2	CVD	Ti(C,N) + Thick α Al ₂ O ₃	12
	AC900G	90,1	2,2	CVD	Ti(C,N) + Thick α Al ₂ O ₃	12
	AC2000	90,1	2,2	CVD	Ti(C,N) + Al ₂ O ₃	10
	AC3000	89,4	2,6	CVD	Ti(C,N) + Al ₂ O ₃	10
	AC230	89,3	3,1	CVD	Ti(C,N) + Al ₂ O ₃	5
	ACZ330	89,5	3,2	PVD	TiN/AlN Multi-Layer	3
	ACZ350	89,3	3,1	PVD	TiN/AlN Multi-Layer	3
M Stainless Steel	AC610M	91,0	2,2	CVD	Ti(C,N) + α Al ₂ O ₃	5
	AC630M	89,5	2,7	CVD	Ti(C,N) + α Al ₂ O ₃	5
	EH10Z	92,3	3,4	PVD	TiN/AlN Multi-Layer	3
	EH20Z	91,2	3,4	PVD	TiN/AlN Multi-Layer	3
K Cast Iron	AC300G	92,0	2,4	CVD	Ti(C,N) + Thick α Al ₂ O ₃	15
	AC700G	91,0	2,2	CVD	Ti(C,N) + Thick α Al ₂ O ₃	12
	AC211	92,0	2,4	CVD	Ti(C,N) + Al ₂ O ₃	3
	ACZ310	91,4	3,3	PVD	TiN/AlN Multi-Layer	3
S Exotic Metal	EH510Z	92,6	2,6	PVD	TiN/AlN Multi-Layer	3
	EH520Z	91,7	2,5	PVD	TiN/AlN Multi-Layer	3

Uncoated Carbide Grades

Class	Grade	Hardness (HRA)	T.R.S. (GPa)	Young's Modulus (GPa)	Thermal Conductivity Coefficient (W/m.°C)	Compressive Strength (GPa)	Linear Expansion Coefficient (x 10 ⁻⁶ /°C)
P Steel	ST10P	92,1	1,9	470	25	4,9	6,2
	ST20E	91,8	1,9	550	42	4,9	5,2
	A30	91,3	2,1	520	—	—	5,2
	A30N	91,2	2,2	520	—	—	—
	ST40E	90,4	2,6	—	75	—	—
M Stainless Steel	U10E	92,4	1,8	460	—	5,9	—
	U2	91,5	2,2	—	88	—	—
	A30	91,3	2,1	520	—	—	5,2
K Cast Iron	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
	H10E	92,3	2,0	—	67	—	—
	EH20	91,3	3,5	620	105	—	4,5
	G10E	91,1	2,2	620	105	5,7	—
	KH03	91,4	3,3	—	—	—	—
Ultra Fine Grained	AF1	92,5	4,4	570	—	5,7	5,7
	F0	93,6	2,0	650	—	—	—
	F1	92,9	2,4	590	—	—	—
	A1	91,4	3,2	550	—	—	—

Cermet Grades

Class	Grade	Hardness (HRA)	T.R.S. (GPa)	Coating Type	Layer Compositions	Coating Thickness (µm)
Coated	T2000Z	15,2	2,3	PVD	TiN/AlN Multi-Layer	3
	T3000Z	13,9	2,4	PVD	TiN/AlN Multi-Layer	3
Uncoated	T110A	16,5	1,6	no	—	—
	T1200A	15,7	2,2	no	—	—
	T250A	14,0	2,1	no	—	—

Ceramic Grades

Coated	NB100C	21,0	1,0	PVD	TiN/AlN Multi-Layer	3
Uncoated	NS260	15,7	1,3	no	—	—

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 ⁻⁶ /°C)	Melting Point (°C)
Tungsten Carbide	WC	15,6	21	690	126	5,1	2.900
Titanium Carbide	TiC	4,94	31	450	17	7,6	3.200
Tantalum Carbide	TaC	14,5	18	280	21	6,6	3.800
Niobium Carbide	NbC	8,2	20	340	17	6,8	3.500
Titanium Nitrate	TiN	5,43	20	260	29	9,2	2.900
Aluminium Oxide	Al₂O₃	3,98	29	410	29	8,5	2.050
Silicon Nitride	Si₃N₄	3,17	25	310	29	3,0	>1.900 (Disintegrate)
Cubic Boron Nitride	CBN	3,48	44	700	1.300	4,7	–
Carbon	C	3,52	>90	970	2.100	3,1	–
Cobalt	Co	8,9	–	100~180	69	12,3	1.495
Nickel	Ni	8,9	–	200	92	13,3	1.495
Carbide	WC- 5% Co	15,0	18	630	79	5,0	–
	WC-10 Co	14,6	14	580	75	5,0	–
	WC-20% Co	13,5	10	530	67	6,0	–
High Speed Steel		8,7	8	210	17	11,0	–

Cutting Conditions

Remarks:

- Mentioned cutting conditions are considered for an approach angle of 90°~95° and usage coolant.
- The conditions should be adjusted in accordance to the machine stability and workpiece conditions.

Recommended Cutting Conditions for Main Grade

ISO	Material	Hardness Brinell HB	Coated Carbide				
			AC300G	AC700G	AC900G	AC2000	AC3000
			Feed Rate f (mm/rev)				
			Cutting Speed v_c (m/min)				
P Steel	unalloyed steel, <0,15%C, annealed	125		380	350	320	270
	" , <0,45%C, annealed	190		330	305	270	230
	" , <0,45%C, tempered	250		280	230	210	205
	low alloyed steel, annealed	180		300	280	250	210
	" , tempered	275		260	240	200	160
	" , tempered	300		220	200	160	120
	" , tempered	350		200	160	120	90
	high alloyed and tool steel, annealed	200		220	200	170	150
	" , tempered	325		130	100	90	70
M Stainless Steel	stainless steel, ferritic/martensitic, annealed	200					
	martensitic, tempered	240					
	austenitic, plunged	180					
K Cast Iron	lamellar cast iron, pearlitic	180	320	300	180		
	" , pearlitic(martensitic)	260	250	230	150		
	nodular cast iron, ferritic	160	280	250	160		
	nodular cast iron, perlitic	250	220	180	130		
	malleable cast iron, ferritic	130	280	250	220		
	malleable cast iron, perlitic	230	220	190	160		
S Exotic Metal	heat resistant alloys, Fe basis	200					
	heat resistant alloys, Ni or Co basis	250					
	heat resistant alloys, Ni or Co basis	350					
	pure Titanium	400					
	Titanium alloys	950					

Recommended Cutting Conditions for Main Grade

ISO	Material	Hardness Brinell HB	Coated Carbide				Coated Cermet	
			AC610M	AC630M	EH510Z	EH520Z	T2000Z	T3000Z
			Feed Rate f (mm/rev)					
			Cutting Speed v_c (m/min)					
P Steel	unalloyed steel, <0,15%C, annealed	125				350	300	
	" , <0,45%C, annealed	190				300	250	
	" , <0,45%C, tempered	250				250	200	
	low alloyed steel, annealed	180				300	230	
	" , tempered	275				260	200	
	" , tempered	300				220	170	
	" , tempered	350						
	high alloyed and tool steel, annealed	200						
	" , tempered	325						
M Stainless Steel	stainless steel, ferritic/martensitic, annealed	200	205	160				
	martensitic, tempered	240	145	110				
	austenitic, plunged	180	180	140				
K Cast Iron	lamellar cast iron, pearlitic	180						
	" , pearlitic(martensitic)	260						
	nodular cast iron, ferritic	160						
	nodular cast iron, perlitic	250						
	malleable cast iron, ferritic	130						
	malleable cast iron, perlitic	230						
S Exotic Metal	heat resistant alloys, Fe basis	200		100	60			
	heat resistant alloys, Ni or Co basis	250		60	40			
	heat resistant alloys, Ni or Co basis	350		40	25			
	pure Titanium	400						
	Titanium alloys	950		70	50			

Indexable Inserts for Turning Negative / Positive Inserts / Ceramic

C1 ~ C44



Inserts

C

D

R

S

T

V

W

Inserts Identification Table.....	C2
C / 80° Diamond, Negative Insert (With Hole).....	C4
C / 80° Diamond, Positive Insert (With Hole).....	C9
D / 55° Diamond, Negative Insert (With Hole).....	C12
D / 55° Diamond, Positive Insert (With Hole).....	C17
R / Round Type Positive Insert (With Hole).....	C18
S / Square Type Negative Insert (With Hole).....	C19
S / Square Type Negative Insert (Without Hole).....	C22
S / Square Type Positive Insert (With Hole).....	C23
S / Square Type Positive Insert (Without Hole).....	C25
T / Triangle Type Negative Insert (With Hole).....	C26
New T-REX Insert.....	C30
T / Triangle Type Positive Insert (With Hole).....	C31
T / Triangle Type Positive Insert (Without Hole).....	C35
V / 35° Diamond Type Negative Insert (With Hole).....	C36
V / 35° Diamond Type Positive Insert (With Hole).....	C38
W / Polygon Type Negative Insert (With Hole).....	C39
W / Polygon Type Positive Insert (With Hole).....	C43

Stock-Marking Chart

- : 1-st recommended stock item
- : Standard stocked item

- : Stock in Japan
(Delivery on request)

- ▲ : Please confirm stock availability
- : We cannot produce

Note:

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



Inserts Identification Table

C

①

Insert Shape
Chart 1

N

②

Relief Angle
Chart 2

M

③

Tolerance
Chart 3

G

④

Insert Type
Chart 4

Inserts

C

D

R

S

T

V

W

Chart 1: Insert Shape

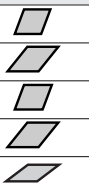



















Symbol	Insert Shape	Angle
C		80°
D		55°
E		75°
F		50°
V		35°
R		Round
S		Square
T		Triangle
W		Trigon
A		85°
B		82°
K		55°
H		Hexagonal
O		Octogonal
P		Pentagonal
L		Rectangular
M		Rhombic

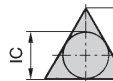


Chart 2: Relief Angle

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

O : Other clearance angle with specific description















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	

● Tolerance of Nose Height (M-Class)

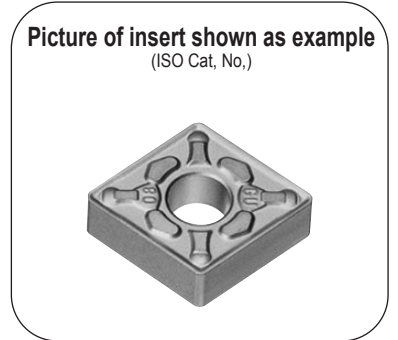
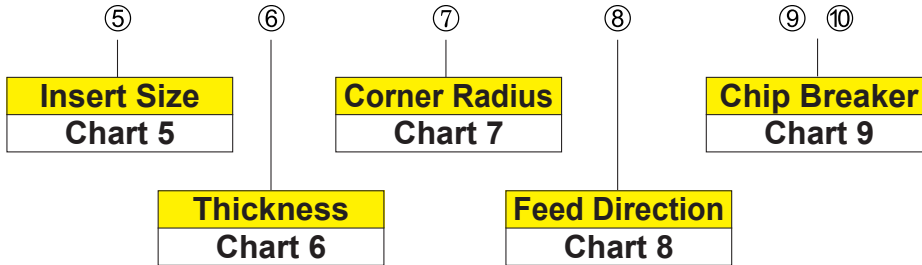
Inscribed Circle	Triangle	Square	80° Diamond	55° Diamond	35° Diamond	Round
6,35	± 0,08	± 0,08	± 0,08	± 0,11	—	—
9,525	± 0,08	± 0,08	± 0,08	± 0,11	± 0,16	—
12,70	± 0,13	± 0,13	± 0,13	± 0,15	—	—
15,875	± 0,15	± 0,15	± 0,15	± 0,18	—	—
19,05	± 0,15	± 0,15	± 0,15	± 0,18	—	—
25,40	± 0,18	± 0,18	± 0,18	—	—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



Inserts

Chart 5: Cutting Edge Length (mm)

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

Chart 6: Thickness

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

Chart 7: Nose Radius

ISO	Nose Radius (mm)
00	Sharp Point
01	0,1
02	0,2
04	0,4
08	0,8
12	1,2
16	1,6
24	2,4
32	3,2
M0	Round Insert (Metric)
00	Round Insert (Imperial)

Chart 8: Feed Direction

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

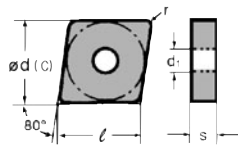
Chart 9: Chip Breaker

Symbol	Process	Bumpy Type	Standard	Handed
F □	Fine Finishing To Finishing	FA FK, FP		FT, FX, FZ FY, FW
S □ L □	Light Cut	SC, SF, SK, SP SS, SU, SX LU, LUW	SJ EX	SD, SM ST
G □ U □	General	GU, GUW UA, UG, UP US, UX	UJ UZ	UM
M □	Rough	MP, MU, MX	MC	MM
H □	Heavy	HG, HP		

Other specials	
Wide Chipbreaker	W
For Countersink	C
For Round insert	RD, RP
For Aluminium	AW, AG
For Carburized Layer Removal	SV

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

80° Diamond Type 0° Relief
With Insert Hole



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

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



⇒ D8, D10

⇒ E7

CNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																					
				P		M					S		K				H		N						
				Uncoated	ZX-Coated	Coated					ZX-Coated		Coated				Uncoated								
				Cermets			Carbide							Ceramic		Ceramic		Ceramic							
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
Medium Cut	"Standard" NGU	CNMG 120404 NGU	0,4						●	●	●			●	●										
		CNMG 120408 NGU	0,8						●	●	●			●	●										
Medium Cut	"Wiper" W-Type NGU-W	CNMG 120408 NGU-W	0,8						●	●	●			●	●			●	●	●					
		CNMG 120412 NGU-W	1,2						●	●	●			●	●			●	●	●					
Medium Cut	NUG	CNMG 120404 NUG	0,4											●	●										
		CNMG 120408 NUG	0,8											●	●										
		CNMG 120412 NUG	1,2											●	●										
Medium Cut	NEX	CNMG 120404 NEX	0,4										●	●	●	●									
		CNMG 120408 NEX	0,8										●	●	●	●									
Medium Cut	NUP	CNMG 120412 NUP	1,2										●	●											
		CNMG 190608 NUG	0,8										●												

● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs CNMG 120404 NGU, AC700G

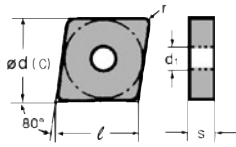
- Carbide
- C
- D
- R
- S
- T
- V
- W

80° DIAMOND TYPE

INSERTS FOR TURNING

CNMG neg. Inserts for Roughing

80° Diamond Type 0° Relief
With Insert Hole



CNMG	Dimensions (mm)			
	l	ød (IC)	s	d ₁
12	12,9	12,7	4,76	5,16
16	16,1	15,875	6,35	6,35
19	19,3	19,05	6,35	7,94

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



⇒ D8, D10

⇒ E7

CNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																							
				P				M				S				K				H				N			
				Uncoated	ZX-Coated	Coated		Carbide				ZX-Coated	Coated			Ceramic				Uncoated							
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
Roughing	 NMU Depth of cut (mm) Feed rate (mm/rev)	CNMG 120408 NMU CNMG 120412 NMU CNMG 120416 NMU CNMG 160608 NMU CNMG 160612 NMU CNMG 160616 NMU CNMG 190612 NMU CNMG 190616 NMU	0,8 1,2 1,6 0,8 1,2 1,6 1,2 1,6																								
				Roughing	 NUX Depth of cut (mm) Feed rate (mm/rev)	CNMG 120404 NUX CNMG 120408 NUX CNMG 120412 NUX CNMG 120416 NUX CNMG 160612 NUX CNMG 160616 NUX	0,4 0,8 1,2 1,6 1,2 1,6																				
								Roughing	 NMX Depth of cut (mm) Feed rate (mm/rev)	CNMG 120408 NMX CNMG 120412 NMX CNMG 120416 NMX CNMG 160612 NMX CNMG 160616 NMX CNMG 190612 NMX CNMG 190616 NMX	0,8 1,2 1,6 1,2 1,6 1,2 1,6																
Roughing	 NUZ Depth of cut (mm) Feed rate (mm/rev)	CNMG 120408 NUZ CNMG 120412 NUZ CNMG 120416 NUZ CNMG 160612 NUZ CNMG 160616 NUZ CNMG 190612 NUZ CNMG 190616 NUZ	0,8 1,2 1,6 1,2 1,6 1,2 1,6																								

Neg. Inserts

C

D

R

S

T

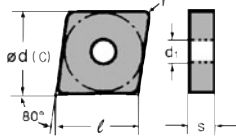
V

W

Carbide

⇒

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



Dimensions (mm)				
CNMM	l	∅d (IC)	s	d ₁
12	12,9	12,7	4,76	5,16
16	16,1	15,875	6,35	6,35
19	19,3	19,05	6,35	7,94

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



⇒ D8, D10

⇒ E7

CNMM

● M-Class One Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																							
				P			M			S			K			H			K			N					
				Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated						
<p>NMP</p> <p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p>	<p>NMP</p>	<p>CNMM 120408 NMP</p> <p>CNMM 120412 NMP</p> <p>CNMM 120416 NMP</p>	0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
	<p>NHG</p> <p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p>	<p>NHG</p>	<p>CNMM 120408 NHG</p> <p>CNMM 120412 NHG</p> <p>CNMM 120416 NHG</p>	0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
					T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
					T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
		<p>NHP</p> <p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p>	<p>NHP</p>	<p>CNMM 120408 NHP</p> <p>CNMM 160608 NHP</p> <p>CNMM 160612 NHP</p> <p>CNMM 160616 NHP</p>	0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
						T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
						T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
	<p>NHP</p> <p>Depth of cut (mm)</p> <p>Feed rate (mm/rev)</p>	<p>NHP</p>	<p>CNMM 160608 NHP</p> <p>CNMM 160612 NHP</p> <p>CNMM 160616 NHP</p>	0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
					T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
					T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
<p>NHP</p>		<p>CNMM 190612 NHP</p> <p>CNMM 190616 NHP</p> <p>CNMM 190624 NHP</p>	1,2	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		

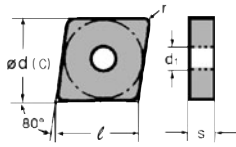
● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs CNMM 120408 NMP, AC2000

80° DIAMOND TYPE INSERTS FOR TURNING

Other CN-- Type neg. Inserts

80° Diamond Type 0° Relief
With Insert Hole



Dimensions (mm)				
CN--	l	∅d (IC)	s	d ₁
12	12,9	12,7	4,76	5,16
16	16,1	15,875	6,35	6,35
19	19,3	19,05	6,35	7,94

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



⇒ D8, D10

CNGA / CNMA / CNMX

● Flat and One Side Handed Inserts

Application	Shape	ISO Cat. No.	r
Roughing		CNGA 120408	0,8
		CNGA 120412	1,2
		CNGA 120416	1,6
Roughing		CNMA 120404	0,4
		CNMA 120408	0,8
		CNMA 120412	1,2
		CNMA 120416	1,6
Heavy Roughing		CNMX 120408 L	0,8
		CNMX 120408 R	0,8

	P			M			S			K			H		K		N					
	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated				
	Cermet			Carbide						Ceramic												
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1

Carbide

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

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Uncoated

Coated

Ceramic

⇒

H1

⇒

Uncoated

Coated

Ceramic

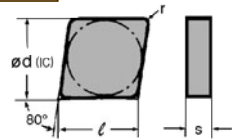
⇒

H1

Dimensions (mm)

CN--	l	∅d (IC)	s	d ₁
1204--	12,9	12,7	4,76	-
1207--	12,9	12,7	7,94	-

0° Relief
Without Insert Hole



⇒ D20

⇒ D18

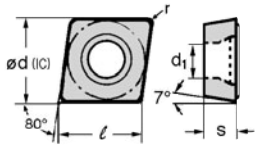
CNMN / CNMX

● M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r
Roughing		CNMN 120408	0,8
		CNMN 120412	1,2
		CNMN 120416	1,6
Roughing		CNMX 120712 CNMX 120716	1,2 1,6

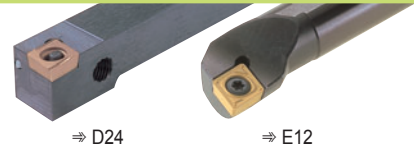
	Uncoated	ZX-Coated	Coated						ZX-Coated	Coated		Uncoated											
	Cermet			Carbide						Ceramic		⇒											
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	

80° Diamond Type **7° Relief**
With Insert Hole



Dimensions (mm)				
CC--	ℓ	ød (IC)	s	d ₁
06	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4
12	12,9	12,7	4,76	5,5

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



CCGT

● **G-Class Handed and Bumpy Chipbreaker**

Application	Shape	ISO Cat. No.	r	Material																					
				P				M			S		K			H		N							
				Uncoated	ZX-Coated	Coated		Carbide			ZX-Coated	Coated		Ceramic		Uncoated									
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
Finishing	L-FX	CCGT 060201 LFX CCGT 060202 LFX CCGT 060204 LFX	0,1 0,2 0,4	●	●		●						●					●							
		CCGT 09T301 LFX CCGT 09T302 LFX CCGT 09T304 LFX	0,1 0,2 0,4	●	●		●							●					●						
Finishing	R-FX	CCGT 060201 RFX CCGT 060202 RFX CCGT 060204 RFX	0,1 0,2 0,4	●	●		●						●					●							
		CCGT 09T301 RFX CCGT 09T302 RFX CCGT 09T304 RFX	0,1 0,2 0,4	●	●		●							●					●						
Light Cut	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	NSC	CCGT 060201 NSC CCGT 060202 NSC CCGT 060204 NSC	0,1 0,2 0,4	●	●		●						●					●							
		CCGT 09T301 NSC CCGT 09T302 NSC CCGT 09T304 NSC CCGT 09T308 NSC	0,1 0,2 0,4 0,8	●	●		●							●					●						

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

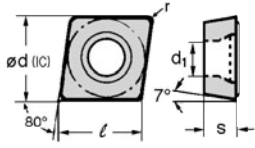
● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs CCGT 060201 L-FX, ACZ310

80° DIAMOND TYPE INSERTS FOR TURNING

CC-- 7° pos. Inserts for Finishing ~ Light Cut

80° Diamond Type 7° Relief
With Insert Hole



Dimensions (mm)				
CC--	ℓ	∅d (IC)	s	d ₁
06	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4
12	12,9	12,7	4,76	5,5

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



CCMT

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																							
				P				M				S				K				H				N			
				Uncoated	ZX-Coated	Coated		Cermet				Carbide				ZK-Coated				Coated				Ceramic			
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
Finishing	NFP	CCMT 060202 NFP	0,2	●	●	●	●																				
		CCMT 060204 NFP	0,4	●	●	●	●																				
		CCMT 060208 NFP	0,8	●	●	●	●																				
Finishing	NLU	CCMT 09T302 NFP	0,2	●	●	●	●																				
		CCMT 09T304 NFP	0,4	●	●	●	●																				
		CCMT 09T308 NFP	0,8	●	●	●	●																				
Finishing	NLU-W	CCMT 060202 NLU	0,2				●	●	●					●	●					●	●						
		CCMT 060204 NLU	0,4				●	●	●					●	●					●	●						
		CCMT 09T302 NLU	0,2				●	●	●					●	●					●	●						
Light Cut	NSU	CCMT 09T304 NLU	0,4				●	●	●					●	●					●	●						
		CCMT 09T308 NLU	0,8				●	●	●					●	●					●	●						
		CCMT 09T304 NLU-W	0,4				●	●	●					●	●					●	●						
Light Cut	NSK	CCMT 09T308 NLU-W	0,8				●	●	●					●	●					●	●						
		CCMT 060202 NSU	0,2	●	●	●	●		●	●	●	●		●	●	●				●	●						
		CCMT 060204 NSU	0,4	●	●	●	●		●	●	●	●		●	●	●				●	●						
Light Cut	NSK	CCMT 060208 NSU	0,8	●	●	●	●		●	●	●	●		●	●	●				●	●						
		CCMT 09T302 NSU	0,2	●	●	●	●		●	●	●	●		●	●	●				●	●						
		CCMT 09T304 NSU	0,4	●	●	●	●		●	●	●	●		●	●	●				●	●						
Light Cut	NSK	CCMT 09T308 NSU	0,8	●	●	●	●		●	●	●	●		●	●	●				●	●						
		CCMT 120404 NSU	0,4						●	●	●	●		●	●	●				●	●						
		CCMT 120408 NSU	0,8						●	●	●	●		●	●	●				●	●						
Roughing	NMU	CCMT 060204 NSK	0,4																								
		CCMT 060208 NSK	0,8																								
		CCMT 09T302 NSK	0,2																								
Roughing	NMU	CCMT 09T304 NSK	0,4																								
		CCMT 09T308 NSK	0,8																								
		CCMT 120404 NSK	0,4																								
Roughing	NMU	CCMT 120408 NSK	0,8																								
		CCMT 09T304 NMU	0,4																								
		CCMT 09T308 NMU	0,8																								

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

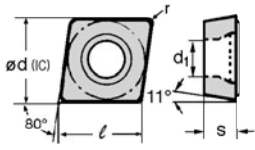
● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs CCMT 060202 NFP, T2000Z



⇒ E13

80° Diamond Type 11° Relief With Insert Hole



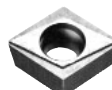
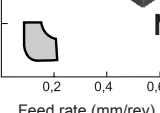
Dimensions (mm)

CP_	ℓ	ϕd (IC)	s	d_1
0602--	6,45	6,35	2,38	2,8
0802--	8,1	7,94	2,38	3,4
0903--	9,7	9,525	3,18	4,4
09T3--			3,97	

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

CPGT ○○○○○○ NSD

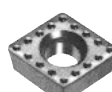
● G-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Finishing ~ Light Cut		CPGT 080202 NSD CPGT 080204 NSD	0,2
			0,4
		CPGT 090304 NSD	0,4



Uncoated		ZX-Coated	Coated			ZX-Coated		Coated			Uncoated											
Cermet			Carbide					Ceramic														
T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
	●	●																				
	●	●																				
		●																				

CPMT/-H ○○○○○○ NUS

● M-Class Bumpy Chipbreaker

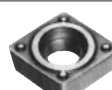
Application	Shape	ISO Cat. No.	r
Light Cut		CPMT 060204 NUS CPMT 09T308 NUS	0,4
			0,8

Uncoated		ZX-Coated	Coated			ZX-Coated		Coated			Uncoated											
Cermet			Carbide					Ceramic														
T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
							●															
							●	●														

The shape of insert hole :  $T/A/W$  H

CPMT/-H ○○○○○○ NSS

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Light Cut		CPMH 090308 NSS	0,8

Uncoated		ZX-Coated	Coated			ZX-Coated		Coated			Uncoated											
Cermet			Carbide					Ceramic														
T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
							●															

● = Euro stock ● = 1-st recommended stock item

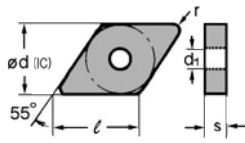
Packing unit and ordering example; 10 pcs CPGT 080202 NSD, T1200A

55° DIAMOND TYPE

INSERTS FOR TURNING

DNMG neg. Inserts for Finishing

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



DNMG	Dimensions (mm)			
	l	ød (IC)	s	d ₁
1104--	11,6	9,525	4,76	3,81
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



DNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																
				P		M			S		K			H		N				
				Uncoated	ZX-Coated	Coated			ZX-Coated		Coated			Uncoated						
Finishing	NFA	DNMG 150604 NFA DNMG 150608 NFA	0,4																	
			0,8	●	●															
	NFL	DNMG 150604 NFL DNMG 150608 NFL	0,4																	
			0,8		●	●														
Finishing	NLU	DNMG 110404 NLU DNMG 110408 NLU	0,4																	
			0,8		●															
	NSU	DNMG 110404 NSU DNMG 110408 NSU	0,4																	
			0,8																	
Finishing	NSU	DNMG 150604 NSU DNMG 150608 NSU DNMG 150612 NSU	0,4																	
			0,8		●	●														
	NSU	DNMG 150604 NSU DNMG 150608 NSU DNMG 150612 NSU	0,4																	
			0,8		●	●														
NSU	DNMG 150604 NSU DNMG 150608 NSU DNMG 150612 NSU	1,2																		
		1,2		●	●															

Neg. Inserts

C

D

R

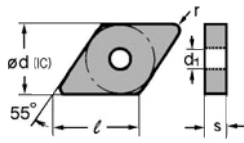
S

T

V

W

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



DNMG	Dimensions (mm)			
	l	∅d (IC)	s	d1
1104--	11,6	9,525	4,76	3,81
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



⇒ D8, D11

⇒ E8

DNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																						
				P				M				S				K				H						
				Uncoated	ZX-Coated	Coated		Carbide				ZX-Coated	Coated			Ceramic				Uncoated						
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
Medium Cut	NGU	DNMG 110404 NGU	0,4						●	●	●			●	●											
		DNMG 110408 NGU	0,8						●	●	●			●	●											
		DNMG 110412 NGU	1,2						●	●	●			●	●											
Medium Cut	NUG	DNMG 150604 NGU	0,8						●	●	●			●	●											
		DNMG 150608 NGU	1,2						●	●	●			●	●											
		DNMG 150612 NGU	1,6						●	●	●			●	●											
Medium Cut	NEX	DNMG 110404 NEX	0,4											●	●	●	●									
		DNMG 110408 NEX	0,8											●	●	●	●									
		DNMG 150604 NEX	0,4											●	●	●	●									
Medium Cut	NUP	DNMG 150608 NEX	0,8											●	●	●	●									
		DNMG 150604 NUP	0,4											●	●	●	●									
		DNMG 150608 NUP	0,8											●	●	●	●									

Neg. Inserts

C

D

R

S

T

V

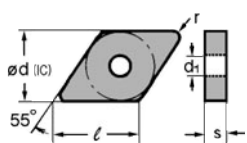
W

55° DIAMOND TYPE

INSERTS FOR TURNING

DNMG neg. Inserts for Roughing

55° Diamond Type 0° Relief With Insert Hole



DNMG	Dimensions (mm)			
	l	ød (IC)	s	d ₁
1104--	11,6	9,525	4,76	3,81
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



⇒ D8, D11

⇒ E8

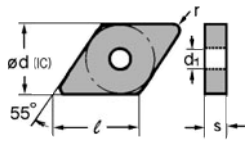
DNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																							
				P			M			S			K			H		N									
				Uncoated	ZX-Coated	Coated			Carbide			ZX-Coated	Coated			Uncoated											
				Cermet			Ceramic						Ceramic			Ceramic											
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
Roughing	 NMU Depth of cut (mm) vs Feed rate (mm/rev) graph.	DNMG 150608 NMU DNMG 150612 NMU DNMG 150616 NMU	0,8					●	●	●	●		●	●													
			1,2					●	●	●	●		●	●													
			1,6					●	●	●	●		●	●													
Roughing	 NUX Depth of cut (mm) vs Feed rate (mm/rev) graph.	DNMG 110408 NUX DNMG 150604 NUX DNMG 150608 NUX DNMG 150612 NUX DNMG 150616 NUX	0,8							●	●																
			0,4								●	●															
			0,8								●	●															
Roughing	 NUZ Depth of cut (mm) vs Feed rate (mm/rev) graph.	DNMG 150608 NUZ DNMG 150612 NUZ	0,8																●								
			1,2																	●							

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

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



Dimensions (mm)				
DN--	l	∅d (IC)	s	d ₁
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



⇒ D8, D11 ⇒ E8

DNMM

● **M-Class One Sided Bumpy Chipbreaker**

Application	Shape	ISO Cat. No.	r
 NMP Depth of cut (mm) vs Feed rate (mm/rev) graph.	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
 NHG Depth of cut (mm) vs Feed rate (mm/rev) graph.	DNMM 150604 NHG DNMM 150608 NHG DNMM 150612 NHG DNMM 150616 NHG	0,4 0,8 1,2 1,6	0,4
			0,8
			1,2
			1,6

Uncoated	P		M			S		K		H		K		N							
	Cermet	ZX-Coated	Coated			ZX-Coated	Coated		ZX-Coated	Coated		Ceramic		Uncoated							
			Carbide	Carbide	Carbide		Ceramic	Ceramic													
T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1

Neg. Inserts

C

D

R

S

T

V

W

DNMA / DNMX

● **Flat Inserts and One Side Handed Inserts**

Application	Shape	ISO Cat. No.	r
Roughing	 DNMA	DNMA 150608 DNMA 150612	0,8
			1,2
Heavy Roughing	 DNMX	DNMX 150608 L	0,8
			 DNMX 150608 R

Uncoated	P		M			S		K		H		K		N							
	Cermet	ZX-Coated	Coated			ZX-Coated	Coated		ZX-Coated	Coated		Ceramic		Uncoated							
			Carbide	Carbide	Carbide		Ceramic	Ceramic													
T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1

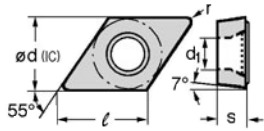
● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs DNMM 150604 NMP, AC2000

55° DIAMOND TYPE INSERTS FOR TURNING

DC-- 7° pos. Inserts for Finishing

55° Diamond Type 7° Relief
With Insert Hole



Dimensions (mm)				
DC--	l	ød (IC)	s	d ₁
0702--	7,75	6,35	2,38	2,8
1103--	11,6	9,525	3,18	4,4
11T3--			3,97	

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



⇒ D25, D26

⇒ E14, E15

DCGT

Carbide

● G-Class Handed and Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																					
				P			M			S			K			H									
				Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated										
				T110A	T120A	T200Z	T300Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
Finishing	L-FX	DCGT 070201 LFX DCGT 070202 LFX DCGT 070204 LFX	0,1 0,2 0,4	●	●	●	●	●					●					●							
		DCGT 11T301 LFX DCGT 11T302 LFX DCGT 11T304 LFX	0,1 0,2 0,4	●	●	●	●	●						●					●						
Finishing	R-FX	DCGT 070201 RFX DCGT 070202 RFX DCGT 070204 RFX	0,1 0,2 0,4	●	●	●	●	●					●					●							
		DCGT 11T301 RFX DCGT 11T302 RFX DCGT 11T304 RFX	0,1 0,2 0,4	●	●	●	●	●						●					●						
Light Cut	NAG	DCGT 070202 NAG DCGT 070204 NAG	0,2 0,4																						●
		DCGT 11T302 NAG DCGT 11T304 NAG DCGT 11T308 NAG	0,2 0,4 0,8																						●
Light Cut	NSC	DCGT 070201 NSC DCGT 070202 NSC DCGT 070204 NSC	0,1 0,2 0,4	●	●	●	●	●					●					●							
		DCGT 110302 NSC	0,2	●	●																				
		DCGT 11T301 NSC DCGT 11T302 NSC DCGT 11T304 NSC DCGT 11T308 NSC	0,1 0,2 0,4 0,8	●	●	●	●	●						●					●						

Neg. Inserts

C

D

R

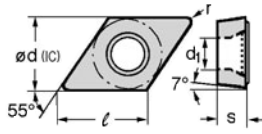
S

T

V

W

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



Dimensions (mm)				
DC--	ℓ	∅d (IC)	s	d ₁
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4

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



DCMT

● **M-Class Bumpy Chipbreaker**

Application	Shape	ISO Cat. No.	r	Material																							
				Uncoated			ZK-Coated			Coated					ZK-Coated			Coated			Uncoated						
				Cermet			Carbide											Ceramic									
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
Finishing		DCMT 070202 NFP DCMT 070204 NFP DCMT 070208 NFP	0,2	•	•	•	•																				
			0,4	•	•	•	•																				
			0,8	•	•	•	•																				
			Graphical data for NFP	Depth of cut (mm)	Feed rate (mm/rev)																						
Finishing		DCMT 070202 NLU DCMT 070204 NLU	0,2				•	•	•				•	•					•	•							
			0,4			•	•	•						•	•					•	•						
			0,8			•	•	•							•	•					•	•					
			Graphical data for NLU	Depth of cut (mm)	Feed rate (mm/rev)																						
Light Cut		DCMT 070202 NSU DCMT 070204 NSU DCMT 070208 NSU	0,2	•	•	•		•	•	•			•	•					•	•							
			0,4	•	•	•		•	•	•				•	•					•	•						
			0,8	•	•	•		•	•	•					•	•					•	•					
			Graphical data for NSU	Depth of cut (mm)	Feed rate (mm/rev)																						
Light Cut		DCMT 070204 NSK DCMT 070208 NSK	0,4					•	•	•									•	•							
			0,8					•	•	•										•	•						
			0,4									•	•								•	•					
			0,8									•	•								•	•					
1,2									•	•								•	•								
Graphical data for NSK	Depth of cut (mm)	Feed rate (mm/rev)																									
Roughing		DCMT 11T304 NMU DCMT 11T308 NMU	0,4					•	•	•			•	•				•	•								
			0,8					•	•	•				•	•					•	•						
Graphical data for NMU	Depth of cut (mm)	Feed rate (mm/rev)																									

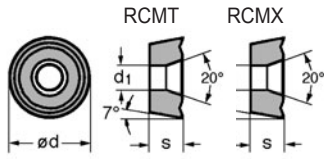
Carbide ⇌

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

ROUND TYPE INSERTS FOR TURNING

RC -- 7° pos. Inserts

Round Type Inserts 7° Relief With Insert Hole



Dimensions (mm)				
RC--	ℓ	∅d (IC)	s	d ₁
1003	-	10,0	3,18	3,6
12	-	12,0	4,76	4,2
16	-	16,0	6,35	5,2
20	-	20,0	6,35	6,5

(M0: IC ist metrisch.)

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



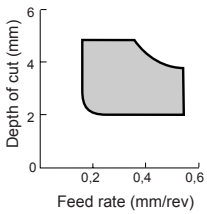
Lever lock holders for RCMX
⇒ D27

Carbide

RCMT ●●●●M0 – X

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Roughing	 - X	RCMT 1003 M0 – X	-
		RCMT 1204 M0 – X	-
		RCMT 1606 M0 – X	-
		RCMT 2006 M0 – X	-

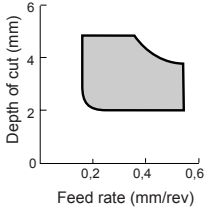


	P		M			S		K		H		K		N										
	Uncoated	ZX-Coated	Coated			ZX-Coated		Coated		Uncoated		Coated		Uncoated										
	Cermet		Carbide			Carbide		Ceramic		Ceramic		Ceramic		Ceramic										
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NS260C	NB100C	NS260	NS260	H1	H1

RCMX ●●●●M0 ■-■

● M-Class Grooved Chipbreaker

Application	Shape	ISO Cat. No.	r
Roughing	 NRP	RCMX 100300 RCMX 1003 M0 NRP	-
		RCMX 120400 RCMX 1204 M0 NRP	-
		RCMX 160600 RCMX 1606 M0 NRP	-
		RCMX 200600 RCMX 2006 M0 NRP	-



	Uncoated	ZX-Coated	Coated		Coated		ZX-	Coated		Uncoated	Coated									
	Cermet		Carbide		Carbide		Carbide	Ceramic		Uncoated	Coated									
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	ACZ310	AC300G	AC700G	AC900G	NS260C	NS260	H1

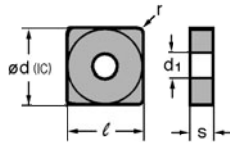


⇒ D12, D13

⇒ E9

90° Square Type

0° Relief
With Insert Hole



- 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	Material																					
				P				M				S				K				H					
				Uncoated	ZX-Coated	Coated		Carbide				ZX-Coated	Coated			Ceramic									
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
Finishing	 NSU	SNMG 120408 NSU	0,8						●		●														
Medium Cut	 NGU	SNMG 120404 NGU SNMG 120408 NGU SNMG 120412 NGU SNMG 120416 NGU	0,4 0,8 1,2 1,6						●	●	●		●	●											
Medium Cut	 NUG	SNMG 120408 NUG SNMG 120412 NUG SNMG 120416 NUG	0,8 1,2 1,6								●	●													
Medium Cut	 NEX	SNMG 120408 NEX SNMG 120412 NEX	0,8 1,2										●	●	●	●									
Medium Cut	 NUP	SNMG 120404 NUP SNMG 120408 NUP SNMG 120412 NUP	0,4 0,8 1,2								●	●	●												

● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs SNMG 120408 NSU, AC2000

Carbide

⇒

⇒

⇒

⇒

⇒

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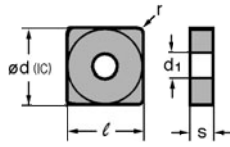
SQUARE TYPE

INSERTS FOR TURNING

SNMG neg. Inserts for Roughing

90° Square Type

0° Relief
With Insert Hole



SNMG	Dimensions (mm)			
	l	∅d (IC)	s	d1
12	12,7	12,7	4,76	5,16
15	15,875	15,875	6,35	6,35
19	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



⇒ D12, D13

⇒ E9

SNMG

Carbide

	P		M			S		K			H		K		N							
	Uncoated	ZX-Coated	Coated			ZX-Coated		Coated			Uncoated		Uncoated									
	Cermet		Carbide			Ceramic		Ceramic		Ceramic		Ceramic										
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
Roughing						●	●	●	●		●	●				●	●	●				
Roughing						●	●	●	●		●	●				●	●	●				
Roughing						●	●	●	●		●	●				●	●	●				
Roughing									●	●	●					●	●	●				
Roughing																●	●	●				
Roughing																●	●	●				

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Roughing		SNMG 120408 NMU	0,8
		SNMG 120412 NMU	1,2
		SNMG 120416 NMU	1,6
Roughing		SNMG 150612 NMU	1,2
		SNMG 150616 NMU	1,6
Roughing		SNMG 190612 NMU	1,2
		SNMG 190616 NMU	1,6
Roughing		SNMG 120408 NUX	0,8
		SNMG 120412 NUX	1,2
		SNMG 120416 NUX	1,6
Roughing		SNMG 120408 NMX	0,8
		SNMG 120412 NMX	1,2
		SNMG 120416 NMX	1,6
Roughing		SNMG 120408 NUZ	0,8
		SNMG 120412 NUZ	1,2
		SNMG 120416 NUZ	1,6
Roughing		SNMG 150612 NUZ	1,2
		SNMG 150616 NUZ	1,6
Roughing		SNMG 190612 NUZ	1,2
		SNMG 190616 NUZ	1,6

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

● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs SNMG 120408 NMU, AC2000

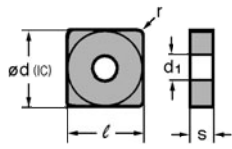


⇒ D12, D13

⇒ E9

90° Square Type

0° Relief
With Insert Hole



Dimensions (mm)				
SNMM	l	ød (IC)	s	d ₁
12	12,7	12,7	4,76	5,16
15	15,875	15,875	6,35	6,35
19	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

SNMM

● M-Class One Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																						
				P			M				S		K			H		K		N						
				Uncoated	ZX-Coated	Cermet	Coated				Carbide		ZX-Coated	Coated			Ceramic		Uncoated							
T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1					
 Depth of cut (mm) vs Feed rate (mm/rev) graph for NMP.	NMP 	SNMM 120408 NMP SNMM 120412 NMP SNMM 120416 NMP SNMM 120420 NMP	0,8																							
			1,2																							
			1,6																							
			2,0																							
	1,2																									
	1,6																									
	1,2																									
	1,6																									
	2,4																									
 Depth of cut (mm) vs Feed rate (mm/rev) graph for NHG.	NHG 	SNMM 120408 NHG SNMM 120412 NHG SNMM 120416 NHG	0,8																							
			1,2																							
			1,6																							
	1,2																									
	1,6																									
	2,4																									
 Depth of cut (mm) vs Feed rate (mm/rev) graph for NHP.	NHP 	SNMM 120408 NHP SNMM 120412 NHP	0,8																							
			1,2																							
	NHP 	SNMM 150612 NHP	1,2																							
			1,2																							
			1,6																							
			2,4																							

● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs SNMM 120408 NMP, AC2000

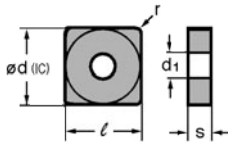
SQUARE TYPE

INSERTS FOR TURNING

Other SN-- Type neg. Inserts

90° Square Type

0° Relief
With Insert Hole



Dimensions (mm)				
SN--	l	ød (IC)	s	d ₁
12	12,7	12,7	4,76	5,16
15	15,875	15,875	6,35	6,35
19	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



⇒ D12, D13

⇒ E9

SNGA / SNMA

● G/M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																						
				Uncoated			ZK-Coated			Coated				Carbide			ZK-Coated			Coated			Uncoated			
				Cermet																Ceramic						
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
Roughing		SNGA 120408 SNGA 120412	0,8																							
			1,2																				●			
Roughing		SNMA 120412 SNMA 120416	0,4																	●	●					
			0,8																		●	●				
		1,2																			●	●				
		SNMA 190612 SNMA 190616	1,6																	●	●					

Carbide

⇒

Ceramic

⇒

H1

⇒

●

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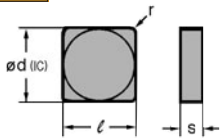
⇒ D20

⇒ D18

Dimensions (mm)

SN--	l	ød (IC)	s	d ₁
1204--	12,7	12,7	4,76	-
1207--	12,7	12,7	7,94	-

0° Relief
Without Insert Hole

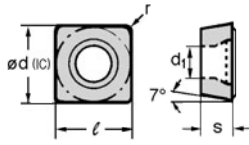


SNMN / SNMX

● M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																							
				Uncoated			ZK-Coated			Coated				Carbide			ZK-Coated			Coated			Uncoated				
				Cermet																Ceramic							
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
Roughing		SNMN 120408 SNMN 120412 SNMN 120416	0,8																								
			1,2																					●	●		
			1,6																						●	●	
Roughing		SNMX 120712 SNMX 120716	1,2																								
			1,6																						●	●	

90° Square Type **7° Relief**
With Insert Hole




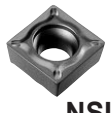
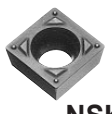
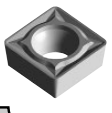
Dimensions (mm)				
SC--	l	ød (IC)	s	d ₁
07	7,94	7,94	2,38	3,4
09	9,525	9,525	3,97	4,4
12	12,7	12,7	4,76	5,5

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



SCMT

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																					
				P				M			S			K			H	K	N						
				Uncoated	ZX-Coated	Coated		Carbide			ZX-Coated	Coated		Ceramic	Uncoated										
Finishing	 NFP	SCMT 09T304 NFP SCMT 09T308 NFP	0,4 0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
				●	●	●																			
Light Cut	 NSU	SCMT 09T304 NSU SCMT 09T308 NSU SCMT 120404 NSU SCMT 120408 NSU	0,4 0,8						●	●	●	●	●	●					●	●					
Light Cut	 NSK	SCMT 09T304 NSK SCMT 09T308 NSK SCMT 120404 NSK SCMT 120408 NSK SCMT 120412 NSK	0,4 0,8																●	●					
Roughing	 NMU	SCMT 09T308 NMU SCMT 120408 NMU	0,8																						

● = Euro stock ● = 1-st recommended stock item

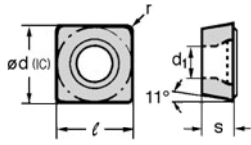
Packing unit and ordering example; 10 pcs SCMT 09T304 NFP, T2000Z

SQUARE TYPE

INSERTS FOR TURNING

SP_ _ 11° pos. Inserts for Finishing ~ Light Cut

90° Square Type 11° Relief
With Insert Hole



Dimensions (mm)				
SP_ _	l	ød (IC)	s	d ₁
0903_ _	9,525	9,525	3,18	4,4

- 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		SPGW 090304 T	0,4

	P			M			S			K			H		K		N					
	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated				
	Cermet			Carbide						Ceramic						Uncoated						
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1

SPMT

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Finishing	 NFK	SPMT 090304 NFK SPMT 090308 NFK	0,4
			0,8
Light Cut	 NSF	SPMT 090304 NSF	0,4

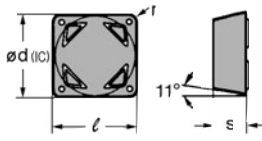
	P			M			S			K			H		K		N					
	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated				
	Cermet			Carbide						Ceramic						Uncoated						
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1

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



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

90° Square Type **11° Relief**
Without Insert Hole



Dimensions (mm)				
SP__	l	ød (IC)	s	d ₁
09	9,525	9,525	3,18	-
12	12,7	12,7	3,18	-

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

SPMR

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Finishing	 NFK	SPMR 090304 NFK	0,4
			0,8
Light Cut	 NSF	SPMR 090304 NSF SPMR 090308 NSF	0,4
			0,8
			0,4
			1,2

	P		M			S		K		H		K		N								
	Uncoated	ZX-Coated	Coated			ZX-Coated	Coated		Coated		Ceramic		Uncoated									
	Cermet		Carbide									Ceramic										
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
		●																				
								●	●													
								●														
								●														

Pos. Inserts



SPGN

● G-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r
Light Cut		SPGN 090304 T SPGN 090308 T	0,4
			0,8

	P		M			S		K		H		K		N								
	Uncoated	ZX-Coated	Coated			ZX-Coated	Coated		Coated		Ceramic		Uncoated									
	Cermet		Carbide									Ceramic										
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
			●																			

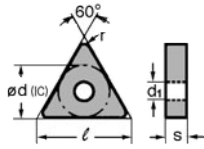
TRIANGLE TYPE

INSERTS FOR TURNING

TNMG neg. Inserts for Finishing

60° Triangle Type

0° Relief
With Insert Hole



Dimensions (mm)				
TNMG	l	∅d (IC)	s	d ₁
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



⇒ D9, D14-15

⇒ E10

TNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																								
				P			M			S			K			H												
				Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated													
Finishing	 NFA	TNMG 160404 NFA TNMG 160408 NFA	0,4 0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1			
				●	●	●	●																					
				●	●																							
				●	●																							
Finishing	 NFL	TNMG 160404 NFL TNMG 160408 NFL	0,4 0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1			
						●	●																					
						●	●																					
						●	●																					
Finishing	 NLU	TNMG 160404 NLU TNMG 160408 NLU TNMG 160412 NLU	0,2 0,4 0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1			
						●																						
						●																						
						●																						
Finishing	 NSU	TNMG 160404 NSU TNMG 160408 NSU TNMG 160412 NSU	0,4 0,8 1,2	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1			
				●	●																							
				●	●																							
				●	●																							

Neg. Inserts

C

D

R

S

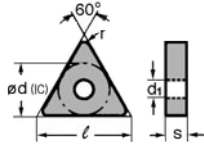
T

V

W

60° Triangle Type

0° Relief
With Insert Hole



TNMG	Dimensions (mm)			
	ℓ	∅d (IC)	s	d ₁
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



⇒ D9, D14-15

⇒ E10

TNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																					
				P				M				S				K				H					
				Uncoated	ZX-Coated	Coated		Carbide				ZX-Coated	Coated			Ceramic				Uncoated					
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
Medium Cut	NGU	TNMG 160404 NGU TNMG 160408 NGU TNMG 160412 NGU	0,4 0,8 1,2						●	●	●			●	●										
		TNMG 220408 NGU TNMG 220412 NGU	0,8 1,2						●	●															
Medium Cut	NUG	TNMG 160404 NUG TNMG 160408 NUG TNMG 160412 NUG TNMG 160416 NUG	0,4 0,8 1,2 1,6							●	●														
		TNMG 220408 NUG TNMG 220412 NUG TNMG 220416 NUG	0,8 1,2 1,6							●	●														
Medium Cut	NEX	TNMG 160404 NEX TNMG 160408 NEX TNMG 160412 NEX	0,4 0,8 1,2											●	●	●	●								
Medium Cut	NUP	TNMG 160404 NUP TNMG 160408 NUP	0,4 0,8							●	●			●											

● = Euro stock ● = 1-st recommended stock item

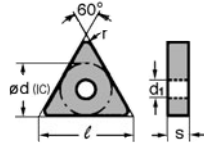
Packing unit and ordering example; 10 pcs TNMG 160404 NGU, AC900G

TRIANGLE TYPE

INSERTS FOR TURNING

TNMG neg. Inserts for Roughing

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



TNMG	Dimensions (mm)			
	l	ød (IC)	s	d ₁
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



⇒ D9, D14-15

⇒ E10

TNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																						
				P				M			S		K			H		K		N						
				Uncoated	ZX-Coated	Coated		Carbide			ZX-Coated	Coated		Ceramic		Uncoated										
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
Roughing	 NMU Depth of cut (mm) vs Feed rate (mm/rev) graph	TNMG 160408 NMU TNMG 160412 NMU	0,8					●	●	●	●			●	●					●	●					
			1,2					●	●	●	●			●	●						●	●				
Roughing	 NUX Depth of cut (mm) vs Feed rate (mm/rev) graph	TNMG 160404 NUX TNMG 160408 NUX TNMG 160412 NUX	0,4							●	●															
			0,8							●	●															
			1,2							●	●															
Roughing	 NMX Depth of cut (mm) vs Feed rate (mm/rev) graph	TNMG 160412 NMX	1,2								●															
Roughing	 NUZ Depth of cut (mm) vs Feed rate (mm/rev) graph	TNMG 160408 NUZ TNMG 160412 NUZ	0,8																	●	●					
			1,2																	●	●					

Neg. Inserts

C

D

R

S

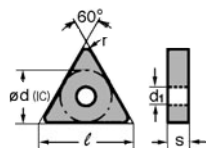
T

V

W

60° Triangle Type

0° Relief
With Insert Hole



TNMM	Dimensions (mm)			
	l	∅d (IC)	s	d ₁
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



⇒ D9, D14-15

⇒ E10

TNMM

● M-Class One Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	
<p>NMP</p>		TNMM 160408 NMP TNMM 160412 NMP TNMM 160416 NMP	0,8 1,2 1,6	
		TNMM 220408 NMP TNMM 220412 NMP TNMM 220416 NMP	0,8 1,2 1,6	
		TNMM 160408 NHG TNMM 160412 NHG TNMM 160416 NHG	0,8 1,2 1,6	
	<p>NHG</p>		TNMM 220408 NHG TNMM 220412 NHG TNMM 220416 NHG	0,8 1,2 1,6

	P		M			S		K			H		K		N								
	Uncoated	ZX-Coated	Coated			ZX-Coated		Coated			Ceramic		Uncoated										
	Cermet		Carbide																				
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
●								●	●														
●								●	●														
●								●	●														
●								●	●														
●								●	●														
●								●	●														

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

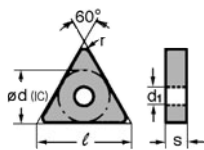
T TRIANGLE TYPE

INSERTS FOR TURNING

Other T--- Type neg. Inserts

60° Triangle Type

0° Relief
With Insert Hole



Dimensions (mm)				
TN--	l	ød (IC)	s	d ₁
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



⇒ D9, D14-15

⇒ E10

TNGA / TNMA

● G/M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r
Roughing		TNGA 160408	0,8
		TNGA 160412	1,2
Roughing		TNMA 160408	0,8
		TNMA 160412	1,2

	P			M			S			K			H		K		N					
	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated				
	Cermet			Carbide			Ceramic			Ceramic		Ceramic		Ceramic		Ceramic						
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1

Carbide

⇒

Neg. Inserts

C

D

R

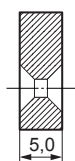
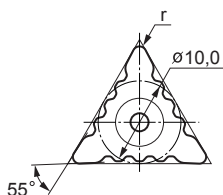
S

T

V

W

New



⇒ D7

⇒ E6

TRM

● M-Class Bumpy Chipbreaker

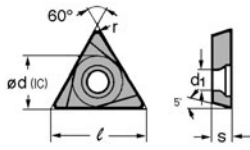
Application	Shape	ISO Cat. No.	r
Finishing	 -LU	TRM 551704 -LU	0,4
		TRM 551708 -LU TRM 551712 -LU	0,8 1,2
Finishing	 -SU	TRM 551704 -SU	0,4
		TRM 551708 -SU TRM 551712 -SU	0,8 1,2
Light Cut	 -GU	TRM 551704 -GU	0,4
		TRM 551708 -GU TRM 551712 -GU	0,8 1,2

	P			M			S			K			H		K		N					
	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated				
	Cermet			Carbide			Ceramic			Ceramic		Ceramic		Ceramic		Ceramic						
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1

● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs TNMA 160408, AC700G

60° Triangle Type 5° Relief
With Insert Hole



Dimensions (mm)

TB--	l	ød (IC)	s	d ₁
0601--	6,9	3,97	1,59	2,3

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



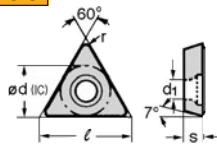
⇒ E18

TBGT

● G-Class Handed Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																						
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
Finishing	 L-FX R-FX Depth of cut (mm) vs Feed rate (mm/rev) graph	TBGT 060102 LFX TBGT 060104 LFX	0,2 0,4																							
		TBGT 060102 RFX TBGT 060104 RFX	0,2 0,4																							
Finishing	 L-W R-W Depth of cut (mm) vs Feed rate (mm/rev) graph	TBGT 060102 LW TBGT 060104 LW	0,2 0,4	●	●			●						●												
		TBGT 060102 RW TBGT 060104 RW	0,2 0,4		●			●							●											

7° Relief
With Insert Hole



Dimensions (mm)

TC--	l	ød (IC)	s	d ₁
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



⇒ D29

⇒ E17

TCGT

● G-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																						
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
Light Cut	 NAG Depth of cut (mm) vs Feed rate (mm/rev) graph	TCGT 110202 NAG TCGT 110204 NAG	0,2 0,4																							
		TCGT 16T304 NAG TCGT 16T308 NAG	0,4 0,8																							
Light Cut	 NSC Depth of cut (mm) vs Feed rate (mm/rev) graph	TCGT 090202 NSC	0,2		●			●										●								
		TCGT 110202 NSC TCGT 110204 NSC	0,2 0,4		●			●											●							

● = Euro stock ● = 1-st recommended stock item

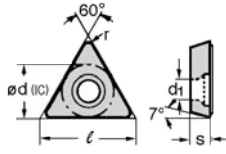
Packing unit and ordering example; 10 pcs TBGT 060102 LFX, ACZ310

T TRIANGLE TYPE

INSERTS FOR TURNING

TC-- 7° pos. Inserts for Finishing ~ Light Cut

60° Triangle Type 7° Relief With Insert Hole



Dimensions (mm)				
TC--	ℓ	∅d (IC)	s	d ₁
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



TCMT

M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material														
				P		M			S		K			H		N		
				Uncoated	ZX-Coated	Coated			ZX-Coated		Coated			Uncoated				
Finishing	NFP	TCMT 090202 NFP	0,2															
		TCMT 090204 NFP	0,4	●														
		TCMT 090208 NFP	0,8	●														
	NSU	TCMT 110202 NFP	0,2	●	●													
		TCMT 110204 NFP	0,4	●	●	●												
		TCMT 110208 NFP	0,8	●	●	●												
	NSK	TCMT 16T304 NFP	0,4	●	●	●												
		TCMT 16T308 NFP	0,8	●	●	●												
Light Cut	NSU	TCMT 110204 NSU	0,4		●	●	●	●	●	●								
		TCMT 110208 NSU	0,8		●	●	●	●	●	●								
	NSK	TCMT 16T304 NSU	0,4				●	●	●	●	●							
		TCMT 16T308 NSU	0,8				●	●	●	●	●							
	NSK	TCMT 110204 NSK	0,4									●	●					
		TCMT 110208 NSK	0,8									●	●					
Light Cut	NSK	TCMT 16T304 NSK	0,4								●	●						
		TCMT 16T308 NSK	0,8								●	●						
	NSK	TCMT 16T304 NSK	0,4									●	●					
		TCMT 16T308 NSK	0,8									●	●					
TCMT 16T312 NSK	1,2									●	●							

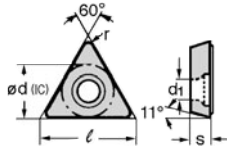
- Pos. Inserts
- C
- D
- R
- S
- T
- V
- W

TRIANGLE TYPE

INSERTS FOR TURNING

TP-- 11° pos. Inserts for Finishing ~ Light Cut

60° Triangle Type 11° Relief With Insert Hole



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

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



⇒ E18

Carbide

TPMT

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Finishing	 NFK	TPMT 110304 NFK TPMT 110308 NFK	0,4 0,8
		TPMT 160404 NFK TPMT 160408 NFK	0,4 0,8
Finishing	 NLU	TPMT 080204 NLU TPMT 080208 NLU	0,4 0,8
		TPMT 110304 NLU TPMT 110308 NLU	0,4 0,8
Finishing	 NSU	TPMT 110304 NSU TPMT 110308 NSU	0,4 0,8
		TPMT 160404 NSU TPMT 160408 NSU	0,4 0,8

	P			M			S			K			H		K		N					
	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated				
	Cermet			Carbide			Ceramic															
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
●	●	●									●	●				●	●					
●	●										●	●				●	●					

The shape of insert hole :

TPMT/-H NSF

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Light Cut	 NSF	TPMH 110304 NSF TPMH 110308 NSF	0,4 0,8
		TPMT 160404 NSF TPMT 160408 NSF	0,4 0,8

	P			M			S			K			H		K		N					
	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated	Uncoated	ZX-Coated	Coated				
	Cermet			Carbide																		
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
●								●	●													
●								●	●													

● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs TPMT 110304 NFK, T1200A

Pos. Inserts

C

D

R

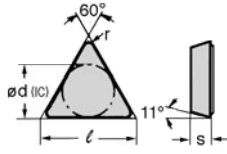
S

T

V

W

60° Triangle Type **11° Relief**
Without Insert Hole



Dimensions (mm)				
TP__	l	ød (IC)	s	d ₁
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



"S... CTFP...11/16" - Type
(⇒ Stock in Japan)

TPGR

● G-Class Handed Chipbreaker

Application	Shape	ISO Cat. No.	r
Finishing	 L-W	TPGR 110304 LW	0,4
		TPGR 160304 LW TPGR 160308 LW	0,4 0,8
		TPGR 110304 RW	0,4
Finishing	 R-W	TPGR 160304 RW TPGR 160308 RW	0,4 0,8

	P										M			S		K		H		K		N	
	Uncoated		ZX-Coated		Coated						ZX-Coated		Coated		Uncoated		Uncoated		Uncoated				
	Cermet				Carbide								Ceramic										
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
Finishing		●			●					●					●								
Finishing		●			●					●					●								
Finishing		●			●					●					●								
Finishing		●			●					●					●								

TPMR

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Finishing	 NFK	TPMR 110302 NFK	0,2
		TPMR 110304 NFK TPMR 110308 NFK	0,4 0,8
		TPMR 160304 NFK TPMR 160308 NFK	0,2 0,4
Light Cut	 NSF	TPMR 110304 NSF TPMR 110308 NSF	0,4 0,8
		TPMR 160304 NSF TPMR 160308 NSF	0,4 0,8
Light Cut	 NUJ	TPMR 110304 NUJ TPMR 110308 NUJ	0,4 0,8
		TPMR 160304 NUJ TPMR 160308 NUJ	0,4 0,8

	P										M			S		K		H		K		N	
	Uncoated		ZX-Coated		Coated						ZX-Coated		Coated		Uncoated		Uncoated		Uncoated				
	Cermet				Carbide								Ceramic										
	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
Finishing		●																					
Finishing	●	●																					
Finishing	●	●																					
Light Cut								●															
Light Cut								●	●														
Light Cut								●	●														
Light Cut								●	●														

● = Euro stock ● = 1-st recommended stock item

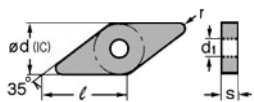
Packing unit and ordering example; 10 pcs TPGR 110304 LW, T1200A

35° DIAMOND TYPE

INSERTS FOR TURNING

VNMG neg. Inserts for Finishing & Medium Cutting

35° Diamond Type 0° Relief
With Insert Hole



Dimensions (mm)				
VN--	ℓ	ød (IC)	s	d ₁
1604--	16,6	9,525	4,76	3,81

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



⇒ D16

VNMG

Carbide

⇌

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	P		M			S		K			H	K	N											
				Uncoated	ZX-Coated	Coated			ZX-Coated	Coated			Uncoated	Uncoated	Uncoated												
				Cermet		Carbide			Ceramic			Ceramic															
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1		
Finishing	NFL	VNMG 160404 NFL VNMG 160408 NFL	0,4			●	●																				
			0,8			●	●																				
Finishing	NLU	VNMG 160404 NLU VNMG 160408 NLU	0,4			●			●	●																	
			0,8			●		●	●	●																	
Finishing	NSU	VNMG 160404 NSU VNMG 160408 NSU	0,4						●	●										●	●						
			0,8					●	●	●	●									●	●						
Medium Cut	NGU	VNMG 160404 NGU VNMG 160408 NGU	0,4						●	●				●	●												
			0,8					●	●	●	●				●	●											
Medium Cut	NUG	VNMG 160404 NUG VNMG 160408 NUG	0,4								●																
			0,8									●															
Medium Cut	NUP	VNMG 160404 NUP VNMG 160408 NUP	0,4								●	●															
			0,8									●	●														

Neg. Inserts

C

D

R

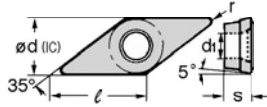
S

T

V

W

35° Diamond Type **5° Relief**
With Insert Hole



Dimensions (mm)




VB_	l	ød (IC)	s	d ₁
1102--	11,0	6,35	2,38	2,8
1103--			3,18	
1604--	16,6	9,525	4,76	4,4

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



VBMT

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																
				P				M			S		K			H		N		
				Uncoated	ZX-Coated	Coated		Carbide			ZX-Coated	Coated		Ceramic		Uncoated				
Finishing	 NFP	VBMT 110202 NFP VBMT 110204 NFP VBMT 110208 NFP	0,2	●	●	●	●													
			0,4	●	●	●	●													
			0,8			●	●													
		VBMT 160404 NFP VBMT 160408 NFP	0,4	●	●	●	●													
			0,8	●	●	●	●													
Light Cut	 NSU	VBMT 110204 NSU VBMT 110208 NSU	0,4							●	●									
			0,8								●	●								
		VBMT 110304 NSU VBMT 110308 NSU	0,4									●	●							
			0,8									●	●							
		VBMT 160404 NSU VBMT 160408 NSU	0,4		●	●						●	●							
			0,8		●	●						●	●							
Light Cut	 NSK	VBMT 110204 NSK VBMT 110208 NSK	0,4																	
			0,8																	
		VBMT 160404 NSK VBMT 160406 NSK	0,4									●	●							
			0,6									●	●							
		VBMT 160408 NSK VBMT 160412 NSK	0,8									●	●							
			1,2									●	●							

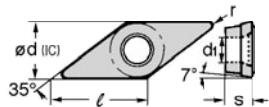
● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs VBMT 110202 NFP, T2000Z

35° DIAMOND TYPE INSERTS FOR TURNING

VC-- 7° pos. Inserts for Finishing

35° Diamond Type 7° Relief
With Insert Hole



Dimensions (mm)				
VC--	ℓ	∅d (IC)	s	d ₁
1103--	11,0	6,35	3,18	2,8
1604--	16,6	9,525	4,76	4,4

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



⇒ D31

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

VCGT

● G-Class Handed and Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																					
				P		M			S		K			H		N									
				Uncoated	ZX-Coated	Coated			ZX-Coated		Coated			Uncoated											
Finishing	L-FX	VCGT 110301 LFX VCGT 110302 LFX	0,1 0,2	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
				●	●		●							●						●					
Finishing	R-FX	VCGT 110301 RFX VCGT 110302 RFX	0,1 0,2	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
				●	●		●							●						●					
Light Cut	NAG	VCGT 110302 NAG VCGT 110304 NAG	0,2 0,4	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
Light Cut	NAG	VCGT 160408 NAG VCGT 160412 NAG	0,8 1,2	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1

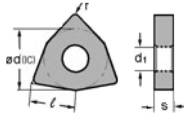
VCMT

● M-Class Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																					
				P		M			S		K			H		N									
				Uncoated	ZX-Coated	Coated			ZX-Coated		Coated			Uncoated											
Light Cut	NSU	VCMT 160404 NSU VCMT 160408 NSU	0,4 0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
									●				●	●							●				
Light Cut	NSK	VCMT 160404 NSK VCMT 160408 NSK	0,4 0,8	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1

80° Trigon Type

0° Relief
With Insert Hole



Dimensions (mm)				
WN--	l	ød (IC)	s	d ₁
0604--	6,52	9,525	4,76	3,81
0804--	8,69	12,7	4,76	5,16

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



⇒ D9, D17

⇒ E11

WNMA

● M-Class No Chipbreaker

Application	Shape	ISO Cat. No.	r
-		WNMA 080408	0,8
		WNMA 080412	1,2
		WNMA 080416	1,6

Uncoated		ZX-Coated	Coated						ZX-Coated	Coated		Uncoated										
Cermets			Carbide							Ceramic		Ceramic										
T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
															●	●						
															●	●						

Carbide

Neg. Inserts

C

WNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r
Finishing	 NFA	WNMG 080404 NFA	0,4
		WNMG 080408 NFA	0,8
Finishing	 NFL	WNMG 080404 NFL	0,4
		WNMG 080408 NFL	0,8
Finishing	 NLU	WNMG 080404 NLU	0,4
		WNMG 080408 NLU	0,8
		WNMG 080412 NLU	1,2
Finishing	 NLU-W	WNMG 060404 NLU-W	0,4
		WNMG 060408 NLU-W	0,8
		WNMG 080404 NLU-W	0,4
		WNMG 080408 NLU-W	0,8
Finishing	 NSU	WNMG 080412 NLU-W	1,2
		WNMG 060404 NSU	0,4
		WNMG 060408 NSU	0,8
		WNMG 080404 NSU	0,4
Finishing	 NSU	WNMG 080408 NSU	0,8
		WNMG 080412 NSU	1,2
		WNMG 080412 NSU	1,2

Uncoated		ZX-Coated	Coated						ZX-Coated	Coated		Uncoated										
Cermets			Carbide							Ceramic		Ceramic										
T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	

● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs WNMG 080404 NFA, T2000Z

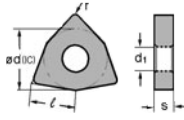
TRIGON TYPE

INSERTS FOR TURNING

WNMG neg. Inserts for Medium Cutting

80° Trigon Type

0° Relief
With Insert Hole



Dimensions (mm)				
WN--	l	ød (IC)	s	d1
0604--	6,52	9,525	4,76	3,81
0804--	8,69	12,7	4,76	5,16

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



⇒ D9, D17

⇒ E11

Carbide

WNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	P		M			S		K		H		K		N			
				Uncoated	ZX-Coated	Coated			ZX-Coated		Coated		Uncoated		Uncoated		Uncoated			
				Cermet		Carbide			Ceramic		Ceramic		Ceramic		Ceramic		Ceramic			
Medium Cut	"Standard" NGU 	WNMG 060404 NGU	0,4																	
		WNMG 060408 NGU	0,8																	
		WNMG 060412 NGU	1,2																	
	"Wiper" W-Type NGU-W 	WNMG 080404 NGU-W	0,4																	
		WNMG 080408 NGU-W	0,8																	
		WNMG 080412 NGU-W	1,2																	
Medium Cut	NUG 	WNMG 060404 NUG	0,4																	
		WNMG 060408 NUG	0,8																	
		WNMG 080408 NUG	0,8																	
Medium Cut	NEX 	WNMG 060404 NEX	0,8																	
		WNMG 060408 NEX	1,2																	
		WNMG 080404 NEX	0,4																	
Medium Cut	NUP 	WNMG 080408 NUP	0,8																	
		WNMG 080412 NUP	1,2																	

Neg. Inserts

C

D

R

S

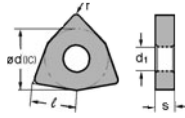
T

V

W

80° Trigon Type

0° Relief
With Insert Hole



Dimensions (mm)				
WN--	l	ød (IC)	s	d ₁
0604--	6,52	9,525	4,76	3,81
0804--	8,69	12,7	4,76	5,16

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



⇒ D9, D17

⇒ E11

WNMG

● M-Class Double Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	Material																								
				P		M		S		K		H		K		N												
				Uncoated	ZX-Coated	Uncoated	ZX-Coated	Uncoated	ZX-Coated	Uncoated	ZX-Coated	Uncoated	ZX-Coated	Uncoated	ZX-Coated	Uncoated	ZX-Coated											
Roughing	 Depth of cut (mm) vs Feed rate (mm/rev) graph for NMU.	WNMG 060408 NMU WNMG 060412 NMU	0,8 1,2	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1			
Roughing	 Depth of cut (mm) vs Feed rate (mm/rev) graph for NUX.	WNMG 080408 NUX WNMG 080412 NUX	0,8 1,2	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1			
Roughing	 Depth of cut (mm) vs Feed rate (mm/rev) graph for NUZ.	WNMG 080408 NUZ WNMG 080412 NUZ	0,8 1,2	T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1			

● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs WNMG 060404 NMU, AC2000

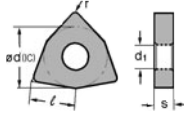
T RIGON TYPE

INSERTS FOR TURNING

WNMM neg. Inserts for Roughing

80° Trigon Type

0° Relief
With Insert Hole



Dimensions (mm)				
WN--	ℓ	ød (IC)	s	d ₁
0604--	6,52	9,525	4,76	3,81
0804--	8,69	12,7	4,76	5,16

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





⇒ D9, D17

⇒ E11

WNMM

● M-Class One Sided Bumpy Chipbreaker

Application	Shape	ISO Cat. No.	r	P		M		S		K		H		K		N										
				Uncoated	ZX-Coated	Coated		Carbide		ZX-Coated	Coated		Ceramic		Uncoated											
				Cermets		Cermet		Cermet		Cermet		Cermet		Cermet		Cermet										
				T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1	
	 NMP	WNMM 080408 NMP WNMM 080412 NMP	0,8 1,2																							
	 NHG	WNMM 080408 NHG WNMM 080412 NHG	0,8 1,2																							

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

Carbide

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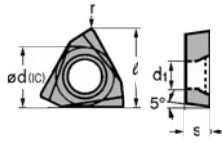
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⇒

80° Trigon Type **5° Relief**
With Insert Hole



Dimensions (mm)				
W-Type	l	ød (IC)	s	d ₁
060102	5,0	3,97	1,59	2,2
060104	4,9			

- 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	Material																			
				P		M			S		K			H		K		N					
				Uncoated	ZX-Coated	Coated			ZX-Coated		Coated			Ceramic		Uncoated							
Cermet		Carbide											Ceramic			Uncoated							
		Carbide																					
		T110A	T1200A	T2000Z	T3000Z	ACZ310	AC700G	AC900G	AC2000	AC3000	ACZ310	AC610M	AC630M	EH510Z	EH520Z	ACZ310	AC300G	AC700G	AC900G	NB100C	NS260C	NS260	H1
Finishing	 L-FX R-FX 	WBGT 060102 LFX WBGT 060104 LFX	0,2 0,4																				
		WBGT 060102 RFX WBGT 060104 RFX	0,2 0,4																				
Finishing	 L-W R-W 	WBGT 060102 LW WBGT 060104 LW	0,2 0,4		●		●										●	●					
		WBGT 060102 RW WBGT 060104 RW	0,2 0,4		●		●											●	●				

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

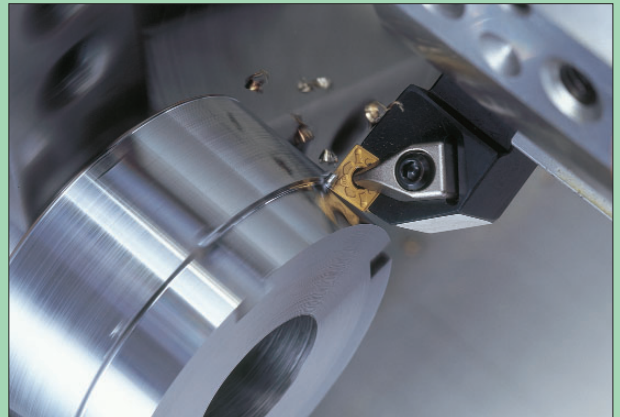
● = Euro stock ● = 1-st recommended stock item

Packing unit and ordering example; 10 pcs WBGT 060102 LFX, ACZ310

External Holders

D1 ~ D32

D



External Holders

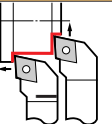
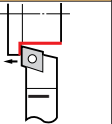
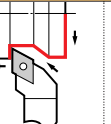
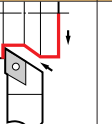
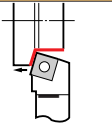
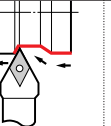
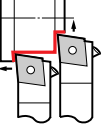
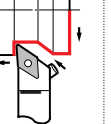
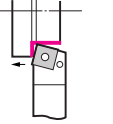
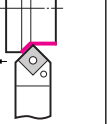
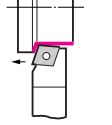
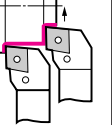
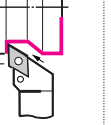
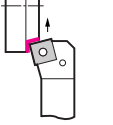
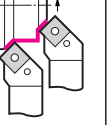
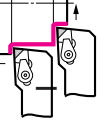
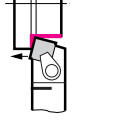
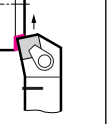
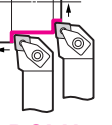
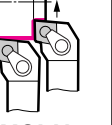
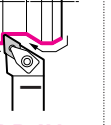
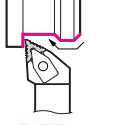
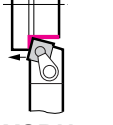
Selection	Turning Holder Series	D3
ISO	Turning Holder Identification Table	D4
	Calculation of The Cutting Edge Position	D5
T-REX Tool Holders	New SumiTurn T-REX Tool Holders	D6 -7
For High Performance Turning	D Type Double Clamp Holders	D8 -9
General Turning	P Type Lever Lock and M Type Top & Hole Clamp Holders	
	PC Type Holders	D10
	PD Type Holders	D11
	PS Type Holders	D12-13
	PT / PM Type Holders	D14-15
	CV Type Holders	D16
	PW / MW Type Holders	D17
For Solid CBN Inserts	C Type Clamp On Holders	D18-19
	X Type Dimple Lock Holders	D20
Selection	Mini Holders Series	D21-22
Special for Back Facing	SBT Type Mini Holders	D23
Small Product Turning	PC / SC Type Mini Holders	D24
	PD / SD Type Mini Holders	D25-26
	PR Type Holders	D27
	SS Type Mini Holders	D28
	ST Type Mini Holders	D29
	SV Type Copying Holders	D30-31

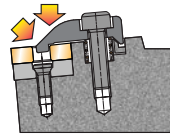
External Tool Holder Series



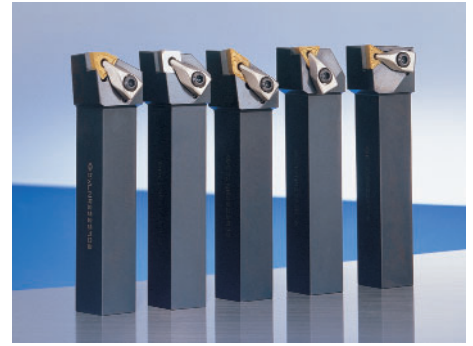
X Type "Dimple Lock" Holder
XSBN-R 2525 N12
for special solid CBN and ceramic inserts

TOOLING SELECTION

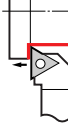
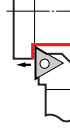
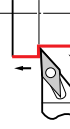
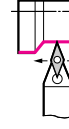
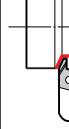
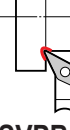
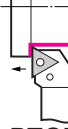
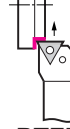
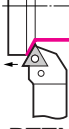
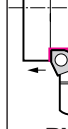

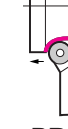


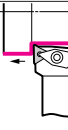
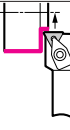

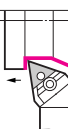
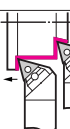
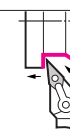
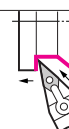
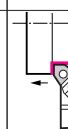
Application		General Turning & Facing	General Turning & Copying		General Turning		
Insert Type		80° Diamond Type	55° Diamond Type	New 55° T-REX	90° Square Type		
System							
Screw Lock System	S Type Mini Holder	 SCLC ⇒ D24	 SCAC ⇒ D24	 SDJC ⇒ D25 SDHC ⇒ D25	 SDAC ⇒ D26	 SSBC ⇒ D28	
		—	—	 SDNC D26	—	—	
Lever Lock System	P Type (* Side Lever Lock Type)	 PCLC (*) ⇒ D24	—	 PDJC (*) ⇒ D25	—	 PSBN ⇒ D12	 PSDN ⇒ D12
		 PCBN ⇒ D10	 PCLN ⇒ D10	 PDJN ⇒ D11	—	 PSKN ⇒ D13	 PSSN ⇒ D13
		 CCLC ⇒ D18	—	—	—	 CSBN ⇒ D18	 CSKN ⇒ D18
Double Lock (D) Dimple Lock (X)	D & X Type	 DCLN ⇒ D8	 XCLN ⇒ D20	 DDJN ⇒ D8	 DTR ⇒ D6~7	 XSBN ⇒ D20	—
Top and Hole Clamp System	M Type	—	—	—	—	—	



D Type "Double Clamp" Holders for high performance machining

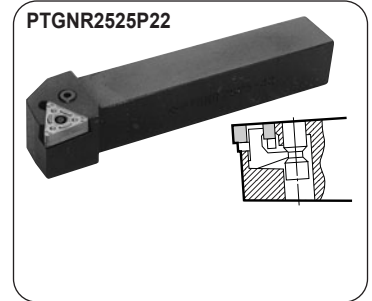
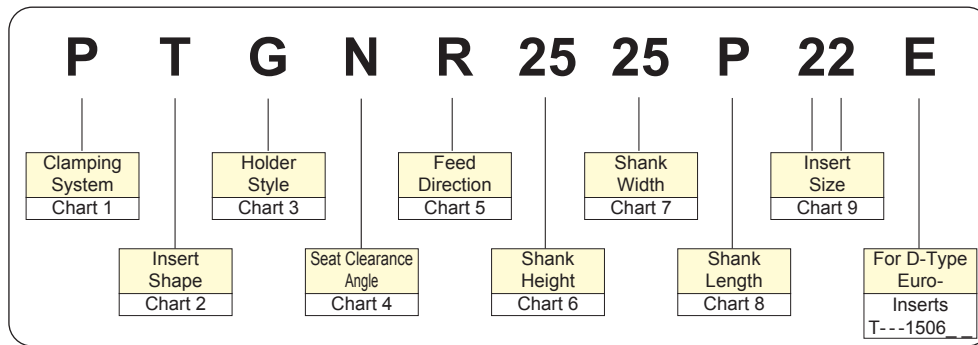


TOOLING SELECTION

Application		General Turning			Copying		General Turning	Special Turning	
Insert Type System		60° Triangle Type			35° Diamond Type		80° Trigon Type	Round and Special Purpose Inserts	
Screw Lock System	S Type Mini Holder	 STAC ⇒ D29	 STGC ⇒ D29	—	 SVJB ⇒ D30 SVLC ⇒ D31	 SVVB ⇒ D30	—	 SBT ⇒ D23	—
		—	—	—	 SVPB ⇒ D30 SVPC ⇒ D31	—	—	—	—
Lever Lock System	P Type	 PTGN ⇒ D14	 PTFN ⇒ D14	 PTTN ⇒ D14	—	—	 PWLN ⇒ D17	 PRDC ⇒ D27	 PRGC ⇒ D27
		—	—	—	—	—	—	—	—
Clamp-On	C Type	—	—	—	—	—	—	 CRDN ⇒ D19	 CRSN ⇒ D19
Double Lock (D) Dimple Lock (X)	D & X Type	 DTGN ⇒ D9	 DTFN ⇒ D9	—	—	—	 DWLN ⇒ D9	—	—
Top and Hole Clamp System	M Type	 MTJN ⇒ D15	 MTXN ⇒ D15	—	 CVC ⇒ D16	 CVJ ⇒ D16	 MWLN ⇒ D17	—	—

ISO Holders Identification

■ Catalogue Classification System For SEC-Tool Holders



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

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 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 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

Chart 8

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 9

Cutting Edge	
Symbol	Length (mm)
Eg. for Triangle Inserts:	
06	6,9
08	8,2
09	9,6
11	11,0
16	16,5
22	22,0
27	27,5
33	33,0
For Round 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	02	(0)	0,203
–	6/32	04	1/64	0,397
–	7/32	08	2/64	0,794
2/8	8/32	12	3/64	1,191
–	(0)	16	4/64	1,588
3/8	–	24	6/64	2,389
4/8	–			
5/8	–			
6/8	–			
8/8	–			

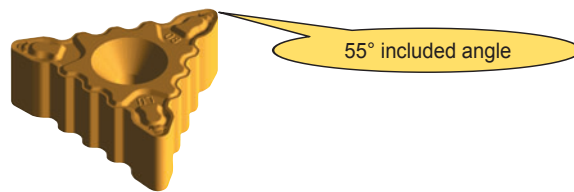
SumiTurn T-REX Tool Holders

RIGIDITY - ECONOMY - PRECISION

The Biting Force Behind



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



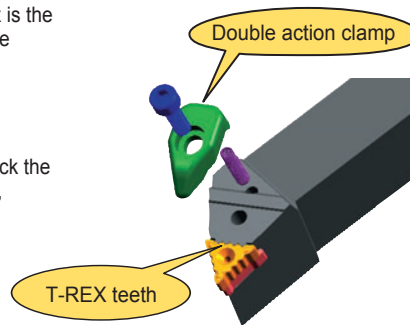
Advantages

● T-REX Inserts for Maximum Economy

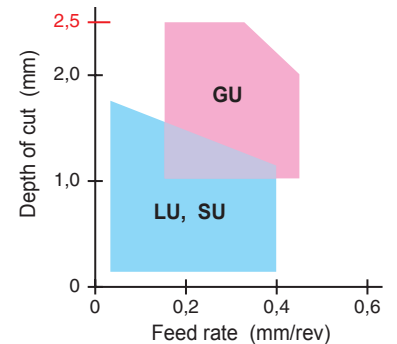
With 6 cutting edges and a 55 degree included angle - T-Rex is the intelligent alternative to profile turning with a traditional 4 edge DNMG insert.

● Biting Performance from T-REX Teeth

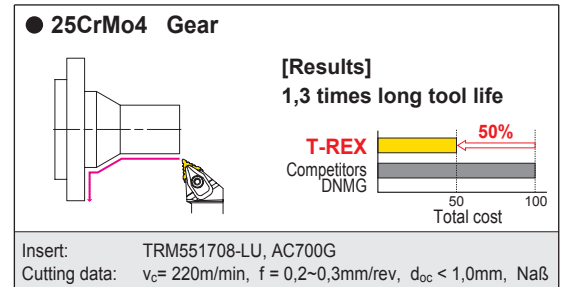
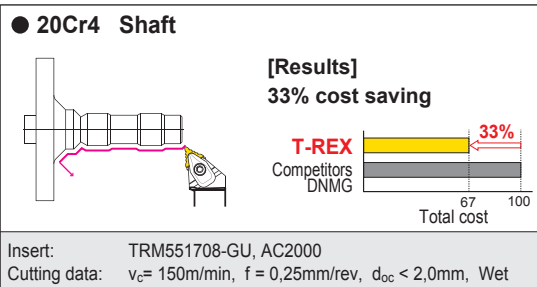
The double clamp tool holder and powerful teeth of T-REX lock the insert to eliminate movement, dramatically improving tool life, machining accuracy, and cutting edge security.



● Application Range

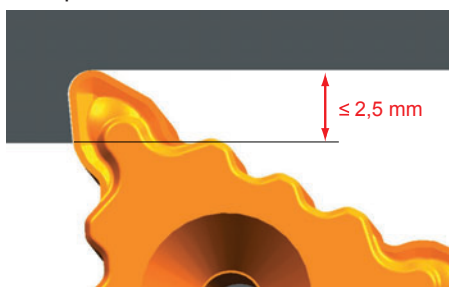


Application Examples

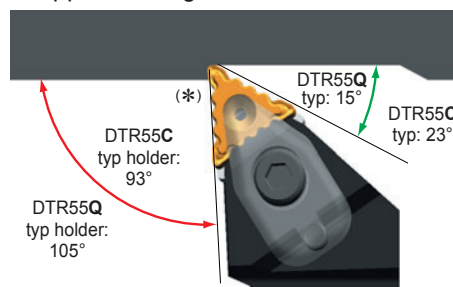


Recommendations

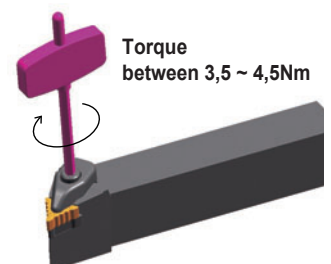
● Depth of Cut



● Approach Angle

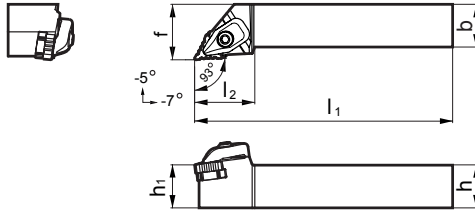
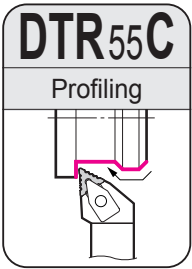


● Insert Clamping



C-Type: 95,5°
Q-Type: 107,5°

External Turning & Copying



■ Holders

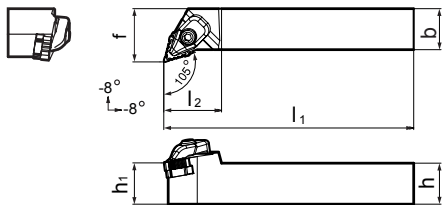
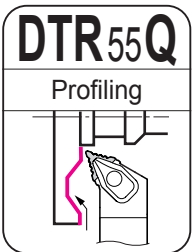
Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h ₁	b	l ₁	l ₂	f
DTR55C R/L 2020-K17	●	●	20	20	20	125	35	25
DTR55C 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 ^(*)

(*) Note: Wrench (TRX10) for shim is not included.



■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h ₁	b	l ₁	l ₂	f
DTR55Q R/L 2020-K17	●	●	20	20	20	125	35	28,5
DTR55Q 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 ^(*)

■ Inserts

● Type LU



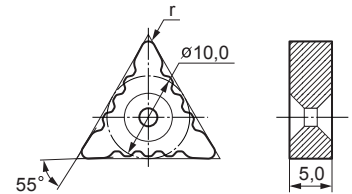
Application **P** Steel
M Stainless steel

● Type SU



	Ordering No.	r	Coated Carbide				Coated Cermet		
			AC700G	AC900G	AC2000	AC3000	AC610M	AC630M	T2000Z
Finishing	TRM 551704 -LU	0,4	●	●	●	●		●	●
	TRM 551708 -LU	0,8	●	●	●	●		●	●
	TRM 551712 -LU	1,2	●	●	●	●		●	●
	TRM 551704 -SU	0,4					●	●	
	TRM 551708 -SU	0,8					●	●	
	TRM 551712 -SU	1,2					●	●	

● Type GU



	Ordering No.	r	Coated Carbide				Coated Cermet		
			AC700G	AC900G	AC2000	AC3000	AC610M	AC630M	T2000Z
Light Cut	TRM 551704 -GU	0,4	●	●	●	●		●	●
	TRM 551708 -GU	0,8	●	●	●	●		●	●
	TRM 551712 -GU	1,2	●	●	●	●		●	●

● Recommended Cutting Conditions

— Cutting speed (m/min)

Grade		Coated Carbide						Coated Cermet	
		AC700G	AC900G	AC2000	AC3000	AC610M	AC630M	T2000Z	T3000Z
Work materials	Low carbon steel	220 350	200 300	150 280	90 250			100 350	100 300
	Alloy steel	150 300	150 280	100 250	80 200			100 300	100 250
	Stainless steel				50 150	130 210	100 160		
Application range	Finishing	○	○	○	○	○	○	○	○
	Medium cutting	○	○	○	○	○	○	○	○
	Interrupted cutting			○	○		○		○

○ 1-st recommendation ○ 2-nd recommendation

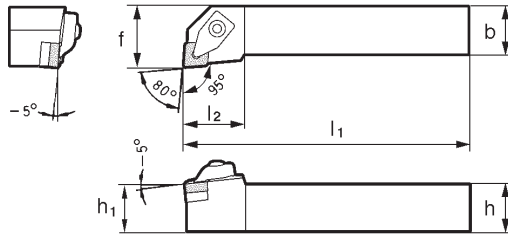
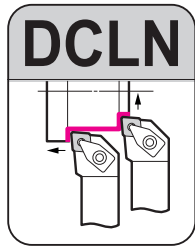
● = Euro stock

Packing unit and ordering example; 1 pce DTR55CR2020-K17 (R: right handed)

External Tool Holders D Type (Double Clamp)

Tool Holders for neg. Inserts CN-- & DN--

General Turning and Copying



■ Inserts



■ Spare Parts

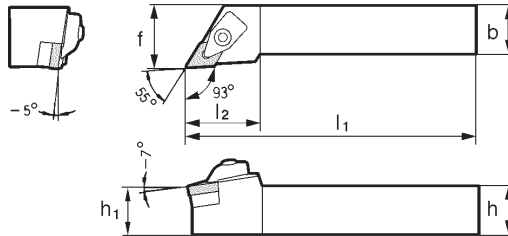
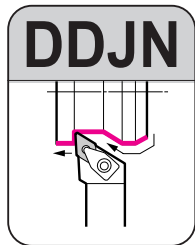
Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-2			CNS1204	BFTX0409N	TRX15	LH040	1

■ Holders

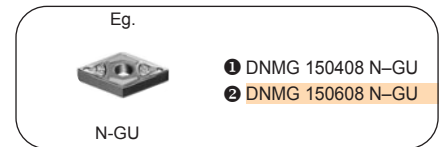
Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h ₁	b	l ₁	l ₂	f
DCLN R/L 2020 K12	●	●	20	20	20	125	32	25
DCLN R/L 2525 M12	●	●	25	25	25	150	32	32

Note: Wrench (TRX15) for shim is not included.



■ Inserts



■ Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-2			DNS1504	BFTX0409N	TRX15	LH040	1
			DNS1506				2
			DNS1504				1
			DNS1506				2

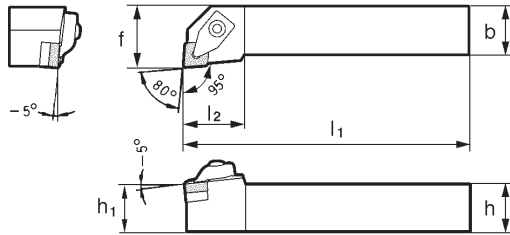
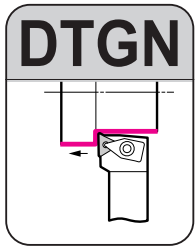
■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)					
	R	L	h	h ₁	b	l ₁	l ₂	f
DDJN R/L 2020 K15			20	20	20	125	38	25
DDJN R/L 2020 K15E	●	●	20	20	20	125	38	25
DDJN R/L 2525 M15	○		25	25	25	150	38	32
DDJN R/L 2525 M15E	●	●	25	25	25	150	38	32

Note: Wrench (TRX15) for shim is not included.

General Turning and Copying



■ Holders

Above figures show right hand tools.

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

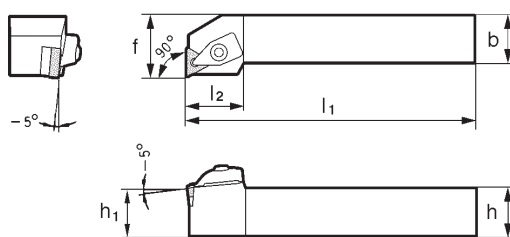
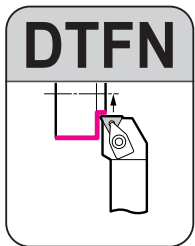
■ Inserts



■ Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-1			TNS1604	BFTX0307N	TRX10	LH040	1

Note: Wrench (TRX10) for shim is not included.

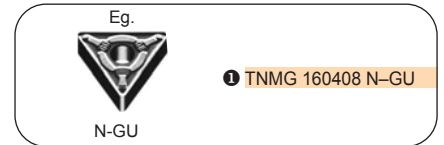


■ Holders

Above figures show right hand tools.

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

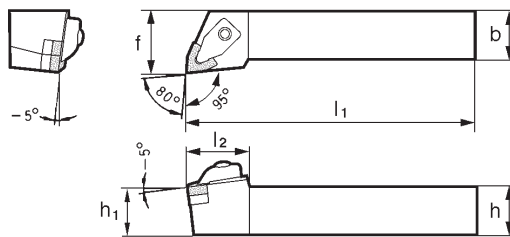
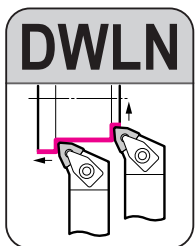
■ Inserts



■ Spare Parts

Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-1			TNS1604	BFTX0307N	TRX10	LH040	1

Note: Wrench (TRX10) for shim is not included.



■ Holders

Above figures show right hand tools.

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

■ Inserts



■ Spare Parts

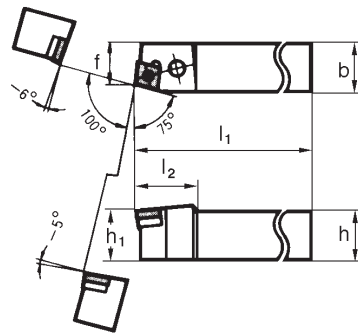
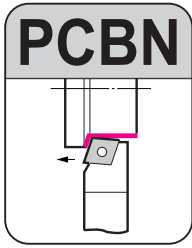
Clamp	Spring	Clamp bolt	Shim	Shim Screw	Wrench	Wrench	Insert
SCP-2			WNS0804	BFTX0409N	TRX15	LH040	1

Note: Wrench (TRX15) for shim is not included.

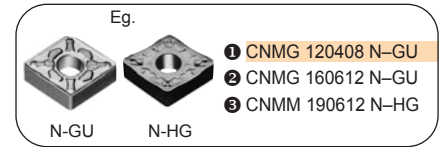
External Tool Holders P Type (Lever Lock)

Tool Holders for neg. Inserts CN-_-

General Turning and Facing



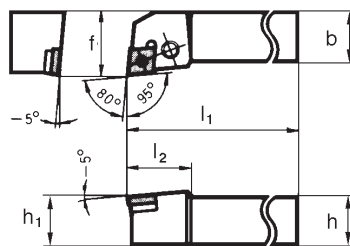
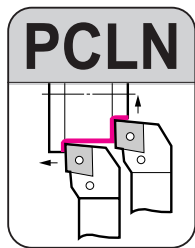
■ Inserts



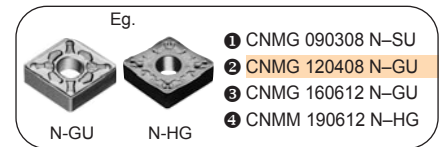
■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	f							
PCBN R/L 2020 K12	●		20	20	20	125	27	17							1
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



■ Inserts



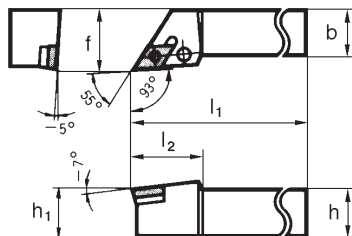
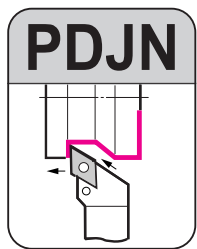
■ Holders

Above figures show right hand tools.

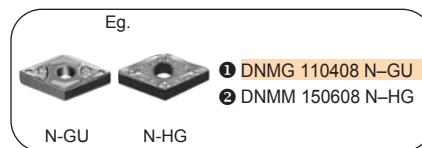
Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	f							
PCLN R/L 1616 H09	●	●	16	16	16	100	25,7	20							
PCLN R/L 2020 K09	●	○	20	20	20	125	27	25		LCL3SD	LCS3TB-SD	LSC32SD	LSP3SD-S	LH025	1
PCLN R/L 2525 M09		○	25	25	25	150	27	32						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

External Holders for neg. Inserts

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 ₁	b	l ₁	l ₂	f								
PDJN R/L 1616 H11	● ●	16	16	16	100	30	20								
PDJN R/L 2020 K11	● ●	20	20	20	125	30	25		LCL3D-SD	LCS3TB-SD	LSD32SD	LSP3SD	LH025	1	
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		LCL4D-SD	LCS5DB-SD	LSD42SD	LSP4SD	LH030	2	
PDJN R/L 4025 P15		40	40	25	170	35	28,7								

■ Holders

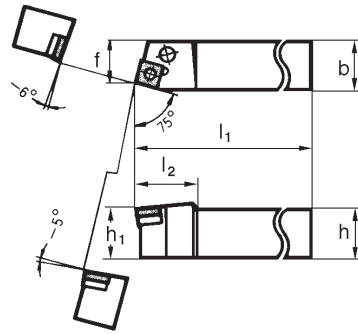
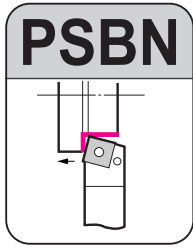
Above figures show right hand tools.

External Holders
for neg. Inserts

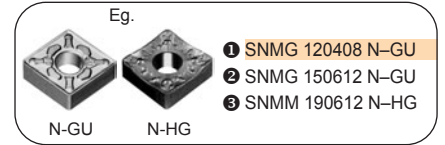
External Tool Holders P Type (Lever Lock)

Tool Holders for neg. Inserts SN_ _

General Turning and Chamfering



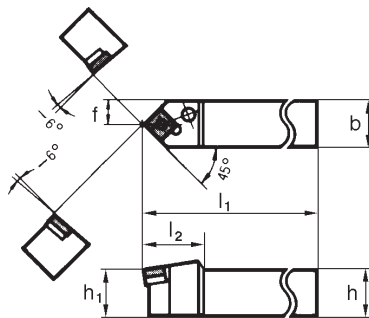
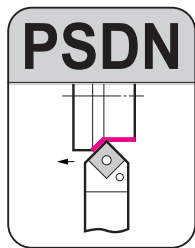
■ Inserts



■ 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 ₁	b	l ₁	l ₂	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	LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	3	
PSBN R/L 3225 P15	●	●	32	32	25	170	32	22							
PSBN R/L 3232 P19	●	●	32	32	32	170	39,2	27							



■ Inserts



■ Holders

Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	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	LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	2	
PSDN N 3225 P12	●		32	32	25	170	27,6	12,8	LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	3	
PSDN N 3225 P19			32	32	25	170	40,6	13							
PSDN N 3232 P19	●		32	32	32	170	40,6	16,5							

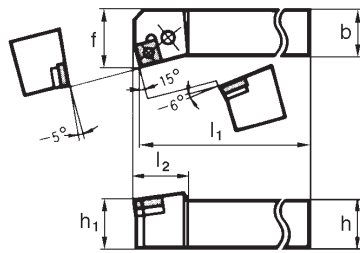
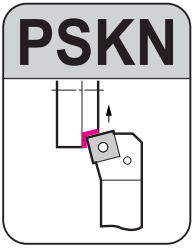
■ Spare Parts

Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
LCL3SD	LCS 3TB-SD	LSS32SD	LSP3SD	LH025	1
LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	2
LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	2
LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	3

External Holders for neg. Inserts



General Turning and Facing



■ Holders

Above figures show right hand tools.

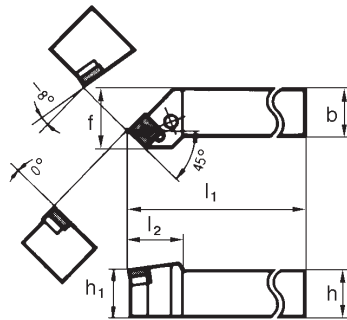
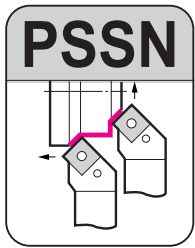
Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h ₁	b	l ₁	l ₂	f	
PSKN R/L 2020 K12			20	20	20	125	22,7	17	
PSKN R/L 2525 M12	●	●	25	25	25	150	22,7	32	
PSKN R/L 3225 P12			32	32	25	170	22,7	32	
PSKN R/L 2525 M15		●	25	25	25	150	32	32	
PSKN R/L 3225 P15		●	32	32	25	170	32	32	
PSKN R/L 3232 P15			32	32	32	170	32	40	
PSKN R/L 3232 P19			32	32	32	170	33,7	40	

■ Inserts



■ Spare Parts

Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
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)						
	R	L	h	h ₁	b	l ₁	l ₂	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	
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	
PSSN R/L 3232 P15	●		32	32	32	170	32	40	
PSSN R/L 3232 P19	●	●	32	32	32	170	40,2	40	

■ Inserts



■ Spare Parts

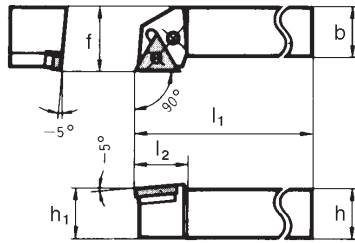
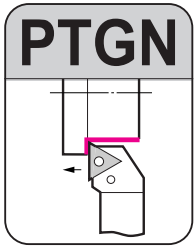
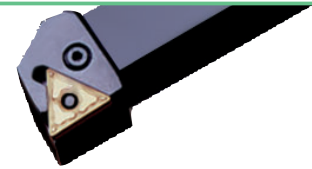
Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
LCL4SD	LCS42BS-SD	LSS42SD	LSP4SD	LH030	①
LCL5SD	LCS5B-SD	LSS53SD	LSP5SD	LH030	②
LCL6SD	LCS6B-SD	LSS63SD	LSP6SD	LH040	③

External Holders
for neg. Inserts

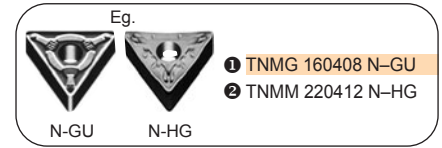
External Tool Holders P Type (Lever Lock)

Tool Holders for neg. Inserts TN_ _

General Turning and Facing



Inserts

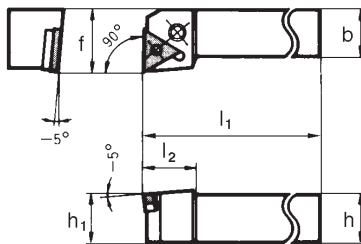
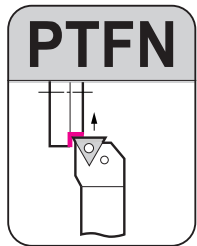


Spare Parts

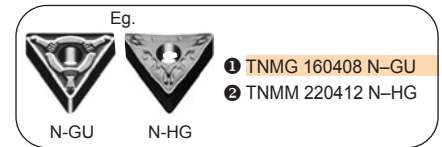
Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	f							
PTGN R/L 1616 H16	●	●	16	16	16	100	20	20							
PTGN R/L 2020 K16	●	●	20	20	20	125	20	25		LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025	1
PTGN R/L 2525 M16	●	●	25	25	25	150	22,2	32							
PTGN R/L 2525 M22	●	●	25	25	25	150	28,7	32							
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							

Holdings

Above figures show right hand tools.



Inserts

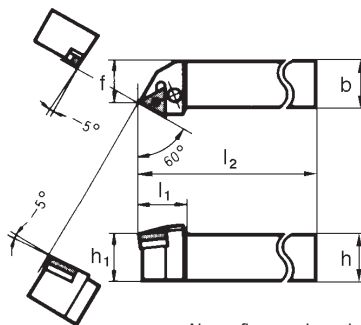
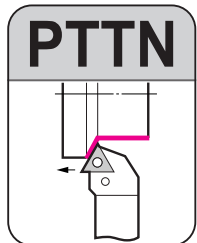


Spare Parts

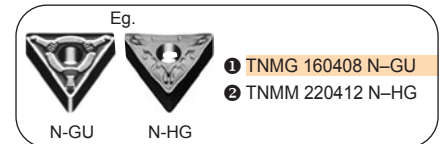
Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	f							
PTFN R/L 1616 H16	●	●	16	16	16	100	19,7	20							
PTFN R/L 2020 K16	●	●	20	20	20	125	20,2	25		LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025	1
PTFN R/L 2525 M16	●	●	25	25	25	150	20,2	32		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

Holdings

Above figures show right hand tools.



Inserts



Spare Parts

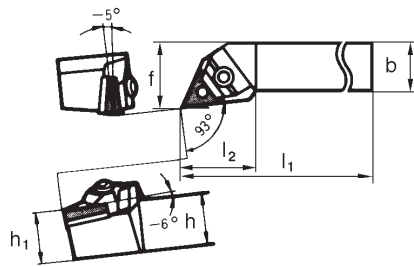
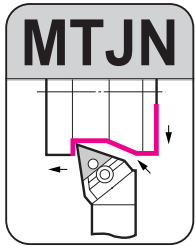
Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	f							
PTTN R/L 2020 K16			20	20	20	125	25,9	17							
PTTN R/L 2525 M16	●		25	25	25	150	25,9	22		LCL3SD	LCS3TB-SD	LST317SD	LSP3SD	LH025	1
PTTN R/L 2525 M22			25	25	25	150	31,9	22							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

Holdings

Above figures show right hand tools.

External Holders for neg. Inserts

General Turning and Copying



■ Holders

Above figures show right hand tools.

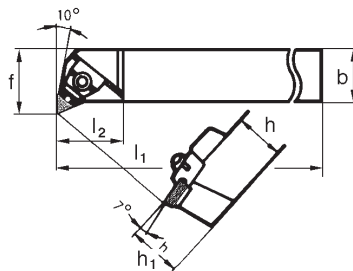
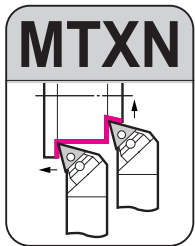
Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h ₁	b	l ₁	l ₂	f	
MTJN R/L 2020-33 (K16)	●	●	20	20	20	125	37	25	
MTJN R/L 2525-33 (M16)	●	●	25	25	25	150	37	32	
MTJN R/L 2525-43 (M22)	●	●	25	25	25	150	37	32	
MTJN R/L 3225-43 (P22)	●	●	32	32	25	170	37	32	
MTJN R/L V-43 (D22)			20	20	25	60	37	30	

■ Inserts



■ Spare Parts

Wedge	Shim pin	Shim	Clamp bold	Nut	Ring	Wrench	Insert
MMW30	MP317	STW323	BHA0525	CPM32N	ER04	LH030	1
	MP320						2
MMW40	MP320	STW434	BHA0625	CPM43N	ER05	LH030 LH040	2
	MP416						



■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h ₁	b	l ₁	l ₂	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

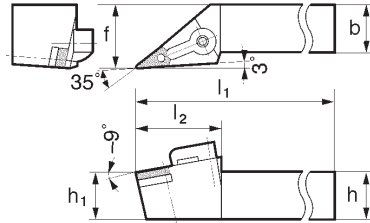
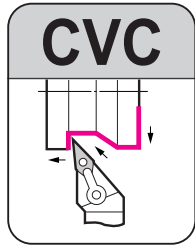


■ Spare Parts

Wedge	Shim pin	Shim	Clamp bold	Nut	Ring	Wrench	Insert
MMW30	MP317	STW323	BHA0525	CPM32N	ER04	LH030	1
	MP320						2
MMW40	MP320	STW434	BHA0625	CPM43N	ER05	LH030, 040	2

External Holders
for neg. Inserts

General Turning and Copying



■ Inserts

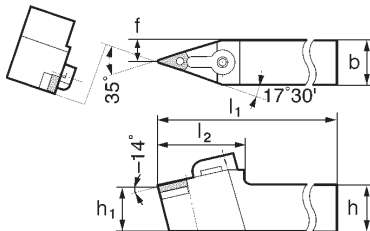
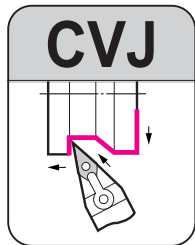


■ Spare Parts

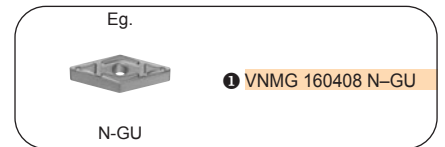
■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Eccentric pin	Clamp	Double screw	Shim	Wrench	Wrench	Insert	
	R	L	h	h ₁	b	l ₁	l ₂	f									
CVC R/L 33-3 S (MVJN R/L 2020 K16)	●		20	20	20	125	42	25		CPZ333V							●
CVC R/L 44-3 S (MVJN R/L 2525 M16)	●	●	25	25	25	150	42	32		CPZ334V	CCM8LONG	WB8-30	SVW322	LH040	KY25		



■ Inserts



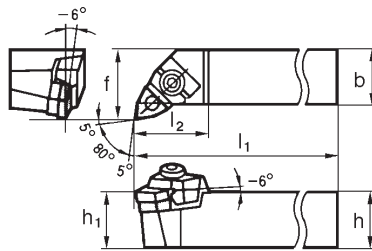
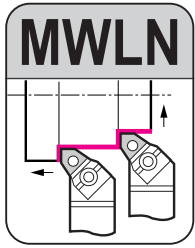
■ Spare Parts

■ Holders

Ordering No.	Stock	Dimensions (mm)							Eccentric pin	Clamp	Double screw	Shim	Wrench	Wrench	Insert	
		h	h ₁	b	l ₁	l ₂	f									
CVJM 33-3 S (MNVNN 2020 K16)		20	20	20	125	42	10		CPZ333V							●
CVJM 44-3 S (MNVNN 2525 M16)		25	25	25	150	42	12,5		CPZ334V	CCM8LONG	WB8-30	SVW322	LH040	KY25		

External Holders for neg. Inserts

General Turning and Facing



■ Inserts



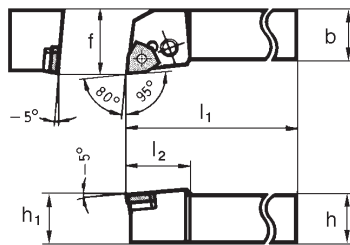
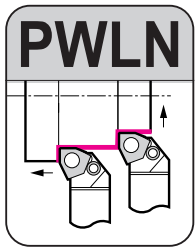
■ Spare Parts

■ Holders

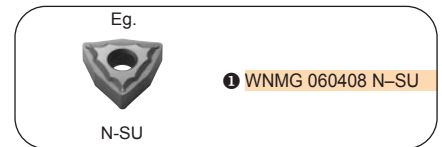
Above figures show right hand tools.

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

P-Type Lever-Lock Holders



■ Inserts



■ Spare Parts

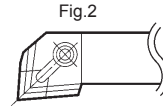
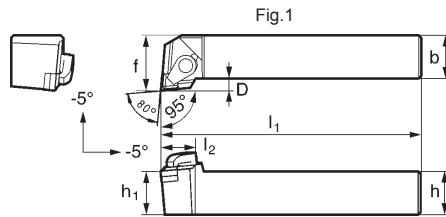
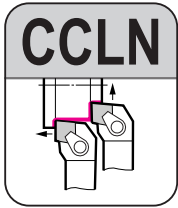
■ Holders

Above figures show right hand tools.

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

External Tool Holders for Solid SUMIBORON

C Type Top Clamp Holders



Inserts



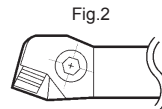
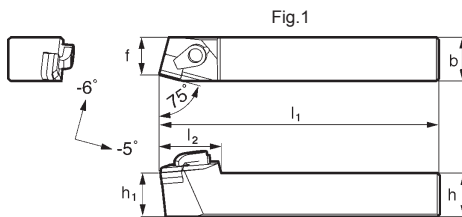
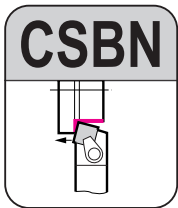
- ① CNGN0903**
- ② CNGN1203**
- ③ CNGN1204**

■ 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 ₁	b	l ₁	l ₂	f	D									
CCLN R/L 2525 M09	●		25	25	150	25	32	7	1	CCM8UL	CBC0903	WB8-24	SCN0903	SPP3	LH040	①	
CCLN R/L 2525 M12-03	●		25	25	150	30	32	7	1		CBC4		SCND433			②	
CCLN R/L 2525 M12-04	●		25	25	150	30	32	7	2	CCM8-LONG	CBC4	WB8-30	SCND433	SPP3	LH040	③	

(FCLN R/L 2525-43)



■ Inserts



- ① SNGN0903**
- ② SNGN1203**
- ③ SNGN1204**

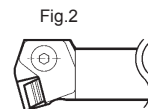
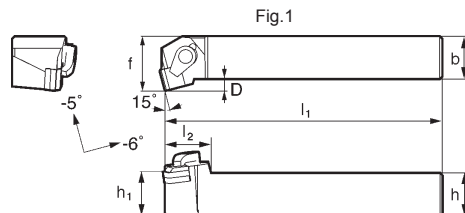
■ Holders

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	h=h ₁	b	l ₁	l ₂	f	D										
CSBN R/L 2525 N09	●		25	25	160	30	21,5	-	1	CCM8UL	CBS13	WB8-24	SSN0903	-	-	LH040	①	
CSBN R/L 2525 N12-03	●		25	25	160	35	21,5	-	1		CBS14		SSND423				②	

CSBN R/L 2525 N12-04	●		25	25	160	33	21,5	-	2	DCR/L-1	CBD4 R/L	BH0830 R/L	SSND423	SPP3	DSP5	LH040	③
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(FN11 R-44A)



■ Inserts



- ① SNGN0903**
- ② SNGN1203**
- ③ SNGN1204**

■ 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	h=h ₁	b	l ₁	l ₂	f	D										
CSKN R/L 2525 N09	●		25	25	160	25	32	7	1	CCM8UL	CBS13	WB8-24	SSN0903	-	-	LH040	①	
CSKN R/L 2525 N12-03	●		25	25	160	25	32	7	1		CBS14		SSND423				②	

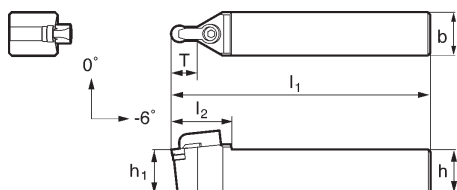
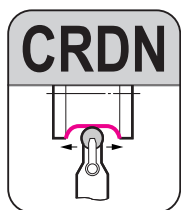
CSKN R/L 2525 N12-04	●		25	25	160	21	32	7	2	DCR/L-1	CBD4 R/L	BH0830 R/L	SSND423	SPP3	DSP5	LH040	③
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(FN15 R/L-44A)

● = Euro stock

Packing unit and ordering example; 1 pce CCLNR 2525 M09 (R: right handed)

C Type Top Clamp Holders



■ Inserts

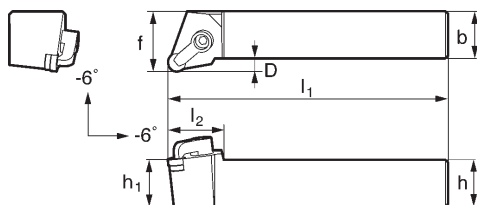
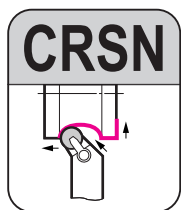


■ Holders

Ordering No.	Stock	Dimensions (mm)							Clamp	Double screw	Shim	Shim pin	Wrench	Insert
		h	h ₁	b	l ₁	l ₂	f	T						
CRDNN 2525 M09	●	25	25	25	150	35	-	15	CCM8-LONG	WB8-24	SRND32	SPP3	LH040	1
CRDNN 2525 M12-03	●	25	25	25	150	35	-	20			SRND42			2
CRDNN 2525 M12-04	●	25	25	25	150	35	-	20			SRND42			3

■ Spare Parts

					Insert
CCM8-LONG	WB8-24	SRND32	SPP3	LH040	



■ 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 ₁	b	l ₁	l ₂	f							
CRSN R/L 2525 M09	●	●	25	25	25	150	30	32	CCM8-LONG	WB8-24	SRND32	SPP3	LH040	1	
CRSN R/L 2525 M12-03	●	●	25	25	25	150	30	32			SRND42			2	
CRSN R/L 2525 M12-04	●	●	25	25	25	150	30	32			SRND42			3	

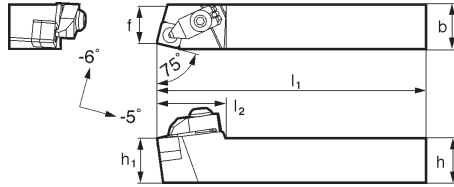
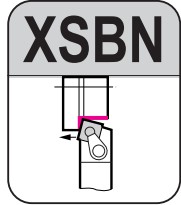
■ Spare Parts

					Insert
CCM8-LONG	WB8-24	SRND32	SPP3	LH040	

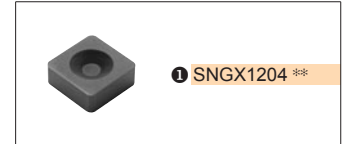
External Tool Holders for Solid SUMIBORON

For Dimple Type Solid CBN Inserts

X-Type Dimple Lock Holders



■ Inserts



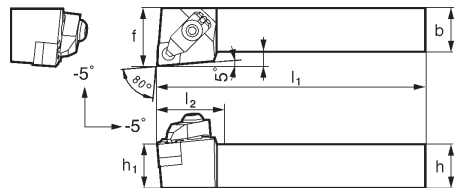
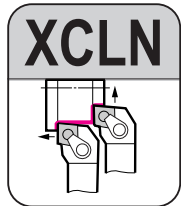
■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Clamp	Clamp bolt	Shim	Shim pin	Spring	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	f	D							
XSBN R/L 2525 N12	●		25	25	25	160	38	21,5	7	DSLX8	BH0825	SSND433	SPP3	GSP10	LH050	1

■ Spare Parts

							Insert
						1	



■ Inserts



■ 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 ₁	b	l ₁	l ₂	f	D							
XCLN R/L 2525 M12	●		25	25	25	150	33	32	7	DSLX8	BH0825	SCND433	SPP3	GSP10	LH050	1

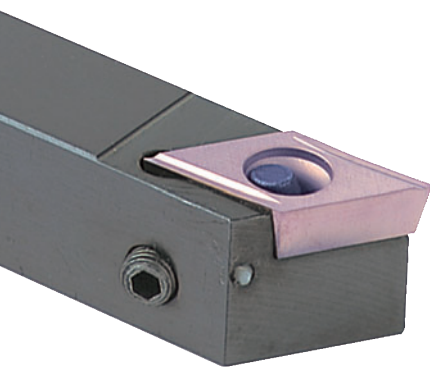
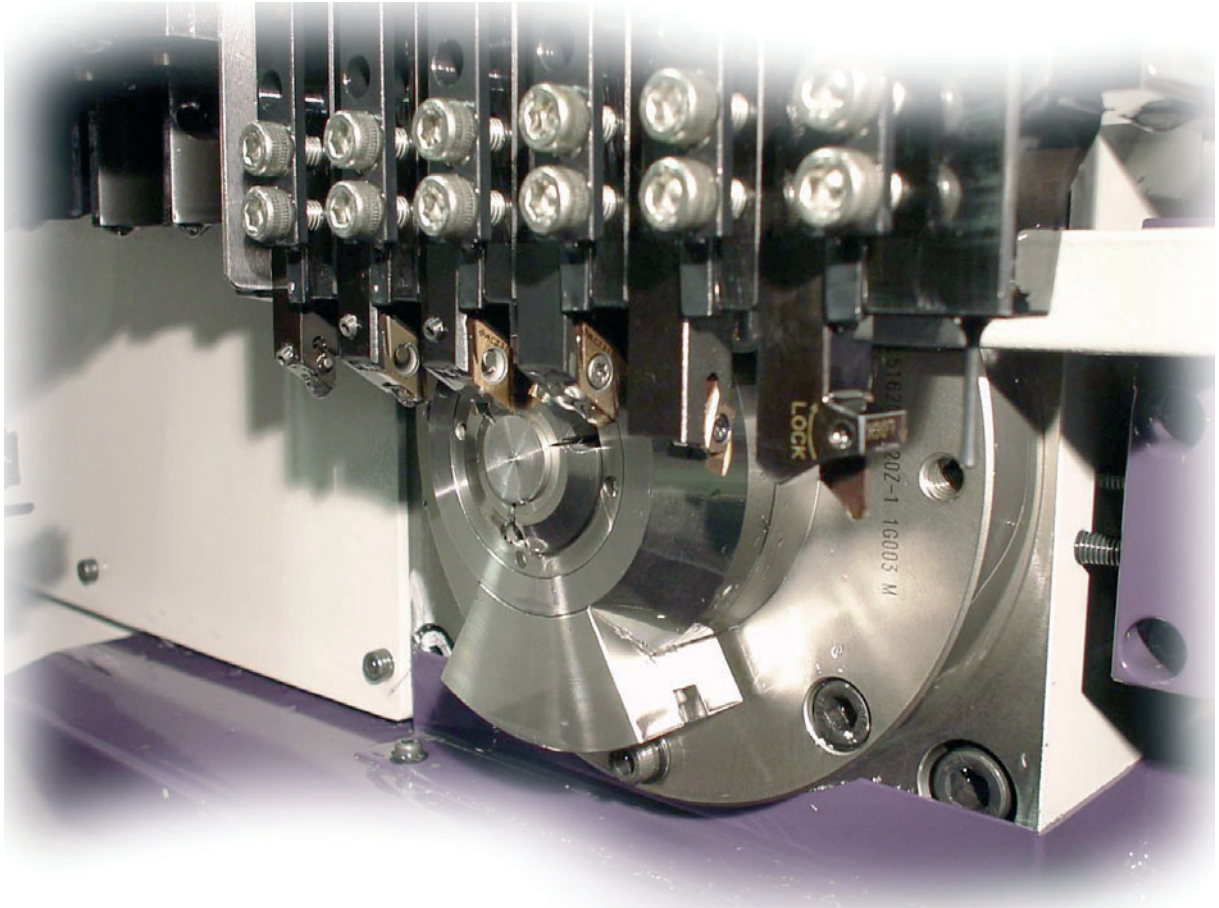
■ Spare Parts

							Insert
						1	

External Holders for neg. Inserts

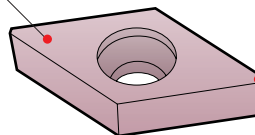
External Mini Holders

External Holders
for pos. Inserts

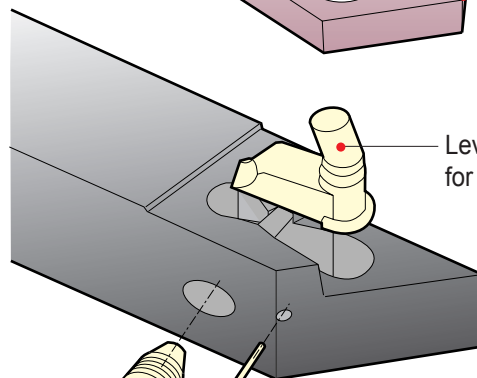


PDJCR type
lever lock holder

Wear-resistant tool materials;
T1200A (Cermet) and
ACZ310 (2000 layers
coated carbide grade)



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

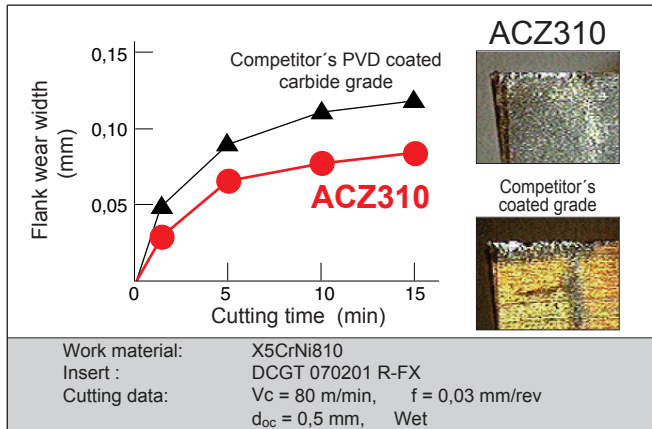


Lever lock clamping
for 7° positive inserts

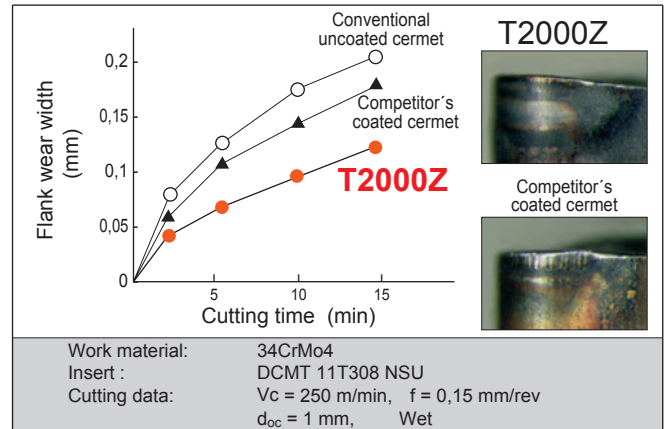
Easy access
side locking screw

For Mini Tool Holders 7° positive Inserts

Wear resistance of ZX coated grade ACZ310



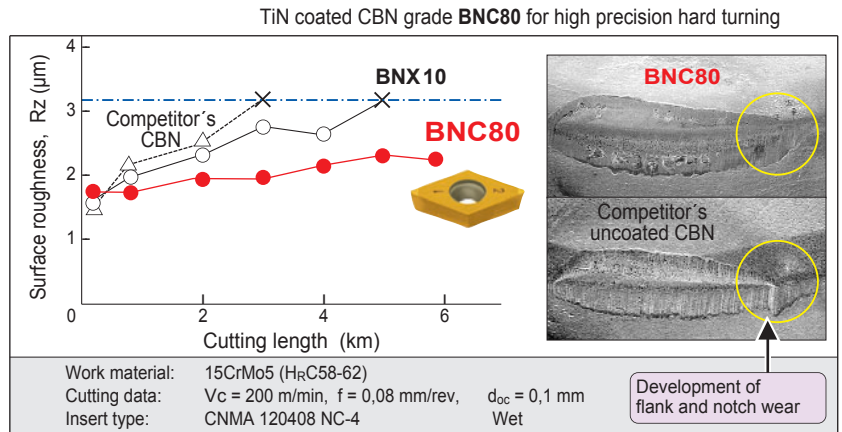
Wear resistance of tough ZX coated Cermet



High performance of coated CBN grades BNC80 and BNC200



TiAlN coated CBN grade **BNC200** for high speed continuous to medium interrupted cutting

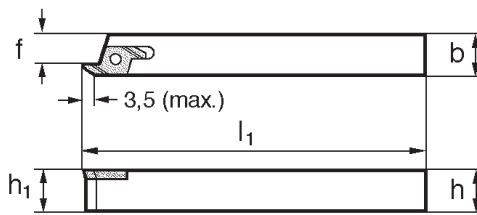
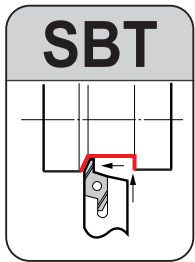


Recommended grades

Cutting material	Application	
	Finishing	Roughing
Coated carbide	ACZ310	
	AC2000	
		AC3000
Uncoated carbide		H1
Coated Cermet	T2000Z	
		T3000Z
Uncoated Cermet	T1200A	
Coated CBN	BNC80	
	BNC150	
		BNC200
		BNC300
Uncoated CBN	BNX20	
	BN250	
	BN700 (BN600)	
PCD SUMIDIA	DA2200	

Recommended cutting conditions

Workpiece material	Sumitomo grade	Cutting speed	
		v_c (m/min)	f (mm/rev)
General steel	ACZ310	50 - 180	0,05 - 0,2
	AC2000	100 - 250	0,05 - 0,2
	AC3000	80 - 200	0,05 - 0,2
Free-cutting steel	T2000Z	100 - 300	0,05 - 0,2
	T1200A	100 - 250	0,05 - 0,2
Stainless steel	ACZ310	40 - 120	0,02 - 0,2
Hardened steel	BNC80	120 - 220	0,02 - 0,13
	BNC150	150 - 250	0,05 - 0,2
	BNC200	100 - 200	0,05 - 0,2
	BNC300	50 - 150	0,02 - 0,2
Exotic materials	BN700 (BN600)	50 - 170	0,02 - 0,15
Non-ferrous metals	DA2200	400 - 3000	0,02 - 0,15
	H1	200 - 2500	0,05 - 0,5



■ Holders

Above figures show right hand tools.

Ordering No.	Stock	Dimensions (mm)					
		h	h ₁	b	l ₁	f	
SBT 35 R 1010	●	10	10	10	120	7,5	
SBT 35 R 1212	●	12	12	12	120	9,5	
SBT 35 R 1616	●	16	16	16	120	13,5	


■ Spare Parts

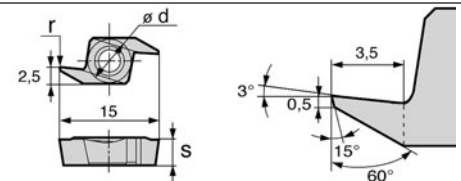
Screw	Wrench	Insert
BFTX0307N	TRX10	BTR 35__

■ INSERTS

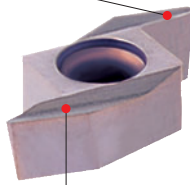
Coated carbide

Coated Cermet

BTR	Ordering No.	Stock		Dimensions (mm)		
		ACZ310	T1200A	d	s	r
	BTR 3505	●	●	6,8	3,8	0,05
	BTR 3515	●	●			0,15

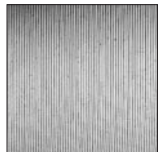
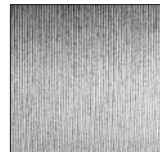


Sharp cutting edge with 15° rake angle



Wide groove breaker for smooth chip evacuation

● Surface roughness comparison

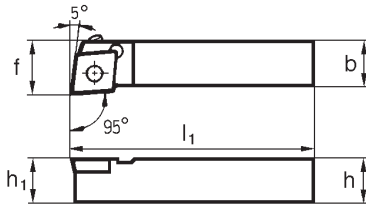
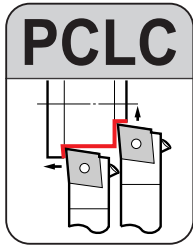
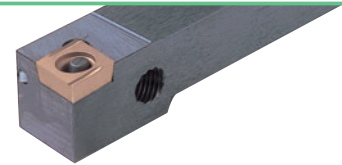
	
BTR 3505	P10 des Wettbewerbs
Work material: C45 Insert: BTR3505 (ACZ310) Cutting data: v _c = 80 m/min, f = 0,04 mm/rev d _{oc} = 3,0 mm, Wet	

■ Recommended cutting data (SBT type)

Work material	Tooling	v _c (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

(ACZ310 & T1200A)

P Type Lever Lock Holders



■ Inserts



■ Spare Parts

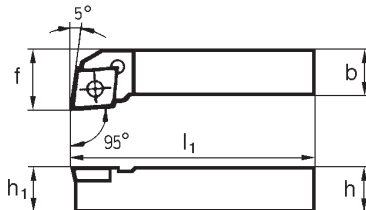
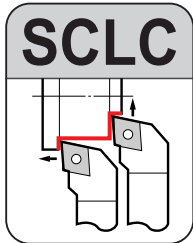
■ Holders

Above figures show right hand tools.

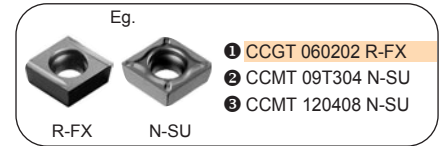
Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp screw	Side pin	Wrench	Insert
	R	L	h	h ₁	b	l ₁	f							
PCLC R/L 0810 K06	○		8	8	10	125	10,5			LCL 06	BTT 0407	LP 07	TH 020	①
PCLC R/L 1010 K06	●	○	10	10	10	125	10,5					LP 06		②
PCLC R/L 1212 M09	●	●	12	12	12	150	12,5			LCL 09	BTT 0411			
PCLC R/L 1616 M09	●		16	16	16	150	16,5							

External Holders for pos. Inserts

S Type Screw Lock Holders



■ Inserts

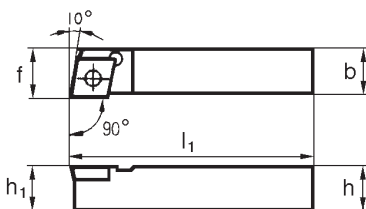
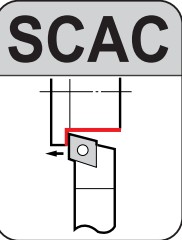


■ Spare Parts

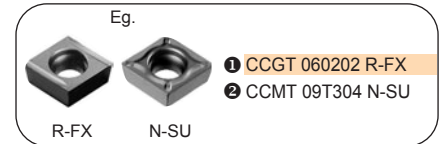
■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Screw	Wrench	Insert
	R	L	h	h ₁	b	l ₁	f					
SCLC R/L 0808 D06	●	●	8	8	8	60	10			BFTX02506N	TRX08	①
SCLC R/L 1010 E06	●	●	10	10	10	70	12					
SCLC R/L 1212 F09	●	●	12	12	12	80	16			BFTX0409N	TRX15	②
SCLC R/L 1616 H09	●	●	16	16	16	100	20					
SCLC R/L 2020 H09	●	●	20	20	20	100	25					
SCLC R/L 2020 K09	●	●	20	20	20	125	25					
SCLC R/L 2020 K12		●	20	20	20	125	25			BFTX0511N	TRX20	③
SCLC R/L 2525 M12	●	●	20	25	25	150	32					



■ Inserts

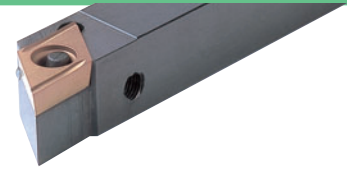


■ Spare Parts

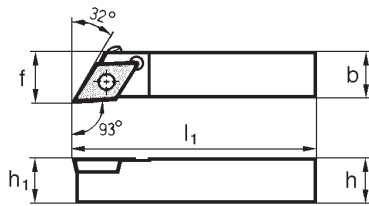
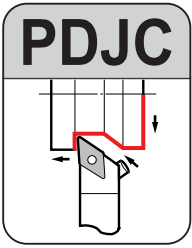
■ Holders

Above figures show right hand tools.

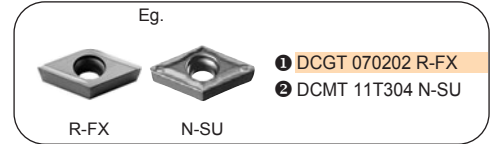
Ordering No.	Stock		Dimensions (mm)							Screw	Wrench	Insert
	R	L	h	h ₁	b	l ₁	f					
SCAC R/L 0808 D06	●	●	8	8	8	60	8,5			BFTX02506N	TRX08	①
SCAC R/L 1010 E06	●	●	10	10	10	70	10,5					
SCAC R/L 1212 F09	●	●	12	12	12	80	12,5			BFTX0409N	TRX15	②



P Type Lever Lock Holders



■ Inserts



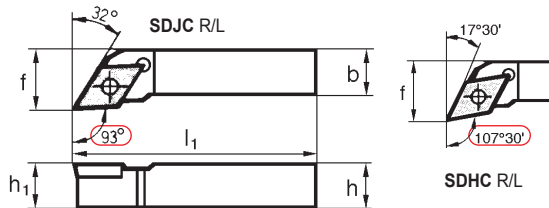
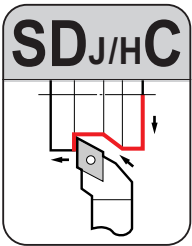
■ Spare Parts

■ Holders

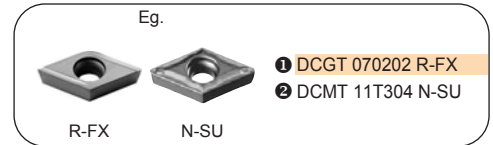
Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp screw	Side pin	Wrench	Insert
	R	L	h	h ₁	b	l ₁	f							
PDJC R/L 0810 K07	●		8	8	10	125	10,5			LCL 06	BTT 0407	LP 04	TH 020	1
PDJC R/L 1010 K07	●	●	10	10	10	125	10,5			LCL 09		BTT 0411		LP 07
PDJC R/L 1212 M11	●	●	12	12	12	150	12,5							
PDJC R/L 1616 M11	●	●	16	16	16	150	16,5							

S Type Screw Lock Holders



■ Inserts

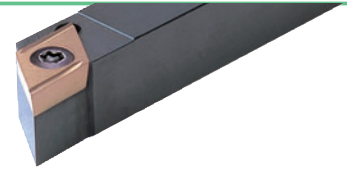


■ Spare Parts

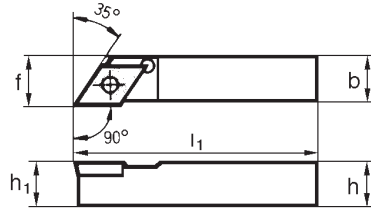
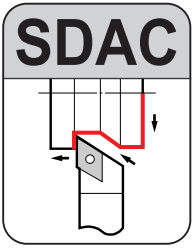
■ Holders

Above figures show right hand tools.

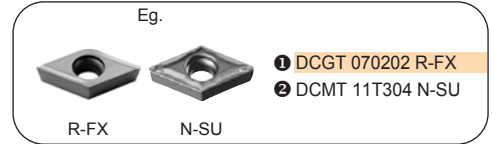
Ordering No.	Stock		Dimensions (mm)							Screw	Wrench	Insert
	R	L	h	h ₁	b	l ₁	f					
SDJC R/L 0808 D07	●	●	8	8	8	60	10			BFTX02506N	TRX08	1
SDJC R/L 1010 E07	●		10	10	10	70	12					
SDJC R/L 1212 F07	●	●	12	12	12	80	16					
SDJC R/L 1616 H07	●	●	16	16	16	100	20					
SDJC R/L 2020 K07	●	●	20	20	20	125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



S Type Screw Lock Holders



■ Inserts

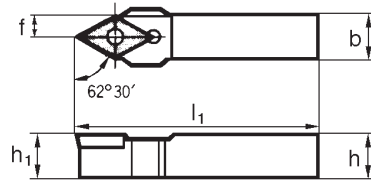
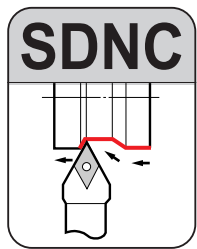


■ Spare Parts

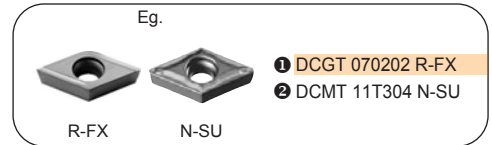
■ Holders

Above figures show right hand tools.

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



■ Inserts

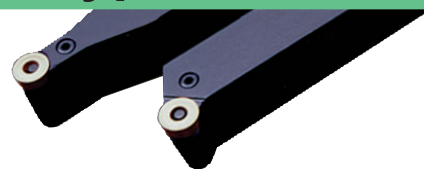


■ Spare Parts

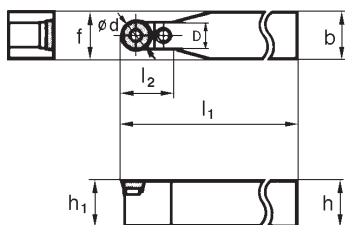
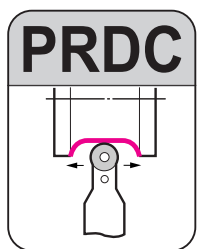
■ Holders

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

External Holders for pos. Inserts



P Type Lever Lock Holders



■ Holders

Ordering No.	Stock	Dimensions (mm)							Lever pin	Clamp screw	Shim	Shim pin	Wrench	Insert
		h	h ₁	b	l ₁	l ₂	f	ød						
PRDC N 3225 P9	●	32	32	25	170	25	12,5	8,0	LCL3S	LCS 3	LSR817	LSP3D	LH025	❶
PRDC N 2020 M10	●	20	20	20	150	22	15	8,0	LCL10	LCS10	LSR10	LSP10	LH020	❷
PRDC N 2525 M10	●	25	25	25	150	22	17,5	8,0	LCL12	LCS12	LSR12	LSP10	LH025	❸
PRDC N 2525 M12	●	25	25	25	150	24	18,5	9,6	LCL16	LCS16	LSR16	LSP16	LH025	❹
PRDC N 3225 Q12	●	32	32	25	180	24	18,5	9,6	LCL20	LCS20	LSR20	LSP20	LH030	❺
PRDC N 3225 Q16	●	32	32	25	180	28	20,5	13,0						
PRDC N 3232 Q20	●	32	32	32	180	32	26	16,6						

■ Inserts

Eg.

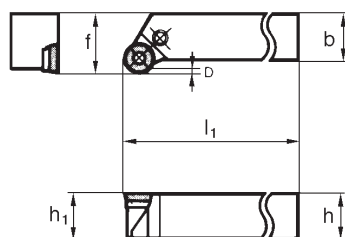
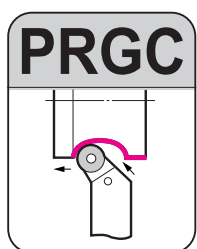
N-RP

- ❶ RCGA 0906M0
- ❷ RCMX 1003M0 N-RP
- ❸ RCMX 1204M0 N-RP
- ❹ RCMX 1606M0 N-RP
- ❺ RCMX 2006M0 N-RP

■ Spare Parts

Lever pin	Clamp screw	Shim	Shim pin	Wrench	Insert

External Holders
for pos. Inserts



■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Lever pin	Clamp screw	Shim	Shim pin	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	f	ød						
PRGC R/L 3225 P9			32	32	25	170	18	32	-	LCL3S	LCS 3	LSR817	LSP3D	LH025	❶
PRGC R/L 2020 K10	●	●	20	20	20	125	-	25	1,5	LCL10	LCS10	LSR10	LSP10	LH020	❷
PRGC R/L 2525 M10	●	●	25	25	25	150	-	32	1,5	LCL12	LCS12	LSR12	LSP10	LH025	❸
PRGC R/L 2020 K12	●		20	20	20	125	-	25	2,5	LCL16	LCS16	LSR16	LSP16	LH025	❹
PRGC R/L 2525 M12		●	25	25	25	150	-	32	2,5	LCL20	LCS20	LSR20	LSP20	LH030	❺
PRGC R/L 3225 P12			32	32	25	170	-	32	2,5						
PRGC R/L 2525 M16	●		25	25	25	150	-	32	3						
PRGC R/L 3225 P16	●		32	32	25	170	-	32	3						
PRGC R/L 3232 P20	●		32	32	32	170	-	40	4						

■ Inserts

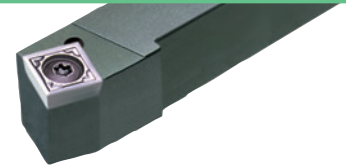
Eg.

N-RP

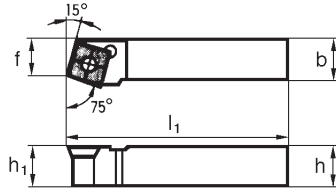
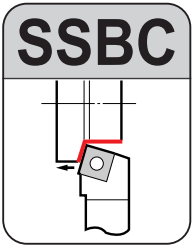
- ❶ RCGA 0906M0
- ❷ RCMX 1003M0 N-RP
- ❸ RCMX 1204M0 N-RP
- ❹ RCMX 1606M0 N-RP
- ❺ RCMX 2006M0 N-RP

■ Spare Parts

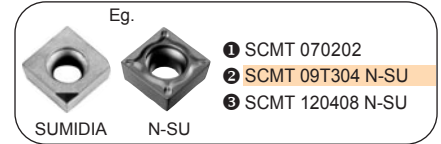
Lever pin	Clamp screw	Shim	Shim pin	Wrench	Insert



S Type Screw Lock Holders



■ Inserts



■ Spare Parts

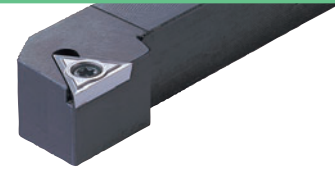
Screw	Wrench	Insert		
		1	2	3
BFTX0307N	TRX10			1
BFTX0409N	TRX15			2
BFTX0511N	TRX20			3

■ Holders

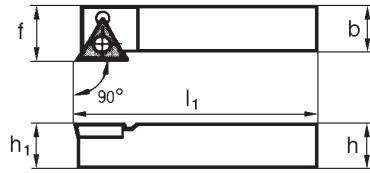
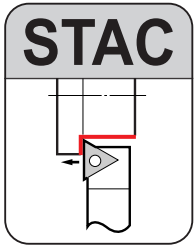
Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h ₁	b	l ₁	f		
SSBC R/L 1010 E07			10	10	10	70	9		
SSBC R/L 1212 F09		●	12	12	12	80	11		
SSBC R/L 1616 H09	●	●	16	16	16	100	13		
SSBC R/L 2020 K12			20	20	20	125	17		
SSBC R/L 2525 M12			25	25	25	150	22		

External Holders for pos. Inserts



S Type Screw Lock Holders

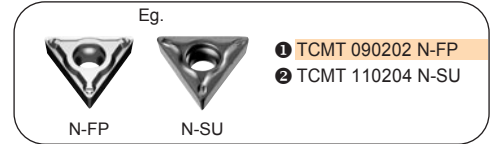


■ Holders



Above figures show right hand tools.

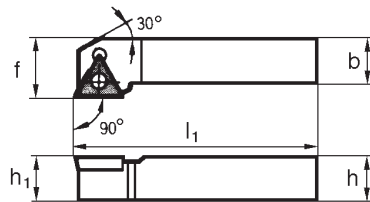
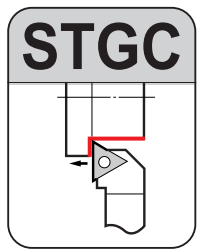
Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h ₁	b	l ₁	f		
STAC R/L 0808 D09	●		8	8	8	60	8,5		
STAC R/L 1010 E09			10	10	10	70	10,5		
STAC R/L 1212 F11	●		12	12	12	80	12,5		

■ Inserts



■ Spare Parts

				Insert
Screw	Wrench			
BFTX02206N	TRX06			1
BFTX02506N	TRX08			2

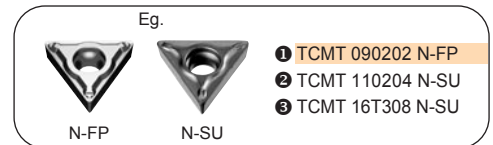


■ Holders



Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h ₁	b	l ₁	f		
STGC R/L 0808 D09			8	8	8	60	10		
STGC R/L 1010 E09	●	●	10	10	10	70	12		
STGC R/L 1212 F11	●	●	12	12	12	80	16		
STGC R/L 1616 H11	●	●	16	16	16	100	20		
STGC R/L 1616 H16	●	●	16	16	16	100	20		
STGC R/L 2020 K16	●	●	20	20	20	125	25		
STGC R/L 2525 M16	●		25	25	25	150	32		
STGC R/L 2525 M22			25	25	25	150	32		

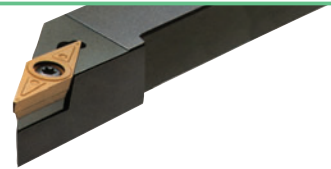
■ Inserts



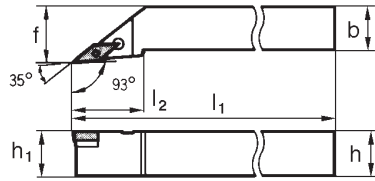
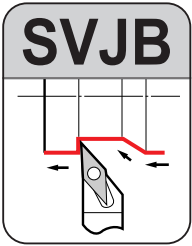
■ Spare Parts

				Insert
Screw	Wrench			
BFTX02206N	TRX06			1
BFTX02506N	TRX08			2
BFTX0409N	TRX15			3
BFTX0511N	TRX20			

External Holders
for pos. Inserts



S Type Screw Lock Holders



■ Inserts



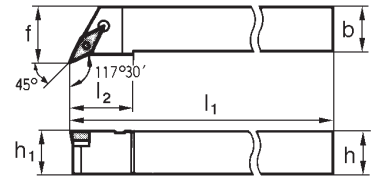
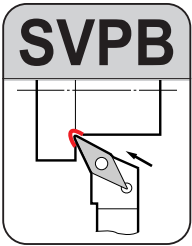
■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Stopper	Nut	Shim	Wrench	Scew	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	f								
SVJB R/L 1212 F11	●	●	12	12	12	80	25	16	-	-	-	-	BFTX 02506N	TRX08	1	
SVJB R/L 1616 H11	●	●	16	16	16	100	25	20	-	-	-	-	BFTX 02506N	TRX08	1	
SVJB R/L 2020 K16	●	●	20	20	20	125	41	25	VP20	CPV33N	SVP32	LH025	BFTX 03508	TRX10	2	
SVJB R/L 2525 M16	●	●	25	25	25	150	41	32	VP25							
SVJB R/L 3225 P16	●	●	32	32	25	170	41	32	VP32							

■ Spare Parts

						Insert
--	--	--	--	--	--	--------



■ Inserts



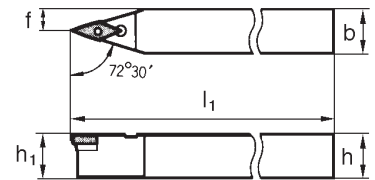
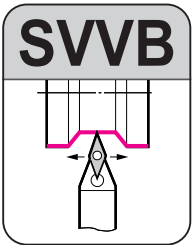
■ Holders

Above figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)							Stopper	Nut	Shim	Wrench	Scew	Wrench	Insert
	R	L	h	h ₁	b	l ₁	l ₂	f								
SVPB R/L 1212 F11	●	●	12	12	12	80	25	16	-	-	-	-	BFTX 02506N	TRX08	1	
SVPB R/L 1616 H11	●	●	16	16	16	100	25	20	-	-	-	-	BFTX 02506N	TRX08	1	
SVPB R/L 2020 K16	●	●	20	20	20	125	36	25	VP20	CPV33N	SVP32	LH025	BFTX 03508	TRX10	2	
SVPB R/L 2525 M16	●	●	25	25	25	150	36	32	VP25							
SVPB R/L 3225 P16	●	●	32	32	25	170	36	32	VP32							

■ Spare Parts

						Insert
--	--	--	--	--	--	--------



■ Inserts



■ Holders

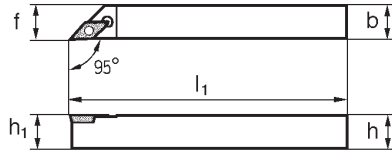
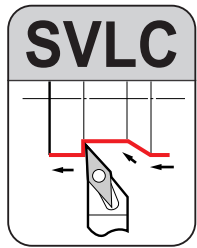
Ordering No.	Stock		Dimensions (mm)							Stopper	Nut	Shim	Wrench	Scew	Wrench	Insert
	h	h ₁	b	l ₁	l ₂	f										
SVVB N 1212 F11	●	●	12	12	12	80	-	6	-	-	-	-	BFTX 02506N	TRX08	1	
SVVB N 1616 H11	●	●	16	16	16	100	-	8	-	-	-	-	BFTX 02506N	TRX08	1	
SVVB N 2020 K16	●	●	20	20	20	125	-	10	VP20	CPV33N	SVP32	LH025	BFTX 03508	TRX10	2	
SVVB N 2525 M16	●	●	25	25	25	150	-	12,5	VP25							
SVVB N 3225 P16	●	●	32	32	25	170	-	12,5	VP32							

■ Spare Parts

						Insert
--	--	--	--	--	--	--------

External Holders for pos. Inserts

S Type Screw Lock Holders

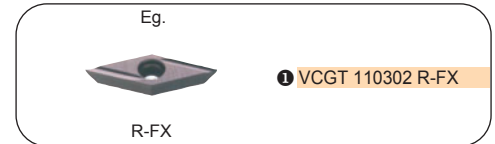


■ Holders

Above figures show right hand tools.

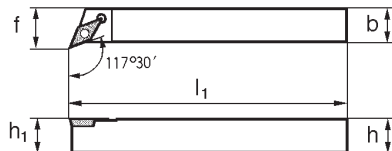
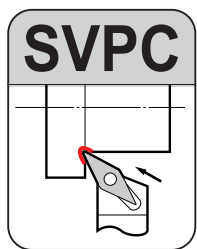
Ordering No.	Stock		Dimensions (mm)						
	R	L	h	h ₁	b	l ₁	f		
SVLC R/L 1010 H11	●	●	10	10	10	100	10,5		
SVLC R/L 1212 H11	●	●	12	12	12	100	12,5		
SVLC R/L 1616 H11	●	●	16	16	16	100	16,5		
SVLC R/L 2525 M11	●		25	25	25	150	25,5		

■ Inserts



■ Spare Parts

Screw	Wrench			Insert
BFTX02506N	TRX08			①



■ Holders

Above figures show right hand tools.

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

■ Inserts



■ Spare Parts

Screw	Wrench			Insert
BFTX02506N	TRX08			①

External Holders
for pos. Inserts

Boring Bars

E1 ~ E20



Boring Bars

New SumiTurn X-Bar	Boring Tool Series	E2 -3
	Boring Tool Selection Table	E4
ISO	Boring Tool Identification Table	E5

Boring Bars for Negative Insert Type :

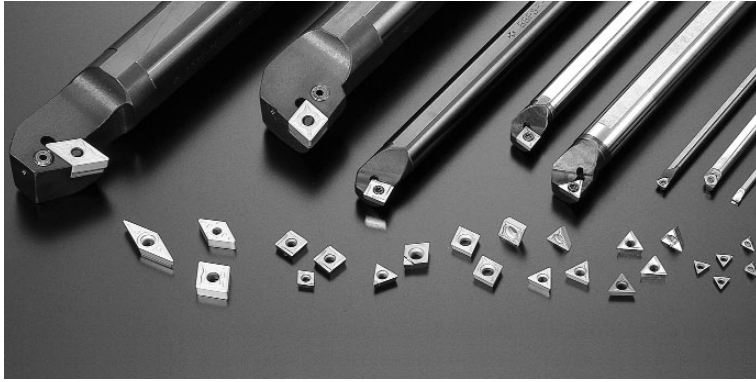
New SumiTurn T-REX	S...DTR	E6
CN_	S...PCLN / BCLN	E7
DN_	S...PDUN / BDUN, BDZN	E8
SN_	S...PSKN / BSKN, BSYN	E9
TN_	S...PTFN / BTFN	E10
WN_	S...WMLN	E11

Boring Bars for Positive Insert Type :

	CC_	S...SCLC	E12
New X-Bar for	CC_	B...SCLC / D...SCLC	E12
	CP_	S...SCLP / C...SCLP	E13
	DC_	S...SDUC	E14
New X-Bar for	DC_	B...SDUC / D...SDUC	E14
	DC_	S...SDQC	E15
New X-Bar for	SC_	B...SDQC / D...SDQC	E15
	SP_	S...SSKP / C...SSKP	E16
	TC_	S...STFC	E17
	TP_	S...STUP / C...STUP	E18
New X-Bar for	TP_	B...STUP / D...STUP	E18
	VB_	S...SVQB / S...SVUB / S...SVZB	E19
	WB_	S...SWUB / C...SWUB	E20

Boring Bars

Boring Tool Series



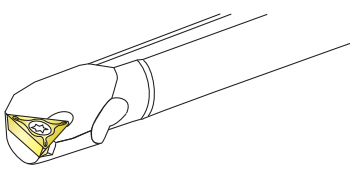
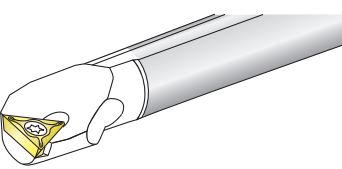
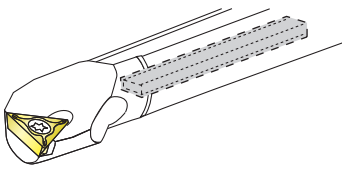
General Features

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

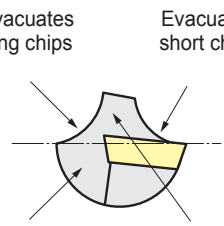
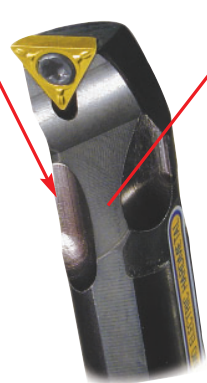
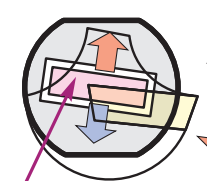
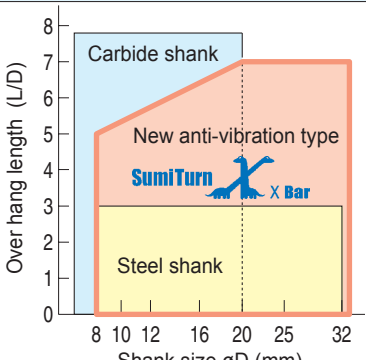
Design Variations

<p>● Steel Shank</p>  <p>Rigid head design for low cost hole boring.</p>	<p>● Carbide Shank</p>  <p>High rigidity shank for high accuracy hole boring.</p>	<p>● Anti-Vibration Type Shank</p>  <p>New SumiTurn X Bar</p> <p>Chatter killer system eliminates vibration - improves productivity - improves quality</p>
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New

SumiTurn Series


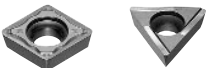


<p>Good Chip Evacuation from new head design</p>  <p>Evacuates long chips</p> <p>Evacuates short chips</p> <p>Strong cross section to withstand high cutting force</p> <p>Ribbed structure for maximum rigidity</p>		<p>Chatter Killer System - Eliminates Vibration</p> <p>Unique structure of X-Bar head</p>  <p>Vibration direction in cut</p> <p>The damper resists vibration</p>	<p>Application Range</p>  <p>Over hang length (L/D)</p> <p>Shank size $\varnothing D$ (mm)</p> <p>Carbide shank</p> <p>New anti-vibration type SumiTurn X Bar</p> <p>Steel shank</p>
---	---	--	---

- Kills chatter - improves productivity - improves quality
- Low cost solution to chatter when deep hole boring
- Effectively rough bores deep holes
- Bores hole up to $6 \times D$
- Recommended for Soft turning

Boring Bars Boring Tool Series

Recommended Over Hang Length / Shank Diameter (L/D)

Chip breakers	Type of boring bar	Over hang length (L/D)									
		1	2	3	4	5	6	7	8	9	10
LU, SU, MU (M class inserts) 	Steel shank	█									
	New SumiTurn X Bar Carbide shank	█			█						
LU-W, SD-W ("Wiper" type inserts) 	Steel shank	█									
	New SumiTurn X Bar Carbide shank	█			█						

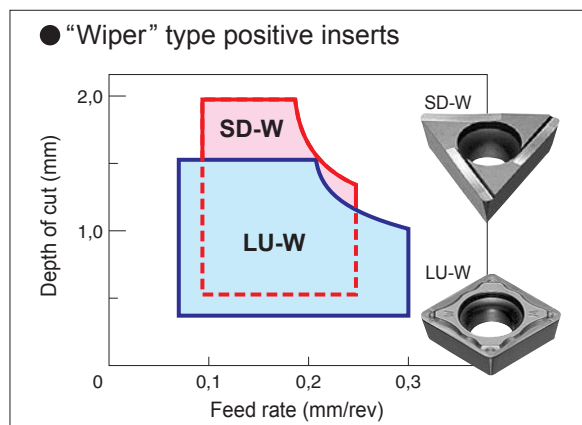
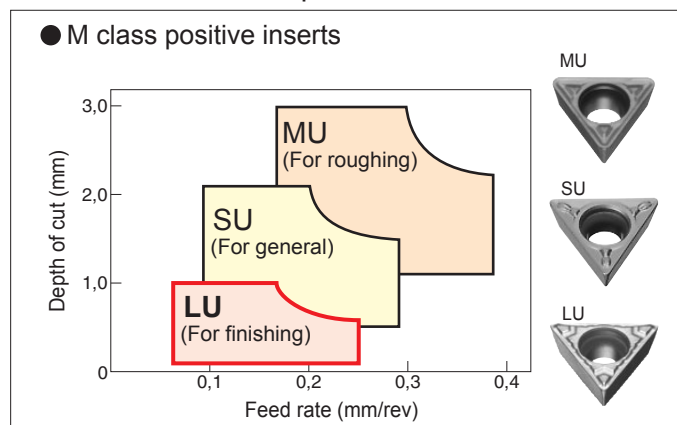
Boring Bars

Grades

Category		Process		Work Material					
		Finish~Light Cut	Medium Cut	General Steel	Stainless Steel	Heat Resistant Alloy	Cast Iron	Hardened Steel	Non-Ferrous Metal
Coated Carbide	CVD	AC2000		○	○		○		
		AC3000		○	○		○		
		AC630M		○	○		○		
		AC300G					○		
	AC700G					○			
	PVD	ACZ310		○	○	○	○		○
EH10Z		○	○	○	○				
T2000Z		○	○	○	○				
		T3000Z		○	○				
Cermet		T1200A		○	○				
Carbide		G10E					○	○	
SumiBoron	BNX20						○	○	
	BN250						○	○	
	BN700					○	○	○	
SumiDia	DA2200							○	
	DA150							○	

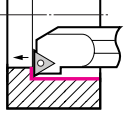
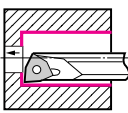
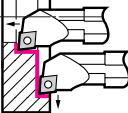
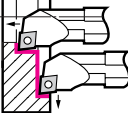
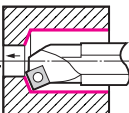
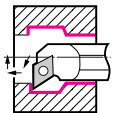
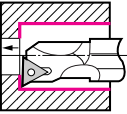
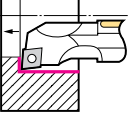
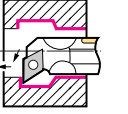
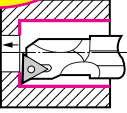
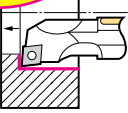
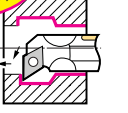
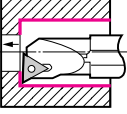
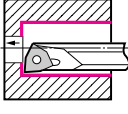
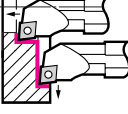
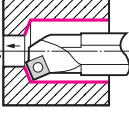
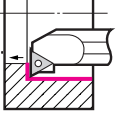
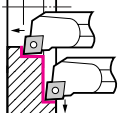
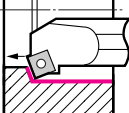
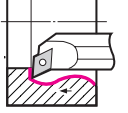
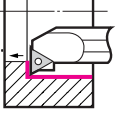
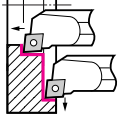
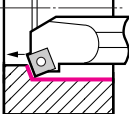
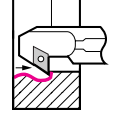
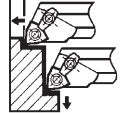
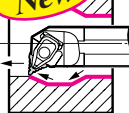
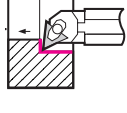
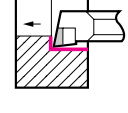
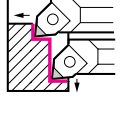
○ 1-st Choice
○ 2-nd Choice

Recommended Chip Breakers

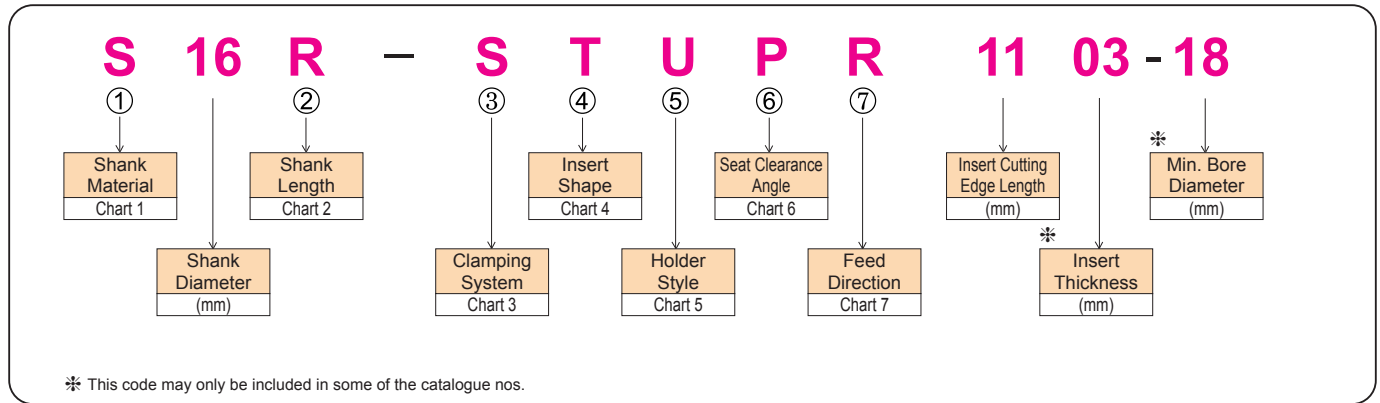


Boring Tool Series

TOOLING SELECTION

Application		Stop Boring		Bottom Facing		Trough Boring	Copying		
Insert Type System	Triangle	Poligon / Others	80° Diamond		Square	New 55° T-REX	55° Diamond	35° Diamond	
	Screw Lock	Steel	 S-STFC ⇒ E17 S-STUP(B) ⇒ E18	 S-SWUB ⇒ E20	 S-SCLC ⇒ E12	 S-SCLP ⇒ E13	 S-SSKP ⇒ E16	—	 S-SDUC ⇒ E14 S-SDQC ⇒ E15
Anti-vibration		 B-STUP ⇒ E18	—	 B-SCLC ⇒ E12	—	—	—	 B-SDUC ⇒ E14 B-SDQC ⇒ E15	—
Anti-vibration with Oil Hole		 D-STUP ⇒ E18	—	 D-SCLC ⇒ E12	—	—	—	 D-SDUC ⇒ E14 D-SDQC ⇒ E15	—
Carbide		 C-STUP (C-STUB) ⇒ E18	 C-SWUB ⇒ E20	—	 C-SCLP ⇒ E13	 C-SSKP ⇒ E16	—	—	—
Lever Lock	Steel	 S-PTFN ⇒ E10	—	 S-PCLN ⇒ E7	—	 S-PSKN ⇒ E9	—	 S-PDUN BDUN ⇒ E8	—
Cam Lock	Steel	 BTFN ⇒ E10	—	 BCLN ⇒ E7	—	 BSKN BSYN ⇒ E9	—	 BDZN ⇒ E8	—
Top Clamp	Steel	—	 S-MWLN ⇒ E11	—	—	—	 S-DTR ⇒ E6	—	—
CBN	Carbide	 BNB ⇒ M21	 BNBB ⇒ M20	 BNZ ⇒ M21	—	—	—	—	—

■ 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

② Chart 2

Shank Length			
Symbol	Length (mm)	Symbol	Length (mm)
F	80	N	160
G	90	P	170
H	100	Q	180
J	110	R	200
K	125	S	250
L	140	T	300
M	150	U	350

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

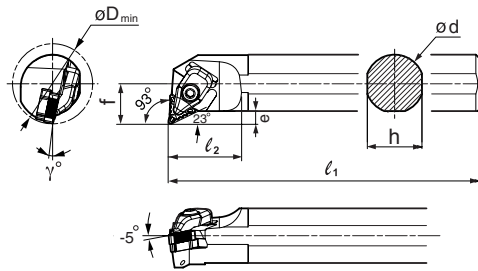
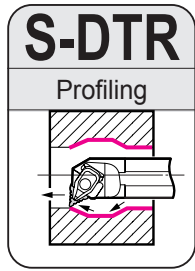
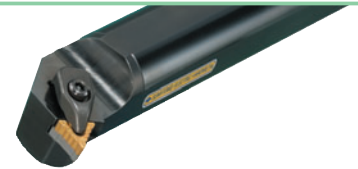
Boring Bars "T-REX" Type

RIGIDITY - ECONOMY - PRECISION, The Biting Force Behind

New

Internal Turning & Copying

SumiTurn T-REX



Spare Parts

Clamp	Spring	Screw	Shim	Screw	Wrench	Wrench
TRCP3	S-SP4-20	BX0520	TRW5505	BFTX0307N	TSW040	TRX10 ^(*)

■ Holders

Above figures show right hand tools.

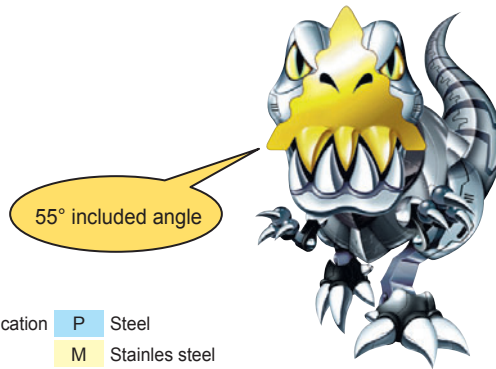
Ordering No.	Stock	ϕD	Dimensions (mm)						
			ϕd	h	l_1	l_2	f	γ	e
S32S-DTR55C R-17	●	44	32	30	250	40	22	-12°	7
S40T-DTR55C R-17	●	50	40	37	300	40	25	-10°	6,2

(*) Note: Wrench (TRX10) for shim is not included.

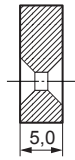
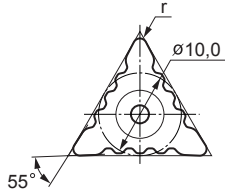
■ Advantages

● 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.



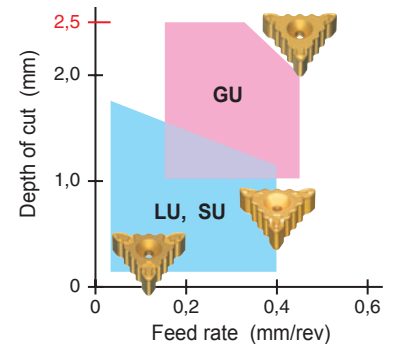
■ Inserts



Application **P** Steel
M Stainless steel

Shape	Ordering No.	r	Coated Carbide				Coated Cermet		
			AC700G	AC900G	AC2000	AC3000	AC610M	AC630M	T2000Z
Finishing Type -LU	TRM 551704 -LU	0,4	●	●	●	●		●	●
	TRM 551708 -LU	0,8	●	●	●	●		●	●
	TRM 551712 -LU	1,2	●	●	●	●		●	●
Type -SU	TRM 551704 -SU	0,4					●	●	
	TRM 551708 -SU	0,8					●	●	
	TRM 551712 -SU	1,2					●	●	
Light Cut Type -GU	TRM 551704 -GU	0,4	●	●	●	●		●	●
	TRM 551708 -GU	0,8	●	●	●	●		●	●
	TRM 551712 -GU	1,2	●	●	●	●		●	●

● Application Range



● Recommended Cutting Conditions

Grade	Coated Carbide						Coated Cermet	
	AC700G	AC900G	AC2000	AC3000	AC610M	AC630M	T2000Z	T3000Z
Work materials	Low carbon steel	220 350	200 300	150 280	90 250		100 350	100 300
	Alloy steel	150 300	150 280	100 250	80 200		100 300	100 250
	Stainless steel				50 150	130 210	100 160	
Application range	Finishing	○	○	○	○	○	○	○
	Medium cutting	○	○	○	○	○	○	○
	Interrupted cutting			○	○		○	○

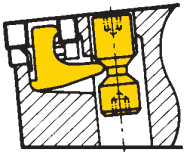
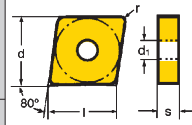
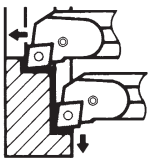
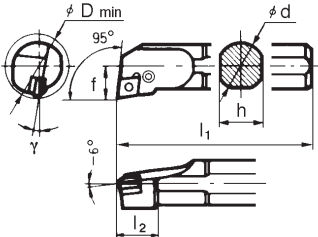
○ 1-st recommendation ○ 2-nd recommendation

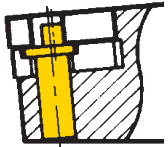
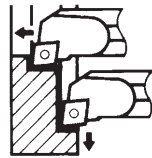
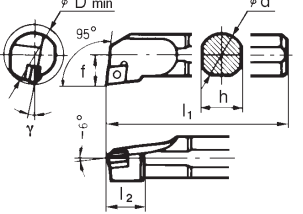
● = Euro stock

Packing unit and ordering example; 1 pce S32S-DTR55C R-17 (R: right handed)



■ Holders


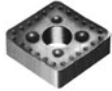







	Tool holders (P type) with lever-lock system	Ordering No.	Stock		Dimensions (mm)									
			R	L	D _{min}	d	h	l ₁	l ₂	f	γ			
	S - PCLN R/L 	S20S - PCLN R/L09	●	●	25	20	18	250	29	13	-11°	CN__0903__		
		S25T - PCLN R/L09	●	●	30	25	23	300	33	17	-10°			
		S25T - PCLN R/L12	●	●	32	25	23	300	42	17	-10°	CN__1204__		
		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°	

	Tool holders (P type) with eccentric pin system	Ordering No.	Stock		Dimensions (mm)							
			R	L	D _{min}	d	h	l ₁	l ₂	f	γ	
	BCLN R/L 	BCLN 320 R/L (S20Q - PCLN R/L 09)	●	●	26	20	18	180	32	13	-12°	CN__0903__
		BCLN 425 R/L (S25R - PCLN R/L 12)	●	●	34	25	23	200	30	17	-12°	CN__1204__
		BCLN 432 R/L (S32S - PCLN R/L 12)	●	●	44	32	30	250	40	22	-10°	
		BCLN 440 R/L (S40T - PCLN R/L 12)	●	●	54	40	37	300	50	27	-10°	
				BCLN 650 R/L (S50U - PCLN R/L 19)	●	●	70	50	47	350	60	35

All figures show right hand tools.

■ Applicable Inserts

■ Spare Parts

Holder	Carbides, Cermets		CBN, PCD	Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Pin
	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	
BCLN R/L									
320	CNMG 0903__ NGU	-	-			-		LH030	CPU304C
425	CNMG 1204__ NGU	CNMM 1204__ NMP	CNGA 1204__			SCW423		LH030	CPB42
435	CNMG 1204__ NGU	CNMM 1204__ NMP	CNGA 1204__			SCW423		LH030	CPB43S
440	CNMG 1204__ NGU	CNMM 1204__ NMP	CNGA 1204__			SCW423		LH030	CPB43
650	CNMG 1906__ NGU	CNMM 1906__ NMP	-			SCW635		LH030	CPB64

● = Euro stock

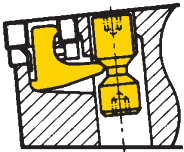
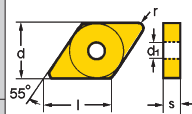
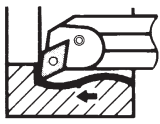
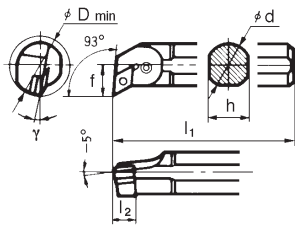
Packing unit and ordering example; 1 pce S25T - PSKNR 12 (R: right handed)


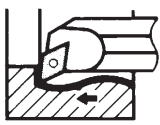
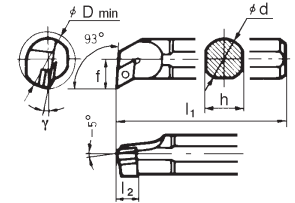
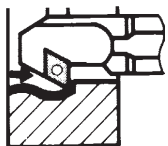
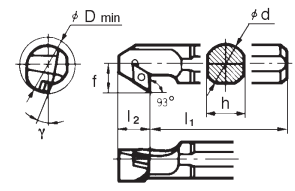
Boring Bars S...PDUN / BDUN, BDZN Type

For Negative DN__ - Inserts ($\alpha = 0^\circ$)



■ Holders


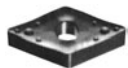
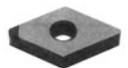






 Tool holders (P type) with lever-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D _{min}	d	h	l ₁	l ₂	f	γ	
S - PDUN R/L  	S25T - PDUN R/L 11	●	●	32	25	23	300	35	17	-11°	DN__ 1104__
	S32U - PDUN R/L 15 04	●	●	40	32	30	350	40	22	-11°	DN__ 1504__
	S40V - PDUN R/L 15	●	●	50	40	37	400	56	27	-11°	DN__ 1506__
	S50W - PDUN R/L 15	●	●	63	50	47	450	63	35	-10°	

 Tool holders (P type) with eccentric pin system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D _{min}	d	h	l ₁	l ₂	f	γ	
BDUN R/L  	BDUN 325 R/L (S25R - PDUN R/L 11)	●		34	25	23	200	25	17	-12°	DN__ 1104__
	BDUN 432 R/L (S32S - PDUN R/L 15)	●	●	44	32	30	250	35	22	-10°	DN__ 1504__
BDZN R/L  	BDZN 325 R/L (S25R - PDXN R/L 11)	●	●	34	25	23	200	25	17	-12°	DN__ 1104__
	BDZN 432 R/L (S32S - PDXN R/L 15)	●	●	44	32	30	250	35	22	-10°	DN__ 1504__

All figures show right hand tools.

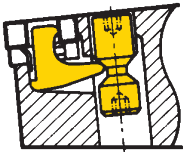
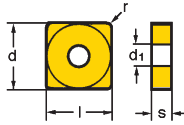
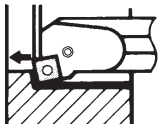
■ Applicable Inserts


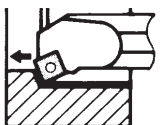
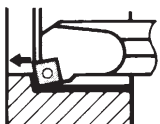
■ Spare Parts

Holder	Carbides, Cermets		CBN	Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Pin
	Double sided	One sided							
S - PDUN R/L									
S25T11	DNMG 1104__ NGU	-	-	LCL3DB-SD	LCS3DB-SD	-	-	LH020	
S32U15 04	DNMG 1504__ NGU	DNMM 1504__ NMP	DNGA 1504__	LCL4D-SD	LCS5DB-SD	LSD42SD	LSP4SD	LH030	
S40V15	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	
BDUN, BDZN R/L									
325	DNMG 1104__ NGU	-	-			SDW323		LH025	CPB34
432	DNMG 1504__ NGU	DNMM 1504__ NMP	DNGA 1504__			SDW423		LH030	CPB43



■ Holders

 Tool holders (P type) with lever-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D_{min}	d	h	l_1	l_2	f	γ	
S - PSKN R/L 	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 __


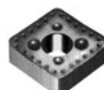







 Tool holders (P type) with eccentric pin system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D_{min}	d	h	l_1	l_2	f	γ	
BSKN R/L 	BSKN 425 R/L (S25R - PSKN R/L 12)	●	●	34	25	23	200	25	17	-12°	SN __ 1204 __
	BSKN 432 R/L (S32S - PSKN R/L 12)	●	●	44	32	30	250	35	22	-10°	
	BSKN 440 R/L (S40T - PSKN R/L 12)	●	●	54	40	37	300	50	27	-10°	
	BSKN 650 R/L (S50U - PSKN R/L 19)	●	●	70	50	47	350	60	35	-10°	SN __ 1904 __
BSYN R/L 	BSYN 425 R/L (S25R - PSYN R/L 12)	●	●	34	25	23	200	25	17	-12°	SN __ 1204 __
	BSYN 432 R/L (S32S - PSYN R/L 12)	●	●	44	32	30	250	35	22	-10°	

Boring Bars
for neg. Insert

All figures show right hand tools.

■ Applicable Inserts

■ Spare Parts

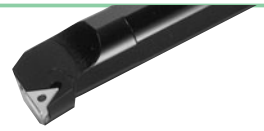
Holder	Carbides, Cermets		CBN	Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Pin
	Double sided	One sided							
S - PSKN R/L									
S25T...12	SNMG 0903 __ NGU	-	-	LCL4C-SD	LCS4B-SD	-	-	LH025	
S32U...12	SNMG 1204 __ NGU	SNMM 1204 __ NMP	SNGA 1204 __	LCL4T-SD	LCS41BS-SD	LSS42SD	LSP4SD	LH030	
S40V...12	SNMG 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	
BSKN, BSYN R/L									
425	SNMG 1204 __ NGU	SNMM 1204 __ NMP	SNGA 1204 __			SSW423		LH030	CPB42
432	SNMG 1204 __ NGU	SNMM 1204 __ NMP	SNGA 1204 __			SSW423		LH030	CPB43S
440	SNMG 1204 __ NGU	SNMM 1204 __ NMP	SNGA 1204 __			SSW423		LH030	CPB43
650	SNMG 1906 __ NGU	SNMM 1906 __ NMP	-			SSW635		LH040	CPB64

● = Euro stock

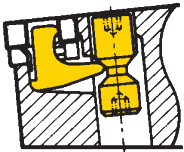
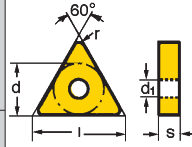
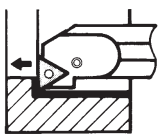
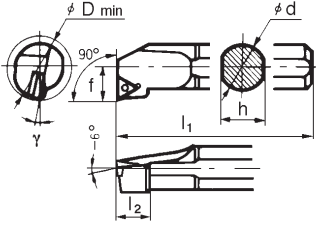
Packing unit and ordering example; 1 pce S25T - PSKNR 12 (R: right handed)

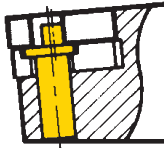
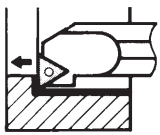
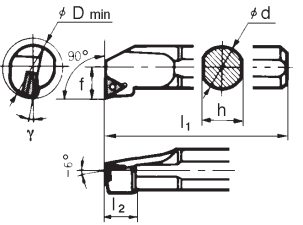
Boring Bars S...PTFN / BTFN Type

For Negative TN__ - Inserts ($\alpha = 0^\circ$)



■ Holders










 Tool holders (P type) with lever-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D _{min}	d	h	l ₁	l ₂	f	γ	
S - PTFN R/L  	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°	

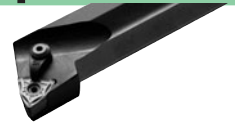
 Tool holders (P type) with eccentric pin system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D _{min}	d	h	l ₁	l ₂	f	γ	
BTFN R/L  	BTFN 325 R/L (S25R - PTFN R/L 16)	●	●	34	25	23	200	30	17	-12°	TN__ 1604__
	BTFN 332 R/L (S32S - PTFN R/L 16)	●	●	44	32	30	250	40	22	-10°	
	BTFN 440 R/L (S40T - PTFN R/L 22)	●	●	54	40	37	300	50	27	-10°	TN__ 2204__
	BTFN 450 R/L (S50U - PTFN R/L 22)			70	50	47	350	60	35	-10°	

All figures show right hand tools.

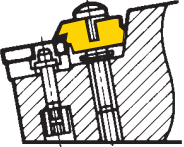
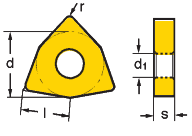
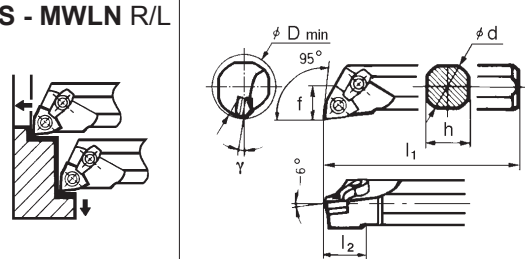
■ Applicable Inserts

■ Spare Parts

Holder	Carbides, Cermets		CBN	Lever pin	Clamp bolt	Shim	Shim pin	Wrench	Pin
	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	
BTFN R/L									
325	TNMG 1604__ NGU	TNMM 1604__ NMP	TNGA 1604__			STW323		LH025	CPB34
332	TNMG 1604__ NGU	TNMM 1604__ NMP	TNGA 1604__			STW323		LH025	CPB35
440	TNMG 2204__ NGU	TNMM 2204__ NMP	TNGA 2204__			STW434		LH030	CPB44T
450	TNMG 2204__ NGU	TNMM 2204__ NMP	TNGA 2204__			STW434		LH030	CPB45T



■ Holders












	Tool holders (M type) with wedge clamp system	Ordering No.	Stock		Dimensions (mm)						
			R	L	D_{min}	d	h	l_1	l_2	f	
S - MWLN R/L 	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.

Boring Bars
for neg. Insert

■ Applicable Inserts

■ Spare Parts

Holder	Carbides, Cermets			Clamp	Double screw	Clamp	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
				Spare parts --> (conventional type)					
				S...08		BCH05R	HE060011P	HE060011E	LH025

Boring Bars B/D/S...SCLC Type

For Positive CC__ - Inserts ($\alpha = 7^\circ$)

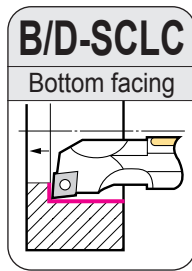


■ Holders

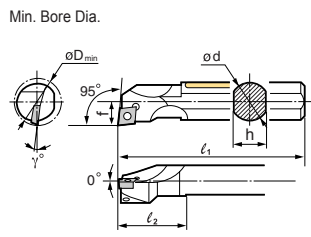
Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							Insert (ex.)
		R	L	D_{min}	d	h	l_1	l_2	f	γ	
	S10K - SCLC R/L 06	●	●	13	10	9	125	9	7	-12°	CC__0602__
	S12M - SCLC R/L 06	●	●	16	12	11	150	11	9	-10°	
	S16R - SCLC R/L 06	●	●	20	16	15	200	15	11	-8°	
	S16R - SCLC R/L 09	●	●	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°	

Boring Bars for pos. insert

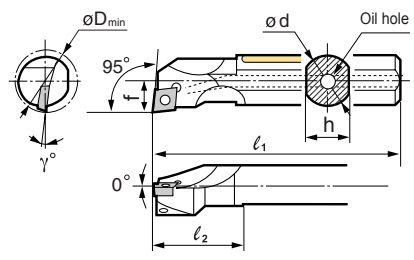
New



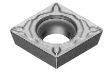
B Type (Fig.1)



D Type (Fig.2)



Insert (ex.)



■ Spare Parts



■ Holders

Steel shank	Ordering No.	Stock		Dimensions (mm)							Fig.	Insert (ex.)	Screw	Wrench	
		R	L	ϕD_{min}	ϕd	h	l_1	f	l_2	γ°					
Anti-vibration B type	B08H - SCLC R/L 0602-10	●	●	10	8	7	100	5.5	19	-13	1.	CC□T 0602	BFTX02505N	TRX08	
	B10K - SCLC R/L 0602-12	●	●	12	10	9	125	6	21	-12					
Anti-vibration D type with oil hole	D12M - SCLC R/L 0602-14	●	●	14	12	11	150	7	25	-10	2.	CC□T 09T3	BFTX0407N	TRX15	
	D16R - SCLC R/L 09T3-18	●	●	18	16	15	200	11	30	-8			BFTX0409N		
	D20S - SCLC R/L 09T3-22	●	●	22	20	18	250	13	30	-7			BFTX0511N		TRX20
	D25T - SCLC R/L 1204-32	●	●	32	25	23	300	17	38	-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.

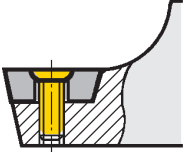
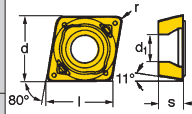
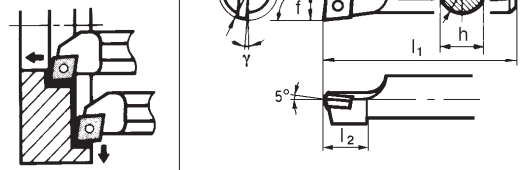
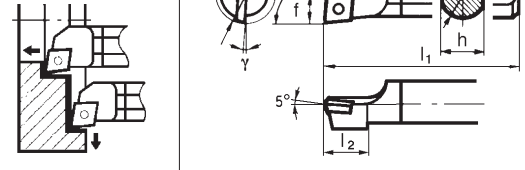
■ Applicable Inserts

■ Spare Parts

Holder	Carbides, Cermets	CBN, PCD	Screw	Wrench
S - SCLC R/L				
S.....06	CCMT 0602__ NFP	CCGW 0602__	BFTX02505N	TRX08
S16R.....09	CCMT 09T3__ NFP	CCGW 09T3__	BFTX0407N	TRX10
S20S.....09	CCMT 09T3__ NFP	CCGW 09T3__	BFTX0409N	TRX10
S.....12	CCMT 1204__ NFP	CCGW 1204__	BFTX0511N	TRX20



■ Holders

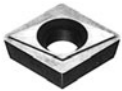
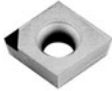


 Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D_{min}	d	h	l_1	l_2	f	γ	
S - SCLP R/L Steel shank 	S10K - SCLP R/L 08	●	●	12	10	9	125	12	6	-5°	CP_T 0802__
	S12M - SCLP R/L 08	●	●	16	12	11	150	15	8	-3°	
	S16R - SCLP R/L 09	●	●	20	16	15	200	18	10	-3°	CP_T 0903__
	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__
C - SCLP R/L 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.

Boring Bars
for pos. Insert

■ Applicable Inserts

■ Spare Parts

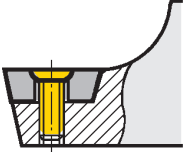
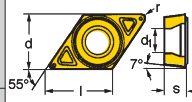
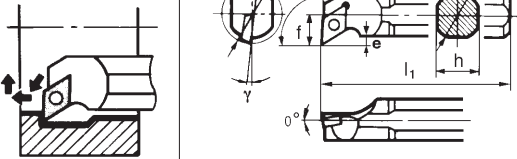
Holder	Carbides, Cermets	CBN	Screw	Wrench					
S/C-SCLP R/L									
S/C 10.....08	CPGT 0802__ NSD	CPMW 0802__	BFTX 0305 A	TRX 10					
S/C 12.....08	CPGT 0802__ NSD	CPMW 0802__	BFTX 0305 A	TRX 10					
S/C 16.....09	CPGT 0903__ NSD	CPMW 0903__	BFTX 0407 A	TRX 15					
S 20.....09	CPGT 0903__ NSD	CPMW 0903__	BFTX 0407 A	TRX 15					
S 25.....12	CPGT 1204__ NSD	-	BFTX 0509 A	TRX 20					

Boring Bars B/D/S...SDUC Type

For Positive DC__ - Inserts ($\alpha = 7^\circ$)



■ Holders

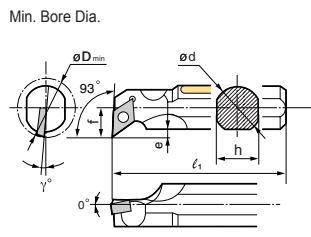
 Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D_{min}	d	h	l_1	f	e	γ	
S - SDUC R/L 	S10K - SDUC R/L 07	●	●	13	10	9	125	7	2,5	-8°	DC__ 0702__
	S12M - SDUC R/L 07	●	●	16	12	11	150	9	3,5	-8°	
	S16R - SDUC R/L 07	●	●	20	16	15	200	11	4	-6°	
	S20S - SDUC R/L 11	●	●	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°	

Boring Bars for pos. insert

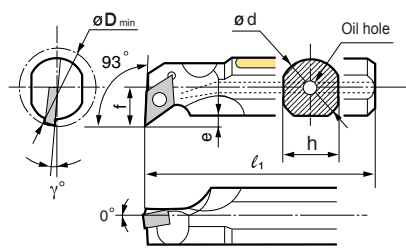
New

B/D-SDUC
Copying

B Type (Fig.1)



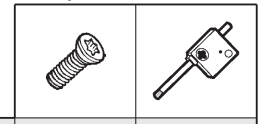
D Type (Fig.2)



Insert (ex.)



■ Spare Parts



■ Holders

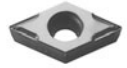




Steel shank	Ordering No.	Stock		Dimensions (mm)							Fig.	Insert (ex.)	Screw	Wrench
		R	L	$\varnothing D_{min}$	$\varnothing d$	h	l_1	f	e	θ°				
Anti-vibration B type	B10M - SDUC R/L 0702-13	●	●	13	10	9	150	7	2,5	-8	1.	DC□T 0702	BFTX02506N	TRX08
Anti-vibration D type with oil hole	D12M - SDUC R/ L0702-16	●	●	16	12	11	150	9	3,5	-8	2.			
	D16R - SDUC R/L 0702-20	●	●	20	16	15	200	11	4,0	-6				
	D20S - SDUC R/L 11T3-25	●	●	25	20	18	250	13	4,5	-6				
	D25S - SDUC R/L 11T3-32	●	●	32	25	22	250	17	7,0	-6				

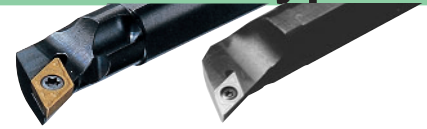
All figures show right hand tools.

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.

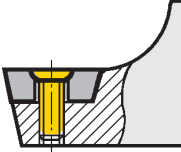
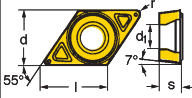
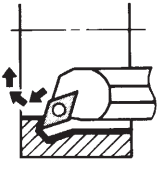
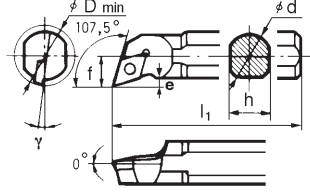
■ Applicable Inserts

■ Spare Parts

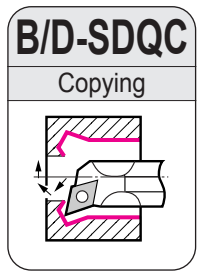
Holder	Carnides, Cermets		CBN, PCD	Screw	Wrench				
S - SDUC R/L S - SDQC R/L									
S10K.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	TRX08				
S12M.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	TRX08				
S16R.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	TRX08				
S.....11	DCMT 11T3__ NFP	DCMT 11T3__ NSK	DCGW 11T3__	BFTX0409N	TRX10				



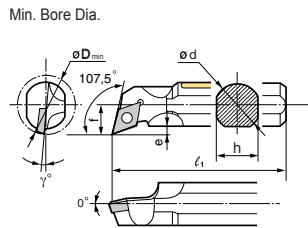
■ Holders

	Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
			R	L	D _{min}	d	h	l ₁	f	e	γ	
S - SDQC R/L 		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°	

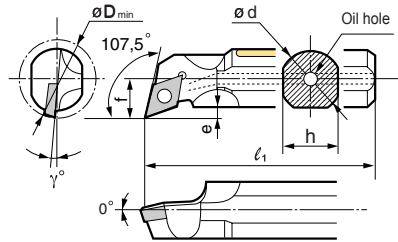
New



B Type (Fig.1)



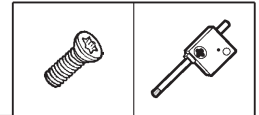
D Type (Fig.2)



Insert (ex.)



■ Spare Parts



■ Holders

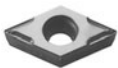




Steel shank	Ordering No.	Stock		Dimensions (mm)							Fig.	Insert (ex.)	Screw	Wrench
		R	L	øD _{min}	ød	h	l ₁	f	e	γ°				
Anti-vibration B type	B10M - SDQC R/L 0702-13	●	●	13	10	9	150	7	2,5	-8	1.	DC□T 0702	BFTX02506N	TRX08
Anti-vibration D type with oil hole	D12M - SDQC R/L 0702-16	●	●	16	12	11	150	9	3,5	-8	2.			
	D16R - SDQC R/L 0702-20	●	●	20	16	15	200	11	4,0	-6				
	D20S - SDQC R/L 11T3-25	●	●	25	20	18	250	13	4,5	-6				
	D25S - SDQC R/L 11T3-32	●	●	32	25	22	250	17	7,0	-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.

■ Applicable Inserts

■ Spare Parts

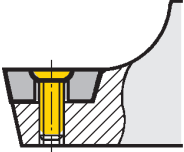
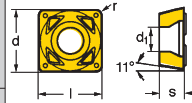
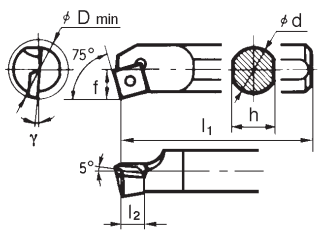
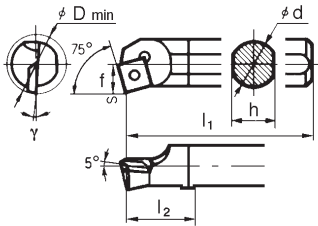
Holder	Carbides, Cermets		CBN, PCD	Screw	Wrench				
S - SDUC R/L S - SDQC R/L									
S10K.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	TRX08				
S12M.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	TRX08				
S16R.....07	DCMT 0702__ NFP	DCMT 0702__ NSK	DCGW 0702__	BFTX02506N	TRX08				
S.....11	DCMT 11T3__ NFP	DCMT 11T3__ NSK	DCGW 11T3__	BFTX0409N	TRX10				

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	D _{min}	d	h	l ₁	l ₂	f	γ	
S - SSKP R/L 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	
C - SSKP R/L 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.

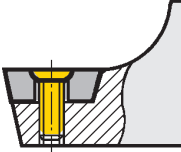
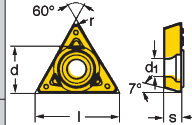
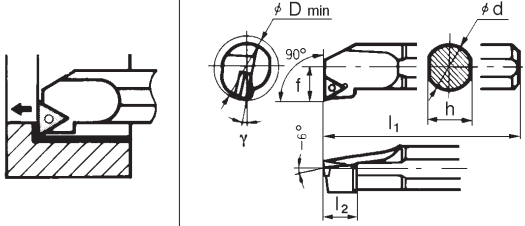
■ Applicable Inserts

■ Spare Parts

Holder	Carbides, Cermets	CBN		Screw	Wrench				
S/C-SSKP R/L									
S/C 12.....09	SPGT 0903__L/R-SD	SPGW 0903__		BFTX 0307 A	TRX 10				
S/C 16.....09									
S 20.....09									
S 25.....09									



■ Holders






	Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
			R	L	D_{min}	d	h	l_1	l_2	f	γ	
S - STFC R/L 		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

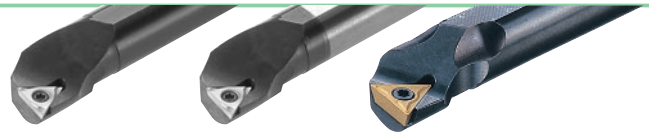
■ Applicable Inserts

■ Spare Parts

Holder	Carbides, Cermets		CBN, PCD	Screw	Wrench				
									
S.....09	TCMT 0902__ NFP	-	TCGW 0902__	BFTX02205N	TRX06				
S.....11	TCMT 1102__ NFP	TCMT 1102__ NSK	TCGW 1102__	BFTX02506N	TRX08				
S.....16	TCMT 16T3__ NFP	TCMT 16T3__ NSK	TCGW 16T3__	BFTX0409N	TRX10				

Boring Bars S/C/B/D...STUP(B) Type

For Positive TB / TP__ - Inserts ($\alpha = 5, 11^\circ$)



■ Holders

Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D _{min}	d	h	l ₁	l ₂	f	γ	
S - STUP/B R/L Steel shank 	S08H - STUB R/L 06-01	●	●	8	8	7	100	30	4	-12°	TB_T 0601__
	S08H - STUB 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 - STUB 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°	

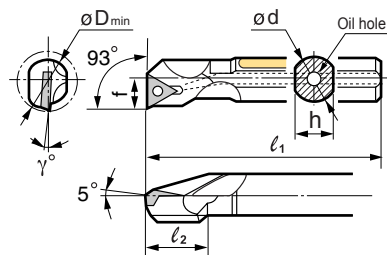
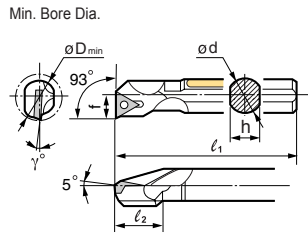
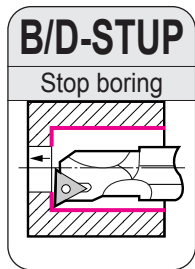
Boring Bars for pos. Insert

New

B Type (Fig.1)

D Type (Fig.2)

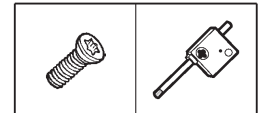
SumiTurn X Bar



Insert (ex.)



■ Spare Parts



■ Holders

Steel shank	Ordering No.	Stock		Dimensions (mm)							Fig.	Insert (ex.)	Screw	Wrench
		R	L	∅D _{min}	∅d	h	l ₁	f	l ₂	γ°				
Anti-vibration B type	B08H - STUP R/L 0802-10	●	●	10	8	7	100	5	13	-10	1.	TP□T 0802	BFTX0204A	TRX06
	B10K - STUP R/L 1103-12	●	●	12	10	9	125	6	15	-8				
Anti-vibration D type with oil hole	D12M - STUP R/L 1103-14	●	●	14	12	11	150	7	17	-7	2.	TP□T 1103	BFTX0306A	TRX10
	D16R - STUP R/L 1103-18	●	●	18	16	15	200	9	18	-4				
	D20S - STUP R/L 1103-22	●	●	22	20	18	250	11	18	-3				
	D25T - STUP R/L 1604-28	●	●	28	25	22	300	14	18	-2				
	D32T - STUP R/L 1604-40	●	●	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.

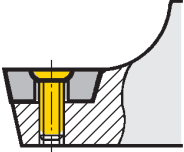

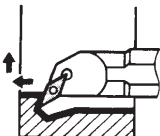
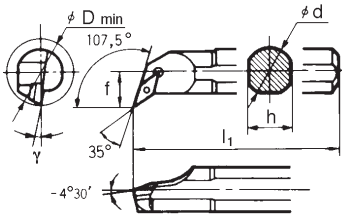
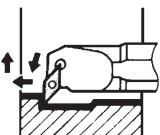
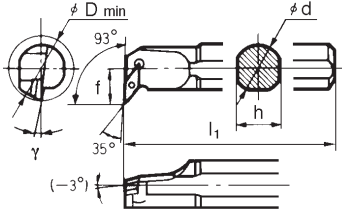
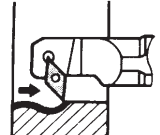
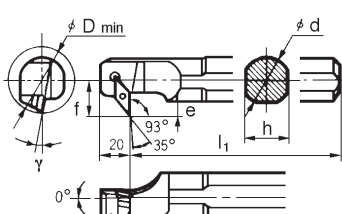
■ Applicable Inserts

■ Spare Parts

Holder	Carbides, Cermets	CBN, PCD	Screw	Wrench
S/C-STU_ R/L				
S/C 08.....06-01	TBGT 0601__L/R-W	-	BFTX 0204 A	TRX 06
S/C 08.....08-02	TPGT 0802__L/R-W	TPMW 0802__	BFTX 0204 A	TRX 06
S/C 10.....11-03	TPGT 1103__L/R-W	TPGW 1103__	BFTX 0306 A	TRX 10
S/C 12/16.....11-03	TPGT 1103__L/R-W	TPGW 1103__	BFTX 0307 A	TRX 10
S 20/25.....16	TPGT 1604__L/R-W	TPGW 1604__	BFTX 0410 A	TRX 15



■ Holders










	Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
			R	L	D _{min}	d	h	l ₁	f	γ	e	
S - SVQB R/L  	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°				
S - SVUB R/L  	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°				
S - SVZB R/L  	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.

Boring Bars
for pos. Insert

■ 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	-	-	-	-	BFTX02506N	TRX08	-
S25T	VBMT 1604__ NFP	VBMT 1604__ NSK	VBGW 1604__	-	-	-	BFTX03508	TRX10	-
S32U	VBMT 1604__ NFP	VBMT 1604__ NSK	VBGW 1604__	VP32B	BH03504	SVP32	BFTX03508	TRX10	LH020
S40V	VBMT 1604__ NFP	VBMT 1604__ NSK	VBGW 1604__	VP40B	BH03504	SVP32	BFTX03508	TRX10	LH020

● = Euro stock

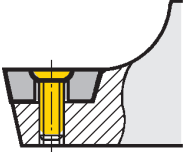
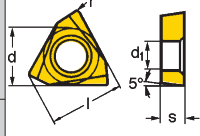
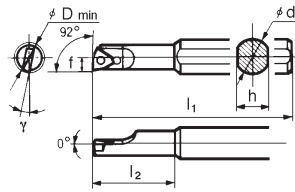
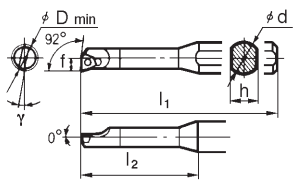
Packing unit and ordering example; 1 pce S16R - SVQBR 11 (R: right handed)

Boring Bars S/C...SWUB Type

For Positive WB __ - Inserts ($\alpha = 5^\circ$)



■ Holders

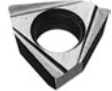


 Tool holders (S type) with screw-lock system	Ordering No.	Stock		Dimensions (mm)							
		R	L	D _{min}	d	h	l ₁	l ₂	f	γ	
S - SWUB R/L Steel shank 	S08H - SWUB R/L 06	●	●	5,5	8	7	100	18	3	-12°	WBGT 0601__
C - SWUB R/L Carbide shank 	C08K - SWUB R/L 06	●	●	5,5	8	7	125	30	3	-12°	WBGT 0601__

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.

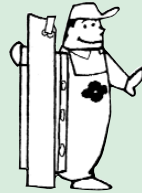
■ Applicable Inserts

■ Spare Parts

Holder	Carbides, Cermets	CBN	Screw	Wrench				
S/C-SWUBR/L								
S/C 08.....R 06	WBGT 0601__ LW	-	BFTX 0203 A	TRX 06				
S/C 08.....L 06	WBGT 0601__ RW	-	BFTX 0203 A	TRX 06				

Parting-Off Threading Holders

F1 ~ F14



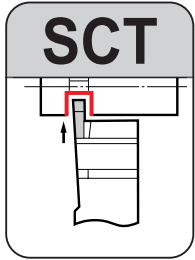
Parting-Off Mini Holders	SCT Type	F2
Sumi-Grip Series	Sumi-Grip Inserts	F3
Sumi-Grip Jr.	STFH / STFS R/L, Steel Type	F4
Sumi-Grip	Selection Guide	F6
	WCFH, Tool Block Type	F7
	WCFS R/L, Shank Type	F8
Threading Tools	Selection Guide	F9
	Threading Inserts	F10
	Cutting Conditions	F11
External Threading Holders	LTER	F12
	STER	F12
Internal Threading Holders	STIR	F13

Parting-Off Threading

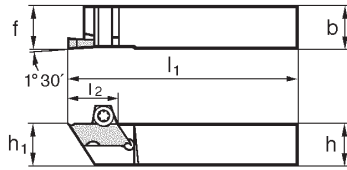
Parting-Off Mini Holders SCT Type




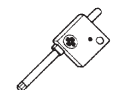
Parting-Off
Tools



■ Holders




■ Spare Parts


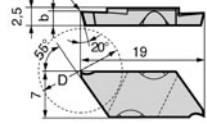
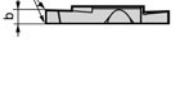

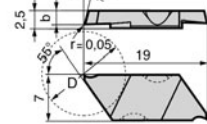
	
Applicable inserts	Screw
CTR ____	BFTX 0410 T8 L
CTL ____	BFTX 0410 T8 R
	Wrench
	TRX 08

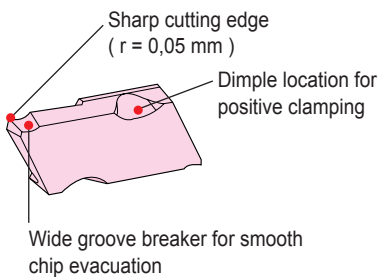
Ordering No.	Stock	Dimensions (mm)					Applicable inserts
		h=h ₁	b	l ₁	l ₂	f	
SCT R 1010	●	10	10	120	15	10	CTR ____
SCT R 1212	●	12	12	120	15	12	
SCT R 1616	●	16	16	120	15	16	
SCT L 1010	●	10	10	120	15	10	CTL ____
SCT L 1212	●	12	12	120	15	12	
SCT L 1616	●	16	16	120	15	16	

Above figures show right hand tools.

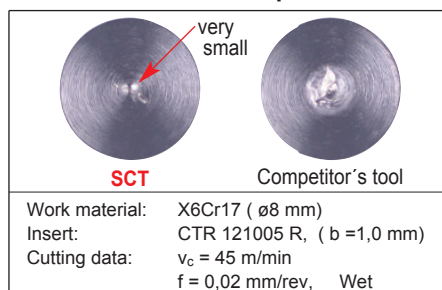
■ Inserts

() Coated carbide

CTR CTL	Ordering No.	Stock ACZ310	Dimensions (mm)		Insert Type	
			b	Max. ø D		
	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			
	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				




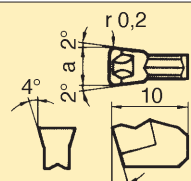
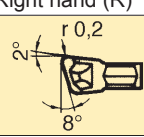
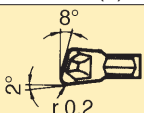
● Surface Finish Comparison

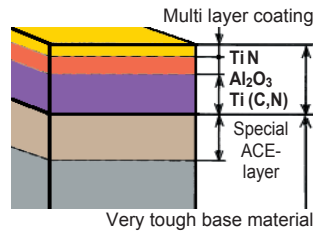


■ Recommended Cutting Data (SCT Type)

Work material	Approach angle	v _c (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

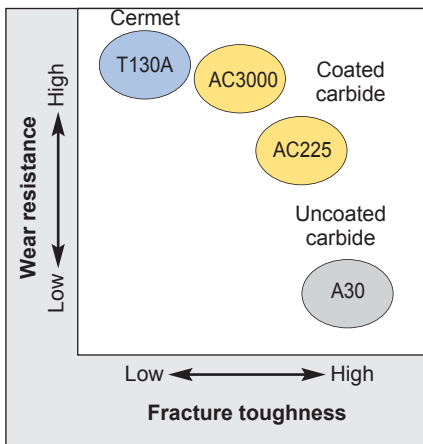
Neutral (N)  Right hand (R)  Left hand (L) 	WCFN [] (General steel)		WCFN [] A Type A for hard to cut materials (Slow feed)				WCFN [] B Type B for Cast iron, Aluminium alloy				
	Ordering No.	Coated carbide	[a] (mm)	Ordering No.	Coated carbide	Cermet	Uncoated carbide	[a] (mm)	Ordering No.	Uncoated carbide	[a] (mm)
		AC3000			AC225	T130A				A30	
	WCFN 2 A	●		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	●		
	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 Al₂O₃ layer. It is very tough and resistant to adhesion wear.

Insert Grade Map



Applications and Features of Inserts

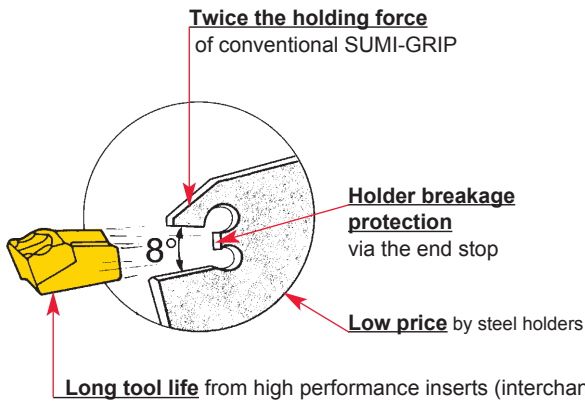
Grade	Ordering No. (Ex. a=3mm)	Applications	Features
AC3000	WCFN 3	General steel and high feed cutting (0,08~0,3/rev)	Coated insert having excellent wear resistance with low cutting resistance
AC225	WCFN 3A	General steel and slow feed cutting (0,04~0,25/rev) soft steel, stainless steel	Coated insert having excellent fracture toughness with good chip removal
T130A	WCFN 3A	General steel and slow feed cutting (0,03~0,15/rev)	Very tough cermet for excellent surface finish
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

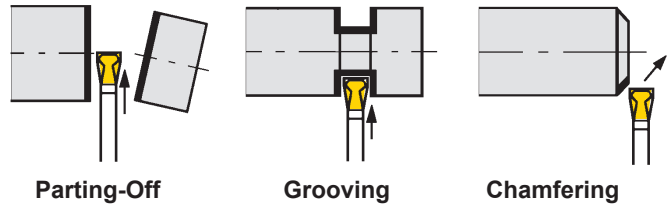
Grade	v _c (m/min) f (mm/rev)	General steel	Soft steel	Stainless steel	Die steel	Gray cast iron
AC3000	v _c	100 - 220	120 - 250	80 - 200	60 - 150	-
	f	0,08 - 0,3	0,08 - 0,15	0,08 - 0,15	0,08 - 0,15	-
AC225	v _c	80 - 200	100 - 230	60 - 180	60 - 150	-
	f	0,04 - 0,25	0,04 - 0,2	0,04 - 0,2	0,04 - 0,2	-
T130A	v _c	80 - 200	100 - 230	60 - 180	60 - 150	-
	f	0,03 - 0,15	0,03 - 0,1	0,03 - 0,1	0,03 - 0,08	-
A30	v _c	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 _c	-	-	-	-	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.

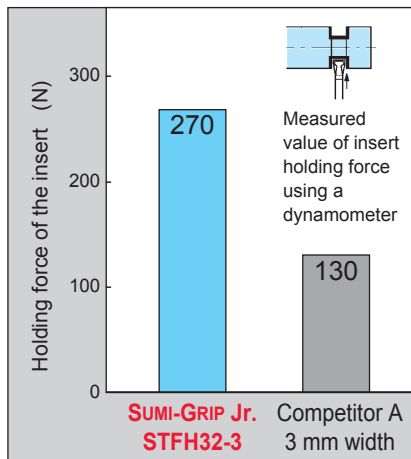
■ Features of Design



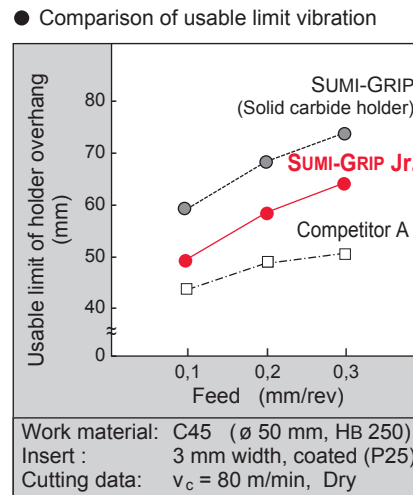
Effective Tooling with Sumi-Grip Jr.



■ Twice the Insert Holding Force

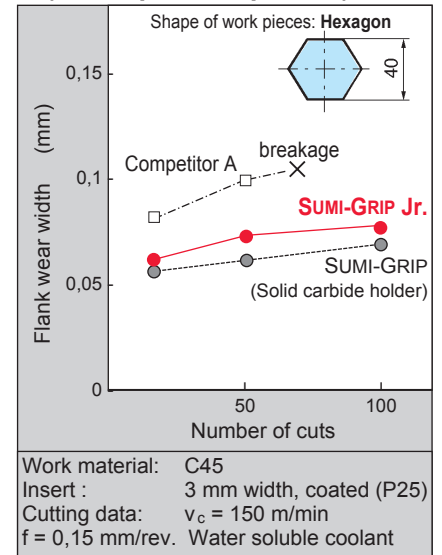


■ Low Vibration



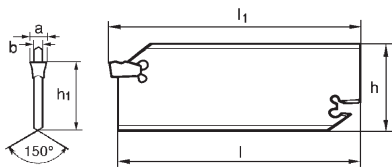
■ WEAR RESISTANCE

● (Interrupted cut part off)



■ Part-Off Holders

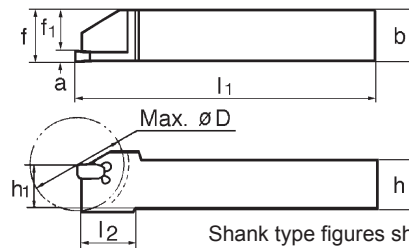
● Steel Blades (Tool Block Type Holders)



Ordering No.	Stock	Dimensions (mm)							Applicable inserts
		a	h	h ₁	b	l	l ₁		
STFH 26-2	●	2	26	21,4	1,7	108	109	WCF_2_	
STFH 26-3	●	3	26	21,4	2,4	108	109	WCF_3_	
STFH 26-4	●	4	26	21,4	3,4	108	109	WCF_4_	
STFH 26-5	●	5	26	21,4	4,3	108	109	WCF_5_	
STFH 32-2	●	2	32	25	1,7	148	149	WCF_2_	
STFH 32-3	●	3	32	25	2,4	148	149	WCF_3_	
STFH 32-4	●	4	32	25	3,4	148	149	WCF_4_	
STFH 32-5	●	5	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.

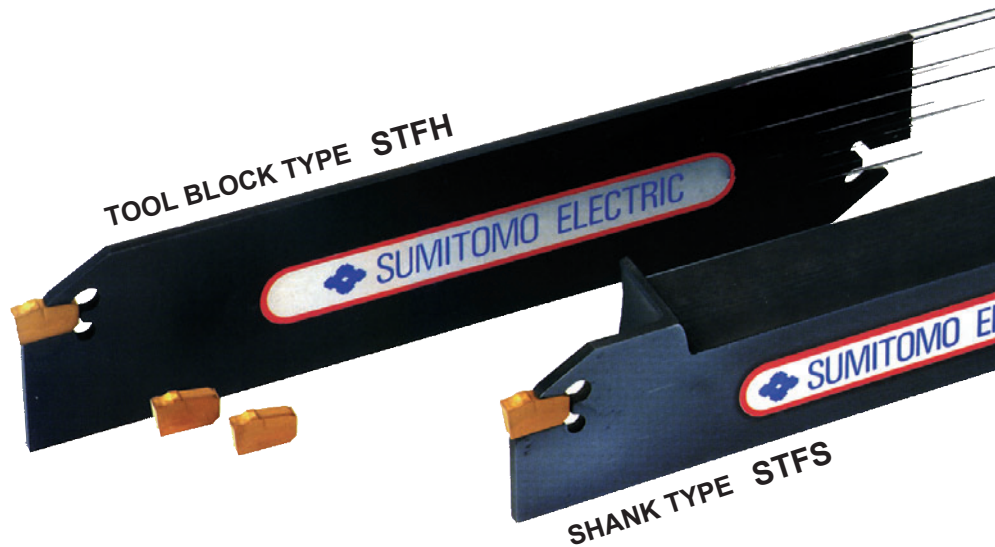
● Shank Type Holders



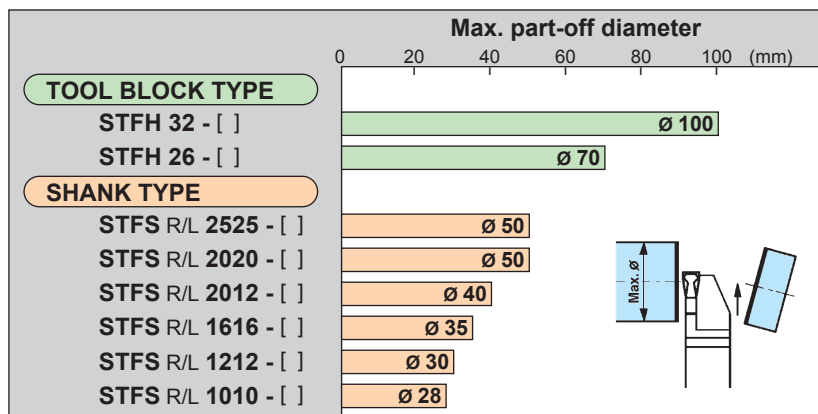
Shank type figures show right hand tools.

Ordering No.	Stock		Dimensions (mm)										Applicable inserts
	R	L	a	h	h ₁	b	l ₁	l ₂	f	f ₁	D		
STFS R/L 1010-2	●	●		10	10	10	86	18	10	8	28	WCF_2_	
STFS R/L 1212-2	●	●	2	12	12	12	110	20	12	10	30		
STFS R/L 1616-2	●	●		16	16	16	110	20	16	14	35		
STFS R/L 2020-2	●	●		20	20	20	125	-	20	18	50		
STFS R/L 1616-3	●	●		16	16	16	110	20	16	13	35		WCF_3_
STFS R/L 2012-3	●	●	3	20	20	12	110	-	12	9	40		
STFS R/L 2020-3	●	●		20	20	20	125	-	20	17	50		
STFS R/L 2525-3	●	●		25	25	25	150	-	25	22	50		
STFS R/L 2020-4	●	●	4	20	20	20	125	-	20	16	50	WCF_4_	
STFS R/L 2525-4	●	●		25	25	25	150	-	25	21	50		
STFS R/L 2020-5	●	●	5	20	20	20	125	-	20	15	50		WCF_5_
STFS R/L 2525-5	●	●		25	25	25	150	-	25	20	50		

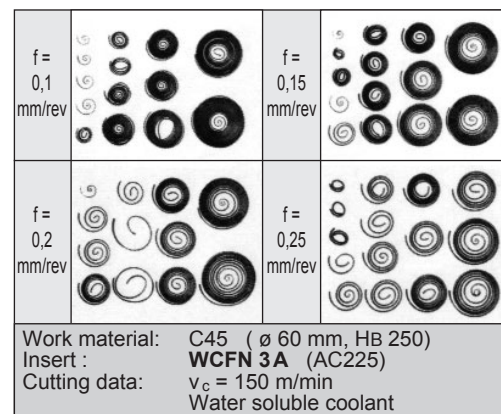
Parting-Off Holders Sumi-Grip " Jr."



Recommended Application Range

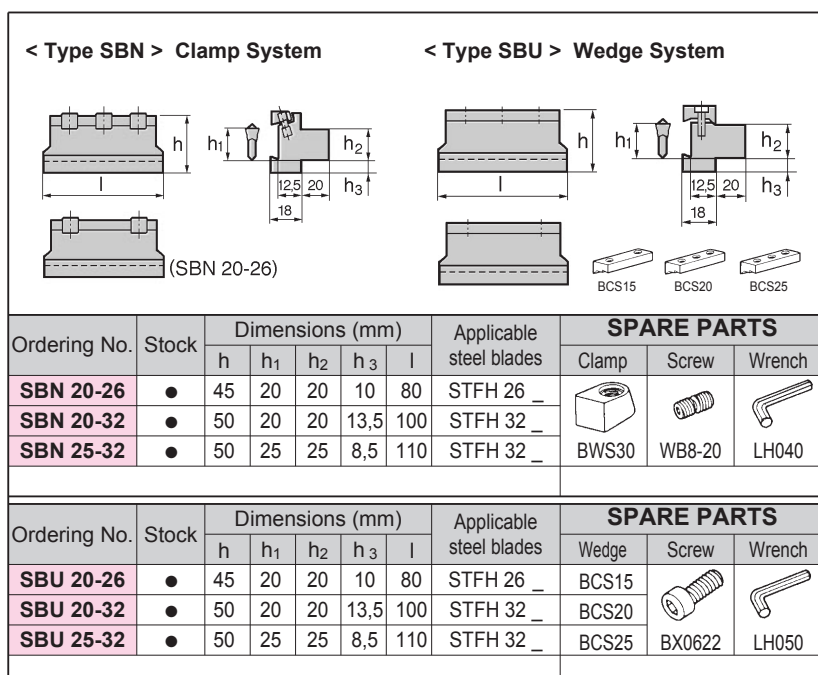


Good Chip Removal

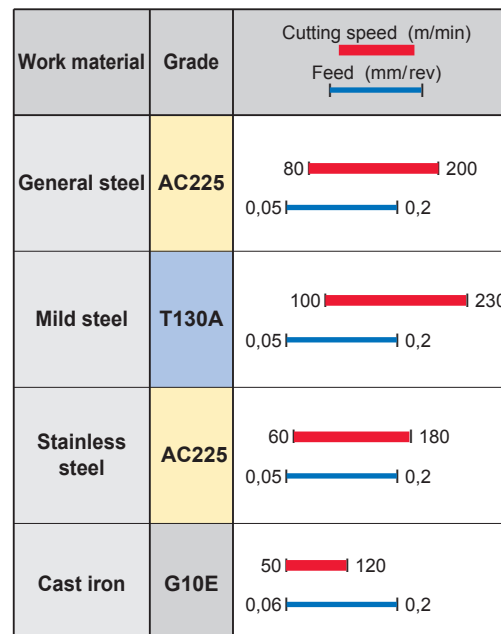


Parting-Off Holders

Tool Blocks



Recommended Grades and Cutting Conditions



● = Euro stock

Packing unit and ordering example; 1 pce

STFH 26-2, 1 pce SBN 20-26

Sumi-Grip- Series



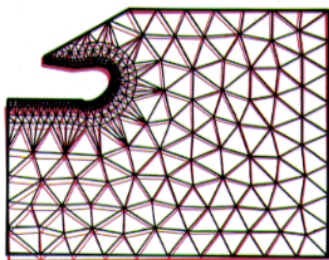
Features of Sumi-Grip

High Rigidity

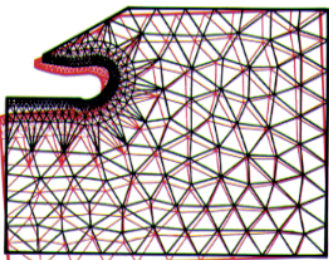
This figure shows a computer generated comparison of the distortion of steel and carbide holders caused by cutting forces.

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

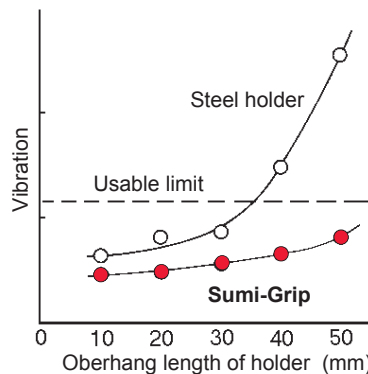
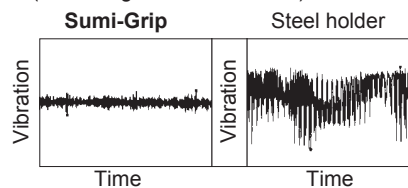
— Changed sharp
— Unchanged sharp

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)

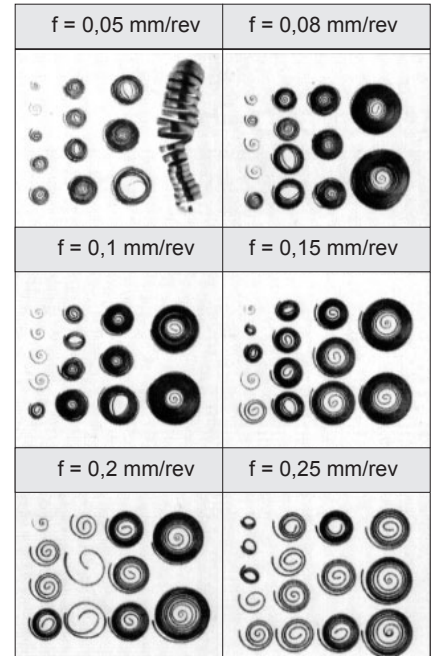


Work; Carbon steel (\varnothing 60mm, HB250)
Width of insert: 3 mm
Cutting data: $v_c = 150$ m/min, $f = 0,1$ mm/rev

Good Chip Removal

This picture show the shape of chips according to feed rate.

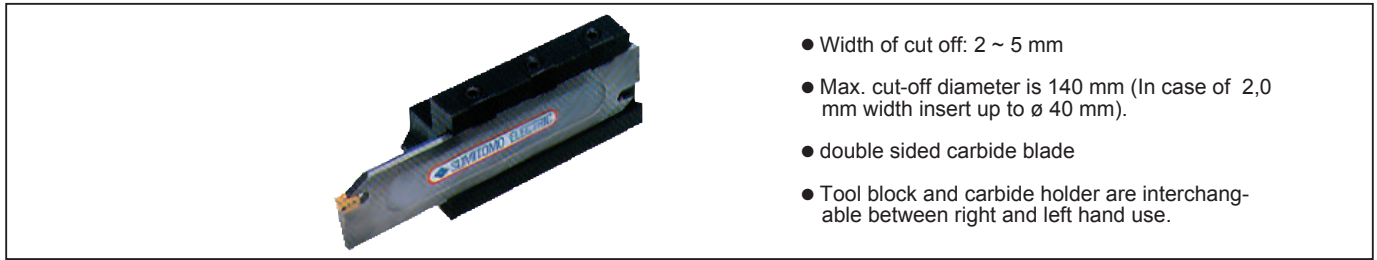
SUMI GRIP produces rolled chip which are easily removed.



Work material: Ck 45 (\varnothing 60mm, HB250)
Insert width and type : 3 mm, WCFN 3A (AC225)
Cutting conditions: $v_c = 150$ m/min, Wet



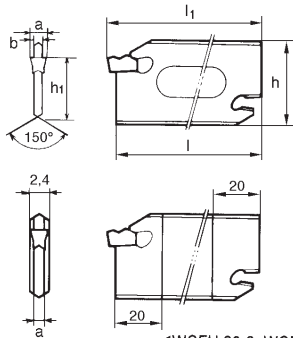
Beautiful surface finish



- Width of cut off: 2 ~ 5 mm
- Max. cut-off diameter is 140 mm (In case of 2,0 mm width insert up to \varnothing 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	b	h	h ₁	l	l ₁	
WCFH 26-2	●	2	1,7	26	21,4	109	110	WCF_2_ _
WCFH 26-3	●	3	2,4	26	21,4	108,5	110	WCF_3_ _
WCFH 26-4	●	4	3,4	26	21,4	108,5	110	WCF_4_ _
WCFH 26-5	●	5	4,3	26	21,4	108,5	110	WCF_5_ _
WCFH 32-2	●	2	1,7	32	25	149	150	WCF_2_ _
WCFH 32-3	●	3	2,4	32	25	148,5	150	WCF_3_ _
WCFH 32-4	●	4	3,4	32	25	148,5	150	WCF_4_ _
WCFH 32-5	●	5	4,3	32	25	148,5	150	WCF_5_ _



Wrench

Wrench
SL - 2
SL - 1
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)	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)	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	SBU20-32	SBU25-32
BCS 15	BCS 20	BCS 25
Screw	Wrench	
BX 0622	LH 050	

Nomenclature

Holder	Insert
<p>Sumi-Grip WCF H 26-3</p> <p>Holder type H : Tool block type S : Shank 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>Sumi-Grip WCF N 3 A</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>


● = Euro stock

Packing unit and ordering example; 1 pce


WCFH 26-2, 1 pce SBN 20-26

Parting-Off Holders Sumi-Grip Series

Shank Type with Carbide Blade

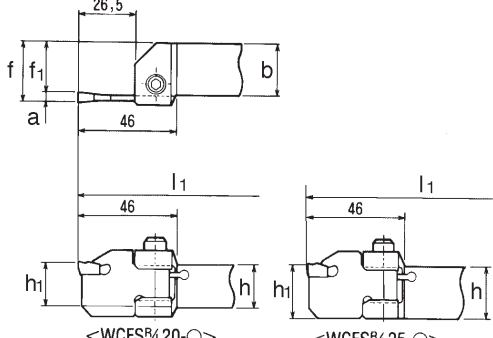


- Carbide blade on shank fixed type
- Width of cut off: 3,0 ~ 5,0 mm
- Max. cut off diameter is 50 mm
- Suitable for machining with small N/C machines and automated lathe machines



- 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)

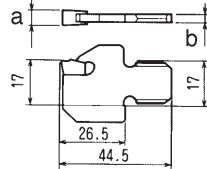



Ordering No.	Stock		Dimensions (mm)								Included carbide blade	Applicable inserts
	R	L	a	b	h	h ₁	l ₁	f	f ₁			
WCFS R/L 20-3	●	●	3	20	20	20	125	23	20	WCFH 17-3	WCF_3_	
WCFS R/L 20-4	●	●	4	20	20	20	125	24	20	WCFH 17-4	WCF_4_	
WCFS R/L 20-5			5	20	20	20	125	25	20	WCFH 17-5	WCF_5_	
WCFS R/L 25-3	●	●	3	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

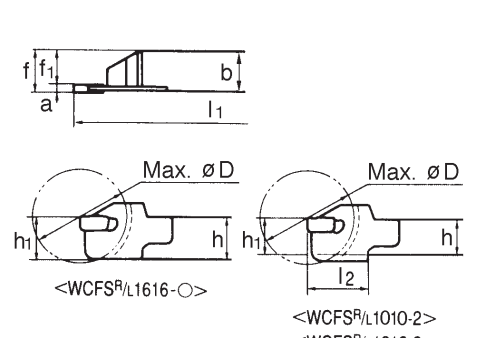
■ Wrench

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)

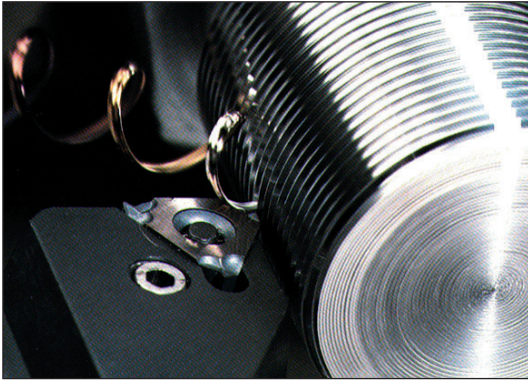
Wrench



Ordering No.	Stock		Dimensions (mm)										Applicable inserts	Wrench
	R	L	a	b	h	h ₁	l ₁	l ₂	f	f ₁	D			
WCFS R/L 1010-2	●		2	10	10	10	86	18	10	8	28	WCFN 2A	SL - 2	
WCFS R/L 1212-2	●	●	2	12	12	12	110	20	12	10	30	WCFN 2A	SL - 2	
WCFS R/L 1616-2	●	●	2	16	16	16	100	-	16	14	35	WCFN 2A	SL - 2	

Remarks: A holder includes an applicable wrench.
All figures show right hand tools.

Threading Tools



■ General Features

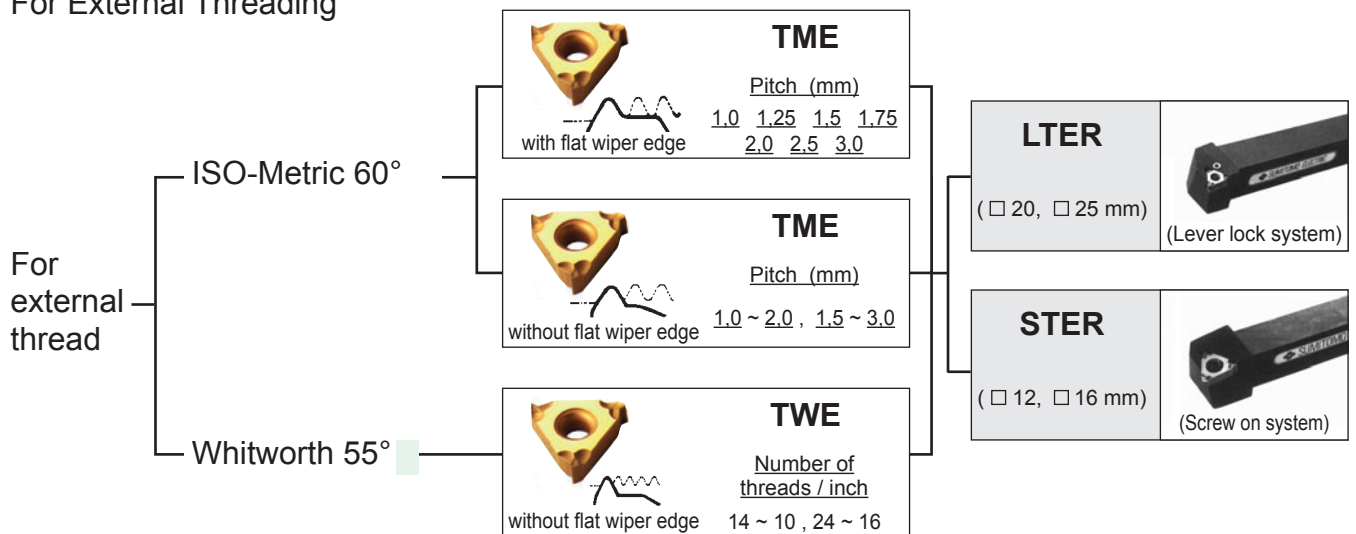
Sumitomo Electric has developed "TME" external threading inserts with pitch ranges of 1,0 ~ 3,0 mm or 10 ~ 24 threads/inch and "TMI" internal threading inserts with a pitch range of 1,0 ~ 3,0 mm.

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.

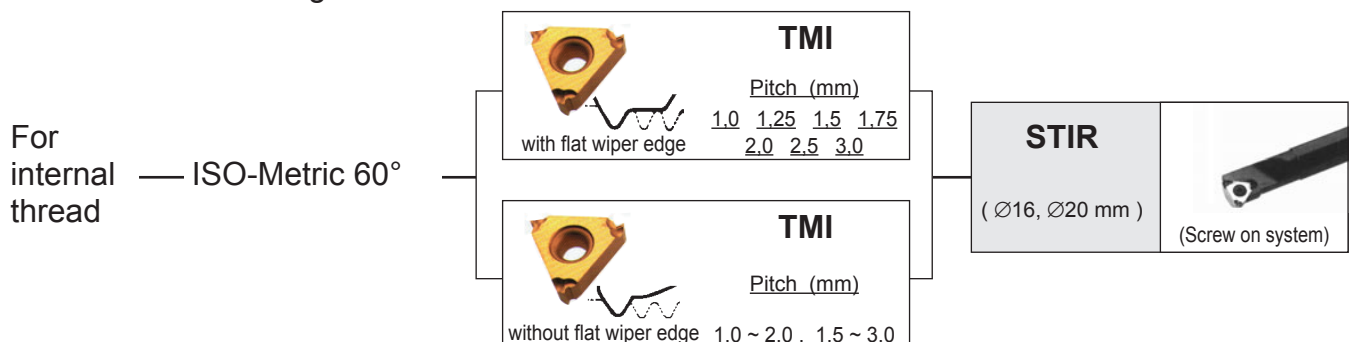
Furthermore, chip control is greatly improved as a result of the specially designed dimple chip breakers.

■ New Series of Indexable Inserts and Holders for Threading

● For External Threading

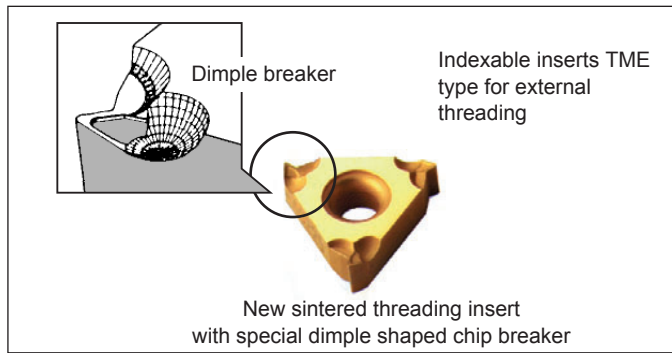


● For Internal Threading

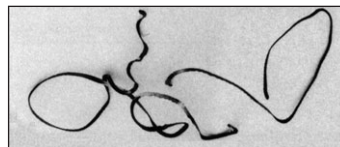
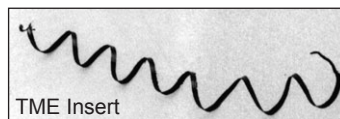


Threading Tools

Threading Insert



● Comparison of Chip Control

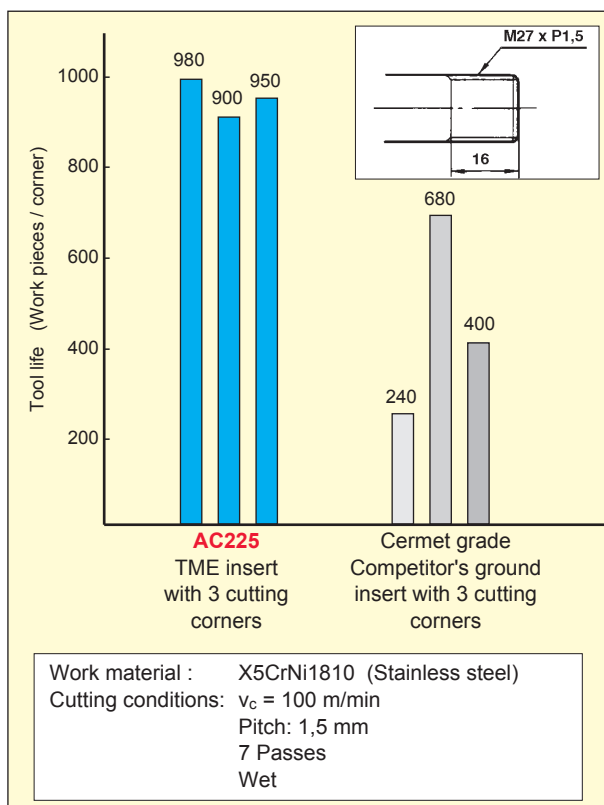


Work material: 25 CrMo 4
Cutting speed: 100 m/min
Pitch: 1,5 mm

■ 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.

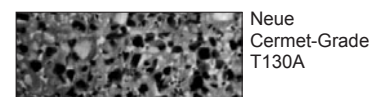
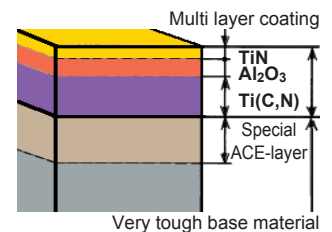
● Comparison of Tool Life



■ Cutting Grades for Threading

AC225

The AC225 is a carbide insert with a 2 μ m multiple-layer coating. This design results in improved toughness and adhesion resistance making this grade **suitable for stainless steel and general steel**.



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)

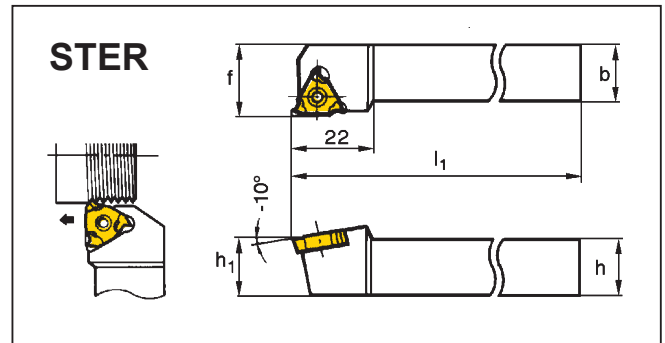
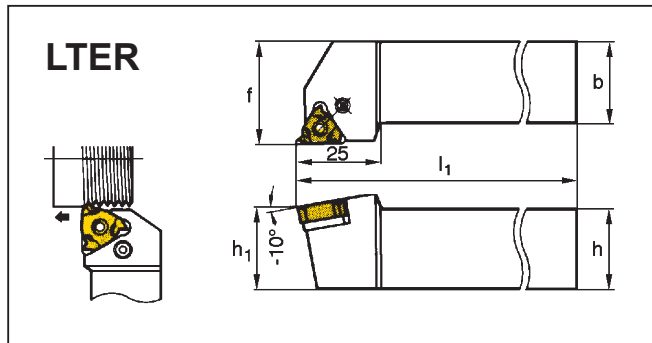
	Cat. No.	Pitch	Depth of cut	Pass	Depth of Cut (mm)														
					1	2	3	4	5	6	7	8	9	10	11	12			
ISO-Metric 60°	External	TME 100 R	1,00	0,68	5	0,20	0,16	0,14	0,11	0,07									
		TME 125 R	1,25	0,82	6	0,20	0,18	0,15	0,12	0,10	0,07								
		TME 150 R	1,50	0,96	7	0,22	0,18	0,14	0,13	0,12	0,10	0,07							
		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	0,18	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	Depth of Cut (mm)														
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	
ISO-Metric 60°	External	0,13	TME 1020 R	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	0,20	TME 1530 R	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				
				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		
		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



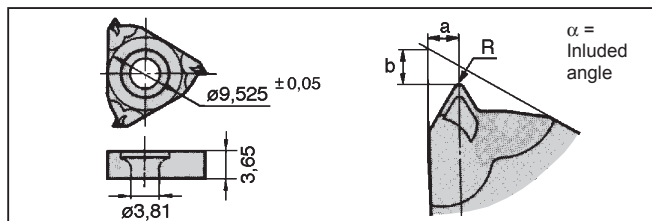
■ Holders with Lever Lock System

Ordering No.	Stock	Dimensions (mm)				
		h	h ₁	b	l ₁	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 ₁	b	l ₁	f
STER 1212	●	12	12	12	100	16
STER 1616	●	16	16	16	100	20

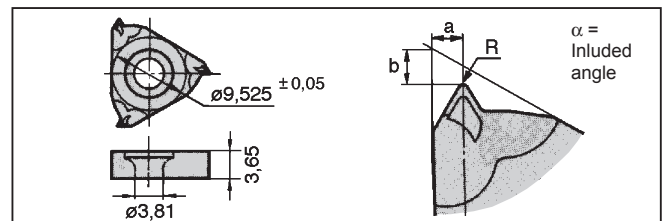
■ Inserts



Ordering No.	Pitch		Coated carbide AC225	Cermet T130A	Dimensions (mm)			
	(mm)	Threads No./inch			R	α	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	-	24~10	●	●	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

■ Inserts



Ordering No.	Pitch		Coated carbide AC225	Cermet T130A	Dimensions (mm)			
	(mm)	Threads No./inch			R	α	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	-	24~10	●	●	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

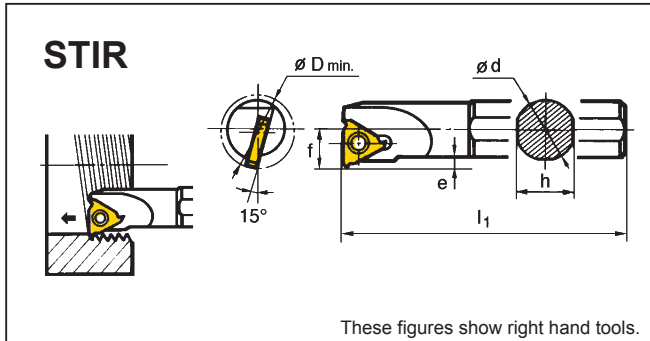
■ Spare Parts

Holder	Lever Pin	Screw	Shim	Rohrstift	Wrench
LTER	LCL3SD	LCS3TE	LSTE31-0 *)	LSP3SD	LH025

*)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.

■ Spare Parts

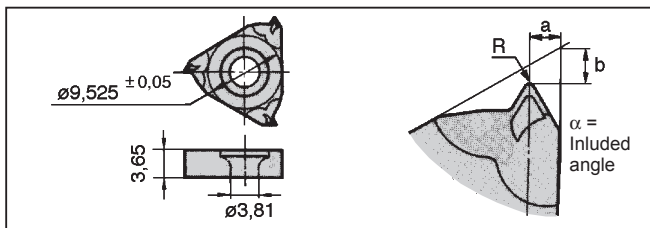
Holder	Screw	Wrench
STER	BFTX03508	TRX 10



■ Holders with Screw on System

Ordering No.	Stock	Dimensions (mm)					
		$\varnothing d$	h	l_1	e	f	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	Cermet	Dimensions (mm)			
	(mm)	Threads No./inch			R	α	a	b
TMI 100 R	1,00	-	●	T130A	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
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
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 ~ G26

G



Selection Guide	Face Mill Series	G2
ISO	Milling Insert Identification Table	G4
General Purpose Face Mills	WGC(F)3000/4000	G6
	UFO4000/5000	G8
	UFOF4000	G9
	EHG4000/5000	G10
	FPG4000/5000	G12
Aluminium Milling	SUMIDIA Face Mill RF Type	G14
	New SUMIDIA Face Mill SRF Type	G15
Grey Cast Iron Milling	SUMIBORON "BN Finish Mill" FMU Type	G16
High Feed Milling	"Metal Slash Mill" MS Type	G18
Shoulder Milling	New CNP(F)13000	G19
	WFM(F)4000 / WFM5000	G20
Special Cutters with Button Inserts	GRC6000	G22
Multi Purpose "Wave Radius Mill" with Polygon Inserts	WRC(F)1200/1600/2000	G24

Milling Cutters

Face Mill Selection Guide

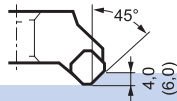
45° Approach Face Mills

WGC 3000 / 4000, WGCF 4000

ø 32 ~ ø 200



- Suitable for high speed machining $v_c > 400\text{m/min}$.
- Tough lightweight cutter body with wide chip pockets
- Improves metal removal rates, flatness, dimensional accuracy, and surface finish.



SEET, SEMT

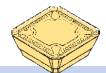
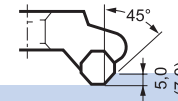
⇒ G6

UFO 4000 / 5000, UFOF 4000

ø 50 ~ ø 315



- Super high rake (27°) multi purpose face mill for outstanding productivity milling steels and cast irons
- Differentially pitched inserts
- Rigid body incorporates carbide locators and HSS shims
- Resulting in extremely run out



SFKN, SFKR

⇒ G8

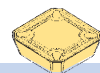
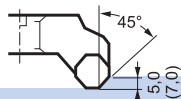
45° Approach Face Mills

EHG 4000 / 5000

ø 50 ~ ø 200



- General purpose face mill with 20° axial rake angle for general milling steels and exotic materials
- High shear cutting action for low powered machines



SEAN, SEKN
SEKR, SEMR

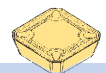
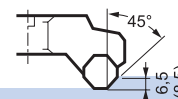
⇒ G10

FPG 4000 / 5000

ø 80 ~ ø 315



- General purpose face for general milling steels and exotic materials
- Excellent chip evacuation



SDEX, SDKN
SDMR

⇒ G12

Milling Cutters

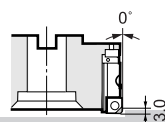
High Speed PCD Face Mill for Aluminium

RF 4000

ø 80 ~ ø 315



- Finishing and roughing aluminium alloys and non-ferrous materials
- High precision and high speed machining $v_c = 5000\text{ m/min}$
- Aluminum alloy body
- Run-out less than 10µm
- Easy assembling



SNEW...NF

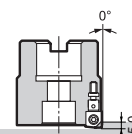
⇒ G14

SRF New

ø 30 ~ ø 63



- High speed finishing aluminium alloys on small machines
- Economical NF type SumiDia inserts
- High speed machining with spindle speed up to $N=20.000\text{ rpm}$
- Easy tool height adjustment



SNEW...NF

⇒ G15

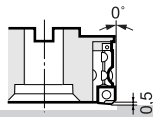
Face Mill Selection Guide

High Speed CBN Finish Mill for Cast Iron

FMU 4000

ø 80 ~ ø 315

- High performance CBN face mill for finishing grey cast iron
- High speed machining $v_c = 1500$ m/min
- Excellent surface roughness $R_z = 3,2$
- Run-out less than $10\mu\text{m}$
- Easy assembling



SNEW

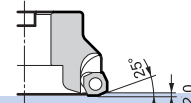
⇒ G16

"Metal Slash" High Feed Face Mills

MS 1400

ø 50 ~ ø 125

- High performance face mills under extreme high feed conditions up to 2 mm/tooth
- The unique 6 mm thick insert with 4 cutting edges



SDMW, SDEW

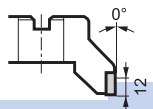
⇒ G18

Square Shoulder Mill

CNP / CNPF 13000 New

ø 40 ~ ø 200

- High performance shoulder mill for steels, stainless steel and cast irons
- Cost saving M class inserts
- Easy handle with side clamping



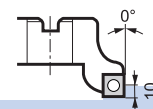
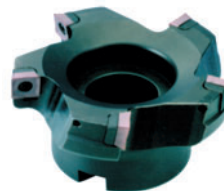
CNMU, CNMQ

⇒ G19

WFM 4000 / 5000, WFMF 4000

ø 50 ~ ø 200

- "Wave Square Shoulder Mill" for steels and irons
- Cost saving M class inserts
- Wave shaped 90° square inserts
- High shear performance
- Efficient metal removal



XDMT

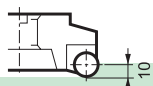
⇒ G20

Face Mill with Round Inserts

GRC 4000

ø 80 ~ ø 250

- Ultra high positive face mill with 25° axial rake angle
- Features button inserts for the machining of stainless steels, heat resistant alloys, titanium based alloys and difficult to cut materials
- Plunge cuts up to 4 mm



RGMN

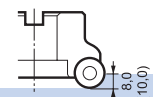
⇒ G22

Face Mill with Polygon Inserts

WRC 1200 / 1600, WRCF 1600 / 2000

ø 40 ~ ø 160

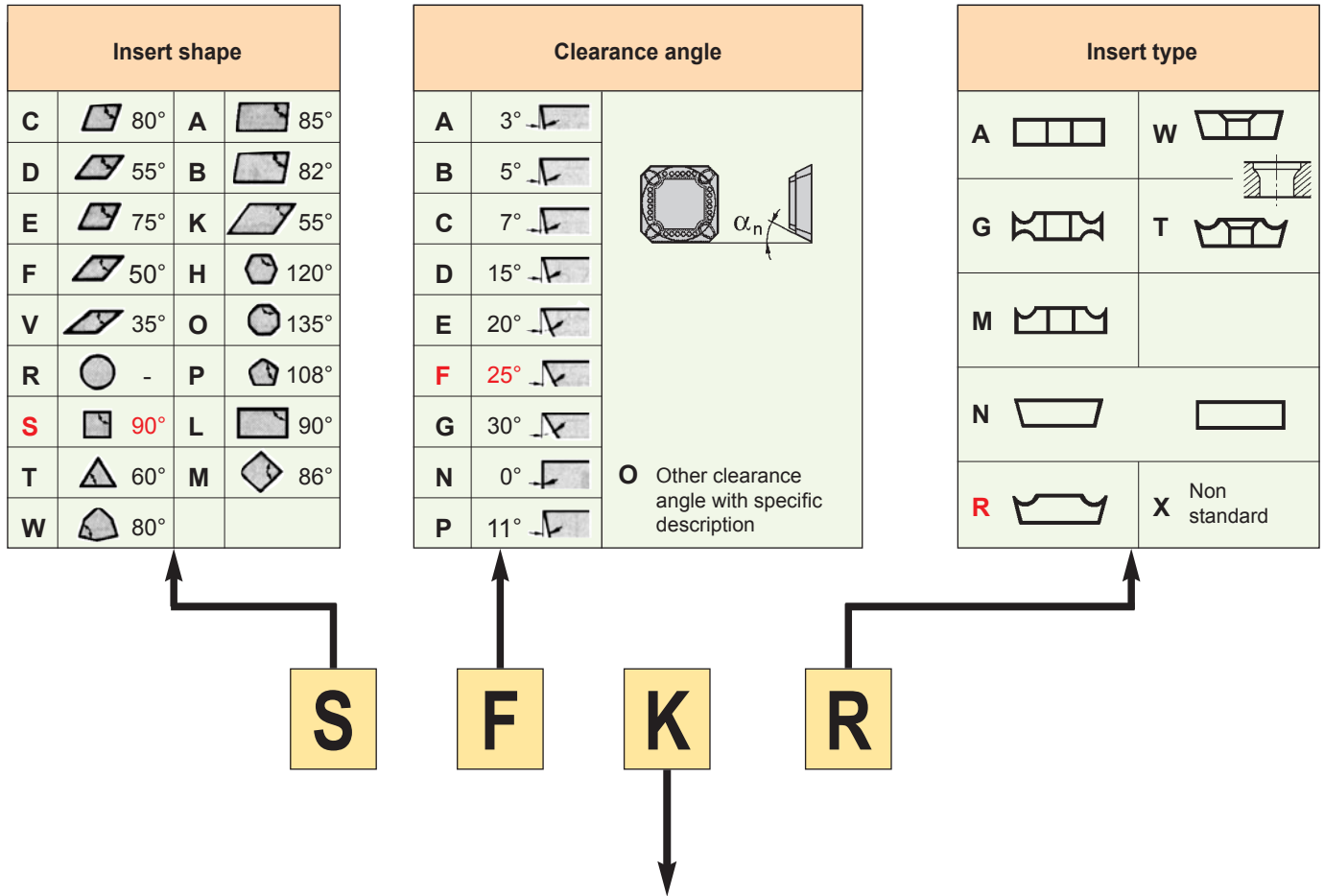
- Multi purpose "Wave Radius Mill"
- Unique 16 corner polygon inserts substantially reduce cutting force
- Vibration-free machining
- Excellent surface finish with integral wiper flat



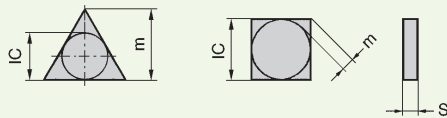
QPMT

⇒ G24

Milling Insert ISO Identification Table



Tolerances



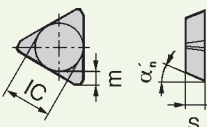
Class	Tolerances (mm)		
	m	IC	s
A	±0,005	±0,025	±0,025
F	±0,005	±0,013	±0,025
C	±0,013	±0,025	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,13

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

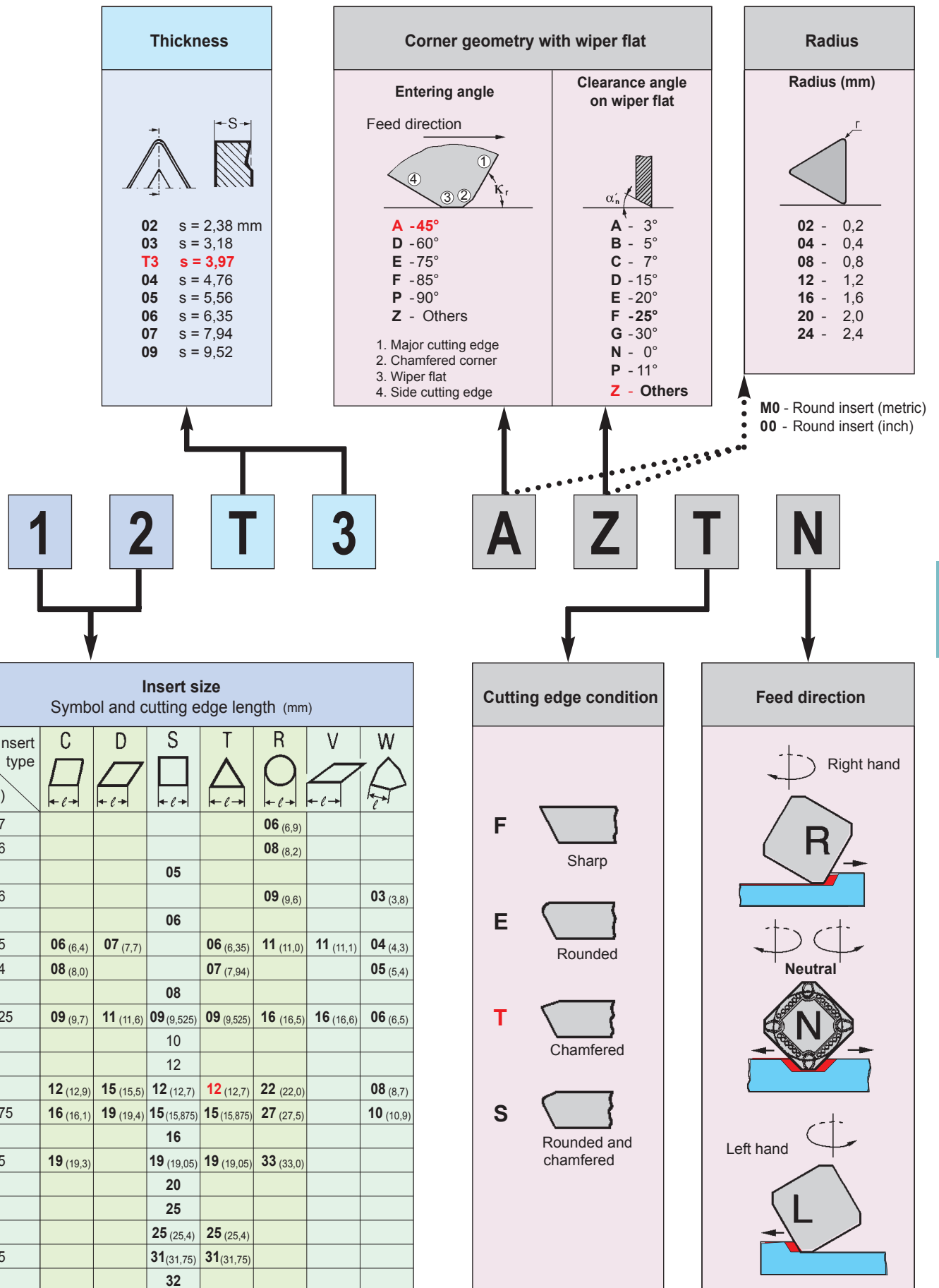
m	S	T	C	W	V	D
6,35					-	
9,525		±0,08			±0,13	±0,11
12,7		±0,13				±0,15
15,875		±0,15				±0,18
19,05		±0,15				±0,18
25,4		±0,18				



Tolerance class for dimension IC

IC	S	T	C	D	V	W	R
6,35							
6,35				±0,05			
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



Face Mill WGC / WGCF Type

General Milling for Steel, Cast Iron & Exotic Material



Fig. 1

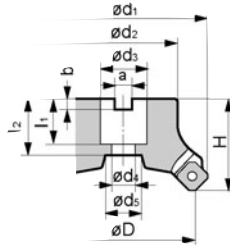


Fig. 2

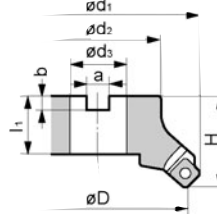
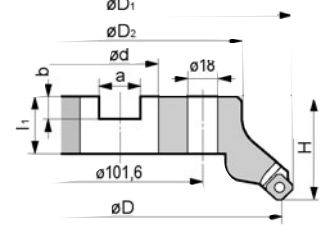


Fig. 3



■ Body

● Standard WGC - Type

Type	Cat. No.	Stock	Dimensions (mm)				Mounting								No. of teeth	Weight (Kg)	Fig.
			ϕD	ϕd_1	ϕd_2	H	a	b	ϕd_3	ϕd_4	ϕd_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	2.	
	WGC 4100 RS	●	100	113	70	50	14,4	8,5	32	-	-	32	-	5	1,5		
	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.		

● Close Pitch WGCF - Type

Type	Cat. No.	Stock	Dimensions (mm)				Mounting								No. of teeth	Weight (Kg)	Fig.
			ϕD	ϕd_1	ϕd_2	H	a	b	ϕd_3	ϕd_4	ϕd_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		3.

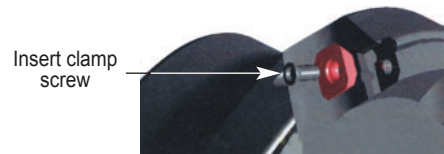
● = Euro stock
○ = Delivery on request

■ Spare Parts

Cutter	Shim	Shim screw	Insert screw	Wrench	Wrench
WGC 3000 RS	-	-	BFTX 0307 IP	TRDR 10 IP	-
WGC/F 4000 RS	WGCS 13 R	BW 0507 F	BFTX 03512 IP	TRDR 15 IP	LH035

■ Structure

● WGC 3000 series

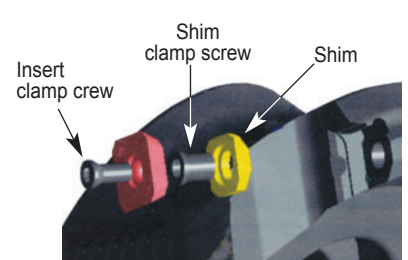


■ Recommended Cutting Conditions

[v_c = m/min, f_t = mm/tooth] [min. - optimum - max.]

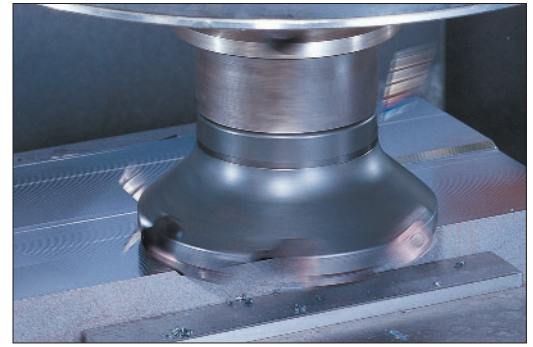
Insert type	Grade	SEET 0903/13T3 AGSN-G					SEET13T3AGFN-L
		ACZ330	ACZ350	ACZ330	ACZ310	H1	
Cutter	Work material	Low carbon steel	Alloy steel	Stainless steel	Die steel	Cast iron	Aluminium alloy
		WGC/F 3000	v_c	180-250-350	150-200-250	160-200-250	100-150-200
f_t	0,1-0,25		0,1-0,2	0,15-0,2	0,15-0,2	0,15-0,2	0,15-0,2
d_{oc}	< 2,0						
WGC/F 4000	v_c	180-250-350	150-200-250	160-200-250	100-150-200	100-200-250	300-500-1000
	f_t	0,1-0,4	0,1-0,3	0,15-0,3	0,15-0,25	0,1-0,3	0,15-0,2
	d_{oc}	< 3,0					

● WGC/F 4000 series



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.	PVD Coated carbide		DLC	Cermet	Uncoated carbide		PCD	Dimensions (mm)			Fig.	
		ACZ310	ACZ330	ACZ350	DL1000	T250A	A30N	EH520	H1	DA2200	I		IC
For WGC/-F 4000 series	SEET 0903 AGFN-L				○			○			9,525 ^{±0,025}	3,18 ^{±0,025}	1.
	SEET 0903 AGSN-G	○	○	○		○		○					
	SEET 0903 AGSN-N	○	○	○		○							
	SEMT 0903 AGSN-L	○	○	○							9,525 ^{±0,05}	3,18 ^{±0,13}	1.
	SEMT 0903 AGSN-G	○	○	○			○						
	SEET 13T3 AGFN-L			○	○			○	●		13,4 ^{±0,025}	3,97 ^{±0,025}	
	SEET 13T3 AGSN-G	●	●	●		○		●	●				
	SEET 13T3 AGSN-N	○	○	○		○	○				13,4 ^{±0,08}	3,97 ^{±0,13}	
	SEMT 13T3 AGSN-L	●	●	●									
	SEMT 13T3 AGSN-G	●	●	●			○						
SEMT 13T3 AGSN-H	●	●	●										
SECW 13T3 AGTN-N-NF									○	13,4 ^{±0,025}	3,97 ^{±0,025}	2.	
XEEW 13T3 AGFR-W-NF									○				
XEEW 13T3 AGER-W	○				○						3,97 ^{±0,025}	3.	

● = Euro stock
○ = Delivery on request

Specifications

Approach angle: 45°
Axial rake angle: +20° ~ +22°
(+20°)
Radial rake angle: -20° ~ -24°
(-10° ~ -19°)

0,03mm

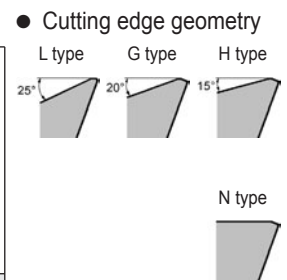
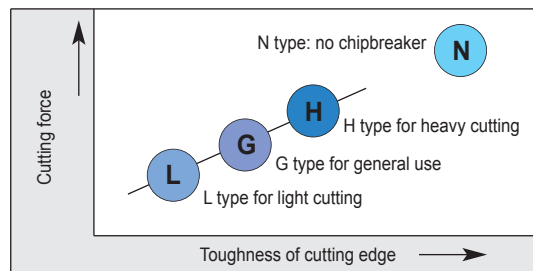
Max. depth of cut: 6 mm (4 mm)

0,02mm

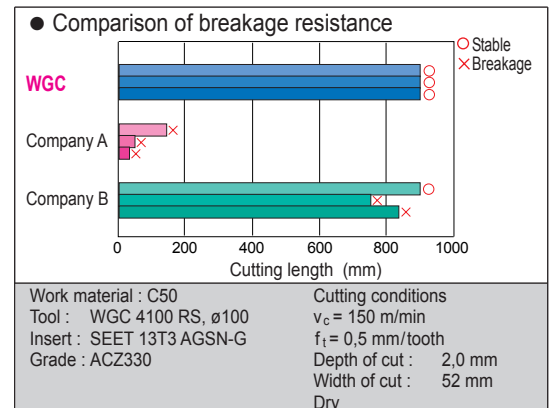
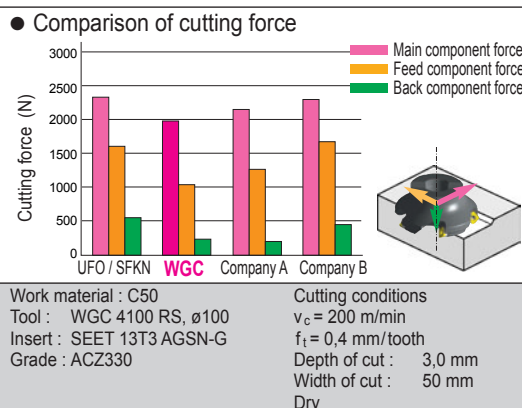
Run-out with M class insert SEMT13T3

() shows WGC 3000 type

Chip Breaker System



Performance

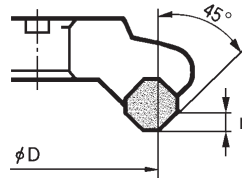


Face Mill UFO / UFOF Type

General Milling for Steel, Cast Iron & Exotic Material



Specifications



Approach angle: 45°
 Axial rake angle: +27°
 Radial rake angle: -7°
 (-10° for ø 50 and ø 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	ø D	ø d ₁	ø d ₂	H	ø 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	5		1,6	
	UFO 4080 R/L-S	●		80	103	60	50	27	12,4	7,0	25	5		2,1	
	UFO 4100 R/L-S	●		100	122	75	50	32	14,4	8,5	29	6		2,9	
	UFO 4125 R/L-S	●		125	146	75	63	40	16,4	9,5	29	7		4,2	
	UFO 4160 R/L-S	●		160	180	100	63	40	16,4	9,5	29	9		6,6	3.
	UFO 4200 R/L-S	●		200	220	130	63	60	25,7	14,0	32	11		9,5	4.
	UFO 4250 R/L-S	●		250	270	300	63	60	25,7	14,0	40	13		14,8	5.
UFO 4315 R/L-S	●		315	335	240	80	60	25,7	14,0	40	15	26,6			
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	6		2,9	2.
	UFO 5125 R/L-S	●		125	143	75	63	40	16,4	9,5	29	7		4,2	
	UFO 5160 R/L-S	●		160	177	100	63	40	16,4	9,5	29	9		6,6	3.
	UFO 5200 R/L-S	●		200	217	130	63	60	25,7	14,0	32	11		9,5	4.
	UFO 5250 R/L-S	●		250	267	200	63	60	25,7	14,0	40	13		14,8	
	UFO 5315 R/L-S	●		315	332	240	80	60	25,7	14,0	40	15		26,6	5.

● = Euro stock

Fig. 1

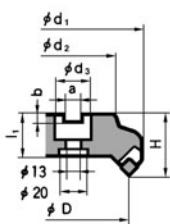


Fig. 2

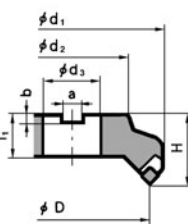


Fig. 3

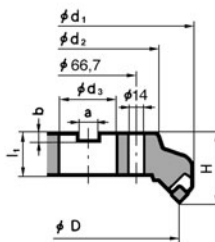


Fig. 4

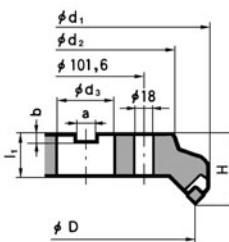
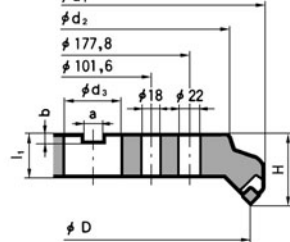


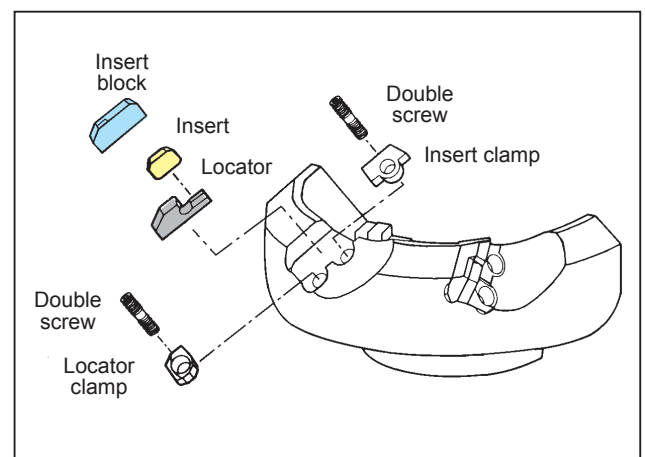
Fig. 5



Spare Parts

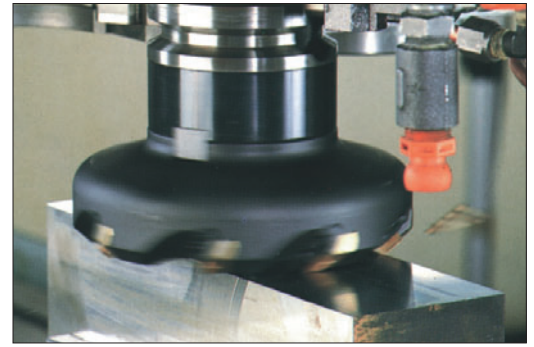
Cutter	Locator	Insert block	Insert clamp
4050 - 4063	UF 4 K R/L	S-UF 4 S R/L	UFTW R/L
4080 - 4315	UF 4 K R/L	UF 4 S R/L	
5080 - 5315	UF 5 K R/L	UF 5 S R/L	
Cutter	Locator clamp	Double screw	Wrench
4050 - 4063	UFWK R/L	WB 7-15 T	TT 25
4080 - 4315			
5080 - 5315			

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 (Close Pitch Type)

Type	Cat. No.	Stock		Dimensions (mm)				Mounting			No. of teeth	max. depth of cut	Weight (Kg)	Fig.
		R	L	∅ D	∅ d ₁	∅ d ₂	H	∅ d ₃	a	b				
UFOF 4000	UFOF 4080 R/L-S	●		80	103	60	50	27	12,4	7,0	25	5,0	2,1	1.
	UFOF 4100 R/L-S	●		100	122	75	50	32	14,4	8,5	29		2,9	
	UFOF 4125 R/L-S	●		125	146	75	63	40	16,4	9,5	29		4,2	2.
	UFOF 4160 R/L-S	●		160	180	100	63	40	16,4	9,5	29		6,6	
	UFOF 4200 R/L-S	●		200	220	130	63	60	25,7	14,0	32		9,5	4.
	UFOF 4250 R/L-S	●		250	270	300	63	60	25,7	14,0	40		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														
			Coated carbide			Cermet		Carbide			Dimensions (mm)			Fig.					
UFO 4000	UFOF 4000	Cat. No.	AC211	AC230	AC325	ACZ310	ACZ330	ACZ350	EH20Z	T130Z	T130A	T250A	A30N		G10E	H10E	I	IC	s ^{±t}
		12 T3	SFKN 12T3 AZFN	●			●							●	●	12,7 ^{±0,075}	3,97 ^{±0,025}	1.	
			SFKN 12T3 AZTN		●	●		●	●		●	●	●	●					12,7 ^{±0,05}
			SFKR 12T3 AZTN		●	●		○						●			16	12,2	3.
			UW 12500 R													●			
UFO 5000	15 04	SFKN 1504 AZFN	●				○		○					●	○	15,875 ^{±0,075}	4,76 ^{±0,025}	1.	
		SFKN 1504 AZTN		●	●						○								
		UW 15500 R													○	20	15,3	3.	

● = Euro stock
○ = Delivery on request

■ Recommended Cutting Conditions

Cutting speed = v_c (m/min), Feed = f_t (mm/tooth)

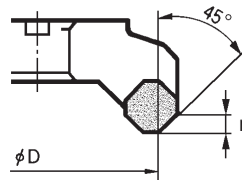
Work material		Low carbon steel (H _B 150)	Alloy/carbon steel (H _B 280)	Stainless steel (X5CrNi1810)	Die steel (H _B 280~350)	Cast iron (GG25)	Aluminium alloy
AC230	v _c	100 ----- 320	100 ----- 300	120 ----- 200	80 ----- 230		
AC325	v _c	100 ----- 280	100 ----- 250	120 ----- 200	80 ----- 150		
ACZ310	v _c					80 ----- 250	
ACZ330	v _c	100 ----- 280	100 ----- 250	120 ----- 230	80 ----- 220		
ACZ350	v _c	100 ----- 220	80 ----- 200	80 ----- 180	80 ----- 150		
EH20Z	v _c		30 ----- 60 (Ti, Ni, Co) f _{0.2}	50 ----- 200			
T250A	v _c	100 ----- 290	100 ----- 250	80 ----- 230	80 ----- 180 (f _{0.2})		
A30N	v _c	60 ----- 150	60 ----- 120	60 ----- 100	60 ----- 100 (f _{0.2})		
AC211	G10E	v _c				150 ----- 250	80 ----- 150
Feed rate: f _t		0,1 ----- 0,4	0,1 ----- 0,3	0,1 ----- 0,3	0,1 ----- 0,25	0,1 ----- 0,3	0,1 ----- 0,3

Face Mill EHG Type

General Milling for Steel and Hard-to-Cut Material



Specifications



Approach angle: 45°
Axial rake angle: + 20°
Radial rake angle: - 3°

max depth of cut: 5,0 mm (EHG 4000 type)
7,0 mm (EHG 5000 type)

Body

Type	Cat. No.	Stock		Dimensions (mm)				Mounting			No. of teeth	max. depth of cut	Weight (Kg)	Fig.	
		R	L	ø D	ø d ₁	ø d ₂	H	ø d ₃	a	b					l ₁
EHG 4000	EHG 4050 R/L-S	●		50	65	45	50	22	10,4	6,2	20	5,0	0,7	1.	
	EHG 4063 R/L-S	●		63	78	50	50	22	10,4	6,2	20				1,0
	EHG 4080 R/L-S	●		80	95	60	50	27	12,4	7,0	25				1,3
	EHG 4100 R/L-S	●		100	114	70	50	32	14,4	8,5	29				1,9
	EHG 4125 R/L-S	●		125	138	80	63	40	16,4	9,5	29				3,5
	EHG 4160 R/L-S	●		160	173	100	63	40	16,4	9,5	29				5,1
	EHG 4200 R/L-S	●		220	213	130	63	60	25,7	14,0	38				7,4
EHG 5000	EHG 5080 R/L-S			80	100	60	50	27	12,4	7,0	25	7,0	1,3	1.	
	EHG 5100 R/L-S			100	118	70	50	32	14,4	8,5	29				1,9
	EHG 5125 R/L-S			125	143	80	63	40	16,4	9,5	29				3,5
	EHG 5160 R/L-S			160	178	100	63	40	16,4	9,5	29				5,1
	EHG 5200 R/L-S			200	218	130	63	60	25,7	14,0	38				7,4

● = Euro stock

Fig. 1

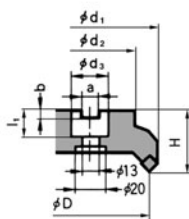


Fig. 2

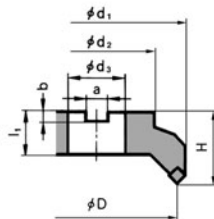


Fig. 3

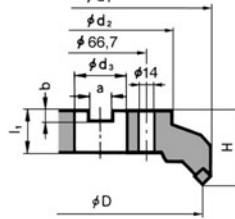
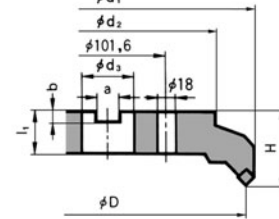


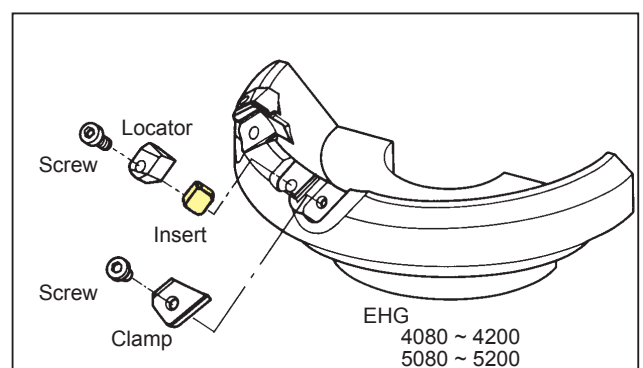
Fig. 4



Spare Parts

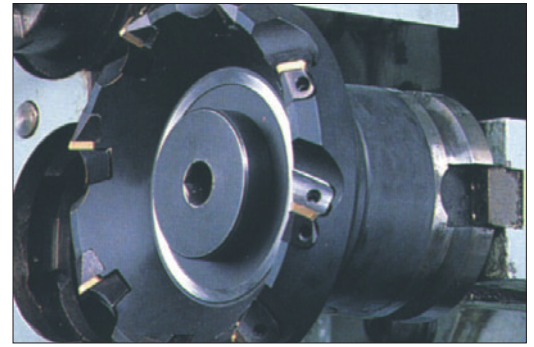
Cutter	-	Clamp	Double screw	Wrench
4050 - 4063	-	EA03031BW-R	WB 7-15 T	TT 25
Cutter	Locator	Clamp	Clamp screw	Wrench
4080 - 4200	EHK 4 R	EHW 4 R	EHBX 0512	TH 040
5080 - 5200	EHK 5 R	EHW 5 R		

Structure



■ Features

- 45° approach face mills
- General purpose face mill with 20° axial rake angle
- High shear cutting action for low powered machines
- Accepts standard ISO designation inserts



■ Insert

		SEAN, SEKN		SEKR, SEMR		Fig. 1		Fig. 2									
EHG 4050 & 4063	12 04	Cat. No.		Coated carbide						Cermet		Carbide		Dimensions (mm)			Fig.
		AC211	AC230	AC325	ACZ310	ACZ350	EH20Z	T130Z	T130A	T250A	A30N	G10E	I = IC ±a	B ±b	s ±t		
	12 04	SEKN 1204 AZ	•	•	•	•				•	•	12,7 ±0,075	±0,013	4,76 ±0,025	1.		
		SEKR 1204 AFTN		•									12,7 ±0,05	±0,08	4,76 ±0,05	2.	
		SEMR 1204 AFTN		•									12,7 ±0,05	±0,08	4,76 ±0,05	2.	
	12 03	SEAN 1203 AFN	•									12,7 ±0,025	±0,013	3,18 ±0,025	1.		
		SEAN 1203 AFTN		•	•				•	•		12,7 ±0,075					
		SEKN 1203 AFN	•			•	•										
		SEKN 1203 AFTN		•	•		•	•		•	•		12,7 ±0,075	±0,08	3,18 ±0,05	2.	
		SEKR 1203 AFEN		•							•						
		SEKR 1203 AFTN		•				•									
		SEMR 1203 AFEN		•													
SEMR 1203 AFTN		•	•						•		12,7 ±0,05						
	15 04	SEKN 1504 AFN	•								•	15,875 ±0,025	±0,013	4,76 ±0,025	1.		
		SEKN 1504 AFTN		•	•					•	•	15,875 ±0,025	±0,013	4,76 ±0,025	1.		

• = Euro stock

Milling Cutters

■ Recommended Cutting Conditions

Cutting speed = v_c (m/min), Feed = f_t (mm/tooth)

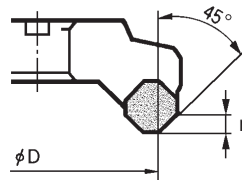
Work material		Low carbon steel (H _B 150)	Alloy/carbon steel (H _B 280)	Stainless steel (X5CrNi1810)	Die steel (H _B 280~350)	Cast iron (GG25)	Aluminium alloy
Insert grade							
AC230	v_c	100 ----- 320	100 ----- 300	120 ----- 200	80 ----- 230		
AC325	v_c	100 ----- 280	100 ----- 250	120 ----- 200	80 ----- 150		
ACZ310	v_c					80 ----- 250	
ACZ350	v_c	100 ----- 220	80 ----- 200	80 ----- 180	80 ----- 150		
EH20Z	v_c		30 ----- 60 (Ti, Ni, Co) f• 0,2	50 ----- 200			
T250A	v_c	100 ----- 290	100 ----- 250	80 ----- 230	80 ----- 180 (f• 0,2)		
A30N	v_c	60 ----- 150	60 ----- 120	60 ----- 100	60 ----- 100 (f• 0,2)		
AC211	G10E	v_c				150 ----- 250	80 ----- 150
Feed rate: f_t		0,1 ----- 0,4	0,1 ----- 0,3	0,1 ----- 0,3	0,1 ----- 0,25	0,1 ----- 0,3	0,1 ----- 0,3

Face Mill FPG Type

General Milling for Steel and Hard-to-Cut Material



Specifications



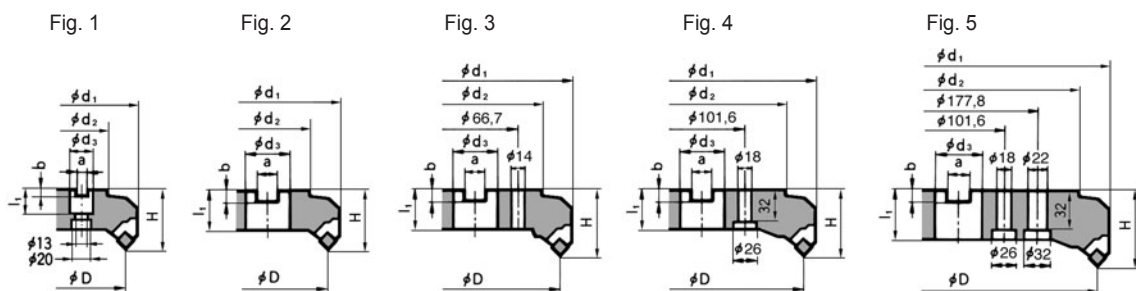
Approach angle: 45°
 Axial rake angle: + 15°
 Radial rake angle: - 4°
 max depth of cut: 6,5 mm (FPG 4000 type)
 8,5 mm (FPG 5000 type)

Body

Type	Cat. No.	Stock		Dimensions (mm)				Mounting				No. of teeth	max. depth of cut	Weight (Kg)	Fig.
		R	L	ø D	ø d ₁	ø d ₂	H	ø d ₃	a	b	l ₁				
FPG 4000	FPG 4080 R/L-S	●		80	105	60	50	27	12,4	7,0	25	4	6,5	1,6	1.
	FPG 4100 R/L-S	●		100	124	70	50	32	14,4	8,5	29	5		2,5	2.
	FPG 4125 R/L-S	●		125	148	80	63	40	16,4	9,5	29	6		4,4	3.
	FPG 4160 R/L-S	●		160	182	100	63	40	16,4	9,5	29	8		6,2	4.
	FPG 4200 R/L-S	●		200	222	130	63	60	25,7	14,0	38	10		9,0	5.
	FPG 4250 R/L-S	●		250	271	130	63	60	25,7	14,0	38	12		14,4	
	FPG 4315 R/L-S	○		315	336	240	80	60	25,7	14,0	40	14		27,6	
FPG 5000	FPG 5080 R/L-S	●		80	105	60	50	27	12,4	7,0	25	4	8,5	1,6	1.
	FPG 5100 R/L-S	●		100	124	70	50	32	14,4	8,5	29	5		2,5	2.
	FPG 5125 R/L-S	●		125	148	80	63	40	16,4	9,5	29	6		4,4	3.
	FPG 5160 R/L-S	●		160	182	100	63	40	16,4	9,5	29	8		6,2	4.
	FPG 5200 R/L-S	○		200	222	130	63	60	25,7	14,0	38	10		9,0	5.
	FPG 5250 R/L-S	○		250	271	130	63	60	25,7	14,0	38	12		14,4	
	FPG 5315 R/L-S	○		315	336	240	80	60	25,7	14,0	40	14		27,6	

The same cutter body can be used for both 12,7 mm and 15,875 mm inserts by changing the locators.

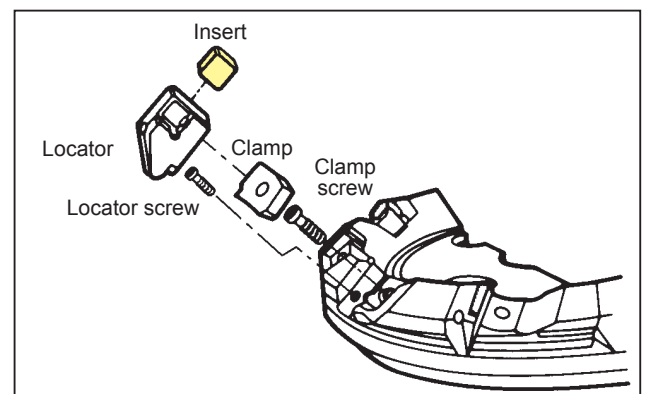
● = Euro stock
 ○ = Delivery on request



Spare Parts

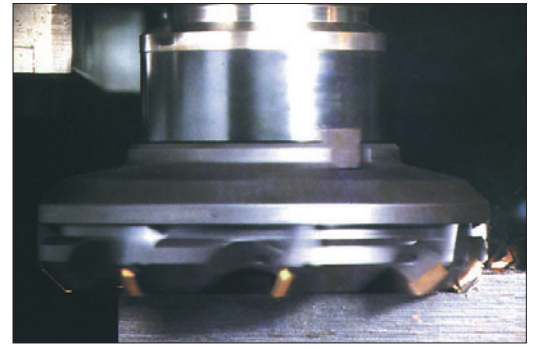
Cutter	Locator	Clamp	Locator screw	Clamp screw
4080 - 4315	LFP 4 R/L	FPW R/L	FBH 0512	FBX 0817
5080 - 5315	LFP 5 R/L			
Cutter	Wrench for locator screw		Wrench for clamp screw	
4080 - 4315	TH 030		TH 040	
5080 - 5315	TH 030		TH 040	

Structure



Features

- 45° approach face mills
- General purpose face mill with interchangeable locators to accommodate 12 and 15 mm inserts
- Excellent chip evacuation



Insert

		SDEX, SDKN		SDMR		Fig. 1		Fig. 2									
FPG 4000	Cat. No.	Coated carbide						Cermet			Carbide		Dimensions (mm)			Fig.	
		AC211	AC230	AC325	ACZ310	ACZ350	EH20Z	T130Z	T130A	T250A	A30N	G10E	$l = IC \pm a$	$B \pm b$	$s \pm t$		
12 03	SDKN 1203 AEN	●	●	●							●	●	●	12,7 ^{±0,075}	±0,013	3,18 ^{±0,025}	1.
	SDMR 1203 AEN		●	○										12,7 ^{±0,05}	±0,08	3,18 ^{±0,025}	2.
15 04	SDKN 1504 AEN	●	●	●								●	●	15,875 ^{±0,075}	±0,013	4,76 ^{±0,025}	1.

● = Euro stock
○ = Delivery on request

Recommended Cutting Conditions

Cutting speed = v_c (m/min), Feed = f_t (mm/tooth)

Work material		Low carbon steel (H _B 150)	Alloy/carbon steel (H _B 280)	Stainless steel (X5CrNi1810)	Die steel (H _B 280~350)	Cast iron (GG25)	Aluminium alloy
AC230	v_c	100 ----- 320	100 ----- 300	120 ----- 200	80 ----- 230		
AC325	v_c	100 ----- 280	100 ----- 250	120 ----- 200	80 ----- 150		
ACZ310	v_c					80 ----- 250	
ACZ350	v_c	100 ----- 220	80 ----- 200	80 ----- 180	80 ----- 150		
EH20Z	v_c		30 ----- 60 (Ti, Ni, Co) f• 0,2	50 ----- 200			
T250A	v_c	100 ----- 290	100 ----- 250	80 ----- 230	80 ----- 180 (f• 0,2)		
A30N	v_c	60 ----- 150	60 ----- 120	60 ----- 100	60 ----- 100 (f• 0,2)		
AC211	G10E	v_c				150 ----- 250	80 ----- 150
Feed rate: f_t		0,1 ----- 0,4	0,1 ----- 0,3	0,1 ----- 0,3	0,1 ----- 0,25	0,1 ----- 0,3	0,1 ----- 0,3

SUMIDIA Face Mill RF Type

High Speed Finishing of Aluminium Alloy

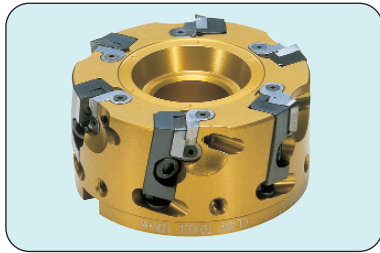


Fig. 1

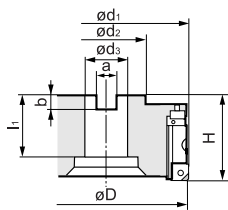


Fig. 2

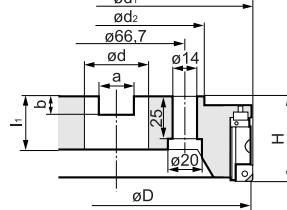
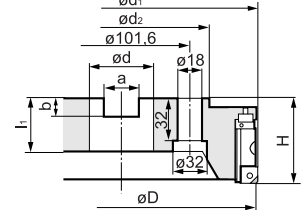


Fig. 3



Body

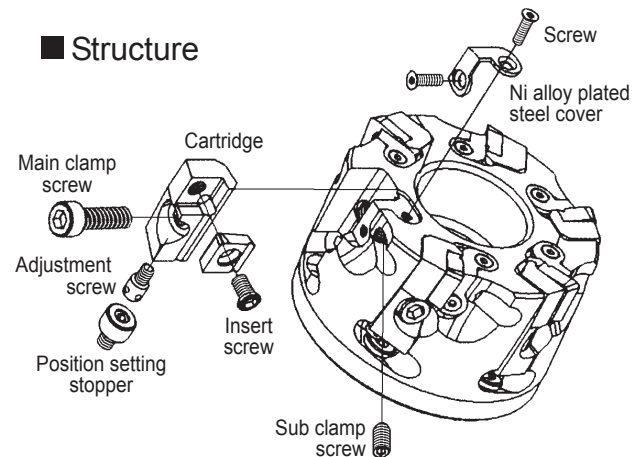
Type	Cat. No.	Stock	Dimensions (mm)				Mounting				Number of teeth	max. depth of cut	Weight (Kg)	Fig.
			ϕD	ϕd_1	ϕd_2	H	ϕd_3	a	b	l_1				
RF 4000	RF 4080 R-S	●	80	82	60	50	27	12,4	7,0	29	6	3,0	0,7	1.
	RF 4100 R-S	●	100	102	75	50	32	14,4	8,5	29	6		1,0	
	RF 4125 R-S	●	125	127	75	63	40	16,4	9,5	29	8		1,6	
	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, cartridges 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	DA2200	●
	PCD insert wiper type SNEW 1204 ADFR-W-NF	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	●

● = Euro stock
○ = Delivery on request

Dummy Blade

	RFD	○
--	------------	---

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

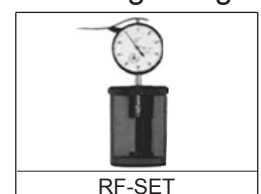
For roughing:

Cartridge **RFR**
Uncoated carbide insert
SDET 1204 ZDFR, grade: H1

Spare Parts

Cover	Position setting stopper	Main clamp screw	Sub clamp screw	Cover clamp screw	Adjustment screw	Insert clamp screw	Hex wrench	Torque wrench
RFC	RFS	BX0620	BTD0510	FBUP2-A0-8	RFJ	BFTX0509N	TH050, TH025, TH015, TH025, TH050	TTX20

Setting Gauge



Dial-gauge is not included.

SUMIDIA Face Mill SRF Type

High Speed Finishing of Aluminium Alloy

New



Fig. 1

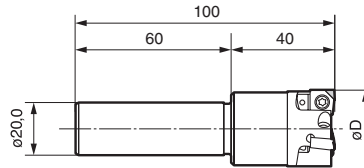
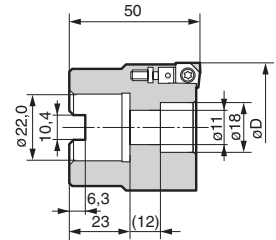


Fig. 2

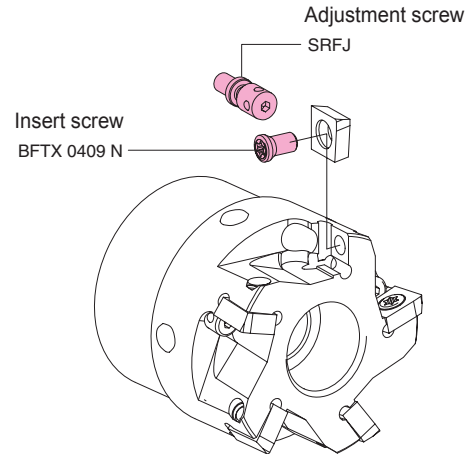


Body

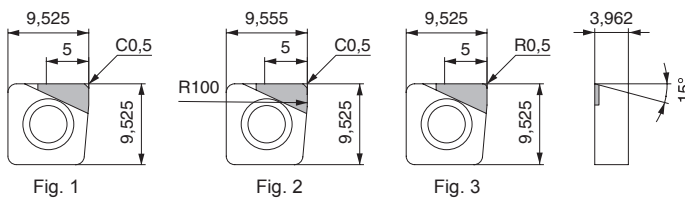
Cat. No.	Stock	ϕD (mm)	No. of teeth	Shape	Weight (Kg)
SRF 30 R-ST	○	30	3	Fig. 1	0,34
SRF 40 R-ST	○	40	4	Fig. 1	0,50
SRF 50 RS	○	50	5	Fig. 2	0,59
SRF 63 RS	○	63	6	Fig. 2	0,67

Inserts are sold separately.
○ = Delivery on request

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	Shape
		DA2200	
SNEW 09T3 ADFR-NF	Standard	●	Fig. 1
SNEW 09T3 ADFR-U-NF	Wiper	●	Fig. 2
SNEW 09T3 ADFR-R-NF	Nose Radius	●	Fig. 3

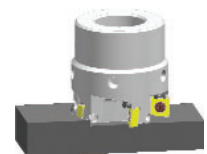
● = Euro stock

- 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 reground 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 reground amount on the same cutter.

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	○	-	-

● Cutting Conditions

Cutter: SRF 50 RS
Insert: SNEW 09T3 ADFR-NF (DA2200)
N: 10.000 rpm
Width: 35mm at D.O.C. indicated above

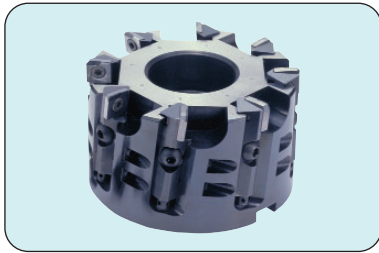


Recommended Cutting Conditions for RF and SRF Type Cutters

Work Material	% of Si	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

■ 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

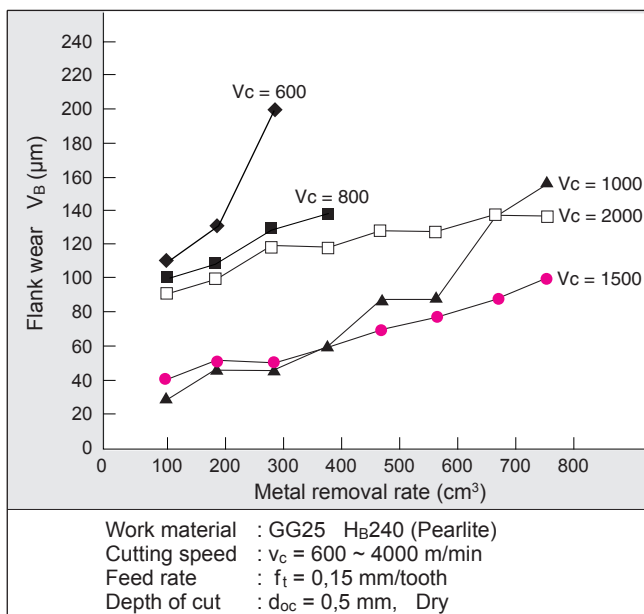
■ Recommended Cutting Conditions

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

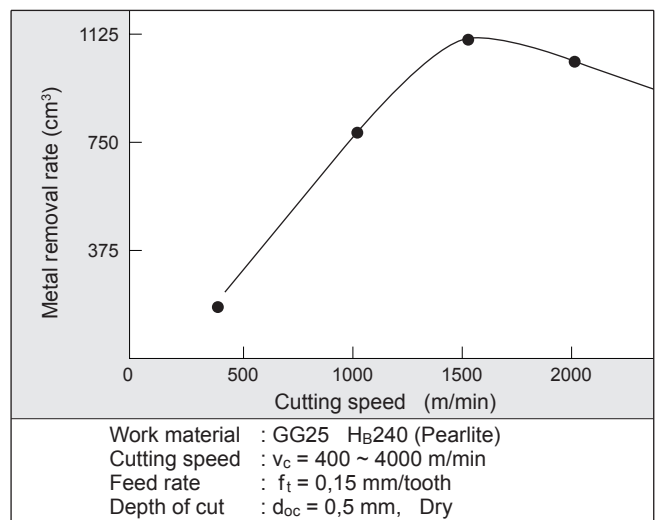


■ Performance

● Tool Life Diagram



● Estimated Tool Life

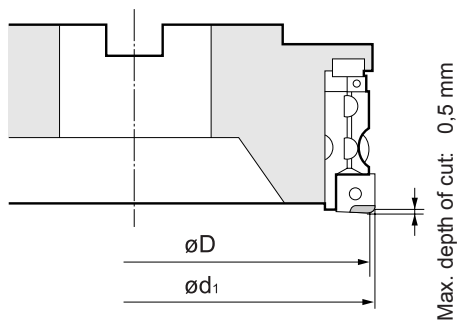


- Milling of ductile cast iron and alloy steel casting do not produce the best results.
- Dry cutting is recommended. Wet cutting will result in chipping of cutting edges in the early stages due to thermal cracking.

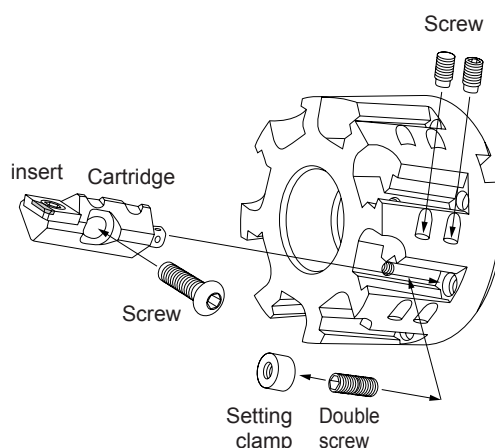
SUMIBORON "BN Finish Mill" FMU Type

Specifications

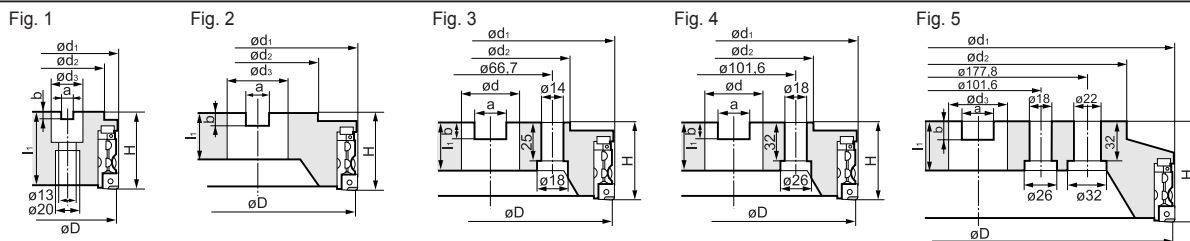
Approach angle: 90°
Axial rake angle: + 8°
Radial rake angle: + 2°



Structure



Body



Type	Cat. No.	Stock		Dimensions (mm)				Mounting				Number of teeth	max. depth of cut	Weight (Kg)	Fig.
		R	L	ø D	ø d ₁	ø d ₂	H	ø d ₃	a	b	l ₁				
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	8		2,4	2.
	FMU 4125 R-S	○		125	127,8	75	63	40	16,4	9,5	29	10		3,4	3.
	FMU 4160 R-S	○		160	162,8	100	63	40	16,4	9,5	29	12		5,6	3.
	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	4.
	FMU 4315 R-S			315	317,8	240	80	60	25,7	14,0	40	28	27,8	5.	

● = Euro stock
○ = Delivery on request

Insert

Cat. No.	Stock		CBN grade	Figure
	R	L		
SNEW 1203 ADT L/R	●	●	BN700	1
SNEW 1203 ADT L/R-S			BN700	2

● = Euro stock

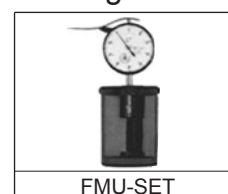
Cartridge

Cartridge	Screw	Adjustment screw	O-ring	Wrench	Wrench
FMUU	BFTX0509N	FMUJ	P3	TRX20	1,8 x 45

Spare Parts

Screw	Screw	Setting clamp	Double screw	Wrench	Wrench	Wrench
BH0620	BTD0609	FMUE	WB5-10	TH040	LH030	LH025

Gauge



Dial-gauge is not included.

"Metal Slash" Mill MS Type

High Feed Milling of Steel, Stainless Steel, Die Steel and Cast Iron



Fig. 1

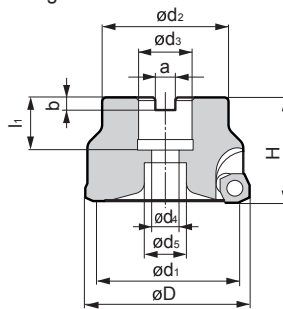
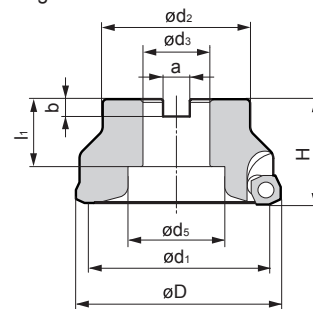


Fig. 2



Body

Type	Cat. No.	Stock	Dimensions (mm)				Mounting						No. of teeth	Plunging α_{max}	Weight (Kg)	Fig.
			ϕD	ϕd_1	ϕd_2	H	a	b	ϕd_3	ϕd_4	ϕd_5	I_1				
MS 14000	MS 14050 RS	○	50	39,12	45	40	10,4	6,2	22	11	18	20	3	1°45'	0,3	1.
	MS 14063 RS	●	63	52,12	59	40	10,4	6,3	22	11	18	20	4	1°00'	0,5	
	MS 14080 RS	●	80	69,12	60	50	12,4	7,0	27	13,5	20	25	5	0°50'	1,0	
	MS 14100 RS	●	100	89,12	70	50	14,4	8,5	32	-	46	32	6	0°30'	1,8	2.
	MS 14125 RS	●	125	114,1	80	63	16,4	9,5	40	-	56	38	7	0°30'	2,7	

● = Euro stock
○ = Delivery on request

Insert

Cat. No.	PVD Coated		CVD Coated	Fig.
	ACZ310	ACZ330	CS3000	
SDMW 1406 ZDTR	●	●	●	1.
SDEW 1406 ZDTR	●	●	●	2.

● = Stock item

● = Stock item

Specifications

Approach angle: 25°
Axial rake angle: + 10°
Radial rake angle: - 5°
Max. depth of cut: 2 mm

"Metal Slash" Mill MS type

- High performance face mills under extreme high feed conditions up to 2 mm/tooth



- The unique 6 mm thick insert with 4 cutting edges
- Centre Screw locking
- Plunge cut possible



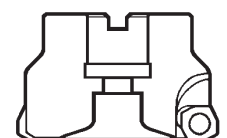
Recommended Cutting Conditions

ϕD (mm)	Material	Carbon steel	Die steel	Stainless steel	Cast iron
		v_c	150-200-250	100-150-200	160-180-200
63 ~ 125	f_t	~ 2,0	~ 1,5	~ 1,0	~ 1,5
	d_{oc}	~ 1,5	~ 1,5	~ 1,5	~ 2,0
Grade		ACZ330,CS3000	ACZ330,ACZ310	ACZ330,CS3000	ACZ330,ACZ310

[v_c = m/min, f_t = mm/tooth] [min. - optimum - max.]

Spare Parts

Cutter	Screw	Wrench
MS 14000 RS	BFTX 0513 N	TRT 820

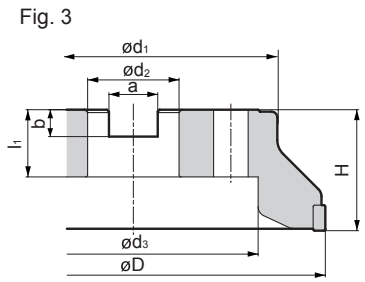
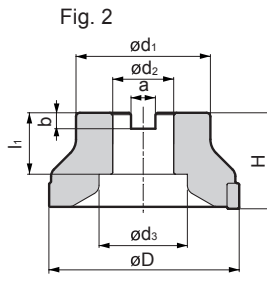
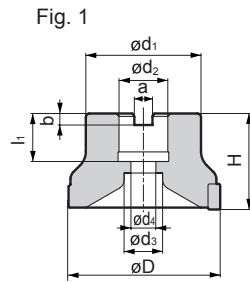


Shoulder Mill CNP / CNPF Type

Shoulder Milling for Steel, Stainless Steel & Cast Iron

Approach angle : 90°
Axial rake angle : +10° ~ 17°
Radial rake angle : +10° ~ 16°

New



Body (Standard, CNP Type)

Type	Cat. No.	Stock	Dimensions (mm)			Mounting						Number of teeth	max. depth of cut	Weight (Kg)	Fig.
			ϕD	ϕd_1	H	ϕd_2	ϕd_3	ϕd_4	a	b	l_1				
CNP13000	CNP 13040 RS	●	40	36	40	22	14	9	8,4	5,6	18	12,0	0,4	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			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 (Close Pitch, CNPF Type)

CNPF13000	CNPF 13063 RS	●	63	40	40	22	18	11	10,4	6,3	20	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			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			

Remark: Inserts are not included. ● = Euro stock

Inserts



Remarks:
-G: General purpose
-H: Strong cutting edge

Fig. 1

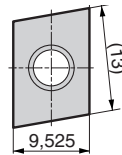
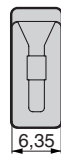
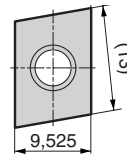


Fig. 2



Cat. No.	Tolerance Class	Nose Radius	PVD Coated			CVD Coated		Fig.
			ACZ310	ACZ330	ACZ350	AC230		
CNMU 130608 N-G	M	0,8	●	●	●	●	1	
CNMU 130608 N-H	M	0,8	●	●	●	●	1	
CNMQ 130608 N	M	0,8	●	●	●	●	2	
CNMQ 130616 N	M	1,6	●	●	●	●	2	
CNEQ 130608 N	G	0,8	●	●	●	●	2	

Recommended Cutting Conditions

Material	Cutting Speed (m/min)	Feedrate (mm/tooth)	D.O.C. (mm)	Grade
Low Carbon Steel	200 ~ 300	0,2 ~ 0,4	~ 10	ACZ330
Carbon Steel	150 ~ 250	0,2 ~ 0,4	~ 10	ACZ330
Alloy Steel	100 ~ 230	0,15 ~ 0,35	~ 10	ACZ330
Die Steel	100 ~ 200	0,15 ~ 0,3	~ 10	ACZ330
Stainless Steel	150 ~ 300	0,15 ~ 0,25	~ 10	ACZ330, ACZ350
Cast Iron	100 ~ 250	0,2 ~ 0,4	~ 10	ACZ310

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.

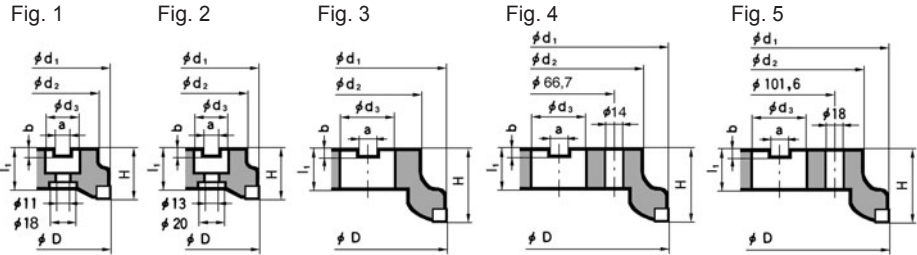
Spare Parts

Cutter	Screw	Wrench
CNP-(F) 13000	BFTX 0412 N	TTX 15 W

Milling Cutters

"Wavemill" WFM / WFMF Type

Shoulder Milling for Steel, Stainless Steel, Die Steel & Cast Iron



■ Body ● Standard Type

Type	Cat. No.	Stock		Dimensions (mm)				Mounting				No. of teeth	max. depth of cut	Weight (Kg)	Fig.									
		R	L	ø D	ø d ₁	ø d ₂	H	ø d ₃	a	b	l ₁													
WFM 4000	WFM 4080 R/L-S	●		80	78	60	50	27	12,4	7,0	25	4	10,0	1,0	2.									
	WFM 4100 R/L-S	●		100	98	70	50	32	14,4	8,5	29					5	1,5	3.						
	WFM 4125 R/L-S	●		125	123	80	63	40	16,4	9,5	29								6	2,6	4.			
	WFM 4160 R/L-S	●		160	158	100	63	40	16,4	9,5	29											8	4,6	5.
	WFM 4200 R/L-S	○		200	198	130	63	60	25,7	14,0	32													
WFM 5000	WFM 5080 R/L-S			80	78	60	50	27	12,4	7,0	25	4	12,0	1,0	2.									
	WFM 5100 R/L-S	●		100	98	70	50	32	14,4	8,5	29					5	1,5	3.						
	WFM 5125 R/L-S	●		125	123	80	63	40	16,4	9,5	29								6	2,6	4.			
	WFM 5160 R/L-S	●		160	158	100	63	40	16,4	9,5	29											8	4,6	5.
	WFM 5200 R/L-S	●		200	198	130	63	60	25,7	14,0	32													

● Close Pitch Type

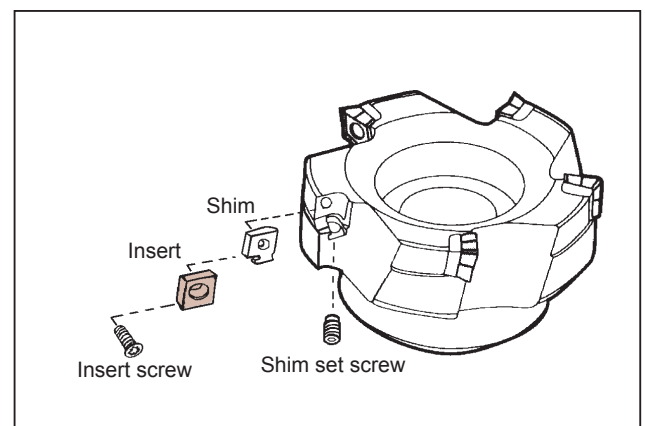
Type	Cat. No.	Stock		Dimensions (mm)				Mounting				No. of teeth	max. depth of cut	Weight (Kg)	Fig.														
		R	L	ø D	ø d ₁	ø d ₂	H	ø d ₃	a	b	l ₁																		
WFMF 4000	WFMF 4050 R/L-S	●		50	47	40	40	22	10,4	6,3	27	4	10,0	0,7	1.														
	WFMF 4063 R/L-S	●		63	60	50	40	22	10,4	6,3	27					5	0,8	2.											
	WFMF 4080 R/L-S	●		80	78	60	50	27	12,4	7,0	25								6	1,0	3.								
	WFMF 4100 R/L-S	●		100	98	70	50	32	14,4	8,5	29											7	1,5	4.					
	WFMF 4125 R/L-S	●		125	123	80	63	40	16,4	9,5	29														8	2,5	5.		
	WFMF 4160 R/L-S	●		160	158	100	63	40	16,4	9,5	29																	10	4,5
	WFMF 4200 R/L-S	○		200	198	130	63	60	25,7	14,0	32																		

● = Euro stock
○ = Delivery on request

■ Spare Parts for WFM and WFMF

Cutter	Shim	Insert screw	Insert wrench
4050 - 4063	—	BFTX 0409 N	TRD 15
4080 - 4200	WFMS 4 R/L	BFTX 0414	
5080 - 5200	WFMS 5 R/L	BFTX 0515 N	
Cutter	Shim set screw		Shim set wrench
4080 - 4200	BT 0506		TH 025
5080 - 5200			

■ Structure



■ Features

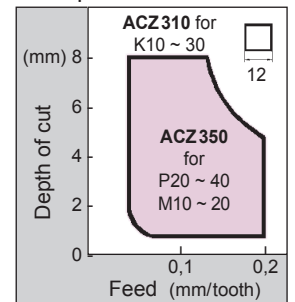
- "Wave Mill" square shoulder milling cutter
- Cost saving M class inserts
- Four wave formed cutting edges
- High shear performance
- Efficient metal removal
- New ZX coated inserts for steels and irons



■ Insert for WFM and WFMF

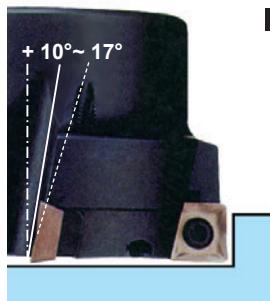
Cutter	Cutter Code	Cat. No.	Coated carbide				Cermet		Carbide		Fig.
			AC230	ACZ310	ACZ330	ACZ350			A30N	G10E	
			WFM 4000 WFMF 4000	12 04	XDMT 120408 PDEN	●	●	●	●		
WFM 5000 WFMF 5000	15 04	●				●					2.

■ Optimal Feed and Depth of Cut



● = Euro stock
○ = Delivery on request

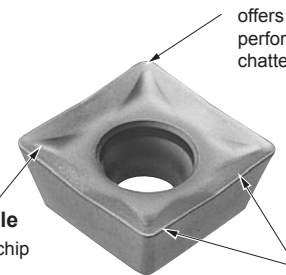
■ Specifications



Approach angle : 90°
Axial rake angle : + 10° ~ 17°
Radial rake angle : + 10° ~ 16°

max. depth of cut:
10,0 mm (WFM 4000 type)
12,0 mm (WFM 5000 type)

3D dimple
excellent chip control



Wave cutting edge with high rake angle

offers a stable cutting performance and eliminates chatter

Stable negative land
increase toughness and strength of the cutting edge

■ Recommended Cutting Conditions

Cutting speed = v_c (m/min), Feed = f_t (mm/tooth)

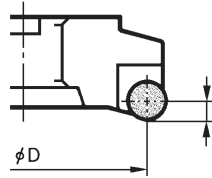
Work material		Low carbon steel (H _B 150)	Alloy/carbon steel (H _B 280)	Stainless steel (X5CrNi1810)	Die steel (H _B 280~350)	Cast iron (GG25)	Aluminium alloy	
ACZ310	v_c				60 100	80 220		
AC230	v_c	80 150	100 150	80 150	60 100			
ACZ330	v_c	80 150	100 150		60 100			
ACZ350	v_c	80 150	100 150	80 180				
A30N	v_c	80 150	100 150	80 150	60 100			
G10E	v_c					80 150	100 450	
Feed rate:	f_t	0,1 0,2				0,1 0,25		
Depth of cut:	d_{oc}	< 8,0 with WFM 4000 (< 12,0 with WFM 5000)		< 5,0 (< 7,0)		< 8,0 (< 12,0)		

Face Mill GRC Type

Milling for Stainless Steel, Die Steel & Hard-to-Cut Material



Specifications



Axial rake angle: + 25°
Radial rake angle: + 10°

max depth of cut: 10,0 mm

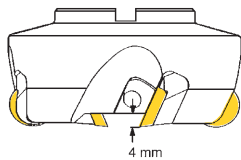
Body

Type	Cat. No.	Stock		Dimensions (mm)				Mounting				No. of teeth	max. depth of cut	Weight (Kg)	Fig.	
		R	L	∅ D	∅ d ₁	∅ d ₂	H	∅ d ₃	a	b	l ₁					
GRC 6000	GRC 6080 R/L-S	●		80	100	60	50	27	12,4	7,0	25	4	10,0	0,9	1.	
	GRC 6100 R/L-S	●		100	119	70	50	32	14,4	8,5	29			1,3		
	GRC 6125 R/L-S	●		125	143	80	63	40	16,4	9,5	29			2,4	2.	
	GRC 6160 R/L-S	●		160	177	100	63	40	16,4	9,5	29			4,0		
	GRC 6200 R/L-S			200	216	130	63	60	25,7	14,0	32			10	6,8	4.
	GRC 6250 R/L-S			250	265	130	63	60	25,7	14,0	38			12	11,3	

● = Euro stock

Milling Cutters

Plunging



Up to 4 mm possible

Fig. 1

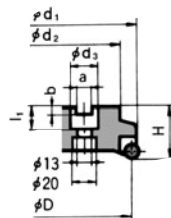


Fig. 2

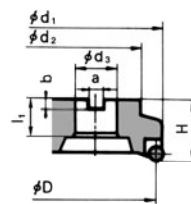


Fig. 3

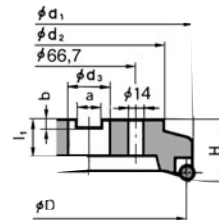
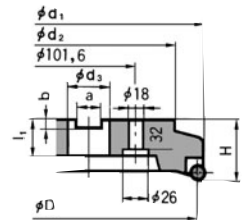


Fig. 4

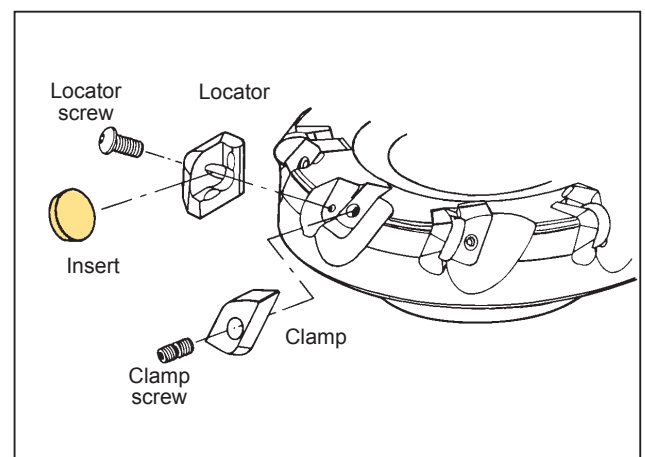


Spare Parts

Cutter	Locator	Clamp	Clamp screw	Locator screw
GRC...R/L-S	GRK R/L-S	GRW R/L-S	WB 8-22T	BH 0410 T
Cutter	Wrench for clamp screw			
GRC...R/L-S	TT27			

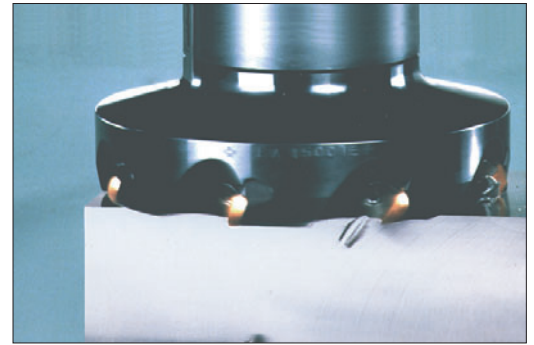
Note: Wrench (TRX15) for locator screw (BH0410T) is not included.

Structure



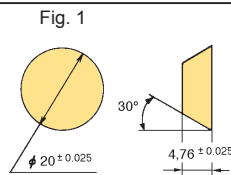
Features

- Ultra high positive face mill with 25° axial rake angle
- Features button inserts for the machining of stainless steels, heat resistant alloys, titanium based alloys and difficult to cut materials
- Plunge cuts up to 4 mm
- Edge preparation suited to specific materials



Inserts

Cat. No.	Coated carbide					Cermet			Carbide			Fig.
	AC230	ACZ310	ACZ330	ACZ350	EH20Z				A30N			
RGMN 2004 SN-S												1.
RGMN 2004 SN-I					●							
RGMN 2004 SN-T	●							●				



● = Euro stock

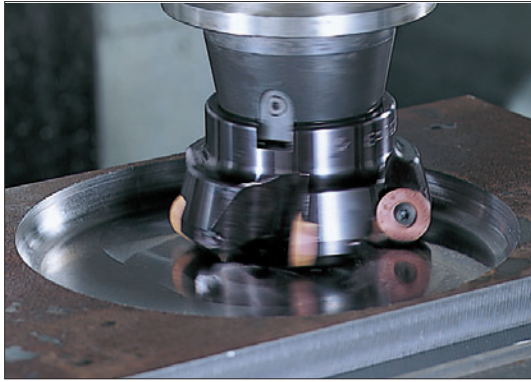
Special edge treatment and grade
 RGMN 2004 SN-S for Stainless steel
 RGMN 2004 SN-I for Super alloys (Eg. Inconel)
 RGMN 2004 SN-T for Titanium alloys

Recommended Cutting Conditions

Cutting speed = v_c (m/min), Feed = f_t (mm/tooth)

Insert grade	Work material	Ni-base alloy		Ti-base alloy		Stainless steel		Die steel	
		(Inconel 750)		(Ti-6Al-4V)		(X5CrNi810)		(X32CrMoV33)	
AC230	v_c	30	40	55	80	80	180	80	160
	f_t	0,1	0,1	0,2	0,2	0,15	0,3	0,15	0,3
AC325	v_c	30	40	55	80	80	180	80	160
	f_t	0,1	0,1	0,2	0,2	0,15	0,3	0,15	0,3
EH20Z	v_c	30	40	55	80	80	180	80	160
	f_t	0,1	0,1	0,2	0,2	0,15	0,3	0,15	0,3
A30N	v_c	30	40	55	80	80	150	80	120
	f_t	0,1	0,1	0,2	0,2	0,1	0,25	0,1	0,25
Recommended depth of cut (mm)	d_{oc}	1,0 ~ 2,0 Wet				2,0 ~ 3,0 Dry			

"Wave Radius Mill" WRC / WRCF Type



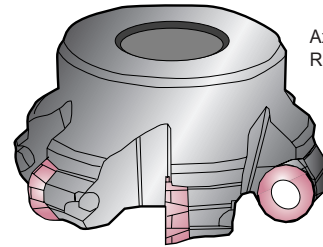
■ Features

The "Wave Mill" type WRC multi purpose milling cutter was originally developed for die mould milling but its high performance features have considerably extended its application range making it suitable for face milling, slotting, helical boring, plunging and profiling in both diverse and numerous industry sectors.

The unique 16 corner polygon inserts substantially reduce cutting force and dramatically increase productivity.

■ Advantages

- High performance cutting
- Vibration-free machining
- Excellent surface finish
- Multi corner inserts
- Integral wiper flat
- Ultra hard coating
- Centre screw locking



Axial rake angle: + 6°
Radial rake angle: - 5°

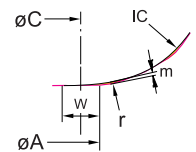
■ Insert

● Standard Type (16 corner Polygon for General Milling)

Type	Shape	Cat. No.	Coated			IC (mm)	r (mm)	s (mm)	Max. d _{oc}		m: Nose height (mm)	w: Wiper width (mm)	
			ACZ310	ACZ330	ACZ350				4 corners application	8 corners application			
35 / 70		QPMT 10T335 PPEN	●	●	●	10	3,5	3,97	5	1,2	0,03	0,6	
		QPMT 10T335 PPEN-H		●									
		QPMT 120440 PPEN	●	●	●	12	4,0	4,76	6	1,5	0,04	0,8	
		QPMT 120440 PPEN-H		●									
		QPMT 160660 PPEN	●	●	●	16	6,0	6,5	8	2,1	0,04	0,8	
		QPMT 160660 PPEN-H		●									
		QPMT 200670 PPEN	○	●	●	20	7,0	6,5	10	2,5	0,06	1,2	

● PPEN-H : Stronger cutting edge

m : Nose height
w : Wiper width
IC: Inscribed circle

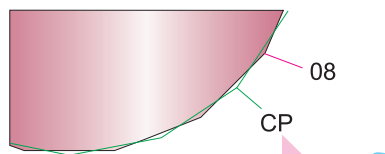
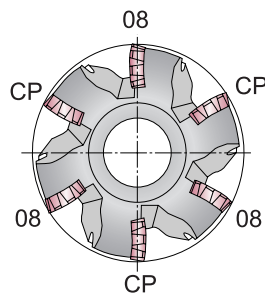


øA = Actual cutting - ø with wiper flat
øC = Centre of insert
øA = øC + w

● Anti-Vibration Type (Paired Sets for Vibration Free Machining)

The combination of different inserts in a staggered formation varies the cut depth and eliminates vibration when feed rate is

$f_t < 0,15$ (IC=16 mm)
or
 $f_t < 0,2$ (IC=20 mm).



CP and 08 type inserts are used in pairs

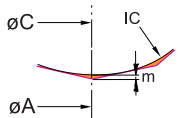
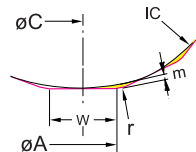
● Chip Formation

Anti-vibration Type	Standard Type
Work material: 50C	
Cutting data: $f_t = 0,1\text{mm/tooth}$, $d_{oc} = 7\text{mm}$	
Insert size: IC = 20 mm	

Type	Shape	IC (mm)	Cat. No.	Coated			r (mm)	Max. d _{oc}		m: Nose height (mm)	w: Wiper width (mm)
				ACZ310	ACZ330	ACZ350		4 corners application	8 corners application		
08		16	QPMT 160608 PPEN	●	●	●	0,8	8	1,2	0,14	2,9
		20	QPMT 200608 PPEN	○	●	●	0,8	10	1,6	0,18	3,7
CP		16	QPMT 160608 PPEN-CP	●	●	●	0,8	8	2,3	0,14	-
		20	QPMT 200608 PPEN-CP	○	●	●	0,8	10	2,9	0,18	-

● = Euro stock
○ = Delivery on request

m : Nose height
w : Wiper width
IC: Inscribed circle

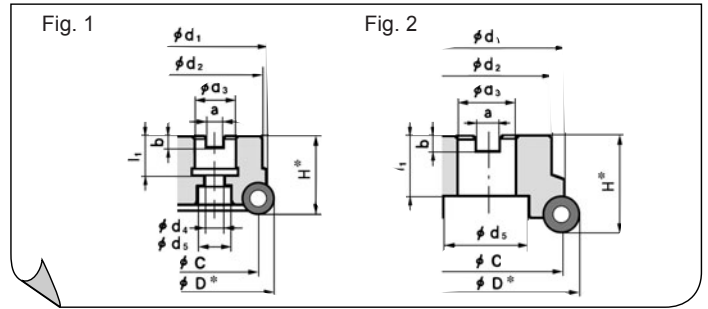


øA = Actual cutting - ø
øC = Centre of insert
øA = øC + w

Standard Type
WRC 20100 R



Close Pitch Type
WRCF 16100 R



■ Body

● Standard WRC Type

Insert IC (mm)	Cat. No.	Stock	Dimensions (mm)					Mounting						No. of teeth	Helical boring $\phi B_{Standard}$	Plunging α_{max}	Weight (Kg)	Fig.
			ϕD^*	ϕC	ϕd_1	ϕd_2	H^*	a	b	ϕd_3	ϕd_4	ϕd_5	l_1					
12	WRC 12040 RS	●	40	28	36	36	40	8,4	5,6	16	9	14	18	4	68 ± 11	10°	0,2	1
	WRC 12050 RS	●	50	38	46	40	40	10,4	6,3	22	11	18	20	4	88 ± 11	7°	0,3	
	WRC 12052 RS	●	52	40	48	40	40	10,4	6,3	22	11	18	20	5	92 ± 11	6°30'	0,3	
	WRC 12063 RS	●	63	51	59	40	40	10,4	6,3	22	11	18	20	5	114 ± 11	5°	0,4	
	WRC 12066 RS	●	66	54	62	40	50	10,4	6,3	22	11	18	20	5	120 ± 11	4°30'	0,4	
16	WRC 16063 RS	●	63	47	50	50	40	10,4	6,3	22	11	18	20	3	110 ± 15	8°	0,4	1
	WRC 16080 RS	●	80	64	70	55	50	12,4	7,0	27	13,5	20	25	4	144 ± 15	5°30'	0,8	
	WRC 16100 RS	●	100	84	90	70	50	14,4	8,5	32	-	46	32	5	184 ± 15	4°	1,3	
20	WRC 16125 RS	○	125	109	115	80	63	16,4	9,5	40	-	56	38	5	234 ± 15	3°	2,4	2
	WRC 20080 RS	○	80	60	68	55	50	12,4	7,0	27	13,5	20	25	4	140 ± 18	7°	0,7	
	WRC 20100 RS	○	100	80	88	70	50	14,4	8,5	32	-	46	32	5	180 ± 18	5°	1,1	
	WRC 20125 RS	○	125	105	113	80	63	16,4	9,5	40	-	56	38	5	230 ± 18	3°30'	2,2	
	WRC 20160 RS	○	160	140	148	100	63	16,4	9,5	40	-	72	38	6	300 ± 18	2°30'	3,8	

C = Centre of insert

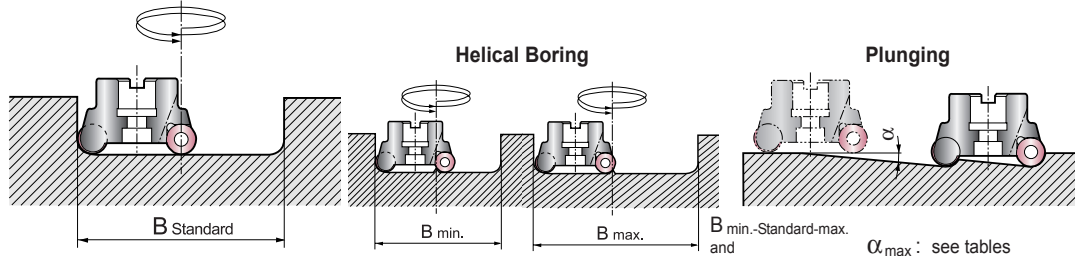
Actual cutting diameter : $\phi A = \phi C + w$ (w: width of wiper flat)

● Close Pitch WRCF Type

Insert IC (mm)	Cat. No.	Stock	Dimensions (mm)					Mounting						No. of teeth	Helical boring $\phi B_{Standard}$	Plunging α_{max}	Weight (Kg)	Fig.
			ϕD^*	ϕC	ϕd_1	ϕd_2	H^*	a	b	ϕd_3	ϕd_4	ϕd_5	l_1					
16	WRCF 16052 RS	○	52	36	49	45	40	10,4	6,3	22	11	17,7	20	4	88 ± 15	10°	0,3	1
	WRCF 16063 RS	●	63	47	50	50	40	10,4	6,3	22	11	18	20	4	110 ± 15	8°	0,4	
	WRCF 16066 RS	●	66	50	53	50	40	10,4	6,3	22	11	18	20	4	116 ± 15	7°	0,5	
	WRCF 16080 RS	●	80	64	70	55	50	12,4	7,0	27	13	20	25	5	144 ± 15	5°30'	0,8	
	WRCF 16100 RS	●	100	84	90	70	50	14,4	8,5	32	-	46	32	6	184 ± 15	4°	1,3	
20	WRCF 16125 RS	●	125	109	115	80	63	16,4	9,5	40	-	56	38	6	234 ± 15	3°	2,4	2
	WRCF 16160 RS	●	160	144	150	100	63	16,4	9,5	40	-	72	38	8	304 ± 18	2°	4,0	
	WRCF 20080 RS	○	80	60	68	55	50	12,4	7,0	27	13	20	25	5	140 ± 18	7°	0,7	
	WRCF 20100 RS	●	100	80	88	70	50	14,4	8,5	32	-	46	32	6	180 ± 18	5°	1,1	
	WRCF 20125 RS	●	125	105	113	80	63	16,4	9,5	40	-	56	38	6	230 ± 18	3°30'	2,3	
	WRCF 20160 RS	●	160	140	148	100	63	16,4	9,5	40	-	72	38	8	300 ± 18	2°30'	3,9	

* 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

● = Euro stock
○ = Delivery on request



■ Spare Parts

Cutter	Screw	Wrench
WRC 12_ _ _	BFTX 0409 N	TRD 15
WRC/-F 16_ _ _	BFTX 0513 N	TRD 20
WRC/-F 20_ _ _	BFTX 0615 N	TRD 25

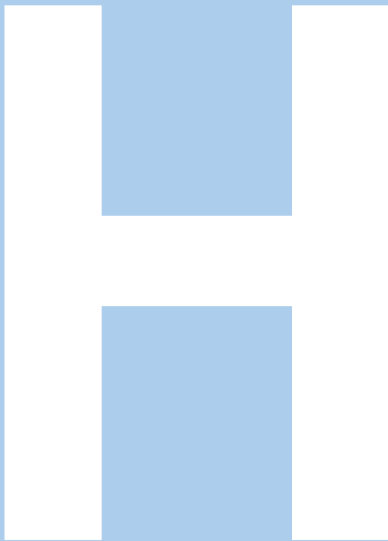
■ Recommended Cutting Conditions

ϕD (mm)	Material	Carbon steel	Alloy steel	Stainless steel	Cast iron
		(ex. C40 ~ C50)	(Below HRC40)	(ex. 10CrNiS189)	(ex. GG20)
40 ~ 80	v_c	100-150-200	100-140-180	80-160-160	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
100 ~ 160	v_c	150-200-250	100-160-200	160-180-200	100-150-200
	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

[v_c = m/min, f_t = mm/tooth] [min. - optimum - max.]

Indexable Endmills

H1 ~ H18



Selection Guide	Wavemill Series	H2
"Wave Mill" New	WEX	H4
	WEX2000E / WEX2000F	H6
	WEX3000E / WEX3000F	H7
"Wave Multi-Function Mill"	WMM	H8
	WMM(H)2000 / WMM(H)3000	H9
"Wave Repeater Mill"	WRM	H10
	WRM20 / WRM30	H11
"Wave Ball-Mill" for Roughing	WBMR	H12
	WBMR2000	H13
"Wave Ball-Mill" for Finishing	WBMF	H14
	WBMF1000	H15
"Wave Radius Mill"	WRC0800/1000/1200E	H16
SEC-Chamfering Endmill	SCP	H17

Indexable Endmills

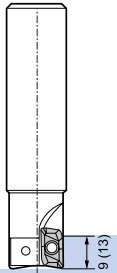
Wavemill Series Selection Guide

New "Wave Mill" Shank and Shell Type

New

WEX 2000 / 3000 E

∅ 14 ~ ∅ 63



⇒ H4~7

- Smooth cutting end mill (Shank type WEX...E) for machining centres and conventional machines
- Wave shaped inserts
- High shear cutting action
- Efficient metal removal
- New ZX coating for steels and irons

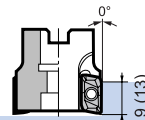


AXMT

New

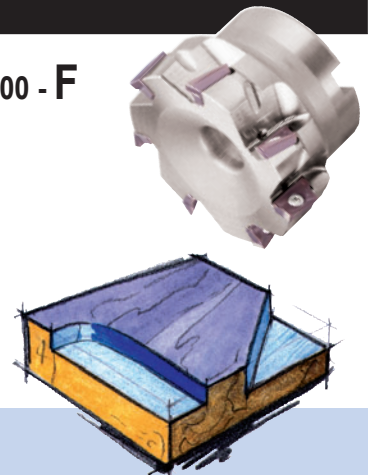
WEX 2000 / 3000 - F

∅ 40 ~ ∅ 100



⇒ H4~7

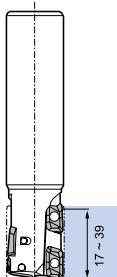
Shell type WEX...F



"Wave Multi-Function Mill"

WMM 2000 / 3000 E

∅ 20 ~ ∅ 40

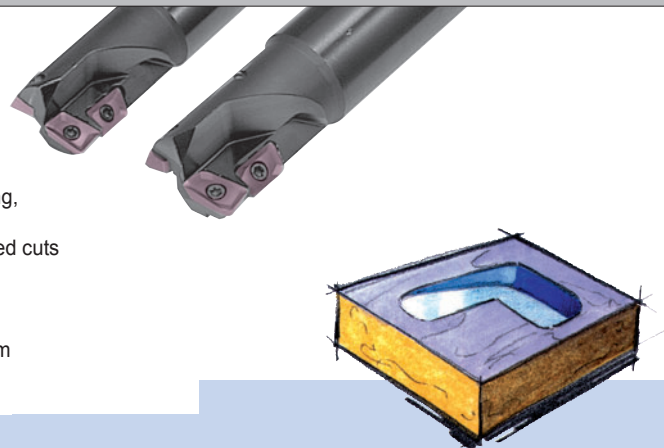


⇒ H8~9

- Multi-functional endmill for shoulder milling, slotting, pocketing, plunging, boring and helical boring
- Wavy cutting edge reduces the shock of interrupted cuts
- Super high rake chipbreaker
- Excellent chip control
- New ZX coating for steels and irons
- APET-S type sharp and honed insert for aluminium



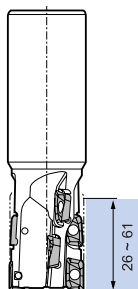
APMT
APET



"Wave Repeater Mill"

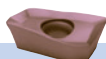
WRM 20 / 30 E

∅ 20 ~ ∅ 50



⇒ H10~11

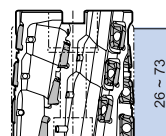
- Shank type repeater endmill for deep shoulder milling and deep slotting
- Wavy cutting edge reduces the shock of interrupted cuts
- Super high rake chipbreaker
- New ZX coating for steels and irons
- APET-S type honed sharp insert for aluminium



APMT
APET

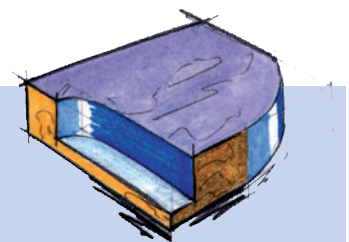
WRM 20 / 30 F

∅ 40 ~ ∅ 80



⇒ H10~11

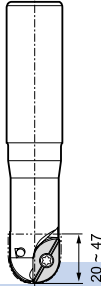
Shell type repeater endmill "WRM-F"



“Wave Ball-Mill” for Roughing

WBMR 2000

∅ 20 ~ ∅ 50



- Ball nose endmill
- Wave shaped inserts
- High shear cutting action
- Exceptionally tough cutting edge
- Thicker inserts for higher rigidity
- New ZX coating for steels and irons

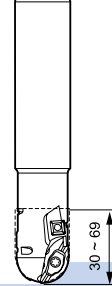
⇒ H12~13



∅D = 20~ 32
for centre
ZNMT-C
ZNMT-S
for side

WBMR 2000 - L

∅ 20 ~ ∅ 50



Extra long type with 4 teeth;

- ∅D=20~32 with two insert type ZNMT-C, ZNMT-S and two square inserts
- ∅D=40~50 with two pieces insert type ZNMT and two square inserts

⇒ H12~13

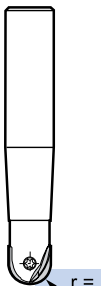


ZNMT
for ∅40~50
SPMT

“Wave Ball-Mill” for Finishing

WBMF 1000

∅ 10 ~ ∅ 30

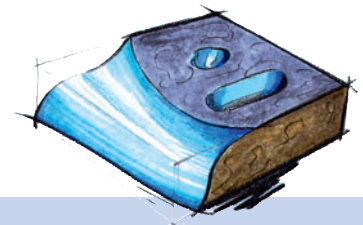


- Ball nose endmill for finishing
- Wave shaped large sigmoid blade
- High shear cutting action
- High quality machined surface
- New ultra hard ZX coating for steels and irons

⇒ H14~15



ZPGU

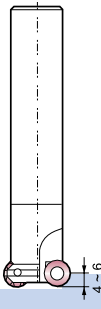


Indexable
Endmills

“Wave Radius Mill” with Polygon Inserts

WRC 0800 1000 / 1200 E

∅ 12 ~ ∅ 32

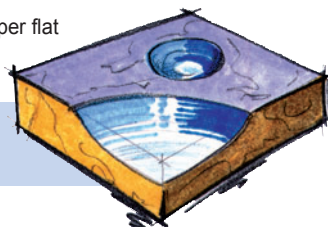


- Multi purpose “Wave Radius Mill” shank type
- Unique 16 corner polygon inserts substantially reduce cutting force
- Vibration-free machining
- Excellent surface finish with integral wiper flat

⇒ H16



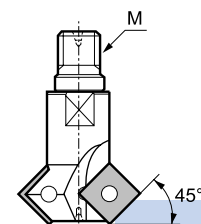
QPMT



Chamfering Endmill

SCP

∅ 8 ~ ∅ 32



⇒ H17



SDMA
SPMA

New "Wavemill" WEX Type

For the Smooth and Reliable Cutting Action

New



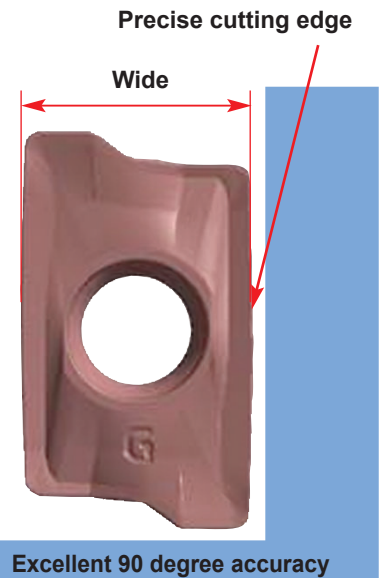
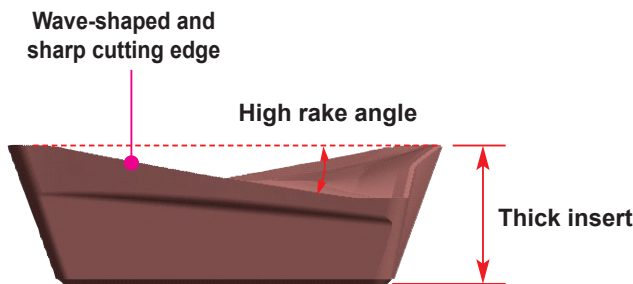
General Features

WEX is a new generation of indexable insert endmills and shoulder milling cutters based on the successful Sumitomo WaveMill concept. The wave shaped cutting edges generate lower cutting forces whilst the high shear cutting action ensures smooth reliable cutting even when deep slotting or milling with low rigidity machines. Strong cutting edges with heat and wear resistant nano technology coatings substantially improve machining accuracy and surface finish. In addition WEX cutter bodies benefit from a highly durable surface treatment and improved method of clamping the inserts into the seat.

Newly developed insert grades both CVD and PVD coated are on offer for steel and cast iron applications which can be used in conjunction with an air blast or coolant in slotting or deep cutting applications for improved chip control.

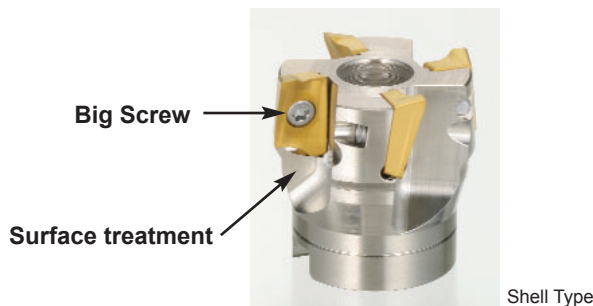
Advantages of WEX Inserts

- Unbeatable performance
- Smooth cutting due to high rake inserts
- High feed rates because of strong cutting edge
- Greatly extended tool life when specified with new PVD and CVD coated inserts
- Wave shaped cutting edge for excellent machined quality



Advantages of WEX Cutter Bodies

- High durable surface treatment
- Improved method of clamping the inserts



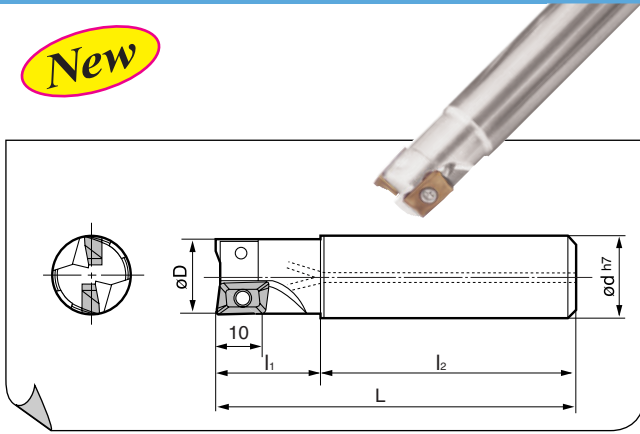
Product range

	Model	Type	ø10	ø20	ø32	ø40	ø63
"E" Shank Type	2000E	Standard type	14	----- 63			
	2000EL	Long shank type	14	----- 40			
	3000E	Standard type		25	----- 63		
	3000EL	Long shank type		25	----- 63		
	3000EW	Weldon shank type		25	----- 32		
"F" Type	2000F	Shell type				40	----- ø100
	3000F	Shell type				40	----- ø100

Indexable Endmills

Wavemill Series WEX 2000E/EW Type

New



■ Body (Short Type "E")

Shank	Cat. No.	Stock	Dimensions(mm)					No. of teeth
			øD	ød	L ₁	L ₂	L	
	WEX 2014 E	●	14	16	25	55	80	1
	WEX 2016 E	●	16	16	25	75	100	2
	WEX 2018 E		18	16	25	75	100	2
	WEX 2020 E	●	20	20	30	80	110	3
	WEX 2022 E		22	25	30	80	110	3
	WEX 2025 E	●	25	25	35	85	120	4
	WEX 2028 E		28	25	35	85	120	4
	WEX 2030 E		30	32	35	85	120	4
	WEX 2032 E	●	32	32	40	90	130	5
	WEX 2040 E		40	32	50	120	170	6
	WEX 2050 E		50	32	50	120	170	7
	WEX 2063 E		63	32	50	120	170	8

■ Body (Long Type "EL")

Shank	Cat. No.	Stock	Dimensions(mm)					No. of teeth
			øD	ød	L ₁	L ₂	L	
	WEX 2014 EL	●	14	16	25	95	120	1
	WEX 2016 EL	●	16	16	25	120	145	2
	WEX 2018 EL		18	16	25	120	145	2
	WEX 2020 EL	●	20	20	40	110	150	2
	WEX 2022 EL		22	20	40	110	150	2
	WEX 2025 EL	●	25	25	50	120	170	2
	WEX 2030 EL		30	25	50	120	170	2
	WEX 2032 EL		32	32	60	120	180	2
	WEX 2040 EL		40	32	80	120	200	2

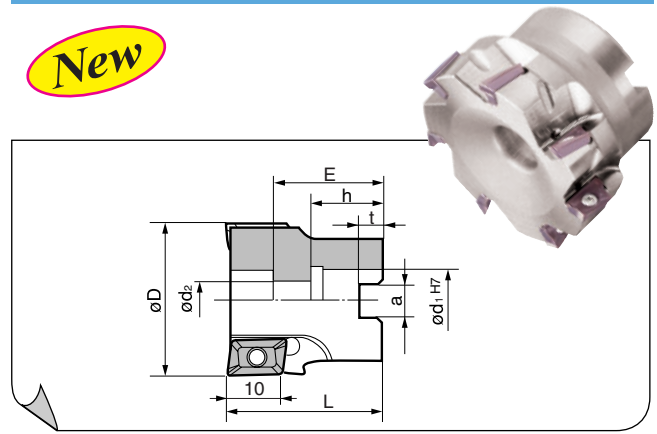
■ Body (Weldon Shank Short Type)

Shank	Cat. No.	Stock	Dimensions(mm)					No. of teeth
			øD	ød	L ₁	L ₂	L	
	WEX 2016 EW	●	16	16	25	75	100	2
	WEX 2020 EW	●	20	20	30	80	110	3

● = Euro stock

Wavemill Series WEX 2000F Type

New



■ Body (Shell Type "F")

Cat. No.	Stock	Dimensions(mm)							No. of teeth	
		øD	ød ₁	ød ₂	a	t	L	E		h
WEX 2040 F	●	40	16	9	8,4	5,6	40	28	18	6
WEX 2050 F	●	50	22	11	10,4	6,3	40	26	20	7
WEX 2063 F	●	63	22	11	10,4	6,3	40	26	20	8
WEX 2080 F		80	27	13,5	12,4	7,0	50	31	25	9
WEX 2100 F		100	32	-	14,4	8,5	63	31	-	10



■ Inserts for WEX 2000 Type

Cat. No.	Coated					Diamond-like coated	Un-coated	Dimensions		
	ACP100	ACP200	ACP300	ACK200	ACK300			H1	r	a
	AXMT 123504 PEER-G	●	●	●	●			●		0,4
AXMT 123508 PEER-G	●	●	●	●	●		0,8	0,08		
AXMT 123512 PEER-G	●	●	●	●	●		1,2	0,08		
AXMT 123504 PEER-H	●	●	●	●	●		0,4	0,08		
AXMT 123508 PEER-H	●	●	●	●	●		0,8	0,08		
AXMT 123512 PEER-H	●	●	●	●	●		1,2	0,08		
AXET 123504 PEFR-S						○	0,4	0,025		
AXET 123508 PEFR-S						○	0,8	0,025		



● = Euro stock

○ = Delivery on request

■ Spare Parts

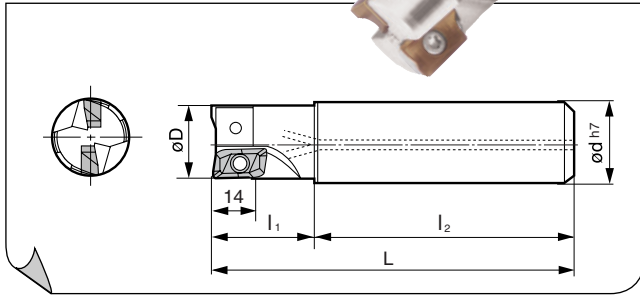
Screw	Wrench	Applicable endmill
		
BFTX 0305 IP	TRDR 08 IP	2014 - 2018
BFTX 0306 IP		2020 - 2063

■ Spare Parts

Screw	Wrench	Applicable endmill
		
BFTX 0306 IP	TRDR 08 IP	WEX 2000 F

Wavemill Series WEX 3000E/EW Type

New



■ Body (Short Type "E")

Shank	Cat. No.	Stock	Dimensions(mm)					No. of teeth
			øD	ød	L ₁	L ₂	L	
	WEX 3025 E	●	25	25	35	85	120	2
	WEX 3032 E	●	32	32	40	90	130	3
	WEX 3040 E	●	40	32	50	120	170	4
	WEX 3050 E		50	32	50	120	170	5
	WEX 3063 E		63	32	50	120	170	6

■ Body (Long Type "EL")

Shank	Cat. No.	Stock	Dimensions(mm)					No. of teeth
			øD	ød	L ₁	L ₂	L	
	WEX 3025 EL	●	25	25	50	120	170	2
	WEX 3030 EL		30	25	50	120	170	2
	WEX 3032 EL	●	32	32	60	120	180	2
	WEX 3040 EL	●	40	32	80	140	220	2
	WEX 3050 EL		50	32	100	120	220	3
	WEX 3063 EL		63	32	100	120	220	3

■ Body (Weldon Shank Short Type)

Shank	Cat. No.	Stock	Dimensions(mm)					No. of teeth
			øD	ød	L ₁	L ₂	L	
	WEX 3025 EW	●	25	25	35	85	120	2
	WEX 3032 EW	●	32	32	40	90	130	3

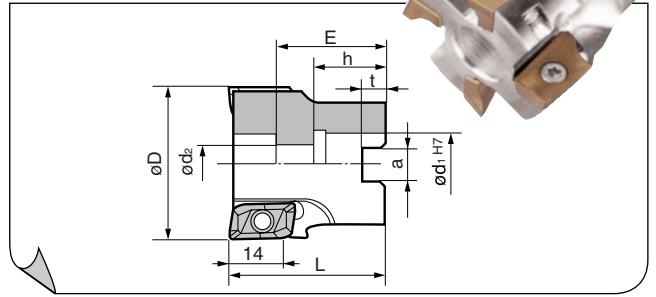
● = Euro stock

■ Spare Parts

Screw	Wrench	Applicable endmill
BFTX 0407 IP	TRDR 15 IP	3025
BFTX 0409 IP		3032 - 3063

Wavemill Series WEX 3000F Type

New



■ Body (Shell Type "F")

Cat. No.	Stock	Dimensions(mm)								No. of teeth
		øD	ød ₁	ød ₂	a	t	L	E	h	
WEX 3040 F	●	40	16	9	8,4	5,6	40	28	18	4
WEX 3050 F	●	50	22	11	10,4	6,3	40	26	20	5
WEX 3063 F	●	63	22	11	10,4	6,3	40	26	20	6
WEX 3080 F	●	80	27	13,5	12,4	7,0	50	31	25	7
WEX 3100 F	●	100	32	-	14,4	8,5	63	31	-	8

■ Inserts for WEX 3000 Type

Cat. No.	Coated					Diamond-like coated	Un-coated	Dimensions	
	ACP100	ACP200	ACP300	ACK200	ACK300	DL1000	H1	r	a
AXMT 170508 PEER-L	●	●	●	●	●			0,8	0,08
AXMT 170508 PEER-G	●	●	●	●	●			0,8	0,08
AXMT 170512 PEER-G	●	●	●	●	●			1,2	0,08
AXMT 170516 PEER-G	●	●	●	●	●			1,6	0,08
AXMT 170508 PEER-H	●	●	●	●	●			0,8	0,08
AXMT 170512 PEER-H		●	●					1,2	0,08
AXMT 170516 PEER-H								1,6	0,08
AXET 170504 PEFR-S						○	○	0,4	0,025
AXET 170508 PEFR-S						○	○	0,8	0,025

● = Euro stock

○ = Delivery on request

■ Spare Parts

Screw	Wrench	Applicable endmill
BFTX 0409 IP	TRDR 15 IP	WEX 3000 F

Indexable Endmills

"Wave Multi-Function Mill" WMM Type



■ Features

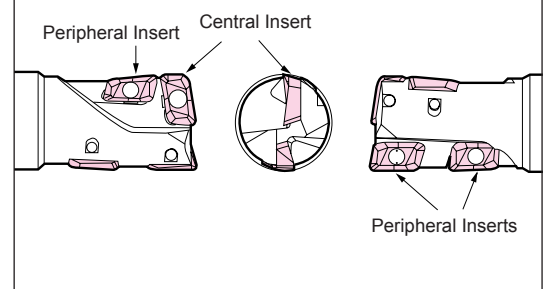
Utilising some of the design features, which made the Wave-Mill so successful, this multi-functional cutter, which utilizes standard wavy shaped inserts mounted radially and axially, performs a variety of operations.

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

● Shoulder cutting DIN X5CrNi810 <i>Cutting of stainless steel tool</i> 	● Slotting GG25 <i>Deep grooving can be performed easily. Easy chip removal</i> 	● Taper cutting C50 <i>Capable of tapered recess cutting of a prepared hole</i>
Tool dia. : 25mm Insert : APMT103504PDER (Grade : ACZ350) $v_c = 200\text{m/min}$, $f_t = 0,1\text{mm/tooth}$ Axial $d_{oc} : 15\text{mm}$, Radial $w_{oc} : 25\text{mm}$, Air blow	Tool dia. : 25mm Insert : APMT103504PDER (Grade : ACZ310) $v_c = 180\text{m/min}$, $f_t = 0,12\text{mm/tooth}$ Axial $d_{oc} : 15\text{mm}$, Radial $w_{oc} : 25\text{mm}$, Air blow	Tool dia. : 25mm Insert : APMT103504PDER (Grade : ACZ310) $v_c = 180\text{m/min}$, $f_t = 0,12\text{mm/tooth}$ Axial $d_{oc} : 15\text{mm}$, Radial $w_{oc} : 25\text{mm}$, Air blow
● Pocketing C50 <i>Capable of pocketing with continuous lateral feed from initial drilling or taper cutting process</i> 	● Drilling C50 <i>Capable of easy chip removal and drilling without tool damage</i> 	● Helical cutting C50 <i>Capable of large boring in diameter of 1,2-1,8 times the cutter diameter without prepared hole</i>
Tool dia. : 25mm Insert : APMT103504PDER (Grade : ACZ350) $v_c = 200\text{m/min}$, $f_t = 0,1\text{mm/tooth}$ Axial $d_{oc} : 15\text{mm}$, Radial $w_{oc} : 25\text{mm}$ Air blow	Tool dia. : 25mm Insert : APMT103504PDER (Grade : ACZ350) Bore size : 25mm, Depth : $d = 15\text{mm}$ $v_c = 200\text{m/min}$, $f = 0,1\text{mm/rev}$ Step feed : 0,5mm, Air blow	Tool dia. : 25mm Insert : APMT103504PDER (Grade : ACZ350) Bore size : 40mm, Depth : $d = 30\text{mm}$ $v_c = 300\text{m/min}$, $f = 0,1\text{mm/rev}$ Axial feed : $t = 15\text{mm/pitch}$, Air blow

■ Recommended Cutting Conditions for WMM(H) 2000

Material Type of milling ϕD (mm)	Carbon steel (ex. C50)	Stainless steel (ex. 10CrNiS189)	Cast iron (ex. GG20)	Aluminium alloy	
					v_c
20 ~ 26	Shoulder milling	80-120-160	80-100-120	70-150-180	200-300-500
	Slotting	0,05-0,20	0,05-0,15	0,05-0,20	0,1-0,15-0,2
	Drilling	0,05-0,12	0,05-0,10	0,05-0,12	0,05-0,10
Grade	ACZ330	ACZ350	ACZ310	DL1000 (H1)	

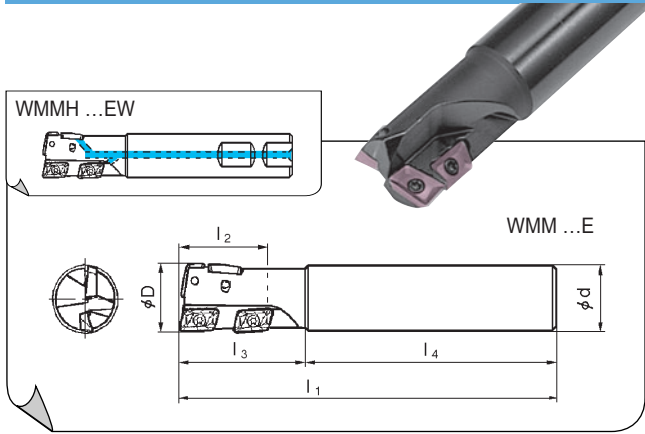
[$v_c = \text{m/min}$, $f_t = \text{mm/tooth}$] [min. - optimum - max.]

■ Recommended Cutting Conditions for WMM(H) 3000

Material Type of milling ϕD (mm)	Carbon steel (ex. C50)	Stainless steel (ex. 10CrNiS189)	Cast iron (ex. GG20)	Aluminium alloy	
					v_c
32 ~ 40	Shoulder milling	80-120-160	80-100-120	70-150-180	200-300-500
	Slotting	0,05-0,25	0,05-0,20	0,05-0,25	0,1-0,15-0,2
	Drilling	0,05-0,15	0,05-0,12	0,05-0,15	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



Body

Shank	Cat. No.	Stock	Dimensions(mm)						Total teeth	Effective teeth
			øD	ød	l ₂	l ₃	l ₄	l ₁		
□	WMM 2020E	●	20	20	17	35	95	130	3	1
	WMM 2025E	●	25	25	26	40	100	140	4	1

(Long type)

□	WMM 2020EL	●	20	20	17	60	125	185	3	1
	WMM 2025EL	●	25	25	26	75	145	220	4	1

(Weldon shank type)

□	WMM 2020EW	●	20	20	17	35	95	130	3	1
	WMM 2025EW	●	25	25	26	40	100	140	4	1

(Long type with weldon shank)

□	WMM 2020ELW	●	20	20	17	60	125	185	3	1
	WMM 2025ELW	●	25	25	26	75	145	220	4	1

(WMMH Standard type with coolant holes and weldon shank)

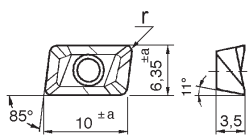
□	WMMH 2020EW	●	20	20	17	35	95	130	3	1
	WMMH 2025EW	●	25	25	26	40	100	140	4	1

(WMMH Long type with coolant holes and weldon shank)

□	WMMH 2020ELW	●	20	20	17	60	125	185	3	1
	WMMH 2025ELW	●	25	25	26	75	145	220	4	1

Inserts for WMM 2000 Series

(mm)



Cat. No.	Coated			Diamond coated DL1000	Un-coated H1	Dimensions	
	ACZ310	ACZ330	ACZ350			r	a
APMT 103504 PDER	●	●	●	—	—	0,4	0,08
APMT 103508 PDER	●	●	●	—	—	0,8	0,08
APMT 103512 PDER	○	○	○	—	—	1,2	0,08
APMT 103504 PDER-H	●	●	●	—	—	0,4	0,08
APMT 103508 PDER-H	○	○	○	—	—	0,8	0,08
APMT 103512 PDER-H	○	○	○	—	—	1,2	0,08
APET 103504 PDER-F	●	●	●	—	—	0,4	0,025
APET 103504 PDFR-S	—	—	—	●	●	0,4	0,025

APMT... PDER

APMT... PDER-H

● = Euro stock

○ = Delivery on request



PDER-H : Stronger cutting edge

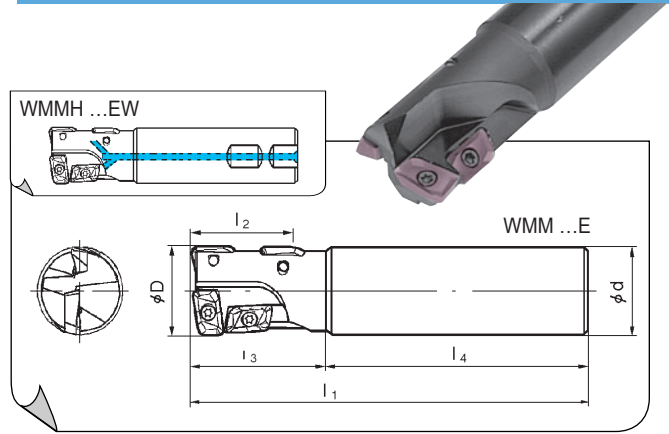
PDER-F : Ground insert for finishing

PDFR-S : Round honed sharp cutting edge for aluminium

Spare Parts

Screw	Wrench
BFTX02506N	TRD08

Wavemill Series WMM (H) 3000 E/EL EW/ELW Type



Body

Shank	Cat. No.	Stock	Dimensions(mm)						Total teeth	Effective teeth
			øD	ød	l ₂	l ₃	l ₄	l ₁		
□	WMM 3032E	●	32	32	39	50	100	150	4	1
	WMM 3040E	●	40	32	39	55	105	160	4	1

(Long type)

□	WMM 3032EL	●	32	32	39	90	140	230	4	1
	WMM 3040EL	●	40	32	39	55	185	230	4	1

(Weldon shank type)

□	WMM 3032EW	●	32	32	39	50	100	150	4	1
	WMM 3040EW	●	40	32	39	55	105	160	4	1

(Long type with weldon shank)

□	WMM 3032ELW	●	32	32	39	90	140	230	4	1
	WMM 3040ELW	●	40	32	39	55	185	230	4	1

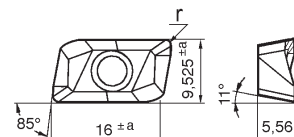
(WMMH Standard type with coolant holes and weldon shank)

□	WMMH 3032EW	●	32	32	39	50	100	150	4	1
	WMMH 3040EW	●	40	32	39	55	105	160	4	1

(WMMH Long type with coolant holes and weldon shank)

□	WMMH 3032ELW	●	32	32	39	90	140	230	4	1
	WMMH 3040ELW	●	40	32	39	55	185	230	4	1

Inserts for WMM 3000 Series



Cat. No.	Coated			Diamond coated DL1000	Un-coated H1	Dimensions	
	ACZ310	ACZ330	ACZ350			r	a
APMT 160508 PDER	●	●	●	—	—	0,8	0,08
APMT 160512 PDER	○	○	○	—	—	1,2	0,08
APMT 160516 PDER	○	○	○	—	—	1,6	0,08
APMT 160508 PDER-H	●	●	●	—	—	0,8	0,08
APMT 160512 PDER-H	○	○	○	—	—	1,2	0,08
APMT 160516 PDER-H	○	○	○	—	—	1,6	0,08
APMT 160520 PDER-H	●	●	●	—	—	2,0	0,08
APMT 160530 PDER-H	●	●	●	—	—	3,0	0,08
APMT 160540 PDER-H	●	○	●	—	—	4,0	0,08
APMT 160550 PDER-H	●	○	●	—	—	5,0	0,08
APMT 160560 PDER-H	●	○	●	—	—	6,0	0,08
APET 160508 PDER-F	●	●	●	—	—	0,8	0,025
APET 160504 PDFR-S	—	—	—	●	●	0,4	0,025
APET 160508 PDFR-S	—	—	—	●	●	0,8	0,025

● = Euro stock

○ = Delivery on request

Spare Parts

Screw	Wrench
BFTX03584	TRD15



● APET--- S, uncoated grade "H1" for Aluminium

"Wave Repeater Mill" WRM Type



■ Features

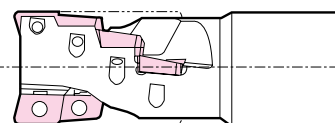
Complementing the already successful WaveMill range of milling cutters the WRM helical cutter is ideal for deep shoulder milling operations where smooth cutting, efficient metal removal, and extended tool life parameters are critical.

Using standard wave shaped inserts radially mounted in a zig zag arrangement to minimize harmonics, this cutter will efficiently remove metal at higher feed rates than conventional cutters thanks to its high shear cutting action.

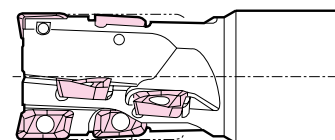
Impressive feed rates substantially reduce cycle times, whilst the long life inserts employed significantly reduce the tool operating costs.

■ Advantages

- Ideal for heavy roughing operations thanks to high shear cutting action and ultra hard inserts
- High shear cutting action means heavy roughing operations possible on low power machines
- Multi flute design provides high feed capability with good chip evacuation
- Uses standard WaveMill inserts
- Suitable for most workpiece materials



WRM 20-E type

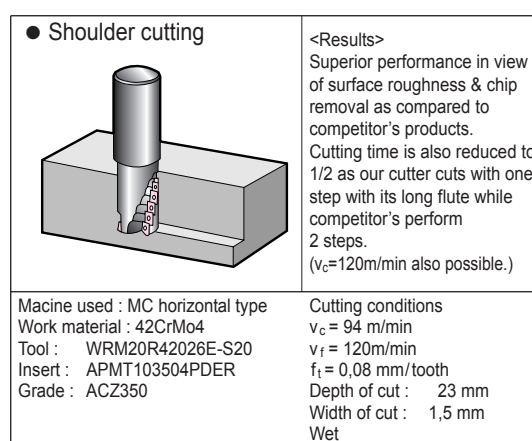
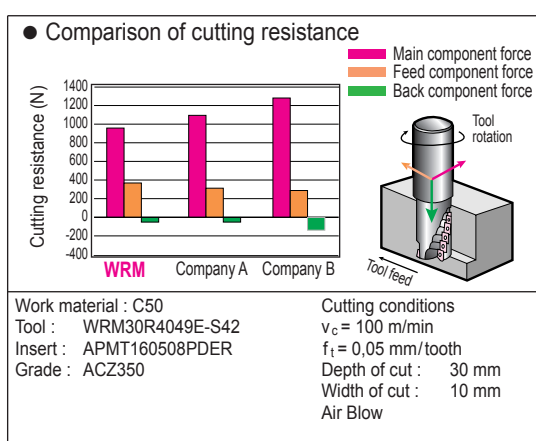


WRM 30-E type

■ Product Range

Type	Cutter diameter(mm)	Cutting edge length(mm)	Insert used	Cutter Body
WRM20R-E	20 ~ 40	26 ~ 53	APMT1035 type	Shank type
WRM30R-E	40 ~ 50	49 ~ 61	APMT1605 type	Shank type
WRM30R-F	63 ~ 80	61 ~ 73	APMT1605 type	Shell type

■ Performance and Application Example



■ Recommended Cutting Conditions for WRM 20-R

Material ϕD (mm)		Carbon steel (ex. C50)	Stainless steel (ex. 10CrNiS189)	Cast iron (ex. GG20)	Aluminium alloy
		20 ~ 25	v_c 50-120-180 f_t 0,05-0,15	50-100-160 0,05-0,12	50-120-180 0,05-0,15
32 ~ 40	v_c 50-120-180 f_t 0,05-0,15	50-100-160 0,05-0,12	50-120-180 0,05-0,20	200-300-500 0,1-0,15-0,2	
Grade		ACZ330	ACZ350	ACZ310	DL1000 (H1)

[v_c =m/min, f_t =mm/tooth] [min.- optimum - max.]

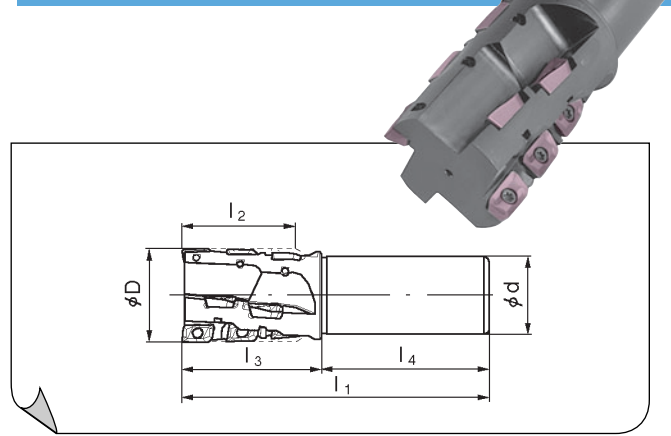
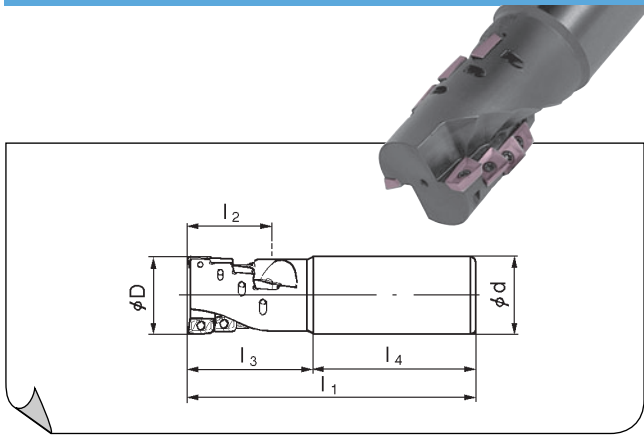
■ Recommended Cutting Conditions for WRM 30-R

Material ϕD (mm)		Carbon steel (ex. C50)	Stainless steel (ex. 10CrNiS189)	Cast iron (ex. GG20)	Aluminium alloy
		40 ~ 80	v_c 50-120-180 f_t 0,05-0,22	50-100-160 0,05-0,15	50-120-180 0,05-0,25
Grade		ACZ330	ACZ350	ACZ310	DL1000 (H1)

[v_c =m/min, f_t =mm/tooth] [min.- optimum - max.]

Wavemill Series WRM 20 E/F Type

Wavemill Series WRM 30 E/F Type

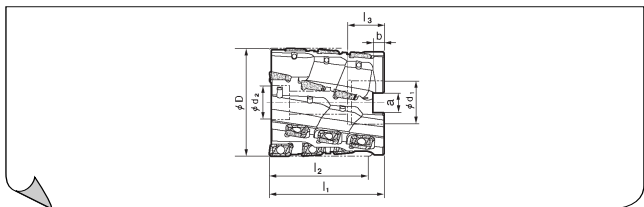


Body (WRM 20-E shank type)

Cat. No.	Stock	Dimensions(mm)						Total teeth	Effective teeth
		ϕD	ϕd	l_2	l_3	l_4	l_1		
WRM 20R 2026E-S20	●	20	20	26	35	85	120	4	1
WRM 20R 2535E-S25	●	25	25	35	45	85	130	8	2
WRM 20R 3244E-S32	●	32	32	44	55	85	140	10	2
WRM 20R 4053E-S40	●	40	40	53	65	85	150	14	2

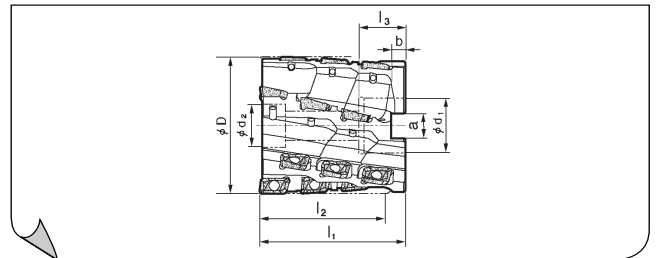
Body (WRM 30-E shank type)

Cat. No.	Stock	Dimensions(mm)						Total teeth	Effective teeth
		ϕD	ϕd	l_2	l_3	l_4	l_1		
WRM 30R 4049E-S40	●	40	40	49	65	85	150	8	2
WRM 30R 5061E-S40	●	50	40	61	75	90	165	10	2



Body (WRM 20-F shell type)

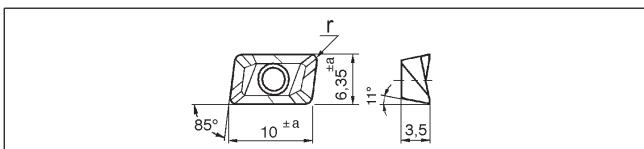
Cat. No.	Stock	Dimensions(mm)								Total teeth	Effective teeth
		ϕD	ϕd_1	ϕd_2	a	b	l_1	l_2	l_3		
WRM 20R 4044F-16	○	40	16	14	8,4	5,6	50	44	20	20	2



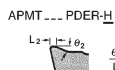
Body (WRM 30-F shell type)

Cat. No.	Stock	Dimensions(mm)								Total teeth	Effective teeth
		ϕD	ϕd_1	ϕd_2	a	b	l_1	l_2	l_3		
WRM 30R 5049F-22	○	50	22	18	10,4	7	59	49	20	8	2
WRM 30R 6361F-27	●	63	27	20	12,4	7	70	61	23	10	2
WRM 30R 8073F-32	●	80	32	25	14,4	8	85	73	27	18	3

Inserts for WRM 20 Series



Cat. No.	Coated			Diamond coated	Un-coated	Dimensions	
	ACZ310	ACZ330	ACZ350			DL1000	H1
APMT 103504 PDER	●	●	●	—	—	0,4	0,08
APMT 103508 PDER	●	●	●	—	—	0,8	0,08
APMT 103512 PDER	○	○	○	—	—	1,2	0,08
APMT 103504 PDER-H	●	●	●	—	—	0,4	0,08
APMT 103508 PDER-H	○	●	○	—	—	0,8	0,08
APMT 103512 PDER-H	○	●	○	—	—	1,2	0,08
APET 103504 PDER-F	●	●	●	—	—	0,4	0,025
APET 103504 PDFR-S	—	—	—	●	●	0,4	0,025



● = Euro stock
○ = Delivery on request

PDER-H : Stronger cutting edge

PDER-F : Ground insert for finishing

PDFR-S : Round honed sharp cutting edge for aluminium

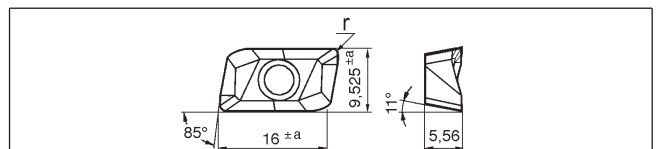
Spare Parts

Screw	Wrench
BFTX02506N	TRD08



● APET--- S, uncoated grade "H1" for Aluminium

Inserts for WRM 30 Series



Cat. No.	Coated			Diamond coated	Un-coated	Dimensions	
	ACZ310	ACZ330	ACZ350			DL1000	H1
APMT 160508 PDER	●	●	●	—	—	0,8	0,08
APMT 160512 PDER	○	○	○	—	—	1,2	0,08
APMT 160516 PDER	○	○	○	—	—	1,6	0,08
APMT 160508 PDER-H	●	●	●	—	—	0,8	0,08
APMT 160512 PDER-H	○	●	○	—	—	1,2	0,08
APMT 160516 PDER-H	○	●	○	—	—	1,6	0,08
APMT 160520 PDER-H	●	●	●	—	—	2,0	0,08
APMT 160530 PDER-H	●	●	●	—	—	3,0	0,08
APMT 160540 PDER-H	●	○	●	—	—	4,0	0,08
APMT 160550 PDER-H	●	○	●	—	—	5,0	0,08
APMT 160560 PDER-H	●	○	●	—	—	6,0	0,08
APET 160508 PDER-F	●	●	●	—	●	0,8	0,025
APET 160504 PDFR-S	—	—	—	●	●	0,4	0,025
APET 160508 PDFR-S	—	—	—	●	●	0,8	0,025

● = Euro stock
○ = Delivery on request

Spare Parts

Screw	Wrench	
		Applicable endmill
BFTX03584	TRD15	$\phi 40$
BFTX03588		$\phi 50$ and above

"Wave Ball Mill" for Roughing WBMR Type

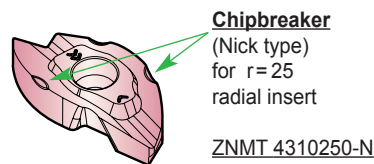


■ Features

Particularly suitable for die mold machining the WBMR replaceable insert ball nose endmill efficiently roughs complex profiles.

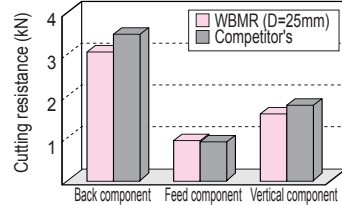
Its high feed rate capability is a direct result of a sharp cutting edge which is maintained during the cutting cycle by the special cemented carbide substrate working in parallel with the ultra hard ZX coating.

- Advantages
 - Wave shaped cutting edge
 - Economical M class insert
 - Precise clamping
 - High feed rate capability



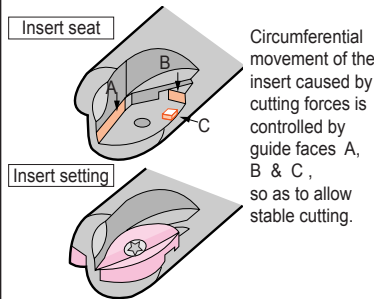
■ Performance

● Cutting resistance

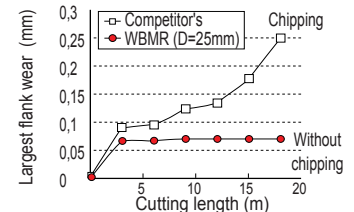


Cutting conditions (Shoulder milling, downcut)
 $v_c = 200\text{m/min}$, $f_t = 0.15\text{mm/tooth}$
 Axial $d_{oc} : 5\text{mm}$, Radial $w_{oc} : 5\text{mm}$
 Work material : C50

● Anti-rotational mechanism



● Insert life

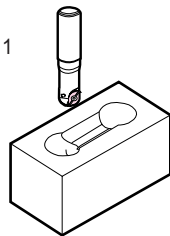


Cutting conditions (Shoulder milling, downcut)
 $v_c = 100\text{m/min}$, $f_t = 0.15\text{mm/tooth}$
 Axial $d_{oc} : 5\text{mm}$, Radial $w_{oc} : 5\text{mm}$
 Work material : X 40 CrMoV 5-1 (HRC45)

■ Application Example

● Cold molding die

Work material :
X 155 CrV Mo 12 1

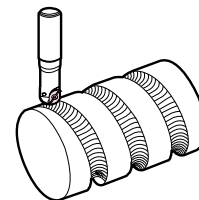


<Results>
Flank wear after continuous cutting for seven hours was less than other manufacturer's product. Stable cutting was observed.

WBMR 2200S ($\phi 20\text{mm}$)
 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 ($\phi 30\text{mm}$) could cut without chattering while other manufacturer's products could not cut at all due to chattering.

WBMR 2300M ($\phi 30\text{mm}$)
 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)

Condition	Material	Carbon steel	Alloy steel	Stainless, Die steel etc.	Cast iron
		(Below HRC25)	(Below HRC45)		
(A)	v_c	200-250-300	100-150-200	50-80-100	100-120-150
	f_t	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,15-0,2	0,2-0,3-0,4

[$v_c = \text{m/min}$, $f_t = \text{mm/tooth}$] [min. - optimum - max.]

■ Recommended cutting conditions (4 teeth)

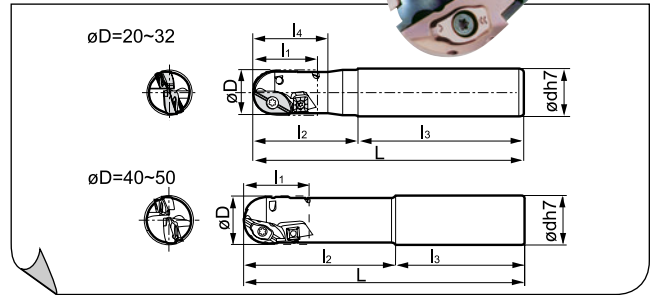
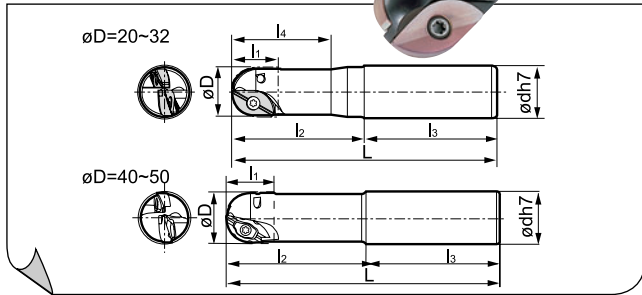
Condition	Material	Carbon steel	Alloy steel	Stainless, Die steel etc.	Cast iron
		(Below HRC25)	(Below HRC45)		
(A)	v_c	200-250-300	100-150-200	50-80-100	100-120-150
	f_t	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,15-0,2	0,2-0,3-0,4
(B)	v_c	160-200-240	80-120-160	40-60-80	80-100-120
	f_t	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,15-0,2	0,2-0,3-0,4

[$v_c = \text{m/min}$, $f_t = \text{mm/tooth}$] [min. - optimum - max.]

Indexable Endmills

Wavemill Series WBMR 2000 Type

Wavemill Series WBMR 2000L Type



■ Body (Short and standard type, 2 teeth)

Cat. No.	Stock	Dimensions(mm)						
		øD	ød	l ₁	l ₂	l ₃	l ₄	L
WBMR 2200S	●	20	25	20	60	80	40	140
WBMR 2200M	●				60	140		
WBMR 2200MW	●				60	140		
WBMR 2250S	●	25	32	23	70	80	50	150
WBMR 2250M	●				73	147		
WBMR 2250MW	●				73	147		
WBMR 2320S	●	32	32	31	80	80	60	160
WBMR 2320M	●				85	155		
WBMR 2320MW	●				85	155		
WBMR 2400S	○	40	42	35	100	100	-	200
WBMR 2400M	○				180	100		
WBMR 2500S	○				100	100		
WBMR 2500M	○	50	42	47	100	100	-	200
WBMR 2500MW	○				180	100		

- S: Short type with cylindrical shank
- M: Standard length type with cylindrical shank
- MW: Standard length type with Weldon shank

■ Inserts

Cat. No.	Coated			Dimensions (mm)				Fig.	No. of teeth	Applicable endmill
	ACZ310	ACZ330	ACZ350	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	1	
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	1	
ZNMT 2907160-C	●	●	●	29,00	15,62	7,15	16	1	1	WBMR2320
ZNMT 3006160-S	●	●	●	30,00	12,00	6,70	16	2	1	
ZNMT 3608200	○	○	○	36,00	19,50	6,70	20	4	2	WBMR2400
ZNMT 4310250	○	○	○	43,00	25,70	10,15	25	4	2	
ZNMT 4310250-N	○	○	○	43,00	25,70	10,15	25	5	2	WBMR2500

- = Euro stock
- = Delivery on request

■ Spare Parts

Screw	Wrench	Wrench	Applicable endmill
BFTX0307N	TRX10	-	WBMR 2200
BFTX0409N	-	TRD15	WBMR 2250
BFTX0511N	-	TRD20	WBMR 2320
BFTX0619N	-	TRD25	WBMR 2400 WBMR 2500

■ Body (Extra long type, 4 teeth)

Cat. No.	Stock	Dimensions(mm)						
		øD	ød	l ₁	l ₂	l ₃	l ₄	L
WBMR 2200LL	●	20	25	30	80	170	40	250
WBMR 2200LLW	●							
WBMR 2250LL	●	25	32	38	100	200	50	300
WBMR 2250LLW	●							
WBMR 2320LL	●	32	32	44	120	230	60	350
WBMR 2320LLW	●							
WBMR 2400LL	○	40	42	50	250	100	-	350
WBMR 2400LLW	○							
WBMR 2500LL	○	50	42	69	250	100	-	350
WBMR 2500LLW	○							

- LL: Extra long type with cylindrical shank
- LLW: Extra long type with Weldon shank

■ Inserts

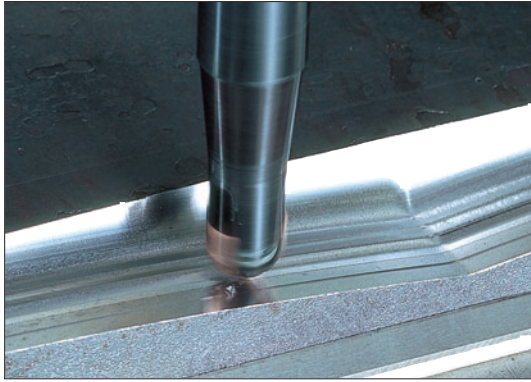
Cat. No.	Coated			Dimensions (mm)				Fig.	No. of teeth	Applicable endmill
	ACZ310	ACZ330	ACZ350	A	B	s	r			
ZNMT 1804100-C	●	●	●	18,00	9,76	4,76	10	1	1	WBMR2200
ZNMT 2004100-S	●	●	●	20,00	7,50	4,37	10	2	1	
ZNMT 2205125-C	●	●	●	22,50	12,20	5,70	12,5	1	1	WBMR2250
ZNMT 2305125-S	●	●	●	23,00	9,38	5,56	12,5	2	1	
ZNMT 2907160-C	●	●	●	29,00	15,62	7,15	16	1	1	WBMR2320
ZNMT 3006160-S	●	●	●	30,00	12,00	6,70	16	2	1	
ZNMT 3608200	○	○	○	36,00	19,50	6,70	20	4	2	WBMR2400
ZNMT 4310250	○	○	○	43,00	25,70	10,15	25	4	2	
ZNMT 4310250-N	○	○	○	43,00	25,70	10,15	25	5	2	WBMR2400

- = Euro stock
- = Delivery on request

■ Spare Parts

Screw	Wrench	Wrench	Applicable endmill
BFTX0307N	TRX10	-	WBMR 2200 LL
BFTX0409N	-	TRD15	WBMR 2250 LL
BFTX0511N	-	TRD20	WBMR 2320 LL
BFTX0409N	-	TRD15	WBMR 2320 LL
BFTX0619N	-	TRD25	WBMR 2400 LL
BFTX0409N	-	TRD15	WBMR 2500 LL

"Wave Ball Mill" for Finishing WBMF Type

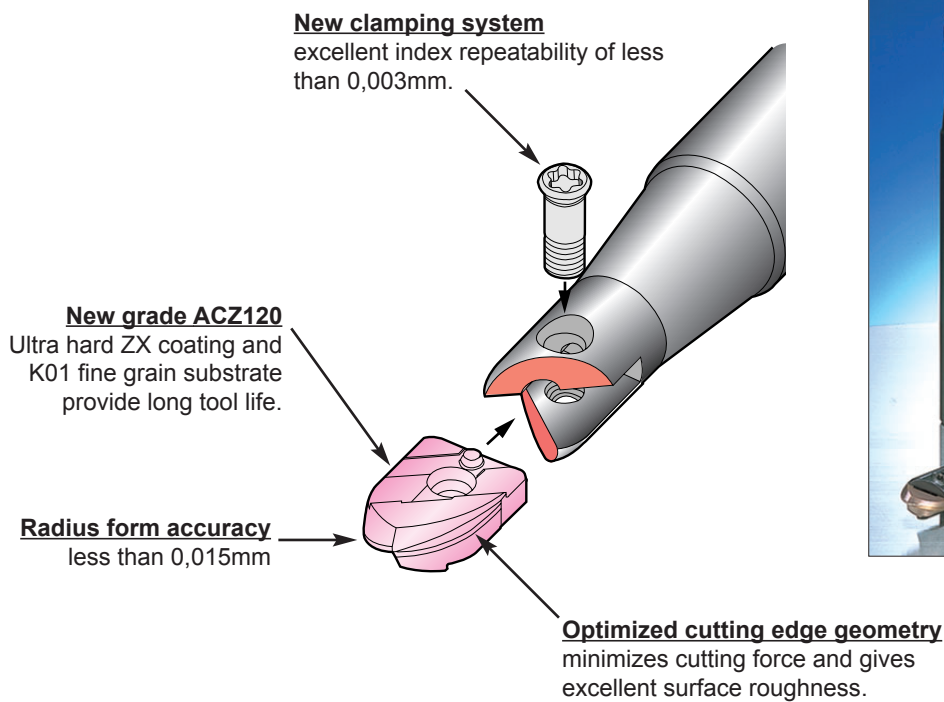


■ Features

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 !

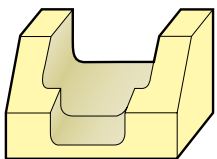
The WBMF achieves an excellent machined finish greatly reducing hand finishing and polishing operations.

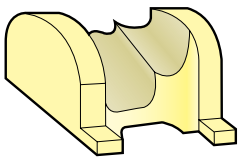
- Advantages
- Unique rigid clamping system
 - Large sigmoid blade
 - Smooth cutting action
 - High quality machined surface
 - Ultra hard ZX coated cutting edge



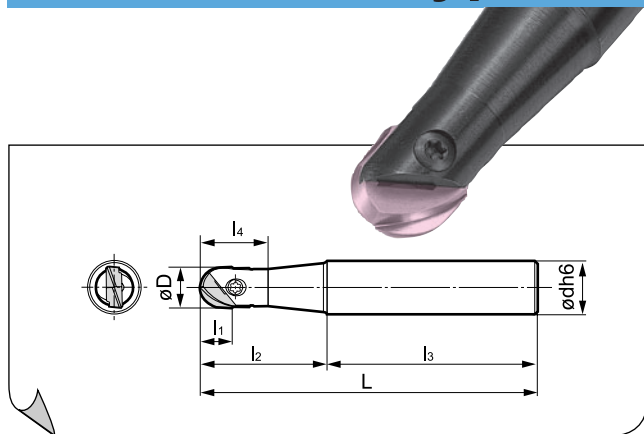
Indexable Endmills

■ Application Example

<p>● Bumper moulding die</p> <p>Work material : C55</p> 	<p><Results></p> <p>Surface roughness after continuous cutting for twelve hours was better than other manufacturer's product. Less width of flank wear was observed.</p>
<p>WBMF1200M (ø20mm)</p> <p>Insert : ZPGU2471100</p> <p>Grade : ACZ120</p>	<p>Cutting conditions</p> <p>$v_c = 88$ m/min</p> <p>$v_f = 700$ mm/min ($f_t = 0,25$ mm/tooth)</p> <p>Width of cut : 0,5 mm</p> <p>Depth of cut : 0,5 mm</p> <p>Dry</p>

<p>● Bumper moulding die</p> <p>Work material : C50</p> 	<p><Results></p> <p>Smooth cutting and good surface finish after continuous cutting for eight hours</p>
<p>WBMF1200M (ø20mm)</p> <p>Insert : ZPGU2471100</p> <p>Grade : ACZ120</p>	<p>Cutting conditions</p> <p>$v_c = 190$ m/min</p> <p>$v_f = 1200$ mm/min ($f_t = 0,21$ mm/tooth)</p> <p>Width of cut : 0,2 mm</p> <p>Depth of cut : 0,2 mm</p> <p>Dry</p>

Wavemill Series WBMF 1000 Type



Body

Cat. No.	Stock	Dimensions(mm)						
		ϕD	ϕd	l_1	l_2	l_3	l_4	L
WBMF 1100S	○	10	16	9	30	70	17	100
WBMF 1100M	●				35	95		130
WBMF 1100L	○				50	130		180
WBMF 1120S	○	12	16	10,5	40	70	19,5	110
WBMF 1120M	●				40	110		150
WBMF 1120L	○				60	140		200
WBMF 1160S	○	16	20	12	50	80	25,5	130
WBMF 1160M	●				50	130		180
WBMF 1160L	○				70	150		220
WBMF 1200S	○	20	25	15	60	80	32	140
WBMF 1200M	●				60	140		200
WBMF 1200L	○				80	170		250
WBMF 1250S	○	25	32	18,5	70	80	36	150
WBMF 1250M	●				73	147		220
WBMF 1250L	○				100	200		300
WBMF 1300S	○	30	32	22,5	80	80	43	160
WBMF 1300M	●				85	155		240
WBMF 1300L	○				120	230		350

S : Short type
M : Standard length type
L : Long type

Inserts

Cat. No.	Coated	Dimensions(mm)						Applicable endmill
		ϕD	l_1	l_2	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	

● = Euro stock

Spare Parts

Screw	Wrench	Applicable endmill
BFTG0408F	TRD15	WBMF1100
BFTG0409F	TRD15	WBMF1120
BFTG0513F	TRD20	WBMF1160
BFTG0617F	TRD25	WBMF1200
BFTG0621F	TRD25	WBMF1250
BFTG0825F	TRD25	WBMF1300

Recommended cutting conditions

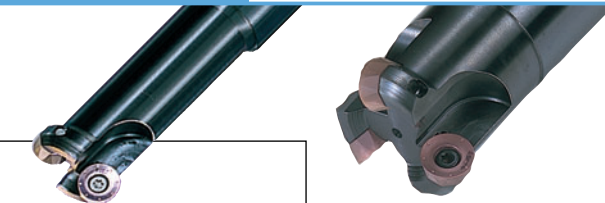
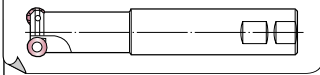
Material Condition	Carbon steel (Below HRC25)		Alloy steel (Below HRC45)		Stainless, Die steel etc.		Cast iron	
	ϕD	v_c	ϕD	v_c	ϕD	v_c	ϕD	v_c
10~30		200-250-300	100-150-200	50-80-100	100-120-150			
	f_t	0,1-0,2-0,3	0,1-0,2-0,3	0,1-0,15-0,2	0,2-0,3-0,4			

"Wave Radius Mill" WRC 0800/1000/1200 E

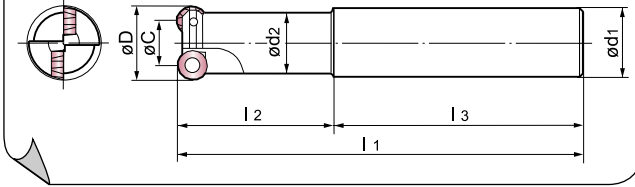
Multi Purpose Endmills with Polygon Inserts

Shank Type with Small Diameter Inserts

EW*: Weldon shank type



E_ : Cylindrical straight shank type



Axial rake angle: + 6°
Radial rake angle: - 5°

■ BODY

Insert IC (mm)	Cat. No.	Stock	Dimensions (mm)							No. of teeth
			øD	øC	ød ₁	ød ₂	l ₁	l ₂	l ₃	
8	WRC 08012 ES	●	12	-	12	10	110	40	70	1
	WRC 08012 EM	●	12	-	12	10	150	50	80	1
	WRC 08016 ES	●	16	-	16	14	120	50	70	1
	WRC 08016 EM	●	16	-	16	14	150	70	80	1
	WRC 08020 ES	●	20	12	20	18	130	50	80	2
	WRC 08020 EM	●	20	12	20	18	180	100	80	2
	WRC 08020 EL	●	20	12	20	18	250	130	120	2
	WRC 08025 ES	●	25	17	25	21	130	50	80	3
	WRC 08025 EM	●	25	17	25	21	180	100	80	3
WRC 08025 EL	●	25	17	25	21	250	130	120	3	
10	WRC 10016 ES	●	16	-	16	14	120	50	70	1
	WRC 10016 EM	●	16	-	16	14	150	70	80	1
	WRC 10020 ES	●	20	10	20	18	130	50	80	1
	WRC 10020 EM	●	20	10	20	18	180	100	80	1
	WRC 10025 ES	●	25	15	25	21	130	50	80	2
	WRC 10025 EM	●	25	15	25	21	180	100	100	2
	WRC 10025 EL	●	25	15	25	21	250	130	130	2
	WRC 10025 EW*	●	25	15	25	21	160	60	100	2
	WRC 10032 ES	●	32	22	32	28	130	50	80	3
WRC 10032 EM	●	32	22	32	28	200	120	80	3	
WRC 10032 EL	●	32	22	32	28	300	180	120	3	
12	WRC 12032 EW*	●	32	20	32	28	180	80	100	2

ES : Short type with straight shank
EM : Standard length type with straight shank
EL : Long type with straight shank
EW* : Weldon shank type



■ Inserts

Cat. No.	Coated			Max. d _{oc}		Dimensions (mm)		
	ACZ310	ACZ330	ACZ350	4 corners application	8 corners application	IC	r	s
QPMT 080330 PPEN	○	●	○	4	1,0	8	3,0	3,18
QPMT 10T335 PPEN	●	●	●	5	1,2	10	3,5	3,97
QPMT 120440 PPEN	●	●	●	6	1,5	12	4,0	4,76

● = Euro stock
○ = Delivery on request

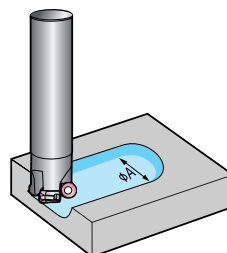
■ Recommended cutting conditions

[v_c = m/min, f_t = mm/tooth] [min. - optimum - max.]

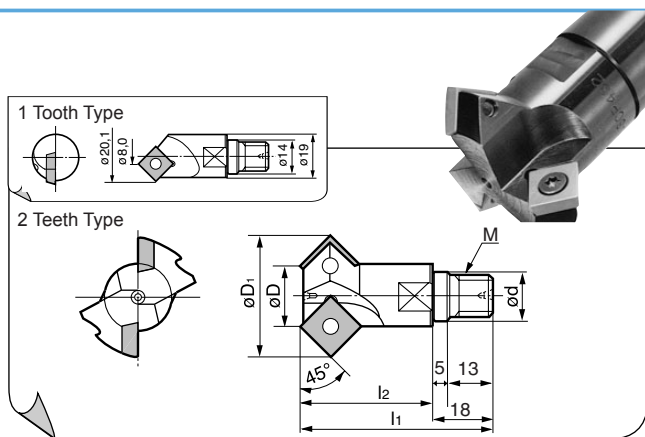
øD (mm)	Material	Carbon steel	Alloy steel	Stainless steel	Cast iron
		(ex. C40 ~ C50)	(Below HRC40)	(ex. 10CrNiS189)	(ex. GG20)
12 ~ 32	v _c	80-120-160	60-100-140	60-100-120	60-80-120
	f _t	0,1-0,3-0,4	0,1-0,2-0,3	0,1-0,15-0,2	0,1-0,2-0,3

■ Spare Parts

Endmill	Screw	Wrench
WRC 08012 E_	BFTX 02505N	TRD 08
WRC 08_ _ _ E_	BFTX 02506N	TRD 08
WRC 10_ _ _ E_	BFTX 03584	TRD 15
WRC 12_ _ _ E_	BFTX 0409N	TRD 15



Chamfering Endmills SCP Type



Body

Cat. No.	Stock	Dimensions (mm)						No. of teeth
		ϕD	ϕD_1	ϕd	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

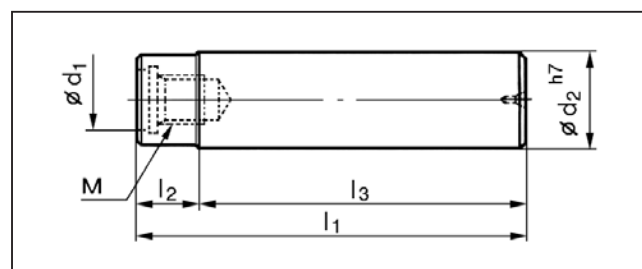
Fig. 1

Fig. 2

Cat. No.	Coated carbide		Carbide		Applicable endmill
	AC211	AC325	A30N	G10E	
SDMA 090308				●	SCP 308
SDMA 090308 T			●		
SPMA 120408				●	SCP 419
SPMA 120408 T		●	●		SCP 432

● = Euro stock

Holder for SCP



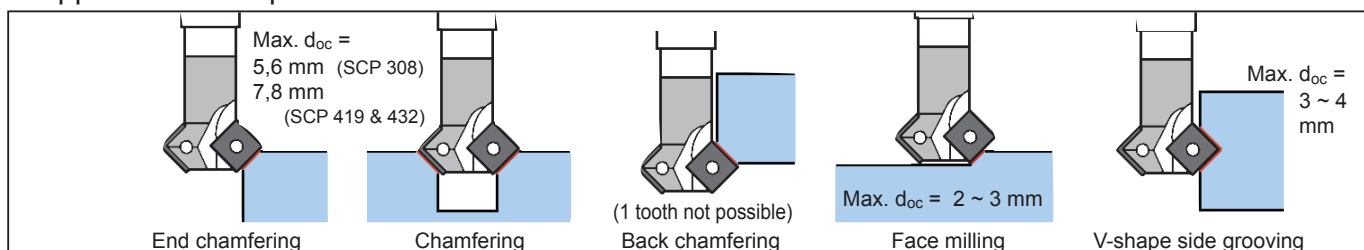
Cat. No.	Stock	Dimensions (mm)						Applicable endmill
		ϕd_1	ϕd_2	M	l_1	l_2	l_3	
SCA 20	●	14	20	M12	105	20	85	SCP 308 SCP 419
SCA 32	●	20	32	M16	130	20	110	SCP 432

● = Euro stock

Spare Parts

SCP	Screw	Wrench
308	BFTX 0407 N	TRX 10
419, 432	BFTX 0511 N	TRX 20

Application examples



Recommended cutting conditions for SCP

(min. - optimal - max.)

Multi-Mills	ϕD (mm)	Tooling	Cutting conditions	General steel			Cast iron
				Less than H _R C25	H _R C25 ~ 35	H _R C35 ~ 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 ~ J28

J



	Selection Guide	Coated Endmills	J2 -3
		Uncoated Endmills	J4 -5
Coated Endmills	GS MILLS	GLM2000/4000SF	J6 -7
	UP MILLS	SSUP4000ZX/ZX-R	J8 -9
	New AURORA COAT Endmills	ASM2000/4000DL	J10-11
	Standard Type	SSM2000/4000ZX	J12
	Long Type	LSM2000/4000ZX	J13
	Hard Type	HHM4000/6000/8000ZX	J14
		LHHM4000/6000/8000ZX	J14
		EHHM4000/6000/8000ZX	J15
		HHM6000/8000ZX-R	J15
	Fast Helix Type	HSM2000/3000/4000ZX	J16
	Roughing Type	RSM4000ZX	J17
	GS Mills Ball Type	GLB2000SF	J18
	New AURORA COAT Ball Type	SNB2000DL	J19
	Ball Mills "Neo"	SNB2000ZX	J20-21
	Standard Ball Type	SSB2000ZX	J25
Uncoated Endmills	Standard Type	SSM2000/4000	J22-24
	Long Type	LSM2000/4000	J24
	Extra Long Type	ELSM2000/4000	J25
	Fast Helix Type	HSM2000/3000/4000	J26
	Roughing Type	RSM4000	J26
	For Aluminium Cutting	ASM4000	J27
	Straight Flute Ball Type	BSM2000	J26
	SUMIBORON "Helical Master" for Hardened Steel	BNES1000	J28

Solid Carbide
Endmills

Coated Spiral Endmills Selection Guide

Economical "Global Standard" Type

GLM... SF

∅ 0,5 ~ ∅ 12



New **TiAlN** coated high performance "GS" type solid carbide endmill

Square type with 2 and 4 teeth

Accurate sizing
Increased tool life

Grade: **ACZ20W**
30° helix angle

⇒ J6~7

High Efficient Endmills "UP MILL"

SSUP... ZX

∅ 2 ~ ∅ 20



New **ZX** coated high performance solid carbide endmill

Low cutting forces

Grade: **ACZ50M**
40° helix angle

⇒ J8~9

SSUP... ZX-R

∅ 3 ~ ∅ 20



New **ZX** coated high performance solid carbide endmill

Corner radius type

Grade: **ACZ50M**
40° helix angle

⇒ J8~9

AURORA Coated Spiral Endmills

New ASM... DL

∅ 2 ~ ∅ 16



DLC (Diamond Like Carbon) coated high performance solid carbide endmill for Aluminium alloys

Excellent surface finish

Square type with 2 and 4 teeth

Grade: **DL1000**
30° helix angle
Sharp cutting edge

⇒ J10~11

Standard Type

SSM... ZX

∅ 1 ~ ∅ 32



ZX coated general purpose solid carbide endmill

Grade: **ACZ50**
30° helix angle

⇒ J12

Long Type

LSM... ZX

∅ 1 ~ ∅ 25



ZX coated general purpose solid carbide endmill

Long type

Grade: **ACZ50**
30° helix angle

⇒ J12

Fast 45° Helix Type

HHM... ZX

∅ 3 ~ ∅ 32



New **ZX** coated fast helix solid carbide endmill for hardened materials

Grade: **ACZ10M**
45° helix angle

⇒ J14

LHHM... ZX

∅ 3 ~ ∅ 32



New **ZX** coated fast helix solid carbide endmill for hardened materials

Long type

Grade: **ACZ10M**
45° helix angle

⇒ J14

EHHM... ZX

∅ 3 ~ ∅ 32



New **ZX** coated fast helix solid carbide endmill for hardened materials

Extra long type

Grade: **ACZ10M**
45° helix angle

⇒ J15

HHM... ZX-R

∅ 3 ~ ∅ 32



New **ZX** coated fast helix solid carbide endmill for hardened materials

Corner radius type

Grade: **ACZ10M**
45° helix angle

⇒ J15

60° High Helix Type

HSM... ZX

ø 2 ~ ø 25

ZX coated high helix solid carbide endmill

Low cutting forces
Excellent surface finish

Grade: ACZ50
60° helix angle

⇒ J16

For Roughing

RSM... ZX

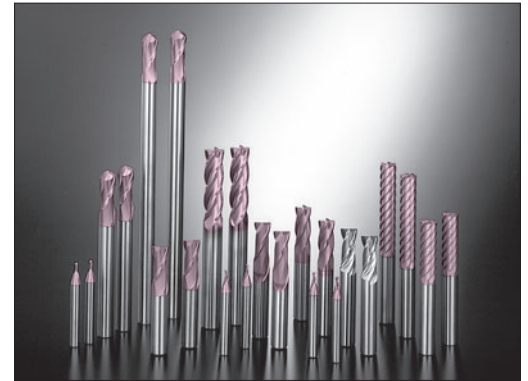
ø 6 ~ ø 25

ZX coated serrated tooth solid carbide endmill

Prevents chatter
Good chip evacuation

Grade: ACZ50
30° helix angle

⇒ J17



Economical "Global Standard" Ball Nose Type

GLB... SF

ø 1 ~ ø 12

New **TiAlN** coated high performance "GS" type solid carbide endmill

Ball nose type with 2 teeth

Accurate sizing
Increased tool life

Grade: ACZ20W
30° helix angle

⇒ J18

AURORA Coated Ball Nose Endmills

New SNB... DL

ø 2 ~ ø 16

DLC (Diamond Like Carbon) coated high performance solid carbide endmill for Aluminium alloys

Excellent surface finish

Ball nose type with 2 teeth

Grade: DL1200
30° helix angle

⇒ J19

Solid Carbide
Endmills

General Copying and Radius endmilling

SNB... ZX

ø 1 ~ ø 30

New high efficient ZX coated ball-nose solid carbide endmill "Neo"

High precision cutting
with sharp cutting edge

Grade: ACZ10M
30° helix angle

⇒ J20

SSB... ZX

ø 1 ~ ø 25

ZX coated ball-nose solid carbide endmill

Convex ball nose

Grade: ACZ50
25° helix angle

⇒ J21

Uncoated Spiral Endmills Selection Guide

Standard Type

SSM 2000/4000

∅ 0,5 ~ ∅ 25

General poupose solid carbide endmill



Grade: A1 (Micrograin)
Sharp cutting edge

⇒ J22~23

Long Type

LSM 2000/4000

∅ 0,2 ~ ∅ 25

General poupose solid carbide endmill for finishing



Long type

Grade: A1 (Micrograin)
Sharp cutting edge

⇒ J24

Extra Long Type

ELSM 2000/4000

∅ 0,2 ~ ∅ 25

General poupose solid carbide endmill for finishing



Extra long type

Grade: A1 (Micrograin)
Sharp cutting edge

⇒ J25

For Finishing with 60° Helix Angle

HSM 2000/3000/4000

∅ 2 ~ ∅ 32

High shear solid carbide endmill

Low cutting forces
Excellent surface finish



Grade: A1 (Micrograin)
60° helix angle

⇒ J26

For Roughing

RSM 4000

∅ 6 ~ ∅ 25

Serrated tooth solid carbide endmill

Prevents chatter
Good chip evacuation



Grade: A1 (Micrograin)

⇒ J26

General Copying and Radius Endmilling

BSM

∅ 1 ~ ∅ 20

Ball-nose solid carbide endmill for copying

Strait ball nose
Straight flute



Grade: A1 (Micrograin)
Sharp cutting edge

⇒ J27

For Aluminium and Non-Ferrous Materials

ASM 2000



∅ 0,2 ~ ∅ 25
High shear solid carbide
endmill for aluminium alloys
and non ferrous materials

Grade: H1 (Micrograin)
Sharp cutting edge
30° Helix angle

⇒ J27

CBN Brazed Endmills for Hardened Steel

BNES 1000



∅ 6 ~ ∅ 16
"Helical Master" with spiral
Sumiboron brazed cutting
edge for super finishing
hardened steel
(HRC50~60)

CBN grade: BN350
Single flute

⇒ J28, M30

"Global Standard" Endmills GS MILL Series



GLM 2000 SF

Square type with 2 teeth



GLM 4000 SF

Square type with 4 teeth

■ Features

Newly developed ultra hard coated endmills for high performance shoulder milling and slotting of carbon steel, alloy steel, heat treated steel, hardened steel, stainless steel, high temperature alloys etc.

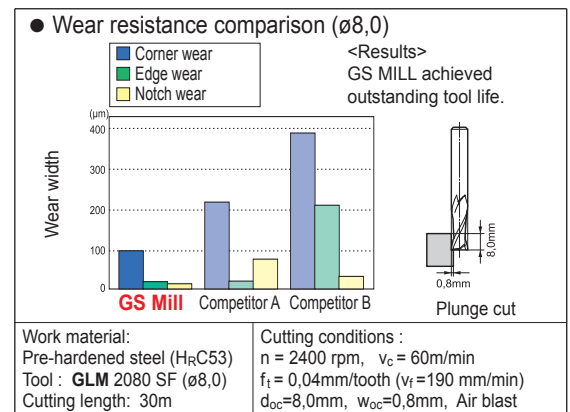
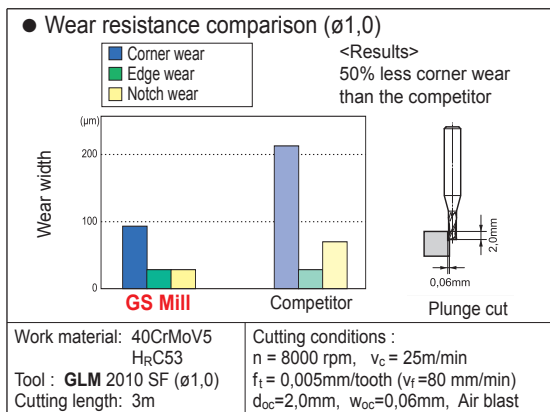
Unique flute design and strong cutting edge ensure excellent chip control even at high feed and high speed cutting.

Feed rate up to 1500 mm/min with and without coolant

■ Advantages

- Rapid metal removal
- Accurate sizing
- Increased tool life
- Tough new tungsten carbide substrate
- Newly developed ultra hard coating

■ Performance

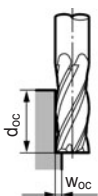


■ Recommended cutting conditions

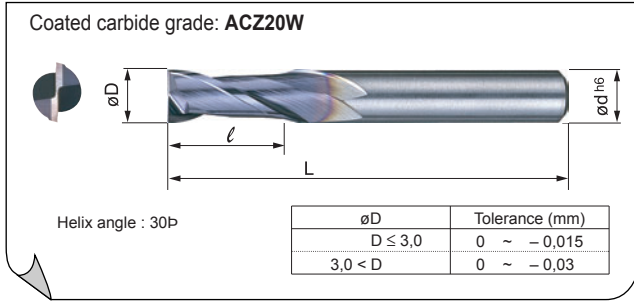
HSC Machining Centre Operations

● GS Mill, HSC operations with 4 teeth square type endmill, GLM 4000SF

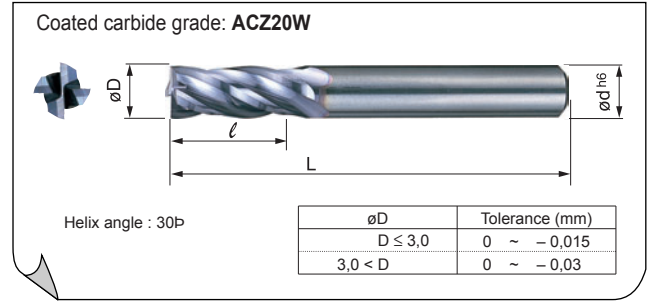
Material Cutting data	Carbon steel, Cast iron (HB150~250)		Alloy steel, Prehardened steel (HRC25~35)		Heat treated alloy steel, hardened steel (HRC35~45)		Hardened steel (HRC45~55)		Stainless steel		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
	Tool Dia. (mm)										
2	47.800	2.200	47.800	1.600	39.800	1.200	31.800	900	15.900	400	
4	23.900	2.600	23.900	1.900	19.900	1.400	15.900	1.100	8.000	490	
6	16.000	2.700	16.000	2.000	13.300	1.500	10.600	1.200	5.300	510	
8	12.000	2.700	12.000	2.000	10.000	1.500	8.000	1.200	4.000	520	
10	9.600	2.700	9.600	2.000	8.000	1.500	6.400	1.200	3.200	520	
12	8.000	2.700	8.000	2.000	6.700	1.500	5.300	1.200	2.700	520	
Shoulder cutting	d_{oc}	1,5D						1,0D		1,5D	
	w_{oc}	0,05D						0,02D		0,05D	



GS MILL Series GLM 2000SF Type



GS MILL Series GLM 4000SF Type



Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	GLM 2005 SF	●	0,5	1,25	38	3
	GLM 2010 SF	●	1,0	2,5	38	3
	GLM 2015 SF	●	1,5	3,75	38	3
	GLM 2020 SF	●	2,0	5	38	3
	GLM 2025 SF	●	2,5	6,25	38	3
	GLM 2030 SF	●	3,0	7,5	38	3
	GLM 2040 SF	●	4,0	11	45	4
	GLM 2050 SF	●	5,0	13	50	6
	GLM 2060 SF	●	6,0	13	50	6
	GLM 2080 SF	●	8,0	19	60	8
	GLM 2100 SF	●	10,0	22	70	10
	GLM 2120 SF	●	12,0	26	75	12

● = Euro stock

Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	GLM 4010 SF	●	1,0	2,5	38	3
	GLM 4020 SF	●	2,0	5	38	3
	GLM 4030 SF	●	3,0	7,5	38	3
	GLM 4040 SF	●	4,0	11	45	4
	GLM 4050 SF	●	5,0	13	50	6
	GLM 4060 SF	●	6,0	13	50	6
	GLM 4080 SF	●	8,0	19	60	8
	GLM 4100 SF	●	10,0	22	70	10
	GLM 4120 SF	●	12,0	26	75	12

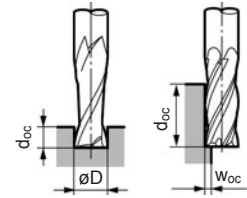
● = Euro stock

Recommended cutting conditions

Conventional Milling Operations

Recommended :

- (1) Cutting performance is enhanced when using a high quality machine and rigid set up.
- (2) When slotting stainless steels it may be necessary to reduce spindle speed and feed per tooth.
- (3) In case of chatter check immediately rigidity of set up and the cutting conditions.



● GS Mill, 2 teeth square type endmill, GLM 2000SF

Material Cutting data	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)	
2	11.200	340	10.500	240	7.300	130	5.300	80	5.300	90	3.300	50	
4	6.400	460	6.000	320	4.200	180	3.000	110	3.000	130	1.900	70	
6	4.600	550	4.300	390	3.000	210	2.200	130	2.200	150	1.400	80	
8	3.400	550	3.200	390	2.200	210	1.600	130	1.600	150	1.000	80	
10	2.800	560	2.600	390	1.800	210	1.300	130	1.300	150	800	80	
12	2.300	560	2.200	400	1.500	210	1.100	130	1.100	150	700	80	
Shoulder cutting	d _{oc}	1,5D				1,0D		1,5D		1,0D			
	W _{oc}	0,1D				0,05D		0,02D		0,1D		0,05D	
Slotting	d _{oc}	0,5D				0,2D		0,05D		0,3D		0,05D	

● GS Mill, 4 teeth square type endmill, GLM 4000SF

Material Cutting data	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)	
2	12.800	570	12.000	380	8.300	230	6.000	150	6.000	130	3.700	70	
4	6.800	730	6.400	490	4.400	300	3.200	200	3.200	170	2.000	90	
6	4.600	770	4.300	520	3.000	320	2.200	210	2.200	180	1.400	100	
8	3.400	770	3.200	520	2.200	320	1.600	210	1.600	180	1.000	100	
10	2.800	780	2.600	520	1.800	320	1.300	210	1.300	180	800	100	
12	2.300	780	2.200	530	1.500	320	1.100	210	1.100	180	700	100	
Shoulder cutting	d _{oc}	1,5D				1,0D		1,5D		1,0D			
	W _{oc}	0,1D				0,05D		0,02D		0,1D		0,05D	
Slotting	d _{oc}	0,5D				0,2D		0,05D		0,3D		0,05D	

Coated Endmills

High Efficient Endmills UP MILL Series



■ Features

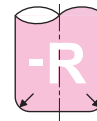
ZX coated general use endmill for high efficient slotting and side cutting of steels, stainless steels, high temperature alloys and cast irons.

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

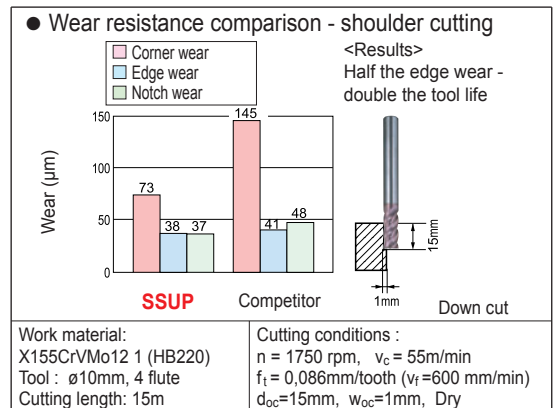
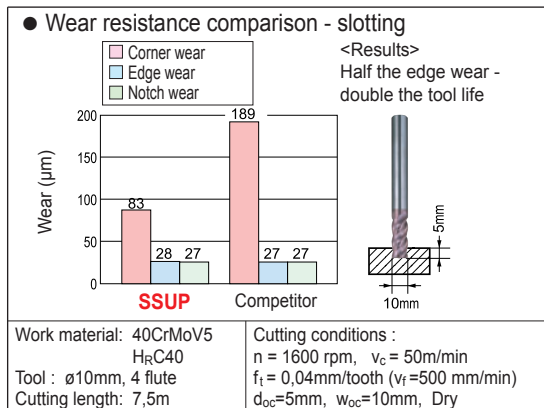
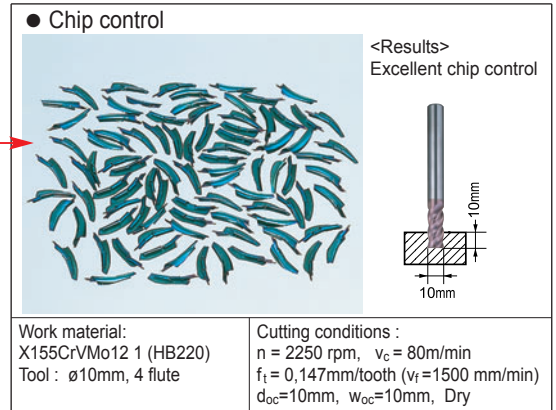
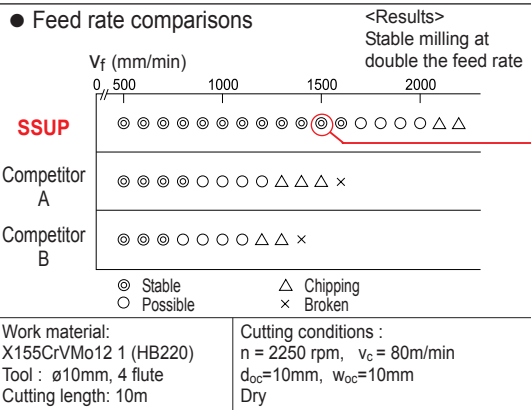
- Unique flute design for excellent chip removal
- Extra strong cutting edge
- 40° high helix angle for high feed rates
- New ZX coating for excellent wear resistance
- Smooth cutting
- Excellent rigid wide cutting land



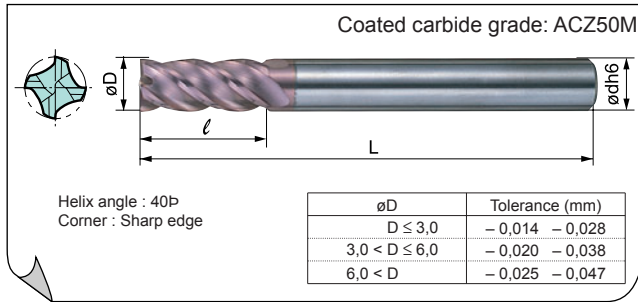
SSUP 4000ZX-R Series
Diameter and Corner Radius Range

∅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				●	●	●	●

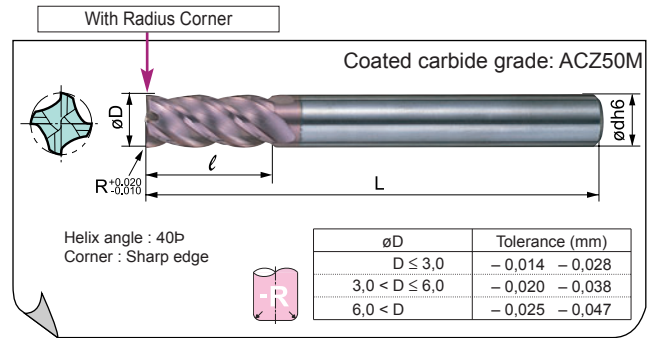
■ Performance



ZX Coated UP MILL SSUP 4000ZX Type



ZX Coated UP MILL SSUP 4000ZX-R Type



Endmills (mm)

	Cat. No.	Stock	øD	l	L	ødh6
	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

● = Euro stock
○ = Delivery on request

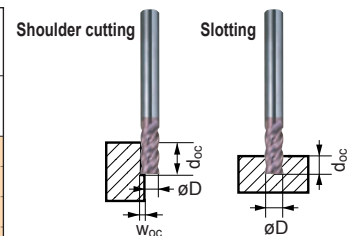
Endmills (mm)

	Cat. No.	Stock	øD	R	l	L	ødh6
	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	19	80	8
	SSUP 4080ZX-R05	●	8,0	0,5	19	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

● = Euro stock
○ = Delivery on request

Recommended cutting conditions

Material	Carbon steel, Cast iron (Hb150~250)		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 _{oc}	1,5D								
	w _{oc}	0,1D		0,05D		0,1D		0,05D		
Slotting	d _{oc}	1,0D								



- (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.

Coated Endmills

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

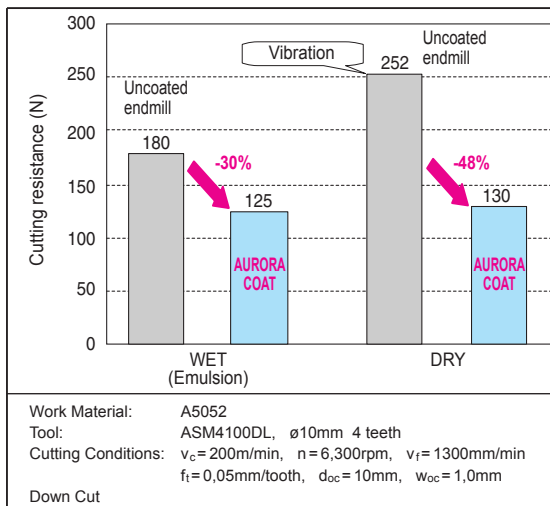
- Very smooth AURORA COAT results in low adhesion as well as good surface finish
- With lower cutting forces and high rigidity, this series is suitable for low rigidity machine
- Available in 2 and 4 flutes square type as well as ballnose type endmills

■ Product Range

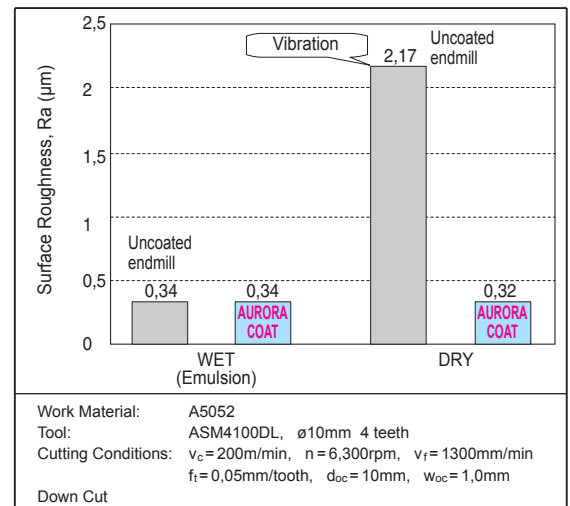
Series	No. of	Shape	Diameter
ASM2000DL	2 Teeth	Square 	ø2~ø16
ASM4000DL	4 Teeth	Square 	ø2~ø16
SNB2000DL	2 Teeth	Ballnose 	ø2~ø16 (R1~R8)

■ Efficiency

● Performance Comparison



● Surface Finish Comparison



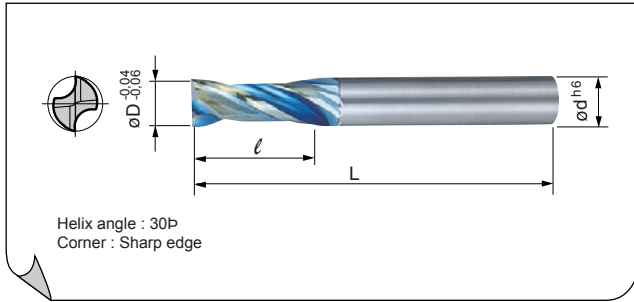
AURORA Coated Spiral Endmills ASM 2000DL Type

AURORA Coated Spiral Endmills ASM 4000DL Type

2

New

DLC coated carbide grade: DL1000



Endmills (mm)

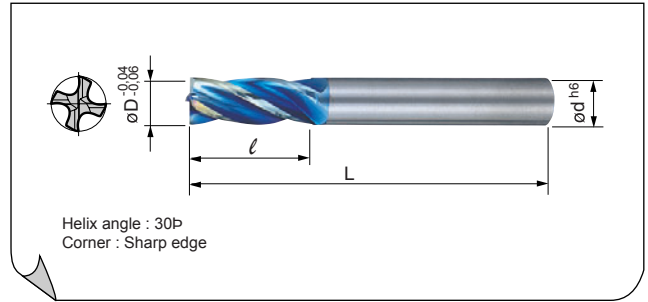
	Cat. No.	Stock	øD	l	L	ød
	ASM 2020 DL	●	2,0	6	40	4
	ASM 2030 DL	●	3,0	10	45	6
	ASM 2040 DL	●	4,0	12	45	6
	ASM 2050 DL	●	5,0	15	50	6
	ASM 2060 DL	●	6,0	15	50	6
	ASM 2080 DL	●	8,0	18	60	8
	ASM 2100 DL	●	10,0	22	71	10
	ASM 2120 DL	●	12,0	25	75	12
	ASM 2160 DL	●	16,0	32	90	16

● = Euro stock

4

New

DLC coated carbide grade: DL1000



Endmills (mm)

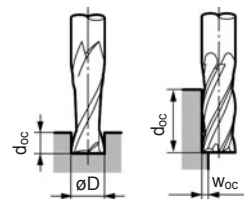
	Cat. No.	Stock	øD	l	L	ød
	ASM 4020 DL	●	2,0	6	40	4
	ASM 4030 DL	●	3,0	10	45	6
	ASM 4040 DL	●	4,0	12	45	6
	ASM 4050 DL	●	5,0	15	50	6
	ASM 4060 DL	●	6,0	15	50	6
	ASM 4080 DL	●	8,0	18	60	8
	ASM 4100 DL	●	10,0	22	71	10
	ASM 4120 DL	●	12,0	25	75	12
	ASM 4160 DL	●	16,0	32	90	16

● = Euro stock

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.

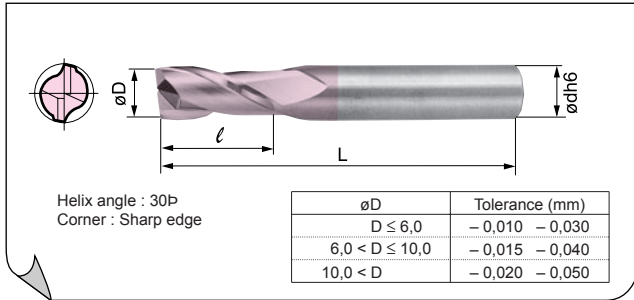


Work Material		Aluminium Alloy							
Cutting data øD (mm)		Wet (Emulsion)				Dry			
		Side Milling (4 teeth)		Groove Milling (4 teeth)		Side Milling (4 teeth)		Groove Milling (4 teeth)	
		Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
2,0		40.000	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	118.000	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	45.000	560	6.400	2.000	4.500	390
Depth and wide of cut	d _{oc}	1,5D		1,0D		1,5D		0,5D	
	w _{oc}	0,2D		(D)		0,2D		(D)	

ZX Coated Spiral Endmills SSM 2000ZX Type

2

Coated carbide grade: ACZ50



Endmills (mm)

	Cat. No.	Stock	øD	ℓ	L	ød
	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

● = Euro stock
○ = Delivery on request

Recommended conditions (Slotting) øD < ø3 ; d_{oc} = 0,5 × øD øD ≥ ø3 ; d_{oc} = 1,0 × øD

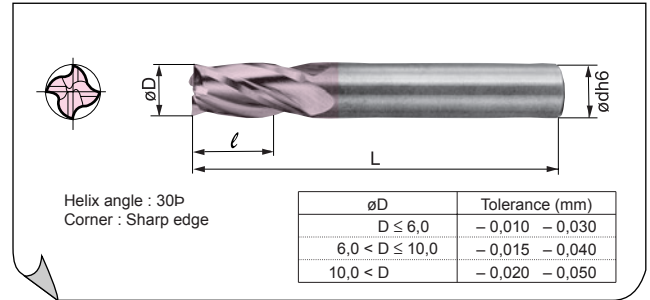
Material øD	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc.	
	(Below HRC25)	(Below HRC45)			
1,0 ~ 2,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,003-0,010	0,002-0,005	0,005-0,016	0,002-0,005
3,0 ~ 5,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,012-0,024	0,006-0,011	0,018-0,040	0,006-0,011
6,0 ~ 12,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,025-0,050	0,013-0,025	0,045-0,105	0,013-0,025
13,0 ~ 20,0	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,055-0,085	0,030-0,050	0,110-0,170	0,030-0,050

v_c = m/min f_t = mm/tooth

ZX Coated Spiral Endmills SSM 4000ZX Type

4

Coated carbide grade: ACZ50



Endmills (mm)

	Cat. No.	Stock	øD	ℓ	L	ød
	SSM 4015ZX	●	1,5	5	40	4
	SSM 4020ZX	●	2,0	6	40	4
	SSM 4025ZX	●	2,5	8	40	4
	SSM 4030ZX	●	3,0	8	45	6
	SSM 4035ZX	●	3,5	8	45	6
	SSM 4040ZX	●	4,0	10	45	6
	SSM 4045ZX	●	4,5	10	45	6
	SSM 4050ZX	●	5,0	12	50	6
	SSM 4055ZX	○	5,5	12	50	6
	SSM 4060ZX	●	6,0	12	50	6
	SSM 4065ZX	○	6,5	12	50	8
	SSM 4070ZX	●	7,0	15	55	8
	SSM 4075ZX	○	7,5	15	55	8
	SSM 4080ZX	●	8,0	15	55	8
	SSM 4085ZX	○	8,5	15	55	10
	SSM 4090ZX	●	9,0	15	55	10
	SSM 4095ZX	○	9,5	15	55	10
	SSM 4100ZX	●	10,0	18	65	10
	SSM 4105ZX		10,5	18	65	12
	SSM 4110ZX	○	11,0	18	70	12
	SSM 4115ZX		11,5	18	70	12
	SSM 4120ZX	●	12,0	18	70	12
	SSM 4130ZX	○	13,0	20	80	16
	SSM 4135ZX		13,5	20	80	16
	SSM 4140ZX	●	14,0	20	80	16
	SSM 4150ZX	○	15,0	25	80	16
	SSM 4160ZX	●	16,0	35	90	16
	SSM 4170ZX		17,0	35	90	20
	SSM 4180ZX		18,0	40	105	20
	SSM 4190ZX		19,0	40	105	20
	SSM 4200ZX	●	20,0	40	105	20
	SSM 4220ZX		22,0	40	105	25
	SSM 4240ZX		24,0	45	115	25
	SSM 4250ZX	●	24,0	50	120	25
	SSM 4300ZX		30,0	55	130	32
	SSM 4320ZX		32,0	55	130	32

● = Euro stock
○ = Delivery on request

Recommended conditions (Shoulder processing) d_{oc} = 1,5 × øD w_{oc} = 0,1 × øD

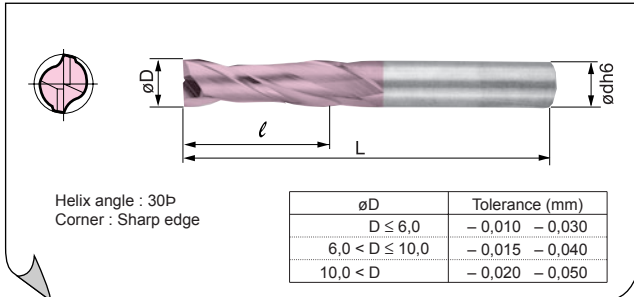
Material øD		Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc.
		(Below HRC25)	(Below HRC45)		
1,0 ~ 2,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,004-0,017	0,002-0,008	0,008-0,020	0,002-0,008
3,0 ~ 5,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,018-0,036	0,009-0,018	0,027-0,060	0,009-0,018
6,0 ~ 12,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,038-0,070	0,019-0,035	0,065-0,157	0,019-0,035
13,0 ~ 19,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,075-0,125	0,040-0,075	0,160-0,250	0,040-0,075
20,0 ~ 32,0	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,135-0,170	0,085-0,110	0,257-0,390	0,085-0,110

v_c = m/min f_t = mm/tooth

ZX Coated Long Spiral Endmills LSM 200ZX Type

2

Coated carbide grade: ACZ50



Endmills (mm)

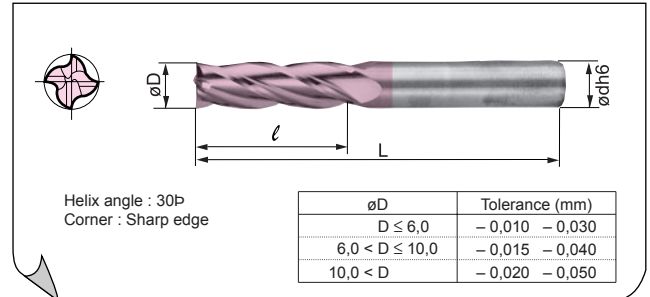
	Cat. No.	Stock	øD	l	L	ød
	LSM 2010ZX		1,0	5	45	4
	LSM 2015ZX		1,5	7	45	4
	LSM 2020ZX		2,0	9	45	4
	LSM 2025ZX		2,5	12	45	4
	LSM 2030ZX	○	3,0	12	50	6
	LSM 2035ZX	○	3,5	12	50	6
	LSM 2040ZX	○	4,0	15	50	6
	LSM 2045ZX		4,5	15	50	6
	LSM 2050ZX	○	5,0	18	55	6
	LSM 2055ZX		5,5	18	55	6
	LSM 2060ZX	○	6,0	18	55	6
	LSM 2065ZX	○	6,5	18	55	8
	LSM 2070ZX	○	7,0	25	65	8
	LSM 2075ZX		7,5	25	65	8
	LSM 2080ZX	○	8,0	25	65	8
	LSM 2085ZX		8,5	25	65	10
	LSM 2090ZX	○	9,0	25	65	10
	LSM 2095ZX		9,5	25	65	10
	LSM 2100ZX	○	10,0	30	75	10
	LSM 2105ZX		10,5	30	80	12
	LSM 2110ZX	○	11,0	30	80	12
	LSM 2115ZX		11,5	30	80	12
	LSM 2120ZX	○	12,0	30	80	12
	LSM 2130ZX	○	13,0	35	95	16
	LSM 2140ZX		14,0	40	95	16
	LSM 2150ZX		15,0	40	95	16
	LSM 2160ZX		16,0	50	105	16
	LSM 2170ZX		17,0	50	105	20
	LSM 2180ZX		18,0	50	115	20
	LSM 2190ZX		19,0	55	120	20
	LSM 2200ZX		20,0	55	120	20
	LSM 2240ZX		24,0	65	140	25
	LSM 2250ZX		25,0	65	140	25

○ = Delivery on request

ZX Coated Long Spiral Endmills LSM 400ZX Type

4

Coated carbide grade: ACZ50



Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	LSM 4030ZX	○	3,0	12	50	6
	LSM 4035ZX	○	3,5	12	50	6
	LSM 4040ZX	○	4,0	15	50	6
	LSM 4045ZX	○	4,5	15	50	6
	LSM 4050ZX	○	5,0	18	55	6
	LSM 4055ZX		5,5	18	55	6
	LSM 4060ZX	○	6,0	18	55	6
	LSM 4065ZX		6,5	18	55	8
	LSM 4070ZX	○	7,0	25	65	8
	LSM 4075ZX	○	7,5	25	65	8
	LSM 4080ZX	○	8,0	25	65	8
	LSM 4085ZX		8,5	25	65	10
	LSM 4090ZX	○	9,0	25	65	10
	LSM 4095ZX		9,5	25	65	10
	LSM 4100ZX	○	10,0	30	75	10
	LSM 4110ZX	○	11,0	30	80	12
	LSM 4115ZX		11,5	30	80	12
	LSM 4120ZX	○	12,0	30	80	12
	LSM 4130ZX	○	13,0	35	95	16
	LSM 4140ZX	○	14,0	40	95	16
	LSM 4150ZX	○	15,0	40	95	16
	LSM 4160ZX	○	16,0	50	105	16
	LSM 4170ZX		17,0	50	105	20
	LSM 4180ZX		18,0	50	115	20
	LSM 4190ZX		19,0	55	120	20
	LSM 4200ZX		20,0	55	120	20
	LSM 4220ZX		22,0	60	135	25
	LSM 4250ZX		25,0	65	140	25

○ = Delivery on request

Coated
Endmills

Recommended conditions (Slotting) øD < ø3 ; d_{oc} = 0,5 × øD øD ≥ ø3 ; w_{oc} = 1,0 × øD

øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc.
		(Below HRC25)	(Below HRC45)		
1,0 ~ 2,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,002-0,008	0,001-0,004	0,003-0,012	0,001-0,004
3,0 ~ 5,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,009-0,018	0,004-0,008	0,014-0,030	0,004-0,008
6,0 ~ 12,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,019-0,038	0,009-0,019	0,034-0,079	0,009-0,019
13,0 ~ 19,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,041-0,064	0,023-0,038	0,083-0,128	0,023-0,038
20,0 ~ 25,0	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,071-0,090	0,041-0,052	0,139-0,195	0,041-0,052

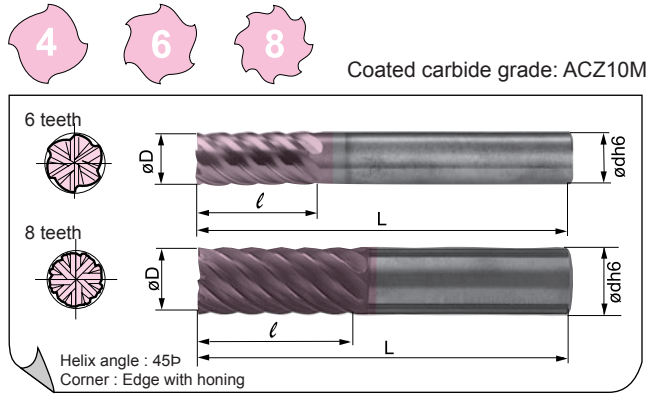
v_c = m/min f_t = mm/tooth

Recommended conditions (Shoulder processing) d_{oc} = 1,5 × øD w_{oc} = 0,1 × øD

øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc.
		(Below HRC25)	(Below HRC45)		
3,0 ~ 5,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,013-0,027	0,007-0,013	0,020-0,045	0,007-0,013
6,0 ~ 12,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,028-0,052	0,014-0,026	0,049-0,118	0,014-0,026
13,0 ~ 19,9	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,056-0,094	0,030-0,056	0,120-0,187	0,030-0,056
20,0 ~ 25,0	v _c	200-250-300	100-150-200	100-120-150	60-75-90
	f _t	0,101-0,127	0,064-0,082	0,193-0,292	0,064-0,082

v_c = m/min f_t = mm/tooth

ZX Coated Fast Helix Endmills HHM 4000/6000/8000 ZX Type



Endmills (mm)

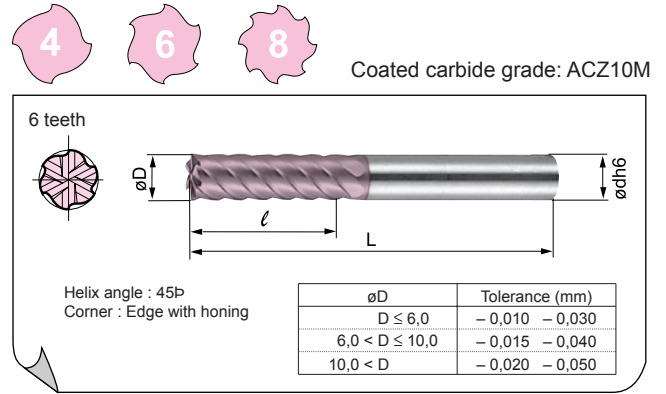
	Cat. No.	Stock	øD	ℓ	L	ød
	HHM 4030ZX	●	3,0	8	50	6
	HHM 4040ZX	●	4,0	10	50	6
	HHM 4050ZX	●	5,0	12	50	6
	HHM 6060ZX	●	6,0	12	50	6
	HHM 6080ZX	●	8,0	16	60	8
	HHM 6100ZX	●	10,0	20	71	10
	HHM 6120ZX	●	12,0	24	75	12
	HHM 8160ZX	●	16,0	32	90	16
	HHM 8200ZX	●	20,0	40	106	20
	HHM 8250ZX	●	25,0	50	120	25
	HHM 8300ZX	○	30,0	60	130	32
	HHM 8320ZX	○	32,0	64	130	32

● = Euro stock
○ = Delivery on request

øD Tolerance

øD	Tolerance (mm)
D ≤ 6,0	-0,010 -0,030
6,0 < D ≤ 10,0	-0,015 -0,040
10,0 < D	-0,020 -0,050

ZX Coated Long Fast Helix Endmills LHHM 4000/6000/8000 ZX Type



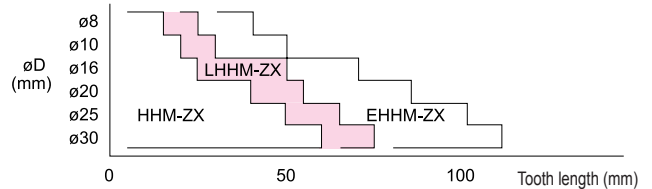
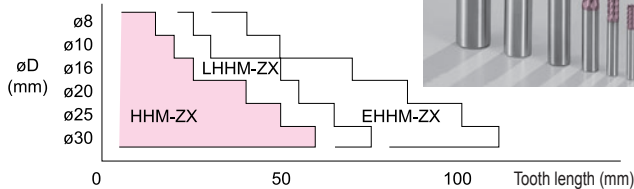
Endmills (mm)

	Cat. No.	Stock	øD	ℓ	L	ød
	LHHM 4030ZX	○	3,0	12	55	6
	LHHM 4040ZX	○	4,0	15	60	6
	LHHM 4050ZX	○	5,0	18	60	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
	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

○ = Delivery on request

Application

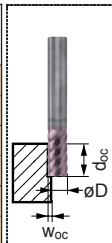
Hardness (HRC)	20	30	40	50	60
Application	Finish ~ Light				



Recommended conditions (Shoulder processing) $d_{oc} = 1,5 \times \phi D$ $w_{oc} = 0,025(HRC56-65) \sim 0,2(\text{below HRC}25) \times \phi D$

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	0,040~0,080	0,030~0,050	0,010~0,020	0,040~0,080
6,0 ~ 12,0	v_c	200-250-300	100-150-200	80-100-120	100-120-150
	f_t	0,082~0,120	0,050~0,090	0,020~0,038	0,080~0,220
16,0 ~ 32,0	v_c	200-250-300	100-150-200	80-100-120	100-120-150
	f_t	0,120~0,130	0,090~0,100	0,038~0,050	0,250~0,350

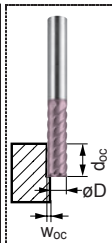
$v_c = m/min$ $f_t = mm/tooth$



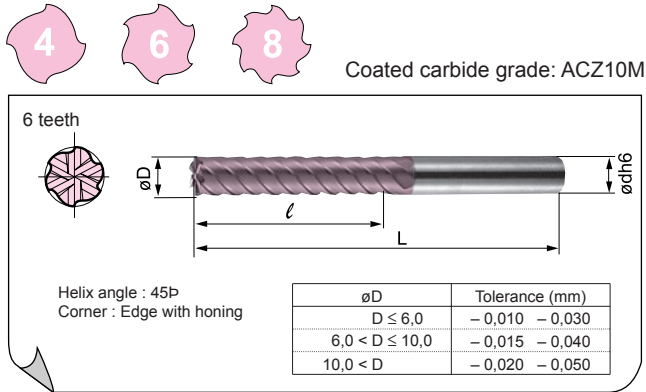
Recommended conditions (Shoulder processing) $d_{oc} = 1,5 \times \phi D$ $w_{oc} = 0,025(HRC56-65) \sim 0,2(\text{below HRC}25) \times \phi D$

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

$v_c = m/min$ $f_t = mm/tooth$



ZX Coated Extra Long Fast Helix Endmills EHHM 4000/6000/8000 ZX Type

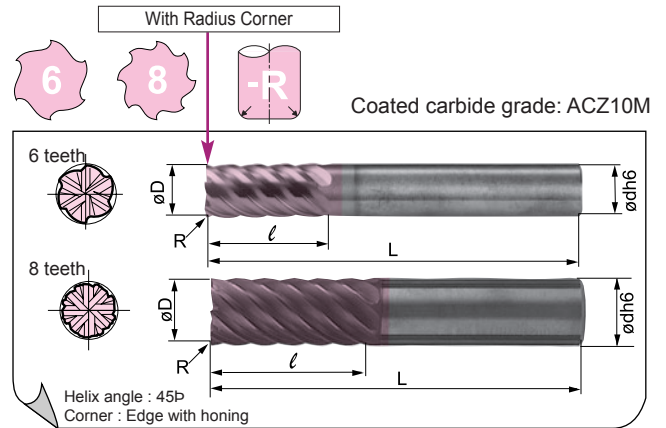


Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	EHHM 4030ZX	○	3,0	20	60	6
	EHHM 4040ZX	○	4,0	25	65	6
	EHHM 4050ZX	○	5,0	30	70	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
	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

○ = Delivery on request

ZX Coated Fast Helix Endmills HHM 6000/8000 ZX-R Type



Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød	R
	HHM 6060ZX-R03	●	6,0	12	50	6	0,3
	HHM 6060ZX-R05	●	6,0	12	50	6	0,5
	HHM 6060ZX-R10	●	6,0	12	50	6	1,0
	HHM 6080ZX-R03	●	8,0	16	60	8	0,3
	HHM 6080ZX-R05	●	8,0	16	60	8	0,5
	HHM 6080ZX-R10	●	8,0	16	60	8	1,0
	HHM 6100ZX-R05	●	10,0	20	71	10	0,5
	HHM 6100ZX-R10	●	10,0	20	71	10	1,0
	HHM 6100ZX-R15	○	10,0	20	71	10	1,5
	HHM 6100ZX-R20	○	10,0	20	71	10	2,0
	HHM 6120ZX-R05	●	12,0	24	75	12	0,5
	HHM 6120ZX-R10	●	12,0	24	75	12	1,0
	HHM 6120ZX-R15	○	12,0	24	75	12	1,5
	HHM 6120ZX-R20	○	12,0	24	75	12	2,0

● = Euro stock
○ = Delivery on request

Application Eg.

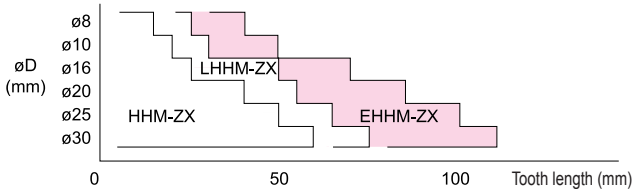
Hardness (H _R C)	20	30	40	50	60
Hardened Steel					Finish ~ Light

Corner Radius Selection Guide

øD	R0,3	R0,5	R1,0	R1,5	R2,0
ø6	●		●		
ø8	●	●	●		
ø10		●	●	○	○
ø12		●	●	○	○
ø16			●	●	○
ø20			●	●	○
ø25			●	●	○



Coated Endmills



Recommended conditions (Shoulder processing) $d_{oc} = 1,5 \times \phi D$

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

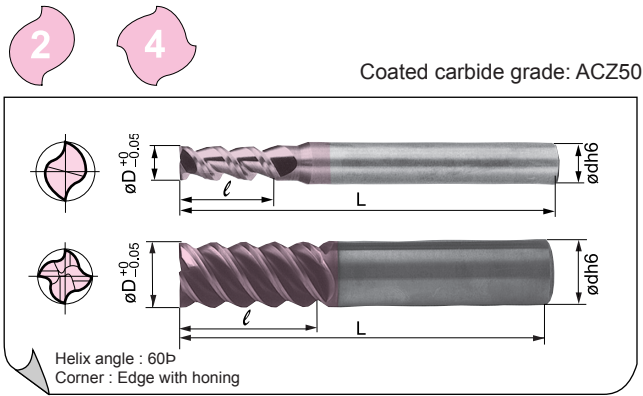
$v_c = m/min$ $f_t = mm/tooth$

Recommended conditions (Shoulder processing) $d_{oc} = 1,5 \times \phi D$

øD	Material	Carbon steel, Alloy steel		Hardened steel	Cast iron
		(Below HRC25)	(Below HRC45)	(Below HRC65)	
6,0 ~ 12,0	v_c	200-250-300	100-150-200	80-100-120	100-120-150
	f_t	0,082~0,120	0,050~0,090	0,020~0,038	0,080~0,220
16,0 ~ 25,0	v_c	200-250-300	100-150-200	80-100-120	100-120-150
	f_t	0,120~0,130	0,090~0,100	0,038~0,050	0,250~0,350

$v_c = m/min$ $f_t = mm/tooth$

ZX Coated Fast Helix Endmills HSM 2000/4000 ZX Type



■ Endmills (mm)

	Cat. No.	Stock	øD	l	L	ødh6
	HSM 2020ZX	●	2,0	6	40	4
	HSM 2030ZX	●	3,0	8	45	6
	HSM 2040ZX	●	4,0	10	45	6

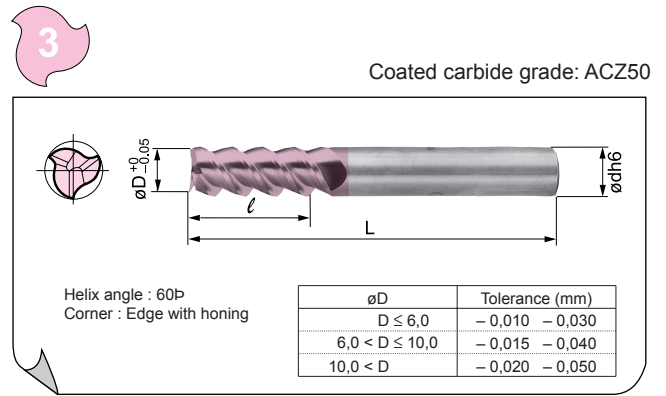
	HSM 4200ZX	●	20,0	40	110	20
	HSM 4250ZX	○	25,0	50	120	25

● = Euro stock
○ = Delivery on request

øD Tolerance

øD	Tolerance (mm)
D ≤ 6,0	-0,010 -0,030
6,0 < D ≤ 10,0	-0,015 -0,040
10,0 < D	-0,020 -0,050

ZX Coated Fast Helix Endmills HSM 3000ZX Type



■ Endmills (mm)

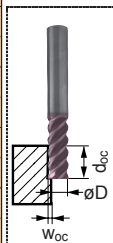
	Cat. No.	Stock	øD	l	L	ødh6
	HSM 3030ZX	●	3,0	12	45	6
	HSM 3040ZX	●	4,0	15	45	6
	HSM 3050ZX	●	5,0	12	50	6
	HSM 3060ZX	●	6,0	15	50	6
	HSM 3070ZX	○	7,0	18	60	8
	HSM 3080ZX	●	8,0	18	60	8
	HSM 3090ZX	○	9,0	20	65	10
	HSM 3100ZX	●	10,0	25	70	10
	HSM 3110ZX	●	11,0	25	75	12
	HSM 3120ZX	●	12,0	30	75	12
	HSM 3130ZX	●	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

● = Euro stock
○ = Delivery on request

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, Ti-alloy etc.
		(Below HRC25)	(Below HRC45)		
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

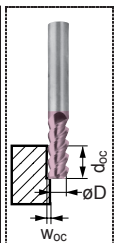
$v_c = \text{m/min}$ $f_t = \text{mm/tooth}$



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, Ti-alloy etc.
		(Below HRC25)	(Below HRC45)		
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 ~ 20,0	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

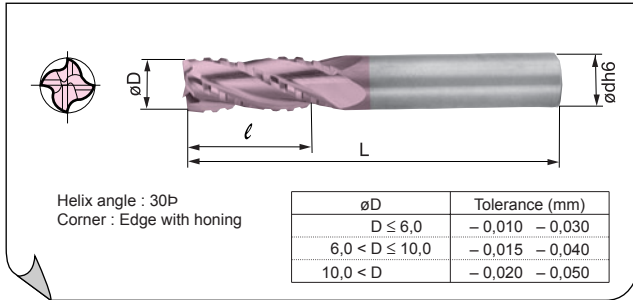
$v_c = \text{m/min}$ $f_t = \text{mm/tooth}$



Serrated Tooth ZX Coated Endmills RSM 4000ZX Type

4

Coated carbide grade: ACZ50



Endmills

(mm)

	Cat. No.	Stock	øD	l	L	ød
	RSM 4060ZX	●	6,0	18	55	6
	RSM 4070ZX	●	7,0	25	65	8
	RSM 4080ZX	●	8,0	25	65	8
	RSM 4090ZX	●	9,0	25	65	10
	RSM 4100ZX	●	10,0	30	75	10
	RSM 4110ZX	●	11,0	30	80	12
	RSM 4120ZX	●	12,0	30	80	12
	RSM 4130ZX	●	13,0	35	95	16
	RSM 4140ZX	●	14,0	40	95	16
	RSM 4150ZX	●	15,0	40	95	16
	RSM 4160ZX	●	16,0	50	105	16
	RSM 4170ZX	●	17,0	50	105	20
	RSM 4180ZX	○	18,0	50	115	20
	RSM 4190ZX	○	19,0	55	120	20
	RSM 4200ZX	●	20,0	55	120	20
	RSM 4250ZX	○	25,0	65	140	25

● = Euro stock

○ = Delivery on request

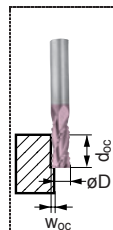
Recommended conditions (Shoulder processing)

$$d_{oc} = 1,5 \times \phi D$$

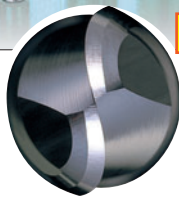
$$w_{oc} = 0,3 \times \phi D$$

øD	Material	Carbon steel, Alloy steel		Cast iron
		(Below HRC25)	(Below HRC40)	
6 ~ 14	v _c	200-250-300	150-200-250	100-120-150
	f _t	0,010~0,030	0,005~0,025	0,030~0,050
15 ~ 25	v _c	200-250-300	150-200-250	100-120-150
	f _t	0,030~0,050	0,020~0,040	0,060~0,080

v_c = m/min f_t = mm/tooth



GS MILL Ball Endmills GLB 2000SF Type

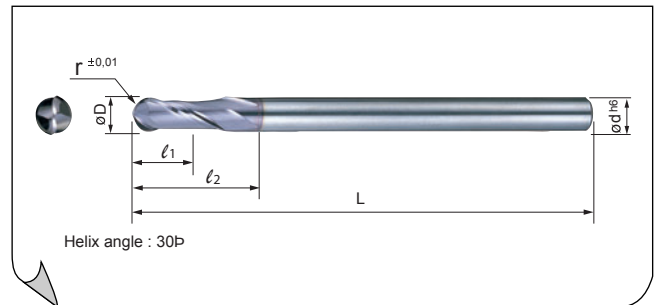


GLB 2000 SF

New "Global Standard" Mills
Ball nose type with 2 teeth

2

Coated carbide grade: **ACZ20W**



Endmills (mm)

	Cat. No.	Stock	r	øD	l ₁	l ₂	L	ød
	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

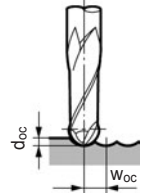
● = Euro stock

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.



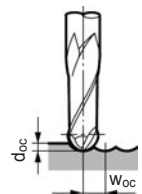
GS Mill, 2 teeth ball nose type endmill, GLB 2000SF

Material	Carbon steel, Cast iron		Alloy steel, Prehardened steel		Heat treated alloy steel, hardened steel		Hardened steel		Stainless steel		Heat resistant alloys Titanium alloy	
	(HB150~250)		(HRC25~35)		(HRC35~45)		(HRC45~55)					
Corner radius (mm)	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 _{oc}	0,1D		0,05D		0,05D		0,1D		0,05D		
	W _{oc}	0,2D		0,05D		0,05D		0,2D		0,1D		

HSC Machining Centre Operations

GS Mill, HSC operations with 2 teeth ball nose type endmill, GLB 2000SF

Material	Carbon steel, Cast iron		Alloy steel, Prehardened steel		Heat treated alloy steel, hardened steel		Hardened steel		Stainless steel	
	(HB150~250)		(HRC25~35)		(HRC35~45)		(HRC45~55)			
Corner radius (mm)	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 _{oc}	0,05D		0,02D		0,05D		0,05D		
	W _{oc}	0,1D		0,05D		0,05D		0,1D		





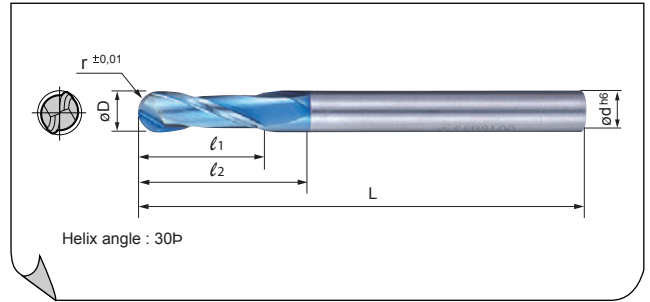
■ Characteristics / Application

- 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

2

New

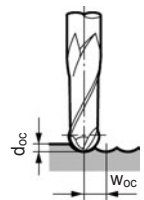
DLC coated carbide grade: DL1200



■ Endmills (mm)

	Cat. No.	Stock	r	øD	l ₁	l ₂	L	ød
	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

● = Euro stock



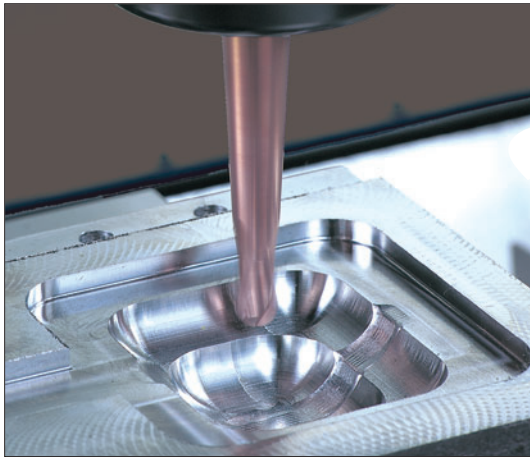
■ Recommended cutting conditions

Work Material	Aluminum Alloy			
	Wet (Emulsion)		Dry	
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
Corner radius (mm)				
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 _{oc}	1,5D	1,0D	
	w _{oc}	0,2D	(D)	

High Efficient Endmills Ball Endmills "Neo"

Extreme Hard ZX Coated Ball Endmills

Grade: ACZ10M

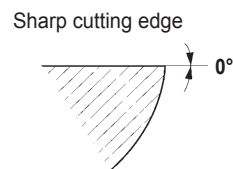


■ Features

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



"Neo-Ball" SNB type

Sharp and tough centre of cutting edges

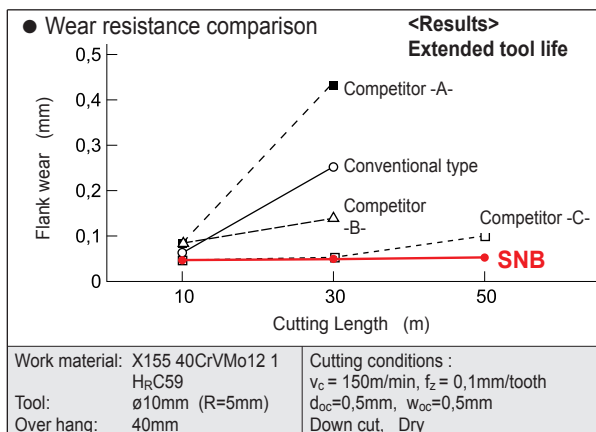


Extreme hard ZX coating
Grade: ACZ10M

Smooth cutting edge passage



■ Performance

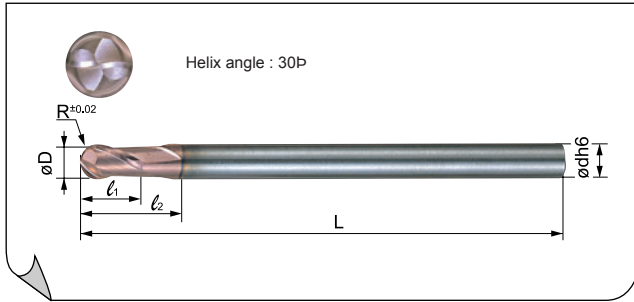


ZX Coated "Neo Ball" Endmills SNB 2000ZX Type

ZX Coated Ball Endmills SSB 2000ZX Type

2

Coated carbide grade: ACZ10M



Endmills

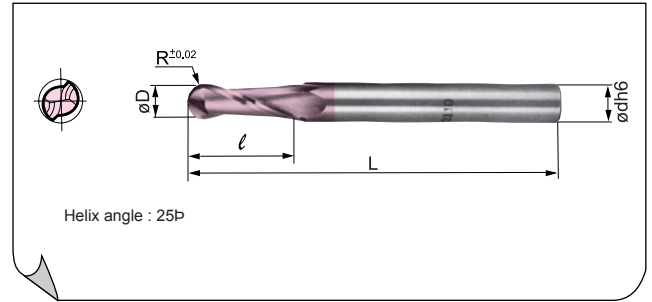
(mm)

	Cat. No.	Stock	R	øD	l ₁	l ₂	L	ød
	SNB 2010ZX	●	0,5	1,0	1,5	3	50	4
	SNB 2020ZX	●	1,0	2,0	3,0	5	60	6
	SNB 2030ZX	●	1,5	3,0	4,5	8	80	6
	SNB 2040ZX	●	2,0	4,0	6,0	12	80	6
	SNB 2050ZX	●	2,5	5,0	7,5	14	90	6
	SNB 2060ZX	●	3,0	6,0	9,0	—	100	6
	SNB 2070ZX	○	3,5	7,0	11,0	20	100	8
	SNB 2080ZX	●	4,0	8,0	12,0	—	100	8
	SNB 2100ZX	●	5,0	10,0	15,0	—	120	10
	SNB 2120ZX	●	6,0	12,0	18,0	—	120	12
	SNB 2140ZX	●	7,0	14,0	21,0	38	160	16
	SNB 2160ZX	●	8,0	16,0	24,0	—	160	16
	SNB 2180ZX	●	9,0	18,0	27,0	50	180	20
	SNB 2200ZX	●	10,0	20,0	30,0	—	180	20
	SNB 2250ZX	○	12,5	25,0	38,0	—	200	25
	SNB 2300ZX	○	15,0	30,0	45,0	80	200	32

● = Euro stock
○ = Delivery on request

2

Coated carbide grade: ACZ50



Endmills

(mm)

	Cat. No.	Stock	R	øD	l	L	ød
	SSB 2010ZX	●	0,5	1,0	3	50	4
	SSB 2020ZX	●	1,0	2,0	6	50	4
	SSB 2030ZX	●	1,5	3,0	9	60	6
	SSB 2040ZX	●	2,0	4,0	12	70	6
	SSB 2050ZX	●	2,5	5,0	15	80	6
	SSB 2060ZX	●	3,0	6,0	15	80	6
	SSB 2070ZX	●	3,5	7,0	20	90	8
	SSB 2080ZX	●	4,0	8,0	20	90	8
	SSB 2090ZX	○	4,5	9,0	25	100	10
	SSB 2100ZX	●	5,0	10,0	25	100	10
	SSB 2110ZX	●	5,5	11,0	30	110	12
	SSB 2120ZX	●	6,0	12,0	30	110	12
	SSB 2130ZX	○	6,5	13,0	35	120	16
	SSB 2140ZX	●	7,0	14,0	35	120	16
	SSB 2150ZX	●	7,5	15,0	40	120	16
	SSB 2160ZX	●	8,0	16,0	40	120	16
	SSB 2180ZX	●	9,0	18,0	40	130	20
	SSB 2200ZX	○	10,0	20,0	45	130	20
	SSB 2250ZX	○	12,5	25,0	55	140	25

● = Euro stock
○ = Delivery on request

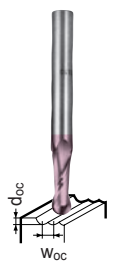


Recommended conditions

$d_{oc} = 0,3 \times \phi D$ (Below R1,0 ; $0,2 \times \phi D$)
 $W_{oc} = 0,7 \times \phi D$ (Below R1,0 ; $0,6 \times \phi D$)

Material	Carbon steel, Alloy steel		Hardened steel (Below HRC65)	Cast iron	Stainless steel, Ti-alloy etc.	
	(Below HRC25)	(Below HRC45)				
R0,5 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90	
R1,4	f_t	0,005~0,010	0,003~0,005	0,002~0,003	0,008~0,015	0,003~0,005
R1,5 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90	
R2,9	f_t	0,013~0,025	0,007~0,013	0,005~0,008	0,017~0,042	0,007~0,013
R3,0 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90	
R6,4	f_t	0,030~0,050	0,017~0,033	0,010~0,020	0,056~0,136	0,017~0,033
R6,5 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90	
R9,9	f_t	0,070~0,100	0,040~0,057	0,020~0,040	0,167~0,238	0,040~0,057
R10,0 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90	
R15,0	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



Recommended conditions

$d_{oc} = 0,3 \times \phi D$ (Below R1,0 ; $0,2 \times \phi D$)
 $W_{oc} = 0,7 \times \phi D$ (Below R1,0 ; $0,6 \times \phi D$)

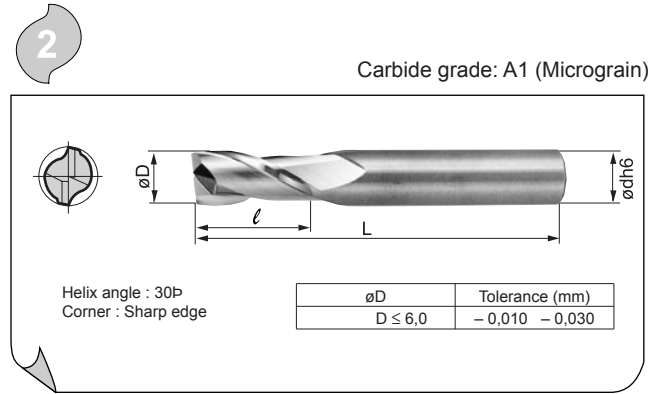
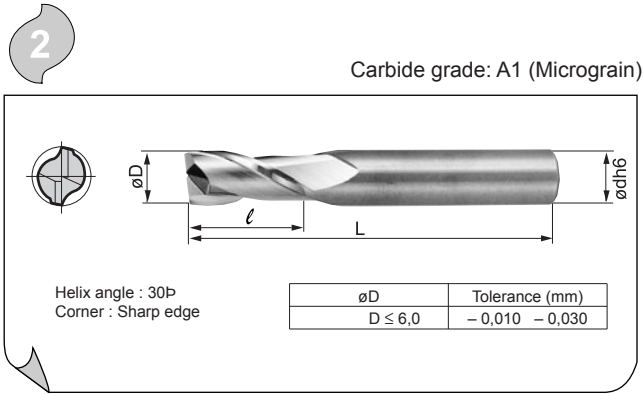
Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc.	
	(Below HRC25)	(Below HRC45)			
R0,5 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90
R1,4	f_t	0,005~0,010	0,003~0,005	0,008~0,015	0,003~0,005
R1,5 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90
R2,9	f_t	0,013~0,025	0,007~0,013	0,017~0,042	0,007~0,013
R3,0 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90
R6,4	f_t	0,030~0,050	0,017~0,033	0,056~0,136	0,017~0,033
R6,5 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90
R9,9	f_t	0,070~0,100	0,040~0,057	0,167~0,238	0,040~0,057
R10,0 ~	v_c	200-250-300	100-150-200	100-120-150	60-75-90
R12,5	f_t	0,118~0,167	0,085~0,095	0,250~0,350	0,085~0,095

v_c = m/min f_t = mm/tooth

Coated
Endmills

Solid Carbide Spiral Endmills SSM 2000 Type ($\phi 0,2 \sim \phi 4,3$)

Solid Carbide Spiral Endmills SSM 2000 Type ($\phi 4,4 \sim \phi 8,5$)



■ Endmills (mm)

	Cat. No.	Stock	øD	l	L	ødh6
	SSM 2002	●	0,2	0,5	40	3
	SSM 2003	●	0,3	1	40	3
	SSM 2004	●	0,4	1	40	3
	SSM 2005	●	0,5	1,5	40	3
	SSM 2006	●	0,6	1,5	40	3
	SSM 2007	●	0,7	1,5	40	3
	SSM 2008	●	0,8	2	40	3
	SSM 2009	●	0,9	2	40	3
	SSM 2010	●	1,0	3	40	4
	SSM 2011		1,1	3	40	4
	SSM 2012		1,2	3	40	4
	SSM 2013		1,3	3	40	4
	SSM 2014		1,4	3	40	4
	SSM 2015	●	1,5	5	40	4
	SSM 2016		1,6	5	40	4
	SSM 2017		1,7	5	40	4
	SSM 2018		1,8	5	40	4
	SSM 2019		1,9	5	40	4
	SSM 2020	●	2,0	6	40	4
	SSM 2021		2,1	6	40	4
	SSM 2022		2,2	6	40	4
	SSM 2023		2,3	6	40	4
	SSM 2024		2,4	6	40	4
	SSM 2025	●	2,5	8	40	4
	SSM 2026		2,6	8	40	4
	SSM 2027		2,7	8	40	4
	SSM 2028		2,8	8	40	4
	SSM 2029		2,9	8	40	4
	SSM 2030	●	3,0	8	45	6
	SSM 2031		3,1	8	45	6
	SSM 2032		3,2	8	45	6
	SSM 2033		3,3	8	45	6
	SSM 2034		3,4	8	45	6
	SSM 2035	●	3,5	8	45	6
	SSM 2036		3,6	10	45	6
	SSM 2037		3,7	10	45	6
	SSM 2038		3,8	10	45	6
	SSM 2039		3,9	10	45	6
	SSM 2040	●	4,0	10	45	6
	SSM 2041		4,1	10	45	6
	SSM 2042		4,2	10	45	6
	SSM 2043		4,3	10	45	6

■ Endmills (mm)

	Cat. No.	Stock	øD	l	L	ødh6
	SSM 2044		4,4	10	45	6
	SSM 2045	●	4,5	10	45	6
	SSM 2046		4,6	12	50	6
	SSM 2047		4,7	12	50	6
	SSM 2048		4,8	12	50	6
	SSM 2049		4,9	12	50	6
	SSM 2050	●	5,0	12	50	6
	SSM 2051		5,1	12	50	6
	SSM 2052		5,2	12	50	6
	SSM 2053		5,3	12	50	6
	SSM 2054		5,4	12	50	6
	SSM 2055	●	5,5	12	50	6
	SSM 2056		5,6	12	50	6
	SSM 2057		5,7	12	50	6
	SSM 2058		5,8	12	50	6
	SSM 2059		5,9	12	50	6
	SSM 2060	●	6,0	12	50	6
	SSM 2061		6,1	12	50	6
	SSM 2062		6,2	12	50	6
	SSM 2063		6,3	12	50	6
	SSM 2064		6,4	12	50	6
	SSM 2065	●	6,5	12	50	8
	SSM 2066		6,6	15	55	8
	SSM 2067		6,7	15	55	8
	SSM 2068		6,8	15	55	8
	SSM 2069		6,9	15	55	8
	SSM 2070	●	7,0	15	55	8
	SSM 2071		7,1	15	55	8
	SSM 2072		7,2	15	55	8
	SSM 2073		7,3	15	55	8
	SSM 2074		7,4	15	55	8
	SSM 2075	●	7,5	15	55	8
	SSM 2076		7,6	15	55	8
	SSM 2077		7,7	15	55	8
	SSM 2078		7,8	15	55	8
	SSM 2079		7,9	15	55	8
	SSM 2080	●	8,0	15	55	8
	SSM 2081		8,1	15	55	8
	SSM 2082		8,2	15	55	8
	SSM 2083		8,3	15	55	8
	SSM 2084		8,4	15	55	8
	SSM 2085	●	8,5	15	55	10

● = Euro stock

Recommended conditions (Slotting) $\phi D < \phi 3$; $d_{oc} = 0,5 \times \phi D$ $\phi D \geq \phi 3$; $d_{oc} = 1,0 \times \phi D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
0,2 ~ 0,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	~ 0,002	~ 0,002	~ 0,001	0,002-0,004
1,0 ~ 2,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,003-0,010	0,003-0,010	0,002-0,005	0,005-0,017
3,0 ~ 4,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,012-0,024	0,012-0,024	0,006-0,011	0,018-0,040

$v_c = \text{m/min}$ $f_t = \text{mm/tooth}$

Recommended conditions (Slotting) $d_{oc} = 1,0 \times \phi D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
5 ~ 5,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,012-0,024	0,012-0,024	0,006-0,011	0,018-0,040
6 ~ 8,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,025-0,050	0,025-0,050	0,013-0,025	0,045-0,105

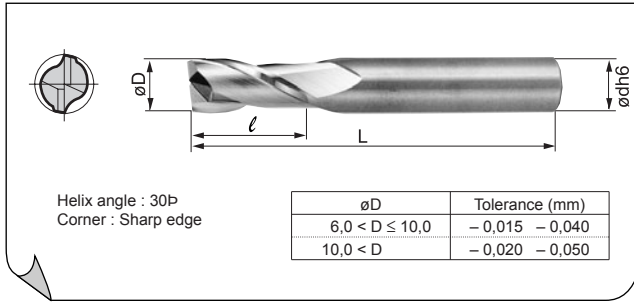
$v_c = \text{m/min}$ $f_t = \text{mm/tooth}$

Uncoated Endmills

Solid Carbide Spiral Endmills SSM 2000 Type (ø8,6~ø30)

2

Carbide grade: A1 (Micrograin)



■ Endmills (mm)

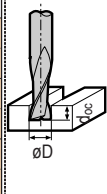
	Cat. No.	Stock	øD	l	L	ød
	SSM 2086		8,6	15	55	10
	SSM 2087		8,7	15	55	10
	SSM 2088		8,8	15	55	10
	SSM 2089		8,9	15	55	10
	SSM 2090	●	9,0	15	55	10
	SSM 2091		9,1	15	55	10
	SSM 2092		9,2	15	55	10
	SSM 2093		9,3	15	55	10
	SSM 2094		9,4	15	55	10
	SSM 2095	●	9,5	15	55	10
	SSM 2096		9,6	18	65	10
	SSM 2097		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	20	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	105	25
	SSM 2230	●	23,0	45	115	25
	SSM 2240		24,0	45	115	25
	SSM 2250	●	25,0	50	120	25
	SSM 2300		30,0	55	130	32

● = Euro stock
○ = Delivery on request

Recommended conditions (Slotting) $d_{oc} = 1,0 \times \phi D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
9 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,025-0,050	0,025-0,050	0,013-0,025	0,045-0,105
13 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,055-0,085	0,055-0,085	0,030-0,050	0,110-0,170
20 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,095-0,120	0,095-0,120	0,055-0,070	0,185-0,260

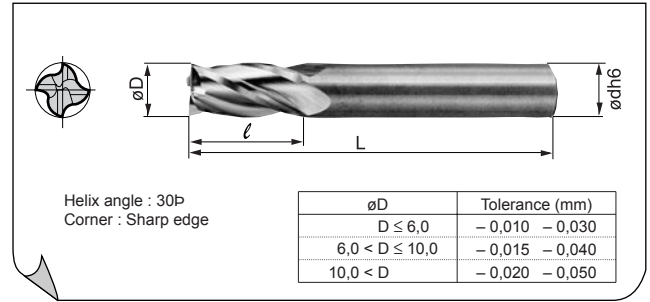
$v_c = m/min$ $f_t = mm/tooth$



Solid Carbide Spiral Endmills SSM 4000 Type (ø1,6~ø25)

4

Carbide grade: A1 (Micrograin)



■ Endmills (mm)

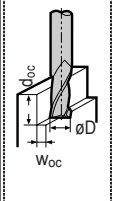
	Cat. No.	Stock	øD	l	L	ød
	SSM 4015	●	1,5	5	40	4
	SSM 4020	●	2,0	6	40	4
	SSM 4025	●	2,5	8	40	4
	SSM 4030	●	3,0	8	45	6
	SSM 4035	●	3,5	8	45	6
	SSM 4040	●	4,0	10	45	6
	SSM 4045	●	4,5	10	45	6
	SSM 4050	●	5,0	12	50	6
	SSM 4055	●	5,5	12	50	6
	SSM 4060	●	6,0	12	50	6
	SSM 4065	●	6,5	12	50	8
	SSM 4070	●	7,0	15	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

● = Euro stock
○ = Delivery on request

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
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
1 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,004-0,017	0,004-0,017	0,002-0,008	0,008-0,020
3 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,018-0,036	0,018-0,036	0,009-0,018	0,027-0,060
6 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,038-0,070	0,038-0,070	0,019-0,035	0,065-0,157
13 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,075-0,125	0,075-0,125	0,040-0,075	0,160-0,250
20 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,135-0,170	0,135-0,170	0,085-0,110	0,257-0,390

$v_c = m/min$ $f_t = mm/tooth$

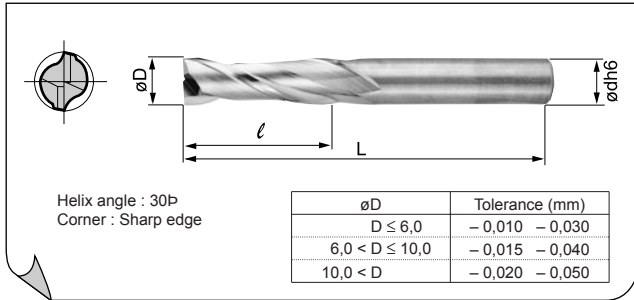


Uncoated
Endmills

Long Spiral Endmills LSM 2000 Type

2

Carbide grade: A1 (Micrograin)



Endmills (mm)

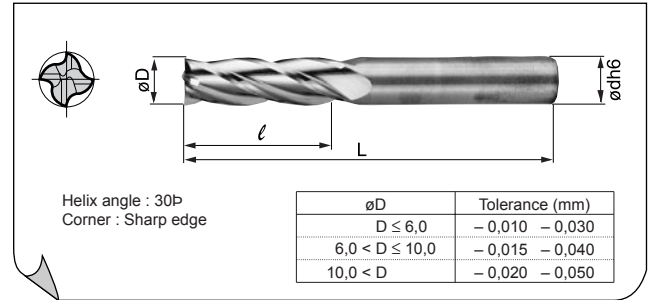
	Cat. No.	Stock	øD	l	L	ød
	LSM 2030	●	3,0	12	50	6
	LSM 2035	●	3,5	12	50	6
	LSM 2040	●	4,0	15	50	6
	LSM 2045	●	4,5	15	50	6
	LSM 2050	●	5,0	18	55	6
	LSM 2055	●	5,5	18	55	6
	LSM 2060	●	6,0	18	55	6
	LSM 2065	●	6,5	18	55	8
	LSM 2070	●	7,0	25	65	8
	LSM 2075	●	7,5	25	65	8
	LSM 2080	●	8,0	25	65	8
	LSM 2085	●	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

● = Euro stock

Long Spiral Endmills LSM 4000 Type

4

Carbide grade: A1 (Micrograin)



Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	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

● = Euro stock

Recommended conditions (Slotting) $d_{oc} = 1,0 \times \phi D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
3 ~ 5,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,009~0,018	0,009~0,018	0,005~0,008	0,014~0,030
6 ~ 12,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,019~0,038	0,019~0,038	0,009~0,019	0,034~0,079
13 ~ 19,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,041~0,064	0,041~0,064	0,023~0,038	0,083~0,128
20 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,071~0,090	0,071~0,090	0,041~0,052	0,139~0,195

$v_c = \text{m/min}$ $f_t = \text{mm/tooth}$

Recommended conditions (Shoulder processing) $d_{oc} = 1,5 \times \phi D$ $W_{oc} = 0,1 \times \phi D$

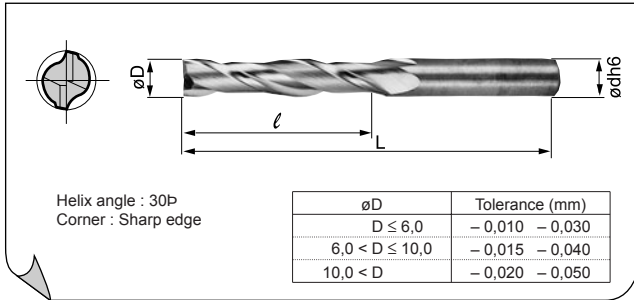
øD	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
3 ~ 5,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,014~0,027	0,014~0,027	0,007~0,014	0,020~0,045
6 ~ 12,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,028~0,053	0,028~0,053	0,014~0,026	0,048~0,118
13 ~ 19,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,056~0,094	0,056~0,094	0,030~0,056	0,120~0,188
20 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,101~0,127	0,101~0,127	0,064~0,082	0,193~0,292

$v_c = \text{m/min}$ $f_t = \text{mm/tooth}$

Extra Long Spiral Endmills ELSM 2000 Type

2

Carbide grade: A1 (Micrograin)



Endmills

(mm)

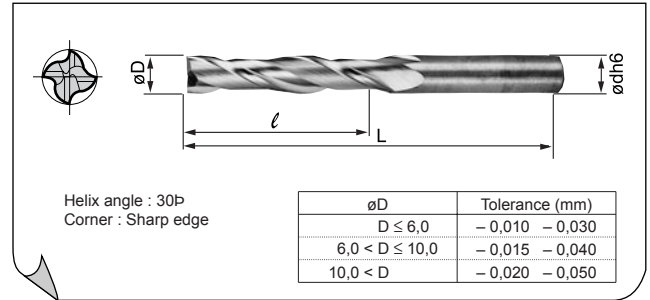
	Cat. No.	Stock	øD	ℓ	L	ød
	ELSM 2030	●	3,0	20	55	6
	ELSM 2040	●	4,0	25	60	6
	ELSM 2050	●	5,0	30	65	6
	ELSM 2060	●	6,0	30	65	6
	ELSM 2070	●	7,0	40	85	8
	ELSM 2080	●	8,0	40	85	8
	ELSM 2090	●	9,0	40	85	10
	ELSM 2100	●	10,0	50	100	10
	ELSM 2110	●	11,0	50	100	12
	ELSM 2120	●	12,0	50	100	12
	ELSM 2130	●	13,0	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

● = Euro stock

Extra Long Spiral Endmills ELSM 4000 Type

4

Carbide grade: A1 (Micrograin)



Endmills

(mm)

	Cat. No.	Stock	øD	ℓ	L	ød
	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

● = Euro stock

Recommended conditions (Slotting) $d_{oc}=1,0 \times \phi D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
3 ~ 5,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,006~0,012	0,006~0,012	0,003~0,006	0,009~0,020
6 ~ 12,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,013~0,025	0,013~0,025	0,006~0,013	0,023~0,053
13 ~ 19,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,028~0,043	0,028~0,043	0,015~0,025	0,055~0,085
20 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,048~0,060	0,048~0,060	0,027~0,035	0,092~0,130

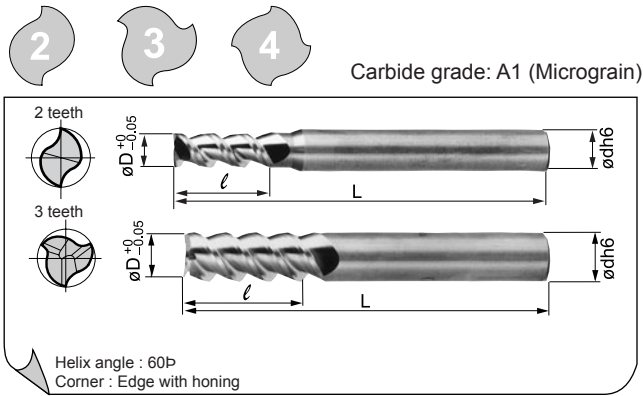
$v_c = m/min$ $f_t = mm/tooth$

Recommended conditions (Shoulder processing) $d_{oc}=1,5 \times \phi D$ $w_{oc}=0,05 \times \phi D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
3 ~ 5,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,009~0,018	0,009~0,018	0,005~0,009	0,014~0,030
6 ~ 12,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,019~0,035	0,019~0,035	0,010~0,018	0,033~0,079
13 ~ 19,9	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,038~0,063	0,038~0,063	0,020~0,038	0,080~0,125
20 ~	v_c	40-50-60	30-40-50	20-30-40	40-50-60
	f_t	0,067~0,085	0,067~0,085	0,042~0,055	0,128~0,195

$v_c = m/min$ $f_t = mm/tooth$

Fast Helix Spiral Endmills HSM 2000/3000/4000 Type



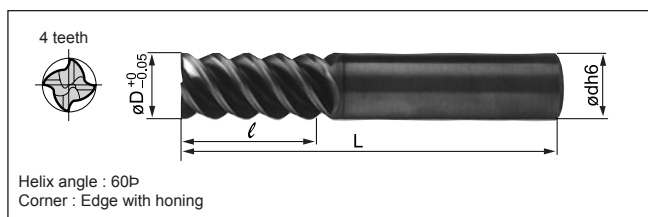
■ Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	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

	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

	HSM 4200		20,0	40	110	20
	HSM 4320		32,0	55	130	32

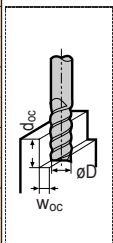
○ = Delivery on request



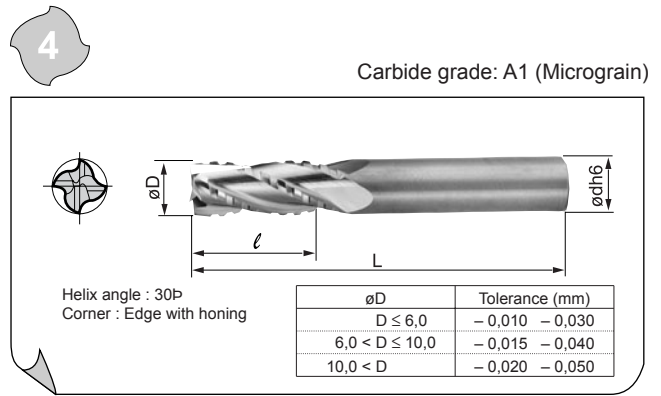
Recommended conditions (Shoulder processing) $d_{oc} = 1,5 \times \varnothing D$, $W_{oc} = 0,1 \times \varnothing D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
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



Serrated Tooth Spiral Endmills RSM 4000 Type



■ Endmills (mm)

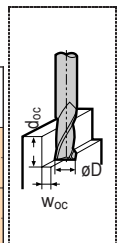
	Cat. No.	Stock	øD	l	L	ød
	RSM 4060	●	6,0	18	55	6
	RSM 4070	●	7,0	25	65	8
	RSM 4080	●	8,0	25	65	8
	RSM 4090	●	9,0	25	65	10
	RSM 4100	●	10,0	30	75	10
	RSM 4110	●	11,0	30	80	12
	RSM 4120	●	12,0	30	80	12
	RSM 4130	●	13,0	35	95	16
	RSM 4140	●	14,0	40	95	16
	RSM 4150	●	15,0	40	95	16
	RSM 4160	●	16,0	50	105	16
	RSM 4170	●	17,0	50	105	20
	RSM 4180	●	18,0	50	115	20
	RSM 4190	●	19,0	55	120	20
	RSM 4200	●	20,0	55	120	20
	RSM 4240	●	24,0	65	140	25
	RSM 4250	●	25,0	65	140	25
	RSM 4300		30,0	75	160	32

● = Euro stock

Recommended conditions (Shoulder processing) $d_{oc} = 1,5 \times \varnothing D$, $W_{oc} = 0,3 \times \varnothing D$

øD	Material	Carbon steel, Alloy steel		Cast iron	-
		(Below HRC25)	(Below HRC40)		
6 ~ 14	v_c	40-50-60	30-40-50	40-50-60	
	f_t	0,010-0,030	0,005-0,025	0,030-0,050	
15 ~ 25	v_c	40-50-60	30-40-50	40-50-60	
	f_t	0,030-0,050	0,020-0,040	0,060-0,080	

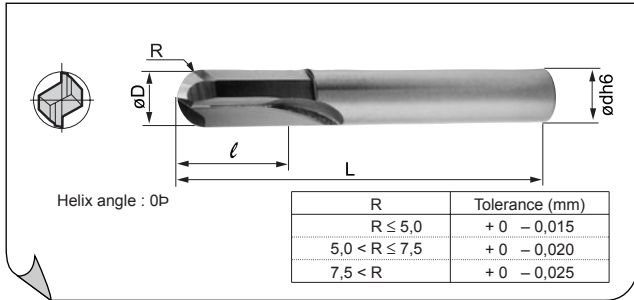
v_c = m/min f_t = mm/tooth



Straight Flute Ball Endmills BSM 2000 Type

2

Carbide grade: A1 (Micrograin)



Endmills

(mm)

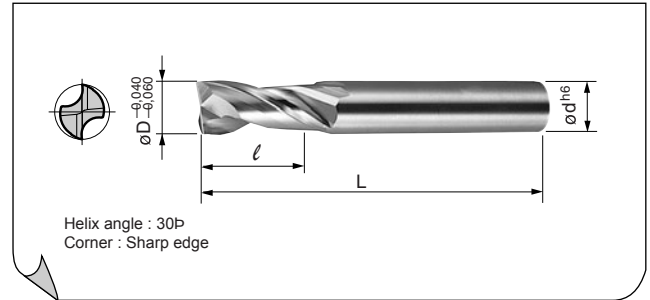
	Cat. No.	Stock	R	øD	l	L	ød
	BSM 2010		0,5	1,0	4	40	4
	BSM 2020	●	1,0	2,0	7	40	4
	BSM 2030		1,5	3,0	9	45	6
	BSM 2040	●	2,0	4,0	15	45	6
	BSM 2050	●	2,5	5,0	15	50	6
	BSM 2060	●	3,0	6,0	20	50	6
	BSM 2080	●	4,0	8,0	20	60	8
	BSM 2100	●	5,0	10,0	20	70	10
	BSM 2120	●	6,0	12,0	25	75	12
	BSM 2140		7,0	14,0	25	90	16
	BSM 2160		8,0	16,0	35	110	16
	BSM 2200		10,0	20,0	35	110	20

● = Euro stock

Spiral Endmills for Non-Ferrous Cutting ASM 2000 Type

2

Carbide grade: H1 (Micrograin)



Endmills

(mm)

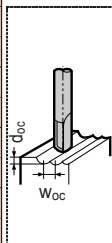
	Cat. No.	Stock	øD	l	L	ød
	ASM 2020		2,0	6	40	4
	ASM 2030		3,0	10	45	6
	ASM 2040		4,0	12	45	6
	ASM 2050		5,0	15	50	6
	ASM 2060		6,0	15	50	6
	ASM 2080		8,0	18	60	8
	ASM 2100		10,0	22	71	10
	ASM 2120		12,0	25	75	12
	ASM 2160		16,0	32	90	16

Uncoated
Endmills

Recommended conditions $d_{oc} = 0,3 \times \phi D$ (Below R1,0 ; $0,2 \times \phi D$)
 $w_{oc} = \text{Max}0,7 \times \phi D$ (Below R1,0 ; $0,6 \times \phi D$)

R	Material	Carbon steel, Alloy steel			Cast iron
		(Below HRC30)	(Below HRC40)	(Below HRC45)	
R0,5 ~ R1,25	v_c	40-50-60	30-40-50	20-30-40	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	30-40-50	20-30-40	40-50-60
	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	30-40-50	20-30-40	40-50-60
	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	30-40-50	20-30-40	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

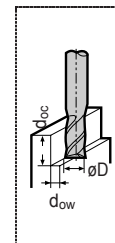
$v_c = \text{m/min}$ $f_t = \text{mm/tooth}$



Recommended conditions (Shoulder processing) $d_{oc} = 1,5 \times \phi D$
 $w_{oc} = 0,2 \times \phi D$

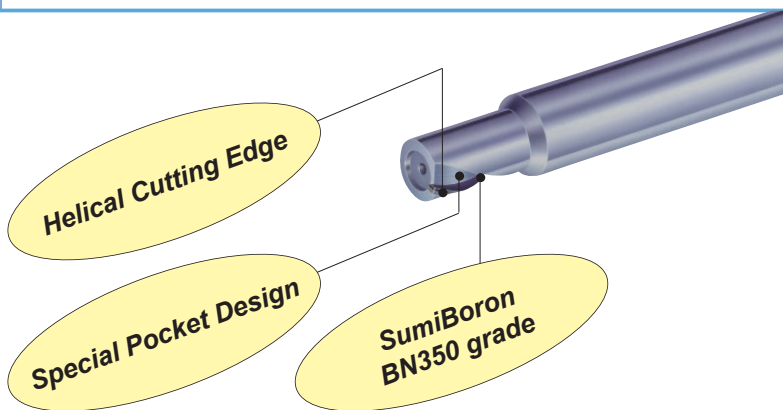
øD	Material	Al-alloy	Cast iron
1 ~ 2,5	v_c	100-200-300	100-120-150
	f_t	0,004~0,017	0,008~0,020
3 ~ 5	v_c	100-200-300	100-120-150
	f_t	0,018~0,036	0,027~0,060
6 ~ 12	v_c	100-200-300	100-120-150
	f_t	0,038~0,070	0,065~0,157
14 ~ 16	v_c	100-200-300	100-120-150
	f_t	0,075~0,125	0,160~0,250

$v_c = \text{m/min}$ $f_t = \text{mm/tooth}$



SUMIBORON "Helical Master" BNES Type

Spiral CBN Endmill for Hardened Steel



Endmills BNES Type with 1 Spiral Flute

	Cat. No.	Stock	Dimensions (mm)				
		BN350	ϕD	ϕd	ℓ_1	ℓ_2	L
	BNES 1060	●	6,0	10	7,0	11	60
	BNES 1080	●	8,0	10	10,0	14	70
	BNES 1100	●	10,0	12	12,0	17	75
	BNES 1120	●	12,0	12	14,0	20	80
	BNES 1140	●	14,0	16	16,0	21,5	80
	BNES 1160	●	16,0	16	18,0	24	80

Helix angle : 15°
right-hand cut, right-hand helix

Recommended Cutting Conditions

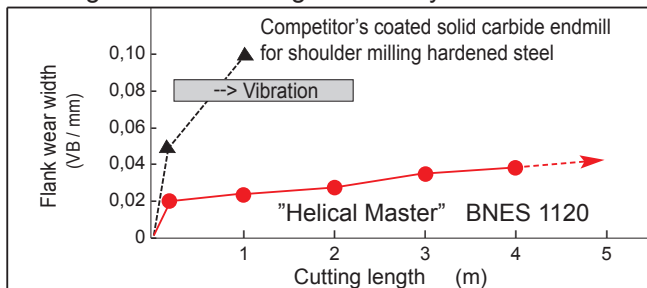
Cutting speed: v_c (m/min), Spindle revolutions: N (rpm), Feed per tooth: f_t (mm/tooth), Feed speed: v_f (mm/min), Number of teeth: n

Tooling example	ϕD	Hardened steel (HRC 50 ~ 57)			Hardened steel (HRC 58 ~ 65)		
		$v_c = 100 \sim 170$ m/min			$v_c = 80 \sim 150$ m/min		
<p>Depth of cut: $d_{oc} \leq D$</p>	$\phi 6 \sim 8$	$W_{oc} \leq 0,1$ mm	n = 4000 ~ 9000	V_f (mm/min) = 240 ~ 540	$W_{oc} \leq 0,08$ mm	n = 3200 ~ 8000	V_f (mm/min) = 150 ~ 370
	$\phi 10 \sim 12$	$W_{oc} \leq 0,15$ mm	n = 2700 ~ 5400	V_f (mm/min) = 180 ~ 360	$W_{oc} \leq 0,12$ mm	n = 2100 ~ 4800	V_f (mm/min) = 120 ~ 270
	$\phi 14 \sim 16$	$W_{oc} \leq 0,2$ mm	n = 2000 ~ 3800	V_f (mm/min) = 140 ~ 260	$W_{oc} \leq 0,15$ mm	n = 1600 ~ 3400	V_f (mm/min) = 110 ~ 230

Recommendation: Dry cutting (Air coolant)
Down-cut milling
Minimise the overhang
Use a rigid machine

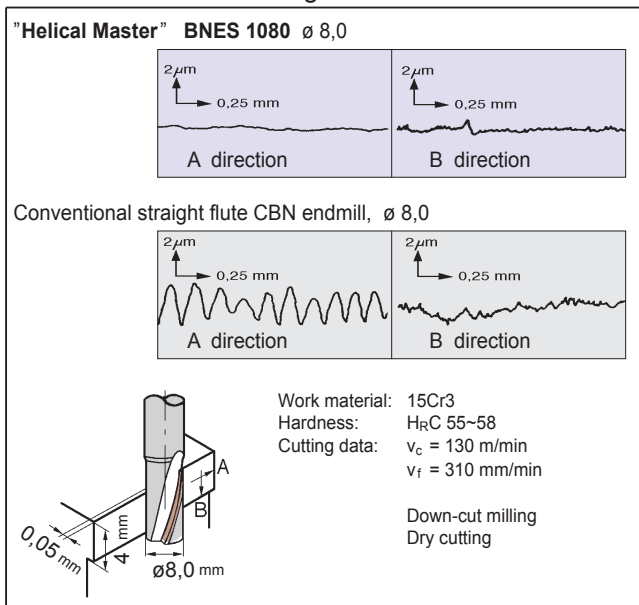
Performance

● Long Tool Life and High Efficiency



	Work material: X155CrVMo12-1 Hardness: HRC 60
	Cutting data: $v_c = 100$ m/min (Helical Master) $v_c = 40$ m/min (Competitor's coated solid carbide endmill) $v_f = 186$ mm/min
Down-cut milling Dry cutting	

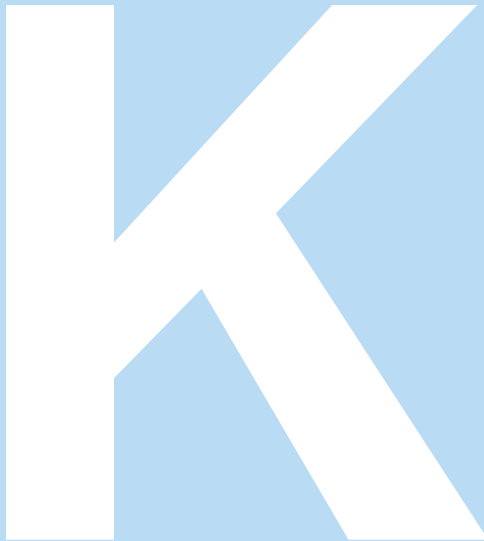
● Excellent Surface Roughness



Uncoated Endmills

Multi-Drills

K1 ~ K34



Solid Type	Selection Guide		Multi-Drill SeriesK2-3
	Introduction		m7, K Type (DIN) MULTI-DRILLSK4
			K Type SUPER MULTI-DRILLSK5
		Super Multi-Drill Series	MDS ... SK-HAK TypeK6
			MDS ... MK-HAK TypeK7
			MDS ... SK/SG TypeK8-9
			MDS ... MK/MG TypeK10-11
		Deep Hole Drills	MDW ... XHT TypeK12-14
		Pilot Hole Drills	MDW ... PHT TypeK12-14
		AURORA COAT Drills	MDW ... DLH TypeK15
	MINI Multi-Drills	MDSS TypeK16	
Brazed Type	Introduction		KDS Type Multi-Drill SeriesK17
			KDS ... MAK TypeK18-19
			KDS ... LAK TypeK20-21
			KDS ... DAK TypeK22-23
			KDS ... FA TypeK24-25
Replaceable Type	Head Type Multi-Drills		SMD TypeK26-27
	Insert Type Multi-Drills		WDS TypeK28-31
SUMIDIA Drills	Straight Flute Type	New	DAL/DDD/DML TypeK32-33

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

Series	MDS				MDW			MDSS		
Type	K-HAK (DIN)		K		G		XHT	PHT	DLH	-
							New	New	New	New
Page	⇒ K6	⇒ K7	⇒ K8~9	⇒ K10~11	⇒ K8~9	⇒ K10~11	⇒ K12~14	⇒ K13	⇒ K15	⇒ K16
Application	P M K S		P M K S		K N		P M K N	P M K N	N	P M K H
Form	m7 drill, DIN type		h8 drill, straight		h8 drill, straight		Extra long	Pilot drill	Super Multi-Drill	Mini Multi-Drill
Length (The ratio to øD)	Short	Long	Short	Long	Short	Long	10D ~ 30D	3D	3D / 5D	10D
Coolant holes	Yes		No		No		Yes	Yes	Yes	No
Coating	TiAlN	TiAlN	TiAlN	TiAlN	-	-	TiAlN	TiAlN	DLC	ZX
Diameter range	ø 4,0 ~ ø12,0	ø 4,0 ~ ø12,0	ø 2,0 ~ ø14,0	ø 2,0 ~ ø14,0	ø 2,0 ~ ø14,0	ø 2,0 ~ ø14,0	ø 4,0 ~ ø 8,0	ø 4,0 ~ ø 8,0	ø 3,0 ~ ø 16,0	ø 0,2 ~ ø 1,0

Multi-Drill Series

- **Advantages**
- Unique curved flute design has proven to enhance 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 advance PVD coating. (10x tool life of HSS drills, 5x the efficiency)
 - Wide selection range (Diameter: 1,0 ~ 40,5mm , Drilling depths L/D: 2 ~ 30)

■ **Brazed Carbide Type and Insert Type Multi-Drills Selection**

Series	KDS				SMD		WDS		SUMIDIA (PCD)
Type	MAK	LAK	DAK	FA	Replaceable head type		Indexable insert type		DAL/DDI/DML
									 
Page	⇒ K18~19	⇒ K20~21	⇒ K22~23	⇒ K24~25	⇒ K26~27		⇒ K28~31		⇒ K32~33
Application	P M K S				K N		P M K N		N
Form	h7 drill				h8 drill		LPMX type insert XPMX type insert		Straight type, Step type
Length (The ratio to øD)	3D	5D	7D	10D	3D / 5D		2D / 3D / 5D		3D / 5D
Coolant holes	Yes				Yes		Yes		No
Coating	TiAlN	TiAlN	TiAlN	-	ZX	ZX	TiCN / ZX	TiCN / ZX	-
Diameter range	ø 9,5 ~ ø40,5	ø 9,5 ~ ø40,5	ø 9,5 ~ ø40,5	ø 8,0 ~ ø30,5	ø 14,0 ~ ø25,0	ø 14,0 ~ ø25,0	ø 14,0 ~ ø23,5	ø 24,0 ~ ø50,0	ø 5,0 ~ ø12,0

K Type SUPER MULTI-DRILLS (DIN) MDS ... s/M-HAK Type

TiAlN Coated Solid Carbide Drills with Coolant Holes

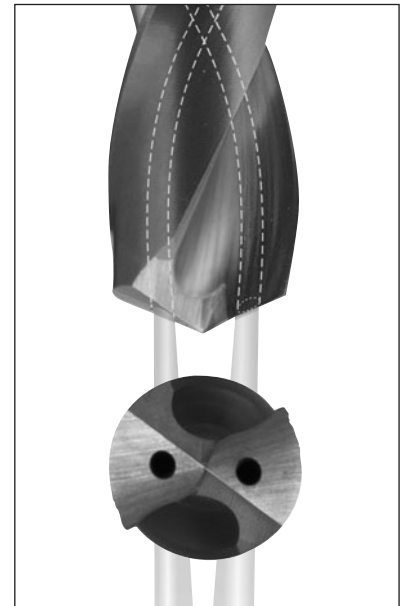
to DIN6535 Form HAK and DIN6537 (\varnothing -Tolerance: m7)



Description

The new K type Multi-Drill features an extra tough carbide substrate, new cutting geometry, spiral coolant holes, ultra hard TiAlN coating and significantly reduces hole making costs.

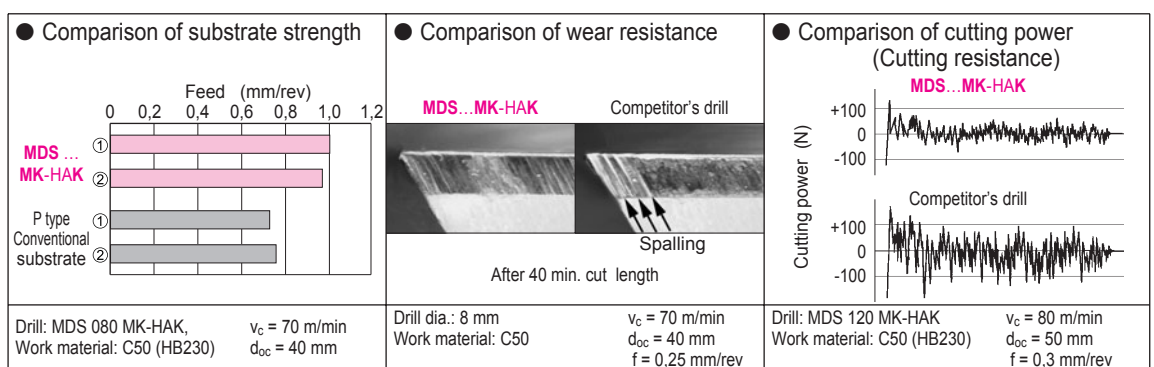
- Advantages
- High productivity drilling even on deep holes up to 4 x D
 - Twice the tool life of conventionally coated drills
 - Self centering
 - Surface finish and tolerances comparable to reaming
 - Regrindable



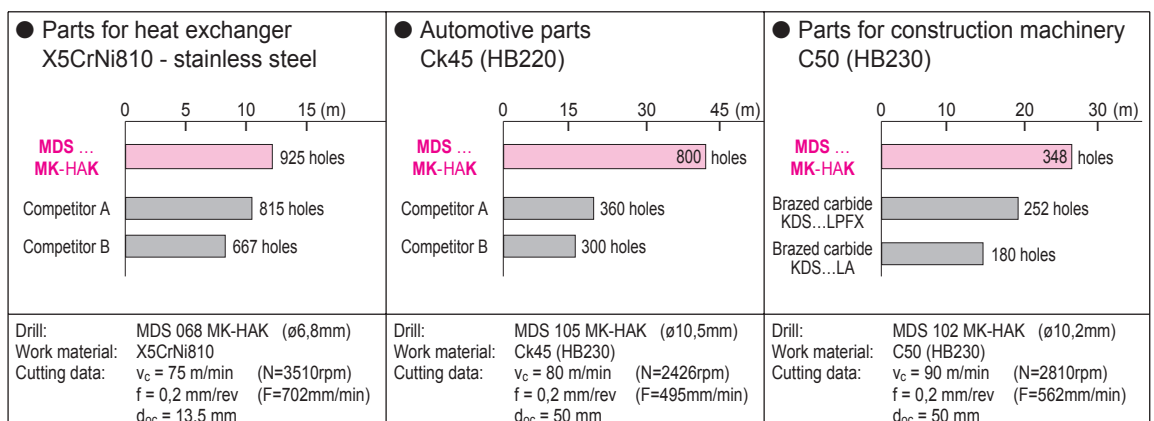
Series

Type	Diameter range (mm)	Hole depth (L/D)	Remark
Short type (MDS...SKHAK)	\varnothing 4,0~ \varnothing 12,0	3 ~ 4	4,5 ~ 6
Long type (MDS...MKHAK)	\varnothing 4,0~ \varnothing 12,0	~ 4	

Performance



Tool Life Examples



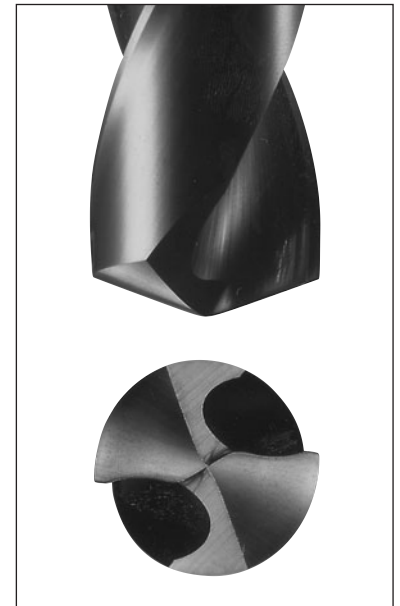
Cylindrical Type (\varnothing -Tolerance: h8)



Description

The new K type Multi-Drill features an extra tough carbide substrate, new cutting geometry, ultra hard TiAlN coating and significantly reduces hole making costs.

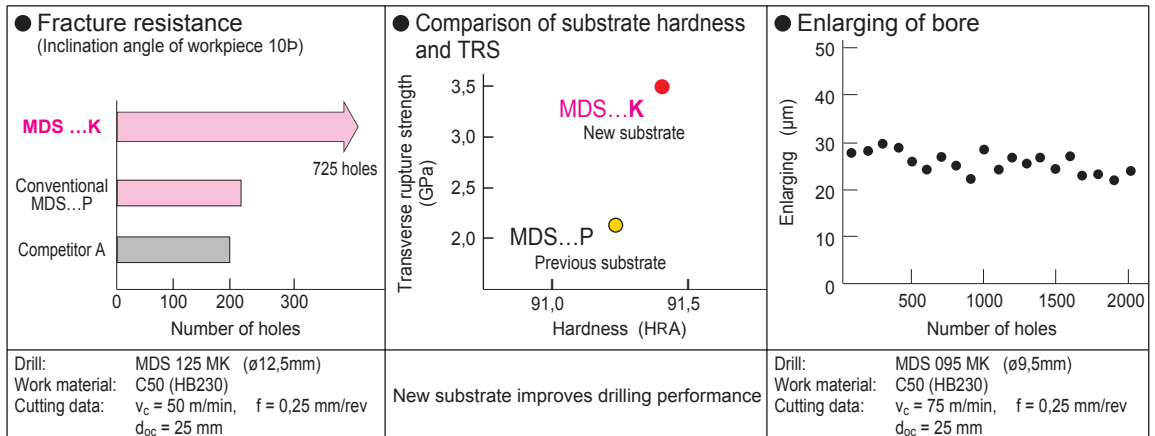
- Advantages
- General purpose drill for steels, stainless steels and cast irons
 - High productivity drilling even on deep holes up to 4 x D
 - Twice the tool life of conventionally coated drills
 - Self centering
 - Surface finish and tolerances comparable to reaming
 - Regrindable



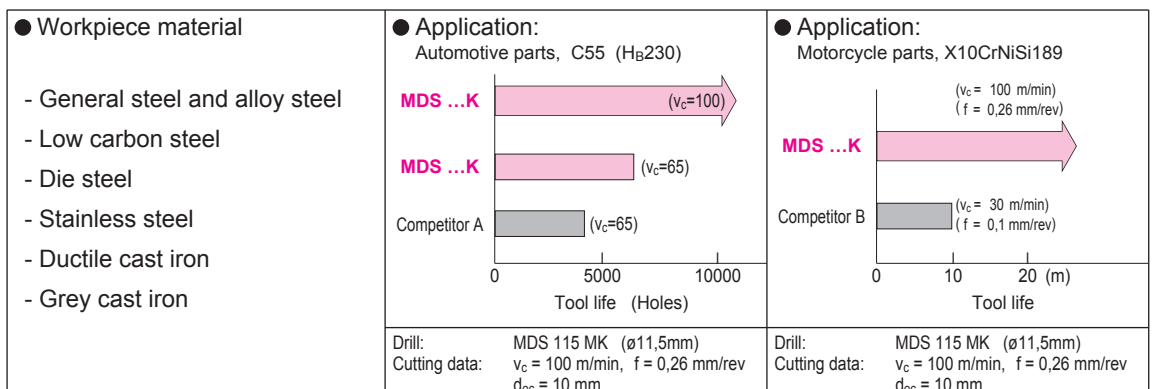
Series

Type	Diameter range (mm)	Hole depth (L/D)	Remark
Short type (SK Type)	\varnothing 2,0~ \varnothing 20,0	2,5 ~ 3	First choice general purpose drill
Long type (MK Type)	\varnothing 5,0~ \varnothing 20,0	~ 4	

Performance



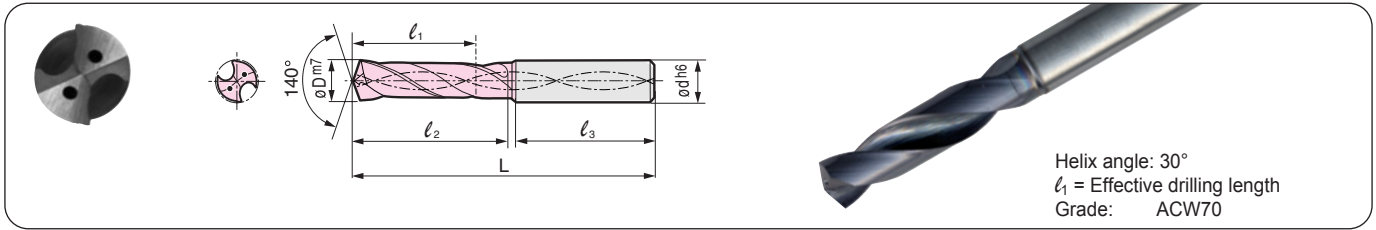
Application Examples



K Type SUPER MULTI-DRILLS (DIN) MDS ... SK-HAK Type

Short Type

TiAlN Coated Solid Carbide Drills to DIN6537 (ϕ -Tolerance: m7)



● Diameter $\phi 4,0 \sim 8,0$ mm

Dimensions (mm)			Cat. No.	DIN 6537 K (Short Type)			
ϕD (mm)	Shank			Stock SK-HAK	Dimensions (mm)		
	ϕd	l_3			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			MDS 048 SKHAK				
4,9			MDS 049 SKHAK				
5,0	6	36	MDS 050 SKHAK	●	66	20	28
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	8	36	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)			
ϕD (mm)	Shank			Stock SK-HAK	Dimensions (mm)		
	ϕd	l_3			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	10	40	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	12	45	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

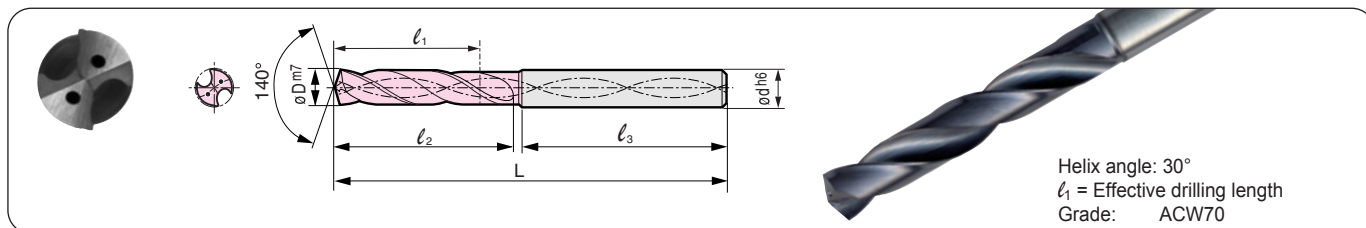
Diameter (mm)		Steels	Steels	Alloy Steels	Hardened Steels	Stainless Steels	Ductile	Grey	Titanium Alloys	Inconel
		(under HB200)	(HB200~300)	(over HB300)	(HRC45)	(except 316-bar)	Cast Irons	Cast Irons	(Ti-6Al-4V)	(Inconel 718)
~ $\phi 5$	v_c	50 - 80 - 120	50 - 75 - 100	40 - 65 - 80	20 - 35 - 50	30 - 45 - 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 - 120	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)

K Type SUPER MULTI-DRILLS (DIN) MDS ... MK-HAK Type

Long Type

TiAlN Coated Solid Carbide Drills to DIN6537 (\varnothing -Tolerance: m7)



● Diameter $\varnothing 4,0 \sim 8,0$ mm

Dimensions (mm)			Cat. No.	DIN 6537 K (Long Type)			
$\varnothing D$ (mm)	Shank			Stock	Dimensions (mm)		
	$\varnothing d$	l_3		MK-HAK	L	l_1	l_2
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	8	36	MDS 071 MKHAK		91	43	53
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 $\varnothing 8,1 \sim 12,0$ mm

Dimensions (mm)			Cat. No.	DIN 6537 K (Long Type)						
$\varnothing D$ (mm)	Shank			Stock	Dimensions (mm)					
	$\varnothing d$	l_3		MK-HAK	L	l_1	l_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					118	56	71
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 to: DIN6535 Form HAK

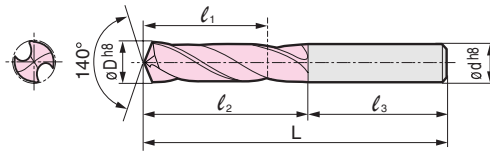
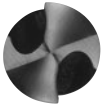
S : Short type
M : Long type



SUPER MULTI-DRILLS MDS ... SK/SG Type

Short Type

Cylindrical Solid Carbide Drills without Coolant Holes



Helix angle: 30°
 l_1 = Effective drilling length

● Diameter $\phi 2,0 \sim 6,0$ mm

Dimensions (mm)			Cat. No.	Short Type				
ϕD	Shank			Stock	Dimensions (mm)			
	ϕd	l_3			SK	SG	L	l_1
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	30	MDS 027			46	12,4	16
2,8	2,8		MDS 028	●				
2,9	2,9		MDS 029					
3,0	3,0	30	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	33	MDS 040	●	●			
4,1	4,1		MDS 041					
4,2	4,2		MDS 042	●				
4,3	4,3	34	MDS 043			58	18,4	24
4,4	4,4		MDS 044					
4,5	4,5		MDS 045	●	●			
4,6	4,6		MDS 046					
4,7	4,7		MDS 047					
4,8	4,8	36	MDS 048			62	19,6	26
4,9	4,9		MDS 049					
5,0	5,0	36	MDS 050	●	●			
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 $\phi 6,1 \sim 10,0$ mm

Dimensions (mm)			Cat. No.	Short Type				
ϕD	Shank			Stock	Dimensions (mm)			
	ϕd	l_3			SK	SG	L	l_1
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

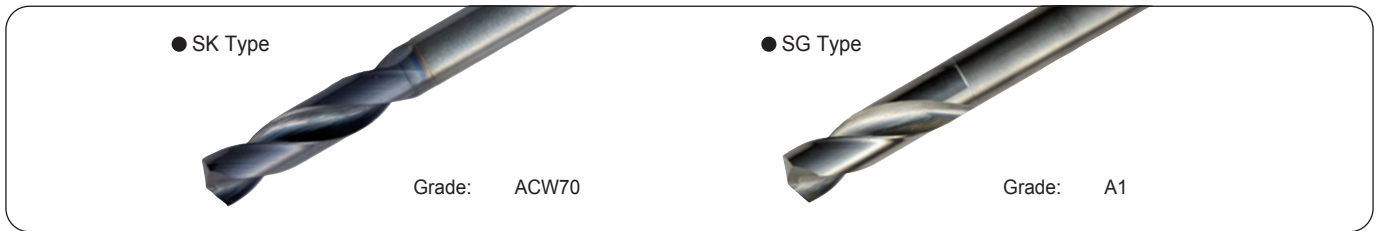
Diameter (mm)		Soft Steels (under HB250)	General Steels, Alloy Steels	Die Steels (about HB250)	Stainless Steels (except 316)	Ductile Cast Irons	Grey Cast Irons
~ $\phi 5$	v_c	40 - 60 - 80	40 - 60 - 80	15 - 30 - 45	15 - 40 - 55	40 - 60 - 80	40 - 70 - 90
	f	0.15 - 0.25	0.15 - 0.25	0.10 - 0.20	0.08 - 0.15	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

(v_c : 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 $\varnothing 10,1 \sim 12,0$ mm

Dimensions (mm)			Cat. No.	Short Type				
$\varnothing D$	Shank			Stock		Dimensions (mm)		
	$\varnothing d$	ℓ_3		SK	SG	L	ℓ_1	ℓ_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 $\varnothing 12,1 \sim 14,0$ mm

Dimensions (mm)			Cat. No.	Short Type				
$\varnothing D$	Shank			Stock		Dimensions (mm)		
	$\varnothing d$	ℓ_3		SK	SG	L	ℓ_1	ℓ_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)
Multi-Drill Solid type
Drill diameter 10,2 mm
K : K-Type drill
G : G-Type drill
S : 2,5 ~ 3 x D

■ Recommended Cutting Conditions for G Type Multi-Drills

(v_c : Cutting Speed (m/min), f : Feed rate (mm/rev)) (Min - Standard - Max)

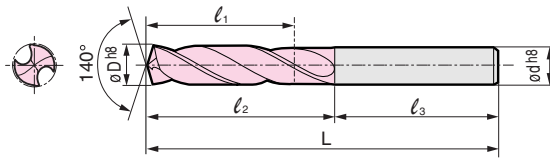
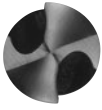
Diameter (mm)		Ductile Cast Irons	Grey Cast Irons	Aluminium Alloys
~ $\varnothing 6$	v_c	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	f	0,15 - 0,2 - 0,25	0,2 - 0,25 - 0,3	0,2 - 0,3 - 0,4
~ $\varnothing 10$	v_c	25 - 50 - 70	25 - 55 - 80	80 - 120 - 200
	f	0,2 - 0,3 - 0,35	0,25 - 0,35 - 0,4	0,25 - 0,35 - 0,45
~ $\varnothing 14$	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
~ $\varnothing 20$	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°
l₁ = Effective drilling length

● Diameter ø2,0~6,0mm

Dimensions (mm)			Cat. No.	Long Type				
øD	Shank			Stock		Dimensions (mm)		
	ød	l ₃		MK	MG	L	l ₁	l ₂
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	30	MDS 026			49,5	15,9	19,5
2,7	2,7		MDS 027					
2,8	2,8	30	MDS 028			52,6	17,6	21,6
2,9	2,9		MDS 029					
3,0	3,0	30	MDS 030			56,7	20,3	24,7
3,1	3,1		MDS 031					
3,2	3,2	31	MDS 032			59,9	28,0	33,9
3,3	3,3		MDS 033					
3,4	3,4	32	MDS 034			65,9	26,3	31,9
3,5	3,5		MDS 035					
3,6	3,6	32	MDS 036			69,9	28,0	33,9
3,7	3,7		MDS 037					
3,8	3,8	33	MDS 038			77,0	32,4	39,0
3,9	3,9		MDS 039					
4,0	4,0	33	MDS 040			82,1	34,9	42,1
4,1	4,1		MDS 041					
4,2	4,2	34	MDS 042	●				
4,3	4,3		MDS 043					
4,4	4,4	34	MDS 044					
4,5	4,5		MDS 045					
4,6	4,6	34	MDS 046					
4,7	4,7		MDS 047					
4,8	4,8	36	MDS 048					
4,9	4,9		MDS 049					
5,0	5,0	38	MDS 050	●	●			
5,1	5,1		MDS 051	●				
5,2	5,2	38	MDS 052					
5,3	5,3		MDS 053					
5,4	5,4	40	MDS 054					
5,5	5,5		MDS 055	●	●			
5,6	5,6		MDS 056					
5,7	5,7	40	MDS 057					
5,8	5,8		MDS 058					
5,9	5,9	40	MDS 059					
6,0	6,0		MDS 060	●	●			

● Diameter ø6,1~10,0mm

Dimensions (mm)			Cat. No.	Long Type				
øD	Shank			Stock		Dimensions (mm)		
	ød	l ₃		MK	MG	L	l ₁	l ₂
6,1	6,1		MDS 061					
6,2	6,2	40	MDS 062			82,1	34,9	42,1
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	40	MDS 068	●	●			
6,9	6,9		MDS 069					
7,0	7,0		MDS 070	●	●			
7,1	7,1	41	MDS 071			88,3	37,3	46,3
7,2	7,2		MDS 072					
7,3	7,3		MDS 073					
7,4	7,4	41	MDS 074					
7,5	7,5		MDS 075	●	●			
7,6	7,6	42	MDS 076			91,4	39,8	49,4
7,7	7,7		MDS 077					
7,8	7,8	42	MDS 078					
7,9	7,9		MDS 079					
8,0	8,0		MDS 080	●	●			
8,1	8,1	43	MDS 081			97,5	44,3	54,5
8,2	8,2		MDS 082					
8,3	8,3		MDS 083					
8,4	8,4	43	MDS 084					
8,5	8,5		MDS 085	●	●			
8,6	8,6	43	MDS 086			99,6	45,8	56,6
8,7	8,7		MDS 087					
8,8	8,8	43	MDS 088					
8,9	8,9		MDS 089					
9,0	9,0		MDS 090	●	●			
9,1	9,1	44	MDS 091			103,7	48,3	59,7
9,2	9,2		MDS 092					
9,3	9,3		MDS 093					
9,4	9,4	44	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	45	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

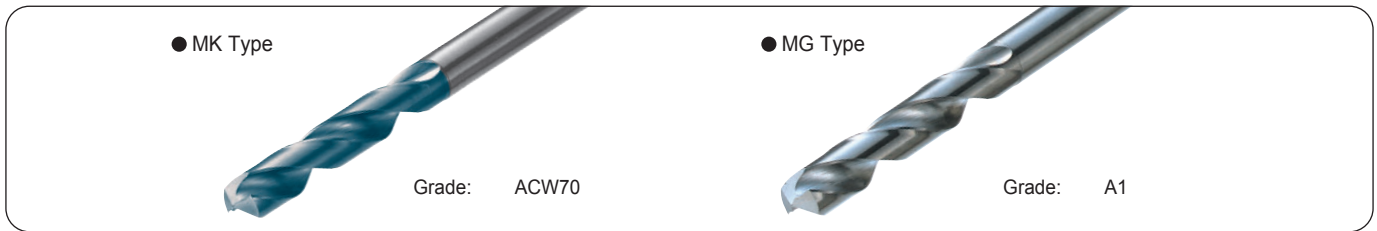
Drill diameter
10,2 mm

K : K-Type drill
G : G-Type drill

M : ~4 x D

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 $\varnothing 10,1 \sim 12,0$ mm

Dimensions (mm)			Cat. No.	Long Type				
$\varnothing D$	Schaft			Stock		Dimensions (mm)		
	$\varnothing d$	ℓ_3		MK	MG	L	ℓ_1	ℓ_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 $\varnothing 12,1 \sim 14,0$ mm

Dimensions (mm)			Cat. No.	Long Type				
$\varnothing D$	Schaft			Stock		Dimensions (mm)		
	$\varnothing d$	ℓ_3		MK	MG	L	ℓ_1	ℓ_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 (except 316-bar)	Ductile Cast Irons	Grey Cast Irons
~ $\varnothing 5$	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
~ $\varnothing 10$	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
~ $\varnothing 15$	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
~ $\varnothing 20$	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



Multi-Drills

■ 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
~ $\varnothing 6$	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
~ $\varnothing 10$	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
~ $\varnothing 14$	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
~ $\varnothing 20$	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



Extra Long SUPER MULTI-DRILLS MDW ... XHT/PHT Type

A Revolution in Deep Hole Drilling



■ Features

- Drills faster than conventional high speed drills and gun drills
- Drilling depths up to 30xD
- Unique flute design efficiently removes chips
- Solid carbide construction provides excellent finished hole geometry
- Low cutting forces - suitable for low powered machine spindles
- Eco-friendly - uses MQL (minimum quantity lubrication) systems

■ Chip Form Examples Using Alternative Coolant Methods

- MQL chips well across a wider range of cutting conditions
- MQL works well even when drilling soft steels

▶ **MQL - optimised chip evacuation**

Coolant supply

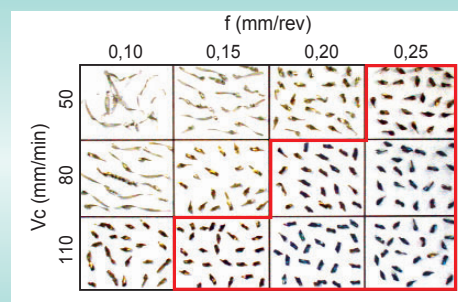
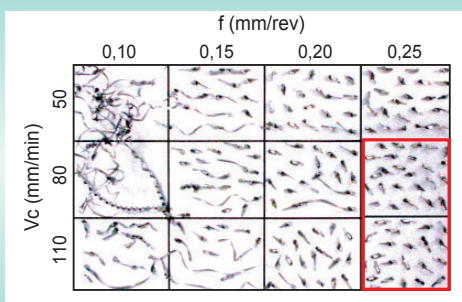
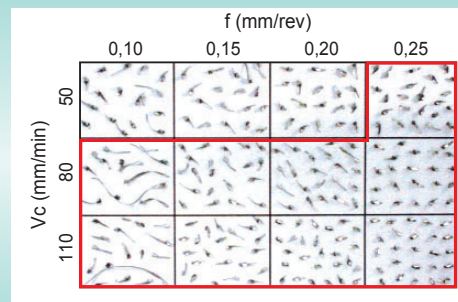
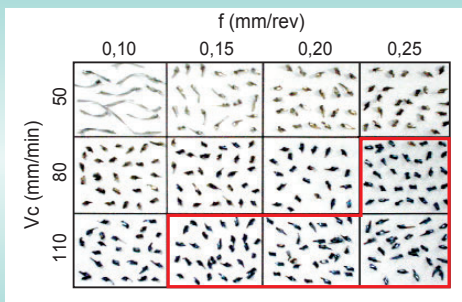
Internal coolant (Emulsion 3MPa)

Internal MQL (Natural oil 0,6MPa)

Work material

C50 (230HB)

15CrMo5 (<230HB)



□ Applicable range

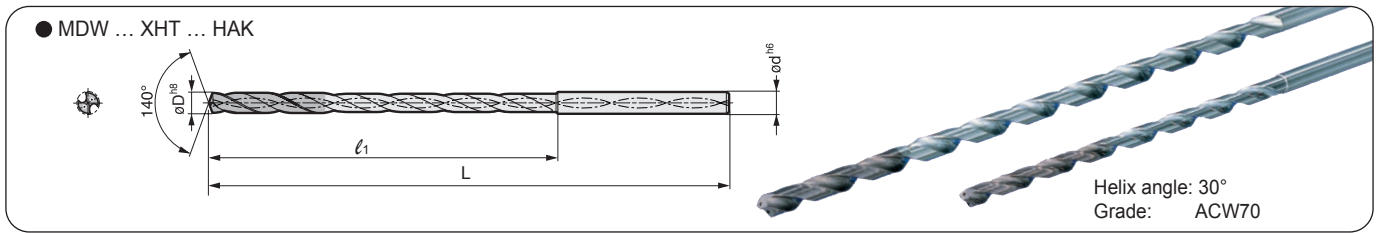
■ Recommended Cutting Conditions

Vc: Cutting speed (m/min), f: Feed rate (mm/rev)

Diameter (mm)		General Steel	Alloy Steel	Stainless Steel	Grey Cast Iron	Ductile Cast Iron	Aluminium Alloy
		(~300HB)	(~45HRC)	(~200HB)	(GG25)	(GGG45)	—
~ 5	Vc	70 ~ 90	50 ~ 70	30 ~ 50	50 ~ 90	50 ~ 90	80 ~ 160
	f	0,08 ~ 0,12	0,06 ~ 0,15	0,06 ~ 0,12	0,15 ~ 0,25	0,15 ~ 0,2	0,08 ~ 0,3
~ 6	Vc	80 ~ 110	60 ~ 80	30 ~ 60	50 ~ 90	50 ~ 70	80 ~ 160
	f	0,1 ~ 0,17	0,12 ~ 0,25	0,08 ~ 0,15	0,15 ~ 0,3	0,15 ~ 0,25	0,12 ~ 0,35
~ 8	Vc	80 ~ 120	70 ~ 90	40 ~ 80	60 ~ 100	50 ~ 80	80 ~ 180
	f	0,12 ~ 0,2	0,12 ~ 0,25	0,1 ~ 0,2	0,2 ~ 0,35	0,15 ~ 0,25	0,15 ~ 0,4

Extra Long SUPER MULTI-DRILLS MDW ... XHT/PHT Type

New



● MDW...XHT Type for Deep Hole

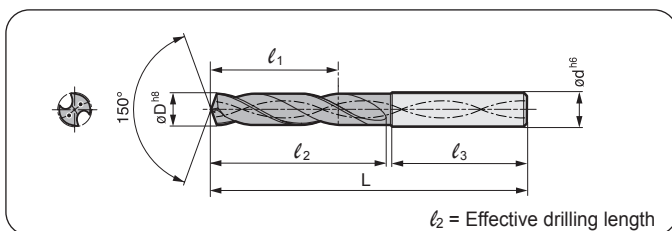
Dimensions		Cat. No.	For 10 x D			For 15 x D			For 20 x D			For 25 x D			For 30 x D		
$\varnothing D$ (mm)	$\varnothing d$ (mm)		Stock	Dimensions		Stock	Dimensions		Stock	Dimensions		Stock	Dimensions		Stock	Dimensions	
			10	L	ℓ_1	15	L	ℓ_1	20	L	ℓ_1	25	L	ℓ_1	30	L	ℓ_1
4,0	4,0	MDW 040 XHT S□□HAK	●	87	58	●	107	78	●	127	97	●	147	117	●	167	137
4,5	5,0	MDW 045 XHT S□□HAK	●	95	63	●	118	86	●	140	108	●	163	130,5	●	184	153
5,0		MDW 050 XHT S□□HAK ^(*)	●	98	68	●	123	93	●	148	118	●	173	133	●	198	168
5,0	6,0	MDW 050 XHT S□□HAK	●	106	68	●	131	93	●	156	118	●	181	133	●	206	168
5,5		MDW 055 XHT S□□HAK	●	113	73	●	141	101	●	168	128	●	196	155,5	●	223	183
6,0		MDW 060 XHT S□□HAK	●	118	78	●	148	108	●	178	138	●	208	168	●	238	198
6,5		MDW 065 XHT S□□HAK	●	125	87	●	158	120	●	190	148	●	223	180,5	●	255	213
7,0	8,0	MDW 070 XHT S□□HAK	●	131	92	●	166	127	●	201	162	●	236	197	●	271	232
7,5		MDW 075 XHT S□□HAK	○	136	97	○	174	135	○	211	172	○	249	209,5	○	286	247
8,0		MDW 080 XHT S□□HAK	●	141	102	●	181	142	●	221	182	●	261	222	●	301	262
8,5		MDW 085 XHT S□□HAK	○	154	110	○	197	153	○	239	195	○	282	238	○	324	280
9,0	10,0	MDW 090 XHT S□□HAK	○	159	115	○	204	160	○	249	205	○	294	250	○	339	295
9,5		MDW 095 XHT S□□HAK	○	164	120	○	212	168	○	259	215	○	305	263	○	354	310
10,0		MDW 100 XHT S□□HAK	○	167	125	○	217	175	○	267	225	○	317	275	○	367	325
10,5	12,0	MDW 105 XHT S□□HAK	○	181	131	○	234	184	○	286	236	○	339	289	○	391	341
11,0		MDW 110 XHT S□□HAK	○	186	136	○	241	191	○	296	246	○	351	301	○	406	356
11,5		MDW 115 XHT S□□HAK	○	190	141	○	248	199	○	305	256	○	363	314	×		
12,0		MDW 120 XHT S□□HAK	○	195	146	○	255	206	○	315	266	○	375	326	×		

ⓘ All Long Drill series include an allowance to accommodate regrinding!
Grade of TiAlN coated Super Multi-Drill: ACW70

(*) Cat. No. description: Drill- \varnothing : 5mm, shank- \varnothing : 5 mm, (Eg. for 20xD: MDW 050 XHT S20 HAK5)

● Euro stock standard
○ Available on request
× Not possible to produce

● MDW...PHT Type for Pilot Hole



Helix angle: 30°
Grade: ACW70



Dimensions		Cat. No.	For Pilot Hole				
$\varnothing D$ (mm)	$\varnothing d$ (mm)		Stock	Dimensions			
				L	ℓ_1	ℓ_2	ℓ_3
4,03	5,0	MDW 0403 PHT	●	59	12	29	28
4,53		MDW 0453 PHT	●	59	12	29	28
5,03	6,0	MDW 0503 PHT	●	71	15	33	36
5,53		MDW 0553 PHT	●	71	15	33	36
6,03	8,0	MDW 0603 PHT	●	76	18	38	36
6,50		MDW 0653 PHT	●	76	18	38	36
7,03		MDW 0703 PHT	●	82	21	43	36
7,53		MDW 0753 PHT	○	82	21	43	36
8,03	10,0	MDW 0803 PHT	●	88	24	46	40
8,53		MDW 0853 PHT	○	88	24	46	40
9,03		MDW 0903 PHT	○	88	24	46	40
9,53		MDW 0953 PHT	○	88	24	46	40
10,03	12,0	MDW 1003 PHT	○	104	30	55	45
10,53		MDW 1053 PHT	○	104	30	55	45
11,03		MDW 1103 PHT	○	104	30	55	45
11,53		MDW 1153 PHT	○	104	30	55	45
12,03	14,0	MDW 1203 PHT	○	117	42	68	45

■ How to Order

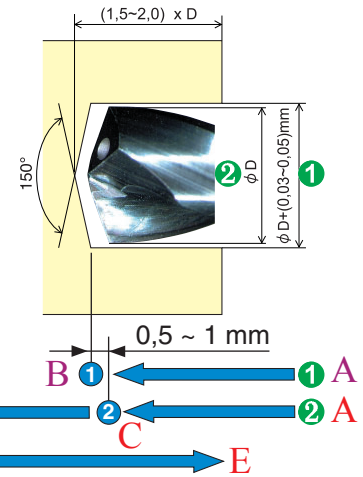
Non-Stock Items will be required minimum order quantity for 6 pcs.
Please specify the Cat. No. For example, if the diameter for deep hole drilling is 5,0 mm, please indicate as follow.

E.g., **MDW 050 XHT S25**, ACW70 (Grade)

Drilling depth (L/D ratio)
Shape for steel with double margin
Special shape of clearance face
Extra long type
Pilot drill type

SUPER MULTI-DRILL
 $\varnothing D=5,0$ mm
 $\varnothing D=5,03$ mm

0503 P (HT)



Tooling Strategy

1. A ⇒ B: Preparation of pilot hole with MDW ...PHT type

$v_c = 50-80\text{m/min}$, $f = 0,15-0,25\text{mm/rev}$, $d_{oc}: 1-2xD$

2. A ⇒ C: Entering into pilot hole with long Multi-Drill (MDWXHT type)

$N = 500\text{ rpm}$, $v_f = 2000\text{mm/min}$

At C the drill should stay (about. 3 sec.) and increase speed to set recommended cutting conditions.

3. C ⇒ D: Deep hole drilling

After reaching required number of revolution operation can be started taking into consideration mentioned recommendation for the feed rates. At cross holes and irregular or angled surfaces feed should be reduced.

4. D ⇒ E: After hole drilling

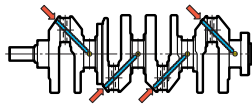
Decrease spindle rotation to $N=500-700\text{rpm}$ and pull back with high feed rate $F = 2000\text{ mm/min}$.

Application Examples

Work piece: Crank shaft (C45E, 1.1191)

Machine

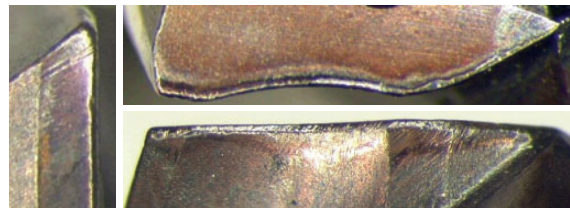
Machine: Horizontal M/C
Coolant: MQL (Synthesized ester)
Air pressure 0,9MPa
Supplying rate 20cc/h



Process and cutting condition

- 1) Pilot hole ($\phi 5,75 \times 12\text{mm}$, Top angle of drill: 150°)
 $v_c = 80\text{m/min}$ $f = 0,2\text{mm/rev}$.
- 2) Deep hole ($\phi 5,70 \times 83\text{mm} \times 4\text{ holes}$, XHT type)
 $v_c = 100\text{m/min}$ $f = 0,15\text{mm/rev}$. $F = 873\text{mm/min}$

Tool life 200pcs



Cutting edge after 66,4m drilling

Work piece: Connecting rod (C53,1.1213)

Machine

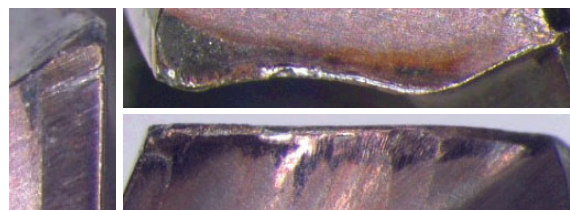
Machine: Vertical M/C (BT40)
Coolant: Internal cooling (Emulsion)
Pump pressure 2,0MPa



Process and cutting condition

- 1) Pilot hole ($\phi 5,85 \times 10\text{mm}$, Top angle of drill: 175°)
 $v_c = 80\text{m/min}$ $f = 0,05 \quad 0,15\text{mm/rev}$.
- 2) Deep hole ($\phi 5,80 \times 130\text{mm}$, XHT type)
 $v_c = 90\text{m/min}$ $f = 0,20\text{mm/rev}$. $F = 988\text{mm/min}$

Tool life 300pcs

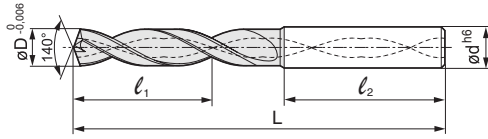


Cutting edge after 39,0m drilling

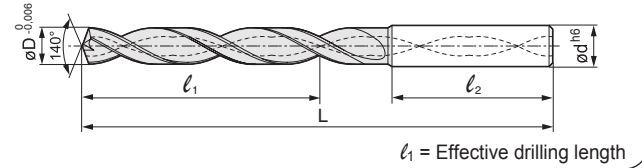
* Current tooling (with $\phi 5,8 \times 130\text{mm}$ gun drill)
 $v_c = 100\text{m/min}$ $f = 0,03\text{mm/rev}$. $F = 164\text{mm/min}$.
==> Tool life 120pcs

New

● Short Type (MDW...MDLH)



● Long Type (MDW...LDLH)



● Diameter $\varnothing 3,00 \sim 8,00$ mm (mm)

Dimensions			Kat.-Nr.	Short Type (3D)		Long Type (5D)		
$\varnothing D$	Shank			Stock	Dimensions	Stock	Dimensions	
	$\varnothing d$	l_2		MDLH	L l_1	LDLH	L l_1	
3,00	3	48	MDW 0300		68,5	14,4	78,5	24,4
3,10			MDW 0310					
3,20			MDW 0320					
3,30			MDW 0330					
3,50	4	48	MDW 0350		72,7	17,2	86,7	31,2
3,65			MDW 0365					
4,00			MDW 0400					
4,20			MDW 0420					
4,50			MDW 0450					
4,60	5	50	MDW 0460		80,9	22,0	98,9	40,0
5,00			MDW 0500					
5,10			MDW 0510					
5,50	6	52	MDW 0550		83,1	20,8	101,1	38,8
6,00			MDW 0600					
6,50			MDW 0650					
6,80	7	53	MDW 0680		89,3	24,6	110,3	45,6
7,00			MDW 0700					
7,36			MDW 0736					
7,50	8	54	MDW 0750		95,5	28,4	119,5	52,4
8,00			MDW 0800					

● Diameter $\varnothing 8,50 \sim 16,00$ mm (mm)

Dimensions			Kat.-Nr.	Short Type (3D)		Long Type (5D)		
$\varnothing D$	Shank			Stock	Dimensions	Stock	Dimensions	
	$\varnothing d$	l_2		MDLH	L l_1	LDLH	L l_1	
8,50			MDW 0850					
8,80	9	55	MDW 0880		101,6	32,2	128,6	59,2
9,00			MDW 0900					
9,20			MDW 0920					
9,50	10	56	MDW 0950		107,8	36,0	137,8	66,0
10,00			MDW 1000					
10,30			MDW 1030					
10,50			MDW 1050					
10,80	11	61	MDW 1080		118,0	39,8	151,0	72,8
11,00			MDW 1100					
11,10			MDW 1110					
11,50	12	62	MDW 1150		124,2	43,6	160,2	79,6
12,00			MDW 1200					
12,50			MDW 1250					
12,96	13	63	MDW 1296		130,4	47,4	169,4	86,4
13,00			MDW 1300					
13,50			MDW 1350					
14,00	14	64	MDW 1400		136,5	51,2	178,5	93,2
14,50			MDW 1450					
14,96	15	65	MDW 1496		142,7	55,0	187,7	100,0
15,00			MDW 1500					
15,50			MDW 1550					
16,00	16	66	MDW 1600		148,9	58,8	196,9	106,8

AURORA Coated DLH Type, Grade: DL1300

■ 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: $\varnothing 3 \sim \varnothing 12$ mm
total length: 50 times drill diameter (max. 290mm)

■ Applicable Work Materials

- Aluminium Die Casting
- Aluminium Alloy
- Aluminium Alloy Casting
- Brass Casting
- Bronze Casting

■ Ordering

Non-Stock Items will be required minimum order quantity for 6 pcs.

■ Recommended Cutting Conditions

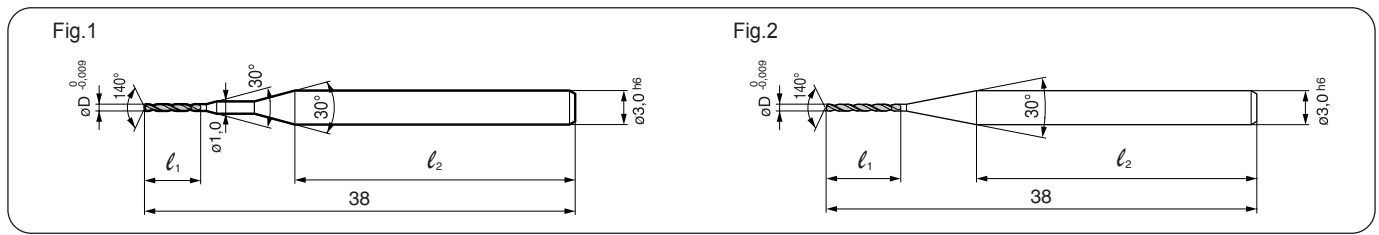
$\varnothing D$ (mm)		Aluminium Alloy	Aluminium Die Casting	Copper Alloy
~ $\varnothing 5$	V_c	80 ~ 160	80 ~ 180	80 ~ 160
	f	0,08 ~ 0,3	0,1 ~ 0,3	0,08 ~ 0,15
~ $\varnothing 10$	V_c	80 ~ 180	80 ~ 200	60 ~ 180
	f	0,1 ~ 0,3	0,1 ~ 0,35	0,1 ~ 0,2
~ $\varnothing 16$	V_c	80 ~ 200	80 ~ 200	80 ~ 200
	f	0,15 ~ 0,4	0,1 ~ 0,4	0,1 ~ 0,25

(v_c : Cutting Speed (m/min), f: Feed rate (mm/rev), Min ~ Max)



Multi-Drills

Solid Carbide MINI MULTI-DRILLS MDSS Type



● Diameter ø0,20~0,49mm

øD (mm)	Cat. No.	Stock	Dimensions		Fig.
			l ₁	l ₂	
0,20	MDSS 0020		2,5	28	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	28	2
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		5	28	2
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				

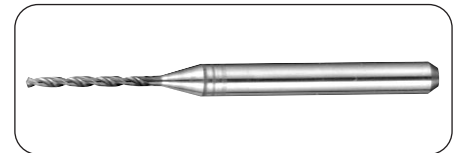
● Diameter ø0,50~0,79mm

øD (mm)	Cat. No.	Stock	Dimensions		Fig.
			l ₁	l ₂	
0,50	MDSS 0050		6	27	1
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				
0,60	MDSS 0060		7	26	2
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	2
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				

● Diameter ø0,80~1,00mm

øD (mm)	Cat. No.	Stock	Dimensions		Fig.
			l ₁	l ₂	
0,80	MDSS 0080		10	23	1
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		11	22	2
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		12	21	

Grade: ACF40B



■ Recommended Cutting Conditions (Wet)

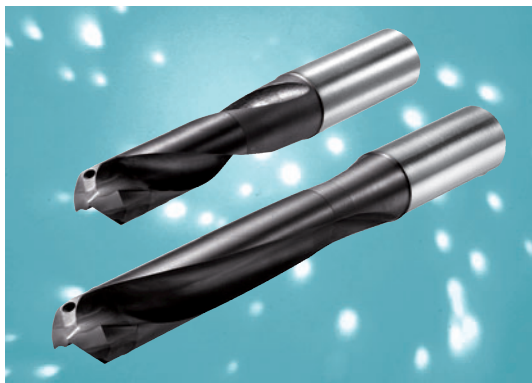
Work Cond. Drill-ø (mm)	Structural Steel, Carbon Steel, Cast Iron			Alloy Steel, Pre-hardened Steel			Tempered Steel, Hardened Steel			Hardened Steel (H _R C40~50)			Hardened Steel (H _R C50~55)		
	Spindle (rpm)	Feed rate (mm/min)	Step-feed (mm)	Spindle (rpm)	Feed rate (mm/min)	Step-feed (mm)	Spindle (rpm)	Feed rate (mm/min)	Step-feed (mm)	Spindle (rpm)	Feed rate (mm/min)	Step-feed (mm)	Spindle (rpm)	Feed rate (mm/min)	Step-feed (mm)
0,2	31800	60	0,1D	26500	50	0,1D	21200	40	0,1D	12700	30	0,1D	10600	20	0,1D
0,3	31800	100		26500	80		21200	60		12700	40		10600	30	
0,4	31800	130		25900	100		19900	80		12700	50		9900	40	
0,5	31800	190		25500	150		19100	110		12700	60		9500	50	
1,0	23900	360		0,2D~0,5D*	15900		240	0,2D~0,5D*		12700	190		0,2D~0,5D*	8000	

Work Cond. Drill-ø (mm)	Gray Cast Iron (GG45)			Stainless Steel		
	Spindle (rpm)	Feed rate (mm/min)	Step-feed (mm)	Spindle (rpm)	Feed rate (mm/min)	Step-feed (mm)
0,2	31800	60	0,1D	10600	20	0,1D
0,3	31800	100		10600	30	
0,4	31800	130		9500	40	
0,5	31800	190		9500	50	
1,0	19100	290		0,2D~0,5D*	5600	

1. The above conditions are recommended under wet conditions, using water-soluble coolant.
2. If machine noises and vibrations are present, please adjust the cutting conditions accordingly.
3. 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.

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	



■ Performance

<p>● High efficiency drilling</p> <p>Comparison of coating damage when high speed drilling</p> <p>TiAlN coated KDS...AK</p> <p>TiN coated type</p> <p>$v_c = 120$ m/min $v_c = 60$ m/min After 30 m cut length (600 holes)</p> <p>Drill dia.: 18,0 mm Work material: C50 (HB230) $f = 0,3$ mm/rev $d_{oc} = 50$ mm</p>	<p>● Optimized drill geometry</p> <p>Comparison of damage to drill margin After 40 min. cut length</p> <p>KDS...AK Competitor's drill</p> <p>Drill dia.: 18,0 mm Work material: C50 (HB230) $v_c = 50$ m/min $f = 0,25$ mm/rev $d_{oc} = 38$ mm</p>	<p>● Comparison of cutting power (chip removal capability)</p> <p>Drill dia.: 18,0 mm Work material: C50 (HB230) $v_c = 50$ m/min $f = 0,3$ mm/rev $d_{oc} = 90$ mm (L/D=5)</p>
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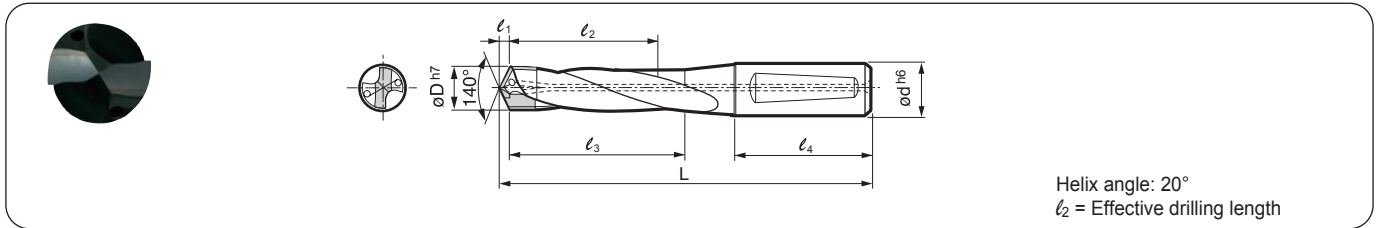
■ Application examples

<p>● Workpiece material</p> <ul style="list-style-type: none"> - General steel and alloy steel - Low carbon steel - Die steel - Stainless steel - Ductile cast iron - Grey cast iron 	<p>● Automotive parts Work material: C50 (HB250)</p> <p>Drill: KDS 180 LAK (ø18,0mm) Cutting data: $v_c = 55$ m/min, $f = 0,25$ mm/rev $d_{oc} = 70$ mm</p>	<p>● Automotive parts Work material: 42CrMo4 (HB250)</p> <p>Drill: KDS 250 MAK (ø25,0mm) Cutting data: $v_c = 60$ m/min, $f = 0,25$ mm/rev $d_{oc} = 65$ mm</p>
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Brazed Carbide MULTI-DRILLS KDS ... MAK Type

Short Type (3 x D)

Brazed Carbide Drills with Coolant Holes



● Diameter ø9,5~15,5mm

Dimensions (mm)				Cat. No.	Short Series (3D)		
øD (mm)	Shank		Drill Head l ₁		Stock	Dimensions (mm)	
	ød	l ₄			MAK	L	l ₂
9,5~10,0	16	48	1,8	KDS 095 MAK	96,8	32	37
10,0~10,5				KDS 100 MAK			
				KDS 105 MAK			
10,6~11,0	16	48	2	KDS 106 MAK	102,0	35	40
11,0~11,5				KDS 110 MAK			
				KDS 115 MAK			
11,6				KDS 116 MAK			
11,7				KDS 117 MAK			
11,8				KDS 118 MAK			
11,9	KDS 119 MAK	107,3	38	44			
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	112,4	41	47			
12,6	KDS 126 MAK						
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	117,5	44	51			
13,2	KDS 132 MAK						
13,3	KDS 133 MAK						
13,4	KDS 134 MAK						
13,5	KDS 135 MAK						
13,6	KDS 136 MAK						
13,7	KDS 137 MAK	127,7	47	54			
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	20	50	2,7			
14,4	KDS 144 MAK						
14,5	KDS 145 MAK						
14,6	KDS 146 MAK						
14,7	KDS 147 MAK						
14,8	KDS 148 MAK						
14,9	KDS 149 MAK	127,7	47	54			
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 l ₁		Stock	Dimensions (mm)	
	ød	l ₄			MAK	L	l ₂
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	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	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	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	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_c: Cutting Speed (m/min), f: Feed rate (mm/rev)) (Min - Standard - Max)

Diameter (mm)		Steels (under HB 250)	Steels (HB 250~320)	Hardened Steels (HRC 45)	Stainless Steels (except 316 - bar)	Ductile Cast Irons	Cast Irons	Aluminium Alloys	Titanium Alloys (Ti-6Al-4V)	Inconel (Inconel 718)
~ ø15	v _c	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 _c	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 _c	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.

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 $\varnothing 20,1 \sim 24,5$ mm

Dimensions (mm)				Cat. No.	Short Series (3D)			
$\varnothing D$ (mm)	Shank		Drill Head l_1		Stock	Dimensions (mm)		
	$\varnothing d$	l_4			MAK	L	l_2	l_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 $\varnothing 24,6 \sim 40,5$ mm

Dimensions (mm)				Cat. No.	Short Series (3D)			
$\varnothing D$ (mm)	Shank		Drill Head l_1		Stock	Dimensions (mm)		
	$\varnothing d$	l_4			MAK	L	l_2	l_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				32	60			
~28,5	~285 MAK							
28,6	KDS 285 MAK							
~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	40	70	6,0	KDS 326 MAK		221,0	101	119
~33,5				~335 MAK				
33,6				KDS 336 MAK				
~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	40	70	6,7	KDS 376 MAK		241,9	116	163
~38,5				~385 MAK				
38,6				KDS 386 MAK				
~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

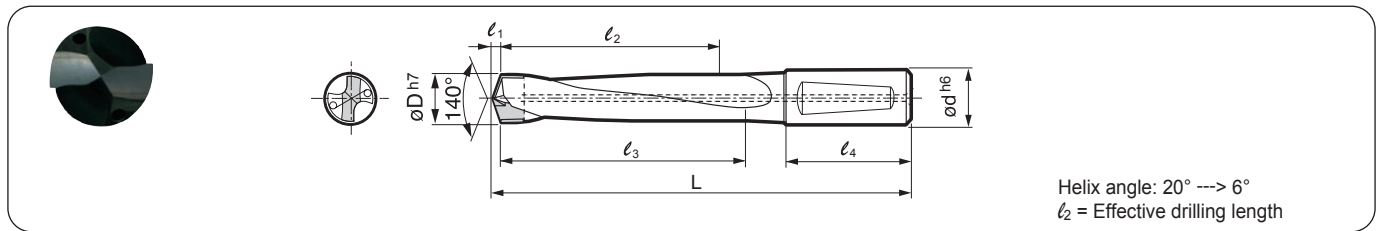
M : Short type
L : Long type



Brazed Carbide MULTI-DRILLS KDS ... LAK Type

Long Type (5 x D)

Brazed Carbide Drills with Coolant Holes



● Diameter ø9,5~15,5mm

Dimensions (mm)			Cat. No.	Long Series (5D)				
øD (mm)	Shank			Drill Head l ₁	Dimensions (mm)			
	ød	l ₄			LAK	L	l ₂	l ₃
9,5~10,0	16	48	1,8	KDS 095 LAK	116,8	52	57	
10,0~10,5				KDS 100 LAK				
				KDS 105 LAK				
10,6~11,0	16	48	2	KDS 106 LAK	127,0	57	63	
11,0~11,5				KDS 110 LAK				
				KDS 115 LAK				
11,6				KDS 116 LAK				
11,7				KDS 117 LAK				
11,8	KDS 118 LAK	132,2	63	69				
11,9	KDS 119 LAK							
12,0	KDS 120 LAK							
12,1	KDS 121 LAK							
12,2	KDS 122 LAK							
12,3	KDS 123 LAK	142,4	67	74				
12,4	KDS 124 LAK							
12,5	KDS 125 LAK							
12,6	KDS 126 LAK							
12,7	KDS 127 LAK							
12,8	KDS 128 LAK	147,5	73	80				
12,9	KDS 129 LAK							
13,0	KDS 130 LAK							
13,1	KDS 131 LAK							
13,2	KDS 132 LAK							
13,3	KDS 133 LAK	157,7	77	85				
13,4	KDS 134 LAK							
13,5	KDS 135 LAK							
13,6	KDS 136 LAK							
13,7	KDS 137 LAK							
13,8	KDS 138 LAK	167,7	77	85				
13,9	KDS 139 LAK							
14,0	KDS 140 LAK							
14,1	KDS 141 LAK							
14,2	KDS 142 LAK							
14,3	KDS 143 LAK	193,5	97	107				
14,4	KDS 144 LAK							
14,5	KDS 145 LAK							
14,6	KDS 146 LAK							
14,7	KDS 147 LAK							
14,8	KDS 148 LAK	198,6	103	113				
14,9	KDS 149 LAK							
15,0	KDS 150 LAK							
15,1	KDS 151 LAK							
15,2	KDS 152 LAK							
15,3	KDS 153 LAK	198,6	103	113				
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 l ₁	Dimensions (mm)			
	ød	l ₄			LAK	L	l ₂	l ₃
15,6	20	50	2,9	KDS 156 LAK	167,9	93	91	
15,7				KDS 157 LAK				
15,8				KDS 158 LAK				
15,9				KDS 159 LAK				
16,0				KDS 160 LAK				
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	20	50	3,1	KDS 166 LAK	173,1	97	96	
16,7				KDS 167 LAK				
16,8				KDS 168 LAK				
16,9				KDS 169 LAK				
17,0				KDS 170 LAK				
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	20	50	3,3	KDS 176 LAK	178,3	93	102	
17,7				KDS 177 LAK				
17,8				KDS 178 LAK				
17,9				KDS 179 LAK				
18,0				KDS 180 LAK				
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	25	56	3,5	KDS 186 LAK	193,5	97	107	
18,7				KDS 187 LAK				
18,8				KDS 188 LAK				
18,9				KDS 189 LAK				
19,0				KDS 190 LAK				
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	25	56	3,6	KDS 196 LAK	198,6	103	113	
19,7				KDS 197 LAK				
19,8				KDS 198 LAK				
19,9				KDS 199 LAK				
20,0				KDS 200 LAK				

■ Recommended Cutting Conditions

(v_c: Cutting Speed (m/min), f: Feed rate (mm/rev)) (Min - Standard - Max)

Diameter (mm)		Steels (under HB 250)	Steels (HB 250~320)	Hardened Steels (HRC 45)	Stainless Steels (except 316 - bar)	Ductile Cast Irons	Cast Irons	Aluminium Alloys	Titanium Alloys (Ti-6Al-4V)	Inconel (Inconel 718)
~ ø15	v _c	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 _c	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 _c	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.

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 $\varnothing 20,1 \sim 24,5$ mm

Dimensions (mm)				Cat. No.	Long Series (5D)			
$\varnothing D$ (mm)	Shank		Drill Head l_1		Stock	Dimensions (mm)		
	$\varnothing d$	l_4			LAK	L	l_2	l_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 $\varnothing 24,6 \sim 40,5$ mm

Dimensions (mm)				Cat. No.	Long Series (5D)			
$\varnothing D$ (mm)	Shank		Drill Head l_1		Stock	Dimensions (mm)		
	$\varnothing d$	l_4			LAK	L	l_2	l_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				32	60			
~28,5	~285 LAK							
28,6	KDS 285 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	40	70	6,0	KDS 326 LAK		291,0	175	194
~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	40	70	6,7	KDS 376 LAK		311,7	188	207
~38,5				~385 LAK				
38,6				KDS 386 LAK				
~39,5				~395 LAK				
39,6				KDS 396 LAK				
~40,5				~405 LAK				
40,6				KDS 406 LAK				
~41,5				~415 LAK				
41,6				KDS 416 LAK				
~42,5				~425 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

LAK: Brazed carbide and TiAlN coated drill

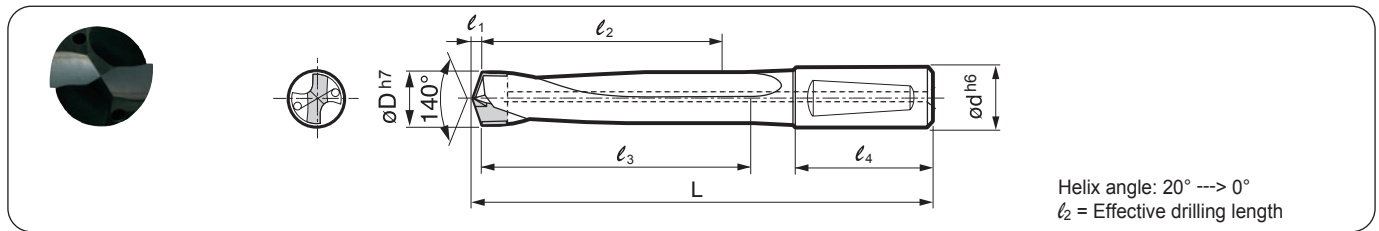
M : Short type
L : Long type



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 l ₁		Stock	Dimensions (mm)		
	ød	l ₄			DAK	L	l ₂	l ₃
9,5~10,0	16	48	1,8	KDS 095 DAK		141,8	75	80
10,0~10,5				KDS 100 DAK				
				KDS 105 DAK				
10,6~11,0	16	48	2	KDS 106 DAK		152,0	81	87
11,0~11,5				KDS 110 DAK				
				KDS 115 DAK				
11,6				KDS 116 DAK				
11,7				KDS 117 DAK				
11,8				KDS 118 DAK				
11,9	KDS 119 DAK							
12,0	16	48	2,2	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				KDS 126 DAK				
12,7				KDS 127 DAK				
12,8				KDS 128 DAK				
12,9				KDS 129 DAK				
13,0	16	48	2,4	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				KDS 136 DAK				
13,7				KDS 137 DAK				
13,8				KDS 138 DAK				
13,9				KDS 139 DAK				
14,0	16	48	2,5	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				KDS 146 DAK				
14,7				KDS 147 DAK				
14,8				KDS 148 DAK				
14,9				KDS 149 DAK				
15,0	20	50	2,7	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 l ₁		Stock	Dimensions (mm)		
	ød	l ₄			DAK	L	l ₂	l ₃
15,6	20	50	2,9	KDS 156 DAK		207,9	121	129
15,7				KDS 157 DAK				
15,8				KDS 158 DAK				
15,9				KDS 159 DAK				
16,0				KDS 160 DAK	●			
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		218,1	129	138
16,7				KDS 167 DAK				
16,8				KDS 168 DAK				
16,9				KDS 169 DAK				
17,0				KDS 170 DAK	●			
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		223,3	136	145
17,7				KDS 177 DAK				
17,8				KDS 178 DAK				
17,9				KDS 179 DAK				
18,0				KDS 180 DAK	●			
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		243,5	144	154
18,7				KDS 187 DAK				
18,8				KDS 188 DAK				
18,9				KDS 189 DAK				
19,0				KDS 190 DAK	●			
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		248,6	151	161
19,7				KDS 197 DAK				
19,8				KDS 198 DAK				
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	v _c	40 - 65 - 90	40 - 60 - 90	40 - 50 - 70	50 - 70 - 100	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	0,15 - 0,2 - 0,3	0,1 - 0,2 - 0,25	0,1 - 0,2 - 0,25	0,2 - 0,3 - 0,35	
~ ø20	v _c	40 - 65 - 90	40 - 60 - 90	40 - 50 - 70	50 - 70 - 100	
	f	0,2 - 0,3 - 0,4	0,15 - 0,25 - 0,35	0,15 - 0,25 - 0,3	0,2 - 0,35 - 0,4	
~ ø40,5	v _c	40 - 70 - 90	40 - 65 - 90	40 - 55 - 70	50 - 70 - 100	
	f	0,2 - 0,35 - 0,45	0,2 - 0,3 - 0,4	0,2 - 0,3 - 0,35	0,25 - 0,4 - 0,5	

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 ℓ ₁		Stock	Dimensions (mm)		
	ød	ℓ ₄				DAK	L	ℓ ₂
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 ℓ ₁		Stock	Dimensions (mm)		
	ød	ℓ ₄				DAK	L	ℓ ₂
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				32	60			
~28,5	~285 DAK							
28,6	KDS 285 DAK							
~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	40	70	6,0	KDS 326 DAK		371,0	243	260
~33,5				~335 DAK				
33,6				KDS 336 DAK				
~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	40	70	6,7	KDS 376 DAK		406,7	271	290
~38,5				~385 DAK				
38,6				KDS 386 DAK				
~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

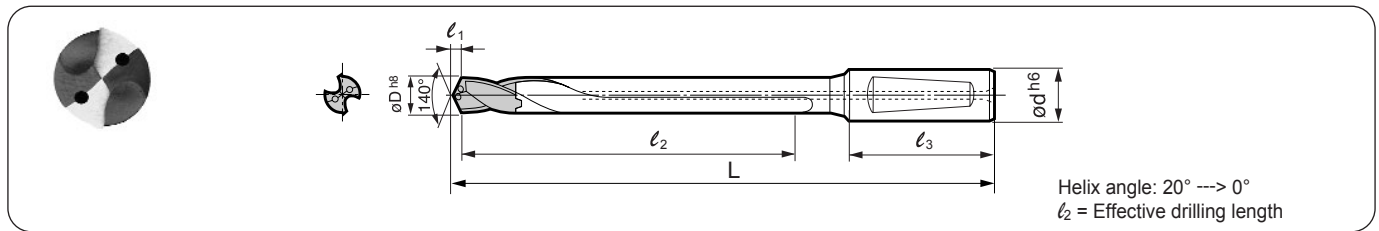
D : Extra long type



Brazed Carbide MULTI-DRILLS KDS ... FA Type

Extra Long Type (10 x D)

Brazed Carbide Drills with Coolant Holes
(Available on Request)



● Diameter ø8.0~15,0mm

Dimensions (mm)				Cat. No.	Extra Long Series (10D)		
øD (mm)	Shank		Drill Head l ₁		Stock	Dimensions (mm)	
	ød	l ₃			FA10	L	l ₂
8,0	16	48	1,5	KDS 080 FA10		156,5	93
~8,5				KDS 085 FA10			
8,6~	16	48	1,6	KDS 086 FA10		171,6	104
~9,5				KDS 095 FA10			
9,6~	16	48	1,8	KDS 096 FA10		181,8	115
~10,5				KDS 105 FA10			
10,6~	16	48	2,0	KDS 106 FA10		197,0	126
~11,5				KDS 115 FA10			
11,6				KDS 116 FA10			
11,7				KDS 117 FA10			
11,8				KDS 118 FA10			
11,9				KDS 119 FA10			
12,0	16	48	2,2	KDS 120 FA10		207,2	137
12,1				KDS 121 FA10			
12,2				KDS 122 FA10			
12,3				KDS 123 FA10			
12,4				KDS 124 FA10			
12,5				KDS 125 FA10			
12,6				KDS 126 FA10			
12,7				KDS 127 FA10			
12,8				KDS 128 FA10			
12,9				KDS 129 FA10			
13,0	16	48	2,4	KDS 130 FA10		222,4	148
13,1				KDS 131 FA10			
13,2				KDS 132 FA10			
13,3				KDS 133 FA10			
13,4				KDS 134 FA10			
13,5				KDS 135 FA10			
13,6				KDS 136 FA10			
13,7				KDS 137 FA10			
13,8				KDS 138 FA10			
13,9				KDS 139 FA10			
14,0	16	48	2,5	KDS 140 FA10		232,5	159
14,1				KDS 141 FA10			
14,2				KDS 142 FA10			
14,3				KDS 143 FA10			
14,4				KDS 144 FA10			
14,5				KDS 145 FA10			
14,6				KDS 146 FA10			
14,7				KDS 147 FA10			
14,8	20	50	2,7	KDS 148 FA10		247,7	170
14,9				KDS 149 FA10			
15,0				KDS 150 FA10			

● Diameter ø15,1~19,5mm

Dimensions (mm)				Cat. No.	Extra Long Series (10D)		
øD (mm)	Shank		Drill Head l ₁		Stock	Dimensions (mm)	
	ød	l ₃			FA10	L	l ₂
15,1				KDS 151 FA10			
15,2				KDS 152 FA10			
15,3	20	50	2,7	KDS 153 FA10		247,7	170
15,4				KDS 154 FA10			
15,5				KDS 155 FA10			
15,6				KDS 156 FA10			
15,7				KDS 157 FA10			
15,8				KDS 158 FA10			
15,9				KDS 159 FA10			
16,0	20	50	2,9	KDS 160 FA10		262,9	181
16,1				KDS 161 FA10			
16,2				KDS 162 FA10			
16,3				KDS 163 FA10			
16,4				KDS 164 FA10			
16,5				KDS 165 FA10			
16,6				KDS 166 FA10			
16,7				KDS 167 FA10			
16,8				KDS 168 FA10			
16,9				KDS 169 FA10			
17,0	20	50	3,1	KDS 170 FA10		273,1	192
17,1				KDS 171 FA10			
17,2				KDS 172 FA10			
17,3				KDS 173 FA10			
17,4				KDS 174 FA10			
17,5				KDS 175 FA10			
17,6				KDS 176 FA10			
17,7				KDS 177 FA10			
17,8				KDS 178 FA10			
17,9				KDS 179 FA10			
18,0	20	50	3,3	KDS 180 FA10		288,3	203
18,1				KDS 181 FA10			
18,2				KDS 182 FA10			
18,3				KDS 183 FA10			
18,4				KDS 184 FA10			
18,5				KDS 185 FA10			
18,6				KDS 186 FA10			
18,7				KDS 187 FA10			
18,8				KDS 188 FA10			
18,9				KDS 189 FA10			
19,0	25	56	3,5	KDS 190 FA10		303,5	214
19,1				KDS 191 FA10			
19,2				KDS 192 FA10			
19,3				KDS 193 FA10			
19,4				KDS 194 FA10			
19,5				KDS 195 FA10			

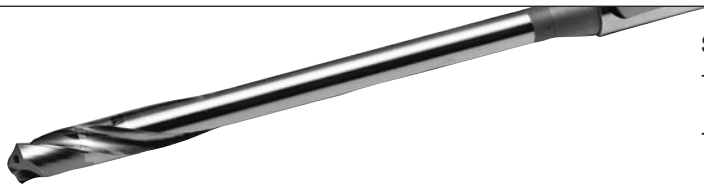
■ Recommended Cutting Conditions

(v_c : Cutting Speed (m/min), f : Feed rate (mm/rev)) (Min - Standard - Max)

Diameter (mm)		Cast Irons	Aluminium Alloys	Remarks
~ ø12	v _c	30 - 55 - 60	50 - 70 - 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. Higher feed rates and deep holes require high coolant pressure. Cutting fluid : Water soluble oil Cutting fluid pressure : 4 ~ 10 bar
	f	0,1 - 0,2 - 0,25	0,1 - 0,2 - 0,3	
~ ø20	v _c	40 - 60 - 70	60 - 70 - 100	
	f	0,2 - 0,3 - 0,4	0,3 - 0,35 - 0,5	
~ ø30	v _c	40 - 60 - 70	70 - 100 - 150	
	f	0,3 - 0,4 - 0,5	0,3 - 0,4 - 0,5	

Brazed Carbide MULTI-DRILLS KDS ... FA Type

Brazed Carbide Multi-Drills for Cast Irons and Aluminium Alloys



Specification:

- Brazed carbide (Grade: G10E) drill with coolant holes
- Shank with whistle notch

● Diameter \varnothing 19,6~22,5mm

Dimensions (mm)				Cat. No.	Extra Long Series (10D)		
\varnothing D (mm)	Shank		Drill Head l_1		Stock	Dimensions (mm)	
	\varnothing d	l_3			FA10	L	l_2
19,6	25	56	3,6	KDS 196 FA10	318,6	225	
19,7							
19,8							
19,9							
20,0							
20,1							
20,2							
20,3							
20,4							
20,5							
20,6	25	56	3,8	KDS 205 FA10	328,8	236	
20,7							
20,8							
20,9							
21,0							
21,1							
21,2							
21,3							
21,4							
21,5							
21,6	25	56	4,0	KDS 216 FA10	344,0	247	
21,7							
21,8							
21,9							
22,0							

● Diameter \varnothing 22,6~30,5mm

Dimensions (mm)				Cat. No.	Extra Long Series (10D)		
\varnothing D (mm)	Shank		Drill Head l_1		Stock	Dimensions (mm)	
	\varnothing d	l_3			FA10	L	l_2
22,1	25	56	4,0	KDS 221 FA10	344,0	247	
~22,5							
22,6	25	56	4,2	KDS 226 FA10	354,2	258	
~23,5							
~24,5							
23,6	32	60	4,4	KDS 236 FA10	374,4	269	
~24,5							
24,6	32	60	4,5	KDS 246 FA10	384,5	280	
~25,5							
~26,5							
25,6	32	60	4,7	KDS 256 FA10	399,7	291	
~26,5							
26,6	32	60	4,9	KDS 266 FA10	409,9	302	
~27,5							
~28,5							
27,6	32	60	5,1	KDS 276 FA10	425,1	313	
~28,5							
28,6	32	60	5,3	KDS 285 FA10	435,3	324	
~29,5							
~30,5							
29,6	32	60	5,5	KDS 296 FA10	450,5	335	
~30,5							

■ 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° --> 0°)



Replaceable Head Type MULTI-DRILLS SMD Type



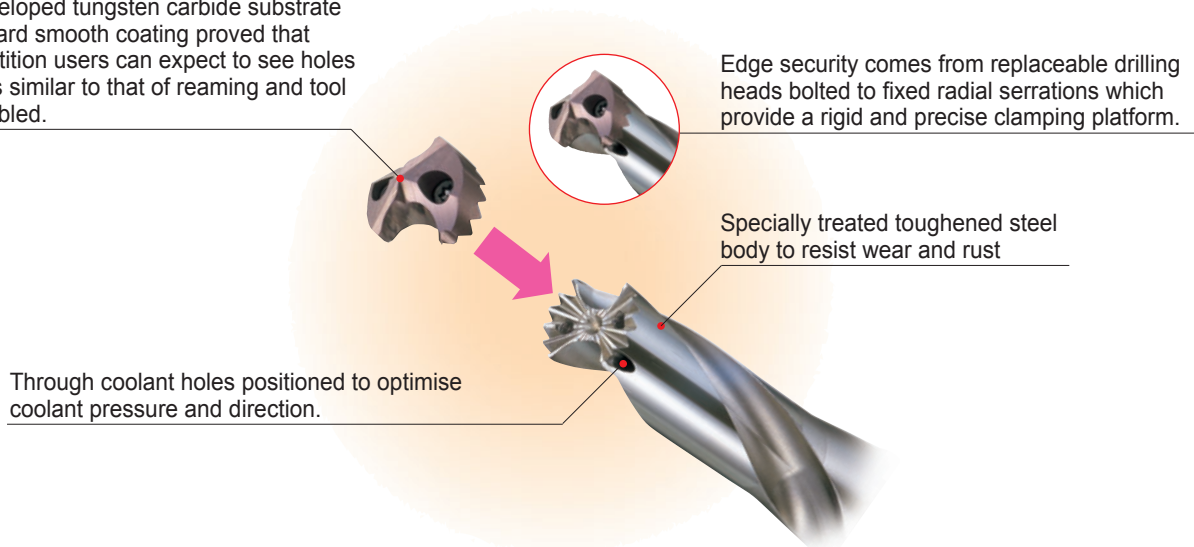
General Features

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.

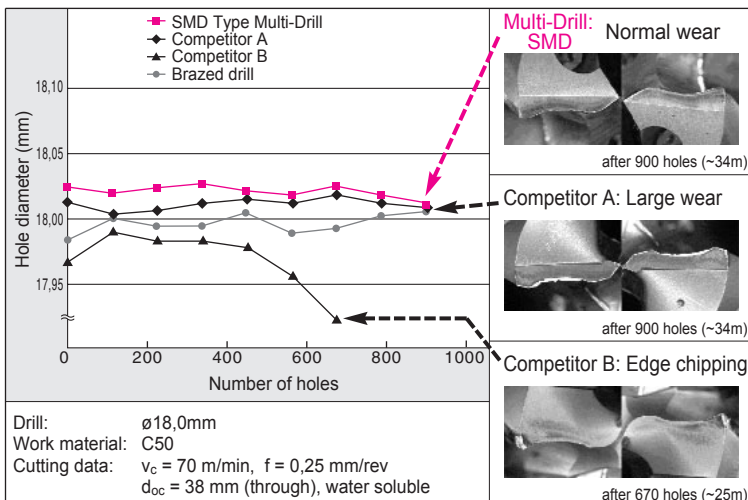
Advantages

- New regrindable drill head type MTL (1,5~3mm regrinding allowance)
- Available in diameters ranging from 13,5~30,5mm (initial launch up to 25mm)
- Drilling Depths to 8 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

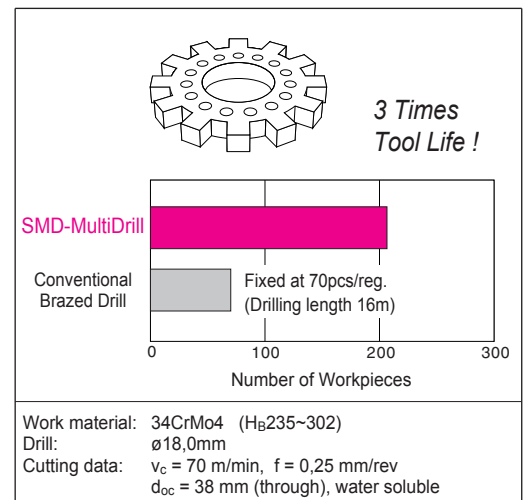
The newly developed tungsten carbide substrate with its ultra hard smooth coating proved that against competition users can expect to see holes with tolerances similar to that of reaming and tool life almost doubled.



Drilling Precision

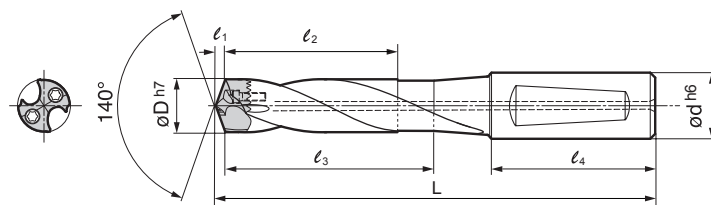


Application Example



Replaceable Head Type MULTI-DRILLS SMD Type

● Holder



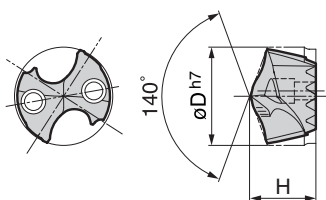
l_2 = Effective drilling length

■ Holder

Dimensions (mm)				Cat. No.	Short Series (3D)			Long Series (5D)			Deep Hole Series (8D)			Applicable Drill Head
øD (mm)	Drill Head l_1	Shank			Stock	Dimensions		Stock	Dimensions		Stock	Dimensions		
		ød	l_4		M3	L	l_2	M5	L	l_2	M8	L	l_2	
14,0	2,5	16	48	SMDH 140 □□	●	119,0	45,5	●	149,0	74,5	●	194,0	117,5	SMDT 1351~1450 MTL
15,0	2,7	20	50	SMDH 150 □□	●	129,2	48,0	●	159,2	79,0	●	204,2	126,0	SMDT 1451~1550 MTL
16,0	2,9			SMDH 160 □□	●	134,4	51,5	●	169,4	84,5	●	214,4	133,5	SMDT 1551~1650 MTL
17,0	3,1			SMDH 170 □□	●	139,6	54,0	●	174,6	89,0	●	224,6	142,0	SMDT 1651~1750 MTL
18,0	3,3			SMDH 180 □□	●	144,8	57,5	●	179,8	94,5	●	229,8	149,5	SMDT 1751~1850 MTL
19,0	3,5			SMDH 190 □□	●	160,0	60,0	●	195,0	99,0	●	255,0	158,0	SMDT 1851~1950 MTL
20,0	3,6	25	56	SMDH 200 □□	●	160,1	63,5	●	200,1	104,5	●	265,1	165,5	SMDT 1951~2050 MTL
21,0	3,8			SMDH 210 □□	●	160,3	66,0	●	200,3	109,0	●	270,3	174,0	SMDT 2051~2150 MTL
22,0	4,0			SMDH 220 □□	●	165,1	69,1	●	205,1	114,1	●	275,1	181,1	SMDT 2151~2280 MTL
23,0	4,2			SMDH 230 □□	●	164,8	71,0	●	214,8	118,1	●	284,8	189,1	SMDT 2281~2380 MTL
24,0	4,4			SMDH 240 □□	●	174,6	74,2	●	224,6	123,2	●	299,6	196,2	SMDT 2381~2480 MTL
25,0	4,5	32	60	SMDH 250 □□	●	174,5	75,5	●	229,5	127,5	●	304,5	204,5	SMDT 2481~2580 MTL

(mm)

● Drill Head (Insert)



■ Drill Head (Insert), SMDH...MTL Type

● Diameter 14,0 ~ 19,5mm

(mm)

øD ^{h7}	Cat. No.	Stock	Grade	H
14,0	SMDT 1400 MTL	●	ACW70	10,3
14,5	SMDT 1450 MTL	●		10,3
15,0	SMDT 1500 MTL	●		11,0
15,5	SMDT 1550 MTL	●		11,0
16,0	SMDT 1600 MTL	●		11,6
16,5	SMDT 1650 MTL	●		11,6
17,0	SMDT 1700 MTL	●		12,2
17,5	SMDT 1750 MTL	●		12,2
18,0	SMDT 1800 MTL	●		12,9
18,5	SMDT 1850 MTL	●		12,9
19,0	SMDT 1900 MTL	●		13,5
19,5	SMDT 1950 MTL	●		13,5

● Diameter 20,0 ~ 25,0mm

(mm)

øD ^{h7}	Cat. No.	Stock	Grade	H
20,0	SMDT 2000 MTL	●	ACW70	14,1
20,5	SMDT 2050 MTL	●		14,1
21,0	SMDT 2100 MTL	●		14,8
21,5	SMDT 2150 MTL	●		14,8
22,0	SMDT 2200 MTL	●		15,0
22,5	SMDT 2250 MTL	●		15,0
23,0	SMDT 2300 MTL	●		15,1
23,5	SMDT 2350 MTL	●		15,1
24,0	SMDT 2400 MTL	●		15,4
24,5	SMDT 2450 MTL	●		15,4
25,0	SMDT 2500 MTL	●		15,8

■ Recommended Cutting Conditions

(v_c : Cutting Speed (m/min), f : Feed rate (mm/rev), Min ~ Max)

Drill Ø (mm)		Soft steel (~ HB250)	Alloy steel (HB250~320)	Harden steel (HRC45)	Stainless steel (~ HB200)	Nodular cast iron	Gray cast iron
		~ 16.0	v_c	80 ~ 120	80 ~ 110	50 ~ 80	50 ~ 80
	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
~ 20.0	v_c	80 ~ 120	80 ~ 110	60 ~ 90	60 ~ 90	70 ~ 100	80 ~ 130
	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
~ 30.5	v_c	80 ~ 120	80 ~ 130	60 ~ 90	60 ~ 90	80 ~ 110	80 ~ 140
	f	0,2 ~ 0,4	0,2 ~ 0,35	0,15 ~ 0,25	0,15 ~ 0,25	0,2 ~ 0,4	0,2 ~ 0,45

■ Spare Parts

Screw	Wrench	Applicable Holder
BXD 02208 IP	TRDR 08 IP	SMDT 140 ~ 150 □□
BXD 02509 IP	TRDR 10 IP	SMDT 160 ~ 180 □□
BXD 03011 IP	TRDR 15 IP	SMDT 190 ~ 210 □□
BXD 03512 IP	TRDR 15 IP	SMDT 220 ~ 240 □□
BXD 04014 IP	TRDR 20 IP	SMDT 250 □□

Indexable Insert Type Drills WDS Type



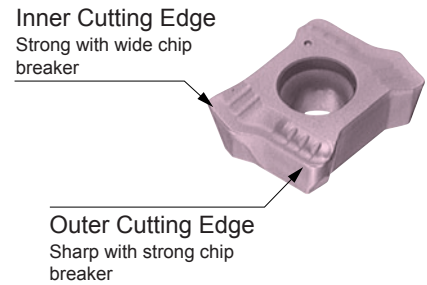
■ Description

The WDS drill is an ideal solution für those preferring the cost and convenience of indexable insert drills.

The newly designed drill body and optimised inserts result in a balanced cut approach to drilling enabling feed rates to be maximised, swarf to be effectively managed, and hole making costs to be reduced.

■ Advantages

- High feed rates - fast metal removal
Example C50 material
ø14mm (f=0,2 mm/rev)
ø25mm (f=0,3 mm/rev).
- Excellent swarf management and optimised chip control
- Deep hole drilling up to 5 x D
- Cost reducing performance



■ Performance

● Design

- Small chips produced by 4 effective cutting edges.
- Good cutting balance and low shock penetration result in a smooth and even contact with the workpiece.

● Superior swarf control (even for deep holes)

Competitor's drill

WDS

Drill: WDS 140 M5 S20
Work material: C50 (HB230)
 $v_c = 120$ m/min, $f = 0,15$ mm/rev, $d_{oc} = 70$ mm

■ Inserts

		Grade	
<p>● LPMX type</p> <p>Chipbreaker S04</p>	<p>● XPMX type</p> <p>Chipbreaker S04</p>	AC350	Tough PVD coated grade for steels
Recommended for high feed drilling.		3 corner available. Same cutting performance as LPMX-S04 type inserts.	
		ACZ310	Ultra hard ZX coated grade for irons

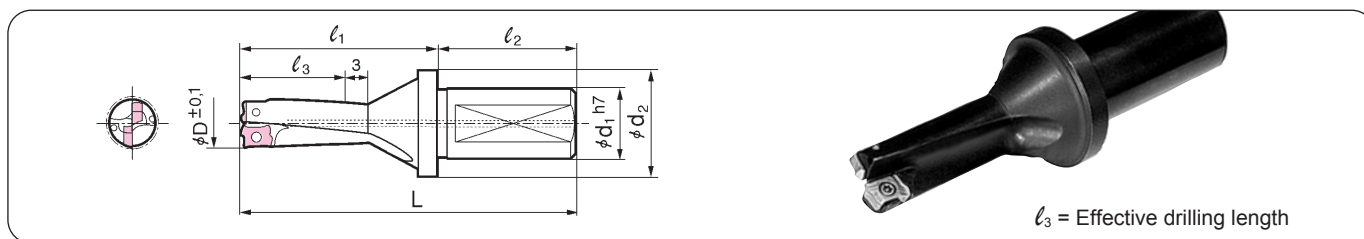
■ Recommended Cutting Conditions

Work material	Grade	Cutting Speed (m/min)	Feed Rate (mm/rev)			
			ø14 ~ ø17	ø17,5 ~ ø23,5	ø24 ~ ø32	ø33 ~ ø50
Low carbon steel	AC350	80 ~ 120	0,12 ~ 0,18	0,12 ~ 0,20	0,15 ~ 0,22	0,18 ~ 0,25
Carbon steel	AC350	100 ~ 180	0,12 ~ 0,22	0,12 ~ 0,25	0,15 ~ 0,30	0,18 ~ 0,35
Alloy steel	AC350	100 ~ 150	0,12 ~ 0,20	0,12 ~ 0,22	0,15 ~ 0,25	0,18 ~ 0,30
Stainless steel	AC350	100 ~ 150	0,12 ~ 0,18	0,12 ~ 0,20	0,15 ~ 0,22	0,15 ~ 0,25
Cast iron	ACZ310	100 ~ 180	0,12 ~ 0,20	0,12 ~ 0,25	0,15 ~ 0,30	0,15 ~ 0,35
Aluminium alloy	ACZ310	100 ~ 180	0,12 ~ 0,25	0,12 ~ 0,30	0,15 ~ 0,35	0,15 ~ 0,40

Note : When using 5 x D drills the feed rates should be reduce to 50% at the point of entry and 20% during the rest of the drilling cycle.
For low feed drilling Hand to cut materials with R06 type inserts the feed rates should be reduced to 50% at the point of entry and 30% during the rest of the drilling cycle.

Indexable Insert Type Drills WDS Type

Max. Depth : 2 x D (Short Type)



Holder

Cat. No.	Stock	Dimensions (mm)							Insert
		D	d ₁	d ₂	L	l ₁	l ₂	l ₃	
WDS 140 M2 S20	●	14	20	31	95	51	44	28	LPMX 06T206
WDS 142 M2 S20	●	14,2	20	31	95,6	51,6	44	28,4	
WDS 145 M2 S20	●	14,5	20	31	96,5	52,5	44	29	LPMX 07T208
WDS 150 M2 S20	●	15	20	31	98	54	44	30	
WDS 155 M2 S20	●	15,5	20	32	99,5	55,5	44	31	LPMX 080308
WDS 160 M2 S20	●	16	20	32	101	57	44	32	
WDS 165 M2 S20	●	16,5	20	32	102,5	58,5	44	33	LPMX 090308
WDS 170 M2 S20	●	17	20	32	104	60	44	34	
WDS 175 M2 S25	●	17,5	25	37	117,5	61,5	56	35	LPMX 080308
WDS 180 M2 S25	●	18	25	37	119	63	56	36	
WDS 185 M2 S25	●	18,5	25	37	120,5	64,5	56	37	LPMX 090308
WDS 190 M2 S25	●	19	25	37	122	66	56	38	
WDS 195 M2 S25	●	19,5	25	37	123,5	67,5	56	39	LPMX 090308
WDS 200 M2 S25	●	20	25	37	125	69	56	40	
WDS 210 M2 S25	●	21	25	40	128	72	56	42	LPMX 090308
WDS 220 M2 S25	●	22	25	40	131	75	56	44	
WDS 230 M2 S25	●	23	25	40	134	78	56	46	

Inserts for 2 x D

Fig. 1

Chipbreaker S04

Cat. No.	Coated		Dimensions (mm)			Fig.
	AC350	AC310	l	Thickness	r	
LPMX 06T206 S04	●	●	6,0	2,8	0,6	1
LPMX 07T208 S04	●	●	6,8	2,8	0,8	
LPMX 080308 S04	●	●	7,6	3,2	0,8	
LPMX 090308 S04	●	●	8,8	3,2	0,8	

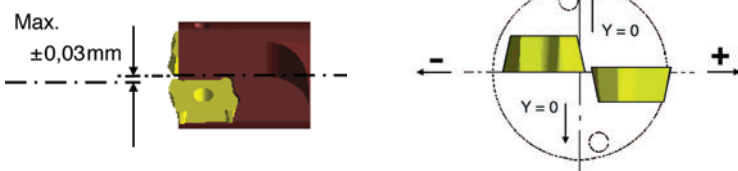
Spare Parts

Screw	Wrench	Applicable Holder
BFTY02205	TRD07	WDS 140 ~ 150 M2 S20
BFTY02206	TRD07	WDS 155 ~ 170 M2 S20
BFTX02506N	TRD08	WDS 175 ~ 200 M2 S25
BFTX02508	TRD08	WDS 210 ~ 230 M2 S25

Technical Information

Lathe (set up)

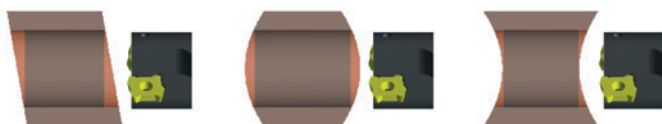
Align the drill centre to the late centre line



Drill Offsets

Drill Diameter	Max. Offset (mm)	
	" - "	" + "
14,0 ~ 17,5 mm	- 0,3	+ 0,5
18,0 ~ 23,5 mm	- 0,3	+ 0,8
24,0 ~ 32,0 mm	- 0,3	+ 1,0
33,0 ~ 50,0 mm	- 0,3	+ 1,2

Drilling an uneven work surface



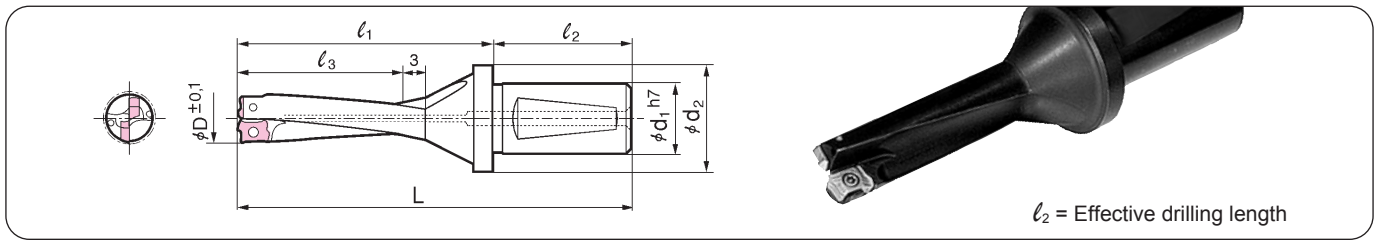
Feed rate reduction

Drill Diameter	Feed Rate	
	uneven work surface	5 x D long type
≤ 23,5 mm	50 %	80 %
≥ 24,0 mm	60 %	

If the workpiece surface is not flat reduce the feed rate (shown on the feed rate reduction chart) at the drill entry and exit point.

Indexable Insert Type Drills WDS Type

Max. Depth : 3 x D (Standard)



Holder



Cat. No.	Stock	Dimensions (mm)							Insert
		D	d ₁	d ₂	L	l ₁	l ₂	l ₃	
WDS 140 M3 S20	●	14,0	20	31	109	65	44	42,0	LPMX 06T206
WDS 142 M3 S20	●	14,2	20	31	109,8	65,8	44	42,6	
WDS 145 M3 S20	●	14,5	20	31	111	67	44	43,5	
WDS 150 M3 S20	●	15,0	20	31	113	69	44	45,0	LPMX 07T208
WDS 155 M3 S20	●	15,5	20	32	115	71	44	46,5	
WDS 160 M3 S20	●	16,0	20	32	117	73	44	48,0	
WDS 165 M3 S20	●	16,5	20	32	119	75	44	49,5	LPMX 080308
WDS 170 M3 S20	●	17,0	20	32	121	77	44	51,0	
WDS 175 M3 S25	●	17,5	25	37	135	79	56	52,5	
WDS 180 M3 S25	●	18,0	25	37	137	81	56	54,0	LPMX 080308
WDS 185 M3 S25	●	18,5	25	37	139	83	56	55,5	
WDS 190 M3 S25	●	19,0	25	37	141	85	56	57,0	
WDS 195 M3 S25	●	19,5	25	37	143	87	56	58,5	LPMX 090308
WDS 200 M3 S25	●	20,0	25	37	145	89	56	60,0	
WDS 205 M3 S25	●	20,5	25	40	147	91	56	61,5	
WDS 210 M3 S25	●	21,0	25	40	149	93	56	63,0	LPMX 090308
WDS 215 M3 S25	●	21,5	25	40	151	95	56	64,5	
WDS 220 M3 S25	●	22,0	25	40	153	97	56	66,0	
WDS 225 M3 S25	●	22,5	25	40	155	99	56	67,5	LPMX 090308
WDS 230 M3 S25	●	23,0	25	40	157	101	56	69,0	
WDS 235 M3 S25	●	23,5	25	40	159	103	56	70,5	

Holder



Cat. No.	Stock	Dimensions (mm)							Insert
		D	d ₁	d ₂	L	l ₁	l ₂	l ₃	
WDS 240 M3 S32	●	24,0	32	47	167	107	60	72,0	XPMX 11T308
WDS 245 M3 S32	●	24,5	32	47	168	108,5	60	73,5	
WDS 250 M3 S32	●	25,0	32	47	170	110	60	75,0	
WDS 260 M3 S32	●	26,0	32	47	173	113	60	78,0	XPMX 13T308
WDS 270 M3 S32	●	27,0	32	47	176	116	60	81,0	
WDS 280 M3 S32	●	28,0	32	47	182	122	60	84,0	
WDS 290 M3 S32	●	29,0	32	47	185	125	60	87,0	XPMX 13T308
WDS 300 M3 S32	●	30,0	32	47	188	128	60	90,0	
WDS 310 M3 S32	●	31,0	32	55	191	131	60	93,0	
WDS 320 M3 S32	●	32,0	32	55	194	134	60	96,0	XPMX 150408
WDS 330 M3 S40	●	33,0	40	55	210	140	70	99,0	
WDS 340 M3 S40	●	34,0	40	55	213	143	70	102,0	
WDS 350 M3 S40	●	35,0	40	55	216	146	70	105,0	XPMX 150408
WDS 360 M3 S40	●	36,0	40	55	219	149	70	108,0	
WDS 370 M3 S40	●	37,0	40	65	222	152	70	111,0	
WDS 380 M3 S40	●	38,0	40	65	225	155	70	114,0	XPMX 170412
WDS 390 M3 S40	●	39,0	40	65	228	158	70	117,0	
WDS 400 M3 S40	●	40,0	40	65	231	161	70	120,0	
WDS 410 M3 S40	●	41,0	40	65	234	164	70	123,0	XPMX 170412
WDS 420 M3 S40	●	42,0	40	65	237	167	70	126,0	
WDS 430 M3 S40	●	43,0	40	65	240	170	70	129,0	
WDS 440 M3 S40	●	44,0	40	65	243	173	70	132,0	XPMX 200412
WDS 450 M3 S40	●	45,0	40	65	246	176	70	135,0	
WDS 460 M3 S40	●	46,0	40	65	249	179	70	138,0	
WDS 470 M3 S40	●	47,0	40	65	252	182	70	141,0	XPMX 200412
WDS 480 M3 S40	●	48,0	40	65	255	185	70	144,0	
WDS 490 M3 S40	●	49,0	40	65	258	188	70	147,0	
WDS 500 M3 S40	●	50,0	40	65	261	191	70	150,0	

Inserts for 3 x D and 5 x D

Fig. 1

Fig. 2

For general use S04 type chipbreaker

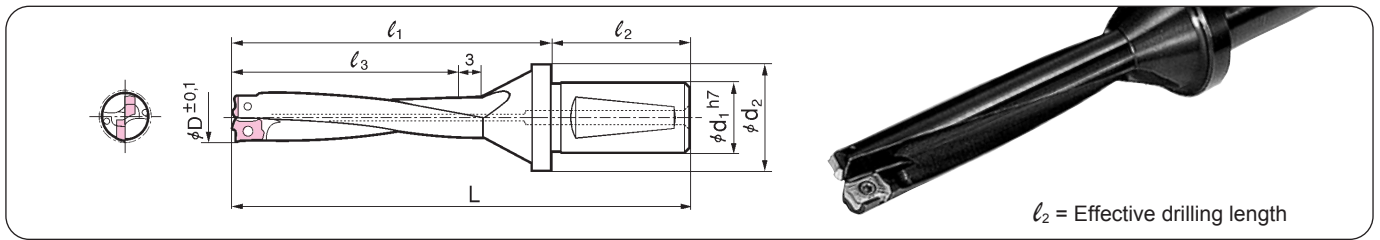
Cat. No.	Coated		Dimensions (mm)			Fig.
	AC350	ACZ310	l	Thickness	r	
LPMX 06T206 S04	●	●	6,0	2,8	0,6	1
LPMX 07T208 S04	●	●	6,8	2,8	0,8	
LPMX 080308 S04	●	●	7,6	3,2	0,8	
LPMX 090308 S04	●	●	8,8	3,2	0,8	
XPMX 11T308 S04	●	●	11,1	3,97	0,8	2
XPMX 13T308 S04	●	●	13,0	3,97	0,8	
XPMX 150408 S04	●	●	15,0	4,76	0,8	
XPMX 170412 S04	●	●	17,0	4,76	1,2	
XPMX 200412 S04	●	●	19,5	4,76	1,2	

Spare Parts

Screw	Wrench	Wrench	Applicable Holder
BFTY02205	TRD07	-	WDS 140 ~ 150 M3/5 S20
BFTY02206	TRD07	-	WDS 155 ~ 170 M3/5 S20
BFTX02506N	TRD08	-	WDS 175 ~ 200 M3/5 S25
BFTX02508	TRD08	-	WDS 205 ~ 275 M3/5 S25 / S32
BFTX0309N	-	TRX10	WDS 280 ~ 320 M3/5 S32
BFTX3584	-	TRX15	WDS 330 ~ 370 M3/5 S40
BFTX0409N	-	TRX15	WDS 380 ~ 430 M3/5 S40
BFTX0511N	-	TRX20	WDS 440 ~ 500 M3/5 S40

Indexable Insert Type Drills WDS Type

Max. Depth : 5 x D (Long Type)



Holder



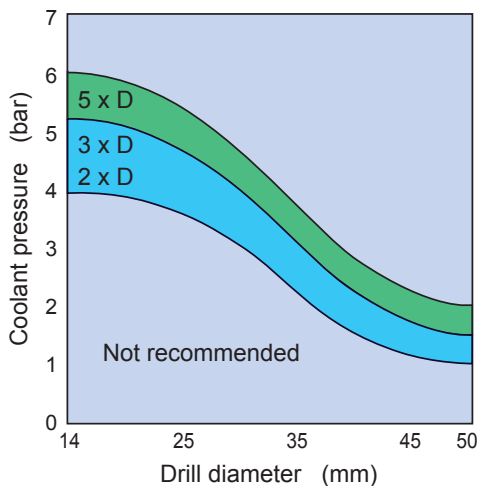
Cat. No.	Stock	Dimensions (mm)							Insert
		D	d ₁	d ₂	L	ℓ ₁	ℓ ₂	ℓ ₃	
WDS 140 M5 S20	●	14,0	20	31	137	93	44	70,0	LPMX 06T206
WDS 142 M5 S20	●	14,2	20	31	138,2	94,2	44	71,0	
WDS 145 M5 S20	●	14,5	20	31	140	96	44	72,5	
WDS 150 M5 S20	●	15,0	20	31	143	99	44	75,0	LPMX 07T208
WDS 155 M5 S20	●	15,5	20	32	146	102	44	77,5	
WDS 160 M5 S20	●	16,0	20	32	149	105	44	80,0	
WDS 165 M5 S20	●	16,5	20	32	152	108	44	82,5	LPMX 080308
WDS 170 M5 S20	●	17,0	20	32	155	111	44	85,0	
WDS 175 M5 S25	●	17,5	25	37	170	114	56	87,5	
WDS 180 M5 S25	●	18,0	25	37	173	117	56	90,0	LPMX 080308
WDS 185 M5 S25	●	18,5	25	37	176	120	56	92,5	
WDS 190 M5 S25	●	19,0	25	37	179	123	56	95,0	
WDS 195 M5 S25	●	19,5	25	37	181	126	56	97,5	LPMX 090308
WDS 200 M5 S25	●	20,0	25	37	185	129	56	100,0	
WDS 205 M5 S25	●	20,5	25	40	188	132	56	102,5	
WDS 210 M5 S25	●	21,0	25	40	191	135	56	105,0	LPMX 090308
WDS 215 M5 S25	●	21,5	25	40	194	138	56	107,5	
WDS 220 M5 S25	●	22,0	25	40	197	141	56	110,0	
WDS 225 M5 S25	●	22,5	25	40	200	144	56	112,5	LPMX 090308
WDS 230 M5 S25	●	23,0	25	40	203	147	56	115,0	
WDS 235 M5 S25	●	23,5	25	40	206	150	56	117,5	

Holder

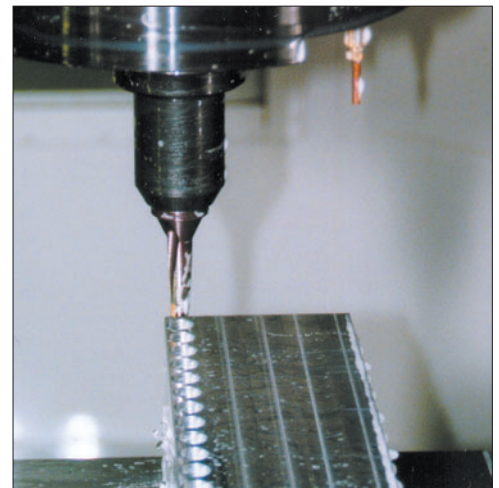


Cat. No.	Stock	Dimensions (mm)							Insert
		D	d ₁	d ₂	L	ℓ ₁	ℓ ₂	ℓ ₃	
WDS 240 M5 S32	●	24,0	32	47	215	155	60	120,0	XPMX 11T308
WDS 245 M5 S32	●	24,5	32	47	217,5	157,5	60	122,5	
WDS 250 M5 S32	●	25,0	32	47	220	160	60	125,0	
WDS 260 M5 S32	●	26,0	32	47	225	165	60	130,0	XPMX 13T308
WDS 270 M5 S32	●	27,0	32	47	230	170	60	135,0	
WDS 280 M5 S32	●	28,0	32	47	238	178	60	140,0	
WDS 290 M5 S32	●	29,0	32	47	243	183	60	145,0	XPMX 150408
WDS 300 M5 S32	●	30,0	32	47	248	188	60	150,0	
WDS 310 M5 S32	●	31,0	32	55	253	193	60	155,0	
WDS 320 M5 S32	●	32,0	32	55	258	198	60	160,0	XPMX 170412
WDS 330 M5 S40	●	33,0	40	55	276	206	70	165,0	
WDS 340 M5 S40	●	34,0	40	55	281	211	70	170,0	
WDS 350 M5 S40	●	35,0	40	55	286	216	70	175,0	XPMX 200412
WDS 360 M5 S40	●	36,0	40	55	291	221	70	180,0	
WDS 370 M5 S40	●	37,0	40	65	296	226	70	185,0	
WDS 380 M5 S40	●	38,0	40	65	301	231	70	190,0	XPMX 200412
WDS 390 M5 S40	●	39,0	40	65	306	236	70	195,0	
WDS 400 M5 S40	●	40,0	40	65	311	241	70	200,0	
WDS 410 M5 S40	●	41,0	40	65	316	246	70	205,0	XPMX 200412
WDS 420 M5 S40	●	42,0	40	65	321	251	70	210,0	
WDS 430 M5 S40	●	43,0	40	65	326	256	70	215,0	
WDS 440 M5 S40	●	44,0	40	65	331	261	70	220,0	XPMX 200412
WDS 450 M5 S40	●	45,0	40	65	336	266	70	225,0	
WDS 460 M5 S40	●	46,0	40	65	341	271	70	230,0	
WDS 470 M5 S40	●	47,0	40	65	346	276	70	235,0	XPMX 200412
WDS 480 M5 S40	●	48,0	40	65	351	281	70	240,0	
WDS 490 M5 S40	●	49,0	40	65	356	286	70	245,0	
WDS 500 M5 S40	●	50,0	40	65	361	291	70	250,0	

Recommended Coolant Pressure

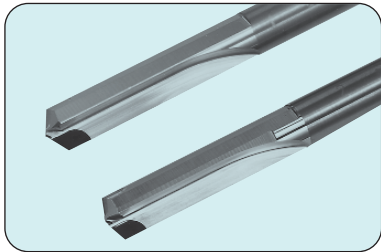


It is important to provide an adequate supply of coolant at the recommended pressure in order to ensure smooth chip removal. This chart shows the recommended coolant pressure required for each drill.



SUMIDIA Drills DAL/DDL/DML Type

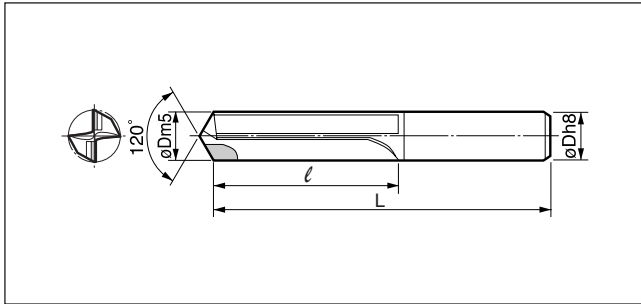
New



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	ϕD	L	ℓ
	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

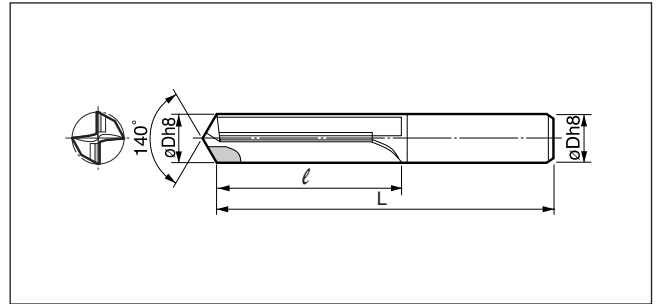
■ Recommended Conditions

	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"> • Holes by carbide drill was out of specifications after 2.000 holes/reg. • SumiDia drill could drill up to 30.000 holes/reg. • 15 times tool life that of carbide drills.
	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"> • Average 40,000 holes/reg • Surface roughness $R_y = 1\mu\text{m}$
	ADC10 Aluminum Die Cast	$V_c=90\text{m/min}$ $f=0,08\text{mm/rev}$	<ul style="list-style-type: none"> • More than 50.000 holes and still running

■ DLL Type



Cat. No.	Stock	ϕD	L	ℓ
	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

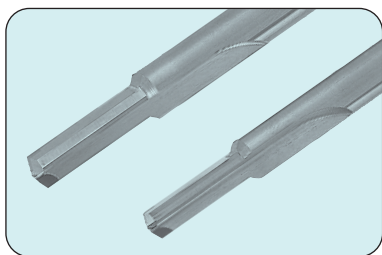
■ Important Notes

- Select a high rigidity machine and high precision tool holder.
- Enough coolant to drilled hole.

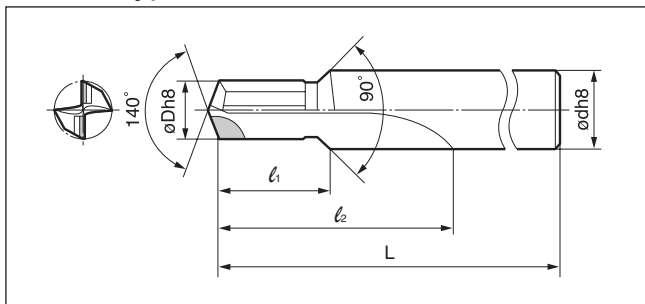
■ Application Examples (DDL Type)

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"> • Regrind after 100.000 holes
	ADC12 Aluminum Die Cast	$V_c=200\text{m/min}$ $f=0,17\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 74.000 holes (2.000m) (Preset tool change)
	AC2A Aluminum Casting	$V_c=234\text{m/min}$ $f=0,28\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 80.000 holes (Preset tool change)

New



■ DML Type



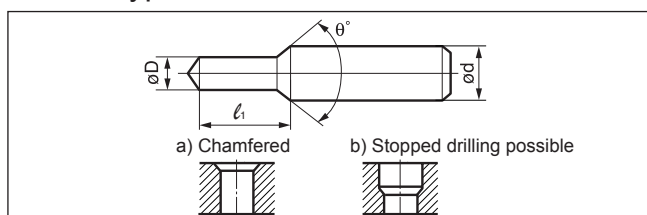
Applicable Tap Size	Cat. No.	Stock	ϕD	ϕd	L	l_1	l_2
		DA2200					
M6	DML 050V		5	8	90	18	36
M8	DML 068V		6,8	10	104	24	48
M10	DML 085V		8,5	12	122	30	60
M12	DML 103V		10,3	14	136	36	72

Chamfering position is usually just carbide but PCD edges can be incorporated.

■ 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"> • Regrind after 150.000 holes • Tool life for carbide drill is 500 holes. • 30 times tool life that of carbide drills
	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"> • 100.000 holes/reg (2.000m) and still running. • Drilling and chamfering in the same process
	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"> • 80.000 holes/reg (1,840m) and still running. • Drilling and chamfering in the same process

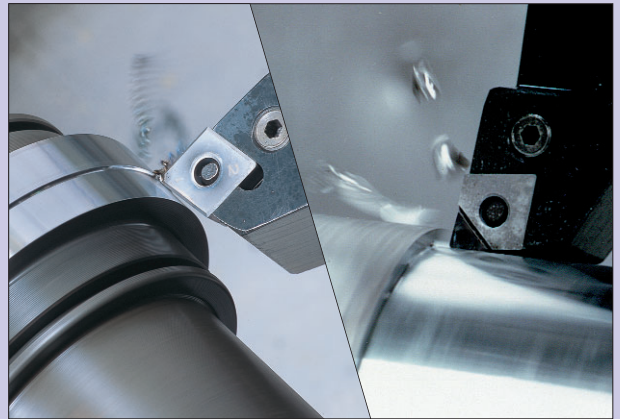
■ DML Type Possible Profiles



- (1) Tolerance for dimension L is more than 0,2mm.
- (2) θ° is less than 180° .

SumiBoron SumiDia

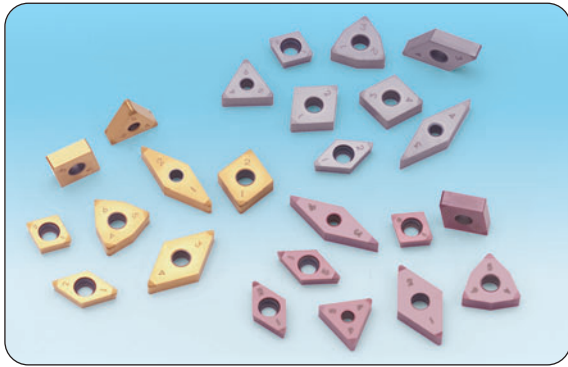
L1 ~ L18



CBN Grades	SUMIBORON Series	L2
	Recommended Grades	L3
SUMIBORON		
Coated	BNC80	L4
	BNC150	L5
	BNC200	L6
	BNC300	L7
Uncoated	BN700	L8
	BNS800	L9
SUMIBORON Insert	ISO Identification	L10
	Insert Guidance	L11
SUMIBORON Chipbreaker	Break Master SV Type	L12
	One-Use Wiper Type	L13
	New	
SUMIBORON / SUMIDIA	Production Process	L14
SUMIDIA PCD Grades	DA2200/DA150	L15
SUMIDIA Chipbreaker	NF Type	L16
	Break Master DM Type	L17

CBN Tools SUMIBORON series

Sumiboron CBN inserts create an alternative way to machine hardened steels!



■ General

In accordance with our policy of continued research and development, a new generation of coated Sumiboron inserts are now added to our extensive range. The special coating not only enhances performance but in combination with our numbering system makes used corner identification quick and easy.

Sumitomo coated cBN series (**BNC150**, **BNC200**, **BNC300** and **BNC80**) can cover all application range of hard turning with advanced performance.

In addition Sumitomo has developed **BN700** new CBN grade especially suited to the machining requirements of grey cast iron, powder metal even with a large depth of cut and high feed rates.

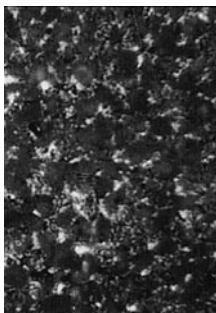
■ Types and application

Microstructure



Type	Grade	Application	Characteristic	Hardness(Hv) (GPa)	TRS (GPa)
Uncoated CBN	BNX10	High speed Continuous cutting	Best wear resistance grade and suitable for high speed continuous cutting	27 ~ 31	0,80 ~ 0,90
	BNX20	High efficiency cutting (Continuous-Interrupted)	Binder with high heat resistance improves tool life during high speed machining	31 ~ 33	0,95 ~ 1,10
	BNX25	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
	BN250	Continuous and Interrupted cutting (Light-Medium)	Micro-grain CBN with Ceramic binder improves fracture toughness and wear resistance	31 ~ 34	1,00 ~ 1,10
	BN300	Interrupted cutting (Heavy)	Micro-grain CBN with higher fracture toughness that improves cutting edge strength	32 ~ 34	1,10 ~ 1,20
Coated CBN	BNC 80	High Precision, Continuous cutting	High precision grade that produces excellent finishing due to the very smooth coating	31 ~ 33	1,00 ~ 1,10
	BNC150	High speed continuous and light interrupted cutting	Most suited for continuous and light interrupted high speed finishing due to heat resistant substrate and high wear resistant coating.	29 ~ 32	1,00 ~ 1,10
	BNC200	Continuous and Inter- rupted cutting (Light-Medium Interrupted)	Tough substrate with excellent wear resistant coating makes this a general grade for low to high speed cutting with longer tool life.	33 ~ 35	1,00 ~ 1,10
	BNC300	Interrupted cutting (Heavy)	Micro-grain CBN with higher fracture toughness, excellent wear resistant coating	32 ~ 34	1,10 ~ 1,20

Microstructure



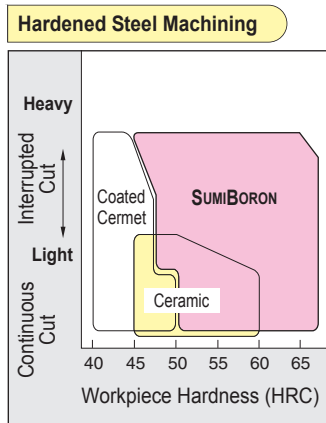
Grade	Application	Characteristic	Hardness(Hv) (GPa)	TRS (GPa)
BN500	GG and GGG machining Hardened VSR cutting (Traverse cut) Continuous finishing of hardened roll	For Cast Iron machining with a good balance of wear and fracture resistance	32 ~ 34	1,00 ~ 1,10
BN700 (BN600)	High speed machining of GG Cast Iron machining Iron based products Rolls of high hardness Heat resistant alloy	First choice for high speed finishing of grey cast iron Less burrs when machining sintered parts due to excellent edge sharpness	40 ~ 43 (38 ~ 41)	1,20 ~ 1,30 (0,95 ~ 1,10)
BNS800	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

HARDENED STEEL MACHINING

● Merits 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



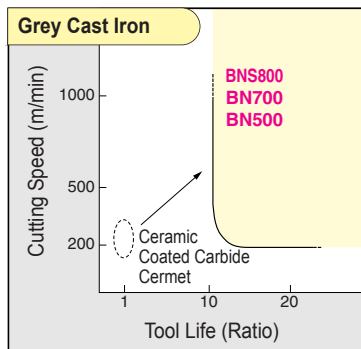
Conditions		Recommended Cutting Speed (m/min)			
		50	100	200	300
Hardened Steel	High Precision Machining (1,6 ~ 3,2 Rz)	BN250 BNC80			
	HSC	BNX10			
	General Purpose (Continuous ~ Light Interrupted Machining)	BN250 BNC200 BNC150			
	Interrupted Machining	BN250 BNC200			
	Heavy Interrupted Machining	BN300 BNC300 BNX25			
Carburised Workpiece		BNC200			

CAST IRON MACHINING

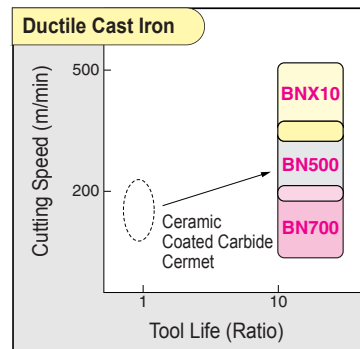
● Merits of using CBN

Following chart shows merits of using CBN in cast iron machining compared with conventional tool, 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.

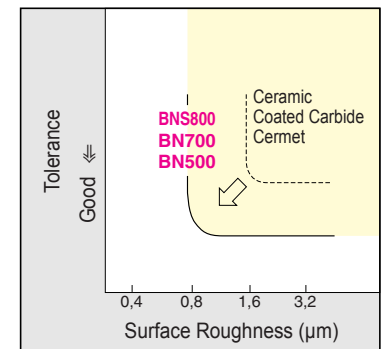
● High Speed Machining



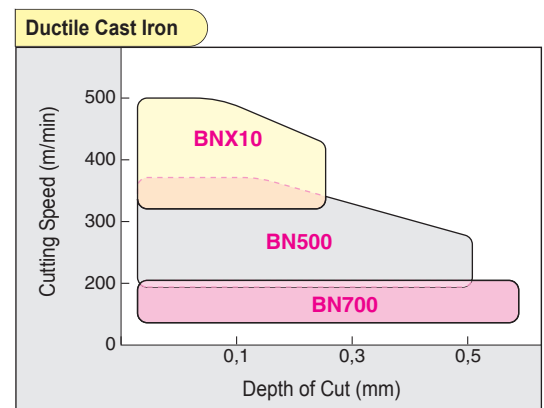
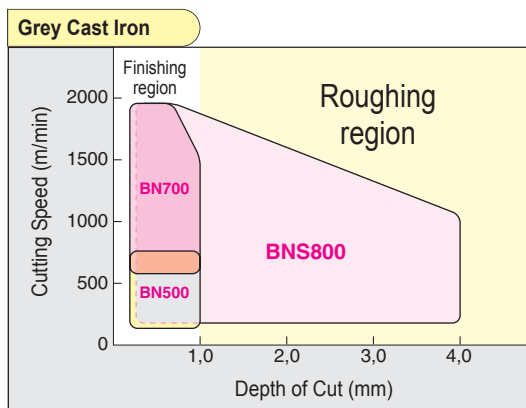
● High Speed Machining



● High Precision Machining



■ Application Range



Coated SUMIBORON BNC80

High precision machining with surface finishes down to 1,6 Rz possible thanks to smooth coating!



■ General

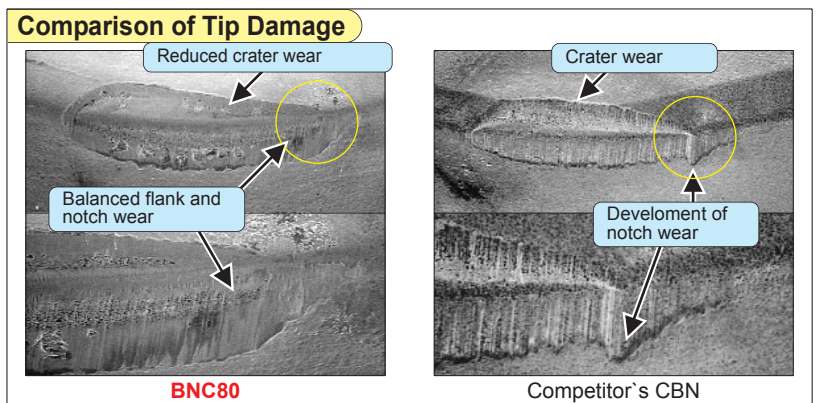
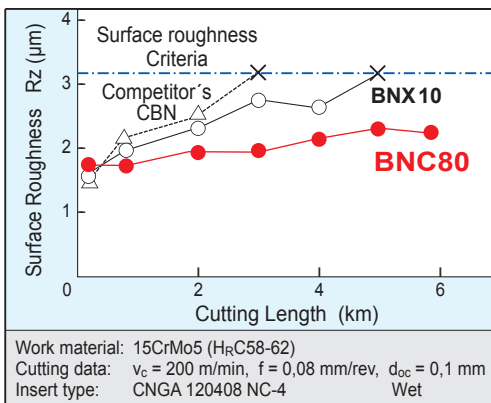
Use the gold Sumiboron grade BNC 80 to improve surface integrity. The TiN-base smooth surface ceramic coating and the newly developed Sumiboron substrate enhances edge strength and wear resistance making high precision machining with surface finishes as low as 1.6Rz readily achievable.

This new grade is ideal for turning components that previously relied on precision grinding machines for final machining.

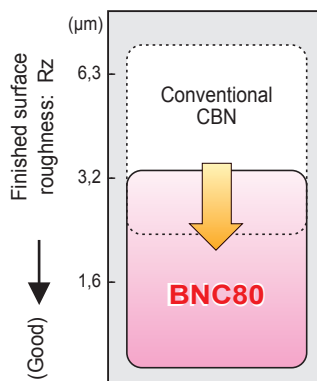
■ Advantages

- **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



■ Application



■ Recommended Conditions

Recommended Conditions					f (mm/rev)	d _{oc} (mm)
120	140	160	180	200		
v _c (m/min)					0,03-0,13	0,03-0,3

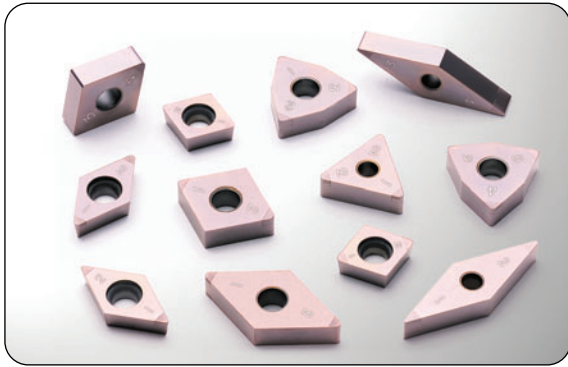
* Feed rate and nose radius are set such that the theoretical surface roughness is 1/2 to 1/3 of the required surface roughness.

* Dry or Wet

Most suitable for high speed finishing !

Coated SUMIBORON BNC150

Coated Sumiboron premium grade for high speed machining of hardened steels



■ General

Our copper coloured Sumiboron grade BNC150 features heat resistant CBN and a special TiCN-base ceramic coating that provides consistent and enhanced surface finishes across a broad range of applications.

Ideal for higher speed machining and suitable for continuous or light interrupted cuts BNC150 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.

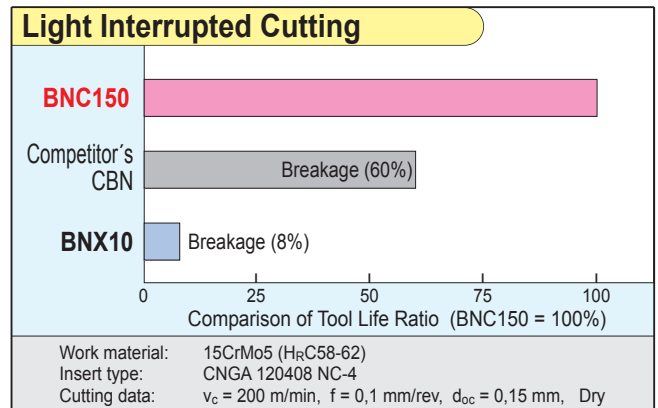
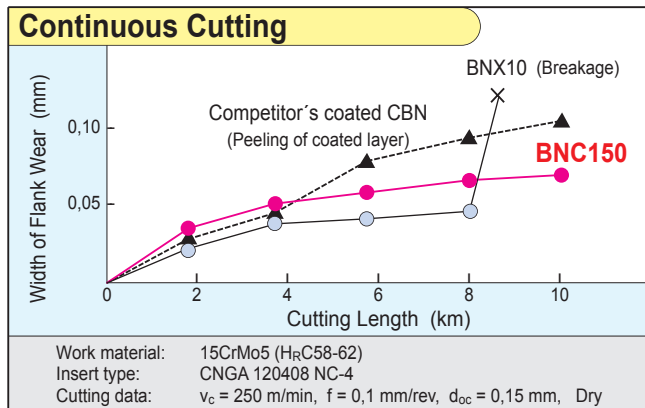
● Extended tool life!

Wear resistant ceramic coating and tough CBN substrate considerably extends tool life.

● Excellent surface finish!

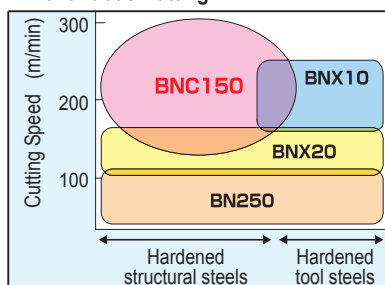
A consistent surface finish to values less than 6.3Rz is easily achieved on both continuous and light interrupted cut applications.

■ Performance

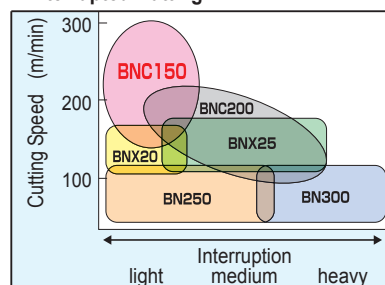


■ Application Range

● Continuous Cutting



● Interrupted Cutting



■ Recommended Conditions

Recommended Conditions			
v_c (m/min)		f	d_{oc}
100	150	(mm/rev)	(mm)
100 - 300		0,03-0,2	0,03-0,3

* Coolant ... Continuous cutting: Dry or Wet
 Interrupted cutting: Dry

Coated SUMIBORON BNC200

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-base 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 realized even when high speed cutting thanks to excellent wear resistance.

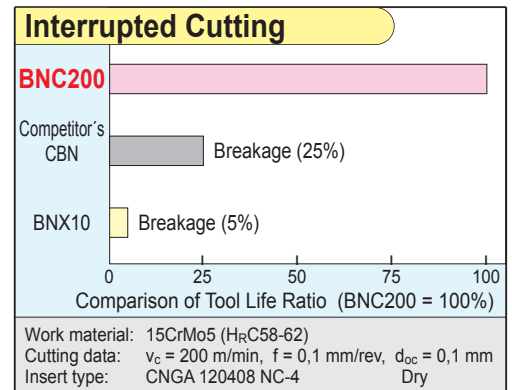
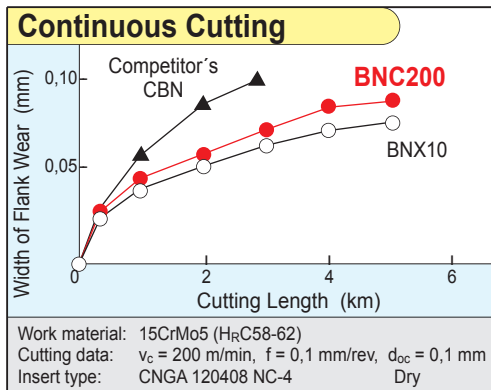
● Interrupted cutting!

The newly developed brazing technology maximises edge strength making Sumiboron suitable for interrupted and continuous cutting.

● Wide range of applications!

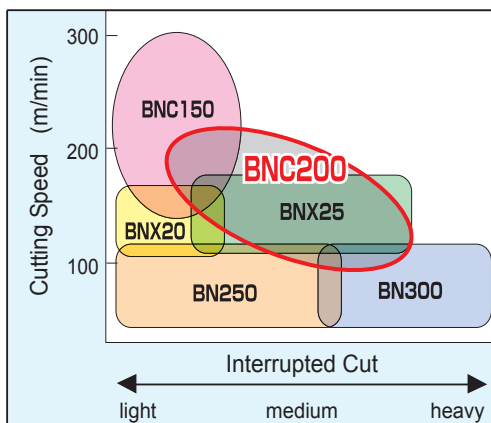
Sumiboron is suitable for a wide range of applications eg. from low to high speed interrupted cutting.

■ Performance



- **BNC200 features excellent wear resistance comparable with BNX10, plus outstanding fracture resistance.**

■ Application Range



■ Recommended Conditions

Recommended Conditions			
v _c (m/min)		f (mm/rev)	d _{oc} (mm)
50	100 150 200 220	0,03-0,3	0,05-0,5

Cutting fluid ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

Can be used in a wide range of applications from low to high speed operation.

Coated SUMIBORON BNC300

New coated grade BNC300 for heavy interrupted hard turning

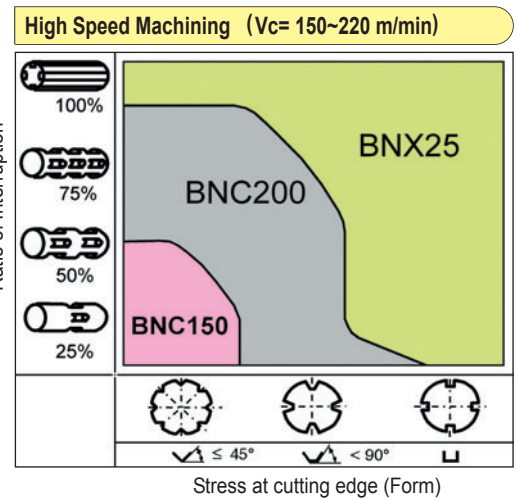
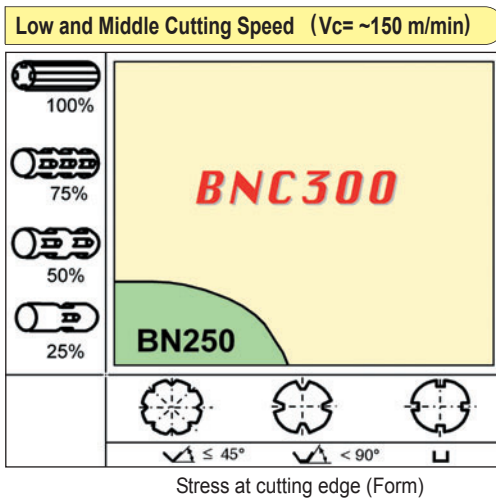


General

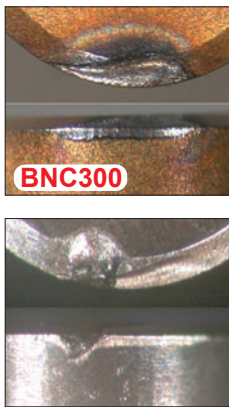
New line-up of Sumitomo coated cBN grade, BNC300, can cover heavy interrupted hard turning. The combination of extremely tough cBN and Gold-colored high wear resistant coating can provide excellent performance in wide range of interrupted hard turning.

Sumitomo coated cBN series (BNC150, BNC200, BNC300 and BNC80) can cover all application range of hard turning with advanced performance.

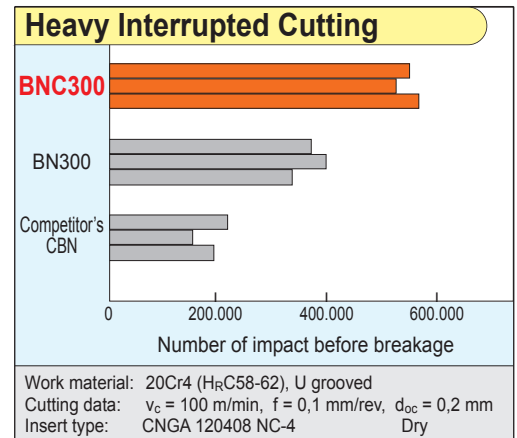
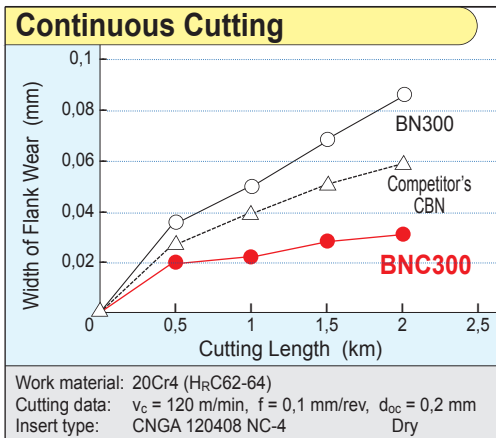
Recommended Cutting Area



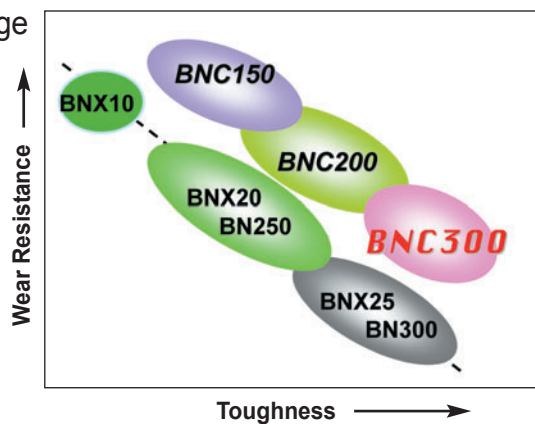
Performance



Competitor's CBN



Application Range



Recommended Conditions

Recommended Conditions				
v_c (m/min)			f (mm/rev)	d_{oc} (mm)
50	100	120	150	
----- ----- -----			0,03-0,3	0,03-0,2

Cutting fluid ... Dry cutting is recommended.

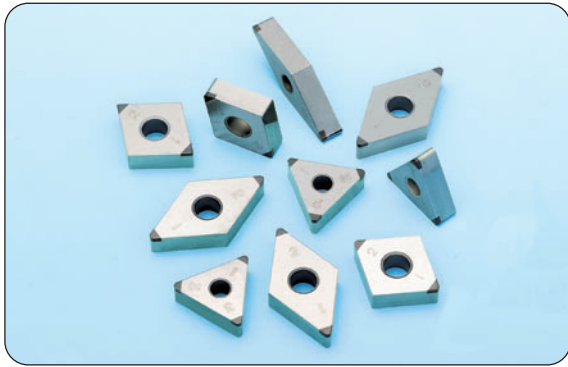
SUMIBORON BN700

New grade BN700 for cast iron and ferrous powder metal

General

New grade BN700 is suitable for cast iron and ferrous powder metal. BN700 has the highest cBN content of all Sumitomo cBN grades, which provides many advantages, such as high toughness, hardness and thermal conductivity.

BN700 shows excellent performance in high speed machining of gray cast iron with good wear and thermal resistance, also suitable for ferrous powder metal turning with sharp and tough cutting edge.



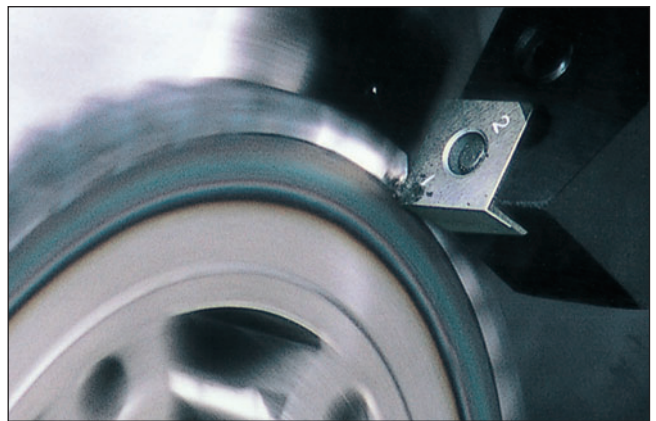
Advantages

Extremely resistant to breakage !

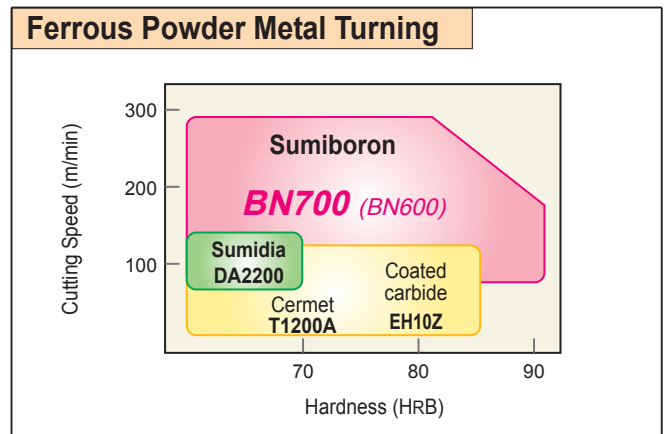
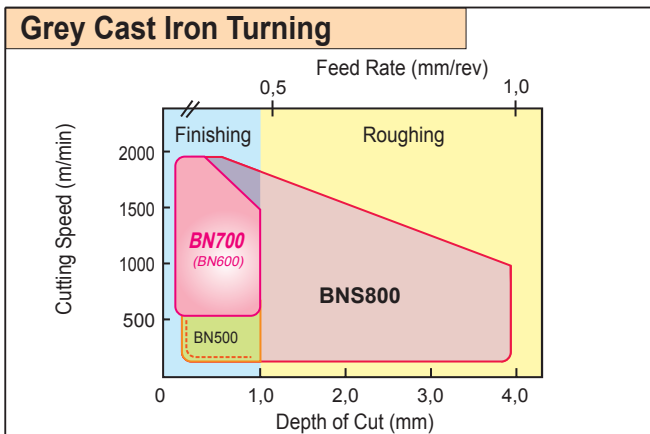
Suitable for chilled iron, high alloy iron and hard rolls even with a large depth of cut and high feed rates.

Extremely resistant to wear !

Good thermal conductivity and chip adhesion resistance result in a greatly improved tool life.



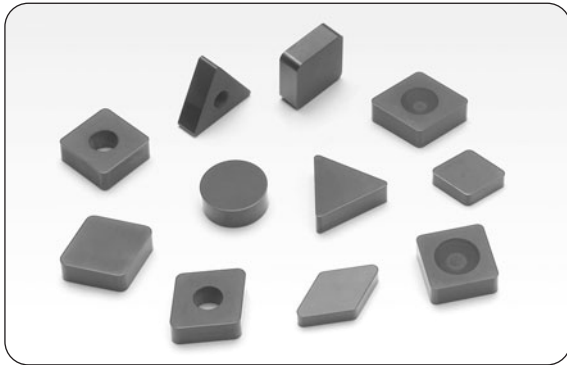
Recommended Cutting conditions



Application Example

Tooling	Workpiece	Insert	Cutting Conditions	Results (machined work pieces / cutting edge)
	Material	Cat. No.		
	Gears Ferrous powder metal HRC 58~60	TNGA 160404 NU3 (BN700)	$v_c = 120$ m/min $f = 0,15$ mm/rev $d_{oc} = 0,25$ mm Dry	<p>● The tool life of BN700 is 30% longer than competitor's CBN</p>
	Cylinder bore GG25	SNGN 090308 (BN700)	$v_c = 500$ m/min $f = 0,2$ mm/rev $d_{oc} = 0,2$ mm Dry	<p>● The tool life of BN700 is 50% longer than competitor's CBN</p>

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

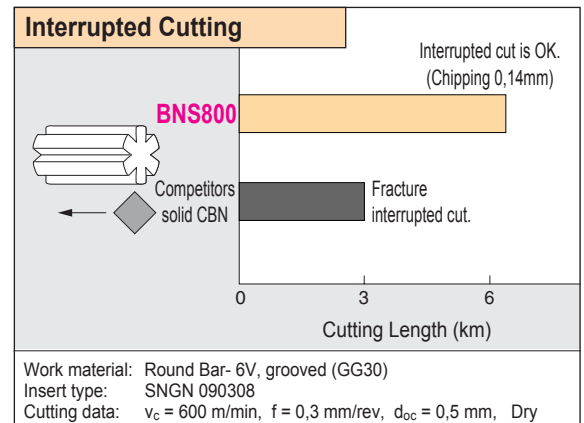
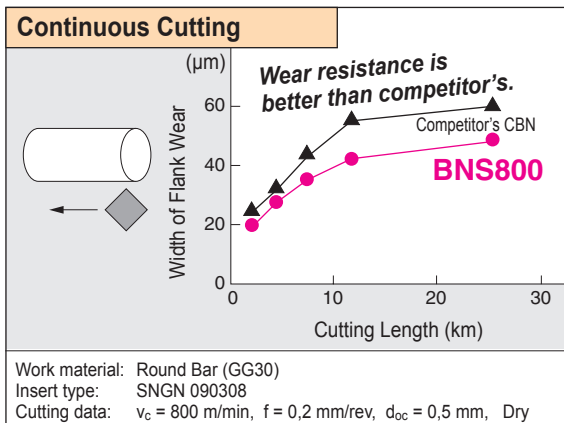
High wear resistance !

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 GG25 Finishing</p>		<p>GG25 Turning</p>		<p>Carbide (Co 15%) Turning</p>		<p>Colmonoy Boring</p>	
(Tool life criteria : Finishing)		(Tool life criteria : Breakage)		(Tool life criteria : Breakage)		(Tool life criteria : Breakage)	
BNS800 7500 Bore Comp. sold CBN 2500 Bore		BNS800 400 pcs Comp. sold CBN 200 pcs		BNS800 5 pass Comp. CBN 1 pass Breakage		BNS800 10 pcs Comp. CBN 6 pcs	
Tooling	Light Cut Finishing	Tooling	Finishing	Tooling	Finishing	Tooling	Roughing Finishing
Grade	BNS800	Grade	BNS800	Grade	BNS800	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

One-Use Type

CNGG 120408 N-SV NC-(W)-4

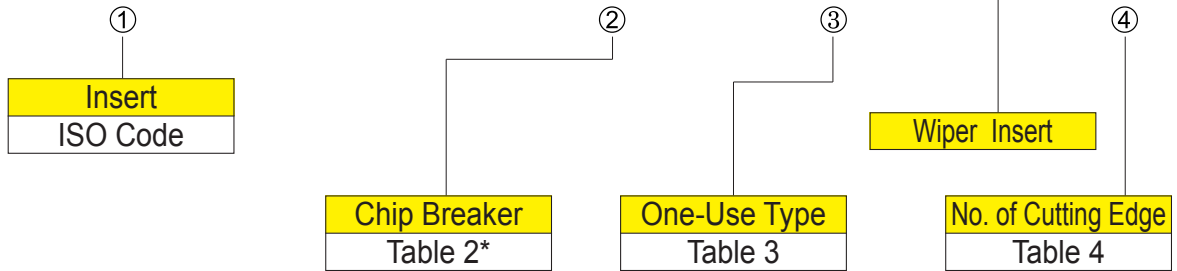


Table 2*

Code	Code Description
(No Code)	Standard Type
SV	Chipbreaker Type

*) Additional Information

Table 3

Code	One-Use Type	Grade
NC	Coated SUMIBORON	BNC80, 150 BNC200, 300
NU	Uncoated SUMIBORON	BNX10, 20 BN250, 300 BN500, 700
NS		BNX25

Table 4

Code	No. of Cutting Edges	Type
(No Code)	1 cutting edge	Single-corner
2	2 cutting edges	Multi-corner
3	3 cutting edges	
4	4 cutting edges	
6	6 cutting edges	

Regrindable Type

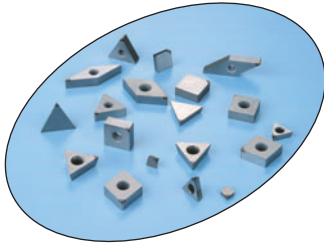
CNMA120408(-) B



Table 1, Additional Information

Code	Code Description
(-) B	Full-top CBN insert

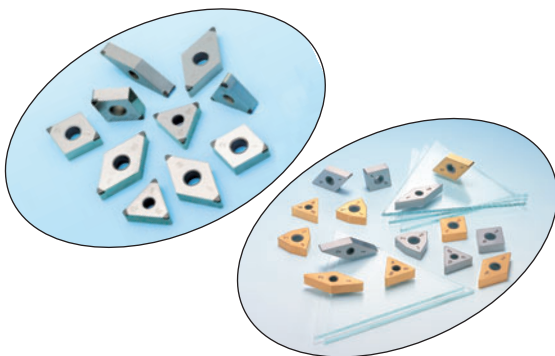
One-use Insert NU Type/ NS Type



■ Characteristics

- Affordable version of the once expensive sintered CBN material, at its best size.
- One-use type eliminates regrinding thus making tool management easy.
- Reduce required storage space with 10pcs pack.

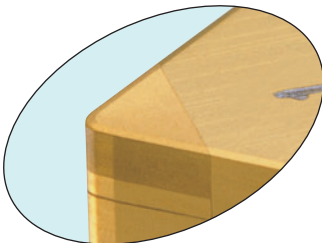
Multi-cornered, One-use Insert



■ Characteristics

- Insert with several brazed SumiBoron one-use corners. Price per edge is more reasonable compared to normal single cornered, one-use type insert.
- Coated SumiBoron is available as a double-faced insert. Diamond shaped inserts have 4 cutting edges and Triangle shaped inserts have 6 cutting edges etc.
- Multi-cornered, one-use type has G-class specification with side faces ground. In addition, all edges are numbered for easy cutting edge management.

One-use Wiper Insert



■ Characteristics

- SumiBoron one-use insert with wiper edge for Hardened Steel machining.
- Excellent surface roughness comparable to grinding.
- Multi-cornered, one-use type has G-class specification with side faces ground. In addition, all edges are numbered for easy cutting edge management.

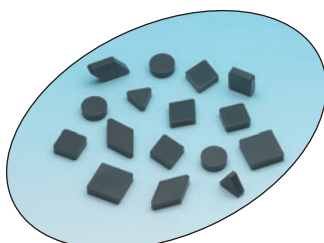
One-use insert with chipbreaker Break Master SV Type



■ Characteristics

- SumiBoron with chipbreaker! Especially for carburized layer removal.
- Breaker included on the CBN edge, chipbreaking effect can be maintained throughout.
- Unique breaker design can be applied to both hardened and non-hardened parts with effective chip control.

Solid CBN Insert



■ Characteristics

- 100% solid CBN structure. With no brazed portion, this grade is excellent for the roughing of Cast Iron at large depth of cut.

SUMIBORON Insert With Chipbreaker Break Master SV Type

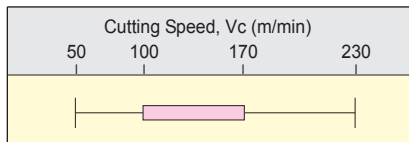
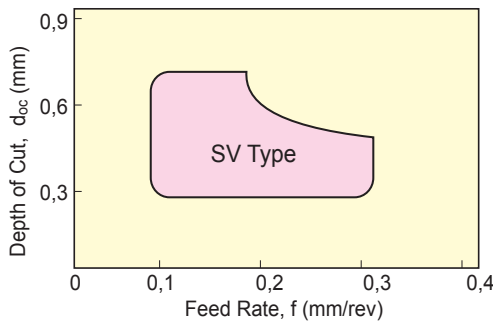
New



Characteristics

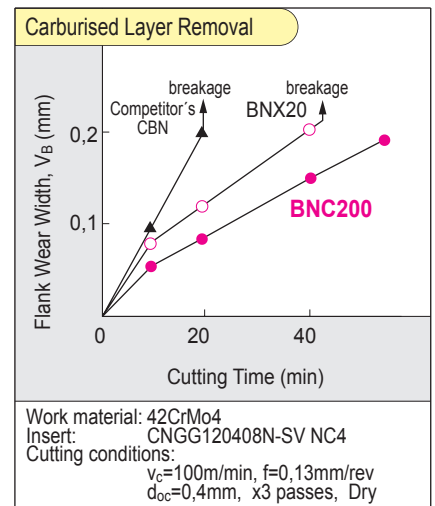
- SumiBoron with chipbreaker! Especially for carburized layer removal.
- Breaker included on the CBN edge, chipbreaking effect can be maintained throughout.
- Unique breaker design can be applied to both hardened and non-hardened parts with effective chip control.
- Used with Coated SumiBoron BNC200 for high efficiency machining.

Application Range



* When machining heat treated steel harder than HRC50 the depth of cut should not exceed 0,5 mm.

Cutting Performance



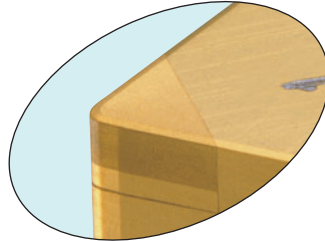
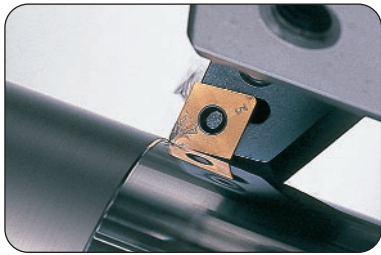
● Stable tool life with BNC200

Application Examples

External Carburised Layer Removal	
<p>No constant stoppages or incorrect part dimension problem and the chips are small.</p> <p>Double the tool life of competitor's CBN</p> <p>Work material: 42CrMo4, Carburised steel (shaft) Insert: CNGG120408N-SV NC4 (BNC200) Conditions: $v_c=150\text{m/min}$, $f=0,15\text{mm/rev}$, $d_{oc}=0,5\text{mm}$, x 2 passes, Wet</p>	<p>Break Master SV Tool life = 200pcs</p>
	<p>BNC200 (no breaker) Tool life = 200pcs</p>
	<p>Comp. CBN (no breaker) Tool life = 100pcs</p>

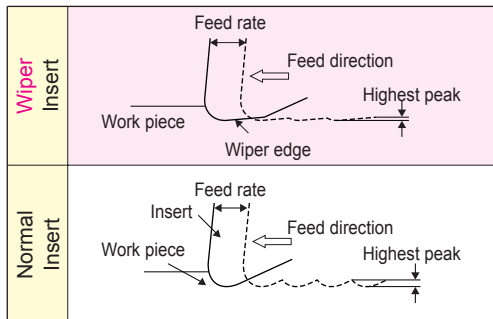
Carburised Face Layer Removal	
<p>Break Master SV type improves chip control with increased productivity until the pre-set tool life.</p>	<p>Break Master SV No chip control problem</p> <p>No breaker Constant chip control problem</p> <p>No. of pcs / unit of time (relative)</p>
	<p>Work material: 42CrMo4 (HRC30-62) Insert: CNGG120408N-SV NC4 (BNC200) Conditions: $v_c=140\text{m/min}$, $f=0,15\text{mm/rev}$, $d_{oc}=0,3\text{mm}$, Wet</p>

SUMIBORON One-Use Wiper Inserts



- SumiBoron One-Use Insert with wiper flat
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds

■ Purpose of Wiper Edge



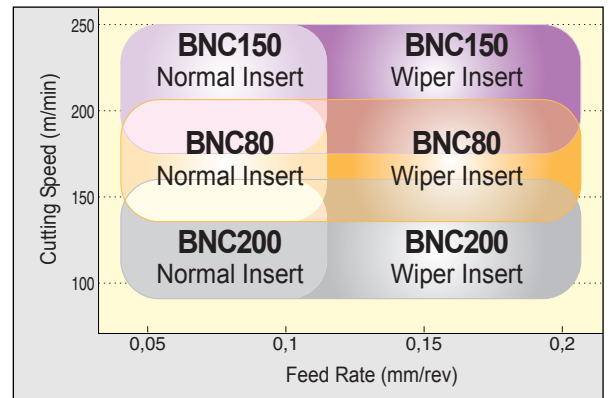
■ Surface Roughness of Wiper Insert

	Wiper Insert (r=0,8)		Normal Insert (r=0,8)	
	Finishing (f=0,15mm/rev)	High feed cutting (f=0,25mm/rev)	Finishing (f=0,15mm/rev)	High feed cutting (f=0,25mm/rev)
Surface Roughness Profile				
Surface Roughness Rz (Highest peak)	0,6µm	1,0µm	3,5µm	9,8µm

■ Recommended Conditions

(Surface Roughness Standard: 1,6s ~ 3,2s)

- Wiper insert is recommended for high feed conditions
- 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.

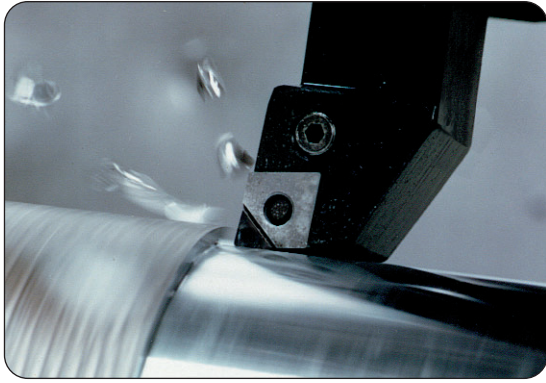


Feed rate can be up to 0,3mm/rev for high-feed machining

■ Application Examples

Process	Work	Tool	Cutting Conditions	Results
	Ⓜ Part Name ♥ Grade	Insert	v_c = Cutting speed (m/min) f = Feed rate (mm/rev) d_{oc} = Depth of cut (mm)	
Pinion Gear Ext. Turning 	Ⓜ Gear ♥ Hardened Steel HRC58~62 Required finish $R_z=3,2\mu\text{m}$	CNGA 120404 NC-W-4 (BNC200)	$v_c = 130$ m/min $f = 0,18$ mm/rev $d_{oc} = 0,15$ mm Wet	BNC200 (Wiper) 120 pcs Competitor's CBN (no wiper) 70 pcs
Pinion Gear Ext. Turning 	Ⓜ Shaft ♥ Carburised Steel HRC58~62 Required finish $R_z=3,2\mu\text{m}$	CNGA 120404 NC-W-4 (BNC80)	$v_c = 200$ m/min $f = 0,11 \sim 0,15$ mm/rev $d_{oc} = 0,13$ mm Wet	BNC200 (Wiper) 350 pcs Competitor's CBN (no wiper) less than 150pcs

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/mm² with a special device. The piston and cylinder are made of cemented carbide.

Fig. 1

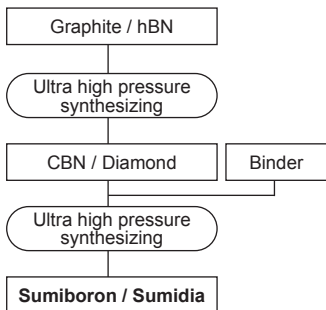
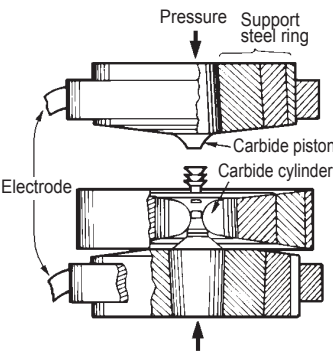


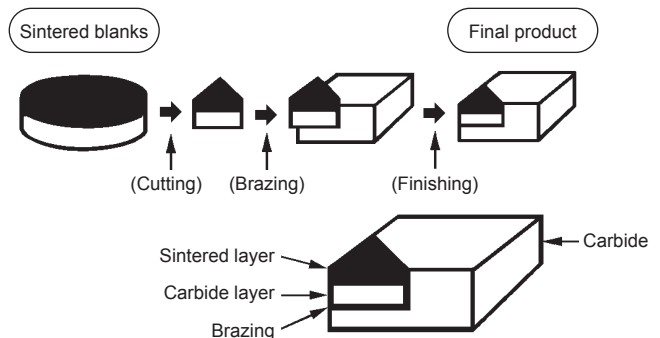
Fig. 2



■ Production Process

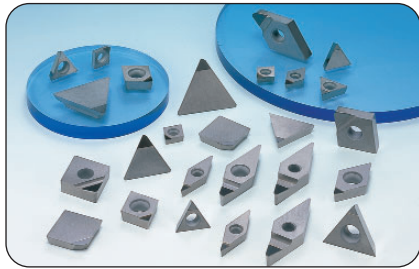
To manufacture final products round discs of SUMIBORON and SUMIDIA material are cut into specific shapes and brazed on to tool bodies made of cemented carbide, or steel, etc., and after that finished by grinding the edge.

In another process the final product can be obtained only by cutting blanks and finishing them.



■ 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.



■ DA2200 Features

SumiDia DA2200 is a high density, ultra fine grained sintered PCD with high toughness similar to that of cemented carbides.

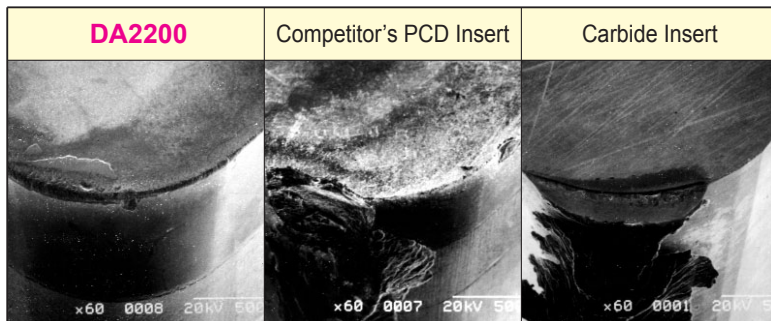
SumiDia DA2200, with its great improvement in fracture resistance, eliminates the breakage problems faced by conventional PCD tools especially during the milling of Aluminium alloys and achieves a longer and more stable tool life.

Furthermore, the NF type inserts makes it even more cost effective.

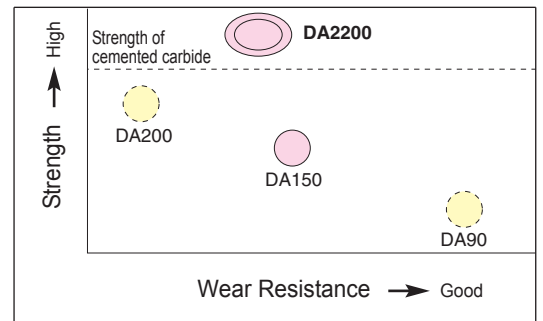
■ Series • Features • Application

Grade	Features	Application	Average size of Diamond grains (μm)	Hardness Hv	Transverse Rupture Strength (kgf/mm ²)
DA2200	High density sintered material made of ultra-micro diamond particles. Superior hardness and wear resistance with sharp edge.	<ul style="list-style-type: none"> • Rough, Interrupted and Finishing of Al-alloy • Wood or Wooden Board Cutting 	0,5	90 ~ 100	about 2,45
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.	<ul style="list-style-type: none"> • Non-Ferrous Metal finishing (Aluminium, Copper Alloy) • Green or Semi-Sintered Carbide & Ceramic Roughing • FRP, Hard Rubber & Carbon Cutting • Wooden or Inorganic Material Board Cutting 	5	100 ~ 120	about 1,95

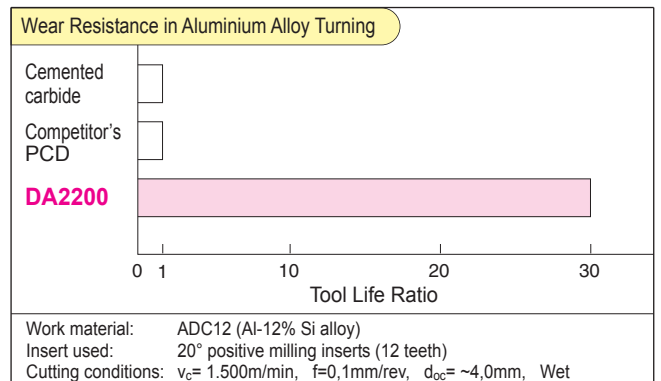
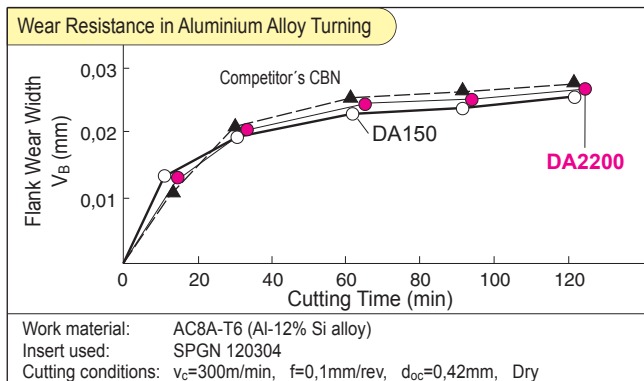
■ Comparison of cutting edges after machining Aluminium alloy



■ Position of DA2200



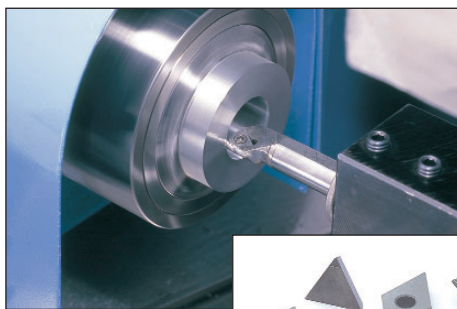
■ Cutting Performance



■ 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

SUMIDIA Inserts NF Type



General Features

Total Cost Effectiveness with High Performance and Lower Price

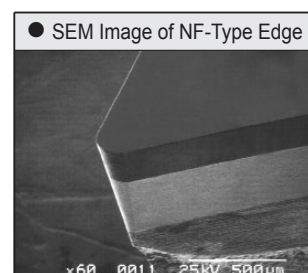
- Long, stable tool life and good fracture resistance with high toughness grade DA2200.
- Optimum design utilizing improved mass production techniques provides a relatively lower cost.
- Regrindable type results in huge total cost reduction.

Wide Application Range

- Wide range of stocked items for small hole boring, OD turning to milling processes.
- Nega-posi type inserts that are applicable on standard lever-lock, pin-lock type holders.

Efficiency

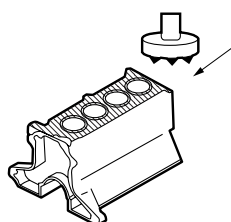
SumiDia NF-type inserts uses improved mass production techniques, which maintain the usual good performance yet offering a higher cost efficiency. Coupled with SumiDia DA2200 grade, its exhibits strong cutting edges which gives excellent surfaces finishes.



(NF-type is precision ground just like conventional inserts.)

Application Examples

Milling of Aluminum Cylinder Block

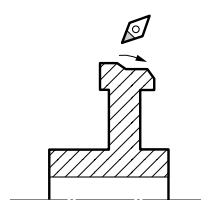


Results:
Burs are not formed due to the edge sharpness of DA2200.
1,5 times longer tool life than competitor's.

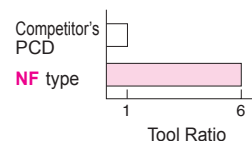


Work material: ADC12 (Al-12% Si alloy)
Insert used: 20° positive milling inserts (12 teeth)
Cutting conditions: $v_c = 1.000\text{m/min}$, $f_t = 0,025\text{mm/t}$, $d_{oc} = 1,2\text{mm}$

OD Turning of Aluminum Alloy Electronics Part

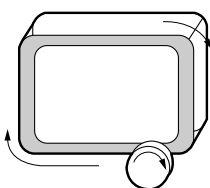


Results:
6 times tool life with relatively no chipping.



Work material: ADC12 (Al-12% Si alloy)
Insert used: VCMT 110301 NF
Cutting conditions: $v_c = 800\text{m/min}$, $f = 0,1\text{mm/rev}$, $d_{oc} = 0,02\text{mm}$

Milling of Aluminum Oil Pump Cover

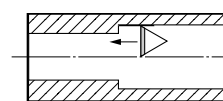


Results:
1,5 times longer tool life than competitor's with higher cost effectiveness.

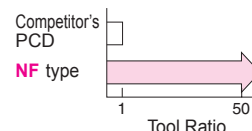


Work material: ADC12 (Al-12% Si alloy)
Insert used: TEEN32R NF
Cutting conditions: $v_c = 3.000\text{m/min}$, $f_t = 0,06\text{mm/rev}$, $d_{oc} = 0,2\text{mm}$

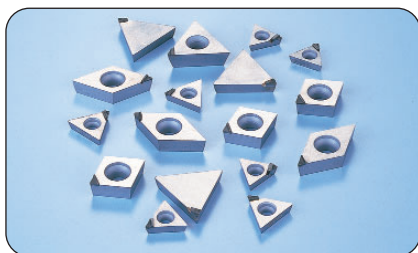
Boring of Aluminum Valve Bore



Results:
No initial chipping, tool life is more than 50 times that of carbides.



Work material: ADC12 (Al-12% Si alloy)
Insert used: TPGN 110304 NF
Cutting conditions: $v_c = 530\text{m/min}$, $f = 0,05\text{mm/rev}$, $d_{oc} = 0,2\text{mm}$

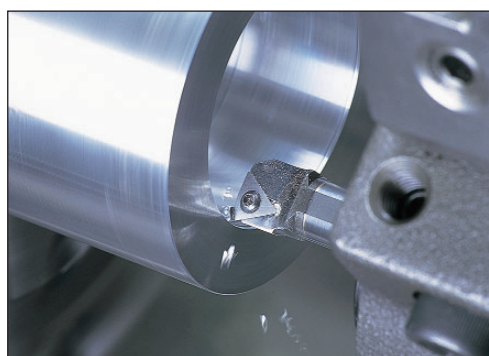
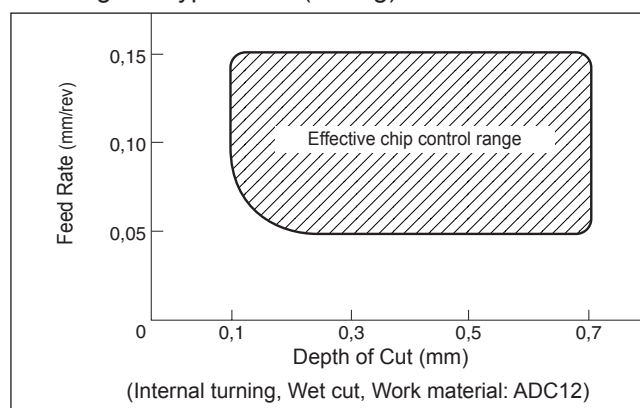


■ General Features

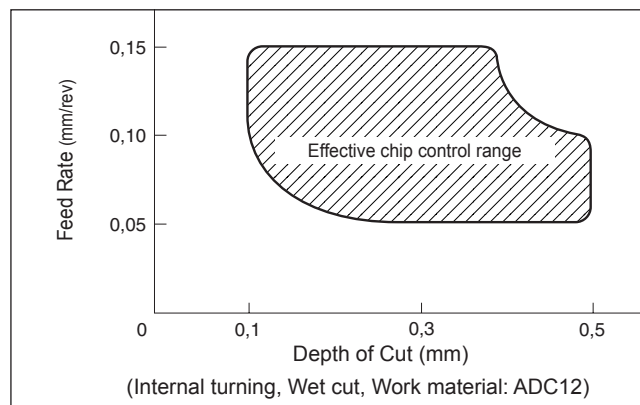
- **Economy One-Use Insert**
 - Similar to SumiBoron One-Use type inserts
- **With Built-in Chipbreaker for Effective Chip Removal**
 - Solving chip control problems and improving efficiency with DM-type chipbreaker.
- **Extensive Insert Range for External and Facing Operation**
 - 80° and 55° diamond 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



■ 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

■ Application

Types of holder	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.

■ Series

External Turning & Facing		Boring	
	CCMT 0602__ L/R-DM NU		TPMT 0802__ L/R-DM NU
	CCMT 09T3__ L/R-DM NU		TPMT 0902__ L/R-DM NU
	DCMT 0702__ L/R-DM NU		TPMR 1103__ L/R-DM NU ^(*)
	DCMT 11T3__ L/R-DM NU		TPMR 1603__ L/R-DM NU ^(*)

^(*) Stock in Japan
Delivery on request

SUMIBORON / SUMIDIA

Indexable Inserts & Tools



M1 ~ M30



	SUMIBORON / SUMIDIA Insert	
C / 80° Diamond	CC__ 7° pos. Type	M2
	CN__ neg. Type	M4
	CP__ 11° pos. Type	M5
D / 55° Diamond	DC__ 7° pos. Type	M6
	DN__ neg. Type	M8
R / Round	RN__ neg. Type	M9
S / Square	SC__ 7° pos. Type	M9
	SN__ neg. Type	M10
T / Triangle	TB__ 5° pos. Type	M11
	TC__ 7° pos. Type	M12
	TN__ neg. Type	M13
	TP__ 11° pos. Type (Without Hole)	M14
	TP__ 11° pos. Type (With Hole)	M15
V / 35° Diamond	VB__ 5° pos. Type	M16
	VC__ 7° pos. Type	M16
	VN__ neg. Type	M17
W / Polygon	WN__ neg. Type	M18
Special	ZNEX neg.-pos. Type	M18
SUMIBORON / SUMIDIA Precision Tools	Guidance	M19
SUMIBORON	BNBB Type Small Hole Boring Bars	M20
	BNZ / BNB Type Small Hole Boring Bars	M21
	BNGG Type Grooving and Threading Holder	M22
SUMIDIA	DABB Type Small Hole Boring Bars	M23
	RF Type Face Mill	M24
New	SRF Type Face Mill	M25
SUMIBORON	FMU Type Face Mill "BN Finish Mill"	M26
SUMIDIA	DAL / DDL / DML Type Drills	M28-29
SUMIBORON	BNES Type Endmill "Helical Master"	M30

80° Diamond Type 7° Relief
With Insert Hole

Dimensions (mm)				
CC--	ℓ	∅d (IC)	s	d ₁
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

CCMT

● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	r	Material															
			Coated		Uncoated										PCD			
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
	CCMT 060202 CCMT 060204	0,2 0,4															●	
	CCMT 09T302	0,2															●	

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	Material															
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
	CCMT 060201 NF CCMT 060202 NF CCMT 060204 NF	0,1 0,2 0,4															●	
	CCMT 09T301 NF CCMT 09T302 NF CCMT 09T304 NF CCMT 09T308 NF	0,1 0,2 0,4 0,8															●	

● M-Class SumiDia (PCD, One-Use "Break Master" Type)

Break Master - DM	Shape	ISO Cat. No.	r	Material														
				BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
	CCMT 060202 L-DM NU CCMT 060204 L-DM NU	0,2 0,4															●	
	CCMT 09T302 L-DM NU CCMT 09T304 L-DM NU	0,2 0,4															●	
	CCMT 060202 R-DM NU CCMT 060204 R-DM NU	0,2 0,4															●	
	CCMT 09T302 R-DM NU CCMT 09T304 R-DM NU	0,2 0,4															●	

80° Diamond Type




0° Relief

Dimensions (mm)				
CC--	ℓ	ød (IC)	s	d ₁
0903--	9,7	9,525	3,18	4,4
1204--	12,9	12,7	4,76	5,5

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal


CNGA / CNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)


Shape	ISO Cat. No.	r	Material														
			Coated		Uncoated										PCD		
			BNC80	BNC150	CBN		K								N		
				BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
 with 4 CBN cutting edges	CNGA 120404 NC-4 CNGA 120408 NC-4 CNGA 120412 NC-4	0,4 0,8 1,2	●	●	●	●											
	CNGA 120404 NC-W4 CNGA 120408 NC-W4 (Wiper Type)	0,4 0,8	●	●	●												
 with 2 CBN cutting edges	CNGA 120404 NS-2 CNGA 120408 NS-2 CNGA 120412 NS-2	0,4 0,8 1,2						●									
	CNGA 120404 NU-2 CNGA 120408 NU-2 CNGA 120412 NU-2	0,4 0,8 1,2					●	●		●	●			●			
 One-use insert with chipbreaker	CNGG 120404 N-SV NC4 CNGG 120408 N-SV NC4 CNGG 120412 N-SV NC4	0,4 0,8 1,2			●												

CNGN / CNGX

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	r	Material														
			Coated		Uncoated										PCD		
			BNC80	BNC150	CBN		K								N		
				BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
 with 2 CBN cutting edges	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	Material														
			Coated		Uncoated										PCD		
			BNC80	BNC150	CBN		K								N		
				BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
 with 2 CBN cutting edges	CNGX 120412 CNGX 120416	1,2 1,6													●		

● = Euro-Stock

Packing unit and ordering example; 1 pce

CCGW 09T304, BNX20


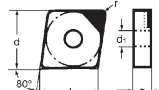
80° Diamond Type 0° & 11°
With Insert Hole

Dimensions (mm)				
CC--	ℓ	ød (IC)	s	d ₁
06	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4
12	12,9	12,7	4,76	5,5


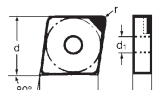

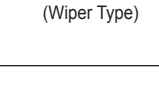
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

CNMA

● M-Class SumiBoron (CBN, Regrindable Type)



Shape	ISO Cat. No.	r	Material														
			Coated			Uncoated						PCD					
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
		CNMA 120404 CNMA 120408 CNMA 120412															

● M-Class SumiBoron (CBN, One-use Type)

Shape	ISO Cat. No.	r	Material														
			Coated			Uncoated						PCD					
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
		CNMA 120404 NS CNMA 120408 NS CNMA 120412 NS															
		CNMA 120404 NU CNMA 120408 NU CNMA 120412 NU															
		CNMA 120404 NU-W CNMA 120408 NU-W CNMA 120412 NU-W															


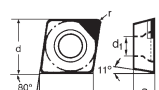
CNMX

● M-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Material														
			Coated			Uncoated						PCD					
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
		CNMX 120402 NF CNMX 120404 NF CNMX 120408 NF CNMX 120412 NF															

CPMW

● M-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Material														
			Coated			Uncoated						PCD					
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
		CPMW 060202 NF CPMW 060204 NF CPMW 060208 NF															

● = Euro-Stock

Packing unit and ordering example; 1 pce CNMA 120404, BNX20

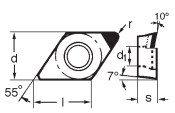
55° Diamond Type **7° Relief**
With Insert Hole

Dimensions (mm)				
DC--	ℓ	∅d (IC)	s	d ₁
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4

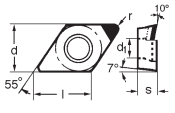
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

DCMT

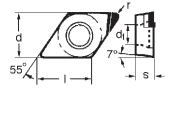
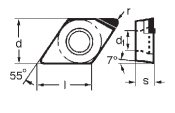
● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	r	Material														
			Coated			Uncoated											
			CBN										PCD				
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
	DCMT 070202 DCMT 070204	0,2 0,4														●	
	DCMT 11T302 DCMT 11T304 DCMT 11T308	0,2 0,4 0,8														● ● ●	

● G-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	Material														
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
	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 - DM	Shape	ISO Cat. No.	r	Material													
				BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150
	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														● ●	
	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														● ●	

55° Diamond Type



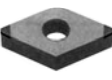
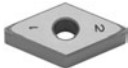
0° Relief
With Insert Hole

Dimensions (mm)				
DN_	ℓ	ød (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

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

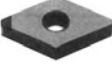
DNGA / DNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

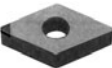
Shape	ISO Cat. No.	r	H		K								N			
			Coated		Uncoated								PCD			
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150
 with 2 CBN cutting edges	DNGA 110404 NC-2	0,4			●											
	DNGA 110408 NC-2	0,8			●											
	DNGA 110412 NC-2	1,2			●											
 with 4 CBN cutting edges	DNGA 150604 NC-4	0,4	●	●	●	●										
	DNGA 150608 NC-4	0,8	●	●	●	●										
	DNGA 150612 NC-4	1,2	●	●	●	●										
 with 2 CBN cutting edges	DNGA 150604 NU-2	0,4							●	●						
	DNGA 150608 NU-2	0,8							●	●						
	DNGA 150612 NU-2	1,2							●	●						
 Break Master - SV One-use insert with chipbreaker with 4 CBN cutting edges	DNGG 150604 N-SV NC4	0,4														
	DNGG 150608 N-SV NC4	0,8			●											
	DNGG 150612 N-SV NC4	1,2			●											

DNMA

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	Coated		Uncoated												
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
			 with 2 CBN cutting edges	DNMA 150604	0,4												
DNMA 150608	0,8								●	●							
DNMA 150612	1,2								●	●							

● M-Class SumiBoron (CBN, One-Use Type)

 with 2 CBN cutting edges	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								●	●	●	●	●	●	●	

Round Type

0° Relief
Without Insert Hole


Dimensions (mm)

RN--	ℓ	ød (IC)	s	d ₁
0603--	6,35	6,35	3,18	-
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

RNGN

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	r	H		K		N										
			Coated		Uncoated		PCD										
			CBN														
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
	RNGN 090300 RNGN 120300 RNGN 120400	- - -													● ● ●		

● G-Class SumiBoron (CBN, Full Top Type)

Shape	ISO Cat. No.	r	H		K		N										
			Coated		Uncoated		PCD										
			CBN														
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
	RNGN 060300 B RNGN 090300 B RNGN 120300 B RNGN 120400 B	- - - -			●	●											

Square Type

7° Relief
With Insert Hole


Dimensions (mm)

SC--	ℓ	ød (IC)	s	d ₁
09T3--	9,525	9,525	3,97	4,4
12	12,7	12,7	4,76	5,5

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

SCGW

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K		N										
			Coated		Uncoated		PCD										
			CBN														
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
	SCGW 09T304 NU SCGW 09T308 NU	0,4 0,8						● ●						● ●			

Square Type

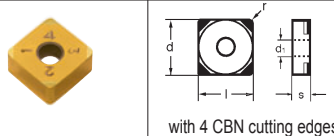
0° Relief
With Insert Hole

Dimensions (mm)				
SN--	ℓ	ød (IC)	s	d ₁
1204--	12,7	12,7	4,76	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

SNGA

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Material												
			Coated				Uncoated								
			CBN								PCD				
BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
 <p>with 4 CBN cutting edges</p>	SNGA 120408 NC-4 SNGA 120412 NC-4	0,8			●	●									
		1,2			●	●									

Square Type

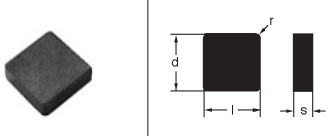
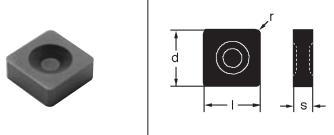
0° Relief
Without Insert Hole

Dimensions (mm)				
SN--	ℓ	ød (IC)	s	d ₁
0903--	9,525	9,525	3,18	–
1204--	12,7	12,7	4,76	–

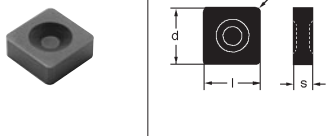
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

SNGN / SNGX

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	r	Material												
			Coated				Uncoated								
			CBN								PCD				
BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
	SNGN 090308 SNGN 090312	0,8											●		
		1,2												●	
	SNGN 120412 SNGN 120416	1,2											●		
		1,6												●	

● G-Class SumiBoron (Solid CBN, "Dimple" Type)

Shape	ISO Cat. No.	r	Material												
			Coated				Uncoated								
			CBN								PCD				
BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
	SNGX 120412 SNGX 120416	1,2											●		
		1,6												●	

● = Euro-Stock

Packing unit and ordering example; 1 pce

SNGA 120408 NC-4, BNC200

Square Type

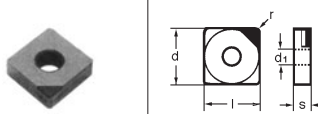
0° Relief
With Insert Hole

Dimensions (mm)				
CC--	ℓ	ød (IC)	s	d ₁
06	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4
12	12,9	12,7	4,76	5,5

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

SNMA

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Material																
			Coated		Uncoated										PCD				
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200		
	SNMA 120408 NS SNMA 120412 NS	0,8 1,2																	
	SNMA 120408 NU SNMA 120412 NU	0,8 1,2							●	●									

60° Triangle Type

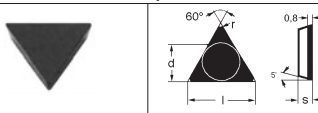
5° Relief

Dimensions (mm)				
TBGN	ℓ	ød (IC)	s	d ₁
0601--	6,9	3,97	1,59	—
TBGW				
0601--	6,9	3,97	1,59	2,8

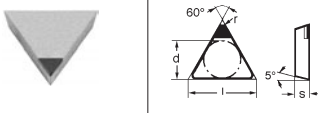
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

TBGN / TBGW

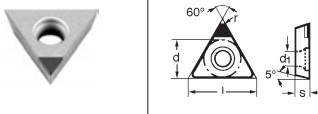
● G-Class SumiBoron (CBN, Full Top Type)

Shape	ISO Cat. No.	r	Material																
			Coated		Uncoated										PCD				
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200		
	TBGN 060102 B TBGN 060104 B TBGN 060108 B	0,2 0,4 0,8	●	●	●		●	●	●										

● G-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Material																
			Coated		Uncoated										PCD				
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200		
	TBGN 060102 NF TBGN 060104 NF TBGN 060108 NF	0,2 0,4 0,8																●	●

● G-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	r	Material																
			Coated		Uncoated										PCD				
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200		
	TBGW 060102 NF TBGW 060104 NF TBGW 060108 NF	0,2 0,4 0,8																●	●

60° Triangle Type

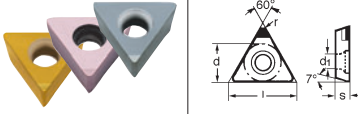


7° Relief
With Insert Hole

Dimensions (mm)				
TC--	ℓ	∅d (IC)	s	d ₁
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


TCGW

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Material																	
			Coated			Uncoated											PCD			
			BNC80	BNC150	BNC200	CBN											DA150	DA2200		
	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	●	●	●															
 <p>with 3 CBN cutting edges</p>	TCGW 16T304 NC-3 TCGW 16T308 NC-3	0,4 0,8			●															
	TCGW 090204 NU TCGW 090208 NU	0,4 0,8																	●	●
	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	Material																		
			Coated			Uncoated											PCD				
			BNC80	BNC150	BNC200	CBN											DA150	DA2200			
	TCMT 090201 NF TCMT 090202 NF TCMT 090204 NF	0,1 0,2 0,4																		●	●
	TCMT 110201 NF TCMT 110202 NF TCMT 110204 NF	0,1 0,2 0,4																		●	●

60° Triangle Type

0° Relief
With Insert Hole

Dimensions (mm)				
TN_	ℓ	ød (IC)	s	d ₁
1604--	16,5	9,525	4,76	3,81

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

TNGA / TNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Coated		Uncoated													
			CBN										PCD					
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
<p>with 6 CBN cutting edges</p>	<p>TNGA 160404 NC-6 TNGA 160408 NC-6 TNGA 160412 NC-6</p>	0,4 0,8 1,2	●	●	●	●												
<p>Break Master -SV</p> <p>One-use insert with chipbreaker</p> <p>with 6 CBN cutting edges</p>	<p>TNGG 160404 N-SV NC6 TNGG 160408 N-SV NC6 TNGG 160412 N-SV NC6</p>	0,4 0,8 1,2				●												

TNMA

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	r	Coated		Uncoated													
			CBN										PCD					
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
	<p>TNMA 160404 TNMA 160408</p>																	

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Coated		Uncoated													
			CBN										PCD					
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
	<p>TNMA 160404 NU TNMA 160408 NU TNMA 160412 NU</p>																	



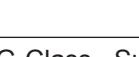
35° Diamond Type 5° & 7° Relief
With Insert Hole

Dimensions (mm)				
VB--	ℓ	∅d (IC)	s	d ₁
1103--	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

VBGW

● G-Class SumiBoron (CBN, One-Use Type)



Shape	ISO Cat. No.	r	Material															
			Coated		Uncoated										PCD			
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
  	VBGW 110202 NC VBGW 110204 NC VBGW 110208 NC	0,2 0,4 0,8			●													
	VBGW 110202 NU VBGW 110204 NU VBGW 110208 NU	0,2 0,4 0,8																
	VBGW 160402 NU VBGW 160404 NU VBGW 160408 NU	0,2 0,4 0,8																

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Material														
			Coated		Uncoated										PCD		
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200
 	VBGW 160404 NC-2 VBGW 160408 NC-2 VBGW 160412 NC-2	0,4 0,8 1,2	●	●	●	●											
	VBGW 160404 NU-2 VBGW 160408 NU-2 VBGW 160412 NU-2	0,4 0,8 1,2															

VCMT

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	r	Material															
			Coated		Uncoated										PCD			
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
 	VCMT 110301 NF VCMT 110302 NF VCMT 110304 NF	0,1 0,2 0,4																
	VCMT 160404 NF VCMT 160408 NF VCMT 160412 NF	0,4 0,8 1,2																

● = Euro-Stock

Packing unit and ordering example; 1 pce VBGW 110202 NC, BNC200

35° Diamond Type

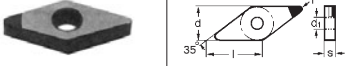
0° Relief
With Insert Hole

Dimensions (mm)				
VN--	ℓ	∅d (IC)	s	d ₁
1604--	16,6	9,925	4,76	3,81

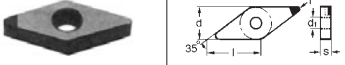
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

VNMA

● M-Class SumiBoron (CBN, Regrindable Type)

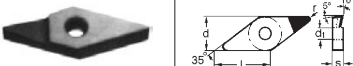
Shape	ISO Cat. No.	r	H		K		N											
			Coated		Uncoated		PCD											
			CBN															
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
	VNMA 160404 VNMA 160408 VNMA 160412	0,4						●			●							
		0,8						●										
		1,2																

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	H		K		N											
			Coated		Uncoated		PCD											
			CBN															
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
	VNMA 160404 NU VNMA 160408 NU VNMA 160412 NU	0,4						●	●		●	●						
		0,8						●	●									
		1,2																

VNMX

● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	r	H		K		N											
			Coated		Uncoated		PCD											
			CBN															
			BNC80	BNC150	BNC200	BNC300	BNX10	BNX20	BNX25	BN250	BN300	BN500	BN600	BN700	BNS800	DA150	DA2200	
	VNMX 160404 NF VNMX 160408 NF VNMX 160412 NF	0,4															●	
		0,8																●
		1,2																



SumiBoron / SumiDia
Inserts

● = Euro-Stock

Packing unit and ordering example; 1 pce VNMA 160404, BNX20

80° Trigon Type

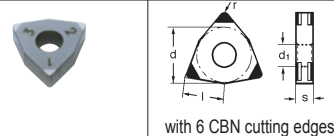
0° Relief
With Insert Hole

Dimensions (mm)				
WN--	ℓ	ød (IC)	s	d ₁
0804--	8,69	12,7	4,76	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

WNGA

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	r	Material												
			Coated			Uncoated						PCD			
			BNC80	BNC150	BNC200	CBN			PCD						
 <p>with 6 CBN cutting edges</p>	WNGA 080404 NC-6 WNGA 080408 NC-6 WNGA 080412 NC-6	0,4			●										
		0,8			●										
		1,2			●										

80° Special Type

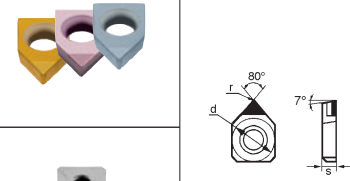

7° Relief
With Insert Hole

Dimensions (mm)				
ZN--	ℓ	ød (IC)	s	d ₁
0401--	-	4,76	1,59	2,3

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal

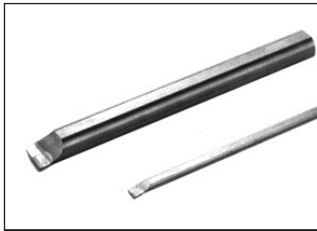
ZNEX

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	r	Material												
			Coated			Uncoated						PCD			
			BNC80	BNC150	BNC200	CBN			PCD						
	ZNEX 040102 NC ZNEX 040104 NC ZNEX 040108 NC	0,2	●	●	●										
		0,4	●	●	●										
		0,8	●	●	●										
	ZNEX 040102 NU ZNEX 040104 NU ZNEX 040108 NU	0,2													
		0,4				●	●								
		0,8				●	●	●							

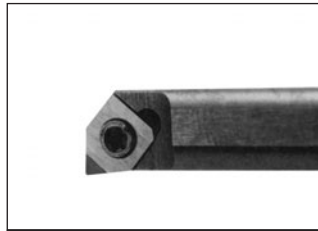
● = Euro-Stock

Packing unit and ordering example; 1 pce WNGA 080404 NC-6, BNC200



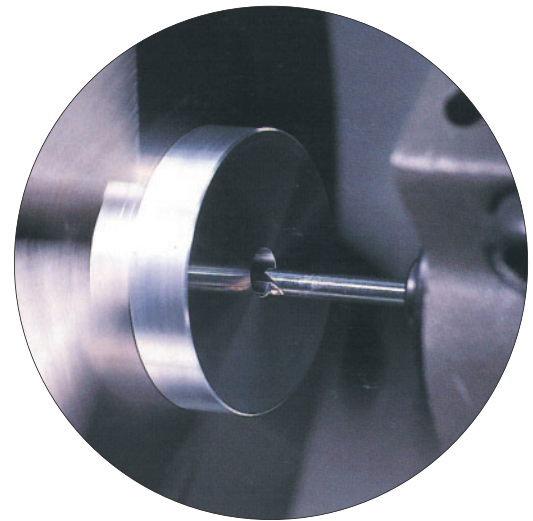
BNBB
Small hole boring tools

- 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
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.

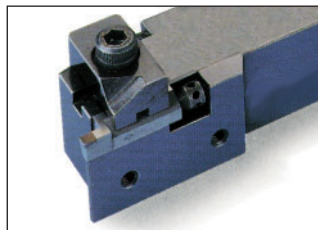


DABB-C type PCD boring tools for small boring up to diameter 3,0 mm



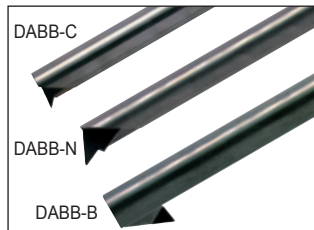
BNB
Small hole boring bars

- Solid carbide boring bars with economical CBN and PCD insert.
- Min. boring dia. is \varnothing 10,0 mm.



BNGG
Grooving and threading holders

- CBN cutting edge for hardened steel
- Two applications from one holder
- Various and adjustable grooving and threading after regrinding.



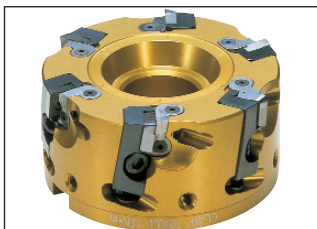
DABB
Small hole boring tools

- 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



DAL / DDL / DML
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



RF
High speed face mill for Aluminium

- Finishing and roughing aluminium alloys and non-ferrous materials
- High precision and highspeed machining $v_c=5000$ m/min
- Aluminium alloy body
- Run-out less than $10\mu\text{m}$
- Easy assembling



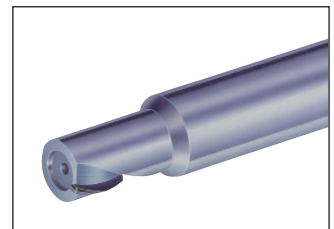
SRF
High speed face mill for Aluminium

- 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
"BN Finish Mill" for finishing grey cast iron

- High speed machining $v_c=1500$ m/min
- Excellent surface roughness $R_z=3,2$
- Run-out less than $10\mu\text{m}$
- Easy assembling



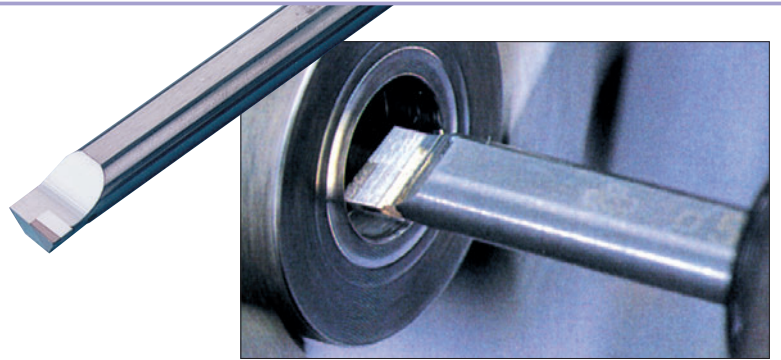
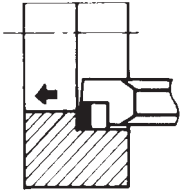
BNES
"Helical Master" SUMIBORON Endmill

- Spiral CBN brazed cutting edge for super finishing hardened steel ($H_R C50-60$)
- Dry machining
- Stable cutting
- High accuracy
- Excellent swarf evacuation

SUMIBORON Small Hole Boring Tools BNBB Type

For Hardened Steel

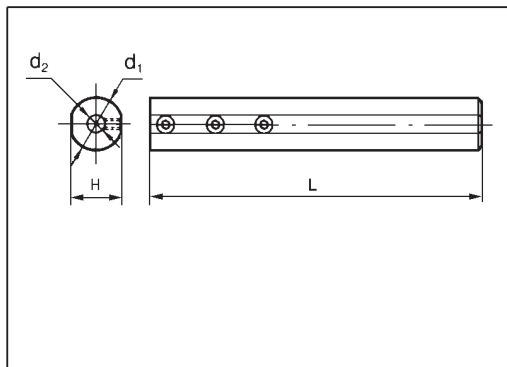
BNBB type small hole boring tools for hardened work pieces up to diameter 3,5 mm



■ "Sumiboron" Brazed Boring Tools for Small Hole Boring

	Cat. No.	Stock	Dimensions (mm)					Applicable holder	Grade of brazed cutting edge
			D _{min}	d	l ₁	h	r		
BNBB (Carbide shank) 	BNBB 03 R	●	3,5	3	60	2,4	0,2	HBB 316	SUMIBORON (CBN) BN250
	BNBB 04 R	●	4,5	4	60	3,4	0,2	HBB 416	
	BNBB 05 R	●	5,5	5	80	4,4	0,2	HBB 516	
	BNBB 06 R	●	6,5	6	80	5,4	0,2	HBB 616	
	BNBB 08 R	●	8,5	8	100	7,4	0,2	HBB 816	

■ Holder



Cat. No.	Stock	Dimensions (mm)			
		d ₁	L	d ₂	H
HBB 316	●	16	100	3	15
HBB 416	●			4	
HBB 516	●			5	
HBB 616	●			6	
HBB 816	●			8	

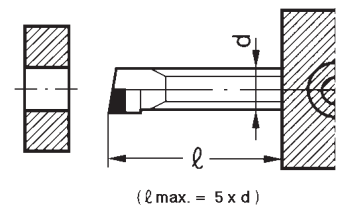
■ Spare Parts

Screw	Wrench
BT 0404	TH 020

■ Recommended Cutting Conditions

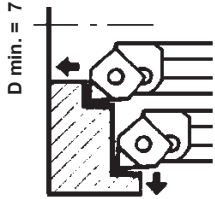
Work material	SUMIBORON BN250		Notes
Hardened steels (H_RC45~68)	Cutting speed (v _c)	30 ~ 150 m/min	Low speed may cause chattering in cutting process and chipping occurrence on the cutting edge.
	Feed rate (f)	0,03 ~ 0,1 mm/rev	-
	Depth of cut (d _{oc})	0,03 ~ 0,2 mm	Excessive depth of cut may cause larger deformation of tool, resulting in deterioration of bore accuracy.

■ Precaution On Use

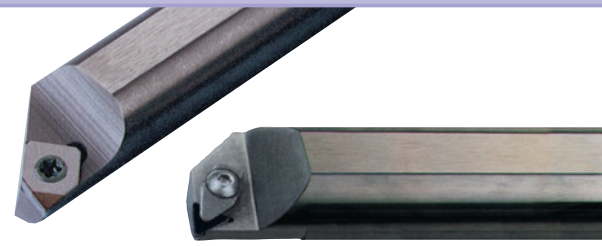
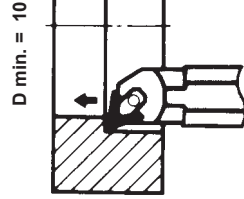


- Adjust overhang to achieve absolute minimum.
- For use of a small diameter brazed boring tool, select high speed and small feed rate, as much as possible.

BNZ type



BNB type



■ Boring Bars for Small Hole Boring

	Cat. No.	Stock		Dimensions (mm)						Applicable insert	
		R	L	D _{min}	d	l ₁	h	f	γ		
BNZ (Carbide shank) 	BNZ 606 R	●	●	7	6	80	5,5	3,5	-14°	ZNEX 0401__	 ZNEX (CBN)
	BNZ 608 R	●	●	9	8	100	7,5	4,5	-12°		
	BNZ 610 R	●	●	11	10	125	9,5	5,5	-10°		
	BNZ 612 R	●	●	13	12	130	11	6,5	-8°		
"HBB616" holder for BNZ606 (ød=6mm)											
BNB (Carbide shank) 	BNB 508 R/L	●	●	10	8	140	7	5	-9°	TBGN 0601__	 TBGN (CBN)
	BNB 512 R/L	●	●	14	12	160	11	7	-6°		
	BNB 516 R/L	●	●	18	16	180	14	9	-5°		
	BNB 520 R/L	●	●	22	20	180	18	11	-4°		

■ Spare Parts for BNZ

Holder	Screw	Wrench
BNZ 606 R		
BNZ 608 R	BFTX 0204 N	TRX 06
BNZ 610 R		

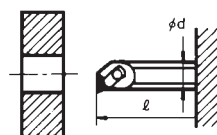
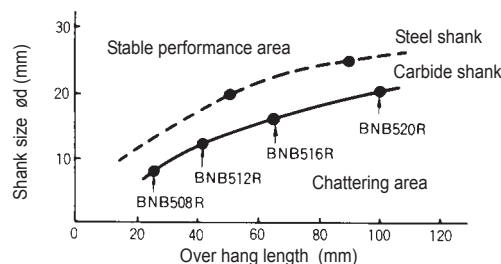
■ Spare Parts for BNB

Holder	Clamp	Clamp bold	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

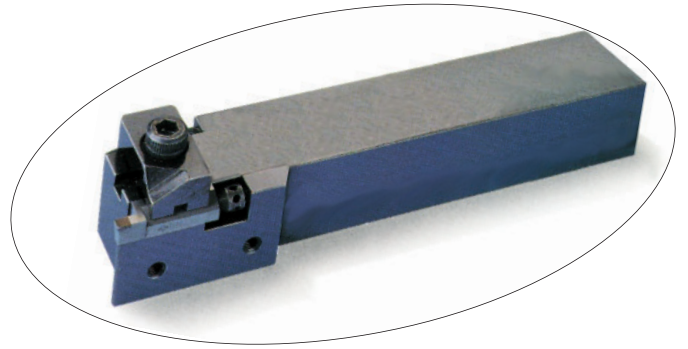
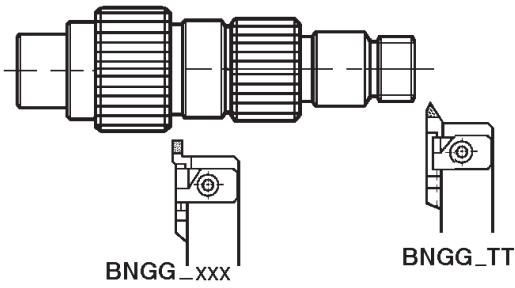
■ Holders Performance Area



Work material: Alloy steel (H_RC 60)
 Cutting conditions: v_c = 100 m/min
 f = 0,1 mm/rev
 d_{oc} = 0,2 mm

SUMIBORON Grooving Tool Holder BNGG Type

For Hardened Steel



■ "Sumiboron" Holders

 ● Grooving	Cat. No.	Stock		Dimensions (mm)			Applicable Insert
		R	L	f	l ₂	l ₁	
 ● Grooving	BNGG R/L 2525- 200 *)	●		30,5	4	150	BNGNT 0200 R/L
	BNGG R/L 2525- 250 *)	●		30,5	4	150	BNGNT 0250 R/L
	BNGG R/L 2525- 300 *)	●		30,5	5	150	BNGNT 0300 R/L
	BNGG R/L 2525- 400 *)	●		30,5	6	151	BNGNT 0400 R/L
	BNGG R/L 2525- 500 *)	●		30,5	6	151	BNGNT 0500 R/L
	BNGG R/L 2525- 600 *)	●		30,5	7	152	BNGNT 0600 R/L
 ● Threading	BNGG R/L 2525 - TT *)	●		28,5	5	150	BNTT 1020 R/L BNTT 1530 R/L

■ Inserts

 ● BNGNT	Cat. No.	Stock						Dimensions (mm)					Applicable Holder
		BN250		BN300		BNX20		b	l ₂	r	l ₁	s	
		R	L	R	L	R	L						
 ● BNTT	BNGNT 0200 R/L	●	●			●	●	2,0	4,0	0,2	25	6,0	BNGG R/L 2525-200
	BNGNT 0250 R/L	●	●			●	●	2,5	4,0	0,2	25	6,0	BNGG R/L 2525-250
	BNGNT 0300 R/L	●	●			●	●	3,0	5,0	0,4	25	6,0	BNGG R/L 2525-300
	BNGNT 0400 R/L	●	●			●	●	4,0	6,0	0,4	26	6,0	BNGG R/L 2525-400
	BNGNT 0500 R/L	●	●			●	●	5,0	6,0	0,4	26	6,0	BNGG R/L 2525-500
	BNGNT 0600 R/L	●	●			●	●	6,0	7,0	0,4	27	6,0	BNGG R/L 2525-600
	BNTT 1020 R/L	●	●			●	●	Pitch	1,0-2,0	0,13	25	6,0	BNGG R/L 2525 -TT
	BNTT 1530 R/L	●	●			●	●	Pitch	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- 200 BNGG R/L 2525- 250 BNGG R/L 2525- 300 BNGG R/L 2525- 400 BNGG R/L 2525- 500 BNGG R/L 2525- 600 BNGG R/L 2525 - TT	 BNGS R/L 200 BNGS R/L 250 BNGS R/L 300 BNGS R/L 400 BNGS R/L 500 BNGS R/L 600 BNGS R/L TT	 BNGC R/L	 FMJ	 GSP 6	 BX 0615 LH050 (for Clamp) BX 0414 LH030 (for support)	 ∅1,8x45	

*) Grooving and threading capability when changing the insert and support

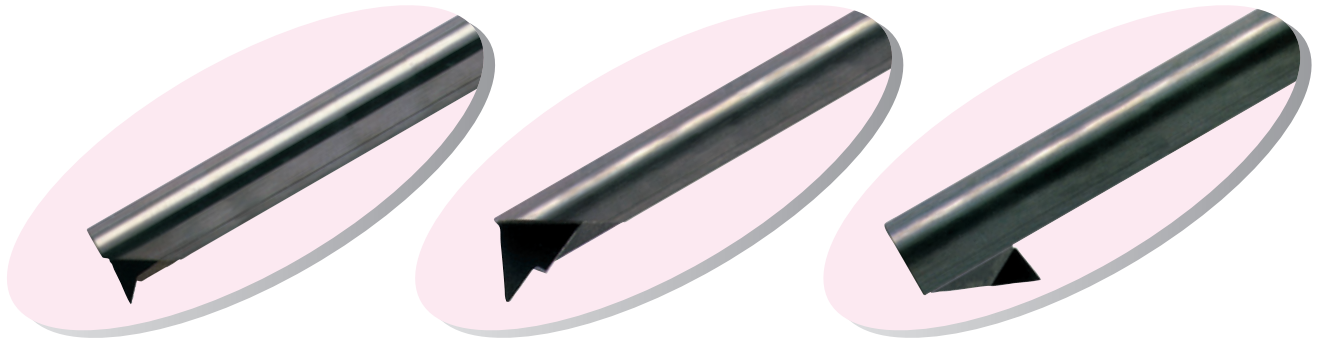
■ Recommended Cutting Conditions

● Grooving

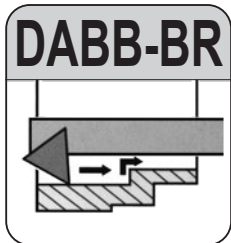
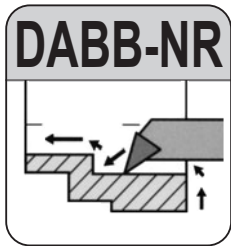
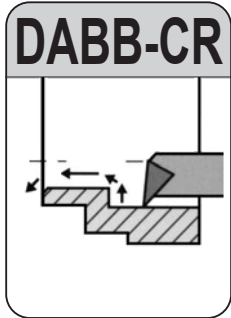
Cutting speed (v _c)	80 ~ 120 m/min
Feed rate (f)	0,03 ~ 0,07 mm/rev

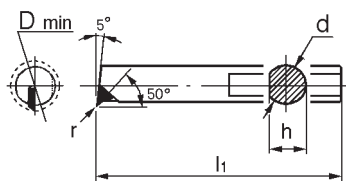
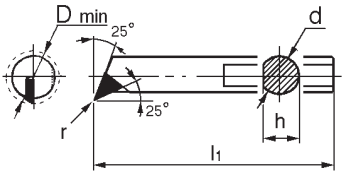
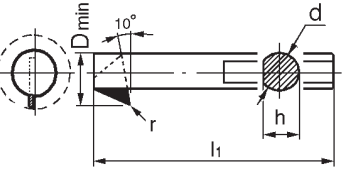
● Threading

Cutting speed (v _c)	80 ~ 120 m/min
Feed rate (f)	Max. pitch: 3,0 mm



■ "Sumidia" Brazed Boring Tools for Small Hole Boring

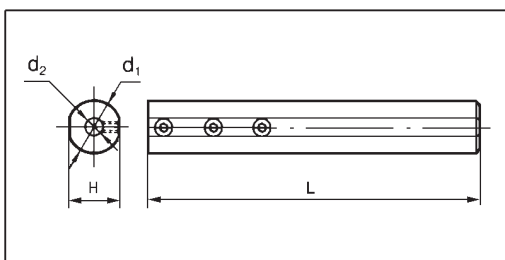


DABB (Solid carbide shank)	Cat. No.	Stock	Dimensions (mm)					Applicable Holder
		DA2200	D _{min}	d	l ₁	h	r	
For small boring 	DABB 025 CR	●	3,0	2,5	60	2,2	0,1	HBB 2516
	DABB 035 CR	○	4,0	3,5	60	3,2	0,1	HBB 3516
	DABB 045 CR	●	5,0	4,5	80	4,1	0,1	HBB 4516
	DABB 060 CR		7,0	6,0	80	5,2	0,1	HBB 616
For profiling 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


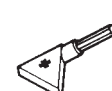
Spindle revolution	Feed rate	Depth of cut	Coolant
> 2000 rpm	0,03 ~ 0,1 mm/rev	0,03 ~ 0,2 mm	Wet

■ Holder



Cat. No.	Stock	Dimensions (mm)			
		d ₁	L	d ₂	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

For High Speed Finishing Aluminium Alloys

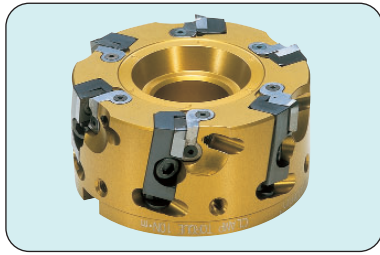


Fig. 1

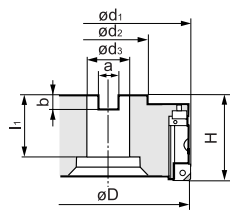


Fig. 2

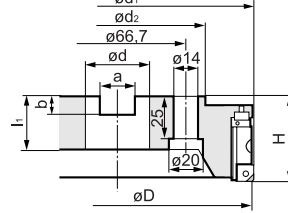
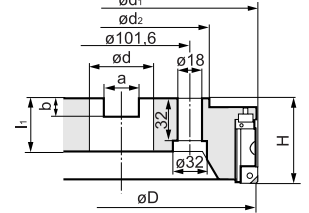


Fig. 3



Body

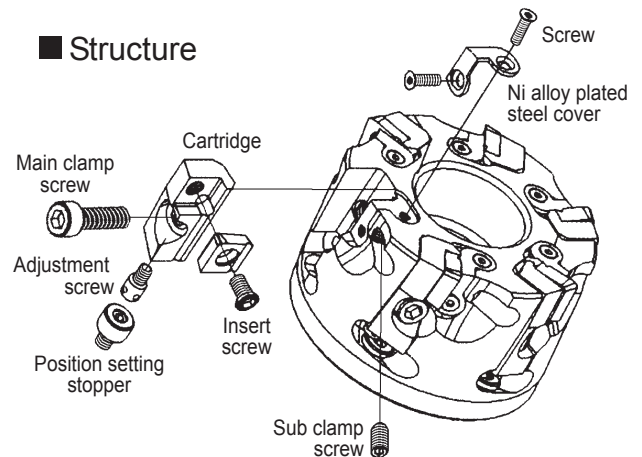
Type	Cat. No.	Stock	Dimensions (mm)				Mounting				Number of teeth	max. depth of cut	Weight (Kg)	Fig.
			ϕD	ϕd_1	ϕd_2	H	ϕd_3	a	b	l_1				
RF 4000	RF 4080 R-S	●	80	82	60	50	27	12,4	7,0	29	6	3,0	0,7	1.
	RF 4100 R-S	●	100	102	75	50	32	14,4	8,5	29	6		1,0	
	RF 4125 R-S	●	125	127	75	63	40	16,4	9,5	29	8		1,6	
	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, cartridges 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	DA2200	●
	PCD insert wiper type SNEW 1204 ADFR-W-NF	DA2200	●

Structure



"Sumidia" Blade

PCD grade DA2200	Shape	Cat. No.	Stock
Standard type		RFB	●
		RFBW	●

Cartridge

Shape	Cat. No.	Stock
For carbide insert 	RFR	●
For Sumidia insert 	RFF	●

● = Euro stock
○ = Delivery on request

Dummy Blade

Shape	Cat. No.	Stock
	RFD	○

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

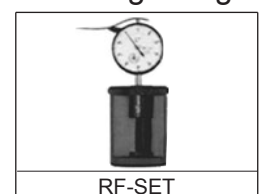
For roughing:

Cartridge **RFR**
Uncoated carbide insert
SDET 1204 ZDFR, grade: H1

Spare Parts

RFC	RFS	BX0620	BTD0510	FBUP2-A0-8	RFJ	BFTX0509N	TH050 TH015, TH025	TTX20

Setting Gauge



Dial-gauge is not included.

New



Fig. 1

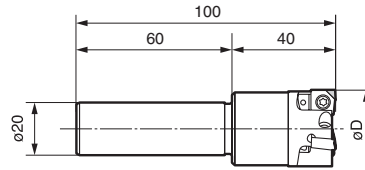
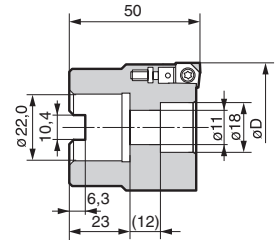


Fig. 2

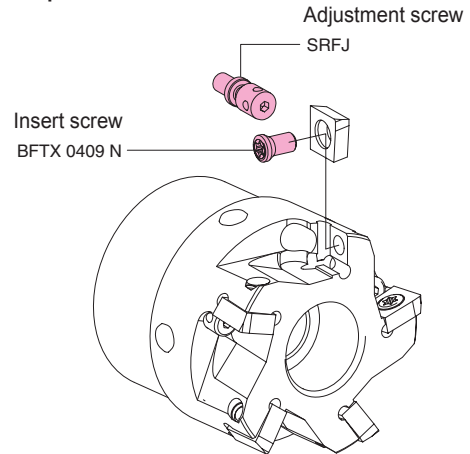


Body

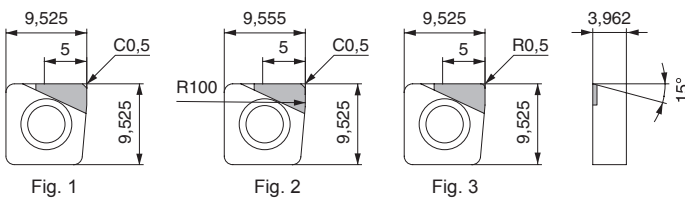
Cat. No.	Stock	øD(mm)	No. of teeth	Shape	Weight (Kg)
SRF 30 R-ST	○	30	3	Fig. 1	0,34
SRF 40 R-ST	○	40	4	Fig. 1	0,50
SRF 50 RS	○	50	5	Fig. 2	0,59
SRF 63 RS	○	63	6	Fig. 2	0,67

Inserts are sold separately.
○ = Delivery on request

Spare parts



Insert



Cat. No.	Cutting Edge	SUMIDIA	Shape
		DA2200	
SNEW 09T3 ADFR-NF	Standard	●	Fig. 1
SNEW 09T3 ADFR-U-NF	Wiper	●	Fig. 2
SNEW 09T3 ADFR-R-NF	Nose Radius	●	Fig. 3

● = Euro stock

- 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 reground 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 reground amount on the same cutter.

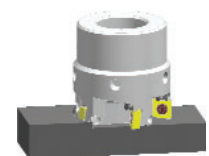
Maximum D.O.C. Guide (SRF50RS, 5 teeth)

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.

D.O.C. (mm)	Feed	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		○	-	-

Cutting Conditions

Cutter: SRF 50 RS
Insert: SNEW 09T3 ADTR-NF (DA2200)
N: 10.000 min⁻¹
Width: 35mm at D.O.C. indicated above



Recommended Cutting Conditions for PF and SRF Type Cutters

Work Material	% of Si	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

For High Speed Finishing Grey Cast Iron



■ Features

- High speed machining $v_c=1500\text{m/min}$
- 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

■ Application

FC250~FC300(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

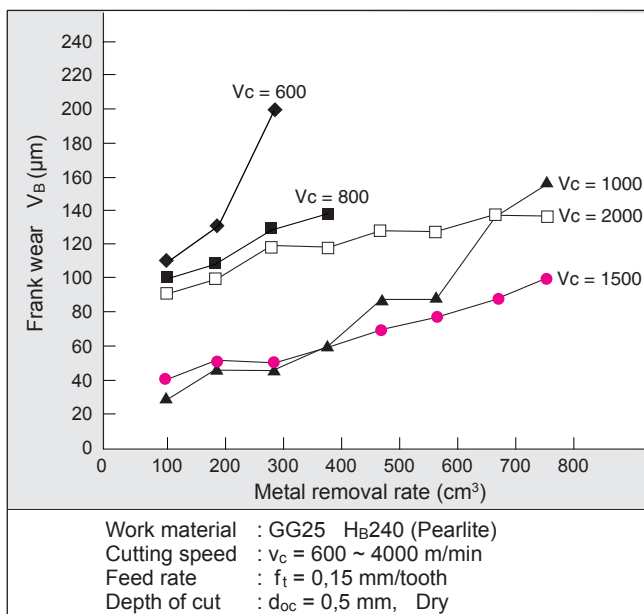
■ Recommended Cutting Conditions

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

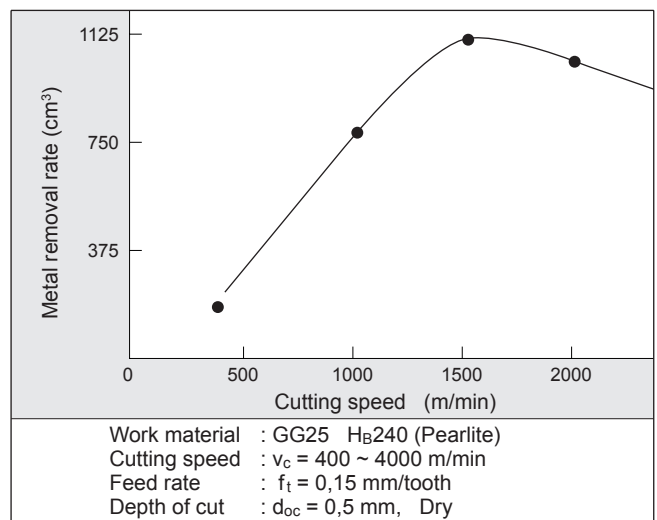


■ Performance

● Tool Life Diagram



● Estimated Tool Life

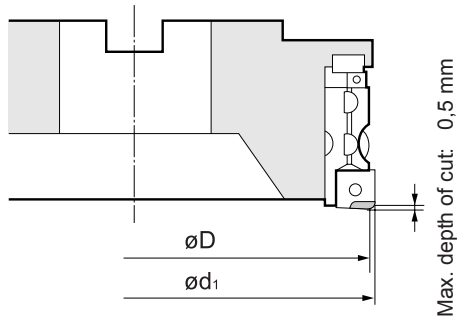


- Milling of ductile cast iron and alloy steel casting do not produce the best results.
- Dry cutting is recommended. Wet cutting will result in chipping of cutting edges in the early stages due to thermal cracking.

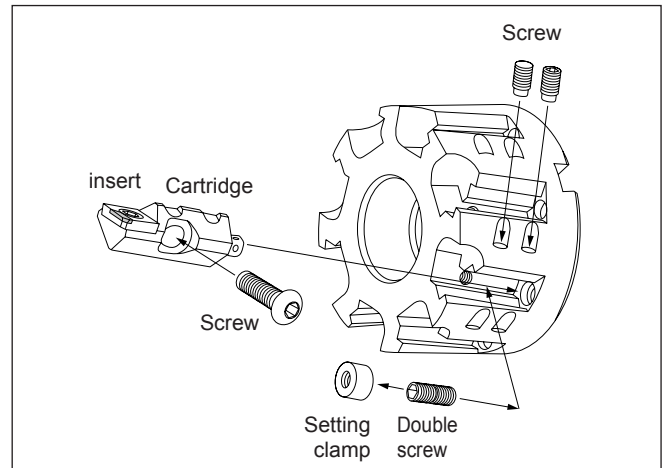
SUMIBORON BN Finish Mill FMU Type

Specifications

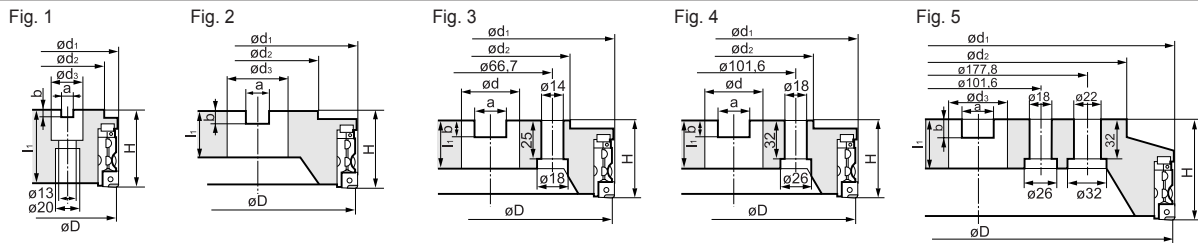
Approach angle: 90°
Axial rake angle: + 8°
Radial rake angle: + 2°



Structure



Body



Type	Cat. No.	Stock		Dimensions (mm)				Mounting				Number of teeth	max. depth of cut	Weight (Kg)	Fig.
		R	L	ø D	ø d ₁	ø d ₂	H	ø d ₃	a	b	l ₁				
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	8		2,4	
	FMU 4125 R-S	○		125	127,8	75	63	40	16,4	9,5	29	10		3,4	2.
	FMU 4160 R-S	○		160	162,8	100	63	40	16,4	9,5	29	12		5,6	3.
	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	28	27,8	5.	

● = Euro stock
○ = Delivery on request

Insert

Cat. No.	Stock		CBN grade	Figure
	R	L		
SNEW 1203 ADT L/R	●	●	BN700	1
SNEW 1203 ADT L/R-S			BN700	2

● = Euro stock

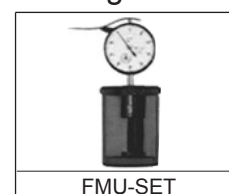
Cartridge

Cartridge	Screw	Adjustment screw	O-ring	Wrench	Wrench
FMUU	BFTX0509N	FMUJ	P3	TRX20	1,8 x 45

Spare Parts

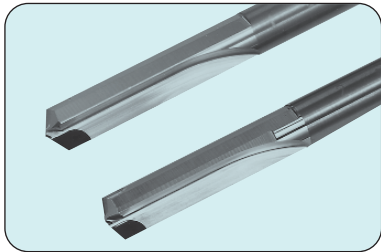
Screw	Screw	Setting clamp	Double screw	Wrench	Wrench	Wrench
BH0620	BTD0609	FMUE	WB5-10	TH040	LH030	LH025

Gauge



Dial-gauge is not included.

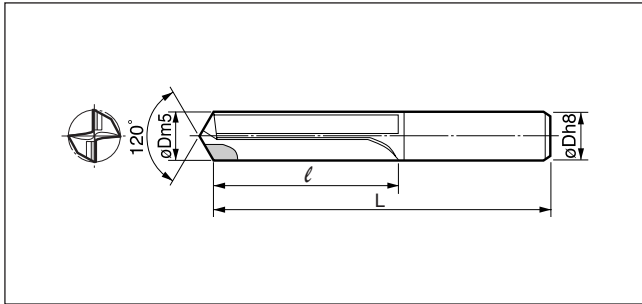
SUMIDIA Drills DAL/DDL/DML Type



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	ϕD	L	ℓ
	DA2200			
DAL 0500H ~ 0600H		$\phi 5 < D \leq \phi 6$	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

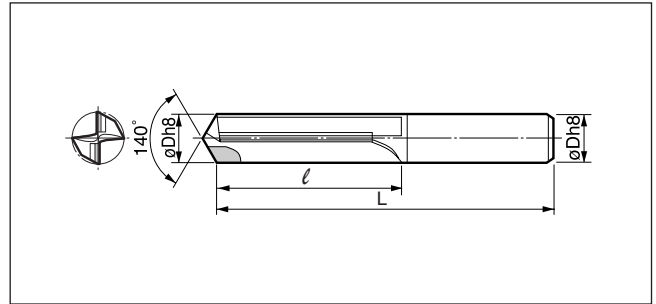
■ Recommended Conditions

	Cutting Speed (m/min)	Feed Rate (m/min)	Drilling Length L/D	Oil
$\phi D < 8$	80 ~ 250	0,05 ~ 0,2	Below 3 x D	Water soluble
$\phi D \geq 8$		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"> • Holes by carbide drill was out of specifications after 2.000 holes/reg. • SumiDia drill could drill up to 30.000 holes/reg. • 15 times tool life that of carbide drills.
	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"> • Average 40,000 holes/reg • Surface roughness $R_y = 1\mu\text{m}$
	ADC10 Aluminum Die Cast	$V_c=90\text{m/min}$ $f=0,08\text{mm/rev}$	<ul style="list-style-type: none"> • More than 50.000 holes and still running

■ DDL Type



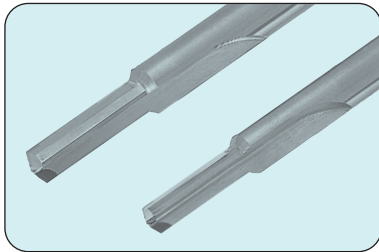
Cat. No.	Stock	ϕD	L	ℓ
	DA2200			
DDL 050V ~ 060V		$\phi 5 \leq D \leq \phi 6$	80	30
DDL 061V ~ 070V		$\phi 6 < D \leq \phi 7$	90	35
DDL 071V ~ 080V		$\phi 7 < D \leq \phi 8$	90	35
DDL 081V ~ 090V		$\phi 8 < D \leq \phi 9$	100	40
DDL 091V ~ 100V		$\phi 9 < D \leq \phi 10$	100	40
DDL 101V ~ 110V		$\phi 10 < D \leq \phi 11$	110	50
DDL 111V ~ 120V		$\phi 11 < D \leq \phi 12$	110	50

■ Important Notes

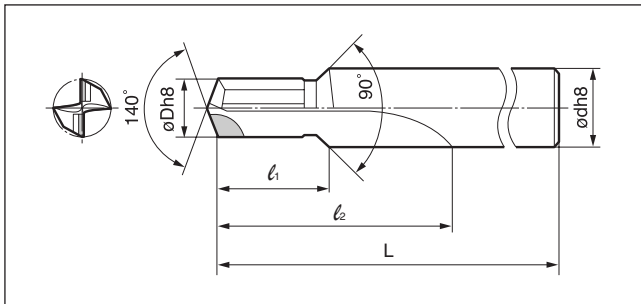
- Select a high rigidity machine and high precision tool holder.
- Enough coolant to drilled hole.

■ 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"> • Regrind after 100.000 holes
	ADC12 Aluminum Die Cast	$V_c=200\text{m/min}$ $f=0,17\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 74.000 holes (2.000m) (Preset tool change)
	AC2A Aluminum Casting	$V_c=234\text{m/min}$ $f=0,28\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 80.000 holes (Preset tool change)



■ DML Type



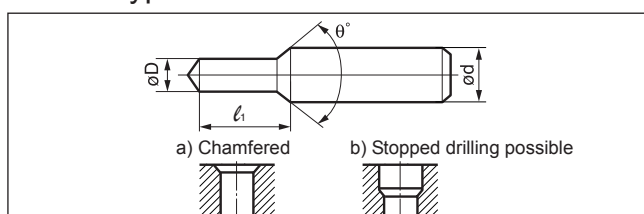
Applicable Tap Size	Cat. No.	Stock DA2200	ϕD	ϕd	L	l_1	l_2
M6	DML 050V		5	8	90	18	36
M8	DML 068V		6,8	10	104	24	48
M10	DML 085V		8,5	12	122	30	60
M12	DML 103V		10,3	14	136	36	72

Chamfering position is usually just carbide but PCD edges can be incorporated.

■ 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"> • Regrind after 150.000 holes • Tool life for carbide drill is 500 holes. • 30 times tool life that of carbide drills
	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"> • 100.000 holes/reg (2.000m) and still running. • Drilling and chamfering in the same process
	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"> • 80.000 holes/reg (1.840m) and still running. • Drilling and chamfering in the same process

■ DML Type Possible Profiles

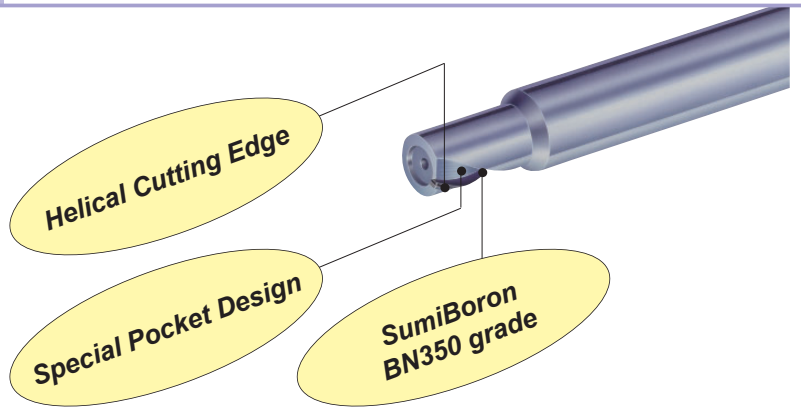


(1) Tolerance for dimension L is more than 0,2mm.

(2) θ° is less than 180° .

SUMIBORON "Helical Master" BNES Type

Spiral CBN Endmill for Hardened Steel



Endmills BNES Type with 1 Spiral Flute

	Cat. No.	Stock	Dimensions (mm)				
		BN350	ϕD	ϕd	ℓ_1	ℓ_2	L
	BNES 1060	●	6,0	10	7,0	11	60
	BNES 1080	●	8,0	10	10,0	14	70
	BNES 1100	●	10,0	12	12,0	17	75
	BNES 1120	●	12,0	12	14,0	20	80
	BNES 1140	●	14,0	16	16,0	21,5	80
	BNES 1160	●	16,0	16	18,0	24	80

Helix angle : 15°
right-hand cut, right-hand helix

Recommended Cutting Conditions

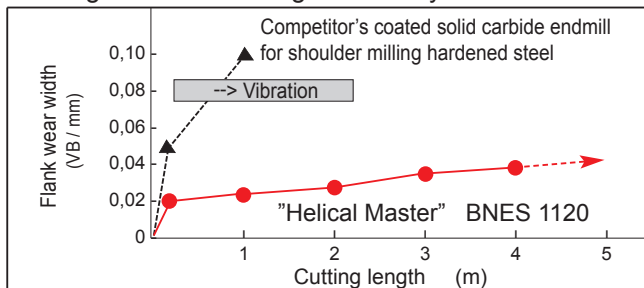
Cutting speed: v_c (m/min), Spindle revolutions: N (rpm), Feed per tooth: f_t (mm/tooth), Feed speed: v_f (mm/min), Number of teeth: n

Tooling example	ϕD	Hardened steel (HRC 50 ~ 57)			Hardened steel (HRC 58 ~ 65)		
		$v_c = 100 \sim 170$ m/min			$v_c = 80 \sim 150$ m/min		
	$\phi 6 \sim 8$	$W_{oc} \leq 0,1$ mm	n = 4000 ~ 9000	V_f (mm/min) = 240 ~ 540	$W_{oc} \leq 0,08$ mm	n = 3200 ~ 8000	V_f (mm/min) = 150 ~ 370
	$\phi 10 \sim 12$	$W_{oc} \leq 0,15$ mm	n = 2700 ~ 5400	V_f (mm/min) = 180 ~ 360	$W_{oc} \leq 0,12$ mm	n = 2100 ~ 4800	V_f (mm/min) = 120 ~ 270
	$\phi 14 \sim 16$	$W_{oc} \leq 0,2$ mm	n = 2000 ~ 3800	V_f (mm/min) = 140 ~ 260	$W_{oc} \leq 0,15$ mm	n = 1600 ~ 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



Work material: X155CrVMo12-1
Hardness: HRC 60

Cutting data:
 $v_c = 100$ m/min (Helical Master)
 $v_c = 40$ m/min (Competitor's coated solid carbide endmill)
 $v_f = 186$ mm/min

Down-cut milling
Dry cutting

● Excellent Surface Roughness

"Helical Master" BNES 1080 $\phi 8,0$

Conventional straight flute CBN endmill, $\phi 8,0$

Work material: 15Cr3
Hardness: HRC 55~58
Cutting data: $v_c = 130$ m/min
 $v_f = 310$ mm/min

Down-cut milling
Dry cutting

Spare Parts

N

N1 ~ N7

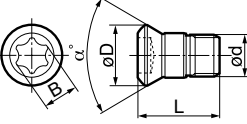


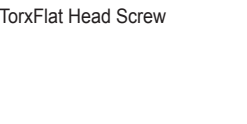
Screw	N2
Lever Pin, Shim	N4
Shim Pin, Nut, Eccentric Pin	N6
Wrench	N7

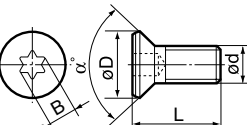
SPARE PARTS


Screw

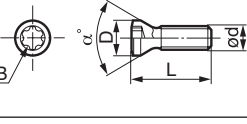
■ Screw

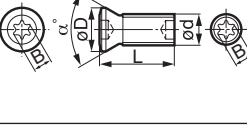
High Precision Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	B	α°
	BFTG0408F	●	M4	0,5	7,5	5,7	T15	60
	BFTG0409F	●	M4	0,5	8,4	6,2	T15	60
	BFTG0513F	●	M5	0,5	13	6,8	T20	60
	BFTG0617F	●	M6	0,75	16,5	8	T25	60
	BFTG0621F	●	M6	0,75	21	9,5	T25	60
	BFTG0825F	●	M8	0,75	24,5	12	T25	60

TorxFlat Head Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	B	α°
	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
	BFTX03584	●	M3,5	0,6	7,4	5,2	T15	60
	BFTX03588	●	M3,5	0,6	8,8	5,2	T15	60
	BFTX0414	●	M4	0,7	14,5	5,5	T15	60
	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

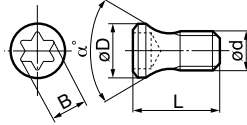
Hexagonal Hole Type	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	B	α°
	BFTX0203A	●	M2	0,4	3	2,7	T6	90
	BFTX0204A	●	M2	0,4	4,3	2,7	T6	90
	BFTX0305A	●	M3	0,5	5,3	4,3	T10	90
	BFTX0306A	●	M3	0,5	5,8	4,3	T10	90
	BFTX0307A	●	M3	0,5	6,8	4,3	T10	90
	BFTX0407A	●	M4	0,5	7,3	5,6	T15	90
	BFTX0410A	●	M4	0,7	10,3	5,6	T15	90
	BFTX0509A	●	M5	0,8	9,3	6,9	T20	90

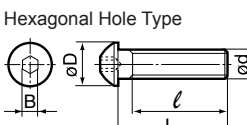
T Type with Torx Hole	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	B	α°
	BFTX0203N	●	M2	0,4	3	2,7	T6	60
	BFTX0204N	●	M2	0,4	4,3	2,7	T6	60
	BFTX02205N	●	M2,2	0,45	4,5	3	T6	60
	BFTX02505N	●	M2,5	0,45	4,5	3,45	T8	60
	BFTX02506N	●	M2,5	0,45	5,5	3,45	T8	60
	BFTX0306N	●	M3	0,5	5,5	4,2	T10	60
	BFTX0307N	●	M3	0,5	7	4,2	T10	60
	BFTX0309N	●	M3	0,5	8,8	4,2	T10	60
	BFTX03509N	●	M3,5	0,6	9	5,1	T10	52
	BFTX0406N	●	M4	0,7	5,5	5,6	T15	60
	BFTX0407N	●	M4	0,7	7	5,6	T15	60
	BFTX0409N	●	M4	0,7	9	5,6	T15	60
	BFTX0412N	●	M4	0,7	11,5	5,6	T15	60
	BFTX0509N	●	M5	0,8	9	7	T20	60
	BFTX0511N	●	M5	0,8	11,5	7	T20	60
	BFTX0515N	●	M5	0,8	15	7	T20	63

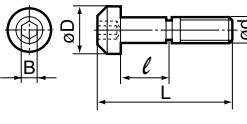
TorxFlat Head Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	B	α°
	BFTX0307IP	●	M3	0,5	7	4,3	10IP	55
	BFTX03512IP	●	M3,5	0,6	11,5	5,3	15IP	60

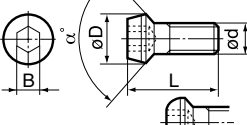
TorxFlat Head Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	B	α°
	BFTX0410T8L	●	M4 ^(L)	0,7	10,3	5,6	T10	90
	BFTX0410T8R	●	M4	0,7	10,3	5,6	T10	90

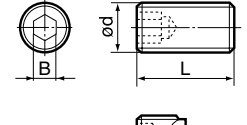
■ Screw

TorxFlat Head Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	B	α°
	BFTY02205	●	M2,2	0,45	5,0	3,05	T7	60
	BFTY02206	●	M2,2	0,45	5,6	3,05	T7	60

Button Head Cap Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	B	α°
	BH0304		M3	0,5	4	Full	5,5	2
	BH0306	●	M3	0,5	6	Full	5,5	2
	FBUP3-A0-9 (=BH0308)	●	M3	0,5	8	Full	5,5	2
	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	6	2,5
	BH0510		M5	0,8	10	Full	9,5	3
	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	20	12	4
	BH0830R		M8	1,25	30	26	12	4
	BH0830L		M8	1,25	30	26	12	4
	BH0832		M8	1,25	32	29,5	12	4
	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

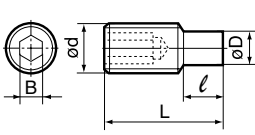
Phillip Head Cap Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	ℓ	α°
	BHA0525	●	M5	0,8	25,5	9,5	8,5	3
	BHA0625	●	M6	1,0	30	11,3	10,5	4
	BHE0407	●	M4	0,7	9,5	2	5,7	2,5
	BHE0510		M5	0,8	13	3	7,7	3

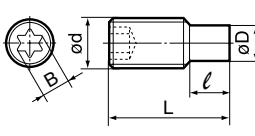
Button Head Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	B	α°
	BHF0203L		M2	0,4	4	3	1,5	90
	BHF0203T		M2	0,4	4	3	1,5	90
	BHF0203S		M2	0,4	5,5	3	1,5	90
	BHF0203B		M2	0,4	5,5	3,5	1,5	90
	BHF0306R		M3	0,5	6,5	4,4	2	90
	BHF0308R		M3	0,5	8	4,4	2	90
	BHF0623	●	M6	1,0	23	12	4	90

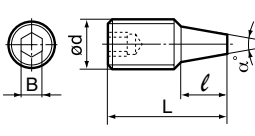
Set Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	-	B	-
	BT0305		M3	0,5	5	-	1,5	-
	BT0310		M3	0,5	10	-	1,5	-
	BT0404	●	M4	0,7	4	-	2	-
	BT0506	●	M5	0,8	6	-	2,5	-
	BT0507K		M5	0,8	7	-	2,5	-
	BT0510		M5	0,8	10	-	2,5	-
	BT0610		M6	1,0	10	-	3	-
	BT0612		M6	1,0	12	-	3	-
	BT0620		M6	1,0	20	-	3	-

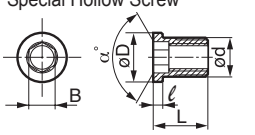
SPARE PARTS Screw

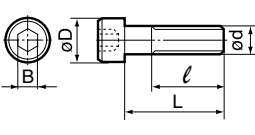
■ Screw

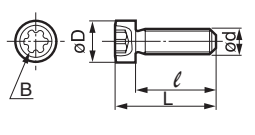
Set Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	B	α°
	BTD0408		M4	0,7	8	2	2,8	2
	BTD0410		M4	0,7	10	2	2,8	2
	BTD0412		M4	0,7	12	2	2,8	2
	BTD0508		M5	0,8	8	3	3,5	2,5
	BTD0510	●	M5	0,8	10	3	3,5	2,5
	BTD0518		M5	0,8	18	4	3,5	2,5
	BTD0609	●	M6	1,0	9	2	4	3
	BTD0615		M6	1,0	15	5	4	3
	BTD0618		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

Set Screw with Torx Hole	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	B	α°
	BTD0615T		M6	1,0	15	5	4	T20
	BTD0620T		M6	1,0	20	5	4,3	T20

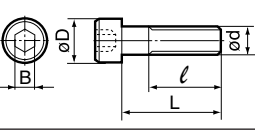
Set Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	B	α°
	BTT0407	●	M4	0,5	7	2,6	2	60
	BTT0411	●	M4	0,5	11	2,6	2	60
	BTT0511		M5	0,8	11	5	2	60
	BTT0615		M6	1,0	15	6	2,6	60

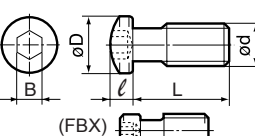
Special Hollow Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	D	B
	BW0507F	●	M5	0,5	7	1,2	6,3	3,5

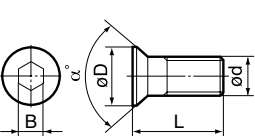
Cap Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	D	B
	BX0308		M3	0,5	8	Full	5,5	2,5
	BX0408		M4	0,7	8	6	7	3
	BX0410		M4	0,7	10	8	7	3
	BX0412		M4	0,7	12	Full	7	3
	BX0414	●	M4	0,7	14	Full	7	3
	BX0425		M4	0,7	25	23	7	3
	BX0430		M4	0,7	30	28	7	3
	BX0508	●	M5	0,8	8	Full	8,5	4
	BX0510	●	M5	0,8	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	16	8,5	4
	BX0615	●	M6	1,0	15	Full	10	5
	BX0620		M6	1,0	20	18	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
	BX0835		M8	1,25	35	22	13	6

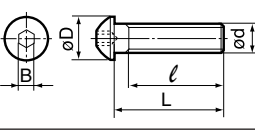
Torx Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	D	B
	BXD02208 IP	●	M2,2	0,45	7,5	5,7	3,5	8IP
	BXD02509 IP	●	M2,5	0,45	9	7	4,1	10IP
	BXD03011 IP	●	M3	0,5	10,5	8	4,9	15IP
	BXD03512 IP	●	M3,5	0,6	11,5	8,8	5,5	15IP
	BXD04014 IP	●	M4	0,7	12,5	9,5	6	20IP
	BXD04519 IP	●	M4,5	0,75	14,3	10,8	6,8	25IP

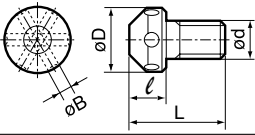
■ Screw

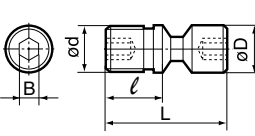
Cap Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	D	B
	EHBX0512	●	M5	0,8	12	10,5	8	4

Fastener Bolt	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	D	B
	FBH0512	●	M5	0,8	12	3,1	7,3	3
	FBX0811	●	M8	1,25	11	4,9	8,5	4
	FBX0817	●	M8	1,25	17	5	8,5	4

Flat Head Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	D	B
	FBUP1-A0-8		M3	0,5	6	4,4	2	82
	FBUP1-V0-8		M3	0,5	6	5,6	2	82
	FBUP2-A0-8		M3	0,5	10	5,5	2	82
	FBUP3-A0-8		M3,5	0,6	12	7	2	82
	FBUP4-A0-8		M5	0,8	15	9,3	3	82
	BFX0307R		M3	0,5	7	4	2	60
	BFX0407R		M4	0,7	6,5	5,8	2,5	90
	BFX0410R		M4	0,7	9,5	5,8	2,5	90
	BFX0410L		M4(L)	0,7	9,5	5,8	2,5	90
	BFX0508		M5	0,8	8	7,5	3	90
	BFX0511R		M5	0,8	10,5	7,5	3	90
BFX0511L		M5(L)	0,8	10,5	7,5	3	90	
BFX0611R		M6	1,0	11	9,5	3	90	

Button Head Cap Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	D	B
	FBUP3-A0-9	●	M3	0,5	8	Full	5,5	2

Axial adjustment Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	D	B
	FMUJ	●	M4	0,7	17	6,5	6	2
	RFJ		M4	0,7	12	6	6	2
	SRFJ		M4	0,7	17	6,5	6	1,8

Screw for Lever Lock	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	ℓ	D	B
	LCS2B		M3	0,5	10	3	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
	LCS5CA		M8	1,0	20,5	12	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	4	
LCS25		M10	1,0	30	17,4	10	6,5	
LCS32		M12	1,0	36	19,3	12	7	

SPARE PARTS

Screw, Lever Pin, Shim

■ Screw

Double Screw	Cat. No.	Stock	Dimensions (mm)					
			d	Pitch	L	D	B	α°
	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
	WB5-18		M5	0,8	18	6	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	D	B	α°
	WB6-16T		M6	1,0	14	6	4,5	T20
	WB6-24T		M6	1,0	24	8,5	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 ^(L)	0,75	20	8,5	5,5	T25
	WB8-22T	●	M8	1,25	22	5,5	6,2	T27
	WB8-22TL	●	M8 ^(L)	1,25	22	8,5	6,2	T27
	WB8-30T	●	M8	1,25	30	11,5	6,2	T27
	WB8-30TL	●	M8 ^(L)	1,25	30	11,5	6,2	T27
	WB8R-16T	●	M8	1,25	14	6	6,2	T27

■ Lever Pin

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	-	-
LCL8-SD	●	8,6	25,4	25,4	8,6	-	-	
	LCL06	●	2,5	6,2	7,0	2,1	-	-
	LCL09	●	3,5	9,3	10,8	3,2	-	-
	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	-	-
	LCL25		7,5	23,5	23,9	6,2	-	-
	LCL32		8,5	26,8	29,8	8	-	-

■ Shim

Shim	Cat. No.	Stock	Dimensions (mm)					
			A	T	d	-	-	-
	LST317SD	●	9,5	2,7	5,2	-	-	-
	LST42SD	●	12,65	3,18	6,9	-	-	-
	LST53SD		15,85	4,76	7,9	-	-	-
	LSS32SD	●	9,48	3,18	5	-	-	-
	LSS42SD	●	12,65	3,18	6,9	-	-	-
	LSS53SD		15,85	4,76	7,9	-	-	-
	LSS63SD	●	19	4,76	10	-	-	-
	LSS84		25,35	6,35	13,2	-	-	-
	LSC32SD	●	9,48	3,18	5	-	-	-
	LSC42SD	●	12,65	3,18	6,9	-	-	-
	LSC53SD	●	15,85	4,76	7,9	-	-	-
	LSC63SD		19	4,76	10	-	-	-
	LSC317		9,5	2,7	5,2	-	-	-
	LSD32SD	●	8,5	3,18	5	-	-	-
	LSD42SD	●	12,65	3,18	6,9	-	-	-
	LST317CA		9,33	2,7	5	-	-	-
	LST42CA		12,5	3,2	6,7	-	-	-
	LSR817		8,4	2,7	4,8	-	-	-
	LSR917		9	2,7	4,8	-	-	-
	LSR10	●	8,4	3,18	4,7	-	-	-
	LSR12	●	10	3,18	4,7	-	-	-
	LSR16	●	13,5	4,76	6,3	-	-	-
	LSR20	●	17,2	4,76	7,9	-	-	-
	LSR25	●	22	6,35	9,5	-	-	-
	STND323		9,3	3,18	3,4	-	-	-
	STND433		12,5	4,76	3,4	-	-	-
	SSND423	●	12,5	3,18	3,4	-	-	-
	SSND533		15,65	4,76	3,4	-	-	-

SPARE PARTS Shim

Shim

Cat. No.	Stock	Dimensions (mm)					
		A	T	d ₁	d ₂	-	-
STW323	●	9,5	3,18	4,7	6,5	-	-
STW333	●	9,5	4,76	4,7	6,5	-	-
STW434	●	12,65	4,76	6,2	8	-	-
Cat. No.	Stock	Dimensions (mm)					
A	T	d ₁	d ₂	-	-	-	
SSW423	●	12,65	3,18	6,2	8	-	-
SSW433	●	12,65	4,76	6,2	8	-	-
SSW635	●	19	4,76	9	11,5	-	-
Cat. No.	Stock	Dimensions (mm)					
A	T	d ₁	d ₂	-	-	-	
EST32		9,53	3,18	5,5	5,9	-	-
EST43		12,7	4,76	7,5	7,9	-	-
Cat. No.	Stock	Dimensions (mm)					
A	T	d ₁	d ₂	-	-	-	
ESS42		12,7	3,18	7,5	7,9	-	-
Cat. No.	Stock	Dimensions (mm)					
A	T	d	-	-	-	θ°	
LSS42CA		12,5	3,2	6,7	-	-	8
LSS53CA		15,68	4,8	7,7	-	-	10
Cat. No.	Stock	Dimensions (mm)					
A	T	d	-	-	-	θ°	
LSC42CA		12,5	3,2	6,7	-	-	8
LSC53CA		15,68	4,8	7,7	-	-	10
Cat. No.	Stock	Dimensions (mm)					
A	T	d	-	-	-	θ°	
SVW322		9,5	3,18	4,7	6,5	-	35
SFW423		12,65	3,18	6,2	8,0	-	50
SFW433		12,65	4,76	6,2	8,0	-	50
SDW323		9,5	3,18	4,7	6,5	-	55
SDW423		12,65	3,18	6,2	8,0	-	55
SCW323		9,5	3,18	4,8	6,5	-	80
SCW423		12,65	3,18	6,2	8,0	-	80
SCW635		19	4,76	9	11,5	-	80
Cat. No.	Stock	Dimensions (mm)					
A	T	d ₁	d ₂	-	-	-	
SWW433	●	12,65	4,76	6,2	8	-	-

Shim

Cat. No.	Stock	Dimensions (mm)					
		A	T	d	-	-	θ°
SDND433		12,65	4,76	3,4	-	-	55
SEND423		12,5	3,18	3,4	-	-	75
SCND433	●	12,65	4,76	3,4	-	-	80
Cat. No.	Stock	Dimensions (mm)					
A	T	d	-	-	-	θ°	
STPD322	●	8,4	3,18	3,4	-	-	6
STPD422	●	11,0	11,0	3,4	-	-	6
STPL42		11,0	3,18	3,4	-	-	6
Cat. No.	Stock	Dimensions (mm)					
A	T	d	-	-	-	θ°	
SSPD422		11,6	3,18	3,4	-	-	6
SSPD522		14,1	3,18	3,4	-	-	6
Cat. No.	Stock	Dimensions (mm)					
A	T	d	-	-	-	θ°	
SCN204		8,7	2,04	-	-	-	7
Cat. No.	Stock	Dimensions (mm)					
D	T	d	-	-	-	θ°	
SRPH163		14	3,2	5,3	-	-	11
SRPH203		18	3,2	6,3	-	-	11
Cat. No.	Stock	Dimensions (mm)					
D	T	-	-	-	-	-	
BNRS120		11,2	4	-	-	-	-
BNRS160		15,2	4	-	-	-	-
BNRS200		19,2	4	-	-	-	-
BNRS290		28,2	4	-	-	-	-
Cat. No.	Stock	Dimensions (mm)					
D	-	-	-	-	-	-	
SRND32	●	9,5	-	-	-	-	-
SRND42	●	12,7	-	-	-	-	-
Cat. No.	Stock	Dimensions (mm)					
A	T ₁	T ₂	d	-	-	-	
LSTE31-0	●	9,5	2,7	2,7	5,2	-	-
LSTE31-1	●	9,5	2,67	2,91	5,2	-	-
LSTE31-2	●	9,5	2,64	3,11	5,2	-	-
LSTE42-0		12,7	3,18	3,18	7,0	-	-
LSTE42-1		12,7	3,14	3,45	7,0	-	-
LSTE42-2		12,7	3,09	3,71	7,0	-	-
Cat. No.	Stock	Dimensions (mm)					
A	T	d ₁	d ₂	-	-	θ°	
WGCS13R		10,7	3,0	5,5	7,5	-	5

SPARE PARTS

Shim Pin, Nut, Eccentric Pin

Shim Pin

Cat. No.	Stock	Dimensions (mm)						
		d	Pitch	L	D	D ₁	d ₁	
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	
MP445	●	M5	0,8	45	7,5	6	5	

Cat. No.	Stock	Dimensions (mm)				
		d	—	L	D	θ°
SPP308	●	3,2	—	8	4,8	120

Cat. No.	Stock	Dimensions (mm)				
		d	—	L	D	θ°
SPP3	●	—	—	16	3	—

Cat. No.	Stock	Dimensions (mm)				
		d	—	L	D	θ°
LSP3SD	●	5	3,5	5,5	—	—
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	—	—

Nut

Cat. No.	Stock	Dimensions (mm)					
		d	L	D	B	—	—
CPM32N	●	M4	7,5	7	3	—	—
CPM43N	●	M5	8,5	7	3	—	—
CPM43S	●	M5	6	7	3	—	—

Cat. No.	Stock	Dimensions (mm)					
		L	—	—	—	—	—
BNBW-2	●	3	—	—	—	—	
BNBW-4	●	5	—	—	—	—	
BNBW-7	●	8	—	—	—	—	

Eccentric Pin

Cat. No.	Stock	Dimensions (mm)					
		d	D ₁	D ₂	L	ℓ	B
CPB32C	●	3,3	4,1	5,5	14	3,4	2,5
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)					
		d	D ₁	D ₂	L	ℓ	—
P221US	●	2,11	3,5	4	18	3,3	—
P322US	●	3,635	5	5,5	21	3,3	—
P323US	●	3,635	5	5,5	24	3,3	—
P332US	●	3,635	5	5,5	21	4,9	—
P333US	●	3,635	5	5,5	24	4,9	—
P334US	●	3,635	5	5,5	30	4,9	—
P433U	●	5,025	7	7,5	24	4,9	—
P434U	●	5,025	7	7,5	30	4,9	—

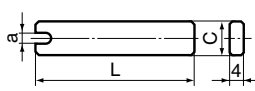
Cat. No.	Stock	Dimensions (mm)					
		d	D ₁	D ₂	L	ℓ	—
P323WS	●	3,635	5	5,8	24	3,3	—
P333WS	●	3,635	5	5,8	24	4,9	—
P334WS	●	3,635	5	5,8	30	4,9	—
P433W	●	5,025	7	7,8	24	4,9	—
P434W	●	5,025	7	7,8	30	4,9	—

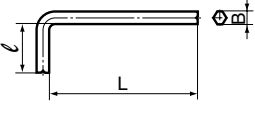
Cat. No.	Stock	Dimensions (mm)					
		d	D ₁	D ₂	L	ℓ	—
CPZ333V	●	3,4	4,1	5,5	29	5	—
CPZ334	●	3,4	4,1	5,5	32	5,5	—
CPZ433	●	4,5	5,5	7	26	5	—
CPZ434	●	4,5	5,5	7	32	5	—
CPZ435	●	4,5	5,5	7	39	5	—
CPZ438	●	4,5	5,5	7	44	5	—

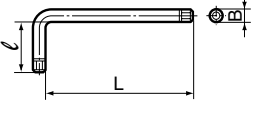
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		d	D ₁	D ₂	L	ℓ	—
CPU304C	●	3,3	5,5	—	10	3,5	3

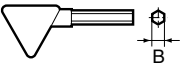
SPARE PARTS Wrench

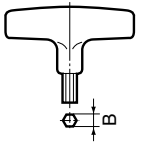
Wrench

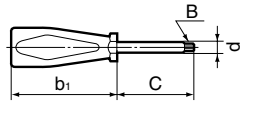
Key Wrench	Cat. No.	Stock	Dimensions (mm)					
			L	a	-	C	-	-
	KY25		45	2,5	-	10	-	-
	KY40		60	4	-	13	-	-

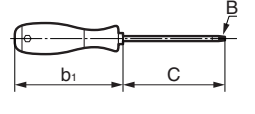
Hex Wrench (Hexagonal)	Cat. No.	Stock	Dimensions (mm)					
			B	L	ℓ	-	-	-
	LH015		1,5	52	8	-	-	-
	LH020	●	2	58	12	-	-	-
	LH025	●	2,5	60	15	-	-	-
	LH030	●	3	65	20	-	-	-
	LH035	●	3,5	70	25	-	-	-
	LH040	●	4	72	25	-	-	-
	LH050	●	5	80	28	-	-	-
LH060	●	6	90	32	-	-	-	

Torx Wrench	Cat. No.	Stock	Dimensions (mm)					
			B	d	L	ℓ	-	-
	LT08-06		T8	2,3	45,0	6,0	-	-
	LT20	●	T20	3,9	57,2	19,1	-	-
	LT25	●	T25	4,4	60,3	20,2	-	-

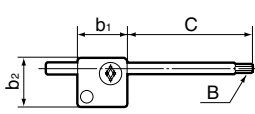
Hex Wrench (Hexagonal)	Cat. No.	Stock	Dimensions (mm)					
			B	-	-	-	-	-
	TH015	●	1,5	-	-	-	-	-
	TH020	●	2	-	-	-	-	-
	TH025	●	2,5	-	-	-	-	-

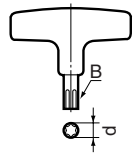
Hex Wrench (Hexagonal)	Cat. No.	Stock	Dimensions (mm)					
			B	-	-	-	-	-
	TH030	●	3	-	-	-	-	-
	TH040	●	4	-	-	-	-	-
	TH050	●	5	-	-	-	-	-

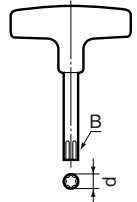
Torx Wrench	Cat. No.	Stock	Dimensions (mm)					
			B	d	C	B ₁	-	-
	TRD07	●	T7	2,0	45	70	-	-
	TRD08	●	T8	2,3	55	70	-	-
	TRD15	●	T15	3,9	70	100	-	-
	TRD20	●	T20	4,6	100	90	-	-
	TRD25	●	T25	5,3	80	110	-	-

Torx Wrench	Cat. No.	Stock	Dimensions (mm)					
			B	C	B ₁	B ₂	-	-
	TRDR08 IP	●	8IP	60	104	-	-	-
	TRDR10 IP	●	10IP	80	111	-	-	-
	TRDR15 IP	●	15IP	80	111	-	-	-
	TRDR20 IP	●	20IP	100	118	-	-	-
	TRDR25 IP	●	25IP	100	118	-	-	-

Wrench

Torx Wrench	Cat. No.	Stock	Dimensions (mm)					
			B	d	-	-	-	-
	TRX06	●	T6	34,5	15	15	-	-
	TRX08	●	T8	34,5	19	19	-	-
	TRX10	●	T10	42,5	22	22	-	-
	TRX15	●	T15	45	22	27	-	-
	TRX20	●	T20	49,0	22	30	-	-

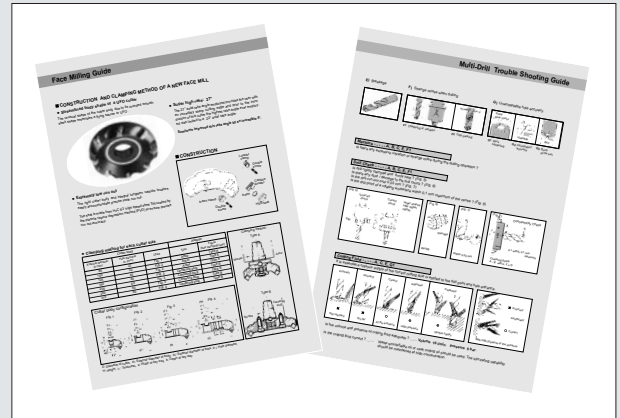
Torx Wrench	Cat. No.	Stock	Dimensions (mm)					
			B	d	-	-	-	-
	TT20	●	T20	3,9	-	-	-	-
	TT25	●	T25	4,4	-	-	-	-
	TT27	●	T27	5,0	-	-	-	-

Torx Wrench	Cat. No.	Stock	Dimensions (mm)					
			B	d	-	-	-	-
	TTX15W	●	T15	-	-	-	-	-
	TTX20	●	T20	3,9	-	-	-	-

Problem and Remedies / References

N9 ~ N16

N



Trouble Shooting for Turning	N10
Trouble Shooting for Milling	N11
Trouble Shooting for Endmilling	N12
Trouble Shooting for Drilling	N13
Steel and Non-Ferrous Metal Symbols Chart	N14
Hardness Scale Comparison Chart	N15
Finished Surface Roughness	N16

Problem and Remedies

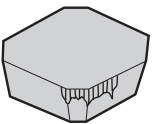
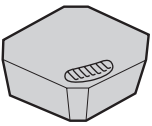
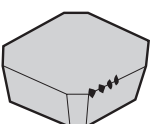
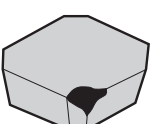
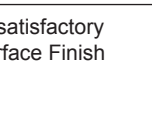
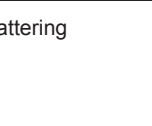
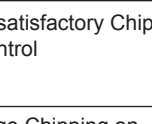
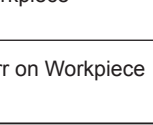

Form of Tool Failures

	No.	Failure	Cause	
	1~5	Flank Wear	Physical	Due to the scratching effect of hard grains contained within the work material.
	6	Chipping		Fine breakages caused by high pressure cutting, chatter and vibration, etc.
	7	Partial Fracture		Due to mechanical impact when an excessive force is applied to the cutting edge.
	8	Crater Wear	Chemical	Due to a combination of galling and welding between the chips and the top rake.
	9	Plastic Deformation		The cutting edge is deformed due to its softening at high temperature.
	10	Thermal Crack		Thermal fatigue from the heating and cooling cycle during interrupted cutting.
	11	Built-up Edge		The deposition and adhesion of the hardened work material on the cutting edge.

Trouble Shooting Guide for Turning

Failure		Basic Remedies		Remedies Examples		
Cutting Edge Failure	Excessive Flank Wear 	Tool Material	- Select a more wear resistant grade.	- Recommended insert grades		
		Cutting Conditions	- Reduce cutting speeds.		Steel	Cast Iron
		Tool Design	- Select a large rake angle.	Finishing	T2000Z (Coated Cermet)	BN700 (SumiBoron)
				Roughing	AC700G (Coated Carbide)	AC300G (Coated Carbide)
	Excessive Crater Wear 	Tool Material	- Select a crater wear resistant grade.	- Recommended insert grades		
	Cutting Conditions	- Decrease cutting speeds. Reduce depth-of cut and feed rate.		Steel	Cast Iron	
	Tool Design	- Select a large rake angle. - Select an appropriate chipbreaker.		Finishing	T3000Z (Coated Cermet)	BN700 (SumiBoron)
				Roughing	AC700G (Coated Carbide)	AC300G (Coated Carbide)
	Cutting Edge Chipping 	Tool Material	- Select a tougher grade. P10 ⇒ P20 ⇒ P30 K01 ⇒ K10 ⇒ K20	- Recommended insert grades		
	Cutting Conditions	- If built-up-edge is the cause, select a less susceptible grade (Cermet). - If increase cutting speeds. (If the cause is built-up edge)		Steel	Cast Iron	
	Tool Design	- Select a smaller rake angle.		Finishing	T3000Z (Coated Cermet)	AC300G (Coated Carbide)
				Roughing	AC3000 (Coated Carbide)	AC700G (Coated Carbide)
	Cutting Edge Fracture 	Tool Material	- Select a tougher grade. P10 ⇒ P20 ⇒ P30 K01 ⇒ K10 ⇒ K20	- Recommended insert grades		
	Cutting Conditions	- Reduce depth-of-cut and feed rate. - Select a strong cutting edged chipbreaker. - Use a holder with a larger approach angle.		Steel	Cast Iron	
	Tool Design	- Use a large shank tool holder.		Roughing	AC3000 (Coated Carbide)	AC2000 (Coated Carbide)
	Built-Up Edge	Tool Material	- Select an adhesion resistant.	- Recommended insert grade: T2000Z (Coated Cermet).		
	Cutting Conditions	- Increase cutting speeds and feed rates. - Select a higher heat resistant grade.				
	Plastic Deformation	Tool Material	- Select a higher heat resistant grade.	- Recommended insert grade: AC700G (Coated Carbide).		
	Cutting Conditions	- Increase cutting speeds and feed rates. - Select a higher heat resistant grade.				

■ Trouble Shooting Guide for Milling

Trouble		Basic Remedies		Remedy Examples															
Cutting Edge Failure	Excessive Flank Wear 	Tool Material Carbide $(P30 \Rightarrow P20) \Rightarrow \begin{cases} \text{Coated} \\ \text{Cermet} \end{cases}$ $(K20 \Rightarrow K10)$	- Select a more wear resistant grade. - Reduce cutting speeds. - Increase feedrate.	- Recommended insert grades <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>ACZ310 (Coated Carbide)</td> <td>DA2200 (SumiDia)</td> </tr> <tr> <td>Roughing</td> <td>AC330 (Coated Carbide) AC230 (Coated Carbide)</td> <td>AC211 (Coated Carbide)</td> <td>H1 (Uncoated Carbide)</td> </tr> </tbody> </table>					Steel	Cast Iron	Non-Ferrous Alloy	Finishing	T250A (Cermet)	ACZ310 (Coated Carbide)	DA2200 (SumiDia)	Roughing	AC330 (Coated Carbide) AC230 (Coated Carbide)	AC211 (Coated Carbide)	H1 (Uncoated Carbide)
		Steel	Cast Iron	Non-Ferrous Alloy															
	Finishing	T250A (Cermet)	ACZ310 (Coated Carbide)	DA2200 (SumiDia)															
	Roughing	AC330 (Coated Carbide) AC230 (Coated Carbide)	AC211 (Coated Carbide)	H1 (Uncoated Carbide)															
Excessive Crater Wear 	Tool Material Carbide	- Select crater wear resistant grade. - Reduce cutting speeds. - Reduce depth-of-cut and feedrate.	- Recommended insert grades <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>ACZ310 (Coated Carbide)</td> <td>DA2200 (SumiDia)</td> </tr> <tr> <td>Roughing</td> <td>AC230 (Coated Carbide)</td> <td>AC211 (Coated Carbide)</td> <td>H1 (Uncoated Carbide)</td> </tr> </tbody> </table>					Steel	Cast Iron	Non-Ferrous Alloy	Finishing	T250A (Cermet)	ACZ310 (Coated Carbide)	DA2200 (SumiDia)	Roughing	AC230 (Coated Carbide)	AC211 (Coated Carbide)	H1 (Uncoated Carbide)	
	Steel	Cast Iron	Non-Ferrous Alloy																
Finishing	T250A (Cermet)	ACZ310 (Coated Carbide)	DA2200 (SumiDia)																
Roughing	AC230 (Coated Carbide)	AC211 (Coated Carbide)	H1 (Uncoated Carbide)																
Cutting Edge Chipping 	Tool Material Carbide $P10 \Rightarrow P20 \Rightarrow P30$ $K01 \Rightarrow K10 \Rightarrow K20$	- Select tougher grade. - Reduce feed rates. - Select a negative-positive cutter configuration with a large approach angle. - Reinforce the cutting edge (Honing).	- Recommended insert grades <table border="1"> <thead> <tr> <th></th> <th>Steel</th> <th>Cast Iron</th> </tr> </thead> <tbody> <tr> <td>Finishing</td> <td>ACZ310 (Coated Carbide)</td> <td>EH10Z (Coated Carbide) EH20 (Uncoated Carbide)</td> </tr> <tr> <td>Roughing</td> <td>ACZ350 (Coated Carbide)</td> <td>ACZ310 (Coated Carbide)</td> </tr> </tbody> </table> - Recommended cutter: WaveMill WGC type - Cutting conditions: refer to recommended conditions listed in the general catalogue					Steel	Cast Iron	Finishing	ACZ310 (Coated Carbide)	EH10Z (Coated Carbide) EH20 (Uncoated Carbide)	Roughing	ACZ350 (Coated Carbide)	ACZ310 (Coated Carbide)				
	Steel	Cast Iron																	
Finishing	ACZ310 (Coated Carbide)	EH10Z (Coated Carbide) EH20 (Uncoated Carbide)																	
Roughing	ACZ350 (Coated Carbide)	ACZ310 (Coated Carbide)																	
Partial Fracture of Cutting Edges 	Tool Material Carbide Cermet	- If it is due to excessive low speeds or very low feed rates, select an adhesion resistant grade. - If it is due to thermal cracking, select a thermal impact resistant grade. - Select appropriate conditions with regards to the particular application. - Select a negative-positive (or negative) cutter configuration with a large approach angle. - Reinforce the cutting (Honing) - Increase insert size- (Thickness in particular).	- Recommended insert grades <table border="1"> <thead> <tr> <th></th> <th>Steel</th> <th>Cast Iron</th> </tr> </thead> <tbody> <tr> <td>Roughing</td> <td>ACZ350 (Coated Carbide)</td> <td>ACZ310 (Coated Carbide)</td> </tr> </tbody> </table> - Recommended cutter: WaveMill WGC type - Insert thickness: 3,18 4,76mm - Insert type: Standard Strong edge type - Cutting conditions: Refer to recommended conditions listed in the general catalogue					Steel	Cast Iron	Roughing	ACZ350 (Coated Carbide)	ACZ310 (Coated Carbide)							
	Steel	Cast Iron																	
Roughing	ACZ350 (Coated Carbide)	ACZ310 (Coated Carbide)																	
Others	Unsatisfactory Surface Finish 	Tool Material Carbide Cermet	- Select an adhesion resistant grade. - Increase cutting speeds. - Improve axial run-out of cutting edges. (Use a cutter with less run-out) (Attach correct inserts) - Use wiper inserts. - Use special purpose cutters designed for finishing..	- Recommended insert grades <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>WGC type ACZ330 (Coated Carbide)</td> <td>DPG(F) type* H10E (Carbide)</td> <td>RF type* H1 (Carbide)</td> </tr> <tr> <td>Finishing</td> <td>WGC type T250A (Cermet)</td> <td>FMU type BN700 (SumiBoron)</td> <td>FMU type DA2200 (SumiBoron)</td> </tr> </tbody> </table> * marked cutters can be fitted with wiper inserts.					Steel	Cast Iron	Non-Ferrous Alloy	Roughing	WGC type ACZ330 (Coated Carbide)	DPG(F) type* H10E (Carbide)	RF type* H1 (Carbide)	Finishing	WGC type T250A (Cermet)	FMU type BN700 (SumiBoron)	FMU type DA2200 (SumiBoron)
		Steel	Cast Iron	Non-Ferrous Alloy															
	Roughing	WGC type ACZ330 (Coated Carbide)	DPG(F) type* H10E (Carbide)	RF type* H1 (Carbide)															
	Finishing	WGC type T250A (Cermet)	FMU type BN700 (SumiBoron)	FMU type DA2200 (SumiBoron)															
	Chattering 	Cutting Conditions Tool Design Others	- Reduce number of teeth. - Select a high rake cutter with sharp cutting edges - Use an irregular pitched cutter. - Improve workpiece and cutter clamp rigidity.	- Recommended cutters: For steel: WaveMill WGC type For cast iron: Face Mill DPG(F) type For Non-ferrous alloy: RF type high speed cutter for aluminium															
Unsatisfactory Chip Control 	Tool Design	- Select cutter with good chip removal features. - Reduce number of teeth. - Enlarge chip pocket.	- Recommended cutter: WaveMill WGC type																
Edge Chipping on Workpiece 	Tool Design Cutting Conditions	- Select a large approach angle. - Reduce feed rate.	- Recommended cutter: WaveMill WGC type																
Burr on Workpiece 	Tool Design Cutting Conditions	- Select a cutter with sharp cutting edges. - Increase feed rates.	- Recommended cutter: WaveMill WGC type																

Problem and Remedies

■ Trouble Shooting Guide for Endmilling

Failure		Basic Remedies		Remedies Examples
Cutting Edge Failure	Excessive Wear on Periphery and Cutting Edge Corner	Tool Material	- Select a more wear resistant grade.	- Uncoated type ⇒ Coated type, eg. GS MILL.
		Cutting Conditions	- Reduce cutting speeds. - Increase feed rates. - Check the cutting fluid use.	- Cutting fluid: Water soluble ⇒ Oil based
	Chipping on Cutting Edge	Cutting Conditions	- Reduce feed rates. - Use Down-cut milling. - Reduce depth-of-cut.	- Refer to recommended cutting conditions listed in the general catalogue.
		Machine and Others	- Remove backlash on machine. - Ensure strong workpiece clamping. - Improve tool clamp rigidity. - Reduce tool overhang.	- Check for damage on the collet and run-out precision
	Tool Breakage During Machining	Cutting Conditions	- Increase cutting speeds. - Reduce feed rates. - Reduce depth-of-cut. - Reduce tool overhang.	- Use an arbor speed inducer if spindle speed is too slow
		Tool Design	- Shorten the length of cut.	- Check for damage on the collet and run-out precision
Unsatisfactory Surface Finish	Unsatisfactory Surface Finish: - Surface Roughness - Surface Waviness - Squareness	Tool Material	- Select a grade with high Young's Modulus. - Select an adhesion resistant grade.	
		Cutting Conditions	- Reduce feed rates. - Reduce the depth-of-cut. - Use Down-cut milling.	- Use high helix type endmills, eg. HSM type
		Tool Design	- Select a large helix angle. - Increase the number of flutes. - Shorten the length of cut.	- 4 teeth ⇒ 2 teeth eg. SSM2000/ZX type change to SSM4000/ZX type or GLM4000SF type
		Others	- Prevent build-up on the cutting edge.	- For Aluminium endmilling, select ASM-DL type or
	Chattering	Cutting Conditions	- Reduce cutting speeds. - Use Down-cut milling. - Use cutting fluid.	
		Tool Design	- Improve workpiece and tool clamp rigidity.	- Check clearances between the spindle chuck and collet. - Check clearances between the collet and endmill.
Others	Packing of Chip	Tool Material	- Reduce feed rates. - Reduce depth-of-cut.	
		Cutting Conditions	- Reduce the number of flutes. - Improve chip evacuation capabilities.	- 4 teeth ⇒ 2 teeth - Use good chip evacuation type endmills, eg. UP MILL or GS MILL
		Tool Design	- Increase the amount of cutting fluid.	

■ Trouble Shooting Guide for Drilling

Failure		Basic Remedies		Remedies Examples
Drill Failures	Excessive Wear of the Cutting Edge	Cutting Conditions Cutting Fluid	- Use higher cutting speed range. - Increase feed rates. - Increase pressure if using internal coolant. - Use cutting fluid with more lubricity.	- $V_c=80\sim 100\text{m/min}$ - Refer to recommended cutting conditions listed in the general catalogue. - Below 1,5MPa.
	Excessive Wear of the Cutting Edge	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 phase. - Improve workpiece clamping rigidity.	- $f=0,05\sim 0,1\text{mm/rev}$.
	Chipping on Peripheral Cutting Edge	Tool Design Cutting Conditions Cutting Fluid Others	- Increase amount of edge honing. - Reduce margin width. - 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. - Improve workpiece clamp rigidity.	- 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. - Increase feed rates. - Use cutting fluid with more lubricity. - Improve workpiece clamp rigidity.	- Refer to recommended cutting conditions listed in the general catalogue.
	Unsatisfactory Surface Finish	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.
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
Others	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.

■ 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	—	20Cr4
SCr430	5130	34Cr4
SCr435	5135	37Cr4
SCr440	5140	42Cr4
SCr445	5147	—

● Cr-Mo Steels

JIS	AISI	DIN
SCM415	—	15CrMo5
SCM420	—	20CrMo5
SCM430	4130	25CrMo4
SCM435	4135	34CrMo4
SCM440	4140	42CrMo4
SCM445	4145	—

● Mn Steels and Mn-Cr Steels for Structural Use

JIS	AISI	DIN
SMn420	1522	—
SMn433	1536	—
SMn438	1541	—
SMn443	1541	—
SMnC420	—	—
SMnC443	—	—

● Cr-Mo Steels

JIS	AISI	DIN
SK1	W1-13	—
SK2	W1-11 1/2	—
SK3	W1-10	C105W1
SK4	W1-9	—
SK5	W1-8	C80W1
SK6	W1-7	C80W1
SK7	—	C70W2

● High Speed Steels

JIS	AISI	DIN
SKH2	T1	—
SKH3	T4	—
SKH10	T15	—
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	20	GG-10
FC150	25	GG-15
FC200	30	GG-20
FC250	35	GG-25
FC300	40	GG-30
FC350	50	GG-35

● Nodular Cast Iron

JIS	AISI	DIN
FCD400	—	GGG-40
FCD450	60/40/8	GGG-40.3
FCD500	65/45/12	GGG-50
FCD600	80/55/06	GGG-60
FCD700	100/70/03	GGG-70

● Ferritic Stainless Steels

JIS	AISI	DIN
SUS405	AISI 405	DINX6CrAl13
SUS429	AISI 429	—
SUS430	AISI 430	DINX6Cr17
SUS430F	AISI 430F	DINX12CrMoS17
SUS434	AISI 434	—

● Martensitic Stainless Steels

JIS	AISI	DIN
SUS403	AISI 403	—
SUS410	AISI 410	DINX10Cr13
SUS416	AISI 416	—
SUS420J1	AISI 420	DINX20Cr13
SUS420F	AISI 420F	—
SUS431	AISI 431	DINX20CrNi172
SUS440A	AISI 440A	—
SUS440B	AISI 440B	—
SUS440C	AISI 440C	—

● Austenitic Stainless Steels

JIS	AISI	DIN
SUS201	AISI 201	—
SUS202	AISI 202	—
SUS301	AISI 301	—
SUS302	AISI 302	—
SUS302B	AISI 302B	—
SUS303	AISI 303	DINX10CrNiS189
SUS303Se	AISI 303Se	—
SUS304	AISI 304	DINX5CrNi1810
SUS304L	AISI 304L	DINX2CrNi1911
SUS304NI	AISI 304N	—
SUS305	AISI 305	DINX5CrNi1812
SUS308	AISI 308	—
SUS309S	AISI 309S	—
SUS310S	AISI 310S	—
SUS316	AISI 316	DINX5CrNiMo17122
SUS316L	AISI 316L	DINX2CrNiMo17132
SUS316N	AISI 316N	—
SUS317	AISI 317	DINX2CrNiMo18164
SUS317L	AISI 317L	—
SUS321	AISI 321	—
SUS347	AISI 347	DINX6CrNiNb1810
SUS384	AISI 384	—

● Heat Resisting Steels

JIS	AISI	DIN
SUH31	—	—
SUH35	—	—
SUH36	—	—
SUH37	—	—
SUH38	—	—
SUH309	AISI 309	—
SUH310	AISI 310	DINCrNi2520
SUH330	AISI 330	—

● Ferritic Heat Resisting Steels

JIS	AISI	DIN
SUH21	—	DINCrAl1205
SUH409	AISI 409	DINX6CrTi12
SUH446	AISI 446	—

● Martensitic Heat Resisting Steels

JIS	AISI	DIN
SUH1	—	—
SUH3	—	—
SUH4	—	—
SUH11	—	—
SUH600	—	—

■ Hardness Scale Comparison Chart

Brinell Hardness (HB) 3.000kgf	Rockwell Hardness				Vickers Hardness 50kgf	Shore Hardness	Traverse Rupture Strength (kg/mm ²)
	"A" Scale 60kgf (Brale)	"B" Scale 100kgf (1/10" Ball)	"C" Scale 150kgf (Brale)	"D" Scale 100kgf (Brale)			
—	85,6	—	68,0	76,9	940	97	—
—	85,3	—	67,5	76,5	920	96	—
—	85,0	—	67,0	76,1	900	95	—
767	84,7	—	66,4	75,7	880	93	—
757	84,4	—	65,9	75,3	860	92	—
745	84,1	—	65,3	74,8	840	91	—
733	83,8	—	64,7	74,3	820	90	—
722	83,4	—	64,0	73,8	800	88	—
712	—	—	—	—	—	—	—
710	83,0	—	63,3	73,3	780	87	—
698	82,6	—	62,5	72,6	760	86	—
684	82,2	—	61,8	72,1	740	—	—
682	82,2	—	61,7	72,0	737	84	—
670	81,8	—	61,0	71,5	720	83	—
656	81,3	—	60,1	70,8	700	—	—
653	81,2	—	60,0	70,7	697	81	—
647	81,1	—	59,7	70,5	690	—	—
638	80,8	—	59,2	70,1	680	80	—
630	80,6	—	58,8	69,8	670	—	—
627	80,5	—	58,7	69,7	667	79	—
601	79,8	—	57,3	68,7	640	77	—
578	79,1	—	56,0	67,7	615	75	—
555	78,4	—	54,7	66,7	591	73	210
534	77,8	—	53,5	65,8	569	71	202
514	76,9	—	52,1	64,7	547	70	193
495	76,3	—	51,0	63,8	528	68	186
477	75,6	—	49,6	62,7	508	66	177
461	74,9	—	48,5	61,7	491	65	170
444	74,2	—	47,1	60,8	472	63	162
429	73,4	—	45,7	59,7	455	61	154
415	72,8	—	44,5	58,8	440	59	149
401	72,0	—	43,1	57,8	425	58	142
388	71,4	—	41,8	56,8	410	56	136
375	70,6	—	40,4	55,7	396	54	129
363	70,0	—	39,1	54,6	383	52	124
352	69,3	(110,0)	37,9	53,8	372	51	120
341	68,7	(109,0)	36,6	52,8	360	50	115
331	68,1	(108,5)	35,5	51,9	350	48	112

Brinell Hardness (HB) 3.000kgf	Rockwell Hardness				Vickers Hardness 50kgf	Shore Hardness	Traverse Rupture Strength (kg/mm ²)
	"A" Scale 60kgf (Brale)	"B" Scale 100kgf (1/10" Ball)	"C" Scale 150kgf (Brale)	"D" Scale 100kgf (Brale)			
321	67,5	(108,0)	34,3	50,1	339	47	108
311	66,9	(107,5)	33,1	50,0	328	46	105
302	66,3	(107,0)	32,1	49,3	319	45	103
293	65,7	(106,0)	30,9	48,3	309	43	99
285	65,3	(105,5)	29,9	47,6	301	—	97
277	64,6	(104,5)	28,8	46,7	292	41	94
269	64,1	(104,0)	27,6	45,9	284	40	91
262	63,6	(103,0)	26,6	45,0	276	39	89
255	63,0	(102,0)	25,4	44,2	269	38	86
248	62,5	(101,0)	24,2	43,2	261	37	84
241	61,8	100,0	22,8	42,0	253	36	82
235	61,4	99,0	21,7	41,4	247	35	80
229	60,8	98,2	20,5	40,5	241	34	78
223	—	97,3	(18,8)	—	234	—	—
217	—	96,4	(17,5)	—	228	33	74
212	—	95,5	(16,0)	—	222	—	72
207	—	94,6	(15,2)	—	218	32	70
201	—	93,8	(13,8)	—	212	31	69
197	—	92,8	(12,7)	—	207	30	67
192	—	91,9	(11,5)	—	202	29	65
187	—	90,7	(10,0)	—	196	—	63
183	—	90,0	(9,0)	—	192	28	63
179	—	89,0	(8,0)	—	188	27	61
174	—	87,8	(6,4)	—	182	—	60
170	—	86,8	(5,4)	—	178	26	58
167	—	86,0	(4,4)	—	175	—	57
163	—	85,0	(3,3)	—	171	25	56
156	—	82,9	(0,9)	—	163	—	53
149	—	80,8	—	—	156	23	51
143	—	78,7	—	—	150	22	50
137	—	76,4	—	—	143	21	47
131	—	74,0	—	—	137	—	46
126	—	72,0	—	—	132	20	44
121	—	69,8	—	—	127	19	42
116	—	67,6	—	—	122	18	41
111	—	65,7	—	—	117	15	39

1) Figures within the () are not commonly used
 2) Rockwell A, C and D scales utilises a diamond brale

Reference

■ Finished Surface Roughness

● Types of Surface Roughness Measurements

Types	Symbol	Method of Determination	Descriptive Figure
Maximum Height	# 1) Rz	This is the value (expressed in μm) measured from the deepest valley to the highest peak of the reference line, ℓ , extracted from the profile. (Disregard unusually high peaks and deep valleys as they are considered as flaws.)	
Ten-point Mean Roughness	# 2) Rz _{JIS}	From the profile, extract a portion to be the reference line, ℓ . Select the 5 highest peak and 5 deepest valleys. Measure the distance between the two lines and express it in μm . (1 μm = 0,001mm)	
Calculated Roughness	Ra	This method is to obtain a center line between the peaks and valleys within the reference line, ℓ . 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 ℓ in μm .	

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) Rz : According to new **JIS B 0601:2001** (Old symbol: Ry)

2) Rz_{JIS} : According to new **JIS B 0601:2001** (Old symbol: Rz)

Designated values for # 1) Rz	Designated values for # 2) Rz _{JIS}	Designated values for Ra	Standard reference length values, ℓ (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	0,40a 0,80a 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.

Index

N

N17 ~ N24



A

1,8x45	Spare parts	G17, M22, M27
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APET○○○○○○PDER-S	Indexable insert	H9, H11
APMT○○○○○○PDER	Indexable insert	H9, H11
APMT○○○○○○PDER-H	Indexable insert	H9, H11
ASM○○○○DL	Solid endmill	J11
AXET○○○○○○PEFR-S	Indexable insert	H6, H7
AXMT○○○○○○PEER-G	Indexable insert	H6, H7
AXMT○○○○○○PEER-H	Indexable insert	H6, H7
AXMT○○○○○○PEER-L	Indexable insert	H7

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B○○○-SCLC R/L ○○○○-○○	Boring bar	E12
B○○○-SDQC R/L ○○○○-○○	Boring bar	E15
B○○○-SDUC R/L ○○○○-○○	Boring bar	E14
BCH○○○R	Spare parts	E11
BCLN○○○ R/L	Boring bar	E7
BCS○○	Spare parts	F7
BDUN○○○ R/L	Boring bar	E8
BDZN○○○ R/L	Boring bar	E8
BFTG○○○○F	Spare parts	H15, N2
BFTX○○○○	Spare parts	G20, N2
BFTX○○○○○	Spare parts	D30, E19, F12, F13, H16 K29, K30, N2
BFTX○○○○○IP	Spare parts	G6, N2
BFTX○○○○○ON	Spare parts	D30, E12, E14, E15, E17 E19, H16, K29, K30, N2
BFTX○○○○○A	Spare parts	E13, E16, E18, E20, N2
BFTX○○○○○IP	Spare parts	G6, H6, H7, N2
BFTX○○○○○ON	Spare parts	D7, D8, D9, D23, D24 D25, D26, D28, D29, D31 E6, E12, E14, E15, E17, G17 G18, G19, G20, H9, H11 H13, H16, H17, M27, N2
BFTX○○○○○T8 R/L	Spare parts	F2, N2
BFTY○○○○○	Spare parts	K29, K30, N2
BFX	Spare parts	N3
BH○○○○	Spare parts	D20, G17, M21, M27, N2
BH○○○○ R/L	Spare parts	D18, N2
BH○○○○○	Spare parts	E19, N2
BH○○○○○T	Spare parts	G22, N2
BHA○○○○	Spare parts	D15, D17, N2
BHE	Spare parts	N2
BHF	Spare parts	N2
BNB○○○ R/L	Boring bar	M21
BNBB○○R	Boring bar	M20
BNBC	Spare parts	M21
BNBWO	Spare parts	M21, N6
BNES○○○○	SUMIBORON Endmill	M30
BNGC R/L	Spare parts	M22
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BNGG R/L ○○○○-TT	Tool holder	M22
BNGT○○○○ R/L	SUMIBORON insert	M22
BNGS R/L ○○○	Spare parts	M22

BNGS R/L TT	Spare parts	M22
BNRS	Spare parts	N5
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BSKN○○○ R/L	Boring bar	E9
BSYN○○○ R/L	Boring bar	E9
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BTD○○○○	Spare parts	G14, G17, M24, M27, N3
BTFN○○○ R/L	Boring bar	E10
BTR○○○○	Indexable insert	D23
BTT○○○○	Spare parts	D24, D25
BW○○○○F	Spare parts	G6, N3
BWS○○	Spare parts	F5, F7
BX○○○○	Spare parts	D7, E6, F5, F7, G14 M22, M24, N3
BXD○○○○○IP	Spare parts	K27, N3

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C○○○-SSKP R/L ○○	Boring bar	E16
C○○○-STUB R/L ○○	Boring bar	E18
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C○○○-SWUB R/L ○○	Boring bar	E20
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CBC○○○○	Spare parts	D18
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CCGT○○○○○○ONAG	Indexable insert	C9
CCGT○○○○○○ONSC	Indexable insert	C9
CCGT○○○○○○ORFX	Indexable insert	C9
CCGW○○○○○○	SUMIBORON insert	M2
CCGW○○○○○○ONC-2	SUMIBORON insert	M2
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CCGW○○○○○○ONU	SUMIBORON insert	M2
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CCM8UL	Spare parts	D18
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CCMT○○○○○○ONF	Indexable insert	M3
CCMT○○○○○○ONFP	Indexable insert	C10
CCMT○○○○○○ONLU	Indexable insert	C10
CCMT○○○○○○ONLU-W	Indexable insert	C10
CCMT○○○○○○ONMU	Indexable insert	C10
CCMT○○○○○○ONSK	Indexable insert	C10
CCMT○○○○○○ONSU	Indexable insert	C10
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CNMA0000000NU.....	SUMIBORON Insert	M5
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CNMG0000000NFA.....	Indexable insert.....	C4
CNMG0000000NFL.....	Indexable insert.....	C4
CNMG0000000NGU.....	Indexable insert.....	C5
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CNMG0000000NLU.....	Indexable insert.....	C4
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CNMG0000000NMU.....	Indexable insert.....	C6
CNMG0000000NMX.....	Indexable insert.....	C6
CNMG0000000NSU.....	Indexable insert.....	C4
CNMG0000000NUG.....	Indexable insert.....	C5
CNMG0000000NUP.....	Indexable insert.....	C5
CNMG0000000NUX.....	Indexable insert.....	C6
CNMG0000000NUZ.....	Indexable insert.....	C6
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CNMM0000000NHP.....	Indexable insert.....	C7
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SDMR0000AEN	Indexable insert	G13	SPGN0000000T	Indexable insert	C25
SDMW00000ZDTR	Indexable insert	G18	SPGW0000000T	Indexable insert	C24
SDNCN 0000-000	Tool holder	D26	SPMA0000000	Indexable insert	H17
SDND	Spare parts	N5	SPMR0000000NFK	Indexable insert	C25
SDW000	Spare parts	E8, N5	SPMR0000000NSF	Indexable insert	C25
SEAN0000AFN	Indexable insert	G11	SPMT0000000	Indexable insert	H13
SEAN0000AFTN	Indexable insert	G11	SPMT0000000NFK	Indexable insert	C24
SECW00000AGTN-N-NF	Indexable insert	G7	SPMT0000000NSF	Indexable insert	C24
SEET00000AGFN-L	Indexable insert	G7	SPP000	Spare parts	N6
SEET00000AGSN-G	Indexable insert	G7	SPP3	Spare parts	D18, D19, D20, N6
SEET00000AGSN-N	Indexable insert	G7	SRFOOR-ST	Cutter	G15, M25
SEKN0000AFN	Indexable insert	G11	SRFOORS	Cutter	G15, M25
SEKN0000AFTN	Indexable insert	G11	SRFJ	Spare parts	N3
SEKN0000AZ	Indexable insert	G11	SRND00	Spare parts	D19, N5
SEKR0000AFEN	Indexable insert	G11	SRPH000	Spare parts	N5
SEKR0000AFTN	Indexable insert	G11	SSB0000ZX	Solid endmill	J21
SEM0000AFEN	Indexable insert	G11	SSBC R/L 0000-000	Tool holder	D28
SEM0000AFTN	Indexable insert	G11	SSM0000	Solid endmill	J22, J23
SEMT00000AGSN-G	Indexable insert	G7	SSM0000ZX	Solid endmill	J12
SEMT00000AGSN-H	Indexable insert	G7	SSN0000	Spare parts	D18
SEMT00000AGSN-L	Indexable insert	G7	SSND000	Spare parts	D18, D20, N4
SFKN00000AZFN	Indexable insert	G9	SSPD000	Spare parts	N5
SFKN00000AZTN	Indexable insert	G9	SSUP00000ZX	Solid endmill	J9
SFKR00000AZTN	Indexable insert	G9	SSUP00000ZX-ROO	Solid endmill	J9
SL-0	Spare parts	F8	SSW000	Spare parts	E9
SMDH0000D	Multi-Drill	K27	STAC R/L 0000-000	Tool holder	D29
SMDH0000MO	Multi-Drill	K27	STER0000	Tool holder	F12
SMDT00000MTL	Indexable insert	K27	STFH00-0	Tool holder	F4
SNB00000DL	Solid endmill	J19	STFS R/L 0000-0	Tool holder	F4
SNB00000ZX	Solid endmill	J21	STGC R/L 0000-000	Tool holder	D29
SNEW00000ADFR-NF	SUMIDIA insert	G14, M24	STIR000	Tool holder	F13
SNEW00000ADFR-NF	SUMIDIA insert	G15, M25	STND000	Spare parts	N4
SNEW00000ADFR-R-NF	SUMIDIA insert	G15, M25	STPD000	Spare parts	N5
SNEW00000ADFR-U-NF	SUMIDIA insert	G15, M25	STPLO0	Spare parts	N5
SNEW00000ADFR-W-NF	SUMIDIA Insert	G14, M24	STW000	Spare parts	D15, E10, N5
SNEW00000ADT L/R	SUMIBORON Insert	G17, M27	SVJB R/L 0000-000	Tool holder	D30
SNEW00000ADT L/R-S	SUMIBORON Insert	G17, M27	SVLC R/L 0000-000	Tool holder	D31
SNGA0000000	Indexable insert	C22	SVPO0	Spare parts	D30, E19
SNGA0000000NC-4	SUMIBORON Insert	M10	SVPB R/L 0000-000	Tool holder	D30

SVPC R/L 0000-000	Tool holder	D31
SVVB0000-000	Tool holder	D30
SVW000	Spare parts	D16, N5
SWW000	Spare parts	D17, N5

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TBGN000000B	SUMIBORON Insert	M11
TBGN000000NF	SUMIDIA Insert	M11
TBGT000000LFX	Indexable insert	C31
TBGT000000LW	Indexable insert	C31
TBGT000000RFX	Indexable insert	C31
TBGT000000RW	Indexable insert	C31
TBGW000000NF	SUMIDIA Insert	M11
TCGT000000NAG	Indexable insert	C31
TCGT000000NSC	Indexable insert	C31
TCGW000000NC	SUMIBORON Insert	M12
TCGW000000NC-3	SUMIBORON Insert	M12
TCGW000000NU	SUMIBORON Insert	M12
TCMT000000NF	SUMIDIA Insert	M12
TCMT000000NFP	Indexable insert	C32
TCMT000000NSK	Indexable insert	C32
TCMT000000NSU	Indexable insert	C32
TH000	Spare parts	D24, D25, G10, G12, G14 G17, G20, M20, M21, M23 M24, M27, N7
TME0000R	Indexable Insert	F12
TME000R	Indexable Insert	F12
TMI0000R	Indexable Insert	F13
TMI000R	Indexable Insert	F13
TNGA000000	Indexable insert	C30
TNGA000000NC-6	SUMIBORON Insert	M13
TNGG000000N-SV NC4	SUMIBORON Insert	M13
TNMA000000	Indexable insert	C30
TNMA000000	SUMIBORON Insert	M13
TNMA000000NU	SUMIBORON Insert	M13
TNMG000000NEX	Indexable insert	C27
TNMG000000NFA	Indexable insert	C26
TNMG000000NFL	Indexable insert	C26
TNMG000000NGU	Indexable insert	C27
TNMG000000NLU	Indexable insert	C26
TNMG000000NMU	Indexable insert	C28
TNMG000000NMX	Indexable insert	C28
TNMG000000NSU	Indexable insert	C26
TNMG000000NUG	Indexable insert	C27
TNMG000000NUP	Indexable insert	C27
TNMG000000NUX	Indexable insert	C28
TNMG000000NUZ	Indexable insert	C28
TNMM000000NHG	Indexable insert	C29
TNMM000000NMP	Indexable insert	C29
TNS0000	Spare parts	D9
TPGN000000NF	SUMIDIA Insert	M14
TPGN000000NU	SUMIBORON Insert	M14
TPGR000000LW	Indexable insert	C35
TPGR000000RW	Indexable insert	C35
TPGT000000LFX	Indexable insert	C33
TPGT000000LSD	Indexable insert	C33

TPGT000000LSD-W	Indexable insert	C33
TPGT000000LX	Indexable insert	C33
TPGT000000RFX	Indexable insert	C33
TPGT000000RSD	Indexable insert	C33
TPGT000000RSD-W	Indexable insert	C33
TPGT000000RX	Indexable insert	C33
TPGW000000	SUMIBORON Insert	M15
TPGW000000NC	SUMIBORON Insert	M15
TPGW000000NF	SUMIDIA Insert	M15
TPGW000000NU	SUMIBORON Insert	M15
TPMH000000NSF	Indexable insert	C34
TPMR000000NFK	Indexable insert	C35
TPMR000000NSF	Indexable insert	C35
TPMR000000NUJ	Indexable insert	C35
TPMT000000L-DM NU	SUMIDIA Insert	M15
TPMT000000NFK	Indexable insert	C34
TPMT000000NLU	Indexable insert	C34
TPMT000000NSF	Indexable insert	C34
TPMT000000NSU	Indexable insert	C34
TRCPO	Spare parts	D7, E6
TRDOO	Spare parts	G20, H9, H11, H13, H15 H16, K29, K30, N7
TRDROOIP	Spare parts	G6, H6, H7, K27, N7
TRM000000-GU	Indexable insert	C30, D7, E6
TRM000000-LU	Indexable insert	C30, D7, E6
TRM000000-SU	Indexable insert	C30, D7, E6
TRT000	Spare parts	G18
TRW0000	Spare parts	D7, E6
TRX00	Spare parts	D7, D8, D9, D23, D24 D25, D26, D28, D29, D30 D31, E6, E12, E13, E14 E15, E16, E17, E18, E19 E20, F2, F12, F13, G17 H13, H17, K30, M27, N7
TSW000	Spare parts	D7, E6
TT00	Spare parts	G8, G10, G22, N7
TTX00	Spare parts	G14, M24, N7
TTX00W	Spare parts	G19, N7
TWE0000R	Insert	F12

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UFOK R/L	Spare parts	G8
UFOS R/L	Spare parts	G8
UFKW R/L	Spare parts	G8
UF00000 R/L-S	Cutter	G8
UF0F0000 R/L-S	Cutter	G9
UFTW R/L	Spare parts	G8
UW00000R	Indexable Insert	G9

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VBGW000000NC	SUMIBORON Insert	M16
VBGW000000NC-2	SUMIBORON Insert	M16
VBGW000000NU	SUMIBORON Insert	M16
VBGW000000NU-2	SUMIBORON Insert	M16

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VBMT000000NFP	Indexable insert	C37
VBMT000000NSK	Indexable insert	C37
VBMT000000NSU	Indexable insert	C37
VCGT000000LFX	Indexable insert	C38
VCGT000000NAG	Indexable insert	C38
VCGT000000RFX	Indexable insert	C38
VCMT000000NF	SUMIDIA Insert	M16
VCMT000000NSK	Indexable insert	C38
VCMT000000NSU	Indexable insert	C38
VNM000000NF	SUMIDIA Insert	M17
VNMA000000	SUMIBORON Insert	M17
VNMA000000NU	SUMIBORON Insert	M17
VNMG000000NFL	Indexable insert	C36
VNMG000000NGU	Indexable insert	C36
VNMG000000NLU	Indexable insert	C36
VNMG000000NSU	Indexable insert	C36
VNMG000000NUG	Indexable insert	C36
VNMG000000NUP	Indexable insert	C36
VPO0	Spare parts	D30
VPO0B	Spare parts	E19

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WBO-00	Spare parts	D16, D18, D19, E11, F5 F7, G17, M27, N4
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WBG000000LFX	Indexable insert	C43
WBG000000LW	Indexable insert	C43
WBG000000RFX	Indexable insert	C43
WBG000000RW	Indexable insert	C43
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WBMF0000M	Indexable endmill	H15
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WBMR0000LLW	Indexable endmill	H13
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WCFH00-0	Tool holder	F7
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WEX0000E	Indexable endmill	H6, H7
WEX0000EL	Indexable endmill	H6, H7
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WFM0000 R/L-S	Cutter	G20
WFMF0000 R/L-S	Cutter	G20
WFMS0 R/L	Spare parts	G20
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WGCO0000RS	Cutter	G6
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WGCS00R	Spare parts	G6, N5
WMM00000E	Indexable endmill	H9
WMM00000EL	Indexable endmill	H9
WMM00000ELW	Indexable endmill	H9
WMM00000EW	Indexable endmill	H9
WMMH00000ELW	Indexable endmill	H9
WMMH00000EW	Indexable endmill	H9
WNGA000000NC-6	SUMIBORON Insert	M18
WNMA000000	Indexable insert	C39
WNMG000000NEX	Indexable insert	C40
WNMG000000NFA	Indexable insert	C39
WNMG000000NFL	Indexable insert	C39
WNMG000000NGU	Indexable insert	C40
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WNMG000000NMU	Indexable insert	C41
WNMG000000NSU	Indexable insert	C39
WNMG000000NUG	Indexable insert	C40
WNMG000000NUP	Indexable insert	C40
WNMG000000NUX	Indexable insert	C41
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WNMM000000NMP	Indexable insert	C42
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XCLN R/L 0000-000	Tool holder	D20
XDMT000000PDEN	Indexable Insert	G21
XEEW00000AGFR-W	Indexable Insert	G7
XEEW00000AGFR-W-NF	Indexable Insert	G7
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ZNEX000000NC	SUMIBORON Insert	M18
ZNEX000000NU	SUMIBORON Insert	M18
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